

Essentials of Computing for KVK Professionals

*An e - book of chapters compiled from
Programme Assistants (Computer Application) of KVKs of Zone-III*



J. Wahlang

A. K. Bhalerao

A. K. Gogoi



**Zonal Project Directorate, Zone-III
Indian Council of Agricultural Research
Umiam, Meghalaya- 793103**

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Dr. A. K. Gogoi
Zonal Project Director

Foreword

Information Communication Technologies are widely recommended by developmental professionals and change agents throughout the globe. Researchers across the world are framing and implementing strategies to mitigate the negative impacts of climate changes in agriculture through the use of ICTs. In this scenario, use of ICTs is much needed in eco vulnerable North Eastern region of India. Because of lack of awareness coupled with indiscriminate exploitation of natural resources in farming operations harming biodiversity. And ICT is potential tool of mass mobilization. Therefore, creating awareness among scientific professionals of North East India about smart use of computer and ICTs is need of hour.

This publication focuses on various themes with respect to progressive use of ICTs and smart use of computer. The emphasis on cloud computing, Open source software and website management are highly appreciated topics. The bulletin will help scientists, scholars and researchers in getting ideas of precise use of ICT tools as per the need of user. The publication may also be of immense help to all computer users who are willing to do something innovative work.

I would like to congratulate and thank the all contributors from entire North East region KVKs. I would especially like to thank Mr. Amol K. Bhalerao, Scientist (AE), ZPD-III, Umiam for his marvellous hard work and Mr. J. Wahlang for their colossal involvement to bring out this much needed publication. I hope the e-publication will contribute in enhancing welfare of farmer through ICT-extension in North Eastern region.

Dated: 8th October, 2014

(A.K. Gogoi)

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Dated: 10 October, 2014

Authors/Compilers/Editors

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Electronic Mail :: A Heart Of Communication

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1.1 Overview

- **Introduction to E-mail**
- **What is Email**
- **Types of E-mail**
- **Practical utility**
- **Email Threat**
- **Privacy Concern**
- **Problems**
- **Effective use of Email**
- **Importance of Email**
- **Conclusion**
- **References**

1.2 Introduction

Gone are the days when people waited for the postman to delivered his telegram. A single message needed at least 4 or 5 days to reach to its destination. But now a day's advanced technology has minimised those 4 or 5 days into seconds. A wonder of wonders can do with just a touch of keyboard and clicking the mouse which is popularly known as E Mail. Internet world introduces email as one of most important tool for communication.

Electronic mail has made it possible to exchange message within a second. One of the easiest way to share the information in every sector. Email has immensely changed the way of communication in every sector. The world seems very small since emailing has its power of dropping a message in a second. so it has become most popular activities in the world of internet.

1.3 What is E-mail

E-mail means sending digital messages comprising of text file, images and other attachments over the network to a recipient. The first e-mail was sent by Ray Tomlinson in 1971. By 1996, more electronic mail was being sent than postal mail. Some early email systems required that the author and the recipient both be online at the same time, in common with instant messaging. Today's email systems are based on a store-and-forward model. Email servers accept, forward, deliver, and store messages. Neither the users nor their computers are required to be online simultaneously; they need connect only briefly, typically to an email server, for as long as it takes to send or receive messages.

To send and receive e-mail messages one can use an **e-mail software**, that is also known as an **e-mail client** or client based e-mail. Client based email is where email is downloaded from a server to an

application such as Microsoft outlook or Mozilla Thunderbird on the user's computer. This type of email is often used by business users. This service is provided by your ISP but can also be a service provided by another company.

Now a day's mobile is on the rise, most of the mobile has got internet facility so, it is not always necessary to sit in front of computer. Email access via tablet and mobile phones will soon overshadow desktop access. 38% of email is accessed by mobile phones in compare to 33% of desktop access according to Litmus: an email marketing and analytics firm.

1.4 Types of e-mail

1.4.1 Web-based email (webmail)

Many free email providers host their servers as web-based email. It is also known as online email service that allows users to log into the email account by using a web browser to send and receive their email. Example. Gmail, Yahoo mail, Outlook.com

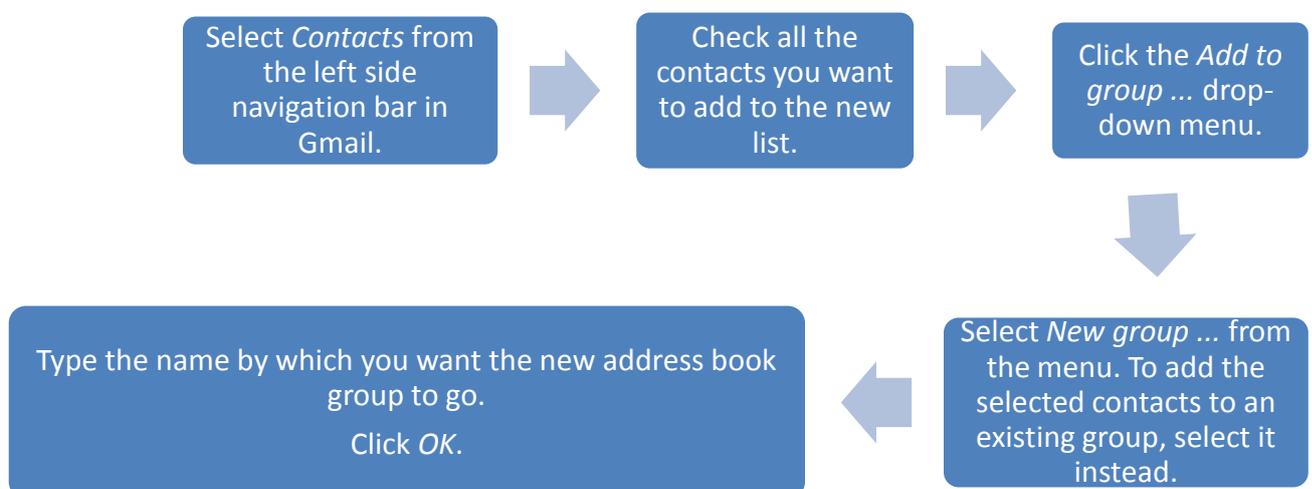
1.4.2 Gmail : Email system offered by Google is called Gmail and it is one of the most popular e-mail services available. Gmail has many strong features for its user.

Here is some features available in Gmail settings:

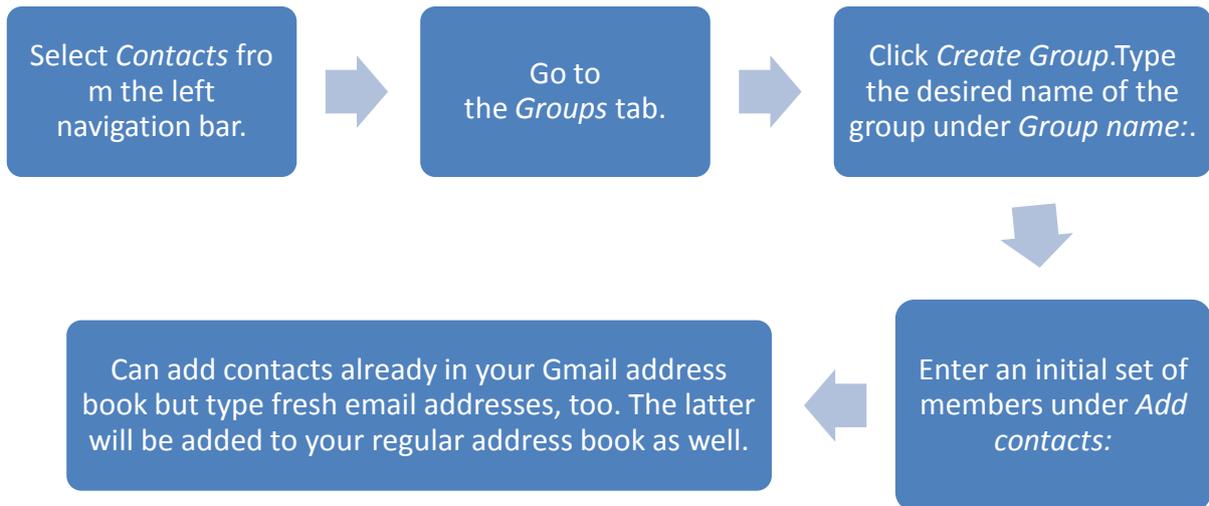
1.4.3 Create mailing list group from existing contacts

Sometime user needed to send the same single message to a multiple recipient. So here you can set up a group of contact mailing list and send messages to all the members of a group easily and swiftly. As an alternative, you can rely on Gmail making out and suggesting group recipients automatically.

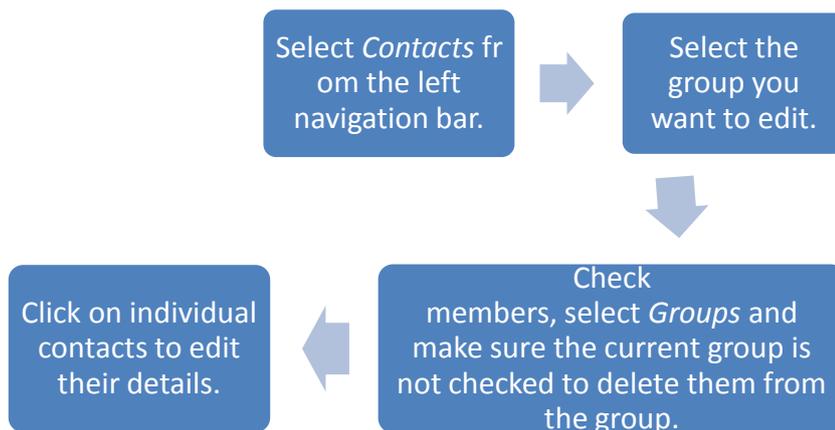
To create a group for list mailing from existing contacts in Gmail:



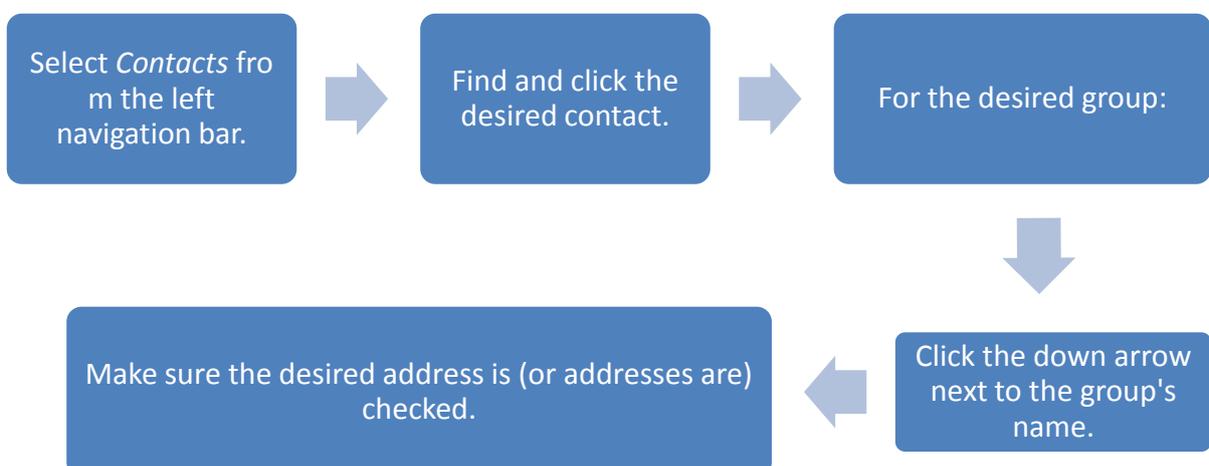
Of course, you can also create an empty group:



To add new members to a group in Gmail, proceed as above. To remove or edit members of a mailing list:



To have Gmail use a contact's specific email address in a certain group:



1.4.4 Signature in Email

Signature in email is a set of text such as senders name , contact information or your favourite quote that will automatically inserted at the bottom of every message you send.

To create Email Signature in Gmail

1. Open [Gmail](#).
2. Click the  gear in the top right.
3. Select **Settings**.
4. Scroll down to the “Signature” section and enter your new signature text in the box. You can format your text using the buttons directly above the text box.

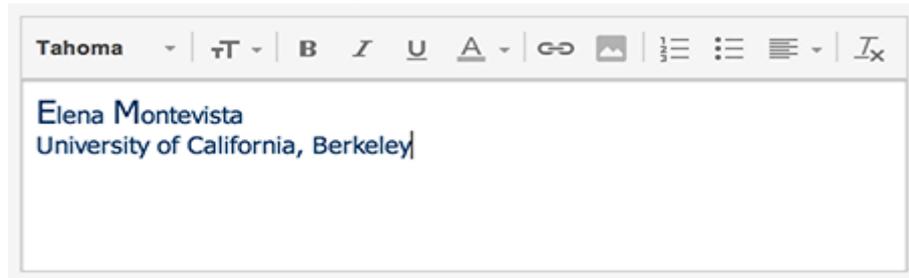


Figure 1: Email signature in the text box

5. Click **Save Changes** at the bottom of the page.

1.4.5 To attach Images or bulk documents above 25 MB.

Gmail can attach Maximum upto 25 MB of files. But to attach more than 25 MB

1. First make signup/Login to Gmail Account.
2. Click on compose email appears on top left side in window.
3. Then a new sub window will popup about new email composer layout and features, click on **try it now**.

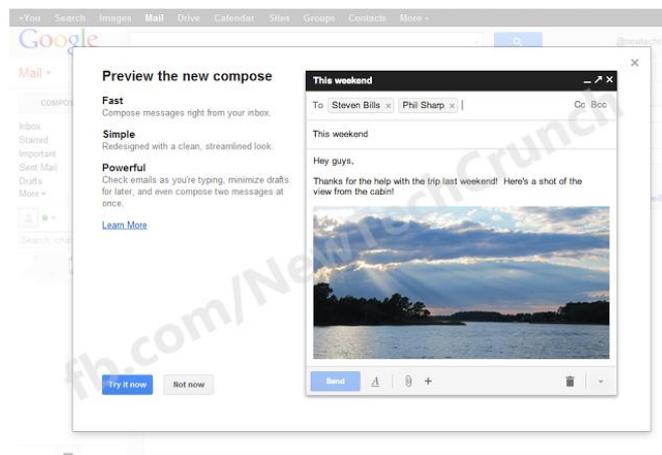


Figure 2: Sub window about new email composer layout and features

4. After that you are now shifted to new composer with directions how it works. Once you read them click on Got It to skip it in order to move to new Gmail composer to send large files.

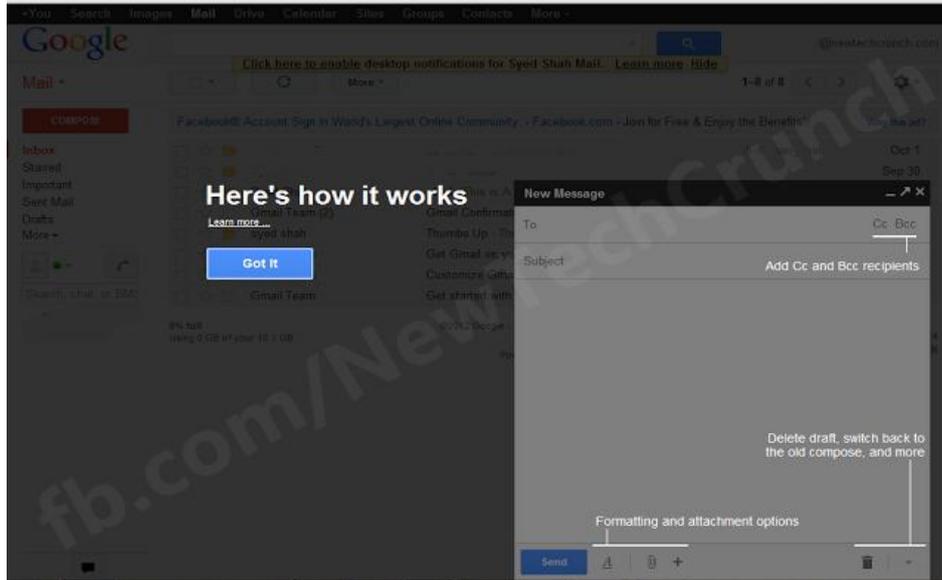


Figure 3: Shifted to new gmail composer

5. Finally you are shifted to Gmail new email box.

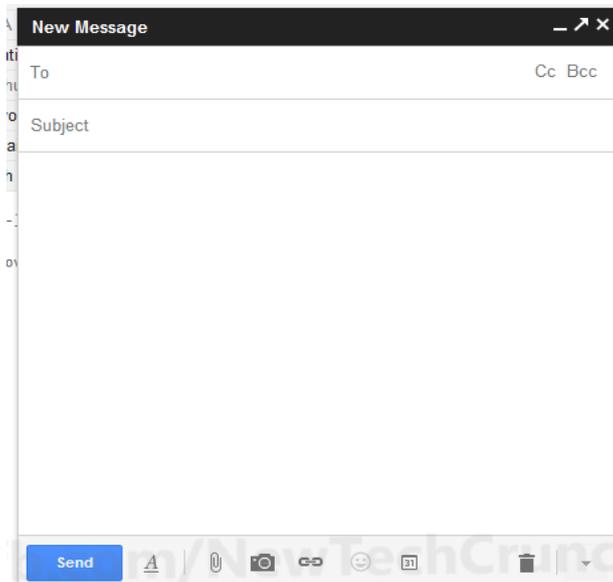


Figure 4: compose new message window

6. To attach small / large file(s) click on paper clip logo which is at bottom. And then select requisite file. If it was less than 25 MB then it will attached without any difficulty, otherwise a new window will pops with note “The files you are trying to send exceed the 25MB attachment limit. But Don’t Worry, you can send them using Google Drive”. Then click on Send Using Google Drive.

7. Again you will redirected to new sub window as shown in following image. From where you can upload your big files from various options like; directly from computer via Upload, My Drive (to

embed stuff in email directly from Google drive), Shared With Me (to see items shared with you by your contacts), Starred important items which are featured or Bookmarked by you), Recently Selected (recently used files), and in last ALL items.

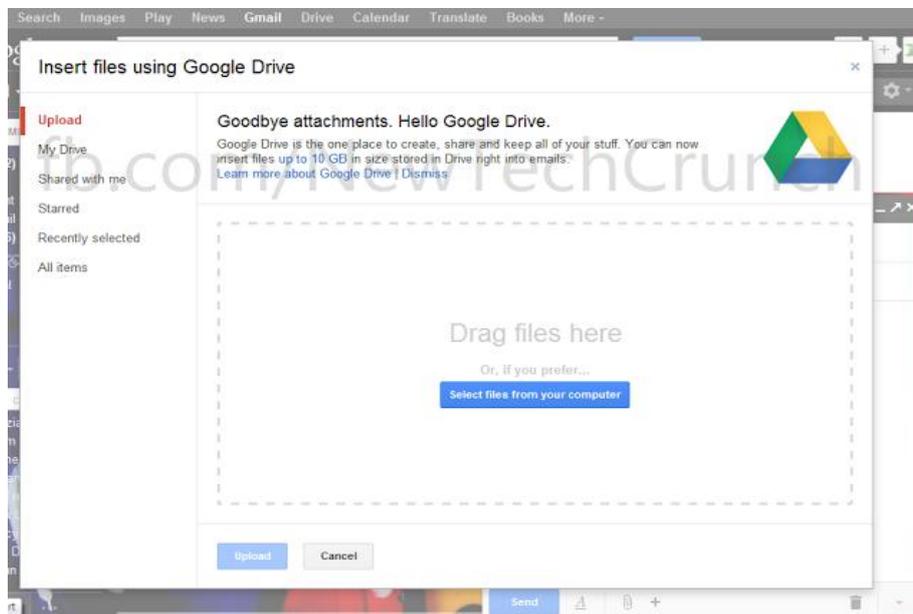


Figure 5: Select files from computer in sub window of google drive

8. Click on Select Files from your computer to upload them on Google Drive and, Click UPLOAD for activation.

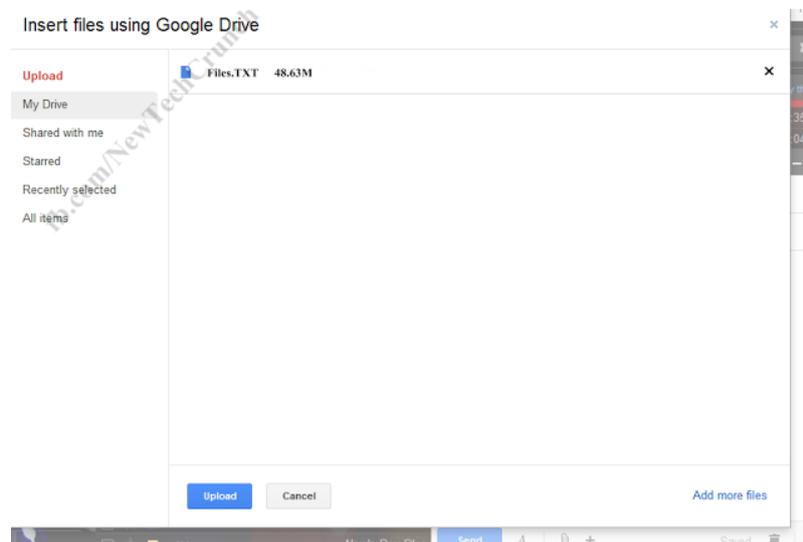


Figure 6: Upload files window in google drive

9. After completion the sub-window will close automatically and will land you on email composer with attached file. Now simply fill email box with desired content and press SEND button to send big files through gmail.

1.4.6 Auto reply function

One can use this feature when you are not available to reply the email. Auto reply settings in gmail will automatically reply to anyone who emails you.

Here's how to let people know you can't respond right away:

1. Sign in to Gmail.
2. Click the gear icon in the upper-right and select **mail settings** along the top of any Gmail page.
3. From the **General** tab, select **Vacation responder on** in the **Vacation responder:** section.
4. Enter the subject and body of your message in the **Subject:** and **Message:** fields.
 - o If you've enabled a personalized signature in your settings, Gmail will automatically append it to the bottom of your vacation response.
5. Check the box next to **Only send a response to people in my Contacts** if you don't want everyone who emails you to know that you're away from your mail.
6. Click **Save Changes**.

1.4.7 Send email from MS Office

Word document also can be send as an email. Not just as an attachment but as an email.

To send email from Ms word document

- 1) Make your word document and save it.
- 2) Go to the "File" on the menu bar and select "send to" and the "Mail Recipient"

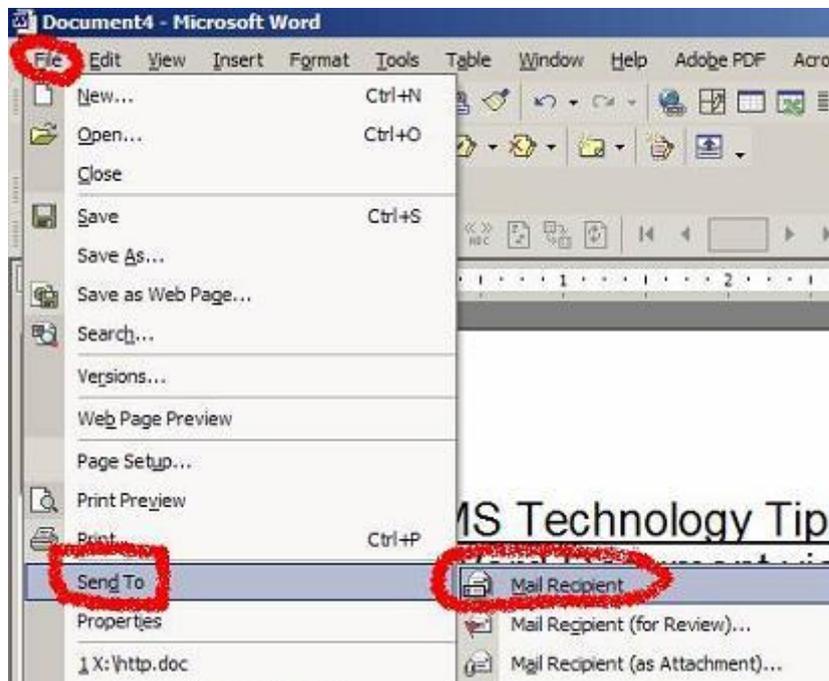


Figure 7: Menu bar of Ms word document

- 3) Above your word document you should now see an email tool bar that is full of icons that you are used to seeing in Outlook. Just fill it out as you would to send any email.

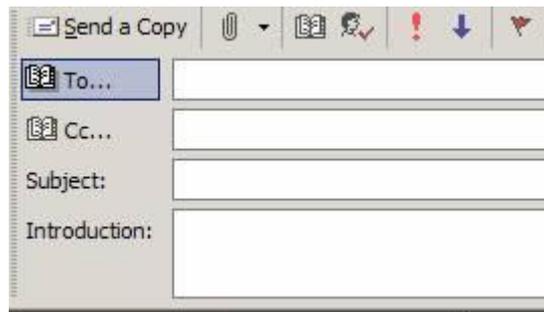
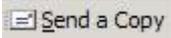


Figure 8: Send a copy window

- 4) When you are done filling in the TO: line and the SUBJECT: line click  to send your email.

Note that your word document will be turned into an email automatically. The recipients will not need to open it as an attachment or anything. The size of the file will also be smaller which will help those who have full mailboxes.

For Word 2007

1. Click the **Microsoft Office Button**  and then click **Word Options**.
2. Click **Customize**, and then click **All Commands** in the **Choose commands from** list.
3. In the list that appears, click **Send to Mail Recipient**, and then click **Add** to add the command to the Quick Access Toolbar.

1.4.2 POP3 email services

POP3 is the acronym for Post Office Protocol. It is a leading email account type on the Internet and email messages are downloaded to the client device (i.e. a computer) and later they are deleted from the mail server. It is difficult to save and view messages on multiple devices. Also, the messages sent from the computer are not copied to the Sent Items folder on the devices. The messages are deleted from the server to make room for more incoming messages. POP supports simple download-and-delete requirements for access to remote mailboxes (termed maildrop in the POP RFC's). Although most POP clients have an option to leave messages on the server after downloading a copy of them, most e-mail clients using POP3 simply connect, retrieve all messages, store them on the client device as new messages, delete them from the server, and then disconnect. Other protocols, notably IMAP, (Internet Message Access Protocol) provide more complete and complex remote access to typical mailbox operations. Many e-mail clients support POP as well as IMAP to retrieve messages; however, fewer Internet Service Providers (ISPs) support IMAP.

1.4.3 IMAP email servers

IMAP refers to Internet Message Access Protocol. It is an alternative to the POP3 email with an IMAP account, a user's account has access to mail folders on the mail server and can use any compatible device to read messages, as long as such a device can access the server. It shows the

headers of messages, the sender and the subject and the device needs to request to download specific messages. Usually mail is saved on a mail server and hence it is safer as it is backed up on an email server.

1.4.4 MAPI email servers

Messaging Application Programming Interface (MAPI) is a messaging architecture and a Component Object Model based API for Microsoft Windows.

1.4.5 Offline email access

Indeed you can read Gmail when you're not connected to the Internet. You can't receive new messages, of course, but it's very handy to be able to check your mail when you're offline.

There are at least two ways to access email services on offline mode condition. The first way is to use your desktop email program, like Outlook or Apple Mail. If you change your Gmail settings to allow POP or IMAP access, you can check Gmail from your desktop mail program to check your Gmail account, too.

The easier way to check Gmail when offline, is to download tools like an offline gmail, thunderbird (the browser extension Google Gears. Gmail can use this extension) let you see your Gmail messages right from your browser window, even when your computer is not connected to the Internet.

1.4.5.1 To set up an offline Gmail

1. Go to the Offline Google Mail app in the Chrome Web Store. <https://chrome.google.com/webstore/detail/ejidjhkpiempkbhmpbfngldkglhimk>

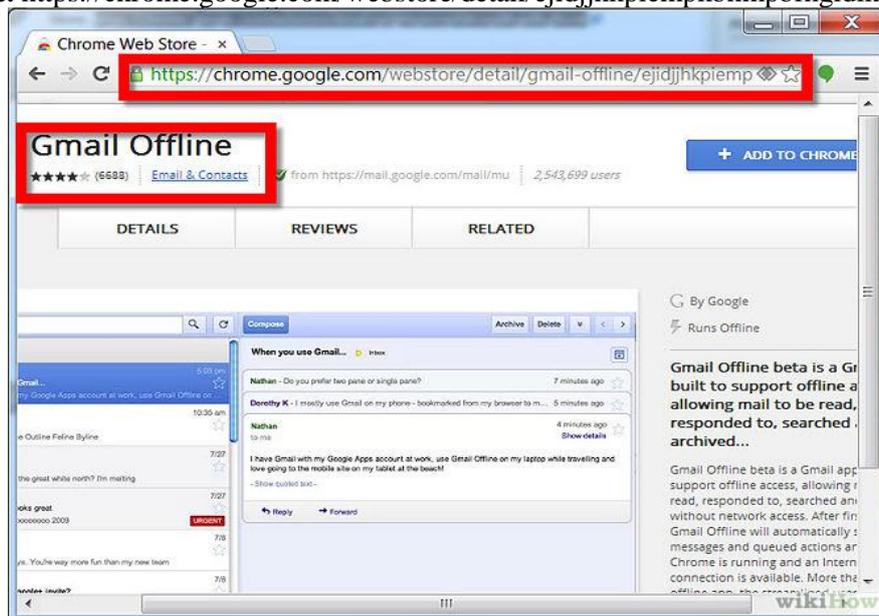


Figure9: Gmail offline in the Chrome web

2. Click "add to Chrome" and agree to the installations. Notice that the Offline Gmail app will now show up your Chrome Apps window.

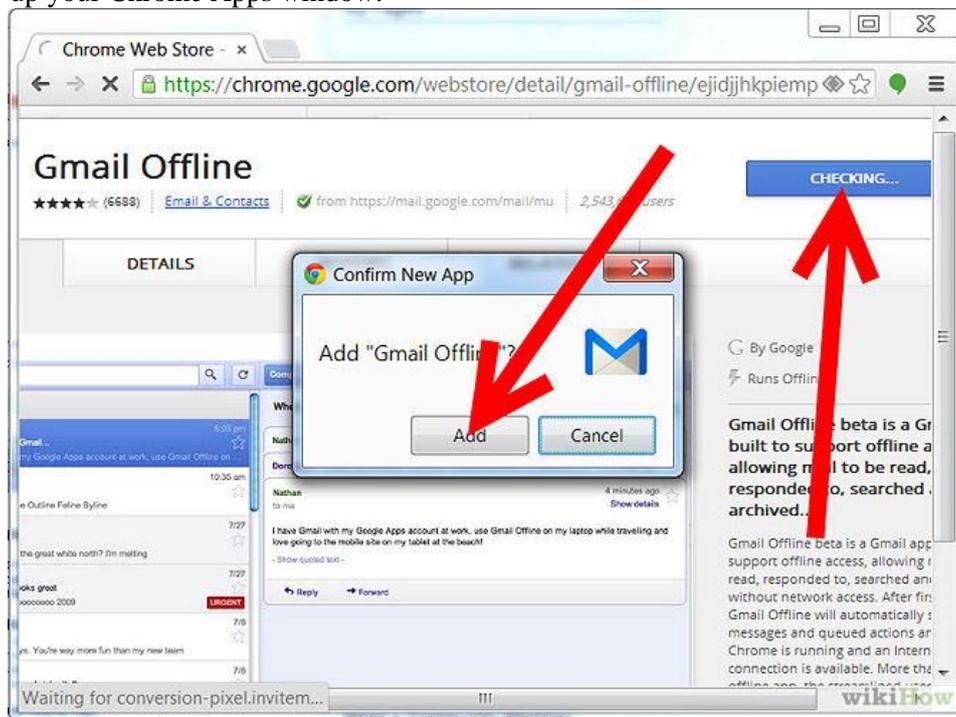


Figure 10: Add Gmail offline

2. Click "Allow offline mail". This will launch offline Gmail which will begin synchronizing the mail in your online Gmail account and storing it into your local computer.

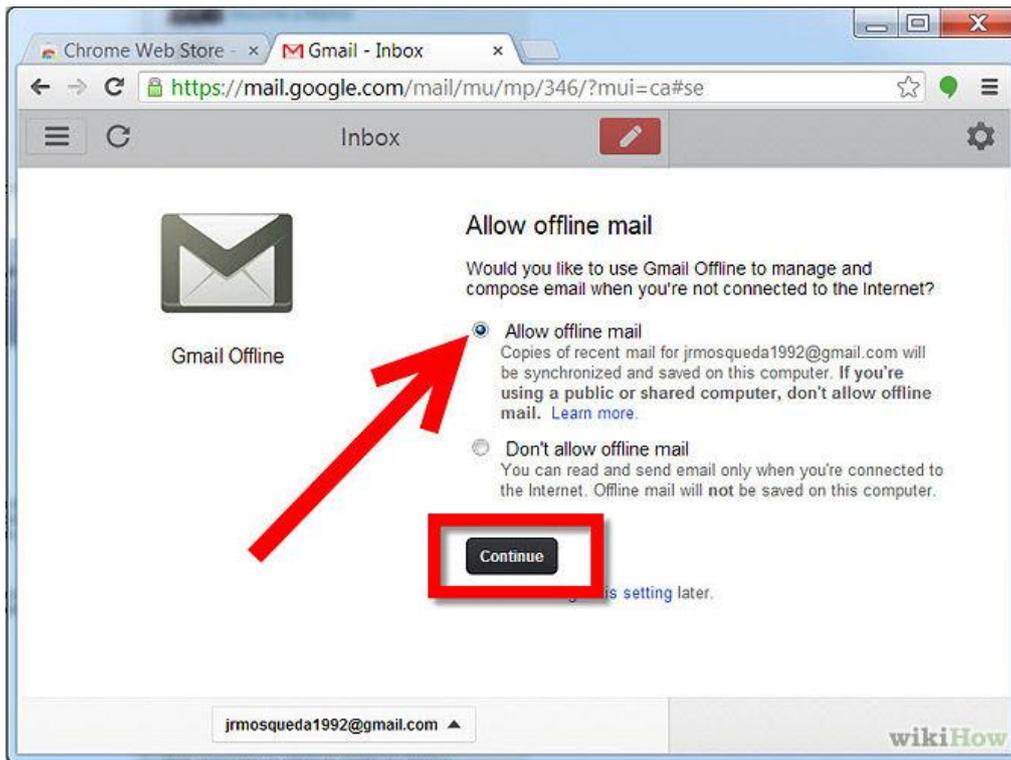


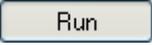
Figure 11: Allow offline mail

1.4.5.2 Mozilla Thunderbird is an another example of popularly used offline email service.

How to Install Mozilla Thunderbird

Installing **Thunderbird** is a quick and straightforward process. To begin installing **Thunderbird**, perform the following steps:

Step 1. Double click  Thunderbird Setup 3.1.5.exe; the *Open File - Security Warning* dialog box may appear. If it does,

click  to activate the following screen:

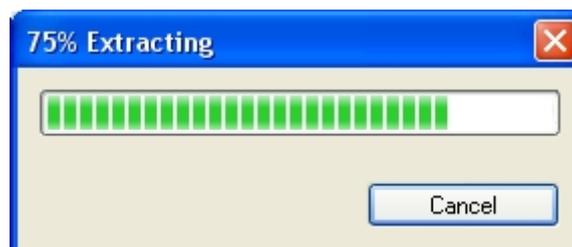
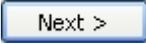


Figure 12: The Extracting status progress bar

After the **Thunderbird** files have completed extracting themselves, the *Welcome to the Mozilla Thunderbird Setup*

Wizard window appears.

Step 2. Click  to activate the *Mozilla Thunderbird - Setup Type* window.

Step 3. Click  to accept the default settings and activate the following screen:

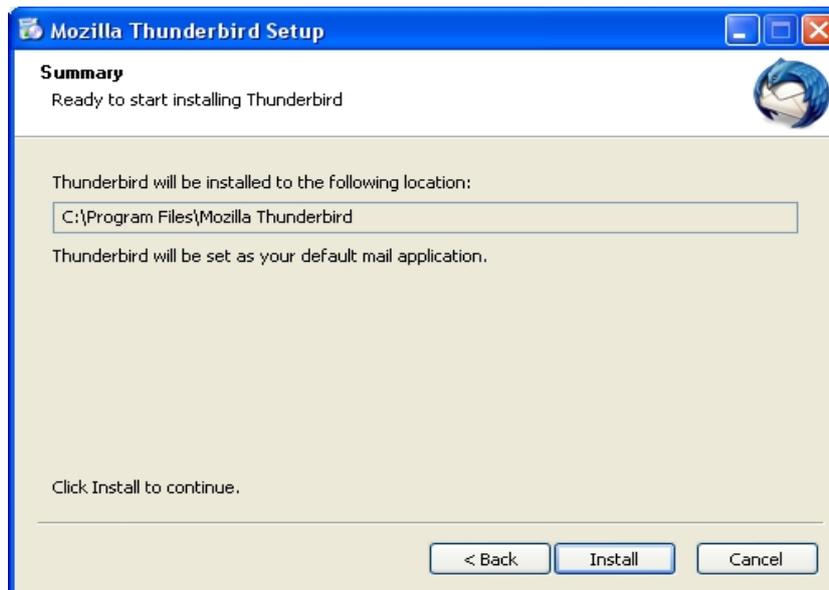


Figure 13: The Mozilla Thunderbird - Summary screen

Step 4. Click  to start the installation process. The **Mozilla Thunderbird - Installing** progress status window appears. After the installation process is complete, the following screen appears:



Figure 14: The Completing the Mozilla Thunderbird Setup Wizard screen

Step 5. Click  to complete the installation process.

Tip: **Thunderbird** will automatically launch itself if the *Launch Mozilla Thunderbird now* check box is enabled,

as shown in *figure 3* above. To open the program in the future, either **double click** the **Thunderbird** desktop icon,

or **select > Programs > Mozilla Thunderbird > Mozilla Thunderbird.**

1.5 Practical Utility

1.5.1 Email software

This software is used **for** creating, sending, receiving and organizing electronic mail or e-mail. Modern desktop email clients like Microsoft Outlook, Windows Live mail and Mozilla Thunderbird offered advanced features for managing email, including WYSIWYG (What You See Is What You Get) editors for composing email messages, anti-spam and anti-phishing security protection, advanced search capabilities, and rules and filters for more efficiently handling and organizing messages and email folders.

Email management and functionality of desktop email service is similar to that of online email service. There are many free email software available. Eg. Mozilla Thunderbird

Mozilla Thunderbird is a fully featured, secure and very functional email client and RSS feed reader. The main advantages of this software includes handle mail efficiently and with style, and Mozilla Thunderbird filters away junk mail and helps you organize and find the good mail.

1.5.2 Email marketing

A type of direct digital marketing that uses electronic mail as the marketing communication delivery method. Email marketing is used in a number of ways by organizations and marketers for brand and customer loyalty building, acquiring or converting customers, company advertisements, or for communicating promotional offers and more.

1.5.3 Research on email marketing

Research suggests that email marketing can be viewed as useful by consumers if it contains information such as special sales offerings and new product information. Offering interesting hyperlinks or generic information on consumer trends is less useful. This research by Martin et al. (2003) also shows that if Consumers find email marketing useful, they are likely to visit a store, thereby overcoming limitations of Internet marketing such as not being able to touch or try on a product.

1.5.4 In business

Email was widely accepted by the business community as the first broad electronic communication medium and was the first 'e-revolution' in business communication. Email solves two basic problems of communication: logistics and synchronization.

LAN based email is also an emerging form of usage for business. It not only allows the business user to download mail when *offline* but also allows the small business user to have multiple users' email IDs with just *one email connection*.

1.5.5 Online Faxing

Online fax helps us in sending and receiving faxes through email, the web or smart phone around the world. Faxes are sent as e-mail attachments that includes Microsoft word documents, PDF files and scanned images. The basic things to send internet fax are internet connectivity, ability to send and receive email, email address, a subscription to internet faxing service. Internet faxing bypasses the need of fax machines and phone lines entirely. You usually pay a onetime start up fee and then a flat monthly rate based on maximum number of faxes you plan to send.

To avail this facility, one has to subscribe to a third - party internet faxing service that converts e-mails to faxes and faxes to e-mails.

Your subscription to Internet faxing service assign to toll free or regular fa number and the sender dials that number and then send the fax from a regular fax machine. The subscription service receives the fax, converts it into an e-mail attachment and sends it to your e-mail address. To read the fax you simply open the attachment.

1.6 Email Threat

The usefulness of email is being threatened by four phenomena: email bombardment, spamming, phishing, and email worms.

Spamming is unnecessary commercial (or bulk) email. Because sending email is inexpensive, so spammers can send millions of email messages each day over an inexpensive Internet connection. Such hundreds of email results in information overload for computer user's who receive unnecessary email each day. Email worms use email as a way of replicating themselves into vulnerable computers. (Although the first email worm affected U NIX computers, the problem is most common today on the Microsoft Windows operating system.)

And the combination of spam and worm results in users junk email, which interrupts the usefulness of email as a practical tool.

A number of anti-spam techniques reduce the impact of spam. In the United States, U.S. Congress has also passed a law, the Can Spam Act of 2003, attempting to regulate such email. Australia also has very strict spam laws restricting the sending of spam from an Australian ISP, but its impact has been minimal since most spam comes from regimes that seem reluctant to regulate the sending of spam.

1.6.1 Email spoofing

Email spoofing is an another threat for email users. Email spoofing is when the header information of an email appears to come from known or trusted source. Spam and phishing emails typically use such spoofing to mislead the recipient about the origin of the message.

1.6.2 Email bombing

Email bombing is the intentional sending of large volumes of messages to a target address. The overloading of the target email address can render it unusable and can even cause the mail server to crash.

1.7 Privacy concern

Today it can be important to distinguish between Internet and internal email systems. Internet email may travel and be stored on networks and computers without the sender's or the recipient's control. During the transit time it is possible that third parties read or even modify the content. Internal mail systems, in which the information never leaves the organizational network, may be more secure, although information technology personnel and others whose function may involve monitoring or managing may be accessing the email of other employees.

Email privacy can be compromised because:

- Email messages are generally not encrypted.
- Email messages have to go through intermediate computers before reaching their destination, meaning it is relatively easy for others to intercept and read messages.
- Many Internet Service Providers (ISP) store copies of email messages on their mail servers before they are delivered. The backups of these can remain for up to several months on their server, despite deletion from the mailbox.
- The "Received:"-fields and other information in the email can often identify the sender, preventing anonymous communication.

1.8 Problems

1.8.1 Speed of correspondence

Despite its name implying that its use is faster than either postal (physical) mail or telephone calls, emailing can be slower as a communication mode. No guarantee the mail will be read until the user logs in and check their mail so hence, communication can take weeks or even months to garner a response. Meanwhile, some people, due to exasperation with not getting responses to urgent messages, may eventually decline to use email with any regularity at all, and may be put in the sometimes-awkward position of having to notify their friends and colleagues who do use email regularly, that this is not a good way to reach them.

1.8.2 Attachment size limitation

Email messages may have one or more attachments, i.e., MIME parts intended to provide copies of files. Attachments serve the purpose of delivering binary or text files of unspecified size. In principle there is no technical intrinsic restriction in the Internet Message Format, SMTP protocol or MIME limiting the size or number of attachments. In practice, however, email service providers implement various limitations on the permissible size of files or the size of an entire message.

Furthermore, due to technical reasons, often a small attachment can increase in size when sent which can be confusing to senders when trying to assess whether they can or cannot send a file by email, and this can result in their message being rejected.

As larger and larger file sizes are being created and traded, many users are either forced to upload and download their files using an FTP server, or more popularly, use online file sharing facilities or services, usually over web-friendly HTTP, in order to send and receive them.

1.8.3 Information overload

A December 2007 New York Times blog post described information overload as "a \$650 Billion Drag on the Economy", and the New York Times reported in April 2008 that "E-MAIL has become the bane of some people's professional lives" due to information overload, yet "none of the current wave of high-profile Internet start-ups focused on email really eliminates the problem of email overload because none helps us prepare replies". GigaOm posted a similar article in September 2010, highlighting research that found 57% of knowledge workers were overwhelmed by the volume of email they received. Technology investors reflect similar concern.

In October 2010, CNN published an article titled "Happy Information Overload Day" that compiled research on email overload from IT companies and productivity experts. According to Basex, the average knowledge worker receives 93 emails a day. Subsequent studies have reported higher numbers. Marsha Egan, an email productivity expert, called email technology both a blessing and a curse in the article. She stated, "Everyone just learns that they have to have it ding and flashing and open just in case the boss e-mails," she said. "The best gift any group can give each other is to never use e-mail urgently. If you need it within three hours, pick up the phone."

Despite these disadvantages, Today email has become the most widely used medium of communication within the business world. In fact, a 2010 study on workplace communication, found that 83% of U.S. knowledge workers felt that email was critical to their success and productivity at work.

1.9 Effective use of Email

Email can be stressful if we don't take a measure while making use of it.

1. Clear out inbox, it reduces clutter and stress. Move the emails into a folders instead keeping them into inbox.
2. Never forward virus hoaxes and chain letter. if you receive a message that warns you of virus that will damage your PC, it is certainly a hoax. Sometimes this hoaxes contain viruses themselves. By forwarding these hoaxes one will waste valuable resources.

Email chain letter usually shows untold riches or ask for your support for a charitable cause. Even if the message seems to be legitimate, the name of the senders is often forged. It is better to delete such message.

3. Be careful when opening attachments. Email attachments infected with viruses are one of the most used methods for infecting PCs.

1.10 Importance of E-mail?

1.10.1 Enhance Productivity

Agriculture sector has greatly influenced by IT. IT refers to right information at the right time and emailing is one of the IT tools where the information are transmitted at right time over the internet. Here is an example where email plays a key role for the farmer in “ A farmer walks through his soyabean field in Central Illineous, heading for a spot pinpointed by a remote sensing image the farmer downloaded in that mornings email. Pest infestation in this small spot indicated by a change in the “vegetative index”, would not ordinarily be detected this quickly. Untreated, it could spread rapidly and destroy his entire crop. The farmer opens his palm top computer, brings up information on the pest, completes an economic threshold analysis, and determines what control measures he will use”. It is an good example where farmer has gathered information at the right time via email and could take a measure to control the disaster.

1.10.2 Stream line Communication

Today Indian post offices are also using web based services called e-post. E-post is a service in which printed or handwritten messages are scanned and transmitted as email over the internet. At the

destination post offices this mails are printed and then enveloped by the post man like other letters and delivered to their respective addresses. So this is how the distance between the source and destination is reduced by time.

1.10.3 Time Saver

Email is almost instantaneous and delivered extremely fast compared to traditional post. Email reduces the distance so, this saves time.

1.10.4 Economical

E-mail is free. Anyone with internet access can get email account without a cost and can get use of it. So, Email has cut down the communication cost. Transcends national and international boundaries.

1.11 Conclusion

E-mail is an effective communication tool that is widely accepted and employed in the world of Information Communication Technology. It has immensely changed the way of communication in every sector. E-mail application helps in enhances productivity, streamline communication, time saver. The usefulness of email is being threatened by four phenomena: email bombardment, spamming, phishing, and email worms. Information overload, Attachment size limitation. Hence it is need of the hour to implement Information Communication Technology in various sectors for timely operation of work and better output.

References:

Wikipedia.com, computerhope.com, kurukshetra vol 59.no6, informationweek.com, How Internet Faxing Works : Dave Roos, Marziah Karch (About.com), Heinz Tschabitscher (About.com), techij.com, Webopedia computer dictionary, liv.ac.uk, Anonymous: Role of Information Technology (IT) in modern sciences with special reference to Agricultural Science.



BASIC OF ANIMATION “LET’S ANIMATE”

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2.1 Overview

- Introduction to Animation
- The Basic Principles of Animation
- The Three Major Types of Animation
- How to create a simple gif animation
- Advantages and Disadvantages of Animation
- Recent Development
- How KVKs can use this knowledge and where

2.2 Introduction

When we hear the term ‘animation’, many of us will think of Sunday morning cartoons, but the medium has come a long way in the last few decades with the advent of high-quality three-dimensional animations. One of the great advantages of animation is that it can be used to show concepts and techniques that are often hard to capture with live-action filming.

Animation has the capacity to entertain, exaggerate, simplify, abstract, reveal complex processes, clarify difficult-to-understand concepts, visualise data, be a vehicle for humorous writing, sell product, be an art form, create slapstick sight gags, be a vehicle for insightful social comment, portray the human condition, and tackle difficult and uncomfortable subject matter.

2.2.1 What is Animation

The word 'animation' is derived from *anima*, the Latin word for soul or spirit. The verb 'to animate' literally means 'to give life to'. Animation is the process of creating the continuous motion and shape change illusion by means of rapid display of a sequence of static images that minimally differ from each other.

Animations can be stored or recorded on either analogue media, such as Flip book, motion picture film, video tape, on digital media, including formats such as animated GIF, Flash animation or digital video. To display it, a digital camera, a computer, or a projector are used.

2.3.1 The Basic Principles of Animation

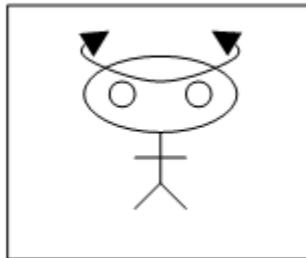
The Twelve Basic Principles of Animation is a set of principles introduced by the Disney animators Ollie Johnston and Frank Thomas in their 1981 book The Illusion of Life: Disney Animation. This book was also voted the best animation book of all time. The book is based on Disney animators views and experiences going back all the way to the 1930's. The main focus of the principles is to give the impression that characters in animation adhere to the basic laws of physics but it also dealt with the more abstract. Things like emotional timing and character appeal.

The 12 Basic Principles of animation are:

2.3.1.1 Timing

Timing is the essence of animation. The basics are: more frames between poses slow and smooth the action. Fewer frames make the action faster and crisper. The speed at which something moves gives a sense of what the object is, the weight of an object, and why it is moving. Something like an eye blink can be fast or slow. If it's fast, a character will seem alert and awake. If it's slow the character may seem tired and lethargic.

2.3.1.1: Image of example: Head that turns left and right.



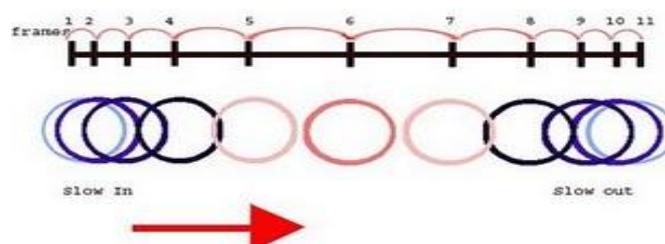
(Source: *Principles of Traditional Animation Applied to 3D Computer Animation* by J. Lasseter)

- Head turns back and forth really slow: it may seem as if the character is stretching his neck (lots of in between frames).
- A bit faster it can be seen as saying "no" (a few in between frames)
- Really fast, and the character is reacting to getting hit by a baseball bat (almost none inbetween frames).

2.3.1.2. Ease In and Out (or Slow In and Out)

Ease in and out has to do with gradually causing an object to accelerate, or come to rest, from a pose. An object may slow down as it approaches a pose (Ease In) or gradually start to move from rest (Ease Out). Objects take time to accelerate, so more frames at the beginning and end of a movement will aid in a realistic looking motion.

2.3.1.2: Image of example : Slow in and out

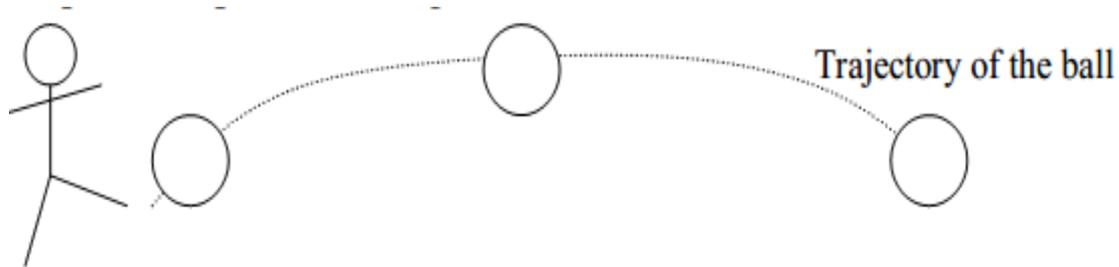


(Source: <http://richard-wood.co.uk/animation/12-basic-principles-of-animation/>)

2.3.1.3. Arcs

Most human and animal actions happen along an arched trajectory. When creating animation one should try to have motion follow curved paths rather than linear ones. It is very seldom that a character or part of a character moves in a straight line. Arcs give animation a more natural action and better flow. When a hand/arm reaches out to reach something, it tends to move in an arc.

2.3.1.3: Image of example : Arcs



(Source: *Principles of Traditional Animation Applied to 3D Computer Animation* by J. Lasseter)

2.3.1.4. Anticipation

Anticipation is used to prepare the audience for a major action and to make the action appear more realistic. For example, before you can throw a ball you must first swing your arm backwards. The backwards motion is the anticipation; the throw itself is the motion.

Generally, for good clear animation, the viewer should know what is about to happen (anticipation), what is happening (the actual action itself) and what happened (related to follow through).

2.3.1.4: Image of example : Anticipation



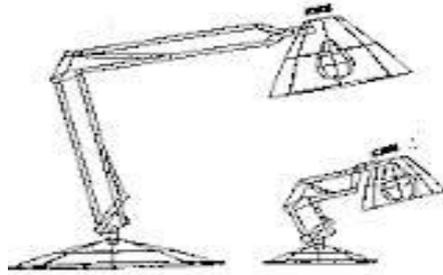
(Source: *Fundamentals of computer Animation, University of Calgary , Graphics Jungle Project, CPSC 587 2005*)

2.3.1.5. Exaggeration

Exaggeration is very useful in animation as it can stop true-to-reality scenes looking boring or dull. It should be used in a careful and balanced manner, not arbitrarily. Figure out what the desired goal of an action or sequence is and what sections need to be exaggerated. The result will be that the animation will seem more realistic and entertaining. The key is to take something and make it more extreme in order to give it more life, but not so much that it destroys believability.

Example: exaggerating the lamp proportions to give a sense of dad and son.

2.3.1.5: Image of example: Exaggeration

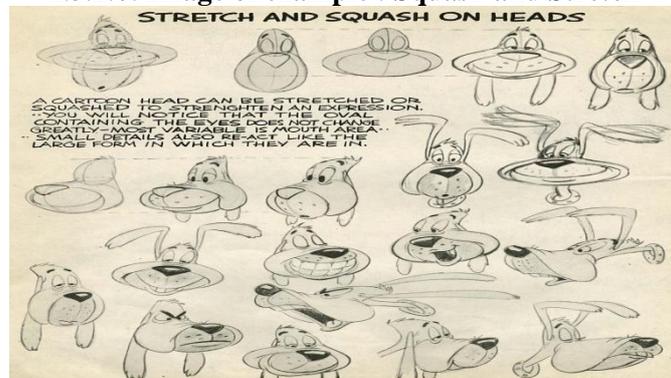


(Source: *Principles of Traditional Animation Applied to 3D Computer Animation* by J. Lasseter)

2.3.1.6. Squash and Stretch

This is considered as the most important of the twelve. Squash and stretch is a way of deforming an object such that it shows how rigid the object is. An important note about squash and stretch is that no matter how an object deforms, it should still appear to retain its volume. The most obvious usage in character animation is muscles. When a muscle is contracted it will squash and when extended, it stretches.

2.3.1.6: Image of example : Squash and Stretch



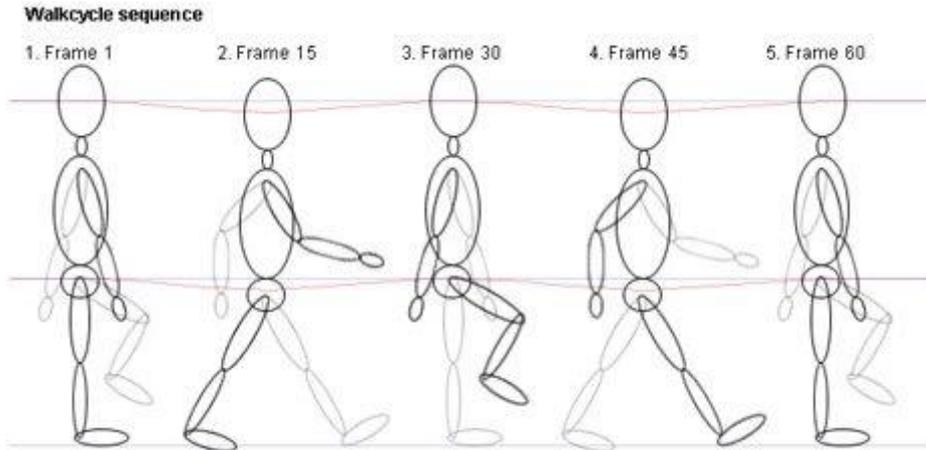
(Source: <http://richard-wood.co.uk/animation/12-basic-principles-of-animation/>)

2.3.1.7. Secondary Action

Secondary action creates interest and realism in animation. This action adds to and enriches the main action and adds more dimension to the character animation, supplementing and/or re-enforcing the main action.

Example: A character is angrily walking. The walk is forceful, aggressive, and forward leaning. The leg action is just short of a stomping walk. The secondary action is a few strong gestures of the arms working with the walk. Also, the possibility of dialogue being delivered at the same time with tilts and turns of the head to accentuate the walk and dialogue, but not so much as to distract from the walk action. All of these actions should work together in support of one another. Think of the walk as the primary action and arm swings, head bounce and all other actions of the body as secondary or supporting action.

2.3.1.7: Image of example: Secondary action



(Source: <http://richard-wood.co.uk/animation/12-basic-principles-of-animation/>)

2.3.1.8. Follow Through and Overlapping Action

When the main body of the character stops all other parts continue to catch up to the main mass of the character, such as arms, long hair, clothing, coat tails or a dress, floppy ears or a long tail (these follow the path of action). Nothing stops all at once. This is follow through. Overlapping action is when the character changes direction while his tail or hair continues forward. The character is going in a new direction, to be followed, a number of frames later, by his clothes in the new direction.

2.3.1.8: Image of example: Follow Through and Overlapping Action





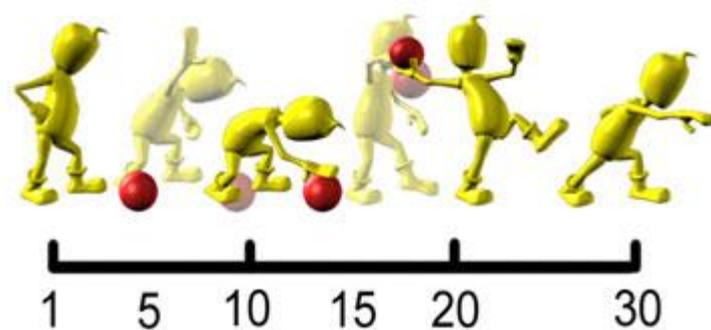
(Source: *Fundamentals of computer Animation, University of Calgary , Graphics Jungle Project, CPSC 587 2005*)

2.3.1.9. Straight Ahead Action and Pose-To-Pose Action

These are both different approaches to the drawing process. Straight ahead animation is one where the animator draws or sets up objects one frame at a time in order. For example, the animator draws the first frame of the animation, then draws the second, and so on until the sequence is complete.

The other approach is Pose-To-Pose animation. Pose to Pose is created by drawing key poses and then drawing or creating inbetween images. This is the basic computer "key frame" approach to animation. It is excellent for tweaking timing and planning out the animation ahead of time. You figure out the key poses, and then the motion inbetween is generated from that. This is very useful when specific timing or action must occur at specific points. You always know exactly what will happen. The basic difference is with Pose-To-Pose you plan out, and know exactly what will happen ahead of time, whereas with Straight Ahead, you're not quite sure how things will turn out until you are done.

2.3.1.9: Image of example : Straight Ahead Action and Pose-To-Pose Action



(Source: <http://richard-wood.co.uk/animation/12-basic-principles-of-animation/>)

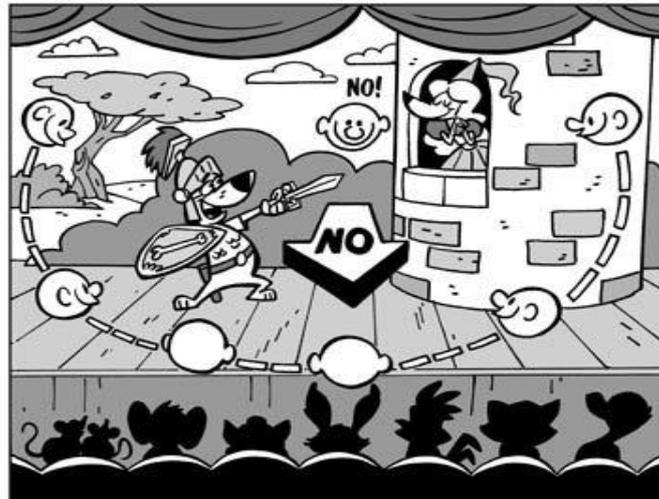
2.3.1.10. Staging

The purpose of staging is to direct the audience's attention and make clear that which is of greatest importance to a scene. In general, it is important that action is presented one item at a time. If too much is going on the audience will be unsure what to look at and the action will be "upstaged". With characters, it is important to really think about whether or not each pose for an action adequately

and correctly reads to the audience. You should also make sure no two parts of a character contradict each other (unless it's intended).

Staging multiple characters is also an important issue. Generally you want to always make sure you know where the audience is looking within the shot. Background characters must be animated such that they are still "alive", but not so much that they steal the viewer's attention from the main action. Staging like this is also related to a lot of directing and editing principles.

2.3.1.10: Image of example: Staging



LIKE A STAGE.

2.3.1.11. Appeal

A live performer has charisma. An animated character has appeal. Appealing animation does not mean just being cute and cuddly. All characters have to have appeal whether they are heroic, villainous, comic or cute. Appeal, as you will use it, includes an easy to read design, clear drawing, and personality development that will capture and involve the audience's interest. It is important to make the viewer feel as though the drawn character is "real" and interesting.

2.3.1.12. Solid Drawing

The basic principles of drawing form, weight, volume solidity and the illusion of three dimension apply to animation as it does to academic drawing. The way you draw cartoons, you draw in the classical sense, using pencil sketches and drawings for reproduction of life. You transform these into color and movement giving the characters the illusion of three-and four-dimensional life. Three dimensional is movement in space. The fourth dimension is movement in time.

2.3.2. The Three Major Types of Animation are:

2.3.2.1. Traditional animation (also called cel animation or hand-drawn animation) was the process used for most animated films of the 20th century. The individual frames of a traditionally animated film are photographs of drawings that are first drawn on paper. To create the illusion of movement, each drawing differs slightly from the one before it. The animators' drawings are traced or photocopied onto transparent acetate sheets called cells, which are filled in with paints in assigned colors or tones on the side opposite the line drawings. The completed character cells are photographed one-by-one against a painted background by a rostrum camera onto motion picture film.

Examples of traditionally animated feature films include *Pinocchio* (United States, 1940), *Animal Farm* (United Kingdom, 1954) and Traditional animated films which were produced with the aid of computer technology include *The Lion King* (US, 1994).

2.3.2.2 Stop motion (also known as **stop frame**) is an animation technique to make a physically manipulated object appear to move on its own. The object is moved in small increments between individually photographed frames, creating the illusion of movement when the series of frames is played as a continuous sequence. Dolls with movable joints or clay figures are often used in stop motion for their ease of repositioning. Stop motion animation using plasticine is called clay animation or "clay-mation". Not all stop motion requires figures or models; many stop motion films can involve using humans, household appliances and other things for comedic effect. Stop motion using objects is sometimes referred to as object animation.

2.3.2.3. Computer animation encompasses a variety of techniques, the unifying factor being that the animation is created digitally on a computer. This animation takes less time to produce than previous traditional animation. 2D animation techniques tend to focus on image manipulation while 3D techniques usually build virtual worlds in which characters and objects move and interact. 3D animation can create images that seem real to the viewer.

2D animation

2D animation figures are created and/or edited on the computer using 2D bitmap graphics or created and edited using 2D vector graphics. This includes automated computerized versions of traditional animation techniques such as interpolated morphing, onion skinning and interpolated rotoscoping. 2D animation has many applications, including analog computer animation, Flash animation and PowerPoint animation. Cinemagraphs are still photographs in the form of an animated GIF file of which part is animated.

3D animation

3D animation is digitally modeled and manipulated by an animator. The animator starts by creating an external 3D mesh to manipulate. A mesh is a geometric configuration that gives the visual appearance of form to a 3D object or 3D environment. The mesh may have many vertices which are the geometric points which make up the mesh; it is given an internal digital skeletal structure called an armature that can be used to control the mesh with weights. This process is called rigging and can be programmed for movement with keyframes.

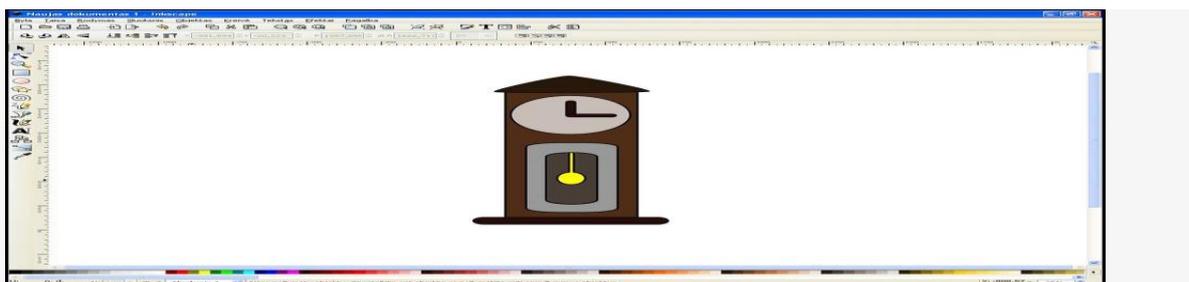
Other techniques can be applied, such as mathematical functions (e.g., gravity, particle simulations), simulated fur or hair, and effects such as fire and water simulations. These techniques fall under the category of 3D dynamics.

Examples: Up (2009, USA), Kung-Fu Panda (2008, USA), Ice Age (2002, USA).

2.3.3. How to create a simple gif animation

Inkscape and Gimp are two very nice and free open source programs. **Step 1: Beginning**

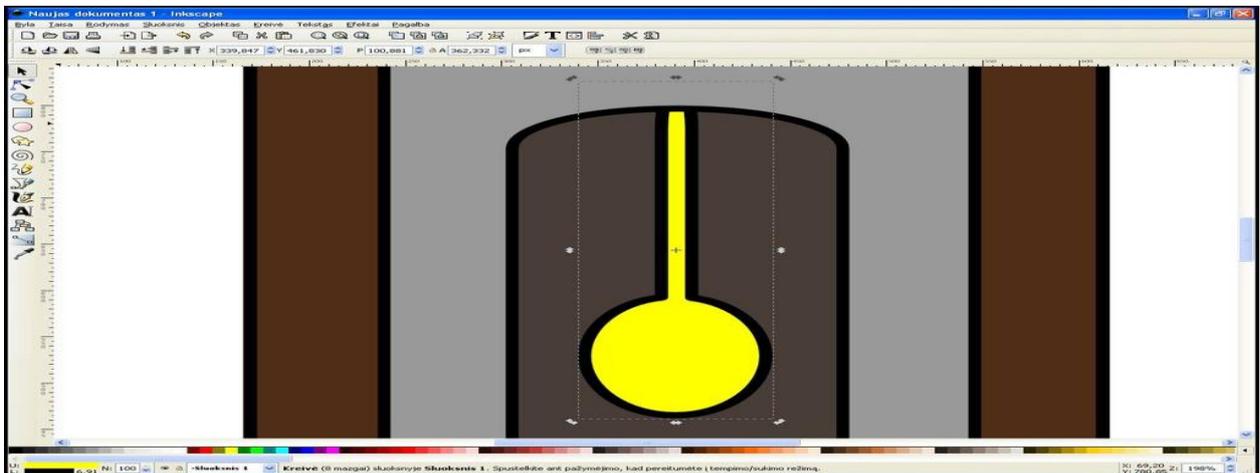
1.3.3.1 Image



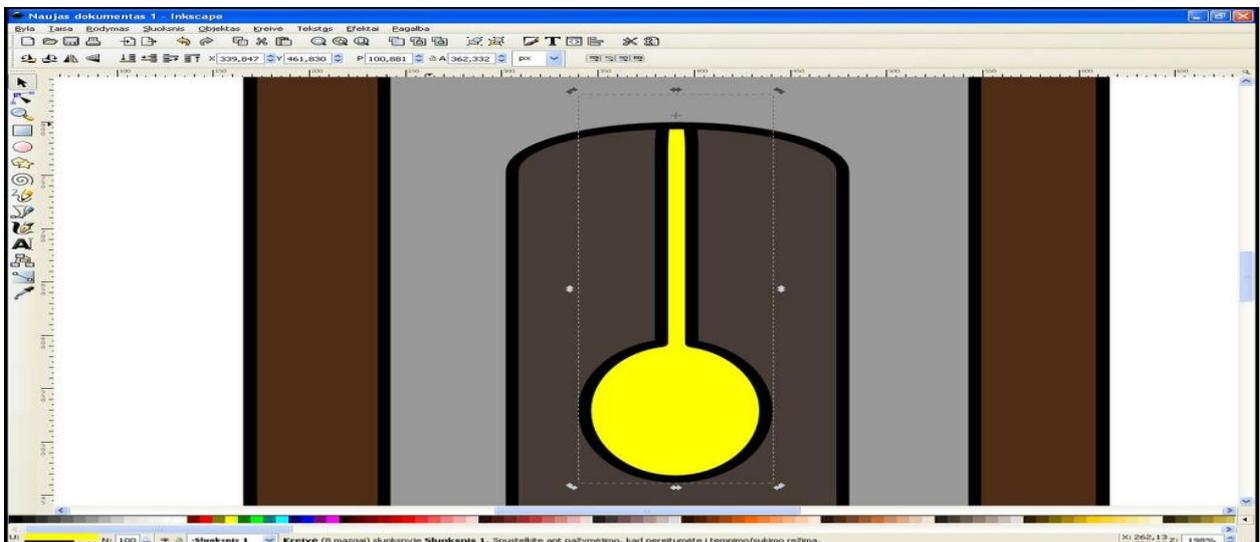
- Download both Inkscape and GIMP software.
- Open Inkscape, if you are not familiar with it, go through the tutorials, this will help you.
- Draw the first frame of your animation (clock this time as shown in 1.3.3.1 Image). I have drawn it using rectangles with rounded edges, a triangle and a circle, pendulum is made by placing an oval either over another one or a rectangle, selecting both of them and pressing ctrl+ + (Path/Union). By the way, the end of the pendulum is hidden under the lighter. Actually, to do this, you must duplicate the darker inner part of the place where the pendulum is, then select the duplicate and the lighter rectangle and press ctrl+ - (Path/Difference). Then arrange the pieces of the clock by sending them back/Forward. Then draw a white rectangle without borders on top of the clock, and send it to back of the image. With this rectangle you will control the size of your gif and it is essential.

Step 2: Changing the rotation center of the pendulum

2.3.3.2 Image



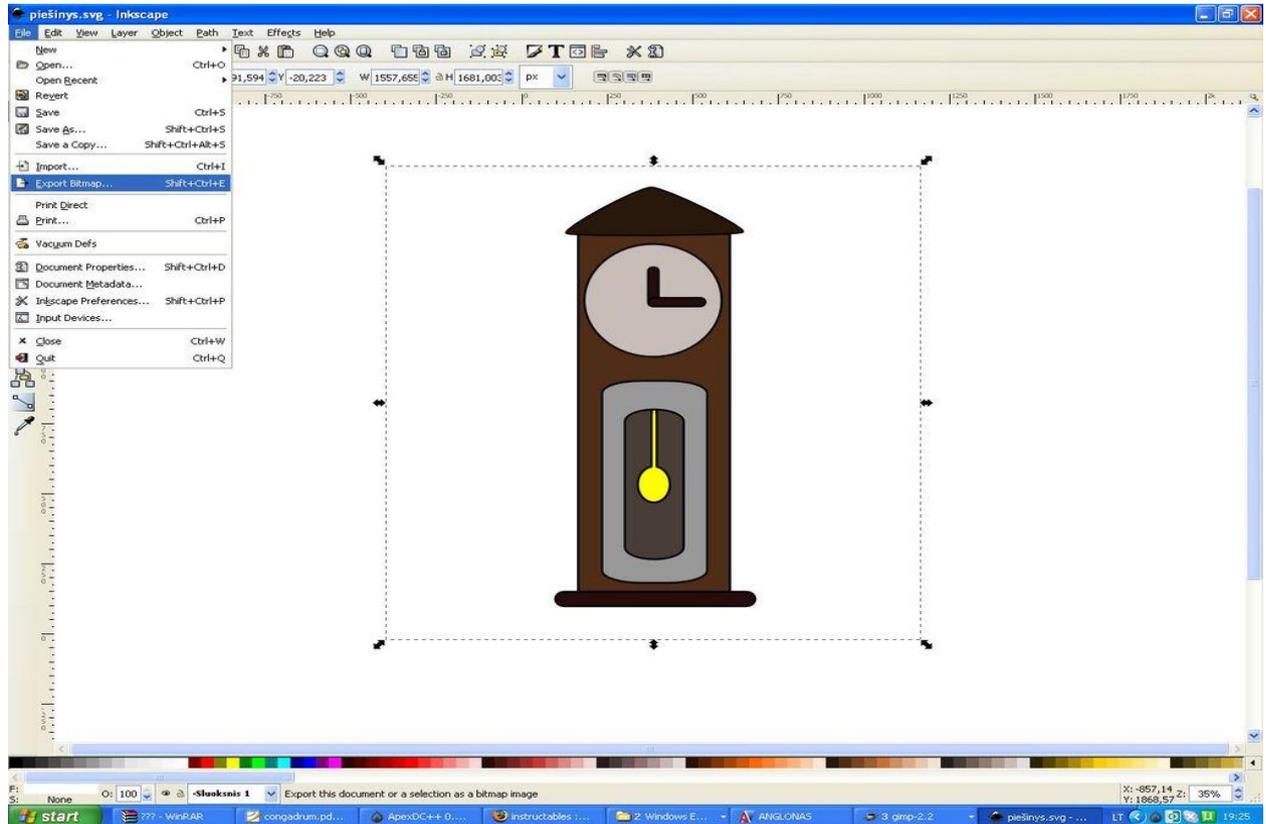
2.3.3.3 Image



Zoom in. Select the pendulum clicking it twice. Rotation arrows should appear on the edges of the border and a cross in the middle. That cross is the rotation center. You have to carefully move it upwards to the top of the pendulum to make it swing.

Step 3: Saving first frame

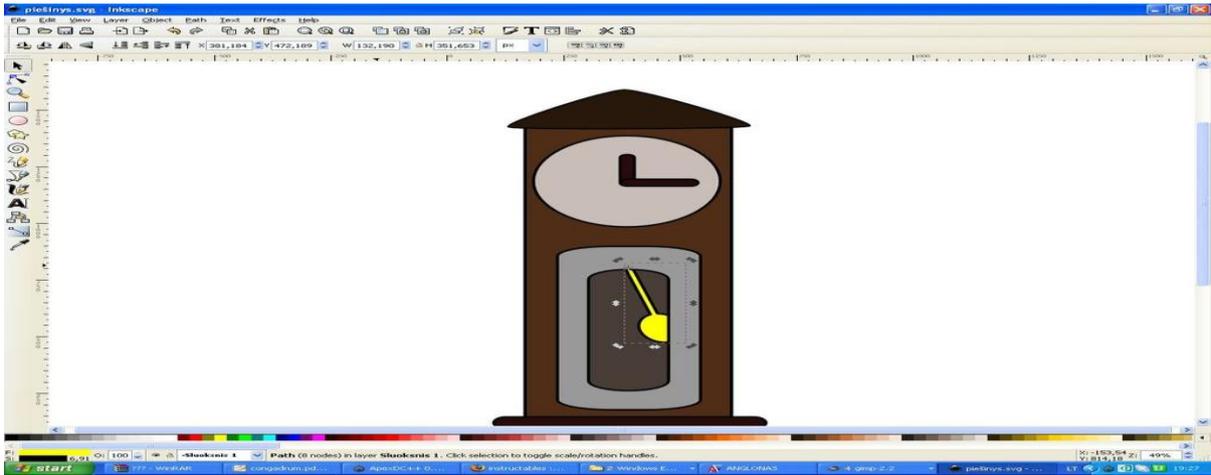
2.3.3.4 Image



Now zoom out and select the white rectangle in the back. Press File\Export Bitmap. A window will appear. Make sure that "Selection button is pressed, set the location and save

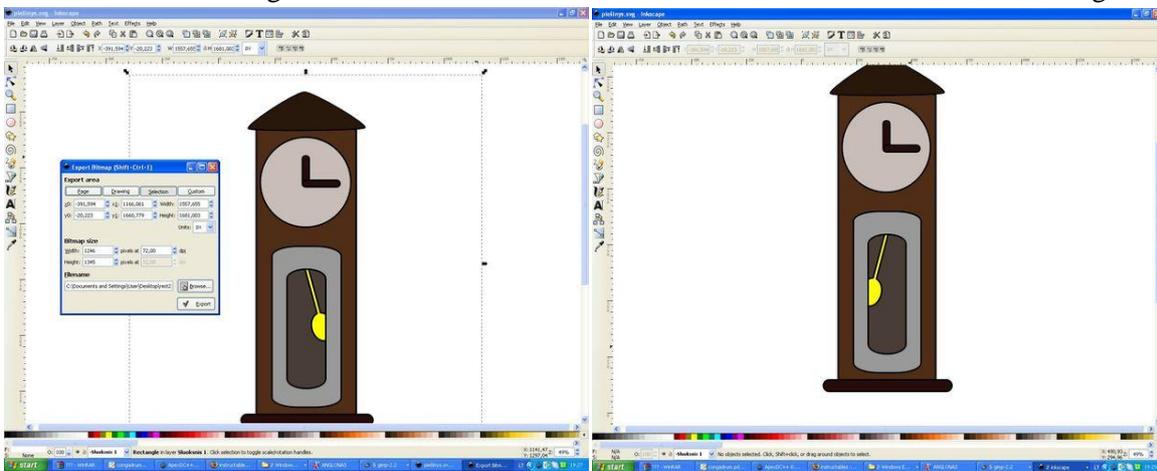
Step 4: Create second and third frames

2.3.3.5 Image



2.3.3.6 Image

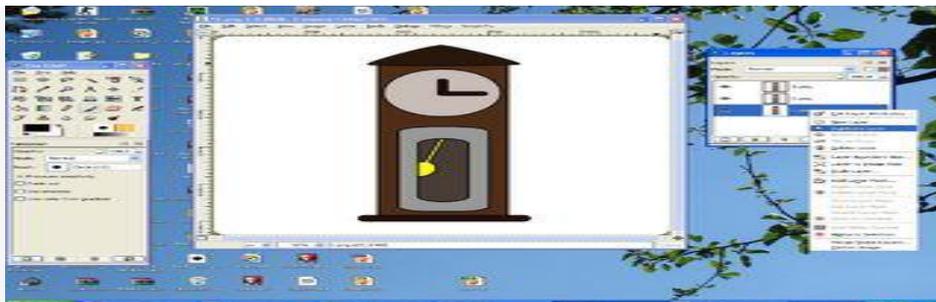
2.3.3.7 Image



Saved? Ok, let's continue. Select the pendulum doubleclicking and rotate it right while pressing ctrl. It will rotate at a fixed angle and now the second frame is done. Select the background rectangle and save again. Now rotate it back to the original position and rotate left. Save again. Ok, job with Inkscape finished. Save the svg file if you want, then close the program.

Step 5: Creating the gif

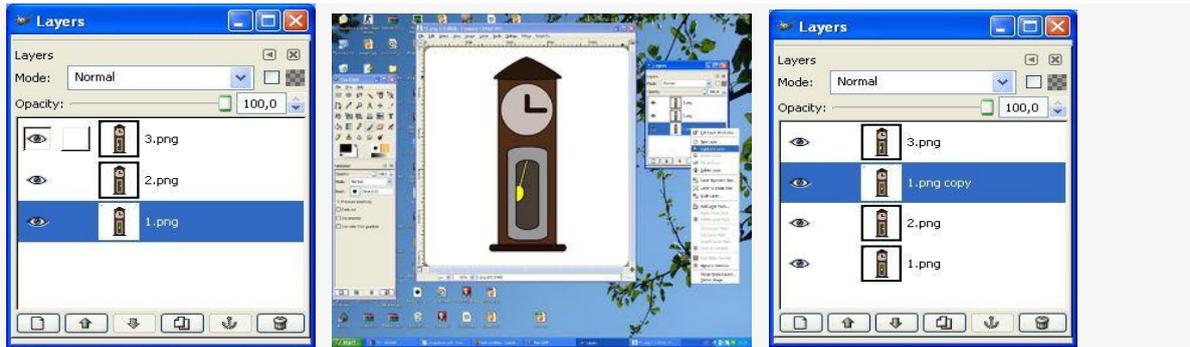
2.3.3.8 Image



2.3.3.9 Image

2.3.3.10 Image

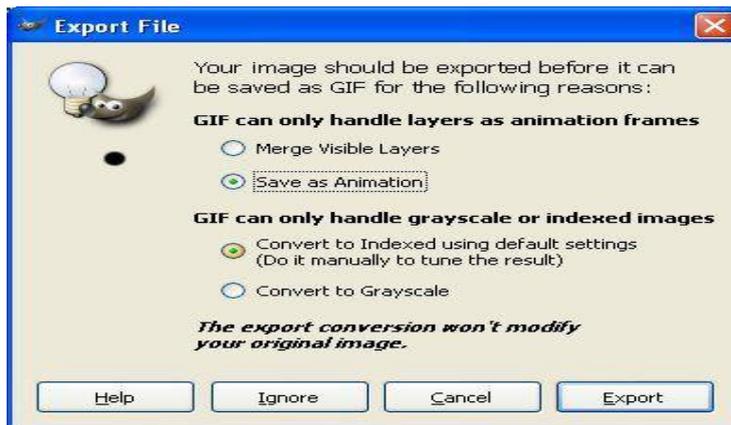
2.3.3.11 Image



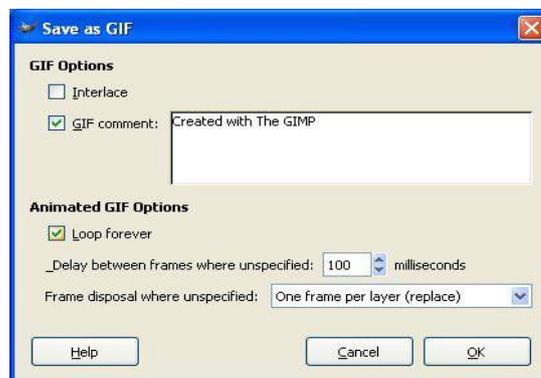
Open the GIMP. Drag the first frame onto the program's main window. It will open, as shown in the image (1.3.3.8 Image). Now check if the layers dialog is open. If it isn't, open it by clicking ctrl+l or going to file/dialogs/layers. Now drop second & third frame onto the first one that is already open. They will appear in the layers window, like in the image(1.3.3.9 Image). Only the top layer will show by the way. Now select the first layer, & duplicate it (right click on the layer in layers window & select duplicate). Drag the duplicate between the second & third frames.

Step 6: Saving the gif

2.3.3.12 Image



2.3.3.13 Image



Press File\Save as..., select the file format as *.gif and press save. A window (2.3.312 Image) should appear. Select "Save as Animation" and "Convert to indexed..." and press Export. Another window

(2.3.3.13 Image) will appear. Write a comment that you want, set the gif to loop forever and frame disposal as one frame per layer (replace). Set the delay to 200ms (100ms is too fast). Now sit and glare at the results.

2.3.4. Advantages and Disadvantages of Animation

2.3.4.1. Advantages

- Brings a topic to life.
- It gains the attention of the viewer.
- Can be fun to watch.
- Educational game and quizzes allow the visitor to interact and learn.

2.3.4.2. Disadvantages

- Takes a lot of effort to create even a basic animation.
- Needs skill in using the animation software such as flash.
- Too much animation on a page can be distracting and even annoying.
- Can take up a lot of bandwidth, so will take too long to show over a slow internet connection.

2.4.1 Recent Development

Scientific Animations Without Borders (SAWBO) develops educational materials designed to help learners with low levels of literacy in developing nations. They use three-dimensional animations to convey agricultural and medical advice that can be used to improve the quality of people's lives. These two-minute animations can be viewed on a range of electronic devices including cell phones with video capacity. Using Bluetooth technology, the animations can be transmitted from cell phone to cell phone.

The animations are shared on an online journal called the Sustainable Development Virtual Knowledge Interface (SusDeViKI). This journal specialises in educational material for low-literate learners in impoverished settings. Educators can easily search for, view, and download SAWBO's animations onto their computers. They can then transfer them onto cell phones for use in the field as part of ongoing educational programmes. The educational animations can be left on the phones of community members, and viewed at any time.

One of the big problems with many development messages, especially those created and tested in the academic community, is that these ideas are often placed in peer-reviewed journal articles, making it very difficult for educators to access these materials in a format that would allow them to take the information to target populations in the field. But SAWBO's animations have overcome this barrier and are easy to access and distribute.

Since its inception, SAWBO, an initiative of the University of Illinois, has produced four animations. Three focus on pest control strategies for dealing with insects that attack cowpea plants, and one deals with cholera prevention.

2.4.2. How KVKs can use this knowledge and where

Agricultural production needs to increase by 70 percent in order to meet the new demands for the predicted world population of nine billion by 2050. KVKs plays a key role in helping to stimulate growth, secure rural livelihoods and reduce poverty in a way that is environmentally sustainable. These include investing in training, knowledge sharing and research and development to help farmers sustainably improve the quantity and quality of the crops they grow.

Animation can be used to inspire, educate, inform and entertain the farmers. KVKs can develop two to three minutes animated videos which are scientifically accurate. Using only information that has been proven in the field trials or scientific studies. Once an animation is complete, the experts in the

relevant field can recheck to make sure that the animations are technically correct. Then we can translate the scripts into many local and regional languages. The voice-overs for each animation can be easily adapted for a range of local languages.

Our goal will be to be a centralized place where KVKs can get the videos and deploy them locally. We can also develop an online system that allows the KVKs to download and use the videos in the deployment strategies that they think are best in their environment, including transferring the videos from cell phone to cell phone, which they can carry to the field. As the cost of cell phones has decrease, especially ones with video and Bluetooth capacity.

And for the place where there is no internet connectivity & cell phone network we can distribute disks to farmers' groups and farm schools.

2.5 Reference

- *"Illusion Of Life" by Frank Thomas & Ollie Johnston*
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Electronic Spreadsheets - Its application in KVK System

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3.1 Overview

- **Introduction to electronic Spreadsheets**
- **Evolution of Electronic Spreadsheets**
- **Types of Spreadsheets**
- **Application of Electronic Spreadsheets in KVK System**
- **Concluding remarks**

3.1 Introduction:

An electronic spreadsheet is a simulation of paper accounting worksheets. It is a 'soft' document that organizes data into columns and rows (tabular form) that is defined by the software. It operates on the data represented as cells organized in columns and rows. The sheet is also able to summarize content that is obtained from many sources in one area and present it in a given format. A spreadsheet file can consist of multiple worksheets and that makes up one workbook, with each file being one workbook. Spreadsheets share many principles and traits of databases. Today a spreadsheet program is one of the main components of an office productivity suite, which usually also contains a word processor, a presentation program, and a database management system.

3.2 Evolution:

It all started with **VisiCalc**. The world's first electronic spreadsheet, **VisiCalc**, was conjured up by Dan Bricklin and Bob Frankston back in 1978, when personal computers were pretty much unheard of in the office environment. **VisiCalc** was written for the Apple II computer. **VisiCalc** essentially laid the foundation for future spreadsheets, and we can still find its row-and-column-based layout and formula syntax in modern spreadsheet products.

Envious of VisiCalc's success, a small group of computer freaks at a start-up company in Cambridge, Massachusetts, refined the spreadsheet concept. Headed by Mitch Kapor and Jonathan Sachs, the company designed a new product called **Lotus 1-2-3**. **Lotus 1-2-3**, released in January 1983 by Lotus Development Corporation's was an instant success.

In the meantime, another class of personal computers was evolving; these PCs ran the CP/M operating system. A company called Sorcim developed **SuperCalc**, which was a spreadsheet that also attracted a legion of followers.

Borland started in spreadsheets in 1987 with a product called **Quattro**. In the fall of 1989, Borland began shipping **Quattro Pro**, which was a more powerful product that built upon the original **Quattro** and trumped 1-2-3 in just about every area. For example, the first **Quattro Pro** let you work with multiple worksheets in movable and resizable windows.

In 1982, Microsoft released its first spreadsheet, **MultiPlan**. **Excel** sort of evolved from MultiPlan, first surfacing in 1985 on the Macintosh. **Excel** was a graphics-based program (unlike the character-based MultiPlan). In November 1987, Microsoft released the first version of Excel for Windows Excel's first macro language also appeared in Version 2.

Since then a number of spreadsheet applications have evolved. Some examples are shown below.

3.3 Types of Spreadsheets with Examples:

TYPE	NAME	PAID/FREE	PLATFORM
Software Based (Offline)	Microsoft Office Excel	Paid	Windows & Machintosh
	OpenOfficeCalc	Free	Windows & Linux
	Libre Office Calc	Free	Windows & Linux
	Kingsoft Office Spreadsheet	Free	Windows & Android
	Polaris Office	Free	Android
Web Based (Online)	Google Spreadsheet	Free	Any
	EditGrid	Free	Any
Web Based Spreadsheet Scripts	dhtmlxSpreadsheet	Free	Any
	Gelsheet	Free	Any

These web based spreadsheet scripts available in the Internet can be embedded in our own websites, customize it and even link it to our own database. There are several other Spreadsheets found in each category.

3.4 Application of Electronic Spreadsheets in KVK System:

Spreadsheets are the simplest software having wide applicability in KVK system. Spreadsheets can also simplify a variety of tasks. Starting from recording, organizing and presenting data regarding OFT, FLD, Trainings, Extension activities, Seed & planting materials and organizing emails & reports etc., it can also be utilized for almost all accounting tasks. Moreover most of the

common data analysis can also be performed. Once brought to practice it may become ubiquitous to the organization.

In order to record data in an understandable form it must be well organized. To record and analyze a large amount of data on a number of parameters, it must be presented in tabular form. And that is where Electronic spreadsheets come in.

Application of Spreadsheets:

- **For recording and analyzing OFTs:** Data of OFTs can be recorded with parameters like Discipline, Date Of Sowing, Date Of Transplanting, Date Of Harvesting, Thrust area, Crop/Enterprise, Identified Problems, Title, Technology Assessed/Refined, No. of Trials, BCR, Feedback from farmer etc. See Figure 1.
- **For recording and analyzing FLDs:** There are around 36 parameters on which FLDs data can be recorded. Some calculations like “BCR” and “Percentage (%) of increase in yield” can be generated simply by applying a formula on the whole column.
- **For recording Trainings:** Whoever does the job, it’s a tedious job to summarize the Trainings as required in different reports in different occasions, like, Trainings have to be summarized discipline wise and calculate the total beneficiaries accordingly, in another occasion you might be expected to arrange them according to the thrust area but in chronological order. Sorting, Filtering and AutoSum feature in spreadsheet applications come in handy while doing such a job. It makes the job pretty easy any saves a lot of time. See Figure 2.

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	Sl. No.	Discipline	Start Date	End Date	Thrust Area	Crop/Enterprise	Identified Problems	Title	No. of Technology Assessed	Technology Assessed	No. Of Trials	No. of Locations	Result
2													
3													
4													
5													
6													
7													
8													
9													
10													
11													
12													
13													
14													
15													
16													
17													

Figure 1. FLD Sheet

	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
1	Date	Clientele	Under ICARD/ICR/IA/ISRD	Title of the training programme	Discipline	Thematic area	Duration in days	Venue (Off / On Campus)	Number of other participants			Number of SC/ST			Total number of participants		
2									Male	Female	Total	Male	Female	Total	Male	Female	Total
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	
11																	
12																	
13																	
14																	
15																	
16																	
17																	
18																	

Figure 2. Training DataSheet

• **For recording Others Extension Activities, Seed & Planting Materials and Publication:**

In a similar fashion data regarding others Extension Activities, Seed & Planting Materials and Publications can be recorded with every minute detail. And Searching, Sorting, Filtering and Quick formulas help greatly in fast reporting.

• **For organizing and analyzing weather records:** Most of our weather stations records data hourly, which then we download it in CSV or XLS format. These CSV (Comma Separated Values) files can be opened in spreadsheets. The weather records contain several parameters like Rainfall, humidity, Sunshine, Air temperature, Soil moisture content & temperature etc. These parameters are recorded every hour. So, we come up with an enormous sheet of data every time. To present these hourly data in Daily, Weekly and Monthly basis the **Pivot table** feature helps a lot. Weather data of 1 year consisting of 8760 rows of data i.e. 24 records everyday each row containing 6 columns takes just a few clicks and 10 – 15 minutes to summarize them in daily and monthly order.

• **For preparing Pay Bills & Salary Statement:** One of the most important job of an Accountant in KVKs or any other organization is preparing Pay Bills of the staff and Salary Statements. In a modern spreadsheet one sheet can get updated depending on other automatically. Long and repetitive calculations can be done performed effortlessly within no time. Even Salary Statements need not be attended, they are being generated automatically.

• **KVK Ledger Book:** I have never seen a book as big as the KVK Ledger book. Well, the Ledger book keeps all the records of Funds received and spent by the office. Computerizing and maintaining the similar record in a Spreadsheet helps automatic generation of Monthly Expenditure Statements and Annual accounts. While working with such huge number of entries against each sector, scheme,

programmes; the grouping rows and columns feature does a great help in organizing the entries and calculate them separately. Moreover it keeps all information in your hand for Financial Audits.

3.5 Concluding remarks:

Above is a glance of how spreadsheets can be used in KVK system. The wide applicability of Spreadsheets in KVK for recording the data, presenting them as demanded by different reports, analyzing data, accounting and generating financial reports has been portrayed in the text above. Once put into practice Spreadsheets will become an indispensable tool for the KVK system. Lastly, it is good to use free Spreadsheet application like Apache OpenOffice calc (included in Apache OpenOffice package). Apache OpenOffice is totally free, also supports Microsoft Office file types i.e. .doc, .docx, .xls, .xlsx can also be opened.

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Free and Open Source Software (FOSS) with special emphasis to GNU Project

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4.1 OVERVIEW: It all started in 1983 when Richard Matthew Stallman is a software developer and software freedom activist working at MIT Artificial Intelligence lab, announced the project to develop the GNU operating system, a Unix-like operating system meant to be entirely free software, and has been the project's leader ever since. With that announcement he also launched the Free Software Movement.

Stallman began working on this project on January 5, 1984, resigning from MIT employment in order to do so. In October 1985 he started the Free Software Foundation, of which he is president as a full-time volunteer.

Stallman pioneered the concept of Copyleft, and is the main author of the GNU General Public License, the most widely used free software license, which implements “Copyleft”, contrary to “Copyright” in which the exclusive right of the software developed, including the code, lies with the developer.

4.2 INTRODUCTION: Free and open-source software (FOSS) is software that can be classified as both free software and open source software. That is, anyone is freely licensed to use, copy, study, and change the software in any way, and the source code is openly shared so that people are encouraged to voluntarily improve the design of the software. This is in contrast to proprietary software, where the software is under restrictive copyright and the source code is hidden from the users, so that the rights holders (the software publishers) can sell binary executables.

Free, open-source operating systems such as Linux and BSD are widely utilized today, powering millions of servers, desktops, Smartphone (e.g. Google Android), and other devices. Free software licenses and open-source licenses are used by many software packages.

In the coming sections we will be focusing GNU Operating System, which marked the beginning of the Free Software movement and its legacy still continues.

4.3 The GNU Operating System

As we already had a discussion, as part of an unusual move by a Computer Programmer at the MIT, Richard Matthew Stallman, the GNU Project was launched in 1984 to develop the GNU system. The name “GNU” is a recursive acronym for “GNU's Not Unix!”. “GNU” is pronounced *g'noo*, as one syllable, like saying "grew" but replacing the *r* with *n*.

The GNU operating system is a complete operating system made entirely of free software. Millions of people are using GNU every day to edit their documents, browse the web, play games, and handle their email, or as part of a GNU/Linux system on their home computer. Even people who have never heard of it use GNU everyday, because it powers many of the sites they visit and services they use. Learn more about GNU, and support progress on fully free operating systems by volunteering or donating to the FSF.

A Unix-like operating system is a software collection of applications, libraries, and developer tools, plus a program to allocate resources and talk to the hardware, known as a kernel.

The Hurd, GNU's own kernel, is some way from being ready for daily use. Thus, GNU is typically used today with a kernel called Linux. This combination is the **GNU/Linux operating system**. GNU/Linux is used by millions.

1.3.1 Nevertheless, the technicalities of the GNU/Linux, or any of its applications components is not the part of this discussion, as we mainly focus on the merits of the use and development of Free Software. Free and Open Source Software (FOSS) is more a idea which involves computer programmers across the globe volunteers to participate and contribute to the development of one or more software, as in the case of GNU/Linux, with the freedom to run the program means the freedom for any kind of person or organization to use it on any kind of computer system, for any kind of overall job and purpose, without being required to communicate about it with the developer or any other specific entity.

4.3.2 How to get GNU software

GNU software is available by several different methods.

- Download a wholly free GNU/Linux distribution.
- Get a copy from a friend.
- Buy a computer with a wholly free GNU/Linux system preinstalled from one of the companies that offers this.
- Download individual packages from the web or via FTP: we provide source code for all GNU software as free software, and free of charge. (Please also make a donation to the FSF if you can, to help support the development of more free software.)
- Use the GNU Guix functional package manager to install and manage GNU package releases.
- Use the GNU GSRC collection to easily install the latest GNU package releases on their own, without conflicting with any system versions.
- Use the GNU PPA or GNUstep PPA (Personal Package Archive) on Trisquel, gNewSense, or related distros to get the latest releases suitably packaged.
- Get the development sources for a package and build them. Many GNU packages keep their development sources at the GNU hosting site savannah.gnu.org. Some packages use other source repositories, or have none at all. Each package's web pages should give the specifics.

4.3.3 GNU/Linux distributions

All of the distributions that follow are installable to a computer's hard drive and most can be run live.

We cannot make a general recommendation for using one over another, so they are listed here in alphabetical order. We encourage you to read these brief descriptions and even more to explore their respective web sites and other information to choose the one best for you.

Below is a list of small system distributions. These distributions are meant for devices with limited resources, like a wireless router for example. A free small system distribution is not self-hosting, but it must be developable and buildable on top of one of the free complete systems listed above, perhaps with the aid of free tools distributed alongside the small system distribution itself.

The major distributions of GNU/Linux are

- BLAG Linux and GNU, a GNU/Linux distribution based on Fedora.
- Dragora, an independent GNU/Linux distribution based on concepts of simplicity.

- Dynebolic, a GNU/Linux distribution with special emphasis on audio and video editing.
- gNewSense, a GNU/Linux distribution based on Debian and Ubuntu, with sponsorship from the FSF.
- Musix, a GNU+Linux distribution based on Knoppix, with special emphasis on audio production.
- Parabola GNU/Linux, a distribution based on Arch that prioritizes simple package and system management.
- Trisquel, a GNU/Linux distribution based on Ubuntu that's oriented toward small enterprises, domestic users and educational centers.
- Ututo XS, a GNU/Linux distribution based on Gentoo. It was the first fully free GNU/Linux system recognized by the GNU Project.

4.3.4 The emblems of GNU/Linux and Free Software Foundation



4.3.5 Develop GNU software

If you are developing a GNU package, please take a look at the available GNU software developer resources.

Although not strictly about official GNU software, we maintain a list of high-priority free software projects. Please help with these projects if you can. For other ways to contribute to GNU, including taking over unmaintained GNU packages and helping with development, see the GNU help wanted page.

If you're writing a new program and would like to make your software an official GNU package, see the evaluation information and submission form.

4.4 This collaborative mode of programming and developing software, though, it looked a bit weird in its initial stages, has brought about radical changes in the way software are being written, distributed and most importantly extended to meet the specific requirements of the end user. Unless we have a closer look as to how this programming fraternity has been constantly delivering, we cannot get a idea what led a established programmer at MIT, like Mr. Stallman, to quit his job and start something unusual at that time.

4.4.2 It is worthwhile to look into the main features which distinguishes the Free Software movement from its proprietary counterpart can be listed as follows-

Security

It's hard to think of a better testament to the superior security of open source software.

What that means is that the more people who can see and test a set of code, the more likely any flaws will be caught and fixed quickly. It's essentially the polar opposite of the "security through

obscurity" argument used so often to justify the use of expensive proprietary products, in other words.

Does the absence of such flaw reports about the code of the iPhone or Windows mean that such products are more secure? Far from it--quite the opposite, you might even say.

All it means is that those products are closed from public view, so no one outside the companies that own them has the faintest clue how many bugs they contain. And there's no way the limited set of developers and testers within those companies can test their products as well as the worldwide community constantly scrutinizing FOSS can.

Bugs in open source software also tend to get fixed immediately, as in the case of the Linux kernel exploit uncovered not long ago.

In the proprietary world? Not so much. Microsoft, for example, typically takes weeks if not months to patch vulnerabilities such as the recently discovered Internet Explorer zero-day flaw. Good luck to all the businesses using it in the meantime.

Freedom

"Free software" does not mean "noncommercial". A free program must be available for commercial use, commercial development, and commercial distribution. Commercial development of free software is no longer unusual; such free commercial software is very important. You may have paid money to get copies of free software, or you may have obtained copies at no charge. But regardless of how you got your copies, you always have the freedom to copy and change the software, even to sell copies. "Free software" is a matter of liberty, not price. To understand the concept, you should think of "free" as in "free speech," not as in "free beer". With these freedoms, the users (both individually and collectively) control the program and what it does for them. When users don't control the program, the program controls the users. The developer controls the program, and through it exercises power over the users. Therefore, a "nonfree" or "proprietary" program is an instrument of unjust power. The freedom to run the program means the freedom for any kind of person or organization to use it on any kind of computer system, for any kind of overall job and purpose, without being required to communicate about it with the developer or any other specific entity.

In Free software, like the GNU project, a unique licence called copyleft is used to protect these freedoms legally for everyone. But noncopylefted free software also exists. We believe there are important reasons why it is better to use copyleft, but if your program is noncopylefted free software, it is still basically ethical. (See Categories of Free Software for a description of how "free software," "copylefted software" and other categories of software relate to each other.)

Quality

Which is more likely to be better: a software package created by a handful of developers, or a software package created by thousands of developers? Just as there are countless developers and users working to improve the security of open source software, so are there just as many innovating new features and enhancements to those products. In general, open source software gets closest to what users want because those users can have a hand in making it so. It's not a matter of the vendor giving users what it thinks they want--users and developers make what they want, and they make it well. At least one recent study has shown, in fact, that technical superiority is typically the primary reason enterprises choose open source software.

Adaptability

The software can be adapted to the underlying hardware solution even by its user, provided, he knows how to do it. One can easily assume the mess he or she has to face, when forced to use a proprietary software package. The software can be customized to meet job specification as exactly as possible.

Software Productivity

“Software productivity” can mean two different things: the overall productivity of all software development, or the productivity of individual projects. Overall productivity is what society would like to improve, and the most straightforward way to do this is to eliminate the artificial obstacles to cooperation which reduce it. But researchers who study the field of “software productivity” focus only on the second, limited, sense of the term, where improvement requires difficult technological advances.

Open source software is generally free, and so is a world of support through the vibrant communities surrounding each piece of software. Most every Linux distribution, for instance, has an online community with excellent documentation, forums, mailing lists, forges, wikis, newsgroups and even live support chat.

For businesses that want extra assurance, there are now paid support options on most open source packages at prices that still fall far below what most proprietary vendors will charge. Providers of commercial support for open source software tend to be more responsive, too, since support is where their revenue is focused.

4.4 CONCLUSION: The **mission is to preserve, protect and promote the freedom to use, study, copy, modify, and redistribute computer software, and to defend the rights of Free Software users.** We like to think that our society encourages helping your neighbor; but each time we reward someone for obstructionism, or admire them for the wealth they have gained in this way, we are sending the opposite message.

Software hoarding is one form of our general willingness to disregard the welfare of society for personal gain. If we don't want to live in a jungle, we must change our attitudes. We must start sending the message that a good citizen is one who cooperates when appropriate, not one who is successful at taking from others. I hope that the free software movement will contribute to this: at least in one area, we will replace the jungle with a more efficient system which encourages and runs on voluntary cooperation.

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Open Source Web Server

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5.1 Overview

- Introduction to Apache web server
 - i. Description of building block in Apache
 - ii. Apache Core
 - iii. Request Phase
 - iv. Module and handler
 - v. Standard module
 - vi. Abstract architecture
 - vii. Handling of Multiple request (UNIX)
 - viii. Resource allocation and Resource pool
 - ix. Configuration issue
- Important of the topic
- Practical utility
- Advantages
- Disadvantages
- Where KVK can apply this software

5.2 Introduction

According to NetCraft Survey Apache is one of the most popular web servers. It has gained its status since mid 1995. Originally, the project was based on National Center for Supercomputing Applications httpd 1.3 (NCSA httpd), the code was completely rewritten and a complete new independent project was developed. The reason behind that Apache is popular because it was an “open source”, every one can access to software for free and can make improvements to it, Apache has been designed to cop with NCSA 1.3 server because some commands which is used by NCSA server cannot be directly implement by Apache Server.

One should be note that the chapter written and the architecture explain here might not be accurate since it has been referred from different sources, including structure of files and files name. It does not start completely from the beginning of design documents.

5.2.1 What does a web server do?

The main function of a web server is to service a request through HTTP protocol (http protocol is a standardized language that understand between the web server and the client (example of client is browser)) [4]. The web server receive a request for a specific resources and return that resources as a response, here the client might request a files and that files is returned, for example, directory and the content of that directory is returned (codified form), a client might request a program and it is the tasks of the web server to run that program and return the output of that program to the client (CGI script). Client can make a request to any available resources in the web server, it is the tasks of web server to service and response to client request. In order for the client to receive

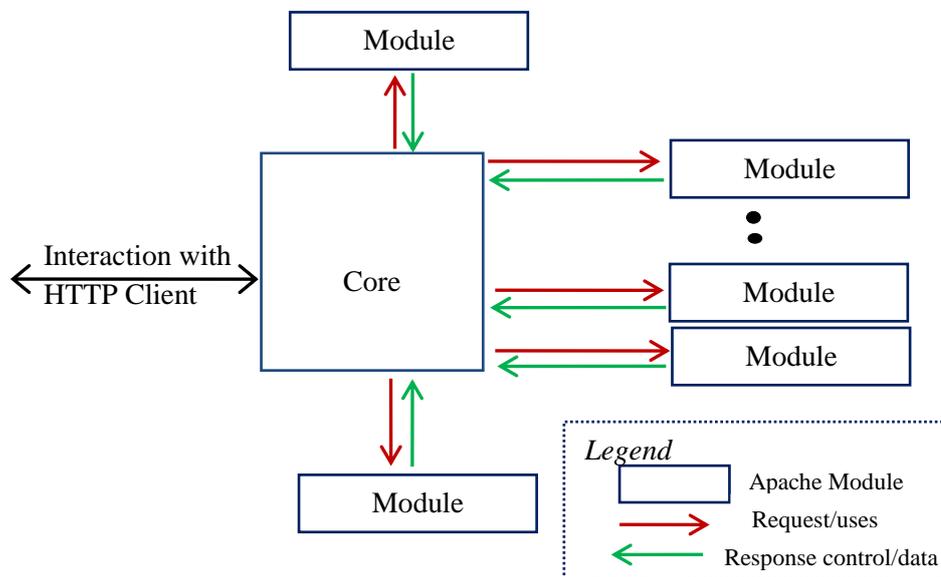
resources from server, it is the server responsibility to check for access authentication and client authorizations, as we have said earlier that the web server might execute programs as a response to client requests. Web server must ensure that this request is not a threat to the host system (Web server). It must also capable to respond to simultaneous multiple requests from clients and to satisfy a request as quickly as possible.

The whole business of a web server is to translate a URL either into a filename, and then send that file back over the Internet, or into a program name, and then run that program and send its output back [3].

5.2.2 Description

Apache follow a modular approach, the core responsible for handling multiple service and response to the request, different modules implement different phases for handling the request as in [8]. Apache can be customize to improve security and performance. Let as see in the figure bellow (figure.5.2.3) how the modules interact with each other.

Figure 5.2.3 Module description



Source: The Conceptual Architecture of the Apache Web Server

The figure shows here that it was designed in a modular approach to ease third parties in modifying by adding or removing the module that we need.

5.2.4 Core and modules

The early decision of Apache web server was made to support the NCSA-compatible server functionality through API-compliant modules, other than committed code in the server core, the idea was to keep the code clean, and to allow the third parties to provide similar functionality in different ways through their own module [2]. This section represent the basic architecture and also clearly describes how request from the client split into phases.

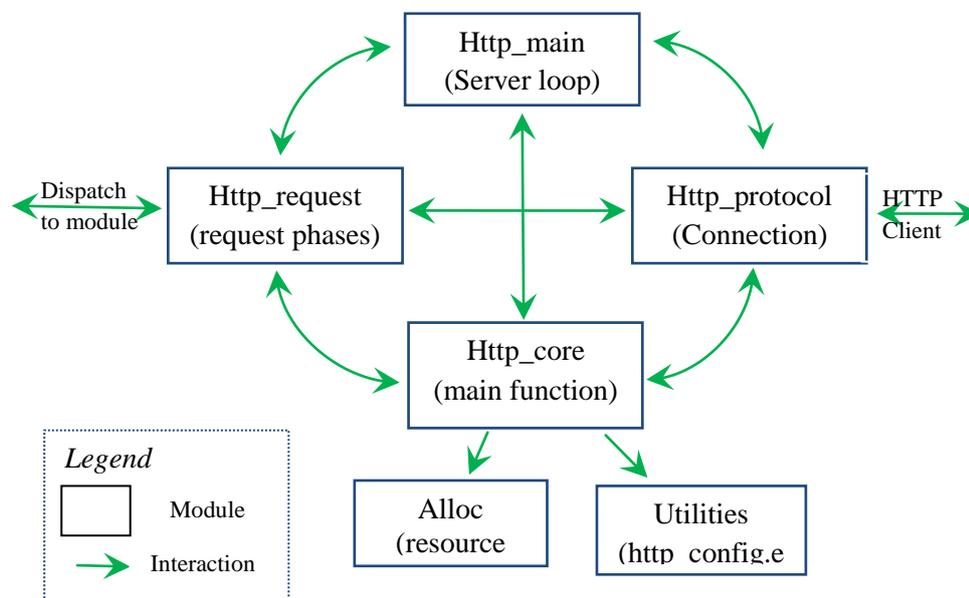
5.2.5 Apache Core

The core describe the basic architecture of web server, it implements all the basic function of the web server, its provides resource allocation base on a request pool, this function is also offered to the modules [3].

The following are the components of the core (Actually these are also Modules but to differentiate from Apache core)

1. http_core.c: this component responsible for instantiating the most basic functionality this component behaves like a module as it has to access directly some global function.
2. http_main.c: this component responsible for startup the server and contains the main server loop that is responsible for connection. It is also responsible for session.
3. Alloc.c: this component responsible for allocating resources pools, and keeping track all of them.
4. http_protocol.c: this component allows for communication directly with the client, through socket connection, all the data is used to transfer between the client and the web server.
5. http_request.c: handles the request, service, dispatching control to the modules in a systematic order. It is also responsible for error handling.
6. other utilities: here its include configuration of files and managing information gathered from those files (http_config), as well as support for virtual hosts. An important task of http_config is to forms the list of modules for services different phases of the requests [8].

Figure 5.2.6 Component of Apache core



Source: *The Conceptual Architecture of the Apache Web Server*

5.2.7 Request Phase

The request process is a special server module (Multi Processing Modules), It can be configured as a process base server, a threaded base server or both. Module uses some part of its function for servicing a request but a combination of more than one module is necessary for a client request to response. Module actually does not know the existent of other module. The control is transferred back and forth between the core and different modules. The process is handled by dividing the request into a set of different phases [8].

For Apache server this is the steps:

- URI: filename translation
- Authentication checking access based on the host address, and other information
- From the HTTP request get the user id and validate

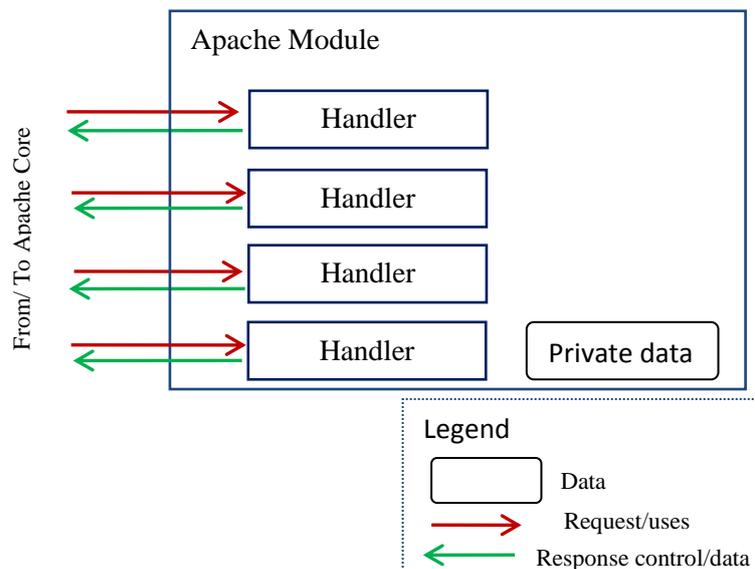
- Authorize the user
- Checking other than authorize user
- Determine the MIME type of the requested object
- Fix-up (replacing aliases by actual path)
- Sending the actual data back to the client
- Log the request [4]

5.2.8 Module and handler

The role of the modules is to extend the functionality of the base package, the core knows about the various modules structures because they are listed in *modules.c* [3], all modules have the same interface to the server core, even though they do not interact with each other directly but if they have to do so they always interact through the core.

Modules define several handlers, each responsible for a handling phase, a handler for Apache is the action that must be performed at some point of serving a request that is distinguished by the type of entities that have been defined to handle (scripts, directories, ordinary files, or anything). Handlers are defined by the modules, handlers are called when servicing of the request enters the phase for which the handler is defined [2]. A module can define a handler for more than one phase and the reason is that, a module saves internal data on the request being serviced, and when the next handler request is called for the next or subsequent phase they might use the same data. The modules even save data that are called between different requests (e.g. some content of the file for future use) [2].

Figure 5.2.9 Handlers in Apache module



Source: *The Conceptual Architecture of the Apache*

5.2.10 Standard Modules

The standard Apache modules which are approved and supported by the Apache group for providing the complete function of a web server are listed below. It also illustrates their specific task at each phase.

1. Translation of URI to file name phase:
 - `mod_userdir`: Determine the source directories based on username and common prefix
 - `mod_rewrite`: Rewrites requested URIs based on regular expressions

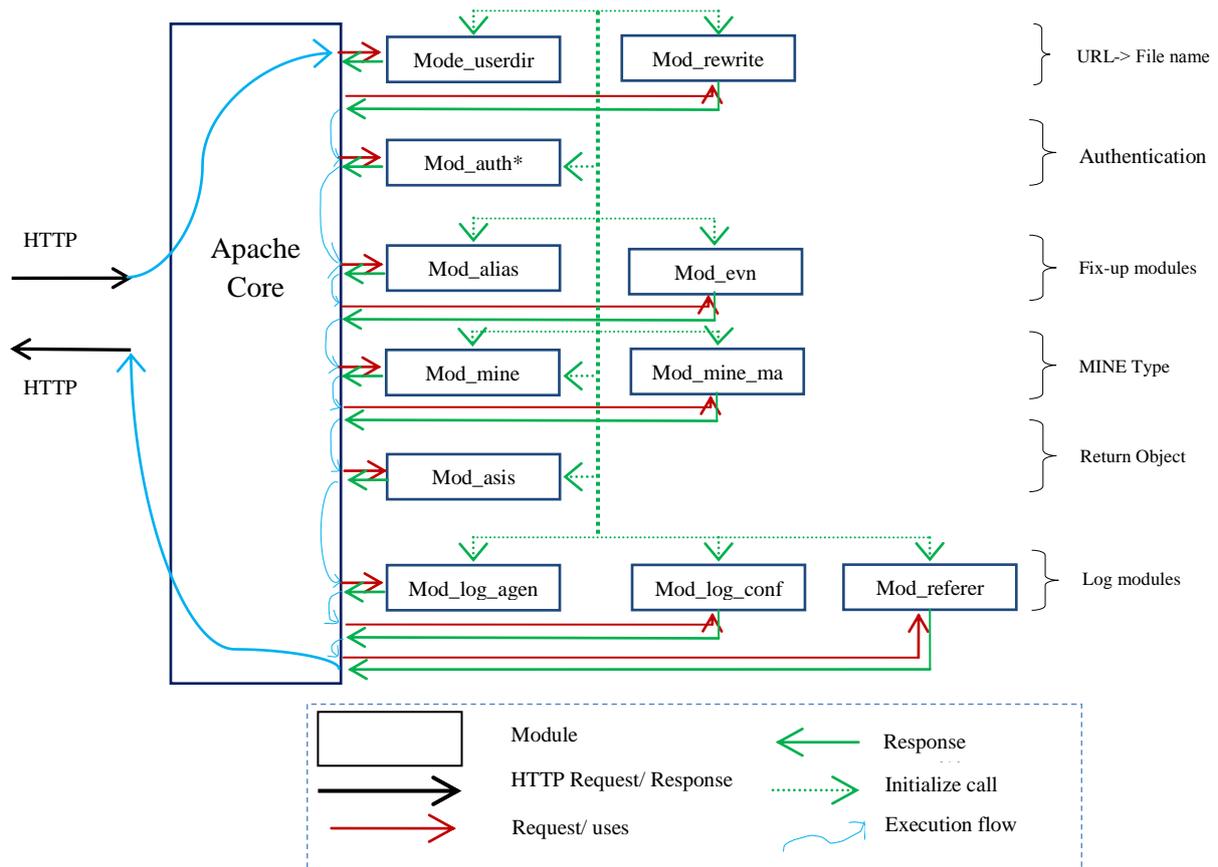
2. Determining the MIME type of the requested object (the encoding, content type and language):
 - mod_mime: differentiate document types using file extensions
 - mod_mime_magic: determines file types by using "magic numbers"
3. Logging the request phase:
 - mod_log_config: Determine the various types of logging modules
4. Authentication and authorization phases:
 - mod_auth: user authentication using text files
 - mod_auth_anon: anonymous authentication user name/password in FTP-style
 - mod_auth_db,mod_auth_dbm: manages database password.
 - mod_access: provides access control.
5. Sending data back to the client request:
 - mod_dir: handles directory
 - mod_asis: implementing .asis file types
 - mod_cgi: execute CGI scripts and returns the output
 - mod_actions: handles for particular file type based on script execution
 - mod_autoindex: perform indexes directories without directory file
 - mod_include: handles server side includes statements in CGI texts
 - mod_imap: handles imagemap file
6. Fix-ups phase:
 - mod_alias: perform URLs translation and redirection
 - mod_env: fix-up environment variable that will be pass to CGI script
 - mod_speling: correct automatically common spelling mistake in request [3]

5.2.11 Abstract Architecture

In this section present a module handlers is called in a fix, predefined order. As discuss before that for some particular phase of service only one module (module handler) is enough to be called. For e.g. authentication, authorization, return of the object to client and sometimes URI to filename translation, on the other hand some phases can have more than one handler to be called for servicing a request [8]. For example there can be more than one module called for implement the logging part of the request.

For processing a request on some phase all handler (register modules) might be called until one returns a special code that subsequent registered handlers for that particular phase should not be called (e.g. URI to filename translation phase). In some case there might be that a handler should returns an error code. Like this case, processing of a request should be stop and an error should be sent to the client. Meaning that handler should not be called from this phase or subsequent phase [8].

Figure 5.2.12 Abstract Architecture of Apache



Source: *The Conceptual Architecture of the Apache Apache*

5.2.13 Handling of Multiple request (Unix)

Some web sites when there are multiple request (request per minutes or request per second), TCP/IP servers fork a new child to handle incoming request from clients. However in case of a busy web site, the over head of fork-ing a number of children will suffocate the server (machine).

As a result, Apache uses a technique *persistent server processes*. Right from the beginning it forks a fixed number of children. The children service the requests independently (different address spaces). When Apache compiles on MS Windows a fixed number of threads is created from the beginning to service the request (due to characteristic of this operating system) [8].

An interesting characteristic of Apache web server is that it can dynamically control a number of children it forks (increasing/ decreasing) based on its current load.

From the binning we talk about modules it's seem as if we talk as a separated process or as if we can implement it as an independent process. In Apache module is not a separate process. However some modules might fork new child in order to do their job. An example of this is the mod_cgi module, which handles the cgi script. It forks a new child to execute the CGI script, and wait for it to be done (finish). This is a characteristic of the cgi, other modules does not need to fork children. Different kind of modules which is not a separate process and does not fork children they communicate through IPC mechanisms or sockets with different process (located on a different machine)[8]. An example of such module can be an authorization module which communicates with a server that manages users and passwords information. Even CGI module can be implemented in this way that will improve security, but the consequence is that will have communication overhead.

5.2.14 Resource allocation and Resource pool

A web server has to manage different types of resources, which needs to be allocated and then freed. Apache implement the concept of *resource pool*, a grouped of resources related to a request (i.e., file handles, sockets, pipes, memory, child programs, etc.) which are allocated and handled through a resources pool are released when the pool is destroyed. Modules defined their own sub-resource pools if they want to manage private resources, similar to general resources. Pools may contain sub-pools, and sub-pool may contain sub-pools and so on. When the pools is destroyed all other sub-pools are destroy along with it to prevent it from leakage of data [4].

5.2.15 Configuration issues

One of the goals that has been designed Apache web server was to cop with the NCSA 5.3 sever, that is due to some configuration commands designed to NCSA server that can not be implement directly by Apache server, and also to read the configuration files, process all the directive correctly. Another goal was to move the server functionality to the modules that have been done with monolithic core [4]. After defining commands to the modules it is not enough to leave them from the server core, the server have to remember the commands to act latter for maintaining data which is private to the modules and which can be either per-server or per-directory commands. Most of the things are per-directory, include a particular access control and authorization information and information on how to determine file type from suffixes, that can be modified by AddType and DefaultType directives [4].

The advantages of Apache server is that it can be customize or easy configure by the third party. Apache Configuration files permit the third party to customize not only the behavior of the server but also the modules too. Module can advertise the custom commands it recognize from the configuration files and will be called when such commands are found (new commands). Apache allows even directory customization via a file called *.htaccess* file[2].

Virtual Host is an interesting concepts implemented by Apache server. The server can respond to more than one name, each assigned to one of the multiple IP addresses of the machine. The multiple IP addresses can be associated with physical network interfaces or can be addresses associated with virtual network interfaces (through logical devices by the operating system). Apache knows to direct under which name the host has been referenced and used different configuration options that has been defined. This information can also be accessed by modules [8].

One should be noted here that some functions implement by modules, related with configuration, and initialization, they are called at the startup phase of the server.

5.3 Importance of topic

Apache is innovating software which is able to use the latest protocols that are used in the internet. it is flexible which can be extend the functional of module, and can also be modified the source code by the third parties, Apache is a reliable, portable, extendable and also highly secure. Apache server can be run with a minimum space (memory).

5.4 Practical utility

A key decision in setting up and maintaining a web server is the choice of operating system and hardware platform, therefore before choosing any web server we need to think about it, the operating system need to be affordable, reliable, secure, fast, scalable and have the web server software available and give satisfactory to the users [1]. Apache suits site of different size and types, one can run a single personal page on it or a huge number of sites serving millions of active regular

visitors, it can serve static file or dynamic over the Web, it can be used as a test server on the desktop for developers, testing code on a local environment before publishing it to the Web. Practically Apache suite any application involving HTTP protocol.

5.5 Advantages

1. **Advanced features of Apache Server:** Apache is innovating software and is able to use the latest protocols that are used in the internet.

2. **Apache Web Server is Open:** the advantage of Apache is that it is an extensible tool. The API of Apache Server belongs to the Open Source Community. Third party can write their own code to adapt their needs.

3. **Easy to administer:** Administration of Apache Server can be easily solved. Apache Server has a list of configuration files that is available easily and well documented with all the necessary information. Beside that the configuration files are in ASCII format and can be understand without any difficulties.

4. **Portability:** Apache can be installed and operated under multiple platforms (any Operating System) with a high level of portability.

5. **Flexible:** Apache Server can be extend by adding new module or customize because of its modular structure.

6. **Security:** Integration of ideas from thousand of programmers around the world and advanced user made the Apache server more secure and reliable.

7. **Apache Web Server is Efficient:** efficiency of Apache is one of a great virtue for a web server. Apache is reliable, very stable and mature web server with a great efficiency like no other web server can do.

8. An interesting concept an Apache implemented is that of *Virtual Hosts*, the server can response to more than one name, each assigned to one of the multiple IP addresses of the machine.

5.6 Disadvantages

1. There is no well defined API, as in the case for module

2. An important part of the Apache web server that cannot be changed only by changing / adding a module is the one that implements the HTTP protocol.

5.7 How KVKs can use this knowledge & where?

Apache web server is a portable open source software which run on multiple platforms (any operating system), KVKs can use along with these open source application software like PHP, Python, Perl, Java which can be host on this web server, all these software are affordable, freely available, beside that they are scalable, reliable, secure, fast etc.

Using this web server, KVK can have their own server, which can be run and store records and activities of the organization so that data will be easily available in hand at any time of need.

KVKs can apply this knowledge in web application like Common KVK web portal to share information through Net, LAN or Intranet. This web server can be use to host other web application software that use machine learning technique for example to predict the productivity of different crops in different part of the country, and also to predict where crops can be grow without doing OFTs and FLDs these will help an Officers, Scientists and farmers in case they want to transfer plants from one part of the country to another part for minimize cost and maximize productivity.

5.8 Conclusion

The fact that have been designed this web server was to cop with the NCSA 1.3 sever, that is due to some configuration commands designed by NCSA server that cannot be directly implement by Apache server.

Apache is a modular architecture with a core which done the basic functionalities of web server and a set of standard modules that handling service of different phases HTTP request from the client. The core responsible for manages and accept HTTP connections and calls the handlers from modules to service the request. The core provides resource allocation on a per request pool.

Modules are not implemented as a separate process even though it can fork children or to cooperate with other independent process to handle the phase of servicing a request.

The functionality of Apache can be customize by the third parties by modifying or writing new modules or replace the existing one according to the application. Apache can also be easily configured by the third parties at different level (directory, module, and host) and modules can be defined their own configuration commands independently.

5.9 References

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Introduction of Geographic Information System (GIS) and its application in KVKs for mitigation of impacts of climate change

1. Introduction
2. Objective
3. Content
 - a) Why Learn GIS?
 - b) GIS Management
 - c) The Mapping and Charting
 - d) Natural Resources
 - e) Impact of Climate Change
 - f) Mitigation of Climate Change
 - g) Potential mitigation of green agriculture
 - h) Supporting Policy and Decision Making
 - i) Land Tenure
 - j) Community for climate change in agriculture
 - k) Using GIS for climate change mitigation
 - l) Using GIS for climate change mitigation
 - m) Observations & Recommendations
4. Conclusion
5. Bibliography (with Reference websites)

6.1.Introduction:

A transformation is taking place in business governments, schools and hospitals, nonprofit organizations, and around the world and people are working more efficiently because of it. Information that was limited to spreadsheets and databases is being unleashed in a new, exciting way by using geography method.

But this isn't the elementary school's geography. This approach uses geography to gain new insights and make better, more informed decisions. Linking location to information is a process that applies to many aspects of decision making in business and the community. Choosing a site, targeting a market segment, planning a distribution network, zoning a neighborhood, allocating resources, and responding to emergencies---all these problems involve questions of geography. And where are current and potential customers which people have to organized and unlock geography from the data they use every day to make decisions and the most intuitive way to view it is on a map.

Not just any map but the intelligent digital maps made possible by geographic information system (GIS) technology. Even people who have never used maps to analyze data are finding that maps make processing information much easier and more effective by using GIS. It represents features on the earth such as buildings, cities, roads, rivers, land marks and states on a computer. People use GIS to visualize, question, analyze, and understand data about the world and human activity. Often, this data is viewed on a map, which provides an advantage over using spreadsheets or databases. Because the reason why people question a lot and put exercise comes with the maps and analysis can reveal patterns, point out problems, and show connections that may not be apparent in tables or text.

The global climate change's potential impacts on infrastructure create some of the most significant and challenging issues facing transportation planners and asset managers today. Despite uncertainty regarding the scope and magnitude of future climate change effects and their associated impacts, some transportation agencies have begun to factor climate change considerations into their decision-making processes. Geographic information systems have proven to be a useful tool in transportation agencies' efforts to analyze and address climate change as it pertains to transportation facilities and operations. The studies include all the impacts of mitigation in chapter wise with details and describes the current practice and application of geographic information systems (GIS) technologies for integrating climate change into the transportation decision-making process. It

examines how select state, regional, and local agencies are using GIS to analyze, mitigate, and adapt to the potential effects and impacts of climate change on the transportation sector.

The impact on GIS of climate change in mitigation and adaptation are addressed separately. The climate change mitigation cases describe how select agencies have used GIS tools to analyze the GHG emissions associated with projects or transportation plans, as well as and to identify opportunities to reduce or remove GHG emissions from the atmosphere. Whereas the GIS for climate change in adaptation cases describe how the agencies have used GIS tools to identify transportation infrastructure that is vulnerable to the climate change effects, such as sea level rise and increased frequency and intensity of storm events.

6.2.Objective:

The main basic objective to learn and compute with the following GIS demonstration and impacts through climatic change in mitigation are shown in details:-

- Improved Technologies and Approaches for Sustainable Farm Management
- About Climate-Smart Agriculture
- Mitigation of Climate Change in Agriculture
- Tackling climate change through livestock
- Supporting policy and decision making
- Where do you see the greatest potential for climate change mitigation in food production?
- What are the differences in the way smallholder farmers and large-scale industrial industries perceive climate change mitigation?
- New training material to help researchers gather data
- Gender and Climate Change Research in Agriculture and Food Security for Rural Development
- Community for Climate Change Mitigation in Agriculture
- The GIS case studies that follow, climate change mitigation and adaptation which addressed separately
- Benefit from networking documentation using GIS strategies

6.3.Content:

a)Why learn GIS?

What is GIS?

A geographic information system (GIS) integrates hardware, software, and data for capturing, managing, analyzing, and displaying all forms of geographically referenced information. GIS allows us to view, understand, question, interpret, and visualize data in many ways that reveal relationships, patterns, and trends in the form of maps, globes, reports, and charts. And it helps you answer questions and solve problems by looking at your data in a way that is quickly understood and easily shared. GIS technology can be integrated into any enterprise information system framework.

The benefits of GIS generally fall into five basic categories:-

- Cost Savings and Increased Efficiency
- Better Decision Making
- Improved Communication
- Better Recordkeeping
- Managing Geographically

The Power of GIS:

GIS is computer software that links geographic information (where things are) with descriptive information (what things are). Unlike a flat paper map, where what you see is what you get, GIS can present many layers of different information.

To use a paper map, all you do is unfold it. Spread out before you is a representation of cities and roads, mountains and rivers, railroads, and political boundaries. The cities are represented by little

dots or circles, the roads by black lines, the mountain peaks by tiny triangles, and the lakes by small blue areas similar to the real lakes. A GIS-based map is not much more difficult to use than a paper map. As on the paper map, there are dots or points that represent features on the map such as cities, lines that represent features such as roads, and small areas that represent features such as lakes.

All this information---where the point is located, how long the road is, and even how many square miles a lake occupies---is stored as layers in digital format as a pattern of ones and zeros in a computer. Think of this geographic data as layers of information within the computer screen. Each layer represents a particular theme or feature of the map. One theme could be made up of all roads in an area. Another theme could represent all the lakes in the same area. Yet another could represent all the cities. These themes can be laid on top of one another, creating a stack of information about the same geographic area. Each layer can be turned off and on, as if you were peeling a layer off the stack or placing it back on. You control the amount of information about an area that you want to see, at any time, on any specific map.

The Geographic Approach:

Maps are a proven method of communicating geographic knowledge. When a decision needs to be made, GIS helps us gather place-based information and organize it on a digital map. We then use GIS to evaluate the decision. Once we fully understand the geographic consequences of our decision, we can then act in an informed, responsible manner.

Map-----Evaluate-----Act

This geographic approach to problem solving helps us answer a wide variety of important questions related to geography, such as:-

1. Where are my current and potential customers?
2. Which areas of my town are most vulnerable to natural disasters?
3. Where should we locate a new elementary school or offices?

GIS helps answer such question by combining data from governments and other sources in a custom map. The geographic approach benefits organizations of all sizes and in almost every industry, and there is a growing interest in and awareness of its economic and strategic value. The benefits generally fall into five basic categories:-

1. Cost savings resulting from greater efficiency
2. Better decision making
3. Improved communication
4. Better geographic information record keeping
5. Geographic management

Remote-sensing satellites and earthbound sensors are providing us with vast amounts of data about our planet. With the availability of new, easy-to-use GIS tools to display and analyze this data, now everyone can be an explorer. This has far-reaching benefits to both society and the environment, ushering in a new era of understanding our world. From desktop computers to smartphones to the cloud, it is becoming easier for anyone to use and benefit from GIS.

GIS in Action:

Planners of all kinds like business analysts, city planners, environmental planners, and strategists from all organizations---create new patterns or reshape existing ones every day. Their job is to lay out a framework so growth can occur in a managed way and benefit as many people as possible while respecting our natural resources. Every day, businesses need to deliver goods and services to clients all around a city. Each truck driver needs a route of how to most efficiently visit each client. GIS provides tools to create efficient routes that save time and money and reduce pollution.

In the military, leaders need to understand terrain to make decisions about how and where to deploy their troops, equipment, and expertise. They need to know which areas to avoid and which are safe. GIS provides tools to help get personnel and materials to the place where they can best do their job. During floods and hurricanes, emergency response teams save lives and property. GIS provides tools to help locate shelters, distribute food and medicine, and evacuate those in need. In forestry, caring for existing and futures trees ensures a steady supply of wood for the world's building needs. GIS provides tools to help determine where to cut today and where to seed tomorrow while minimizing negative impacts on our natural resources.

b)GIS Management:

Facilities Management:

GIS integrates with the top facilities management (FM) software and consulting firms, making it easier than ever to extend the life of FM data. GIS can be used throughout the life cycle of a facility---from deciding where to build to space planning.

GIS helps facilities managers do the following:

1. Streamline asset information collection, dissemination, maintenance, and use.
2. Expedite planning and analysis.
3. Share information in and out of the field more efficiently.
4. More important details about how facilities management can gain benefits using GIS technology and spatial analysis.

Real Estate:

Like real estate, GIS is all about location, location, location. GIS helps real estate professionals in all segments of their business, from map-based content management to sophisticated investment analysis.

Surveying:

Surveyors depend on a variety of software and technology in their daily workflows. GIS technology integrates with other systems while providing new functionality and a central database. A GIS database gives surveyors a better way to easily manage, reuse, share, and analyze survey data, saving time, money, and resources.

Urban and Regional Planning:

No matter how large or small a community, planners must deal with spatial information: parcel, zoning and land-use data; addresses; transportation networks; and housing stock. Planners also study and keep track of multiple urban and regional indicators, forecast future community needs, and plan accordingly to guarantee a higher quality of life for everyone in livable communities.

Federal, regional, state, county, and local planning agencies have realized the power of enterprise GIS to identify problems, respond to them efficiently, and share the results with the public. GIS technology provides tools to help planners reach their agency mission while doing more and spending less.

Managed Care:

Managed care organizations use GIS to better understand relationships between providers, employers, and consumers by incorporating analysis and data from demographics to market demand. GIS can assist in determining the health service needs of employee groups and special populations such as Medicare and Medicaid patients. GIS helps organizations with business functions including enrollment planning, marketing, utilization review, network administration, and disease management.

C)The Mapping and Charting:

GIS is a critical tool for topographic, nautical, and aeronautical mapping and charting agencies. It has the unique ability to manage and produce the specific data and map products where agencies require and the technology allows them to implement an effective workflow for data collection, management, production, and delivery.

Aeronautical:

Civil and military organizations must quickly produce aeronautical information for safer navigation. GIS technology can help these agencies maintain, control, and disseminate data that meets their rigorous requirements.

GIS technology helps aeronautical organizations do the following:-

1. Create, visualize, analyze, and share information with others.
2. Automatically update charts throughout the organization.

3. Produce a wide range of charting products from a single database.
4. Readily share information through mobile and web applications.

Cartographic:

Cartographic organizations and data publishers must be able to produce professional, standardized maps from their libraries of data. GIS provides database-driven cartography that creates sophisticated, high-end cartographic production tools and workflows allowing these agencies to more easily and efficiently create the products they need.

GIS helps cartographic organizations do the following:-

1. Automate tasks and implement user-defined cartographic rules.
2. Override cartographic conventions for individual preferences or requirements.
3. Reduce map production costs.
4. Produce a more flexible range of products.
5. Achieve a higher throughput to meet publishing deadlines.

Nautical:

National hydrographic organizations, commercial chart producers, and naval commands can benefit greatly by leveraging a database-centric approach to the production and maintenance of data.

With GIS, nautical charting organizations can do the following:-

1. Produce multiple products from a seamless database.
2. Create and maintain hydrographic data in a Nautical Information System.
3. Support central/regional office mobile units with disconnected editing.

Spatial Data Infrastructure:

Many organizations that use GIS need to integrate data from multiple sources, organizations, and formats. A spatial data infrastructure (SDI) which catalogs and provides access to diverse geospatial resources and extends the value and use of your GIS within the framework of standards and policies.

Creating an SDI is a collaborative venture between public and private organizations. With Esri technology built on open standards, organizations can work together to build an SDI within their enterprises or across local, national, and global communities.

Topographic:

GIS technology gives both civilian and defense organizations worldwide the ability to efficiently produce and maintain topographic databases and publication-quality map products and services using fewer resources. Costs can be reduced by streamlining production management using one integrated system and organizations can provide authoritative information to their customers so they can address national issues. Data and map production can be streamlined, providing customers with the data they need across any platform including web and mobile.

d)Natural Resources:

Natural resource managers like biologists, botanists, ecologists, environmental regulators, farmers, foresters, hydrologists, petroleum engineers, planners are rely on the analytical power of GIS for help in making critical decisions as they manage the earth's resources. Today more than ever before, we must manage, preserve, and restore our natural resources. Decision makers charged with this task need a complete picture of the issues. GIS helps us gain a deeper understanding of the problems we face and lets us bring more accurate information and less guesswork to the table.

There is no simple answer to our environmental and natural resource concerns, but whether we are restoring habitats, planting crops, drilling for oil, or monitoring endangered species, there is increasing optimism that the application of GIS tools will help us better sustain the planet.

Agriculture:

Balancing the inputs and outputs on a farm is fundamental to its success and profitability. The ability of GIS to analyze and visualize agricultural environments and workflows has proved to be very

beneficial to those involved in the farming industry. From mobile GIS in the field to the scientific analysis of production data at the farm manager's office, GIS is playing an increasing role in agriculture production throughout the world by helping farmers increase production, reduce costs, and manage their land more efficiently.

Archaeology:

As researchers and resource managers, archaeologists understand the importance of geography. Its variables exert a strong influence on human behavior today, and archaeologists are aware of the significance of this influence throughout history. Geography also influences the degree of exposure of archaeological sites and the impacts that they face from human activity and natural forces.

GIS facilitates mapping to analyze depositional patterns as well as catalog and quantify artifacts. It can provide a well-structured descriptive and analytical tool for identifying spatial patterns.

Climate Change:

Climate change is a geographic problem, and solving it takes a geographic solution. GIS has a long history of driving environmental understanding and decision making. Policy makers, planners, scientists, and many others worldwide rely on GIS for data management and scientific analysis. GIS users represent a vast reservoir of knowledge, expertise, and best practices in applying this cornerstone technology to climate science, carbon management, renewable energy, sustainability, and disaster management.

Conservation:

Sustaining biodiversity and preventing fragmentation, extinction, and natural resource depletion are crucial to conservation of the environment. The ability to use GIS technology as a tool to monitor habitat change, track wildlife demographics, and forecast land and resource use is essential to conservation goals and practices. The spatial and thematic aspects of GIS technology enable users to overlay various data to delineate and predict the future of our resources, land, ocean, plant life, and wildlife. This geoprocessing enables decision makers to implement laws and programs that will protect and sustain the environment and its resources.

GIS is a tool that manages, analyzes, and models data from our environment so that we can make decisions based on that information to better conserve its resources and protect its biodiversity.

Environmental Management:

Environmental managers and scientists use GIS to study the environment, report on environmental phenomena, and model how the environment is responding to natural and man-made factors.

GIS technology can help environmental management organizations do the following:-

1. Manage multiple types of geographic data.
2. Assess relationships such as that between runoff and groundwater purity.
3. Measure change such as wildlife habitat encroachment.
4. Model events such as drought impact on forest health.
5. Improve workflow processes, from data gathering and analysis to publication and distribution of findings.

Forestry:

GIS technology profoundly and positively impacts the way land and timber managers and forestry specialists manage timber resources. GIS helps foresters and land managers meet the needs of their forests, the demands of society, and the pressures of economic efficiency. Land managers increasingly turn to GIS for the analytic and visualization tools that allow them to analyze complex situations and make better-informed decisions.

GIS is becoming the foundation for new decision support tools used in all business processes of integrated forest management.

Sustainable Development:

As a global society, people are becoming more aware that many human activities, such as land use and economic development, consume natural resources, such as energy, water, and soils, and can have long-lasting and irreversible effects on our environment including wildlife habitats and biodiversity. The important question for all of us is, Can the earth continue to provide and regenerate the resources we need to support life and encourage development as we know it?

To make this real, it is necessary to personalize and localize the question to specific resources and geographies that we are involved in or possibly responsible for---our parcel, neighborhood, community, nation. GIS allows us to measure our assets, understand our patterns of change, better understand the resources we are using, and identify the impact of human induced geographic change. GIS is also helping us better utilize the resources we have by leveraging geographic information with analysis tools that support planning as well as operational activities.

Water Resources:

GIS is a powerful tool for developing solutions for water resources, such as assessing water quality and managing water resources on a local or regional scale. Hydrologists use GIS technology to integrate various data and applications into one, manageable system.

Wildland Fire Management:

Maps are essential for fighting wildfires. Fire fighters must be able to quickly answer questions such as, Where is the fire and how fast is it spreading? What are the priority values to protect? And, What are the risks to fire fighters and the community? GIS produces maps that answer these and other question and provides a robust platform for fast, efficient analysis and data dissemination.

Fire planning, preparedness, mitigation, incident response, and recovery are vital functions for managing effective wildland fire programs. GIS helps wildfire agencies do the following:-

1. Develop fire management plans.
2. Enhance situational awareness and improve fire fighter safety.
3. Access real-time fire status and control efforts.
4. Develop and implement mitigation strategies.
5. Optimize resource placement and allocation.
6. Develop budget requirements.
7. Support incident management mapping and analysis requirements.

E)Impact of climate change:

Agriculture policies are the cornerstones for achieving food security and improving livelihoods. Effective agriculture and climate change policies can also boost green growth, protect the environment and contribute to the eradication of poverty. The expert works closely with many of the world's most vulnerable populations to help them increase their agricultural productivity, while ensuring that the natural resources they depend on are not exploited or depleted. Agriculture not only suffers the impacts of climate change, it is also responsible for 14 percent of global greenhouse gas emissions. But agriculture has the potential to be an important part of the solution, through mitigation reducing or removing which significant amount of global emissions. Some 70 percent of this mitigation potential could be realized in developing countries.

Climate change poses many threats to agriculture, including the reduction of agricultural productivity, production stability and incomes in areas of the world that already have high levels of food insecurity and limited means of coping with adverse weather. Being able to transform agriculture to feed a growing population in the face of a changing climate without hindering the natural resource base will not only achieve food security goals but also help mitigate the negative effects of climate change. More productive and resilient agriculture will need better management of natural resources,

such as land, water, soil and genetic resources through practices, such as conservation agriculture, integrated pest management, agroforestry and sustainable diets.

This smart agriculture is followed with three following steps such as the Case for Climate, improved Technologies and approaches for Sustainable Farm Management and enabling frameworks.

f)Mitigation of climate change:

Some of the important points, to be followed and made for mitigation for climatic change:-

- Tackling climate change through livestock.
- Life Cycle Analysis.
- Developing LCA methodologies.
- What do life cycle analyses have to offer in global efforts to mitigate climate change in agriculture?
- Where do you see the greatest potential for climate change mitigation in food production?
- What are the differences in the way smallholder farmers and large-scale industrial industries perceive climate change mitigation?
- What potential is there to build partnerships with food production-related industries to reduce emissions? How do you see FAO's role in fostering these partnerships?
- A guidance document to give support to planning.
- Review paper on agricultural NAMAs and LEDs.
- Marginal Abatement Cost Curves.

g)Potential mitigation of green agriculture:

Climate Change Mitigation refers to efforts to reduce or prevent emission of greenhouse gases. Mitigation can mean using new technologies and renewable energies, making older equipment more energy efficient, or changing management practices or consumer behavior. It can be as complex as a plan for a new city, or as a simple as improvements to a cook stove design. Efforts underway around the world range from high-tech subway systems to bicycling paths and walkways. Protecting natural carbon sinks like forests and oceans, or creating new sinks through silviculture or green agriculture are also elements of mitigation. UNEP takes a multifaceted approach towards climate change mitigation in its efforts to help countries move towards a low-carbon society.

While dealing with climate change will require a new way of thinking about agriculture and current farming methods are depleting the earth's resources and producing alarming quantities of greenhouse gases. Agriculture operations currently produce 13 percent of human-based global GHG emissions and the environment is paying a huge price in biodiversity loss and deforestation, while the global economy leaks billions of US dollars per year on conventional agriculture's economic side effects.



Turning agriculture a brighter shade of green will not only ease pressure on the environment and help cope with climate change, but will also create opportunities to diversify economies, increase yields, reduce costs, and generate jobs, which will in turn help reduce poverty and increase food security. Increasing farm yields and improving ecosystems services will be a boon to the 2.6 billion

people who depend on agriculture for a livelihood, particularly in developing nations where most farmers live on small parcels in rural areas.

Huge gains can be made for a greener future by simply reducing agricultural waste and inefficiency. Nearly 50 percent of food produced is lost through crop loss or waste during storage, distribution, marketing, and household use. Some of these inefficiencies especially crop and storage losses can be addressed with small investments in simple farming and storage technologies. Greening agriculture will require investment, research, and capacity building. For further details visit UNEP's website.

h) Supporting policy and decision making:

The smart agriculture is being hampered by the fact that the scope and quality of advice on policy and finance options for climate change mitigation in agriculture is currently very limited. As a result, policy-makers cannot make sound decisions on the best ways to harness agriculture's potential for climate change mitigation. To address this issue, the MICCA Programme is generating information and tools to identify technical, financial and institutional options for climate change mitigation in agriculture.

The MICCA team is currently collecting and processing data from global datasets on economic activities and land use by global agro-ecological zone, as well as on greenhouse gas emissions for agriculture. Some additional inputs on mitigation potentials and costs are also being incorporated into the model and which follows with the supporting policies and decision making such as:-

- Global economic analysis of mitigation policy options
- Supporting the international climate change negotiations process
- Global review of on-farm decision-making processes

i) Land Tenure:

Climate change mitigation policies that concern the forestry and agriculture sectors will have to address land tenure issues in order to foresee, plan and distribute risks and benefits of their incentive schemes. Unclear and often complex tenure arrangements are still prevailing in large areas of many developing countries, and addressing them is a major challenge. MICCA is working with partners to understand identify, review and raise awareness of key land and resource tenure issues and requirements to be addressed for implementing climate change mitigation policies (including REDD+) in the forestry and agriculture sectors.

Following land tenure security is essential for climate change mitigation in agriculture are as follows:-

- Land rights are first and foremost for livelihoods and resource distribution issue. If inappropriately designed mitigation programmes are implemented where tenure insecurity still prevails, local farmers may find their use rights destabilized as the value of the land increases. This may lead to displacement of resource dependent users, conflict and increased food insecurity.
- Long-term soil and biomass carbon accumulation and conservation require foresight. Without tenure security, it may not make financial sense for farmers to adopt and invest into land management practices, such as the cultivation of perennial crops and tree planting, the construction of water harvesting facilities, and the regeneration of degraded lands that will yield returns only in the long-term.
- Benefit distribution mechanisms attached to investments for increased productivity and other possible incentive measures for climate-smart agricultural practices must identify who the beneficiaries are. In situations with unclear tenure, this becomes unfeasible.
- The risks of conflict and lack of accountability that can be a consequence of unclear tenure arrangements may deter those who want to invest in sustainable, climate-smart agriculture.

j) Community for Climate Change Mitigation in Agriculture:

The Community for Climate Change Mitigation in Agriculture provides a network for practitioners, civil society organizations, national policy decision-makers and private sector working on reducing greenhouse gas emissions in agriculture. The Community facilitates the development and adoption of sustainable mitigation practices currently being used in agricultural production systems in different parts of the world.

Some of the Community for climate change mitigation in agriculture are followed to be practice and serves such as:-

- make information about climate change mitigation in agriculture easily accessible for practitioners;
- foster knowledge-sharing and collaboration among practitioners;
- support collective efforts to influence relevant policy areas; and
- increase the visibility of climate change mitigation in agriculture at a global level.

Some examples made through activities practices maintained and held in Nagaland region in climate change mitigation in agriculture are shown below:-

Conservation in agriculture:

Conservation agriculture is as an approach to farming that seeks to increase food security, alleviate poverty, conserve biodiversity and safeguard ecosystem services. Conservation agriculture practices can contribute to making agricultural systems more resilient to climate change. In many cases, conservation agriculture has been proven to reduce the farming systems' greenhouse gas emissions and enhance its role as carbon sinks. The learning event on conservation agriculture brought together experts and practitioners from many countries to discuss the importance and different methods of conservation agriculture practices. The event was organized by the Community of practice for climate change mitigation in agriculture and CA-Cop Conservation agriculture community of practice.



Agroforestry, food security and climate change:

Agroforestry is an example of a triple – win practice as it can support food security, mitigate climate change and contribute to adaptation to these changes. In addition to reducing greenhouse gases by capturing carbon, agroforestry systems also improve resilience to climate variability and extreme conditions, such as heavy rains or droughts. As such, agroforestry is considered a climate-smart practice. Moreover, it can significantly improve food security as it provides farmers with diversified food sources, additional income and improves resilience of the production system, thus improving the food availability, food accessibility, utilization and food production system stability. The role of agroforestry in both climate change mitigation and adaptation is progressively being acknowledged in policy dialogue arenas where climate change is being discussed on local and international levels.



Towards climate responsibility management:

It is important for scientists working on local adaptation mechanisms to climate change (...) to compare notes, share information, and learn from progress made in other regions of the world. The establishment of a network focusing on climate smart agriculture will facilitate the advancement of achieving food security in most developing countries. Effective agriculture and climate change policies can also boost green growth, protect the environment and contribute to the eradication of poverty. FAO works closely with many of the world's most vulnerable populations to help them increase their agricultural productivity, while ensuring that the natural resources they depend on are not exploited or depleted. However, implementing this approach is challenging, partly due to a lack of tools and experience. Climate-smart interventions are highly location-specific and knowledge-intensive. Considerable efforts are required to develop the knowledge and capacities to make CSA a reality.



Tackling climate change through livestock:

An important emitter of greenhouse gases (GHG), the livestock sector also has a large potential to reduce its emissions. This is the main conclusion drawn by the report “Tackling climate change through livestock”. This newly released report provides the most comprehensive global assessment made to-date of the livestock sector's GHG emissions and its mitigation potential.

The report also presents a detailed assessment of the magnitude, the sources and pathways of emissions from different production systems and supply chains. Relying on life cycle assessment, statistical analysis and scenario building, it identifies concrete options to reduce emissions.

It comes at a time when the world needs to urgently reduce GHG emissions to avert catastrophic climate change. The livestock sector can make an important contribution to such international efforts by offsetting some of the sector's emission increases, which are expected as demand for livestock products is projected to grow by 70 percent by 2050.



Learning events:

The learning events are a series which put all those activities of training demonstration with practical and theory. The experts put all those necessary objective by conducting training, mentioning and using all those advance tools for the farmers as smart agriculture and measured with height and weight level while farming in the field, Each learning event takes place over a period of two to three weeks and gathers professionals, practitioners, and institutions to discuss issues related to climate change and agriculture. Through this, the Community of Practice has grown to more then higher level and developing level in smart agriculture.



Discussion fora:

The Community's members communicate via its discussion group. The experts allows them to exchange experiences, questions and advice with each other individually or in discussion threads. It interacts with the farmers individually and allows them to share their difficulty while farming and putting advance tools to the field. They can also benefit from the moderation and support provided by the Community's co-ordination team. The experts want the group to become an active forum in which practical and technical issues relating to mitigation in agriculture.

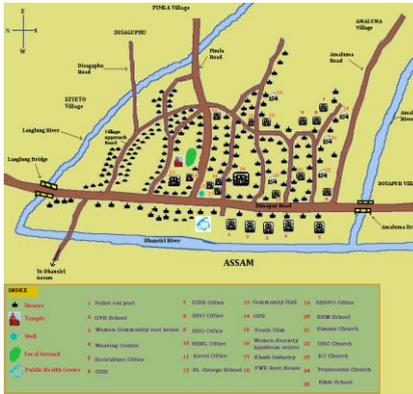


k)Using GIS for climate change mitigation:

In GIS climate change mitigation and adaptation are addressed separately. The GIS for climate change mitigation cases describe how select agencies have used GIS tools to analyze the GHG emissions associated with projects or transportation plans, as well as and to identify opportunities to reduce or remove GHG emissions from the atmosphere. Some **simple examples done from Nagaland region are highlighted below:-**

Bench mark survey:

A bench mark survey was conducted as per the guidelines provided by CRIDA, Hyderabad. The objective of the survey was to collect first hand information on land use pattern, area, production and productivity of different agricultural and Horticultural crops, Livestock composition and production, Fishery production, awareness level of farmers about climate change, ground water level and its uses, income from agriculture, level of crop loss due to climate variability as per 100 farmers selected randomly on recall basis.



Social map



Resource map



Data collection

Soil Sample Analysis:

As per the guidelines of CRIDA, Hyderabad 100 soil samples were collected from different location in the NICRA village for analysis to study the status of nutrient available to crops which will help in evaluating soil productivity and determining intervention based on soil nutrient status in future.



Analysis of soil samples

Average results of the 100 soil sample analysis:

Sl. No	Components	Mean
1.	Organic Carbon (%)	0.57
2.	Nitrogen (kg/ha)	165.59
3.	Phosphorous (kg/ha)	6.56
4.	Potassium (kg/ha)	145.81
5.	Manganese (mg/ml)	214.32
6.	Copper (mg/ml)	5.72
7.	Iron (mg/ml)	431.31
8.	Zinc (mg/ml)	11.65

Name of village	: Dhansiripar
Altitude	: 171
Latitude	: 25 ^o 47.968'N
Longitude	: 0.93 ^o 38.252'E
No. of households	: 305
Population	: 2367
Per capita income	:
Total cultivated area	: 352 ha
Major soil types	: Sandy loam and loamy soil
Agro climatic zone	: Sub tropical hill zone and mid tropical hill zone
Mean annual rainfall	: 1657 mm
Major crops	: Rice, Maize, Mustard and vegetable crops
Climate vulnerability	: Draught like situation and late onset of monsoon

Installation of Digital Weather Station at Dhansiripar Village:

Digital weather station was installed in NICRA village as part of enhancing weather literacy, collection of climate/weather data pertaining to the village so as to help the farmer's in understanding the extent of vulnerability of the village agriculture by assessing the different weather parameters like temperature, Relative humidity, Wind direction, pressure and rainfall



Digital weather station

Months	Temperature (Indoor) °C	Temperature (outdoor) °C	Relative Humidity (%)	Rainfall (mm)
May 2013	28.80	29.30	75.08	115.45
June 2013	32.13	33.40	85.24	324.04
July 2013	30.55	30.47	76.88	495.03
August 2013	29.69	29.43	80.52	791.36
September 2013	31.06	31.54	73.00	926.14

Using GIS for climate change adaptation:

GHG emissions is an important strategy for reducing the long-term effects of climate change, mitigation will likely do little in the short-term to alter climate change processes . Climate change stands to have effects on transportation infrastructure in a variety of ways. For example, increased temperatures can accelerate the degradation of infrastructure; increased precipitation may increase short-term flooding of roadways; sea level rise may inundate existing infrastructure; and, increased

storm intensity and the number of events may lead to greater service disruption and infrastructure damage. Such impacts pose safety and economic risks for the transportation sector and the public.

As a result, transportation agencies have begun to consider the effects of climate change in the way they plan, design, and construct projects. They are doing so in order to minimize impacts and increase the resiliency of the transportation system.

There are five primary actions for transportation facilities and services:-

- Repair and maintenance
- Reconstruction/strengthening
- Relocation
- Abandonment
- Improve redundancy

These actions differ in cost and capital investments required and have varying economic, social, and environmental implications. For example, while repair and maintenance can have low short-term capital but high long-term costs due to recurrence of the problem over the long-term. Generally, the appropriate adaptation action will depend on the specific context of the transportation facility or service being considered and the risk the transportation agency and its stakeholders are willing to accept. The highest priorities are those that face the highest risk and are of critical importance.

Transportation agencies are using GIS tools to help in the effort to identify transportation infrastructure vulnerabilities and those assets considered priorities. Such tools are also being used to evaluate potential adaptation strategies to address future climate conditions. For example, the “Impacts of Climate Variability and Change on Transportation Systems and Infrastructure”

Technology demonstration with climate variability:

The following cases highlight how GIS is being used to support climate change adaptation. Some additional examples managed by Nagaland region using “technology demonstration components under four modules to cope with current climate variability” such as given below:-

Module I: Natural Resource Management:

Construction of Diversion Channel:

The farmer’s of Dhansiripar village experience late onset of monsoon and subsequent moisture stress during peak season for transplanting of summer rice. Farmer’s use to divert the water from Langlung River to their field with the help of rock fill dam supported by bamboo structures and *kutcha* irrigation channel to fulfill the water requirement for timely transplanting. But, due to frequent washout the temporary dam by strong river current the farmers spend most of their time in repairing the dam. Identifying the resource KVK Dimapur mobilized the farmers to construct “Rock fill Dam” using sausage wire and stones along with a concrete irrigation channel (1100 ft.) on community participatory approach covering catchment area of 180 hectares. The materials like sausage wire, cement, sand and bricks were provided by KVK Dimapur where as the farmer’s put in their labour in construction of the dam and channel. Thus, during the year 2012, 80 farming household of the village could irrigate their field in time which resulted in significant increase in summer rice production with a productivity of 28.50 q/ha as against 18-20 q/ha in the previous year. This has also led to increase in moisture availability for the second crop leading to higher cropping intensity.



Dam washed away by strong current



Planning for construction of a rock fill dam



Dam constructed with Sausage wire & boulders



Water from the dam flowing towards the field

Sl. No.	Particulars	Before installation of dam (2011)	After installation of dam (2012)
1.	Area under summer rice (ha)	100.32	125.40
2.	Productivity (q/ha)	18-20	28.50
3.	Cropping intensity (%)	116	124



Moisture stress before construction of irrigation channel



A good crop after construction of irrigation channel



Luxuriant growth of Toria as second crop



Field Day on Toria (M-27)

Low cost water harvesting – Jalkund:

In the recent years the farmers of Dhansiripar witness decline in number of rainy days, erratic rainfall with an increase in high intensity during August-October resulting in water scarcity during lean season for cultivation of winter vegetable and feeding to livestock and poultry. In an effort to harvest rainwater during rainy season and subsequent use during dry spell, KVK Dimapur initiated to popularize low cost water harvesting – Jalkund using Silpaulin lining (5mx4mx1.5m) size with a capacity to store 30,000 liters of rainwater. Inputs like Silpaulin, digging charge (Rs. 1500.00) high value winter vegetable seeds like Broccoli, celery, capsicum and French beans etc., were distributed to 15 farmers during the year 2011-12 & 2012-13. This help in supplemental irrigation of vegetable crops and feeding to livestock during lean period apart from domestic uses.

Economics of Jalkund/Cropping season

Crop	Cropping period	Area (m ²)	Crop Equivalent Yield (Kg)	Average Gross Cost (Rs)	Average Gross Return (Rs)	Average Net Return (Rs)	B:C Ratio
Broccoli Celery Capsicum French bean Tomato Potato	October to March	1200	188.33	3345	5650	2305	1:1.68



Functional Jalkund with fencing



Farmers watering vegetable from Jalkund

Module II: Crop production:

System of Rice intensification Method:

Paddy is the major crop in Dhansiripar village of Dimapur district. Almost 40 percent of the field could not be cultivated due to moisture stress or due to late onset of monsoon. Therefore, an attempt was made to introduce the System of Rice Intensification method of cultivation technology under NICRA project which is gaining popularity in India and started picking up in NEH region. Keeping in view for its effectiveness in improving productivity of rice and saving resources like water, seed, time, soil health etc, one hectare of land was brought under SRI to demonstrate the technology with paddy variety RCM-11 covering four beneficiaries.



Farmers Transplanting paddy in SRI method



Paddy at tillering stage in SRI method

Performance of SRI at Dhansiripar village, Dimapur.

Parameter	2011-12		2012-13	
	Conventional	SRI	Conventional	SRI
Av. Yield/ha	26.60	31.40	28.56	36.6
Net Income (Rs)	6450	9600	11560	20700
B:C Ratio	1.15:1	1.44:1	1.68:1	2.30:1

Cultivation of oilseed as a second crop:

Popularization of Oilseeds like Linseed and Toria as a second crop after the harvest of paddy was initiated to utilize the residual moisture available in the soil and to increase the cropping intensity as farmers of Dhansiripar practice only mono cropping. Thus, oilseed crops like Toria (Var.TS-36, TS-38 and TS-67) and Linseed (Var. Shweta) were cultivated in large scale covering an area of 40 and 10 hectares in the year 2011-12 and 50 and 10 hectares in 2012-13 respectively to study the performance in terms of yield and economic return. Both Toria and Linseed crops performed well under residual moisture condition with an average yield of 10-12 q/ha and 10-13 q/ha giving an average net income of Rs 12,000 and 10,500 per hectare respectively.



Toria as second crop along the irrigation channel



Director, ICAR Complex, visiting the Toria field

Performance of Toria/Linseed as second crop

Crops	2011-2012			2012-2013		
	Av. Yield (q/ha)	Net Income	B:C Ratio	Av. Yield (q/ha)	Net Income	B:C Ratio
Toria/Mustard	9.05	6100	1.50:1	9.40	15700	2.25:1
Linseed	10.20	15600	2.04:1	9.73	18455	2.18:1

Broccoli cultivation:

Demonstration on Broccoli cultivation as high value crop was initiated to popularize among the farmers to enhance the system resilience in the area. It also helps the farmers earn maximum profit and encourage the farmers to use the sprinkler irrigation set. This technology not only help in effective utilization of irrigation water from Jalkund and river sources but, it also increases water use efficiency to get maximum profit. Initially, in the year 2011-2012 ten farmers were selected to demonstrate the cultivation of broccoli variety F-1 hybrid Harumi (Green head) covering an area of 0.5 hectare followed by 1 hectare in the year 2012-2013 benefitting 15 farmers. The result obtained was encouraging with an average yield of 144.6 q/ha. Farmers of the village sell their produces in local and Dimapur market with a price ranging from Rs. 20 to Rs. 60/kg.



Broccoli cultivation near the water source



KVK officials visiting broccoli field



Matured Broccoli ready for harvest

Performance of Broccoli F-1 hybrid Harumi (Green head)

Broccoli F-1 hybrid Harumi	2011-12	2012-13
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(Green head)		
Av. Yield (q/ha)	170.00	170.40
Net Income	2,80,000.00	2, 98, 800.00
B:C Ratio	3.5:1	2.21:1

Assam lemon plantation:

Assam lemon is one of the important fruit crops of the region and is grown in backyard or kitchen garden by the farming community in small scale for family consumption. Dhansiripar village under NICRA project has large area under cultivable wasteland lying vacant due to moisture stress and lack of irrigation facility. Assam lemon plantation was initiated with an attempt to convert this land into orchards. 10 farmers were selected and inputs like Assam lemon samplings (1000 nos.), Vermicompost and plant protection chemicals were provided during the first year, *i.e.*, 2011-2012. Results shows that 80 per cent of the saplings are surviving during the second year and it is expected to get fruiting from third year which will replace cultivable wasteland into Assam lemon orchards.



Distribution of Assam lemon saplings

Assam lemon plantation during the second year

Mushroom cultivation:

Paddy is the major crops in Dhansiripar village where tonnes of agricultural waste are produced and a major part of it is left out to decompose naturally or burn in situ. This can effectively be utilized to produce highly nutritive food such as mushrooms. Mushroom is one such component that not only imparts diversification but also help in addressing the problem of quality food, health and environmental related issues. One of the major areas that can contribute towards goal of conservation of natural resources as well as increase in productivity is the recycling of agro-wastes including agro-industrial waste. Oyster mushroom cultivation was demonstrated as it can be grown seasonally in wide range of temperature, less prone to diseases, fast growth rate, easy cropping, low cost of production and most suitable for rural areas which can create self employment and additional income to the farmers. Keeping in view the above facts three SHG's and two farmers were selected for Oyster mushroom cultivation wherein inputs like spawn, wooden box, polythene sheet, spirit, cotton, utensils etc, were provided. On an average, the farmers harvested 1.5 kg of mushroom per cube with an average net profit of Rs 103 per cube.



Apiculture for increase oilseed production and income generation:

Apiculture/Beekeeping is one of the most universal agriculture endeavours. Bees act as a pollinating agent for enhancing the production and productivity of oilseed crop specially Toria/Mustard and Linseed apart from honey production. Their distribution, multipurpose nature makes their management relatively simple. Beekeeping was introduced in the village selecting five (5) farmers where necessary trainings and inputs like bee colony and other materials required for apiculture were provided. It helps in generating self employment and improves the income of small and marginal farmer's of the village



Traditional Beekeeping before NICRA intervention.



Distribution of beekeeping inputs to farmers



Beekeeping in farmer's field



Harvesting of Honey

Vermicompost unit:

Paddy is the major crop cultivated in Dhansiripar village of Dimapur district. The crop residues and various weed species are left as such in the field or burnt. Therefore, the soil must be fed in such a way that the activities of beneficial soil organism's necessary for recycling nutrients and producing humus are not inhibited. Use of earthworm for degradation of organic wastes and production of Vermicompost is being popularized among the farmers. Three (3units) of Vermicompost was constructed where materials like Cement, Bricks, Sand, Chips and earthworm were provided. Labour for construction was done by the farmers. Department of horticulture, Government of Nagaland as a convergence approach provided 30 units of portable Vermin bed to the farmers through their various scheme to strengthen the demonstration. It is expected to harvest 2-3 tonnes of Vermicompost which can be used for enriching the soil and earn additional income by selling the Vermicompost in local market at the rate of Rs 10 per kilogram.



Portable vermin bed



Cemented vermicompost tank

Low cost net house:

Two numbers of Low cost net houses was constructed in the village for raising winter vegetable (Broccoli, Cabbage, Cauliflower, Tomato, Capsicum etc.) seedlings to be distributed among the farmers by the farmers club.



Module-III: Livestock & Fisheries:

Programme on vaccination camp, mitigation of vitamin and mineral deficiency for livestock and poultry:-

Two days of vaccination camp were organized in Dhansiripar village under the NICRA project. A total of 300 cattle, 75 goats, 250 pigs and 200 local birds were vaccinated. Cattle were vaccinated against Foot and Mouth Disease (FMD) whereas pigs were vaccinated against Swine fever and local poultry birds against Ranikhet Disease. Besides vaccination, animals were treated against skin infections, diarrhea, bacterial infections and parasitic infestations. Due to hilly terrain, the livestock and poultry in this region are deficient in macro and micro minerals. Among the several nutritional qualities, mineral nutrients are very important for health, production and reproduction for livestock and poultry. Keeping in view of the above mentioned problem minerals and vitamins have been supplemented to 25 units covering 25 beneficiaries



Vaccination camp organized

Rural youths trains on Distribution of minerals and administering vaccines and vitamins for livestock medicines

Backyard poultry:

PRA was conducted before initiating the project among the farmers of Dhansiripar village, and it was found that all the poultry farmers were keeping only indigenous birds (100 %) that too in their backyard as secondary source of income. But the production level of desi birds was so low that it could not meet the requirements of the local people. KVK Dimapur under NICRA project provided the farmers with 1000 nos. of one month old Vanaraja and Gramapriya birds covering 40 families/households. These birds due to their physical adaptability to the diversified agro-climatic conditions and better production potential in terms of meat and egg with minimum investment were considered as the choice of bird in NICRA village. The average body weight was recorded from fourth to 16 weeks randomly. At fourth weeks the average body weight was 612 ± 73.76 g/bird in Gramapriya and 590 ± 51.61 g/bird in case of Vanaraja that increased up to 2420 ± 369.83 g/bird at sixteen weeks in Gramapriya and 2869 ± 323.87 g/bird in case of Vanaraja respectively. Average no. of egg production was 167.2 ± 9.55 nos. bird/year in Gramapriya birds and 155.2 ± 6.76 eggs/bird/year in case of Vanaraja birds. The eggs were mostly used for home consumption and some were sold @Rs. 200/set of eggs. Culling of extra adult male birds was done on 141th day with average body weight of 2.93 ± 0.27 kg/bird in Gramapriya and 3.03 ± 0.37 kg/bird in Vanaraja and sold @ Rs. 150/kg. Average egg weight in grams was 47.37 ± 3.74 for both the breeds. The survivability percentage ranged from 88.25 to 90.75 % which indicates that these birds are sturdy and can with stand even at high atmospheric temperature. The farmers are still keeping the birds for egg production.



Distributed of 21 days old chicks to the farmers

Low cost poultry shed



Vanaraja birds scavenging in the backyard



Farmer with the Vanaraja eggs

Piggery development:

Pig rearing is traditional among Naga households as it helps them to meet the religious and social obligations in the form of meat or cash. Based on the information from PRA and designed questionnaires through random sampling among piggery farmers, it was found that most of the pig lovers were keeping local pigs (94.44 %) in their backyard without providing any shelter (77.78 %). The production from local pigs was less and animals being exposed to various environmental stresses were not satisfactory. Keeping in view of these factors KVK introduced improved breeds of pigs covering 10 households/families with 4 piglets /unit in the ratio of 1:3. Financial assistance was also provided for concrete flooring. Roofing and side walls were made by their own with locally available materials. Feeding was done using locally available non-conventional fodders along with kitchen waste and some farmers even incorporated wheat bran and rice polish depending upon the availability. The body weight was taken at monthly interval. The average body weight at 2 months was 8.57 ± 2.35 kg/pig, at 5 months it was 23.86 ± 8.82 kg/pig and 50.57 ± 13.07 kg/pig at 7th months respectively. Age at first farrowing was 391 ± 33.91 days with average litter size of 8.78 ± 1.20 nos. The survivability percentage is 92 % indicating sustainability and adaptability to local climatic conditions. The farmers are still keeping the pigs for further multiplication.



Traditional method of rearing pigs in the backyard without shelter



Improved pig sty after NICRA intervention



First born piglets under NICRA Project

Fisheries:

Due to climatic change in the district, it has been observed that flowering in paddy in the month of October is coincided with moisture stress (no rain) condition resulting to reduced yield, in order to compensate this loss a secondary agriculture i.e. composite fish culture of six species combination in the ratio of 20:20:15:20:20:10:15 for Catla, Rohu, Mrigal, Silver Carp, Grass Carp and Common Carp respectively. The NICRA village is having 80 small ponds where rain water harvesting is carried out and fish farming is being done as well. The average initial pH of the fisheries was 6.42 ± 0.24 which is moderately acidic, therefore advised to go for liming accordingly @ 1000 kg of lime/ha. The average water temperature was 27.53 ± 4.24 which was within the normal range. The farmers could yield 1 ton/ha after 8 months of rearing and could earn 60-70 thousand/ha in a year by selling it @ Rs. 150/kg.



Lime distribution to fishery beneficiaries



Recording the Water temperature with the help of digital thermometer



Weighing of the Silver Carp fish after harvesting



Farmers with their fish after 8 months of rearing

Module IV: Institutional Interventions:

Village Climate Ricks Management committee (VCRCM):

The village climate risk management committee were selected representing all the categories of farmers in the village with the approval of village council members and Gaon Buras (G.Bs). The committee is involved in all discussion leading to finalizing interventions, selection of target farmers, area of demonstration and the responsibility to look after the implementation of the programme based on the need of the farmers.

Custom Hiring Centre committee: In order to address the climate vulnerabilities and supplementing the inadequate draft power in the village custom hiring centre was established as per NICRA project norms, to finalize the purchase of farm implements and machineries for use during climate aberrations. The committee members were selected by the farmers in presence of the village authorities and KVK officials to look after the affairs in price fixing, record keeping, account maintenance, renting and repairing etc.

Name of Implement	Numbers	Revenue generated (Rs/year) for the year 2011-13
Power tiller	1	18469.00
Power operated seed cum fertilizer driller	1	
Water pump with 100 feet discharge pipe	2	
Cono weeder	5	
Prun shear	5	
Knapsack sprayer	5	
Power sprayer	2	
Foot sprayer	1	
Duster	1	
Wheel hoe	4	
Electric operated thresher	2	
Maize Sheller	10	
Sprinkler irrigation set	1	



Distribution and Demonstration of farm implements under custom hiring

Capacity Building:

After the implementation of the project priority was taken to uplift the knowledge of the farming community. A total number of 24 training programme was conducted covering 553 numbers

of beneficiaries during the year 2011-2013, covering various agricultural aspects like Crop Production, Livestock and Fisheries and Natural Resource Management. Other extension activities viz. Method Demo, Diagnostic Visit, Field Visit, Group Discussion, Awareness campaign, Field Day, Agro Advisory Service etc were also covered.

Trainings:-

Thematic area	No. of Courses	No. of beneficiaries		
		Male	Female	Total
Crop production	13	161	110	271
Livestock and Fisheries	6	101	37	138
Natural Resource Management	5	100	44	144
Total	24	362	191	553

Extension Activities:

Name of the activity	Number of programmes	No. of beneficiaries		
		Male	Female	Total
Method Demo	4	71	31	102
Diagnostic Visit	33	150	85	235
Field Visit	6	60	35	95
Group Discussion	6	51	39	90
Awareness campaign	1	20	10	30
Field Day	1	25	7	32
Agro Advisory Service	3	14	7	21
Grand Total	54	391	214	605

Other Activities:

- Participated in the poster presentation during North East Region Agri Expo2012 on the Topic “Enhance crop productivity by sustainable irrigation through diversion channel”.
- Participated in the poster presentation and adjudged the **3rd Best Poster** during the National Seminar on “Climate change and climate resilient agriculture” from 18-19 March, 2013 organised by Agromet Advisory Services, Sonitpur, in collaboration with AICRPDA, B.N. College of Agriculture, AAU, Biswanath Chariali, Assam on the topic “**Low cost rain water harvesting- Jalkund**”.
- Participated in the power point presentation during the National Seminar on “Climate change and climate resilient agriculture” from 18-19 March, 2013 organised by Agromet Advisory Services, Sonitpur, in collaboration with AICRPDA, B.N. College of Agriculture, AAU, Biswanath Chariali, Assam on the topic “Enhance crop productivity by sustainable irrigation through diversion channel”.
- A folder on “**Low cost rain water harvesting- Jalkund**” compiled by Anamika Sharma, Rabi Kolom, Z. James Kikon, Imliakum Pongen

m) Observations & Recommendations:

Transportation agencies are increasingly considering climate change in their decision-making processes. Accordingly, the use of GIS to support climate change analyses in the transportation field is emerging as a common practice. As demonstrated by the reported case studies, GIS can help transportation planners and asset managers understand and respond to transportation-related GHG emissions and to the potential effects of climate change.

Some of the following points are shown below how GIS observed and recommend with the climatic change:-

- GIS tools can help transportation decision-makers prioritize responses to climate change. GIS can be used for both complex and less detailed analysis.
- There is a need to downscale data and to identify appropriate data sources.
- A visual representation of modeling results can be useful in explaining complex and controversial findings to non-technical audiences.
- Recommendations for FHWA
- Promote state and local efforts to identify areas where restoration or maintenance of ecosystems may be able to reduce highway maintenance or repair costs.
- Provide information on climate change resources and available datasets that may be useful for GIS analysis.
- Provide opportunities for practitioners to share information on using GIS for climate change.

6.4. Conclusion:

Agriculture has a unique role in development. It is our primary source of food, has significant potential for mitigation of global GHG emissions, and is particularly sensitive to climate change. Innovations in agriculture have always been important and will be even more vital in the context of climate change. Thoughtful policy responses that encourage the development and diffusion of appropriate agricultural technologies will be crucial to enabling an effective technological response. A careful balance of institutional change and wise investments is required to deal with both the demands of climate change and the demands of improving lives of the poor.

Today Esri is the market leader in GIS. Esri software is used in more than 300,000 organizations worldwide including each of the 200 largest cities in the United States, most national governments, more than two-thirds of Fortune 500 companies, and more than 7,000 colleges and universities. Esri applications, running on more than one million desktops and thousands of web and enterprise servers, provide the backbone for the world's mapping and spatial analysis. Esri is the only vendor that provides the complete range of GIS solutions for desktop, mobile, server, and web platforms. For more information Esri GIS technology, visit esri.com. For more information about GIS Day events near you, to register your own event, or to receive presentation materials, visit gisday.com

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Basics of Computer Science and Some of Its Areas of Application in Agriculture

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7.1 Overview: This chapter proposes an outline of computer science, its areas application with some reference to the use of computer science in the field of Agriculture.

7.2 Key words: Artificial intelligence, Office Automation, Global Positioning System, Geographical Information System, E-Learning, Electronic Commerce, Software engineering

7.3 Introduction: Computer Science is the study of computers and computational systems. Unlike electrical and computer engineers, computer scientists deal mostly with software and software systems; this includes their theory, design, development, and application.

Principal areas of study within Computer Science include artificial intelligence, computer systems and networks, security, database systems, human computer interaction, vision and graphics, numerical analysis, programming languages, software engineering, bioinformatics and theories of computing. **Theory of computation** is the branch that deals with how efficiently problems can be solved on a model of computation, using an algorithm and **applied Computer Science** aims at identifying certain Computer Science concepts that can be used directly in solving real world problems.

7.4 Computer Science in Agriculture: Computer Science is applied in agriculture in various forms like e-commerce, artificial intelligence, database management system, image processing, GIS, GPS and office automation etc. Some of the fields where computer science technology is applied in the field of agriculture are as follows.

7.4.1 Artificial Intelligence: Artificial intelligence aims to synthesize goal-orientated processes such as problem-solving, decision-making, environmental adaptation, learning and communication which are found in humans and animals. Artificial intelligence is mainly associated with robot development. “From the automation point of view, agriculture remains mainly labour intensive not only in those countries where manpower is relatively cheap, but also for those enterprises which enthusiastically embrace latest technologies in an effort to improve their competitiveness and to ensure top quality products” (Gustavo Belforte, 2006). A good example of robotic development in agriculture is “automated systems for milking the dairy cattle without the human labor where milking is done with the help of a robot”(U.R. Wageningen 2008). It helps the farmer to save time and labor in milking process and allow the farmer more time in supervising the farm. Farmer can also improve

management by using the data gathered from the computer and analyze each cow's performance in milk yield and also be alerted unusual changes which may be sickness or injuries.

7.4.2 Databases and information retrieval: A database is intended to organize, store, and retrieve large amounts of data easily. Digital databases are managed using database management systems to store, create, maintain, and search data, through database models and query languages. A good example of database information retrieval in the field of agriculture is IPM informatics. It is computer applications in Integrated Pest Management where it encompasses computer-based storage, retrieval, sharing, and optimal use of pest management data, information, and knowledge for problem solving and decision-making. It includes all basic and applied fields in pest management sciences (acarology, entomology, plant nematology, plant pathology, vertebrate pest management and weed science) and is closely tied to modern information technologies, particularly in the areas of computing and communication.

7.4.3 Office automation : The office automation is application of computers, computer networks, telephone networks, and other office automation tool such as scanners, printers and electronic security systems to increase the productivity of organizations. One example of distinct advantage shows in automation of land administration is that “Worldwide, 61 percent of economies have an electronic database for encumbrances, including almost all Organization for Economic Co-operation and Development (OECD) high-income and Eastern European and Central Asian economies. But in Sub-Saharan Africa and South Asia, more than 80 percent retain paper-based systems. This lag in automation makes a difference. In economies with computerized registries, transferring property takes about half as much time. Twenty-nine of 30 high-income OECD economies have electronic registries, and 85 percent allow online access to information on encumbrances, either for all or for professionals such as notaries” (ICT in Agriculture. P-348)

Table- Where Registering Property Is Easy and Where It Is Not

Most Business friendly	Rank	Least Business friendly	Rank
Saudi Arabia	1	Angola	174
Georgia	2	Guinea-Bissau	175
New Zealand	3	Liberia	176
United Arab Emirates	4	Belgium	177
Armenia	5	Eritrea	178
Belarus	6	Nigeria	179

Lithuania	7	Timor-Leste	180
Norway	8	Micronesia, Fed. Sts.	181
Slovak Republic	9	Marshall Islands	182
Azerbaijan	10	Brunei Darussalam	183

Source: Doing Business database, <http://www.doingbusiness.org/data/explore-topics/registering-property>.

Note: Rankings are the average of the economy's rankings on the procedures, times, and cost to register property.

It can be easily pointed out that application of office automation is one of the solutions to enhance the efficiency and inter-connectivity in the field of agricultural development. In addition using computers and laptops reduces paperwork burdens and also reduces time in accessing the information.

7.4.4 E-learning: E-learning refers to the use of electronic media and information and communication technologies (ICT) in education. E-learning is broadly inclusive of all forms of educational technology in learning and teaching. E-learning is broadly synonymous with multimedia learning, technology-enhanced learning (TEL), computer-based instruction (CBI), computer-based training (CBT), computer-assisted instruction or computer-aided instruction (CAI), internet-based training (IBT), web-based training (WBT), online education, virtual education. These alternative names emphasize a particular aspect, component or delivery method.

E-learning includes various types of media that deliver text, audio, images, animation, and streaming video, and includes technology applications and processes such as audio or video tape, satellite TV, CD-ROM, and computer-based learning. "Internet is a tool for the advancement of learning. A textbook which was a traditional learning tool are now out of date as internet moves quickly and provides up to date information and includes a wide variety of international sources. Now learning has a greater reliance on information gained from the internet rather than from textbooks. Reliance on this tool has increased exponentially and incredibly". (Nilesh Jain 2011)

"E-Learning is a potentially viable and cost-effective way to facilitate knowledge development among agricultural professionals and farmers but is still not widely employed. Many of the main challenges are known and a number of organizations have made significant progress in overcoming them". (Buenafe Abdon. 2008) "E-Learning can benefit every agricultural community around the world, from research scientists in American universities to the poor subsistence farmers of developing countries. It can benefit persons of all ages, all locations, and bridge the gaps created by mountains, deserts, oceans, wars, and political boundaries. E-Learning in agriculture can assemble resources and knowledge from distant places that may otherwise be unobtainable. It can connect farmers with far

away researchers and experts. It can also dramatically increase the numbers of farmers who can be reached by single training programs” (Leary & Berge 2006, p.51).

E-learning can be within or outside the classroom. It can be self-paced, asynchronous learning or may be instructor-led, synchronous learning. E-learning is suited to distance learning and flexible learning, but it can also be used in conjunction with face-to-face teaching. In Agriculture both farmers and technical staffs can be introduced with e-learning as a learning tool or learning medium. The only requirement can be that one must have basic knowledge of the technology for achieving that educational goal.

7.4.5 Electronic commerce: Electronic commerce, commonly known as e-commerce, is a type of industry where the buying and selling of products or services is conducted over electronic systems such as the Internet and other computer networks. Electronic commerce draws on technologies such as mobile commerce, electronic funds transfer, Internet marketing, online transaction processing, electronic data interchange (EDI), inventory management systems, and automated data collection systems. Modern electronic commerce typically uses the World Wide Web at least at one point in the transaction's life-cycle, although it may encompass a wider range of technologies such as e-mail, mobile devices social media, and telephones.

It is a platform that can link farmers to buyers. Electronic commerce is generally considered to be the sales aspect of e-business. It also consists of the exchange of data to facilitate the financing and payment aspects of business transactions. This is an effective and efficient way of communicating within an organization and one of the most effective and useful ways of conducting business. There are many portals which are giving information on rates of agricultural commodities which helps the farmers know the price of their commodities and by this way they are able to fetch a good price. It helps in minimizing the dependency on middle man.

7.4.6 Software engineering: Software engineering is the study of designing, implementing, and modifying software in order to ensure it is of high quality, affordable, maintainable, and fast to build. It is a systematic approach to software design, involving the application of engineering practices to software. Software engineering deals with the organizing and analyzing of software—it doesn't just deal with the creation or manufacture of new software, but its internal maintenance and arrangement.

An information system for animal health. “TADinfo” a software package consisting of a Microsoft Access database linked to an ArcView mapping function was issued by Emergency Prevention System for Transboundary Animal and Plant Pests and Diseases (EMPRES) of Food and Agriculture Organization (FAO) in the year 1999. TADinfo was used by FAO's disease control projects for data storage and as an entry point for spatial analysis of disease epidemiology. (www.fao.org). A software called (Lucid) for **identifying pests** was developed at Centre for Biological Information Technology

(CBIT), University of Queensland, Brisbane, Australia to easily identify the pest and retrieve the necessary information on how to combat it. This software with various multimedia modules (images, video, sound) and processing functions will reduce the list of pests. Once you have identified the species, It offers descriptive notes, illustrations, sound recordings and videos. It also provides links to websites and experts offering more detailed information and advice on what pest management steps you may need to take. (www.lucidcentral.com). Application of Software engineering in agricultural field helps in saving time, remote access to information, reduce labor involvement in management which automatically leads to betterment of the farming community.

7.4.7 Global Positioning System: It is a space-based satellite navigation system that provides location and time information in all weather conditions, anywhere on or near the Earth where there is an unobstructed line of sight to four or more GPS satellites. Around the world the system provides critical capabilities to military, civil and commercial users. It is maintained by the United States government. With a GPS receiver it is freely accessible to anyone.

In Today's world because of increasing input costs and decreasing commodity prices, the farmers are looking for new ways to increase efficiency and cut costs. In this context, Precision farming technology would be a viable alternate to improve profitability and productivity. Precision farming inputs based on soil, weather and crop requirement to maximize sustainable productivity, quality and profitability.

In Precision farming, GPS provides benefits in geo-fencing, map-making and surveying. GPS satellites broadcast signals that allow GPS receivers to compute their location. This information is provided in real time, meaning that continuous position information is provided while in motion. Having precise location information at any time allows soil and crop measurements to be mapped. A more accurate estimate of land size also helps farmers determine precise amounts of fertilizer and pesticides needed for their crops. "GPS receiver, either carried to the field or mounted on implements allows users to return to specific location to sample or treat those areas". (Anil Kumar Singh Precision Farming). In some cases farmers do not know the exact size of their land, but they often pay laborers according to the amount of land they work. The farmers used the functions of the GPS receiver to calculate the exact acreage of their farms and pay a fairer price to their workers. (Cynthia Woodsong 1994). In Kenya, for example, the solution to prevent an elephant bull from wandering into farms and destroying precious crops was to tag the elephant with a device that sends a text message when it crosses a geo-fence. Using the technology of SMS and GPS, the elephant can roam freely and the authorities are alerted whenever it is near the farm. (CBS News 2009)

7.4.8 Geographic Information System (GIS): "A GIS is a specific information system applied to geographical data and is mainly referred to as a system of hardware, software, and procedures designed to support the capture, management, manipulation, analysis, modelling and display of

spatially- referenced data for solving complex planning and management problems.

While many other graphical packages could handle spatial data- say AUTOCAD and other statistical packages, GIS is distinct in its capability to perform spatial operations of integration, it is this characteristic of GIS that helps in distinguishing it from other graphical packages.” (Anil Rai. P 129- P 150). In agriculture GIS can be used to store layers of information, such as yields, soil survey maps, remotely sensed data, crop scouting reports and soil nutrient levels. Geographically referenced data can be displayed in the GIS, adding a visual perspective for interpretation. I can be used in decision making such as what to plant and where to plant using historical data and sampling.

7.5 Advantages: Application of computer science in agriculture enhance agricultural production. It increases the efficiency, productivity and sustainability of small scale farms is an area where computer science and its technology can make a significant contribution. Farming involves risks and uncertainties, with farmers facing many threats from poor soils, drought, erosion and pests. Key improvements stem from information about pest and disease control, especially early warning systems, new varieties, new ways to optimize production and regulations for quality control.

7.6 Disadvantages: There arises problems in country like Indian where farmers cannot afford latest technology and unless government comes in support for agricultural infrastructure, it will remain the same and a dream only. Further, power and electricity also remains a major problem for Indian farmers and alternative means of power like solar energy panels, regulated and optimized by ICT, can be a blessing for them. Thus, e-agriculture in India can put India on the higher pedestal of Green Revolution making India self-sufficient in the matters of food grains.

Most users living outside of the main cities had poor telecommunications services; “connection in the rural Internet shop is very slow. This rural-urban and domestic-foreign disparity increases the digital divide and reduces the participation of rural smallholders.

7.7 Conclusion: Attractiveness of the newest technologies can lead to a preference for the latest technologies at the expense of older technologies, yet the newest, most elaborate or most innovative technology may not be automatically the most appropriate. The more complex the technology, the more training and (qualified) extension support it will require to convince the social system.

Computer based intervention improves the livelihood of poor rural families and having the significant direct and indirect impact on enhancing the agricultural production, marketing and post harvest activities, which in turn can further contribute to poverty reduction. It also provides favorable environment where Rejoption (Rejection + Adoption) can happen because farmers get the opportunity to reject the old or outdated technology with adoption of suitable new technology.

Computer science based interventions also focuses on sustainable livelihood approaches which gives foremost priority to stakeholder's voice and their traditional communication practices in policy and programme formation, because farmer acceptance level to information and communication should also be taken into account and their role in farming community should be well defined.

It is important to recognize that these newer technologies do not automatically replace the more traditional forms of communication, knowledge sharing and collective action that have evolved within a given community or region. In designing application of computer science and its technologies interventions, it is necessary to research and understand local information and communication practices, barriers to computer science and ICT-enabled empowerment and priority information and communication needs of end users. Using conventional information and communication tools to address the needs of those who cannot access the computers and ICT because of limitations related to literacy, isolation and social norms is often required.

7.8 Abbreviation:

ICT-Information and Communication Technology,

TEL- technology-enhanced learning

CBI- computer-based instruction

CBT-Computer-Based Training

CAI- Computer-Assisted Instruction

IBT- Internet-Based Training

WBT- Web-Based Training

CD-ROM- Compact Disc- Read Only Memory

EDI- Electronic Data Interchange

GIS- Geographic Information System

GPS- Global Positioning System

EDI- Electronic Data Interchange

EMPRES- Emergency Prevention System for Transboundary Animal and Plant Pests and Diseases

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Fundamentals of Database Management Systems

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1.1 OVERVIEW

- Introduction
- Importance of Database Management System
- Advantages and disadvantages of DBMS
- Entity Relationship Model
- Structured Query Language
- Working with Microsoft SQL Sever
- Recent Developments
- Implementation of DBMS in KVKs

1.2 INTRODUCTION

The development pace of computing appears to accelerate year on year. Database Management Systems (DBMS) have been maturing slowly over the last twenty years and have reached a high level of reliability. Nowadays, all are trying to implement a paperless office. A **paperless office** is a work environment in which the use of paper is eliminated or greatly reduced. This is done by converting documents and other papers into digital form. Preparing databases instead of paper files can be treated as the first step to a paperless office.

8.2.1 WHAT IS DATABASE

A *database* is a set of data that has a regular structure and that is organized in such a way that a computer can easily find the desired information. Data is a collection of distinct pieces of information, particularly information that has been *formatted* (i.e., organized) in some specific way for use in analysis or making decisions. A database can generally be looked at as being a collection of *records*, each of which contains one or more *fields* (i.e., pieces of data) about some *entity* (i.e., object), such as a person, organization, crop, variety, project etc. For example, the fields for a database that is about people who work for a specific institution might include the name, employee identification number, address, telephone number, date employment started, position and salary for each employee.

8.2.2 WHAT IS DBMS

A database management system (DBMS) is a collection of programs that enables users to create and maintain a database. The DBMS is hence a general-purpose software system that facilitates the processes of defining, constructing, and manipulating databases for various applications. Defining a database involves specifying the data types, structures, and constraints for the data to be stored in the database. Constructing the database is the process of storing the data itself on some storage medium that is controlled by the DBMS. Manipulating a database includes such functions as querying the database to retrieve specific data, updating the database to reflect changes in the mini-world, and generating reports from the data.

The main objectives of designing a DBMS should be to:

- provide for large-scale storage of relevant data,
- make it easier for users to access data,
- provide quick response to user requests for data,

- get the latest amendments to the database immediately available,
- eliminate unnecessary/duplicate data,
- be active to allow multiple users at a time,
- allow for the development of database systems,
- protect data from unauthorized access and physical damage.

To qualify a DBMS as a genuine Relational DBMS (RDBMS), a system must have at least the following properties:

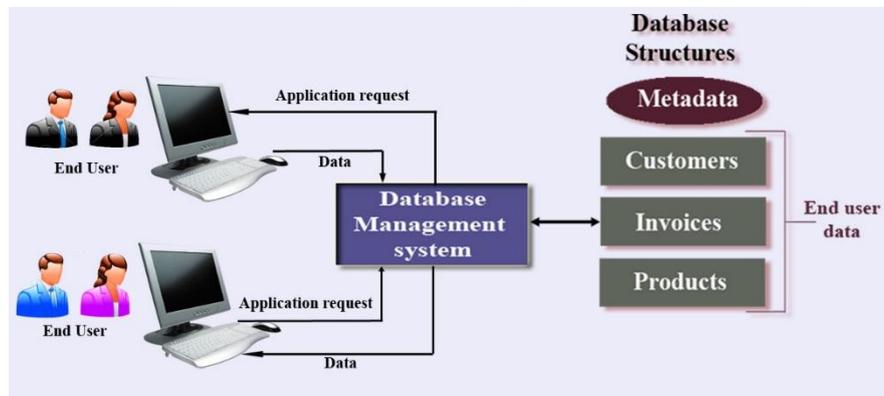
- It must store data as relations such that each column is independently identified by its column name and the ordering of rows is immaterial.
- The operations available to the user, as well as those used internally by the system, should be true relational operations; that is, they should be able to generate new relations from old relations.
- The system must support at least one variant of the JOIN operation.

DBMSs are commonly used to manage:

- Membership and subscription mailing lists
- Accounting and bookkeeping information
- The data obtained from scientific research
- Customer information
- Inventory information
- Personal records
- Library information etc.

8.3 IMPORTANCE OF DATABASE MANAGEMENT

Databases are collections of independently stored information pieces (data), and management of a database involves initial indexing of available data by 'tagging' the individually stored information based on common factors or lack thereof. This is done through assignment of values which represent relevant criteria (i.e. phone numbers, names, addresses, etc.). A DBMS is

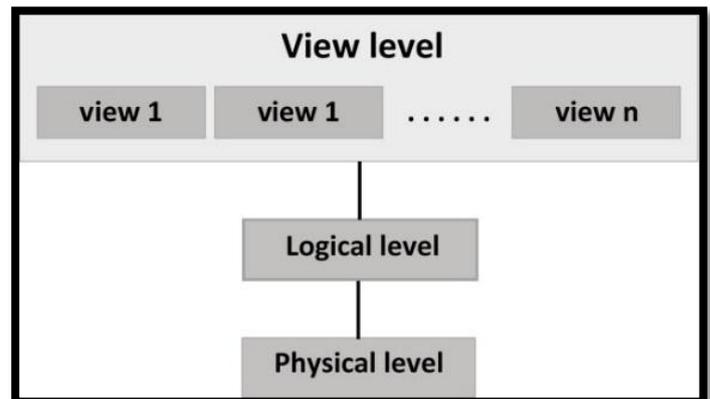


1.3.1 Image: DBMS Architecture

designed to manage a large body of information. Data management involves both defining structures for storing information and providing mechanisms for manipulating the information. In addition, the database system must provide for the safety of the stored information, despite system crashes or attempts at unauthorized access. If data are to be shared among several users, the system must avoid possible anomalous results due to multiple users concurrently accessing the same data. Examples of the use of database systems include airline reservation systems, company payroll and employee information systems, banking systems, credit card processing systems, and sales and order tracking systems.

A major purpose of a database system is to provide users with an abstract view of the data. That is, the system hides certain details of how the data are stored and maintained. Thereby, data can be stored in complex data structures that permit efficient retrieval, yet users see a simplified and easy-to-use view of the data. The lowest level of abstraction, the physical level, describes how the data are actually stored and details the data structures. The next-higher level of abstraction, the logical level, describes what data are stored, and what relationships exist among those data. The highest level of abstraction, the view level, describes parts of the database that are relevant to each user; application programs used to access a database form part of the view level.

1.3.2 Image: Levels of Database Architecture



8.4 ADVANTAGES & DISADVANTAGES OF DBMS

8.4.1 ADVANTAGES OF DBMS

The DBMS has a number of advantages as compared to traditional computer file processing approach. Some of the advantages are:

- **Data integrity and security:** If data is always accessed through the DBMS, the DBMS can enforce integrity constraints on the data. For example, before inserting salary information for an employee, the DBMS can check that the department budget is not exceeded. Also, the DBMS can enforce *access controls* that govern what data is visible to different classes of users.
- **Data independence:** Application programs should be as independent as possible from details of data representation and storage. The DBMS can provide an abstract view of the data to insulate application code from such details.
- **Efficient data access:** A DBMS utilizes a variety of sophisticated techniques to store and retrieve data efficiently. This feature is especially important if the data is stored on external storage devices.
- **Improved decision making:** Better-managed data and improved data access make it possible to generate better-quality information, on which better decisions are based. The quality of the information generated depends on the quality of the underlying data. Data quality is a comprehensive approach to promoting the accuracy, validity, and timeliness of the data.
- **Data administration:** When several users share the data, centralizing the administration of data can offer significant improvements. Experienced professionals, who understand the nature of the data being managed, and how different groups of users use it, can be responsible for organizing the data representation to minimize redundancy and fine-tuning the storage of the data to make retrieval efficient.
- **Concurrent access and crash recovery:** A DBMS schedules concurrent accesses to the data in such a manner that users can think of the data as being accessed by only one user at a time. Further, the DBMS protects users from the effects of system failures.
- **Reduced application development time:** Clearly, the DBMS supports many important functions that are common to many applications accessing data stored in the DBMS. This, in

conjunction with the high-level interface to the data, facilitates quick development of applications. Such applications are also likely to be more robust than applications developed from scratch because many important tasks are handled by the DBMS instead of being implemented by the application.

8.4.2 DISADVANTAGES OF DBMS

Although there are many advantages of DBMS, the DBMS may also have some minor disadvantages. These are:

- **Danger of Overkill:** For small and simple applications for single users a database system is often not advisable.
- **Complexity:** A database system creates additional complexity and requirements. The supply and operation of a database management system with several users and databases is quite costly and demanding.
- **Qualified Personnel:** The professional operation of a database system requires appropriately trained staff. Without a qualified database administrator nothing will work for long.
- **Costs:** Through the use of a database system new costs are generated for the system itself but also for additional hardware and the more complex handling of the system.
- **Lower Efficiency:** A database system is a multi-use software which is often less efficient than specialized software which is produced and optimized exactly for one problem.

8.5 ENTITY RELASHIONSHIP MODEL

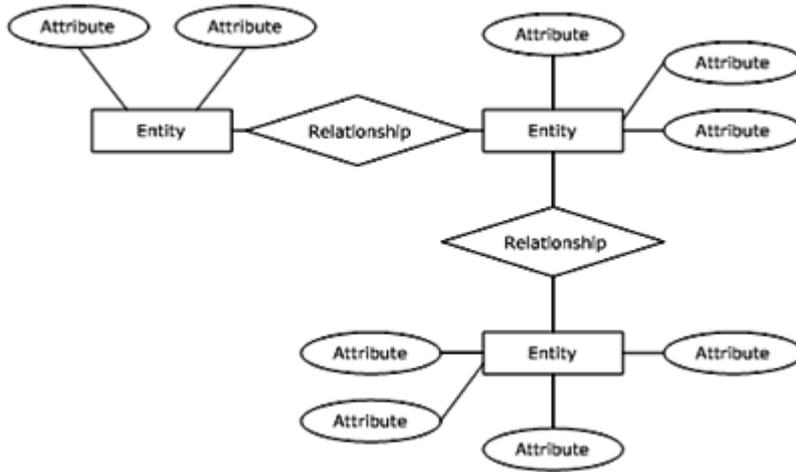
An Entity Relationship(ER) model is an abstract way of describing a database. In the case of a relational database, which stores data in tables, some of the data in these tables point to data in other tables - for instance, your entry in the database could point to several entries for each of the phone numbers that are yours. The ER model would say that you are an entity, and each phone number is an entity, and the relationship between you and the phone numbers is 'has a phone number'. Diagrams created to design these entities and relationships are called entity–relationship diagrams or ER diagrams.

An entity may be defined as a thing which is recognized as being capable of an independent existence and which can be uniquely identified. An entity is an abstraction from the complexities of a domain. When we speak of an entity, we normally speak of some aspect of the real world which can be distinguished from other aspects of the real world.

An entity may be a physical object such as a house or a car, an event such as a house sale or a car service, or a concept such as a customer transaction or order. Although the term entity is the one most commonly used, following Chen we should really distinguish between an entity and an entity-type. An entity-type is a category. An entity, strictly speaking, is an instance of a given entity-type. There are usually many instances of an entity-type. Because the term entity-type is somewhat cumbersome, most people tend to use the term entity as a synonym for this term. Entities can be thought of as nouns. Examples: a computer, an employee, a song, a mathematical theorem.

A relationship captures how entities are related to one another. Relationships can be thought of as verbs, linking two or more nouns. Examples: an 'owns' relationship between a company and a computer, a 'supervises' relationship between an employee and a department, a 'performs' relationship between an artist and a song, a 'proved' relationship between a mathematician and a theorem.

1.5.1 Image: Symbols used in ER diagram



Entities and relationships can both have attributes. Examples: an employee entity might have a Social Security Number (SSN) attribute; the proved relationship may have a date attribute. Every entity (unless it is a weak entity) must have a minimal set of uniquely identifying attributes, which is called the entity's primary key.

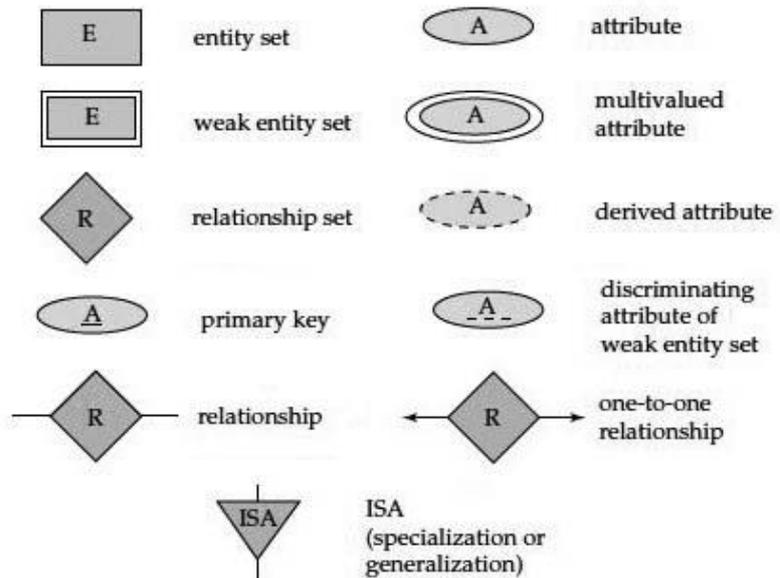
ER diagrams don't show single entities or single instances of relations. Rather, they show entity sets and relationship sets. Example: a particular song is an entity. The collection of all songs in a database is an entity set. The eaten relationship between a child and her lunch is a single relationship. The set of all such child-lunch relationships in a database is a relationship set. In other words, a relationship set corresponds to a relation in mathematics, while a relationship corresponds to a member of the relation. Here is a sample ER diagram showing the building blocks of database, i.e. Entity, Attribute and Relationship.

8.5.2 Image: Sample ER diagram

8.6 STRUCTURED QUERY LANGUAGE (SQL)

8.6.1 What is SQL?

SQL stands for Structured Query Language. SQL is used to communicate with a database. According to ANSI (American National Standards Institute), it is the standard language for relational database management systems (RDBMS). SQL statements are used to perform tasks such as update data on a database, or retrieve data from a database. Some common relational database management systems that use SQL are: Oracle, Sybase, Microsoft SQL Server, Access, Ingres, etc. Although most database systems use SQL, most of them also have their own additional proprietary extensions that are usually only used on their system. However, the standard SQL commands such as "Select", "Insert", "Update", "Delete", "Create", and "Drop" can be used to accomplish almost everything that one needs to do with a database.



8.6.2 SQL Commands:

SQL commands are instructions used to communicate with the database to perform specific task that work with data. SQL commands can be used not only for searching the database but also to perform various other functions like, for example, you can create tables, add data to tables, or modify data, drop the table, set permissions for users. SQL commands are grouped into four major categories depending on their functionality:

- **Data Definition Language (DDL)** - These SQL commands are used for creating, modifying, and dropping the structure of database objects. The commands are CREATE, ALTER, DROP, RENAME, and TRUNCATE.
- **Data Manipulation Language (DML)** - These SQL commands are used for storing, retrieving, modifying, and deleting data. These commands are SELECT, INSERT, UPDATE, and DELETE.
- **Transaction Control Language (TCL)** - These SQL commands are used for managing changes affecting the data. These commands are COMMIT, ROLLBACK, and SAVEPOINT.
- **Data Control Language (DCL)** - These SQL commands are used for providing security to database objects. These commands are GRANT and REVOKE.

8.7 WORKING WITH MICROSOFT SQL SERVER

8.7.1 ABOUT MS SQL SERVER

Microsoft SQL Server is a Relational Database Management System (RDBMS) designed to run on platforms ranging from laptops to large multiprocessor servers. SQL Server is commonly used as the backend system for websites and corporate CRMs and can support thousands of concurrent users. SQL Server is much more robust and scalable than a desktop database management system such as Microsoft Access. Although, SQL Server can also be run as a desktop database system, it is most commonly used as a server database system.

SQL Server 2008 Express with Advanced Services includes the following features:

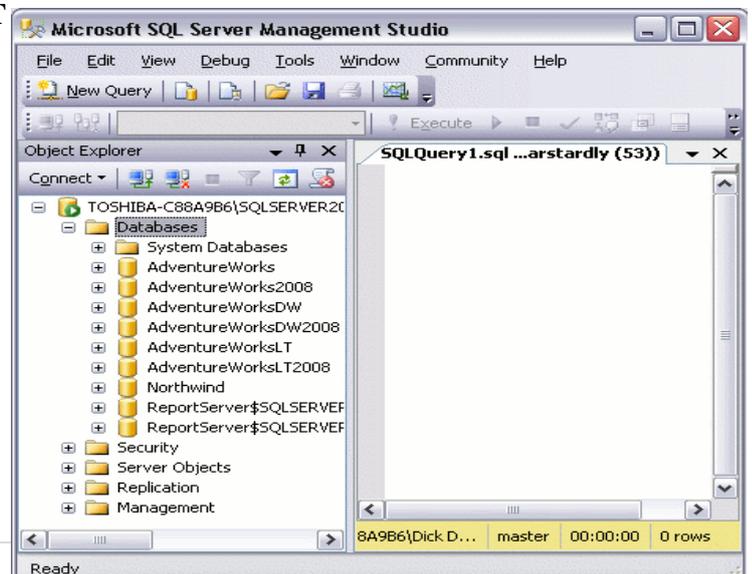
- SQL Server database engine - create, store, update and retrieve your data
- SQL Server Management Studio Basic - visual database management tool for creating, editing and managing databases
- Full-text Search - powerful, high-speed engine for searching text-intensive data
- Reporting Services - integrated report creation and design environment to create reports

1.7.3 Image: Screenshot of SSMS

8.7.2 SQL SERVER MANAGEMENT STUDIO (SSMS)

SQL Server Management Studio (SSMS) is the main administration console for SQL Server. SSMS enables us to create database objects (such as databases, tables, views etc), view the data within the database, configure user accounts, transfer data between databases, and more.

The left pane contains the Object Explorer. The Object Explorer provides navigation to databases, server objects (such as triggers), log files, and more. The right pane



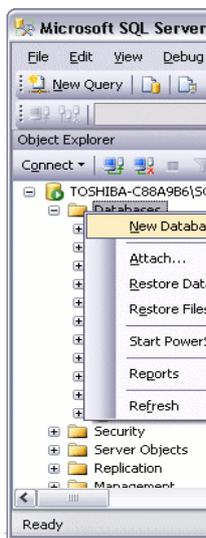
allows us to write queries against the database and view the results

SQL Server provides both graphical and SQL command interface to work with the database and database objects. SSMS is the graphical interface and we can write SQL query/script by creating a new query which can be done by clicking New Query on Standard Toolbar. After writing a query user must have to execute the query by clicking on Execute or by pressing F5.

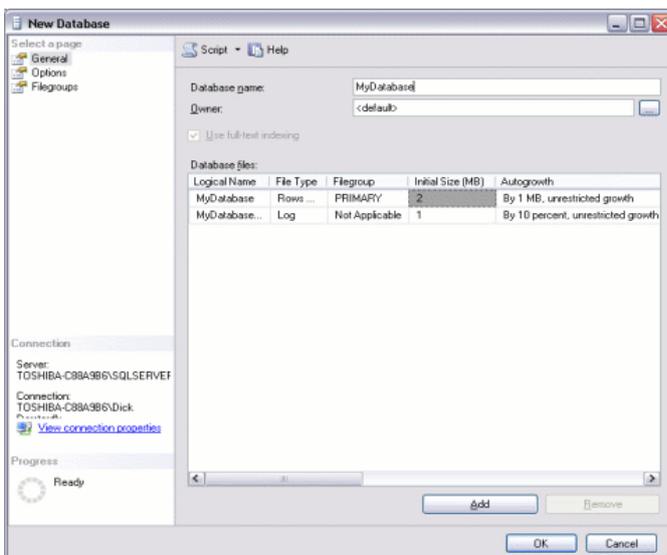
8.7.4 CREATING A DATABASE

The following steps demonstrate how to create a database in SQL Server using SQL Server Management Studio.

1. Right click on the "Databases" icon and select "New Database...":
2. Name your database and click "OK"



1.7.5 Image: Creating Database using SMSS



Database can also be created using the CREATE DATABASE statement using a New Query.

The basic syntax of the CREATE DATABASE statement is:

```
CREATE DATABASE DATABASENAME;
```

Example:

If we want to create new database <MYDATABASE>, then CREATE DATABASE statement would be as follows:

```
CREATE DATABASE MYDATABASE;
```

8.7.6 CREATING A TABLE

Creating a basic table involves naming the table and defining its columns and each column's data type. The SQL CREATE TABLE statement is used to create a new table.

The syntax for CREATE TABLE statement:

```
CREATE TABLE TABLE_NAME  
(  
    COLUMN1 DATATYPE,  
    COLUMN2 DATATYPE,  
    COLUMN3 DATATYPE,  
    ....  
    COLUMNN DATATYPE,  
    PRIMARY KEY(ONE OR MORE COLUMNS)  
);
```

Example:

Following is an example, which creates a Individual table with IndividualId as PRIMARY KEY and NOT NULL are the constraints showing that these fields cannot be null while creating records in this table:

```
CREATE TABLE Individual  
(  
    IndividualId          INT          NOT NULL,  
    FirstName             VARCHAR(50)  NOT NULL,  
    LastName              VARCHAR(50)  NOT NULL,  
    DateCreated           DATETIME     GetDate()  
    PRIMARY KEY (IndividualId)  
);
```

8.7.7 ADDING DATA TO TABLE

The INSERT INTO statement is used to insert new records in a table.

SQL INSERT INTO Syntax:

It is possible to write the INSERT INTO statement in two forms.

The first form does not specify the column names where the data will be inserted, only their values:

```
INSERT INTO table_name  
VALUES (value1,value2,value3,...);
```

The second form specifies both the column names and the values to be inserted:

```
INSERT INTO table_name (column1,column2,column3,...)  
VALUES (value1,value2,value3,...);
```

To insert data into the Individual, we can use the following SQL statement:

```
INSERT INTO Individual (IndividualId, FirstName, LastName)
VALUES (1,'Homer','Simpson');
```

8.7.8 VIEW DATA IN EXISTING TABLE

The SELECT command is used to view the data stored within a table. For example, to view data from 'Individual' table following statements can be used:

```
SELECT * FROM Individual;
```

1.7.9 Image: Screenshot showing the result after using SELECT command



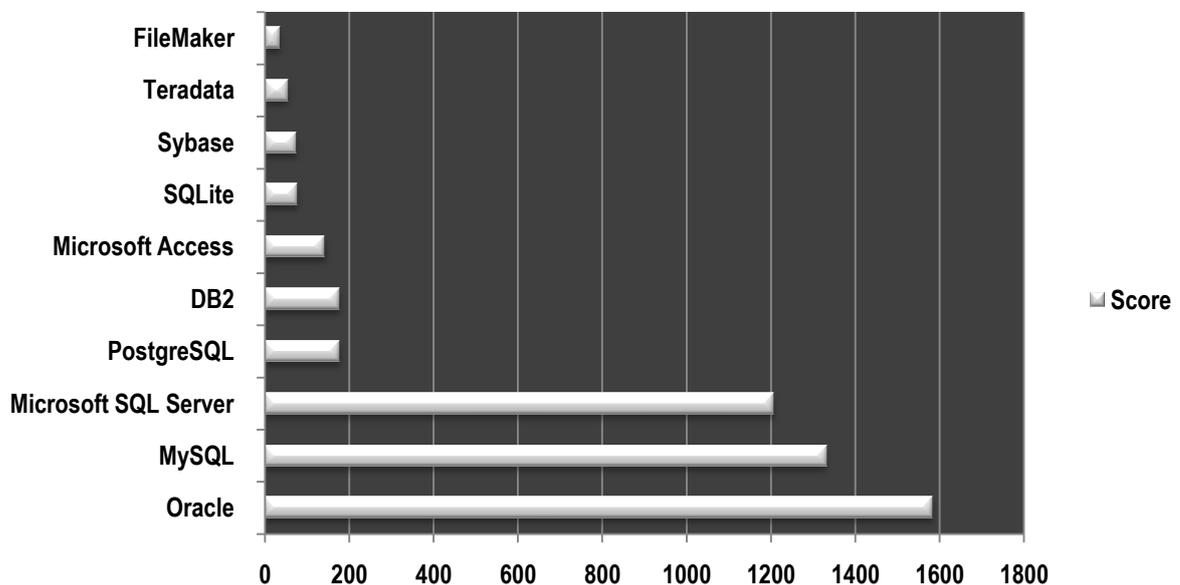
8.8 RECENT DEVELOPMENTS

Nowadays lots of DBMS are available. Here is the list of 10 (ten) most powerful database systems running today's enterprise businesses around the world:

- **Oracle** – Oracle Enterprise Server, designed for grid computing, is the best RDBMS, running on multiple platforms, with the latest version 11G.
- **MySQL** – An open source database, MySQL is the most popular database for web-based business applications, and is moving to enterprise level.
- **SQL Server** – Microsoft SQL Server is a comprehensive database software platform providing enterprise-class data management and integrated business intelligence (BI) tools.
- **DB2** – DB2 is the database management system that delivers a flexible and cost-effective database platform to build robust on demand business applications. The DB2 Universal Database (UDB) Enterprise Server Edition 7 (ESE) is one of the best RDBMS.
- **Sybase** – Sybase Adaptive Server Enterprise (ASE) is a high-performance, mission-critical database management system that gives customers an operational advantage by lowering costs and risks.

- **Teradata** – Teradata Database, currently on Version 2 Release 6.0, is the most powerful Very Large Database (VLDB) system. Many large scale data warehousing and business intelligence systems are powered by Teradata.
- **ADABAS** – Adabas made by Software AG, once was the most powerful mainframe database, now runs in multiple platforms, and provides superior reliability and performance.
- **FileMaker** – FileMaker Pro 8.5 is the #1-selling easy-to-use database software for Windows and Mac OS. FileMaker Server 8 maximizes performance of shared databases while increasing security.
- **Access** -Microsoft Access is the most used desktop database application in Windows available with Microsoft Office Package. This is used basically for creating databases for standalone programs.
- **Informix** -Informix, now under IBM, once was the most promised object-oriented database.

1.8.1 Graph: Ranking of DBMSs



(Source: <http://db-engines.com>, November, 2013)

Some of the free and open source database management software's are:

MySQL, PostgreSQL, Apache Accumulo, Apache Derby, BaseX, Berkeley DB, BlackRay, C-Store, CouchDB, CSQL, CUBRID, Drizzle (database server), Druid (database designer), EnterpriseDB, Firebird (database server), FleetDB, GCstar, Gizzard (Scala framework), GNOME-DB, GT.M, H2 (DBMS), HSQLDB, InfiniDB, Ingres (database), MonetDB, MongoDB, Mozilla Raindrop, MS SQL-JDBC.

8.8 IMPLEMENTATION OF DBMS IN KVKs

Krishi Vigyan Kendra(KVK) is an Agricultural station where it has lots of paper works to be done along with the activities in KVK Mandate. It is a pain to prepare a report containing details of On Farm Trials(OFT), Front Line Demonstrations(FLD), trainings, other extension activities etc., as the data are kept with concerned scientists either in an unstructured way or in a format which is not a

standard for all. So, if all the data are maintained centrally at KVK in a single database, then it can be accessed by *anyone at any time in any format* as needed.

A Management Information System (MIS) can also be designed using a DBMS software. According to Mr. M. B. Hanji, Computer Programmer, ICAR, Zonal Project Directorate Zone VIII, Bangalore, "MIS at KVK aims to convert raw data on technologies, farmers, district profile, selected village profile, farm, labs, administration, accounts and other resources into meaningful information in the forms of reports like daily, monthly, quarterly, annual, seasonal, technical, financial, administrative etc."

Managing database in a computer system leads to lesser the paper work, need lesser human resource, correct and efficient report preparation etc.

8.9 CONCLUSION

As we can see, much of what we have discussed learning about the database system to implement it in our everyday lives can be very useful . Database management systems in the business world or in the lives of everyday people can be a very useful asset . In addition, because it has the potential to enhance the networking and mobility, database systems for various methods of communication between businesses would be a great benefit .

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An Introduction of Google tools

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1.1 OVERVIEW:

- Introduction
- introduction
- Practical utility
- Advantages
- Disadvantages
- How KVK can use this knowledge and where
- Conclusion
- references

9.2 INTRODUCTION

Google Apps is a cloud-based suite that helps us to connect and get work done from anywhere on any device. It's simple to setup, use and manage, allowing us to work smarter and focus on what really matters. As the organizations are moving towards free and open source technologies to reduce the cost and flexibility, KVK should also adopt the free tools. In this article a brief description of some of the important Google tools are discussed.

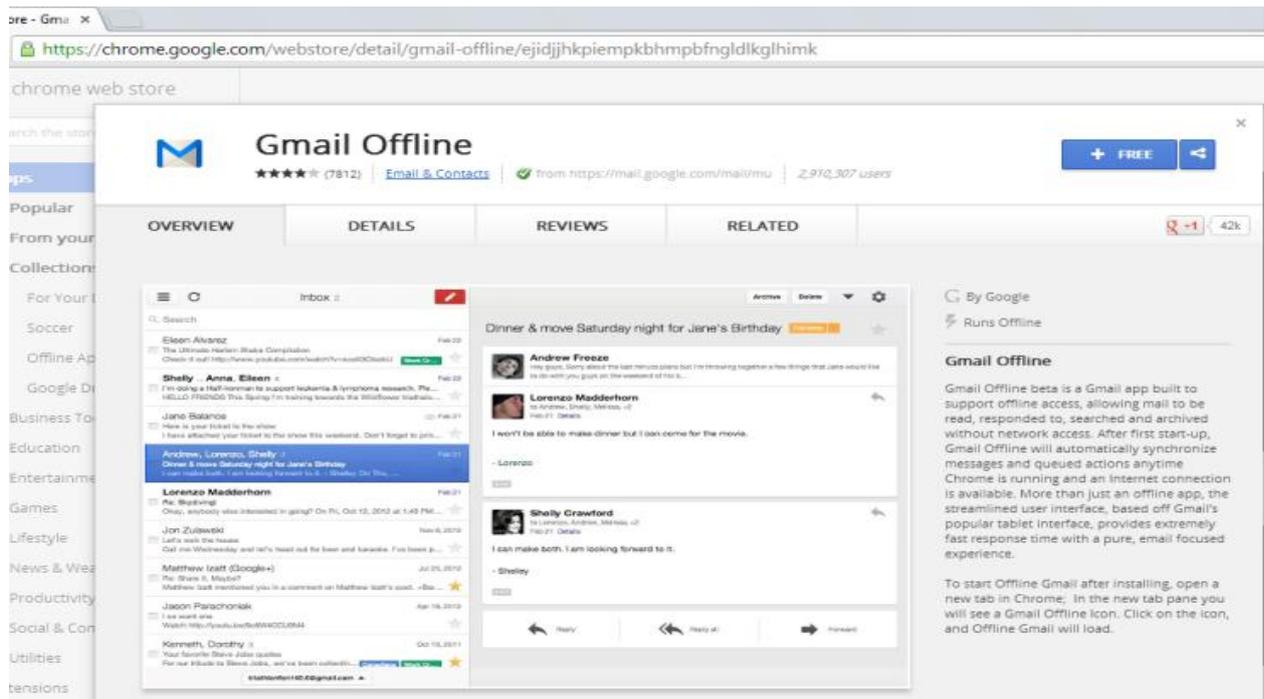
9.3 PRACTICAL UTILITY

9.3.1 GMAIL: Gmail offers up to 30GB of storage per user with spam filtering and powerful search, labels and filters that help users to stay organized. Gmail is not only mail service; text, voice, and video chat is available and can see who is online and connect them instantly. It has good administrative control and limit that can send emails to whom. Gmail works on any computer or mobile device with an internet connection and you can work offline when there is no internet connection.

The Offline Google Mail app for Chrome lets users read and write email without an internet connection. Drafted messages are sent next time when there is an Internet connection and if there is new mails these new mails will store locally.

To use Gmail offline with Google Chrome, need to install an application. To install the application need to follow the steps bellow. This application will work only on Chrome web browser.

1. Visit the url for app's page in the Chrome Web Store <https://chrome.google.com/webstore/detail/gmail-offline/ejidjjhkpkiemphmpbfngldlkglhink>
2. Click the Install button. Click Continue and Install the prompts to approve installation to your Chrome browser.



(source:chrome.google.com/webstore)

Fig9.3.1: Gmail offline application in Google Webstore

9.3.1.1 HOW TO CREATE GMAIL ACCOUNT: To create your Google account, you need to visit www.gmail.com and click on ‘create an account’ at the bottom of the page and you have to fill the registration form.

9.3.2 CALENDAR: It is a great way to manage staff schedules and easy to manage group calendaring. Users can make their individual calendars visible to their coworkers. They can also send invitations to group events and set personal and group reminders. Organize your event with Calendar and get event reminders on your Gmail inbox. You can attach files or docs to your event so you have the materials when your meeting starts. Also create an event calendar and embed it on website or set up appointment slots so customers can choose the best time for them.

Google Calendar has offline support with Chrome. The Google Calendar app for Chrome lets you view your event schedule and respond to invites; even you don’t have an internet connection. Your calendar will be synchronized the next time you connect to the internet.

9.3.2.1 HOW TO USE CALENDAR: To accessing Calendar, first log in with your existing Gmail account and then click on the Apps icon on the top right side of the google.com home page and select calendar icon as shown on the figure 9.3.2. you will be presented with a calendar.

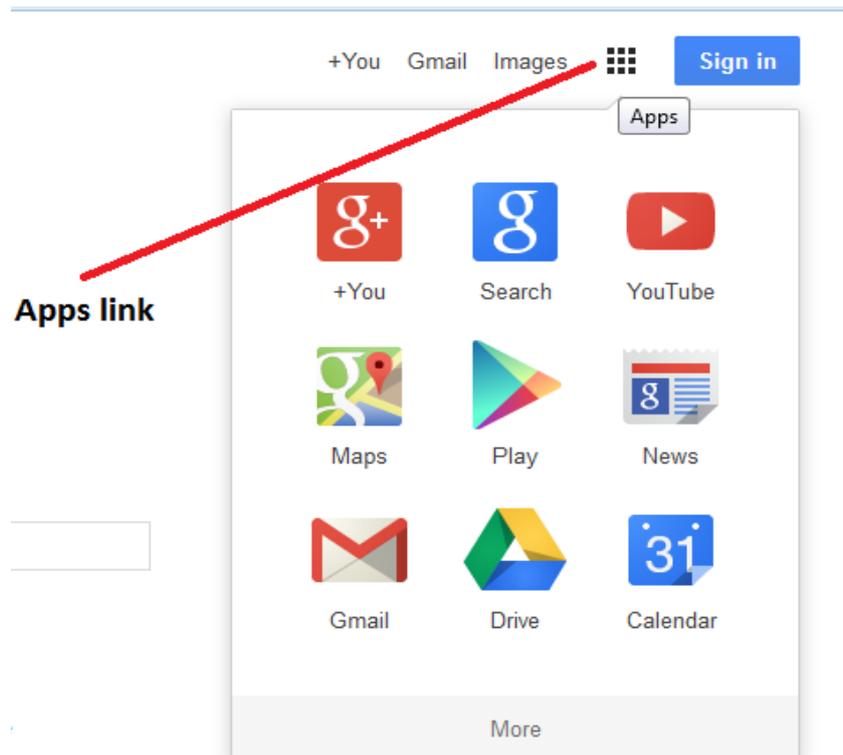


Fig9.3.2: Accessing Google Tools

Once the calendar is open you can create different event by click on ‘CREATE’ button. A new form will be open, here in this form you have to give the event title, event start date, time, end date, event place, description etc. you can set different event color for different event here. Also you can add the guest by entering email and set permission for guest.

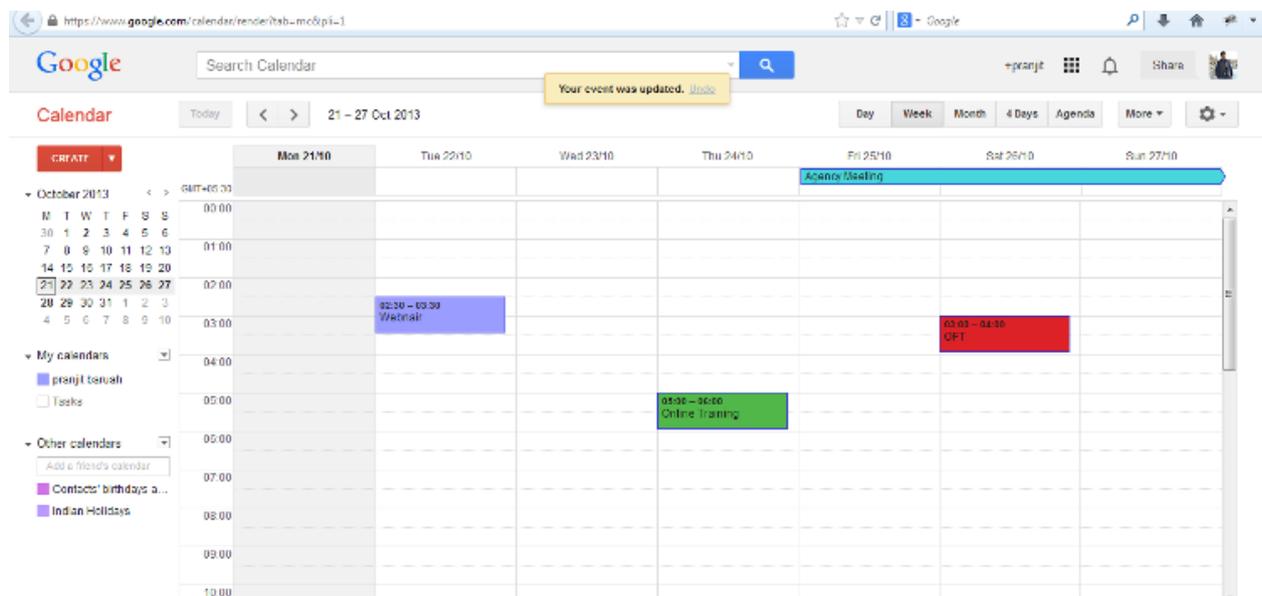


Fig9.3.3: Google Calendar with 4 different event distinguished by color

9.3.3 DRIVE: It is an online storage. You can put files in Google Drive and can access them on your desktop, mobile phone or tablet.

You can download Google Drive for PC and, you can sync files from your computer to My Drive. Update a file on one device and changes are automatically saved to Drive and your other device, so you have the most up-to-date version of your files wherever you need them. One can share files or whole folders with individuals, your entire team or even customers and partners.

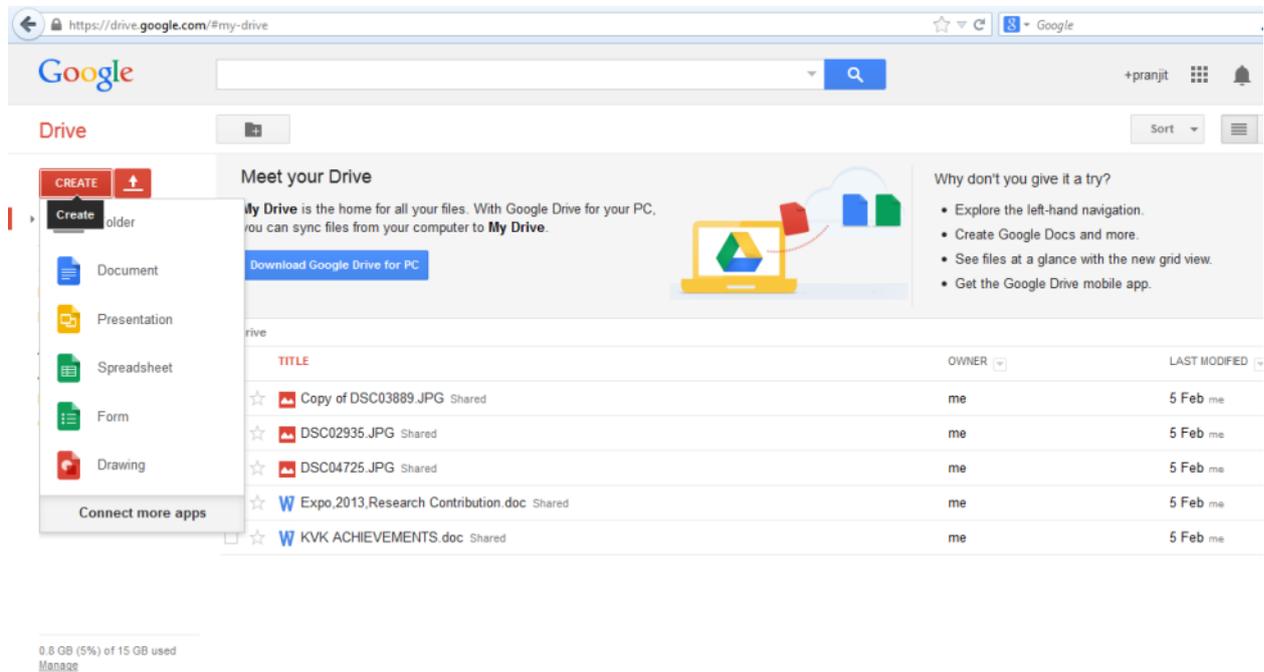


Fig9.3.4: Google Drive Dashboard

9.3.3.1 HOW TO USE DRIVE: Log in to <http://drive.google.com> with Gmail user id and password, you will be presented with a Google Drive dashboard. From here you can upload file from your local device, create new document, spreadsheet, presentation, form etc.

To share content from Drive, first need to select the file by clicking the checkbox next to file name. On selecting a file a new set of icon appears on top of the page as shown on the fig9.3.5. Click on 'share' button sharing setting will appear. From this window you can invite people to access this content.

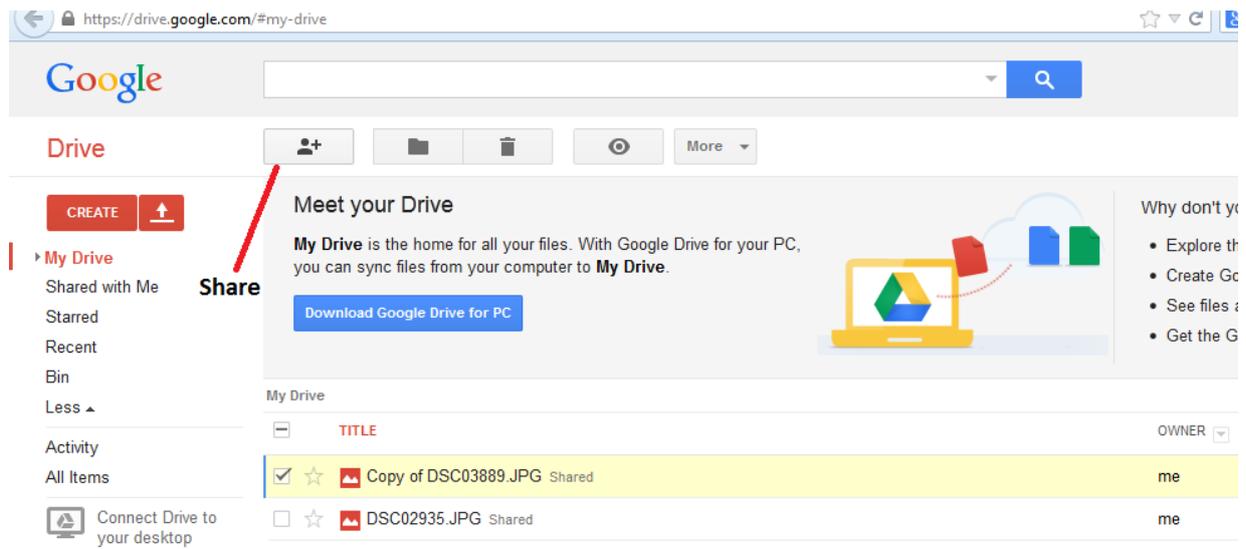


Fig9.3.5: Sharing a file on Drive

The next step is to enable the other user to gain access to the document. There are three visibility options as shown in the following figure

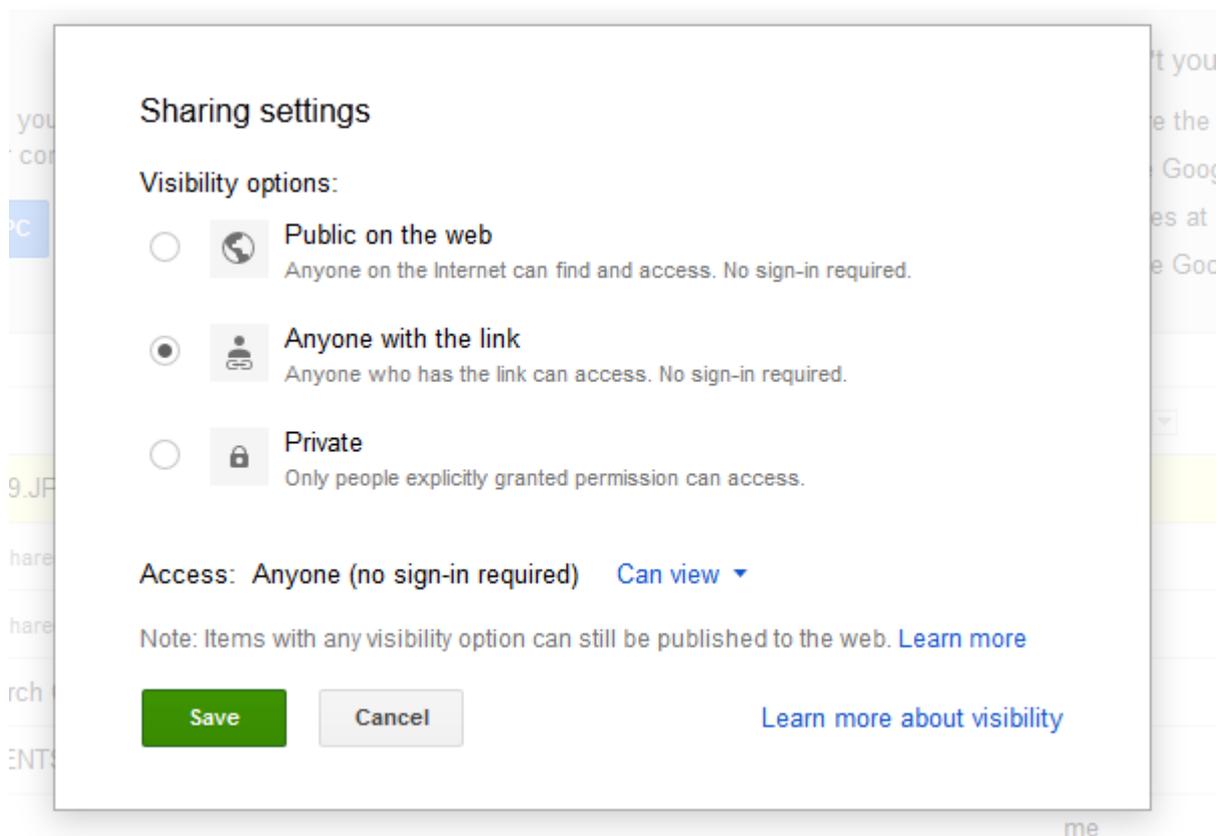


Fig9.3.5: Three visibility options

The first option is to make it public where anyone can find and access the document without having to sign in. The second option is to grant access to anyone with the link. The third option is to make it private where only people who are granted permission can access the document.

9.3.4 GOOGLE DOCS: Google Docs is a free suite of applications that allows you to create, store, share, and collaborate on documents with colleagues. A doc has the features such as word processor, spreadsheet, and presentation applications and also includes robust tools for creating surveys, quizzes etc. In Google Docs, there are three kinds of participants, document owner, viewer, and collaborator. Document owner is the one who creates a document. He or she can invite viewers to view the document. He or she also can invite collaborators to edit the document.

9.3.4.1 DOCUMENT: Create rich documents with images, tables, equations, drawings, links and more. Gather input data and manage feedback with social commenting.

To create a new document, Log in to <http://drive.google.com> with Gmail user id and password and click on 'Create' then 'Document' as shown in the Fig9.3.4.

9.3.4.2 SPREADSHEET: Keep and share lists, track projects, analyze data and track results with powerful spreadsheet editor. Use tools like advanced formulas, embedded charts, filters and pivot tables to get new perspectives on your data.

9.3.4.3 PRESENTATION: Create beautiful slides with presentation editor, which supports things like embedded videos, animations and dynamic slide transitions. Publish your presentations on the web so anyone can view them, or share them privately.

9.3.4.4 GOOGLE FORM: Google Form can be used to conduct online quizzes, survey, collecting answers of open-ended question and so on. Google Forms as the best tool for online survey. The form can be easily published on the Web and can be embedded in blogs or websites. Google Spreadsheet can be used to store data collected from Google Forms. When Google Form is created, it is automatically connected to a spreadsheet with the same filename. The recorded data can be published either through generated url or embedded in a blog or website.

9.3.4.5 HOW TO CREATE ONLINE FORM: To create online form, log in to <http://drive.google.com> with your existing Google account. To create a form, click the 'Create' button, and the drop-down menus appears as shown in the fig 9.3.4.

From the drop down menu, select 'Form'. You are then directed to a title and theme choosing window. Here you can put the title of the form and select the theme. By default, the filename given is 'Untitled form' but this can be changed to a new filename.

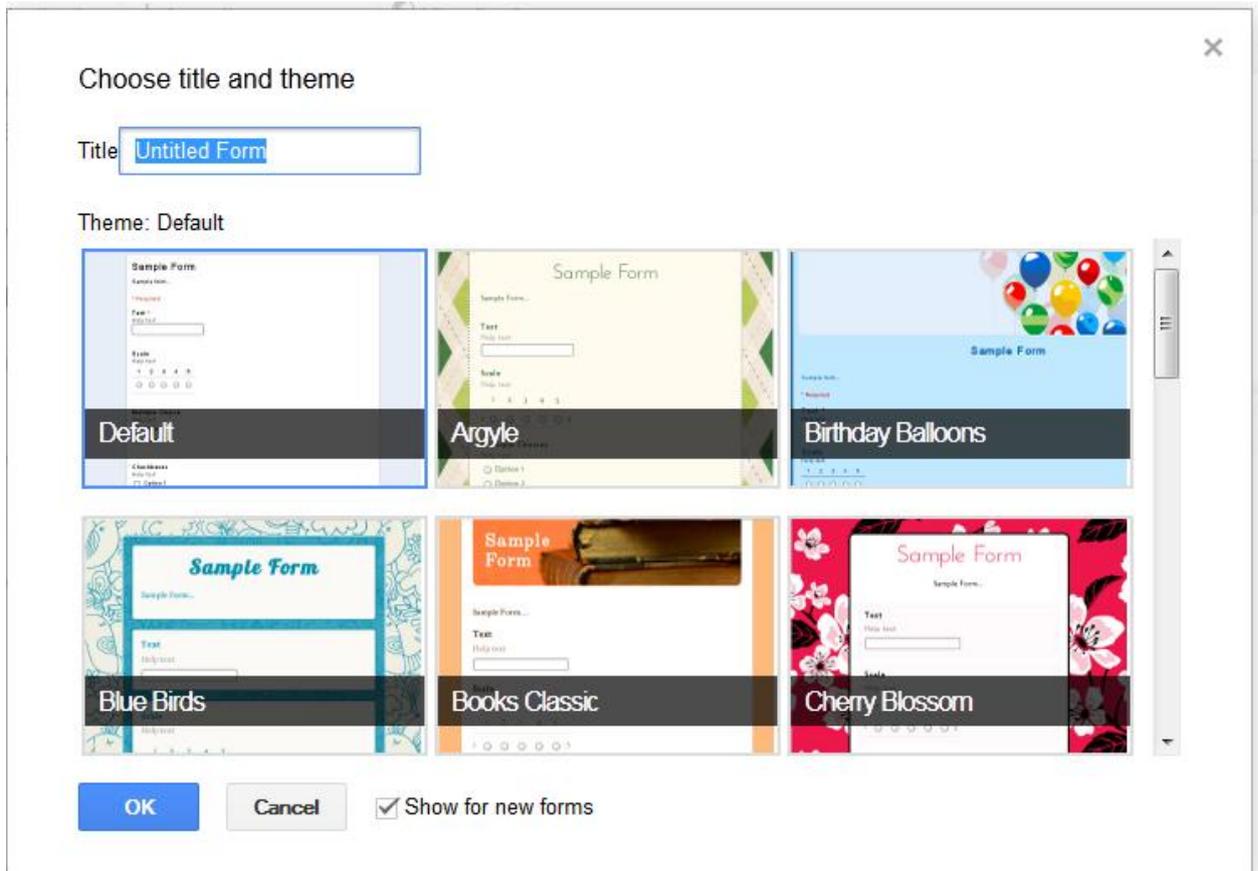


Fig9.3.6: Selection of Google Form Theme

After select the theme click on 'OK' you will be presented with a form. The next step is to fill in the required information. You can add different form of questions in this form like 'Multiple Choice', 'checkbox', 'drop down list' as shown in the figure bellow.

Training Needs

Form Description

Untitled Question

Option 1

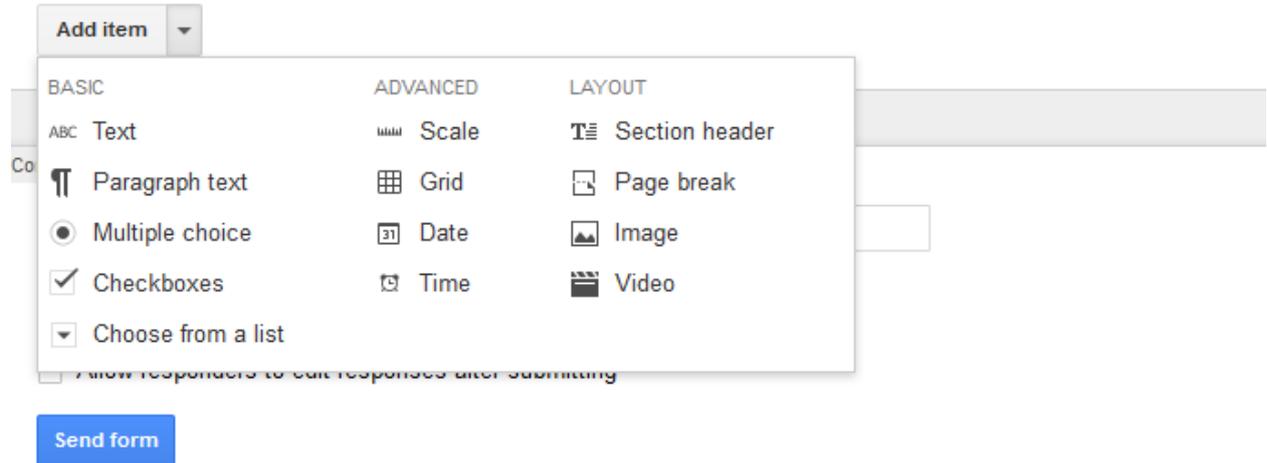


Fig9.3.7: Adding different form element in Form

The next step is to publish the form so that user would be able to fill it in. There are several options for this. First is to notify user through e-mail. To do this, clicks bellow ‘Send form via email’ and enter the mail id and click ‘Send’. You can also copy the direct url link at the top of the page as in Figure.

Another option is to embed the form in your blog or website. To do this you need to click on ‘Embed’ button and it will display HTML code with option to customize the width and height of the form. Copy the code and insert the code in your blog or website.

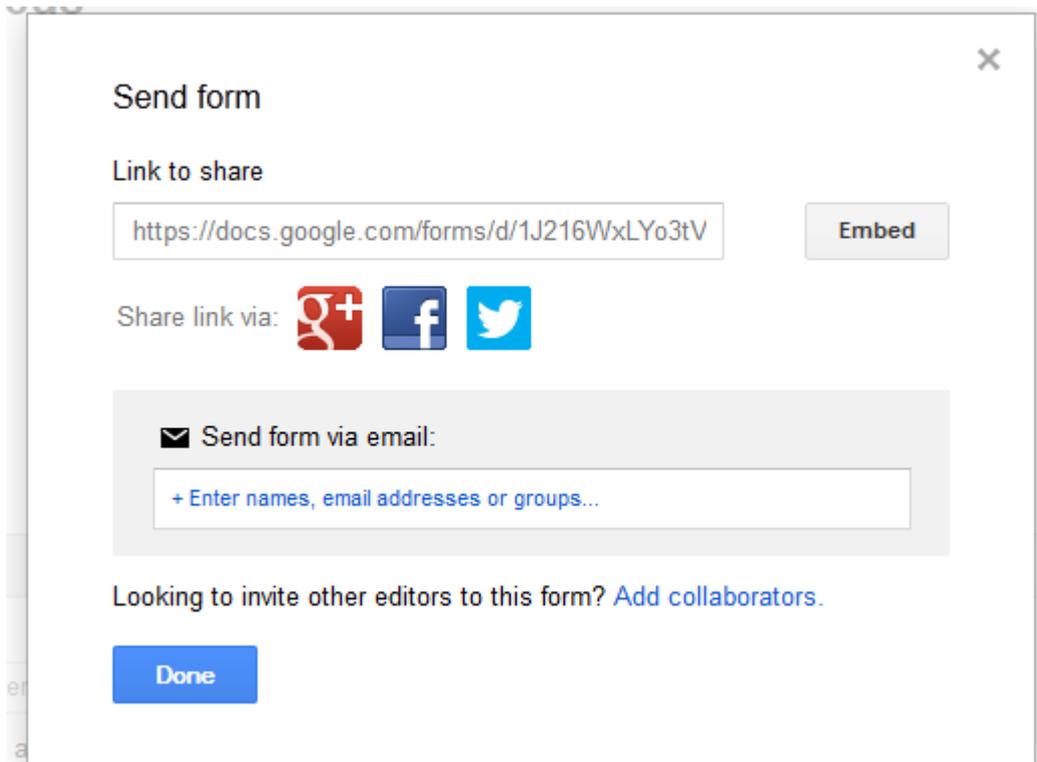


Fig9.3.8: Publishing options for Google Form

9.3.5 HANGOUTS: With the use of Hangouts you can have a group chat, and easily turn it into a video or voice conversation right on your PC, laptop, mobile phone or tablet. Meet face-to-face with up to 15 coworkers from anywhere. Hangouts sync across devices so you can pick up the conversation where you left off, while on the move. Schedule a Hangout from Calendar, start a chat from your inbox, or collaborate on a Google Drive file during a video meeting to finish your to-do list faster.

To enable Hangouts in Gmail, Click your profile photo at the top of your Chat list, Click Try the new Hangouts

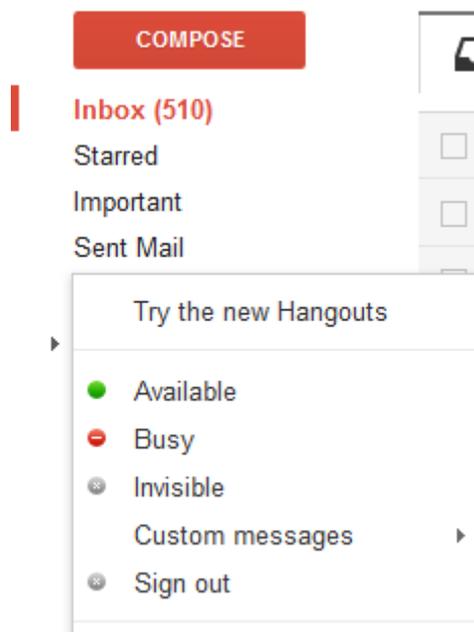


Fig9.3.9: How to start Google Hangout

9.3.6 GOOGLE+: Google+ gives you new ways to share with coworkers. Share private posts with your organization to ask questions, find experts and get answers. Schedule online video meetings with up to 10 participants and join right from your PC, laptop, phone or tablet.

9.3.7 SITES: User can build sites without writing a single line of code. It's as easy as writing a document. Start your site with one of the pre-built templates, or create a privately shared template gallery for your organization/class/faculty with sites.

Google Sites allows you display a variety of information in one place including videos, slideshows, calendars, presentations, attachments, text and share it for viewing or editing with a small group, an entire organization, or the world.

Good administrative interface is available. You can control who can view and who can edit your site and you can adjust settings later.

With the help of Google Sites you can

- Customize your site.
- Create sub-pages to keep content organized.
- Choose page types: webpage, announcements etc.
- Have a central location for your web content.

9.3.7.1 HOW TO CREATE SITE: To start Sites, log in to <http://sites.google.com> with your existing Gmail user id and password and click on “CREATE” and follow the instruction for creating a site.

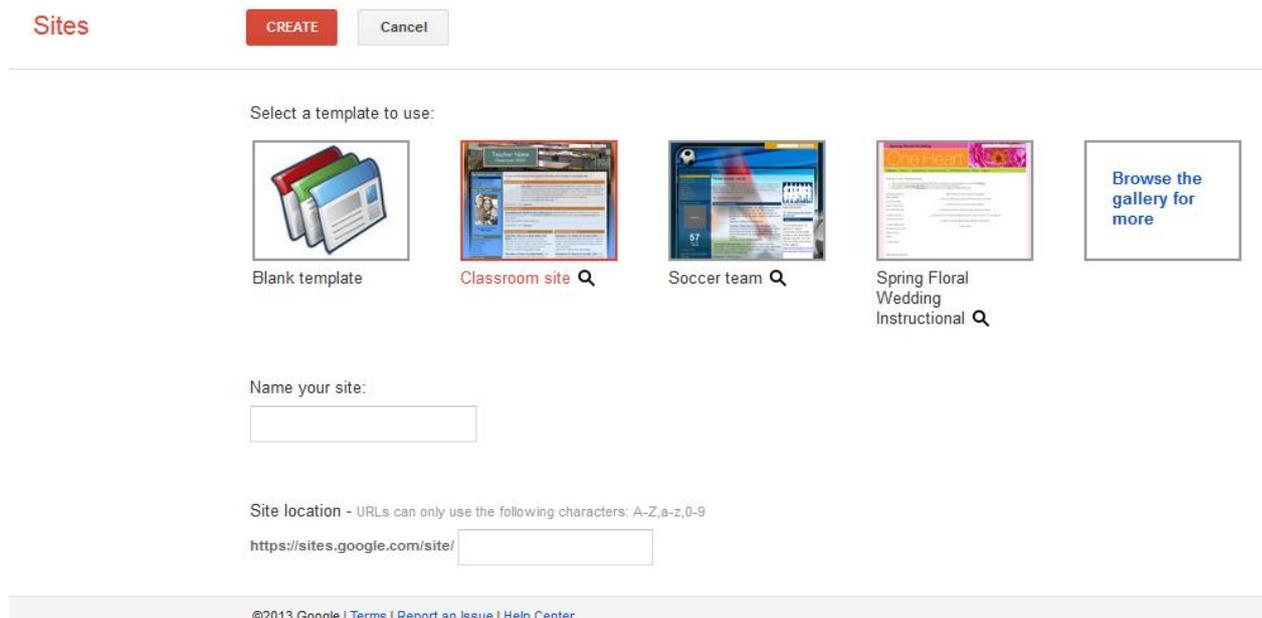


Fig9.3.10: Google Site Creation Page

9.3.8 BLOGGER: Create a custom, hosted blog with features such as photo publishing, comments, group blogs, blogger profiles and mobile-based posting with little technical knowledge. It is

- Free
- Simple-to-use interface
- Change appearance with templates
- Add photos and videos
- Interact with readers
- Add feeds for readers to follow
- Allow a team to add or edit content

9.3.8.1 HOW TO CREATE BLOG: To start a blogger, visit www.google.com and go to Apps icon (Fig9.3.2) and select Blogger from the drop down list. Log in with existing Gmail user id and password is required. Once log in you will be redirected to the 'Blogger' landing page. From this page you can create new blog by following the steps listed here.

9.3.9 PICASA & PICASA WEB ALBUMS: Google's Picasa software allows you organize, edit, and upload your photos in quick, easy steps. Download Picasa at <http://picasa.google.com>. The Picasa software provides a simple way to view, edit, and organize the photos on computer. When using editing tools in Picasa, your original files are never changed. Picasa creates a new version of the photo with your edits applied, leaving the original file totally preserved.

Google's Picasa Web Albums provides 1GB of free storage. Visit <http://picasaweb.google.com> and log in with Gmail account. You can create album, upload photos and share the photos with your co workers.

9.3.10: YOUTUBE: Video is a powerful way to show organization's impact and needs, and with a designated "Nonprofit" channel you can deliver your message to the world's largest online video community. Benefits include:

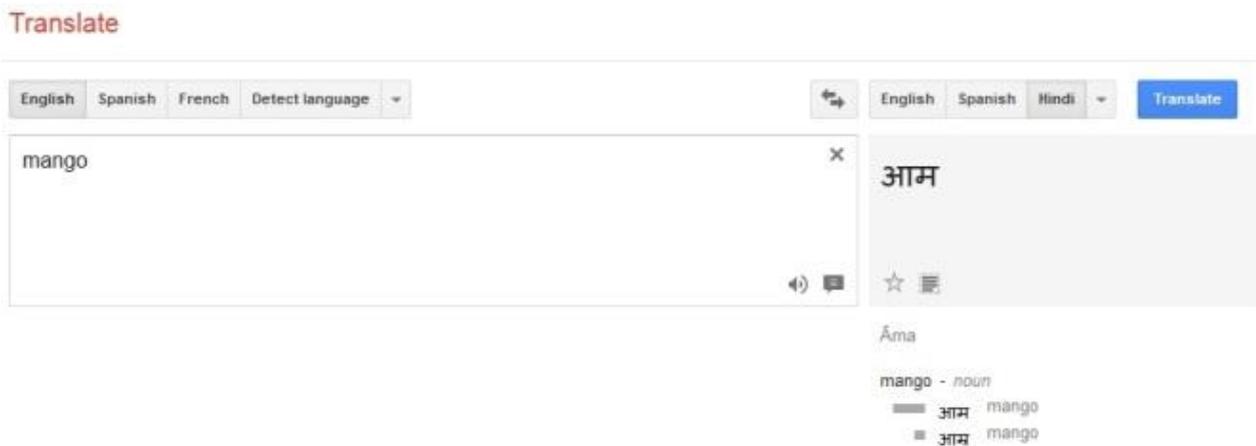
- Listing on the Nonprofit channels and the Nonprofit videos pages
- Post videos and then stay in the conversation with comments and video responses.
- Find other organizations on YouTube who complement your mission, and work together to promote each other.
- Put up new videos regularly and keep them short, ideally under 5 minutes.
- One of the key features of YouTube is the ability of users to view its videos on web pages outside the site. Share links and the embed code for your videos with personnel and official web pages.

9.3.11: GOOGLE TRANSLATE: It is a free translation service that provides instant translations between different languages. It can translate words, sentences and web pages between any combinations of supported languages. Currently it supports 71 languages.

9.3.19.1 HOW TO USE GOOGLE TRANSLATES:

- Visit translate.google.com
- Select your languages for translation. If you aren't sure what language you're attempting to translate, click the Detect language button.
- Start typing and the translation will appear instantly

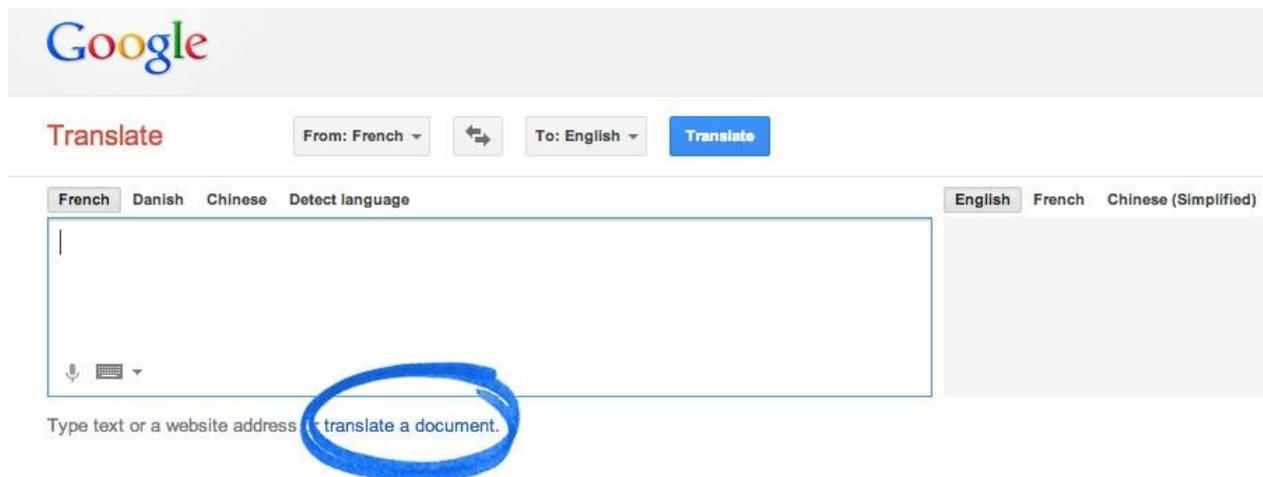
In translating a single word or a common phrase, there is a simple dictionary underneath the translation indicating parts of speech and possible alternative translations. Next to each dictionary entry, you'll see a corresponding set of reverse translations back into the original language. The bar next to each entry indicates how commonly that particular translation is used on the Web.



(source: translate.google.com)

Fig9.3.11: Translate text from English to Hindi

Google Translate provides an easy way to translate whole documents, without the need for copying and pasting large blocks of text. Simply click the translate a document link and submit your file as a PDF, TXT, DOC, PPT, XLS or RTF.



(Source: support.google.com/translate)

Fig9.3.12: Translate a document

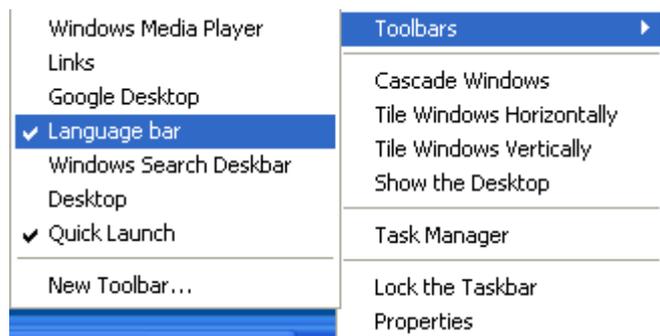
9.3.12: INPUT TOOLS: Google Input Tools for Windows is an input editor which allows users to enter text in any of the supported languages using a keyboard. Users can type a word the way it sounds using Latin characters and Google Input Tools for Windows will convert the word to its native script.

Google Input Tools for Windows is currently available for 22 different languages viz. Amharic, Arabic, Bengali, Persian, Greek, Gujarati, Hebrew, Hindi, Kannada, Malayalam, Marathi, Nepali, Oriya, Punjabi, Russian, Sanskrit, Serbian, Sinhala, Tamil, Telugu, Tigrinya and Urdu.

To use this tool user need to download and install the software on the PC. To download go to the url <http://www.google.co.in/inputtools/windows/index.html> then select the languages by checking the checkboxes. More than one language of input tools can be installed on the same machine. Check the checkbox before "I agree to the Google Terms of Service and Privacy Policy.", and click "Download" button to download software. Run the installer after download completed, and follow the instructions on screen

To use Google Input Tools with other applications, first open the application and then select the input tool. Google Input Tools can be opened by clicking on the language bar on the desktop, then selecting the input tool language icon.

9.3.12.1 DISPLAYING LANGUAGE BAR: On the desktop, right-click on the taskbar, then select Toolbars → Language bar



(Source : <http://www.google.co.in/inputtools>)

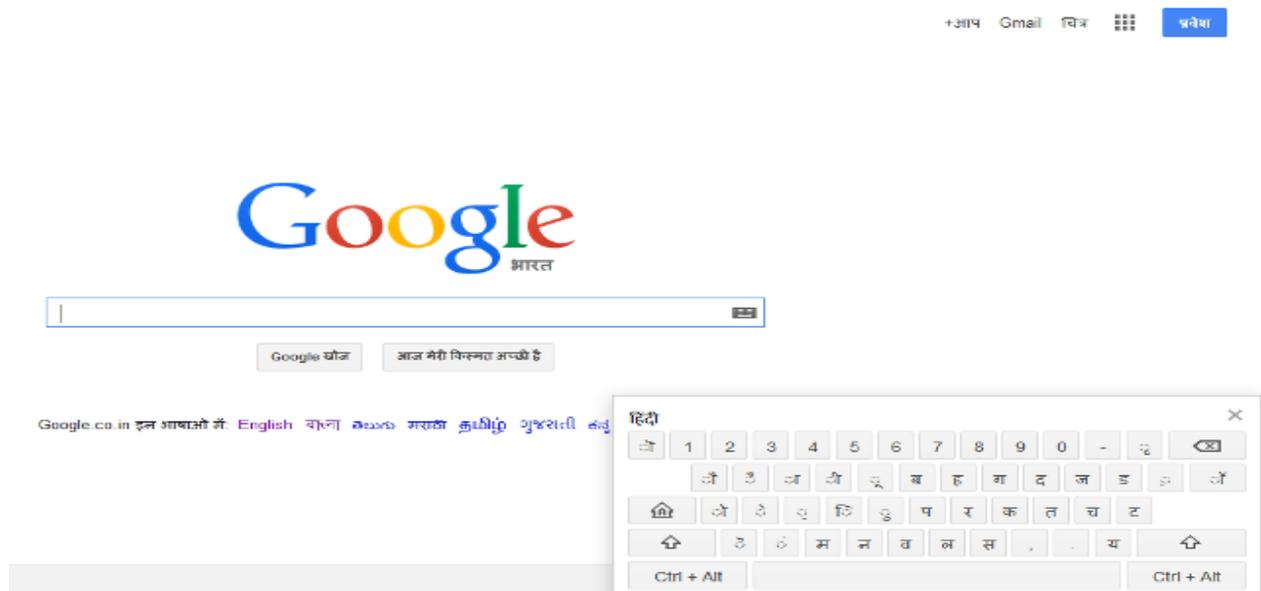
Fig9.3.12: Displaying language bar

9.3.12.2 ENABLING LANGUAGE BAR: If the 'Language bar' option is not visible in the 'Toolbars' menu, it needs to be enabled through the Control Panel. The steps are given bellow.

1. Navigate to the Control Panel → Regional and Language Options → Keyboard and Languages tab
2. Click on the Change keyboards... button and open the Text services and input languages dialog
3. Navigate to Language Bar tab
4. Enable the radio button Docked in the taskbar under the Language Bar section
5. Apply all settings, then try to display the language bar as described in the previous section.

9.3.12.3 GOOGLE INPUT TOOLS ON GOOGLE SERVICES: Cloud Input Tools makes it easy to type in native language whenever you want. Currently it covers over 90 languages. In this section two Google services ‘Google Search’ and ‘GMail’ are discussed.

Google Search: Depending on your chosen Google Search domain, a virtual keyboard may be provided to Search box. For example, if you go to www.google.co.in, and select language ‘Hindi’ bellow the search box, keyboard icon for ‘Hindi’ will display automatically near the search box as shown on the figure bellow.



(Source:www.google.com)

Fig9.3.13: Hindi input keyboard on google.com

Gmail: To enable Input Tools in Gmail, follow these steps:

1. Click the gear icon  in the upper right, and then select “Settings”.
2. In the General tab, select the language ‘Hindi’ under Gmail display language and then enable the check box next to “Enable input tools” under the “Language” section.
3. You can also double click the input tool to add it to the “Selected input tools” field
4. You can re-order selected input tools by clicking on a tool and clicking on the up/down arrow that appears
5. Click Save Changes in the bottom of the General tab

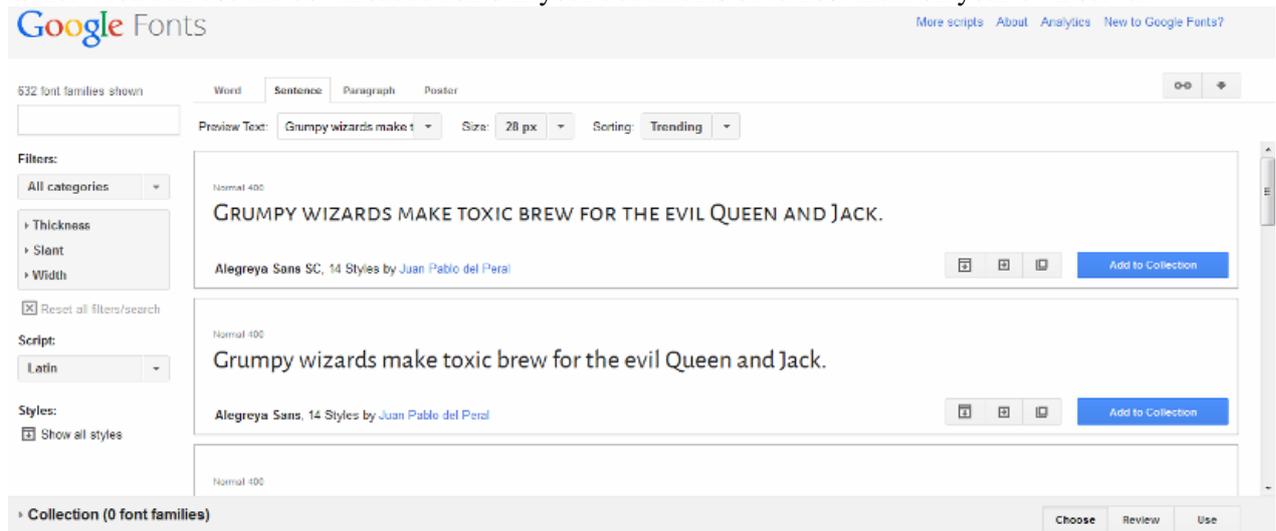
Once you’ve enabled Input Tools, your Gmail account is load with the selected language.

9.3.13: GOOGLE FONTS: A webpage with web fonts is more beautiful, readable, accessible and free to use. Google Fonts makes it quick and easy for everyone to use web fonts, including professional designers and developers. Google API service makes it easy to add Google Fonts to a

website in seconds. The service runs on Google's servers which are fast, reliable and tested. Google provides this service free of charge.

All of the fonts are Open Source. This means that it is free to share with friends and colleagues. It is customizable for your own use, or collaborates with the original designer to improve them. And it can be used in every way you want, privately or commercially — in print, on your computer, or in your websites.

To download the fonts, visit the url <http://www.google.com/fonts/> and then simply add fonts to your collection by clicking on 'Add to Collection' and click the download icon on the top right corner. You can use the downloaded fonts in your documents or to host them on your own server.



(Source: www.google.com/fonts)

Fig9.3.14: Displaying different fonts

To use the font on your website or blog, you can simply copy the HTML snippet available from the "Use" tab for your collection.

The Google Fonts is compatible with the following browsers:

- Google Chrome: version 4.249.4+
- Mozilla Firefox: version: 3.5+
- Apple Safari: version 3.1+
- Opera: version 10.5+
- Microsoft Internet Explorer: version 6+

9.3.14: GOOGLE ALERTS: Google Alerts are emails sent to user when Google finds new results -- such as web pages, newspaper articles, or blogs - that match user's search term. You can use Google Alerts to monitor anything on the Web. For example, people use Google Alerts to:

- Find out what is being said about their company or product.
- Monitor development of a news story.
- Keep up to date on about industry.

- Get the latest news on a celebrity or sports team.

9.3.14.1 HOW TO USE ALERT: To use alert visit the url <http://www.google.co.in/alerts>, it will presented with a form as shown bellow. Enter a query that you're interested in and select the other options from the form and click on 'Create Alert'. Google Alerts checks regularly to see if there are new results for your query. If there are new results, Google Alerts sends them to you in an email. You might not get an email every day, but you'll find out when something new and relevant is published

(Source: <http://www.google.co.in/alerts>)

Fig 9.3.15: Creating Google Alert Form

9.3.15: GOOGLE BOOKS: Google Books is a good place to find books online in all streams, some of which can read for free of cost. If you are book owner, then you can get the book listed on Google Books, so that you can sell it to a larger audience.

You can search books which work just like web search. Try a search on Google Books or on Google.com. Browse of books is available if the book is out of copyright, or the publisher provided permission to see a preview of the book and in some cases the entire text. If it's in the public domain, it is free to download a PDF copy of the book.

In Google Books people can buy book or borrow books from the online library. For this click on the "Buy this book" and "Borrow this book" links to see where you can buy or borrow the print book. Using Google Play Store you can buy ebooks.

Google Books created reference pages for every book so one can quickly find all kinds of relevant information like book reviews, web references, maps and more.

If someone wants to promote books on Google it is free of cost. Just need to create one Partner Account. For that visit <https://books.google.com/partner/> and log in with your existing Gmail account and create the Google partner account and start uploading your books.

9.4 ADVANTAGES: Many features are available for the different Google tools. In this section advantages of different Google tools will be discussed.

Gmail offers 2GB of Mail Box, Spam control, and separate folder for spam mails. Mails with threaded conversations for reference, which make it easy to access only required mail. With online quick contacts & talk facility, it can be used as messenger too.

Built in Calendar - with Google Calendar, sharing events and meetings with others is simple. We can coordinate schedules with people in several ways.

- Send out meeting and event invitations and track people's responses whether or not they use Google Calendar.
- Share your calendar (or just some of your agenda information) with people you know.
- Create a shared calendar for your organization, team or group that everyone can view and edit.
- Create a public calendar that anyone can subscribe to.
- Display your calendar on your internal or external website

Online document creation - Create new documents from scratch, or upload saved documents from your computer. Edit your documents from any internet-connected computer

Real-time collaboration - Simultaneously work on documents together with others that user invite, even if we're not in the same place.

Revision history - Individual edits are kept so we can see who added and deleted what, when.

Search tools - Just like Gmail, with Docs & Spreadsheets, we can use the power of Google search to look for a document we haven't edited in months.

Security and privacy - we can choose who sees our document and when. Other users can only access your document or spreadsheet if you add them to the list of collaborators or viewers, or if we decide to publish the document. And administrators have the ability to set restrictions on internal and external document sharing.

One of the major advantages of Google Apps is that it is very cheap. In fact, most legal aid organizations will be able to use Google Apps for free, if you are not eligible as a non-profit, Google Apps is still relatively cheap.

Another advantage of Google tools is to spend staff time on training and improvement, not on maintaining systems. Properly maintaining an email and calendar server with 99.9% uptime is time-consuming and requires a skilled admin to be available nearly 24/7 to troubleshoot errors. Google Apps frees that amount time.

Administering Google Apps is easy. The admin interface is simple to use, and self-explanatory. Everything you want to control for your domain has a button or switch in the back end. You can add, delete or suspend users, transfer ownership of all documents, create aliases, and change minimum password requirements.

9.5 DISADVANTAGES: Some of the disadvantages we may be considered as

- All facilities becomes internet (web) based; require enough bandwidth for smooth operation
- Conflict between users if editing in the same region. If two collaborators are editing the same region and working at the same time, the conflict might occur. To solve this problem, the document owner needs to organize the editing task so that conflict will not occur

- There is no direct image paste. For example if an editor wishes to paste screenshot image into a Google document, there is no direct paste function as normally done in Word. The editor has to save the image first and then insert the image into the Google document
- Google Docs currently does not support oÆ-line editing of documents and subsequent merging with the on-line copy.
- Data will be under Google control (Security issue – we have to trust Google).
- Nothing is free in long term so cost issue is also important
- As the data will be stored under Google server we don't have privacy
- Some features may be blocked by company network

9.6 HOW KVK CAN USE THIS KNOWLEDGE & WHERE?

As the organization is moving towards to adopt open source and free technology, KVK also needs to adopt the open source technologies. KVK already used Gmail for online communication across all the KVK offices. Along with these services we need to explore the other tools associated with the same Google account.

KVK can create a shared calendar for the whole organization that everyone can view and subscribe. Create a public calendar for KVK that anyone can subscribe and display calendar on KVK internal or external website. Use the Calendar to set the reminder for all the report like monthly, quarterly, six monthly and all other reports in advanced. Apart from the report invitation to any important event, schedule meeting.

Collaborate document among KVKs; with the help of Google Docs work on the same document is possible at the same time with a colleague sitting on a remote kvk. Keep minutes of meeting notes in a Google Doc and share the notes with entire staff or a selected group of staff. Staff members can access the notes at any time.

Creating a shared repository among kvk. Create folder for different type of document and share resources. Store the resources in shared folder so that anyone at can find and access them.

Publish kvk work is easy. Multiple sharing settings allow kvk to publish different work by sharing it within KVK employee, within different kvk, or by making it public on the web.

Collect, share and analyze data. Use Google Forms conduct the different surveys and modify your instruction based on the results.

With the help of Google Sites, KVK site can be built using predefined templates. Embedding kvk calendar, videos and presentation will make the site more interactive. Also manage employee e-portfolios by using site and Showcase kvk employee's work

Communicate in different languages. Use the translate feature in GMail to communicate with different employees who might speak a different language.

Using Google Talk invite a guest lecturer into your kvk to do a guest lecture through Video Chat who lives in another state.

Using Picasa Web Albums KVK can upload the photos for different activities and share it with host organizations quickly

Create videos for different KVK activities and upload it on YouTube. Embed this video on KVK website.

Using Google alert we can get any new news and discussions about ICAR or Agriculture on personal mail id when it is available on internet.

9.7 CONCLUSION: Google tools are useful collaborative tool that people can use. It offers a more productive alternative of collaborating through e-mail. Apart from collaborating in writing multi-authored paper, academicians can use Google Docs in monitoring student research paper. Google tools make it easy to quickly find whatever you're seeking, whether it's a web page, a recent news story, a photograph, advice, or a present for a friend. Google Docs is a highly complex application that uses unconventional methods for accepting and processing input, whereas GMail and Calendar are built using standard user interface elements.

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ICT in Agriculture: Drivers of Change

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10.1 OVERVIEW:

- Introduction to the use of Information Communication Technology(ICT) in Agriculture
- Significance of ICT in the Indian Agriculture Scenario
- Brief review of policy formulations and initiatives regarding ICT in agriculture
- Imperatives of ICT based agriculture
- Information Requirements of Farmers
- Guidelines for ICT propagation
- ICT initiatives in Indian Agriculture
- Role of Krishi Vigyan Kendras in implementing ICTs
- Challenges faced in implementing ICTs in agriculture

10.1 INTRODUCTION:

Information and communication have always been of indispensable importance to agriculture. Ever since people have been engaged in agricultural activities such as growing crops, raising livestock, and caught fish, they have sought information from associated and accessible sources. Which is the most effective planting strategy for a particular situation? Where can they buy the farm inputs such as improved seeds or feed this year? Where can they most profitably market their produce? How can they participate in government subsidy and credit programs? Farmers rarely find it easy to obtain answers to such questions, even if similar ones arise season after season. People in a certain community may have been engaged in agricultural activities for decades, but over time, weather patterns and soil conditions change and epidemics of pests and diseases come and go. Updated, timely and location specific information allows the farmers to cope with and even benefit from these changes. The contemporary period has come to be called varyingly as the ‘information age’, the ‘communication age’ and most recently, the ‘networking/cyber age’. So in a nutshell, 21st century is the age of Information and Communication Technology (ICT). Knowledge is said to be power, and information is a valuable resource and a problem-solving tool, its generation, mobilization and finally communication can bring about rapid economic transformation of the masses and brings in greater social equality and larger fulfillment of human potential.

ICT (Information and Communications Technology - or Technologies) is an umbrella term that includes any communication device or application, encompassing radio, television, cellular phones, computer and network hardware and software, satellite systems and so on, as well as the various services and applications associated with them, such as videoconferencing and distance learning. ICTs are often spoken of in a particular context, such as ICTs in education, health care, or libraries.

Information and communication technologies facilitate the processing and transfer of information, i.e. communication by electronic means. ICT generally link Information processing devices like computers with telecommunication technologies like telephones, wired or wireless networks. ICTs are a range of electronic technologies which when converged in new configurations

are flexible, adaptable, enabling and capable of transforming organizations and redefining social relations. The range of technologies is increasing all the time and there is a convergence between the new technologies and conventional media. The sphere of ICT has advanced so much that today they are defined as a booming congregation of technologies that are utilized for collection, storage and sharing of information & knowledge between people using multiple devices and multiple media.

10.3.1 IMPORTANCE OF ICTs FOR AGRICULTURE:

Today, Indian agriculture is faced with the challenge of providing adequate and sustained livelihoods to over 103 million farm families spread across the country, under changing social, economic and environmental conditions (*Chattopadhyay, undated*). ICT can act as an accelerating force behind the productivity of Indian agriculture. Backed by adequate technological infrastructure and appropriate strategies, it can become a transformational factor for overall development of agriculture. The European Commission has stated that the importance of ICTs lies less in the technology itself than in its ability to create greater access to information and communication for bridging the economic gap between the technological ‘have’ and have not’ populations. This is possible with the use of Information and communication technologies which can assist agricultural extension to provide “Knowledge Resource” delivery to the millions of the farmers to fulfil their information needs. ICT can strive to produce newer sets of information services for sustainable development of farming systems thereby benefitting the rural farmers. ICT in agriculture is an emerging field focusing on the enhancement of agriculture and rural development in India. It involves the use of innovative ways to use ICT in the rural domain. It can provide with accurate information necessary for the farmers which facilitates better agricultural output.

The benefits of the green revolution greatly improved agricultural productivity. However, there is a demonstrable need for a new revolution that will bring lower prices for consumers (through reduced waste and more-efficient supply chain management), contribute to “smart” agriculture, and incentivize farmers (for example, through higher income) to increase their production. ICT is one of these solutions with rapidly increasing mobile, wireless, and Internet connectivity it can surely find a place in many farming communities and in their activities.

The report of the “Task Force on India as Knowledge Superpower (GOI, 2001) emphasised” the necessity of developing the capacity to generate, absorb, disseminate and protect knowledge and exploit it as a powerful tool to derive societal transformation. ICT is seen as an important means of achieving such a transformation. (*Banerjee, 2011*).

Agricultural extension can use ICT based technology packages for transferring knowledge or information packages. If this can be achieved, with the help of ICT, extension will become more diversified, knowledge-intensive and demand driven, and thus, more effective in meeting farmers' information needs. (*Banerjee, 2011*).

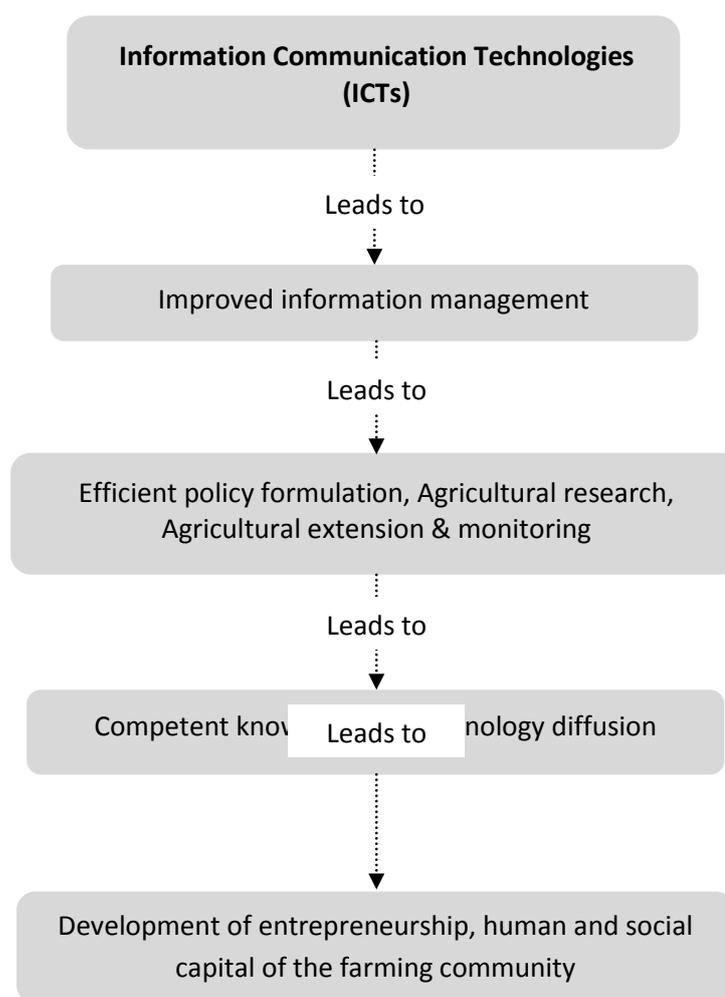


Fig. 10.3.2 : Flowchart depicting benefits of implementation of ICTs in Agriculture

10.3.3 POLICY FORMULATION BY THE GOVERNMENT:

It has been estimated that there are roughly 110,000 extension workers to cater to the needs of farm families spread across 600,000 villages. Furthermore, the government run public extension system has a poor track record of reaching small and marginal farmers. All these factors combine to result in an information deficit situation where about 60% of the farmers – usually the small and marginal – do not have access to a reliable source of agricultural information. (V.L.V. Kameswari, G. B. Pant University of Agriculture and Technology, India). The National Commission on Farmers has noted that the use of Information and Communication Technologies (ICTs) for agricultural extension is one way of addressing the information needs of farmers. In keeping with this view, the Working Group on Agricultural Extension constituted by the Planning Commission (Eleventh Five Year Plan), Government of India has recommended that there is a need to respond to emerging challenges to the sector by strengthening information dissemination to farmers through use of ICTs. With the help of ICTs, agricultural extension is expected to become more diversified, knowledge-intensive, and demand-driven, and thus more effective in meeting farmers’ information needs. (Zijp, 1994).

National e-Governance Plan indicated that the typical services envisaged in Agriculture as a Mission Mode Projects (MMP) to provide information to the farmers on seeds, fertilizers, pesticides, Govt. Schemes, Soil recommendations, Crop management, Weather and marketing of agriculture

produce. Several projects such as ASHA in Assam, KISSAN and e-Krishi in Kerala and Krishi Maratha Vahini in Karnataka have been initiated by the Department of Agriculture and Cooperation (DoA&C), Government of India.

The Department of Agriculture & Cooperation, Government of India has formulated information technology Vision 2020 has stipulated the following as regards ICT:

- Information relating to agriculture sector would be available to the ultimate users – the farmers - for optimizing their productivity and income.
- Extension and advisory services making use of information technology would be available to the farmers on round the clock basis.
- The tools for information technology will provide networking of agriculture sector not only in the country but also globally and the Union and State Government Departments will have reservoirs of data base.
- The long term vision on ‘Information Technology in Agriculture Sector’ is to bring farmers, researchers, scientists and administrators together by establishing ‘Agriculture on-line’ through exchange of ideas/information.

10.3.4 POLICY INITIATIVES BY THE GOVERNMENT:

National policy for farmers (2007) indicated that the potential of ICT would be harnessed by establishing gyan chaupels (Knowledge centres) in villages. Further, the Common Service Centres (CSCs) of the Department of Information Technology, Ministry of Communications and Information Technology, Government of India and those set up by the state governments and private initiative programmes will be evolved for inclusive broad-based development. Last mile and last person connectivity would be facilitated with the help of technologies such as broadband internet, community radio or internet-mobile phone synergies (*NPFF, 2007*).

Document of ICAR Framework for Technology Development and Delivery System in Agriculture (2008) outlined the need for the construction of Agri – India knowledge portal – A single electronic gateway to be developed through a peer review process with the help of 15 content accreditation centres from 15 agro – climatic regions of the country. Each accreditation centres will be coordinate with other Agricultural Universities and agricultural institutions in their region for development of content in regional language as well as in English and also do its validation, which will be collected in the central data warehouse integrated in the knowledge portal. The portal will also serve as a platform for facilitation of interaction among researchers and extension personnel in the KVKs through high speed server intranet (*ICAR-FFTDOSA, 2008*).

10.3.5 INDISPENSABILITY OF ICT BASED AGRICULTURE:

The main focus of ICT in agriculture is to meet farmers’ needs for information for sustainability of their agricultural activities and thereby achieving agricultural growth, rural employment, enhanced productivity and continual agricultural livelihoods. ICT can help in collecting, storing, retrieving, processing and disseminating a broad range of information needed by the farmers. Imperatives of ICT based agriculture may be summarized as but may not be limited to the following due to the continuous advances in technology:

- To ensure ownership and develop entrepreneurship among the farmers, developing human and social capital and proving enhanced food security and support to rural livelihoods thereby achieving nationwide GDP growth.
- Ensure the formation of congregated communities of small and marginal farmers for effective implementation of ICT services.

- To disseminate information and create awareness among rural societies using local languages.
- Information on ‘best practices’ for cultivation of a particular crop, about the crop cycle and suitable use of fertilizers. Information regarding drought resistant, flood tolerant, disease resistant varieties of crops.
- Information about rural development programs, subsidies, agricultural development strategies, investment programmes offered for farmers by the Government, which are particularly important to small and marginal farmers.
- Promoting growth of public investment in agriculture.
- Input prices and availability of agricultural inputs like seeds, fertilizers, manures, etc. and prices.
- Post harvest management and value addition of crops. Information on post-harvest and storage technology is as vital as pre-harvest.
- Provide access to local, nation-wide and global market information of agricultural commodities of on a daily basis. For farmers, the price updates of nearby markets is also of high priority so that they can compare the prices and choose to sell at the appropriate place.
- Provide farmers’ linkages with food processing units.
- Providing updated information on weather and information regarding the impact of climate on agriculture.
- Early warning systems and management of diseases and pests.
- General agricultural news and information on district, state or national level agricultural events.
- Information on crop insurance schemes, the type of damage covered and compensation offered premiums to be paid, etc.
- Soil testing and soil sampling information, providing information on quality or nature of soil is very important for farmers as it prepares farmers to get the best produce given the resources.
- Prepare and make accessible crop acreage and land use pattern information collected using Geographical Information Systems(GIS).
- Location specific information for agricultural research and extension by capturing data generated from agricultural activities.
- A mix of strategic planning with knowledge management can give results to least-cost inputs, better storage facilities, improved transportation links and collective negotiations with buyers.

10.3.6 INFORMATION REQUIREMENTS OF FARMERS:

A comprehensive need assessment study of farmer’s in various agro and socio-economic situations vis a vis their information needs was carried out by Dr G V Ramaraju et. al. using structured questionnaires, group discussion and PRA exercise methods. This study covered a total of 26 ICT initiatives in agriculture, included 1381 Farmers in 57 selected sample villages in 12 states of India to elicit the need felt by farmers, prioritize their perceptions and bring out the issues involved in the development of ideal ICT applications for agriculture. The study reveals information needs of the farmers as shown in the chart below.

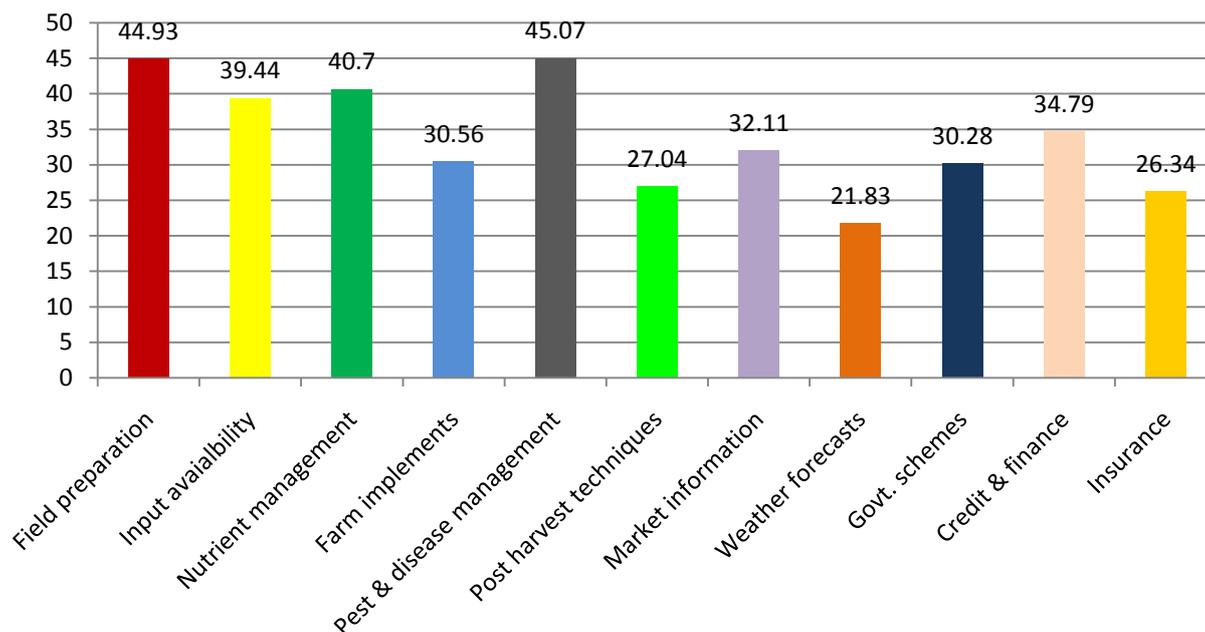


Fig 10.3.7: Study of farmers' information needs. (Source: *ICT in Agriculture: Gaps and Way Forward*, Dr G V Ramaraju, Dr. T.S Anurag, Dr. Hrishikesh Kumar Singh, Shambhu Kumar, ITDC Newsletter, Volume 21, No. 2, July 2011)

1.3.8 GUIDELINES FOR PROPAGATION OF ICT TO RURAL INDIA:

The whole new scenario demands inducing reforms process to bring out changes in systems, processes, frameworks and policies. Innovations play an important role in Agriculture for optimising resource utilisation by farmers. The new way of learning in terms of local context, operational process, need-based, user centric and in-time extension services system puts forward an innovation challenge to all the stakeholders in it. The relevant, understandable and need based information available timely in local language and reach in time enhance the farm productivity (Rao, 2013).

The following are some approaches for the propagation of ICT to rural India:

Ensure availability and access to relevant information:

- Ensure affordable and wide availability of ICTs to rural communities by giving emphasis on:
 - ✓ Partnerships between public-private sector organizations.
 - ✓ Partnerships within public sector organizations.
 - ✓ Partnerships within private sector organizations.
 - ✓ Implementing effective regulations and policies as required viz. taxes, licensing, liberalization, and competition policies.
 - ✓ Improving rural telecommunications and VSAT connectivity complementing rural access infrastructure such as roads and electricity.
- Put policies into place that systematically capture knowhow from organizations/ institutes involved in agricultural research, knowledge from local farmers' and experiences of field level functionaries. Foster strategies and programmes with an associated objective or goal.
- ICT should be integrated into agricultural sector policies to develop frameworks which provide support to overall development of agricultural practices and create new business opportunities for farmers.

- Develop customized ICTs which provide quality agricultural information services that ensure adaptation of information into local languages and have cultural pertinence.
- Digitize information from various stakeholders and stimulate the use of shared and open web-based platforms.
- ICT projects must evolve into a dynamic model with set objective(s) implemented through flexible ICT technologies to implement and sustain in long run.
- Associate public-private partnerships to make market and business information accessible.

Enhance rural access:

- Enhance rural availability of ICT technologies viz. cheaper and improved internet connectivity for rural communities.
- Foster combined public-private efforts and cost sharing arrangements to ensure sustainability of rural information centres.
- Foster awareness-raising and capacity-building of rural communities to use and maintain ICT
- Support technical innovations for rural connectivity, such as wireless broadband connections or solar powered systems.

1.3.9 STRENGTHS & WEAKNESSES OF THREE TYPES OF ICT DELIVERY MEDIUMS:

Type of ICT	Functionality	Strengths	Weaknesses
Kiosk-CSCs	Available on individual/community basis	<ul style="list-style-type: none"> • Best for community services • Best for pull based services • Best for local language based content • Best for store, repeat and re-use of content • Can create local knowledge depository • Multiple ICT features can be used for better extension • Can be used for multiple areas • ROI is high at proper usage • Multiple services are in use • Better for eGovernance 	<ul style="list-style-type: none"> • Operator need is essential • Reach to any individual is difficult • Individual push based service is difficult to implement • All can't able to utilise by themselves • Availability of services is time-bound • Establishment cost is to be borne by system • Power supply, back-up and maintenance are critical • Recurring cost is high at low usage • Skills for usage is needed for operators
Mobile Phone	Availability on individual basis	<ul style="list-style-type: none"> • Best for user specific services • Reach is definite at any time & space to anyone / many • Best in speed, accuracy, transparency, equal info- 	<ul style="list-style-type: none"> • Most of the farmers use low end devices that has limited features • The display space & font language display are device dependent

		<p>delivery at low or no cost</p> <ul style="list-style-type: none"> • Best for text or voice based SMS services • Best in video stream under 3G • Service available for 24x7 • Best to provide information at farmer's understandable level • Radio, Internet, Video streaming etc are added features add value 	<ul style="list-style-type: none"> • Voice & text SMS are difficult to store • User specific service can only succeed • The SMS within 256 characters & voice in 03-minutes are the restriction • Multiple SMSs won't have impact on Farmers
Community Radio	Available on community basis	<ul style="list-style-type: none"> • Best for localised information dissemination • Participatory programs enhance local community development • Best for training & message delivery at prefixed time to all • Own & local problems are discussed in their own dialect • Interaction with nearby progressive farmer help adoption of skills & knowledge • Mobile phone based FM community radio is best option • Phone-in is the best interactivity with any expert or progressive farmer 	<ul style="list-style-type: none"> • Community radio require radio to listen • The cost in terms of batteries or electricity • Radio is costly to buy for usage • Digital radios are not commonly available in market now • It is a one way linkage with voice connectivity • Field demonstrations can't be seen like in television • Till visual radio launch it still provide restricted community support

Table 10.3.10: Analysis of the strengths and weaknesses of three type of ICT media. (Source: Rao V.K., SMJ School of Management, IIT Bombay, CSI Communications, 2013)

10.3.11 ICT INITIATIVES IN INDIAN AGRICULTURE:

Sl. No.	Name of the project	Particulars
A	Web Portals	
1	aAQUA	Online discussion, archived, multi-lingual and multimedia based. 27674 posts 3.3 million views by 12,964 viewers

		(www.aaqua.org).
2	KISSAN Kerala	Content processing and dissemination system. Online information, video channel, Tele-advisory, SMS and GIS based agro-services (www.kissankerala.net).
3	TNAU AGRITECH Portal	Dynamic portal and e-linkage with research stations and farm sciences centres for agro-advisory services (www.agritech.tnau.ac.in).
4	AGRISNET	Agriculture Resources Information System Network (AGRISNET) is a mission mode project funded by the Ministry of Agriculture, Government of India to develop a comprehensive online knowledge portal to disseminate relevant information to farmers. Under this scheme most of the State Governments are established information rich agricultural websites. For example, Sikkim AGRISNET (http://www.sikkimagrisnet.org), Andhra Pradesh agriportal, http://www.apagrisnet.gov.in , Uttar Pradesh (UP) Agrisnet Knowledge Portal (http://agriculture.up.nic.in), Tamil Nadu- www.tnagrisnet.tn.gov.in , AGRISNET– Himachal Pradesh (http://203.193.179.168/default.aspx) - Expert Advisory Services (http://www.hp.gov.in/expertadvisory/SignUp.aspx).
5	DACNET	DACNET scheme, 46 web sites and 39 applications are developed (75 were developed and functional), which include web portals on complete information on 9 crop directorates, extension services, Integrated Nutrient Management, Marketing, Mechanisation and Technology, Economics and statistics (www.dacnet.nic.in).
6	e-Krishi	Web based farm advisory services, market information, resource library and online expert advisory (www.ekrishi.org).
7	ASHA	Relevant and need based agricultural information for the farmers of Assam state of North-East India. (www.assamagribusiness.nic.in).
8	India Development Gateway (InDG) portal	Multilingual portal for agriculture and other rural information. Decentralized content management system by 225 institutional partners and others (www.indg.in).

9	Rice Knowledge Management Portal (RKMP)	Comprehensive information portal on Rice. Separate domains for farmers, extension personnel and researchers and also e-learning platform is unique feature of this portal (www.rkmp.co.in).
10	Agropedia	Agriculture knowledge repository of universal meta models and localized content for a variety of users with appropriate interfaces. Built in collaborative mode in multiple languages. Currently hosts nine thousand pages (agropedia.iitk.ac.in)
B	Web Portals for Market Information and Agri-Business Firms' Portal to Farmers	
1	AGMARKNET	Market information by portal. Information on 2000 markets and 300 commodities in India (www.agmarknet.nic.in).
2	ITC-e-Choupal	Innovative trading and e-Commerce initiative in agriculture. Reaches 4 million farmers by 6500 e-Choupals spread over 40000 villages of rural India (www.echoupal.com).
3	Indiancommodities.com	User fee-based market information on Cotton, Sugar, Oilseeds, Pulses, Spices, Rice, Wheat, Tea, Coffee (http://www.indiancommodities.com/)
4	Mahindra Kisan Mitra	Mahindra and Mahindra Ltd., Farm Equipment Sector of the Mahindra Group hosted MahindraKisanMitra.com, a web portal for the Indian farmers to access wealth of information which is updated on a daily basis. Farmers can check daily mandi prices, read weather updates, latest crop advisories, and agri related news. The site also provides information under various other sections such as crop information, loans, insurance, mandi database, cold storages/warehouses and agri events (www.mahindrakisanmitra.com).
5	IFFCO Agri-Portal	Information for farmers in local language. Web portal and 100 farmers' information kiosks in 16 States (Patil et al., 2009) (www.iffco.nic.in).
6	Agrowatch Portal	The agriwatch.com is the largest agribusiness portal in India and enables access to a large amount of agribusiness related information covering more than 15 sub sectors within the agricultural and food Industry. The daily, weekly and fortnightly Agriwatch trade research reports are published (Patil et al, 2009) (www.agriwatch.com).

7	iKissan	Agriculture information; Crop specific package of practices of crops, animal husbandry, aromatic and medicinal plants, agricultural machinery, allied agriculture, sprayers, rural credit, insurance iKisan crop solutions; farmers have a critical need to get timely solutions for protecting and nurturing their crops to get best yields. Addressing this key need, iKisan has developed easy-to-use diagnostic packages for different crops which will be provided on demand. Further, it also provides local agri news, weather and market information to the farmers (http://www.ikisan.com).
C	VKCs/ VRCs/CICs/ CSCs	
1	Village Knowledge Centres (VKCs)-M.S. Swaminathan Research Foundation (MSSRF)	101 VKCs in Tamil Nadu, Puducherry, Maharashtra, Orissa, Andhra Pradesh and Kerala state of India. VRCs and VKCs working with 315 partners for implementation and location specific content generation (Senthilkumaran, 2011). Demand driven information and knowledge with support services, social inclusion, community ownership and partnership proved critical for the success and sustainability (www.mssrf-nva.org).
2	Village Resource Centres (VRCs) –Indian Space Research Organisation (ISRO)	473 VRCs have been set up in 22 States/Union Territories in India. The VRCs are connected to Knowledge/Expert Centres (ECs) like Agricultural Universities and Skill Development Institutes (SDI). Over 6500 programmes have been conducted by the VRCs in the areas of agriculture/ horticulture, fisheries, live stock, water resources, telehealth care, awareness programmes, women empowerment, supplementary education, computer literacy, Micro credit, micro finance, skill development/ vocational training for livelihood support etc. So far, over 500000 people have availed VRC services (www.isro.org/scripts/villageresourcecentres.aspx)
3	Community Information Centres (CICs)	Community information centres in North-East India e-Infrastructure for accessing rural information needs of farmers and others (http://www.cic.nic.in/).
4	Common Service Centres (CSCs)	Web based e-governance to services, including agriculture information to rural areas. So far 96,163 CSCs were rolled out in India (www.csc-india.org).
D	Telephony/ Mobile Telephony	
1	Agricultural Partnership (AIP) Innovative Mobile	Mobile solutions implemented in Assam Agricultural University, Jorhat to give farmers information on crops and weather, expert advice, pest management etc.. The AIP, a

	Solutions	consortium of Indian agricultural universities and US land grant universities and various private sector enterprises, is implementing these projects at the university.
2	Farmers Call Centre (Kissan Call Centre)	32 Farmers Call Centres, 2043636 farmers calls' answered during 2010-11, total calls answered during last five years (2005-2010) was 6247911.
3	Lifelines India	Connectivity by innovative mix of internet and telephony. Reaches 200000 farmers in three States of India (www.lifelines-india.net).
4	IFFCO Kisan Sanchar Limited (IKSL)	Voice messages in local languages. 95,000 voice messages delivered and 81000 Q&A repository with 5000 feedback messages from the farmers. 10 Lakh active farmers benefiting from IKSL's Value Added Services and IKSL enrollment crosses 4 million and 40000 cooperative societies as IKSL Retailers (www.iksl.in).
5	Fisher Friend	QUALCOMM, MSSRF, Tata tele services and Asute system technology jointly implemented mobile based advisory services (instant access to helpful information such as weather conditions, where they can and cannot fish and market prices) to fishing communities of costal Tamil Nadu since, 2007. Due to technical challenges and availability of services only 5 nautical miles created mixed impact. Some of successful case studies on mobile services impact were reported by Mittal et al., 2010.
6	Reuters Market Light (RML)	Micro-information Services designed specifically for the farming community was launched by RML in 2009. Currently covers over 440 crops and varieties with more than 1400 markets and 2800 weather locations of 15000 villages in 13 States of India. Timely and personalized information and individual farmers have reaped significant return on their investment achieving up to INR 200,000 (\$ 4000) of additional profits, and savings of nearly INR 400,000 (\$8000) by using RML (www.reutersmarketlight.com).
7	Mobile Advisory Services by Krishi Vigyan Kendras (KVKs) of Indian Council of Agricultural	Mobile advisory services to the farmers by the Krishi Vigyan Kendras (Farm Science Centres) are operational in India since, 2010.

	Research (ICAR).	
E	Hybrid Projects (Mix of ICTs, Info-mediaries & Conventional Extension Methods)	
1	e-Arik	Internet, Offline CDs and farmer-to-farmer communication, conventional extension methods. A study among 300 farmers indicated that an average Rs. 5252 was increased among 73 number of e-Arik registered farmers who were growing Khasi mandarin. Similarly, an average Rs. 1611 was increased among 258 paddy farmers who were registered with e-Arik initiative. The cost and time indicators comparing traditional extension system and e-Arik project, sixteen fold and three fold less time were required to the clientele availing and extension system delivering extension services, respectively. Further it is also reported that 3.4 fold economic benefit as compared to the expenditure of deploying e-agriculture prototype and traditional extension system (www.earik.in).
2	e-Sagu	Agro-advisory services by digital photographs and coordinators for 3035 farmers (4130 ha). Benefited Rs. 9491 (USD 240) per ha (www.esagu.in).
3	Digital Green	Farmer participatory video for agricultural extension. 1681 videos produced and 60313 farmers involved. Increased seven fold more adoption of farm practices and ten times more effective per dollar spent as compared to traditional extension system (www.digitalgreen.org).
4	Knowledge Share Centres	Information by touch screen kiosks, IVRS, bilingual web portal and awareness created by screening films & CDs by the Central Research Institute for Dryland Agriculture (CRIDA), Hyderabad. Project covered 51 villages in eight districts of Andhra Pradesh State in 2011 (www.naipsri.org/ikisan)
5	AIP project implemented by Sathguru Management Consultants Pvt Ltd.	Sathguru co-manages the AIP project along with Cornell University. Sathguru engages with all the stake holders in India and connects them with the partners in the US. Apart from interventions in these areas, Sathguru also reviews successful agricultural extension models, launches training programs for extension specialists and resource-constrained farmers and agriculturists, builds capacity among Indian faculty members for establishing centers for agricultural extension education, shares knowledge on AIP among the stakeholders, develops innovative training models, facilitates faculty exchanges and visits among Indian and US universities, conducts workshops to disseminate knowledge and promotes entrepreneurship among the

	Indian farmers.
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Table 10.3.12: ICT initiatives in Indian Agriculture. (Source: R. Saravanan, School of Social Sciences, College of Post Graduate Studies, Central Agricultural University (CAU))

10.3.12 ROLE OF KRISHI VIGYAN KENDRAS IN IMPLEMENTING ICTs:

India is a country with over 1 billion population and 5 million computers. 80% of the 5 million computers used in offices and hardly, 20 per cent are available for use in development work. Despite all the barriers, the Indian agriculture is bound to adopt and implement ICT to double the agricultural production. As ICT helps in information dissemination in less time with effective ways of communication, its implications cannot be ignored by KVKs (Venkatasubramanian V., Sajeev, M.V. & Singha A.K.). Securing the trust of the local farmers for their information needs, by providing definitive and specific answers to farmers' queries by using the available manpower and with minimal budget. Moreover, large areas or communities can be covered to provide faster and door step delivery of information. What is important is to have linkages between the experts and the farmer – value adding services such as soil testing, disease forecasting etc. and making visit to KVK a rewarding experience for farmers. KVKs can thereby gain satisfaction through the use of innovative technologies to diminish the effects poor availability of information through the use of user friendly sources of information.

KVKs have a definite role to play as regards Knowledge Management. Knowledge Management (KM) comprises a range of practices used in an organization to identify, create, represent, distribute and enable adoption of insights and experiences. Knowledge Management precedes the development of databases for management of agricultural information of the district. This gives rise to KDD(Knowledge Discovery in Databases) and data mining which abet the development of ICT based web-based agricultural services and applications.

10.3.13.a SUCCESS STORY OF KVK, BARAMATI

aAQUA (Almost All Questions Answered) is an online expert Question & Answer based community forum, developed by Media Labs Asia, KReSIT, IIT Bombay, for delivering information to the Indian farmers. It is an online, multilingual, multimedia, discussion forum accessible using a web browser, allowing members to create, view and manage content in their mother tongue (Hindi, Marathi etc). aAQUA has cyber extended the reach of experts at KVK, Baramati and has demonstrated great potential for local content creation.

10.3.13 CHALLENGES IN IMPLEMENTING ICTS:

The use of ICTs in most of agricultural implementations is gaining importance but there are some challenges in implementation of ICT based services that need attention and requires a lot of research. Following are major challenges:

- Lack of access and familiarization with ICT tools.
- Lack of understanding and awareness of the needs and challenges of small scale farmers
- Lack of standardized approaches of ICT usage in national poverty reduction schemes.
- Need of appropriate socio cultural issues to achieve the desired objectives.
- Poor connectivity, low bandwidth, limited electricity, user specific information.
- ICTs developed in project suffer from assurance of self generating finances.
- Continuous updating and maintenance of web portals implemented in project mode require sufficient resources for sustenance once the project period is over.

- Overcome difficulty in localisation of content aggregated from various sources.
- Introducing interactivity in ICT based applications for stopping one way information flow thereby proliferating farmer fascination and participation in ICTs.
- System and process analysis studies of ICT projects need to be published so that practical challenges and constraints in implementing the ICT projects get shared with other stakeholders.

10.4 CONCLUSION:

Planning for ICT infrastructure, end-user training, design and implementation of systems, on-going maintenance and support are all required. However, it is not only the technological issues that will need attention in ICT, change management plays an important role in the introduction of ICT solutions in order to ensure sustained usefulness.

ICT in the context of its usefulness, adoption and impact on the Indian agriculture scenario is steadily evolving itself to usher in an era of economic progress for the large workforce (approximately 50%) engaged in agricultural and allied activities in the country. The application of Information Communication Technologies (ICTs) in agriculture is a vast subject and encompasses a broad area of study. This chapter makes an effort to chart out the relevance of ICTs for the improvement of small and marginal farmers and also of the rural/ agrarian societies at large. In doing so this work elicits in brief the facts about policy guidelines, initiatives, requirements for implementing ICTs and challenges faced. Therefore, it is felt that enthusiastic efforts in planning and coordination in implementation coupled with requirements such as information need assessment of the communities, continuous involvement and feedback will lead to the application of suitable ICTs for sustainable agricultural development.

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Presentation tools for better communication

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11.1 OVERVIEW:

- Introduction
- Importance of presentation tools
- Practical Utility
- Advantages and disadvantages
- Recent developments
- How KVKs can use this knowledge & where?
- Conclusion

11.2 INTRODUCTION

Presentation software refers to any software that uses slides or a series or path of related virtual pages to present information to an audience. The information can be pictures, video, audio or text, and is usually made in such a way to make the information more visually available to the individuals watching it.

Presentation tools generally include functions that allow the user to insert text, audio, pictures, and videos, as well as functions which allow the user to manipulate the presentation as a whole in order to maximize viewer interest and make the presentation more appealing. Presentation tools also include functions that allow the user to email, upload, or share the presentation in some way.

Presentation tools is a category of application program used to create sequences of words and pictures that tell a story or help support a speech or public presentation of information. Presentation tools can be divided into business presentation tools and more general multimedia authoring tools, with some products having characteristics of both. Business presentation tools emphasize ease- and quickness-of-learning and use. Multimedia authoring tools enables you to create a more sophisticated presentation that includes audio and video sequences. Business presentation tool usually enables you to include images and sometimes audio and video developed with other tools.

Keep in mind that all presentation tools are not equal – while you could use PowerPoint to create a text and image-based presentation, that same information would be perceived very differently if presented via Pixton or Dipity. The value of familiarizing yourself with multiple tools is that you'll

create more opportunities for yourself and for your students to engage more, and possibly in a better way, with the material.

11.3 IMPORTANCE OF PRESENTATION TOOLS

In today's world and numerous corporate circles, presentations are visual displays and explanations regarding a specific topic that employ the use of text and images. They are an extremely important part of everyday business operations. Choosing the right presentation tools enables a person to create a powerful presentation that will grab and hold the attention of their audience. Whether that audience is comprised of fellow employees or potential clients or customers, it will enable the person to provide them with valuable information that they can take away with them when the presentation is over.

The use of the right presentation tools will enable the user to target a diversity of audiences. Presentations have three basic purposes - to build good will, to inform, and to persuade. The type of presentation tools that is used can make all the difference in the world when it comes to creating impact and getting major points across to that audience. In the long run, these tools can be invaluable, especially when trying to communicate critical need-to-know information to an audience.

11.4 PRACTICAL UTILITY

Anyone who's had to give a formal speech or presentation will know that having high-quality visuals is a key to success. Presentation software is an excellent tool to help you stay organized and on subject in front of a crowd with behind-the-scenes tools like timers and scripts. And using effective presentation and slideshow software will help your audience connect to the subject, whether it's professional or personal. Add smooth transitions, text, photos and video to create a dynamic and engaging presentation, and set it off with some cool effects or music for a professional-quality show.

Presentation tools are used to enhance lectures, seminars, or other presentations. Some presentation tools, such as PowerPoint, Smart boards and Mind Maps may be used to add visual content to a presentation. Other tools, such as Clickers, allows for engagement between the audience and presenter during presentation. Overall, presentation tools aid a presenter in organizing and expressing their thoughts and engaging with their audience.

Presentation using videos and slideshows is an excellent way to develop literacy in young learners, because it allows them to engage with text in a very visual way aided by multimedia. People will have to find ways to express their ideas in concise ways that capture the attention of the audience and will develop an ability to communicate thoughts and concepts through a variety of resources, including text and recorded narrations.

11.5 .1 ADVANTAGES OF PRESENTATION TOOLS

The main advantage of presentation tools are incredibly easy to learn how to use. Users can make use of animations, sound, fonts and video to enhance a presentation because multimedia can easily be added to the presentation. Presentation tools are excellent for summarising facts and great for showing graphs/charts/diagrams to an audience.

Presentation tools have a lot of uses in classroom with interactive white boards being used regularly to allow children to interact with pre-prepared presentations. Children pay more attention to the fun pictures and activities provided by the interactive whiteboards than the normal chalk-and-talk works on a standard whiteboard. It makes the learning more fun for the children, and allows the teacher to organize their lessons accordingly.

Users can make professional looking presentations with little to no design skills via the use of large numbers of background templates, library and wizards which are supplied with most of the presentation software. In terms of size and portability - an entire presentation with multiple slides can be represented as a single computer file. Presentation software can be used in conjunction with web conferencing to deliver presentations from different geographical locations.

Presentation can be easily output to different formats e.g. interactive whiteboard, acetate slides, handouts. Can create a set of handouts for people to write on whilst presentation being given. Allows us to face our audience and make eye contact rather than facing the screen.

11.5 .2 DISADVANTAGES OF PRESENTATION TOOLS

It is difficult for the audience to take notes while presentation is taking place, otherwise they loose concentration. Audience is often happy to sit placidly and not interact with the presenter. It is all too easy to make a very bad presentation with too many animation effects and too much text images. Presenters often just read from the presentation which is boring for the audience.

Technical Difficulties or lack of sufficient hardware/software on the day of a presentation may leave you unable to deliver the presentation as intended. Producing a professional yet visually unique presentation can be difficult with no design skills as templates / wizards have the disadvantage that many presentations can look similar.

Reliance on presentation software as well as its simplicity can lead to presenters simply reading from the slides rather than using them as cues or visual aids.

In terms of expense, presentation software requires a suitable computers system as well as the software to produce a presentation. The computer used to present a presentation has to have the same software on it as was used to develop the presentation.

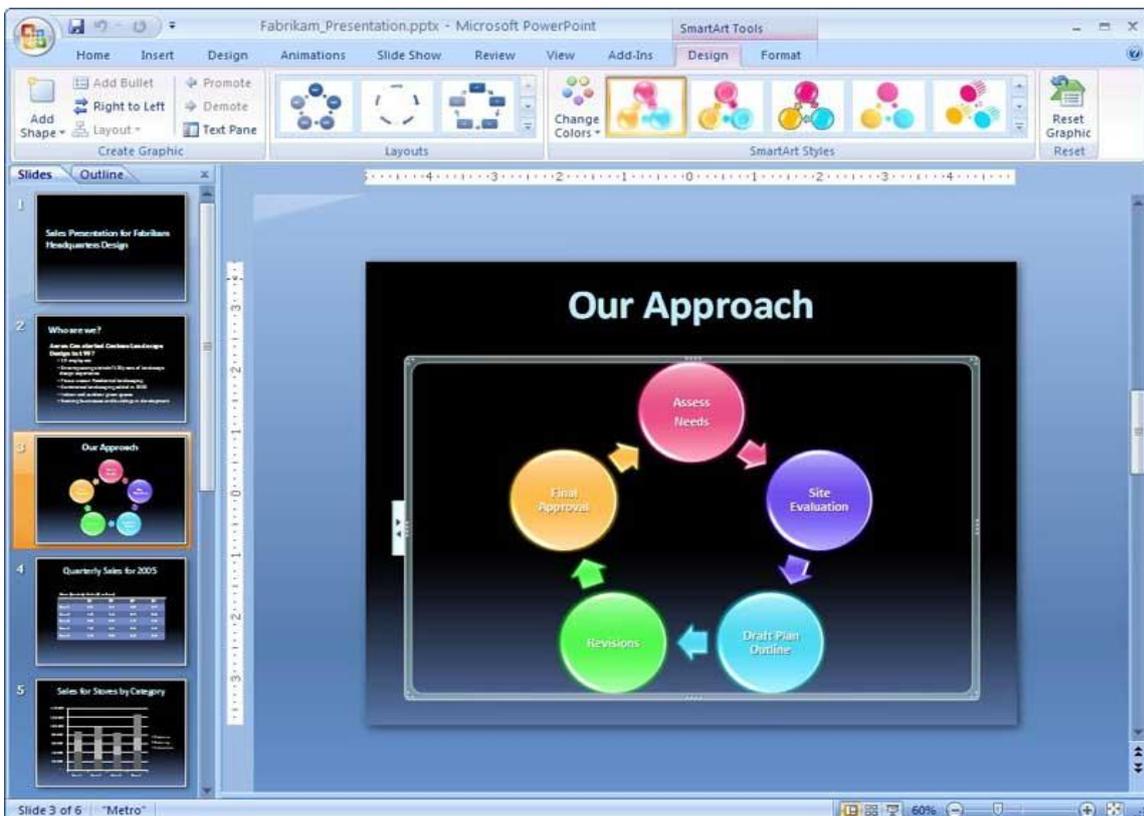
11.6 RECENT DEVELOPMENTS

Some recent developments in presentation tools are discussed below:

11.6.1 MICROSOFT POWER POINT

Though Microsoft PowerPoint is more than 15 years old it is the most widely used presentation tool in the world. It is powerful but easy-to-use presentation graphics program you can use to create professional-quality presentations. PowerPoint can be used in a variety of settings by people in many different career fields. For example, a day care worker may develop a presentation showing parents pictures of their children in all of the year's activities, or a minister may utilize PowerPoint to display notes on the sermon or display song lyrics for the congregation. An instructor may use it for notes for a lecture to help keep the students focused and their notes organized, or a hotelier may develop a presentation to help market their hotel at conferences and meetings. PowerPoint is also an effective tool for creating flyers and other printed products because of its versatile drawing and layout tools.

11.6.2 Image: Screenshot of a Microsoft Power Point template



(Source: http://microsoft_powerpoint.virtualsoft.com/?v=128114)

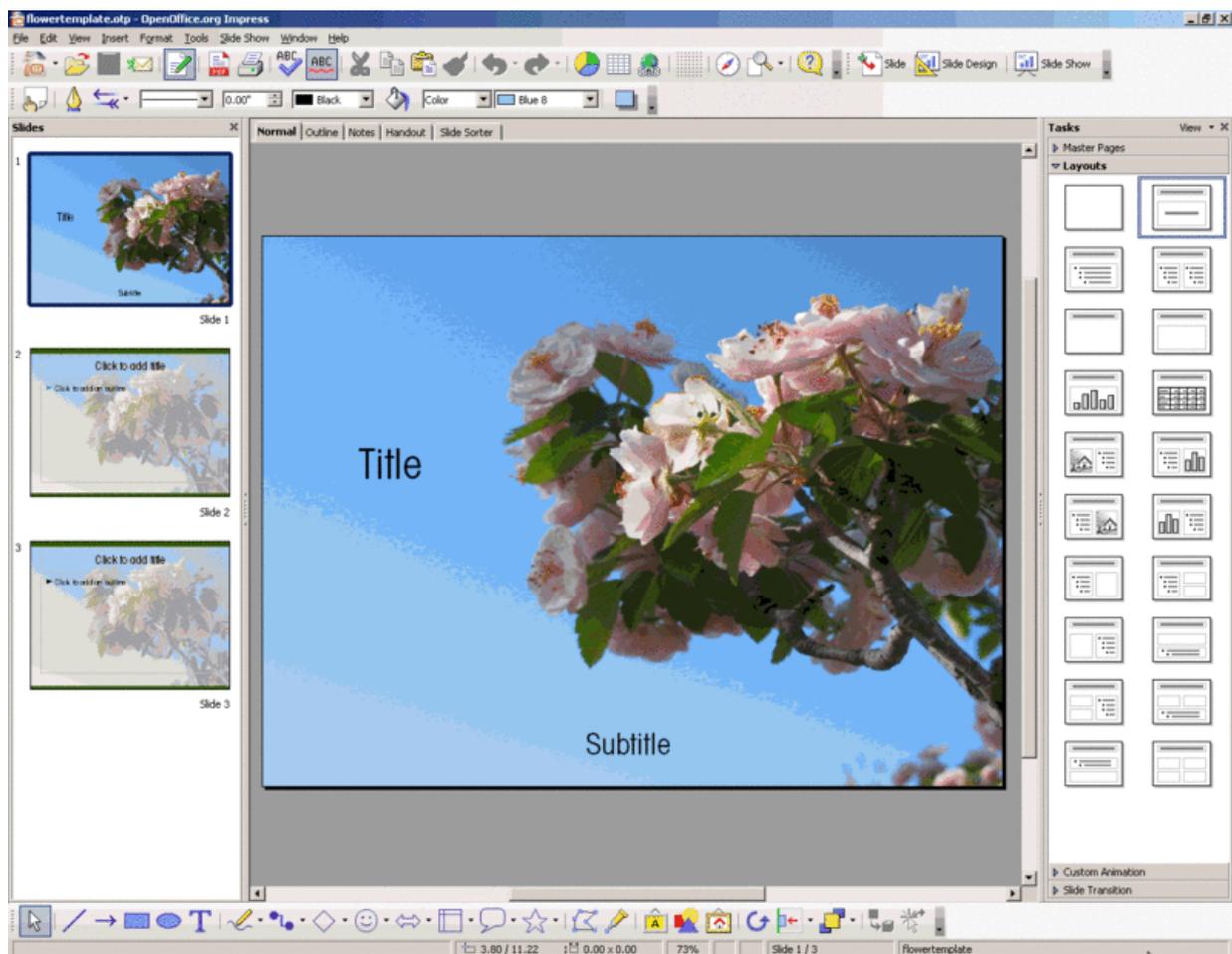
11.6.3 OPENOFFICE IMPRESS

Open Office Impress is a presentation software program that is part of a suite of programs offered free from OpenOffice.org. OpenOffice Impress is a great tool for presentations in business, classrooms, and personal use.

Open Office Impress uses a graphical approach to presentations in the form of slide shows that accompany the oral delivery of the topic. This program can be effectively used in business and classrooms.

Open Office Impress is one of the simplest computer programs to learn. If you are at all familiar with Microsoft PowerPoint, then you will be right at home with this program. Anyone can create stunning presentations that look like they were designed by a professional. An added bonus is that you can open and use presentations that you have already created previously in PowerPoint.

11.6.4 Image: Screenshot of a Open Office Impress template



(Source: http://openoffice.blogs.com/openoffice/2006/05/a_few_openoffic.html)

11.6.5 SLIDESHARE

SlideShare has recently gained attention as one of the best business presentation sites around. To use it, you import a source file from PowerPoint, Word, PDF or other formats (and you can also import video with the paid pro version).

With SlideShare, you can gussy up your plain PowerPoint with an embedded YouTube video or audio file to make it a more media-rich experience for viewers. And once it's done, you can embed or share it widely and share automatically to your LinkedIn account.

11.6.6 Image: Logo of Slideshare



(Source: <http://blog.crazyegg.com/2013/04/04/resources-slideshare-for-marketing/>)

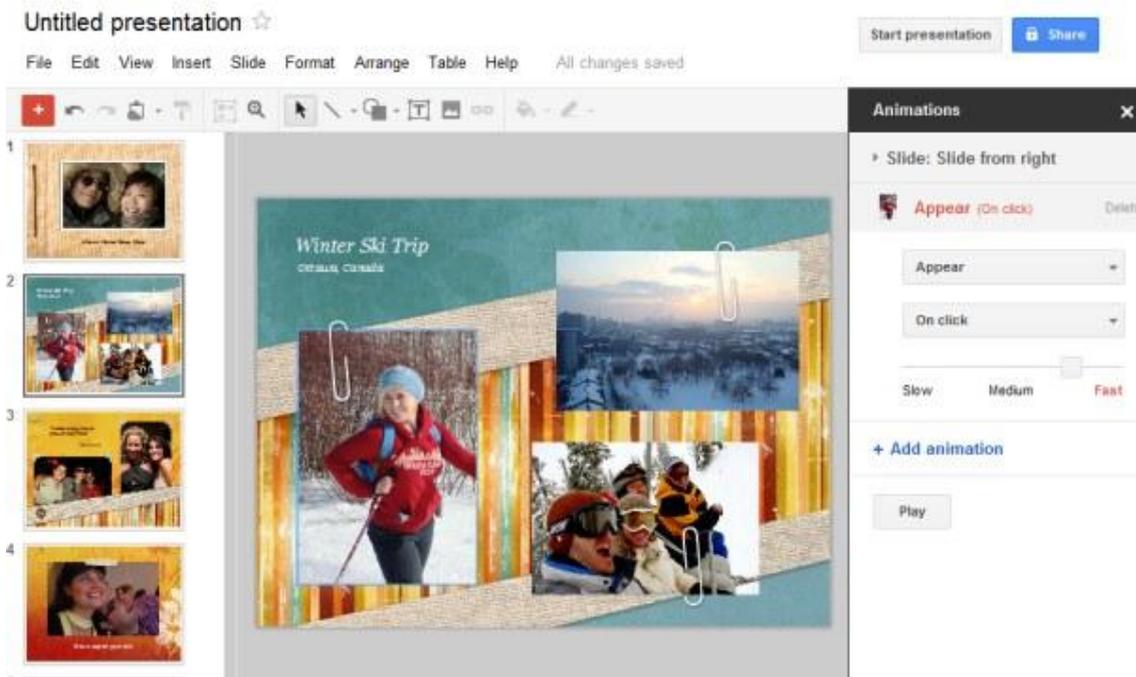
11.6.7 GOOGLE PRESENTATIONS

Part of Google Drive, Google Presentations gives you a tool that mimics PowerPoint, but it has the advantage of being online.

You can import an existing PowerPoint presentation for editing, or start from scratch with Google's own templates. And there are 450+ fonts you can use too. You can embed images and YouTube videos, but unfortunately not sound, which may limit its utility for some users.

Once your presentation is done, you can publish to the web, embed or share. The killer feature: multiple people can work on a presentation at once.

11.6.8 Image: Screenshot of a Google presentation template

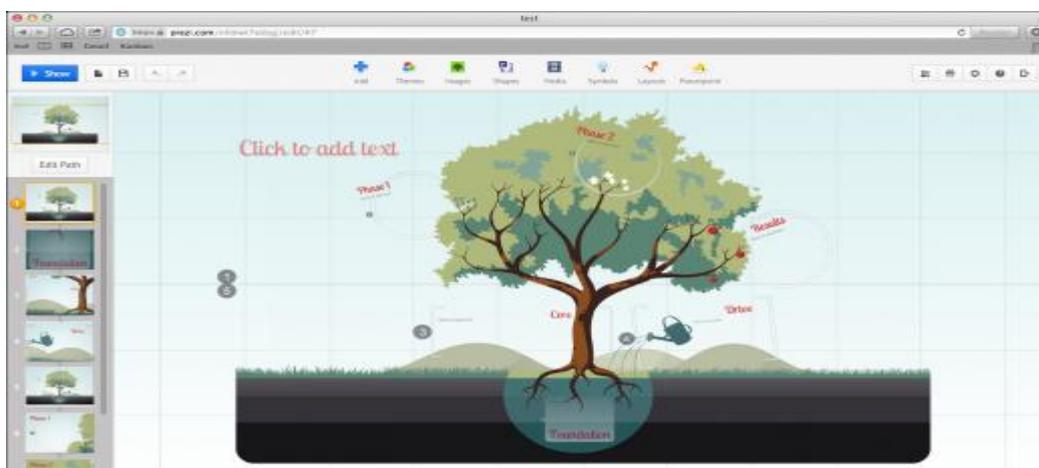


(Source: <http://googlesystem.blogspot.in/2011/10/new-version-of-google-presentations.html>)

11.6.9 PREZI

Prezi is a zooming presentation tool that lets you create and present your ideas on a large and zoomable virtual canvas. You can easily place ideas, images, and videos and arrange them in a natural flow to tell your story. It works on Cloud, desktop and even on the iPad or iPhone. It offers a free account which gives you public presentations plus 100MB storage space.

10.6.10 Image: A Prezi template Screenshot



(Source: <http://thenextweb.com>)

11.6.11 EWC PRESENTER

It provides an HTML5 WYSIWYG editor for you to design simple presentation content in HTML5.

Users can animate their presentations with a Flash-like editor where you can select keyframes, set the length of the various animations, and so on. It's still under Beta and it's free to register an account.

11.6.12 Image: A EWC Presenter template Screenshot



(Source: <http://www.free-power-point-templates.com/articles/create-presentations-in-html5-with-ewc-presenter/>)

11.6.13 SLIDEROCKET

SlideRocket is a presentation platform that helps you to create and manage your presentation. Import your existing presentations from PowerPoint or Google, and start using SlideRocket's authoring and tracking tools to create a vibrant and dynamic presentation.

You can work with HD video, audio, charts, pictures and Flash.

11.6.14 Image: A SlideRocket template Screenshot



(Source: <http://www.sliderocket.com/product/>)

11.6.15 VUVOX

Vuvox offers 3 main features: Collage, Studio and Express to create a multimedia presentations with feeds, links, music, audio, video and photos from Flickr, SmugMug or Picasa. It's a useful tool to create a documentary-style slideshows.

It is also perfect for multimedia collage presentations that require the use of rich media elements.

11.6.16 Image: A Vuvox template Screenshot



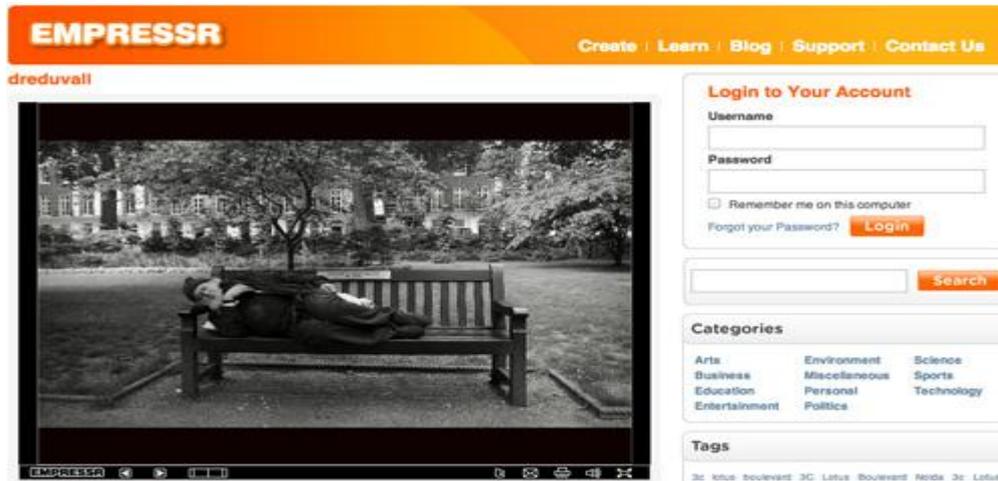
(Source: <http://vuvox.appappeal.com/>)

11.6.17 EMPRESSR

Empresser is an online rich media presentation editor which allows you to add photos, music, audio, video, and even Flash into your presentation. Users are allowed to share their presentations via link or embed them on their websites.

Registration is free and there's no limit to the number of presentations you can create and store.

11.6.18 Image: A Empresser template Screenshot



(Source: <http://www.hongkiat.com/blog/presentation-tools/>)

11.6.19 OOMFO

Charts are important in a presentation and that's why Oomfo in this list. In short, Oomfo helps you to design interactive charts like Pareto, Waterfall, Funnel, Marimekko, Pyramid and etc. Oomfo allows you to connect your chart data from your Cloud application or multiple Excel files.

You may start by choosing a chart template from its gallery and it only supports Microsoft Office 2003 and above.

10.6.20 Image: A Oomfo template Screenshot



(Source: <http://www.hongkiat.com/blog/presentation-tools/>)

11.6.21 SCROLLSHOW

As the name suggested, ScrollShow is a scrolling presentation editor for iPad with multi-speed backgrounds. With ScrollShow, can create panoramic presentations with parallax effect. It is

ideal to present timeline presentations, animate infographics online or at a personal level, present your vacation photos.

11.6.22 Image: A Scrollshow template Screenshot



(Source: <http://www.crunchbase.com/company/scrollshow>)

11.6.23 KNOVIO

If you always share your presentations on the Web, Knovio can help you show your personality by letting you attach your voice or a video alongside the presentation. You can coordinate your narration to run parallel to the slides.

You can even import PowerPoint presentations that are already done and work on that with Knovio. Your slides can then be shared on Twitter, Facebook or LinkedIn or shared privately with close friends.

11.6.24 Image: A Knovio template Screenshot



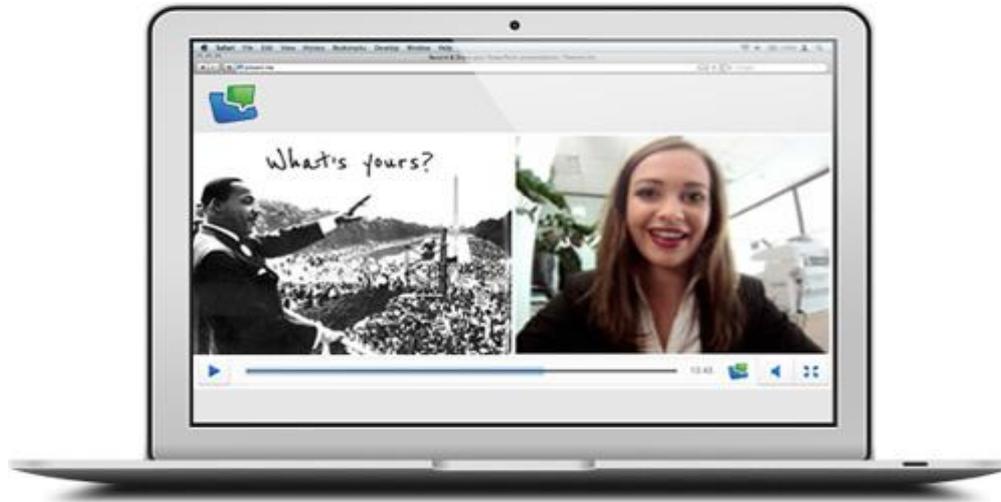
(Source: <http://www.hongkiat.com/blog/presentation-tools/>)

11.6.25 PRESENT.ME

Similar to Knovio, Present.me supercharges your presentation by adding videos side by side to your slideshows whether it is in Powerpoint, PDF, Excel, Word, Google Docs or Open Office

format. You can even watch the edited presentation on mobile devices using Present.me exclusive apps.

11.6.26 Image: A Present.me template Screenshot



(Source: <http://geoffarcher.wordpress.com/tag/social-media/>)

11.6.27 VCASMO

VCASMO is an online presentation editor for multimedia slide shows, business presentations, training, academic teaching and etc. It lets you easily place videos with subtitle and PowerPoint presentation side by side and publish in on your desktop, iPad or even iPhone.

Free account comes with 512MB storage with unlimited presentations.

11.6.27 Image: A VCASMO template Screenshot



(Source: <http://www.fusionswim.com/2013/08/04/cool-tools-to-help-you-make-presentation-less-painful/>)

11.7 HOW KVKs CAN USE THIS KNOWLEDGE & WHERE?

In KVK system the use of presentation is immense. Therefore knowledge of good presentation tools and skills is essential. Several review meetings, progress meetings, seminars, workshops, zonal meetings etc are attended by the scientist through out the year need to present progress report, annual report, annual work plan, contingency plan etc. Good, attractive, informative presentation plays a vital role here.

The scientists conducting training programme for farmers regularly in KVK. A presentation combining videos, graphics, and images can make the presentation interactive, attractive and easy to understand the topic of the training for the farmers.

Open office Impress presentation software is discussed below to help the KVK personnel in details for how to create a presentation using text, image etc. This software is useful for KVK as it is open source software.

11.7.1 Open office Impress

These instructions will help to give an overview of "Impress" explained with a small and easy example.

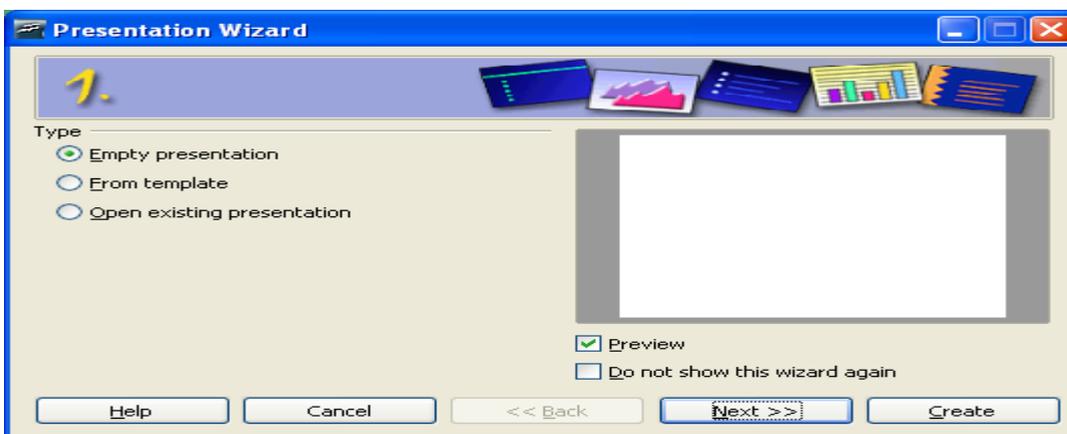
Start the program by selecting Presentation in the group OpenOffice.org (or OpenOffice.org Impress under Linux/KDE) in the Start menu. The wizard of OpenOffice.org Impress appears to help to create the basis of presentation with only a few mouse clicks.

To prevent the automatic start of the wizard with a new presentation choose **Tools > Options**, then select **Presentation > General** and disable "**Start with wizard**" under "**New document**".

In OpenOffice.org 2.0 the options dialog is context-sensitive to the used module. If you start another module of OpenOffice.org, you cannot see this dialog.

To create presentations choose "**Empty presentation**" as shown in image 10.7.2. Later on you can select your own presentations and patterns.

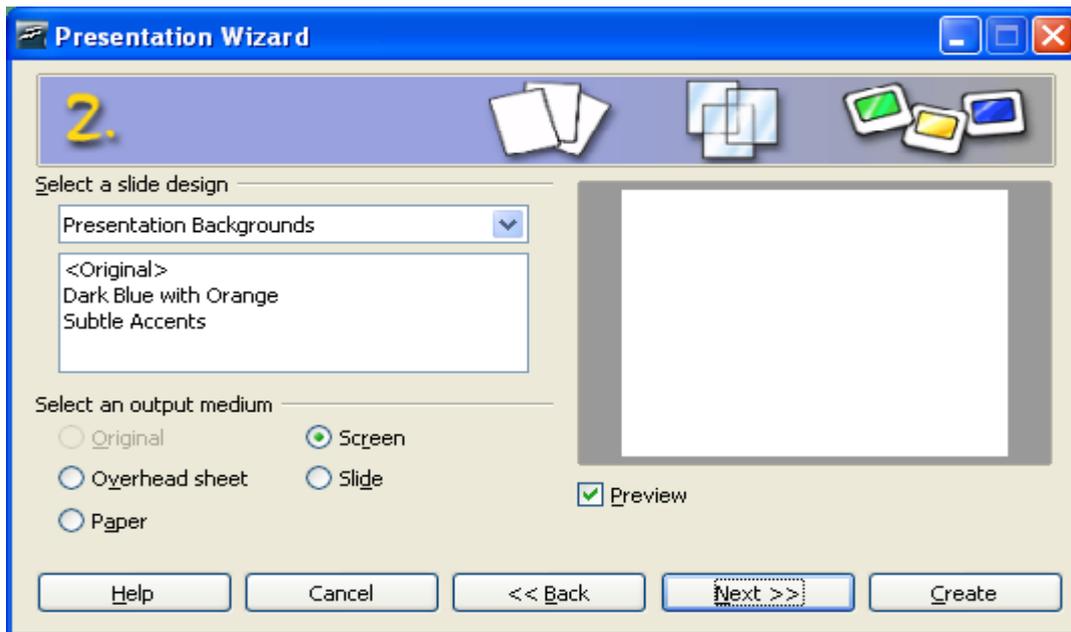
11.7.2 Image: Presentation Wizard step 1



(Source: Open office tutorial)

Click "Next". The next dialog appears:

11.7.2 Image: Presentation Wizard step 2



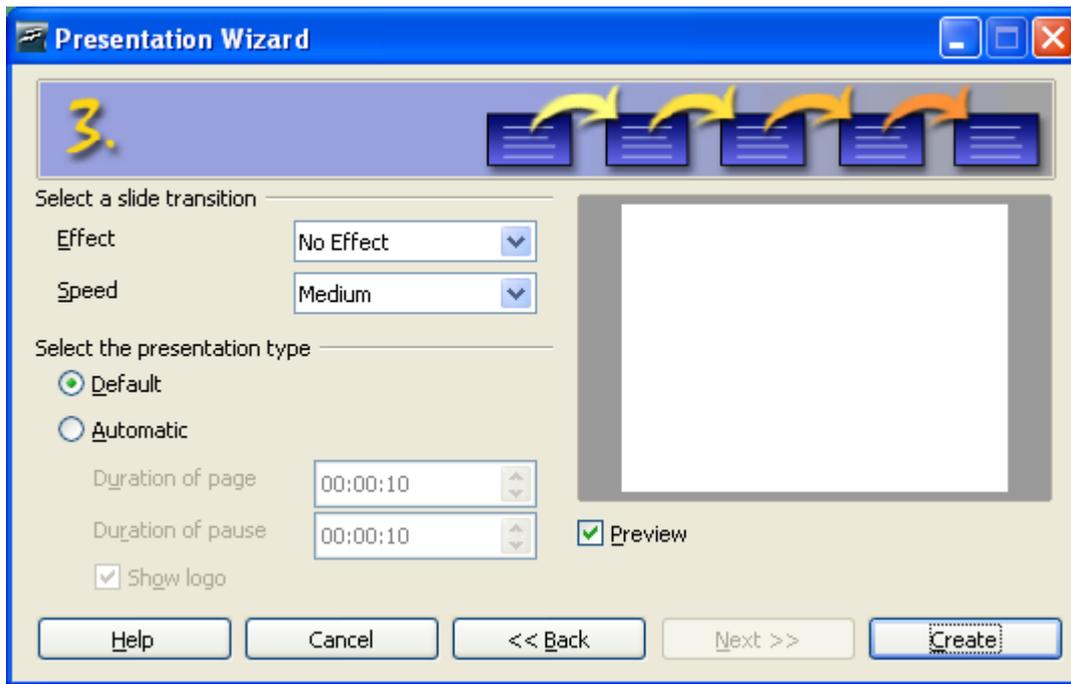
(Source: Open office tutorial)

Here, you decide for which medium you want to create your presentation like paper, screen etc.

For the beginning choose "Screen".

During the third step you can choose how to change from one slide to the next.

11.7.3 Image: Presentation Wizard step 3

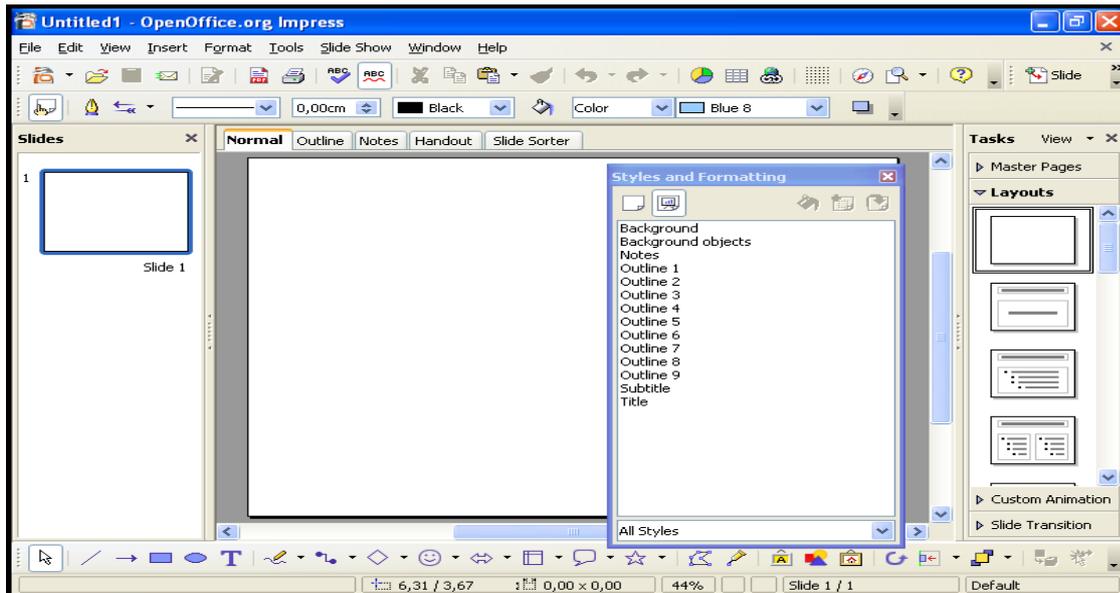


(Source: Open office tutorial)

In the first drop-down-menu you can determine, whether the content of your slide will be changed through overlaying from the left side. In the second drop-down-menu you can choose how fast the change will happen. In the last selection you can automate your presentation (change of the portrayal or the slides after a fixed time).

For the beginning, you should use the standard presentation. For this click – without any changes – "**Create**". After you have clicked "**Create**", you will see the main window of OpenOffice.org Impress with its three parts. In the middle of the window is the work space, the main design area of the application.

11.7.4 Image: The main window



(Source: Open office tutorial)

On the left side of the window you find the Slides pane with thumbnails of all slides in your presentation. They are in the order that you have chosen. If you want to change the order, you can do it here. Click on a slide and, with the left mouse button pressed, drag it to the new place and release the mouse button.

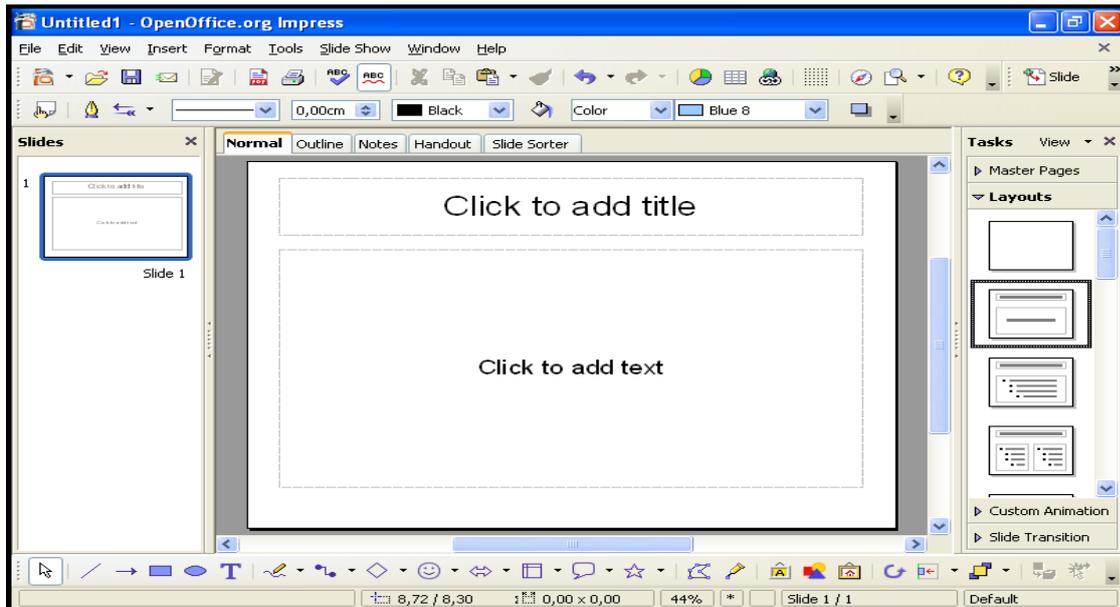
On the right side you see the floating Styles and Formatting window. To open/close this window press <F11> or choose **Format > Styles and Formatting**

To the right of the work space you find the Tasks pane. Figure 10.7.4 shows the "Layouts" part opened. Here, you can select different templates with the following fields in different combinations:

- title,
- text,
- clipart
- table,
- diagram
- object.

If you look at all layout variants, you see that all convenient combinations are there. For your first presentation start with the Title Slide containing fields for title and text. Click on the corresponding layout symbol. Your empty slide will change to the new layout.

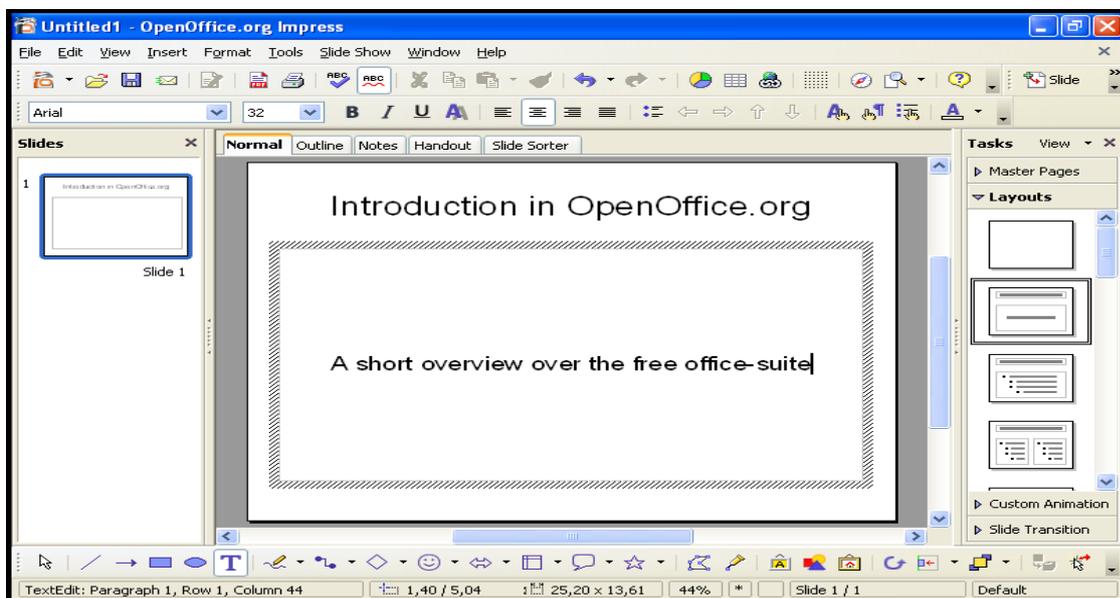
11.7.5 Image: Selection of Title Slide



(Source: Open office tutorial)

On the title insert a title for the presentation. For this, click in the upper text field "Insert title by clicking" and insert the text "Introduction in OpenOffice.org". In the lower text field, after clicking, write "A short overview over the free office suite"

11.7.6 Image: Title page with inserted text

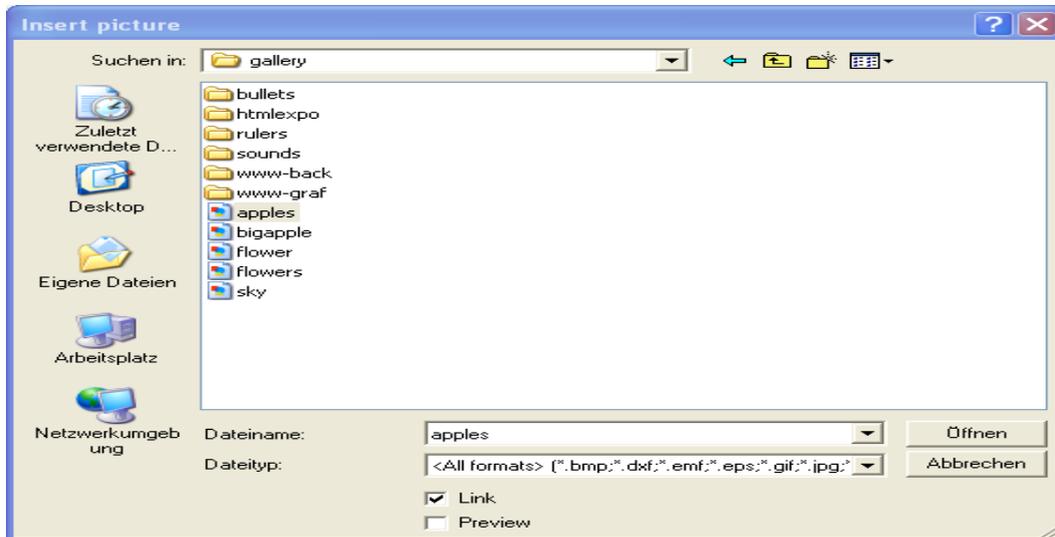


(Source: Open office tutorial)

To add new pages to your presentation choose **Insert > Slide**. A new, empty page will be added. From the Layouts pane select a layout with title, graphic and bullet text. This selection will be used immediately for your new page. Insert the text from the first page.

In the lower left half you will insert a graphic. Double-click in this part. In the next dialog choose the image, which you want to insert, and click **Open**. (The dialog can be different, depending on the used operating system.)

11.7.6 Image: Dialog for selecting the picture



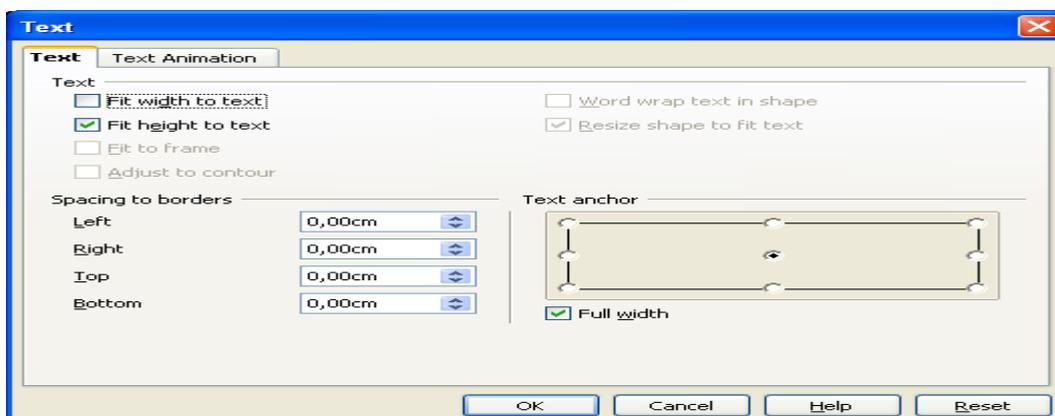
(Source: Open office tutorial)

Use the lower right half for a bulleted list:

- free office suite
- file exchange with other office suites
- platform independent (Windows, Linux, MacOS and Solaris)

You can change the font size by selecting the inserted text with the Line and Filling bar. Afterwards, right-click the selected text to call the context-menu for further editing.

11.7.7 Image: Text dialog

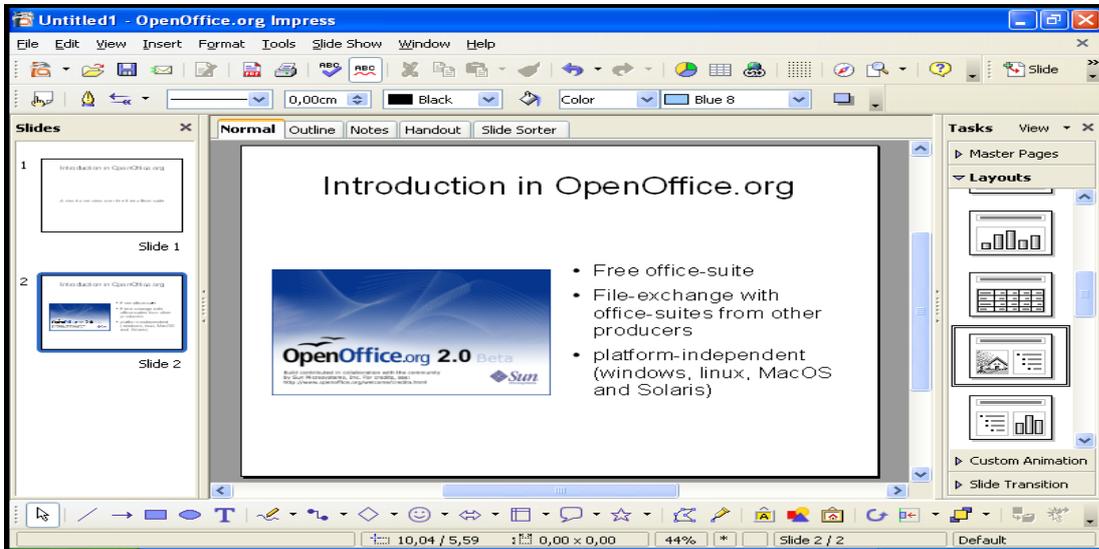


(Source: Open office tutorial)

Select **"Text"**. On this tab you can edit the text on the right.

The result should be as follows:

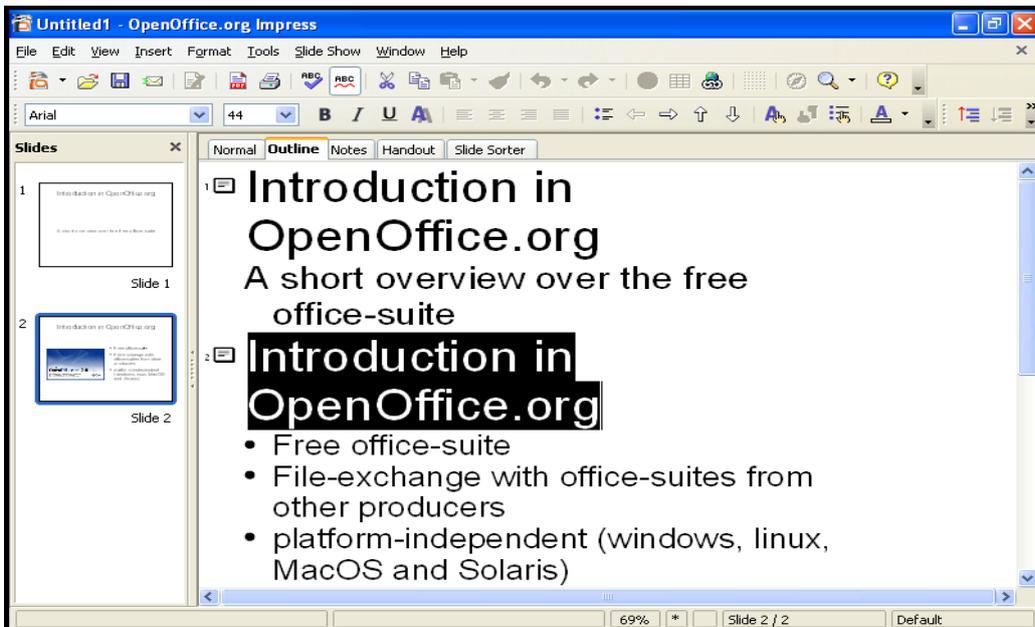
11.7.8 Image: Slide 2 with graphic and bulleted list



(Source: Open office tutorial)

Until now, we have worked in the Normal view of OpenOffice.org Impress. Earlier you have learned about the tabs for the other views. Choose the second tab of the left hand side ("**Outline**"). You can see now all the slides with the texts:

11.7.9 Image: Outline view



(Source: Open office tutorial)

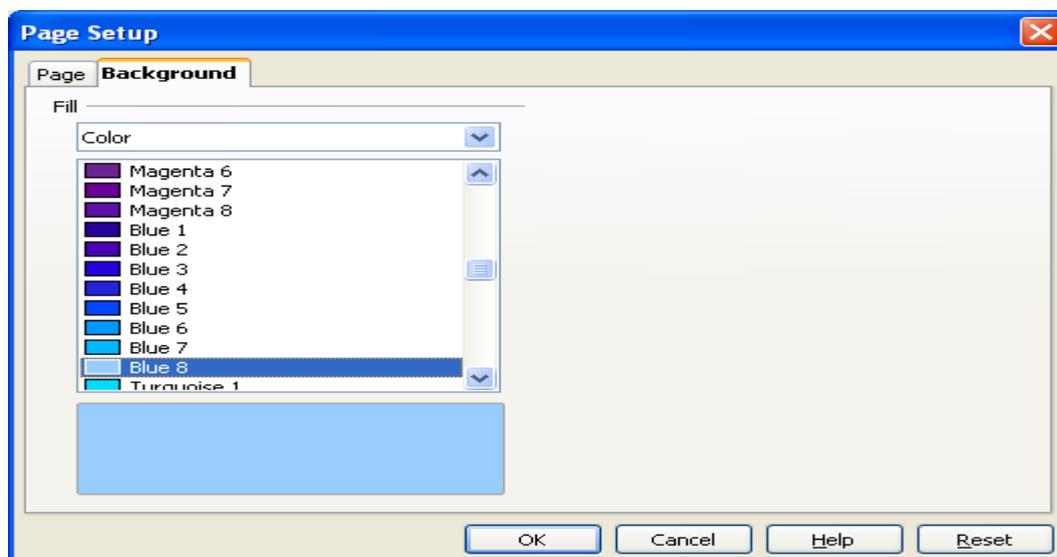
In this view you can check the contents of your slides. You can insert new outline levels and distribute contents on the different slides. The Outline view is very helpful for the planning and the arrangement of the content in your presentation. You can see the result of your changes with a short delay in the Slides pane on the left. Select the first row of the second slide and replace the text with *"Advantages of OpenOffice.org"*. Go to the end of the last row, press Return and insert *"Transformed for other operating systems"*. On your second slide a new point appears.

Place your mouse pointer behind the title of your second slide and press the Return key. A new slide (number 3) appears. The bullet points will be moved to slide 3. With the Backspace key you can take back the changes. The bullet points are on slide 2 again.

Repeat the creation of a new slide. But now, press the Tab key instead of the Return key. The new slide disappears. On the second slide there is only one bullet point at the beginning. This point can be deleted with the Backspace key.

As a next step, you can add a background color. Place your mouse pointer on your slide and call the menu **Format > Page**.

11.7.10 Image: Dialogue Page Setup – Background



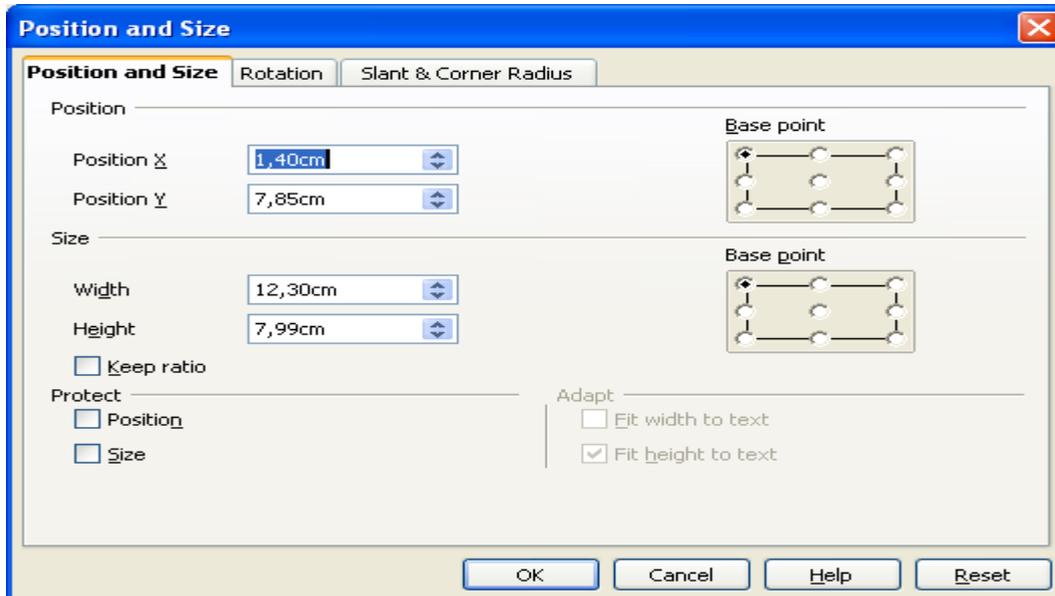
(Source: Open office tutorial)

In the opening window you can select the background color for your slide in the **"Background"** tab. You can choose between plain color, color gradient, hatching or bitmap. Look at all possibilities and test them with your presentation.

If you want to create a special background (for example using a graphic or a logo) choose **View > Master > Slide Master** to open the master view of the slides. Now choose **Insert > Picture > From File** to select the image you want to insert. Confirm your selection with the **"Open"** button.

Select the image and call for the context-menu (click with the right mouse-button). Choose **Position and Size**. In the following dialog you can change the size and the alignment of your graphic.

11.7.11 Image: Position and Size dialogue



(Source: Open office tutorial)

You can now save your presentation with **File > Save** or by clicking on the "Save" button (disk symbol). You can also use the menu **File > Save as...** and define a path. You can save your presentation as a template for using it as a base for your next presentation.

To present slide show open your presentation with **File > Open**. Start the slide show with the menu **Slide show > Slide show** or with the button in the Presentation bar. Alternatively, you can start the slide show with the function key F5.

11.8 CONCLUSION

Presentation software is an essential for many professionals like teacher, student, sales person, etc. It is a good practice to write presentation first, make sure what are going to be said. Then only think about what kinds of images, graphs, charts, music, would help to communicate that idea to audience. Keeping these points in mind is essential when designing a presentation. The basic principle of good design is to keep it simple in terms of fonts, images, and text. Slides should reinforce words, not repeat them. Consider that a badly designed presentation is one in which the speaker fills every slide with text, often in a small font, and spend the entire presentation reading the slides. This is the least effective way of using presentation software. One image, one word can be much more powerful than a paragraph. If there are several points you want to make, consider splitting them into several slides.

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9. <http://www.openoffice.org/>

Management Information systems in KVKs

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12.1 Overview

- Introduction to MIS
- Structure and classification of MIS
- Information and system Concept
- Implementation and Evaluation of MIS
- Intervention of MIS
- MIS at KVK System

12.2 Introduction

The concept of the MIS has evolved over a period of time comprising many different facets of the organizational function. MIS is a necessity of all the organizations. The initial concept of MIS was to process data from the organization and present it in the form of reports at regular intervals. The system was largely capable of handling the data from collection to processing. This concept was further modified, that the system should present information in such a form and format that it creates an impact on its user, making a decision or an investigation. An MIS gives information through data analysis. The Physical view of the MIS can be seen as assembly of several subsystems based on the databases in the organization. These subsystems range from data collection, transaction processing and validating, processing, analyzing and storing the information in databases. The subsystem could be at a functional level or a corporate level.

An information system that provides information to managers to help them in decision making is called a management information system (MIS). MIS provides different types of information to different levels of management. These are designed on the basis of the information flow within an organization. Managers manage an organization by using reports. Several types of reports are used by managers, such as schedule reports, on demand reports, exception reports, predictive reports, summary reports and statutory reports. These reports help managers plan, organize, direct and control better by presenting relevant information to them. MIS benefits the organization in many ways. It increases productivity, enhances the quality of decision making, improves communication and team work, and helps in organizational transformation. MIS uses information technology to help deliver greater value to the organization by leveraging the power of IT for faster and more accurate information processing and delivery.

MIS are designed to provide feedback on operations in a specified time intervals and consist of an integrated set of subsystems. MIS may be used as an input for higher level support system. MIS can be extended by the systems that use it as their primary inputs. MIS provides the user many information tools to support the credibility of the organization. Information is essential to support information tracking, making enquires and assessment to explore opportunities. MIS helps in carrying out inspection, tracking of resources and auditing in a dynamic environment which is essential for every individual. The gathering and executing of information is essential for the management to process such as recruitment, training, assessment, evaluation that is related to personnel management and quality management. To achieve this, an MIS, that is effective and efficient, yet flexibility is required.

12.3 Structure of Management Information System

Structure helps determine the shape of an entity, which provides its basic framework. The structure of MIS is difficult to define because some entities may not have well defined outline and structures. The multiple approaches to an entity help describe the structure of an entity in a better way. The structure of MIS could be described by using a variety of different approaches, which are as follows :

- Physical Component
- Information system processing functions
- Decision support
- Levels of management activities
- Organizational functions

1.3.1 Physical Component of MIS :

The physical component of the information system in an organization helps to understand the structure of MIS easily. These physical components can be hardware, software, manual procedures, database and operating system.

12.3.2 Information system processing functions

The information system has a central importance in any venture. This is an interdisciplinary subject and is much more than just a collection of computerized information for processing and distribution. The function of information system are as follows :

- Information Processing and usability function
- Education and learning function
- Information system development function
- Management and control function

- Strategy and planning function

12.3.3 Decision Support

The structure of MIS also depends on how MIS supports decision making. A decision support system is defined as an information system application that assists the managers in decision making. Decision support system is used for planning and analysing activities. Such decision support system are generally executed with the help of terminal based interactive dialogues with users and incorporating a variety of decision-models.

1.3.4 Levels of Management activities

There are three levels of management in every organization. They are top level, middle level and operational level management. The top level management are responsible for planning and other strategic activities. Ideally, top management consists of the CEO, the Board and department heads. The middle level management works on tactical issues. It is responsible for the smooth functioning of the company and passing on critical information about markets and competitors to the top management. The operational management takes decision on operational issues like which worker will be deployed for which work etc. They are the implementers of board decision taken by the higher tiers of management.

Characteristic	Top Management	Middle management	Operational Management
Planning Activity	Heavy	Moderate	Low
Controlling Activity	Low	Heavy	Heavy
Organizing Activity	Low	Heavy	Heavy
Leading Activity	Heavy	Moderate	Low
Decision-making	Heavy	Moderate	Low
Complexity			
Problem Handled	Unstructured and semi structured	Semi structured	Structured
Type of information required for decision making	Strategic information, unstructured/semi structured from both within the organization and outside environment	Tactical and structured/ semi structured information from within the organization	Operational and structured information from within the organization
Impacts and Outcome	Long term and organization wide	Medium term	Short term
Understanding of the line of Business	High	Very high	Medium to low
Understanding of the Business environment	High	High to medium	Low
Understanding of the competition	High	High to medium	Low

Table 12.3.4 Distinct Characteristics of the different levels of management

12.3.5 Organizational functions

Organization can be defined as when two or more people work in a structured or unstructured environment to achieve a common goal or mission using some resources. An organization has at time been compared to machines working on the basis of set rules and controlled operation in a deterministic environment, to produce specific and certain outputs. Organizations have been also considered to be like organisms, within which subsystems function in their own way to produce some desired output. The culture view of the organization conceptualizes it as a social entity, functioning within a social structure.

Management Functions	Strategic Planning	Management Control	Operational Control
Planning	Long range, high impact	Medium range, medium impact	Short range, low impact
Organizing Staffing	General framework Key senior people	Departmental level Medium level, tactical level	Small unit level Operational level
Directing	General and long range directive	Tactics	Routine activities
Controlling	Aggregate level	Periodic control and controlling exceptions	Regular and continuous supervision

Table 12.3.5.1 Management functions classified under different levels of organizations

1.4 Information and System Concept

The concept of data and information has been emphasized in every MIS. The reason being that this issue is important from a conceptual perspective in the study of MIS. The concept of data and information are interlinked. Data is raw facts, which is not of much meaning by itself. When this is processed, it becomes information. Information is now being used to provide insights to decision making, so that better and informed decision can be taken.

Management using information system has greater options when such systems are technology enabled. Technology not only ensures a faster processing, storage and retrieval of data but also generate a lot of flexibility in the system by introducing different options, making the task of user easier. The use of technology creates various options which make an impact on the information quality as well as the information delivery.

12.4.1 Need for Information Management

Every manager today has to manage loads of information, some for purpose of reporting and some for taking actionable decision. The competitive environment that exists today makes the task of information management even more challenging. Today managers have to work in an increasingly competitive globalized environment in which the cost of a wrong decision can be quite high. Hence

they rely more on data driven decision making technique than on instinct. The focus is on gaining an understanding of an issue before jumping to a decision. MIS fills this gap. It informs the managers about the issue so that they may take better decision.

12.4.2 Types of Information

Information is defined as processed data. It is used by managers to commerce activities and to resourcefully and successfully run the organization. The data is processed by expert systems called information systems to obtain information. The information system facilitates a timely processing of data where quick action is required. The same data has be processed in different ways and when organizations require innovative processing. Hence information means raw data that verifies the accuracy, relevancy and context with reference to the fact of data. This leads to an increasing in understanding and decreases in uncertainty and follows the 'FCPPP' technique. The 'FCPPP' technique involved in types of information are as follows :

FACT – Raw data that is to be processed as per requirement.

CONCEPT – Ideas shared by other resource

PROCEDURES – A logical sequence of control flow of data

PROCESS – Information to be processed according to set procedures.

PRINCIPLES – Provides user manual, guidelines and rules according to which information is distributed.

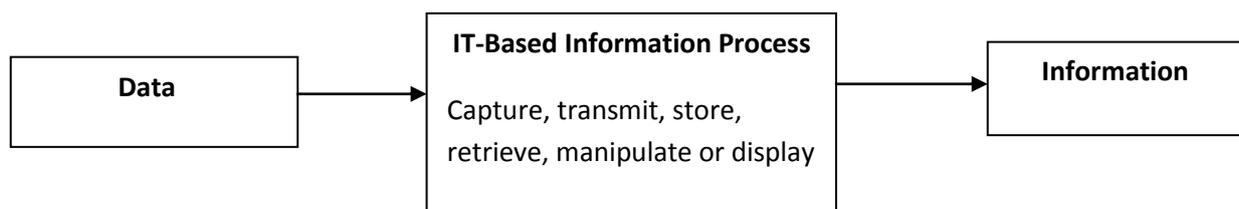


Fig 12.4.1.1 Data → Process → Information

12.4.2.1 Strategic Information

Strategic management is the methodology of formulating, implementing, analysing and evaluating cross functional decision that helps an organization attain its objective. It is done using Strategic Information System (SIS). Strategic Information System manages information and help in strategic decision making. It is defined as an information system to support or modify the strategies of an organization or enterprise. The strategic information helps to analyses a situation and quickly responds to conditional changes and create a competitive benefit. The following are the objective of Strategic Information System:

- It modifies the way the farm competes.
- It has an external focus.
- It is associated with greater project risk.
- It is innovative and cannot be copied easily.

12.4.2.2 Tactical Information

The information that helps managers at the middle level to control the organization is called tactical information. It helps managers to take tactical decision. This type of information has its source within the organization and is derived after analysing the data of the organization. This type of information flows mostly in the form of regular reports. These information are required for Personal appraisal, Production incentives, Morale of personnel, Absentee reduction etc

12.4.2.3 Operational Information

Information that helps in the operational decision making is called operational information. This type of information comes from analysing data from within the organization and is in the form of rules, manuals and procedures. This type of information helps the operational level manager to control operations. It is mostly shop versus achievement, Market share and trend etc.

Levels of Management	Problems Handled / Decision Made	Types of Information required
Top Level	Unstructured Problems, Decision are based on situation not rarely handled in the past. Decision making variable not clearly defined	Strategic information from within the organization and outside. Information about likely scenarios. Information which can be analysed in different ways, Exception reports.
Middle Management	Semi structured / structured problem. Decisions on regular issues. Decisions of tactical issues.	Regular summarized reports. Information which can be drilled deeper for insight. Information to find out exception so that they can be reported to the top management
Operational Management	Structured problem. Structured decision making. Decision making on the basis of set rules.	Operational information. Rule based information, guidelines, handbook level information

Table 12.4.2.3.1 Information needs of the management

12.5 Implementation of MIS

The implementation of information system is an important task. Sometimes, an information system can be planned, analysed, designed and developed very well, but due to poor implementation it may fail to deliver the required goal. Implementers not only manages technical issue, but also managerial and change management issue. For this, they require both technical and managerial skills. The process of implementation is normally a process of change, and hence is riddled with challenge. Steps to implement MIS are as follows:

- Planning and implementation
- Acquisition of facilities and space planning
- Developing MIS procedure
- User training
- Acquisition of hardware and software
- Creating forms and database
- Testing
- Change over

12.5.1 Evaluation of MIS

Evaluation of MIS is a process in which the performance of an organizational MIS is determined. According to the performance results, the organization evaluates and implements the necessary modification in MIS. Various approaches are used to evaluate the performance of MIS. The most commonly used approaches are:

- Quality assurance review
- Compliance audits
- MIS personal productivity measurement
- Computer performance evaluation
- User attitude survey
- Cost / benefit analysis
- Effectiveness
- Efficiency

The evaluation of a system is based primarily on the output from a system. The major attributes of information from a system can be stated as timeless, content, format and cost. The evaluation of information system is based on the evaluation of the attributes of the information system. If the information system performs well and the values of the attributes are satisfactory, then the information system is said to be valuable.

1.6 Intervention of MIS

MIS reports are prepared for taking some decision to be made in an organization. The types of information comes from analysing data from within the organization are different for various level of management. Following are the few examples :

12.6.1 Following are the information required in the Production Management Process –

Strategic Information:

- Yearly and monthly production quotas and alternative schedules.
- Policies on machine replacement, augmentation and modernization.
- Information on identifying best product mix.

Tactical Information:

- Information on identifying and controlling areas of elevated cost.
- Information on identifying critical bottlenecks in production
- Information on identifying alternate production schedules based on tools, machines etc
- Information on performance measures of machines to decide replacement.

Operational Information:

- Monitoring up-to-date production information by examining assemblies, detecting possible shortage and giving timely warning
- Scheduling better production dynamically
- Preventive maintenance schedule
- Monitoring tools, machines and personnel availability.

1.7 MIS at KVK system

National agricultural extension systems, especially in developing countries, tend to be very large. For example, in India, the national agricultural extension system employs about 125,000 people. Extension managers at various levels need relevant information in order to make effective decisions. In the absence of such information, they act only on the basis of their intuition and past experience. Data that have been processed, stored, and presented properly will aid them in analysing situations and to make effective decisions.

Source of Data for MIS at KVK :

- District Agricultural Profile (Secondary)
- Village level Agricultural Profile (Gen.)
- Farmers database (Primary)
- Technological Inventory Database (Se.)
- Technological Problems database (Gen.)
- FLD Database
- Training Database
- Extension activities Database
- Seeds and Planting material database

- SWTL database
- KVK Automation (Accounts/Admin.)

12.7.1 Information Systems at KVK

- Executive Information Systems – Summary reports of achievements against targets of all mandated activities
- Decision Support Systems – Planning of all mandated activities based on approved action plan including villages, crops/enterprises, farmers, modes of interventions, agricultural operations, extension activities along with probable dates and budget.
- Expert System – On all disciplines of crops/enterprises targeting all probable questions under various situations
- Office Automation System – Routine administrative and accounts operations under KVK.

12.7.2 Outcome of Sound MIS at KVK

- Accurate Planning and Execution of mandated activities based on facts and figures
- Efficient utilization of limited resources through sound inventory management
- E-Extension (On-line interaction between scientists and farmers)
- On-line Reporting
- Facilitating enhancement of Knowledge through development of Technological modules after successful refinement of Technology

12.7.3 Conclusion

Even though MIS has many benefits, it has limitations as well. MIS is sometimes considered a solution for every bane within an organization. While MIS may solve some critical problem but it not solution to all the problems of an organization. The limitations of MIS may be stated as follows :

- MIS is as good as its design. MIS if designed in an improper manner, does not serve the management and hence is of little relevance to the management.
- MIS is as good as its users. If the users does not know how to leverage the information available from MIS, then MIS is of little use.
- MIS is no use if the basic data, which goes into it, is not good. MIS will only facilitate the “garbage in garbage out” process.
- MIS lacks a decision support capability and has to depend on managers for decision making. Even if MIS has performed its tasks with efficiency, the managers may turn out to be incompetent and may take wrong decisions negating all the benefits of MIS. There is no mechanism to guarantee that the managers in the decision making process do not make a mistake.

- MIS lacks expert knowledge and hence is incapable of providing solutions to complex problems.

12.7.4 REFERENCES

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Basics of Word editing tools

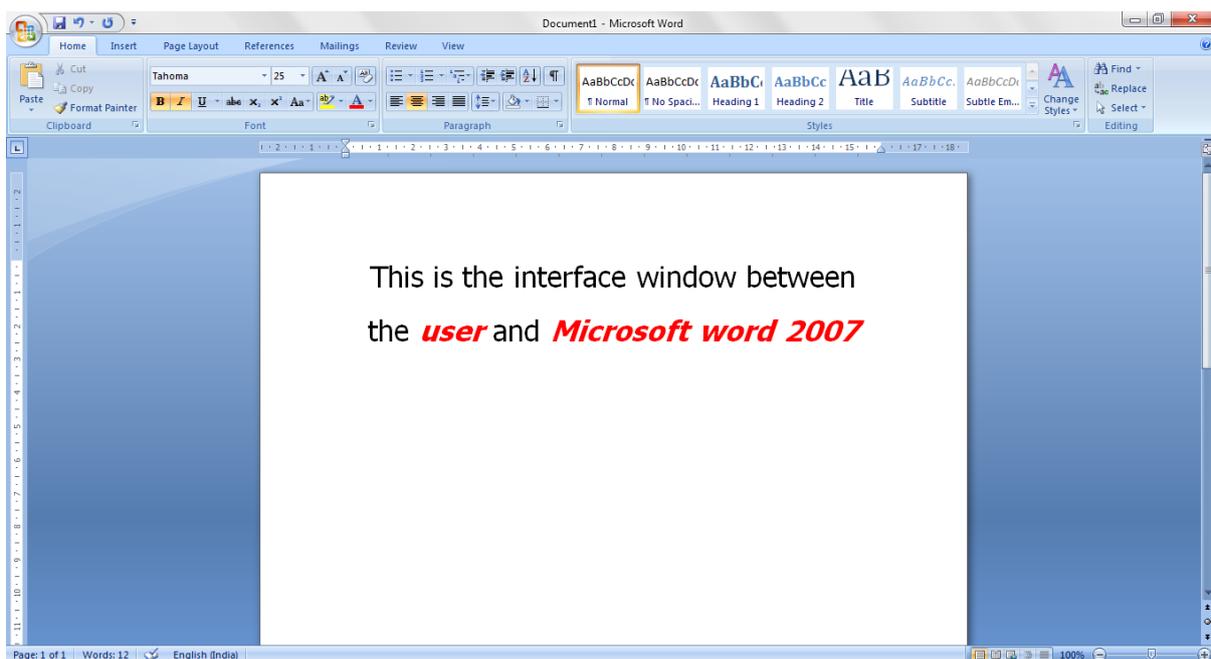
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Here in this chapter we are going to look into the two most common word editing tools; **Microsoft word** and **Notepad**. In our KVK system, with the increasing amount of reporting that we are doing, in some or the other way we highly depend on these tools for our daily reporting activity. We will look into their various features and uses and how best we can apply them in our system.

I. MICROSOFT WORD

Microsoft Word or Word is one of the most common Microsoft Office tools first released in the year 1983 for Xenix systems under the name *Multi-Tool word* and the naming was soon simplified to *Microsoft word*. The first version of Microsoft Word for Windows was released in the year 1989. With various additional features being incorporated year by year, various versions of Microsoft word were released till date and the latest version is Word 2013 released in the year 2013 which is included in the Office 2013 package. Here in this chapter we are going to know about Microsoft word 2007 for windows operating system.



Microsoft word 2007screen in windows operating system

Functions of Microsoft word:

We can access Microsoft word either through the desktop (if shortcut is already placed) or through the Start Menu (Start Menu → All Programs → Microsoft Office → Microsoft Office → Word 2007). There are various functions of Word and here we will look into some of the most basic functions that are mostly used by us. A pictorial view of the various functions is given in the below picture.

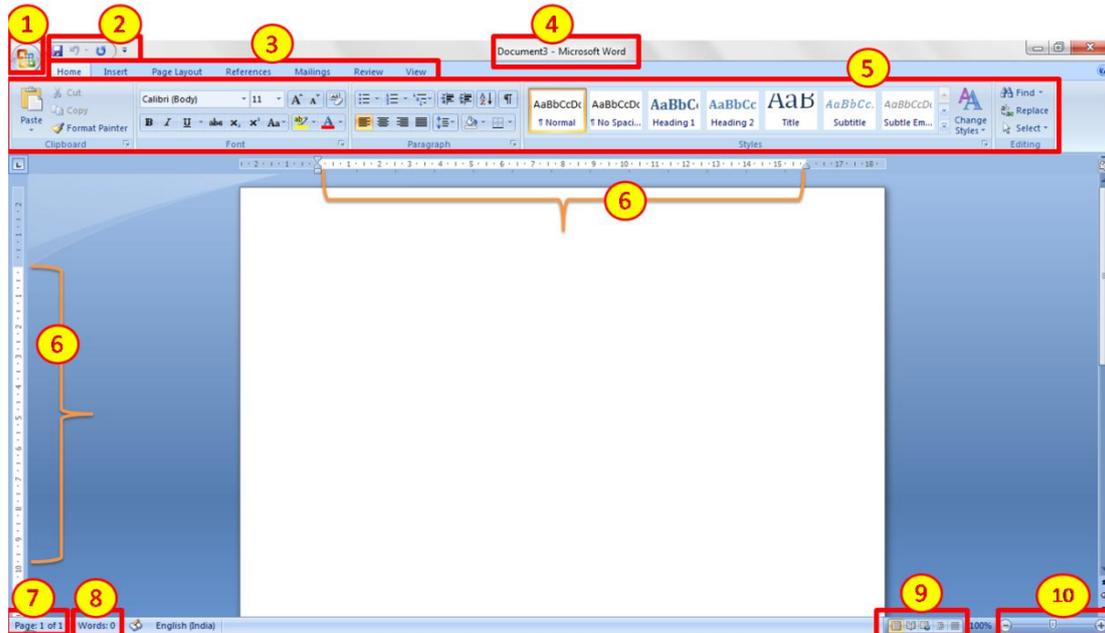


Fig. 1

1. Office Button: The screen of the Microsoft word 2007 application will look like how it is shown in the Fig.1. It will display a blank document and on the top left corner will be the office button which provides us the fast access with respect to creating a new document, opening and saving a document, printing, preparing, sending, publishing and closing a document. Also, it will display the list of recently accessed documents. A pictorial view is given below in Fig.2

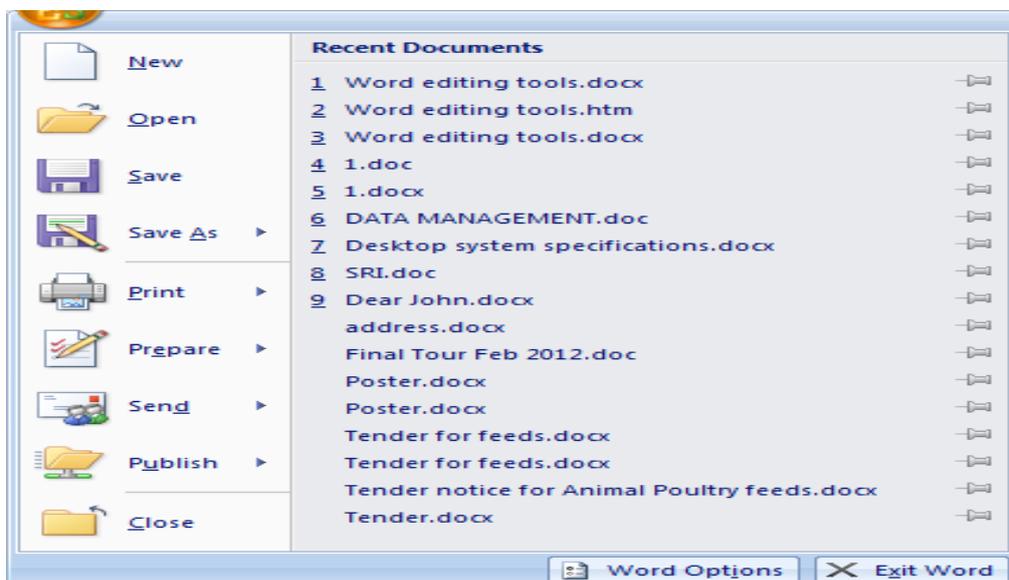


Fig.2

2. Quick Access toolbar: Next to the Office Button is the Quick Access toolbar. As the name indicates it is for quick access for the functions available and we can customise it as per our convenient and easy used. In this toolbar by default there will be a SAVE, UNDO and a REDO button.

3. Menu Tab: Here lies the main functions of the Microsoft word wherein each functions are being divided and categorised into the various tabs such as Home Tab, Insert, Page Layout, References, Mailings, Review and View Tab.

4. Header bar: The Header bar is displayed at the top middle position of the document. It shows the name of that particular file that we are working on. The file extension of Microsoft word 2007 is *.docx* while that of Microsoft word 2003 version is *.doc* and we have to remember here is that if our file is in the Microsoft word 2007 version, we will not be able to open this particular in the system which have only Microsoft word 2003 version. We will need to covert first into the compatible version of Microsoft word 2003. Follow the below steps to convert the file from Microsoft word 2007 to Microsoft word 2003 version.

Step 1: Click on the **Office button** in the top left corner

Step 2: From the **Save As** options choose **Word 97-2003 document**

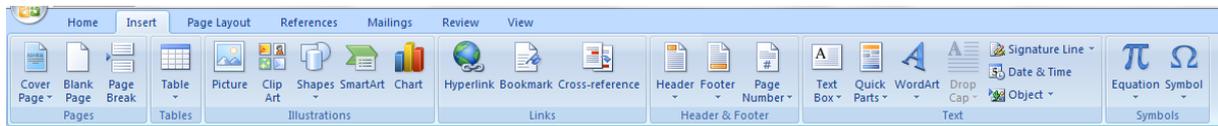
Step 3: Enter the name of the file and click **Save**. Make sure that the file extension of this new file should end as *.doc*

5. Ribbon: This is one among the features that differentiate this version of Microsoft word from the old version. The Ribbon is the area that spans the top of the Microsoft word and has been numbering as **5** in the Fig. 1 and it brings out the most popular commands that we used to the forefront so that we don't have to search in the menus for things that we do all the time as in the old version of Microsoft word. All the commands have been classified accordingly and have been placed under different blocks or sections. For example, under **Home** we can see various basic commands; in **Insert** we can see commands like inserting Tables, Pictures, Header, Footer and so on. This brings out the simplicity of this application since every command that we are working on are right in our view and thus erase all the difficulty we are experiencing with the menus driven old version of Microsoft word.

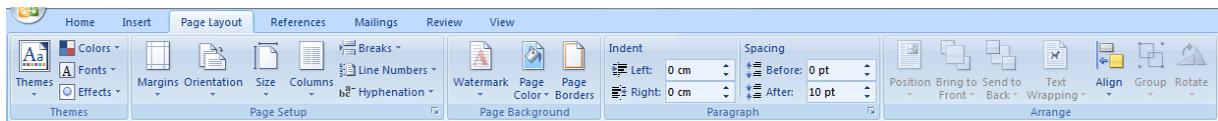
Home tab of the Ribbon



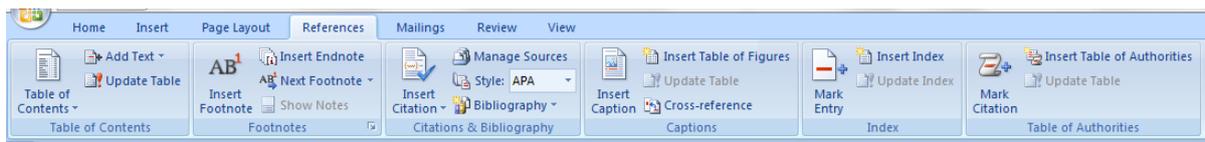
Insert tab of the Ribbon



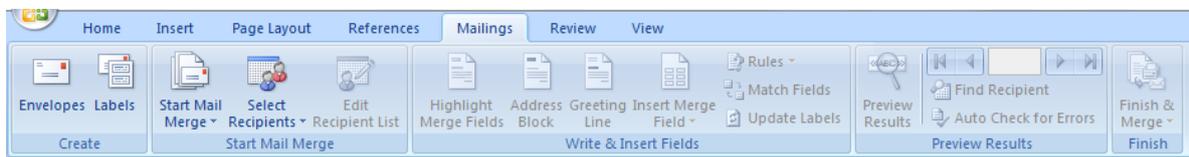
Page Layout tab of the Ribbon



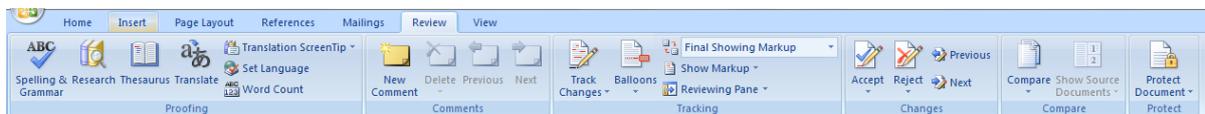
References tab of the Ribbon



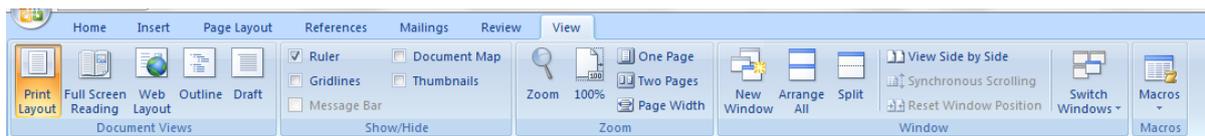
Mailings tab of the Ribbon



Review tab of the Ribbon



View tab of the Ribbon



6. Ruler: The Ruler shows the margins and is displayed across the top and along the left side of the document. The Ruler defines the working area of the application and based on this we will be able to get an idea of how much our work is occupying space in the particular paper that we want to print

(may be A4 size, Post card, envelope etc.). We can increase or decrease the size of the margins base on our requirements.

7. Page Number: It shows the number of pages that a particular file/document has and also when we place a cursor in any one page then out of the total page numbers it will also specify the page number where the cursor is located.

8. Words Number: It the gives the count for the number of words that is available in our file/document. If we just want to know the number of words available in a statement or in a paragraph then we can select that particular statement or paragraph and automatically the count of words available will be shown.

9. View options: It provides the viewing options available for our document. These are Print Layout, Full Screen Reading, Web Layout, Outline and Draft views. The most common is the 'Print Layout' and it does provide a more accurate view of the final layout of our document.

10. Zoom bar: Here we can view the document in various sizes that we want.

II. NOTEPAD

In this section we will look into one of the simplest and commonly used text editing program for Microsoft windows i.e **Notepad**. This particular software is being included in all the versions of Microsoft windows since Windows 1.0 which was released in 1985. A snapshot below (fig.1) shows the pictorial view of Notepad.

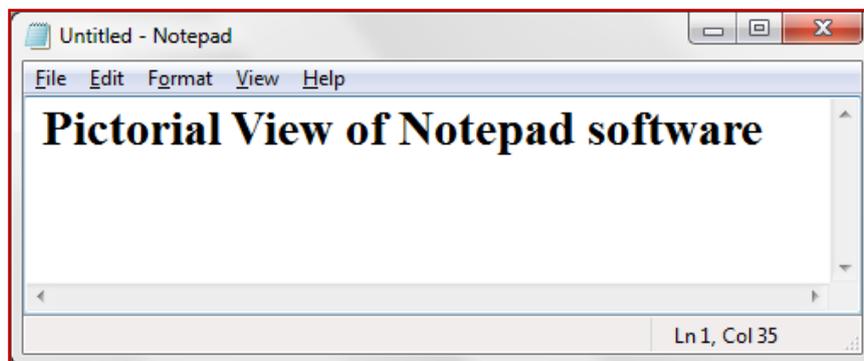
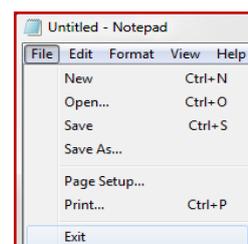


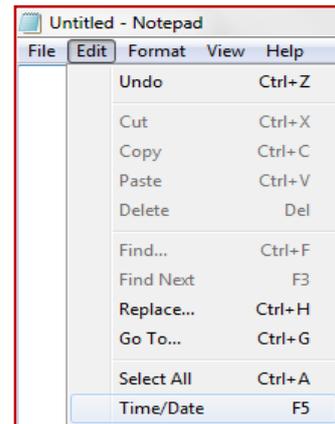
Fig .1

Notepad enables the user to open and read plain-text files or simple text files. If the file is having special formatting then we will not be able to open it in Notepad. A simple text file or a notepad file will have **.txt** filename extension. The Menu bar in Notepad consists of menus like **File, Edit, Format, View** and **Help** and we will look into the functions of each of these features.

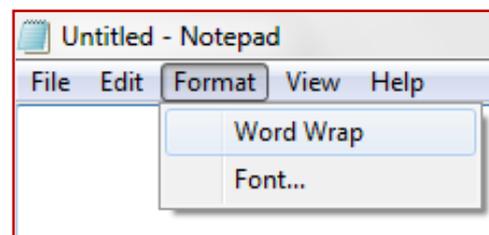


1. File menu: Here in this tab we can create a new file, open/read the existing file, save the new file or the edited file, setup the page of the document and then print it out.

2. Edit: In this menu we can perform editing of the data present in the document. We can *Cut*, *Copy*, *Paste* and *Delete* any part of the data that we wish to perform according to our requirements. Also we can *Find* any particular word or sentence and we can *Replace* with the one that we want. The Notepad document does not display the line numbers but the lines are counted and the result is displayed in the Status bar below and if we want to go to any specific line then we can use the *Go To* function. We have to make a note here that is the *Go To* function will be disable if we enable or use the *Word Warp* function. The *Select All* function will select every data available in the particular document so that we can perform any functions thereafter. Here if we want the time and date to be display in our document we can use the *Time/Date* function.

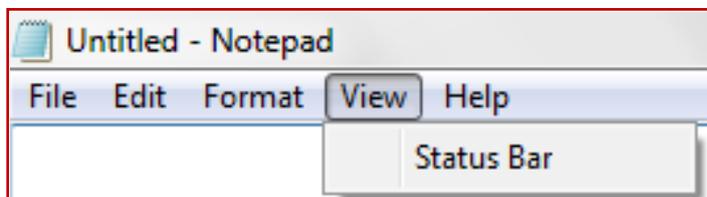


3. Format: At times the text in the document runs off the right edge of the screen and we need to scroll in order to view all the text. To avoid this we can enable the *Word Wrap* function so that we will be able to view all the text without scrolling.

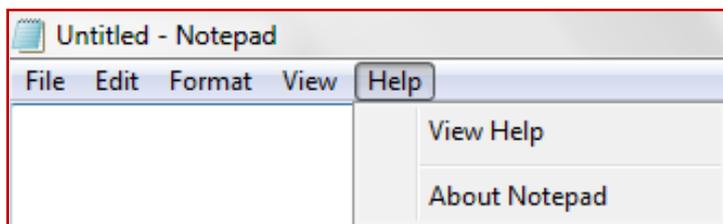


The *Font* function provides the option to choose different types of fonts, the font style and its sizes.

4. View: The View menu gives the option to enable or disable the Status Bar.



5. Help: This is one of the very helpful functions in Notepad because it provides the information on how to use the Notepad software. We can just click on the *View Help* function and we will get lots of information related to Notepad and also we can get the **frequently asked questions** with the answers for each of those questions.



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Basics of Cloud Computing

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14.1 Overview

- Introduction to cloud computing
- Architecture of Cloud Computing
- Deployment and Service Model
- Cloud computing Pros and Cons
- Key facts of Cloud Computing

14.2 Introduction

In general terms Cloud computing, is anything that delivers hosted IT services over the Internet, and allows consumers to access services and data via any device with Internet access.

What distinguishes cloud computing from traditional computing is that: it is sold on demand; it is flexible (the user can consume as much or as little as they need); and the service is managed by the provider.

National Institute of Standards, USA definition of Cloud Computing is “Cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction. This cloud model is composed of five essential characteristics, three service models, and four deployment models.”

An example of cloud computing is Google Mail. This uses a device and an Internet connection to access the service. The server and e-mail management software reside on the cloud (Internet) and are managed by the cloud service provider, Google.

The rapid growth in cloud computing is attributable to the use of a more efficient cost model, which provides centralized storage, memory, processing, and bandwidth on a pay- per-use basis. The model allows users to reduce capital expenditure in tandem with the growth of operational expenditure and is a genuine attempt to provide computing as a utility service, similar to electricity and water.

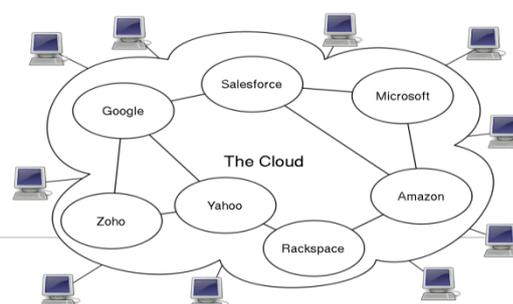


Fig1- Cloud Computing

14.3. How Cloud Computing Works

Sun Microsystems's slogan is "The network is the computer," and that's as good as any to describe how cloud computing works. In essence, a network of computers functions as a single computer to serve data and applications to users over the Internet. The network exists in the "cloud" of IP addresses that we know as the Internet, offers massive computing power and storage capability, and enables wide scale group collaboration.

But that's the simple explanation. Let's take a look at how cloud computing works in more detail.

14.3.1. Understanding Cloud Architecture

The key to cloud computing is the "cloud"—a massive network of servers or even individual PCs interconnected in a grid. These computers run in parallel, combining the resources of each to generate supercomputing-like power. In simply, the cloud is a collection of computers and servers that are publicly accessible via the Internet. This hardware is typically owned and operated by a third party on a consolidated basis in one or more data center locations. The machines can run any combination of operating systems; it's the processing power of the machines that matter, not what their desktops look like. As shown in Figure2 individual users connect to the cloud from their own personal computers or portable devices, over the Internet. To these individual users, the cloud is seen as a single application, device, or document. The hardware in the cloud (and the operating system that manages the hardware connections) is invisible.

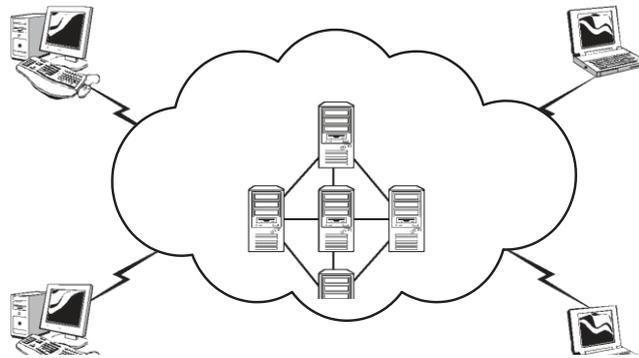


Fig2.How users connect to the cloud.

The cloud architecture is deceptively simple, although it does require some intelligent management to connect all those computers together and assign task processing to multitudes of users. As you can see in Figure 3, it all starts with the front-end interface seen by individual users. This is how users select a task or service (either starting an application or opening a document). The user's request then gets passed to the system management, which finds the correct resources and then calls the system's appropriate provisioning services. These services carve out the necessary resources in the cloud, launch the appropriate web application, and either creates or opens the requested document. After the web application is launched, the system's monitoring and metering functions

track the usage of the cloud so that resources are apportioned and attributed to the proper user(s).

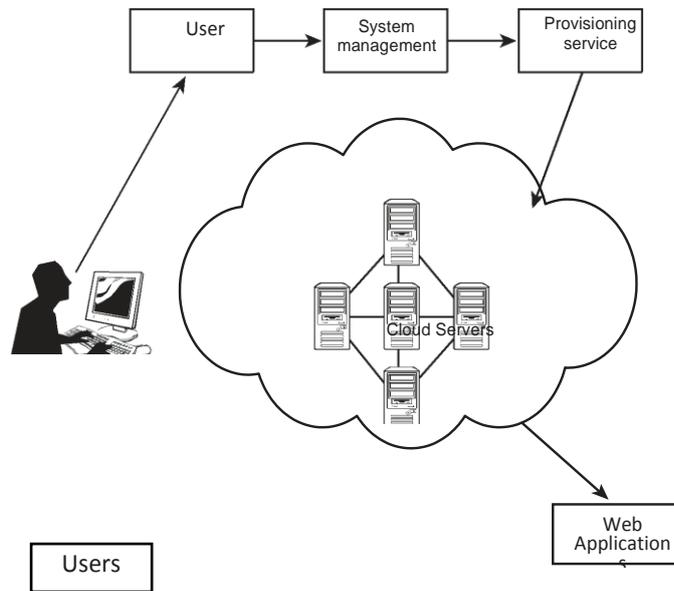


Fig3. The architecture of a cloud computing system.

Here we can see that, key to the notion of cloud computing is the automation of many management tasks.

14.4 Characteristics of the Cloud

14.4.1 On-demand self-service: A consumer can unilaterally provision computing capabilities, such as server time and network storage, as needed automatically without requiring human interaction with each service’s provider.

1.4.2 Broad network access: Capabilities are available over the network and accessed through standard mechanisms that promote use by heterogeneous thin or thick client platforms (e.g., mobile phones, laptops, and PDAs).

1.4.3 Resource pooling: The provider’s computing resources are pooled to serve multiple consumers using a multi-tenant model, with different physical and virtual resources dynamically assigned and reassigned according to consumer demand. There is a sense of location independence in that the customer generally has no control or knowledge over the exact location of the provided resources but may be able to specify location at a higher level of abstraction (e.g., country, state, or datacenter). Examples of resources include storage, processing, memory, network bandwidth, and virtual machines.

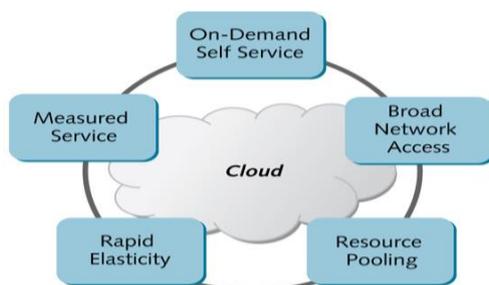


Fig4: Cloud Characteristics

1.4.4 Rapid elasticity: Capabilities can be rapidly and elastically provisioned, in some cases automatically, to quickly scale up and rapidly released to quickly scale down. To the consumer, the capabilities available for provisioning often appear to be unlimited and can be purchased in any quantity at any time.

1.4.5 Measurable service - payment pay-per-use: Cloud systems automatically control and optimize necessary resources depending on the needs of users and required types of services (disk space, power of processor, amount of RAM and so on). All these services are measurable and their usage is transparent, both for the provider and clients. This is very important because the financial momentum plays a huge role when it comes to this new technology, especially for large enterprise systems .

14.5 Cloud Service Models

The cloud-based ecosystem allows for a wide range of service delivery models. The services offered today can be broadly divided into three major categories [3] (see Figure 2).

14.5.1 Cloud Software as a Service (SaaS): Provides the users the ability to use the provider's applications running on a cloud infrastructure. The applications are accessible from various client devices through a thin client interface such as a web browser (e.g., web-based e-mail). The consumer does not manage or control the underlying cloud infrastructure including network, servers, operating systems, storage, or even individual application capabilities, with the possible exception of limited user-specific application configuration settings. Some of the prominent industry names offering SaaS are **Salesforce** and **Microsoft Office 365**.

14.5.2 Cloud Platform as a Service (PaaS): Provides the consumer the ability to deploy onto the cloud infrastructure consumer-created or acquired applications created using programming languages and tools supported by the provider. The consumer does not manage or control the underlying cloud infrastructure including network, servers, operating systems, or storage, but has control over the deployed applications and possibly application hosting environment configurations. Some of the prominent industry names offering PaaS are **Google App Engine** and **OpenStack**

14.5.3 Cloud Infrastructure as a Service (IaaS): Provides the consumer the ability to provision processing, storage, networks, and other fundamental computing resources where the consumer is able to deploy and run arbitrary software, which can include operating systems and applications. The consumer does not manage or control the underlying cloud infrastructure but has control over operating systems; storage, deployed applications, and possibly limited control of select networking components (e.g., host firewalls).Some of the prominent industry names offering IaaS are **Amazon Web Services** and **AT&T**

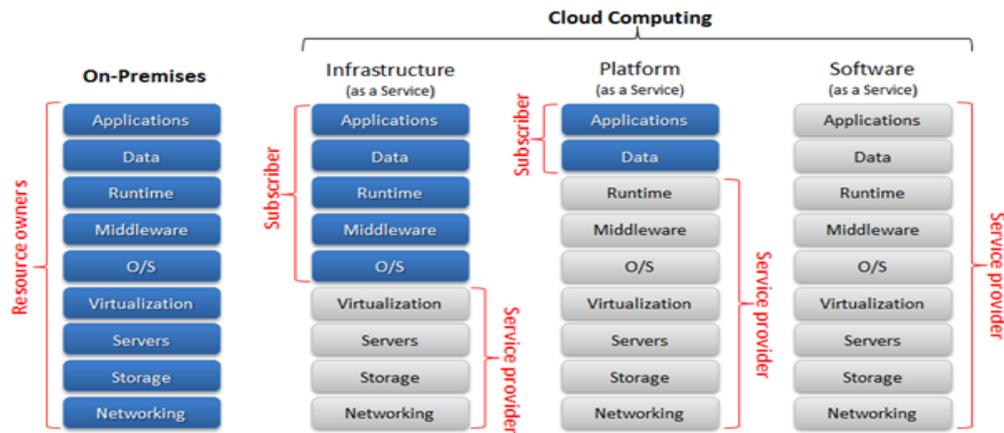
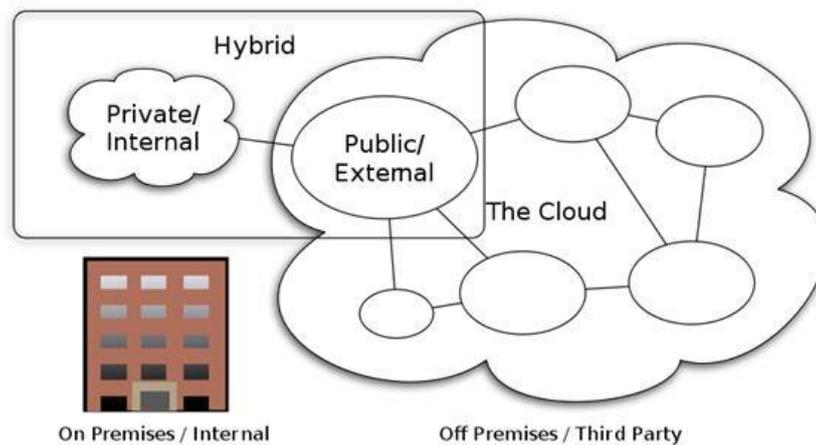


Fig5. Cloud Service Delivery Model

(Source: WWW)

14.6 Deployment Models

There are four primary cloud deployment models: public, community, private, and hybrid



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Fig7 – Cloud Deployment Model

14.6.1 Private cloud: The cloud infrastructure is operated solely for one organization. It may be managed by the organization or a third party and may exist on premises or off premises.

14.6.2 Community cloud: The cloud infrastructure is shared by several organizations and supports a specific community that has shared concerns (e.g., mission, security requirements, policy, and compliance considerations). It may be managed by the organizations or a third party and may exist on premises or off premises.

14.6.3 Public cloud: The cloud infrastructure is available to the public on a commercial basis by a cloud service provider. This enables a consumer to develop and deploy a service in the cloud with

very little financial outlay compared to the capital expenditure requirements normally associated with other deployment options

14.6.4 Hybrid cloud: The cloud infrastructure consists of a number of clouds of any type, but the clouds have the ability through their interfaces to allow data and/or applications to be moved from one cloud to another. This can be a combination of private and public clouds that support the requirement to retain some data in an organization, and also the need to offer services in the cloud.

14.7 Cloud Service providers

We're currently in the early days of the cloud computing revolution. Although many cloud services are available today, more and more interesting applications are still in development. That said, cloud computing today is attracting the best and biggest companies from across the computing industry.

Perhaps the most noticeable company currently embracing the cloud computing model is Google. It offers a powerful collection of web-based applications, all served via its cloud architecture. Whether you want cloud-based word processing (Google Docs), presentation software (Google Presentations), email (Gmail), or calendar/scheduling functionality (Google Calendar), Google has an offering. And best of all, Google is adept in getting all of its web-based applications to interface with each other; their cloud services are interconnected to the user's benefit.



Fig7. Companies offering cloud service (Source: www)

Other major companies are also involved in the development of cloud services. Microsoft, for example, offers its Windows Live suite of web-based applications, as well as the Live Mesh initiative that promises to link together all types of devices, data, and applications in a common cloud-based platform. Amazon has its Elastic Compute Cloud (EC2), a web service that provides cloud-based resizable computing capacity for application developers. IBM has established a Cloud Computing Center to deliver cloud services and research to clients. And numerous smaller companies have launched their own web-based applications, primarily to exploit the collaborative nature of cloud services.

In India also cloud computing service is spreading rapidly. Cloud computing companies located mainly in all major cities of India The Indian market has shown particularly strong growth for the past few years and is predicted to continue to be one of the fastest growing countries in Gartner's cloud forecast[8].IT spending on public cloud services in India is expected to reach \$1.4 billion in 2017. New Delhi, Bangalore, Chennai, Hyderabad, Pune, Noida, Kolkata and Mumbai based companies list provided below. This list contains top cloud computing companies in India 2013.

- **Tata Consultancy Services:** TCS or Tata consultancy service is a leading cloud computing service provider to IT industry. They provide various cloud services such as cloud advisory, cloud development and migration, cloud development and assurance, cloud environment build and management and disaster recovery services.
- **Infosys:** Infosys is a global consulting, information and outsourcing organization which also offers cloud computing service and a leading player in cloud services in India. The company started cloud operation in year 2008 and focused to provide stack of three clouds one for development and other two for production and clients.
- **Wipro Limite: Wipro** is one of the giant leader in IT industry which offers cloud based services such as virtual cloud lab solution, gateway, custom cloud platform engineering and differentiated application engineering. It is a leading name in the list of cloud computing companies in India.
- **InstaCompute – Tata Communication:** Insta compute is a Tata communication company/product which offers a cost effective cloud computing solution. It is one among the top cloud companies in India providing flexible payment, security, round-the-clock technical support and uses basis pricing.
- **Zenith InfoTech Limited: Zenith** InfoTech is a leading security, cloud computing and IT solution provider . With the brand name of Tiger Cloud and BDR G14 for cloud service, storage, disaster recovery and backup.
- **Cypher Cloud:** One of the most trusted brand in cloud computing and virtual appliances, Cypher cloud is a leading cloud service provider in India. The company caters to insurance, banking, healthcare, manufacturing, supply chain and technology industry.
- **Cirrologix Private Limited :** It is a software development organization which offers cloud based services, software integration, maintenance and designs. The company is partnering with cloud

industry giant Sales force and has a strong base of clients including Leads berry, Makessence and DC design.

- **Ctrl's Datacenters Limited:** Ctrl's is one among the top 10 Cloud computing companies in India. The company offers reliable and best data security service which includes complete infrastructure, storage, data management and network.
- **Clogeny Technologies Private Limited:** It is a leading cloud computing company and complete computing solution provider including SaaS, PaaS and LaaS. The company's offerings are cloud platform development, application, engineering & integration, cloud strategy and advising services.
- **App Point** "App India is a software development organization which is engaged with global IT companies like IBM and Microsoft for software development and design. It is rated amongst the best cloud computing companies in Bangalore and India.

14.8 Benefits of Cloud Computing

14.8.1 Flexibility: There is a high rate of flexibility when using cloud computing because people can opt out of using it whenever they want too. One of the major benefits of cloud computing is that there is no limitation of place and medium. We can access our applications and data anywhere in the world, on any system. These are the main reasons, which attract people to use this method.

14.8.2 Economical: With cloud computing, a company uses the resources of the hosting company to store their data and applications. Companies also pay for use of the software and programs by paying a subscription fee. The cost of using cloud resources is very economical for resources such as centralized, real estate, bandwidth, and power. Users will also save money on software updates, management costs, and data storage costs. It is a cheaper way to maintain the software and it will save time, as the developers keep track of updates and maintain your programs while you use it.

14.8.3 Rapid implementation: Traditional methods to buy and configure hardware and software are time consuming. There is no need to purchase and setup hardware manually when using the cloud computing method. Cloud computing provides a rapid deployment model that enables applications to grow quickly to match increasing usage requirements. Depending upon their needs the user can quickly scale up or scale down.

14.8.4 Ease of Data Management : Since all data are located on a centralized location, data are more organized making it easy to manage. All transactions are also recorded so management can easily track activities of their employees.

14.8.5 Device Diversity: Cloud Computing Services can be accessed through various different electronic devices that are able to have access to the internet. These devices would include and iPad, smartphone, Laptop, or desktop computer.

14.8.6 Increased Storage Capacity: Increased Storage Capacity is another benefit of the cloud computing, as it can store more data as compared to a personal computer. So it saves us from the upgrading computer memory that helps reduce the cost for companies and users.

1.8.7 Consistent Service: Network outages can send an IT department scrambling for answers. Cloud computing can offer a higher level of service and reliability, and an immediate response to emergency situations.

1.8.8 Increased Effectiveness: Cloud computing frees the user from the finer details of IT system configuration and maintenance, enabling them to spend more time on mission-critical tasks and less time on IT operations and maintenance.

1.8.9 Energy Efficient: Because resources are pooled, each user community does not need to have its own dedicated IT infrastructure. Several groups can share computing resources, leading to higher utilization rates, fewer servers, and less energy consumption.

14.9 Disadvantages of Cloud Computing:

While cloud computing service is a great innovation in the field of computing but still some issues are their relating to cloud computing

14.9.1 Dependency: One major disadvantages of cloud computing is user's dependency on the provider. Internet users don't have their data stored with them.

14.9.2 Risk: Cloud computing services means taking services from remote servers. There is always insecurity regarding stored data because users does not have control over their software. Nothing can be recovered if their servers go out of service.

14.9.3 Requires a Constant internet connection: The most obvious disadvantage is that Cloud computing completely relies on network connections. When it's offline, you're offline. If you do not have an Internet connection, you cant access anything, even your own data. Similarly, a low-speed Internet connection, such as that found with dial-up services, makes cloud computing painful at best and often impossible. Web-based apps often require a lot of bandwidth to download,. In other words, cloud computing isn't for the slow connection.

14.9.4 Security: Security and privacy are the biggest concerns about cloud computing. Companies might feel uncomfortable knowing that their data is stored in a virtual server which makes

responsibility on the security of the data difficult to determine and even users might feel uncomfortable handing over their data to a third party.

Privacy is another big issue with the cloud computing server. To make cloud servers more secure to ensure that a clients data is not accessed by any unauthorized users, cloud service providers have developed password protected accounts, security servers through which all data being transferred must pass and data encryption technique.

14.9.5 Migration Issue: Migration problem is also a big concern about cloud computing. If the user wants to switch to some other Provider then it is not easy to transfer huge data from one provider to another.

2.0 Key Facts

Some of the key facts that are the most prominent ones in uplifting cloud computing globally, according to a study done by , “Microsoft TechNet ” , on 2013 among 1979 IT Professionals are as follows:

Almost 70% of the users believe that it has simplified the IT management process.

72% users have experienced improved end-user assistance.

63% users consider that it has brought down the IT performance challenges.

73% users believe that it has reduced the cost of infrastructure.

According to 74% of the users, it has alleviated internal resource pressures.

Concluding Remarks

It is seen that the cloud provides many options for the everyday computer user as well as large and small organization. It opens up the world of computing to a broader range of uses and increases the ease of use by giving access through any internet connection. However, with this increased ease also come drawbacks. You have less control over who has access to your information and little to no knowledge of where it is stored. You also must be aware of the security risks of having data stored on the cloud. The cloud is a big target for malicious individuals and may have disadvantages because it can be accessed through an unsecured internet connection.

If you are considering using the cloud, be certain that you identify what information you will be putting out in the cloud, who will have access to that information, and what you will need to make sure it is protected. Additionally, know your options in terms of what type of cloud will be best for your needs, what type of provider will be most useful to you, and what the reputation

and responsibilities of the providers you are considering are before you sign up.

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Content Management System (CMS) and its importance in modern computing

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15.1 OVERVIEW

Abbreviated as CMS, a *Content Management System*, also called a Web management system is software or a group or suite of applications and tools that enable an organization to seamlessly create, edit, review and publish electronic text. Many content management systems offer a Web-based GUI, enabling publishers to access the CMS online using only a Web browser. Also, a CMS designed for Web publishing will provide options and features to index and search documents and also specify keywords and other metadata for search engine crawlers.

15.2 INTRODUCTION

A CMS normally functions as a managed content publisher, rather than a library of pages; and so it needs to be seen in a different light to flat HTML websites. It is best used as an interactive repository of information, whether that be at the first level, simply between owner and application; or at the second level, between visitors and the application.

The capability of individual CMS decides how many jobs they can do, how well, and in how many different ways. As new plug-in are developed, new functions become available. From just being a convenient way of editing text, they now act in some cases as fully-interactive central community facilitators.

In most cases, managing a website and taking the right decision regarding its features becomes increasingly complex, as it requires time versus effectiveness. Before explaining what the advantages of using Content Management Systems are and how they a role in modern web development, we should understand why they are so important.

Content management system is the systematic and structured process of creation, processing, management and presentation of the content.

Most of them operate with simple and easy to use concepts, leading to an overall high quality browsing experience. CMS also helps you save money and time, including data files, images, audio files, electronic documents and informational web content. It can be integrated in any data base: MS Access, MS SQL, PostgreSQL, and MySQL

15.3 BENEFITS OF CMS

The applicability of a CMS is so widespread that it will not be an exaggeration to say that developing a *content rich* website with a CMS has become not only utterly difficult but also important to stay in a competitive environment. Some of benefits of using a CMS can be chalked out as follows-

- Pages are edited online via a normal browser.
- Edits go live immediately.
- The site owner can easily edit, add or delete pages.
- With minimal training, the site owner may be able to add new menu items and even sections to the site.
- Design and layout are controlled by templates - no custom design is necessary, though of course it can be utilized in order to extensively customize the page appearance.
- Additional functions are added via plug-in - no custom work is needed.
- Plug-in are (or should be) widely available.
- Content of many different types can be organized and presented in many different ways.
- Content is completely separated from presentation, meaning that the page content does not affect its layout.
- Rich media capability is usually better than for standard websites.
- Many people will have been down the same road you are on. This transfers directly to the CMS you will use, and even more to the plug-in. This work has all been done many times before and you reap the rewards. Design issues, functionality issues, and how to do things better - all have been tuned already.
- 75% of web designers cannot even write valid HTML code (or can't be bothered to correct their first attempt). By using a modern, standards-compliant database-driven website application you avoid being dependent on the ability of your chosen contractor - a good thing, because 3 out of 4 are not competent.

CMS disadvantages

It is very important to outline some of the disadvantages of using a CMS, so as to shed some light on making a good judgment of whether using one or not. We sincerely believe that even if this article aims at concentrating on the benefits of using a CMS, it will not be without prejudice if we omit the drawbacks of a CMS.

- A CMS must have a webmaster to oversee security and functionality issues. It is not like an HTML website that consists of static pages, that can be installed and then left. The webmaster

needs to upgrade the CMS when security patches are released or when bugs are fixed. The website cannot be installed and then left.

- Freeform art-based websites are not ideally suited to a CMS.
- A specialist in the particular CM software used will be needed - an HTML website designer or a specialist in other apps will not get the best results.

15.4 TYPES OF CMS

There are a very wide range of content management systems available now - probably around 3,000 - so the choice is vast. They can be classified in many ways but the most obvious groupings are free software and commercial software.

The most basic division is probably between the community / news model, and the provider-consumer model. These model types refer to whether a CMS is best suited to many people providing content, or one person or a small team doing so. The community model can be further subdivided into two sections: those suitable for one group or those suitable for multi-group use.

At first glance it might look as if a free offering could not be of any value but in fact some of the best of all, until very large enterprise-scale requirements are reached, are free. This type is called 'open-source' software because the code is published. The advantage, and the reason it is often of high quality, is that it uses the modern distributed development system, whereby programmers join a project and contribute, and their contribution is rated by peer evaluation. This means that the best coders in the world contribute to these projects in their spare time.

It is important to realize that open-source software is not a cheap or second-class option - in some cases it is better than the commercial equivalent. This is not surprising when the real cost of development is calculated: one well-known open-source CMS would have cost over \$5m to develop if the process had been commercial.

For this reason commercial software normally has to be quite expensive before it can compete in functionality and quality. All the modern advances in functionality, accessibility, standards compliance, SEO compliance, and web publishing innovation have been driven by open-source CMS. However the areas of documentation and support are not normally as well-organised as in the commercial field, and therefore enterprises may prefer to deal with a commercial single supplier.

15.5 HOW A CMS OPERATES:

A CMS is mainly a dynamic online program and organizational tool used to manage multiple websites instantly, while recording any changes that take place and producing uniform changes effectively across the website pages.

The main principle of a CMS consists in making accessible in the online environment various files of a department or company, being also used as an electronic archive. CMS is designed to be integrated

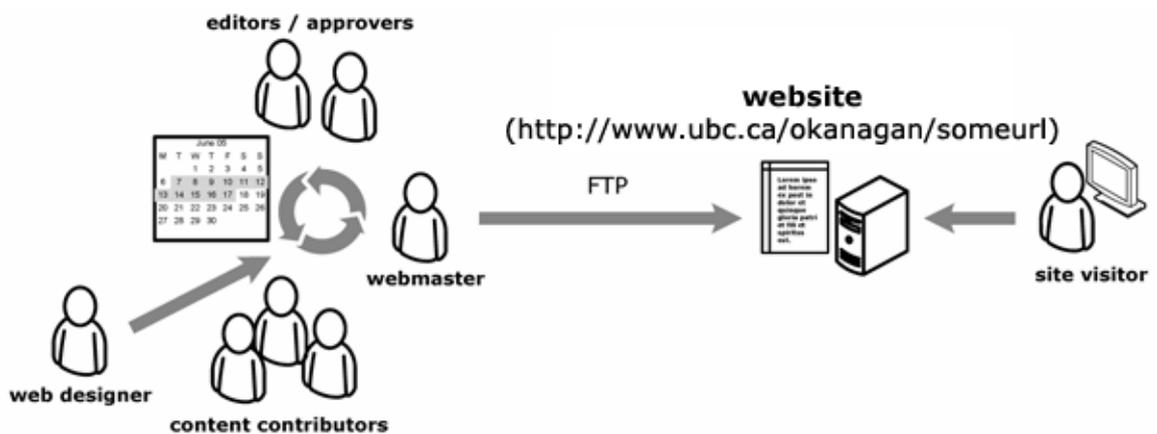
in any kind of website. It encourages the collaboration between people, leading to a productive management.

15.5.1 The very structure of CMS

The following part discusses the structure of a CMS A content management system may the following modules/components, although it may vary from developer to developer.

- Content development, analysis and classification;
- A search application;
- Posting comments
- Forums;
- Blogs;
- Rating systems;
- Projects collaboration platform;
- Personal profile pages;
- Communication between the users or managers of a website;
- New custom themes, templates and design changes;
- Administration of menus and submenus;
- Provides a custom user interface in several languages;
- User registration and management;
- Assigning modules of application to the users;
- Access restriction to the website by username, email address or IP address;
- Statistics and reports for users;
- Cache systems to improve the website reaction to intense traffic;
- SEO friendly URL;
- Chat platforms;
- Webmaster support;
- Editor support;
- Users support;
- Currency converter;

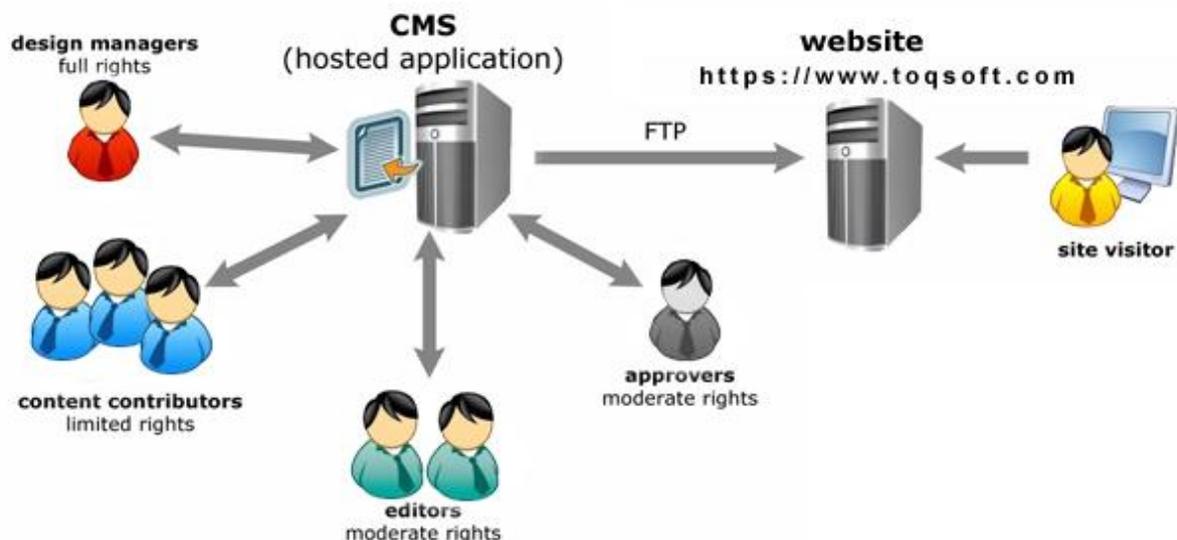
- Weather displaying systems;
- Dynamic generation of pages;
- Delimited design and content;
- A database for storing content;
- uses the concept of **WYSIWYG (What You See Is What You Get)** editor; this way, the users don't need to have HTML knowledge;
- Automatic syndication (RSS or Atom)



Normal way of operation of a website

15.5.2 How a CMS page is created

A normal HTML website's operation is completely different from the way a CMS works. On a standard site, all the pages exist on the server. However, with a server-side web application such as a CMS, pages are built on the fly; they do not exist before a browser requests one.



When CMS comes in

Factors affecting how a CMS works

The vast majority of CMS work the same way, but there are a small number of factors affecting this. A few CMS can work additionally as a client-side application, and one or two only work this way. That means the application resides on the local machine (the PC) and the pages are generated there, then uploaded to the server. Thereafter, the CMS works in the same way as a normal flat HTML site - meaning that there is no scripted interaction between user and website.

15.5.3 CMS server overhead

The process we just discussed is sometimes becomes quite involved and requires some server overhead, building the CMS pages and carrying out the other tasks. It uses CPU time, memory, and all other resources on the server computer. This translates into two things: server load and extended page loading times.

This can be measured by benchmarking, which is built in to Apache server and therefore fairly easy to measure. As an example, while serving ordinary flat HTML pages, servers commonly benchmark at between 100 and 400 pages per second. The lower figure is a more realistic one, higher numbers only being possible when all parameters are absolutely optimal, which is unlikely in a production environment.

This means over a hundred visitors can be catered for per second on a standard web server, all being well. This is a phenomenal number since if you calculate it as a visitor number per day, it comes out to over eight million. Even allowing for a factor-ten error, it is still far more than is ever likely to be encountered on most sites or even most multi-user servers. However, these are in effect theoretical figures because it is extremely unlikely a production server could supply pages this fast, multiple sites on the server will introduce all kinds of other problems, production servers have to execute other queries, a server cannot run at this load indefinitely, and neither can the network supply such a load to a single server. Even a factor-one hundred reduction in the page per second figure might not be sufficient for production.

However, when a CMS is used, pages served commonly drops to around four per second on the benchmark tests. Whoops! This is actually a much more realistic figure for a production server in any case; but because of the difference between a testing environment and a production server, as we saw above, the actual real-world figure is probably lower. Even four pages per second is a vast number that would not normally be required on a dedibox, though it might be needed on a busy multi-user server; but due to the difference between reality and benchmarking, the real figure in production is in any case probably even lower still.

These time lag and server load questions are partly resolved by caching - the 'memory pool' on both the CMS (usually) and the server which keep popular pages in memory, ready for instant serving. If

nothing else this shows that a server needs plenty of RAM and fast disks. It also explains why server disks are more likely to fail than desktop PC disks.

15.6 Open-source CMS vs. Commercial CMS

There are on the market a series of systems that are improved constantly, having a considerable documentation, which can be personalized for each user. Most content management systems are open-source; therefore, developing a personal CMS is an inexpensive method.

The advantages of using an open-source CMS than a personal CMS are various:

- **Minimum expenses:** An open-source CMS is free, the client pays only for personalizing and implementing the CMS; developing a personal CMS is expensive and requires time
- **Constant improvement:** Open-source CMS are used by people worldwide; thus, any possible errors and maintenance issues are fixed due to the users' constant feedback; a personal CMS is tested only by the company and employees who created it;
- **Flexible and elegant design:** There are several templates and themes that can be personalized for each user. Changing the webpage appearance and design can be made in a short time;
- **Easy maintenance:** The website administration based on CMS is simple and doesn't require advanced web programming knowledge. By using a user friendly administration interface, even the company's employees can update the website, having only basic HTML knowledge and the ability to work with a text processor;
- **Extensibility:** Content management system functions can be extended easily by installing new modules (galleries, a news module, a blog platform, etc.)
- **Updating content through a **WYSIWYG interface**;**
- **HTML not required;**
- **Multiple contributors.**
- **The code generated for the website is SEO optimized**

15.6 CMS running costs

The most economical and easily-supported website content management systems accord with these basic principles:

- The CMS is a recognized name and has a good reputation
- Plug-in and templates are widely available from different sources
- The CMS runs on a normal web server (a LAMP server)

There is nothing wrong with CMS that do not follow these principles, except they will be more expensive to build and implement, and much more expensive to operate, maintain and support.

There are a wide variety of offerings on the market, from the basic to the ultra-complex. Occasionally, websites are advertised as being a CMS only because they have an online editing capability; they do not comply with all of the other requirements for a CMS as stated above. Being able to edit a website online does not make it a CMS.

15.7 Conclusion

The concept of content management is the current solution for a problem of management from the past, -the human communication management. Content management is a concept with many facets, being an activity that must be centered on the user: it must consider the users' problems and needs, applying the appropriate technologies to help people in their work. Knowledge, information and content are the main resources of the modern economy. The way in which we create and manage them determines our success as individuals and / or organizations.

The previous experience and fierce competition has consolidated the CMS solutions market and the standardization of content management systems. It is known that the content is more important than the technologies used for its management.

If the website is a small one, which doesn't require multiple changes, it is better to use a static site, which will consume less disk space, being easier to use and understand than a content management system.

A website CMS is therefore the best way to run a large website, or indeed any site where regular edits or changes are made; and where additional functions will be needed at a later date. A large or complex site will be far quicker and cheaper to build with a CMS

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Basics of Data Management

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16.1 INTRODUCTION

This topic is called “*Data Management*” but everyone knows that data management is time consuming and data are often expensive to collect, but it also means that all end users have a huge resource of data that is available, thus it makes it easy to create reports, conduct analysis and make high quality decisions based on data that is collected and used within the organization. In this book and inside it by *learning and doing*, it will make sure that everyone is aware with different types of data each field will accept becomes a challenge, especially when there is a lack of consistency when assigning data types to the fields in relation to what we are doing today in agriculture.

We all know that any collective enterprise must have records that are both reasonably, accurate and readily accessible. So what to do with the ‘data management’? It serves as a reminder that a computer application is only as good as the data on which it depends. It is common for the development of computer systems to start from the desired facilities and work backwards to identify the objects involved and so to the data by which these objects are described.

*Data management includes all aspects of data planning, analysis, documentation and storage. The objective is to create a reliable data base containing high quality data. The main elements of data management are database files. **Database files** contain text, numerical, images, and other data in machine readable form. Such files should be viewed as part of a database management system (DBMS), which allows for a broad range of data functions, including data entry, data collection, data validation and checking, data documentation, updating, data files backup and analysis.*

16.2 Why Data Management is useful and important in application to KVK?

At this stage of information technology, where we live in an information age and where the volume of data processed by the organization etc increase exponentially. Nowadays becomes very popular in the entire world for gathering of information, especially for farmers when they use for marketing and coordinating their products sales. It is very useful for us to execute our works either in institute or in the field. For example farmers need to utilize the basic computer program for farm management, when they plough their field, milking cows etc and in between working in the fields and barns that produce the world’s food supply they have an efficient way to manage their business. Computers offer an effective way to track their planting, breeding and finances of agricultural operations, while also reducing the clutter from paper records. Use them to manage their operation’s financial records via an electronic bookkeeping program. Enter income, expenses, invoices and tax records for an accurate representation of the farm or ranch’s financial standing at any given time.

Enter records of seed planting, fertilization and management for individual fields and crops. Track production for each season and save records from previous years to compare production over multiple growing seasons. It may also choose to track weather or other environment factors that affect crop production for comparison over multiple years. Farmers need to record their data regarding breeding and birth records of animals, as well feeding cycles and any change in types of feed in a

database or spreadsheet program. Save the data so that it may be reviewed for production comparison over multiple. Use collected data to keep track of herd size and utilized the information to plan the sale of animals once they are ready for slaughter or transfer to another farm. Maintaining a list of business contact within a database program that allow easy access to contact information for buyers, seed companies and colleagues, utilized their e-mail to communicate with colleagues and clients in an electronic format, when appropriate. It may also choose to utilize video conferencing for communication via internet.

Computers have played a very significant role in agricultural research. The use of computers for analysis of data pertaining to research experiments is well known. Research planning in agriculture is also a complex process. The research planner must identify a specific problem, define specific objectives, construct hypotheses, mobilized resource for experiments, disseminate result and continuously re-assess the research result. Computers are extremely useful for these activities. As the computers have advanced over time, these are increasingly being used for the compilation and tabulation of not only agricultural data but also of the large scale sample of survey data. The data entry, storage, retrieval in the desired format, making cross classified tables and applying statistical functions and procedures has become all to easy with the availability of powerful computers. Computers can be used for development of management information system for supporting such activities.

Important of Data management in application to KVK

Farmers tilled the soil and harvested acres of crops from their fields without the use of modern technology, but when the computer's arrival in the world of farming it helps the agricultural works in a range of ways. Like many small business owners, farmers use basic program and computer application to keep records such as budget information, farm equipment inventories and animal health forms. Farm implements such as tractors and fertilizers, sprayers have computer that farmers can program to automatically adjust the type of amount of fertilizer that the equipment applies, resulting in improved soil and lighter crop yields. It can use computer system to guide the steering on their farm equipment during planting or harvesting. They use Global Positioning System (GPS receivers to electronically map factors and areas that might affects crops yields, such as wet spots and weed patches. Data are often expensive to collect. There is no point, therefore, in putting a lot of effort into making sure that the methods used for obtaining the data are of high, scientific analytical quality if the same stringent quality controls are not maintained during data recording and computer entry. Procedures in data management begin at the start of the study design stage and cover the following range of activities:

- planning how data are to be collected and recorded
- budgeting and planning for how the data will be managed
- deciding how observational units are to be identified
- planning how data are to be entered into the computer and stored
- devising schemes for data entry and checking
- undertaking data entry and validation
- organising the data for analysis
- tabulating data for reports

Like in our institute that has several branches of KVK under it, instead of having all the farmers record in one database, separate KVK may handling different database and different record are store and maintain like a data repository. The data repository is a logical (and sometimes physical) partitioning of data where multiple databases which apply to specific applications or set of applications reside.

DATA MAINTENANCE IN KVK

16. 3.1 TECHNIQUES AND SKILLS OF DATA ADMINISTRATOR: A data administrator also called as “Data Resource Management” develops and implements policies and procedures for data collection of how data shall be coordinated for a given system. This administrator codes and tests how data is to be stored in the way of location, physical characteristics and amount of space needed and access method. It also design and manages the directory of computerized data. Information system planning for the use of data is also developed by the data administrator. Data administrator resolves dispute that arises because data are centralized, but shared among system users, and decides where data will be stored and manage but manage corporate wide data definitions and standards. When an organization function working in the areas of information system and computer science that plans, organizes, describes and control data resource. In many organizations, data administrator is performed occasionally, or is a small component of the database administrator’s work. One way the data administrator (also called “data analyst”) can assist in making data sharable and consistent across applications is to use the techniques of logical data modeling. Data administrator maintains and administers key data to ensure quality accuracy and usability, resolved data problem and requests for systems access, including migration, archiving and deletion of inactive data. A Data Administrator typically role may include:

- Collects, review, and inputs data into a computer processing system, audits output data.
- May be expected to code data and input data for computer processing.
- Identifies and resolves production related errors.
- Maintains and revises procedural lists, control records and coding schemes to process source data.
- Performs a variety of tasks.
- Works under general supervision; typically reports to a supervisor.

16. 3.2 TECHNIQUES AND SKILLS OF DATA REPOSITORY ADMINISTRATOR: Data Repository is a logical (and sometimes physical) partitioning of data where multiple databases which apply to specific applications or sets of applications reside. For example, several databases (revenues, expenses) which support financial applications could reside in a single financial Data Repository. Data warehousing is a complex process of building a data repository in the form of a relational database so that it can support web or text mining in order to leverage data and transform or aggregate them in useful information. Data Repository offers easier and faster access due to the fact that related information is, to some degree, lumped or clustered together. The data repository load can be distributed across many databases or even across many servers. For instance, instead of having one computer handle the data related to farmers, customers etc, several database could be handling the different aspects of farmers and record. A repository is a top-level data administrator entity that contains cabinets which contain the documents. At this level a Repository Administrator can do the following:

- Change billing information and numbers of users.
- Add and remove users and groups.
- Define custom document profile attributes and upload attributes values.

16.3.3 ANALYSIS AND DESIGN OF DATA MODEL/MANAGEMENT & ITS ARCHITECTURE

This short chapter provides an initial review of the design / description and should set data standards for all its data system as a vision or a model of the interactions between those data systems. It also

describes the data structure used by the organization and address data in storage and data in motion. Description of data stores, data groups and data items, mapping of those artifacts to data qualities, applications, location etc. It provides criteria for data processing operations so as to make it possible to design data flow and also control the flow of data in the system.

16. 4.1 DATA ARCHITECTURE: In information technology, **data architecture** is composed of models, policies, rules or standards that govern which data is collected, and how it is stored, arranged, integrated, and put to use in data systems and in organizations. Data is usually one of several architecture domains that form the pillars of an enterprise architecture or solution architecture.

Data Architect has 3 traditional architectural processes:

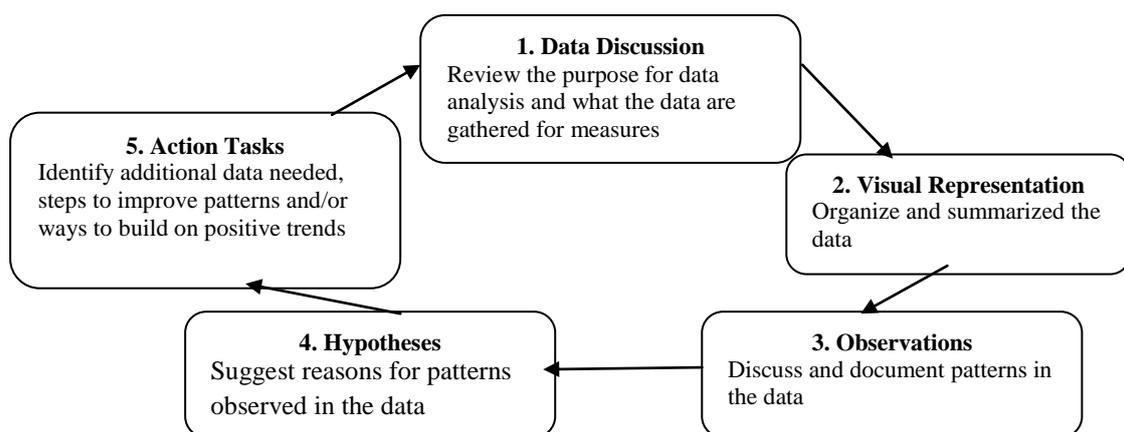
- *Conceptual* - represents all organization data entities. For examples People receive information, process this information, and respond accordingly many times each day. This sort of processing of information is essentially a conceptual model (or mental model) of how things in our surrounding environment work.
- *Logical* - represents the logic of how entities are related.
- *Physical* - the realization of the data mechanisms for a specific type of functionality. For examples is a smaller or larger physical copy of an object. The object being modeled may be small (for example, an atom) or large (for example, the solar system).

Layer	View	Data
1	Conceptual/Business Model	Semantic model or conceptual/enterprise data model
2	Logical/System model	Enterprise/logical data model
3	Physical/Technology model	Physical data model

Table 1. Traditional architecture process (Layer)

16. 4.2 DATA ANALYSIS: Data analysis is a practice in which raw data is ordered and organized so that useful information can be extracted from it. The process of organizing and thinking about data is a key to understanding what the data does and does not contain. There are a variety of ways in which people can approach data analysis, and it is notoriously easy to manipulate data during the analysis phase to push certain conclusions or agendas.

Fig:1 Data Analysis Process

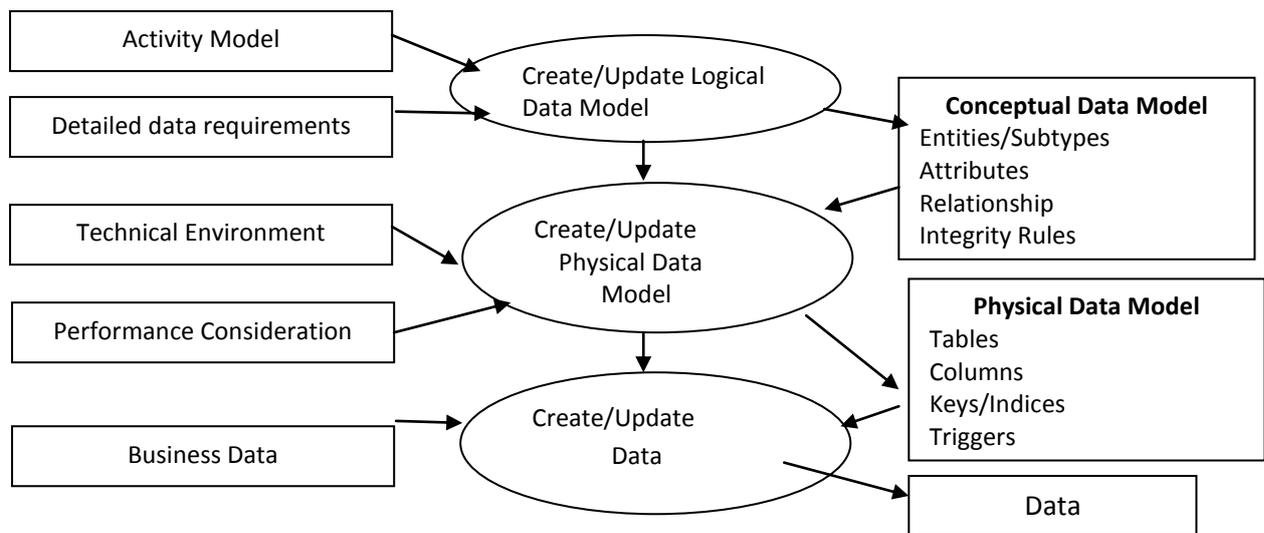


Data from various sources is gathered, reviewed, and then analyzed to form some sort of finding or conclusion. For this reason, it is important to pay attention when data analysis is presented, and to think critically about the data and the conclusions which were drawn. Analysis of data is a process of inspecting, cleaning, transforming, and modeling data with the goal of discovering useful information, suggesting conclusions, and supporting decision making. Data analysis has multiple facets and

approaches, encompassing diverse techniques under a variety of names, in different business, science, and social science domains.

16. 4.3 DATA MODELING: Data modeling is first creating a structure for the data collected and using and organizing this data in a way that is easily accessible and efficient to store and pull the data for reports and analysis. In order to create a structure for data, it must be named appropriately and show a relationship with other data. It also must fit appropriately in a class. For instance, with a database of media, users might have a hierarchical structure of objects that include photos, videos, and audio files. Within each category, users can classify objects accordingly.

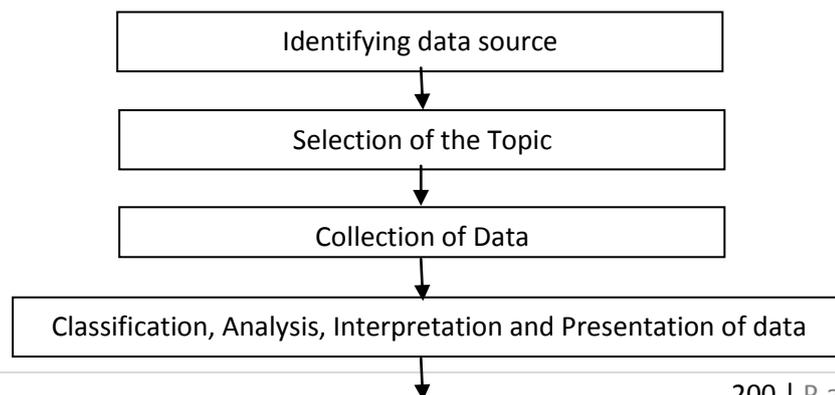
Fig.2 Structure of Data Modeling

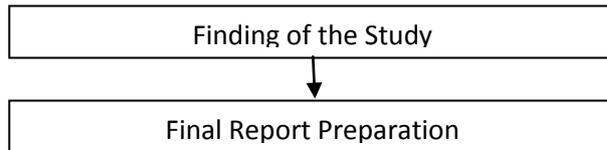


The data modeling process, the figure illustrates the way data models are developed and used today. A conceptual data model is developed based on the data requirements for the application that is being developed, perhaps in the context of an activity model. The data model will normally consist of entity types, attributes, relationships, integrity rules, and the definitions of those objects. This is then used as the start point for interface or database design

16. 4.4 DATA DESIGN:

Designing data is about discovering and completely defining our applications data characteristics and process. Data design is a process of gradual refinement, from the coarse "What data does your application require?" to the precise data structures and processes that provide it. With a good data design, your application's data access is fast, easily maintained, and can gracefully accept future data enhancements. The process of data design includes identifying the data, defining specific data types and storage mechanisms.





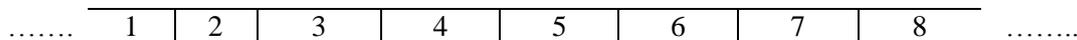
The process of data design includes identifying the data, defining specific data types and storage mechanisms, and ensuring data integrity by using business rules and other run-time enforcement mechanisms. . After all, it is not always obvious at the beginning of an application design just exactly how or where the data will be stored. While most formal data modeling methodologies anticipate using a relational database engine, an enterprise application has many data storage options, including relational, mainframe hierarchical and various other distributed file data structures.

16.4.5 DATA SECURITY MANAGEMENT

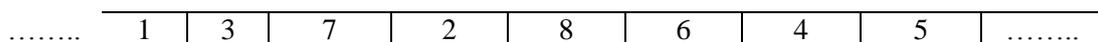
- *Accessing of Data*
- *How data can be erasing?*
- *Data Privacy*
- *How data are protected?*

16. 5.1 Accessing of Data: Data accessing refers to a user’s ability to access or retrieve data stored within a database or other repository. Users who have data access can store, retrieve, move or manipulate stored data, which can be stored on a wide range of hard drives and external devices. There are two types of data access, a sequential access and random access.

Sequential access: is a system by which data is stored and read it in a fixed order. As well as being fixed, this order is pre-determined and follows a logical progression.



Random access: is a system by which data is store and read it randomly. Random access is more precisely and more generally called direct access is the ability to access an item of data at any given coordinates. For example data might be stored nationally is a single sequence like a row, in two dimensions like rows and column on a surface, or in multiple dimensions.



Data Access is simply the authorization you have to access different data files. Data access can help distinguish the abilities of Administrators and users. E.g. Admins may be able to remove, edit and add data, while a general user may not be able as they don’t have the access to that particular file.

16.5.2 How data can be erasing: Data erasure also called data clearing or data wiping is the act of deleting information from a computer, most usually done to clear space for newer files. Some individuals practice routine file deletion to improve the performance of their computers. Data wiping can also be done for security purposes, especially when the integrity of a system has been compromised by an external party. In this regard, data erasure can be performed to ensure that sensitive information isn't obtained by other individuals. Computer hard drives have a finite amount of space for storing data, making data erasure necessary when the drive can no longer accommodate new information. One common example of this necessity arising is when users try to install new programs into their computers, only to be alerted that the hard drive does not have space to contain the incoming program files. When this occurs, users will need to clear more space by deleting an adequate amount of files from their system.

16.5.3 Data Privacy: It is also called as information privacy is the relationship between collection and dissemination of data, technology, the public expectation of privacy, and the legal and political issues surrounding them. Information privacy is considered an important aspect of information sharing. With the advancement of the digital age, personal information vulnerabilities have increased. Privacy concerns exist wherever personally identifiable information is collected and stored – in digital form or otherwise. Improper or non-existent disclosure control can be the root cause for privacy issues. Data privacy issues can arise in response to information from a wide range of sources, such as:

- Farmers records
- Staff records
- Banks records
- Financial institutions and transactions
- Residence and geographic records

The challenge in data privacy is to share data while protecting personally identifiable information. The fields of data security and information security design and utilize software, hardware and human resources to address this issue.

16.5.4 How data are protected?

Applications can always be reinstalled, but your data is the most important thing on your computer or network. Here's are some useful ways we can protect our data.

- **Save as your work:** You should always save your work as you go and learn how to use the 'auto-save' features in your application.
- **Make a backup:** Before you make changes to critical data always make a duplicate. Even if you just made a backup yesterday - make another.
- **Keep a copy of your data offsite:** Diligently backing up your data is good practice but keep a copy of your data offsite. If there were a fire or other disaster your onsite data backup could be lost as well.
- **Refresh your archives:** Years ago you archived your data to a zip drive. Now you decide to use that data as a baseline - are you sure there is still a zip drive that can read your data? As technology changes, it is a good idea to transfer your data to a current data storage standard so that you aren't stuck with irretrievable data.
- **Never open email attachments by habits:** If your email reader has an option to automatically open attachments you should disable that feature. Always run any attachments and downloaded files through a virus scanner first.
- **Never trust disk from other people:** Anytime you receive a file on any type of media check it first for viruses!
- **Update:** Make sure you have the latest updates for your software - especially for your virus checking software. Make it a habit to regularly check for updates and enable automatic updates for software that offers that feature.
- **Protect your password:** Your USERID is your identity. The key to your identity is your password. Anytime your account accesses the network you are responsible for any activity from that account. Remember: change your password on a regular basis.
- **Protect your computer:** Use a secure operating system which requires users to be 'authenticated'. As an added benefit these operating systems also restrict what individual users can see and do on the system.
- **Perform regular maintenance:** Learn how to use the utilities that diagnose your system for problems. It is a good idea to run a disk-scanning program, defragment your hard drive, or

whatever else your system might need. These utilities can prevent little problems from becoming big problems, and will keep your system running at top speed.

The protection of data against unauthorized access, Programs and data can be secured by issuing passwords and digital certificates to authorized users. However, passwords only validate that a correct number has been entered, not that it is the actual person. Digital certificates and biometric techniques (fingerprints, eyes, voice, etc.) provide a more secure method. After a user has been authenticated, sensitive data can be encrypted to prevent eavesdropping. **Authorized Users Can Be the Most Dangerous** Although precautions can be taken to authenticate users; it is much more difficult to determine if an authorized employee is doing something malicious. Someone may have valid access to an account for updating, but determining whether phony numbers are being entered requires a great deal more processing. The bottom line is that effective security measures are always a balance between technology and personnel management.

When it comes to data, security is an important feature since data can be sensitive. Security can protect data from either being destroyed or stolen. Types of data security are disk encryption, hardware based mechanisms, backups, disk masking, and data erasure. In addition to those security measures, you should also get antivirus programs to prevent someone from remotely accessing your data. Viruses can also destroy valuable work that is stored on the hard drive.

16.6 QUALITY OF DATA MANAGEMENT

- ***Data Cleansing***
- ***Data Integrity***
- ***Data Enrichment***
- ***Quality Assurance and Quality Control***

16. 6.1 Data cleansing: Data cleansing (also known as *data scrubbing*) is the name of a process of correcting and - if necessary - eliminating inaccurate records from a particular database. The purpose of data cleansing is to detect so called dirty data (incorrect, out-of-date, redundant, formatted incorrectly, irrelevant or incomplete parts of the data) to either modify or delete it to ensure that a given set of data is accurate and consistent with other sets in the system. A data cleansing process seeks to clean data, making it more useful. Data cleansing is usually done by persons who read through a set of records for verification of accuracy of these, correct spelling errors and complete missing entries. During this operation some unnecessary or unwanted data is removed in order to increase efficiency of data processing. There are various methods of data cleansing, but they generally include the same steps.

- ***Error identification***
- ***Error reporting***
- ***Cleansing***
- ***Error check***
- ***Data Merging***

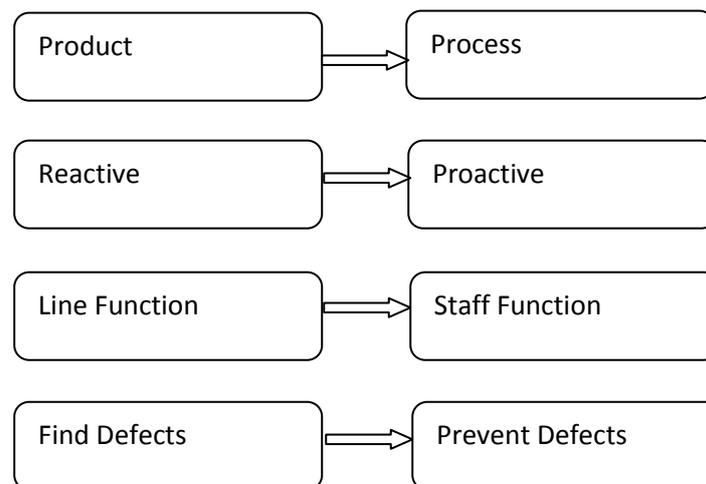
16. 6.2 Data Integrity: Refers to maintaining and assuring the accuracy and consistency of data over its entire life-cycle, and is a critical aspect to the design, implementation and usage of any system which stores, processes or retrieves data. The term **data integrity** is broad in scope and may have widely different meanings depending on the specific context - even under the same general umbrella of computing. This article provides only a broad overview of some of the different types and concerns of data integrity. Problems with data integrity can start with a human source. People entering records may make mistakes, leading to variations between the original data and the data stored in a system. Likewise, people can make mistakes while transferring or copying data electronically, causing a

disparity between different versions of a file or references to a file. In order for data integrity to be maintained, there need to be no changes or alterations to the data.

16. 6.3 Data enrichment: Data Enrichment means that information from the data base can be extracted according to user- defined criteria and requirements to a file where the data can be restructured as desired. Data enrichment is a general term that refers to processes used to enhance, refine or otherwise improve raw data. Improve the quality of your data and increase the value of your fundraising efforts. It also refers to processes used to enhance, refine or otherwise improve raw data. This idea and other similar concepts contribute to making data a valuable asset for almost any modern business or enterprise. It also shows the common imperative of proactively using this data in various ways. Although data enrichment can work in many different ways, many of the tools used for this goal involve a refinement of data that might include small errors. A common data enrichment process could, for example, correct likely misspellings or typographical errors in a database through the use of precision algorithms. Following this logic, data enrichment tools could also add information to simple data tables.

16. 6.4 Quality Assurance and Quality Control: Sometimes, QC is confused with the QA. Quality control is to examine the product or service and check for the result. Quality assurance is to examine the processes and make changes to the processes which led to the end-product.

Fig.3 Quality control Vs Quality Assurance



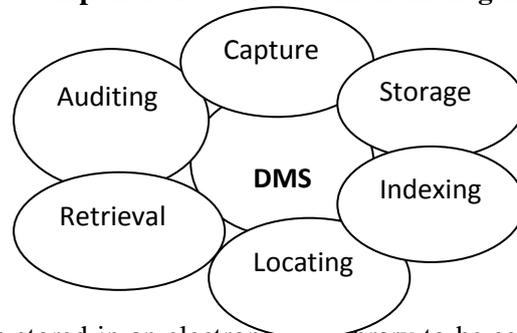
Quality control is a process used to ensure quality in a product or a service. It does not deal with the process used to create a product; rather it examines the quality of the “end product” and the final outcome. Its aim is to check whether the products meet the specifications and requirements of the organization. If an issue or problem is identified, it needs to be fixed before delivery, and also evaluates people on their quality level skill sets and imparts training and certifications. This evaluation is required for the service based organization, and helps provide “perfect” service to the organization. It involves activities related to implements of processed, procedures and standards. It is very reactive measures, correctives techniques, and their scope applies to a particular product being tested. **Whereas Quality Assurance** is an activity to ensure that an organization is providing the best possible product or services; it **focuses on improving the processes** to deliver their Quality Products. An organization has to ensure, that processes are efficient, and effective as per the quality standards defined, and implement actions that are necessary to achieve improvement in the process. It involves actives with respect to verification of products. It is very proactive techniques, preventive measure, and their scope is applied to all products that will be created by the organization.

16.7 DOCUMENT MANAGEMENT AND RECORD MANAGEMENT SYSTEM

This topic tells us how to set up filing systems, deal with receipts, email management, file management, document management and records management with these data management resources for an organization. While most of us consider business record management to be scut work and tend to give it a low priority, good record management not only makes our working lives easier, but can give us real stress relief at tax time. Let us see how the role of documents and record management helps us in accessing to keep track of our records in our organization.

16.7.1 Role of Document Management System: The document management systems are highly used within the different organization due to the convenience of use and the practicality. Whenever the farmers need seeds, fertilizers, etc the office deal in both electronic and paper document, tracking every element of the farmer's history and tracking of procedures performed. Keeping this data properly achieved and secure is of the utmost importance, and the DMS is capable of meeting the rigorous demands of their needs. Documents should be clearly linked to data holding, and should state the standards to which the data have been collected or derived methodologies, described in detail the processes used in calculating and computations. Data should be collected throughout the measurement program and reviewed periodically. The use of supporting information may become necessary during the data interpretation process, and it is important in determining data validity. Data document includes metadata records. As with the dataset documentation, maintenance of metadata records in a manner consistent with good record-keeping practices is crucial to sustaining the long-term value of the dataset. For this reason, metadata management must be an integral component of data management, not merely an afterthought. Document management systems are applications and capable of digitizing paper document and storing all records electronically. Some system will simply store scanned documents as image document, whereas others are capable of recognizing character and translating scanned document into editable electronic text.

Fig: 4. Component/Role of Document management System



These documents are then stored in an electronic library to be searched through and stored when needed. It designed to assist organizations while managing the **creation, storage, retrieval** and expiration of information stored as document. This concept involves a centralized repository either in-house or off-site to store any type of information used throughout the organization. And, most importantly, it provides a secure environment that can protect against infiltration. Contents store within a DMS is typically self contained, which necessitates the need for effective means of finding and sharing information easily. Through the use of comprehensive search tools, user can add classification schemes or tag to documents to help them more easily be identified when needed.

16.7.2 Record store in Document Management System: Record management is a process for handling records from the time they are created to the point when they need to be disposed of. A well-implemented records management system starts at the point of creation, with a standardized system for records creation that is designed to make records useful, consistent, and easy to access. Data holding should be suitable identified and maintained in a manner consistent with good record-keeping practices, whenever seeds, fertilizers, are distributes to the farmers, their name, address contact no,

and how many Kg, what types of seeds are distribute to them everything needs to be store and recorded because in some way if their plants, animals is in need of treatment once recorded is easily to identity by searching their name in a record stored. For examples today the farmers milking their cows they have to entered into the record how many liters they have sell and how many profit this month they have earn, it's very important for them to record in each and everything for their benefit. Once the data store should be suitable identified and maintained in a manner consistent with good record-keeping practices. Unusual conditions should always be recorded. Where relevant, records of equipment maintenance must also be documented (so as to track potential systematic errors). A record is “information created, received, and maintained as evidence and information by an organization or person. A record can be:

- Traditional/paper or element/digital (base on its storage media)
- Active, inactive, or achieved (base on its current use)
- Structure or unstructured (depending on its format)
- Vital or routine (base on its importance)
- Temporary or permanent (base on need for its retention)

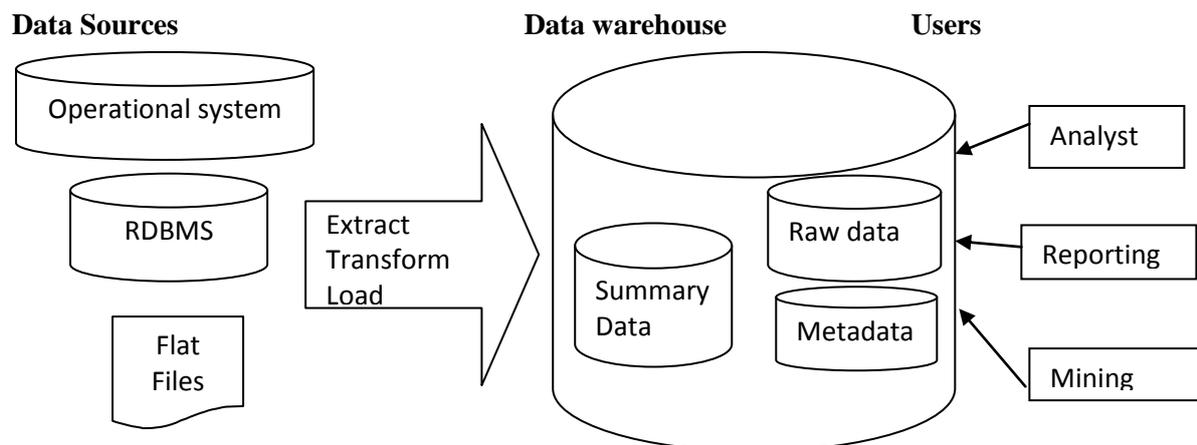
Although most historical records may still be paper-based, the majority of new records are now “born-digital” electronic records, that is, created and stored in electronic format. Also, more and more traditional records are being converted into electronic/digital records and stored in electronic repositories/databases because of efficiency, ease of handling, and preservation advantages associated with computer-based systems. Records Management (RM) is the intentional management of all records, regardless of whether they are paper or electronic, created in the course of organizational activities as an institutional asset for legal, fiscal, administrative or historical purposes through the records' entire life cycle. Electronic record management (ERM) system must accomplish the following:

- *Ensure specification and consistent application of record management policies*
- *Ensure records identification and classification*
- *Ensure records availability*
- *Ensure records contextual information*
- *Ensure records structure*
- *Ensure records preservation*
- *Ensure records disposition*

Just as the records of the organization come in a variety of formats, the storage of records can vary throughout the organization. Records may be managed in a centralized location, such as a records center or repository, or the control of records may be decentralized across various departments and locations within the entity.

16.7.3 DATA WAREHOUSING AND BUSINESS INTELLIGENCE MANAGEMENT

Data warehouse is a repository of an organization's electronically store data. Data warehouse are designed to manage and store the data whereas the business intelligence (BI) focuses on the usage of the data to facilitate reporting and analysis. The purpose of data warehouse is to house standardized, structured, consistent, integrated, correct, cleansed and timely data, extracted from various operational systems in an organization. The extracted data are integrated in the data warehouse environment in order to provide an enterprise wide perspective. An essential component of a data warehouse/business intelligence system is the metadata and tools to manage and retrieve the metadata. The data warehouse includes the following: Data Mart, Data Mining and data Movement.



Data Mart: A **data mart** is the access layer of the data warehouse environment that is used to get data out to the users. The data mart is a subset of the data warehouse that is usually oriented to a specific team. Data marts are small slices of the data warehouse. Whereas data warehouses have an enterprise-wide depth, the information in data marts pertains to a single department. In some deployments, each department or organization unit is considered the owner of its data mart including all the hardware, software and data. The primary use for a data mart is business intelligence (BI) applications. BI is used to gather, store, access and analyze data. A data mart can be less expensive than implementing a data warehouse, thus making it more practical. The low cost and quick set up of the data mart makes it a suitable method for storing data.

Data Mining:

Another important topic regarding data management is data mining. Data mining is a process in which large amounts of data are sifted through to show trends, relationships, and patterns. Data mining is a crucial component to data management because it exposes interesting information about the data being collected. It is important to note that data is primarily collected so it can be used to find these patterns, relationships, and trends that can help a business grow or create profit.

While there are many topics within data management, they all work together from the beginning where data is collected to the end of the process where it is sifted through, analyzed, and formatted so that specialists can then make quality decisions based upon it.

Data Movement:

Data movement is the ability to move data from one place to another. For instance, data needs to be moved from where it is collected to a database and then to an end user, but this process takes quite a bit of logistic insight. Not only do all hardware, applications, and data collected need to be compatible with one another, they must also be able to be classified, stored, and accessed with ease within an organization. Moving data can be very expensive and can require lots of resources to make sure that data is moved efficiently and is secure in transit, and that once it reaches the end user it can be used effectively either to be printed out as a report, saved on a computer, or sent as an email attachment.

Conclusion: Data management is one of the most aspects in present era, which helps in collecting, storing, analysing, assessing the data for planning and management of development works related to agriculture and allied sector, which will finally helps the farming community by improving their livelihood status.

Reference:

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2. *Principles of Data Mining-David J. Hand, Heiki manila & Padhraic Smyth.*
3. *Master Data Management-David Loshin*
4. *Handbook of Data Management-Barbara Von Halle & David Kull*
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SIMPLE AND FREE VIDEO EDITING TOOLS FOR KVKs

Dehkhohao Dounel

PA (Computer Application), KVK Chandel

From time immemorial communication is one of the key roles in facilitating human development in various aspect. Communication can be defined as a process in which participants create and share information with one another in order to reach a mutual understanding. This communication occurs through channels between sources and a source is an individual or an institution that originates a message while a channel is the means by which a message gets from the source to the receiver. Communication channels can be categorized as mass media and interpersonal communication where mass media channels include a mass medium such as TV, video, radio, or newspaper and interpersonal channels consist of a two-way communication between two or more individuals. Mass media extension have benefitted many farmers and got a shot in arm with the advancement of technology and computing hardware that have led to quick and ease dissemination of information through cheap and availability of mobile phones, camcorders, projectors, tablets and laptops to various stack holders.

As a result, subject experts in agriculture, can now establish their own movie studios and portable movie theatres to create and diffuse extension videos as a mass medium, all using equipment that costs very less price. Farmers' friendly videos have help extension agents and farmers in showing improved practices or techniques and disseminated to dozens of farmers at a time. These videos are not replacing extension agents, but rather complementing them. However, creating video or movie requires proper planning and editing technique to produce a well documented and productive farmer's video. Video editing can be learnt from easily available from beginner software from various vendor and that too many freely available in the internet.

Professional video editing software like Adobe Premier, Pinnacle Studio, Sony Vegas and Movavi Video Suite are definitely awesome video editing software, but unfortunately it comes with financially a price to pay. It is worthwhile to test them as some of them come with trial version. In case, if you are use to it and have the budget –professional editing softwares are commendable. However, there are some great video editing software that also happens to be free for low budget. They are simple but helpful. Free video editing software can definitely meet the purpose indeed for creative people. The disappointing things about free video editors are that they come with limitations. Some of the great and free video editing software are discuss as follows:

17. 1. Window Movie Maker:

For newbie in video editing, Window Live Movie Maker can be the first choice for editing because it is incredibly easy to use and for its simplicity and user friendly. Windows Movie Maker is a

free video editor from Microsoft and it comes with inbuilt in latest Windows Essential. It can also be downloaded from internet free of cost. It is to be noted that Window Movie Maker can create or export movie in Window Media format only.

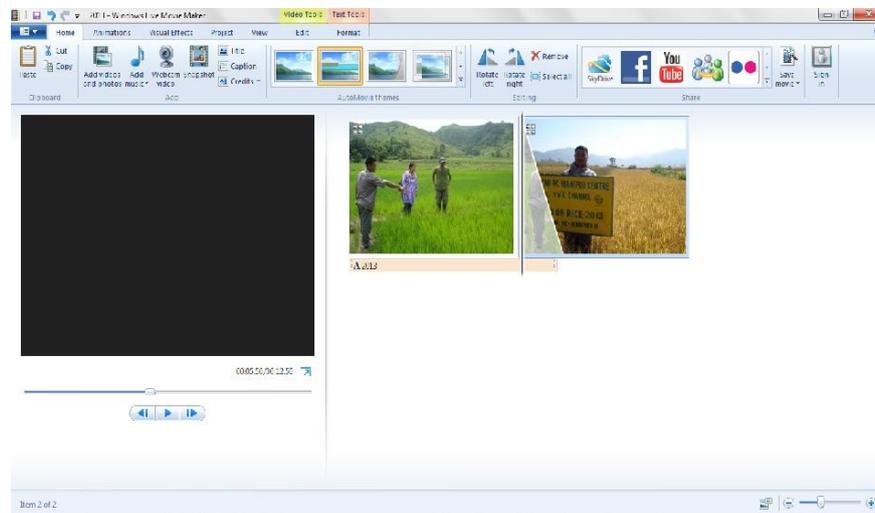


Fig.1 Window Movie Maker

HOW TO USE:

Using the video editing features in Movie Maker, you can make your movie look the way you want it to.

Add a video

Get started with making a movie and editing it by first adding any videos that you want to use into Movie Maker.

On the **Home** tab, in the **Add** group, click **Add videos and photos**. Hold down the Ctrl key and click the videos you want to use, and then click **Open**.

Trim video

To trim the beginning or end of a video clip so only the part of the video you want appears in your final movie, click the video you want to trim, and then drag the playback indicator on the storyboard to the point where you want the video to start or stop playing in your movie. Do one of the following:

- To set a new start point, under **Video Tools**, on the **Edit** tab, in the **Editing** group, click **Set start point**.
- To set a new end point, under **Video Tools**, on the **Edit** tab, in the **Editing** group, click **Set end point**.

Split a video

You can split a video into two smaller items and then continue editing. For example, after splitting a video, you can move one video in front of the other to change the order in which the videos play in your movie.

To split a video into two items, click the video, and then drag the playback indicator to the point where you want to split the video. Under **Video Tools**, on the **Edit** tab, in the **Editing** group, click **Split**.

Speed up or slow down a video

You can change the speed of your video in Movie Maker to make the video play faster or slower in your movie.

To change the speed of a video, click the video. Next, under **Video Tools**, on the **Edit** tab, in the **Adjust** group, click the **Speed** list, and then click a speed (depending on how much you want to speed the video up or slow it down).

IMPORT PHOTOS AND VIDEOS

To make a movie with Movie Maker, you'll need some photos and videos on your computer. You can import photos and videos from your digital camera, a flash memory card, DVDs, or your mobile phone. To import your photos and videos into Movie Maker, connect the camera to your computer by using a USB cable, and then turn on the camera. Click the **Movie Maker** button, and then click **Import from device**. If the **Photos and videos will be imported into Photo Gallery** message appears, click **OK**. Click the device you want to import photos and videos from, and then click **Import**. On the **New photos and videos were found** page, click **Import all new items now**, type a name for all the photos and videos, and then click **Import**.

In Photo Gallery, select the check box in the upper-left corner for each photo or video you want to use in your movie. On the **Create** tab, in the **Share** group, click **Movie**. When the photos and videos appear in Movie Maker, you're ready to start making your movie.



EDIT THE AUDIO

Get great sound in your movie by using the audio editing tools in Movie Maker. Make your finished movie feel polished and professional by adding a soundtrack and using the editing features to adjust the volume fade music in or out, and more.

Add music

You can add music that plays during your movie. After you add music, you can edit it so it plays how you want in your movie.

On the **Home** tab, in the **Add** group, click **Add music**. Click the music file you want to use, and then click **Open**.

Fade music in or out

Make the audio fade in nicely at the beginning and fade out smoothly at the end to make a movie that looks and sounds professional.

To make the music fade in or out, click the music. Then, under **Music Tools**, on the **Options** tab, in the **Audio** group, do one or both of the following:

- To make the music fade in, click the **Fade in** list, and then click the speed for the music to fade in.
- To make the music fade out, click the **Fade out** list, and then click the speed for the music to fade out.

Change the start or end point of the music

Trim the beginning or end of the music, so only the part of the song that you want plays in your final movie.

To trim the beginning or end of the music, click the music, and then drag the playback indicator on the storyboard to the point in the music where you want it to start or stop playing in your movie. Do one of the following:

- To set a new start point for the music to start playing at the current point, under **Music Tools**, on the **Options** tab, in the **Editing** group, click **Set start point**.
- To set a new end point so the music stops playing at the current point, under **Music Tools**, on the **Options** tab, in the **Editing** group, click **Set end point**.

Change the audio volume

You can change the volume of a music item or the audio in a video. This way, regardless of the audio or music that's playing, it sounds just right in your movie.

To change the volume of a music item, click the music. Under **Music Tools**, on the **Options** tab, in the **Audio** group, click **Music volume**, and then move the slider left to lower the volume or right to increase it.

To change the volume of the audio in a video, click the video. Under **Video Tools**, on the **Edit** tab, in the **Audio** group, click **Video volume**, and then move the slider left to lower the volume or right to increase it.

SHARE ON THE WEB

With Movie Maker, you can quickly publish your movie to popular websites, and then share your movie with friends, family, or the whole world.

Add photos and videos

On the **Home** tab, in the **Add** group, click **Add videos and photos**. Hold down the Ctrl key and click the photos and videos you want to use, and then click **Open**.

Edit your project

Edit your project so it appears how you want. This includes adding any music, titles, effects, and transitions, or making other edits that you want.

Publish your movie on the web

On the **Home** tab, in the **Sharing** group, click the website where you want to publish your movie. Enter your user name and password, and then follow the steps to publish your movie.

Watch your movie online

After your movie is published on the web, click **Watch online** to watch your movie on the website. You can then send a link to your movie in an email message to friends and family, so they can watch your movie online.

17. 2. VideoPad Video Editor:

For those who have a little bit of experience in video editing and users who are technically able, but new to video editing, VideoPad Video Editor can be their best bet to create movie.

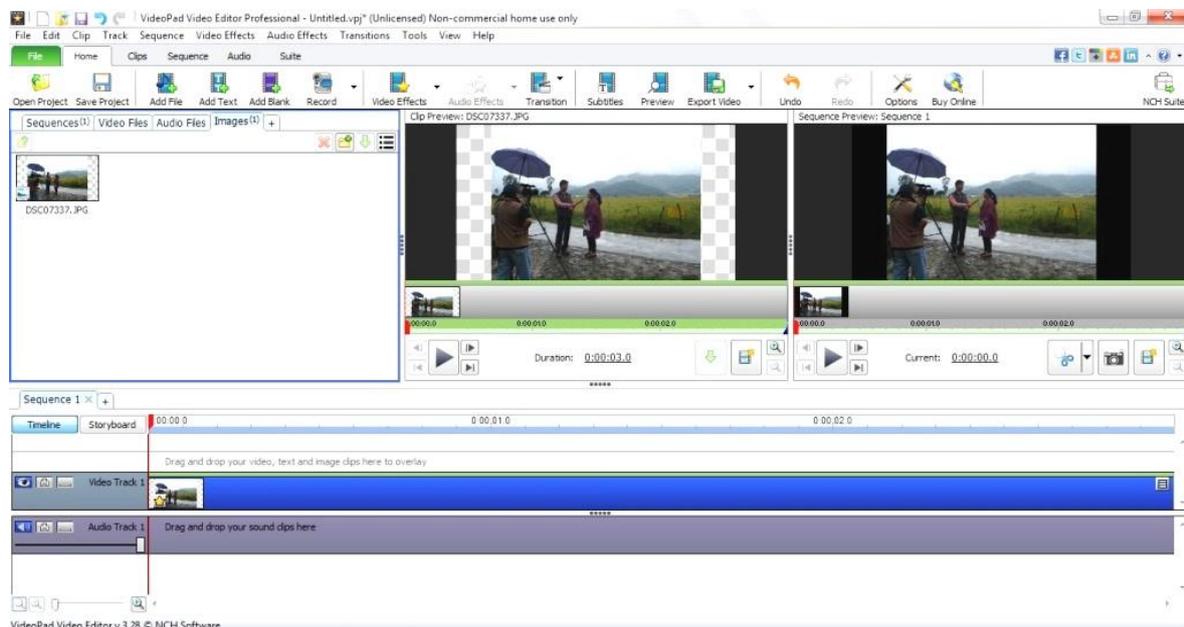


Fig. 2 VideoPad Video Editor

VideoPad Video Editor is simple, easy to use, and though more advanced users will definitely find it too basic, it's just perfect for anyone starting to play around with video compositions. It is developed by NCH Software and it has been designed to be intuitive, easy and fast. It can make a movie in minutes, add transitions and effects from the several options available, and obtain a product

with a professional appearance. It can import pictures or videos and audio, cut, paste, eliminate unwanted parts from the frame, zoom the image, add effects, export, etc. It also provides a visual interface, with drag-and-drop functions that make it easy to use and facilitate the work of an editor. Save time and money that would otherwise cost loads for locations, using Chroma Key tool; and show your final film to your friends through social networks.

VideoPad Video Editor features a complete interface very much in the style of professional editors, with important elements such as a double built-in screen – one to preview selected clips, the other one to preview the complete sequence - and a time line for both the video and the audio tracks. You can also add still images to your composition, either a blank screen or an image. As with any editor, with VideoPad Video Editor you have the option to import and add audio, but the audio-editing tools of this program are especially advanced. You are able to extract an audio track from a video. It includes the free Sound Effect Library, and it works with MixPad Multitrack Recording Software. Regarding the optimization of the display, you can tune up color keys, apply image stabilization and eliminate camera shake, rotate a video, change the speed of video playback, add more effects to the library with VirtualDub plugin support, etc.

When you finish your project, simply click the "Create Movie" button on the interface and you'll be able to export it to a variety of formats. The good thing about VideoPad Video Editor is that it includes a bunch of exporting presets, depending on the platform you are producing the video for: PC, Mac, portable device, mobile phone, etc.

Also, if you get lost at any moment, do not worry. VideoPad Video Editor includes a through help section where you'll find an answer to all your video editing queries.

Some of the characteristics of VideoPad Video Editor are:

- **Capture video from almost any camcorder** - It is compatible with many cameras' software. You can import practically any video file, because VideoPad Video Editor support almost all video formats.
- **Add transitions and effects** - VideoPad Video Editor provides more than fifty customizable transitions and effects to get an expert look
- **Green Screen** - Use the transparency function of Chroma Key and add a virtual backdrop or a scenario
- **Edit 3D videos** - Convert a normal movie to 3D. To export a 3D film, click the Stereoscopic 3D button at the end of editing
- **Share** - Save the video to upload it to YouTube, Facebook, Flickr or another social networking site
- **Export in multiple formats** - Once you have finished your film, export it in HD or a special format to watch it on a mobile device or to upload to the Internet

- **Stabilize videos** - Eliminates effects of camera movement by clicking on the Stabilize Video button

VideoPad Video Editor supports the following formats

Video: AVI, WMV, ASF, MPG, MPEG, MPE, VOB, MOV, 3GP, MP4, M4V, FLV, MKV
 Image: BMP, GIF, JPG, JIF, JPEG, EXIF, PNG, TIF, PSD, TGA
 Audio: WAV, MP3, M4A, OGG, AVI, MID, FLAC, AAC, WMA, AU, OGG, RAW, VOX, CDA, DSS

Pros and Cons of VideoPad Video Editor

Pros

- Very easy to use
- Works with many multimedia formats
- Includes a few video effects

Cons

- Too simple for more advanced users
- Only three transition effects

17. 3. Avidemux

If you need an application for slightly more complex tasks for video editing, Avidemux can be the first choice among open software. This open source tool is perfect for tasks like cutting and encoding and it supports plenty of formats. Best of all, it has lots of information available on its wiki and forum, so even if you do run into problems in the application or want to ask for help from more experienced users, there will be people around to help.



Fig. 3 Avidemux video editor

Avidemux is a free video editor designed for simple cutting, filtering and encoding. It's very flexible, supporting AVI, DVD compatible MPEG files, MP4 and ASF files using a variety of codecs. This means there is no messing around converting it to DV format before you can edit it in a third party editing application.

Avidemux is completely open source and works across platforms, so it is ideal for those that are working on both Macs and PCs. It is written in C++. Avidemux is very powerful and although it is not particularly insightful at first, with trial and error it can be quickly learnt the editing basics.

Avidemux supports the following formats

AVI, MJPEG, MPEG-1, MPEG-2, MPEG-4, NuppelVideo, H263+, MOV, 3GP, Ogg Vorbis, DivX, Xvid, VP3, Huffiyuv, WMV2, H263, MSMP4V2, SVQ3, RAW, RGB, DV, MP2, MP3, AC3, WMA, MP4, PCM

Pros and cons of Avidemux

Pros

- Lightweight and fairly simple
- Handles several different formats

Cons

- May drop frames in certain formats
- Interface is very dated

17. 4. VirtualDub

VirtualDub is a video capture and processing utility licensed under the GNU General Public License (GPL). VirtualDub is free software and hosted on SourceForge.net. It is designed to be a general utility that can trim and clean up video before exporting to tape or processing with another program. It does not possess the editing power of a general-purpose editor such as Adobe Premiere, but is streamlined for fast linear operations over video.

It has batch-processing capabilities for processing large numbers of files, which you can extend with third-party video filters. VirtualDub is best at processing AVI files, although it can read (not write) MPEG-1 and handle BMP image sets.

VirtualDub is not the stylist application on the block, but for fast linear clean-ups of video that will be sent to other programs for editing. It is not the ideal application to make a nice video, but if efficiency and speed are of importance, it is the fantastic choice.

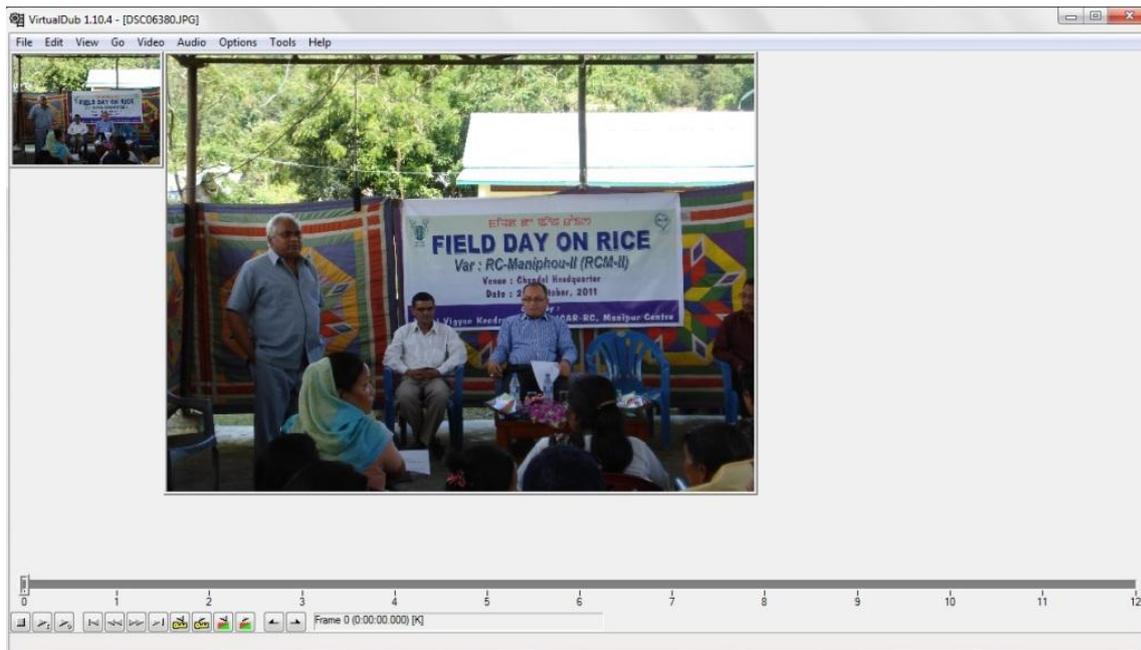


Fig. 4 VitualDub video editor

Pros and cons of VitualDub

Pros

- VirtualDub is the last word on manipulating avi files. It has been the defacto standard of the container for years.

Cons

- Chimps have trouble using some of its features.

17. 5. Videolan Movie Creator

The developers of one of the most popular video players in the world, VLC Media Player, have started a new, promising project: Videolan Movie Creator. VideoLAN Movie Creator (**VLMC**) is a cross-platform, non-linear, video editing software application based on the VLC Media Player.

VideoLAN is a project that develops software for playing video and other media formats across a local area network (LAN). It originally developed two programs for media streaming, VideoLAN Client (VLC) and VideoLAN Server (VLS), but most of the features of VLS have been incorporated into VLC, with the result renamed VLC media player.



The project began as a student endeavor at École Centrale Paris (France), but after releasing the software under the free software/open source GNU General Public License, the project is now multinational with a development team spanning 20 nations.

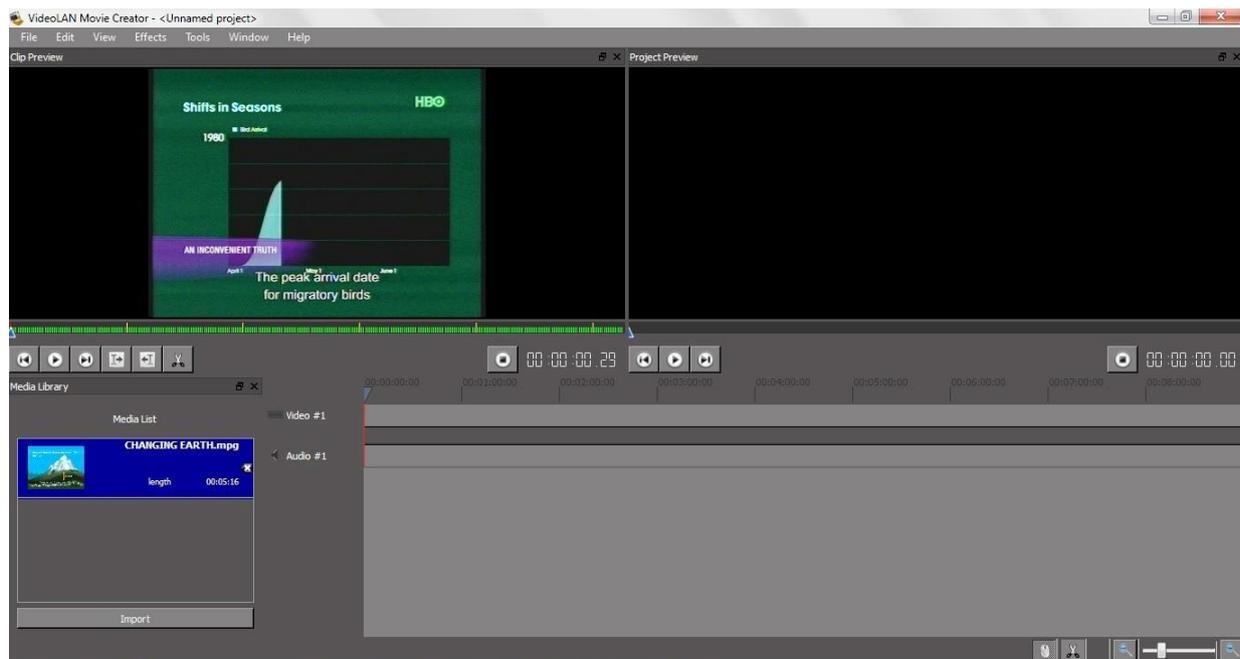


Fig. 5 Videolan Movie Creator

Videolan Movie Creator is still at a very early stage of development and it is promising open software. It is still just a pre-alpha release, with many key features missing and lots of faults. The program is still unstable and faulty as it is still in nascent stage of development. Videolan Movie Creator features a well-designed interface, in black, gray and orange. Also, it includes a wizard that guides how to program and which comes in especially handy when creating the first project. Managing media in Videolan Movie Creator is really simple. It has the typical dual-screen interface featured in many video editors, and a timeline at the bottom. All it needs to do is drag and drop the media there and then. It can be arranged in any way you want - cut it into fragments, add effects as you like. However, users are cautioned that it is a pre-alpha release and it is to be used at their own risk. It is really meant for tech savvies who want to test the latest developing open source software.

Videolan Movie Creator is still in development stage, but it is a very promising tool that will hopefully turn into a simple, powerful video editor.

Pros and cons of Videolan Movie Creator

Pros

- Works with images, videos and audio
- Includes a wizard to get you started
- Pretty simple to use

Cons

- Very unstable and buggy

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An introduction of Graphic designing

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18.1 OVERVIEW:

Creativity and design are important features of a well-developed knowledge system. Design transforms creative ideas into new products, services and systems. Design links creativity to innovation and has the potential to substantially improve brand image, sales and profitability of an organization. The measurement of creativity and design is hampered by a lack of quantitative indicators which directly measure performance and we have to rely on proxy indicators, which only indirectly measure performance in creativity and design.

The quality of the educational system, the desire of people to express them artistically and the openness of a society towards different cultures determine the creative climate in a country. The analysis confirms that a favorable creative climate has a positive effect on the creativity of a country. A more favorable creative climate results in more ideas and more creativity, which in turn increases Research & Development (R&D) and design activities. R&D and design not only develop new ideas but also shape them into commercially attractive new products and processes, thus increasing innovation. Creative education shows the strongest relation to innovation. Policies aimed at improving levels of educational attainment and creative thinking in education will have a positive effect on an innovative performance.

Graphic design can assist to achieve a visual impact that meets communication objectives. A successful graphic design comes from an effective working between creative ideas and innovation.

KEYWORDS: Graphic design, effective communication tool. Visualization, images, creativity

18.2 INTRODUCTION:

In recent years the scope of graphic design has extended rapidly into new areas. The social and humanitarian benefits of design paved the way towards a new kind of practice shaped around socially responsible behavior.

These new dimensions of graphic design assigned newer responsibilities to designers who play an important role as the new agents of change. Modern day designers try to create something new for the world by using creativity and at the same time demonstrate their enthusiasm towards social awareness; it may be agricultural sector to corporate world.

Graphic Design has always played a crucial role in shaping the cultural identity, social structure, economy, cultural development and environment of a society. It touches many individuals on a daily basis and encompasses a variety of disciplines. One would see from architecture to communication, engineering to agriculture graphic designing is playing a significant role.

It is observed that ever since the industrial revolution, design has taken a primary role in modern societies. It attempts to shape a better life for people and refine information and technology. Everything we use and experience today from a newspaper to a food product has been conceived by a designer.

18.3 GRAPHICS DESIGN: Graphic design is the art of communication that combines images, words, and ideas to convey information to an audience. The field is also often erroneously referred to as Visual Communication or Communication Design due to overlapping skills involved. Graphic designers use various methods to create and combine words, symbols, and images to create a visual representation of ideas and messages. A graphic designer may use a combination of typography,

visual arts and page layout techniques to produce a final result. Graphic design often refers to both the process (designing) by which the communication is created and the products (designs) which are generated.

Common uses of graphic design include identity (logos and branding), publications (magazines, newspapers and books), print advertisements, posters, billboards, brochure, leaflet, website graphics and elements, signs and product packaging. Through using various mediums of graphic design effective communication can be achieved. For example an illiterate farmer is certain to miss out on the information that- over uses of pesticides is harmful if the material is in written form only. But if one prepares the same material is in audio/visual form in their own language, they are going to enrich with the information.

18.3.1 WAYS OF SEEING

- 1.**Perception-** Interpret our unique experience of the world through our five senses (memory and sensation).
- 2.**Visualization** – A journey we can follow in our minds through mental images.
- 3.**Imagination** - The ability to see images in the form of dreams, fantasies, fairy tales and or ideas.

18.3.2 FORCES BEHIND CREATIVITY

- 1.**Inspiration:** is that creative fire which offers light, energy and a source of excitement
- 2.**Motivation:** is the immobilizing energy which moves you to reach a desired goal
- 3.**Frustration:** a feeling of disorganization which can be positively refocused into a creative solution
- 4.**Intuition:** an immediate sensation of an answer, a feeling or a direction (hunch)
- 5.**Curiosity:** is an eagerness to question further, and to explore beyond the initial idea

18.4 THE ROLE OF GRAPHIC DESIGNERS: The graphic designer or design team can contribute to the development of an educational multimedia project in three major areas: (i) developing a visual concept, (ii) developing effective visual communication, and (iii) developing conceptual ideas. Graphic designers can draw on techniques used in traditional graphic field in each of these areas.

18.4.1 DEVELOPING A VISUAL CONCEPT: The development of visual concepts has always been a part of traditional print-based graphic design (Lawson, 1990). It involves the graphic designer or team coming up with screen designs that organize and clearly present content to maximize users' understanding. In addition the design team attempts to develop a visual concept that is stimulating and appealing to the specific target audience. As Phillips (1996) says “graphic design or screen design provides the visual communication necessary to transmit a message in an attractive way”. Traditional graphic design frameworks have changed to accommodate the unique requirements of designing educational multimedia (Zeldman, 2001). These new requirements include working with programmers and information technology delivery experts to determine technical considerations that may impact on the graphic design. Programmers help to define the technical boundaries of an educational multimedia project. For example, an Internet-based project may have bandwidth limitations that may affect choices regarding the use of graphics and embedded objects. The designer may be required to restrict their use of large file-size graphics and embedded objects such as QuickTime and Shockwave. Similarly, graphic designers must learn to work with instructional designers, a role not often found in traditional design studios but often found in educational multimedia production. The instructional designer is responsible for developing the macro structure of the program and also must work with the graphic designer to ensure the concept, as determined by the content provider, is effectively displayed on-screen.

18.4.2 VISUAL COMMUNICATION: The visual communication choices of multimedia graphic designers are affected by the technical specifications of computer screens. Graphic designers must learn to create clear or “clean” layouts within the tight confines of a computer screen as well as contend with the low resolution of computer screens compared with printed media (Phillips, 1996;

Boyle, 1997). One example in this area is the use of on-screen text by graphic designers. Researchers have reported that users find reading from a screen more difficult than reading from printed material (Zeldman, 2001). Improving the on-screen readability of text is one of the primary ways in which graphic designers can enhance a project. Techniques to assist users with readability include, using short lines of text (8-10 words), “chunking” text into blocks on the screen, presenting topical blocks of text over a number of screens and maximizing the contrast between the background and the text.

18.4.3 CONCEPTUAL DESIGN: The graphic design field has always placed great emphasis on providing creative solutions to practical and conceptual problems. In the design of educational multimedia, the client or content expert will often present a practical or conceptual problem to the development team. In an educational context, this may be a concept students traditionally have trouble understanding or a practical problem associated with simultaneously providing students with access to a wide array of information.

18.5 WHAT DO GRAPHIC DESIGNERS DO?

1. Plan
2. Analyze
3. Create visual solutions to communication problems.
4. Decide the most effective way of getting a message across in print, electronic, and film media using a variety of methods such as color, type, illustration, photography, animation, and various print and layout techniques.
5. Develop the overall layout and production design of magazines, newspapers, journals, corporate reports, and other publications.
6. Produce promotional displays, packaging, and marketing brochures for products and services, design distinctive logos for products and businesses, and develop signs and signage systems—called environmental graphics—for business and government.
7. Develop material for Internet Web pages, interactive media, leaflets and multimedia projects.

18.6 THE IMPORTANCE OF GRAPHIC DESIGN:

Through graphic design often professionals across messages of social importance in a lucid but effective manner. They create these messages in an imaginative way and bring out a change in the way we see a problem in the society.

Graphic Design is something which drives advertising, knowledge and attracts us to share. That is why it is said Graphic Design is so important to our everyday lives. Graphic designs are present everywhere to be found be it newspaper, magazines, Packaging, branding, websites, posters, books, farm to food etc.

Graphic Design gives a face and visual presentation that just by looking at it; we have a feeling and mental positioning in mind on the product. As we talk of the world becoming a global village the need for eye catching graphics becomes more and more valuable to a knowledge sharing system. The need of the hour is mind boggling graphics with simpler message.

The strong meaning of graphic stimulates a person to reach for the product or feel drawn to it or to immediately decide it's an inferior product and has no use for it.

A strong graphic design conveys a message that one is creative and should be taken seriously. A strong corporate identity along with professionalism is also visible with strong and rational graphic design.

A large percentage of people remember what they see and a creative and strong design by virtue of being a creative and strong design brings out that necessary quality into the design and people tend to remember that for a quite a long time. In agricultural sector, it is more effective to teach farmers through graphic design like brochure, leaflet etc. Preparation.

A creative and innovative design helps an organization stand out from its competitors. This can be done through all visual avenues. Business owner's especially educators' need to realize the value of graphic design and the impact it can have on the society. Graphic Design done by a professional will attract the target group and increase the benefit of the respective organization.

18.7 THE MOST USED GRAPHIC DESIGN PROGRAMS: Graphic design today is completely based on digital platform. Most designers are familiar with a variety of graphic design programs, such as Photoshop, Illustrator and other design related software's.

Each graphic design program has its own purpose, such as photo editing, 3D graphics, vector graphics, or raster graphics. Thus, designers have to have working knowledge of a variety of tools in order to succeed.

The list of the top graphic design programs. Most of the graphic design software's in this list are free.

Adobe Photoshop: The go-to design program, Photoshop is a versatile (albeit expensive) tool to handle most of your design needs.

Maxon Cinema 4D Studio: Possibly the easiest to use full-fledged 3D program, Cinema4D is a popular 3D package for designers.

Adobe Illustrator: Illustrator's niche is with lossless vector graphics, such as logos and illustrations, which makes it a must-have program for a designer.

Corel Draw Graphic Suite: A bit different from Photoshop or Paint Shop Prop, Corel Draw provides digital art capabilities for a lower cost than Adobe products.

Autodesk Maya: Maya is the ultimate in 3D and animation software. Despite a steep learning curve, it has found a home for Hollywood VFX and in design projects as well.

Xara Designer Pro: Xara Designer is another design package that provides various graphics editing capabilities.

3d Studio Max: 3d Studio Max is like Maya Lite. It is easier to use and more commonly used by designers, but still is challenging and a lot of fun to use.

Gimp: Gimp is a free but powerful graphic design program that is like a free version of Photoshop.

Adobe InDesign: Adobe InDesign is a bit like Microsoft Publisher, except with Adobe's integrated graphics platform.

Blender: Like Gimp, Blender is a free alternative, although Blender is for 3D graphics.

Google SketchUp: Sketchup is an awesome tool from Google that allows for quick 3D modeling and architectural visualization.

Adobe Lightroom: Lightroom is an awesome photo editing utility used by photographers and designers to modify the visual profiles of images.

Autodesk AutoCAD: AutoCAD is a bit more technical than other 3D programs, but you'll still find it used by designers for various purposes.

Serif Photoplus: Photoplus is another photo editing utility that allows for editing of pictures in a flash

Canvas: Canvas is another technical 3D program that is an alternative to AutoCAD that you may find used by technical illustrators.

Adobe After Effects: Adobe After Effects is a visual effects package that can be used to create some great visual effects for design projects.

DAZ Studio: DAZ Studio is a great 3D program that is user friendly but powerful as well.

Adobe PageMaker: Pagemaker is an Adobe product similar to in Design and Microsoft Publisher.

PaintShop Pro X4: Paintshop Pro is a mix between Gimp and Photoshop, providing the features of Photoshop with a lower cost.

SmithMicro Poser: Poser is a great 3D program for rendering character bases for design projects.

18.8 GRAPHICS DESIGNING CAN HELP PEOPLE WITH LEARNING DISABILITY:

Having a learning disability can greatly affect people development in terms of coping with mentally. Although this term refers to a very broad variation of disabilities, a higher number of people find it difficult to read and write. However, this does not mean that the process of learning should stop for them. It is important to note that these people require extra special attention in order for them to continually learn and develop their skills.

The use of graphics designing has become increasingly popular when teaching or communicating with this group. Despite their learning disability, they are able to learn how to read and write. Graphics designing or visualization uses visual diagrams and images that are presented in papers, thus making it easier for the people to see and understand. It can also be by means of videos (collection of images).

These materials have been proven to be greatly helpful and effective to maximize the people's potentials and learning abilities.

We can also make it fun and interesting for them by simply using catchy materials that would make them feel like watching. Some experts use cartoon books since it is easily recognized and very popular among them. And because of their learning disability, it is understandable that too much information may just be hard for them to absorb, which is why patience is a very essential character that an expert should possess. But this does not mean that we should treat them differently. It is a matter of treating them special without them having to feel like they are different.

18.9 GRAPHIC DESIGN AND ITS IMPACT ON THE SOCIETY: We may be surprised to find examples of design surrounding us almost anywhere. Understanding exactly what graphic design is may change your interpretation of how design can benefit us or the target group.

Graphic design is the most pervasive art in our world today. It is spread throughout the branches of almost every entity of our lives. Simply put, designer and columnist Jessica Helfand said, "graphic design touches everything we do... it is the art of visualizing ideas." In order to fully understand this statement, we must stray from the normal realm of what you feel is art.

Take a look at the book sitting beside, the empty beverage can on our desk, the website we are browsing or the billboard we drive past every morning. All of these items have been carefully and thoughtfully executed by a graphic designer. Designers of all forms are collaborators and problem solvers charged with choosing and executing the best solution possible and with that, achieving progress.

Sometimes that progress is a boost in sales or sometimes it is just to make an idea or concept understood. If consumers react to the solution (ie. an intriguing book cover, a tempting soda can, an easily navigated and aesthetically appealing website, or a enticing billboard), then the designer has made a step in the right direction towards achieving progress.

Graphic design has a big influence on what people decides to do - what products they buy, what shops they go into, etc. If one think about it, if something doesn't hold any appeal one doesn't normally buy it or even look at it again. Trends in culture are reflected in graphic design because to make a product successful, it has to appeal to the people. To appeal to the people, the product has to reflect the current factors that most appeal to everyone.

So, graphic design both creates trends in society and reflects them. Media plays a significant role in human life, seeing as we are very visual beings. Thus, the media allows people to be shaped by graphic design. Then there's the whole other thing with graphic design and how it can be manipulated to reach separate groups of people. That's a whole different question though.

18.10 DISADVANTAGE OF GRAPHIC DESIGN: Graphic design is seen as a skill in today's world because it is creating art on the computer. One designer needs to know how to manipulate and use programs like adobe photoshop, paint shop pro, adobe photo elements and more. The disadvantage is that less and less people are now engaged in traditional way of drawing by using traditional tools like pencil and paper. This causes people not to be as skilled in traditional artworks as they used to be. Being able to draw and paint is important to graphic design, because if one can draw by hand one can easily capture drawn designs and convert them into digital media. Also, with traditional works one is creating the artwork and not manipulating the computer to create art. In the end of the day graphic design is the artwork that one manipulated the computer to make, and therefore is not as valuable in relation to traditional work.

18.11 ROOM FOR IMPROVEMENT: WHAT NEXT FOR GRAPHIC DESIGNERS: In order to promote the expansion of graphic design beyond conventional frames of reference as well as help maintain the international discourse of design and its role in socio-cultural development, graphic

designers and other related organizations have to learn, promote, network and collaborate. Here are ten recommendations to achieve socially responsible design:

1. Build experience around the needs of people living in different contexts;
2. Network with international organizations and corporations in order to demonstrate the value of design;
3. Participate in multidisciplinary initiatives in which designers have a critical role to play in the development of entrepreneurship and innovation;
4. Work on publications, events, exhibitions and competitions on design in collaboration with design bodies from different continents showcasing international design works and initiatives for cultural development;
5. Advocate the power of graphic design in a cultural context by organizing workshops and seminars and by encouraging cross-cultural design activities;
6. Study the quality standard of design education across the world and help develop design curricula for the developing world;
7. Learn from professional organizations that can provide expertise, knowledge, guidance, contacts and ensure an international perspective and representation of design;
8. Enable a open sources of information on design methodologies in partnership with public/private partners worldwide;
9. Provide new platforms where individuals and professional organizations can share best practices and create opportunities for designers to work together internationally;
10. Knock on doors that have never been opened.

18.12 EFFECTIVE COMMUNICATION FOR KVK SYSTEM: Graphic designing is an essential subject in emergent societies. The deliberations at various places in the third world and elsewhere prove that communication should be treated as a vital part of the total development process. Knowledge expansion, information technology and information dissemination are the three very important dimensions of any development systems be it agriculture, industry or whatever. Graphic designing such as brochure, leaflet, cover-page, banner, flex etc. has influenced the quality of extension work. Graphic design which encompasses all the traditional forms of communication like – graphics, text etc, is an excellent tool for extension communication in KVKs.

Each learning task is most effectively taught through the optimum usage of relevant media. Graphic designing refers to a combination of text, data, photographs and image processing. Using the Graphic designing tools- such as images, any participant can facilitate better message to the farming community.

It informs, educates, persuades and entertains us with dazzling pictures, compiling clipart and raw textual information. We can electrify the thought and action centers of farmer's minds. The technologies developed within the four walls of laboratories and research field, must reach the farmers at the earliest to speed up the process of transfer of technology amongst the farmers in the KVK system.

The importance of information dissemination in promoting agriculture and rural development is widely recognized. India has potential to encourage the use of high-level information technology such as graphic designing. Impact of graphic designing on extension services promoted a variety of technologies in various regions in the country.

The use of graphic design as a training tool is advantageous to turn agriculture into industry and enhance turnover, reducing training costs and improving confidence of an employee. It also increases the efficiency and effectiveness of training programs and reduces the cost of delivery of information.

The graphic design technology could function in the field of agricultural extension in the following areas which may include a range of media technologies, including text, diagrams, pictures and

cartoons. Graphic design can be used to present the subject matter in an interesting, interactive and effective format. Through graphic designing effective monitoring and management is possible.

Various agriculture related solutions can also be depicted using figures, photographs or pictures. Using a chat room, crop pest specialists can be consulted.

Quality of extension material and process can be supplemented time to time by graphic designing. Government policies and other related circular and announcements from government can be made available to farmers and extension workers from time to time with the use of graphic designing.

The information on weather parameters, cropping systems availability of high yielding varieties, irrigation, fertilizer management, IPM etc. can be made available to farmers using graphic designing (in website also) and convince them easily. Graphic designing offers immense potential today as well as for the future and it will help extension worker and scientist to integrate modeling, visualization and decision making processes associated with farming systems. This will definitely accelerate development in the field of agricultural extension and ultimately farmers of the country will be able to harvest the benefits at the desired level.

18.13 THE FUTURE OF GRAPHIC DESIGN: Design is constantly changing to reflect the ever-changing technology around us. It tends to go through cycles of being simple, to being complex, to being simple again – and right now, graphic design is shifting away from a simple, clean Swiss style, to a rather more complex and creative vintage style, embracing handwritten fonts and vintage tones and textures. Graphic design is now becoming more about true, traditional graphic design which focuses on accurately conveying the message, but in a much more creative way than ever before.

Overall, graphic design is moving toward a traditional set of principles. Design should easily convey the brand message in a clear cut way – but with a touch of added creativity with the use of a handwritten font, geometric shape or unexpected arrangement of data. Make the designs easily recognizable yet creative and we'll be on the right track – and perhaps we'll even create the design of the future.

18.14 CONCLUSION: Graphic designing has brought a drastic change in the field of communication. It has made a message simpler and lucid. Graphic designing has big influence on how we see some product and choose to be part of that product or solution. Graphic designing is an extremely creative work and it creates powerful images or impressions on what people would like to choose, whom to choose and whatever they adopt.

The influence of Graphic design is so much so that it plays a role in behaviour change as well as helping people with different strata of society. The good thing about Graphic design is that it is impacting all classes of the society from farmers to business community.

Over the period of time graphic design has found new ways to help different strata of people and one such community is- farming community. Graphic designing has paved way new ideas, patterns and models in agriculture and that has brought sea changes the way farming is done today.

A good design must include contemporary factors that appeal to the individuals and also the specific target groups.

Therefore, graphic design consciously tries to solve all those problems and fulfills our dreams and aspirations by giving shape to creative ideas.

Like in many other spheres of human activity, Graphic Design has solved myriad problems of farming related issues. By using modern tools Graphic design has transferred new logistics to the farming community.

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INFORMATION AND COMMUNICATION TECHNOLOGY

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19.1 OVERVIEW

- INTRODUCTION
- INFORMATION AND COMMUNICATION TECHNOLOGY- A SYSTEM AND ITS COMPONENTS
- WHAT FUNCTION DOES ICT SERVE?
- CONCLUSION

19.2 INTRODUCTION:

Today, Information and Communication Technology is the need and talk of every academician or an aspirant. Gone are the days of Stone Age, Iron Age, Copper Age and other materialistic age. Now we are in the age of Information Technology. Every individual and almost all fields of endeavour such as education, manufacturing, research, games, entertainment, and business treat information systems as a vital need of the hour. Indeed, every activity in our daily life today requires people to get involved in the use of information systems. Right from the morning awakening alarm tone to goodnight's reminder tone, one is surrounded and dependent on IT gadgets. An efficient and effective ICT structure reflects professionalism, compliance, fairness, reliability and transparency in any organization. To achieve this, ICT requires considerable attention. The success of an organization is completely dependent on the availability of local ICT infrastructure, availability of trained staff and service facility. Managers of any organization are directly affected in management due to lack of computing/computer resources, use of older technologies (i.e., hardware, software, communication, etc.), by limited management information, lack of operational information, Untimely information, lack of software features, functions and capabilities, High data processing etc. which results in progress stagnation. Today, the mobile revolution is empowering people in developing countries by delivering ICT applications in education, health, government, banking, environment and business. In order to provide information at a very high speed at any time and at any place, one needs a communication network and media. These are internet, telephone, mobile phone, TV, radio and office automation systems such as word-processing, fax, audio conferencing, video conferencing, computer conferencing, multimedia, etc, through the use of networks of satellite and fiber optics.



19.2. 2. INFORMATION AND COMMUNICATION TECHNOLOGY- A SYSTEM AND ITS COMPONENTS

A system is a set of related components, which process input data and bring out the input data after processing as output to form Information. Every system requires a form of data input. For example, an automated weather station may require date or time as data to forecast weather, ATM machine requires PIN number as data, a xerox machine or a fax machine accepts data when you select the start buttons. They process the inputs and produce their respective outputs. In an information system, input data consist of facts and figures, which form the system's raw material. Information is data that has been usefully processed. However, an information system does not only contain data and information. There are also other elements inside the system, which are related and are in support of one another. The presence of these related elements makes information more useful whereby, it can be made available, can be processed, distributed, manipulated, saved and so on. This combination gives rise to a system called an "Information System".

19.2.1 DIFFERENT COMPONENTS OF INFORMATION SYSTEM

Processing is an activity performed by different components of Information system to convert data into meaningful information. This art of converting data into information is called a process. The main components of Information system are- the hardware, software, data, process and human which are inter-related and are in support of one another in processing data to bring out fruitful information.

19.2.2 Hardware

Information system's hardware refers to all types of hardware and the media used for input, processing, managing, distributing and saving information that are being used in an organisation.

Examples of the hardware are the physical computers parts (i.e. processors, memories, monitors, keyboards, mouse etc.), networks, communication equipment, scanners, digital drives, barcode readers, etc.

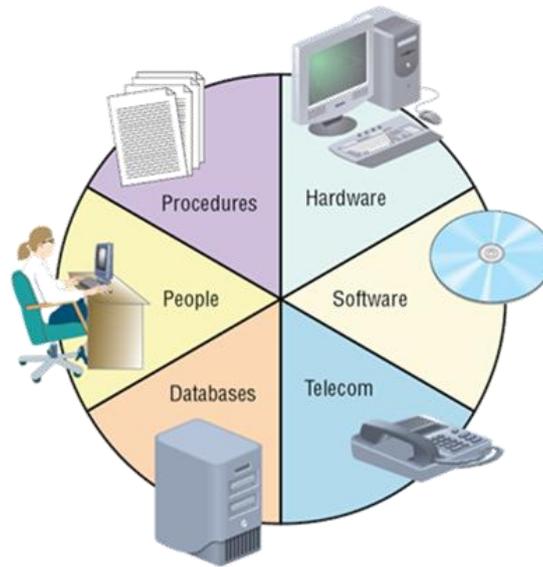


Fig. 2 : Hardware components of Information system

Input devices for giving data input to the system comprises of keyboard, mouse, pointer, screen, touch ball and scanner. For processing or operating the computer system is the Central processing unit and memory. Output devices for displaying results or output which are generated from the computer system are screen (Monitor/VDU), microphone and printer. Storage devices for storing data inside computer are hard disk, floppy disk, CD-ROM, magnetic tape, pendrive, memory card etc. Computers can be turned into useful tools if known to exploit them. To enable computers to function more effectively and to diversify their functions, one needs the communication network to connect several computers together. The network provides the hardware support to enable communication to be established among each other. The communication network includes modems, hubs, cables and other devices.

- Software

Software consists of two categories -the system software and the application software.

- System Software controls the computer and contains the operating system and device drivers, which can communicate with the hardware. It can also modify data into a new form, prevent viruses and make copies.



Fig. 3 System software of ICT gadgets.

- Application Software contains programs which can help users and enable companies to perform business functions. Users can increase productivity with the presence of application software such as spreadsheets, word processing, ordering systems, and accounts receivable.



Fig. 4 Application software of ICT gadgets.

- **Data**
Data refers to the raw facts on anything or entities like student names, courses and marks. The raw data that has not yet been provided can be processed to become more useful information. Information is an organised, meaningful and useful interpretation of data such as a company's performances or a student's academic performance. Information systems change data into information, which is useful and capable of giving a certain meaning to its users.

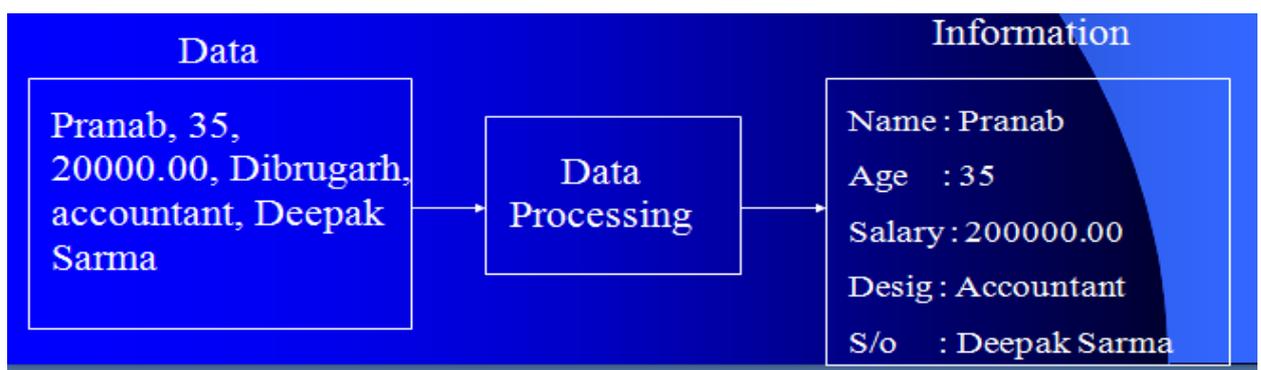


Fig. 5 : Differences between data and information Process

After going through processes such as addition, ordering, combining, manipulating and so on, many kinds of information can be produced. The information generated is not limited to a certain form. It can be interpreted in many ways according to the needs and wills as desired.

- **Process**

Process or procedure explains the activities carried out by users, managers and staff. Process is important for supporting a certain business model available as written documents or as reference materials on-line. The procedure for using a certain matter is very wide and very important to ensure that it can be implemented with success. All the information system components contain management and implementation procedures on their own, and they are different from each other.

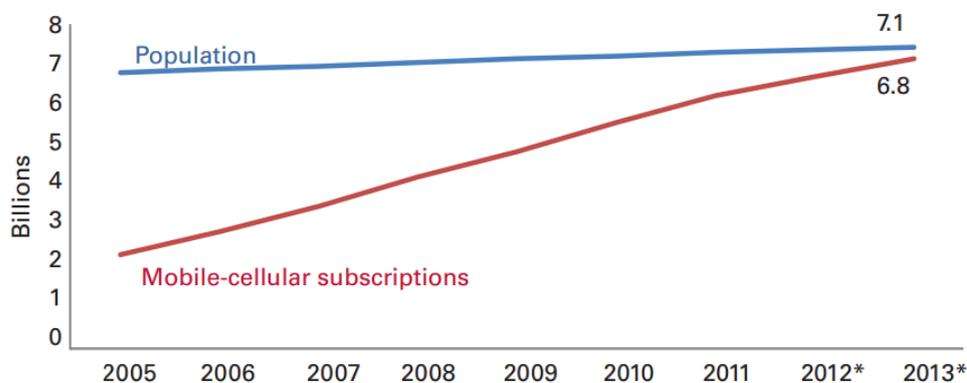
- **Human**

The main objective of an information system is to provide invaluable information to managers and users, whether inside or outside the company. Users can be broken up into three categories, which are: End-Users, consisting of the staff, customers, suppliers and others who communicate with the information system. Internal Users, including the managers, technicians, sales representatives and corporate officers. External Users, consisting of the customers who use the company's system for performing transactions, suppliers who use the system for planning sales, and the staff who use the system outside office hours. The success or failure of an information system depends on whether the System that has been developed can fulfill the user's requirements, and the users feel satisfied with the results and the system's operation. A successful system requires integrated efforts from information technology experts such as the system analysts, programmers and the information technology managers so as to fulfill business needs and to support company's objectives. Processes are orderly steps, which need to be followed and implemented in order to get a certain decision on a certain matter within a time frame.

19. 3. WHAT FUNCTION DOES ICT SERVE? Every organization has information processing and communication requirements. The efficiency of the organization depends on how the organization has optimized its information processing system. The use of ICT processes allows an organization to continuously monitor its developments and helps to evaluate the need to change in right hour in positive direction. In the current environment of continuous development in the ICT sector, agencies are tempted to opt for technologies that look very fashionable and optimized. Investment in ICT technology will be smart in keeping agency to right strategy. Every company today use information as a basis to increase productivity, produce quality products, provide quality services and create customer confidence by making timely decision. As such, Information technology has become the prime reason for the success and failure of a company to compete in business. The whole world is now a village through the effective use of ICT. In most developing countries, access to ICT based information is very limited and its implementation is the most vital task of the nation. ICT Organizes and processes the data of an organisation to provide useful information. These can be communicated for effective use and real time decision-making. Information about cyclones, weather, health, business, education, and jobs is now provided from an e-community centre based on ICT. News services and the mass media are making themselves available so that people access them when they want and wherever they are. The socio-economic conditions of many developing countries have been improving very quickly through application of modern ICT, and through the creation of various categories of skills in this field. Data and information of different sectors in all ministries may be processed/stored/exchanged using e-government and e-governance based on ICT. Information on any disasters or any sort of epidemic like Cyclone, tornados, twisters, landslides alert is being implemented through ICT. The loss in lives would have been many times more if warning signals is not being received in time through ICT based systems. Prime areas where ICT is implemented are education, health, agriculture, commerce, industry and family planning. One of the application area of ICT is poverty elimination of the people in rural areas by providing necessary information about work, business, selling of goods, providing knowledge about prices and availability of daily necessary items for survival, health care, food, shelter, education etc. Most of the farmers, fishermen and

businessmen are being directly or indirectly involved in ICT systems. Through e-community center poor people are able access ICT resources and are able to share global resources. Another major application of ICT based systems is outsourcing work. Many developed companies run their organisations by using people situated in different countries in the world with less payment. The government has e-government and e-governance through ICT. Nowadays, there are digital markets for on-line shopping. India needs about 50,000 ICT workers per year. On-line education system and distance education system has tremendously improved by ICT enabled devices for aged people, house- wives, people who did not have the opportunity of education in time, and people who want to build career in new fields. Now students are able to attend on-line virtual classes, lectures based on multimedia system at any moment. One teacher is able to teach a very large number of students on-line, and they can access lectures at any time from any place. Examinations are held on-line where examinee answers questions within a fixed time. This on-line system is very popular all over the world. Printing materials, lectures in CDs, and TV and radio are OK for distance learning, but without on-line exam systems it is difficult to examine the learners.

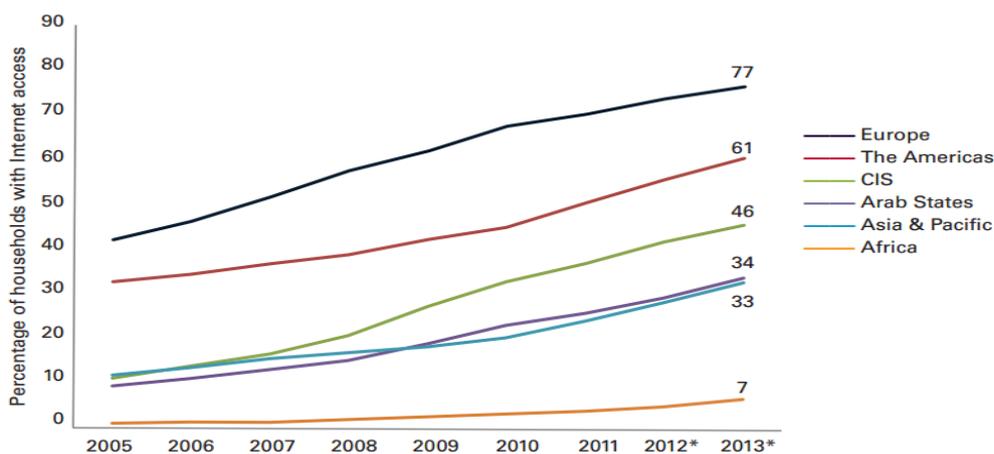
Fig. 6 : Mobile-Cellular Subscriptions of the World



Source: ITU World Telecommunication /ICT Indicators database

In 2013, there were almost as many mobile-cellular subscriptions as people in the world, with more than half in the Asia-Pacific region (3.5 billion out of 6.8 billion total subscriptions). 2.7 billion people – almost 40% of the world’s population – are online. In the developing world, 31% of the population is online, compared with 77% in the developed world. Europe is the region with the highest Internet penetration rate in the world (75%), followed by the Americas (61%). Europe and Africa are the regions with the highest and the lowest levels of household Internet penetration respectively: 77% in Europe, compared with 7% in Africa.

Fig. 7 : Households with Internet access, by region



Source: ITU World Telecommunication /ICT Indicators database

19.4. CONCLUSION

Business firms invest heavily in information systems to achieve their strategic business objectives. Operational excellence is achieved efficiently, increase in productivity and improved changes in business practices and management behavior is brought together with ICT. Information systems and technologies create opportunities for products, services, and new ways to engage in company produces, deliver and sell product or service to create wealth. Without accurate and timely information, business managers must make decisions based on forecasts, best guesses, and luck, a process that results in over and under-production of goods, raising costs, and the loss of customers. ICT helps in Implementing effective and efficient information systems can allow a company to charge less for superior products, adding up to higher sales and profits than their competitors. Information technology is one of the many tools used by management to cope with change. The Internet is the world's largest and most widely used network. The Internet is a global network that uses universal technology standards to connect many private and public networks. Every organisation needs to be aware and conscious of development, especially in the fields of computing and information technology, to ensure that they would not be left behind and fail in the competition to move forward. Nowadays, in most of the technical/technological aspects one depends on foreign experts. They don't want to transfer the technology so easily. It should be the policy of government to implement modern ICT in all sectors by joint foreign collaboration so that our young people can be directly involved in technology. ICT education is a must at school level up to university level. Indulging different categories of skilled persons for implementing ICT must be primary task of every sector for its success. Peering into the current scenario, survival of any individual, agency, business etc. without the aid of Information and Communication Technology cannot be thought off.

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Scope of ICTs in Agriculture

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Overview

- **Introduction**
- **Constraints in application of ICTs in Agriculture**
- **Technologies that can help in development of Agriculture**
- **Concluding remarks**

20.1 Introduction

IT has changed the world in every aspect, making jobs faster and easier, making things possible that were once thought impossible. In Agriculture ICTs has already proven to be a great aid in knowledge dissemination and better & faster communication. Implementing computers directly into the field is a bit difficult and has fewer scopes. But it can help researchers, specialists and Agricultural organizations which will in turn help the farmers.

20.2 Constraints in application of ICTs in Agriculture

There are numerous technologies that may help in many aspects of Agriculture. But certain constraints have been restricting the progress. Some of them are:

1. Lack of IT literacy among agriculture experts, which is likely to perish with the coming generation.
2. Absence of IT experts or department dedicated to research and find scope of IT based technology in agriculture. A bunch of experts or a department dedicated to Research and Development (R&D) could have done wonders. And I am sure such steps would be taken in future or is already thought of as the need will be felt soon.
3. Reluctance for a change, a common human behavior which is obstructing the development. Existence of such attitude among top level managers or the decision makers can bar such a scope of development.

Implementation of computers in agriculture to a great extent is eminent but earlier the better.

1.3 Technologies that can help in development of Agriculture

20.3.1 Cloud Computing:

Simplest definition to Cloud Computing is that, Cloud computing is a system where Computers (Laptops, PCs, Tablet PCs, Smartphones etc.) are connected by a network (which may be a private one or The Internet) so as to use files, applications or some other services.

Such a service would have been very fruitful. How? Let us list out some stuff that we need:

1. **A database of farmers in the country.** Needless to mention the importance of such a database. Uses of such a database would be countless.
2. **A database of Trainings, OFTs, FLDs and Awareness programmes being conducted.** Such a database can help us assess numerous facts and help in decision making e.g. which areas are being left out and reach them.
3. **WIKI for researchers and specialists.** WIKI is somewhere you can post your articles and some other may refine it. This may help agriculture specialists and student keep track of improvements in technologies and gather information by surfing through the articles.
4. **A user friendly Package of practice** that is searchable and readable to the farmers with pictorial presentations.
5. **Video library of tutorials/demonstrations** (including use of farm machineries) for farmers and students.
6. **Video library of Lectures for students.** Lectures of experts from all disciplines whether it is History or Literature, Computer Science or Aeronautical engineering its available on the internet, why not Agriculture.
7. **Source of District and Village level contingency plans and up to date weather related contingency steps.**
8. **A news portal** of all agricultural news like recent developments, indigenous technologies, researches, best practices, success stories, marketing, govt. schemes etc. to help aspiring students, experts and famers have up to date information and take advantage of it.

Now let us put it all together. All the above services can be made available through one website or a smartphone app. Websites can be opened on any platform with any operating system whether it is Windows, Linux or Machintosh. Applications for mobile platforms like windows, android and iOS can also be built to provide all these services under one roof.

1.3.2 GIS Maps exclusively for specialists is a need today. Just like Google maps we need GIS maps exclusively for specialists. Apart from streets Google maps contains information like locations of restaurants, shops, schools, briefly any organization but we need a map that contains data like Soil type, population of farmers, crops grown, water bodies, land type etc. which will aid the specialist in decision making.

1.3.3 Video conferencing is a technology that must be used to avoid all constraints for which regular meetings are being avoided, which is very important to formulate plans and even presentations.

1.3.4 Control engineering & Robotics is a field where we must invest on. Controller driven machines can almost eliminate the need of skilled laborers. Skilled laborers are pretty hard to find these days, for which farmers are opting for other ways of livelihood. To meet this issue farm implements are being innovated, but it is time to think beyond that. Now, what is a controller? Well, controllers are a bunch of micro chips that are programmed(instructed) to control some other device. For example, inexpensive remote controlled toy cars. These cars have complicated chips programmed in it so that the Kids may redirect the car at any moment in any direction with simple

press of buttons or movement of a joystick. Such controllers should be implemented in tractors, seed drills and transplanters etc. to perform these tasks with simple press of buttons and movement of joysticks. Even inexpensive remote controlled helicopters may help in imaging and monitoring of huge fields and spraying fertilizers and insecticides. Lastly, implementation of Artificial Intelligence in Robotics is something to be thought of in future.

1.3.5 Online Agriculture Courses is a need today. Certificate courses may help farmers to specialize in any aspect of agriculture.

Many other technologies can speed up and smoothen work in the offices. Online activity proposals, centralized pay roll systems, electronic record keeping etc. can save paper work, papers, time and fund involved, required by the manual systems existing in offices.

1.4 Concluding remarks:

Helping a farmer directly is appreciated. But helping the agricultural experts and the students will in turn help the farmers.

Development of Agricultural Web Portals

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Contents:

- Introduction
- Agriculture based information portals
- Advantages of Agricultural Information Portals
- Components of Agricultural Information Portals
- Portal development guidelines
- Portal End users
- Portal developers
- Portal Security

21.1 OVERVIEW:

A **web portal** is a specially-designed webpage in a website which brings information together from various sources in a uniform way. The extent to which information about the content of the sources is displayed in a "uniform way" may be more or less depending on the intended user and for the intended purpose for which the portal is designed. In addition, the role of the designer in designing a portal may determine which content can be added to the portal or deleted from the portal configuration.

Development of web based information dissemination services in the area of Agriculture is becoming one of the most common applications of Information Technology now-a-days. Pure information web portals with basic operational capabilities have mushroomed due to the easiness in their construction, hosting and management. But most of the websites, intending to minimize the information gap between farmers and extension workers are far from achieving these objectives. User end factors like lack of knowledge on internet, poor communication, low literacy levels etc. are often cited as the reasons for the lack luster performance of these IT applications. It is ironical that not much attempts have been, made in taking care of these factors during the design of websites.

Examples of public web portals are AOL, iGoogle, MSN, Indiatimes, Rediff, Sify, My Yahoo etc.



Figure- 21.1.1



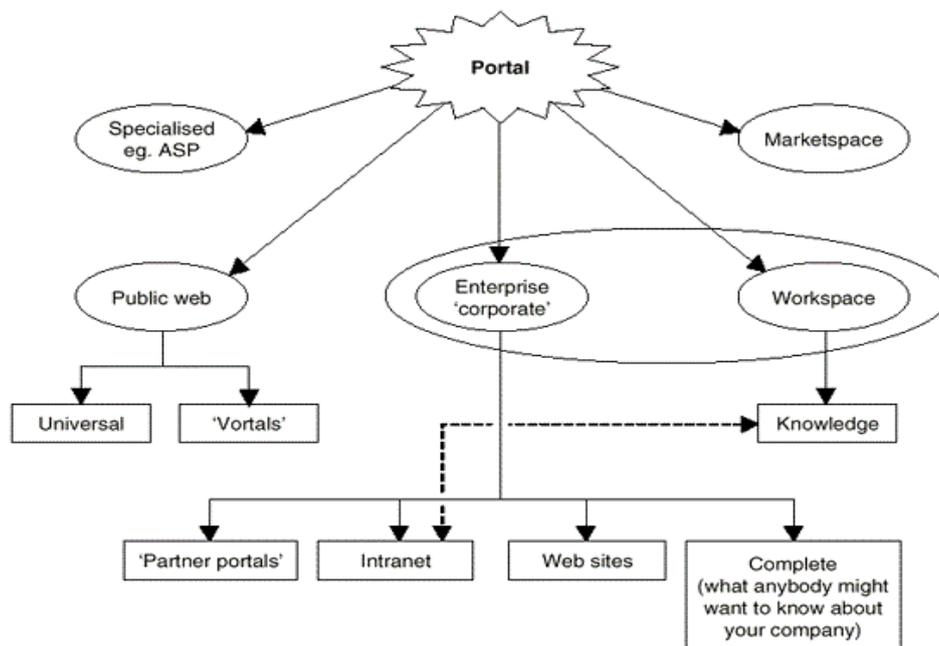
Figure- 21.1.2

21.2 INTRODUCTION:

The main concept of designing a portal is to present the user with a single web page that brings together the content of information from a number of different areas and it should focus on user centric aspects. The agricultural web portal forms a specialized region where the developer should bear in mind the customers-side resources like bandwidth, technical knowledge etc while designing it. Good usability is critical to the success of any website.

Portals have become one of today's biggest Web trends. Corporate organizations are setting up portals to attract customers to their Web sites and, in some cases, to use them as a medium for business-to-business (B2B) e-commerce tools. So there is also a need for development of Agricultural web portals at the core levels. These portals would largely be deployed in farmer centric aspects to have greater potential and useful applications on agricultural organizations, where consumption and generation of information and knowledge are among major activities.

Figure- 1.2.1 A hierarchy of portal types



21.3 Agriculture based information portals:

An *agricultural information portal (AIP)* can be defined as: 'A Web-based application accessed over the internet which provides a personalized interface enabling *agricultural researchers* to discover, track, and interact with colleagues and other people about agricultural applications, information resources, services and tools relevant to their research interests/work and place the information for farmers to be implemented in their fields'.

An agricultural information portal is the point of access for the research experts and farmers for agricultural information resources and facilities for sharing different aspects between them. Below are some examples of Agricultural Portals.



Figure- 21.3.1 Farmers Portal



Figure- 21.3.2 KrishiWorld

21.4 Advantages of agricultural information portals

The use of AIPs in providing access to digital information services in agricultural organizations has several advantages. Portals can provide increased functionalities and improved access to information resources and services to researchers, farmers within and outside the organization.

- Share information and knowledge on agricultural practices among researchers and farmers within and outside the organization
- Collaborate on various research projects with colleagues within and outside the organization
- Manage and track the progress of various research projects being implemented by the organization
- Access various information resources such as images, and video clips generated within the organization and provide the same to the farmers for learning the same practices.

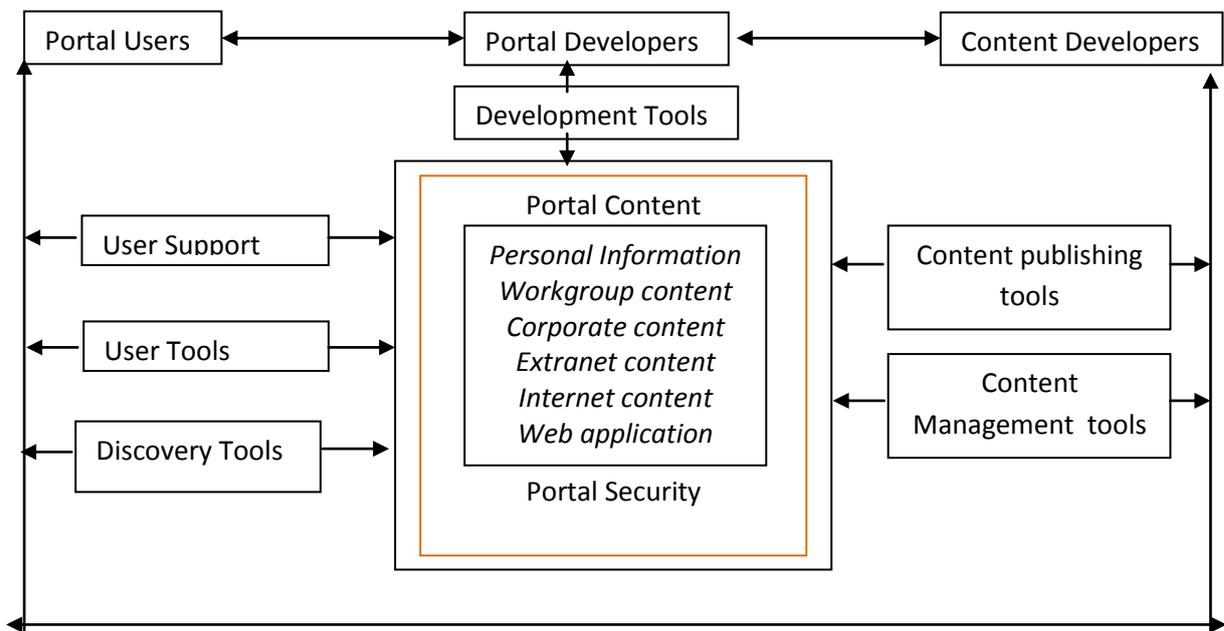
21.5 Components of agricultural information portals (AIP)

An AIP consists of the features outlined below which are shown in Figure 21.5.1.

- *Portal end-users:* These are the target users of the portal facilities and resources. In agriculture related organizations, the farmers are expected to be the major users of AIPs.
- *Portal developers:* This group mainly consists of information technology specialists or external firms and consultants involved in the development and maintenance of the portal.
- *Portal development tools:* Tools which consist of portal development software, standards and guidelines.
- *Portal content developers:* This group includes both internal and external content developers and providers. Therefore, external online database suppliers, publishers of electronic journals, and many others are included in this category.
- *Portal security:* These are features that allow or restrict access to the portal content, and control publishing (adding, modifying and deleting) of content on the portal.
- *Portal content publishing tools:* These are tools and software used to generate and publish content on the portal.
- *Content management and use policy:* These are overall guidelines for publishing, managing and using the contents via the portal for the end users.
- *Portal discovery tools:* Various tools are used for retrieving content on the portal, for example internal search engines and taxonomy.
- *Integration with the Internet:* When developing an agricultural portal, it is economical and efficient not to replicate the contents that are already available on other public Web sites. If appropriate content is available on other public Web sites that support or fit into the goals and objectives of the AIP, links should be established to the content so that users of the AIP have direct access.

- *Portal user support*: This refers to the assistance given to users to enable them to make effective use of the portal resources, including technical support and training.
- *Portal content*: This consists of the various contents and facilities available on the portal.

Figure 21.5.1 Major features of an agricultural information portal



21.6 Portal development guidelines:

As indicated above, portals are Web-based information systems designed to achieve a set of defined objectives. These objectives can be achieved through the interaction of different resources, including hardware, software, human skills, funds and information resources. To achieve optimal interaction of various resources, system development methodologies are used to develop and deploy information systems in organizations. Therefore, as in the case of all information systems, the development of AIPs should be based on sound system development methodologies, and not *ad hoc* approaches.

Ad hoc Web development methodologies are not adequate or suitable for the development of sophisticated Web-based information systems such as portals. There are several problems associated with these approaches. When using *ad hoc* approaches, most Web site and portal developers go directly into the implementation phase of the system, paying little or no attention to requirements acquisition and specification. This makes it very difficult to successfully develop, deploy and maintain Web sites over the long term and the result is poorly developed Web-based applications that have a high probability of failure.

The success in developing an AIP project will depend largely upon the effort, care and skill applied in its initial planning, that is, good planning guidelines, which could be used independently for the portal development approach. Therefore, with a current variety of approaches for Web site and portal development to choose from, the guidelines for the deployment of AIPs proposed in this article are:

- Setting up the AIP project team
- Inventory and analysis of AIP technical infrastructure
- Selection of AIP development approach
- Developing a strategy for AIP adoption
- Budgeting for AIP development costs
- Developing an AIP deployment schedule.

21.6.1 Setting up the AIP project team

The development of an AIP should involve various stakeholders from within and outside the organization. In cases where the portal will also interact via an extranet with external users, such as partner agricultural research organizations and interested individuals, there is also a need to involve representatives or obtain the views of major partner organizations. Therefore, as soon as the idea of an AIP is mooted, one of the first activities to be conducted should be the setting up of an AIP project team (AIP-PT) composed of members from the various stakeholders. The main role of the AIP-PT is to plan, document current practices, set-up priorities and co-ordinate the deployment of the portal framework within the organization. The AIP-PT should have a correct mix of information technology specialists, researchers, management staff, information and knowledge management specialists, all working together towards implementing a suitable portal strategy for the organization.

- *Agricultural researchers:* They are expected to be the main users of the AIP and therefore they should be actively involved in the whole portal project from the onset. Researchers are also content developers and the information and knowledge generated should be integrated into the portal framework.
- *Information technology specialists:* An organization's information technology staff (programmers, Web developers, database administrators, network administrators and many others) should be involved in the portal development process, regardless of the portal development strategy adopted by the organization.
- *Information and knowledge management specialists:* Agricultural science librarians, information and knowledge managers and subject matter specialists should be part of the portal development project team.
- *Partner organizations and individuals:* To ensure that potential obstacles to information and resource sharing via the portal are addressed in good time, it is important to include representatives of the major partner organizations into the AIPPT. This is necessary when external organizations and individuals (consultants or selected individuals from the general public) are involved and the intention is to allow such organizations and individuals access to the portal facilities via an extranet, and also when some of the resources and services provided by the partner organizations are to be integrated into the portal.

21.6.2 Inventory and analysis of AIP technical infrastructure

Implementing a portal requires various types of ICT facilities. It is, therefore, important to make an inventory and analysis of the available ICT facilities to determine whether the available facilities are adequate for the deployment of a portal environment in the organization, what ICT facilities should be used and, where applicable, to establish which facilities should be replaced or upgraded. Among other things, the inventory and analysis should examine the availability and status of the following ICT facilities in the organization:

- *Personal computers or laptops:* For use by portal and content developers to access the portal resources, add and modify content on the portal.
- *Servers:* Different types of servers, both hardware and software. Regarding software, this may include portal application servers providing the development infrastructure for the portal; and Web servers to work with the portal application server to provide the environment for managing client requests.
- *Application software:* Different types of software applications to be used by portal users and individuals involved in the development of the portal
- *Database software:* Database systems implemented in the organization, for example, Oracle, Microsoft Access, MySQL and others. Portals require the use of a database system to keep track of information specific to the portal, such as users, personalization settings, available portal services and security
- *Network infrastructure:* The type of LAN available, and whether the organization has a WAN or intranet and extranet in place; availability of Internet connectivity and the type of connectivity available, for example, dial-up, leased-line connection, or a VSAT (very small aperture terminal) connection

- *ICT skills*: An examination of the capacities available within the organization, in terms of ICT skills, such as staff with computer programming skills, databases administration, and Web site design and development.

21.6.3 Selection of AIP development approach

The organization should decide which portal development approach is to be used or adopted.

There are several options available, among them the following:

- *In-house development (in-sourcing)*: The organization may choose to build the portal using its IT staff and the many available free open-source software and tools. However, this option requires technical expertise, especially programmers, and resources such as time and equipment, some of which are generally not available in most public-funded agricultural research organizations.
- *Commercial portal development software*: Purchase and use of commercial portal development software is another option available to agricultural research organizations. However, although there are several off-the-shelf portal development software packages that could be used, most of them would require customization and this could result in additional costs. In some cases, available information resources within the organization may also need to be migrated to the new software platform, resulting in additional costs.
- *Outsourcing portal development*: There are several firms involved in portal development that could be contracted to do the job. This approach could be cost effective and less time consuming. However, use of an external firm may make the organization dependent on the firm for maintenance and technical support, resulting in additional costs. In addition, dependence on external firms could result in the organization not developing the required local capacities necessary for sustaining the portal.

21.6.4 Developing a strategy for adopting AIP

The success of the deployment of the portal within the organization will depend on how far it is accepted and used by the stakeholders. Therefore, a strategy should be put in place, from the onset, to stimulate and encourage the support and adoption of the portal at all levels within the organization or among the stakeholders. Senior management should be encouraged to buy into the idea of the portal, and provide strong support and advocacy for the adoption of the portal within the organization. Without the involvement of senior management, adoption of the portal at departmental and user levels would be difficult. The main potential portal users should also be encouraged to integrate the portal into their work activities.

21.7 Portal end-users

An AIP should be designed with the users in mind. It should be owned and managed by the users. Therefore, all potential portal end-users in the organization should be identified and categorized. They should be consulted and involved in the major decisions about the portal. Issues relating to the ownership and management of the portal should also be discussed with the portal users. A decision should be made on whether the portal will serve all categories of users within the and outside the organization or only selected groups of users, for example, researchers. In addition, the following factors that are likely to have an impact on the portal end-users' ability to use the portal-based resources and facilities should be addressed:

- Access to appropriate ICT facilities at the office and home
- Level of ICT skills.

If the target portal end-users do not have access to appropriate ICT facilities or their ICT use skills are very low, the adoption and acceptance of the portal in and outside the organization is likely to be affected. Access to ICT facilities at home, such as personal computers, laptops and the Internet, especially the Web, could lead to users requesting access to the portal from their homes.

21.8 Portal developers

Depending on the size and sophistication of the AIP, its development and deployment would require various types of technical skills, among them the following:

- Programming skills in various languages and scripts used in portal development, for example Perl, CGI, HTML, Visual Basic, Java, JavaScript, PHP, C++, XML
- Network administration, including TCP/IP administration
- Internet, intranet and extranet administration
- Database development and administration, for example MySQL and Oracle
- Operating systems, for example Linux, UNIX and Windows 2000
- Information management
- Creative designing.

An organization should make an effort to find staff with the correct mix of the above skills. Unfortunately, it is most unlikely that agricultural research organizations will have staff with all of the above skills. In cases where the required skills are not available, it may be necessary to outsource the development of the portal, or some parts of the portal.

21.8.1 Portal content and sources of content

A portal should provide access to useful content, services and facilities. Therefore, all the potential sources of content, both from within and without the organization, should be identified. These may include the following:

- Individual researchers or departments within the organization
- Relevant government ministries and departments, for example the Ministry of Agriculture, and other related ministries, for example those for fisheries and rural development
- Academic institutions such as universities or colleges of agriculture, and their libraries
- International agricultural organizations that are involved in the generation and provision of access to agricultural information

The identification of content and external sources of content should include identification of content that will be acquired free of charge. The cost of acquiring external content for the portal should also be included in the budget.

21.8.2 Portal development tools

Web site and portal development require the use of different types of software-based tools. There are two main options available to organizations, namely the use of proprietary software or open-source, software-based development tools. Proprietary or commercial portal development tools/software (especially for enterprise information portals) available on the market could be used to design, develop and implement an AIP. These include products such as *WebSphere Portal* by IBM, *Microsoft SharePoint Portal Server 2003*, *Oracle9i Application Server Portal* by Oracle, and many others. In addition, organizations could opt for open-source portal technology solutions such as *Jetspeed* (an open-source implementation of an enterprise information portal), *Metadot Portal Server*, and *Zope* (an open-source application server and portal toolkit) and tools/software like MySQL, Linux, PHP (hypertext preprocessor), Perl and many others. Organizations should identify and list all the tools that would be required, find out which tools are already available within the organizations, and which ones will have to be acquired.

21.8.3 Portal content publishing and management tools

Individuals and departments within the organization involved in content development should be provided with various tools, especially content management software, to assist them in their work. Using content management systems, they should easily be able to generate content, edit and publish on the portal. The content management system should provide facilities and features to deal with documents in their original formats, such as Microsoft Word, Microsoft Excel, Portable Document Format (PDF) and others. It should also include Web editing features such as page templates and wizards, HTML editors, and XML editors to allow content developers to author Web content. Content developers need to know what content should be published or not published on the portal, and when to update or remove the content.

21.8.4 Portal content management policy

The organization should put in place a content management policy to support and facilitate the process of contributing, reviewing, modifying, approving, publishing, delivering and maintaining

digital content integrated with or accessed via the AIP. In addition, the content management policy should empower researchers and agricultural information specialists to manage the content on the portal, while the information technology specialists within the organization should concentrate on managing the portal's technical infrastructure. The portal content should preferably be hosted on the organization's own computer servers. If hosted on an external server, the organization should have the ability to change the content at will.

21.8.5 Portal user training and support

All categories of portal users should be empowered through training so that they can access and use the portal facilities effectively. Training can take the form of workshops, seminars and online courses accessed via the portal. In addition to training, user support should be provided. This can be in the form of access to a physical help desk or an online help desk, online tutorials, telephone support and access to lists of frequently asked questions (FAQs). Training should be a continuous process.

21.8.6 Portal user tools

When planning the deployment of an AIP, decisions should be made regarding the types of tools to be used on the portal and these tools should be configured, packaged and tested together. According to CIO Communication (2001), providing users with tested, packages, licensed tools will reduce the amount of time required for support. Support also simplifies the update process, reduces the amount of training and documentation, and makes it easier for new users to become familiar with the portal.

Depending on the various requirements, the tools may include:

- *Web browsers:* Microsoft Internet Explorer, Navigator or Opera
- *Plug-ins:* Microsoft Media Player, Real Player, QuickTime Player, Adobe Acrobat Reader
- *Specialized software:* For example, Microsoft Office Suite and Lotus Smart Suite.

21.8.7 Portal information discovery tools

Portal users should have access to various information discovery tools. Provision of information discovery tools on the portal will ensure that the portal resources are visible and reduce the time users spend on searching for information. The tools may include a combination of the following:

- Consistent page navigation aids and local search engines
- Search directories
- Push technologies
- Information specialists.

21.9 Portal security

As more organization content becomes accessible via the portal, and especially if external users are also allowed to access some of the content on the portal via an extranet or the Internet, security will become a critical issue. The organization should, therefore, plan and integrate the portal's security services into its overall security infrastructure. Portal security should include both guarding against un-authorized access to the portal and against unauthorized access to portal resources and services once access to the portal is allowed.

Conclusion

Use of portals in agricultural research organizations would definitely improve the access and utilization of relevant information resources according to the information needs of researchers. However, development of such portals should be based on sound information system development approaches, and the guidelines proposed in this article should ensure that organizations adhere to a well-structured approach to portal development.

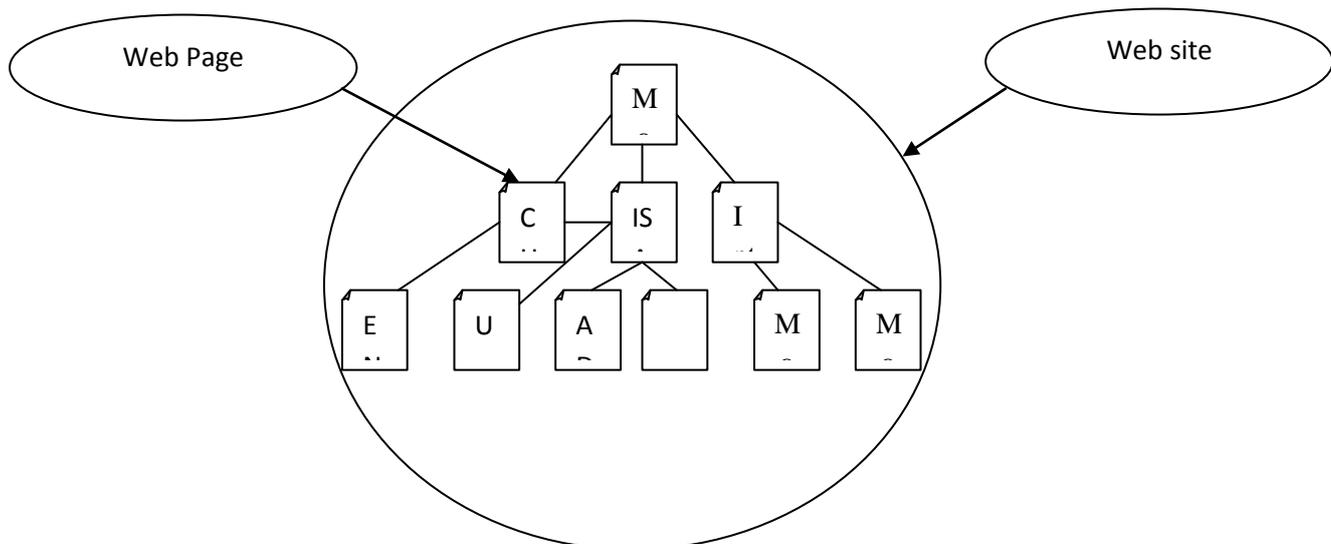
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- (Chisenga and Van Brakel 2004:123–135):

Essentials of Web Designing and Hosting

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22.1 OVERVIEW: While discussing Internet technology, we have seen the basic unit of information displayed over the net is a web page. Now a Web site is a collection of such web pages, which are interlinked. The various web pages are prepared independently and in the end they are linked in the required sequence depending on the logical makeup of information on the site. The link for a web page is basically a URL (Uniform Resource Locator) that is the address of the computer where the page is present. Such a related web page is known as Web Site. As far as the size is concerned, there is no any restriction, if the size of the web site is large, then it can be spread over number of servers even if those servers are placed in different geographical locations. There can also be a web site that cross-link to files on another web site, thus sharing same files. Logically a Web site and the Web pages can be graphically represented as:



The first page of a web site is meant for welcoming the reader who has logged on to the site. Hence it is known as the Home page or default.aspx. All sites necessarily have to have this page. The design of the web page change from site to site depending on the designer and the type of the web site.

So In K.V.K. Web site when user log on. The home page displays various menu options just like application software consisting of various menu list options from where the user can pick a specific task and in most of the pages banner and menu part will remain same but depending on the type of roles or membership.

If the role is administrator then web admin has all privilege for instance he or she can upload all kinds of data that has to be host on the internet as well as lock, delete and can unlock the user those who falls under normal roles or relationship. Apart from this Anonymous user can also view the site and obtain the details of company for further contact, news etc.

22.2 INTRODUCTION: The web application is a collection of web pages comprising texts, images, videos that provide you with relevant information. A web application makes use of the internet to make it accessible to users from all over the world. A web application is accessible only through web browsers, which are software applications that enable you to display and interact with text, images, and other information located in a web site or web application.

In today's world internet plays an important role in our daily life. People have become totally dependent on the internet to carry out activities besides the official work. They even depend on the web sites connected through internet to carry out their day –to-day work. As one can say that internet is serving as a warehouse for web sites has made life smooth by bringing everything within our reach.

Front end and Back end development of the application can be done by using following application

22.2.1 ASP (ACTIVE SERVER PAGES): ASP is a Microsoft technology that enables developers to create dynamic web sites with the help of server side script, such as VBScript and Jscript. ASP technology is supported on all Microsoft Web servers that are freely available. It is such a powerful tool which provides facilities to easily interact with database such as SQL.

ASP.NET is a framework for building great Web sites and Web applications using C# or VB.net. Developers can use Web Forms when creating an ASP.NET application. Web Forms allow you to build powerful forms-based Web pages

Using ASP an interactive user interface has been prepared which requires an interaction with data base. Apart from this, HTML (Hypertext Markup Language) is use to incorporate client component. In addition to these, project also incorporated some advance features which makes pages more interactive such as scrolling image gallery, scrolling Newsletters, blinking text etc.

21.2.2 C# (C SHARP): C# is a programming language which helps programmer to define connectivity between front end and back end as well as defining the functionality of object like button, drop down list, check box, radio button etc.

22.2.3 CASCADING STYLE SHEET (CSS): CSS (Cascading Style Sheet) is also one of the important components of the web which helps developers to define style needed in pages so that pages are rich with colors, images etc.

22.2.4 SQL SERVER (STRUCTURED QUERY LANGUAGE): SQL stands for Structured Query Language which can be used as back end. It stores all the dynamic information of a site. Basically SQL server is used for keeping all the information of application which can be change, delete if required by web administrator only. SQL is database application software hence it store information and contain links with one data to another so that multiple information from multiple table can be extracted from database. This is used as back end for the application.

22.3 SYSTEM REQUIREMENT: System requirements basically dealt with the hardware and software requirements for developing application software. Minimum hardware and software requirement are as under:

22.3.1 HARDWARE REQUIREMENT:

Processor: Intel Pentium III, 1 Ghz

Ram	512 MB and above
Disk	3GB
Drive	DVD Drive.

22.3.2 SOFTWARE REQUIREMENT:

Operating System:	Windows XP
Dot Net Framework	3.0
Visual Studio	2008
SQL Server 2005	

22.3.3 WEBSITE OPERATION REQUIREMENT

Internet Explorer 8.0 and above or
Google Chrome or
Firefox

Website is best viewed in Google chrome.

22.4 WORK PLAN: Work plan for the site has been fragmented depending on the type of users' requirement. A client side planning can be made whether to develop a static or dynamic site. ASP.net along with HTML, CSS and Java Script can be used to build a static site. For a dynamic web designing, ASP.net can be used with HTML, CSS, Java Script, JQuery, Ajax with SQL server as the site is totally server control.

As per my perception web site should be dynamic because the organization or individual should facilitates with those features so that one can update, alter, delete as well as insert any content of the website.

22.5 DESIGN METHODOLOGY: Although there is no one way to develop a web, a web designer can choose from a variety of approaches. No one way necessarily works best all the time; therefore, a web designer even might consider varying approaches while developing the same web. We can design the web site with login privileges for administrator who update and upload the information like news, notice, image gallery and content of the pages and which will be accessed by entire web user. Accordingly, a site can be developed with another login option for the user or annexure to share certain information, viz. news, notice, circular etc., based on demand, where the user cannot upload or change the content of the page and that information are not for all web users. Approaches are as under:

22.5.1 TOP DOWN: If web designers have a good idea about what a whole web should contain in advance, a top-down method of design might be best. In the top-down methodology, designers start with a front or top page (often called the home page) for a web and then branch off from there. They even might create prototype holder pages that contain only minimal information but hold a place for later development in the web. The benefit of the top-down approach is that designers can develop pages according to one central theme or idea. This provides a good opportunity to affect the look and feel of the whole web very powerfully because all pages are designed according to the top page look and feel. A good way to do this is to design a set of templates for types of pages in a web and use these during the implementation process.

Top-down approaches emphasize planning and a complete understanding of the system. It is inherent that no coding can begin until a sufficient level of detail has been reached in the design of at least some part of the system. The Top-Down Approach is done by attaching the stubs in place of the module. This, however delays testing of the ultimate functional units of a system until significant design is complete.

A **top-down** approach (also known as step-wise design) is essentially the breaking down of a system to gain insight into its compositional sub-systems. In a top-down approach an overview of the system is formulated, specifying but not detailing any first-level subsystems. Each subsystem is then refined in yet greater detail, sometimes in many additional subsystem levels, until the entire specification is reduced to base elements.

22.5.2 BOTTOM UP

If web designers don't have a good idea of what the final web will look like or even exactly what it will do, but they know how specific pages will look and work, working from these specific pages to the top page might be the way to proceed. The designer can begin by designing the leaves or pages which accomplish the objectives and can link them through intermediate pages to the home or master page.

22.6 PRACTICAL UTILITY: After successful completion of web application it should host in any windows server in order to utilize by every people of the globe. The practical utility of designing web application is to broad cast the information of an organization and enhance the organization to improve the financial condition as well as to earn the fame of the organization or individual in their required field. Which will decrease the expenses like advertisement in newspaper, designing and printing expenses of palm plate etc. One can advertise using site. Users can take the benefit by using online advertisement.

Secondly it helps owner or organization to maintain the useful data electronically for future growth of the individuals or organization which also reduces the cost of the organization for maintaining data.

22.6.1 ADVANTAGES:

- The greatest advantages is that users can access website wherever they are and whenever they want to by using smart phones, laptop, desktop etc.
- The information within a site can be quickly accessed. There is no need to sift through several pages.
- The site may provide links to other sites on the same topic
- The site can be updated to always provide the latest information.
- The site creator/ author doesn't need to present when someone is retrieving information.
- The author can usually be contacted through an emailing address or a message board connected to the site.
- There is no need to carry a hard copy of information with you. (No heavy book)
- You can look at more than one page or source at a time by having numerous windows.

22.6.2 DISADVANTAGES:

- It may be difficult for researchers to locate, especially if there are many similar sites.
- Because it is not "published" or authorized by a reputable source, the site may be disregarded as inaccurate.
- The information on the site may not be reliable.
- Information may be interpreted incorrectly or used inappropriately.

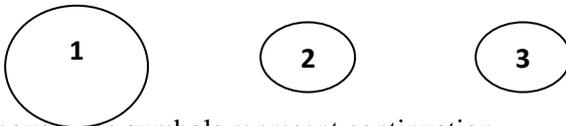
- A connection to the web is needed to access the information, which will be impossible if a computer and connection is not available.
- It may be difficult to reach your target audience.
- Because the author is not present when others are retrieving information there is no opportunity to ask questions or have things explained in greater detail.
- The site may go down or the computer may crash.
- Site may be difficult to use if experience with the internet is limited.

22.6.3 HOW TO DESIGN: For designing application one know the following

22.6.4 FLOW CHART: Flow chart is a graphical representation of the program or how the program should look graphically. Refer [fig\(1.0\)](#) for flow chart.

22.6.5 DATA FLOW: Data flow diagram is such a diagram which shows how the data flow takes place between modules, which can be drawn up to third level. Refer following figures.

[Fig\(2.0\) for First level](#)

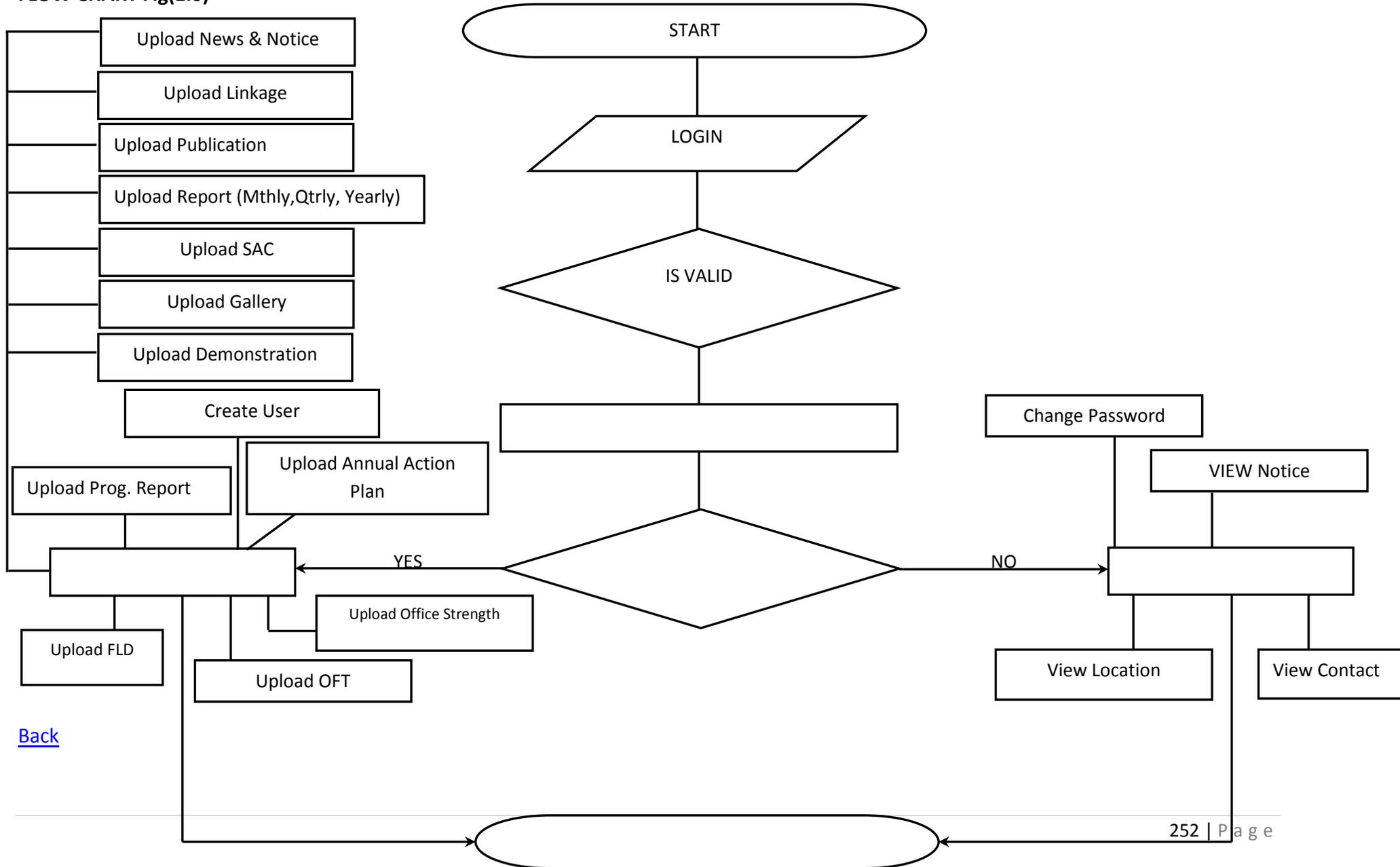


Above three symbols represent continuation.

[Fig \(2.1\) for Second Level](#)

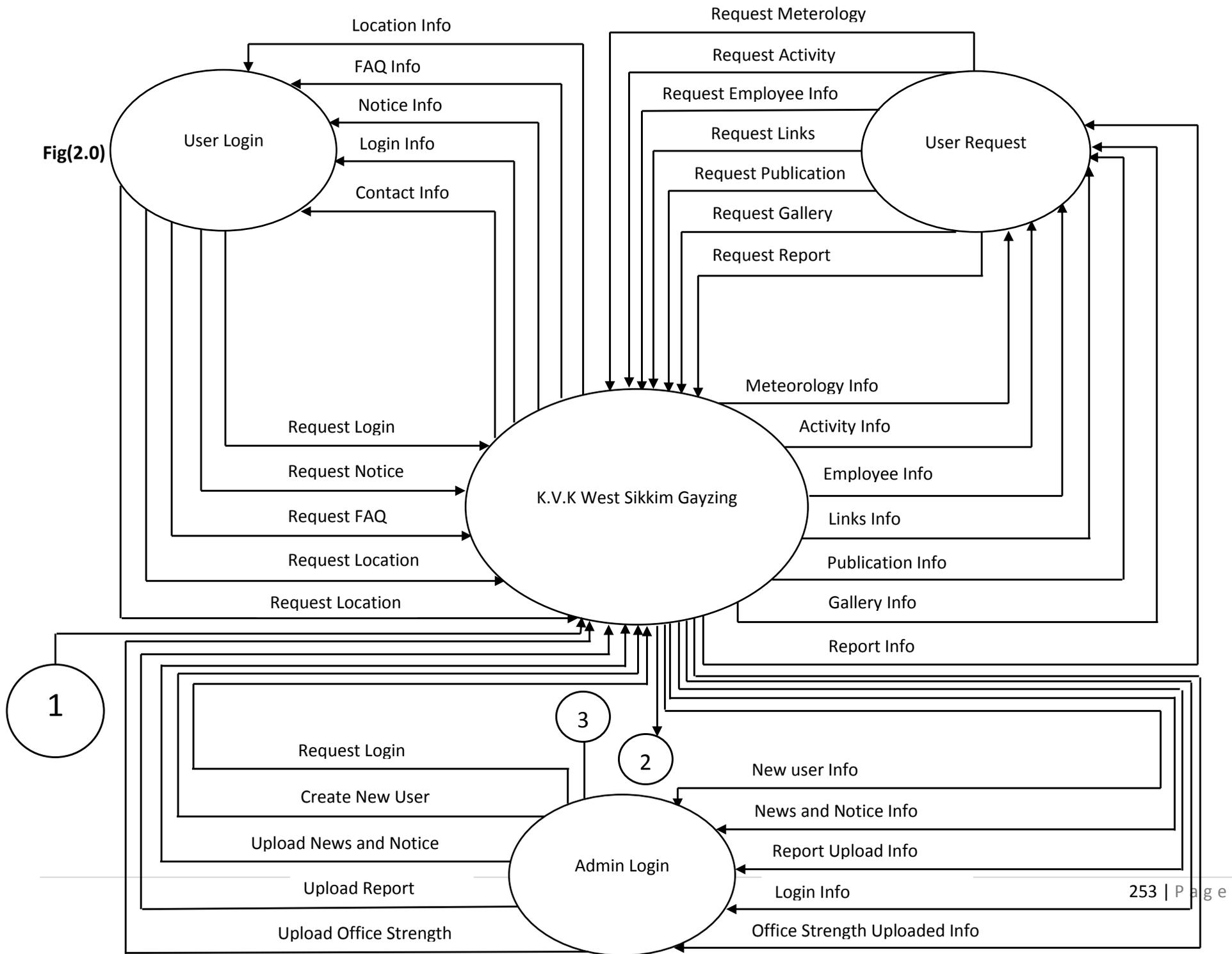
[Fig\(2.2\) for Third Level](#)

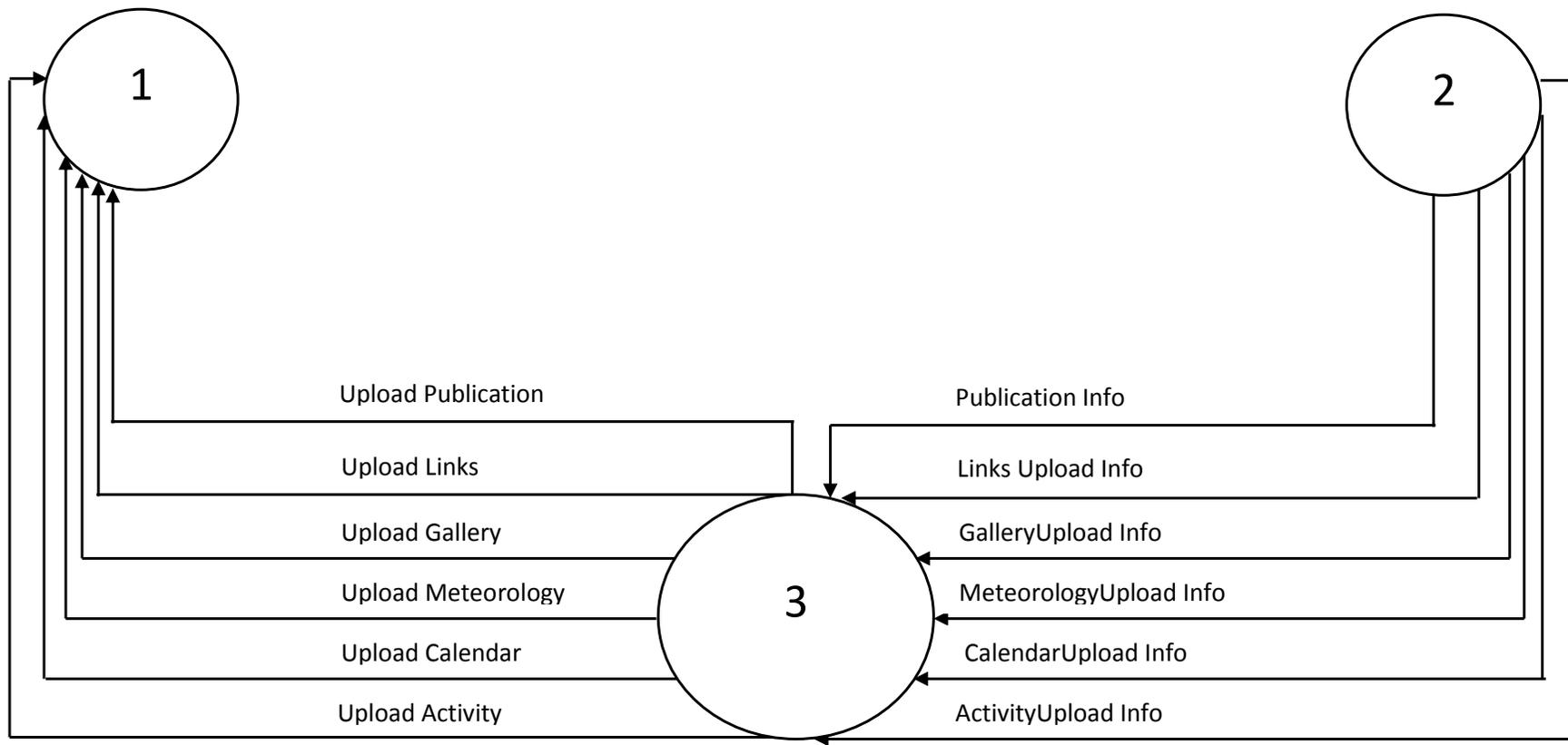
FLOW CHART Fig(1.0)



[Back](#)

Fig(2.0)

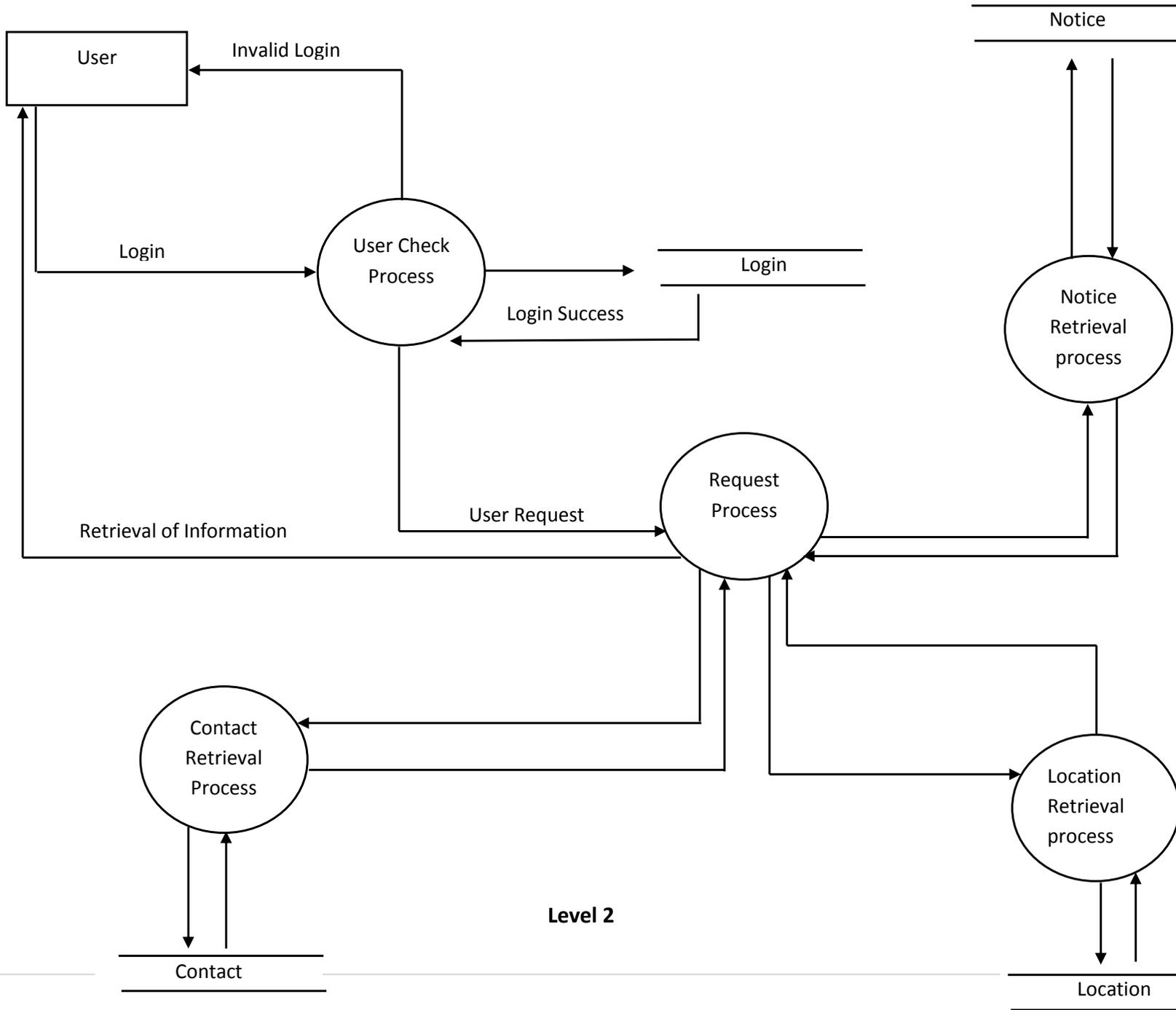




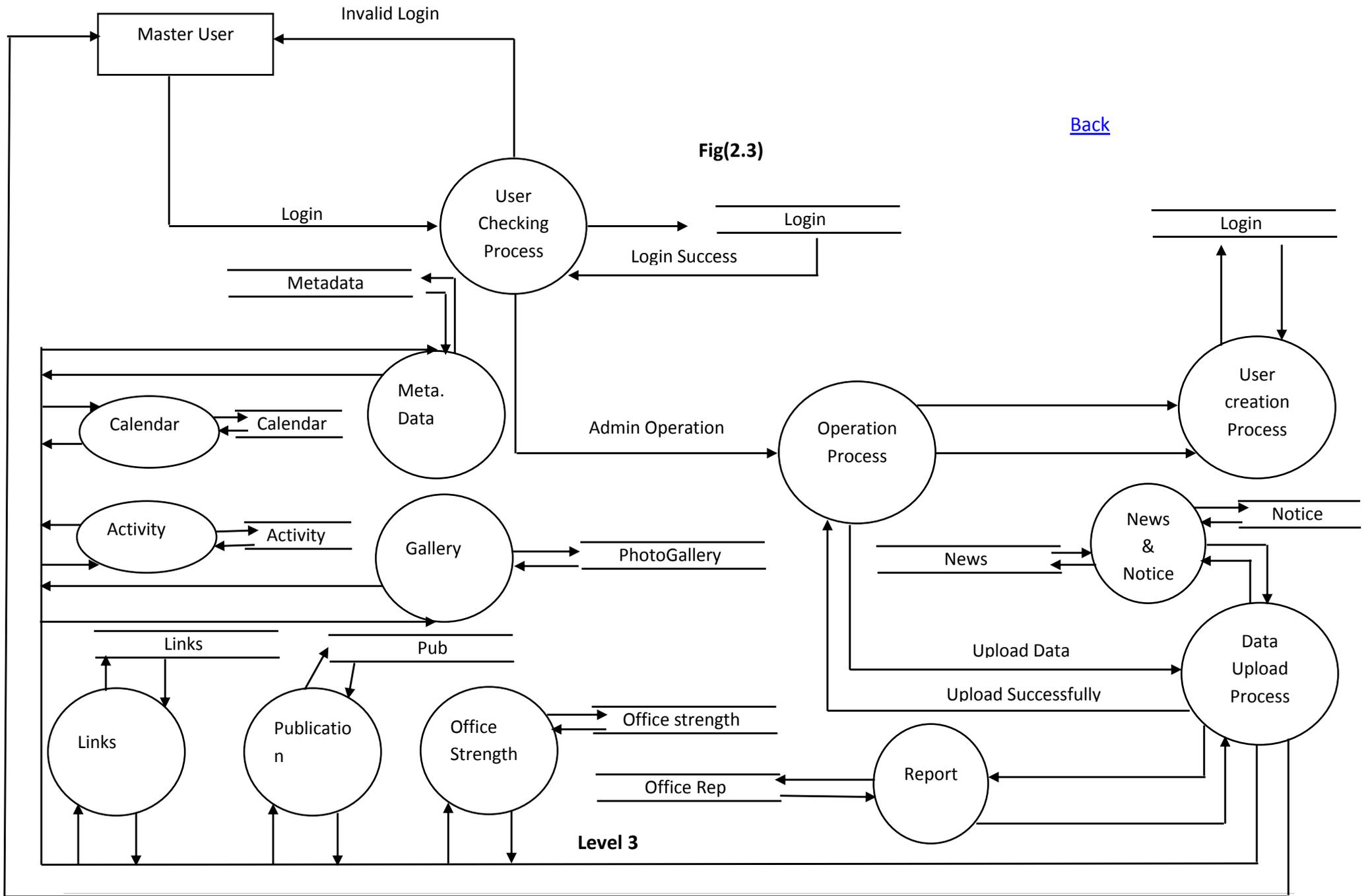
[Back](#)

Level 1

Fig(2.1)



[Back](#)



22.6.6 BEGIN DESIGN: Now after having all the above knowledge one can start designing real application using required development tools. For example developers can use ASP.net with SQL to come up with the application.

At first developers should install following software in a machine.

- Visual Studio 2008 or above
- SQL server 2005 and above

Before installation above mention development tools should purchase from Microsoft Corporation.

After successful completion of installation of development tools developer now open the development software by following the steps given below.

1. Switch on a computer
2. Click to start menu from the task bar to get its menu
3. Choose All Programs and navigate through its sub menu to get Visual Studio
4. Finally click visual studio exe to open the development window which looks like the following:

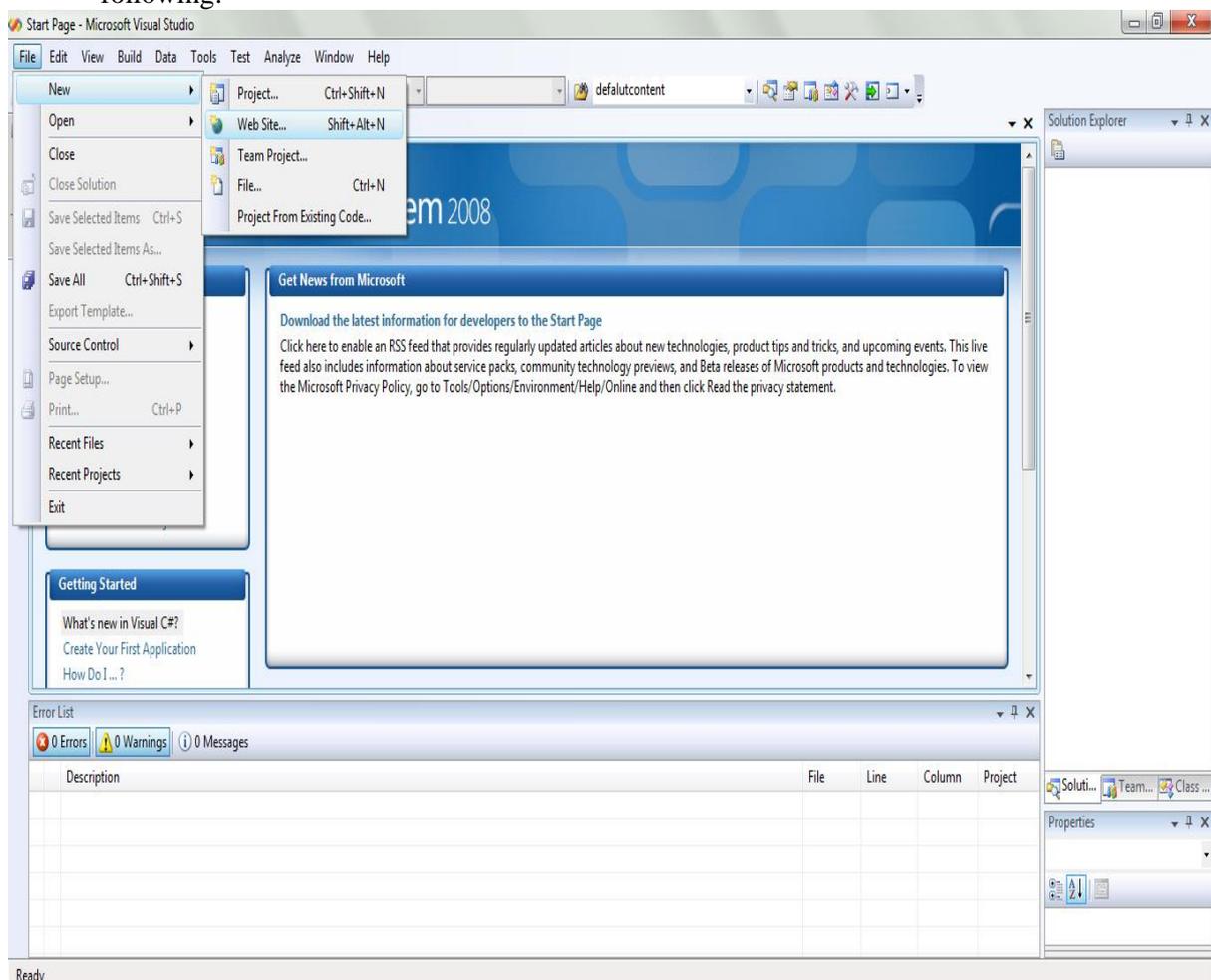


Fig (3.0) Microsoft Visual Studio 2008 Window

Now click on Web site from the **New** option available under **File** Menu to retrieve following window

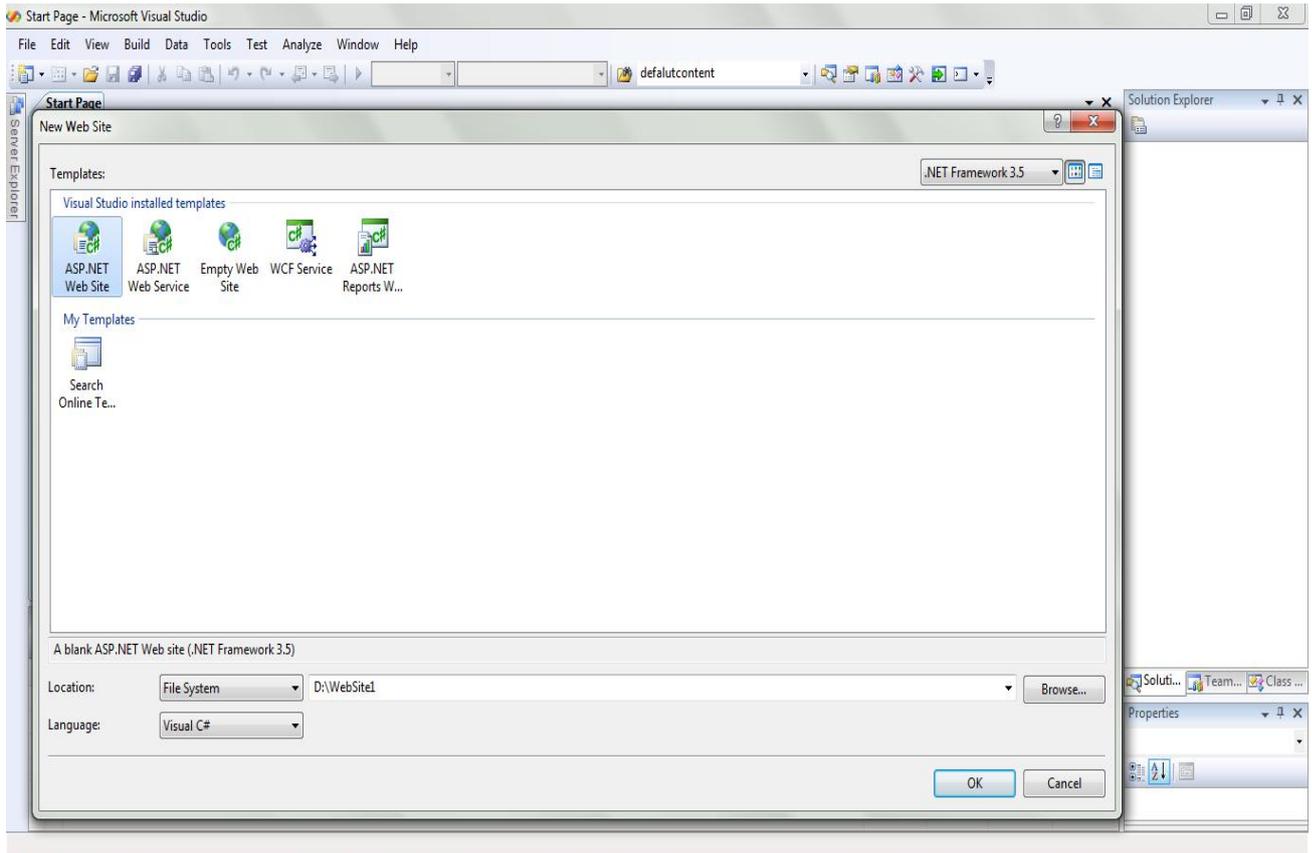
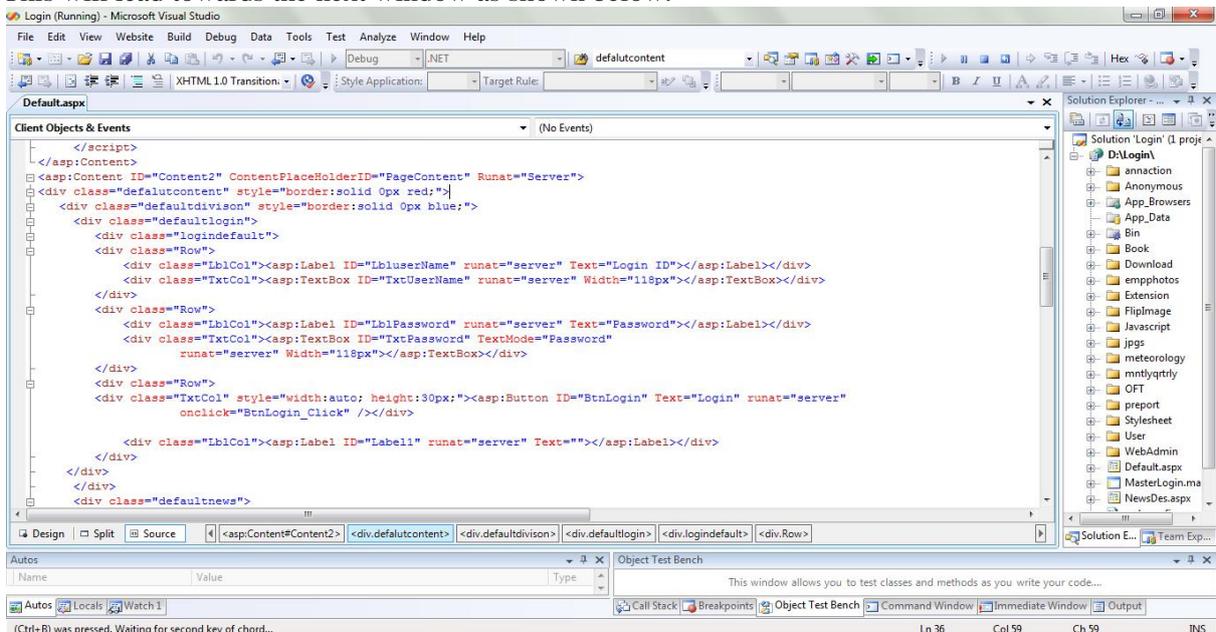


Fig (3.1) New project window

Source: Microsoft visual studio

Select **ASP.NET Web site** icon from the above dialog box and select the location for saving the website project and set the **code behind language** from **Language** list box and click on **OK** button. This will lead towards the next window as shown below:



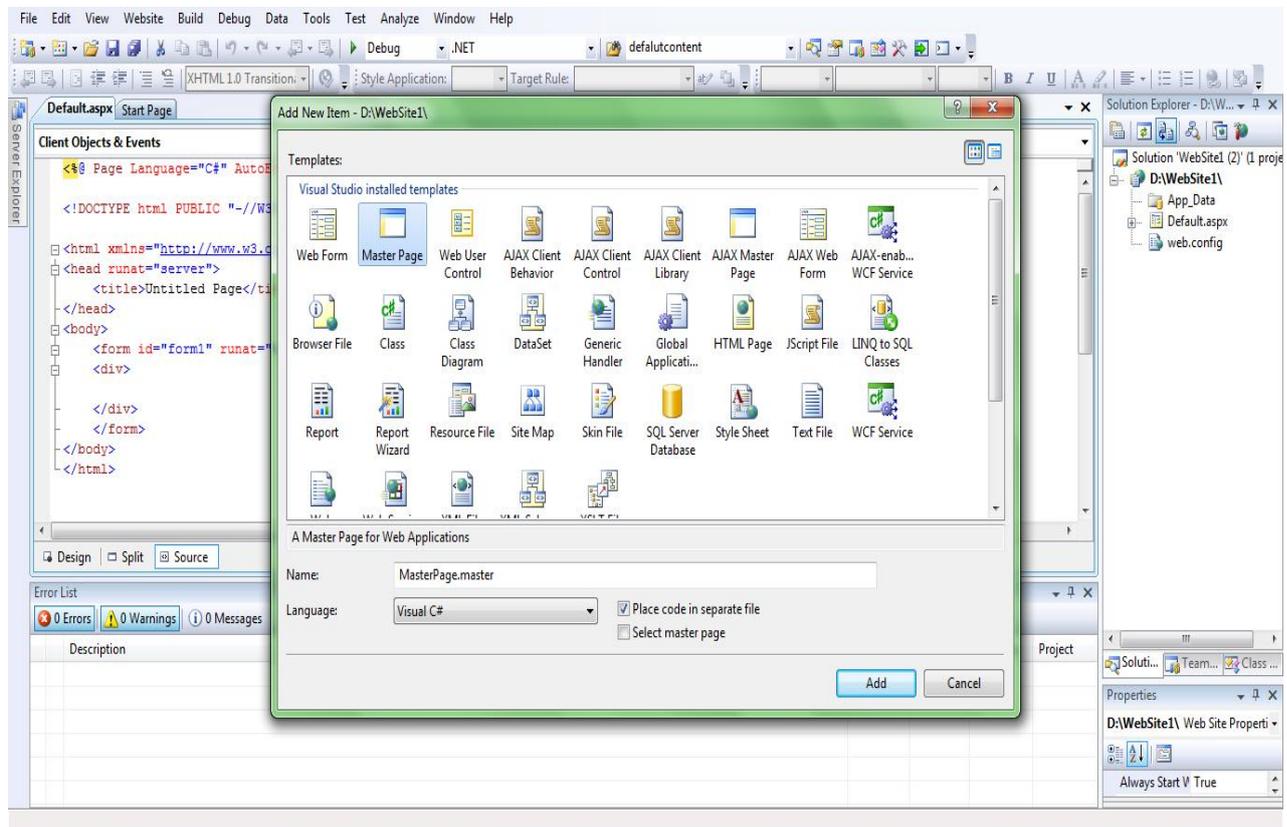
Fig(3.2) Code Window

Source: Microsoft visual studio

Code window of visual studio lets the developer to start code for designing user interface. Some of the description and user interface is given below:

22.6.7 MASTER PAGE: Master page can be created by right clicking on the project folder shown in solution explorer placed on a right hand side of application designing window.

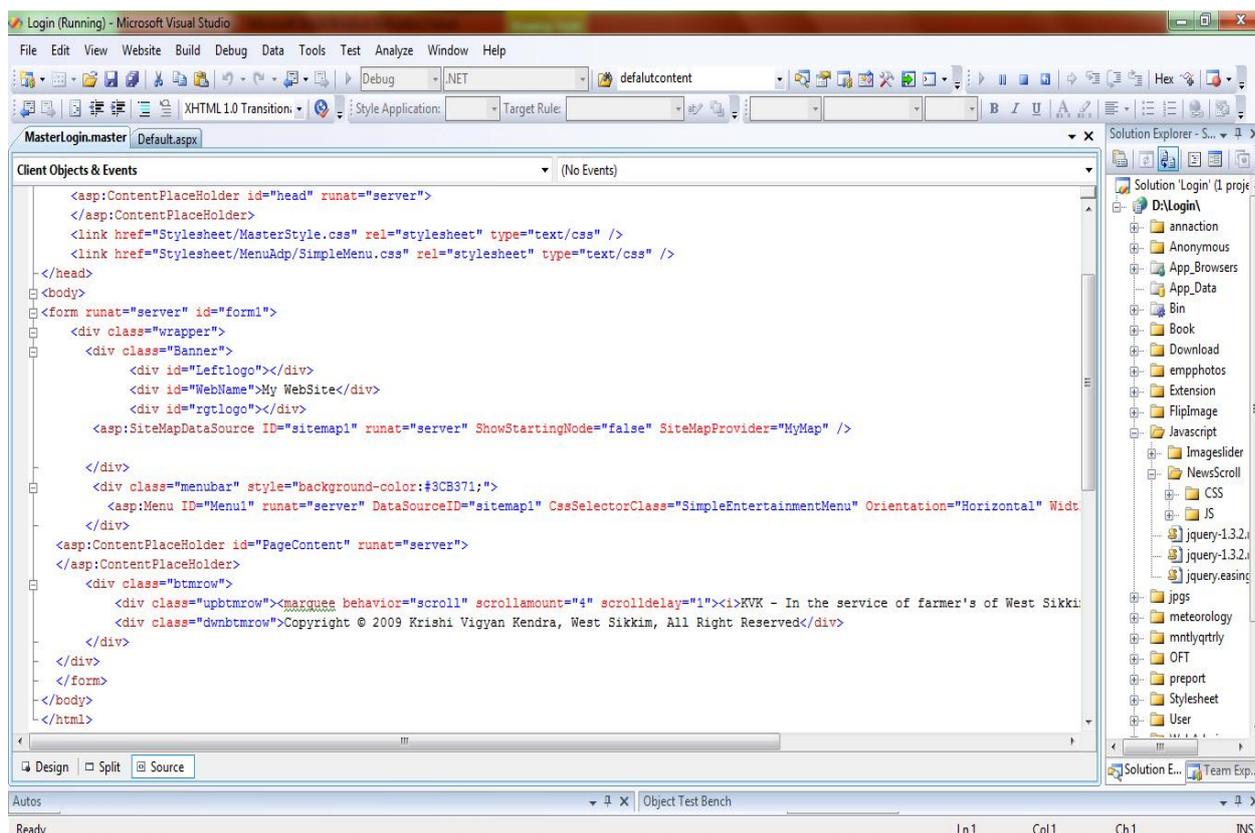
Creating a consistent look, behavior and templates of all the pages are provided on master page of a web site. By changing the style or content of the master page, you can quickly customize the appearance of an entire site. The photographs, texts, templates included in master page are always visible and the output is a combination of the master page and the default page.



Fig(3.3) Master Page Addition Dialog

Source: Microsoft visual studio

In master.aspx we can divide the page to create different section where each section contain different information like text, photos, templates, scrolling news and photos etc. which makes page more interactive.



Fig(3.4) Code window Master Page

Source: Microsoft visual studio

22.6.8 SITE MAP: We can design desired menus in master page with the inclusion of sitemap. A sitemap is such a page which does not display directly instead it should embed with other web pages to display its content. Sitemap page only contain the menu item that should be incorporated in a page, hence when user move mouse pointer towards the menu it displays its menu list if exist or user simply click on the menu to view the content of the pages. If it contains sub menu then user have to browse through the submenu list to access the information. Sitemap is a powerful tool that helps designer to plan for designing menus that should be appear on any pages of the site and it helps web user to lists the pages on a web site.

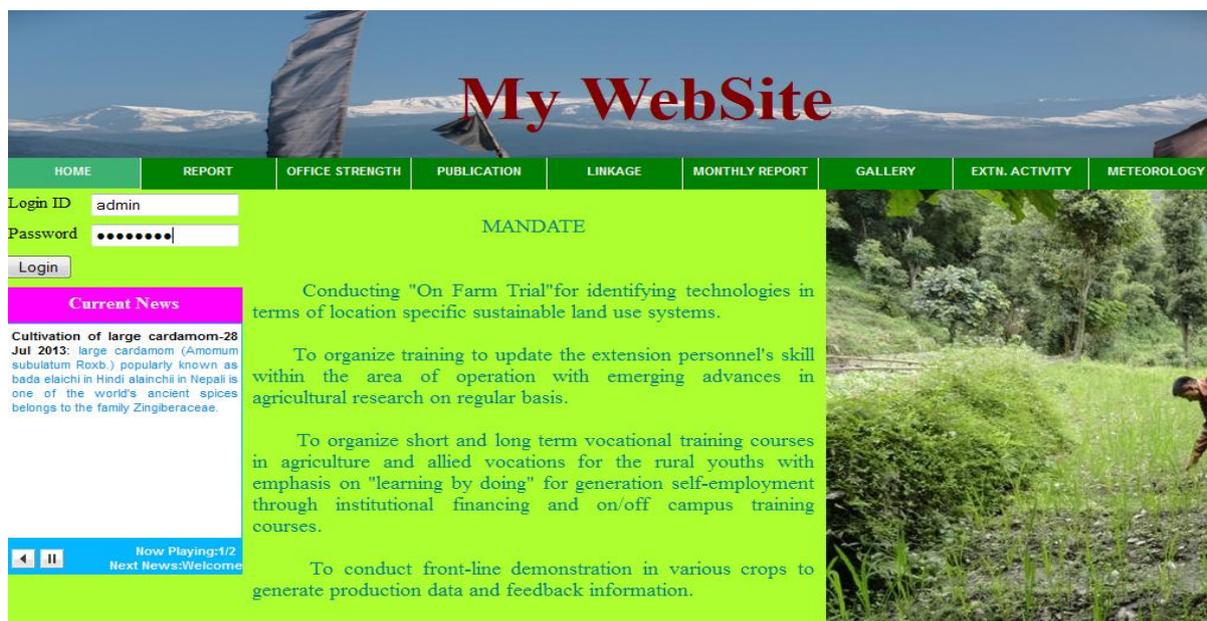


Fig (3.5) Home Page User Interface

Source: KVK Web page

1.6.9 WEB ADMIN: Web administrator after providing the user name and password can log into the admin page from where he can create the new user, update, upload or delete any content of pages. He has a total hold of a web site.



Fig(3.6) Admin Home Page User Interface

Source: KVK Web page

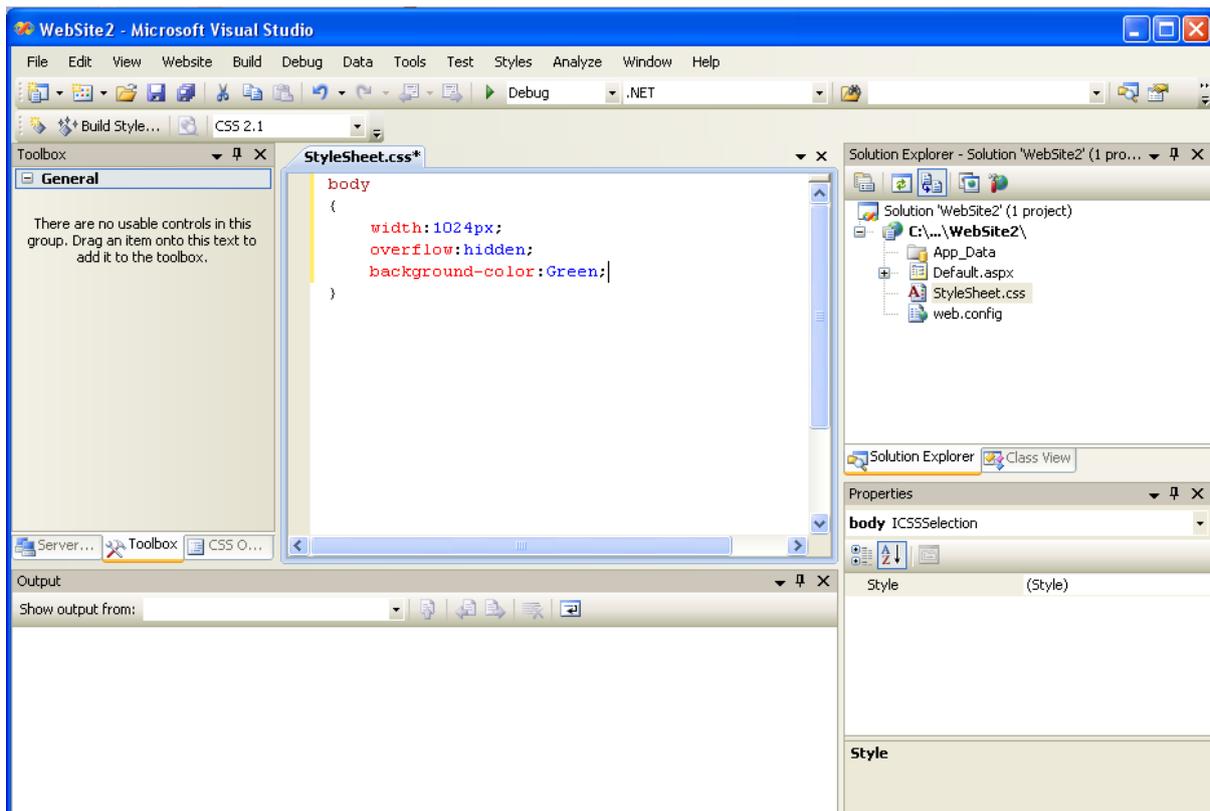
22.6.10 WEB USER: Web administrator creates columns of bottoms and text box for specified users who after providing user name and password can enter into the page where contact details, news, notice, circular, etc. are shared among them.



Fig(3.7) User Home page User Interface

Source: KVK Web page

22.6.11 STYLE SHEET: Allows developer to define themes colors, background images etc. for web pages.



Fig(3.8) Code window for style sheet

Source: Microsoft Visual Studio

As it can be seen, website format has both its strengths and weaknesses. Its complexity is its advantage but may also be its downfall. Careful consideration should be made when deciding which medium is best to present information.

22.7 TESTING: After successful completion of project the project will be supplied to client or project will be handed over to the software testers, who now start testing of application by supplying unnecessary values to the input box and upload unwanted data to the web by following the testing methodology.

Testing Methods are as under

- White Box or Glass box Testing
- Black Box Testing

22.8 WEB HOSTING: A **web hosting service** is a type of Internet hosting service that allows individuals and organizations to make their website accessible via the World Wide Web. Web hosts are companies that provide space on a server owned or leased for use by clients, as well as providing Internet connectivity.

An Internet Service Provider (ISP or IAP, internet access provider) is a firm that offers subscribers access to the internet. It is a complete package of service.

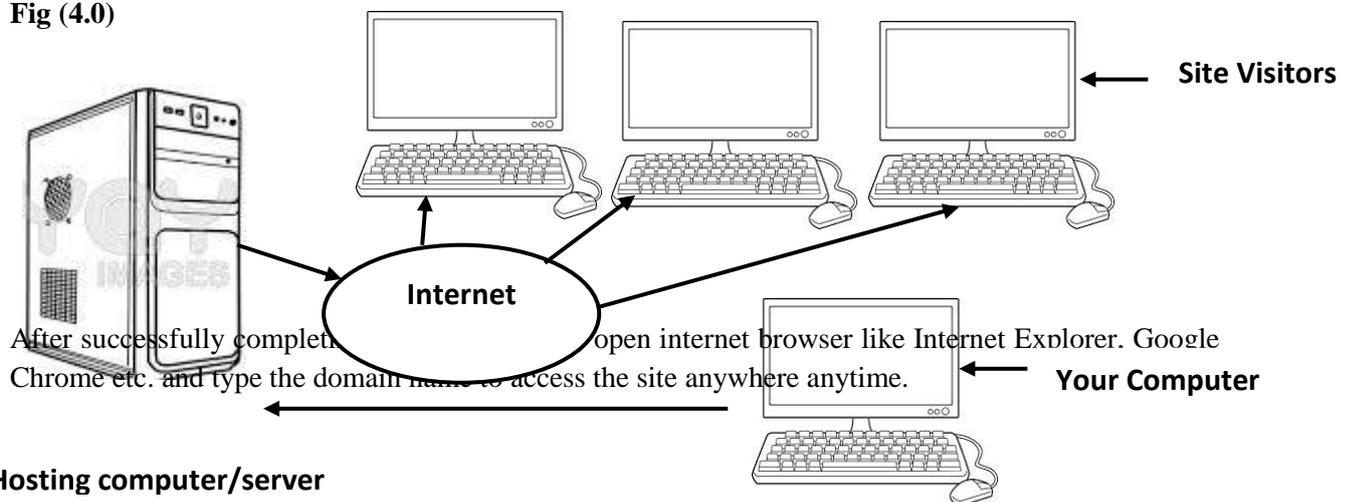
The scope of web hosting services varies greatly. The most basic is web page and small-scale file hosting, where files can be uploaded via File Transfer Protocol (FTP) or a Web interface. Individuals

and organizations may also obtain web page hosting from alternative service providers. Business web site hosting often has a higher expense depending upon the size and type of the website.

Single page hosting is generally sufficient for personal web pages. A complex site calls for a more comprehensive package that provides database support and application development platforms (e.g. PHP, Java, and ASP.NET). These facilities allow customers to write or install scripts.

In order to host website on public server, one should first purchase a domain name. Something like kvkwestsikkim.com. After purchasing domain or space for hosting website, ISP (Internet Service Provider) provide an IP Address for uploading the web file along with database, this can be done by using Filezilla which is one of the powerful application or web interface which allows website owner to supply IP Address supplied by the ISP and start uploading the content of the website. Site can host on private hosting company or on govt. hosting industries if the hosting is done in private industries owner has to pay yearly fees for renewal of the website. If it is under nic.in the registration will be of free of charge.

Fig (4.0)



22.9 CONCLUSION: As it can be seen, website format has both its strengths and weaknesses. Its complexity is its advantage but may also be its downfall. Careful consideration should be made when deciding which medium is best to present information. There are many reasons building a website requires that we obtain the right tools and resources.

Standardization is one factor. When developer uses the right tools, and are assured that the pages would be standard and acceptable to every visitor.

The visitors are able to view web pages no matter what browser they use, by using standard resources and tools. The pages would load faster and it would also be able to maintain the pages that have created with ease. The right resources also make it easy for surfers to use our site. The standard tools used for creating the website will ensure that things such as navigation, menus and layout conform to current practices with which every web user is familiar with. By using the right tool the pages become more attractive. It can display correctly in the browser and the visitors would be glad to visit again.

22.10 REFERENCES: The reference books used to collect ideas for developing web site are as under:

- Complete Reference of ASP.Net
- ASP.Net 3.5 with C# by Wrox.
- Complete Reference by Tata MCGraw Hill
- Complete Reference HTML BPB Publication
- Mastering SQL BPB Publication

22.10.1 OTHER REFERENCES:

- C#.Net 24 hours BPB Publication
- HTML BPB Publication
- Java Script BPB Publication.
- SQL Server BPB Publication

Green Computing for enhancing sustainability

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23.1 OVERVIEW

- Introduction
- Keywords and acronyms used
- History of Green Computing
- Advantages and disadvantages of DBMS
- Practical Usefulness of Green Computing
- Power Consumption Statistics
- Initiatives of Green Computing
- Approaches to Green Computing
- E-waste Management and Green IT
- Virtualization
- Cloud Computing- A Brighter Shade Of Green IT
- Green Computing through Power Management
- Telecommuting
- Return on Investment
- Role of KVKs in Implementing Green Computing

23.2 INTRODUCTION

Green Computing is the environmentally responsible and eco-friendly use of computers and their resources. In broader terms, it is also defined as the study of designing, manufacturing/engineering, using and disposing of computing devices in a way that reduces their environmental impact. The objective of this practice is similar to green chemistry; reduce the use of hazardous materials, maximize energy efficiency during the product's lifetime, and promote recyclability or biodegradability of obsolete products and factory waste.

Many IT manufacturers and vendors are continuously investing in designing energy efficient computing devices, reducing the use of dangerous materials and encouraging the recyclability of digital devices and paper. Green computing practices came into being in 1992, when the Environmental Protection Agency (EPA) launched the Energy Star program. Green computing is also known as green information technology (green IT).

The theme, “Green Computing,” is especially important and timely: As computing becomes increasingly persistent, the energy consumption attributable to computing is climbing, despite the clarion call to action to reduce consumption and undo greenhouse effects. At the same time, the rising cost of energy — due to regulatory measures enforcing a “true cost” of energy coupled with scarcity as innate resources are rapidly being diminished — is refocusing IT leaders on efficiency and total

cost of ownership, particularly in the context of the world-wide financial crisis. The biggest challenge facing the environment today is global warming, caused by carbon emissions. About 98 per cent of CO₂ emissions (or 87 per cent of all CO₂-equivalent emissions from all greenhouse gases) can be directly attributed to energy consumption, according to a report by the Energy Information Administration (EIA). Studies carried out have shown that the temperature is rising in some parts of the world, falling in others and increasing in the seas and oceans. Even a minute change in temperature can affect global weather patterns, resulting in changes in rainfall, cloud cover and the occurrence of natural disasters such as hurricanes and typhoons. With such widespread effects, greenhouse gases can affect agriculture practices. Farmers and livestock managers may have to plant and harvest earlier, in accordance with shifting weather patterns. Climate change from GHG may mean that previously fertile land is no longer sufficiently irrigated, temperate or protected from erosion and drought. Farms may have to be moved, or different, less profitable crops may have to replace traditional harvests. Greenhouse gases are a very real worry, especially as agriculture, livestock farming, energy consumption; material production and the daily carbon footprint of the developing world continue to contribute to climate change.

Many organizations today are speaking openly about a desire to operate in a “green” manner, publishing principles for environmental practices and sustainability on their corporate Web. In addition, many companies are now paying (or will pay in the near future) some kind of carbon tax for the resources they consume and the environmental impact of the products and services they produce, so a reduction in energy consumed can have a real financial payback. In this chapter we focus on reduction in energy over the full equipment life cycle as the prime motivator for “green” application design, with energy reduction as the best measure of “green-ness.” Our sole inspiration is reducing energy consumption, without regard to economic impact.

However, IT professionals must shed the traditional view of the environmentally sustainable data center as a product feature checklist to gain one-time wins. While new technology from the industry will help drive efficiency into the IT infrastructure, it will not replace the necessary ongoing architectural and process commitment. For example, a virtualization or a cutting edge environment product decision has the potential to reduce power consumption. Yet, if there are no processes or architectural guidance to go with it, this can encourage virtual server collapse and eventually increase power consumption at a higher rate due to additional physical servers allocated to meet the needs. And of course, increasing rack power density without an aligned cooling architecture is a recipe for data center disaster.

23.3 KEYWORDS AND ACRONYMS USED

- CO₂ : Carbon-dioxide
- EPA : Environmental Protection Agency
- EIA : Energy Information Administration
- Green IT : Green Information Technology
- LCD : Liquid Crystal Display
- CRT : Cathode Ray Tube
- KW : Kilo-watt
- EUP : Energy Usage Profile
- GHG : Green House Gases
- PDU : Power distribution units
- CRM : Customer relationship management
- SAN : Storage Area Network

- SaaS : Software as a Service
- KVK : Krishi Vigyan Kendra

23.4 HISTORY OF GREEN COMPUTING

The idea of green computing has been around a good time, the government themselves play a role in it. For example, the Environmental Protection Agency (EPA) launched the energy methods. The EPA today still plays an active role by providing not only energy effective methods, but also cost effective methods for the consumers. In 2006 the EPA established a way to save U.S. households and businesses money; "With an eye to saving U.S. households and businesses more than \$1.8 billion in energy costs over the next 5 years, EPA announced new Energy Star specifications for computers and related equipment. These new modifications are also expected to prevent greenhouse gas emissions equal to the annual emissions of 2.7 million cars "(Jones, 2006) though the EPA is a recognizable agency, they are not the only ones who promoting new ways of going green in the technological aspect. Organizations such as European Union and TCO Certification are one of the leading groups in green computing.

To promote green computing concepts at all possible levels, the following four complementary approaches are:

- **Green use:** Minimizing the electricity consumption of computers and their peripheral devices and using them in an eco-friendly manner.
- **Green disposal:** Re-making an existing computer or appropriately disposing of, or recycling, unwanted electronic equipment.
- **Green design:** Designing energy-efficient computers, servers, printers, projectors and other digital devices.
- **Green manufacturing:** Minimizing waste during the manufacturing of computers and other subsystems to reduce the environmental impact of these activities.

23.5 ADVANTAGES AND DISADVANTAGES OF GREEN COMPUTING

Advantages:

- Green computing concept is eco-friendly
- It results in energy saving
- Conserving energy by green computing decreases air pollution
- Reduces gases in the air, such as, carbon dioxide, sulfur dioxide, and nitrogen oxide
- It is very cost-effective (pays over time)
- Green IT saves more money per year

Disadvantages:

- Green computing needs a high startup cost
- It is not possible for everyone to implement and not readily available for all
- Concept is still in experimental stages

23.6 PRACTICAL USEFULNESS OF GREEN COMPUTING

The ever rapid growth of technologies and innovations brings forth many ways on how green computing will have a positive impact, along with great benefits. The benefits of green computing are huge, not only from just the consumer, or business, or country's standpoint, but a global profit. Green computing helps decrease energy demands, waste, and money of how we use technology which positively effects the environment, and our costs. Overall the benefits of green computing will result in saving money, reducing costs, and conserving energy, along with helping the environment.

23.7 POWER CONSUMPTION STATISTICS

Different energy usage of components of a personal computer can be given as follows:

1.7.1 Table: Energy usage of components of a personal computer

Component	Power consumption
Desktop Computer	60-250 watts
With screen saver running	-do-
On Sleep / standby	1-6 watts
Laptop Computer	15-45 watts
17-19" LCD Monitor	19-40 watts
20-24" LCD Monitor	17-72 watts
CRT Monitor	150 watts

- If the computer is used for 8 hours, 5 days a week the total power consumption = 562 Kilo-Watts.
- If the computer is left on all the time without proper power saver modes, this can lead to a power loss of 1,600 Kilo-Watt.
- For a large institution, say a university of 40,000 students and faculty, the power bill for just computers can come to \$2 million per year.
- Data Center is a storehouse of huge number of computer systems and associated components in which one single room contains 100 Racks and 1 Rack = 5 to 20 kw. For eg. Sun Data center in 2006 produced 10 K tons of CO₂ and WW Data center in 2006 produced 200 M tons of CO₂ which is equal to the CO₂ produced by approximately 40 million cars.

(# Source: Faculty Forum, April 1, 2008- Department of Computer Science, Chapman University)

23.7.2 ENERGY USAGE PROFILE (EUP):

EUP is a fundamental part of every application design- through the use of a set of EUP organizations of the future measure the ongoing energy costs and environmental impact of specific applications within the enterprise. EUP for different electrical components can be given as following:

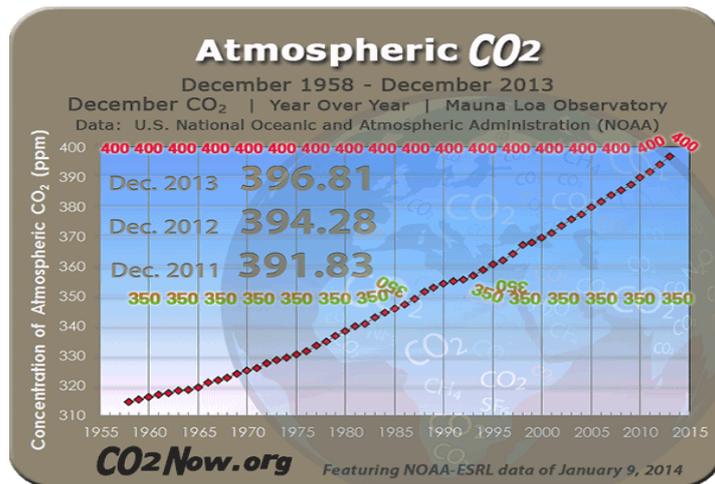
23.7.3 Table: Energy usage profile (EUP)

Component	Power consumption	Amount of CO ₂ emission
CFL bulb	767 KWh per year (13-15 W avg.)	1158 lbs per year
Fluorescent bulb 60 W	0.06 KWh	1208 lbs per year
Ideal computing server	383.75 W in idle 454.39 W in stress	7731.8 lbs per year

Source: Rajesh Chheda, Dan Shookowsky, Steve Stefanovich, and Joe Toscano, "Profiling Energy Usage for Efficient Consumption"

The gradual rise in atmospheric CO₂ has reached 393.31 ppm upto September, 2013 data from 314 ppm during 1955 which is a rising global concern for all. The graph depicting the same is given in the fig. 1.7.4

23.7.4 Figure: Gradual rise in atmospheric CO₂



#Source: co2now.org CO₂ Data Set: Original NOAA-ESRL data file dated January 9, 2014

Now, organizations are apprehending that the source and amount of their energy consumption significantly contributes to GHG emissions. In this connection organizations are currently using the following equation:

Reduced energy consumption

- = reduced greenhouse gas emissions
- = reduced operational costs for the data center and business

For architecture models, it means adopting fewer and more energy efficient systems while refactoring application environments to make optimal use of physical resources (doing more work with less code and systems) as well as leveraging providers that are more energy- and GHG -efficient.

A typical data center consumes energy in four basic areas:

- Critical computational systems (servers, networks, storage)
- Cooling systems
- Power conversion such as power distribution units (PDU)
- Hoteling (everything else: lighting, and so on).

23.8 INITIATIVES OF GREEN COMPUTING

As the energy costs are rising the need for accountability regarding global warming is widening and thus many companies are adopting green computing initiatives to save money and sustain the environment. Following are top ten initiatives of green computing:

- **Improved Data Center Cooling Methods:** This is achieved by improving the data center cooling configuration, eliminating hot spots and energy leaks.
- **Consolidate Servers Using Virtual Software:** IT companies have been using numerous servers, each one dedicated to a specific task. By using virtual software to perform these tasks, one server may be used to power these virtual servers, dramatically reducing energy consumption.
- **Alternative Storage Methods:** Storage drives are another main component of data center hardware and as companies' storage needs increase; more energy is used to power these hard drives. This can be remedied by using large capacity drives and performing examination to eliminate redundancies in the system.

- **Reconfiguring Data Center Floor Layouts:**Restructuring the layout may be achieved by using hot and cold passageway configurations with appropriate air conditioning units at various locations, separating warm air from cool air.
- **Use of Thin Clients:**With thin clients, each employee has a virtual desktop that includes a mouse, keyboard and screen while the remaining unit is shared by all at a central location.
- **Consolidate Printers Via Output Management:** Achieved using one, centrally located printer, to handle all printing tasks virtually eliminating numerous machines.
- **Print Suppression:** It is wasteful in today's society to print many documents when we have e-mail, electronic signatures, and the ability to create PDF documents. This saves time, energy and money by reducing the use of printers and paper.
- **Explore Alternative Energy Sources:** Whenever possible, cleaner energy sources should be used to power data centers, such as nuclear or hydroelectric power. This saves money and generates fewer emissions.
- **Asset Usage Practices:** This includes using energy saving settings and encouraging employees to turn off equipment at the end of the work day and on weekends.
- **Proper Disposal and Recycling:** This is so important because it potentially eliminates the threat of harmful toxins being released into the environment and allows for the reuse of equipment reducing the amount of waste.

23.9 APPROACHES TO GREEN COMPUTING

The need to reduce power consumption is obvious. Gone are the days of measuring data centers by square foot of space. Now, data centers are increasingly sized by the watt. More efficient technologies with new capabilities are being encouraged as solutions. Continuously reducing environmental impact is more challenging. There is a consensus that serious negative environmental repercussions are the consequence of manmade pollution.

The most common environmental impact measurement is labelled carbon footprint, usually measured in CO₂eqv. (Metric tons of CO₂ equivalent) based on the source of energy and amount consumed, manufacturing and logistics impact as well as end-of-life impact (e-waste, environmental externalities, and so on).

Examples of Green IT include the following:

- a) Disposal of e-waste&recycling
- b) Virtualization
- c) Power management
- d) Telecommuting
- e) Return on investment (ROI)

23.9.1 E- WASTE MANAGEMENT AND GREEN IT

E-Waste for short - or Waste Electrical and Electronic Equipment - is the term used to describe old, end-of-life or useless appliances using electricity. It includes computers, consumer electronics, fridges etc which have been disposed of by their original users.

"e-waste" is used as a general term embracing all types of waste containing electrical components. e- Waste contains both valuable materials as well as harmful materials which require special handling and recycling methods. Examples of e-waste includes: Computers, LCD / CRT screens, cooling appliances, mobile phones, etc., contain precious metals, flame retarded plastics, CFC foams and many other substances.

Management of e-waste

e- Waste management practices consist of various means of final disposal of end-of-life equipment which have different impacts on human health and the environment. It can be distinguished between state-of-the-art recycling technologies (Detoxication, Shredding, Refining), which conform with high environmental and occupational health standards and hazardous technologies (Incineration, Land filling) that bear a great risk for both health and the environment and are often applied in countries, where no strict standards exist.

Recycling

Recycling raw materials from end-of-life electronics is the most effective solution to the growing e-waste problem. Most electronic devices contain a variety of materials, including metals that can be recovered for future uses. By dismantling and providing reuse possibilities, intact natural resources are conserved and air and water pollution caused by hazardous disposal is avoided. Additionally, recycling reduces the amount of greenhouse gas emissions caused by the manufacturing of new products.

23.9.2 VIRTUALIZATION

Virtualization is a term used to mean many things, but in its broader sense, it refers to the idea of sharing. It is the process of running two or more logical computer systems on one set of hardware (fig. 2). Virtualization helps a company / enterprise lower power and cooling consumption, by reducing the number of machines and servers it needs.

Reference Model for Virtualization

To understand the different forms of virtualization and the architectural implications for creating and deploying new applications, a reference model has been created to describe the different forms of the concept. In this model we observe a number of different layers of abstraction at which virtualization can be applied, which we describe as increasing levels of maturity, shown in Table 1. Here higher levels of virtualization maturity correspond to lower energy consumption, and therefore architectures based on higher levels of maturity are “greener” than those at lower levels.

Different virtualization levels are:

- **Level 0 (“Local”)** means no virtualization at all. Applications are all resident on individual PCs, with no sharing of data or server resources.
- **Level 1 (“Logical Virtualization”)** introduces the idea of sharing applications. This might be, for example, through the use of departmental servers running applications that are accessed by manyclient PCs. This first appeared in the mainstream as mainframe and then “client/server” technology, and later with more sophisticated N-tier structures. For example, there may be numerous systems carrying out customer relationship management (CRM) functions.
- **Level 2 (“Data Center Virtualization”)** is concerned with virtualization of hardware and software infrastructure. The basic principle here is that individual server deployments do not need to consume the hardware resources of dedicated hardware, and these resources can therefore be shared across multiple logical servers. This is the level most often associated with the term virtualization. The difference from Level 1 is that the hardware and software infrastructure upon which applications/ servers are run is itself shared. For server infrastructure, this is accomplished with platforms such as Microsoft Virtual Server and VMware among others, where a single physical server can run many virtual servers. For storage solutions, this level is accomplished with Storage Area Network (SAN) related technologies, where physical storage devices can be aggregated and partitioned into logical

storage that appears to servers as dedicated storage but can be managed much more efficiently.

- **Level 3 (“Cloud virtualization”)** in the virtualization maturity model extends Level 2 by virtualizing not just resources but also the location and ownership of the infrastructure through the use of *cloud computing*. This means the virtual infrastructure is no longer tied to a physical location, and can potentially be moved or reconfigured to any location, both within or outside the consumer’s network or administrative domain. The implication of *cloud computing* is that data center capabilities can be aggregated at a scale not possible for a single organization, and located at sites more advantageous that may be available to a single organization. Servers and storage virtualized to this level are generally referred to as Cloud Platform and Cloud Storage, with examples being Google App Engine, Amazon Elastic Compute Cloud, and Microsoft’s Windows Azure. Accessing this infrastructure is normally done over the Internet with secure sessions, which can be thought of as a kind of virtualized discrete VPN.

23.9.3 Table: Levels of virtualization maturity

Virtualization Maturity	Name	Applications	Infrastructure	Location	Ownership
Level 0	Local	Dedicated	Fixed	Distributed	Internal
Level 1	Logical	Shared	Fixed	Centralized	Internal
Level 2	Data Center	Shared	Virtual	Centralized	Internal
Level 3	Cloud	Software as a Service	Virtual	Virtual	Virtual

Each level of maturity has a number of significant technology “aspects” of the computing platform that may be virtualized. A summary of the virtualization layers as they map to the server, storage, and network aspects is shown in Table 1.9.4.

23.9.4 Table: Technology aspects for virtualization

Virtualization Maturity	Technology Aspects			
	Name	Server	Storage	Network
Level 0	Local	Standalone PC	Local disks	None
Level 1	Departmental	Client/Server, N-Tier	File Server, DB Server	LAN, Shared services
Level 2	Data Center	Server virtualization	SAN	WAN/VPN
Level 3	Cloud	Cloud platform	Cloud storage	Internet

23.10 CLOUD COMPUTING- A BRIGHTER SHADE OF GREEN IT

Cloud computing provides the next big thing in computing- some interesting architectural constructs, some great potential from a monetary aspect, and a very genuine option to provide a more environmentally friendly computing platform. Fundamentally, cloud computing involves three different models:

- Software as a Service (SaaS), refers to a browser or client application accessing an application that is running on servers hosted somewhere on the Internet.
- Attached services refers to an application that is running locally accessing services to do part of its processing from a server hosted somewhere on the Internet.

- Cloud platforms allow an application that is created by an organization's developers to be hosted on a shared runtime platform somewhere on the Internet.

All of the above models have one thing in common- the same fundamental approach of running server components somewhere else, on someone else's infrastructure, over the Internet. In the SaaS and attached services models the server components are shared and accessed from multiple applications. Cloud Platforms provide a shared infrastructure where multiple applications are hosted together.

23.11 GREEN COMPUTING THROUGH POWER MANAGEMENT

Techniques of efficient power management can reduce the power consumption of different hardware components of a computer thereby leading to minimal emission of GHG. They may be given as follows:

- If the computer is going to be inactive for more than 16 minutes, consider turning it off instead of keeping it on as after this time, the energy needed to run the computer outweighs the start-up energy.
- Use power saver mode
- Use hardware/software with the Energy Star label
- Use Energy star 6.0 (latest) compliant PCs for low power consumption
- Use LCDs instead of CRTs as they are more power efficient
- Don't print unless necessary and you are ready

If you're interested in ways to reduce your power consumption, here are ways you can go "green" at home:

- Buy "Energy Star" labelled monitors, desktops, laptops, and printers. The "Energy Star" devices can be programmed to "power-down" to a low power state when they are not in use, helping you save energy and run cooler which helps them last even longer. The Energy Star specification for computers was revised on October 20, 2006 and goes into effect July 20, 2007. The specification includes new performance requirements to qualify for the Energy Star rating for desktop and notebook computers, workstations, integrated computers, desktop-derived servers and game consoles.
- Put laptops in "sleep" mode when not in use. The EPA has estimated that this reduces their energy use by 60 to 70 percent – and ultimately could save enough electricity each year to power Vermont, New Hampshire, and Maine, cut electric bills by \$2 billion, and reduce carbon dioxide emissions by the equivalent of 5 million cars.
- Even better, turn OFF computers and other equipment when not in use. Despite the debate over whether it's better for your computer to be left on or shut off, the fact is it's better for the environment to shut it off. Trust me, your computer can handle it just fine; in fact, computers were designed to be turned off and back on!
- E-cycle used computer equipment. Find a recycler in your area. Also, Staples, the office supply retailer, has now started a recycling program. They will accept any brands of used desktop and notebook computers, monitors, printers, fax machines and all-in-one devices with a fee of \$10. Smaller items like keyboards, mice and speakers are free to drop off.
- Buy the new "Smart Strip" power strip. The Smart Strip actually senses how much power your computer peripherals use. And when the Smart Strip senses that you've turned your computer off, it automatically shuts off your peripherals, too, preventing them from drawing an idle current, which is the current drawn even after equipment is shut off.

23.12 TELECOMMUTING

Teleconferencing and telepresence technologies are often implemented in green computing initiatives. The advantages are many; increased worker satisfaction, reduction of greenhouse gas emissions, and increased profit margins as a result of lower overhead costs for office space, heat, lighting, etc. The savings are significant; the average annual energy consumption for U.S. office buildings is over 23 kilowatt hours per square foot, with heat, air conditioning and lighting accounting for 70% of all energy consumed.

Rather than traveling great distances, in order to have a face-face meeting, it is now possible to teleconference instead, using a multi-way video phone. Each member of the meeting, or each party, can see every other member on a screen or screens, and can talk to them as if they were in the same room. This brings enormous time and cost benefits, as well as a reduced impact on the environment by lessening the need for travel - a damaging source of carbon emissions. Voice over IP (VoIP) reduces the telephony wiring infrastructure by sharing the existing Ethernet copper (a toxic metal).

23.13 RETURN ON INVESTMENT (ROI)

Green IT or Green computing has become a paranoid area as far as budget focus and being environmentally responsible is concerned. Both small and large companies are facing with new challenges on how to 'save the environment' and cut their own costs. The benefits are sinking into corporate mindsets as IT – the largest technology industry – has been inundated with one IT cost saving solution after another. It is being exploited globally as solutions for a greener IT emerge from Microsoft, Dell, Cisco, HP and Sun. The gains become the focus here and are being recognized and implemented. There are obvious cost savings occurring.

The intentions to be environmentally friendly are not as widespread as ROI gain, just a little lower in the order. Why? Green IT is embarking on a new period of growth. The vendors like Microsoft are all seeing a rise in sales with solutions for IT departments that solve all kinds of issues and at a lower cost. Energy-efficient solutions from the top vendors are saving money for companies.

Employers are now encouraging their employees to save energy with an emphasis on simply turning off computers to monitoring the number of computers running on IT network architectures. This action promotes awareness and responsibility inside the office environment that is being enforced more and more each year. So, it means this – Green IT technology results in a higher ROI as it's simply a huge step in the cost cutting process. The ROI increase as a result of Green IT is something that will literally save disintegrated businesses that grab the huge cost-saving business benefits.

23.14 ROLE OF KVKs IN IMPLEMENTING GREEN COMPUTING

Krishi Vigyan Kendras (KVK) can play a major role in implementing the global concern concept of green computing in every district right from the village level thereby saving the world and country inside it from the ill effects of global warming due to carbon emissions and other means in near future. Being a district knowledge centre consisting of multi-disciplinary scientists following approaches can be taken to turn the present computing into greener one:

- KVK scientists can organize awareness camps in collaboration with line departments to bring awareness about the dreadful effects of e-waste on environment and its recycling methods.
- Training programme can be organized by KVK scientists to train rural youth and extension functionaries on the hazardous effects of mobile phones and other electronic gadgets of similar type on human health and environment.
- Instead of using individual computers a local area network (LAN) can be designed at KVK offices so that each employee will have a virtual desktop that includes a mouse, keyboard and screen while the remaining unit like server CPU, printer, modem etc. will be shared by all at a central location.

- As open source software system is expected to find place in KVK system in near future, the computer programmers in KVK system can work on the methods like virtualization, power management techniques to minimize the effect of GHG on the environment through open sources.
- Telecommuting methods can be used to interact with the farmers for giving solutions to their problems instantly which may indirectly contribute to greener IT. Infrastructure for strengthening telecommuting must be provided by ICAR to all KVKs in this connection.
- Workshops could be organized for school children to train them on different power management techniques of computers and use of eco-friendly gadgets so that the initiative of green IT can start right from every home.
- Use of less paper and use of more soft media should be made mandatory at KVK office at least once in a week at first and gradually twice or thrice in a week by the approval of Programme Coordinators which may contribute another step towards the objective.

23.15 CONCLUSION

So far, when buying computers, consumers care about the speed and priceonly and do not care about the ecological impact of the device. But as Moore's Law marches on and computers commoditize, consumers will become pickier about being green. Devices use less and less power while renewable energy gets more and more portable and effective. New green materials are developed every year, and many toxic ones are already being replaced by them. The greenest computer will not miraculously fall from the sky one day, it'll be the product of years of improvements. The features of a green computer of tomorrow would be like: efficiency, manufacturing & materials, recyclability, service model, self-powering, and other trends. Green computer will be one of the major contributions which will break down the 'digital divide', the electronic gulf that separates the information rich from the information poor.

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ICT Interventions for Farming Community

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24.1 OVERVIEW

- Introduction
- Role of ICT in Agriculture
- ICT Innovations
- Indian pilot projects in Agriculture domain
- Conclusion

24.2 INTRODUCTION:

ICT (information and communications technology - or technologies) is an umbrella term that includes any communication device or application, encompassing: radio, television, cellular phones, computer and network hardware and software, satellite systems and so on, as well as the various services and applications associated with them, such as videoconferencing and distance learning. ICTs are often spoken of in a particular context, such as ICTs in agriculture, education, health care etc.



Over the last 10 - 15 years, there have been so many developments in ICT that it has changed the way the world works, plays, communicates and shops. Many of these changes are seen the world over, some are restricted to more advanced countries.

These changes have been so pervasive that it is hard to remember what the world was like without them.

24.3 Role of ICT in Agriculture

ICT in agriculture is an emerging field focusing on the enhancement of agricultural and rural development in many countries including India. It involves application of innovative ways to use ICT in the rural domain. It can provide with accurate information necessary for the farmers which facilitates better agricultural output.

Though Public-Private Partnership, private initiative and government programmes are there, but it is still in nascent stage in India and evolving as an emerging trend. The benefit of ICT is yet to reach all the farmers, many farmers, especially those who are marginal or sharecroppers are not getting this service or it's better to say they are not availing this due to poor economic condition and social constraint. Other factors are illiteracy, language barrier, and unwillingness to adopt the new technologies.

A new paradigm of agricultural development is fast emerging in both developing and developed countries. The overall development of rural sector is also taking a new direction while growing; at the one hand, old ways of delivering important services to citizens are being challenged and on the other, traditional societies are being transformed into knowledge societies all across the world. E-connectivity is the key word in the new social order.

The report of the „Task Force on India as Knowledge Superpower“ (GOI, 2001) emphasized „the necessity of developing the capacity to generate, absorb, disseminate and protect knowledge and exploit it as a powerful tool to derive societal transformation.“

ICT is seen as an important means of achieving such a transformation. When used as an extensive device for providing local farming communities with scientific knowledge, ICT initiates the formation of knowledge societies in the rural areas of the developing world. However, this can only be realized when knowledge and information are effectively harvested for overall agricultural and rural development. The development of precision farming in Northern countries harps on knowledge-intensity; thus, the agricultural archetype in the developing world will have to be redesigned to take advantage of knowledge availability to achieve multiple goals like income, food, jobs, etc. ICT has a significant role to perform in developing such a paradigm.

24.4 ICT Innovations:



24.4.1 Radio

Over two billion people live in rural areas of developing countries. In India, most agricultural communities live in rural areas. In these rural areas one finds that there is a direct relationship between agricultural and rural development. This comes about by the fact that most people in rural areas depend on agriculture for their livelihood.

Because such a large population lives in rural areas, they are often the birthplace of trends and events, which will have a major impact on cities later on. For example food is grown there to feed the whole nation and droughts, diseases and infestations to crops are first felt there. Even research meant for better farming practices is tested there. Therefore there is needed to keep the communities informed of what is happening in and around them in order for them to adapt to varying situations.

In this breath, radio has forever time stood out as a major dialogue initiator, temperament respondent and untiring arbitrator. The link therefore between radio, the rural community, agriculture and development cannot be over emphasized.



Source- Abhilakh Likhj: Challenges for Community Radio in India's Rural Development

The nature of life in most rural communities is that of a subsistence manner. The communities need basic life necessities like food, shelter, and clothing, all mainly got from agriculture. It is therefore important that the agricultural sector is developed, in order to develop the rural areas. The pivotal role of rural broadcasting therefore becomes handy.



Television (TV)

Television seems to be an effective medium among the mass media, which can be used effectively for agricultural technology transfer among the farming community. It has been acclaimed to be one of the most important communication tools available today. Much of its success in teaching lies in the unique combination of sight, sound, and motion. This coupling of audio and visual stimuli has proven that it can change human behavior and ultimately improves farmer learning. It has the potential of providing information very easily to large audience dispersed over wide geographical areas. Which is impossible through personal contacts argued that certainly video technology plays an increasingly important role in the economical delivery of information.

Television is one of the powerful channels of the mass media, which transmit information very fast about agricultural technology among the farmers community. It is playing very significant role in making awareness and knowledge about latest agriculture technologies information among farmers. It is one the best source of spreading information about new technologies and new innovation of agriculture among farmers which is faster than personnel contacts.



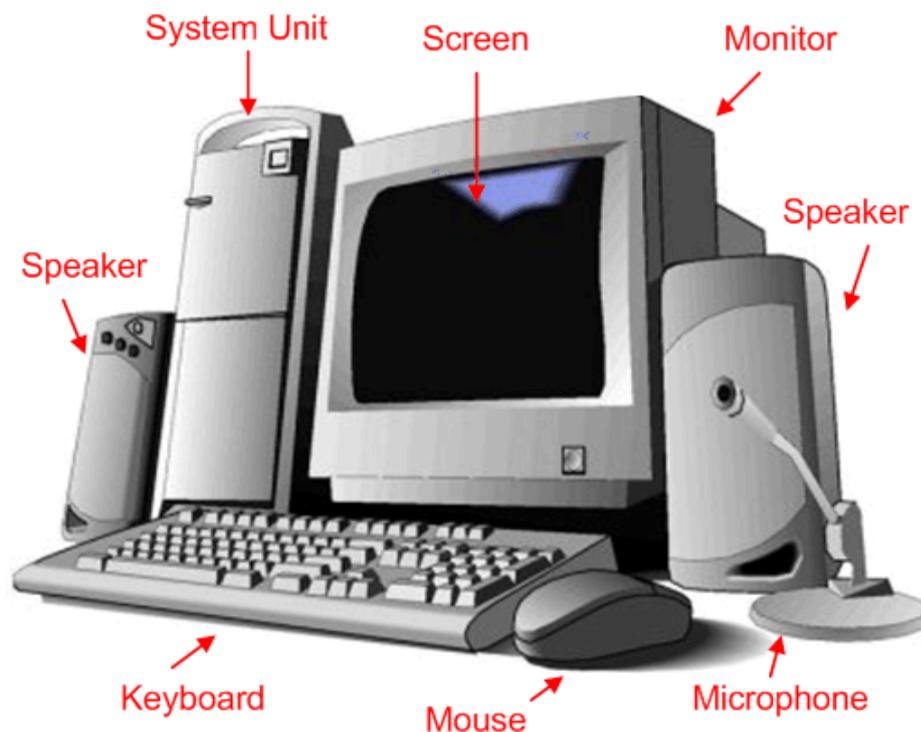
Source- Ken Banks of National Geographic Emerging Explorer

In India DD National is running one programme Krishidarshan which is very popular in farmers. The main objectives of this programme was to create awareness among the rural viewers and to acquaint themselves with the latest technical and scientific knowledge with regard to crop cultivation practices, use of fertilizers, soil-testing, dairying, animal –husbandry, sericulture, horticulture, fishery, poultry, weather forecasts, etc.

Computer

Many farmers shun using ICT because they believe it is complicated and overly expensive but in reality, there are many benefits to be derived from using such systems. Let us investigate.

A computer is a tool for processing **data**. Processed data is called **information**. Thus a computer is a tool that enables us to input agricultural data such as farm records or financial records and it outputs relevant information such as yield information or profits to support us in our business and daily lives. A computer can also be viewed as an automatic electronic device, that process and stores data. Figure below shows the components that make up a typical personal computer (PC) or desktop system. The most popular, and not very expensive.



Laptops:

- ▶ Portable and Briefcase sized
- ▶ As powerful as a PC but more expensive



Palmtop Computers:

- ▶ Portable Hand-held computers.
- ▶ Does very simple functions, and relatively cheap.
- ▶ Also called “Notepad”.



Internet

Amongst the various means for information communication are available, satellite based internet communication found very efficient, accurate, quick and somewhat cheaper in the field of disseminating the information from research system to farmers. Internet communication has touched almost all the district in our country and is mainly down up to the village levels. Internet offers a means for bridging the gap between developmental professional, rural people and agricultural producers through the initiation of interaction and dialogue.

Some 2.5 billion people in the developing world depend upon agriculture for their livelihood. More than 1.5 billion of these are smallholder farmers. These smallholder farmers are at the bottom of

the pyramid in terms of income, literacy, and access to information and services—yet they represent, on average, more than a third of economic activity for the world’s least developed countries.

To escape poverty, smallholder farmers need to enhance their skills and knowledge, and the entire smallholder-dominant value chain needs to become more competitive. The combined effect of these two factors can improve agricultural productivity and raise the incomes of rural dwellers. The Internet can play a pivotal role by providing a cost-effective way to deliver information services to a large, dispersed population. Internet technology can deliver knowledge to farmers and planning tools to agribusinesses, and connects the various players in the value chain so they can conduct commerce more efficiently.

How to connect to the Internet?

Before connecting to the Internet you must determine how you're going to connect to the Internet. Are you going to be connecting to the Internet using a modem or a broadband Internet connection?

Connecting to the Internet using a computer modem is the most widely available method of connecting to the Internet. Although connecting to the Internet with a modem is a much cheaper solution, it will be a much slower connection. To connect to the Internet using a modem, your computer must have a modem and be in reach of being connected to your home phone line. Almost every computer today will come included with a modem, although many computer manufacturers are not including modems because of the increased popularity of broadband connections.

Connecting to the Internet over broadband is becoming a popular solution for connecting to the Internet. Broadband is a much faster solution for connecting to the Internet when compared to a modem and allows you to do more exciting things on the Internet and have a much more enjoyable experience loading web pages without having to wait for each page to load.



Source- The e-Choupal: Empowering India’s Rural Farmers



Mobile Technologies:

Smallholder agriculture dominates the landscape of the developing world. Increasing their productivity and incomes can make a major contribution to reducing hunger and poverty. Indian agriculture is the home of small and marginal farmers (80%). Therefore, the future of sustainable agriculture growth and food security in India depends on the performance of small and marginal farmers.

Indian telecommunication revolution that too wireless connectivity made it possible to reach to unreachable located consumers through mobile services. During the present decade, India has seen an exponential growth in the telecom particularly in wireless.

With quality information at rural people fingertips, and appropriate mobile services available in local languages, rural people can make improved decisions, specific to each individual. Still expanding their vast reach and simplicity of use at affordable cost, mobile devices are now in a position to extend public services to rural people at corner of the country. As a result, there is a growing focus on m-based services implementation by public and private bodies ready to disseminate information as per the needs of the rural people.

The basic core needs and demands of the end-users are mobile services at affordable cost creating confidence on users. The applications used in the services are of short message service (SMS), multi-media service (MMS) and voice stream options. These are customised based on 4 subjectivity such as literacy, usage pattern, social acceptance, domain specific and life-style of rural farmers in various states. Most of the initiatives are push-based method providing opportunity to fill the knowledge transfer to end users" basic needs.



Farmers of South Sikkim

24.5 Indian pilot projects in Agriculture domain:

i. aAqua Mini – It offers real-time decision-support tools (aAQUA) to progressive farmers and organizations supporting progressive farming. The project envisaged working on revenue generating business model. The services provided are broadly to farmers include, localized – remote crop diagnostic solution; audio prompted guide application (in English/Marathi/Hindi); remote crop & land properties based disease diagnostics; micro-weather info (temp, cloud cover, precipitation); SMS enabled register and query mechanism; online poll for registered users; spam, search, rank features; and service is available on GSM and CDMA networks. The aAQUA eAgriService is a problem-solving system dedicated to find solutions to problems posed by Indian farmers - small and large. Answers to agri-related queries are sent in 24 to 72 hours depending on the difficulty. 60 Experts from the expert forum who come from diverse areas of expertise.

ii. Fisher friend – The Fisher Friend project of the M.S. Swaminathan Research Foundation (MSSRF) in Tamil Nadu and Puducherry leverages mobile technology to provide vital livelihood information to fisher folk.

MSSRF partnered with Qualcomm, Tata Teleservices and Astute Technology Systems for developing the Fisher Friend Mobile Application. The tool was designed after a thorough needs assessment of the fisher communities and incorporation of feedback from central stakeholders. Upon sending a single-button-click request from an icon-based software module on mobile, fishermen gain access to vital updates on wave height, wind speed and direction, potential fishing zones, news, government schemes and market prices. All content is displayed in the local language - Tamil.

iii. mKrishi – Tata Consultancy Services” (TCS) Mobile Agro Advisory System (mKRISHI) connects farmers with an ecosystem that empowers them to make efficient decisions about agriculture, drive profits, and conserve the environment. This allows the farmer to make a query in a local language from a mobile phone and receive personalised advice or relevant information on the same in local language (Robert Horvath, 2008). This is the project working on private partnership based revenue generating business model in Maharashtra and Uttar Pradesh states at present. It is

testing to test its sustainability with Indian farmers' needs. The services provided are broadly to farmers include, crop disease diagnosis; sensors based remote land & crop property recording (grape, cotton, soybean and potato); micro-weather Information (temp, cloud cover, precipitation) and service is available on CDMA networks only, but not on GSM networks.

iv. Reuters Market Light (RML) – It offers Indian farmers up-to-date, local and customised commodity pricing information, news and weather updates (Amit Mehra, 2007). The project is working on public private partnership (PPP) revenue generating business model in Maharashtra and Punjab states. The broad services provided to farmers include, localised - commodity pricing (Onion, Cotton, Soybean, Pulses, Pomegranate et al); weather updates; news (agriculture & general) and service is available on GSM networks only, but not on CDMA networks. Reuters Market Light is a pioneering mobile phone-based highly-personalised professional information service specially designed to support the farmer community.

RML was launched in India in the state of Maharashtra in October 2007 and in October 2008 in the state of Punjab. Today RML operates in 13 states in India and covers over 250 crops and more than 1000 markets and 2800 weather locations across these states.

v. IFFCO Kisan Sanchar (IKSL)- The idea is to make use of IFFCO's (Indian Farmer Fertiliser Co-operative) deep extensive reach and establish a low cost telecom distribution channel through the network of cooperative societies. To accomplish the task, IFFCO tied up with Airtel to build and offer a platform for the farmers through the cooperative society network. The unique venture provides the farmer the much desired inputs on real time basis which is going to help him on agri-related issues and would guide him for his day to day chores. The project is working on public-private-NGO partnership based revenue generating business model across major states covering in two stages. The services to farmers include, telecom products and services of Airtel; free daily voice updates on VAS platform (mandi prices, farming techniques, weather forecasts and fertilizer availability) and dedicated helpline for farmers to answer their queries

vi. Life Tools – It is having a range of agriculture, education and entertainment services designed especially for the consumers in small towns and rural areas of the emerging markets (Nokia report: 2008). This project works on private partnership (PP) based revenue generating business model in India. The services include, information on seeds, fertilizers, pesticides, weather (temperature, rainfall, wind conditions) and prices in English, Marathi and Hindi language option and prevailing market prices, education service in dual language display option.

vii. CERES – It aims to assist farmers by providing exhaustive information covering all areas in timely and customized manner to meet specific local needs to increase the overall productivity of agricultural practices (Anurag et al, 2008). This is the project working on private partnership based revenue generating business model in Gujarat state covering 78 villages in Vadodara district. The services provided specific to farmers include, information on seeds, fertilizers, pesticides, disease and farming input; market prices and weather (micro-climatic, rain/storms, temperature, humidity, precipitation, wind speed) on weekly and monthly basis.

viii. KISSAN Kerala – It is an integrated, multi-modal Agricultural information system, which provides several dynamic and useful information and advisory services for the farming community across the state of Kerala. The core deliverable and achievements of the project is an integrated multi-component, multi-modal delivery of Agriculture Information Services system that is accessible anywhere anytime by all concerned. The project adopted a strategy of providing right information to the right people in the right context and empowers the farmers with adequate knowledge, which helps them to take better decision. The project solves the problem of content gaps by providing the authentic agricultural information through various delivery methods like Television, Internet, Telephone, and Mobile. The farmers may choose any medium to seek the relevant information. The project offers the following major services through the effective integration of ICT systems and tools to reaching out to the farming community.

(A) Online Agri advisory service: The dynamic, multi-lingual portal based online Advisory services for the farmers (www.kissankerala.net) provides several interactive contents and dynamic advisory services for the farmers. The farmers can seek the advisory from the expert scientists through online and get better scientific advisory for their problems

(B) Kissan Krishideepam : It deals with production and telecast of Agriculture based weekly Television programme - in local language through Satellite channel.

(C) Online Agri video Channel: The project has launched the country's first online video channel in Agriculture in collaboration with Google/YouTube with more than 150 telecast quality videos.

(D) Tele Advisory Services: The project also provides telephone based Agri advisory services through a dedicated telephone number to provide real-time information and advisory; A dedicated telephone connection has been established and backed up by Agricultural scientists.

(E) The mobile based Agri Advisory services: The project offers text, voice and video content based Agri information services through mobile phones. : A dedicated PAN India based mobile based service has been established to provide text, voice and video based information services. It offers several services like crop advisory, weather forecast, soil test information etc through farmers mobile.

ix. Sanchar Shakti

This scheme has been initiated by the Universal Service Obligation Fund (USOF) of Department of Telecommunications (DoT), Ministry of Communications & IT to contribute in the empowerment of rural women. "Sanchar Shakti" is a programme of pilot projects aimed at facilitating SHGs' access to ICT enabled services and their contribution towards ICT enabling services. There are 4 categories of projects under this scheme:

- i. The provision of subsidized mobile VAS (mVAS) subscriptions to SHGs which are valid for at least a year.
- ii. The setting up of SHG run mobile repair centers in rural areas.
- iii. The setting up of SHG run modem repair centers in rural areas.
- iv. The setting up of SHG run solar based mobile phone/ Fixed Wireless Terminals (phones) charging centres in rural areas.

It is widely accepted that access to Information and Communication Technology (ICT) can play a crucial role in the development to rural and remote areas and the people residing in such places. This programme envisages using ICT to facilitate the process of empowerment of rural women through delivery of information and skill enhancement.

X. agropedia –ICAR initiative

Content availability and its intelligent organization continues to be a serious challenge in agriculture. This prevents offer of meaningful and efficient advisory and allied services to farmers and other stakeholders.

XI. agropedia is an attempt to infuse semantic and social networking technologies into agriculture information management to alleviate this problem. In its short span, it has developed several path breaking concepts and demonstrated their feasibility:

- Crop knowledge models(KMs)– which are network representations of agriculture knowledge
- Use of KMs for tagging content and people; useful for searching information and locating people with similar interest
- content management platform– for storing and searching everything in agriculture
- agropedia deployment options – appliances for off-line/on-line access where the connectivity is poor

□ Social networking platform – like wikis, blogs, chat rooms for interconnecting agriculture community.

Agropedia also managed to attract human resources from FAO and could connect and link up with several National and International organizations. About 500 mid and senior level experts in the SAU-ICAR (State Agricultural University-Indian Council of Agricultural Research) system have participated in a number of capacity-building programs on agropedia and have contributed to content and KM's.

The agropedia platform stands today as a model of content organisation, its core strengths being semantic web techniques and the methodology to build (and link) knowledge models for crop science and farming systems. These elements have combined to make agropedia a pioneering ICT enabler for agriculture in India. The addition of social networking technologies and openagri, a knowledge repository, has added depth to agropedia's capabilities.

Total 631 Krishi Vigyan Kendras-KVKs (Agriculture Science Centres) have been established across the country at district level with a team of multidisciplinary team of experts. The KVKs aim at technology assessment and refinement and work as knowledge and resource centre in the district. However, with a purpose of extending their reach to large number of farmers on real time basis, some experimentations on mobile applications have been worked out in collaboration with technology and subject matter institutions to create an architecture of content management and its delivery in the form of text and voice messages using mobile phones.

XII. vKVK : Voice Krishi Vigyan Kendra

A voice KVK (vKVK) is a set of advisors (KVK experts) and peers (lead smallholder farmers) connected through mobile and internet technologies. In the vKVK, the interaction between the two parties can be entirely electronic. The agropedia platform acts as 'middle ware' for this interaction providing amplification (one-to-many and many-to-one), persistence (messages are stored and can be searched, retrieved), monitoring and other utilities which are possible when the content is electronically stored and semantically indexed. Sub-systems are developed to address the needs of vKVK scientists, farmers and the middle ware to deliver advisory services, alerts and Q&A services over SMS, voice and Web. Mainly E to F (Expert to Farmer), F to E (Farmer to Expert) and E to E (Expert to Expert) services have been tested and operational zed in voice mode.

There have been experiments in technology dissemination using ICT but the mobile applications recently started can revolutionize the information reach to the resource poor small farmers on real time basis. The content development for different clientele groups in different languages is a challenge but voice messages give an easy option for delivery and its understanding by users in case of most of the handsets. Text messages in different languages may be a limitation on some of the handsets. The cost of voice messages is higher which may be brought down with technology development. The development of appropriate software, content development and its authentication and farmer friendliness, reducing cost of message delivery and involvement of different players may bring an environment of efficient use of mobile services. Timely and actionable information from trusted sources, locally relevant, storable and reference able and access of experts may enhance the effectiveness of mobile services. Video calling facility may further enhance the quality of communication.

XIII. SMS Portal For Farmers

An SMS portal for farmers, the Kisaan SMS Portal, was launched by the Ministry of Agriculture on 16th July, 2013.

The Kisaan Portal aims at reaching information, advisories and services through SMS to more than 12 crore farmers across the country.

Being an instant and non-intrusive medium of communication, the SMS advisories and alerts will enable farmers to take informed decisions relating to different aspects of farming including crop production and marketing, animal husbandry, dairying and fisheries. They can also opt to receive

SMS messages customized to their specific requirements.

Weather forecast and alerts will enable farmers in planning, farming operations effectively and taking the best suited action to deal with adverse weather conditions.

Advisories on disease/pest outbreak will help the farmers to take immediate actions to secure their crops and animals. Advisories on best practices, such as selection of better suited crop variety/ animal breed, will lead to better farm productivity and higher income to the farmers.

Timely market information provided through SMS will give the farmer better bargaining power and he will be in a position to take better decisions about sale of his produce.

SMS advisories will also include soil test results, selection of fertilizer and its dosage, and also information on various programmes so that farmers can make the best use of assistance and know-how being made available by the Government.

Farmers will need to register for this service by calling Kisaan Call Centre on the toll free number 1800-180-1551 or through the web portal.

Officers of various departments, experts and scientists in research institution and in the field will use this portal for disseminating information, giving topical and seasonal advisories and providing services through SMSs to farmers in their local languages. Officers can send SMS to farmers belonging to the entire area of their jurisdiction or a part of it. Grouping of farmers based on their location and their preferred crop/activity will help sending relevant messages to the farmers.

KVK is in the forefront of using ICT in disseminating technologies in agriculture and allied field to reach out the farming community and extension functionaries at faster pace. Now KVK Scientists are also using this service for sending time to time agri-advisories to farmers. The service has been well appreciated by the farmers who have said such a service by the KVK is just in the nick of time when farmers have their crops ready for market.

24.6 Conclusion:-

The information and communication technologies (ICT) sector has seen a revolution since the last ICT sector strategy of the World Bank Group (WBG) was prepared in 2000. The number of mobile phone subscriptions in developing countries has increased from 200 million in 2000 to 3.7 billion in 2010, and the number of Internet users has grown more than tenfold. The progress in the ICT Millennium Development Goal (MDG) indicators has been remarkable: In 2010, the proportion of the population in developing countries with access to fixed or mobile telephone has reached 70 percent; and more than 20 percent of the populations of developing countries are internet users. ICT is thus no longer a luxury good but an essential utility for the poor including those in low-income countries. As a result, its vital role in advancing economic development and reducing poverty has been expanded and increasingly recognized.

Technological progress has been the biggest driving force behind agricultural growth and economic development since 1990 which lifted more than 10 percent of the world's population out of poverty. A key driver to a country's growth, development in ICT infrastructure has attracted considerable amounts of investment, and generated significant fiscal revenues and employment opportunities in developing countries.

Providing access to information, making markets more efficient, fostering social inclusion, and equalizing opportunities in rural areas, ICT offers an innovative and unprecedented tool to directly reduce poverty. The wireless communications networks, with more than 5 billion subscriptions globally, are now the world's largest platform to deliver useful information as well as a wide range of public and social services to people including in rural and poor areas. Examples of such

services emerge continuously. Farmers in remote villages of India are using mobile phones to access the most current crop prices. Rural fishermen in remote villages know where to fish based on satellite mapping of fish colonies. Migrant workers in Sierra Leone have cut out intermediaries and can now transfer money almost instantly through mobile banking to relatives in remote villages. Land registration, education programs, health care, and voting are other examples of services that are often difficult to access by poor people in remote areas, but are now being extended to these communities in a timelier manner and cost effectively.

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An ONLINE REPOSITORY (INSTITUTIONAL RESOURCE HUB)

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25.1 OVERVIEW

- Introduction
- Issues on using online repository
- Imperative tools to dig out information
- Behavioural techniques for fetching Up-To-Date Resources
- Evaluation Of Online Repositories
- Few Specific Online Repositories
- Conclusion

25.2 INTRODUCTION

Online repository is a source of information that is directly accessible to the user without having to travel across a network. Internet has enabled every Individual with a democracy to avail everything, anything and at any time that it has in its repository. Every restricted boundary has been lifted out by World Wide Web and has opened a new era in research horizons. The researchers have access to a new frontier and tool for data collection through online repository. The barrier that comes in while collecting information from online repository is acquiring the accurate, timely, clear, important and most valued information from the giant web of metadata. A little efficiency in data collection and application of the most recent techniques and apps of IT will automatically lead one to cross the barrier in acquiring the most accurate, updated, important and most valued information from the online repository. Online repository can be a place where multiple databases or files are located for distribution over a network, or a repository can be a location that is directly accessible to the user without having to travel across a network. The growth of internet i.e. online data is impressive and unimpeded, because websites are getting double in numbers every 18-24 months. At present we have hit 1 billion sites in 2013 and will reach 2 billion sites in 2015. Over the years, the number of web sites seems to be roughly equal to the number of people on the internet, but what is the content of these multiplying sites or what they do? Few to be cited are as follows, but it has a lot more and more to do.

- Communication with people all over the world using apps like skype, google talk, yahoo messenger, rediff Bol, Microsoft's messenger, ooVoo etc.
- Find out just about anything using search engines like google, yahoo, bing etc.
- Shopping and have it delivered to door steps using online shopping like homeshop18, bagittoday, flipkart etc.
- Going online closer to family and friends using social networking tools like facebook, orkut, etc. (200+ social networking sites are available today)
- Save money and gets things done faster through payment of bills of telephone, RDs, recharges of every mobile or DTH, money transfer etc. without being in Queue for hours.
- Finding video tutorials on every kind of hobby and catching up programmes that are missed out through online videos like youtube.
- Have fun with animations and teaching-learning processes.
- Stay tuned upto date of every second's activity of universe using blogs, forums, twitters etc.

- But above all is the astonishing feature of information content in the web on absolutely anything, from researching family tree to accomplishing any academic task and make one knowledgeable on any topic at a click of mouse.

Everything online is repository of anything. The rapid development of the World Wide Web has lifted the restrictions of geographical boundaries and opened new research horizons. In effect, the online repository has provided the research community with the chance to interface with respondents in many ways through web services. The researcher can now engage in research on a world-wide, low cost on this age of IT. The Internet provides a medium whereby the researcher has access to a world of behaviour and ideas - in the form of emails, bulletin boards, discussion forums, chat rooms, twitters, social networking tools - through which individuals share their innermost thoughts and feelings. As a whole the Internet has formed a virtual community of academicians of the world. The more optimistic view of this new research field suggests that the Internet appears to provide the opportunity to concentrate on specific areas of interest, ask the right questions, talk to enough people, read the readily transcribed answers and develop and identify enough patterns in accomplishing a task.

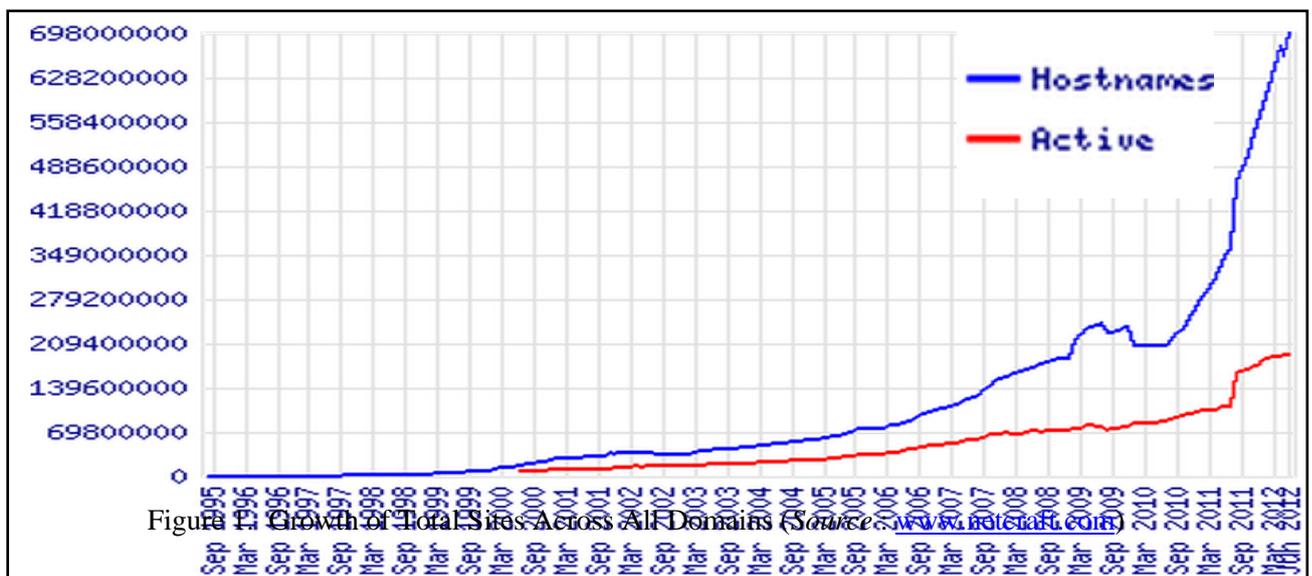


Figure 1. Growth of Total Sites Across All Domains (Source: www.netcraft.com)

Here focus is made on the last and the most spoken feature i.e. Institutional Online Repository for academicians. This astonishing feature i.e enormous content of online information is being used by every literates in every aspect of his/her life to boost his presence in this universe by being tuned himself always up-to-date. Just like any software e.g. antivirus updates himself on being online every day, same is the case of every academician. Online servers are destiny of these respective software and antivirus for getting updated where they are programmed to a specific file for update on the web server. But, the queries come to humans when they wish to get updated. There is no specific file or server for them in the vast universe of online information content or the metadata. They are to filter the information from the good and the bad from the vast metadata. They come into dilemma even if they are loaded with enough data or information acquired from the web. Is the information s/he came into is accurate? Or s/he is going to be crashed with misinformation as a software gets crashed on being updated with wrong source code or wrong version of programme. How far is Online repository accurate, timely, clear, and important? Many adults have the perception that if something appears in print, then it must be true. There are no restrictions on what a person can place on a site or the material is ever edited or reviewed. On the one hand, this has significantly broadened the range of information and ideas available to all of us. On the other, this freedom has allowed irresponsible people to disseminate misinformation for harmful purposes (Lee, 2002; Shiveley, 2004). Whenever such problematic sites are observed, they are required to be made aware through social networking sites or other means of technology that are being employed today. Digizen is a website providing information and advice to encourage responsible digital citizenship. It shares advice and guidance on preventing and responding to cyber bullying. www.digizen.org

25.3 ISSUES ON USING ONLINE REPOSITORY

Since every individual craves to get A+ for his research paper, instead of middling B or gloomy C. Online repository is the room to turn into to get some research paper that will help to definitely get an excellent mark. Researchers and writers are in almost all the time online or offline in search of best and most resourceful information for making their presentations, thesis, and articles etc. of grade A+. Offline sources are seems to be most reliable but time consuming and hard in finding information within a timeframe. So everyone prefers online which is fast and easy in finding the information, but less reliable unless one is experienced and good in harnessing right information through search engines. For finding the right information online, it is good to have basic ideas about search engines and how they actually work.

World Regions	Population (2012 Est.)	Internet Users Dec. 31, 2000	Internet Users Latest Data
Africa	1,073,380,925	4,514,400	167,335,676
Asia	3,922,066,987	114,304,000	1,076,681,059
Europe	820,918,446	105,096,093	518,512,109
Middle East	223,608,203	3,284,800	90,000,455
North America	348,280,154	108,096,800	273,785,413
Latin America / Caribbean	593,688,638	18,068,919	254,915,745
Oceania / Australia	35,903,569	7,620,480	24,287,919
WORLD TOTAL	7,017,846,922	360,985,492	2,405,518,376

Figure 2 INTERNET USAGE STATISTICS Source : <http://www.internetworldstats.com>

25.4. IMPERATIVE TOOLS TO DIG OUT INFORMATION

Search Engine is a program that searches for and identifies items in a database that correspond to keywords or characters specified by the user, used especially for finding particular sites on the Internet. A search engine is really a general class of programs, however, the term is often used to specifically describe systems like Google, Bing and Yahoo! Search that enable users to search for documents on the World Wide Web.

Among the billion websites in the network one may get puzzled in the World Wide Web and may perceive disinformation due to the nature of electronic media. When one wants to find source of a specific topic, service or product s/he uses the Internet search engine. Today there are a number of search engines, and while they work differently, they all use Webcrawlers (also called bots) that are designed to index pages on the Web and also words found on these pages. The indexing of the Web enables users to search for keywords or combinations of words to find information online. Search directories are the other types of search engines. They site index content chosen by human editors, rather than automated indexing done by bots. Today most search engines offer complementary search-related products such as shopping search, news and other services that go beyond the basic keyword search function. The following Quick Reference provides an overview of some of the more popular public Web Search Engines and Directories. One of the elements that a search engine algorithm scans for is the frequency and location of keywords on a Web page. Those with higher frequency are typically considered more relevant. Here is a list of search engines used for some specific purpose for an individual of specific field which may help him/her in accomplishing a specific task.

Type	Search engines
All-Purpose Search Engines	Google, Bing Search, Yahoo! Search, AltaVista, Cuil, Excite,Go.com, HotBot, AllTheWeb, Galaxy, search.aol, Live Search ,Lycos, GigaBlast, Alexa Internet
Accounting	IFAC.com: For resources and information on Accounting.
Bit Torrent	Btjunkie, Demonoid, FlixFlux, isoHunt, Mininova, ThePiratebay, TorrentSpy, Torrentz

Blog	Amatomu, Bloglines , Blogperfect , BlogScope , IceRocket , Sphere, Technorati
Books	FreeBookSearch.net , Google Book Search
Business	Alibaba.com, Bankersalmanac.com, business.com, Hoovers, Kompass, Lexis Nexis, ThomasNet,
Email	Email-Search.org, Nicado, TEK search engine,
Enterprise	AskMeNow, Autonomy, Dieselpoint, dtSearch, Endeca's , Exalead, Expert System Sp. A. , Fast Search & Transfer: , Funnelback , Google Search Appliance, Microsoft's SharePoint Search Services, Northern Light Search, Open Text (Hummingbird), Oracle Secure Enterprise Search 10g, SAP , TeraText Suite, Vivisimo , ZyIMAGE
Forum	Omgili (Oh My God, I Love It)
Games	Cheatsearch.org, Genie Knows, Wazap ,
Human Search	ChaCha Search , Eurekster , Mahalo.com , Rollyo , Trexy: , Wink: ,
International	Accoona, Alleba, Ansearch, Araby, Baidu, Daum, Guruji.com, Goo, Miner.hu, Najdi.si, Naver, Onet, Onkosh, Rambler, Rediff, SAPO, Search.ch, Sesam, Walla, Yandex,
Job	Bixee (India) , Career Builder, Craig's List, CV Fox, Dice.com , Eluta.ca (Canada) , Hot Jobs (Yahoo), Incruit (Korea), Indeed.com, Jobs.pl (Poland), JobsDB (Asia/Pacific), JobPilot (Owned by Monster), Jobserve, Monster.com, Naukri.com (India), Recruit.net, SimplyHired.com , StepStone (Europe), TheLadders.com
Legal	Canadian Law List, Lawyers.com, FindLaw, The Lawyers' List, LexisNexis, Martindale.com , LexisNexis
Maps	Géoportail, Google Maps, MapQuest (AOL), Michelin (Via Michelin), Windows Live Maps, Yahoo Maps,
Medical	Bioinformatic Harvester, Entrez (Pubmed), EB-Eye , Genie Knows, GoPubMed, Healia, KMLE (King's Medical Library Engine), MeSH , SearchMedica, WebMD,
MetaSearch	Brainboost, Clusty, Dogpile, Excite, HotBot , Info.com, ixquick: , Kayak, Krozilo , Mamma: , MetaCrawler , MetaLib , Mobissimo.com , Myriad Search: , Sidestep: , Surfmax , Turbo10.com , WebCrawler ,
MultiMedia	YouTube: , blinkx: , FreeBookSearch.net: , FindSounds, MetaCafe: , Musgle, PBS , Picsearch: , Podscope: , SpeechBot , Singing Fish: , StrimOO, TVEyes, Veveo / VTap, Web-Cam-Search.com,
News	Google News , MagPortal , NewsLookup.com , LexisNexis , Topix , Yahoo News
Open Source	DataparkSearch Engine , Egothor , gonzui , Grub , ht://Dig , The iSearch , Apache Lucene , The Lemur Toolkit , mnoGoSearch, Namazu , Nutch, OpenFTS, Sciencenet, Sphinx , SWISH-Enhanced , Terrier , Wikia Search, Xapian, YaCy , Zettair
People	AnyWho.com, Ex.plode.us, Finding-People.com, InfoSpace, LinkedIn , Spock , Wink, Zabasearch, ZoomInfo,
Question & Answer	About.com, Answers.com , Ask Jeeves, AskMeNow, AskWiki Beta , Brainboost, eHow , Lexxe , Lycos iQ , Powerset , Windows Live QnA, Yahoo! Answers ,
Real Estate	ForSaleByOwner.com, Home.co.uk, Inman News, Properazzi.com , Realtor.com, Rightmove, Trulia, Zillow
School	The College Search Engine.com, Skoolz.org, Google University Search

Scientific	Scirus,
Shopping	Google Product Search, Kelkoo, MSN Shopping, MySimon, Nextag , PriceGrabber.com, PriceRunner, RetailMeNot, Shopping.com, Shopwiki, Shopzilla (Owned by Bizrate), TheFind.com
Source Code	Google Codesearch, JavaScriptSearch.org, JExamples, Koders, Krugle Code Search Engine, PHP Classes Repository
Usenet	Google Groups
Visual Search Engines	Grokker, Kartoo

Figure 3. Search Engines for different purposes

A search engine which provides Relevant results (results you are actually interested in) uncluttered, easy to read interface, have helpful options to broaden or tighten a search is desired by every individual. Google is the undisputed king of 'spartan searching'. Google is fast, relevant, and the largest single catalogue of Web pages available today and with most number of hits. Google 'images', 'maps', 'play', 'blogger', 'news' features... are outstanding services featured by the Google. The more specific you are, the more info you'll find. You can tell the search engine exactly what you're looking for by using search commands, using plus (+), (minus) -, quotations marks (" "), Booleans (AND, OR, NOT) to fetch more specific tuned in results. (<http://www.google.com/insidesearch/tipstricks/>)

25.5 Other few resources that they can be used to find more, and better, online resources:

25.5.1.1 [Carrot2](#)

Carrot2 is a "clustering search engine", which means that, on top of the regular list of results found on the right half of the screen, results are grouped for easier reference. Carrot2 offers three ways to shows those groups of results. This clustering approach appeals to visual learners as well as both global learners (they have all the results showing at once and how they relate to one another) and analytical learners (results are divided into small chunks and relationships between each is easily defined). Carrot2 also pulls resources from the Web, Wikis and News as well as offers an image search, all using the results from the Bing search engine.

25.5.1.2 [SimilarSites](#)

Just enter the URL of a website that you found helpful, and SimilarSites will find more like it! You can install the extension on your browser so that you only have to click on the SimilarSites button instead of going to the site, copy/pasting the URL and then click enter. SimilarSites find *websites*, not *webpages*. If for example you found a great article about your research topic (farmer), inputting the URL for that article will bring up websites for other reputable sites and not other articles on farmers .

25.5.1.3 [Blekko](#)

Blekko calls itself "the spam-free search engine", focusing on a smaller part of the Web, but choosing what they consider to be quality websites. They also organize those websites by topic, which you can search by using slashes. How do the slashes work? You enter your search terms; let's use "agriculture". Using the slashtag "/pests" in the search bar: [agriculture/pests] will bring up websites about pests in agriculture, and will bring different results than entering [India /photography], for example. Blekko has a whole directory of slashtags to use from, divided into sections like: arts, business, culture, education, fashion, food, government, health, humanities, media, science, sports and more. You can create your own slashtags. You will need to register to Blekko (it's free), and then it will walk you through the creation of your slashtags.

25.5.1.4 [Search Commands](#)

More people use Google than any other search engine on the Web, most do not realize that there is much more to this mammoth search index than meets the eye: an amazing repertoire of specific Google search commands that can help Web searchers find what they're looking for, fast. It will lead to exactly- what websites linked to a certain page, searching in a certain timeframe, searching for a certain type of file (when searching for documents).

The level of skill required by the 'electronic' researcher exceeds the conventional research field. The skills range from the practical abilities concerning typing efficacy, speed and IT's principle and basic working techniques. The researcher cannot simply 'step' into a virtual community of IT settings and should be concerned with the technology being employed. While the Internet appears to offer new horizons and open new frontiers for the research community (Cornick, 1995), the nature of the medium itself suggests that these 'frontiers' may just as quickly begin to deny access. The Internet presents itself as a field of rich pickings. In particular, there may be significant research benefits to be gleaned where the group being researched is normally difficult to reach and/or the issues being researched are of a sensitive nature (Coomber, 1997).

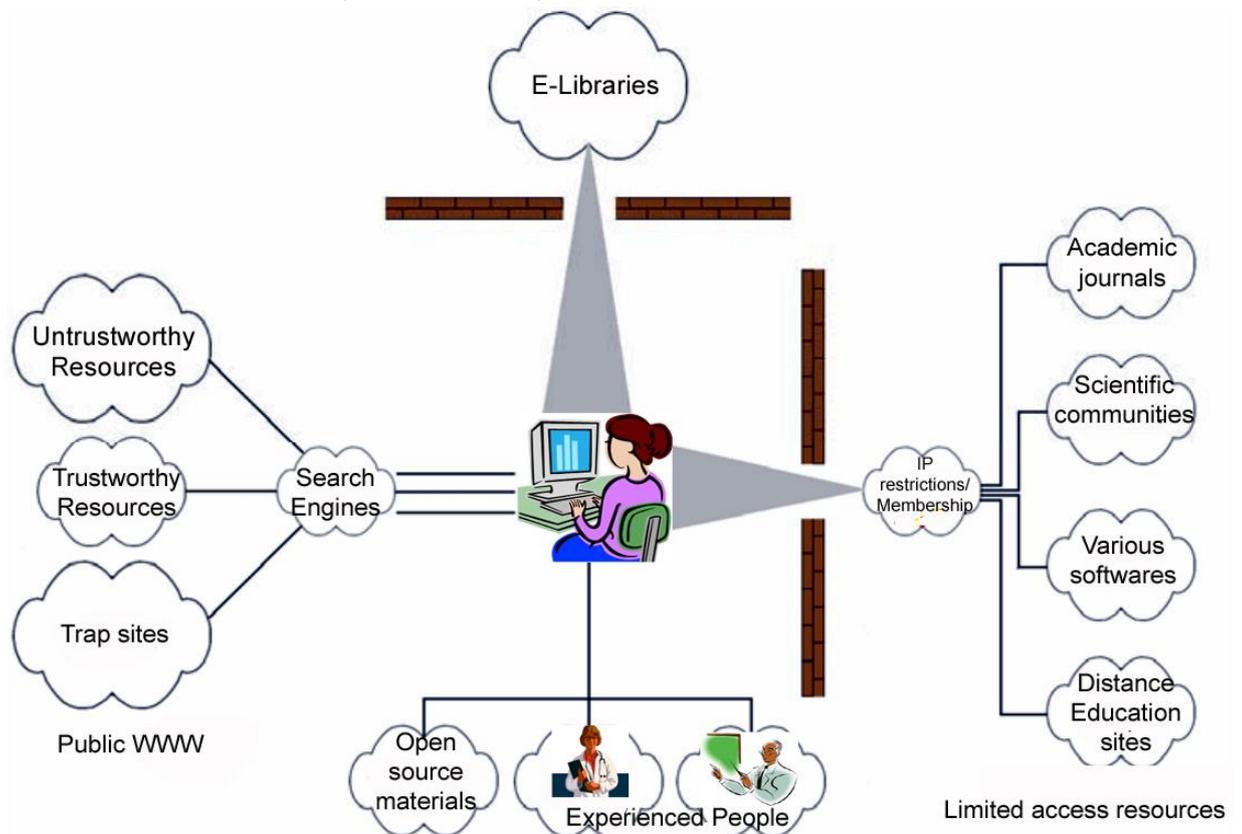


Figure 4. Accessibility of online resources

25.6. BEHAVIORAL TECHNIQUES FOR FETCHING UP-TO-DATE RESOURCES

If one wants to keep up with the research paper rubric or wishes to be alerted on every updates or latest information and other activities on net, he needs to sweat his guts out. He / she should be habituated with following behavioral technique in making himself dynamic.

25.6.1 Competition Spying

A regular spy on every competitor and keeping eye on competitors is a good habit in fetching ideas and resources around. By competition spying one can get ideas and knowledge what others are doing or how his competitors are preparing to excel their academic status.

25.6.1.1 Ego Searches

Ego searches are free and simple searches designed to monitor blogs and news portals for specific keywords. Conducting ego searches not only allows one to stay informed, but also allows maintaining a strategic advantage over competing agents. A number of new Internet services are freely available that make these 'ego searches' painless and easy. Dynamically created keyword based

RSS feeds (Rich Site Summary) , updates RSS reader or news aggregators, each time new information containing the keyword appears in the searched resources. The dynamic feeds match requests against new information, as it comes online in real time. The following free services allow for RSS feed ego searches. A great way to get your news or read your favorite blogs without having to worry about software upgrades, online readers also let you browse your RSS feeds from any computer. <https://kouio.com/>, <http://www.bloglines.com/>

25.6.1.2 Google News

Simply conduct a keyword search of Google News and then click the text that says "RSS" then save the url of the RSS feed into your news reader. Every time a new article with that keyword appears in Google News the feed in your RSS reader will automatically update.

<http://news.google.com/news>

25.6.1.3 Technorati

Create watch lists, by entering the search term add item to the watch list and then scroll to the bottom click the blue RSS icon to obtain the url of the RSS feed that can be added to your reader. Technorati is a real-time search engine that keeps track of what is going on in the blogosphere. In order to setup a watch list one has to create a Technorati account. <http://www.technorati.com>

25.6.1.4 Ice Rocket

Simply search Ice Rocket then click the RSS 2.0 button to obtain the url of the RSS feed that contains your search term. Add the url to your RSS reader or newsaggregator.

<http://www.icerocket.com/>

25.6.1.5 NewsTrove

NewsTrove indexes millions of news articles from a myriad of sources. Build an RSS feed on any topic imaginable. Enter your search words in the search box. Click 'Search' click the orange XML icon on the right side of the search results page and save the feed to your news reader.

<http://www.newstrove.com>

25.6.1.6 BlogDigger

BlogDigger monitors the blogosphere and generally what is said daily in the blogs. Conduct a search on Blogdigger and click the orange XML icon to retrieve the url of the search feed. The feed should then be added to your RSS reader. <http://www.blogdigger.com/>

25.6.1.7 Yahoo News

Conduct a search then click "view as RSS" in the right column save the feed in your aggregator. The feed will check Yahoo news for mentions.

<http://news.yahoo.com/>

25.6.1.8 Google Alerts

Receive notification via email on the latest relevant Google search results (web, news, etc.). <http://www.google.com/alerts>. <http://www.googlealert.com/> (3rd party tracking service) - Google Alert is the web's leading automated search and web intelligence solution for monitoring your professional interests online. It tracks the entire web for your personalized topics and sends you new results by daily email.

25.6.1.9 Meta Tags

Have you ever considered what keywords or phrases a competitor is targeting on their website? Have a peak at their meta tags by simply viewing the webpage source. Pay particular attention to the header tags that include title, description, and keywords.

25.6.1.10 Alexa Ranking

Use Alexa to determine not only who is linking to a competitor, but also to determine what sites are related (list yours). Alexa monitors web traffic trends, and a list of similar websites. Alexa also has the ability to show a website's popularity trends. <http://www.alexa.com>

25.6.1.11 Website Monitoring

It is generally a good practice to monitor competitors, and you can do this using a tool like CodeMonitor. CodeMonitor takes a snapshot of a websites' HTML and notifies of any changes. The differences in the web pages are highlighted, making it easy to discern what changes occurred. CodeMonitor is a free online tool, that can be found at:

<https://polepositionweb.com/roi/codemonitor/index.php>

25.7. EVALUATION OF ONLINE RESOURCES

It is indeed a laborious task in separating the good and the bad information available in the net. Resources available cannot be relied to cent percent. Sources recommended by a librarian, renowned persons, authors of articles in professional journals, Govt. sponsored websites are the sources that are to be relied upon. Sites which are being evaluated, updated regularly, pages with author's signatory, websites with author's addressed or can be contacted with author of the page, website with copy right pages are reliable sources. All sites cannot be relied upon because it may be the product of any individual who has an agenda that will severely bias the information presented. Many sites promote hate, conspiracies, and nonsense but have home pages that look professional and legitimate, but once started reading it appears confusing. Such websites should be immediately consulted.

25.8. SOME SPECIFIC ONLINE REPOSITORIES

The repositories are increasingly and undoubtedly becoming an essential component of every professional to boost his expertise in his or her field. Every Individual on earth has started relying on online repositories in search of every bit and byte of Information. The online repositories showcases scholarly and research output to the wider community, and significantly helps in institutional, professional, social advancement and outreach. It also provides an opportunity to raise profile of faculty and students to the global community. Building an effective and successful online repository where every field's expert can rely to gain knowledge is a complex task and every literate is seeking for. Some specific online repositories which will help an academicians from the field of agriculture in their day-to-day activities have been highlighted.

ScienceDirect (<http://www.sciencedirect.com/>) is a leading full-text scientific database offering journal articles and book chapters. It is the world's leading source for scientific, technical, and medical full text research. You can accelerate your research by exploring more than 2500 peer-reviewed journals and almost 20,000 books.

ResearchGate (www.researchgate.net/) is a network dedicated to science and research. Connect, collaborate and discover scientific publications, jobs and conferences. All for free.

Indian National Agricultural Research System (NARS), <http://egranth.ac.in/> has a large collection of Books and articles in agriculture and allied sciences, spread over the country in different libraries of ICAR Institutes and State Agricultural Universities (SAUs). "AgriCat" is a Union Catalogue of the holdings of 12 major libraries of the ICAR Institutes and SAUs combined together. The libraries under NARS have always been in the forefront in providing latest information in time to the agriculture user community. It provides digital access to library resources of 12 different research institutes and agricultural universities which include important institutional repositories, rare books and old journals and makes them publicly accessible over internet under NARS with Online Computer Library Center (OCLC) partnership.

The Institutional Repository 'KrishiKosh' – a collaborative project under the National Agricultural Innovation Project (NAIP) (<http://krishikosh.egranth.ac.in/>) is an important step towards providing online access to the Indian agricultural information to researchers and scientists all over the world. It launched the Indian agricultural knowledge portal over the Internet for sharing its research information including Electronic Theses & Dissertations (ETD) with the rest of the world using the latest information and communication technologies.

www.indiaagristat.com – The website contains a comprehensive and updated source for Indian agriculture statistics. It provides authentic statistical information on sectors like agricultural education, agricultural export, agriculture census, agriculture prices, agricultural insurance, animal husbandry, agricultural marketing, horticulture production, agricultural wages and all other relevant agricultural statistics of India.

www.isapindia.org - Indian society of agribusiness professional (ISAP) is a site for helping the farmers' community. It is a network of agriculture and allied sector professionals in India and developing countries.

www.fciweb.nic.in – It is site of Food Corporation of India. It works for effective food security, price stabilization and distribute food grains through public distribution system for the benefit of both farmers and consumers.

www.agricoop.nic.in- This site contains information on plant protection information network, rashtriya krishi vikas yojana, and national food security mission. It also lays stress on the agricultural sector, employment, opportunities, industrial sector and infrastructure.

<http://mofpi.nic.in/> This website is of Ministry of food processing industries, the main central agency of the Government responsible for developing a strong and vibrant food processing sector. It provides job opportunities in rural areas, enable the farmers to reap benefit from modern technology

http://agropedia.iitk.ac.in/	http://www.digitalgreen.org	http://www.agriquest.info/
http://irri.org/	http://www.icar.org.in	http://www.nbpgr.delhi.nic.in
http://www.fert.nic.in	http://www.dbtindia.nic.in	: http://www.agriwatch.com
http://www.fertindia.com	http://www.iffco.coop	http://www.envfor.nic.in
http://www.wrmin.nic.in	http://ricelib.irri.org/screens/ejourns_a.html	
http://www.apeda.com	http://www.VirtualPrivateLibrary.com/	

Figure 5 – Some agriculture related websites

<http://www.AgricultureResources.info/> - Agriculture Resources on the Internet is a comprehensive listing of agriculture resources and sites on the Internet. These resources and sources will help you to discover the many pathways available through the Internet to find the latest agriculture resources and sites. As this site is constantly updated it would be to your benefit to bookmark and return to the above URL frequently.

<http://www.aginternetwork.org/en/> - Access to Global Online Research in Agriculture – AGORA
 Food and Agriculture Organization of the UN (FAO) together with major publishers enables developing countries to gain access to an outstanding digital library collection in the fields of food, agriculture, environmental science and related social sciences. AGORA provides a collection of more than 3500 key journals and 3300 books to 2500 institutions all over the world. It is designed to enhance the scholarship of the many thousands of students, faculty and researchers in agriculture and life sciences.

25.9. CONCLUSION

Online repositories are increasingly and undoubtedly becoming an essential component of every professional to boost his expertise in his or her field. Every Individual on earth has started depending on online repositories in search of every bit and byte of Information. The online repositories showcases scholarly and research output to the wider community, and significantly helps in institutional, professional, social advancement and outreach. It also provides an opportunity to raise profile and brand awareness of an institution, faculty and students to the global community. Building an effective and successful online repository where every field's expert can rely to gain knowledge is a complex task and it is a need for every academician. Every Individual goggles for accessing online information for it is the easiest and fastest method in collecting information, but the risk is leading someone with misinformation or disinformation. A little knowledge on working of computers and search engines will always lead an individual to impulse his effort in accessing accurate and updated online repository. The use of trustworthy internet resources is of vital importance for academicians to review the literature and accessibility problems should be solved. Every academic and reliable resources should be made available freely for successful investigation to the academicians. In addition to this, easy access opportunities for reliable resources should be supplied by university administrators. One solution to access problems is to give permission for connection to academic

resources from the students' homes, using specific software and proxy arrangements, thus equipping students with ability to use e-journals, e-libraries, e-books, online-databases as academic resources for related courses.

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Smart Computing To Enhance the Computing Performance

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26.1 OVERVIEW

- ✓ Introduction to Smart Computing
- ✓ Goals of SMART Computing
- ✓ Area of interest
- ✓ Opportunity of Smart Computing

23.2 INTRODUCTION

The technology industry and academia have entered a new cycle of technology innovation and growth, which we are calling ‘**Smart Computing.**’ SMART computing is a collaborative university-wide systems provisioning and management initiative intended to establish a program to better leverage technology resources for hardware and software and to reduce the total cost of ownership for systems procurement, provisioning, and management by standardizing platforms, configuration management, patch management, and software distribution. We had experienced prior cycles, mainframe computing, personal computing, and network computing before smart computing has emerged. SMART computing provides more human-like thinking solutions and it is more complex, blending elements of mainframe computing, personal computing, and network computing. SMART computing usually makes use of collaborative work using software more effectively. Computing devices have become smaller, more mobile, and smarter. In order to achieve the objectives of smart computing, advanced technologies are importantly required and thus, grow quickly. Smart computing is a new generation of technology that adds awareness technologies, real-time analytics, and collaboration applications to the existing technologies that undermine the transactional processes of business today.

26.3 GOALS INCLUDE:

- Promoting a standardized secure computing environment within the Purdue community for 80% of the hardware and software systems
- Maximizing the management of expenditures by streamlining costs and establishing best practices associated with:
 - Systems procurement

- Standardizing platforms
- Configuration management
- Patch management
- Software distribution
- Hardware and software inventory
- Asset management
- Imaging and
- Life-cycle replacement
- Leveraging existing centralized security tools to ensure security of our resources and effectively implement proactive and preventive measures
- Insuring the reliability and integrity of University systems and software and the data they store and/or transmit.
- Standardizing collaborative efforts to reduce technical complexity; improve information security, privacy and integrity; improve customer satisfaction through improved service quality; and optimize resources and strategic partnerships.

A goal of SMART computing is to identify a standardized secure computing environment that can meet the needs of the majority of users in the Purdue community including hardware selection, software selection, and computer imaging.

26.4 AREAS OF CURRENT INTEREST OF SMART COMPUTING include the following:

- Smart devices
- Wireless Communications
- Cognitive radio
- Cloud computing for smart mobile devices
- Smartphone apps
- Smart wireless/mobile computing and communications
- Real-world sensing and interaction
- Smart human-computer interaction (HCI)
- Smart social networks and social network services (SNS)
- Smart vehicles (should be based on information technology)
- Smart mobile operating systems (OS)
- Internet of Things (IoT)
- Smart multimedia
- Security
- Smart robotics
- M2M (Machine to Machine)
- Smart sensors/bio-sensors
- Artificial intelligence for smart computing

All the areas above should be **based on** information technology (IT).

Why is smart still the next big thing?

- Improving transactional processes is yesterday's story. The back-office challenges of preparing financial statements, fulfilling customer orders, or tracking inventory are well addressed by enterprise and personal productivity software. These traditional workloads are migrating to cloud computing resources in some cases, but are not creating incremental technology investments or opportunities to transform how a business operates.
- Optimizing assets is the next important challenge. Especially in service-based industries, favourable economics result from building an asset base and then selling access to those assets in the form of services. Managing and optimizing the use of those assets -- physical, human, financial, and intangible -- is the source of revenue growth and improved margins. Smart computing systems provide the awareness, analytics, and actions required to improve the utilization of a firm's assets. And in most cases, these systems represent incremental investments in computing resource, with the payback coming in the form of more efficient, more highly utilized, and therefore more profitable assets. Smart flexes to meet industry-specific challenges. Each industry has a different mix of assets with different optimization opportunities. In high-tech, development and channel resources must be marshalled in the face of accelerating development cycles, long supply chains, and unpredictable consumer tastes. In finance, mountains of data must be shifted to find the best investment opportunities, while managing market and compliance risk and keeping employees productive. Finding the right mix of online and brick-and-mortar, the right product portfolio, and lean inventories are paramount for retail execs. The right portfolio of smart computing solutions will vary widely across these and other industries (see figure 1)

INDUSTRY CATEGORIES	EXAMPLES OF INDUSTRIES	SMART COMPUTING TECHNOLOGIES
Physical-asset-Intensive Industries	Mining, oil and gas, utilities, lodging, transportation, telecommunications, government public works, real estate	RFID, sensors, M2M, video monitoring, GPS, mapping, routing analytics, predictive analytic, services management, Big data
Human-asset-Intensive industries	Professional services, insurance, government regulator, judiciary and executive agencies, investment banking	GPS, tablets and smart phones, case management, project management, collaborative tools, data repositories, Big Data tools.
Physical and human asset-Intensive Industries	Education, health care, IT outsourcing, entertaining and recreation, public safety agencies, public benefit agencies.	GPS, RFID, mapping, video analysis, tablets and smart phones, case management, predictive analytics.
Transactional industries with physical assets.	Manufacturing, wholesale, asset management	RFID, sensors, video monitoring, demand analytics, risk analytic
Transactional industries with human assets	Commercial banking, consumer banking, Retails	Mapping, social media analytic, tablets and smart phones, BPM

26.5 OPPORTUNITY OF SMART COMPUTING:

Where will tech dollars flow in the next seven to eight years? It may seem that the answer is all into Smart Computing technologies. But technology markets don't work that way. Existing technologies — servers, PCs, routers, switches, database management systems, ERP software, etc. — don't go away. Indeed, well-established, mature tech products will continue to represent the bulk of technology purchases even eight years from now. The problem is that revenues from these products won't grow by much. Instead, almost all of the growth will occur in three areas:

The Smart Computing foundation technologies: These next-generation technologies of unified communications, micro computing devices, virtualized computers and storage devices, and SOA software infrastructure provide the foundation for Smart Computing. In the next one to three years, vendors of these product categories can expect to see a 17% compound annual growth rate (CAGR) as companies purchase these technologies both to capture their immediate cost savings and to get prepared for Smart Computing. However, growth will be strongest in the first few years and then slow as the infrastructure gets fleshed out.

Smart Computing process applications : Based on the design principles articulated in Forrester's definition of Dynamic Business Applications, these new software products will help to automate untouched processes (e.g., contract management, marketing automation, sales proposal generation, strategic plan development, complex services fulfillment), link existing process applications (e.g., demand chains with supply chains), and improve the business results from existing processes. Also included in this category will be the Information Workplace technologies for improving employee collaboration.¹⁸ Current specialist vendors like Pegasystems, Oracle Fusion Applications, and Epicor Software will be joined by IBM, Microsoft, and SAP (among others) in creating these products that will provide a second wind for Smart Computing in the two- to six-year time frame. Collectively, we think revenue for these technologies will grow at a CAGR of 50% between 2008 and 2016

Smart Computing vertical industry solutions : Solutions aimed at helping companies optimize the returns from their balance sheets in the healthcare, utilities, government, telecommunications, transportation, and, ultimately, the education and professional services industries will be the other growth engine for the tech industry. Revenues will come from a combination of software, hardware, and network products sales tied together as a single bundled solution with support services. We think these vertically focused industry solutions will generate revenue growth for tech vendors of 27% CAGR from 2008 to 2016. Growth rates aside, we think that the total revenue from industry-focused solutions will outstrip the revenues from Smart Computing foundation technologies by two to one and that they will exceed the revenues from Smart Computing process applications by almost three to one. By 2016, we predict that Smart Computing industry vertical solutions will equal 0.86% of GDP, while Smart Computing foundation technologies will equal 0.42%, and Smart Computing process applications

The Five A's of Smart Computing

What is important in these technology innovations is the combined impact. While there is standalone value in each of the innovations in software systems, server infrastructure, network infrastructure, and client devices, it is the combination of all these innovations that will allow

computing technologies to become smarter. Smart Computing can do this because it combines five key functions of intelligence — what we call the five A's of Smart Computing.

If we think about any concept of smart behavior or smart actions, these consist of five stages of activity. Smart Computing uses digital business architecture technologies, either brand new ones or new deployments of existing technologies, to support each of these five stages of intelligent activity

- **Awareness.** New technologies for pervasive interactions such as radio frequency identification (RFID), sensors, video cameras, global positioning system (GPS) chips, smart cards, and other tools will capture data on the identity, status, condition, and/or location of people and physical assets — data that indicates anomalies that present a business opportunity, activity, threat, or risk.⁷ Unified communications technologies such as third-generation (3G) wireless networks will transport this data from these client devices back to central servers for analysis.

- **Analysis :** Business intelligence and specialized analytical software such as data mining and predictive analytics, video image analysis, pattern recognition, and artificial intelligence algorithms will determine whether businesses or governments should act on or ignore a pattern or an anomaly. Businesses and governments have already been using these analytical tools for making sense of historical data, as well as for starting to make predictions about what may happen next. But now, they will be deployed against the real-time data being transmitted from the new awareness devices. Analyzing and storing the massive amounts of data that will be received is only possible with the more flexible and adaptable servers and storage devices enabled by server virtualization, data center automation, and storage life-cycle management — as well as the potential for more flexible processing expansion and storage capacity through cloud computing. Expect more of the basic processing that sifts out meaningful information from background noise to happen at the fringes of the unified wireline and wireless broadband networks that connect to the awareness devices. For this analysis to have business value, though, it will need to present alternatives.

- **Alternatives :** Rules engines and workflow are the existing technologies for deciding which alternative courses to pursue, either automatically through the application of a rule that says “if this happens, do this,” or through human review based on workflow engines that route the anomaly and alternative courses to the right person to make a decision.⁸ The basic function of rules engines and workflow will stay constant — seismic leaps will be necessary in the data flow and analytical inputs in a world of vastly expanded real-time awareness. For example, rules engines will need to adapt and change their rules on the fly (based on new analysis of what the best alternatives should be), and workflow engines will need to change rapidly what alternatives should be presented to which people based on the seriousness of the issue. In either case, once a human being or a rules engine makes a decision on what to do, that decision should trigger the requisite actions.

- **Actions :** The action may be as simple as quoting a different price, placing a new order, making a new offer to a customer, or initiating a customer service contact. Or the action may be as complex as adjusting thermostats in tens of thousands of households and businesses to avoid an electricity brownout. These actions will be executed through integrated links to the appropriate process applications. The spreading conversion of process apps to service-oriented architectures will allow these process apps to be adapted to business scenarios, with specific app components pushed down to the awareness devices where they can execute that action, whether that is alerting a citizen on her smartphone to the updated arrival time of a bus that was stuck in traffic, notifying a doctor on a tablet device about the drug allergies of a patient he is about to see, or directing the thermostat in an

individual home to raise the temperature by turning up the air conditioner by three degrees. But whether the right action was actually taken can only be determined if there is auditability.

• **Auditability** : Tracking all steps in the process to aid in regulatory compliance, compliance with company policies and goals, and improvement opportunities is critical. Any definition of “smartness” includes elements of monitoring activity and learning how to do it better. Technology needs to capture, track, and analyze information on each stage of this cycle to make sure that the right actions were taken and to learn how to improve the analysis and identify better alternatives.

Utility software for Krishi Vigyan Kendras

Th Bablu Singh,
KVK Hailakandi, Assam,
Email: b2ksingh@gmail.com

27. 1 Introduction

Software tools play an important role in KVKs as it assist in faster delivering of work. With the help of this the personnel who are working for the welfare of farmers can have more precise interpretation of results. It acts as a tool to do applied research on agricultural technologies. The application software plays a key role in agricultural research work are user friendly and are interactive in nature. The immergence of IT in India helps in the overall improvement and development by providing timely and precise information in life. Nowadays the tools are developed in such a way that it is really easy to use, manage and controlled.

Over the last few years there is a tremendous progress in KVKs with the induction of these software tools. Personnel can deliver the scientific technologies, ideas to farmers effectively. There is a necessity to developing the capacity to generate powerful tool to derive societal transformation. In this context the software tools may be seen as the means of such transformation. When used as a broad tool for providing local farming communities with scientific knowledge, software tools signs the formation of knowledge societies in the rural areas of the developing world. This chapter is mainly focus on empowering the KVKs by providing better access to soft tools for delivering timely and precise result to the farming community.

27.2 Importance of the topic

The adoption of these software tools will bring an immense progress in the work flow of KVKs and also provides access to information on jobs and internships and enables research and useful information sharing through the internet. It enables creation of employment opportunities and enhances interaction among peers over long distances. Interestingly, KVKs little have limited access to software tools as majority of the working personnel are from agricultural background. It is important to use these technologies because the output is much more precise and faster rather traditionally. Presently almost all the work in KVKs is done in an old fashion which actually delays the process of work.

Software tools like Skype, Google talk, Yahoo Messenger can be big leap to exchange ideas and videos with those who are staying in the remote area and also tools like MS Publishers which makes a big impact in preparing book, bulletin, leaflet, magazine etc. Animation tools like flash which are

used to make animated movies are literally useful in showing practical motions and activities and in addition to this it tells the story loud making definite points clearly.

27.3 Practical Utility

3.1 Skype

It is mainly used to communicate between two individuals. In this process an exchange of video, large file like photos, documents and voice messaging can be done simultaneously.

Go to the [Skype website](#) and select Get Skype for Windows desktop.

Save the Skype installation file and then open it to install Skype on your computer.

Select your language, read the [Skype Terms of Use](#) and the [Skype Privacy Policy](#), then click **I agree – next**.

Read the [Microsoft Services Agreement](#) and [Privacy Policy](#), then select **Continue**.

Your Skype installation starts. When it is complete, Skype opens and the sign-in screen is displayed.

27.4 MS Publisher

It comes along with MS Office package and is used for creating folder, bulletin, leaflet, newsletter etc. time to time these publications are required for awareness and educating of farmers. Start Publisher, and then click one of the publication types in the **Publication Types** list. For example, click **Newsletters**. In the **Newsletters** catalogue, click the design that you want, choose any other options that you want, such as a color scheme or a business information set, and then click **Create**.

27.3.3 CMS

Content Management Systems a computer program that allows editing, modification of content which is done from the central interface called Administrator can be used by non-technical person like creating websites, posting of blogs, news, photos, videos etc. some of the example of CMS are Joomla, Wordpress, Megento etc.

27.3.4 GIS

A **geographic information system (GIS)** is a system designed to capture, store, manipulate, analyze, manage, and present all types of geographical data. The implementation of a GIS is often driven by jurisdictional (such as a city), purpose, or application requirements. Generally, a GIS implementation may be custom-designed for an organization. Therefore, a GIS deployment developed for an application, jurisdiction, enterprise, or purpose may not be necessarily interoperable or compatible

with a GIS that has been developed for some other application, jurisdiction, enterprise, or purpose. What goes beyond a GIS is a spatial data infrastructure, a concept that has no such restrictive boundaries.

27.3.5 Google Earth

It is a virtual globe, map and information about the Earth. It is based on 3D maps with the capability to show buildings, structures like bridges.

Operating of Google earth

Select in Google Earth an area that approximately matches the area of your custom image.

Click Add on the menu/tool bar of Google Earth, then to Add Image Overlay. You will see then the following menu:

27.4 Google Talks

It is an instant messaging service which provides both text and voice communication and in sort it is also known as gtalk or gchat. It is used for email alerts, instant messaging, voice and video chatting. After the software is installed and run it would ask to connect to the peers and after the connection is made all the activities like chatting, file exchanging can be performed instantly provided the speed of the internet is good.

27.4.7 GSpace

Document file can be shared among friends' colleagues with the help of this tool and it works within Mozilla Firefox browser.

27.4.8 GPSMap

It's an application that run on PC and allows calibrating with the scanned maps in a moving display on a pocket PC connected to the GPS receiver.

27.4.9 Adobe Photoshop

Photoshop is a graphic editing program with the default extension as .PSD which states for "Photoshop Document". It stores an image with support for most imaging option available in Photoshop. It is the collection of layers with [masks](#), transparency, text, [alpha channels](#) and [spot colors](#), [clipping paths](#), and [duotone](#) settings. This is in contrast with many other file formats like .JPG, .GIF etc. that restrict content provide streamlined functionality. A PSD file has a maximum height and width of 30,000 pixels, and a length limit of 3 Gigabytes.

27.4.10 AllPeers

It uses a social network. Here user can add people under their own group categories like friends, family, colleagues, study team, etc, which is tied to their email address. The user must be registered

with AllPeers with that same email address provided both the user registered with AllPeers. You can select files from your computer and share them with one or more contacts. According to the AllPeers site.

27.4.11 Advantages

With the used of these tools or software the personnel who are working for the welfare of the farmers can do advance research and quick delivery of result to the farmers. It is possible to educate the farmers at their doorsteps with the online interaction system. Some of the unique points can be mentioned as below.

- Greater flexibility in when and where tasks are carried out.
- Access to the up-to-date tools.
- Delivery of task on time.
- Faster Information transfer
- Storage of data is limitless
- Data output in any format
- Free open software and tools in available on the net.

27.5 Disadvantages

- Some of the disadvantages can be noted as follows
- Older generation findsit difficult with the newer generation
- Proper brainstorming is required while implementing such skills
- Some privacy issues
- Proper care must be taken while using the existing system
- Software tools need to update from time to time

27.6 Recent developments

Data collection and monitoring and evaluation (M&E) are a vital part of development work as the results determine where public services are most needed, and what approaches prove effective. Traditionally, pen and paper have been used to collect data in the field and for monitoring and evaluation of projects in rural areas. However, this approach is time consuming and susceptible to human error that may affect productivity and accuracy. Information and communication technologies are now being used widely with remarkable positive results to perform these tasks in agricultural development projects.E-commerce is for direct linkages between local producers, traders, retailers and

suppliers. A geodatabase offers the possibility of a centrally, well-structured storage of data, accessible, via network. Combined with information field management, researchers will have an invaluable database, which will include data over a long period of time and from different location. For the scientific work data can be exported easily by searching via metadata-tools and visualising them in the browser interface. Services like WMS and WFS are used for publishing. The advantage of using standards along the whole analysis process makes data from different sources comparable and ready for automatic handling.

27.7 How KVKs can use this knowledge & where?

These software tools can be used in many aspects like in research work, presentation, or finding the yield value of crop production etc. Google Earth which is readily available on the net can facilitate in finding the exact location of a particular place. CMS software which is also known as Content Management System used for editing and modifying contents on the web which needs to manipulate from the centralized controlled interface and this requires less technical knowledge to operate. Photoshop the most powerful software tool used for editing photos like resizing, editing, colouring, cropping etc. for better presentation of photos in book, folder, and newsletter publication.

The software application like MS office publisher is a powerful tool for creating folder, bulletin, leaflet and Newsletter as documentation and advertising is required for mass publication. Mobile messaging system like waytoSMS which is an online messaging system to an individual or a group of farmers mobile phone, though this text SMS could send to the farmers like scientific farming, advisory message, alert message etc.

List of figures



Fig-1: Google Earth (Source Google)



Fig-2: Skype software tool for interactive communication(Source Google)



Fig-3: AllPeers (Source Google)

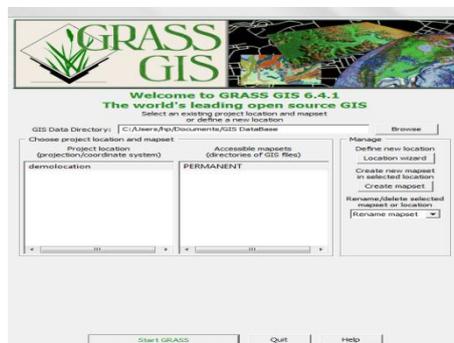
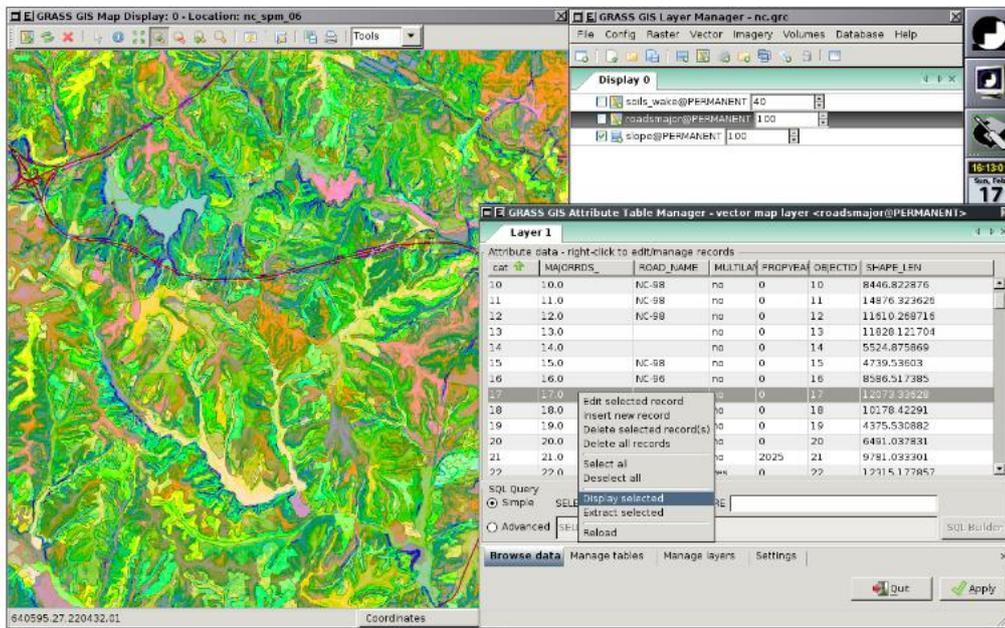


Fig 4(a): GIS Application (Source Grass GIS)



wxGUI attribute manager
Attribute manager for vector data

close or Esc Key

Fig 4(b): Sample screenshots of Vectordata analysis (Source Grass GIS)

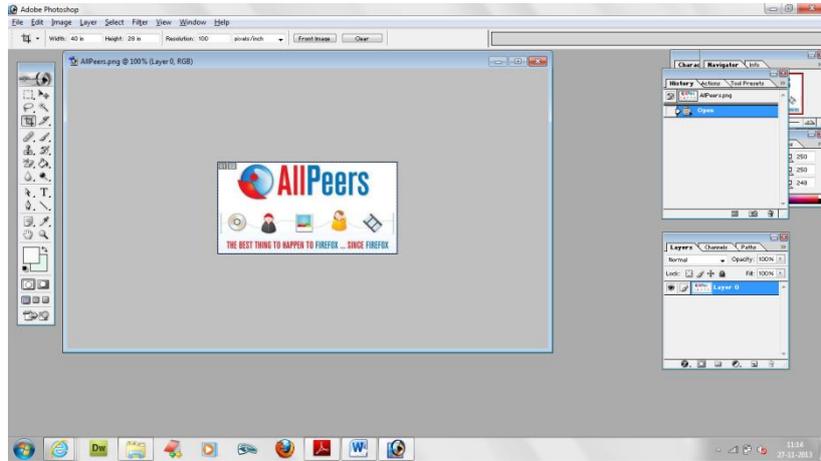


Fig-5: Adob Photoshop

Administration



Login in the administrator page

Fig-6(a): Content Management System (Source ww.Joomla.org)

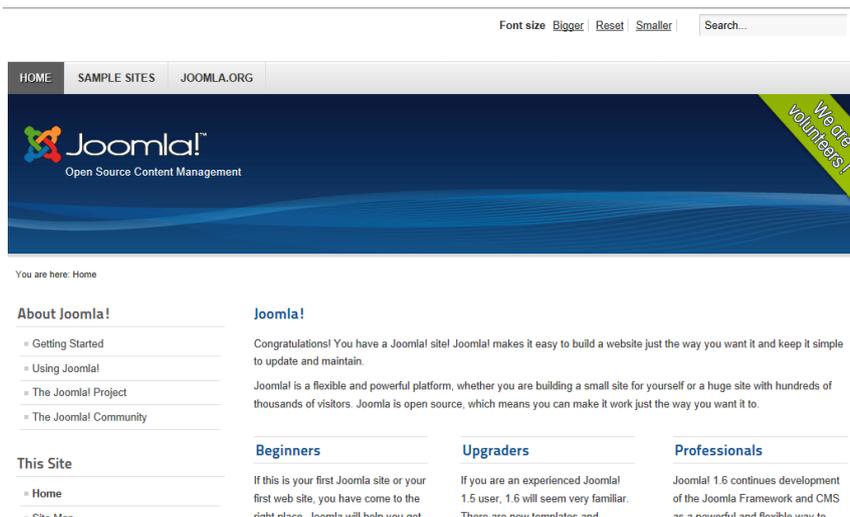


Fig-6(b): Content Management System (Source www.Joomla.org)

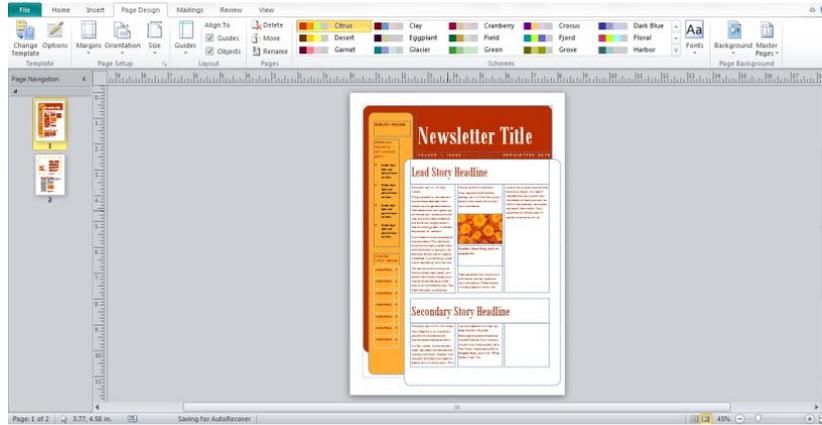


Fig-7: MS Publisher

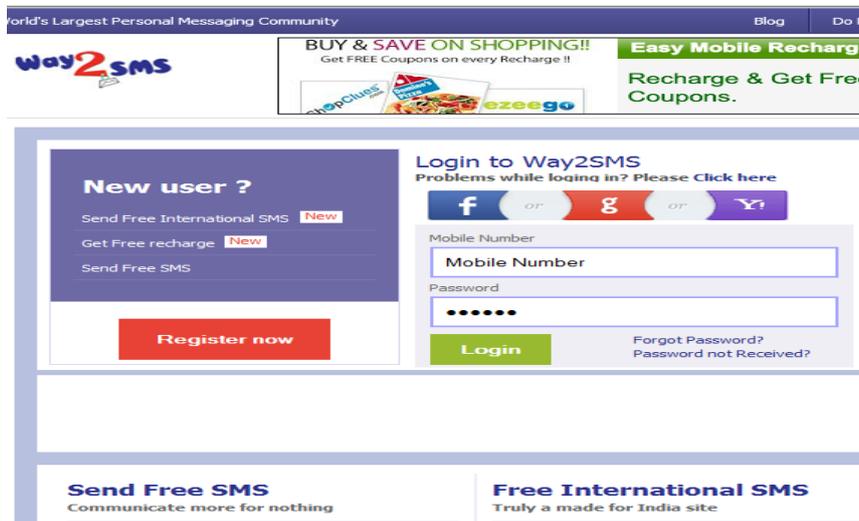


Fig 8: SMS Sending Software (Source wayto SMS)

27. 8 Conclusion

The chapter is intended to highlight the software tools and newly developed software application which can be used in KVKs for better performance in research work and for delivering precise information to the farming community.

The chapter is intended to make aware of how KVK can effectively use these software tools in finding and research work for delivery of scientific technique to the farming community.

The chapter collects different software applications which may play a key role in facilitating KVKs work in the near future.

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Initiating MIS for Agricultural Knowledge Management at KVK

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28.1 Overview:

Remarkable progress in the field of knowledge management within few years is realizing that evaluation and dissemination meaningful knowledge for everyday use. Unfortunately, India being a super power lacks proper records utilizing IT at some of the most respectable project-based institutions around the country. To give justice to innovations at the grass root level, the author humbly takes a step forward to organize some groups of datas in the form of database to produce timely and effectively decision making so as to arrive at a knowledge management at a KVK level. The primary objective of this exercise is to simplify report creation detailly, at each level of the activities, effectively produce monthly report that becomes a ready reckoner for executive decisions, quick and ready archives and finally to compile hassle-free, Annual Action Plan and Annual Report in an information friendly order. However this initiative that is taken may be specifically based on the needs and other conditions at respective KVKs.

Keywords: Knowledge Management, OFT formats, FLD Formats, Training Formats, Extension Activities Formats, Planting & Seeds Material Formats.

28.2 Introduction

It is agreed that Knowledge Management is an upgraded version as well as an enhancement of Management Information System. Hence as a facilitator, MIS form the base level of any knowledge Management. The credibility of managing datas and information has being sorts of dilemma for producing reports. Any organization that ignores an authentic system of evaluation and dissemination of datas and information cannot achieve its organizational objectives. Knowledge management (KM) is a relatively new form of MIS that expands the concept to include information systems that provide decision-making tools and data to people at all levels of an organization. A website, reference for business proposes “The idea behind KM is to facilitate the sharing of information within an organization in order to eliminate redundant work and improve decision-making. Knowledge management is the ability a person has to use information or data efficiently and honestly”¹.

Here at Krishi Vigyan Kendra, an approach is therefore necessary to optimize the effectiveness of not only organizing but also timely delivery of information. Since the Computer Programmers at KVK heads the MIS section, an initiative have been made to exercise the credibility of Management Information System, eventually to consolidated the evolution of knowledge management at KVK. MIS primary objective is to manipulate data in an authentic system (logic and database) that develops necessary information for effective decision making at all levels of management. Here the components involve are the personnels of the Kendra, resources i.e the datas provided by personnels for reports and documentation and the software is the Microsoft office application. Therefore, this leads to credible knowledge at the Kendra which can be further managed to achieve knowledge management.

In respect to Duan Yan-e “Agricultural MIS is a kind of information system focusing on the agricultural production, management, scientific research information collecting, collating, sorting, retrieval and output; it is an important part of the agricultural informatization” 2. MIS analyzes the designing, methods and architecture of Agricultural data to contribute to Agriculture Knowledge Management. According to Vernon, R. “An MIS for agricultural research provides easily accessible information for the various stages of the agricultural research management cycle and its major processes: matching the program with agreed priorities, planning, budgeting, monitoring, reporting, and evaluation. It can present any of a collection of standard reports on screen or in print. Without an MIS, some of the information necessary to answer many questions may exist, but is often in several different places and formats. With an MIS, answers are easily depicted in graphical, tabular, or pie-chart form. The MIS aggregates the information, together with new data collected for the purpose, and then generates information in an easily usable form. This wide range of facilities, coupled with ease of use, requires the use of modern database software and skilled system implementation, but once this investment has been made, managers have a rich support tool at their disposal”3.

Here the author prepares the MIS at the level of Kendra. Once the information is uniformly organized, saving time, cost and optimizes decision making. The information so achieved would be send to the Zonal Project Directorate for further compilation and ultimately to respective division at extension section, which represents the knowledge Management Hub for the Scientist concern.

28.3 Case Study: Lack of smart MIS at Krishi Vigyan Kendra, Mon

Krishi Vigyan Kendra is an innovative institutional project sanctioned by ICAR to capable stakeholders. This institution embodies the multi-disciplinary team of agri-allied specialist that caters to the problems of the farmers. The team is established in the perspective of location-based and need-based of the district. This approach is the best form of extension that bridged the gap between and Scientist and Farmers at the grass-root level. Having acknowledged that, the question arises as to how such an effective institute could not deliver. One instance we could consider is a better defined MIS best suited to the establishment. The problem is not based on the lack of manpower, infrastructure or lack of knowledge. The technical aspects of the mandated activities are well laid down. While the Programme Co-ordinator man the monitoring and evaluation part, the Subject-Matter-Specialist performs their activities and submits the proposal or reports to the Programme Co-ordinator for approval or further rectification. What could go wrong here? The decision or the performance. What system of documentation of data could cross examine the Action Plan Proposed and Report submitted for that calendar year? Thus an evaluation of the performance as to determine the direction, towards which the Kendra improved, stagnated or downgraded.

28.4 Solution to the above case study

The preference I perceive is the data collection and information management. For whatever stages of inputs or outputs, what data are to be collected, when is it to be collected? What kind of data formats are supposed to be at the hands of the SMS that can be submitted to Computer Programmer through the Programme Co-ordinator at the right time. SMS performs their OFT, FLD, Training and Extension Activities. Unfortunately, at the end of the calendar period, they struggle to retain back the facts and figures they performed. This created a setback for all the staffs to prepare the Annual Report. Therefore, I initiate a proposal of formats that can monitor the activities of each SMS effectively. SMS must jot down the figures as soon as they finish each and every activity. Timely submission of this information will generate any reports whenever it is requested.

On Farm Trial Proposed

Designation/Discipline:

Annual Period:

OFT No.	Thematic Areas	Type of Crop	Crop/Enterprise	Title of the OFT	Assessment /Refinement	Parameters of Assessment/Refinement	Target of Trials	No. of Farmers			Supply of Seeds/Planting Materials
								Male	Female	Total	
Problem with severity		Technology Concept		Source of Tech. & Year of Release		Area (ha)		Period & Duration		Cost (Rs.)	

Ongoing On Farm Trial

Designation/Discipline:

OFT No.:

Date/Month/Year:

Date of Sowing:

Amount Sanction:

Sanctioned Date:

Trial No.	Date of activity	Addl. Parameters of Assessment (if any in Y/N)	Problem Diagnosed	Action Taken	Results Obtained	No. of Farmers involved		Cost Involved	Feedback from the Farmer	Feedback from the Researcher
						Male	Female			

Name of the SMS:

Signature and Seal of the SMS:

Programme Co-ordinator

Krishi Vigyan Kendra, Mon

Final On Farm Trial

Designation/Discipline:

OFT No.:

Date of Sowing:

No. of Trials Done	Compiled Parameter of Assessment	Problems encountered	Resolved Action	Final Result Obtain	Farmers		B.C ratio	Target Achieved
					Male	Female		

Proposed FLD

Designation:

Beneficiary:

FLD No.:

Village:

FLD No.	Season/ Year	Thematic Area	Crop/Enterprise	Technological Concept	Source of Technology	Area (ha)	No. of Farmers	Parameters of Demonstration	Seed/Planting Material	Avg. Cost of cltn. (Rs.)

Ongoing FLD

Designation:

FLD No.:

Crop:

Season/Year:

Demo No.	Date of Demo.	Technology Demonstrated	Area (ha)	Parameters of Assessment/Ref inement	Problem Diagnosed	Action Taken	Farmers Involved		Farming situation (Rf/ Irrigated, Soil type, altitude, etc)	Status of soil (Kg/ha)			Farmer Feedba ck	Resear cher's Feedba ck
							Male	Female		N	P	K		

Final FLD Report

Designation:

FLD no.:

Season/Year:

Demo. Yield Qtl/ha			Yield of local Check Qtl./ha	Data on parameter in relation to technology demonstrated (Yield, Disease incidence, etc. as specified in FLD Programme)		Average Gross Return (Profit) (Rs./ha)	Average Net Return (Profit) (Rs./ha)	B:C Ratio		Increase in Yield (%)	Researcher Feedback	Farmers reaction from the Technology Demonstrated
H	L	A		Demo	Local			Demo	Local			

Extension and Training activities under FLD

Sl.No.	Activity	No. of activities organised	Date	Number of participants	Remarks
1	Field days				
2	Farmers Training				
3	Media coverage				
4	Training for extension functionaries				

Training Proposed

Designation:

Client Tele:

Training Tag:

Unique No.	Proposed Date	Thematic Area	Title of the Training	No. of Courses			Participant			Related to OFT/FLD/Ext. Act. (if any)
				ON	OFF	Total	M	F	Total	

Training Just Concluded

Designation:

Client Tele:

Training Tag:

Unique No.	Date of Conduct	No. of Courses			Participants			Feed Back from the Farmers	Researchers Feed Back
		ON	OFF	Total	M	F	Total		

Training Report

Designation/Discipline:

Client Tele: **Farmers/ Farm Women**

Training Tag:

No. of Courses			Achievements (%)	Farmers Benefited			Target Beneficiaries (nos.)	Achievements (%)
ON	OFF	Total		M	F	Total		

Clientele: **Rural Youth/School Drop-outs**

Training Tag:

No. of Courses			Achievements (%)	Farmers Benefited			Target Beneficiaries (nos.)	Achievements (%)
ON	OFF	Total		M	F	Total		

Client Tele: **Extension Personnel**

Training Tag:

No. of Courses			Achievements (%)	Farmers Benefited			Target Beneficiaries (nos.)	Achievements (%)
ON	OFF	Total		M	F	Total		

Client Tele: **Sponsored**

Training Tag:

No. of Courses			Achievements (%)	Farmers Benefited			Target Beneficiaries (nos.)	Achievements (%)
ON	OFF	Total		M	F	Total		

Client Tele: **Consolidated**

Training Tag:

No. of Courses			Achievements (%)	Farmers Benefited			Target Beneficiaries (nos.)	Achievements (%)
ON	OFF	Total		M	F	Total		

Seed Materials

Item	Crop	Variety	Proposed Qty(qt)	Cost (Rs.)	To be provided/supplied to (Exp. No. of farmers)

Planting Materials

Item	Crop	Variety	Proposed Qty(qt)	Cost (Rs.)	To be provided/supplied to (Exp. No. of farmers)

28. 5 Conclusion

The formats are the base reservoir to knowledge management. The next journal is proposed to develop the knowledge management out of the information generated. The decision making patterns will be dealt discretely out of the concepts that evolves necessarily. Further decisions can be formatted as tables, pie-charts and graphical forms.

Some database from Annual Report are left out in this journal, however those formats will be made available in the next edition.

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