

DIGITAL HISTORY
(HIS 4C03)



IV SEMESTER
M.A. HISTORY
(CBCSS PG 2019 Onward)

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**School of Distance Education
University of Calicut**

**Study Material
M.A. HISTORY
IV Semester**

**HIS 4C03
DIGITAL HISTORY**

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MODULE - I

UNDERSTANDING DIGITAL HISTORY

What is Digital History?

Researching historical information, nowadays, has become lot easier with the internet. People either start with a Google search or a query to a voice-controlled intelligent personal assistant.

Depending on the search terms, the results may include websites with resources and links to digital materials from thousands of libraries, archives, and museums. This near-instant access to primary source material stored in multiple locations is made possible by the work of digital historians.



Digital history refers to historians' use of modern computer and communication technologies to digitize archival materials and make them available to anyone with internet access. Using technologies ranging from basic web publishing applications to the latest virtual reality (VR) and augmented reality (AR) tools, digital historians present materials in new ways to various audiences. According to the *Inclusive Historian's Handbook* the

digital history also provides opportunities for historians to expand the reach of their historical collections to “marginalized or silenced voices”.

Digital history involves the use of digital tools to:

- Research, analyse, and visualize patterns in historical information.
- Present research findings and historical narratives in an enriched content format that is both informative and entertaining.
- Invite collaboration and enable various audiences to participate in the preservation and telling of stories.

Digital history, provides links to notable digital history resources, examines key digital historical projects, explains the role of digital historians, and how students can prepare for careers in this growing field through advanced education.

Historians can use technology to gather, quantify, interpret, and present the past and educate various audiences. In addition to digitizing the past, digital history advances scholarly pursuits in the field of history, helping to “create frameworks for mediating the results of scientific research.” This digital approach to examining and representing historical information is known as digital history.

The integration of primary sources and imagery with modern technological advances allows historians to transform their scholarly research into digitized material. These digital resources are more accessible than the traditional avenues of presenting research. Digital historians can publish their analyses on websites, blogs, social media, and online journals. Through digital media tools, digital historians can build dynamic and insightful presentations, such as interactive graphs, charts, and maps, to help others visualize historical events.

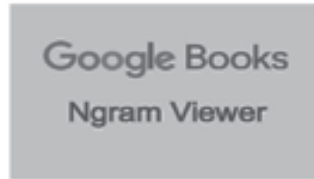
Digital history expands access to historical materials and can advance historical knowledge. In the classroom, digital history provides teachers with the resources to create more engaging lesson plans and curricula, including the use of simulations, VR, and AR. Digital history also provides an avenue for the creation of digitized public historical projects that engage various audiences.

The Resources of Digital History

Historians can expand the presentations of their research beyond traditional books and journal articles by employing digital history resources such as text-gathering tools, interactive map builders, and data visualization.



Open-source digital publishing tools such as **Scalar** and **Omeka** enable historians to publish their scholarly work. These tools, which are useful in gathering and annotating text from various sources, allow for the inclusion of visualizations and media-rich presentations.



Exploring historical data through visualization can enrich historical interpretation and teaching, provide additional context to data, and help to make scholarly points. Historians have many options for building these visualizations. For example, R, a programming language, is commonly used in



digital history projects to create visualizations such as geospatial data, interactive plots, and animations. Another tool, **Google Books Ngram Viewer**, allows users to search through millions of digitized books to create insightful graphs.

Digital history resources such as **StoryMapJS** and **ArcGIS StoryMaps** enable users to incorporate descriptive text, images, and multimedia content to present historical information on interactive maps. Historians and teachers can tell a story of places, events, trends, and patterns through the context of space, time, and geography. The Geography of the Post website, which shows the openings and closings of post offices in the western U.S. in the second half of the 19th century, offers an example.

The American Historical Association provides digital history resources to help historians get started with digital history initiatives. Additionally, collections from the Library of Congress and digital history projects from many states reflect the diversity of what can be created with digital history tools.

One of the aims of digital history is to inform and engage new audiences. Video and audio podcasts focused on historical subjects and themes can help build online communities. These digital communities provide a place for people to communicate their shared experiences and interests. Social media tools also help. For example, the use of the hashtag **#twitterstorians** on Twitter can help extend the reach of digital projects to wide-ranging audiences.

A Look at Key Digital History Projects

Throughout the U.S., historians, educators, cultural institutions, museums, and libraries have created and collaborated on digital history projects. These projects provide different insights on cultures, traditions, and stories that are part of our shared history. These projects

are organized around specific themes, incorporate dynamic content, and are freely accessible to everyone. Below are examples of digital history projects:

1. Korean War Legacy Project: This interactive library provides historical insights on the origins and outcomes of the Korean War, often referred to as the “forgotten war.” Teachers, students, and the public can visit the project to understand the challenges soldiers faced on the battlefield. The project also aims to heighten awareness of the war’s impact on democracy in the world today. Content includes interviews with Korean War veterans, archives and recordings of their experiences as well as original artifacts.

2. Constitute: This digital history project enables individuals to read, search, and compare the constitutions of nearly every independent state in the world. It includes useful interactive tools, including a timeline of constitutions, which visually represent constitutional amendments made throughout history. In building content, historians constructed the chronology of constitutional events, acquired English texts of constitutions, and translated non-English texts of constitutions. They also used survey tools to gather data from international, legal, and constitutional scholars.

3. Smithsonian Learning Lab: This platform provides visitors with an interactive site to research, explore, and discuss millions of archives, including recordings, texts, and videos, housed across the Smithsonian’s 19 museums, 9 major research centers, and the National Zoo. This digital project encourages the Smithsonian community to share knowledge and learning in the areas of history, art and culture, and the sciences.

4. Indian Ocean in World History: This digital history project allows individuals to explore documents and artifacts that chronicle the Indian Ocean’s trading and exploration history. The site includes an interactive map, a lesson plan generator for teachers, and video journeys.



Website of Indian Ocean in World History

Building the project involved the collection of primary sources such as written accounts of travellers throughout history; political and economic documents such as inscriptions, decrees, and treaties; objects from archaeological investigations and scientific investigations; and geographic information.

5. Cold War History: The Cold War International History Project (CWIHP) chronicles the origins, rise, and end of the Cold War. This digital project, established in 1991, is overseen by the Wilson Centre’s History and Public Policy Program. It contains declassified historical materials, including photos, diplomatic cables, high-level correspondence, and meeting minutes. Historical information is presented in essays, timelines, educational resources, and tools such as maps and timelines. In addition to using archival documents, it conducts oral history interviews.

6. World Population History: This digital project tracks the evolution of the world’s population over the past 2,000 years. It highlights noteworthy milestones in human history and provides perspectives on the historical, social, political, and environmental influence of various groups. The project was created from “a unique dataset that is a compilation of several sources outlined in the Sources and Credits page,” according to the site.

What Is a Digital Historian, and What Do They Do?

The traditional theory and methodology of the history discipline are critical to digital history. As such, digital historians promote scholarship at the highest levels in their work. They research primary historical resources such as letters, photographs, archival documents, and more to write historical narratives, reports, and presentations.

Digital historians also determine the authenticity and significance of sources and archive or preserve materials. They work for museums, governments, businesses, individuals, non-profits, and historical associations. The primary differentiator in the digital historian role is in their focus on integrating technology to expand the reach of scholarship and enrich the presentation of historical research.

Digital historians use digital tools such as data and text analysis, data mapping, and visualization to share inclusive histories with various audiences. They promote multidisciplinary collaboration and encourage the use of digital methods to provide broad audiences with access to historical information. These historians publish research that is suited for interactive spaces, using graphs, timelines, charts, simulations, and more. Digital historians go by various job titles including historians, historical consultants, archivists, museum professionals, oral historians, curators, historic preservationists, among many others.

How to Become a Digital Historian

Historian positions typically require a master's degree. For historical research positions, a doctoral degree may be required. An advanced degree prepares graduates with research, critical thinking, and analytical skills essential for work as a historian.

Digital literacy is a core competency for digital historians. At a foundational level, digital historians must know how to use digital library catalogues, conduct keyword searches online, and understand the educational impact of using digital technologies. At a more advanced level, the adoption of advanced digital technologies among historians has been gradual, according to a survey of 1,266 historians.

Advanced digital tools can be used to examine historical data from vast resources, present research in online and interactive formats, and improve educational delivery. This base of digital literacy and data analysis skills, along with research, communication, problem-solving, and critical-thinking skills, are essential for digital historian roles of the future.

The Growth of Digital History

Over the last twenty-five years, digital history has grown into a subfield of its own. Using computers to assist in both historical analysis and the sharing of historical narratives is not new. Economic and social historians began adopting computer-based statistical methods in the 1960s to analyse historical data as means for documenting and quantifying different communities. In the 1980s and 1990s, as personal computers became more available and accessible, some historians created simple databases of sources, transcriptions, and numerical data derived from their own research. The birth of the Web and the first modern browser, Mosaic, in 1993, opened new means for sharing,

networking, and collaborating in ways not previously possible. Using computer languages designed for the Web, historians found opportunities for crafting and publishing narratives filled with links to other resources, creating non-linear pathways that encouraged new ways of reading.

An important milestone occurred in the 1990s when cultural heritage institutions began creating digital copies of their holdings and sharing them online for free. The Library of Congress's American Memory and the New York Public Library's first iteration of the Digital Schomburg collection were path-breaking resources that facilitated access to sources for historians and students. Genealogists, collectors, and enthusiasts benefited from these collections, and the Web provided a means for them to share their passion and connect with others. Genealogists, in particular, benefited from digitized databases of passenger records from the Statue of Liberty-Ellis Island Foundation records documenting immigrants entering Ellis Island. In this period, the Church of Jesus Christ of Latter-Day Saints also began its long history of providing access to digitized U.S. Census records and other public records.

- [i]** Collector Omar Khan launched a website filled with his collections, *Harappa: The Indus Valley and the Raj in India and Pakistan*, driven by his personal interest in the histories of South Asia. Soon after the site launched in 1995, Khan connected with scholars in and of the region and the Harappa grew beyond a hobbyist's project into an impressive online resource containing collections and exhibitions on two distinct eras in South Asian history.
- [ii]** Motivated by the potential to expose and document voices from underserved and under-heard communities, individuals and

organizations gravitated to the Web to harness the power of computers to collect, analyse, and present digitized data.

Digital Collections

Today, digitized collections of primary sources from thousands of libraries, archives, and museums continue to facilitate access to existing collections. Many of these collections replicate existing archival structures and collections. As such, digital collections can reproduce the power structures, and absences, involved in the creation of the original physical archives. At the same time, digital scanning and photography, combined with web protocols, have allowed individuals and organizations to build, curate, and share more inclusive collections around themes and communities. Online collaborative research collections, such as the **Digital Library of the Caribbean**, combine resources from multiple organizations to serve an international and multi-lingual audience and promote the study of Caribbean history and culture. Since their founding in 2004, their governance model is designed with principles of equity and inclusion: decision-making is shared and the combined monetary and professional resources are distributed equitably across more than forty institutions. When designated physical spaces for certain types of archival material do not exist (or are limited), people are creating digital spaces to fill the gap.

An important example of digital collections work documenting under-heard voices is the **Colored Conventions Project**. Led by Gabrielle Foreman and a large collaborative team at the University of Delaware, it brings together newly-digitized sources related to Black political conventions from the 1830s to 1890s into a website that includes minutes from local, regional, state, and national meetings discoverable by year, place, and subject tags. To make the scanned

documents fully text searchable, Foreman and her team collaborate with students and community groups, including African American churches, to transcribe documents and research the lives of individuals mentioned in meeting minutes, most of whom are not national figures. Through this community-sourced research, a new story of African American political activism is emerging.

Many digital collections projects begin outside of academic institutions. **The South Asian American Digital Archive (SAADA)**, led by Michelle Caswell and Samip Mallick, began as a way for the organizers to see themselves and their community in history. After ten years of collecting digitally, it holds thousands of items making it the largest collection of South Asian American history. When the Smithsonian's National Museum of African American History and Culture (NMAAHC) first formed, they lacked a physical collection and turned to digital means to jumpstart their efforts. The museum launched an online Memory Book in 2007 that asked visitors to share their stories, family photos, or traditions. These early contributions influenced how curators shaped their interpretative priorities and helped them build their physical and digital collections. This practice also informed their digital strategy from the institution's earliest stages. These digital collections provided building blocks for writing and teaching more inclusive histories.

Teaching and Learning

Some of the earliest digital history projects sought to bring students into direct contact with digitized primary sources and multi-media interactives to teach historical methods and analysis. **History Matters** offered one of the first free online U.S. history courses designed for high school and college classrooms, based on the textbook and CD-ROM, *Who Built America?* By assembling different types of

primary sources to represent many voices from the past and publishing guides to help students interpret different kinds of evidence, History Matters demonstrated the potential for building inclusive and synthetic teaching materials for the Web—such materials are now collectively known as Open Educational Resources (OERs). Since these early projects, educators have posted lesson plans, activities, and other materials online, which has created a need to aggregate these sources in central places for teachers, leading to sites such as **EDSITEment** and **Teaching History.org**.

Immersive websites and games have also played an important role in history education. In *Who Killed William Robinson?* launched in the late 1990s, Canadian historians experimented with an immersive site that invited students to closely examine primary and secondary evidence pertaining to a specific historical event. Designed to help undergraduates understand historical methods and uncertainties in the record, the project asked students to spend time reading about the contexts surrounding the murder and associated events, then dig through a collection of primary sources and different interpretations of the events. Students using the website quickly learned how murky evidence presented at trial led to the conviction and execution of a Chemainus Indian and many questioned the verdict. Project co-creators, Ruth Sandwell and John Lutz, wove together the social, cultural, and political contexts at work in colonial British Columbia to help students solve the mystery behind the death of William Robinson and other African Americans who migrated to British Columbia in the 1860s. Designing investigative activities like *Who Killed William Robinson?* and other serious educational games requires an intense amount of technical and research resources to build and sustain as web browsers evolve and the use of mobile devices continues to increase.

Historians are also sharing and creating undergraduate and graduate-level syllabi online to encourage more inclusive reading lists and assignments that acknowledge and respond to current events. Responding to racially-motivated violence in the 2010s, educators began generating reading lists to promote teaching the history of racial violence, mass incarceration, and white supremacy. One example is **#CharlestonSyllabus**, initiated by Brandies University professor Chad Williams, following the horrific 2015 shootings at Charleston’s Emanuel African Methodist Episcopal Church. The resulting community-sourced resource, now maintained by Keisha Blain and the African American Intellectual History Society, is filled with books and articles on relevant historical topics, many of which were written by scholars of colour. These efforts encourage instructors to teach and discuss difficult historical, cultural, and political topics with their students. Through these examples, we see historians building both simple and complex projects to engage students in historical thinking and research.

Computational Analysis

Digital history that requires computer programming languages to explore historical data through visualization is often referred to as computational analysis. This approach can be most helpful for exploring collections of digital sources and other types of data that can be visualized to frame research questions or expose the relationships among people, places, and ideas. Using spatial data, some digital historians interpret landscapes by generating maps. Exploring the constructions and connections of place and space are important when studying the spread of commodities, ideas, and people, as well as the impact of public policies on physical places. Through careful research of local records, Prologue DC’s Mapping Segregation in Washington, D.C.

visualizes segregation in twentieth-century Washington, D.C., neighbourhoods by mapping the restrictive covenants, block-by-block, across the city. Weaving together legal challenges, historical photographs, and other sources on a map, this project offers a good example of how placed-based storytelling can make systemic racism visible in concrete ways.

Textual analysis, more commonly used in literature and rhetoric fields, offers methods for examining language use by identifying language patterns and themes based on combinations of words and phrases across bodies of texts (corpora). Historian Michelle Moravec employs these techniques when examining documents related to the women's suffrage movement in the United States. Through analysing the rhetoric amassed across six volumes of the *History of Woman Suffrage*, Moravec can see how the white editors framed the voting rights movement's rhetoric. By excluding radical voices and women of colour who saw suffrage as one step toward achieving equal rights for all women, the compendium's editors focused on issues pertinent to themselves—property rights of married white women. These limitations are important to identify when researching a large body of sources. Since computational methods require digitized and machine-readable content, the absence of inclusive collections presents real challenges. Online collecting and recovery efforts mentioned earlier in the essay are an integral piece for creating an inclusive digital history.

Social network analysis helps digital historians to explore relationships between different entities and visualize them. The **Linked Jazz** project team, led by Cristina Pattuelli, spent years extracting and identifying names of jazz musicians, composers, and leaders through recorded transcriptions of oral histories, photographs, and documents using computational techniques. The team built a database of names

and identified connections, such as band member, mentor, influencer, or collaborator. They then asked for assistance from historians, fans, and jazz musicians to identify and confirm the relationships and other biographical information from this community. Driven by metadata that links individuals across multiple collections, Linked Jazz generates visualizations that show the many connections of individuals lesser known in mainstream histories, such as Toshiko Akiyoshi, a prominent Japanese band leader and musician. Engaging in computational analysis requires a digital historian to create datasets, and data needs definition to be processed. Forcing uncertain information into a fixed value, such as a date or specific place, when source material may not offer that certainty creates tension for historians and may mean that a specific digital method cannot reasonably be employed as means for analysis. This also can make computational methods less accessible than other areas of digital history.

Challenges for the Field

Despite the field's efforts to build an open and collaborative community, digital history methods can be exclusive and challenging to practice. Digital historians have worked to be inclusive of underrepresented and under-served communities in their project work, but they have not been as successful in expanding the corps of practitioners. Even still, efforts such as the multi-lingual **Programming Historian**, offer step-by-step lessons with sample data and content for learning different digital methods, free open source software, and workflows. Started in 2008 by William J. Turkel and Alan MacEachern, **Programming Historian is now a free peer-reviewed publication supported by an active cohort of authors, editors, and reviewers committed to teaching, fostering, and growing an inclusive community of practitioners.** Other efforts to increase capacity can

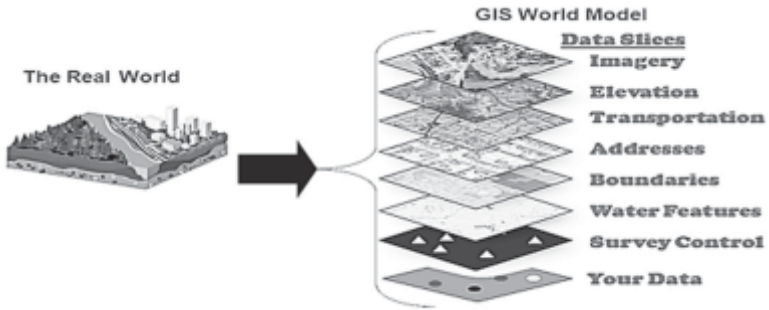
be found through free professional development opportunities offered through the National Endowment for the Humanities, the Getty Foundation, and professional organizations, as well as fee-based courses at the Digital Humanities Summer Institute and many universities. Digital methods and projects offer dynamic ways for creating, publishing, and collaborating on inclusive history projects. Historians are contributing to these new methods and the scholarly communications ecosystem through the development of and contributions to free and open source software. A major challenge is to be active in conversations about preserving and sustaining the open digital infrastructure that makes this inclusive digital history work accessible for all in years to come.



Website of The Programming Historian

Geographical Information Systems (GIS)

GIS is a technological field that incorporates geographical features with tabular data in order to map, analyse, and assess real-world problems. (GIS) is a constantly evolving technology. Over a span of twenty years, members of the geographic information community have seen this technology advance from command line, workstation-based software to tools that can now be used in the cloud and via mobile devices.



The key word to this technology is Geography – this means that some portion of the data is spatial. This means that the data is in some way referenced to locations on the earth. Coupled with this data is usually tabular data known as attribute data. Attribute data can be generally defined as additional information about each of the spatial features. It is the partnership of these two data types that enables GIS to be such an effective problem-solving tool through spatial analysis.

GIS incorporates two types of data; the Spatial data and the Attribute data.

Spatial data	Attribute data
Data referenced to the locations on the Earth	Additional information about each of the spatial locations.

Example: Data of schools in a particular location.

The actual location of the schools is the spatial data	Additional data such as the school name, level of education taught, student capacity would make up the attribute data.
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What is GIS Used For?

GIS operates on many levels. On the most basic level, geographic information systems technology is used as computer cartography, that is for straight forward map making. The real power of GIS, however, is through using spatial and statistical methods to analyse attribute and geographic information. The end result of the analysis can be derivative information, interpolated information or prioritized information. Some examples of the types of questions that GIS is used to answer might be:

- How many schools are within one mile of the bus stop using buffer analysis
- What areas is the cellular service the strongest using line-of-sight analysis
- What are the different types of vegetation in an area using NDVI classification of satellite imagery?
- How walkable is a neighbourhood using street network analysis?
- Where are areas of high crime based on hot spot analysis

How GIS is Used to Understand History

1. Visualizing History Using GIS

GIS has transformed the field of history so that our understanding of historical events is now better contextualized. GIS can be used to create interactive maps of the past that could revolutionise the learning of history. One recent example includes studying Roman harbours in the Mediterranean Sea. We know trade was vital to the Roman Empire; however, journeys across parts of the Mediterranean would have been difficult during certain times of the year, as winds and other factors vary. Therefore, GIS could be used as a forecasting tool to determine

likely routes of shipping lanes in the past, where discovered shipwrecks and amphora, or cargo carried by ancient ships, are used to validate these route estimates.

2. Teaching History Using GIS

Teaching history now is made easier by visualizing to classrooms and students places mentioned and GIS analysis could be used to provide students with historical awareness, such as how far armies travelled and the types of terrain they encountered. One area where GIS has been more recently used in understanding the past has been reconstructing ancient sites or places so that one can visualize in 3D and understand how individuals experience cityscapes or landscapes in the past as they walked through them. This includes understanding Maya architecture and landscapes. This particular project used **Web3D GIS** and a customized tool called **QueryArch3D**. For historians, these tools offer a unique way to understand the past by reconstructing it using available historical or archaeological data.

3. Historical Geographic Information System (HGIS)

Historical GIS is the use of GIS data to document the given geography of an area in history. GIS can be used in historical geography research to map out ancient areas and the changes in cities and places over time. It can be regarded as a subfield of historical geography and geographic information science.

Techniques used in HGIS

- Digitization and georeferencing of historical maps. Old maps may contain valuable information about the past. By adding coordinates to such maps, they may be added as a feature layer to modern GIS data. This facilitates comparison of different map layers showing the geography at different times. The maps

may be further enhanced by techniques such as rubber sheeting, which spatially warps the data to fit with more accurate modern maps.

- Reconstruction of past boundaries. By creating polygons of former administrative sub-divisions and borders, aggregate statistics can be compared through time.
- Georeferencing of historical microdata (such as census or similar records). This enables the use of spatial analysis to historical data.

Notable Historical GIS projects

1. **Great Britain Historical GIS**, A GIS enabled database holding diverse geo-referenced maps, statistics, gazetteers and travel writing, especially for the period 1801-2001 covered by British censuses. Public access via the Vision of Britain site. Created and maintained by Portsmouth University.
2. **Historical GIS.com**, several historical GIS projects including the Copper Country Historical Spatial Data Infrastructure, the Imagining London (Ontario) HGIS Project, and several others. Hosted by the Historical Environments Spatial Analytics Lab at Michigan Tech University
3. **China Historical GIS** similar project for Imperial China developed by the universities of Harvard and Fudan, China.
4. **HistoAtlas** is an open historical geographical information system that tries to build a free historical atlas of the world.

literature. At first, only books that told stories of religion and religious heroes were written. During the Renaissance, people began to write realistic books and not just religious stories. People's mindset about themselves changed. It was no longer about what humans could do for God, but what humans could do for themselves. This way of thinking is called humanism.

The Scientific Revolution changed the modern era by introducing important scientists such as Galileo, Copernicus, and Sir Isaac Newton. Their discoveries paved the way for modern tools, inventions and innovations.

The Industrial Revolution brought about major changes in agriculture, manufacturing, mining, transportation, and technology. This era had a profound effect on the social, economic, and cultural conditions of the world.

Inventions and Innovations of the Information Age

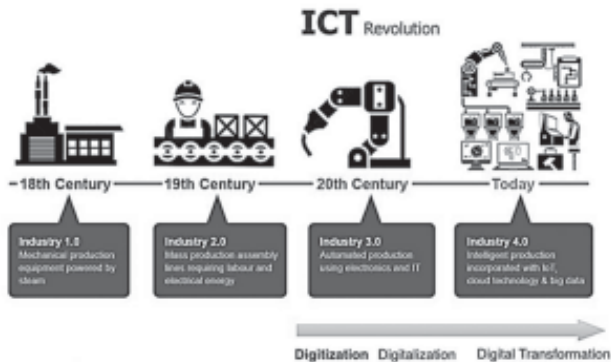
There were many different inventions that came about because of the Information Age, one of which was the computer. The Internet allowed people to access information with the touch of a button. The Internet has turned society into homebodies, individuals who do everything from the comfort of their homes instead of venturing outdoors to complete tasks. People can do everything online; shopping, communicating, bill paying, working, education, entertainment, even ordering food. This may be good, but it has also made us a very lazy and uneducated society.

Tim Berners-Lee, Steve Jobs and Bill Gates are several important people of the Information Age. Berners-Lee created the World Wide Web. Jobs who was created the first effective personal computer called the Apple 1. The Apple 1 was a huge advancement

in computer sciences and it carved the path for the computers we have now. Apple has created iPhone, iPod, iPad, iMac, and Apple TV. Gates is also a huge force in the Information Age. He founded Microsoft, which creates almost everything that has to do with computers. Microsoft develops programs like Microsoft Office, Windows, and many other influential products.

Changes of the Information Age

The Information Age has changed people, technology, science, economies, culture, and even the way people think. The Internet is arguably the most prominent innovation of the Information Age. The Internet changed the way people do everything. It has made people lazier, but it also makes a large amount of the population smarter. The Information Age has made industrial countries stronger. With online companies being some of the most successful and economically stimulating businesses out there, economies receive more from them and keep our world turning. People are becoming more mature and more educated due to things like the computer and the Internet. This time period has reshaped governments, with new technology being created every day. Governments can now have more advanced and effective militaries. Because of things like the Internet, new laws had to be put in place to stop hacking, piracy, and identity theft.



Impacts of the Information Age

The Information Age brought about many new inventions and innovations. Many communication services like texting, email, and social media developed and the world has not been the same since. People learn new languages easier and many books have been translated into different languages, so people around the world can become more educated. However, the Information Age is not all good. There are people in the world that believe they can live their entire life through the Internet. Also, huge criminal organizations rely on hacking into government systems and obtaining confidential information to continue their way of life. Jobs have also become easier, and some jobs can even be done from the comfort of your own home. The Information Age is also known as the Age of Entrepreneurship. Now entrepreneurs can start and run a company easier than ever before. It also impacts our work ethics by distracting us and causing us to lose interest in the task we are doing. This time period has also created a shortage of jobs and making many jobs obsolete because machines are now being used to do the work humans once did.

Digitization

Digital is a numeric representation of something physical. Digitization means that a physical item is converted into a series of numbers. That series of numbers is used to recreate a likeness of that item on a computer screen.

Examples:

Photograph + Digital camera = Digital image

Document + Scanner = Digitized document or digital image

Sound + Digital recorder or converter = Digitized audio

In technical sense, digital storage started out as punch-hole cards or strips that were fed into a computer. Then with the ENIAC, the first purely electronic computer storage was available. These first ones were like RAM memory on a average computer, in that when you turned off the power, the data was lost. It was not until the mid-1950s that memory was invented that did not need a constant power source.

Difference

between **Digitization**, **Digitalization** and **Digital Transformation**



Types of Data Storage

There are two broad types of data storage, including direct attached storage and network attached storage. There are many devices that fit into each of these categories, each with their own unique advantages and disadvantages, which we'll explain in more detail below. For now, let's take a closer look at each of these main categories:

Direct Attached Storage (DAS)

As the name might suggest, direct attached storage (DAS) includes types of data storage that are physically connected to your computer. This storage is generally accessible to only a single machine. Some common devices in this category include:

- Hard Drives
- Solid-State Drives (SSD)
- CD/DVD Drives
- Flash Drives
- And More

DAS solutions are great for creating local backups and can be more affordable than NAS solutions, but sharing data between machines can be cumbersome.

Network Attached Storage (NAS)

Network attached storage (NAS) allows for multiple machines to share storage over a network. This is accomplished with multiple hard drives or other storage devices in a RAID configuration. One of the key benefits of NAS is the ability to centralize data and improve collaboration. Data can be easily shared among connected machines, and permission levels can be set to control access. While NAS solutions tend to be more costly than DAS solutions, they are still very affordable as storage technology has advanced significantly.

Types of Data Storage Devices

Numerous data storage devices provide reliable protection of important files, but a few differences can help you find the best fit for your business. Computer memory and local storage may not be enough to keep your proprietary data protected. The best way to protect yourself is non-volatile data storage, which doesn't require continuous power to store and preserve data. Consider these non-volatile data storage options.

SSD Flash Drive Arrays

Using only flash memory, these solid-state storage systems offer swift data transfer between SSD and a smaller physical size than a disk array. The upfront cost tends to be higher, but there's great potential to pay a lower cost over time.

Hybrid Flash Arrays

These storage devices include both flash memory drives and hard disk drives for balanced performance. Hybrid flash arrays offer low-cost startup, reasonable performance costs and fast data access on demand. All-flash arrays offer lower latency and faster performance than hybrid flash but may cost even more.

Hybrid Cloud Storage

Budget-friendly and flexible, hybrid cloud storage offers a secure and compliant option that helps to assure business continuity. This type of data storage accommodates frequent backups and long-term archives as well as future scaling and always-on availability. The combination of cloud and on-premises storage adds a layer of safety to ensure data is protected and available, and storage space could potentially be unlimited.

Backup Software

Software for system and enterprise backups typically comes with a license or a subscription rate billed monthly or annually. Convenience is a big factor in being able to “set it and forget it,” in many cases.

Backup Appliances

Backup servers, backup and recovery appliances and other devices for this purpose come with a hefty price tag. Configurations

may be complicated and reliability may be at risk with misconfigurations and incorrect software tuning.

Cloud Storage

Complete cloud-based or online storage solutions offer virtual data storage and convenient access to your materials from anywhere, not just a local computer or external hard disk. Reliability tends to be on point, but organizations need to consider a cloud storage security strategy before implementing.

For best results in protecting your data, you should strive to maintain three copies of your important files. Store your primary data plus two backup copies, preferably with one backed up remotely and offsite.

Benefits of Efficient Data Storage

As a business leader, you may wonder, “What is data storage going to do to protect and preserve my company’s proprietary information?” You may want to know how much money a data storage solution can save your business, or how quickly you can get your company back up and running after a failure with the right data storage and recovery solution in place. Consider these data storage benefits to determine how big of an impact the right solution may have on your business.

- Reliable data preservation
- Data continuity and accessibility
- Quicker and easier data recovery
- Flexible price points and capacity options
- Effective security for protected files

Digital Archives-democratization of historical knowledge

Digital archives are collections of primary sources, such as letters, diaries, journals, maps, photographs, and interviews that have been digitized and placed online. The majority of digital archives are developed and maintained by libraries and museums. Each digitized item is catalogued and arranged in a vast online catalogue



system. Items may be located by browsing or searching. Items within digital archives are hypertext documents, in that text is “composed of blocks or words (or images) linked electronically by multiple paths, chains, or trails in an open-ended, perpetually unfinished textuality described by the terms, link, node, network path. “Hypertext documents allow the reader to choose the path in which to read a document. They offer the reader freedom to physically move through the document and across documents.

Conducting historical research with primary sources has been traditionally reserved for scholars who had the means to physically visit historical sites, libraries, and archives. These scholars were typically university faculty and graduate students who had resources to travel to museums or libraries with collections of primary sources. General public were often excluded from conducting authentic historical research with primary sources outside of their local communities because they lacked the time and money to visit remote sites that housed such primary documents. Persons who sought opportunities to go

collections at the Virginia Center for Digital History (VCDH) by giving every one access to historical documents. He states, for too long history's methods have been absent without leave from our classrooms. It's time, we feel, to restore the methodology of history to the center of the classroom experience. The web allows us to accomplish that by providing access to materials that only researchers, scholars, and librarians had access to previously...weat VCDH are trying to democratize history with our projects." Digital archives, such as VCDH, provide open and convenient access to doing historical research. Individuals who have access to an internet-connected computer now have free and ready access to millions of digitized primary sources.

Thomas further elaborates on the concept of democratizing history and states that it is about more than just access. Rather, it involves the inclusion of all histories. Thomas states, "Most of projects are broadly social in their historical objectives, including as many as possible in the investigation of the subject. So, the Civil War, for example, happened not just to soldiers and generals but to women and men, blacks and whites, poor and rich, children and adults. We want to capture the experience of as many as possible in our work. "Digital archives hold the potential of having an enormous impact on the teaching and learning of social studies in our schools. The impact is much more complex than teachers and students simply having greater access to primary sources. Because learning through historical inquiry with primary sources is a radical shift from how social studies content is typically taught, teaching and learning with digital archives holds the potential of transforming the nature of social studies education.

Points to remember

- Digital archives offer social studies teachers a grand opportunity to enrich their pedagogical content knowledge and engage their students in active learning.
- The hypertext nature of digital archives offers learners flexibility in what information they access and how they access the information.
- Digital archives take advantage of the mass, multiplicity, speed, reiteration, reflexivity, and precision offered by computers.
- Digital archives have democratized historical research.

MODULE - III

TOOLS OF DIGITAL HISTORY

What is an archive?

An archive as “a place in which public records or historical documents are preserved” (Merriam-Webster). Archives contain archival materials, which “are information objects that serve as evidence of past events” (Peter Van Garderen, 2007).

What is a digital archive?

A digital archive is similar in purpose to a physical archive, but the historical documents and objects that provide evidence of the past have been digitized (often by scanning or photography, unless a document was created digitally in the first place) and made available online. Digital archives are usually created with a goal of preserving historical objects and making them available to researchers.



Popular Digital Archives

Name	Speciality
World Digital Library	A source for manuscripts, rare books, films, maps and more in multilingual format.
Universal Digital Library	A collection of one million books.
Project Gutenberg	More than 33,000 e-books to read and download.
Bartleby	An immense collection of books for consultation, including fiction, essay and poetry.
ibiblio	E-books, magazines, academic essays, software, music and radio.
Google Books	More than 100,000 books for consultation, download or on-line purchase.
Internet Archive	The largest digital library for downloading e-books and audio-books for free.
Open Library	More than one million e-books of classic literature to download

The Internet Archive (IA)

The Internet Archive is a non-profit digital library of Internet sites and other cultural artifacts in digital form. Like a paper library, IA provides free access to researchers, historians, scholars, the print disabled, and the general public. The mission of IA is to provide Universal Access to All Knowledge.

IA began in 1996 by archiving the Internet itself, a medium that was just beginning to grow in use. Like newspapers, the content published on the web was ephemeral - but unlike newspapers, no one was saving it. Today the IA has 25+ years of web history accessible through the **Wayback Machine** and the IA work with 750+ library and other partners through their **Archive-It** program to identify important web pages.



The IA is an ever-growing digital archive and today our archive contains:

- 475 billion web pages
- 28 million books and texts
- 14 million audio recordings (including 220,000 live concerts)
- 6 million videos (including 2 million Television News programs)
- 3.5 million images
- 580,000 software programs

Anyone with a free account can upload media to the Internet Archive. The Internet Archive pay special attention to books. Not everyone has access to a public or academic library with a good collection, so to provide universal access IA archives digital versions of books. The IA began a program to digitize books in 2005 and today the IA scans 3,500 books per day in 18 locations around the world. Books published prior to 1926 are available for download, and hundreds of thousands of modern books can be borrowed through IA's Open Library site. Some of the IA's digitized books are only available to people with print disabilities.

The Internet Archive began archiving television programs in late 2000, and its first public TV project was an archive of TV news surrounding the events of September 11, 2001. In 2009, it began to make selected U.S. television news broadcasts searchable by captions in IA's TV News Archive. This service allows researchers and the public to use television as a citable and sharable reference.

The Internet Archive serves millions of people each day and is one of the top 300 web sites in the world. A single copy of the Internet Archive library collection occupies 70+ Petabytes of server space (and the IA store at least 2 copies of everything). The IA is funded through donations, grants, and by providing web archiving and book digitization services for business partners. As part of IA's privacy policy, it avoids keeping the IP (Internet Protocol) addresses of readers and offer the IA site in https (secure) protocol.

The Internet Archive Wayback Machine

The Internet Archive Wayback Machine is a service that allows people to visit archived versions of Web sites. Visitors to the Wayback Machine can type in a URL, select a date range, and then begin surfing on an archived version of the Web. Since its launch in 1996, over 544 billion pages have been added to the archive.



Website

Simply, a website may be defined as a group of World Wide Web pages usually containing hyperlinks to each other and made available online by an individual, company, educational institution, government, or organization.

Important websites for historical resources

Name	Web Address
Art Reference Library & Documentation Centre	http://ngmaindia.gov.in/art-rldc.asp
CHS Library (JNU)	https://www.jnu.ac.in/Librarian/
Archives on Contemporary History (JNU)	jnuonlinecatlog.jnu.ac.in
NationalArchivesLibrary	https://www.jnu.ac.in/SSS/Archive/
Central Library (JNU)	https://www.jnu.ac.in/Librarian/
Central Archaeological LibraryKalanidhi, IGNCA	ignca.nic.in
The Ratan Tata Library	http://crl.du.ac.in/rtl/
Anthropological Survey of India Library	www.ehs.org.uk

Note: See Comprehensive list of websites in Appendix.

Blogs

A blog (a shortened version of “weblog”) is an online journal or informational website displaying information in reverse chronological order, with the latest posts appearing first, at the top. It is a platform where a writer or a group of writers share their views on an individual subject. Today, there are more than 570 million blogs on the web. As blogs feature wide variety of topics and interests, they provide an excellent platform for discussing history, research, new historical trends, resource sharing etc. blogs with good quality historical resources are also available online.

Definition of blogging

Blogging refers to writing, photography, and other media that’s self-published online.

Blogging started as an opportunity for individuals to write diary-style entries, but it has since been incorporated into websites for many businesses. The hallmarks of blogging



include frequent updates, informal language, and opportunities for readers to engage and start a conversation. A **blogger** is someone who runs and controls a blog.

Blogging vs. Websites

Blogs	Websites
Updated frequently Allows for reader engagement	Largely evergreen content One-way communication

Blogger (service)

Blogger is an American online content management system (CMS) which enables multi-user blogs with time-stamped entries. Pyra Labs developed it before being acquired by Google in 2003. Google hosts the blogs, which can be accessed through a subdomain of blogspot.com.



Podcasts

Podcasts are digital audio files made available on the internet for downloading to a computer or mobile device, typically available as a series, new instalments of which can be received by subscribers automatically. Podcasting started as mostly an independent way for individuals to get their message out there and build a community of people with similar interests. Today there are podcasts from individuals, companies (large and small), Radio networks (like All India Radio), Newspapers (The Hindu Infocus) TV networks (CNN, ESPN, etc.), podcast-only networks (Castbox, Google Podcasts), comedians. Storytellers etc.



Popular History podcasts

History	Indian History
30 for 30	Ithihasa India History Podcast
Backstory	Lost History of India
Dan Carlin's Hardcore History	Yuddha - The Indian Military History Podcast
Conspiracy Theories	Modern Indian History
Lore	Sovereigns and Skirmishes of India

Robotics and Artificial Intelligence (AI) in historical research

Robotics is the study of robots. Robots are machines that can be used to do jobs. Some robots can do work by themselves. Other robots must always have a person telling them what to do.

Even though the science of robotics is not directly associated with the discipline of history, robots have been increasingly used in archaeology. The aim of both archaeology and history is the research of the human past. The difference between these two disciplines derives from the source materials: historians use written sources while archaeologists concentrate on physical remains. Historical sources are committed to dates while archaeological material is basically connected to spatial origin. This basic difference explains why historians and archaeologists have difficulties in understanding each other.

The number of archaeological findings has risen very fast. On the ground of this material it is possible to make convincing analyses of the past on different levels, not only of single finds or sites but on a regional or even global level too. Archaeology is challenging results made by the historical research. By combining the sources and methods of these two disciplines historical archaeology can offer a much more holistic and thorough view, a deeper understanding of the past than either archaeology or history alone.

Since we have seen the mutually beneficial relationship between the discipline of history and archaeology, any technology that helps or amplifies the archaeological discoveries is of helping history. Different types of robots are being employed for varied missions in historical/ archaeological research. The most helpful use of robots is that they can reach where human beings can't reach, like mines, pits and radioactive areas. Such robots are termed as archaeology bots. There are two major trends when it comes to archaeology bots. One is the use of robots to get to places that are inaccessible or dangerous for humans, and the other is the development of robots for repetitive tasks.

One such robot that has been used in several exploration sites is KUKA LBR iiwa robot arm. It is a lightweight robot specialized in delicate assembly work, safety fences. It is a perfect example for human-robot-collaboration in the workspace.



*KUKA LBR iiwa Image:
Johannes Pfleging, ADRL/ETHZ*

Archaeological excavations typically last several weeks and may unearth thousands of individual pottery sherds. For logistical and legal reasons, archaeologists often cannot bring these materials back from the field and are only able to return home with the data that they collect about these sherds. This makes careful data collection an integral part of archaeological fieldwork. For example, high resolution photos can capture colour, shape, and size information of a sherd and this, along with measurements of the mass of each sherd, can be used to determine the material composition of the artifacts.

However, taking thousands of measurements is a dull and repetitive task that requires a great deal of time to properly accomplish. Furthermore, the time spent cataloguing data about thousands of small, unremarkable body sherds (i.e. pieces which do not have any distinguishing geometric information) is time that is not spent digging, studying the more informative diagnostic sherds (pieces of handles, rims, bases, etc.), or performing higher-level cognitive tasks, such as in situ interpretation of the current findings to help inform where to dig in the following days.

In such a scenario a robotic arm can be employed to autonomously process ceramic sherds during archaeological fieldwork. Supported by a state-of-the-art machine learning and computer vision algorithms we can create suite of open-source software tools to: 1) reliably locate, identify, pick up, and transport sherds and 2) interface with external sensors to collect high quality data about each sherd (e.g. mass, colour, shape). Artificial intelligence will equip the robots to automatically learn and adapt to the specific site scenario they are working in. The data thus created will be of much help in reaching conclusions on findings as well as archiving the same for future explorations.

In 2013, archaeologist Kathryn Bard and colleagues from the Boston University used a “modular robotic snake” designed and built by Carnegie Mellon University’s robotics lab to do a limited probe of a Middle Kingdom Red Sea cave. The team used the snake in two man-made caves in danger of collapse at a 4000-year-old boat harbour site at Mersa/Wadi Gawasis in Egypt.



Modular robotic snake

The ARROWS project: for underwater archaeology

ARchaeological ROBot systems for the World’s Seas (ARROWS) EU Project proposes to adapt and develop low-cost Autonomous Underwater Vehicle (AUV) technologies to significantly reduce the cost of archaeological operations, covering the full extent of archaeological campaign. ARROWS methodology is to identify the archaeologist’s requirements in all phases of the campaign and to

propose related technological solutions. Starting from the necessities identified by archaeological project partners in collaboration with the Archaeology Advisory Group, a board composed of European archaeologists from outside WS, the aim is the development of a heterogeneous team of cooperating AUVs capable of comply with a complete archaeological autonomous mission.

Three new different AUVs have been designed in the framework of the project according to the archaeologists' indications.

1. **MARTA**, characterized by a strong hardware modularity for ease of payload and propulsion systems configuration change.
2. **U-CAT**, a turtle inspired bio-mimetic robot devoted to shipwreck penetration.
3. **A-SizeAUV**, a vehicle of small dimensions and weight easily deployable even by a single person.



The project includes also the development of a cleaning tool for well-known artifacts maintenance operations.

3D Printing in Archaeology: Preserving our Heritage

Throughout centuries, humans have established societies, civilizations and empires. These civilizations have long perished but they are still remembered and studied in present times with the help of the structures they built. But these structures cannot be preserved forever. Due to the natural course of time and other many man-made and natural disasters, we have seen the destruction of our heritage which has long been our window to the past.

This problem of how to preserve our heritage has always puzzled experts, but it seems we have finally found a solution to this inevitable problem. Experts are now using 3D printing technology to preserve age-old structures and thus securing the collection, storage and passing-on of knowledge to the next generation. By utilizing techniques like 3D scanning and photogrammetry, archaeologists and museums can utilize 3D printing technology to its advantage in many unique ways.

1. Replicating a Historical Artefact

3D Scanning can be used to create life-size 3D models of existing artifacts that can be 3D printed. These replicas of historical items can be added to museums' collections, giving the public full access to relics that would otherwise be impossible to display. Such models can be easily made available to students who can get more insights into the item by getting hands on with objects without fear of damaging the original piece. These interactions can help increase students' curiosity and can serve as a unique learning experience.

2. Repairing Damaged Art

If any existing piece of ancient art is damaged or broken, a 3D printer can easily be used to repair the damaged artifacts. Even if a work of art is missing a tiny piece, that bit can be seamlessly recreated and replaced. By utilizing 3D scanning, designing and printing, art that was previously destroyed can be restored to its original form.

3. Preserving Entire Archaeological Sites

3D Printing is not just limited to printing smaller objects; it can be used to recreate an entire archaeological site. By scanning entire structures one by one, these sites can be recreated as a digital CAD model. From there, the CAD model can then be turned into a physical

print. This can give researchers the opportunity to see these sites up close, even if the original sites are located on the other side of the world.

One of the most recent and popular examples of 3D printing and archaeology coming together is in the case of Lion of Mosul. The Lion of Mosul was a 3000-year old colossal Assyrian guardian lion who stood at the entrance of the Temple of Ishtar in Nimrud, Iraq. It was destroyed during the razing of Baghdad's Mosul Museum by ISIS.



3D printed Lion of Mosul Source: Google Arts and Culture

The project was initiated by two Ph.D. students who saw ISIS's destruction and set out to digitally preserve cultural artifacts. Using crowdsourced images of the work, they utilized photogrammetry to render the 3D model of the statue. This 3D model was then printed to reproduce a life-size replica of the Lion of Mosul. This 3D printed model can now be seen at the Imperial War Museum in London. Visitors can even play around with the 3D model and zoom in to study intricate details.

4. Recreating Mummies

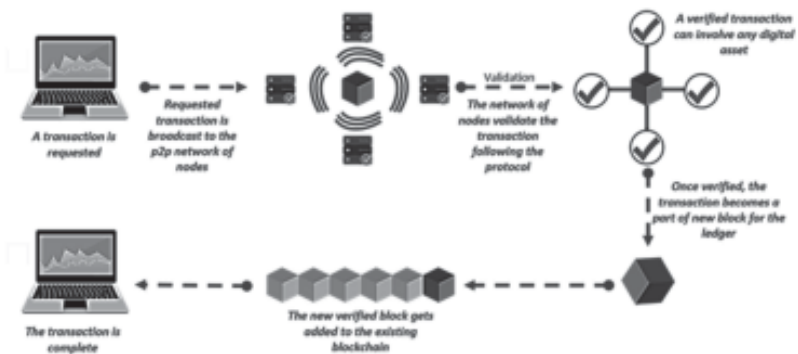
Mummies have always fascinated scientists and researchers but unfortunately, many mummies have been damaged over time. That damage has led to more restricted access to these ancient mummies, but now with the help of 3D printing, Egyptologists can easily recreate these mummies and study them as much as they want. A simple 3D

scanning procedure creates a digital CAD model that can be used to 3D print the mummies. Scientists at the National Museum in Rio de Janeiro have successfully used this technology to recreate mummies. Notably, they’ve even been able to recreate a mummified cat, which was once used as an offering to a God.

A similar use case was also recorded at Harvard’s Semitic Museum in 2012 where they recreated a missing piece from a ceramic lion using a 3D printer. It was able to scan a complete lion that was on loan from another museum to fill in the missing piece on its own. 3D Printing has helped researchers carry out their research without actually handling and disturbing the ancient artifacts, thereby preserving the heritage of our ancestors. As the technology improves, so will our ability to preserve history even more efficiently.

Blockchain

Blockchain is a complex technology, but the underlying idea is quite simple. Blockchain is an open source technology. Blockchain is a public ledger, unlike a ledger kept by a bank or government institution. Each person who owns a “coin” also maintains a copy of all other



assets and transactions, creating a peer-to-peer asset and transaction registry network. This provides transparency and avoids centralized “trust” institutions such as banks. The result is a “distributed” network where all the ledgers and transactions are replicated on delegates’ or users’ computers throughout the network. Data manipulation can be prevented since it will not be approved by the network. Blockchains can store more than financial ledgers- it can be used to store nearly any digital information.

Application of Blockchain in Archaeology

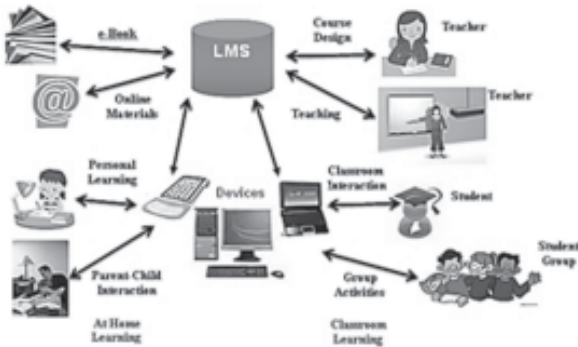
Blockchain could offer an immutable record for archives. This is especially useful for museums who could store their artifacts catalogue with blockchain privately, but provide different levels of access to staff, researchers, and the public.

Blockchain can maintain immutable property records, this can be used to create a foolproof record of invaluable artefacts. When an artefact gets a blockchain record, each time it was moved the authorities can track it. A step further might be to store blockchain information with products like **SmartWater** or **coded DNA** which are currently used to invisibly tag artifacts. Once hashes are recovered from the SmartWater or DNA, the database would provide the record of the artefact.

Another application for researchers working with living subjects may be self-executing smart contracts. Ethical guidelines require the protection of data from human subjects. Ethnographic data is typically stored for a set amount of time (e.g. five years) and then confidential records are destroyed. Blockchain could encrypt and store these records, then the smart contracts could destroy confidential data after a set period of time.

Learning Management System (LMS)

LMS is an acronym for learning management system, a software that enables companies and educational institutions to create and manage lessons, courses, quizzes and other training materials. A learning management system also aids the organization deliver training materials and lessons to employees, students or partners.



What Are the Benefits of an LMS?

1. The more obvious benefits of an LMS include the development of knowledge amongst students or employees.
2. An LMS gives an organization somewhere to centrally house its training and development content. It can be stored, managed, edited and deleted from within the same software.
3. An LMS also saves money, since traditional forms of training like seminars or training days directly impact the company's bottom line.
4. With an LMS, learners can access their eLearning environment from anywhere, at any time, at their own pace and without draining additional company resources or incurring travel expenses.

Basic Components of an LMS

The following are some fundamental features that any LMS should have.

1. **eLearning Standard Compliance:** The ability to exchange data with other eLearning software through compliance with eLearning standards such as SCORM and Tin-Can.
2. **Multichannel Access:** Learners are able to access their account and their course material through desktop, tablet and smartphone devices.
3. **Course Management, Creation or Importing:** Administrators are able to either build courses using a built-in course builder, or import course material from other formats.
4. **Document Management:** The ability to upload and manage documents containing curricular content.
5. **Course Calendars:** Features that support the creation and publication of course schedules, deadlines and tests.
6. **Social Features:** Notifications, messaging and discussion forums to promote knowledge sharing and engagement.
7. **Tracking and Reporting:** Detailed reports should be available so that both administrators and learners may view average test scores, final test scores, single user reports, company and so forth.
8. **Assessment and Certification:** Pre-course assessments (or diagnostic assessments) to assess employee knowledge levels in order to assign suitable content to them. Digital or physical certification should also be supported.

Popular Learning Management Systems

1. Moodle LMS

Moodle is a free online Learning Management System, providing educators around the world with an open source solution for eLearning that is scalable, customisable and secure with the largest selection of activities available



2. Chamilo

Open-source LMS, that improves access to education. Backed up by the Chamilo Association, aiming for promotion of the software, maintenance of a clear communication channel and building of a network of services providers and software contributors.



3. Open edX

Open edX is the open source platform that powers edX courses. Institutions can host their own instances of Open edX and offer their own classes. Educators can extend the platform to build learning tools that precisely meet their needs



4. Canvas

The Canvas LMS is a modern, open-source LMS developed and maintained by Instructure Inc.



LMS vs LCMS (Learning Content Management System)

An LCMS refers to software that's intended to help developers and administrators build and manage eLearning content. Unlike an LMS, it doesn't provide the features needed to actually deliver those courses and track learner progress.

In the modern LMS market, almost all learning management systems are also learning content management systems. Many major LMS provide course building features that allow for course creation and management in the way a traditional LCMS would. Or, at the very least, major LMS will be able to import course content from Microsoft Office or other legacy platforms.

MODULE - IV

DIGITAL DIVIDE

Digital divide

Digital divide is the term that describes the uneven distribution of information and communication technologies (ICTs) in society. The digital divide encompasses differences in both access (first-level digital divide) and usage (second-level digital divide) of computers and the Internet between (1) industrialized and developing countries (global divide), (2) various socioeconomic groups within single nation-states (social divide), and (3) different kinds of users with regard to their political engagement on the Internet (democratic divide). In general, those differences are believed to reinforce social inequalities and to cause a persisting information or knowledge gap amid those people with access to and using the new media (“haves”) and those people without (“have-nots”).

The digital divide metaphor became popular in the mid-1990s, when the National Telecommunications and Information Administration (NTIA) of the U.S. Department of Commerce published “Falling Through the Net: A Survey of the ‘Have Nots’ in Rural and Urban America” (1995), a research report



on Internet diffusion among Americans. The report revealed widespread inequalities in national ICT access, with migrant or ethnic minority groups and older, less-affluent people living in rural areas with low educational attainments being especially excluded from Internet services. That pattern was confirmed by follow-up surveys by the NTIA, which indicated also an initial gender gap in favour of men.

Although diffusion rates of the Internet subsequently rose in all groups, subsequent studies showed a perpetuating digital divide both in the United States and abroad. Some common characteristics emerged. In single nation-states, access to and usage of computer technology was stratified by age, education, ethnicity, race, family structure, gender, income, occupation, and place of residence. In that way, affluent young urban men and women with high levels of education who lived in small families with children were the greatest adopters of new media. Such people are most likely to possess ICTs (material or physical access), the experience and skills necessary to use the Internet (skills access), and sufficient free time to spend online (usage access). Here, Internet usage among advantaged groups includes searching for information to address professional or political interests. On the contrary, many people from less-advantaged groups have been shown to lack those basic navigation skills and to prefer entertainment on the Internet instead.

On the global level, additional factors such as per capita gross domestic product, international trade volume, degree of democratization, deregulation of the telecommunications market, density of communication infrastructure, and investments in research and development also influence Internet diffusion. Thus, industrial societies are more prone to implement new technologies than less-developed countries. For example, by 2012 the greatest intensity of

national ICT access and usage had occurred in South Korea, Japan, and northern Europe.

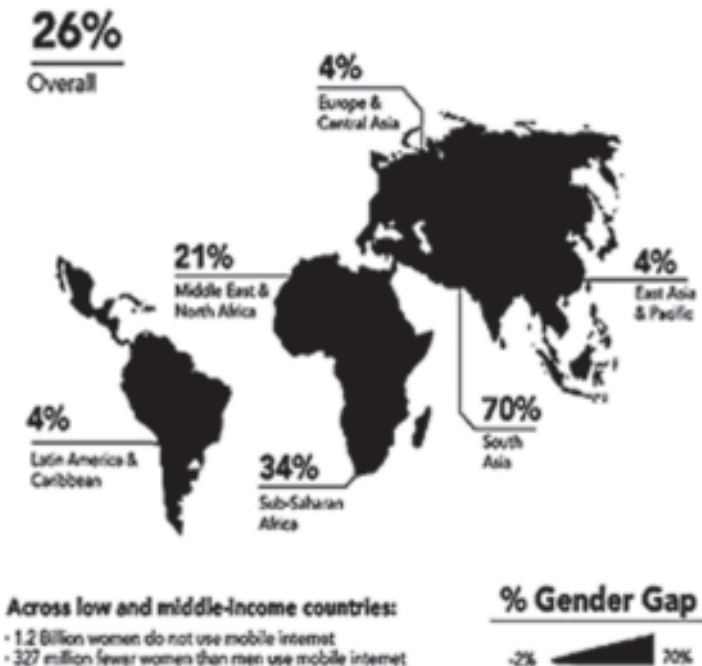
Over time, the global digital divide has remained relatively stable. Yet, in single nation-states some gaps in ICT access and usage have slowly begun to fade. The early differences between men and women and between rural and urban areas of Western residences subsided, possibly due to extended telecommunications networks, lowered entry barriers, and additional ICT experiences at work. Other initial inequalities caused by factors such as age, education, ethnicity and race, and income, however, continued.

Those divergent developments and the various types of ICT access and usage encountered in single countries led some researchers to criticize the original description of a digital divide. In their opinion, the metaphor wrongly implies a binary construction of “haves” and “have-nots” on the basis of the simple notion of absolute and insurmountable class differences in technology. Alternatively, they postulate “digital inequality” as a gradual concept and therefore advocate multidimensional measures of Internet connectedness that take into account the history and context of Internet use, its scope and intensity, and, finally, the centrality of ICTs in people’s lives.

Similarly, policy initiatives conducted by supranational organizations (e.g., European Union and the United Nations), national governments, and private enterprises have been expanded to ameliorate worldwide differences in ICT usage. Although initially concentrating on mere improvement of technical access to computers and the Internet in rural areas and public institutions (e.g., in libraries and schools), projects designed to close the digital divide have shifted to also include civic information campaigns and ICT courses for specific user groups.

Digital Divide- Types

1. Gender Divide – the internet gender gap is striking especially in developing countries. Though mobile connectivity is spreading drastically, it is not spreading equally. Women are still lagging. Men are 90% more likely to own a mobile phone than women. Even among women owning mobile phones they have no access to internet connectivity. The gender digital divide in access to the internet remains largest in the world’s least developed countries at 32.9%. The internet gap is largest in Africa, while in terms of mobile phone ownership, the gender digital divide is most pronounced in South Asia where women are 26% less likely to own a mobile phone than man.



GSMA Mobile Gender Gap Report 2018 Gender gap in mobile internet use in low- and middle-income countries. region

2.Social Digital Divide – Internet access creates relationships and social circles among people with shared interests. Social media platforms like Twitter, Facebook, etc. create online peer groups based on similar interests. Internet usage has created social stratification which is evident among those that are connected to the internet and those that are not. Non-connected groups are sidelined since they don't share in the internet benefits of the connected groups.

3. Access Digital Divide – The main barriers under this point are lack of telecommunication infrastructure with sufficient reliable bandwidth for Internet connections and cost, the ability to purchase, rent without financial hardship and the necessary equipment. This results in lack of access to technology.

4. Other Digital Divide – This includes inequality in the usage of digital technologies due to lack of ICTs skill or support, due to physical disability, cultural and behavioural attitudes towards technology like computers, mobile etc. are difficult to use or belong to a brainy people etc.

Digital Divide in India – Facets

The digital divide exists despite the increase in the number of wireless subscribers in India over the past few years. A few facets are as mentioned below-

1. The Urban-Rural divide: the digital divide between India's rural and urban areas during the lockdown is not just highlighted in Education but is evident everywhere be it telemedicine, e-commerce, banking, e-governance, all of which became accessible only through the internet during the lockdown. Services such as online classrooms, financial transactions and e-governance require access to the internet as well as the ability to operate internet-enabled devices like phones, tablets and computers. As per the report by NSO, most of the Internet-

enabled homes are located in cities, where 42% have Internet access. In rural India, however, only 15% are connected to the internet.

Across India, only one in ten households have a computer — whether a desktop, laptop or tablet. Almost 25% of all homes have Internet facilities, accessed via a fixed or mobile network using any device, including smartphones. The urban-rural disparity of digital divide is evident from the internet penetration in the country. As per the NSO, there is less than 20% Internet penetration, even in States with software hubs such as Karnataka and Tamil Nadu.

As per the report by Telecom Regulatory Authority of India (TRAI), in 2018, total internet density in the country stood at about 49 percent. Of that, 25 percent lived in rural areas and 98 percent in urban areas. According to the latest report released by the TRAI the country had over 1,160 million wireless subscribers in February 2020, up from 1,010 million in February 2016. The number says urban subscribers increased by 74 million (from 579 million to 643 million) and rural subscribers by 86 million (from 431 million to 517 million). This indicated growth in basic telecom facilities and not digital progression.

2. Gender Digital inequalities: India has among the world’s highest gender gaps in access to digital technology. Only 21% of women in India in comparison to 42% of men are mobile internet users, according to GSMA’s 2020 mobile gender gap report. The report says, while 79% of men own a mobile phone in India where the number for women is 63%. While there are economic barriers to girls’ own a mobile phone or laptop, cultural and social norms also play a major part. The male-female gap in mobile use often exacerbates other inequalities for women, including access to information, economic opportunities, and networking.

3. Regional Digital Divide and Intra-State Digital inequality: in terms of people that have access to computers or in the know-how to use the internet, States too greatly differ in the matrices. Southern states are more digitally literate than Northern counterparts. Kerala is the state where the difference between rural and urban areas is the least. Uttarakhand has the greatest number of computers in urban areas, while Kerala has the greatest number of computers in rural areas. Himachal Pradesh leads the country in access to the internet in both rural and urban areas. While the national capital has the highest Internet access, with 55% of homes having such facilities, Odisha is at the bottom with only one in ten homes having Internet.

Talking about Intra-state divide – While urban areas are more digitally literate, rural counterpart are lacking in the respective states Kerala has the least inequality with more than 39% of the poorest rural homes having Internet, in comparison to 67% of the richest urban homes, where Assam shows the striking inequality, with almost 80% of the richest urban homes having the Internet access and 94% of those in the poorest rural homes in the State don't have the access.

4. Disparity due to literacy/digital literacy: having Internet access is no guarantee that one can use it. 20% of Indians above the age of 5 years had basic digital literacy. Just 40% in the critical age group of 15 to 29 years, which includes all high school and college students as well as young parents responsible for teaching younger children. More than one in five Indians above 7 years still cannot read and write in any language. Over the last decade, literacy rates have increased from 71.7% to 77.7%, with the highest gains coming among rural women. A State-wise split of literacy rates also throws up some unexpected results. Andhra Pradesh has the country's lowest literacy rate, at just 66.4%, significantly lower than less developed States such

as Chhattisgarh (77.3%), Jharkhand (74.3%), Uttar Pradesh (73%), and Bihar (70.9%). Kerala remains at the top of the pile with 96.2% literacy, followed by three northern States: Delhi (88.7%), Uttarakhand (87.6%) and Himachal Pradesh (86.6%).

5. Linguistic Digital Divide: More than 80% of the content on the Internet is in English, so states, where people are more competent in English, are more digitally competent.

Programmes for Addressing the Challenges in Bridging the Digital Divide:

India taking significant steps towards acquiring competence in information and technology, the country is increasingly getting divided between people who have access to technology and those who do not.

- ❖ **The Indian government has passed Information Technology Act, 2000** to make to e-commerce and e-governance a success story in India alongwith national e-governance plan.
- ❖ **Optical Fibre Network (NOF-N)**, a project aimed to ensure broadband connectivity to over two lakh (200,000) gram panchayats of India by 2016.
- ❖ **Digital Mobile Library:** In order to bridge the digital divide in a larger way the government of India, in collaboration with the Centre for Advanced Computing (C-DAC) based in Pune.
- ❖ **Unnati**, is a project of Hindustan Petroleum Corporation Limited (HPCL) which strives to bridge the digital divide in schools by giving the rural students with poor economic and social background access to computer education.

- ❖ **E-pathshala:** to avail study materials for every rural and urban student.
- ❖ **Common Service Centres:** which enabled the digital reach to unreachable areas.

Implications of digital divide

1. Increasing penetration of digital technology by bridging the existing digital divides is associated with greater social progress of a country. Digital divide thus in a way hinders the social progress of a country.



Digital Divide: Impact

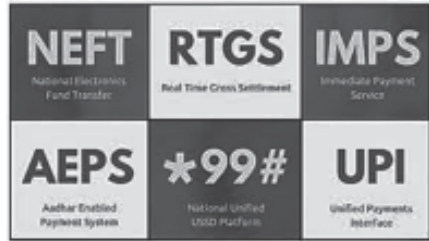
2. Economic disparity is created between those who can afford the technology and those who don't.
3. A direct correlation between a company's access to technological advancements and its overall success in bolstering the economy. Thus, digital divide hinders economic growth of a country.
4. The digital divide also impacts children's ability to learn and grow in low-income school districts. Without Internet access, students are unable to cultivate necessary tech skills in order to understand today's dynamic economy.
5. Almost all India's socio-economic problems have links to the digital divide. Rural India suffered from information poverty.

Information is controlled by a few at the top of the pyramid who restrict its percolation down to those at the bottom.

6. Political empowerment and mobilisation in the age of social media is difficult when there is a digital divide.
7. Transparency and accountability are less due to digital gap. For instance, it impacts delivery of services and good governance as well.

Measures to bridge the digital divide

1. To bridge the digital divide, there is a need to accelerate execution of digital India initiative.
2. Meaningful collaborations with the private sector, technological innovations and following a consistent focused approach towards the larger objective are necessary.
3. Utilisation of multiple modes of transactions such as Unstructured Supplementary Service Data (USSD), Unified Payment Interface (UPI), Immediate Payment Service (IMPS), and Point-of-Sale (POS) machines, need to be strengthened.
4. India also needs easing of regulations to allow interoperability of wallets to ensure easy transfer of funds for merchants as well as for consumers.
5. There is a need to enhance and develop robust rural digital infrastructure and ecosystem.
6. Focus must also be on enhancing the digital literacy through various platforms especially media.

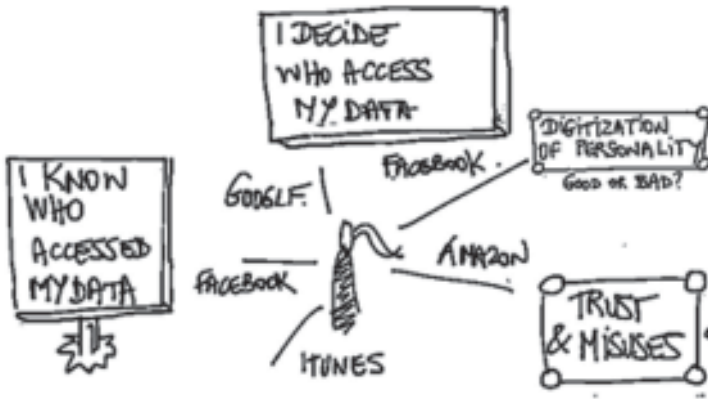


MODULE V

OPEN ACCESS AND COPY RIGHT

Data ownership

Data ownership is the act of having legal rights and complete control over a single piece or set of data elements. It defines and provides information about the rightful owner of data assets and the acquisition, use and distribution policy implemented by the data owner.



Data ownership is primarily a data governance process that details an organization’s legal ownership of enterprise-wide data. A specific organization or the data owner has the ability to create, edit, modify, share and restrict access to the data. Data ownership also defines the data owner’s ability to assign, share or surrender all of these privileges to a third party. This concept is generally implemented in medium to large enterprises with huge repositories of centralized or

distributed data elements. The data owner claims the possession and copyrights to such data to ensure their control and ability to take legal action if their ownership is illegitimately breached by an internal or external entity.

Significance of Data Ownership and Security

Why should one care about data ownership and security? Here are four reasons:

1. Data Storage Considerations

Data is the raw material a business or organisation uses to execute its functions and exchanges. The digital network right from a personal device to the ever-expanding internet is run with the coordination of uncountable digital applications. The very structure of internet is prone to data hacks of all sorts. Hence the secure storage and retrieval of data is essential. Organisations should play out “what if” scenarios with regard to how easily their data can be compromised.

2. Data Ownership and Value

Data is the new oil. It is valuable and hence the ownership of data brings value. Effective and secure processing of data demands better infrastructure and well laid regulations. Data involving the financial and banking institutions, medical services and hiring agencies are as valuable as the business itself.

3. Data Liability

The storage of data incurs responsibility and liability. Custodians of data have the responsibility to check any unauthorised usage of the data. This, most often, warrants formulation of effective regulations at the local and international level.

4. Data Marketability

Data has become one of the most marketed ‘commodities’ and companies ranging from financial marketing to apparel production has now realised the need of analysing the data related to all associated with them, especially their customers. Data analytics has, thus, developed into a standalone discipline much sought after in the business world. Governments also covet data regarding citizens as it helps in better law and order, containment of trafficking and intelligence generation and what not.

Data Protection Laws

Data Protection refers to the set of privacy laws, policies and procedures that aim to minimise intrusion into one’s privacy caused by the collection, storage and dissemination of personal data. Personal data generally refers to the information or data which relate to a person who can be identified from that information or data whether collected by any Government or any private organization or an agency.



General Data Protection Regulation (GDPR)

European Union passed a General Data Protection Regulation (GDPR) Law in 2018. GDPR is a regulation in EU law on data



protection and privacy in the European Union (EU) and the European Economic Area (EEA). It also addresses the transfer of personal data outside the EU and EEA areas. The GDPR's primary aim is to

give individuals control over their personal data and to simplify the regulatory environment for international business by unifying the regulation within the EU.

The GDPR redefines the understanding of the individual's relationship with their personal data. It relates to an identifiable living individual and includes names, email IDs, ID card numbers, physical and IP addresses.

This law grants the citizen substantial rights in his/her interaction with

- 1) **Data controllers** - Those who determine why and how data is collected such as a government or private news website.
- 2) **Data processors** - Those who process the data on behalf of controllers, such as an Indian IT firm to which an E.U. firm has outsourced its data analytics.

Under the GDPR, a data controller will have to provide consent terms that are clearly distinguishable. The GDPR also requires data collectors to provide information on the 'who' and 'how.' Individuals

will also have the right to have personal data deleted under certain conditions. The reporting obligations and enforcement are made stronger under the GDPR. By this, data breaches have to be reported within 72 hours and failure to comply with the new laws could result in a fine up to 4% of global turnover or maximum amount of fine 20 million Euros.

Data Protection Laws in India

The Constitution of India does not patently grant the fundamental right to privacy. However, the courts have read the right to privacy into the other existing fundamental rights, ie, freedom of speech and expression under Art 19(1)(a) and right to life and personal liberty under Art 21 of the Constitution of India. However, these Fundamental Rights under the Constitution of India are subject to reasonable restrictions given under Art 19(2) of the Constitution that may be imposed by the State. Recently, in the landmark case of Justice K S Puttaswamy (Retd.) & Anr. vs. Union of India and Ors., the constitution bench of the Hon'ble Supreme Court has held Right to Privacy as a fundamental right, subject to certain reasonable restrictions.

India presently does not have any express legislation governing data protection or privacy. However, the relevant laws in India dealing with data protection are the Information Technology Act, 2000 and the (Indian) Contract Act, 1872. A codified law on the subject of data protection is likely to be introduced in India in the near future.

The (Indian) Information Technology Act, 2000 deals with the issues relating to payment of compensation (Civil) and punishment (Criminal) in case of wrongful disclosure and misuse of personal data and violation of contractual terms in respect of personal data.

Under section 43A of the (Indian) Information Technology Act, 2000, a body corporate who is possessing, dealing or handling any sensitive personal data or information, and is negligent in implementing and maintaining reasonable security practices resulting in wrongful loss or wrongful gain to any person, then such body corporate may be held liable to pay damages to the person so affected. It is important to note that there is no upper limit specified for the compensation that can be claimed by the affected party in such circumstances.

The Government has notified the Information Technology (Reasonable Security Practices and Procedures and Sensitive Personal Data or Information) Rules, 2011. The Rules only deals with protection of “Sensitive personal data or information of a person”, which includes such personal information which consists of information relating to: -

Passwords; Financial information such as bank account or credit card or debit card or other payment instrument details;Physical, physiological and mental health condition;

Sexual orientation;Medical records and history;Biometric information.

The rules provide the reasonable security practices and procedures, which the body corporate or any person who on behalf of body corporate collects, receives, possess, store, deals or handle information is required to follow while dealing with “Personal sensitive data or information”. In case of any breach, the body corporate or any other person acting on behalf of body corporate, the body corporate may be held liable to pay damages to the person so affected.

Under section 72A of the (Indian) Information Technology Act, 2000, disclosure of information, knowingly and intentionally, without the consent of the person concerned and in breach of the lawful contract

has been also made punishable with imprisonment for a term extending to three years and fine extending to Rs 5,00,000 (approx. US\$ 8,000).

It is to be noted that s 69 of the Act, which is an exception to the general rule of maintenance of privacy and secrecy of the information, provides that where the Government is satisfied that it is necessary in the interest of: **the sovereignty or integrity of India, defence of India, security of the State, friendly relations with foreign States or public order or for preventing incitement to the commission of any cognizable offence relating to above or for investigation of any offence,**

It may by order, direct any agency of the appropriate Government to intercept, monitor or decrypt or cause to be intercepted or monitored or decrypted any information generated, transmitted, received or stored in any computer resource. This section empowers the Government to intercept, monitor or decrypt any information including information of personal nature in any computer resource.

Where the information is such that it ought to be divulged in public interest, the Government may require disclosure of such information. Information relating to anti-national activities which are against national security, breaches of the law or statutory duty or fraud may come under this category.

Information Technology Act, 2000

The Information Technology Act, 2000 (hereinafter referred to as the “IT Act”) is an act to provide legal recognition for transactions carried out by means of electronic data interchange and other means of electronic communication, commonly referred to as “electronic commerce”, which involve the use of alternative to paper-based methods of communication and storage of information to facilitate electronic filing of documents with the Government agencies.

Grounds on which Government can interfere with Data.

Under section 69 of the IT Act, any person, authorised by the Government or any of its officer specially authorised by the Government, if satisfied that it is necessary or expedient so to do in the interest of sovereignty or integrity of India, defence of India, security of the State, friendly relations with foreign States or public order or for preventing incitement to the commission of any cognizable offence relating to above or for investigation of any offence, for reasons to be recorded in writing, by order, can direct any agency of the Government to intercept, monitor or decrypt or cause to be intercepted or monitored or decrypted any information generated, transmitted, received or stored in any computer resource. The scope of section 69 of the IT Act includes both interception and monitoring along with decryption for the purpose of investigation of cyber-crimes. The Government has also notified the Information Technology (Procedures and Safeguards for Interception, Monitoring and Decryption of Information) Rules, 2009, under the above section.

The Government has also notified the Information Technology (Procedures and Safeguards for Blocking for Access of Information) Rules, 2009, under section 69A of the IT Act, which deals with the blocking of websites. The Government has blocked the access of various websites.

Penalty for Damage to Computer, Computer Systems, etc. under the IT Act

Section 43 of the IT Act, imposes a penalty without prescribing any upper limit, doing any of the following acts:

1. accesses or secures access to such computer, computer system or computer network;

2. downloads, copies or extracts any data, computer data base or information from such computer, computer system or computer network including information or data held or stored in any removable storage medium;
3. introduces or causes to be introduced any computer contaminant or computer virus into any computer, computer system or computer network;
4. damages or causes to be damaged any computer, computer system or computer network, data, computer data base or any other programmes residing in such computer, computer system or computer network;
5. disrupts or causes disruption of any computer, computer system or computer network;
6. denies or causes the denial of access to any person authorised to access any computer, computer system or computer network by any means; (g) provides any assistance to any person to facilitate access to a computer, computer system or computer network in contravention of the provisions of this Act, rules or regulations made thereunder;
7. charges the services availed of by a person to the account of another person by tampering with or manipulating any computer, computer system, or computer network, he shall be liable to pay damages by way of compensation to the person so affected.
8. destroys, deletes or alters any information residing in a computer resource or diminishes its value or utility or affects it injuriously by any means;
9. steals, conceals, destroys or alters or causes any person to steal, conceal, destroy or alter any computer source code used for a computer resource with an intention to cause damage.

Tampering with Computer Source Documents as provided for under the IT Act, 2000

Section 65 of the IT Act lays down that whoever knowingly or intentionally conceals, destroys, or alters any computer source code used for a computer, computer programme, computer system or computer network, when the computer source code is required to be kept or maintained by law for the time being in force, shall be punishable with imprisonment up to three years, or with fine which may extend up to Rs 2,00,000 (approx. US\$3,000), or with both.

Computer related offences

Section 66 provides that if any person, dishonestly or fraudulently does any act referred to in section 43, he shall be punishable with imprisonment for a term which may extend to three years or with fine which may extend to Rs 5,00,000 (approx. US\$ 8,000)) or with both.

Penalty for Breach of Confidentiality and Privacy

Section 72 of the IT Act provides for penalty for breach of confidentiality and privacy. The Section provides that any person who, in pursuance of any of the powers conferred under the IT Act Rules or Regulations made thereunder, has secured access to any electronic record, book, register, correspondence, information, document or other material without the consent of the person concerned, discloses such material to any other person, shall be punishable with imprisonment for a term which may extend to two years, or with fine which may extend to Rs 1,00,000, (approx. US\$ 3,000) or with both.

Amendments as introduced by the IT Amendment Act, 2008

Section 10A was inserted in the IT Act which deals with the validity of contracts formed through electronic means which lays down

that contracts formed through electronic means “shall not be deemed to be unenforceable solely on the ground that such electronic form or means was used for that purpose”.

The following important sections have been substituted and inserted by the IT Amendment Act, 2008:

1. Section 43A – Compensation for failure to protect data.
2. Section 66 – Computer Related Offences
3. Section 66A – Punishment for sending offensive messages through communication service, etc. (This provision had been struck down by the Hon’ble Supreme Court as unconstitutional on 24th March 2015 in Shreya Singhal vs. Union of India)
4. Section 66B – Punishment for dishonestly receiving stolen computer resource or communication device.
5. Section 66C – Punishment for identity theft.
6. Section 66D – Punishment for cheating by personation by using computer resource.
7. Section 66E – Punishment for violation for privacy.
8. Section 66F – Punishment for cyber terrorism.
9. Section 67 – Punishment for publishing or transmitting obscene material in electronic form.
10. Section 67A – Punishment for publishing or transmitting of material containing sexually explicit act, etc, in electronic form.
11. Section 67B – Punishment for publishing or transmitting of material depicting children in sexually explicit act, etc, in electronic form.
12. Section 67C – Preservation and Retention of information by intermediaries.

13. Section 69 – Powers to issue directions for interception or monitoring or decryption of any information through any computer resource.
14. Section 69A – Power to issue directions for blocking for public access of any information through any computer resource.
15. Section 69B – Power to authorize to monitor and collect traffic data or information through any computer resource for cyber security.
16. Section 72A – Punishment for disclosure of information in breach of lawful contract.
17. Section 79 – Exemption from liability of intermediary in certain cases.
18. Section 84A – Modes or methods for encryption.
19. Section 84B – Punishment for abetment of offences.
20. Section 84C – Punishment for attempt to commit offences.

Patents

A patent is an exclusive right granted for an invention, which is a product or a process that provides, in general, a new way of doing something, or offers a new technical solution to a problem. To get a patent, technical information about the invention must be disclosed to the public in a patent application.

In principle, the patent owner has the exclusive right to prevent or stop others from commercially exploiting the patented invention. In other words, patent protection means that the invention cannot be commercially made, used, distributed, imported or sold by others without the patent owner's consent.

Patents are territorial rights. In general, the exclusive rights are only applicable in the country or region in which a patent has been filed and granted, in accordance with the law of that country or region. The protection is granted for a limited period, generally 20 years from the filing date of the application.

Evolution of Indian Patent System

The first legislation in India relating to patents was the Act VI of 1856. The objective of this legislation was to encourage inventions of new and useful manufactures and to induce inventors to disclose secret of their inventions. The Act was subsequently repealed by Act IX of 1857 since it had been enacted without the approval of the British Crown. Fresh legislation for granting ‘exclusive privileges’ was introduced in 1859 as Act XV of 1859. This legislation contained certain modifications of the earlier legislation, namely, grant of exclusive privileges to useful inventions only and extension of priority period from 6 months to 12 months. This Act excluded importers from the definition of inventor. This Act was based on the United Kingdom Act of 1852 with certain departures which include allowing assignees to make application in India and also taking prior public use or publication in India or United Kingdom for the purpose of ascertaining novelty.

In 1872, the Act of 1859 was consolidated to provide protection relating to designs. It was renamed as “The Patterns and Designs Protection Act” under Act XIII of 1872. The Act of 1872 was further amended in 1883 (XVI of 1883) to introduce a provision to protect novelty of the invention, which prior to making application for their protection were disclosed in the Exhibition of India. A grace period of 6 months was provided for filing such applications after the date of the opening of such Exhibition.

This Act remained in force for about 30 years without any change but in the year 1883, certain modifications in the patent law were made in United Kingdom and it was considered that those modifications should also be incorporated in the Indian law. In 1888, an Act was introduced to consolidate and amend the law relating to invention and designs in conformity with the amendments made in the U.K. law.

The Indian Patents and Designs Act, 1911, (Act II of 1911) replaced all the previous Acts. This Act brought patent administration under the management of Controller of Patents for the first time. This Act was further amended in 1920 to enter into reciprocal arrangements with UK and other countries for securing priority. In 1930, further amendments were made to incorporate, inter-alia, provisions relating to grant of secret patents, patent of addition, use of invention by Government, powers of the Controller to rectify register of patent and increase of term of the patent from 14 years to 16 years. In 1945, an amendment was made to provide for filing of provisional specification and submission of complete specification within nine months.

After Independence, it was felt that the Indian Patents & Designs Act, 1911 was not fulfilling its objective. It was found desirable to enact comprehensive patent law owing to substantial changes in political and economic conditions in the country. Accordingly, the Government of India constituted a committee under the Chairmanship of Justice (Dr.) Bakshi Tek Chand, a retired Judge of Lahore High Court, in 1949 to review the patent law in India in order to ensure that the patent system is conducive to the national interest. The terms of reference included—

- ❖ To survey and report on the working of the patent system in India;

- ❖ To examine the existing patent legislation in India and to make recommendations for improving it, particularly with reference to the provisions concerned with the prevention of abuse of patent rights;
- ❖ To consider whether any special restrictions should be imposed on patent regarding food and medicine;
- ❖ To suggest steps for ensuring effective publicity to the patent system and to patent literature, particularly as regards patents obtained by Indian inventors;
- ❖ To consider the necessity and feasibility of setting up a National Patents Trust;
- ❖ To consider the desirability or otherwise of regulating the profession of patent agents
- ❖ To examine the working of the Patent Office and the services rendered by it to the public and make suitable recommendations for improvement; and
- ❖ To report generally on any improvement that the Committee thinks fit to recommend for enabling the Indian Patent System to be more conducive to national interest by encouraging invention and the commercial development and use of inventions.

The committee submitted its interim report on 4th August, 1949 with recommendations for prevention of misuse or abuse of patent right in India and suggested amendments to sections 22, 23 & 23A of the Patents & Designs Act, 1911 on the lines of the United Kingdom Acts 1919 and 1949. The committee also observed that the Patents Act should contain clear indication to ensure that food and medicine and surgical and curative devices are made available to the public at

the cheapest price commensurate with giving reasonable compensation to the patentee.

Based on the above recommendation of the Committee, the 1911 Act was amended in 1950(Act XXXII of 1950) in relation to working of inventions and compulsory licence/revocation. Other provisions were related to endorsement of the patent with the words 'licence of right' on an application by the Government so that the Controller could grant licences. In 1952 (Act LXX of 1952) an amendment was made to provide compulsory licence in relation to patents in respect of food and medicines, insecticide, germicide or fungicide and a process for producing substance or any invention relating to surgical or curative devices. The compulsory licence was also available on notification by the Central Government. Based on the recommendations of the Committee, a bill was introduced in the Parliament in 1953 (Bill No.59 of 1953). However, the Government did not press for the consideration of the bill and it was allowed to lapse.

In 1957, the Government of India appointed Justice N. Rajagopala Ayyangar Committee to examine the question of revision of the Patent Law and advise government accordingly. The report of the Committee, which comprised of two parts, was submitted in September, 1959. The first part dealt with general aspects of the Patent Law and the second part gave detailed note on the several clauses of the lapsed bills 1953. The first part also dealt with evils of the patent system and solution with recommendations in regards to the law. The committee recommended retention of the Patent System, despite its shortcomings. This report recommended major changes in the law which formed the basis of the introduction of the Patents Bill, 1965. This bill was introduced in the Lok Sabha on 21st September, 1965,

which however lapsed. In 1967, again an amended bill was introduced which was referred to a Joint Parliamentary Committee and on the final recommendation of the Committee, the Patents Act, 1970 was passed. This Act repealed and replaced the 1911 Act so far as the patents law was concerned. However, the 1911 Act continued to be applicable to designs. Most of the provisions of the 1970 Act were brought into force on 20th April 1972 with publication of the Patent Rules, 1972.

This Act remained in force for about 24 years without any change till December 1994. An ordinance effecting certain changes in the Act was issued on 31st December 1994, which ceased to operate after six months. Subsequently, another ordinance was issued in 1999. This ordinance was subsequently replaced by the Patents (Amendment) Act, 1999 that was brought into force retrospectively from 1st January, 1995. The amended Act provided for filing of applications for product patents in the areas of drugs, pharmaceuticals and agro chemicals though such patents were not allowed. However, such applications were to be examined only after 31-12-2004. Meanwhile, the applicants could be allowed Exclusive Marketing Rights (EMR) to sell or distribute these products in India, subject to fulfilment of certain conditions.

The second amendment to the 1970 Act was made through the Patents (Amendment) Act, 2002 (Act 38 of 2002). This Act came into force on 20th May 2003 with the introduction of the new Patent Rules, 2003 by replacing the earlier Patents Rules, 1972.

The third amendment to the Patents Act 1970 was introduced through the Patents (Amendment) Ordinance, 2004 w.e.f. 1st January, 2005. This Ordinance was later replaced by the Patents (Amendment)

Act 2005 (Act 15 Of 2005) on 4th April, 2005 which was brought into force from 1-1-2005.

Year	Legislation
1856	The Act VI of 1856 on protection of inventions based on the British Patent Law of 1852. Certain exclusive privileges granted to inventors of new manufacturers for a period of 14 years.
1859	The Act modified as act XV Patent monopolies called exclusive privileges (making. Selling and using inventions in India and authorizing others to do so for 14 years from date of filing specification).
1872	The Patterns & Designs Protection Act.
1883	The Protection of Inventions Act
1888	Consolidated as the Inventions & Designs Act
1911	The Indian Patents & Designs Act
1999	On march 26, 1999 Patents (Amendment) Act, (1999)
2002	The Patents (Amendment) Act 2002 came into force from 20 th may 2003
2005	The Patents (Amendment) Act 2005 effective from 1 st January 2005

Patents Rules

Under the provisions of section 159 of the Patents Act, 1970 the Central Government is empowered to make rules for implementing the Act and regulating patent administration. Accordingly, the Patents Rules, 1972 were notified and brought into force w.e.f. 20.4.1972.

These Rules were amended from time to time till 20 May 2003 when new Patents Rules, 2003 were brought into force by replacing the 1972 rules. These rules were further amended by the Patents (Amendment) Rules, 2005 and the Patents (Amendment) Rules, 2006. The last amendments are made effective from 5th May 2006.

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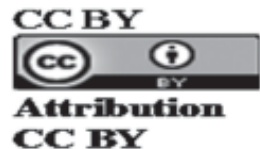


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Open Access

Introduction: what is open access?

Open Access (OA) is a broad international movement that seeks to grant free and open online access to academic information, such as publications and data. A publication is defined 'open access' when there are no financial, legal or technical barriers to accessing it - that is to say when anyone can read, download, copy, distribute, print, search for and search within the information, or use it in education or in any other way within the

Open access is a publishing model for scholarly communication that makes research information available to readers at no cost, as opposed to the traditional subscription model in which readers have access to scholarly information by paying a subscription (usually via libraries).

One of the most important advantages of open access is that it increases the visibility and reuse of academic research



results. There is also criticism, and the aspect of quality deserves extra effort. The principles of open access are set out in the Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities (2003). This declaration has been signed by many international organisations for academic research, various universities and research organisations around the globe.

There are different ways of publishing open access:

- **The Golden Route:**

- a) **Full Open Access journals:** publication via publisher platforms, in full open access journals. This route may involve a charge. The publication costs, known as ‘article processing charges’ (APCs), are covered by authors or by their institutions. Most research funders support open access and are willing to cover the costs themselves. A list of fully open access journals that are accessible worldwide can be found on the DOAJ website (<https://doaj.org/>).

- b) **Hybrid Journals:** publication via ‘hybrid’ journals. These journals are subscription journals that allow open access publication of individual articles on payment of an Article Processing Charge (APC).

- **The Green Route:** the full text of academic publications is deposited in a trusted repository, a publicly accessible database managed by a research organisation.

- **The Diamond Route:** publication via diamond journals/platforms that do not charge author-facing publication fees (APCs). Diamond open access journals are usually funded via library subsidy models, institutions or societies.

In a nutshell, open access is a form of scholarly publishing in which materials are ‘digital, online, free of charge, and free of most copyright and licensing restrictions.’ The Budapest Open Access Initiative (BOAI), one of the original efforts to codify and support open access in a formulaic way, defined open access as scholarly articles that have:

free availability on the public internet, permitting any users to read, download, copy, distribute, print, search, or link to the full texts of these articles, crawl them for indexing, pass them as data to software, or use them for any other lawful purpose, without financial, legal, or technical barriers other than those inseparable from gaining access to the internet itself. The only constraint on reproduction and distribution, and the only role for copyright in this domain, should be to give authors control over the integrity of their work and the right to be properly acknowledged and cited.

Open access refers first and foremost to peer-reviewed scholarly articles; other types of materials such as news articles, chapters, books, born-digital multimedia projects, supplemental data sets, and un-refereed articles are not included in formal definitions of open access, although these materials are generally welcome in open access repositories.

The initial push for open access was to make research more widely, freely, and quickly accessible to the world – to increase the potential impact factor for research. But there are financial issues that

are intertwined with this goal. With skyrocketing costs of journals and quickly shrinking budgets, academic libraries are becoming interested in supporting open access for financial reasons as well. Even without increasing costs, no library is able to purchase all articles from all journals. Researchers at institutions with limited budgets cannot provide access to the wealth of scholarship being produced, much of it funded by public dollars. However, this second problem, that of journal affordability, is mainly a library issue. It has implications for researchers, but it is not a terribly effective way to get faculty interested in open access.

Open access has the potential to have a significant impact on researchers, faculty, publishers, and libraries. With declining revenues, loss of control over how intellectual property is used, misperceptions about copyright and open access, changes in workflows and services, open access can be a highly contentious issue on campus.

The objectives of Open Access

The main objective of the Open Access movement is to improve the system of scientific communication by optimising access to and maximising the impact of research results through self-archiving (Harnad, 2003). It seems obvious that if a publication is freely accessible, it will be read more widely and be cited more often.

The authors of self-archived materials documents are responsible for any infringements of copyright, and they also are the guarantors of authorship and the integrity of the works deposited. In the case of journal articles, for which authors receive no economic compensation, the main question is for authors to determine under what circumstances the rights to public dissemination of the document are established. For this purpose, authors can consult the ROME0/Sherpa database, which

is a tool that allows them to search by journal title, publisher, or ISSN; the resulting information generated uses a colour code scheme to inform authors as to whether or not they hold the rights to public dissemination and under what conditions they are allowed to self-archive in open access repositories. The database will indicate whether authors can deposit preprints and/or post prints of their articles and whether they can do this immediately after publication or only after a certain period of time has passed.

The author is the main agent and the maximum beneficiary of the greater visibility of open access publication, a model that facilitates top-quality publication of scientific literature with no restrictions. The author benefits from being more widely read, cited, and acknowledged by the scientific community, which in turn could lead to better access to subsidies, wider recognition of merits and greater financing for future projects. However, this clashes with the low rate of authors who have deposited at least one document in an open access repository, only 10% (Harnad, 2006). The main argument in favour of open access self-archiving which is used to convince authors stresses high visibility, as evidenced by the download and citation rates of their research results, given that their articles and ideas will be accessible worldwide by means of harvesters and search engines (Google Scholar, Scirus, OAISTER, Scientific Commons, etc.).

Open Access and Institutional Repositories (IR)

An Institutional Repository is a set of services offered by a university to its community members for the stewardship of scholarly publication generated by the faculty, staff, and research scholars by preserving it for long term. Since the resources are generated digitally and electronically it is very easy to build a collection of any specific



subject discipline or any targeted user group. It has dual role so far, its functions concerned. It may be self-generated knowledge-base by the university itself on one hand, on other hand it may be the substitute model for the publication channel.

An Institutional Repository consists of formally organized and managed collections of digital content generated by faculty, staff and students at an institution. This is the collective intellectual output of an institution, recorded in a form that can be preserved and exploited.

Institutional Repository provides tools that help faculty students and researchers to disseminate the Institutional Repository work to audiences outside the institution. Institutional Repository may serve as a complement to traditional forms of publication or as an alternate. Institutional Repository enable information seekers to find faculty and student work more easily by organizing and indexing it, making it more visible to colleagues, fund providers and employers.

The main purpose of Institutional Repository is to bring together and preserves the intellectual output of a laboratory, department, university or any other entity, the incentives and commitments to change the process of scholarly communication have also begun serving as strong motivators.

As part of the Open Access Initiative, various academic organisations like universities have been creating state of the art digital repositories and allow free access to the resources.

Major Institutional Repositories (IR)

There are two popular directories of open access repositories which try to give a comprehensive list of repositories worldwide in classified manner with search and browse option. This makes the researcher’s job easy. These two directories are

- ❖ Directory of Open Access Repositories (DOAR) <http://www.opendoar.org>
- ❖ Registry of Open Access Repositories (ROAR) <http://roar.eprints.org/>
- ❖ **DSpace@MIT** - DSpace@MIT is a growing collection of MIT’s research that includes peer-reviewed articles, technical reports, working papers, theses and more. End-user downloads of the 60,000+ items regularly exceed one million per month. <http://www.dspace.org/resources>
- ❖ **eGyanKosh-aNational Digital Repository-** eGyanKosh-aNationalDigital Repository to store, index, preserve, distribute and share the digital learning resources developed by the Open



and Distance Learning Institutions in the country. Items in eGyanKosh are protected by copyright, with all rights reserved by IGNOU, unless otherwise indicated. To access the items in repository registration is required. Registration is free.

Link: <http://aiht.ac.in/OpenInstitutionalRepositories.html>.

Impact of the Open Access movement

The Open Access (OA) movement has had an important impact on access to scholarly literature. This movement, which aims to make the corpus of scholarly literature freely accessible, accelerated with the expansion of the availability of the Internet. While there are initiatives such as PubMed (open access to medical literature) by the journal publishers to make their offerings available after a certain period of time, it is the self-archiving of scholarly papers, the OA green road, and the OA gold road of publishing in OA journals which have increased access to the full text of scholarly literature.

Web-based public scholarly search engines can add this content since the online e-journals are open to search engine spiders. In the case of the e-repositories, in reality, it is the bibliographic metadata (title, author, subject, etc.) about the papers which is gathered using the Open Access Initiative-Protocol for Metadata Harvesting (OAI-PMH), the first stable version of which was released in 2003. Proprietary services are also able to use this method to add content to their databases; in the case of Scopus, however, this is not necessary since it owns the public scientific search engine, Scirus (2001-2014).

According to some critics the effectiveness of the web-based services may be compromised since they reparse the OAI metadata rather than simply using it. The OAI-PMH mandates the use of a standard metadata format, Dublin Core, which is more compatible

with the metadata, such as subject, document type (article, thesis and review, etc.) and document format, which drives the proprietary services.

Open Access Journal and Open Access Initiatives

Open Access (OA) Open Access is simply the free online availability of digital contents, scholarly journal articles, research results which authors publish without expectation of payment and is based on an ethical argument that research funded by the public should be available to the public. OA operates within the legal framework and own the original copyrights to for their work. Authors can transfer the rights to publishers to post the work on the web or else can retain the rights to post their work on the archives.

The Budapest Open Access (2002) Initiative defines open access as “free availability on the internet, permitting users to read, download, copy, distribute, print, search, or link to the full texts of these articles, crawl them for indexing, pass them as data to software, or use them for any other lawful purpose, without financial, legal or technical barriers other than those inseparable from gaining access to the internet itself.” Bjork (2004) defines OA as that a reader of a scientific publication can read it over the internet, print it out and even further distribute it for non-commercial purposes without any payments or restrictions. According to Suber (2006) Open Access to scientific article means online access without charge to readers or libraries. Committing to open access means dispensing with the financial, technical and legal barriers that are designed to limit access to scientific research articles to paying customers. In fact, open access is a step ahead of “Free Access” which removes just the price barriers by providing free access to end users. Under OA, the end user not only has free access

to the content but also have the right to further distribute the content. Some of the salient features of OA are

- ❖ Open access literature is digital, free of charge and free of copyright;
- ❖ OA is compatible with copyright, peer review, revenue, print, preservation, prestige, career advancement, indexing and supportive services associated with conventional scholarly literature;
- ❖ OA campaign focuses on the literature that authors give to the world without expectation of payment;
- ❖ OA is compatible with peer review and all the major AO initiatives for scientific & scholarly literature insist on its importance.

Open Access Initiatives in India

OA was initiated in the developed countries and later many developing countries including India have joined the effort. In the wake of the open access movement, some policy frameworks have already been established by member communities to foster inclusive, plural and development-oriented knowledge societies. A number of open access declarations / statements were made, where the world leading research institutions agreed on the open access mandates. The United Nations – backed World Summit on the Information Society (WSIS) strongly supported open access to information and Knowledge. Thus, confirms that number countries of the United Nations will take appropriate strategic decisions to bring scholarly literature, produced from public fund research initiatives or state-supported researchers, under the umbrella of Open Access. Some of the major open statements or declarations made during the past decade are given below:

- ❖ ARIIC Open Access Statement (Australian Research Information Infrastructure Committee) [www.caul.edu.au/scholcomm/OpenAccessARIICstatement.doc]
- ❖ Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities [<http://oa.mpg.de/openaccess-berlin/berlindeclaration.html>]
- ❖ BethesdaStatementonOpenAccess [www.earlham.edu/~peters/fos/bethesda.htm]
- ❖ Budapest Open Access Initiative Statement [www.soros.org/openaccess/]
- ❖ ERCIM Statement on Open Access (European Research Consortium for Informatics and Mathematics) [www.ercim.org/publication/Ercim_News/enw64/ercim-oa.html]
- ❖ IFLA Statement on Open Access to Scholarly Literature and Research Documentation
- ❖ NKCStatements on OpenAccess (National Knowledge Commission, India) [http://knowledgecommission.gov.in/downloads/documents/wg_open_course.pdf]
- ❖ OECD Declaration on Access to Research Data from Public Funding
- ❖ Washington DC Principles for Free Access to Science: A Statement from Not-for-Profit Publishers [www.dcprinciples.org/statement.html.]
- ❖ Wellcome Trust Position Statement in support of open and unrestricted access to published research [www.wellcome.ac.uk/doc_WTD002766.html]

- ❖ WSIS Declaration of Principles and Plan of Action (World Summit on the Information Society)

[\[http://www.itu.int/wsis/docs/geneva/official/poa.html\]](http://www.itu.int/wsis/docs/geneva/official/poa.html)

India has spearheaded the Open Access movement in developing countries since the 90s upscaling print based scholarly journals into open access electronic journals and establishing a number of Open Access repositories, both at national and institutional levels embracing free and open source software (FOSS). Various Indian R&D organizations, leading scientific research institutions (such as Indian Institute of Science, IITs, ISI, Institutes under the CSIR and Indian Council of Medical Research etc.) are taking part in the open access movement by establishing institutional and digital repositories to provide worldwide access to their research literature.

The NKC's Working Group on Open Access and Open Educational Resources and Working Group on Libraries have strongly recommended open access to public-funded research literature and supported establishment of open courseware repositories for countrywide dissemination of quality courseware to many cross-sections of people. The scholarly literature and lifelong learning materials produced by state-sponsored institutions are being made accessible through open access channels such as national and institutional repositories. This way the NKC's recommendation on peer-reviewed research papers resulting from public-funded research would be validated by subject experts when making these resources available through open access channels. Today, establishment of open courseware and cross-archive services are new fronts of open access initiatives. Indian information professionals are experimenting with open source software in the establishment of Institutional

Repository (IR) systems in local libraries, using Greenstone, DSpace or EPrints software. Once an IR is successfully implemented in the local library set up, it is then upscaled to institution-wide application through campus networks or intranet. Similarly, it may open up to wider audiences once the authorities of the institution are convinced.

Open Access Journals

Open Access Journals maintain the traditional values of journals— notably peer review, but also editing and formatting and marketing. According to J. M. Velterop there are three criteria for a journal to be open access i.e. free accessibility to all articles, the depositing of all articles in an archive/repository, and a license granted for the right to copy or disseminate. OA movement has made the Indian Journals reach the target audience of the world's communities and now more than hundred Indian Journals provide free access to full text contents. India is placed in the 6th position in the list of open access journals which is well ahead of countries such as the Netherlands, China, Germany, Australia etc. No matter the number or quality of OA journals and repositories in India, it has shown a great commitment amongst the developing world. As far as the journals are concerned some of the open access journals providers in India are listed below.

1. Indian Academy of Sciences (IAS): The Indian Academy of Sciences (IAS) is a scientific

academy funded by the Government of India. It was established in 1934 and publishes 11 journals. All journals are open access and full-text literature is available as PDF files on each journal's website. All of the articles in current issues of these journals are born-digital. The articles of back volumes, which were not born-digital, have been digitized through a government-supported project.

Name of Journal	Website
Journal of Earth System Science	www.ias.ac.in/jess/
<i>Pramana</i> - Journal of Physics	www.ias.ac.in/pramana/
Journal of Biosciences	www.ias.ac.in/jbiosci/

2. **IndianJournals.com:** It provides single window access to multidisciplinary Indian journals

published by different scholarly societies and institutions. It provides access to eleven open access journals and periodicals. This journal gateway also provides access to subscription-based content. These open access scholarly journals mainly belong to the science, technology and medicine (STM) areas.

Name of Journal	Website
Indian Journal of Forensic Medicine & Toxicology	indianjournals.com
Indian Journal of Physiotherapy and Occupational Therapy	
The Journal of Bombay Veterinary College	
Indian Journal of Sleep Medicine	

3. **Medknow Publications Private Limited** is a publisher of high-quality peer-reviewed scholarly open access journals in India. Medknow publishes, maintains and hosts 48+ peer-reviewed scholarly journals, mainly in the biomedical subject areas. Medknow also provides solutions to the scientific societies and scholarly institutions, through Journal-on-Web a web-based manuscript submission and peer review system that handles pre-publication and post publication processes for journal issues. Medknow collaboratively publishes the

electronic versions of some existing journals of learned societies and institutions in India. Table 6 provides a list of Medknow hosted open access journal titles.

Name of Journal	Website
Annals of Indian Academy of Neurology	www.medknow.com
Asian Journal of Transfusion Science	
Indian Journal of Dental Research	
International Journal of Yoga	

4. **Kamla-Raj Enterprises** is a Delhi-based publisher established in 1933. Kamla-Raj publishes seven print-based peer-review scholarly journals mainly in the areas of social sciences which are also available in electronic format on open access. These journals are OAI-compliant. The publisher maintains an archive of each of these open access journals starting from volume one.

Name of Journal	Website
Studies of Tribes and Tribals	krepublishers.com
Journal of Social Sciences	
The Anthropologist	
Journal of Human Ecology	

Open Access Initiatives for E-Books

Name	Website
Universal Digital Library	http://www.ulib.org
Digital Library of India	http://www.dli.ernet.in
Directory of Open Access Books (DOAB)	http://www.doabooks.org

Major Digital Libraries in India

Name	Website
Archives of Indian Labour	http://www.indialabourarchives.org
India Education Digital Library	http://www.edudl.gov.in/
Traditional Knowledge Digital Library	http://www.vigyanprasar.gov.in/digilib

Budapest Open Access Initiative (BOAI)

Budapest Open Access Initiative is an initiative to help provide free access to refereed articles on the Internet. Launched on 14 February 2002, the Budapest Open Access Initiative (BOAI) will help scholars self-archive their refereed journal articles online and assist in the establishment of alternative journals that are committed to offering free and unrestricted online access to published articles. In fact, BOAI is a public statement of principles relating to open access to the research literature, which was released to the public on February 14, 2002. It arose from a conference convened in Budapest by the Open Society Institute on December 1–2, 2001 to promote open access to published articles.



The logo celebrating the 10th anniversary of the Budapest Open Access Initiative in 2012

Significance of Budapest Open Access Initiative (BOAI)

The fruitfulness of a particular research is to be measured on the basis of its reach and applicability in its practical sense. To be useful, research must be used. To be used (read, cited, applied, extended), it must be accessible. There are currently 20,000 peer-reviewed journals of scientific and scholarly research world-wide, publishing over 4 million articles per year, every single one of them given away for free by its researcher, authors and their research institutions, with the sole goal of maximising their uptake and usage by further researchers and hence their impact on world-wide research, to the benefit of learning and of humanity.

Yet access to those 4 million annual research articles can only be accessed for a fee. Hence, they are accessible only to the lucky researchers at that minority of the world's research institutions which can pay for them. Even the wealthiest of these institutions can only afford a small and shrinking proportion of those annual 20,000 journals. The result is exactly as if all those 4 million articles had been written for royalties or fees, just the way most of the normal literature is written, rather than having been given away for free by their authors and their institutions for the benefit of research and humanity.

As a consequence, other researchers' access to all this work, and hence its potential impact on and benefit to research progress, is being minimised by access tolls that most research institutions and individuals world-wide cannot afford to pay. Those access tolls were necessary, and hence justified, in the Gutenberg era of print-on-paper, with its huge real costs, and no alternatives. But they are no longer necessary or justified, and are instead in direct conflict with what is

best for research, researchers, and society, in today’s post-Gutenberg era of on-line-e-prints, when virtually all of those Gutenberg costs have vanished.

The BOAI is dedicated to freeing online access to research journals by:

- providing universities with the means of freeing online access to their own annual peer-reviewed research output (as published in the 20,000 established journals) through institutional self-archiving; and
- providing support for new alternative journals that offer open online access to their full-text contents directly (and for established journals that are committed to making the transition to offering open full-text access online).

Copyrights (Copyright & Copyleft)

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Symbols of copyright and Copyleft

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If a program or document was uncopyrighted and in the public domain, changes could be made and the program or document could be re-distributed as a proprietary product. The copyleft ensures that not only is the original source free, but that all modifications must be made free, and permission is granted for all who follow in modifying that same program or document, provided they abide by these terms. Applying a free software or free documentation license to an application or document qualifies the product as Libre, and protects the open source community at large from it becoming commercial or proprietary.

Copyright

The grant of an exclusive right to make copies, license, use, or otherwise exploit an original work of art, or over the creation of an original design. For example, assume you bought a DVD of Bahubali: The Beginning, you can use this DVD according to specific rules as defined on the package like playing it at your home with your friends. You cannot do anything with it that is not allowed by the publisher like copying the DVD and give a copy to your friend. This is because the publisher has the copyright of the movie and will probably sue you if they know you are copying the DVD.

Copyleft

Copyleft is a general method for making a program free software and requiring all modified and extended versions of the program to be free software as well. The simplest way to make a program free is to put it in the public domain, uncopyrighted. This allows people to share the program and their improvements if they are so minded. But it also allows uncooperative people to convert the program into proprietary software. They can make changes, many or few, and distribute the result as a proprietary product. People who receive the program in that modified form do not have the freedom that the original author gave them; the middleman has stripped it away.

For example, Free-software licenses that use “weak” copyleft include the GNU Lesser General Public License and the Mozilla Public License. Examples of non-copyleft (“permissive”) free-software licenses include the X11 license, Apache license, and the BSD licenses.

No.	Copyright	Copyleft
1	Copyright is the right that enable you to prevent unauthorized copying or selling of your work.	Copyleft is a method using which you can modify the software or documentation and distribute it back to the open-source community.
2	In Copyright the work is original and not the copy of other	Copyleft comes with an idea of collaboration.

3	Copyrights protects your original ideas from others access	Copyleft allows you to make changes to other ideas and give them back
4	Copyright is all about granting individual permission	Copyleft is all about user freedom.
5	You can apply Copyright protection both to work that you have published into the public domain and work that you have not published.	Copyleft allows users to distribute derivative works under a license that offers the same rights as the original work.
6	Examples of Copyright: Suppose you made a movie, now if anyone else wants to make its sequel, he has to buy copyright from you	Examples of Copyleft: Red Hat Enterprise Linux is a good practical example of copyleft. Which is a commercial operating system. Users are free to modify and redistribute the source code but they are not allowed to resell it.
7	It is denoted by ©	It is denoted by mirror image of copyright symbol.

Glossary

NKC	-	<i>National Knowledge Commission</i>
FOSS	-	<i>Free and Open Source Software</i>
R&D	-	<i>Research and Development</i>
SCORM	-	<i>Shareable Content Object Reference Model</i>
AR	-	<i>Augmented Reality</i>
VR	-	<i>Virtual Reality</i>
GIS	-	<i>Geographical Information System</i>
HGIS	-	<i>Historical Geographical Information System</i>
ICT	-	<i>Information and Communication Technology</i>
DAS	-	<i>Direct Attached Storage</i>
NAS	-	<i>Network Attached Storage</i>
SSD	-	<i>Solid-State Drives</i>
NAS	-	<i>Network Attached Storage</i>
AI	-	<i>Artificial Intelligence</i>
ARROWS	-	<i>ARchaeological RObot systems for the World's Seas</i>
DNA	-	<i>Deoxyribonucleic acid</i>
LMS	-	<i>Learning Management System</i>
TRAI	-	<i>Telecom Regulatory Authority of India</i>
NOF-N	-	<i>Optical Fibre Network</i>
GDPR	-	<i>General Data Protection Regulation</i>
E.U.	-	<i>European Union</i>
OA	-	<i>Open Access</i>

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Appendix

List of Online Historical Resources

1. Central Library (JNU) - <https://www.jnu.ac.in/sscs-resources-central-library>
2. CHS Library (JNU) - https://www.jnu.ac.in/sss/chs_resources
3. Archives on Contemporary History - <https://www.jnu.ac.in/sss/archive>
4. National Archives Library - <http://nationalarchives.nic.in/content/library>
5. Central Archaeological Library - <http://ignca.gov.in/divisionss/asi-books/>
6. Kalanidhi, IGNCAL - <http://ignca.gov.in/divisionss/kalanidhi/>
7. The Ratan Tata Library - <http://crl.du.ac.in/rtl/>
8. Anthropological Survey of India Library - <https://ansi.gov.in/library/>
9. Art Reference Library & Documentation Centre - <http://www.ngmaindia.gov.in/art-rl/dc.asp>
10. Central Reference Library - <http://crlindia.gov.in/>
11. Connemara Public Library - <http://www.connemara-publiclibrarychennai.com/>
12. CSIR Headquarters' Library - <https://www.csir.res.in/knowledge-resource-center/introduction>
13. Delhi Public Library - <https://dpl.gov.in/>

14. Indian Agricultural Research Institute Library - <https://lib.icar.gov.in/>
15. Khuda Bakhsh Oriental Public Library - <http://kblibrary.bih.nic.in/>
16. Ministry of Defense Library - http://www.caomod.nic.in/d_DCW/MoD_Library.htm
17. Ministry of External Affairs Library - <https://mealib.nic.in/>
18. National Human Rights Commission Library - <https://nhrc.nic.in/training-and-research/library/services>
19. National Library - <https://ndl.iitkgp.ac.in/>
20. National Museum Library - <http://www.nationalmuseumindia.gov.in/en/library>
21. National School of Drama Library - <https://nsd.gov.in/delhi/index.php/nsd-library/>
22. Nehru Memorial Museum & Library - <https://indianculture.gov.in/MoCorganization/nehru-memorial-museum-and-library>
23. Planning Commission Library - <https://niti.gov.in/planningcommission.gov.in/docs/aboutus/library/index.php?libr=contact>
24. Publication Division's Library - <https://www.publicationsdivision.nic.in/>
25. Raja Rammohun Roy Library Foundation - <http://rrrlf.nic.in/>
26. Rampur Raza Library - <http://rrrlf.nic.in/>
27. Sahitya Akademi Library - http://sahitya-akademi.gov.in/library/L_index.jsp

28. Salar Jung Museum Library Hyderabad - <http://www.salarjungmuseum.in/>
29. The Indian Museum Library - <https://indianmuseumkolkata.org/>

Historical Association:

1. South Indian History Congress - <https://www.southindianhistorycongress.org/>
2. Rajasthan History Congress - <http://rajhisco.com/>
3. Royal Historical Society - <https://royalhistsoc.org/>
4. Social History Society - <https://socialhistory.org.uk/>
5. Historical Association - <https://www.history.org.uk/>
