History of Communications Media

Class 8

History of Communications Media

- What We Cover Today
  - Finish up Phonograph
  - Television
  - Xerox Copier
  - Computer & Internet

Phonograph

- Phonograph Developments
  - Mid-1920s – Electrical recording using microphones and acetate records replaces acoustic recording
  - Radio initially has a depressing impact on phonograph sales but later serves to popularize records sales
    - Quality of radio music was superior to that of phonograph music
    - 78 rpm records could contain only 4 minutes of music

Phonograph

- Phonograph Developments
  - 1948 - The 33-1/3 long-playing record (LP) and 45-rpm single were introduced
    - Unlike the earlier 78 format, these were vinyl rather than glass or metal coated with shellac
    - This paved the way for both high fidelity recordings and
  - 1950s – High Fidelity recordings
    - Created the audiophile
  - 1958 - The first stereophonic phonograph discs made available to the general public in 1958.
  - 1961 - The FCC announces stereo FM technical standards

Phonograph

- Phonograph Developments
  - 1961 - Licensed regular stereophonic FM radio broadcasting begins
  - 1960s – Dolby stereo recording
  - 1963 – Introduction of the audio cassette
  - 1971 – Quadraphonic sound
    - Led the way to the surround sound systems of today
  - 1982 – Dolby surround sound
  - 1985 – “Yellow Book” standard for CD-ROMs published
    - Meant that CD-ROMs could hold either music or data

Phonograph

- Impact of the Phonograph
  - Along with radio, made music an major part of people's lives
    - Before the phonograph (and radio), hearing music required the presence of musicians, singers, or a player piano
    - Made listening to music a passive experience
  - Provided much of the broadcasting content for both early radio and current FM radio
  - Fostered the development of FM radio

Phonograph

- Impact of the Phonograph
  - Gave rise to the juke-box (and the teenage hangout)
  - Fostered the development of portable music media
    - The record gave way to the 8-track, then the audio cassette, and finally the CD-ROM and iPod.
  - Provided through the sale of records (and related media) a major source of income for musicians, singers, opera companies, choruses, and others involved with music

Phonograph

- Impact of the Phonograph
  - In the form of the audio cassette and its related player-recorder
    - It gave Third World peoples a relatively cheap and easy technology by which they could make audiotapes of whatever they wanted to hear -- their native music, stories, myths, chants, prayers, sermons, and speeches. Their impact has frequently been revolutionary.
    - It permitted the survival and even the renaissance of many forms of local music and stories that were in danger of dying out
    - It facilitated the cross-cultural dissemination of musical forms and styles

Television

- Television is based on the discovery of photosensitivity in 1873
  - When certain metals (like selenium) are exposed to bright light, they emit an electrical current
  - This led to the concept of converting an optical image to an electric current and then converting the current back to an image
  - This led eventually to television, the wire photo, and the fax machine

Television

- Early History
  - 1875 - George R. Carey of Boston proposed the use of two matching banks of light-sensitive cells connected by a cable that had a separate transmission circuit for each picture element
  - 1881 – Sheldon Bidwell described a facsimile scanner that moved a selenium element over an image area
  - 1884 – Dr Paul Nipkow patented a scanner that rotated a disc bearing a spiral of small apertures over the image to be scanned

Television

- Early History – 2
  - Two crucial discoveries
    - Cathode rays or beams of electrons – discovered by Sir William Crookes in 1878
    - Thermionic emission (the Edison Effect) was identified as the cause of the blackening of incandescent light bulbs in 1883
  - 1892 – Elster and Geitel devise the photoelectric cell

Television

- Early History - 3
  - 1897 – Karl F. Braun creates a tube that focuses and deflects Crookes' cathode rays
    - This was the basis of both the television picture tube and the modern cathode ray oscilloscope.
  - 1906 – Max Dieckmann and G. Glage, using Braun's tube, devise a facsimile system
  - 1906 – Lee De Forest invents the 3-element audion tube
    - This permits amplification not only of voice signals but also of the weak signals obtainable from image scanning systems

Television

- Early History - 4
  - December 29, 1923 – Vladimir Zworykin filed for a patent for an all-electronic television system employing an electronically scanned camera pickup tube and a cathode ray display tube
  - 1925 – John Logie Baird and C. Francis Jenkins succeeded in transmitting silhouette still picture images via radio
  - January 13, 1926 – Baird succeeds in transmitting moving images in which the gradations in tone scale make it possible to recognize facial features and expressions

Television

- Early History – 5
  - 1927 – Dr Ernst Alexanderson at GE begins experimental television transmissions over W2XAD in Schenectady, NY
  - 1934 – NBC began transmitting electronically scanned 343-line 30 frame/sec interlaced TV
  - September 10, 1938 – The RMA Standards Committee submits its proposed standards to the FCC

Television

- Early History – 6
  - The FCC, however, delayed approval of the proposed RMA standards
    - Dumont & Philco did not agree with them
    - CBS was working on a mechanical-electrical color TV system (which was incompatible with the RMA system) and wanted color taken into account
    - FCC felt that premature approval of standards would discourage R & D and thereby forestall the development of higher technical standards

Television

- Early History - 7
  - 1938 – To force FCC action, RCA announced that it would start regular TV broadcasts using the 441-line scanning standard
  - April 30, 1939 – RCA begins daily broadcasting
    - The initial broadcast featured the speech of President Franklin D. Roosevelt as he opened the 1939 New York World's Fair
  - May 1940 – An FCC report stated that when the radio-television engineers agreed on a standard, the FCC would authorize full commercial broadcasts
    - This led the RMA to establish the National Technical Standards Committee (NTSC) on July 31, 1940

Television

- Early History – 8
  - March 8, 1941 – The NTSC and the television industry approve of set of 22 standards that cover all technical phases of black & white television
    - This included increasing the number of scan lines from 441 to 525
  - May 1941 – The FCC approves and adopts the NTSC standards and authorized the transmission of commercial television programs, starting on and after July 1, 1941

Television

- Impact of World War II
  - Shut down television broadcasting and production of television sets
  - Diverted engineering talent and resources into radar, VHF-UHF-microwave band transmissions, ordnance direction, and scanning technology
    - Out of this came the image orthicon camera which produced a much sharper TV image with greater depth of field than the iconoscope

Television – Homes with Sets

Year	1948	1950	1952	1955	1956	1960	1965
% Homes with sets	3%	10%	34%	67%	81%	87%	94%

Television

- Network TV Production
  - Demand for programming led the networks into TV production
    - All three networks set up television production studios first in New York City and then in Hollywood
      - 1949 – ABC purchased the old Vitagraph studio property in Hollywood and converted it to TV production
      - 1952 – CBS inaugurated program service from CBS Television City in Hollywood
      - 1952 – NBC started operations at NBC Television Center in Burbank CA

Television

- Independent TV Production
  - As noted in the discussion of the movies, the Studios initially saw television as a mortal threat, but independent movie producers saw TV as an opportunity
  - The independents began making films – mostly crime dramas, westerns, and comedies – for television
  - Among the most successful was Desilu Productions
    - The success of Disneyland with the theme park, TV programs, and movies mutually promoting each other led studios to see television as a potential ally

Television

- Color Television
  - In the late 1940s, CBS developed a 405 scan line 24 fps color system that could be transmitted in the established 6-MHz television channel
  - In 1949, CBS petitioned the FCC to establish standards for color television
    - At this time, there were 3 competing systems
      - CBS – Field sequential system
      - RCA – Dot sequential system
      - Color Television, Inc – Line sequential system

Television

- Color Television - 2
  - October 10, 1950 – the FCC found in favor of the CBS system
    - This led to a long court fight with RCA, but the Supreme Court in May 1951 decided in favor of CBS
  - June 25, 1951 – CBS began color TV broadcasting
    - Problem was that the CBS color system was incompatible with the NTSC black & white system
    - On October 22, 1951, manufacture of TV sets capable of receiving CBS color broadcasts was halted at the request of the Office of Defense Mobilization.

Television

- Color Television – 3
  - 1950 - The disputes over color television led the television industry to form a second NTSC to devise a color TV system that would be compatible with the existing black & white NTSC system and acceptable to the industry
  - July 21, 1953 – The NTSC presented its proposals to the FCC
  - December 17, 1953 – The FCC approved the NTSC proposals, reversed its previous approval of the CBS system, and authorized color service to the public under the NTSC standards

Television

- Color Television – 3
  - January 1, 1954 – NBC began color broadcasting with the Tournament of Roses parade in Pasadena CA
  - 1954 – Networks open color TV studios, which include telecine facilities for broadcasting color movies using a 3-tube vidicon camera for scanning the film
  - 1955 – First color broadcast of the World Series

Color Television

Year	% of TV Homes with Color TV
1964	3.1%
1968	9.6%
1968	24.2%
1970	39.3%
1971	45.2%
1972	52.6%
1973	60.1%

Year	% of TV Homes with Color TV
1974	67.3%
1975	70.8%
1980	83.0%
1985	91.0%
1990	98.0%
1995	99.0%

Television

- Cable TV
  - Began in 1949 in Astoria OR
  - Had its origin in the fact that many communities lacked television service because they were either in or beyond the fringe reception area or signals were blocked by mountains, hills, or tall buildings
  - Cable operators soon found that they could put their own or other locally-originated programs on unused cable channels
    - This made cable and the channels they carried (like TNT and CNN) competitors to the broadcast channels

Television

- Cable TV
  - Cable operators also found that they could sell their cable services in cities by supplying ghost-free images and providing additional channels and programs
    - This led to the use of pay channels who provided closed-circuit programming of either sporting events or first-run motion pictures on either cable channels (such as HBO or Cinemax) or theater showings (as in the case of Heavyweight championship fights)

Cable Television

Year	No. Subscribers (millions)	% of TV houses
1960	0.65	1.4%
1965	1.275	2.4%
1970	2.49	7.6%
1975	3.45	15.5%
1977	12.168	16.6%
1979	14.814	19.4%
1980	17.671	22.6%
1981	23.219	28.3%
1982	29.340	35.0%

Year	No. Subscribers	% of TV houses
1983	34.113	40.5%
1984	37.290	43.7%
1985	39.872	46.2%
1987	44.970	50.5%
1988	48.636	53.8%
1989	52.564	57.1%
1990	54.871	59.0%
1995	62.956	65.7%
1999	67.592	68.0%

Television

- Notes about Television
  - TV has several genres
    - Many of these originated with radio or the movies – news, sports, adventure program, mystery-detective program, situation comedy, Western, soap opera, variety show, talk show, and game show
    - One genre originated by TV was the media event
      - Unlike other events, it is live, out-of-the-ordinary, pre-planned, organized by some public body, usually attracts a large audience, and is often ceremonial
      - The real event is the one experienced by the TV audience, not by those physically present at the event

Television

- Satellite TV
  - Enabled cable companies to create national (such as TBS) or even international (such as CNN) networks
    - Beamed programs from one location to cable systems all over the world
  - Permitted transmission from hundreds of cabled channels since cable TV and satellites were not limited to the 12 VHF or 70 UHF channels
  - Radically cut the cost of transmission, making special interest channels carrying niche programming financially feasible.

Television

- Notes about Television
  - Early conceptions of television linked two concepts
    - Visual motion imagery of spatially distant scenes
    - Simultaneity - what people saw was seen live in real-time

Television

- Notes about Television
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Television

- Notes about Television
  - The TV screen occupies about 15% of the viewer's visual field; the movie screen in a theater occupies about 70%.
    - The size of the movie screen and the darkness of the theater make the actor and his every action 'larger than life.'
    - The television screen, however, is smaller than life. It is not set in a darkened theater, but in the viewer's own home.

Television

- Notes about Television
  - Television does not communicate a sense of either the past or the future.
    - It is a present-centered, speed-of-light medium.
    - "Everything we see on television is experienced as happening *now.*
  - The visual-verbal world of TV makes an emotional appeal rather than a logical appeal and stresses the emotion-generating pictorial over linear, logical, and abstract argument.

Television

- Notes about Television
  - TV has been a mutating medium, changing in both its capabilities and its relations to viewers over time. i.e. There were distinct TV eras
  - TV had
    - Over-the-air broadcast TV
    - Satellite- and Cable- TV
    - The VCR-DVD era of TV
    - High Definition Digital TV

Television

- Over-the-air broadcast TV era
  - Limited number of channels due to limited spectrum
  - Dominance of the major networks
  - Broadcasters seek a mass audience
- Satellite- and Cable-TV era
  - Potentially hundreds of available channels
  - Narrowcasting and niche broadcasting
  - Fragmented audiences

Television

- VCR- and DVD-era
  - Timeshifting
  - Permit watching of user-chosen media over broadcast media
    - Users can now see rental movies, music videos, documentary productions, or their own recorded video along with or instead of broadcast programs
- High Definition Digital TV era
  - Has more in common with the traditional movie than NTSC television
  - Permits merger of the computer and the TV

Television

- Impact of TV
  - Created a 'global village' in which boundaries that formerly isolated cultures had been broken down
    - Hollywood films and American television programs were now viewed throughout the world.
    - Led to the large-scale Americanization of World Popular Culture
  - Decreased cultural diversity between societies and increased cultural diversity within societies.

Television

- Impact of TV
  - Changed radio from a broadcasting medium to a narrowcasting medium
    - Radio survived because it could target specific demographic groups (Blacks, teenagers, farmers, and ethnic minorities) that Network television tended to ignore
  - Caused the most popular radio programs and stars to migrate to TV
  - Changed the prime listening hours of radio from the evening to the commuting hours
    - This turned radio from an entertainment medium into an information medium

Television

- Impact of TV
  - Like radio in its initial phases, it created a top-down uniform mass popular culture
    - In some respects, this led to high-quality programming, especially news programming
  - People's social environment expanded from those they met face-to-face people to also include a whole host of media celebrities
    - Communications researchers have discovered that, for most people, these celebrities are socially real
  - TV assumed many of the socializing-values inculcating functions formerly performed by the family, church, and school

Television

- Impact of TV
  - Changed our conception of what is a fact
    - Facts reach us, not in the form of personal perception, not as something we ourselves have seen or heard, but in the form of communications, as something we have only heard or seen on TV
  - Altered the significance of physical presence at events
    - Experiencing an event no longer required physical presence

Television

- Impact of TV
  - There is evidence to suggest that TV has decreased our attention spans and contributed to Attention Deficit Disorder
  - Television has become ubiquitous in a whole host of public spaces
    - Large screens broadcasting any number of images and advertisements can be found in most sports arenas, restaurants, airports, and shopping malls, even concert halls

Television

- Impact of TV
  - Television glued us to our homes, isolating us from other human beings.
    - Except for teenagers and college students, people no longer went out at night to patronize the cafes, bars, theaters, amusement parks, concerts, or dance halls that pre-TV generations patronized
    - One result was that only one-quarter of all Americans know their next-door neighbors.
    - Depending on the methodology, the average American family watches 4 to 5 hours of TV a day.

Television

- Fame and Celebrity
  - Changed the concept of celebrity
    - Celebrities are persons who are both well-known and visible via the mass media
    - Prior to the 20th century, people were celebrities because they were famous – they either occupied high office or had excelled in some field that made them known to the public – e.g. business, performing arts, sports, or writing

Television

- Fame and Celebrity
  - Changed the concept of celebrity – 2
    - With the invention of public relations and television, people become celebrities because they are visible in the media
      - Celebrities are known for their well-knownness
    - Because celebrity status reflects media (especially television) attention, celebrity status no longer is necessarily a result of fame or accomplishment
      - People now become celebrities simply by either media exposure or through some sort of link to a celebrity or celebrities

Television

- TV and News
  - Merged entertainment with news
    - The economics of TV production required a mass audience – this means they must be entertaining
    - TV was a visual medium with an affinity for action and suspense entertainment that had many hours to fill
    - News coverage increasingly focused on the dramatic as opposed to the intrinsically important
  - Created the “pseudo-event”
    - An event concocted for the purpose of gaining media attention

Television

- TV and Politics
  - Changed the nature of political campaigns and politics
    - Before television, candidates required mediators to reach the electorate; with television, candidates could reach the electorate directly with political ads
    - The result was that political campaigns are now largely television commercials, often in the form of attack ads
    - Changed political conventions from decision-making entities that actually chose the presidential nominees to coronations of a nominee chosen long beforehand
    - Made debates a key element in the political campaign

Television

- TV and Politics
  - Led entertainment and sports celebrities to go into politics and embrace political causes
  - Led discussion of policy decisions to focus less on their effects on the public and more on their effects on President's (and his party's) re-election chances
  - After Watergate, it led the tabloid media to cover politicians with the same salacious zeal with which entertainers were covered

Television

- TV and Sports
  - Increased the audience for sports by enabling those not present in the stadium or sports arena to see the sport and develop an interest in it
  - Created interest in previously unknown or little-known sports
    - Popularized many little-known Olympic sports, such as figure skating, speed skating, decathlon, beach volleyball, water polo, etc.

Television

- TV and Sports
  - Greatly popularized football
    - The once a week frequency of football made football both a habit and a special event – enough so that each game was important and an event to look forward to
    - Television made football easier to watch than in person
      - With its close-ups and slow-motion replay, it enabled the audience to more closely view the action
      - At stadiums with jumbotron screens, people characteristically watch the jumbotron rather than the field

Television

- TV and Sports
  - Contributed to the decline in the popularity of baseball
    - Baseball is a one-thing-at-a-time game with the focus on the duel between pitcher and batter. In contrast, football, basketball, and ice hockey are games in which many events occur simultaneously with the entire team normally involved
      - Thus, baseball was well adapted to radio, where the announcer's verbal account and the listener's imagination could convey what was happening
      - Baseball did not come across as well on TV since its relative lack of action made the game seem boring and tedious

Television

- TV and childhood
  - Just as printing brought about the emergence of childhood as a separate social category, TV erased the distinction between childhood and adulthood
    - TV requires no instruction on how to watch it and it communicates the same information to everyone watching
    - TV erodes the idea that there are certain things that are not considered suitable for children to know until they reach a suitable level of maturity

Television

- TV and childhood – 2
  - The result is that we are reverting to the medieval notion of seeing children as simply young adults
    - Dress distinctions that used to differentiate children from adults have largely vanished
    - There is an increasing tendency to try juvenile offenders in adult courts
    - The use of four-letter words in front of and by children

Television

- Impact of Cable & Satellite TV
  - The multiplicity of channels changed TV from a broadcasting medium to a narrowcasting medium
    - Instead of three major networks offering similar-type programming, there were dozens of specialized channels that focus on topics that appeal to small audiences
  - All-news channels (like CNN, MSNBC, Fox News) did to network news departments what TV did to newspapers and news magazines
    - It ended their reign as news sources and led the networks to focus on entertaining features, news analysis, and news commentary

Xerography

- There is a historically significant distinction between *copies* and a *duplicates*
  - *Duplicates* – any of two or more things exactly alike and usually produced at the same time
  - *Copies* – 1: imitations, transcripts, or reproductions of an original work 2: one of a series of especially mechanical reproductions of an original impression

Xerography

- People in the documents business distinguish between duplicators and copiers
  - Duplicators produce identical documents, of which none is truly the ‘original’
    - With duplicators, there is always an intermediate phase – a woodblock, a form filled with metal type, or a lithographic plate – between the source text or imagery and the duplicates
    - Printing Press is a duplicator
  - Copiers make facsimiles of documents that already exist
    - Xerox machine is a copier

Xerography

- Until printing, the only way to reproduce a document was to write it out again
  - Copying was done by scribes
- With printing one could duplicate documents but not copy them
- In 1780, James Watt invented the copying press or letter press
  - Involved placing thin tissue type paper on the original via a press while the ink was still wet

Xerography

- 1806 – Invention of carbon paper by Ralph Wedgwood, a relative of both Josiah Wedgwood and Charles Darwin
  - Flourished only after the invention of the typewriter
  - In conjunction with the typewriter, it made the copy or letter press obsolete
- 1874 – Eugenio de Zaccato invents the stencil

Xerography

- 1842 – Sir John F.W. Herschel invents the blueprint
- 1880s – Albert B. Dick and Thomas A. Edison invent the mimeograph
- 1906 – Beginning of photostat copying
- 1923 – Wilhelm Ritzerfeld invents the Ditto machine

Xerography – Scientific Basis

- Xerography is based on photo-electricity and photo-conductivity
  - A photo-conductive material is one whose ability to transmit electricity increases when it is illuminated
  - Selenium is a photoconductor that acts like an electrical insulator in the dark and an electrical conductor in the light

Xerography – Scientific Basis

- If you brightly illuminate the surface of an original document and then project the reflection onto the selenium, the selenium will retain a charge in areas where no light falls (where the ink is)
- If you then dust the selenium plate with a charged powdery resin
  - The resin makes the latent image visible in the form of a mirror image of the original
  - The resin is then transferred to a sheet of paper and melted to make a permanent copy in the form of a mirror image of the latent mirror image

Xerography - History

- Xerography was the product of Chester Carlson – a patent attorney
  - Carlson conceived the concept in 1937 after reading a technical journal in the New York City Public Library
- In 1944, two key events:
  - Carlson visited the Batelle Institute in Columbus OH to successfully gain backing
  - A New York freelance writer wrote an article about Carlson and his invention which appeared in *Radio News* and later in an Eastman Kodak technical bulletin
    - John Dessauer of the Haloid Company read the bulletin and persuaded President Joseph C. Wilson to visit Batelle and meet with Carlson

Xerography - History

- In 1946, Battelle and Haloid reached an agreement
  - Batelle would research the fundamental process and Haloid would research the treated paper part of the process and manufacture the copying machine, paying Battelle an 8% royalty on any sales
- In 1958, IBM hired Arthur D. Little to assess the market for a copier like the Xerox 914
  - The conclusion: “The model 914 has no future in the office copying market”
    - The nation’s businesses already had carbon paper, photographic processes for ordinary copying, and offset printing and ditto machines for high-volume reproduction.
    - Office workers would have no interest in carrying documents to a central copying room in order to reproduce them and the projected $2,000 cost was frighteningly high.

Xerography – History

- 1960 – Haloid started marketing its first Xerography machine – the 914
  - Haloid anticipated they would sell 3,000 machines; they sold over 200,000
- In 1959, Haloid was just the 12th largest company in Rochester NY. By 1972, the Xerox Corporation was the 15th largest publicly owned company in America
  - Larger than RCA, Bell & Howell, Chrysler, U.S. Steel, and close to IBM

Xerography – Effects

- Effects of the Xerox machine
  - In the words of Marshall McLuhan, it made everyman a publisher
  - Threatened the livelihood of commercial publishers and authors since it was now easy and cheap to make copies
    - Educators began xeroxing articles and chapters of books rather than having student buy them
  - Greatly decreased the demand for carbon paper
  - Made the mimeograph, photostat, and ditto machine obsolete

Xerography – Effects

- Effects of the Xerox machine
  - Led to the laser printer
    - Invented in 1969 by a Xerox researcher
  - Led people in the office to:
    - Copy documents for everyone in the office rather than attach a routing slip to a single incoming copy that could only be read sequentially
    - Give each meeting attendee a copy of the agenda rather than posting the agenda on a bulletin board
    - Create copies of office documents and reports for personal reference files
    - Assume they had a natural and constitutional right to use the machine to make personal copies

Xerography – Effects

- Effects of the Xerox machine
  - Led researchers in libraries to copy pages out of books and journals rather than make handwritten notes
  - Led researchers in archives to xerox documents rather than write out note cards

Xerography – Effects

- Effects of the Xerox machine
  - Greatly weakened the ability of governments to monopolize and limit the dissemination of knowledge
    - Stepan Pachikov – “Many can claim the laurels of the destroyer of communism, especially Xerox”
      - Despite attempts to control access to and use of the Xerox machine, great amounts of *The Gulag Archipelago, 1984, Animal Farm,* and other anti-Soviet literature were duplicated. In the words of Pachikov, “No Xerox machine was ever out of work.”

Xerography – Effects

- Effects of the Xerox machine
  - Eroded the ability of governments to keep secrets and to protect the informational content of security classified documents since it became possible to steal (and disseminate) the information without stealing the original document
    - Daniel Ellsberg and the Pentagon Papers

Xerography – Effects

- Effects of the Xerox machine
  - Vastly increased the information and paper flow within and between organizations
  - Led to the decline of central organizational files as individuals and subordinate organizations began to create their own reference files
  - Decreased the demand for carbon paper
  - Made the mimeograph, stencil, photostat, and ditto machine obsolete

Computers

- Computers have gone through four major computer ages – each of which differed in their basic technology and capabilities
  - 1st Computer Age – 1940-56: Vacuum Tubes
    - Used vacuum tubes for circuitry and magnetic drums for memory
    - Very expensive and took up large rooms
    - Programmed in machine language
    - Input was on punch cards and paper tape
    - Output displayed on printouts
    - UNIVAC and ENIAC

Computers

– 2nd Computer Age – 1956-1963: Transistors
  - Used transistors for circuitry and magnetic core for memory
  - Programmed in assembly language and early versions of COBOL and FORTRAN
  - Input and output as in 1st Computer Age
  - IBM 1401

Computers

– 3rd Computer Age – 1964-1971 Integrated Circuits

- Used integrated circuits (small transistors on silicon chips) for circuitry
- Users interact via keyboard and monitor
- Users interfaced with an operating system which allowed the computer to run different applications at one time
- IBM 360 series & 370 series

Computers

- 4th Computer Age – 1971-1991: Microprocessors
  - Large and ever-increasing number of integrated circuits built onto a single silicon chip
    - The Intel 4004 chip (1971) located the CPU, memory, and input/output controls on a single chip
  - 4th Computer Age computers went through multiple sub-Computer Ages in which each Computer Age of microprocessors (8008, 286, 386, 486, Pentium, Pentium II, etc) greatly expanded the memory, speed, or capabilities of the computer that contained them and reduced both the size and especially the cost of the computer

Computers

- 5th Computer Age – 1991 – present: Internet
  - Desktop and laptop PCs, home modems, and the World Wide Web
  - Graphical User Interfaces
  - Web browsing software
    - 1993 – Mosaic
    - 1994 – Netscape Navigator 1.0
    - 1996 – Internet Explorer 3.0
  - Beginnings of e-Commerce & e-Government
  - Internet both a broadcasting (websites & streaming video) and narrowcasting (e-mail) medium

Computers

- Each Computer Age has had a differential impact on society
  - The first two Computer Ages of computers had limited impact on society because of their limited capabilities, large size, high expense, and inability to communicate
    - Resided in large corporate and governmental entities where they handled tabulation and payroll functions

Computers

- The third Computer Age had a little more of an impact because it did have some limited communication with dumb terminals
  - This had impact on such areas as travel reservations, remote data input and output, and banking transactions
- The fourth Computer Age had an ever-increasing impact as microprocessing capability increased, costs decreased, and increasing numbers of people acquired computers

Internet as the 5th Computer Age

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Internet

- Each Computer Age has had a differential impact on society
  - It is the Internet, however, that made the PC such a revolutionary technology
    - Made the PC part of worldwide network
    - Made possible the near-real-time dissemination of text, audio, still imagery, and video
    - Allowed any PC or computer to communicate with any other computer regardless of platform

Internet

- Origins of the Internet - 1
  - 1958 – Creation of the Defense Advanced Research Projects Agency (DARPA)
  - Internet grew out of DARPA's attempt to link DoD and contractor computers into a network so that information could be easily shared
    - This led to the creation of the ARPANET
      - Grew from 4 computers in 1969 to nearly 2,000 in 1985

Internet

- Origins of the Internet - 2
  - 1985 – Funding of the network was assumed by the National Science Foundation and the name changed to the INTERNET
  - 1989 – The NSF abandoned its support of the net and allowed commercial Internet service providers (ISPs) to offer Internet access to paying customers
    - By 1995, the Net encompassed 44,000 local networks, 160 countries, and an estimated 50 million users

Internet

- Origins of the Internet – 3
  - 1989 – Tim Berners-Lee of CERN developed three breakthrough techniques that made possible the World Wide Web
    - Hypertext Markup Language (HTML) – to format and layout pages of text on the Internet
    - Hypertext Transfer Protocol (HTTP) – a system to link documents
    - Uniform Resource Locators (URLs) – a scheme to address and thereby locate specific nodes of information

Internet

- Origins of the Internet – 4
  - 1993 – Development of Mosaic – the first web browser by Marc Andriessen
  - 1994 – Development of Netscape Navigator – an upgraded version of Mosaic
  - 1996 – Development of Internet Explorer 3.0 by Microsoft

Internet

- Some Effects of the Internet
  - Made anyone with Internet access both a potential publisher and broadcaster
  - Changed how people access and get information
    - Enabled people to obtain information not available in most news media outlets or libraries
    - Enabled people to seek out controversial issues and topics that are ignored by the mass media
      - Abolished information gatekeepers
  - Fostered the rapid circulation of information, rumors, and misinformation

Internet

- Some Effects of the Internet
  - Facilitated political mobilization
    - Enabled narrow coalitions and interest groups to use the Internet to find and mobilize sympathizers via targeted websites and email responses
  - Enhanced the power of small sub-groups (such as dissenters or terrorists) vis-à-vis the State
    - Such groups can use the Web to obtain critical information, mount propaganda campaigns, solicit funds, recruit new members, and plan and coordinate actions

Internet

- Some Effects of the Internet
  - Created bonds between ordinary citizens of different states
  - Enabled formerly local markets to become national and even international markets by
    - Diminishing the costs of acquiring needed market information
    - Allowing auction sites such as e-Bay to turn local flea markets into a worldwide community of potential buyers and sellers

Internet

- Some Effects of the Internet
  - Ended the economics that result from poor matching of supply and demand
    - Poor matching of supply and demand reflected the limited shelf space for storing physical media, the few channels available for broadcasting, and the need for a local audience or market
    - The Internet and virtual stores like Rhapsody and Amazon.com make it profitable to sell long-tail items

Internet

- Some Effects of the Internet
  - Allowed the reader to intervene in the text of a book or article by:
    - Altering the visible format of the text
    - Linking to related information (such as a definition, a picture of an object, an extended discussion of a point, or a related subject) in other texts
    - Making annotations and comments on the text
  - Brought the incipit back to life in the form of the URL
  - It thus returned printed text to the status of the Medieval manuscript

Internet

- Some Effects of the Internet
  - Led to the migration of intellectual content from the printed page to the web
    - Many academic journals and other publications are now published only online
    - Many publications now have an online as well as a printed version
      - News magazines such as *Time* and *Newsweek*
      - Newspapers such as the *New York Times, Washington Post,* and *Los Angeles Times*

Internet

- Some Effects of the Internet
  - Allowed banks to replace tellers with online banking and automated teller machines
  - Allowed people to purchase airline tickets and books online
    - Hurt brick-and-mortar bookstores
    - Drove travel agents out of business by allowing people to book their own trips
  - Replaced the newspaper ad with online ads at Craigslist, eBay, and other similar websites

Internet

- Some Effects of the Internet
  - Fostered Exhibitionism
    - Allowed people to turn their lives via camcorders and the Internet into web spectacles
  - Allowed people to assume virtual identities
  - Facilitated access to Pornography
    - Porn pioneered the use of streaming video, Java-based methods of video transmission, and encryption for secure credit card purchases
    - Accelerated the decline of sex magazines