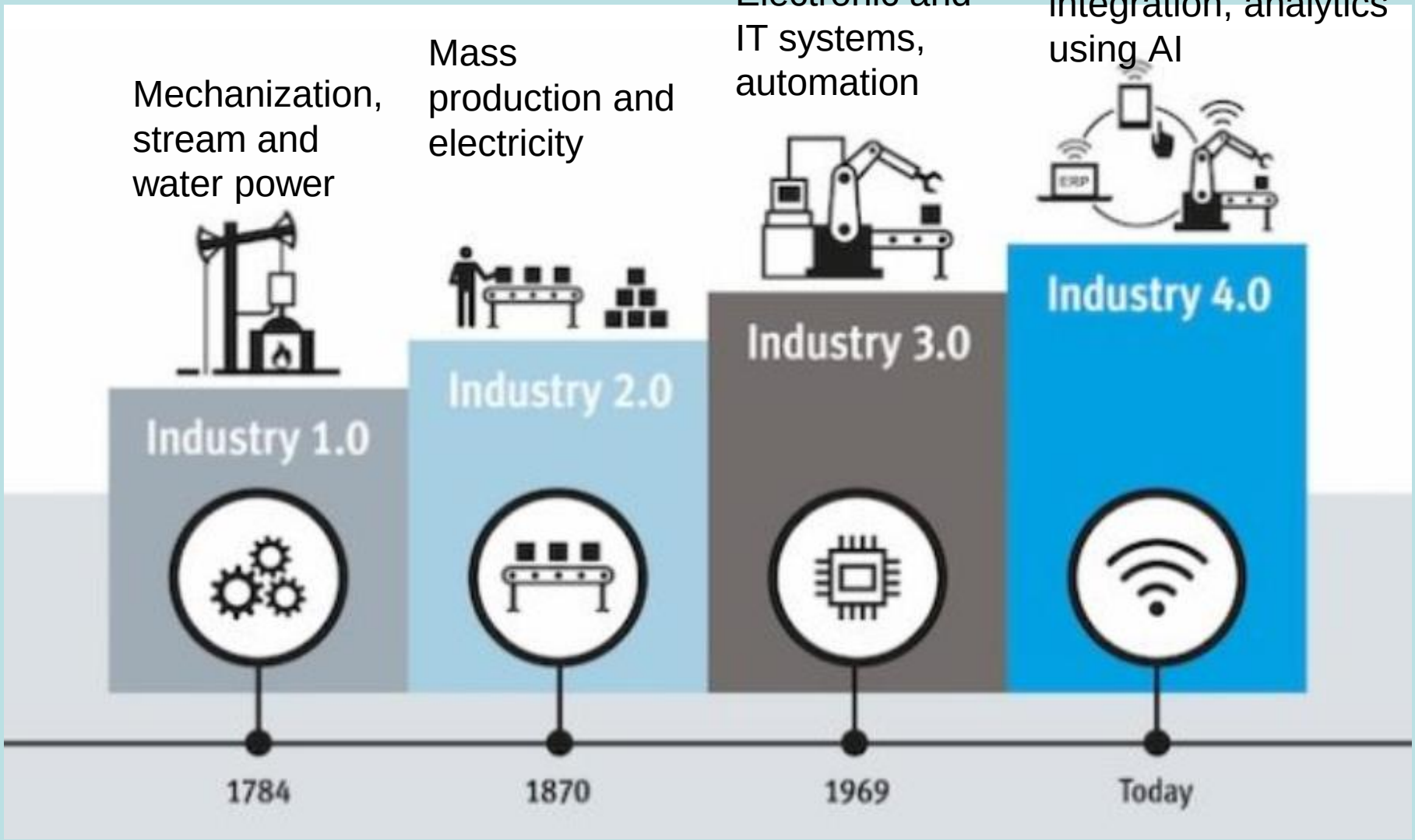
Chapter 2: Part 1
Emergence and Convergence of Technologies

Table of Contents

Emergence (The rise of print media, telegraph and the telephone, broadcast media, computing industry, Internet)

Introduction

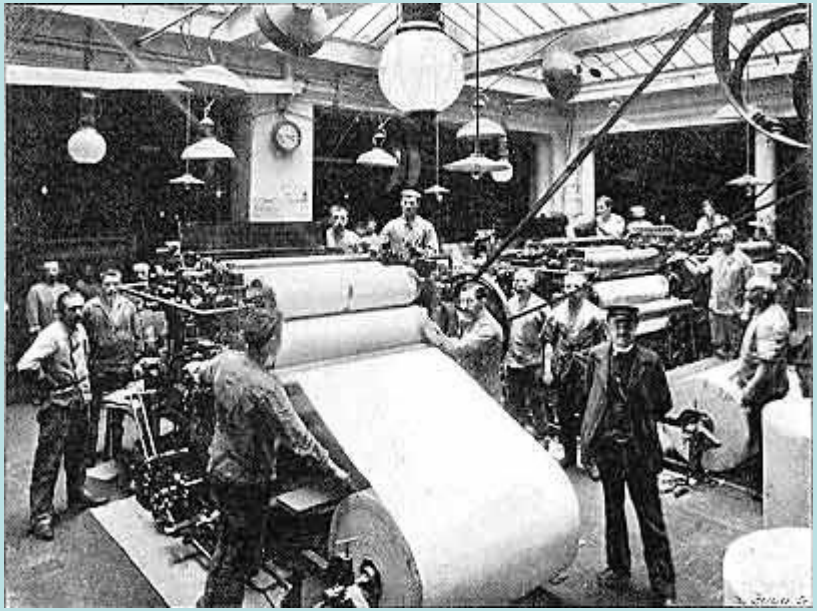
- Many scholars now believe we are in the midst of the next phase change in human society: the ‘information revolution’.
- This time, however, the revolution is happening much faster.
  - programmable digital computers: late 1940s
  - personal computers: 1970s
  - Internet: 1990s
- The scale and pace of change in ‘information revolution’ has far outstripped that of the industrial revolution.

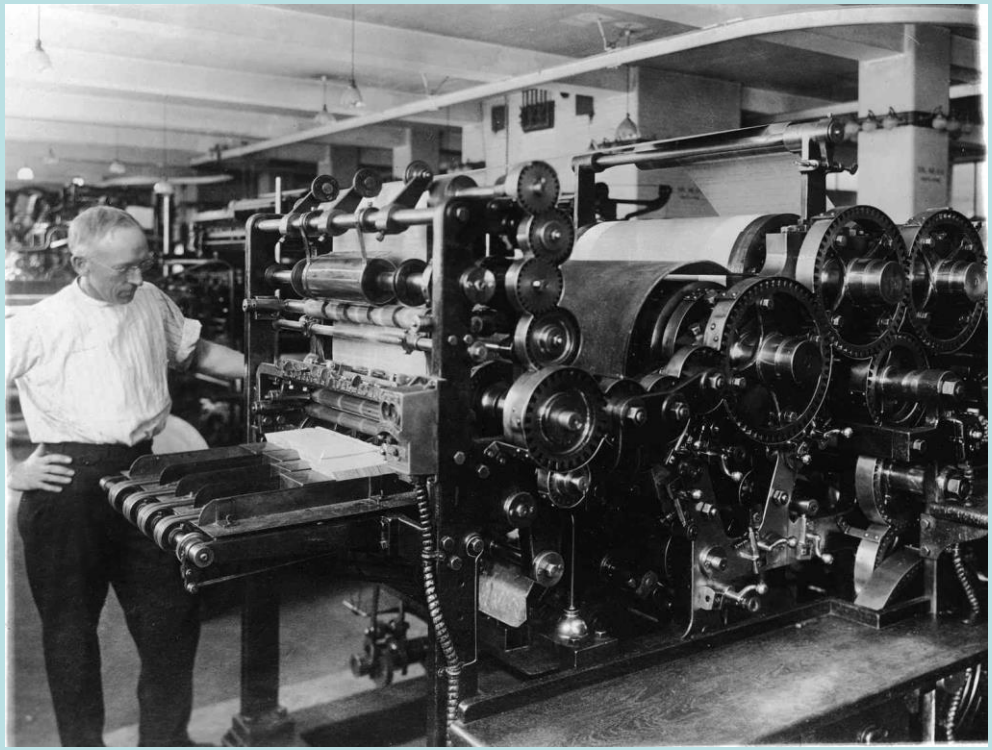


Source: https://innonews.blog/2018/01/04/17-technologickych-oblasti-pre-rozvoj-industry-4-0/

Introduction

- Generations in the industrialized world are much longer now: life spans are considerably longer.
- This all leads to a constant requirement for the individual to cope with a greater many changes during a lifetime.

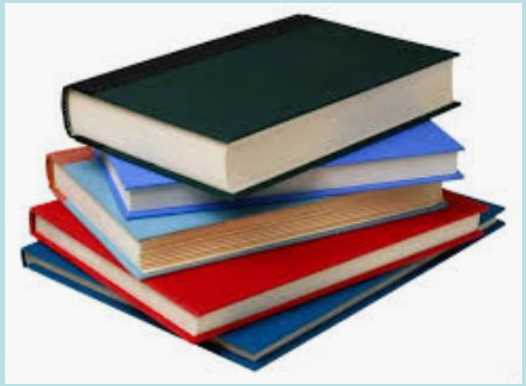




EMERGENCE:
THE RISE OF PRINT MEDIA

EMERGENCE: The Rise of Print Media

- Mass production of copies of written work
  - Cheap and quick
  - Fast dissemination of ideas
  - Mass sales



Printed Books

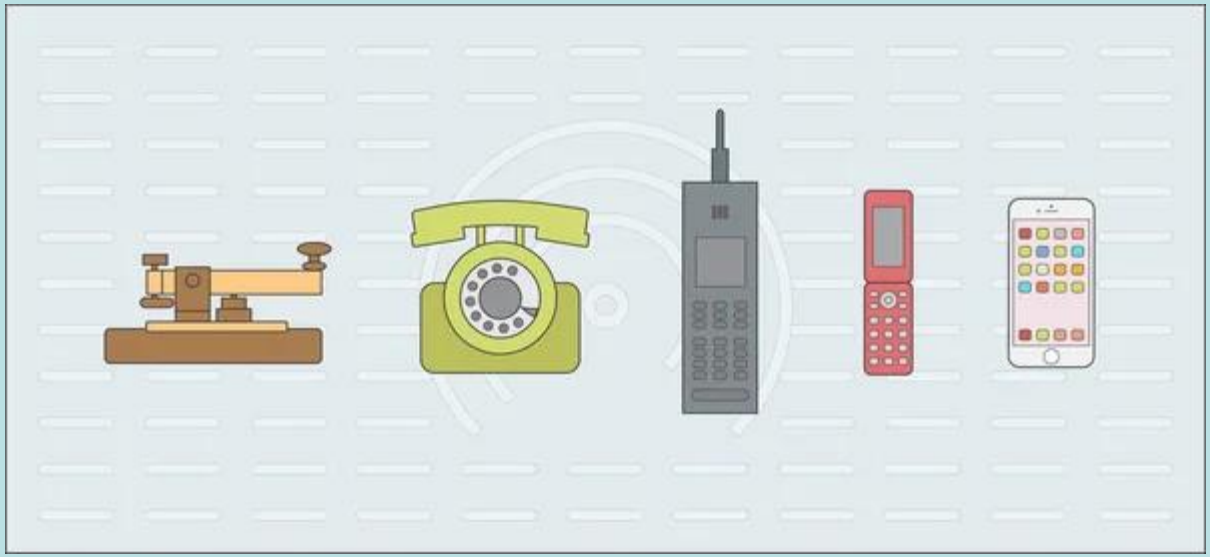
Palm Leaf Manuscripts

Image source: Internet

EMERGENCE: The Rise of Print Media

- Social changes:
  - Quick access to literature
  - Increase in literacy rates for mass sales social policy conflict with the employers of unskilled and semi-skilled labour
  - Control of which information people may access comprises a large part of controlling those people. E.g. Catholic Church resisted interpretation of Bible.
  - Globalized society

History of Newspapers



EMERGENCE:
THE RISE OF THE TELEGRAPH AND THE TELEPHONE

EMERGENCE: The Rise of the Telegraph and the Telephone

Telegraph

- Near-instantaneous communication over great distances
- Requires expert operators to encode and decode the messages
- Issues:
  - Limited to skilled operators
  - Significant investment on laying the wires

Image source: Internet

EMERGENCE: The Rise of the Telegraph and the Telephone

Telegraph

- Distinguish features:
  - Near-synchronicity: almost instantaneous but rely on local postal services or personal collection for the 'last mile' connection.
  - Privacy: if one trusts the postal and telephone services then communication can be assumed to be private. However, at least two operators (more if the message is relayed) have to know the contents of a telegraph message for its transmission.

EMERGENCE: The Rise of the Telegraph and the Telephone

Telegraph

- Digital form of communication: each letter is sent individually using a discrete coding system rather than relying on analogue variations.
- Most marked in United States improved individual communications.
- Main social effect in United Kingdom was on commerce.

EMERGENCE: The Rise of the Telegraph and the Telephone

Telephone

- Person had to be at the physical location of a telephone in order to receive the communication.
- Early telephone system needs operators at each exchange to make the appropriate connections.
- Then, automated electrical switching replaced the operators.

EMERGENCE: The Rise of the Telegraph and the Telephone

Telephone

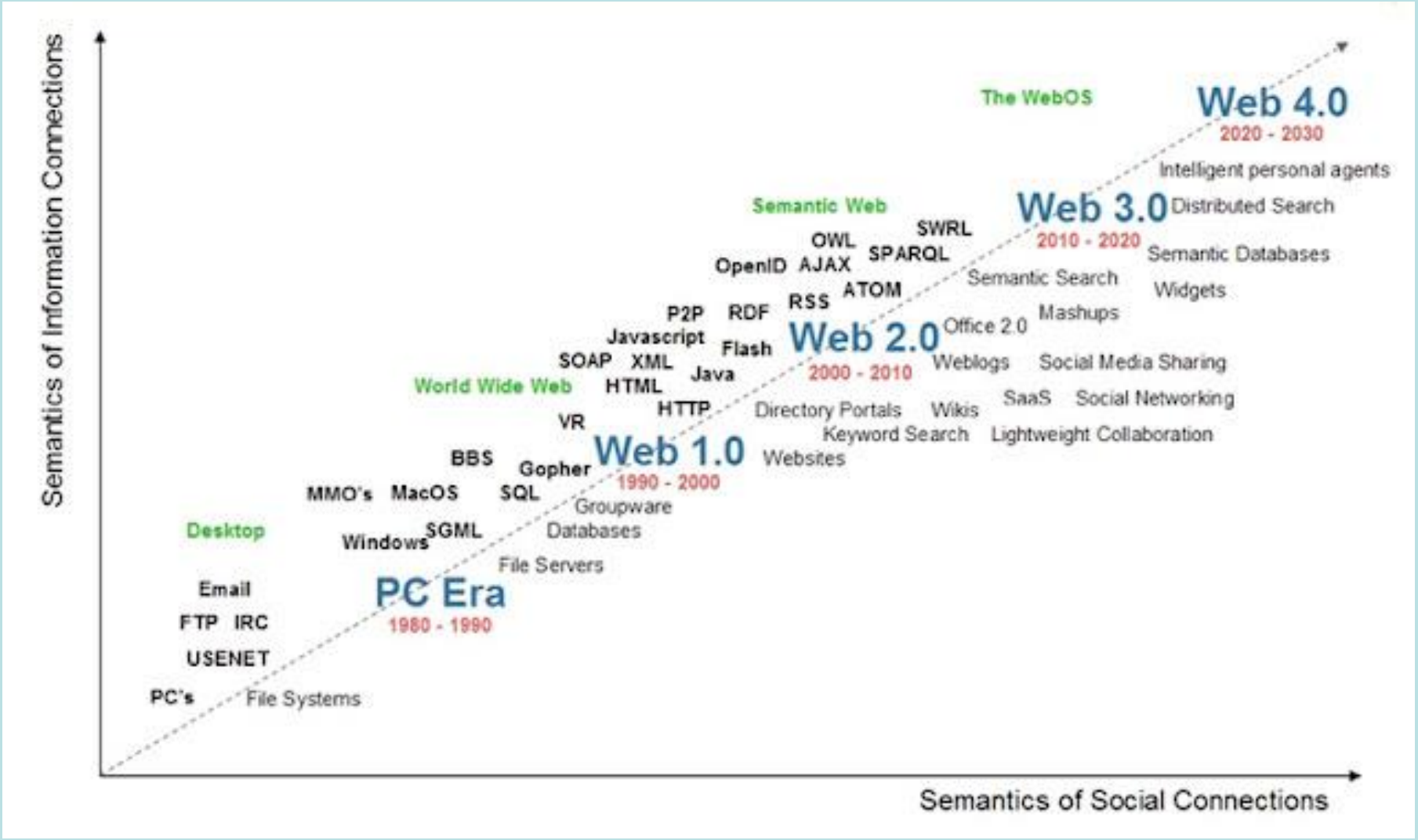
- The development of cell-based mobile phone services brings the near ubiquity of telephones in homes, businesses and reducing cost of calls.
- The text messaging capabilities of pagers inspired mobile phone operating companies towards an accidental ‘killer application’ – short messaging service (SMS)

Image source: Internet

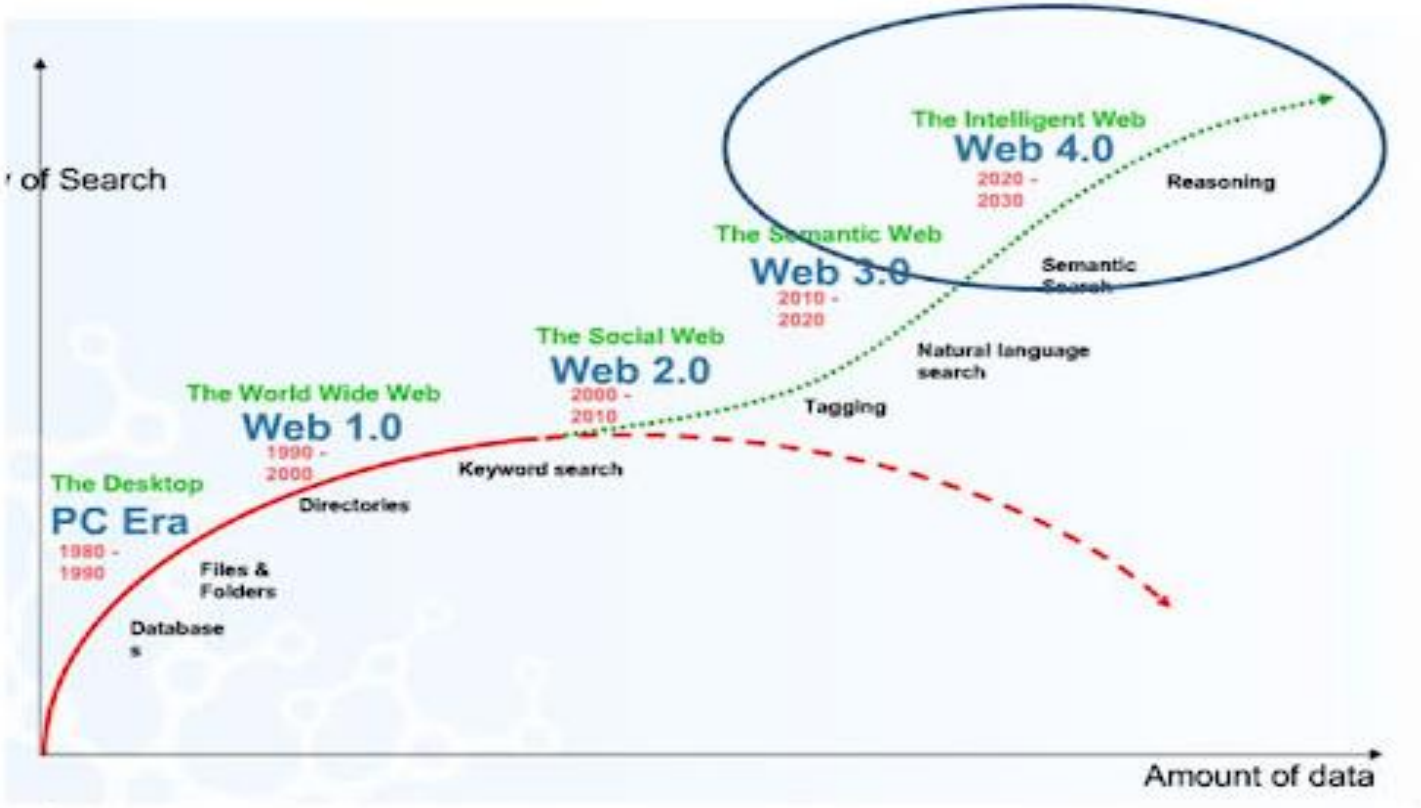
EMERGENCE: The Rise of the Telegraph and the Telephone

Telephone

- With SMS, a culture of using abbreviation has grown up.
- Issues:
  - Health risks from prolonged and regular use of mobile phones
  - Disturbance of sleep among teenagers and children because they do not switch off phones and disturbed by incoming calls or messages.
  - Phone alert in cinemas, theatres, lecture halls distracted others


Semantics of Information Connections
Semantics of Social Connections
PC's
File Systems
USENET
FTP
IRC
Email
PC Era
1980 - 1990
Desktop
Windows
SGML
MMO's
MacOS
SQL
BBS
Gopher
Groupware
Databases
File Servers
World Wide Web
VR
HTTP
HTML
SOAP
XML
Java
Javascript
P2P
RDF
Flash
Web 1.0
1990 - 2000
Websites
Directory Portals
Keyword Search
Web 2.0
2000 - 2010
RSS
ATOM
OpenID
AJAX
OWL
SPARQL
SWRL
Semantic Web
Office 2.0
Weblogs
Mashups
Semantic Search
Web 3.0
2010 - 2020
Wikis
SaaS
Social Media Sharing
Lightweight Collaboration
Social Networking
Widgets
Semantic Databases
Distributed Search
The WebOS
Web 4.0
2020 - 2030
Intelligent personal agents

Web 4.0


of Search
The Intelligent Web
Web 4.0
2020 - 2030
Reasoning
The Semantic Web
Web 3.0
2010 - 2020
Semantic Search
The Social Web
Web 2.0
2000 - 2010
Natural language search
Tagging
The World Wide Web
Web 1.0
1990 - 2000
Keyword search
Directories
The Desktop
PC Era
1980 - 1990
Files & Folders
Database s
Amount of data

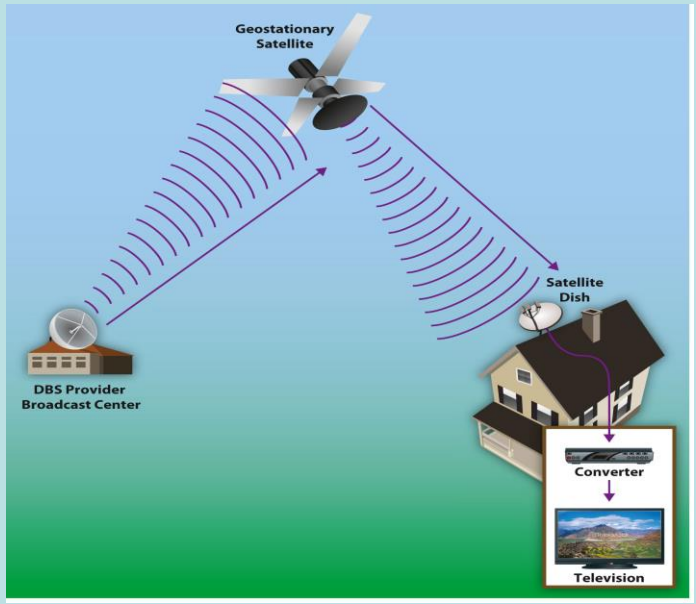
EMERGENCE:
THE RISE OF BROADCAST MEDIA

EMERGENCE: The Rise of Broadcast Media

- Broadcast media were originally very heavily regulated in most countries.
- Part of the reason for this was purely technical: analogue transmission requires a broad band of ‘clear space’ around it to prevent cross-channel interference.

EMERGENCE: The Rise of Broadcast Media

- Although radio transmission and reception has improved over the more than a century since its introduction, such advances have been very small incremental changes: the basic technology remains pretty much the same
- Only recently has broadcast **digital** radio become a reality; there has been a slow growth of both digital audio broadcast (DAB)
- More people listen to digital radio channels via satellite television equipment



EMERGENCE: THE RISE OF THE COMPUTING INDUSTRY

EMERGENCE: The Rise of the Computing Industry

- Machines for tabulating large amounts of statistical information
- Machines for small number of other specialized tasks such as cryptography
- Pharmaceutical industry use it to calculate efficient chemical supply logistics
- First big killer application: airline ticket sales.
- 1970s - personal computer (PC)

History of Computers

EMERGENCE: The Rise of the Computing Industry

- Social impact: Job Market
  - Programmer
  - Operator of complex machines (computers)
  - White-collar employment must develop basic computer skills
  - New industry in personal and business computing training

EMERGENCE: THE RISE OF THE CONTENT INDUSTRY

Emergence: The Rise of the Content Industry

- In recent years, the content industry has experienced a remarkable transformation, emerging as a dominant force in the global economy. With the proliferation of digital platforms, the explosion of user-generated content, and the growing demand for entertainment and information, the content industry has undergone a significant shift.

Emergence: The Rise of the Content Industry

- Digital Revolution and Accessibility:

The digital revolution has played a pivotal role in the rise of the content industry. The advent of high-speed internet, smartphones, and social media platforms has empowered individuals to consume and produce content on an unprecedented scale.

- Shift in Consumer Behavior:

Consumer behavior has experienced a significant shift, with a growing preference for on-demand and personalized content. Traditional media outlets are facing stiff competition from streaming services, online publications, and social media influencers.

Emergence: The Rise of the Content Industry

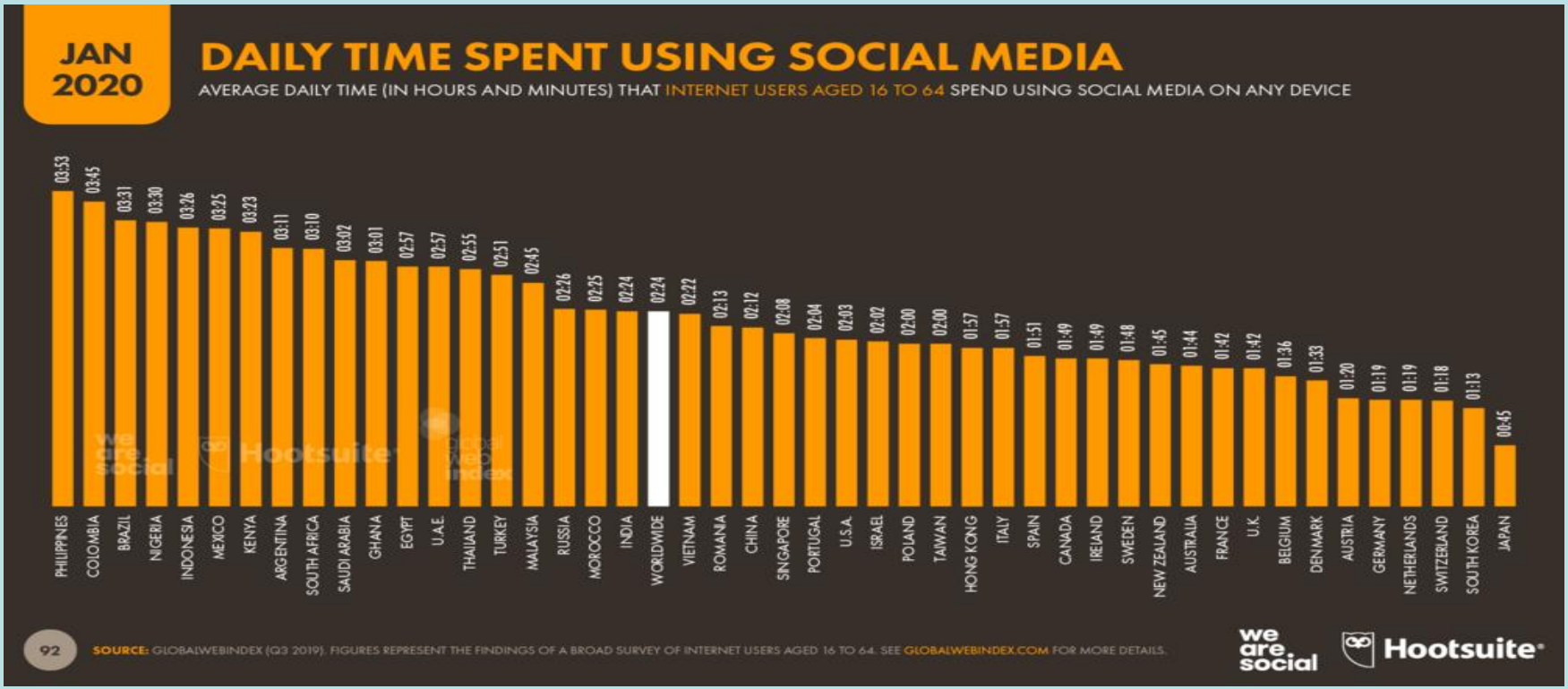
- Publication of books and films require more people with different skills. In order to supply the demand at affordable level, various compromises are made:
  - Law enforcement e.g. copyright
  - acceptance of advertisement during TV programmes

Emergence: The Rise of the Content Industry

- Advertisement:
  - One of the method to fund television broadcast
  - In some TV programmes, advertising dictates the story format for TV shows.
  - Difference between made-for-television movies and mode-for-cinema movies is the obedience to advertising slots by providing mini-climaxes or cliffhangers to keep the viewer watching the programme through the advert break.

Emergence: The Rise of the Content Industry

- Critics of the translation of stories between media:
  - Movie, novel (vice versa), computer game
  - E.g. Spider-Man comics, Spider-Man cartoon TV show, Spider-Man novels, Spider-Man movie, Spider-Man computer games, back to comic-book adaptation of the movies
  - Which version is the original?
    - There are too many versions and re-interpretation



EMERGENCE:
THE RISE OF THE INTERNET

Emergence: The Rise of the Internet

- It has been in existence for over 30 years
- Really emerged into the consciousness of the general public in the late 1990s

Emergence: The Rise of the Internet

- One of the most successful dot com company to date is Amazon
- Starting out as a US online book seller
- it has been franchised out to various other countries, including
  - amazon.co.uk in the United Kingdom
  - amazon.de in Germany
  - amazon.co.jp in Japan
- has branched out into providing various other types of goods, with a different mix for each country

Emergence: The Rise of the Internet

- Airline agencies have also benefitted from the web
- E-Ticketing performed completely online
- E-Ticket – no physical ticket printed only an online version

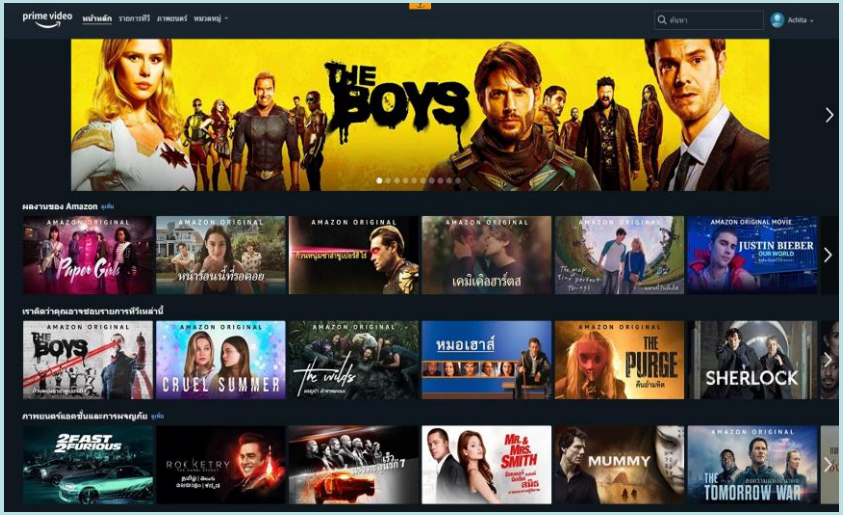
Emergence: The Rise of the Internet

- Online Auction: make use of the many-to-many nature of the web
- Biggest asset: system of trust
  - Buyer knows he/she will receive product
  - Seller knows he/she will get paid
- eBay provides a mechanism for trusting other sellers without paying for expensive escrow payment and delivery systems (i.e. the cash-on-delivery service)
- Rating service derived from previous transactions

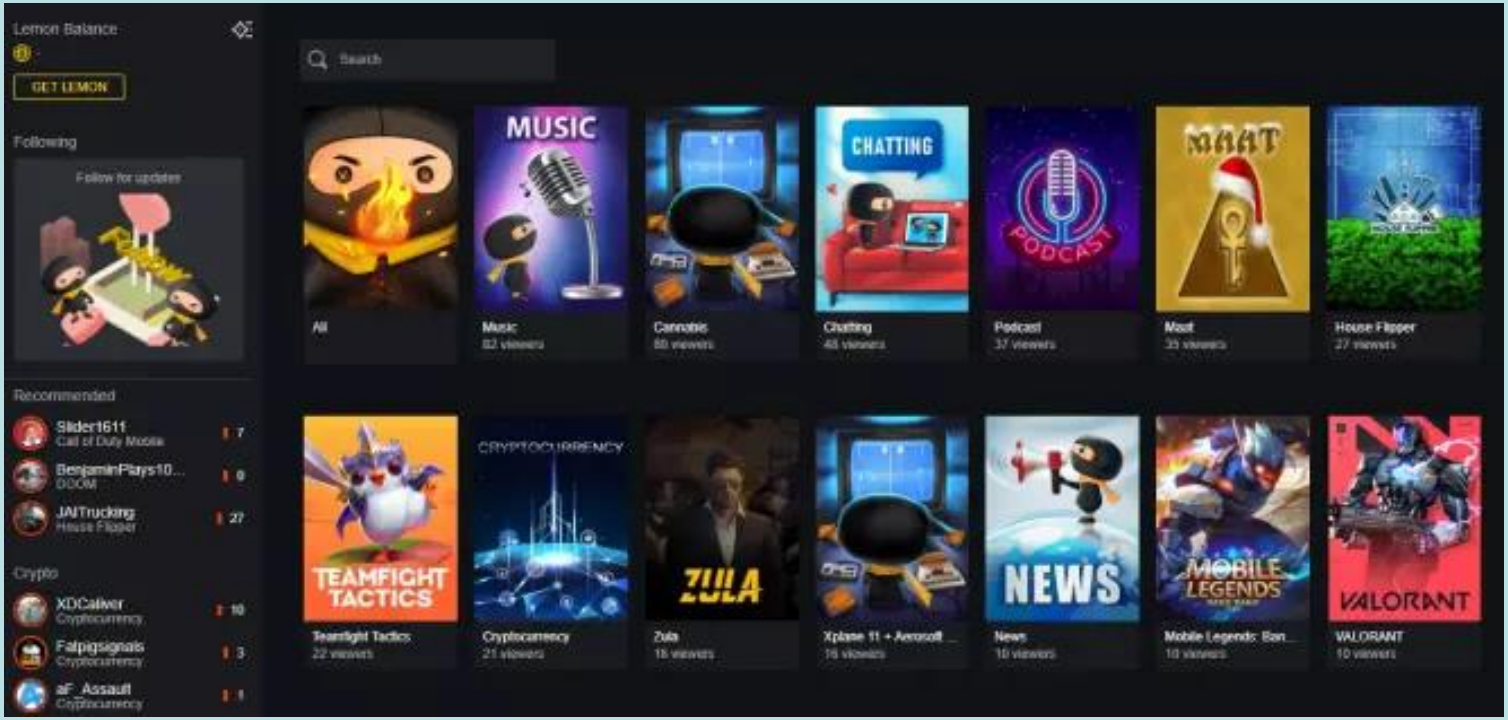
Chapter 2: Part 2
CONVERGENCE:
CONTENT PRODUCERS AND DISTRIBUTORS

Convergence: Content Producers and Distributors

- Example of convergence: content production and distribution companies
- Companies that produce content for TV(Web) and the TV stations(ISP) themselves



Why ASTRO and NETFLIX need to merge?



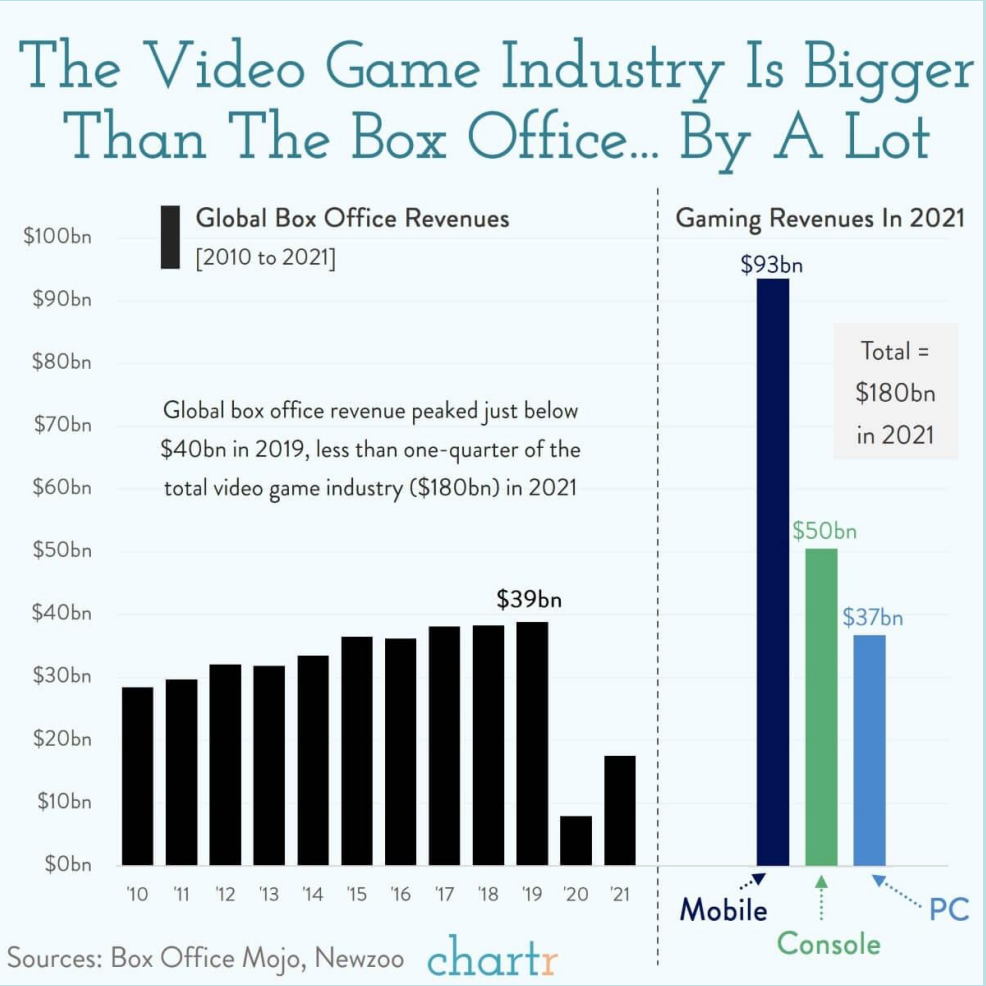
CONVERGENCE: PLATFORM PRODUCERS & CONTENT PRODUCERS/PUBLISHERS

Convergence: Platform producers & Content Producers/Publishers

- Video game production is very costly and quite a risky business – as risky as making movies.
- Console manufacturers allow & encourage, third-party publishers and developers to create games for their consoles
- In order to maintain the revenue stream from games, they require publishers to submit their games through quality assurance tests run by the manufacturer and to pay a licensing fee in order to get appropriate encryption codes which allow their games to be loaded onto the consoles

Convergence: Platform producers & Content Producers/Publishers

- some remaining tensions: since manufacturers are also developers and publishers of their own games, the quality-control process, being used to gain an advantage in the games market, particularly where similar games are due to be released by both the manufacturer and a third-party developer around the same time
- In fact, the computer games industry now grosses more revenue than cinema



CONVERGENCE: MARKET SECTOR INTEGRATION, HORIZONTAL AND VERTICAL INTEGRATION

Convergence: Market Sector Integration

- Companies frequently seek to expand profits by moving into other areas (normally related fields)
- E.g. Microsoft moves into:
  - video game console market with Xbox
  - Mobile-phone-cum PDA world
  - Home entertainment electronic market: to put standard PC running Microsoft software in an integrated TV-DVD-audio entertainment system

Convergence: Market Sector Integration

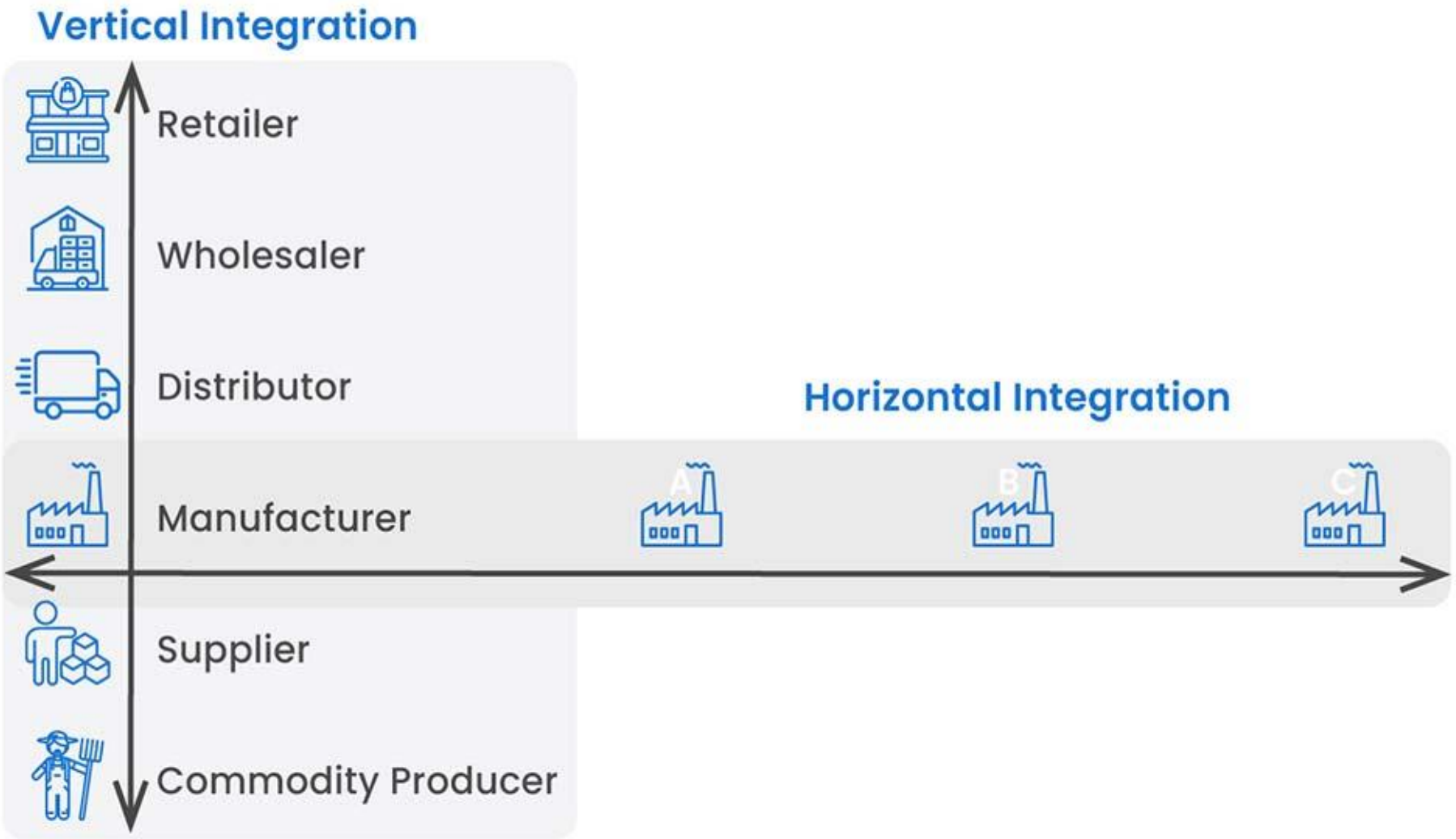
- In some cases, it can be more difficult for a large organization rooted in one field to move into a new field than for an entirely new enterprise to enter that same market.
- This is due to organizational inertia and mistaken expectations within the original company.

Convergence: Market Sector Integration

- Other successful market sector integration:
  - Google emerging into the access provision field with their municipal WiFi contract with the city of San Francisco, CA, United States.
  - Nestlé, original business was based on milk and dietetic foods for children, grew and diversified its markets into: LACTOGEN (1921), MILO (1921), NESCAFE (1938), MAGGI (1947), etc.
  - Genting Berhad, starting up with Genting Highlands Resorts, grew intro plantation, power generation, oil and gas exploration and production.

Vertical vs Horizontal integration

If a vertical integration occurs when a company acquires a company or asset at a different part of the supply chain, horizontal integration occurs when a company consolidates with the acquisition of a company or asset at the same points of the supply chain.



Convergence: Horizontal Integration

- Reduces the number of players in a marketplace or merges two related marketplaces.
- Example:
  - merger between Celcom Axiata Bhd and Digi
  - IBM computer division acquired by Lenovo

Convergence: Vertical Integration

- Reduces the number of steps in the chain from raw material to eventual consumer to gain control over their industry's value chain.
- Example:
  - Samsung is manufacturing OLED for its smart phones
  - Apple is having its own retail stores for selling its products

Advantages of Vertical Integration

- Cost Efficiency: Vertical integration allows companies to streamline their operations by eliminating middlemen and reducing transaction costs. By integrating different stages of the production process, companies can gain greater control over the supply chain, leading to cost savings through economies of scale and improved coordination.
- Quality Control: Vertical integration enables companies to maintain strict control over the quality of their products or services. By bringing different stages of production in-house, companies can ensure consistency and adherence to quality standards throughout the entire process. This can lead to increased customer satisfaction and brand loyalty.
- Competitive Advantage: Vertical integration can provide companies with a competitive edge by enhancing their market position. By controlling key stages of the value chain, companies can differentiate themselves from competitors, respond more quickly to market changes, and have greater flexibility in pricing, distribution, and product development.

Advantages of Horizontal Integration

- Market Power: Horizontal integration allows companies to expand their market share and gain a stronger position within their industry. By acquiring or merging with competitors, companies can eliminate competition and increase their bargaining power with suppliers, customers, and other stakeholders. This can lead to economies of scale, increased market dominance, and enhanced profitability.
- Synergies and Resource Sharing: Horizontal integration can generate synergistic effects by combining complementary resources, capabilities, and expertise. By merging or acquiring similar businesses, companies can leverage shared resources, consolidate operations, and reduce duplication. This can result in cost savings, improved efficiency, and the ability to offer a broader range of products or services.
- Diversification and Risk Mitigation: Horizontal integration allows companies to diversify their product offerings or market presence. By expanding into new markets or adding new product lines, companies can reduce their dependence on a single market or product, thereby spreading risk and minimizing the impact of market fluctuations. Diversification can also lead to cross-selling opportunities and the ability to capture a larger share of customer spending.

Disadvantages of Vertical Integration

- Increased Costs and Complexity: Vertical integration can lead to increased costs and complexity in managing multiple stages of the production process. Companies may need to invest in additional resources, infrastructure, and expertise to handle the integrated operations. It can also result in a loss of economies of scale if the company is not able to efficiently utilize its integrated assets.

- Lack of Flexibility and Adaptability: Vertical integration can limit a company's ability to quickly respond to market changes and adapt to new technologies or consumer preferences. It may be challenging to make changes or adjustments in a vertically integrated system, as it requires coordination and cooperation across different stages of the value chain.

- Risk of Inefficiencies and Dependencies: Vertical integration can create a risk of inefficiencies if the company is not able to effectively manage and optimize each integrated stage. It may also lead to dependencies on internal resources, making the company vulnerable to disruptions in any part of the integrated process.

Disadvantages of Horizontal Integration

- Increased Market Power Concerns: Horizontal integration can raise concerns about market concentration and reduced competition. When companies merge or acquire competitors, it can lead to reduced choices for consumers and less competitive pricing. This can attract regulatory scrutiny and potential antitrust issues.

- Integration Challenges: Integrating different businesses and cultures after a horizontal integration can be complex and challenging. Differences in processes, systems, and organizational structures can create integration hurdles and slow down the realization of expected synergies.

- Risk of Overextension: Horizontal integration can expose companies to the risk of overextending their resources and capabilities. Acquiring too many businesses or expanding into unrelated markets without proper strategic planning can strain financial resources, management bandwidth, and dilute focus, resulting in decreased overall performance.

CONVERGENCE: DIGITIZATION

Convergence: Digitization

- Digitization refers to the process of converting analog information or content into a digital format, typically using computer technology. It involves the conversion of physical objects, such as text documents, images, audio recordings, or videos, into digital data that can be stored, processed, and transmitted electronically.

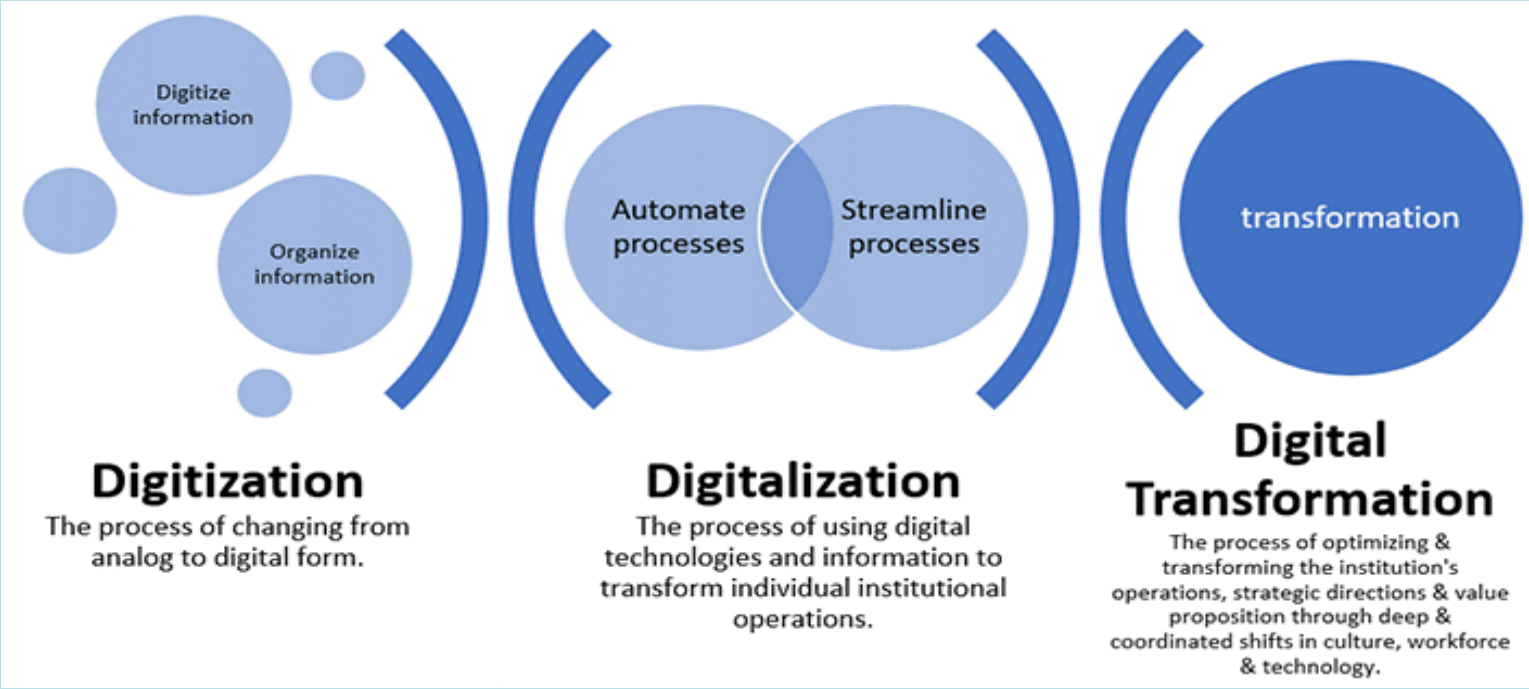
- Digitization involves capturing analog information through various methods such as scanning, photographing, or recording, and converting it into binary code, which consists of a series of 0s and 1s. This digital representation allows for easy storage, manipulation, and transmission of information using digital devices, such as computers, smartphones, or the internet.

Convergence: Digitization

- The digitization of various forms of content has revolutionized many industries, including media, publishing, education, healthcare, and more. It has enabled the efficient storage and retrieval of vast amounts of data, facilitated rapid communication and sharing of information, and opened up new possibilities for analysis, automation, and innovation.

- Digitization has also played a crucial role in the development of the digital economy, as it has enabled the creation of digital products and services, such as e-books, streaming media, online platforms, and digital marketplaces. It has transformed traditional business models and provided opportunities for new business ventures and entrepreneurial endeavors.

Convergence: Digitization



- From analogue technology to digital technology
- **Digitization** vs **Digitalization** vs **Digital Transformation**?

Process of creating value by doing things better

Converting analog information into digital format

Use of digital technologies to change a business model and provide new revenue and value-producing opportunities

A journey of strategically planned organizational change to dominate or stay relevant in a competitive market place by leveraging disruptive technologies

End