Digital Transformation

Class # 4: Social (non-technical) drivers of Digital Transformation

EPITA | Fall 2025

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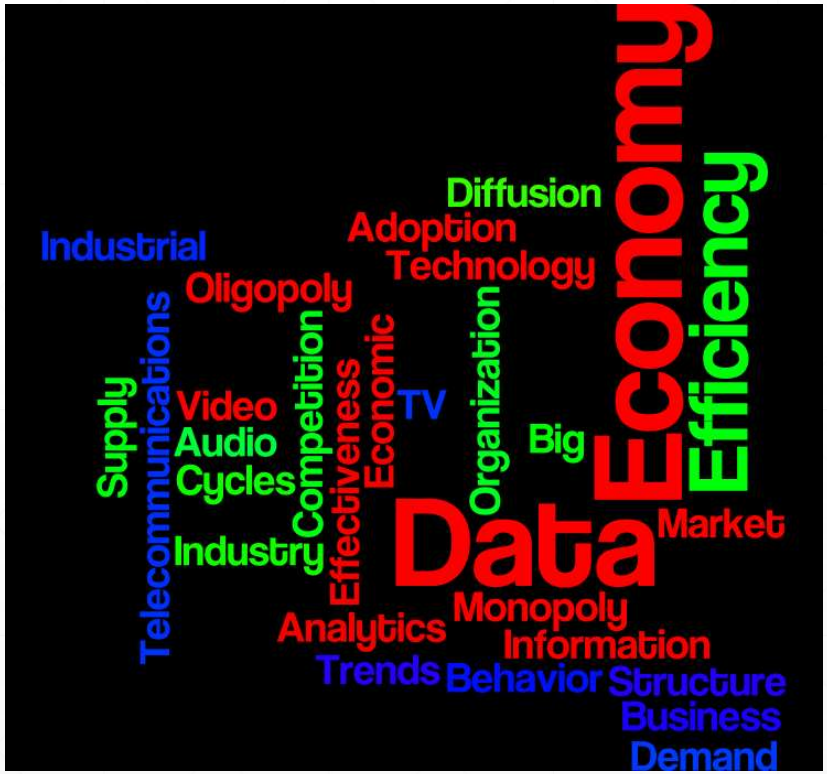
Digital Transformation | Class 4



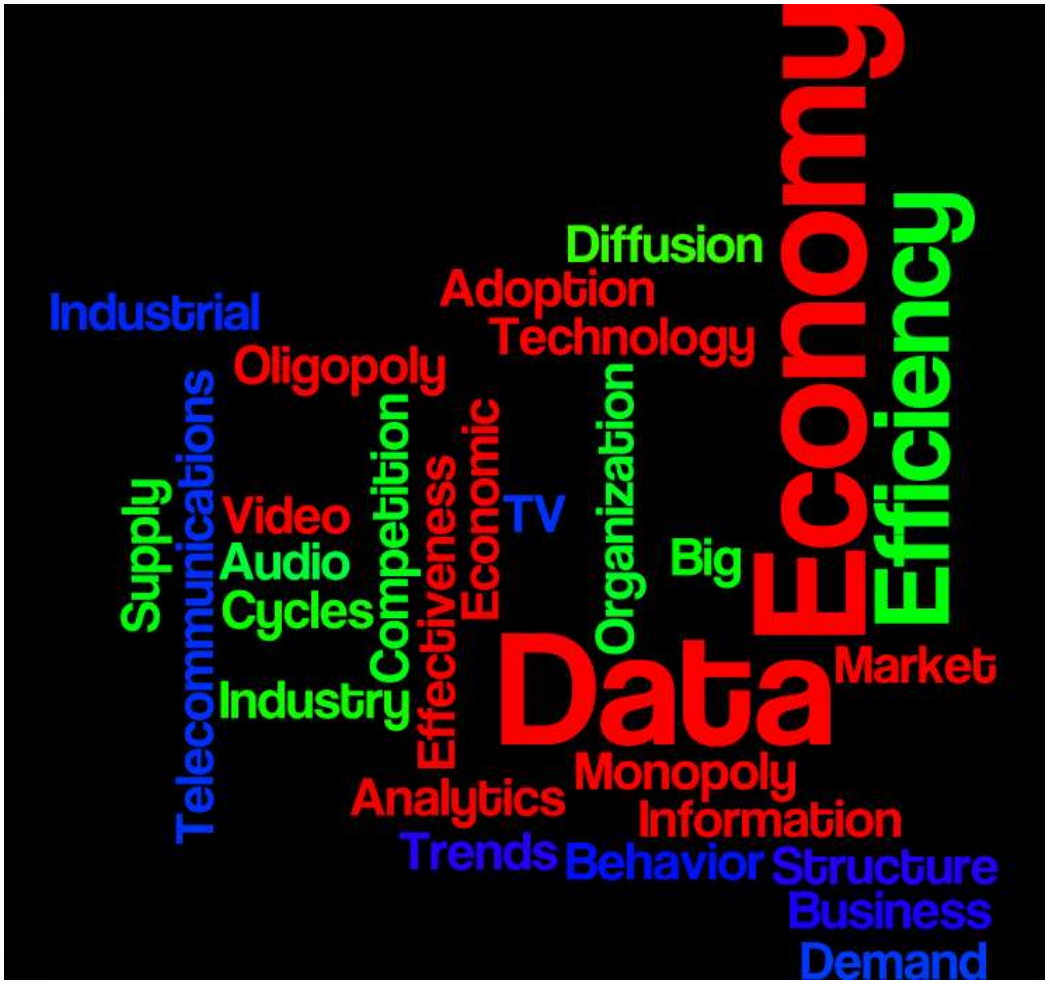
- Admin
- Recap
- Thoughts for the day

Course Breakdown
EPITA Fall 2025

Class	Date & Time | Topics
Class # 1	Welcome to the Digital Economy!
Class # 2	Technology Drivers # 1: Internet of Things (IoT), Blockchain
Class # 3	Technology Drivers # 2: Big Data & Artificial Intelligence (AI)
Class # 4	Other (non-technical) drivers of Digital Transformation
Class # 5	Digital Business Models: Platforms
Class # 6	Beyond Products: Designing Digital Businesses, and Markets | Course Wrap-Up
Class # 7	Final Presentations

Today's Reading:

- **Daron Acemoglu.** *Two Models for Agentic AI*, The Project Syndicate, Mar 28, 2025



Class # 4
Digital Transformation: social (nontechnical) drivers

Network properties (Networked World, Small Worlds, Weak Ties, …)

Consequences of network properties (economic & social)

What do we know about digital transformation, so far?

❺ **Thesis # 5:** Some technologies, called General Purpose Technologies, such as Artificial Intelligence, and specifically Machine Learning, have today relatively higher potential to bring about change.

❻ **Thesis # 6:** Unlike other infrastructural technologies (IoT, Blockchain …) AI and ML's potential for change encompasses activities and processes which are usually performed by humans, for example: decision-making. With AI-driven Digital Transformation, we are witnessing increased human activity embeddedness in technology.

❼ **Thesis # 7:** Digital Transformation, in the era of AI, raises fundamental questions such as, for example, which activities should continue to be performed by humans, and which are the ones that could be "delegated" to AI, and in which conditions.

Digital Transformation Class 4
3 Definitions as a starting point

Human agency entails the claim that **humans make decisions and enact them on the world**, independent of whether it is deterministically or through free will.

Technocentrism is **the tendency to view technology as a central component for addressing complex social issues and driving transformative changes**

Algorithmic agency refers to the capacity of algorithms **to act and make decisions**, often with limited or **no human intervention**

Digital Transformation Class 4
Class Discussion

ARAB SPRING (2010 – 2012)

- “The Arab Spring was a series of anti-government protests, uprisings and armed rebellions that spread across much of the Arab world in the early 2010s.
- In the wake of the Arab Spring protests, a considerable amount of attention focused on the **role of social media and digital technologies** in allowing citizens within areas affected by "the Arab Uprisings" as a **means for collective activism to circumvent state-operated media channels**.
- Some observers have also drawn comparisons between the Arab Spring movements and the Revolutions of 1989 (also known as the "Autumn of Nations") that swept through Eastern Europe […]. Others, however, have pointed out that there are several key differences between the movements, […] such as the **organizational role of Internet-based technologies** in the Arab revolutions.”

Source: Wikipedia

CAMBRIDGE ANALYTICA (2018)

- Established in 2014, Cambridge Analytica used to be a data analysis company
- In 2018, the company was amidst a global scandal, accused of having ‘sucked-up’ the personal data of 87 million Facebook users, with the aim to influence the Brexit referendum in the UK, and the 2016 US presidential election

Digital Transformation Class 4
Class Discussion

US House of Representatives inquiry into Facebook's business activity (2020)

- « Facebook's **monopoly power in social networking is "firmly entrenched,"** and the company has **snuffed out competitors** through strategic acquisitions and copying products. Services like Onavo, a data analytics firm Facebook acquired, helped the company to spot "early bird warning" signals on would-be competitors rising quickly in the app store."
- « Because of the absence of competition, **user privacy has been eroded while misinformation and toxic content have proliferated** across all of the company's services, which are used regularly by more than three billion people."

Source: NY Times, October 20, 2020. https://www.nytimes.com/2020/10/06/technology/amazon-apple-facebook-google-antitrust-report.html

Digital Transformation Class 4 Class Discussion

Pause Giant AI Experiments: An Open Letter (2023)

“**Pause Giant AI Experiments: An Open Letter** is the title of a letter published by the Future of Life Institute in March 2023.

- The letter calls "all AI labs to immediately pause for at least 6 months the training of AI systems more powerful than GPT-4", citing risks such as AI-generated propaganda, extreme automation of jobs, human obsolescence, and a society-wide loss of control.
- It received more than 30,000 signatures, including academic AI researchers and industry CEOs such as Yoshua Bengio, Stuart Russell, Elon Musk, Steve Wozniak and Yuval Noah Harari”

Source: Wikipedia

Questions

- What do the 4 situations have in common?
- What has changed, in the tone of these messages, in less than 12 years (from 2012 to 2023)?

Society, The Economy, and Technology – I)

I) Imagine what the society and the economy looked like in a not-so-distant past, when technology was not ubiquitous

Society:

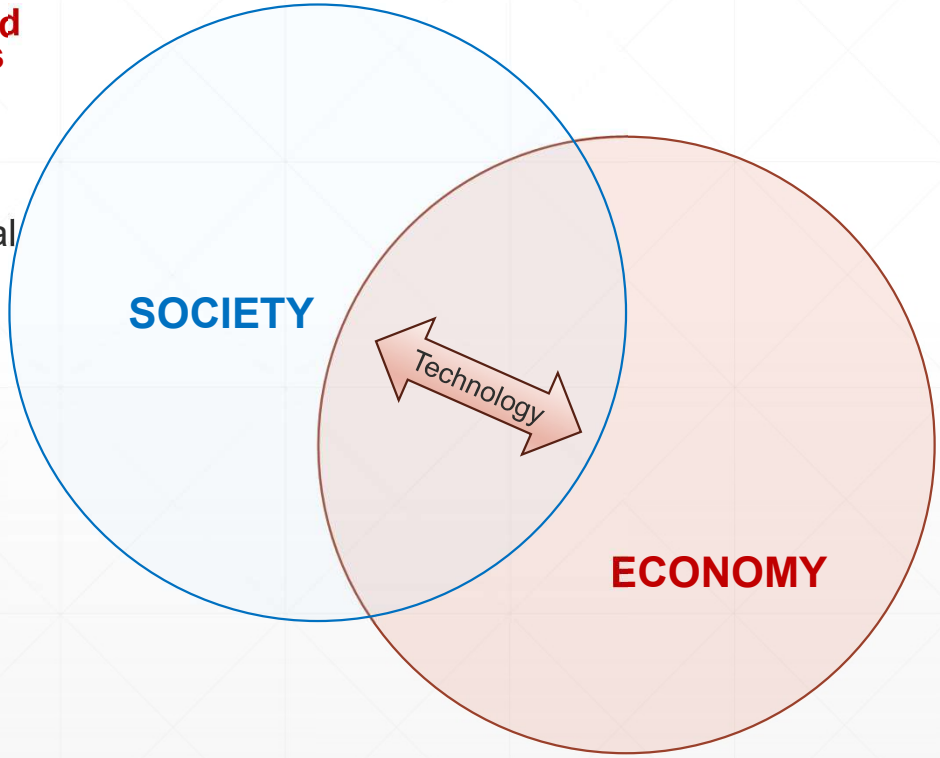
- Shared values, Collective and individual action, Social Agency

Economy:

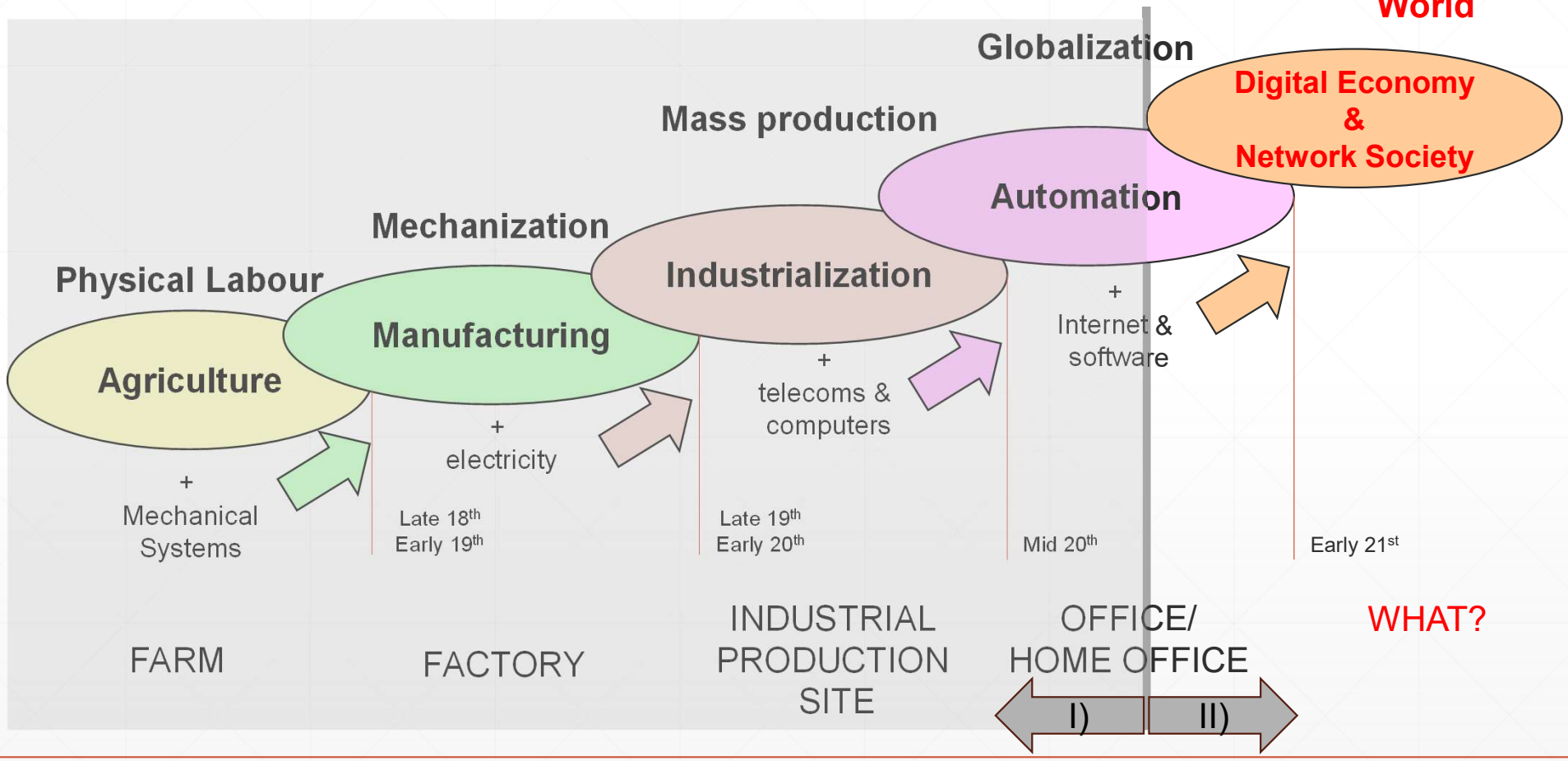
- Value creation/ allocation/distribution, Economic Agency

Technology

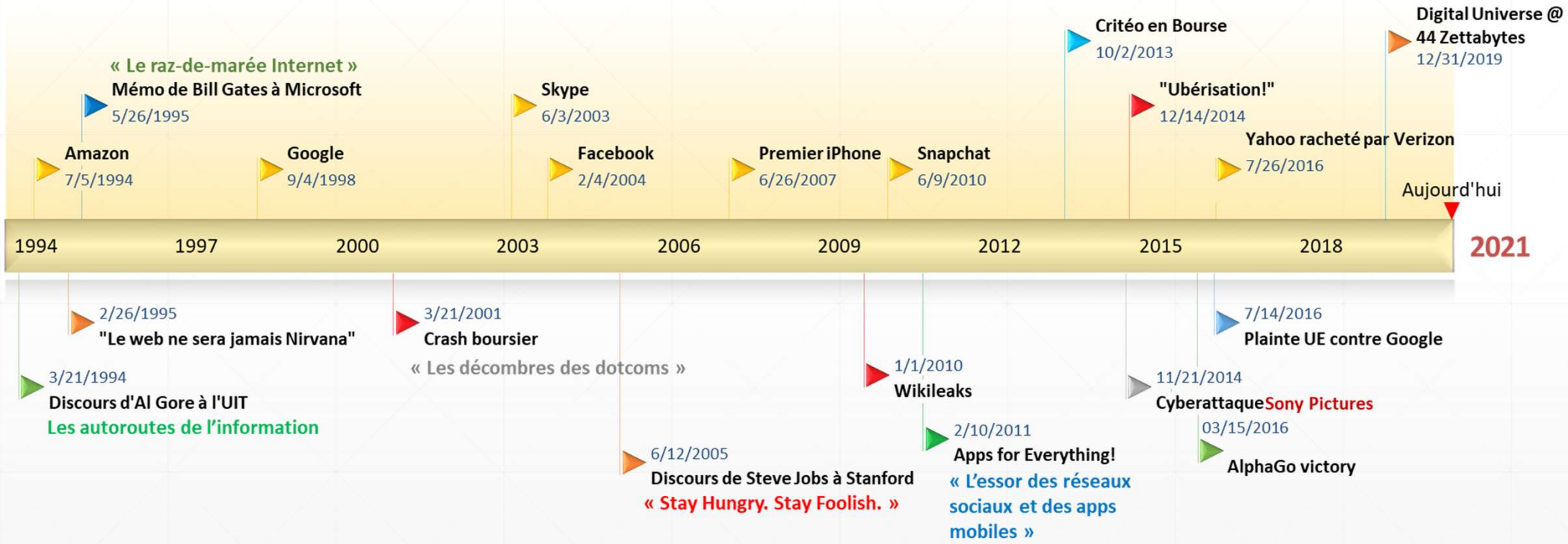
- A means for reaching goals: building infrastructure to support society's needs (railroads, electricity, telecommunications)



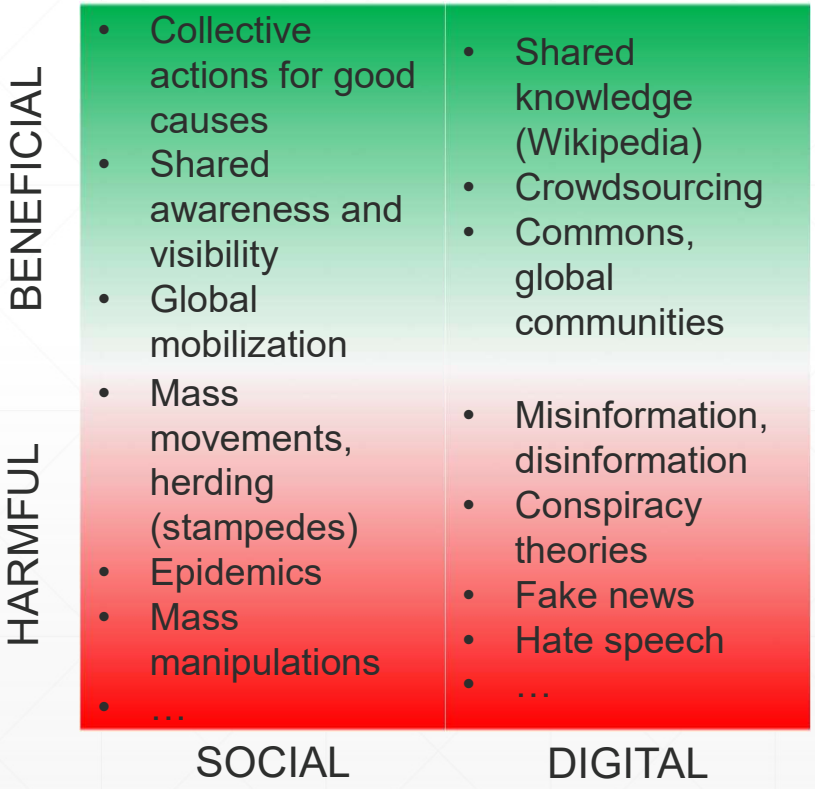
II) Digital Economy & Network Society



II) Digital Economy and Network Society
“The times they are a-changin’ ”



Social aspects of digital transformation



Social (non-technical) aspects of Digital Transformation Illustration: Collective social action (herding)

« Herding can be broadly defined as the alignment of thoughts or behaviours of individuals in a group (herd) through local interactions rather than centralized coordination."

Examples:

- In economics: John Maynard Keynes identified the influence of human emotions ("animal spirits") on economic agents
- In technology adoption: Everett Rogers highlighted the role of social influence (reciprocal influences among the member of a group) on technology diffusion
- In sociology: Mark Granovetter discussed the role of "weak ties" in social networks

Source: Raafat, Chater, Frith. Herding in humans. Trends in Cognitive Sciences Vol.13 No.10

ANALYSIS OF SOCIAL INTERDEPENDENCE = NETWORKS AS A CENTRAL CONCEPT

The Network Society

Manuel Castells:

- “...the definition, if you wish, in concrete terms, of a network society is a society where the **key social structures and activities are organized around electronically processed information networks**. So it's not just about networks or social networks, because social networks have been very old forms of social organization. **It's about social networks which process and manage information and are using micro-electronic based technologies**."
- The diffusion of a networking logic substantially modifies the operation and outcomes in processes of production, experience, power, and culture.

Source: Wikipedia, citing on: Manuel Castells. *The Rise of The Network Society: The Information Age: Economy, Society and Culture, Volume 1.* Blackwell, Cambridge, 1996

Reminder - Social coordination mechanisms

HIERARCHIES

- Most human organizations are vertical
- Visible forms:
  - Administrative procedures (often top-down)
- Individual preferences are dependent
- Often associated with bureaucracy

MARKETS

- Transaction-based exchange mechanisms
- Visible forms:
  - Prices
- Individual preferences are independent (“arm’s length”)
- May require external intervention (through regulation)

NETWORKS

- Horizontal forms of reciprocal interactions
- Visible forms
  - Relationships
- Individual preferences are interdependent
- Need a built-in governance mechanism

Source: Powell (1990)

The Network Society
Networks, Hierarchies, and Markets

HIERARCHY

- « A system in which people or things are arranged according to their importance.” (Cambridge Online Dictionary)
- « A **hierarchy** (from Greek: ἱεραρχία, *hierarkhia*, 'rule of a high priest', from *hierarkhes*, 'president of sacred rites') is an arrangement of items (objects, names, values, categories, etc.) that are represented as being "above", "below", or "at the same level as" one another.” (Wikipedia)

AUTHORITY, POWER, SUBORDINATION

MARKET

- « A **market** is one of a composition of systems, institutions, procedures, social relations or infrastructures whereby parties engage in exchange. […] It can be said that a market is the process by which the **prices** of goods and services are established.” (Wikipedia)
- “ **Market**, a means by which the exchange of goods and services takes place as a result of buyers and sellers being in contact with one another, either directly or through mediating agents or institutions.” (Encyclopedia Britannica)

TRANSACTIONS, PRICES

The Network Society
« Network » as a central concept

“A large system consisting of many similar parts that are connected together to allow movement or communication between or along the parts, or between the parts and a control centre.”

“People that you know, considered as a group whose members exchange information with each other.” (Cambridge Online Dictionary)

“Network, networking and networked may refer to […] graphs as a representation of relations between discrete objects.” (Wikipedia)

INTERDEPENDENCE, RECIPROCITY

Hierarchies, Networks, Markets

ORGANIZATIONAL ATTRIBUTES	HIERARCHIES	NETWORKS	MARKETS
Purpose	Promote the interests of a central executive	Promote the interests of an ad-hoc organization (community, cooperative)	Provide a forum for transacting
Trust	Low	Moderate to high	Low
Conflict Resolution	Detailed contracts Administrative authority (fiat)	Relational/recurrent contracts, Joint negotiation, reciprocity	Market norms Courts, legal systems
Boundaries	Fixed, Rigid Strong, stable ties or associations	Flexible, Permeable Strong and weak, often dynamic ties and associations	Discrete, Atomic Distant, arms-length, one-time ties
Control/Authority/Mode of influence	Based on status or rules	Expertise or reputation based	Persuasion via pricing mechanism

Source: drawing on Van Alstyne (1997)

Networks
Topics for discussion

Network properties

- Social capital: small worlds, 6 degrees of separation, structural holes, weak and strong ties,
- Network distributions: Scale-free networks and preferential attachment

Consequences of network properties

- Economic implications: network effects, hardware-software
- Sociological implications: what do we actually measure on the web? ()
- Illustration with “The attention economy”
  - Who – ultimately - decides in a digital environment?

Network Properties | Social capital

Social capital

- Social capital is a sociological concept about the value of one's relationships (connections). It may relate a person's ties or network position to outcomes such as power, leadership, mobility, employment, individual performance, entrepreneurship…
- Social capital analysis relies on "ego-network" models, describing the social relationships of an individual (ego) with its social peers (alters).

Structural holes

- **Structural holes** is a concept from social network research, originally developed by Ronald S. Burt (1992). A structural hole is understood as a gap between two individuals who have complementary sources to information. An individual who builds a bridge between distinct groups is in a privileged position to transfer or gatekeep valuable information from one group to another.

Network Properties | Social capital

6 degrees of separation

- In a famous sociological experiment, Stanley Milgram (1967) has established that the longest distance between any 2 people in the world, who do not know each other, is 6. In other words, the number of intermediaries between 2 randomly selected people is 5

X – 1 – 2 – 3 – 4 – 5 – Y

Small Worlds

- Milgram's observation triggered additional research in the field of « **small worlds** »which, in a social network, results in the phenomenon of strangers being linked by a short chain of acquaintances.

Network Properties | Social capital

Types of ties - any two nodes of a network are linked by interpersonal ties which can be:

Strong ties

- Between two people who know each other very well and who interact on a frequent basis (family, old friends, boss, co-workers)

Invisible ties

- Between people who know each other by sight and who meet unfrequently, without significant interaction (people in the train, while commuting; newspaper stand owner, …)

Network Properties | Social capital

Weak Ties

- Weak ties are acquaintances with whom we interact unfrequently and, in general, informally
- Weak social ties, as shown by Mark Granovetter (1973), carry a great deal of social value (He has demonstrated that in a job search situation, weak personal ties are the likeliest to help finding a job)
- “More generally, weak ties are responsible for the majority of the **embeddedness** and structure of social networks in society as well as the transmission of information through these networks. Specifically, more novel information flows to individuals through weak rather than strong ties. Because our close friends tend to move in the same circles that we do, the information they receive overlaps considerably with what we already know. Acquaintances, by contrast, know people that we do not, and thus receive more novel information.” Source: Wikipedia

Network Properties | Social capital
Class discussion

Exercise 1

- Try to find the shortest path between yourself and a prominent public figure

Exercise 2

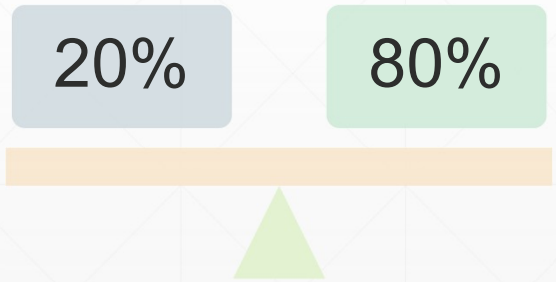
- Are you a bridge between 2 distinct social groups? What advantage or disadvantage does this position create?

Points for discussion

1. How many intermediaries? What types of ties (strong or weak) exist between the various intermediaries?
2. Do the 2 distinct groups have similar interests? Do the interests converge or diverge?

Network Properties | Network Distributions

THE PARETO PRINCIPLE



- « The **Pareto distribution**, named after the Italian civil engineer, economist, and sociologist Vilfredo Pareto, is a probability distribution that is used in description of social, quality control, scientific, geophysical, actuarial, and many other types of observable phenomena; the principle originally applied to describing the distribution of wealth in a society, fitting the trend that a large portion of wealth is held by a small fraction of the population. The Pareto principle or "80-20 rule" stating that 80% of outcomes are due to 20% of causes was named in honor of Pareto." (Wikipedia)
- **The Pareto Principle is a power-law.**

Network Properties | Network Distributions

Networks governed by power-laws

- Some networks are governed by power-laws, which means to say that in these networks, it exists a certain number of nodes with higher number of connections than the average (higher degrees)
- Such networks are called « scale-free networks » (Albert, Barabasi, 1999)
- The nodes with higher degrees are called “hubs”
- Examples of scale-free networks are the world-wide-web, most social networks, some metabolic processes and physical phenomena, some forms of technology adoption, notably the network-based digital technologies

Network Properties | Network Distributions

Main features of scale-free networks

- **Preferential attachment** – « … is any of a class of processes in which some quantity, typically some form of wealth or credit, is distributed among a number of individuals or objects according to how much they already have, so that those who are already wealthy receive more than those who are not." (Wikipedia). Also known as "**Rich get richer**" or "**Matthew effect**"
- **Constant distance** - It has been estimated (Albert, Barabasi, Jeong) that the « diameter » of the web is of approximately 19 clicks, meaning that « two randomly chosen documents on the web are on average 19 clicks away from each other." Considerable increases in the size of the web will only increase this measure by one or two.

Systems displaying network properties are evolving and growing according to some very strong regularities

Consequences of Network Properties Economic

- A wide variety of industries display network properties. Examples include the telephone, e-mail, Internet, computer hardware, computer software, music players, music titles, video players, video movies, banking services, airline services, legal services, and many more.
- Main characteristics of these markets (Shy Oz) are:
  - (i) Complementarity, compatibility and standards.
  - (ii) Consumption externalities (or Network Effects)
  - (iii) Switching costs and lock-in.
  - (iv) Significant economies of scale in production.
- While these shall be discussed extensively in Class 5, here we shall briefly mention the economic implications of “network effects” and the “hardware-software” paradigm

Economic consequences of Network Properties Hardware-Software Paradigm

The idea is that the value of a good is dependent also on the foreseen utility of being able to benefit from a wide variety of additional goods, compatible with the first, hence “hardware-software” paradigm.

- Would one buy a computer if there are not many applications (software) available for this particular computer model?
- Would one buy a DVD/CD player knowing that there are only a handful of movies/songs that one can play on it?

Related examples:

- Razor: blades, shaving creams
- Printer: ink cartridges, reams of paper of various formats

Economic consequences of Network Properties Network Effects

- « Network Effect (also called **network externality** or **demand-side economies of scale**) is the phenomenon by which the value or utility a user derives from a good or service depends on the number of users of compatible products. Network effects are typically positive, resulting in a given user deriving more value from a product as more users join the same network.” (Wikipedia)
- They are a direct consequence of the network properties, as the increase in utility function is a social mutual influence phenomenon, and it’s not directly related to the price of the good or the service
- Several such effects exist and understanding their characteristics is important in many industries (more in Class 5).
- In a nutshell, companies realize that having a “network” presence is increasingly becoming a strategic asset in the digital world

Economic consequences of Network Properties
Networks as strategic assets

Facebook

- Instagram (2012)
- Whatsapp (2014)

Microsoft

- GitHub (2018)
- LinkedIn (2016)
- Yammer (2012)

Twitter

- Vine (2014)
- Periscope (2015)

Google

- Waze (2013)
- Youtube (2206)

Yahoo

- Tumblr (2015)

Le Figaro

- Viadéo (2016)

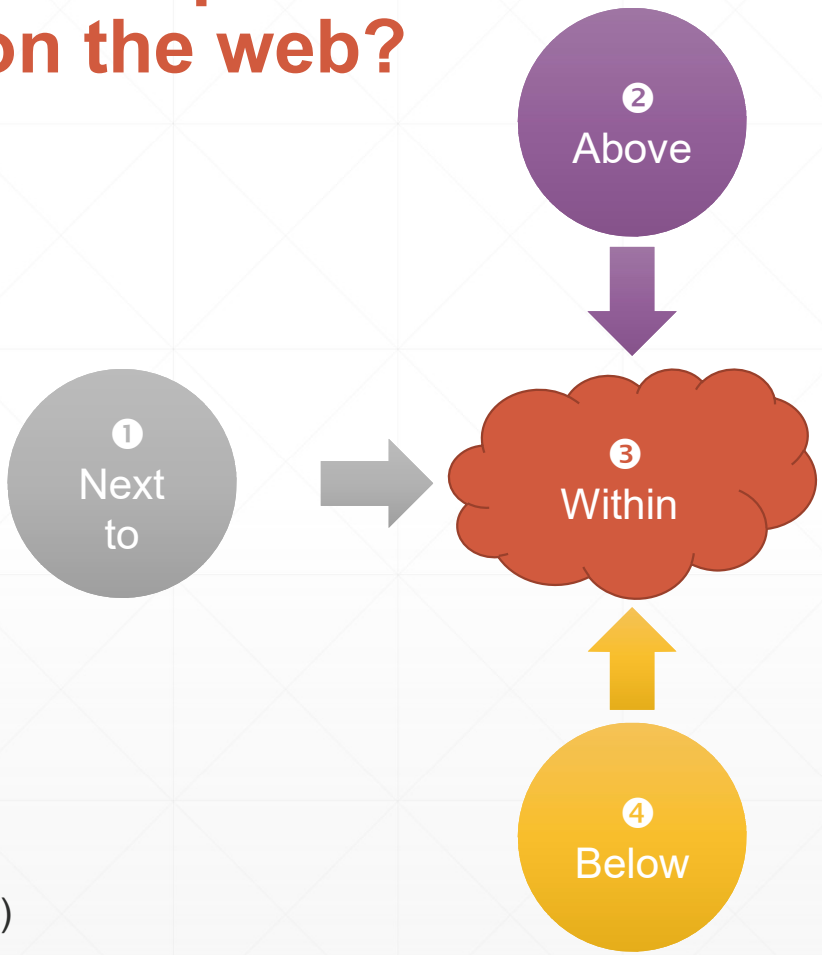
… but also, new comers:

- Clubhouse
- Twitch
- Discord
- Poparazzi…

Economic consequences of Network Properties
Emergence of dominant players

- In an information economy, the various forces at work (notably, economies of scale, consumption externalities) lead **invariably** to the emergence of large players (« economic hubs »)
- Examples:
  - Google in internet search
  - Facebook in social media
  - Amazon in e-commerce, …
- The additional challenge that this situation poses, in a digital world, is that « *… hub firms take their network-based assets that have already reached scale in one setting and use them to enter another industry and re-architect its industry structure.* » (Iansiti, Lakhani, 2017)

Sociological implications - What do we actually measure on the web?



Source: D. Cardon (2015)

❶ Measures from the side of the web

- From the side of the web we measure **audience** of sites
- Examples
  - Médiamétrie,
  - Google Analytics
- Unit of measure: visits, clicks, (unique visitors)
- Underlying principle: **Vote**
- What we measure: **popularity**

Source: D. Cardon (2015)

❷ Measures from above the web

- From above the web we measure **social strength**
- Examples:
  - Google PageRank
  - Wikipedia
- Unit of measure: links
- Underlying principle: **ranking**
- What we measure: **authority**

Source: D. Cardon (2015)

❸ Measures from within the web

- From within the web we measure **influence**
- Examples:
  - Facebook
  - Retweets on Twitter
- Unit of measure: **Likes**
- Underlying principle: **benchmarking**
- What we measure: **reputation**

Source: D. Cardon (2015)

❹ Measures from below the web

- From below the web we measure **the past in order to influence the future**
- Examples:
  - Amazon's recommendation engine
  - Personalized advertising
- Units of measure: **traces (cookies, purchases, …)**
- Underlying principle: programmability (machine learning)
- What we measure: **the predictability of our next action on the web, based on the history of our previous actions, those of other people, and the workings of the algorithms**

Source: D. Cardon (2015)

Implications from measuring the web
Summary 1

1. ‘Division of learning’ is the notion that there is a barrier between the ability to access, understand, and benefit from this data, and the practice of simply producing it. (S. Zuboff)
2. Balance of “knowledge, authority, and power” (S. Zuboff)
   - Who knows?
   - Who decides?
   - Who decides who decides?
3. Is the “data => information => knowledge” paradigm still valid?

Implications of measuring the Web
Summary 2

4. « *There is no free lunch in the digital economy*. » or, said differently: « *When it's free for you, you become the product.* »
5. As networks are pervasive, by nature, any change in the services they propose may leave users "trapped" (example: Facebook - social network => social media => online ad platform => sales channel for brands)
6. As we generate more and more data through our digital interactions, the questions that arise are:
   - Who, ultimately, owns the data? We, as data producers? The platforms that collect it? Or the companies that buy large data sets for their own purposes?
7. The multiplication of web measures, performed for various purposes, raises concerns of mass surveillance, a phenomenon known as « Surveillance capitalism » (S. Zuboff)

Technocentric design of digital technologies leads, invariably, to the reinforcement of algorithmic agency, while sacrificing human agency.

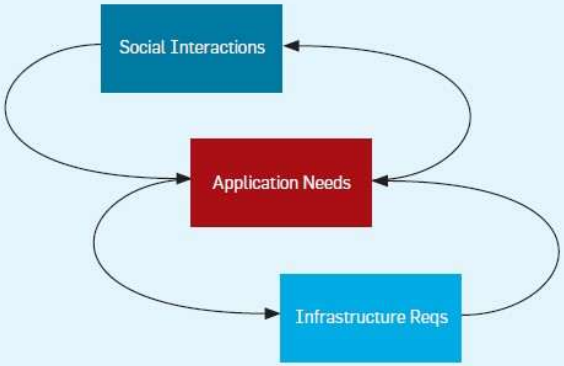
Social (non-technical) aspects of Digital Transformation – Preliminary conclusion

Social actions…

- Communicate, interact, act, collectively, in order to voice concerns, promote values, bring about change
- People influence each other positively (sharing & caring, mutual aid, solidarity in critical situations, …)
- People influence each other negatively (herding), spread diseases (epidemics), …

… call for reimagining and redesigning the digital world, as we know it

Figure 1: The social interactions enabled by the Web put demands on the Web applications behind them, in turn putting further demands on the Web's infrastructure.



Source: An interdisciplinary approach to understanding the web
doi: 10.1145/1364782.1364798

Class Assignment

- Please read https://www.project-syndicate.org/commentary/ai-agents-promising-as-advisers-but-problematic-as-autonomous-decision-makers-by-daron-acemoglu-2025-03
- Drawing on today's reading material and the discussion in class, please consider the social (non-technical) drivers of digital transformation, i.e. individual and collective actions, now transformed into 'data' and available on the internet and the www.
- Thinking about our social networked behavior in all its possible implications (positive and negative), please try to reimagine (redesign) **one** of the following digital products and services to minimize, or to eliminate, all the negative/harmful aspects that may be generated in:

Class Assignment
Digital Products and Services to Re-imagine

1. Digital Advertising (to minimize/eliminate intrusive and unsolicited ads)
2. Social Networks (to minimize/eliminate toxic content, hate speech, commodification of personal interactions, …)
3. Electronic Games (to minimize/eliminate addiction phenomena, tied selling, bullying, …)
4. Online social media (to minimize/eliminate fake news)
5. Digital platforms (to avoid personal data communication to third parties without consent, utilization of personal data for unsolicited services, utilization of personal data to train AI agents, discretionary modifications of Terms and Conditions)
6. All Internet services (to avoid utilization of personal data for commercial purposes without prior consent)

Social (non-technical) aspects of Digital Transformation - The Attention Economy

- As discussed in Class 1, when something becomes abundant, something else becomes rare. In the Network Society, there is abundance of information, and almost instantly, what becomes rare, and valuable, is our human attention to cope with increasingly higher volumes of information. This phenomenon is called « the attention economy »
- In the attention economy, we:
  - Rely on digital services (platforms) to organize, filter, and process large amounts of data
  - As they do so, these platforms become more “intelligent” and autonomous
  - And, as we get answers to our questions, there is a delegation of “agency” from the “human” to the “machine”

The Attention Economy – Part I

THE THREE LIMITS

1. **Perception is subjective**
   - The world, as we see it, is a construction of our brain
2. **Memory is fallible**
   - We cannot always remember accurately what we have experienced before
3. **Attention is volatile**
   - Focus acts as a filter, when we are concentrated, we disregard what our brain perceives as non-essential

WHY IS IT IMPORTANT?

- In video games, for example, the players are guided through the game environment without explicitly being told what the rules of the game are (level design, call-to-action buttons)
- While the main purpose of UX in game design is to increase the gamer's motivation (either through bonuses, level upgrade…) or through developing the gamer's competence, autonomy and feeling of affiliation (belonging to a group)…
- … game designers may also resort to the use of « dark patterns » in order to divert the gamer's attention and obtain consent for other purposes, not directly related to the game (ex: forced purchase, subscriptions, cross-selling)

Source: Interview of Celia Hodent, cognitive scientist, UX expert, developer of Fortnite

The Attention Economy – Part II

ECHO CHAMBERS, FILTER BUBBLES

- An **echo chamber** is an environment or ecosystem in which participants encounter beliefs that amplify or reinforce their preexisting beliefs by communication and repetition inside a closed system and insulated from rebuttal. The echo chambers function by circulating existing views without encountering opposing views
- The users of many online apps are prisoners of « **filter bubbles** (*) » (cognitive bubbles) enforced by algorithms whose sole purpose is to keep users consuming more and more content

REINFORCING MECHANISMS

- « Confirmation bias » - sharing only certain types of content between a community of users with the same interests, contributing to reinforcing the credibility of certain types of information (ex. ‘The world is flat’)
- « Recommendation bias » - privileging certain types of transgressive content (ex: ‘The world is flat’) as they are more likely to generate social activity (likes, retweets), hence more traffic, on the network

(*) A **filter bubble** or **ideological frame** is a state of intellectual isolation that can result from personalized searches.

The Network Society
A reciprocal influence mechanism

TECHNOLOGY => SOCIETY

- As more and more social relationships are conducted through technological means, the proper functioning of economic and social institutions may be distorted through massive usage of technology

SOCIETY => TECHNOLOGY

- As more and more people are interconnected, this « *manyness* » (or multitude) is continuously shaping usages of technology and may, ultimately, lead to divert technology from its initial purposes (technology hijacking)

DISTORTION, MISAPPROPRIATION

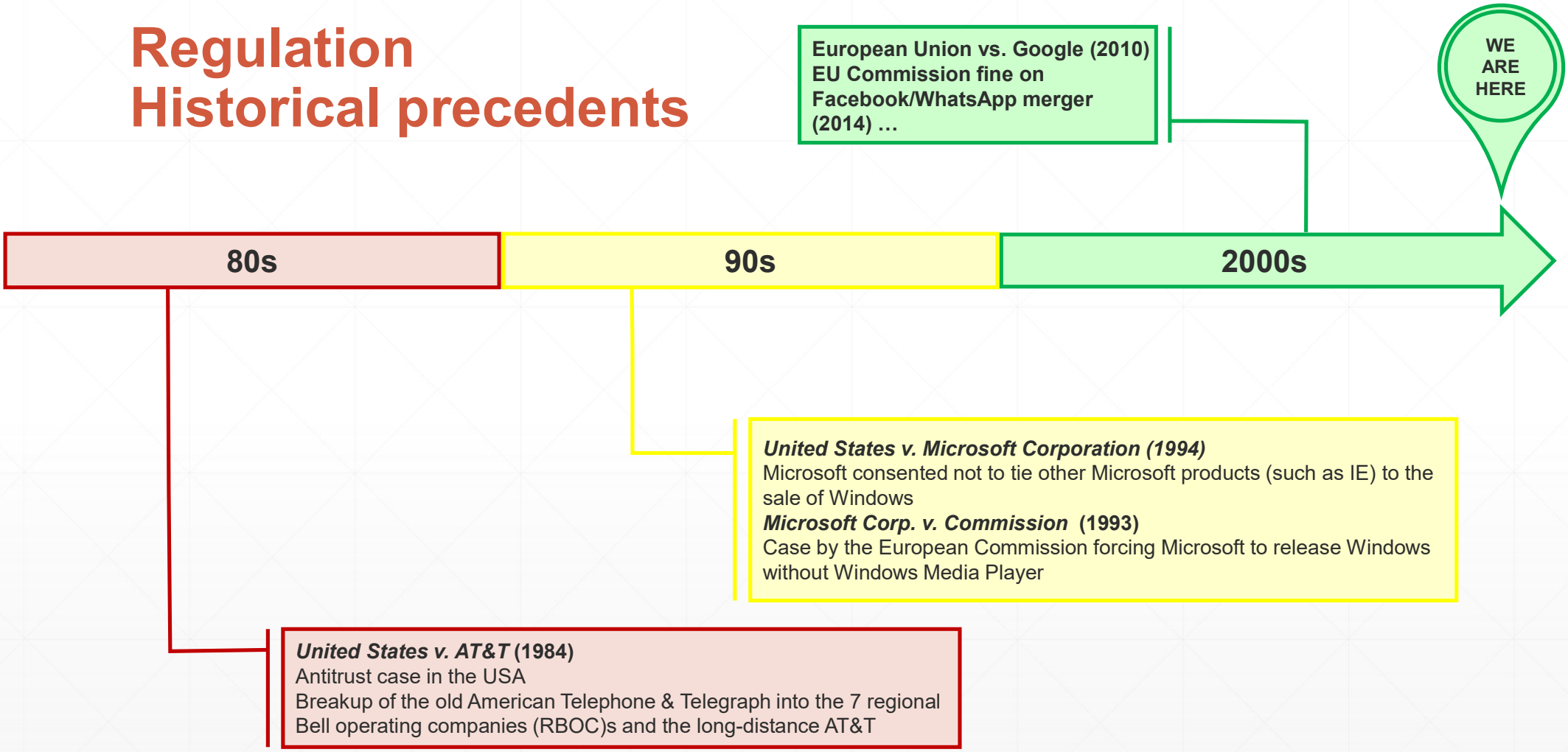
Distortion and misappropriation in the economy and the society (First part of the answer)
1. The role of regulation

« Regulation » covers a wide spectrum of external interventions into the market. These may be performed either by Governments, directly, or by dedicated organizations, called « Regulation authorities »

The reasons for such external interventions are, essentially, the following (Tirole, 2014):

1. Consumer protection (ex: addictions)
2. Negative externalities (ex: pollution)
3. Information asymmetry between firms and consumers (ex: prices and quality of consumer goods)
4. Equity considerations (ex: distribution of wealth)
5. Market power (ex: monopoly)
6. Long term (inter-temporal) protection (ex: bank deposits, insurance)

Regulation
Historical precedents



Regulation
Today's imperatives

- Regulation of tech giants
- Privacy in the digital universe
- Consumer rights, consumer protection
- Artificial Intelligence

Regulating tech giant companies (GAFA)
The US Perspective (House of Representatives) - 1

Google(*)

- « Google maintained its **search monopoly** by grabbing information from third parties without permission to improve search results. In other instances, it introduced changes in search **to give a leg up to its own services and disadvantage competitors' offerings.**"

Apple

- « Apple favors its own apps and services on its devices by pre-installing them and making them the default options for a variety of actions. For instance, when iPhone users click a link to a webpage, a song or an address, their devices will typically open Apple apps. **Such an advantage**, combined with the services' deep integration into Apple's software, **makes it difficult for third-party apps and services to compete.**"

Source: NY Times, October 20, 2020. https://www.nytimes.com/2020/10/06/technology/amazon-apple-facebook-google-antitrust-report.html

(*) Recently (end 2023 – beginning 2024) Google's search engine dominance was at the center of the biggest US antitrust trial in decades

Regulating tech giant companies (GAFA)
The US Perspective (House of Representatives) - 2

Amazon

- « The company uses its **market power** as both the largest online retailer and the leading e-commerce marketplace to its advantage and to hobble potential competitors. Amazon sets the rules for digital commerce. About 2.3 million third-party sellers do business on the Amazon marketplace worldwide, the report said, and 37 percent of them rely on Amazon as their sole source of income — essentially making them hostage to Amazon's shifting tactics."
- « In **cloud computing**, where Amazon Web Services is the market leader, **the company has dealt unfairly with some open source developers**, whose software is often freely shared. One open-source engineer said, "We develop all this work and then some large company comes and monetizes that.""

Source: NY Times, October 20, 2020. https://www.nytimes.com/2020/10/06/technology/amazon-apple-facebook-google-antitrust-report.html

Regulating tech giant companies (GAFA)
The EU Perspective (European Commission)

Amazon

- « The European Commission has informed Amazon of its preliminary view that it has **breached EU antitrust rules by distorting competition in online retail markets**. The Commission takes issue with Amazon systematically relying on non-public business data of independent sellers who sell on its marketplace, to the benefit of Amazon's own retail business, which directly competes with those third party sellers.
- The Commission also opened a second formal antitrust investigation into the **possible preferential treatment of Amazon's own retail offers** and those of marketplace sellers that use Amazon's logistics and delivery services."

Source: European Commission official press release. November 10, 2020
https://ec.europa.eu/commission/presscorner/detail/en/ip_20_2077

The Network Society | New forms of regulation
The EU General Data Protection Regulation (GDPR)

- As of May 2018, **with the entry into application of the General Data Protection Regulation**, there is one set of data protection rules for all companies operating in the EU, wherever they are based.
- Stronger rules on data protection mean:
  - people have more control over their personal data
  - businesses benefit from a level playing field

  (official EU Commission text)

The Network Society
New Forms of regulation

Digital Market Act (2023)

Digital Services Act (2023)

- Coming into force shortly
- DMA is about regulating Digital Platforms (considered to be « access providers »)
- DSA is about problematic (hate speech, …) and illicit (counterfeit) content on the web

Next Step: Regulation of Algorithms? See: https://artificialintelligenceact.eu/

Consumer rights, consumer protection

DIGITAL SERVICES ACT

- The DSA is meant to "*govern the content moderation practices of social media platforms*" and address *illegal content*. It was published in the Official Journal of the European Union on 19 October 2022
- It identifies 19 Very Large Online Platforms (VLOPs) and Very Large Online Search Engines (VLOSEs)

DIGITAL MARKETS ACT

- DMA is an EU regulation that aims to make the digital economy fairer and more contestable. The regulation entered into force on 1 November 2022 and became applicable, for the most part, on 2 May 2023.
- This regulation targets the largest digital platforms operating in the European Union. They are also known as "gatekeepers" due to the "durable" market position in some digital sectors and because they also meet certain criteria related to the number of users, their turnovers, or capitalisation

Sources: European Commission, Wikipedia

Consumer rights, consumer protection
Digital Markets Act - continued

Twenty-two services across six companies - Alphabet, Amazon, Apple, ByteDance, Meta, and Microsoft - were named as "gatekeepers" by the EU in September 2023. These companies have until 6 March 2024 to comply with all of the Act's provisions. The DMA covers eight different sectors, which it refers to as Core Platforms Services (CPS). Due to the presence of gatekeepers who, to a certain degree, affect the market contestability, the CPS are considered problematic by the European Commission:

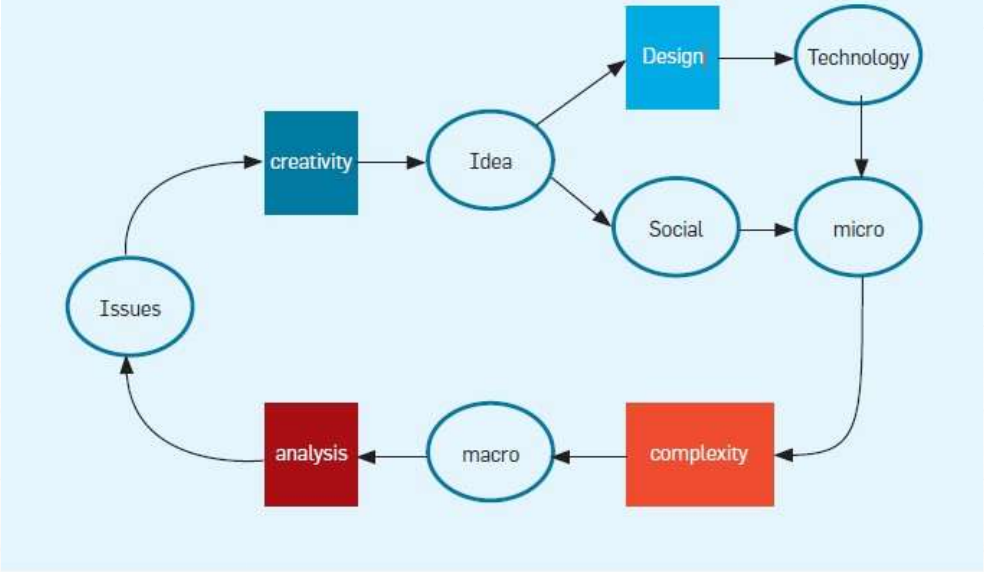
- online search engines (e.g. Google Search);
- online intermediation services (e.g. Google Play Store, Apple's App Store);
- social networks (e.g. Facebook);
- video sharing platforms (e.g. YouTube);
- communication platforms (e.g. WhatsApp, Gmail);
- advertising services (e.g. Google Ads);
- operating systems (e.g. Android, iOS);
- cloud services (e.g. Amazon Web Services).

Artificial Intelligence Act

- Negotiations between Member States have started in June 2023, with the aim to reach final agreement by the end of the year
- Among other measures, the project defines several risk levels in the utilization of AI systems:
  - **Unacceptable Risk** (usage is forbidden):
    - Ex: neuro-behavioral manipulation of vulnerable people (voice activated toys encouraging hazardous behavior), social scoring, biometrical real-time ID systems
  - **High Risk** (usage is regulated)
    - Ex: planes, toys, cars, public infrastructure. 8 additional domains including biometrics, education, critical infrastructures, justice and law enforcement, ….
  - **Limited Risk and Generative AI** (usage is permitted under certain conditions)
    - Transparency is the main obligation, including the right and possibility given to user to discontinue usage

Distortion and misappropriation in the economy and the society (Second part of the answer)
2. Reimagine and redesign digital technologies

Figure 2: The Web presents new challenges to software engineering and application development.



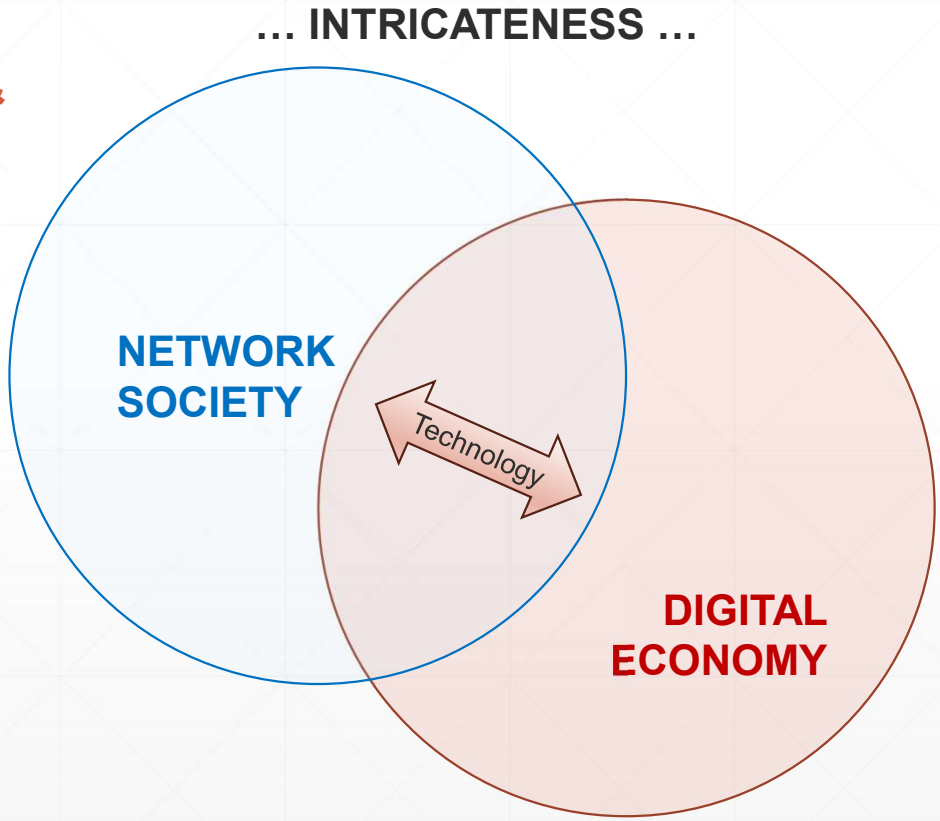
Source: An interdisciplinary approach to understanding the web
doi: 10.1145/1364782.1364798

Digital Economy and Network Society
Class 4 Wrap-Up

IN TODAY'S HIGHLY INTERCONNECTED & INTERDEPENDENT GLOBAL WORLD

- Putting technology at good use, …
- … means, more than ever, to avoid diverting technologies from their primary usages :
  - Telephone – « cold calling »
  - Computer – cyber-hacking
  - Internet – intrusive advertising, …
  - Social networks – toxic content…

… through regulation, but also through reimagination and redesign of digital technologies



Digital Transformation
Class 4 | Concluding thoughts

Understanding the versatile (multifaceted) nature of technology and its embeddedness in social structures is becoming an increasingly valuable skill

“Technology is neither good nor bad, nor is it neutral”

Melvin Kranzberg’s first law of technology

“Although technology might be a prime element in many public issues, nontechnical factors take precedence in technology-policy decisions”

Melvin Kranzberg’s fourth law of technology

Thank You!

Valeriu Petrulian

Studying Networks Conceptual Foundations

NETWORK THEORY

- The study of large graphs
- **“Network theory** is the study of graphs as a representation of either symmetric relations or asymmetric relations between discrete objects. In computer science, network theory is a part of graph theory: a network can be defined as a graph in which nodes or edges have attributes (e.g. names).”

NETWORK SCIENCE

- « **Network science** is an academic field which studies complex networks such as telecommunication networks, computer networks, biological networks, cognitive and semantic networks, and social networks, considering distinct elements or actors represented by *nodes* (or *vertices*) and the connections between the elements or actors as *links* (or *edges*). The field draws on theories and methods including graph theory from mathematics, statistical mechanics from physics, data mining and information visualization from computer science, inferential modeling from statistics, and social structure from sociology.”

Studying Networks Conceptual Foundations

NETWORK ECONOMICS

- « **Network economics** refers to business economics that benefit from the network effect. This is when the value of a good or service increases when others buy the same good or service. Examples are website such as Ebay […] where the community comes together and shares thoughts to help the website become a better business organization.”

COMPUTATIONAL SOCIAL SCIENCE

- « **Computational social science** is the academic sub-discipline concerned with computational approaches to the social sciences. This means that computers are used to model, simulate, and analyze social phenomena. Fields include computational economics, computational sociology, […] and the automated analysis of contents, in social and traditional media. It focuses on investigating social and behavioral relationships and interactions through social simulation, modeling, network analysis, and media analysis.”