NOTES

Social Issues in Information Society

2223-1-FDS01Q005

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January 25, 2023

Abstract

Notes from "Juridical and Social Issues in Information Society" lectures.

Contents

Chapter 1

Lecture 1: From the Cognitive Revolution to the Information Society

1.1 The Shift from the Cognitive Revolution to the Information Society

In the **cognitive revolution** The Homo Sapiens cause the extinction of Neanderthals in a relatively short time, this because an higher level of technology and better social organisation. Some theory like the hybridization and fusion ore the theory of replacement try to explain this. We now that Homo Sapiens has language, myths and abstract thinking. So the Homo Sapiens new abilities consist in:

- Provide higher volumes of information concerning the world around Homo Sapiens
- Provide higher volumes of information about social relationships among Home Sapiens
- Provide information about things which don't exist in reality, such as tribal spirits, nations, limited liability companies and human rights

This abilities lead to the following consequences:

- Plan and carry out complex actions, such as escaping from lions and hunting bison
- Formation of larger and more close-knit groups, up to 150 individuals
- Cooperation among very high numbers of strangers thanks to the belief in shared myths, and rapid innovation in social behaviour

After that was time for a new revolution. The **neolithic revolution** was the first of several agricultural revolutions which have occurred throughout human history. It took place in different times and places around the world, leading to the transition from a subsistence economy, based on hunting and gathering, to the domestication of animals and the cultivation of plants. The improvement that this revolution brought were: agriculture, pottery, sedentary lifestyle, trade, navigation, birth of cities, invention of writing (3500 and 3000 B.C.).

We now refer to Floridi in the shift form **prehistory to hyperhistory**. We now live in the **zettabyte** era, because in 2011 the amount of generated data crossed the threshold of one zettabyte, in 2025 it is expected to reach 180 zettabytes. The problem is that "half of our data is junk, we just do not know which half".

We now live in the **information society**. The main factor which accelerate the transition to this society were:

- Moore's Law: The complexity of a microcircuit, measured (for example) by the number of transistors per chip, doubles every 18 months (and therefore quadruples every 3 years).
- Metcalfe's Law: The usefulness and value of a network are proportional to the square of the number of connected nodes (i.e. connected users). Therefore, if we indicate the number of users with n, the maximum number of possible connections is: $n(n-1) = n^2 - n$.
- Strong growth in connected devices.
- Synergistic development of new digital technologies (Cloud, IOT, Mobile technology, 5G, Robotics, Business Analytics, AI).
- Exponential growth in Big Data.
- Rapid acceleration due to pandemic emergency: Smart Working, transformation of business models and business organisation.

But also the shift to the information society leads to some main bottlenecks:

- Memory.
- Connectivity.
- Lack of shared standards.
- Misalignment between the speed of technological innovation and the adaptation time of organisations.
- The tree of knowledge and asynchronous development.
- The metaphor of the information society as a tree (its branches are 'chaotic' but its conceptual, ethical and cultural roots are scrubby).
- Kryder's law: hard-drive storage density grows more rapidly compared to Moore's Law, nevertheless, the world produces much more data than it can actually store.
- Nielsen's Law: the network speed for home users grows by 50% a year, doubling every 21 months (less rapidly compared to Moore's Law). Our online experience will therefore be limited by our bandwidth capacity.

Chapter 2

Lecture 2: How ICTs are Changing the Philosophy, Ecology and Ethics of Information

Topics

- The Digital Revolution: How does digital technology cuts and pastes modernity? And why does it have this power? (quot. 1, 2, 3)
- Examples:
  - Pasting "Authenticity and reproduction" (quot.1) (e.g: two files vs Monna Lisa)
  - Virtual reality (cutting)(e.g.: metaverse) and enhanced reality (pasting)(e.g: Adding a grip to a handle)(quot. 2)
  - Usage vs legal property (cutting) the sharing economy (e.g.: Amazon's digital books) (quot. 3)
  - Personal identity as information (pasting), welding a person's individual self, their profile and their personal information together (quot. 4)
  - Cutting localisation (where I physically am) from presence (where I interactively am): we are experiencing it now. (quot.5-6)
  - Cutting law from territoriality (quot.7) (Peace of Westphalia, territoriality principle, physical space vs infosphere, discussion on the right to oblivion), GDPR and re-sticking identity to data→ 'regardless of where a European citizen's data are processed, the European law is still applicable' –¿ taking advantage of the welding between personal identity and data, enabled by digital technology)
  - THE CASE OF THE MIGRANTS

2.1 The Digital Revolution

The change from atoms to bits is irrevocable and unstoppable. Why now? Because the change is also exponential — small differences of yesterday can have suddenly shocking consequences tomorrow. Lets now explore two key concepts:

- **Ontology**: Ontology, from the present participle (ontos) of the greek verb einai ("to be") and logos ("law"). Ontology is the branch of philosophy which studies the concept of 'being as being', i.e.

beyond its specific determinations. Ontology therefore deals with the qualities of the existence of things in their characteristic of being existing things (entities). For this reason (i.e. the peculiarity of ontology to refer to the first principle which characterises the existence of things), ontology is often identified with metaphysics.

- **Epistemology**: Epistemology (from greek ἐπιστήμη, epistème, 'certain knowledge' or 'science', and λόγος, logos, 'speech') is the branch of philosophy which deals not only with the conditions in which one can have scientific knowledge, but also with the methods to gain such knowledge. Epistemology can be considered a part of the philosophy of science, i.e. the study of the foundations and methods of scientific disciplines, as well as of the philosophical implications of scientific discoveries.

Digital technology 'unstick and re-stick' the modern atoms of our experience and culture. Digital cuts and pastes what we have inherited from the past in terms of phenomena (facts, things, occurrences: i.e. 'ontology') and their understanding (ideas, concepts, cultural reference frameworks: i.e. 'epistemology') therefore, we can describe the digital revolution as a re-ontologisation and a re-epistemologisation of modernity: and thus as a transformation of the intimate nature and of the ways of knowing the reality. It have this power because it is a third-order technology which creates a distance between us and the reality, enabling us to cut and paste, unstick and stick the world and the way we conceive of it. Also because digital doesn't only design new constructs, structures or systems, but it also radically transforms their inherent nature and the way we conceive of them (re-engineering). So, digital owes its power to stick and unstick the reality to the fact that it is a third-order technology which enables re-ontologisation and re-epistemologisation. For example introfucing two visions og AI: reproductive AI as a way of unsticking the skill of solving problems successfully from the need to be intelligent to do so. As a result the more I can cut and paste, the more opportunities, and the less constraints, I will have: this is what digital does and it is called design. Design is taking advantage of opportunities, while respecting the constraints, in order to solve a problem successfully, in view of a goal. Design is thus the main form of innovation of our time, through which we shape an increasingly malleable reality.

We will use the concept of **technology's in-betweenness** expressed by Floridi, to explain how technologies relate to the different phases of human development. Floridi divide this techologies in three family:

- First-order technology: `HUMANITY← TECHNOLOGY→ NATURE`
- Second-order technology: `HUMANITY← TECHNOLOGY→ TECHNOLOGY`
- Third-order technology: `TECHNOLOGY← TECHNOLOGY→ TECHNOLOGY`

One of the features of a technology is its 'in-betweenness' (see example of the hat). Technology lies between the 'user' and the 'prompter'. The 'inventor' is someone who designs an artefact which can meet a user's needs, which in turn are aroused by a prompter (homo faber). First-order technologies are those between human users and natural prompters (axe-technology which splits wood-prompter), but also animals can use simple first-order technologies (e.g. sticks), in prehistory there were already first-order technologies. Second-order technologies are those in which prompters consist in other technologies: screwdrivers, keys, vehicles. The engine, as a technology which supplies power to another technology, is the most important second-order technology, which characterises the pre-hyperhistorical phase of human development. Third-order technologies link technologies as 'users' with technologies as 'prompters'. For example ICTs are a typical feature of the hyperhistorical age as they become a necessary condition for development. For example a system which controls a car-building robot As a result, we (who were the users) do not exercise control in the process, but at most on the process.

2.2 Interfaces and Protocols

Lets see how technology act between the user and the prompter. Technologies of any order have two interfaces:

- One face looks at the user and should therefore be user-friendly, it is called **interface**.
- The other face connects the technology with its interlocutor, it is called **protocol**, and tends to become more and more imperceptible.

First-order technologies is like an axe splitting wood where the interface is the grip and the protocol is the handle equipped with a blade, in this case the user must access both interfaces. Second-order technologies is like an engine where the interface is the clutch pedal and the protocol is the remaining propulsion system, in this case the protocol tends to be perceived as irrelevant. Third-order technologies is like a router, where we tend to interpret the interface as a system of protocols, but in this way we risk finding ourselves outside the process and losing control of it.

Topic for discussion Does the technology's policy of in-betweenness, i.e. of its progressive independence from human users, have a positive or negative value?

- Negative interpretation: loss of control and corporeality, delocalisation, consumerism, the man getting slave of the machines.
- Positive interpretation: technology as liberation, as an extender of the space for communication and self-fulfilment.

+ space = + freedom = + control = + choices

2.3 The concept of Infosphere

ICTs make us think of the world in informational terms and make the world we experience informational. ICTs are transforming the nature and the meaning of reality, changing it into an **Infoshere**. There are two definition:

- Definition A: At a minimum level, the Infosphere indicates the whole informational environment composed of all informational entities (inforgs – technological artefacts and biological entities), their properties, processes and reciprocal interactions.
- Definition B: At a maximum level, the Infosphere is a concept which can be used as a synonym of reality, where the latter is interpreted in informational terms.

The concept of existence say that "to be" is "to be interactable".

This transformation is caused by the fundamental convergence and homogeneity among tools (software, algorithms, databases) and digital resources (data). In the infosphere, where there is no physical difference between processors and processed, also interactions become informational. Digital has to do with digital without any interruptions, and this determines a progressive reduction in informational friction, i.e. the difficulty information has in flowing from the sender to the recipient. This ≪superconductivity of data≫ has 4 effects:

- Substantial erosion of the right to ignore
- Exponential growth in common knowledge
- Constant increase in agents' responsibility

- The clear attribution of responsibility to an individual agent has become more difficult and controversial

ICTs therefore create a new informational environment, the **onlife world**, where future generations will spend most of their time. Such creation has been hugely accelerated by the Covid emergency. Progressive migration of humanity into the infosphere, which is reabsorbing the 'natural' habitat, from a materialistic metaphysics to an informational one. As interfaces become less and less visible, the threshold between 'here' (analogue, carbon, offline) and 'there' (digital, silicon, online) fades and tends to disappear, digital is spilling over into analogue and mingling with it (the mangrove environment), for example the case of bullying. The infosphere tends to absorb any other space (e.g. RFID makes objects communicate to each other), the offline world is bound to become totally interactive. The impact on the daily environment is living 'onlife' in an infosphere which is becoming ever more synchronised (time), delocalised (space) and correlated (interactions).

Topic for discussion Is the information society per se inclusive or does it lead to growing inequalities? The big theme of inequality and digital divide.

- The Digital Divide actually risks generating new forms of discrimination
- The new divide will be between historical and hyperhistorical societies
- It will redesign the map of worldwide society
- It will risk to cut across societies
- A major challenge for government policies aiming at building a more cohesive society

Chapter 3

Lecture 3: Technological and Scientific Revolutions

Topics

- The Fourth Revolution, according to Luciano Floridi
- What do we mean by 'technological revolutions, scientific revolutions and mental revolutions'? Luciano Floridi's and Alessandro Baricco's views
- Is the digital revolution a technological or scientific revolution?
- Which of them precedes, and somehow determines, the other one?
- Who are the architects and the protagonists of the digital revolution? The fall of the twentieth-century elites
- The idea of ≪augmented humanity≫
- Experience and post-experience, superficiality and depth according to the twentieth-century culture and in the digital world; new elites and new inequalities
- What is the ≪Truth≫ in the digital revolution era?

3.1 Scientific and Technological Revolutions

3.1.1 Baricco: Technological revolutions and Mental revolutions

Some examples of big technological revolutions are the invention of the press, and the invention of the steam engine and the industrial revolution. There are many revolutions which change the world and often they are technological ones, but few revolutions change men and do it radically. Perhaps, we should call them **mental revolutions** because we consider them able to generate *a new idea of humanity*. According to Alessandro Baricco, this is the case of the digital Revolution: *We can perceive in that small revolution, a technological one, the pace of a bigger revolution, which is openly mental.*

3.1.2 Luciano Floridi's Classification

Luciano Floridi divide the revolution in this way:

- **Political Revolutions**: characterised by violence and high speed, Hannah Arendt.
- **Technological and Scientific Revolutions**: they are not violent per se, but their effects can be so; they develop over long periods of time.

T. Kuhn claims that scientific revolutions undermine an entire paradigm of the world, and until the new paradigm succeeds, the scientific revolution can't occur.

3.1.3 Main Revolutions

The main technological or technical-productive revolutions are three. They are the Agricultural revolution (tenth millennium before the modern era), the Industrial revolution (second half of the 18th century) and the Information revolution (birth of digital technologies in mid-20th century).

On the other hand there were three **scientific revolutions** have had both an extroverted and an introverted effect. On the one hand, they have changed our understanding of the outside world, on the other hand, they have also changed the conception of who we are, i.e. our conception of the self.

- *Copernican revolution*: heliocentric cosmology (Earth, and we ourselves, are no longer at the centre of the universe)
- *Darwinian revolution*: each living species is the result of an evolution, which develops over the time, from common ancestors through a process of natural selection (Man is no longer at the centre of the animal world)
- *Freudian revolution*: it has removed us from the centre of the realm of pure and transparent consciousness as theorised by Descartes 'Cogito ergo sum res cogitans'. Therefore, the human mind is not transparent to itself, but it is characterised by subconsciousness and by the mechanism of repression.

After these three revolutions, we could still argue that we were entitled to our special place at the centre of the Infosphere thanks to our superior thinking abilities, i.e. thanks to the 'monopoly of intelligence'. Three following steps gradually undermined this bastion, too:

- Pascal, 1645 ≪The arithmetic machine≫
- Hobbes, ≪Leviatan 1651≫
- Alan Turing, ≪Intelligent machinery≫, 1948: ≪The computer as a programmable machine, endowed with the ability to process information≫

Therefore, our digital devices carry out a growing number of tasks which would take us a certain intellectual activity and we are no longer even at the centre of the Infosphere, but we are an eccentric reality in relation to it.

- **Information Revolution**: we are not isolated entities but *Inforgs*, interconnected informational organisms, who share with biological agents and technical artefacts a global environment which is ultimately made of information: the *Infosphere*.

The challenge of the information revolution is to establish a new paradigm of man as an informational animal alongside technological artefacts and biological entities, placed within the Infosphere.

In order to better understand our informational nature, it is appropriate to distinguish:

. *Enhancing* applications: these are interfaces aimed at enabling the application of the tool to the user's body ergonomically (e.g. grips, switches or knobs).
. *Augmenting* applications: the data and the control panels of the technologies which increase are interfaces between different environments (the human user's external environment and the environment of the technology, e.g. washing machine or fridge).

Applications can lead to radical transformations. ICTs are not simply technologies which improve or increase, but they also change the essence of our world because they create and rebuild realities in which the user can live. Their digital interfaces serve as gateways for the user into the infosphere. ICTs are *re-ontologising* the world (e.g. mouse, touchscreen).

We wonder if the technological revolution come before the scientific revolution (or mental revolution) or the opposite.

- According to Floridi, the information revolution is a scientific and a technological revolution at the same time, as it puts together both the conceptual-scientific aspect (i.e. a new vision of the world which revolves around information) and the technological aspect (centred around the development of digital technologies).
- Whereas from Baricco's point of view "*We can perceive in that small revolution, a technological one, the pace of a bigger revolution, which is openly mental*".
  - We need to invert the map: the mental revolution comes first, then the technological one. Computers have not generated a new form of intelligence, on the contrary, a new form of intelligence has generated computers.
  - A certain mental mutation has obtained the tools which are suitable for its way to be in this world, and has done so very fast with the digital revolution.

  But where did the architects of the digital revolution come from? It's a question of searching for the mental revolution from which everything derives. And, according to Baricco, the root is in the libertarian revolution and in the Californian counter-culture of 1960s-70s (more specifically, in an intellectual and, mainly scientific, elite who detested the traditional American way of life and wanted to change the world).

Baricco talk about **Augmented Humanity** as "*a human being who is not obliged to be linear*". This comes form the World Wide Web that merges the techniques of information retrieval and hypertext to make an easy but powerful global information system, where an hypertext is text which is not constrained to be linear. The title of Baricco's book is "The Game". With the launch of the Iphone (2007) by Steve Jobs the game is elevated as a foundational scheme of an entire civilisation, from the iPhone on, nothing has survived unless it has the genetic heritage of video-games in its DNA (gamification), this lead to superficiality (thinking on the other way round). We can se the modern society as the 20th-century Plato's "allegory of the Cave".

3.2 Truth, Post-truth,fake news, quick truths in the digital revolution era

Fake news are a misleading information based on false evidence presented as news. One example is the Trump inauguration day in 2017 that claimed to were bigger than the Obama inauguration day in 2009.

- **Truth and Post-Truth** is "*An inexact thing but capable of circulating quickly in the blood system of the world is more true than an exact thing that however moves slowly*". Perhaps Alessandro Baricco could explain it this way also the impact of the invention of printing on the circulation of false information in the years following 1439. Therefore Zuckerberg is no more responsible than Gutenberg, even if today verifying the reliability of news is perhaps a less difficult operation. Even if we don't know for sure the origins and the culprit, we do know that technology is the driving force of post-truth.
- **Quick Truths**: is a truth that has been redesigned to be aerodynamic in order to reach the surface of the world; that is in order to be easily understood and catch people's attention. Most of the political communication is made up of quick truths.

On the opposite, according to Maurizio Ferraris: " *The truth asks to be told*" (Saint Augustin), and this is even more true for anyone who works in science communication. It was television and then the web that inaugurated the false balance practice, the unforgivable equidistance between the evidence reported by a researcher who has been studying a problem for years and the opinions of any person: the false equivalence between strong documents (evidence resulting from research, registrations of deeds, contracts, etc.) and weak documents (memoirs, traces, clues, etc.). Let's take the case of vaccinations: people's medicine would like to replace experts' medicine and that's not good news. " *We are dealing with the liberalization of truth*" says Ferraris. " *The great game of post-truth is all here: while for Descartes the truth is an index of itself and of falsehood, the supporters of post-truth argue that the best way to affirm one's truth is to call one's neighbor a liar*".

Chapter 4

Lecture 4: Identity and Privacy in the Onlife World

Topics

- Who are we, who do we become, and who could we be, as we increasingly spend our time in the infosphere?
- What is the glue that guarantees the unity and coordination – the identity – of a system like yourself?
- Could terms as "civilized", "cultured" and "educated" rightly be treated as synonyms?
- Why have ICTs made privacy one of the most pressing issues in our society?
- Privacy and human dignity

4.1 Identity and privacy in the onlife world

ICTs, and especially social media, are becoming influential in shaping our personal identities, ICTs can be viewed as "**technologies of the self**". It is important to distinguish: our *personal identities* (who we are), our*self-conceptions* (who we think we are), and our *social self* (who we are told to be). The social self is the main channel through which ICTs (interactive social media) influence our personal identities. Social conditions is when social self in turn retro-acts on self-conception (personal identity), for example being considered self-confident actually helps us feel self-confident.

Social network are **hyper self-conscious generation**. An hyper self-conscious generation, who takes great care in building its online identity, micro-narratives, huge externalised stream of consciousness, consciousness takes on a digital form. This is online construction of personal identities, for example the importance of your social-network for a professional profile.

The paradox of Identity So, who are we, who do we become, once we increasingly spend our time in the infosphere? Are we the same people we were last year? This is liked to the Theseus' Myth and the paradox of the Ship of Theseus. What is the glue that guarantees the unity and coordination (the identity) of a system like yourself? For example: Is a hospital turned into a school always the same building? Relevant interfaces like "function" and "location" make a difference. ≪Yes≫, in relation to the location; ≪no≫, in relation to the

social function. But questions asked in absolute terms, without specifying which is the relevant interface, cannot be taken seriously.

The right interface may be provided by the informational concept of the self

1. First approach:
   - Descartes: "Cogito ergo sum res cogitans"
   - John Locke: Your identity is grounded in the unit of your consciousness and the continuity of your memories (so if your consciousness or memory got hacked dramatically, you would simply stop being yourself).
2. Second approach: "The Narrative theory of the self". Your identity is a "story", understood as a socio- and/or auto-biographical artefact.

The self is therefore seen as a complex informational system, made up of consciousness activities, memories, or narratives. You are your own information. ICTs as "Powerful technologies of the self" The informational conceptions of the self is either a dualistic view of the relationship between mind and body, or a state-based form of monism (material vs immaterial as two different states of information).

4.1.1 Examples

Let's look now at a couple of examples on how ICT's are influencing E-Health and Education.

Bodies of information see e-health as a pillar of future medical care. The *Transparent body* is the innovation ICTs made enabling us to measure, model, simulate, monitor and manage our bodies ever more deeply, accurately and non invasively, so to prevent illnesses in order to guarantee well-being (e.g.: wearable smart devices). The *Shared body* allow body to be seen as a "type" of body, easing the shift from "my health conditions" to the "health conditions that I share with others". There are three main trends:

- Democratization of health information: more and more information is accessible to a growing number of people
- Increasing availability of user-generated, health-related contents (NHS research revolution)
- Socialization of health conditions

Main critical issues of this is the fragmentation of health systems, lack of integration and interoperability of the relevant health databases (i.e: the Healthcare Data Ecosystem).

Lets now see ICTs and Education. Could terms as "civilized", "cultured" and "educated" rightly be treated as synonyms? Globalization bring the differentiation of global versus local. Being civilized or cultured is a local matter, but in the Infosphere being educated is increasingly a de-localized, uniform and global phenomenon. Education as transmission of knowledge and of how it can be increased: this is an inherently global process. ICTs may allow a degree of didactic customization which is unprecedented in non-elitist contexts, the personalisation of the educational experience. An example are MOOCS (Massive Open Online Courses) increasing widespread basic knowledge based on interactive participation and open access through the Web.

4.2 Privacy

Privacy can be physical, mental, decisional and informational. **Informational Privacy** is freedom from informational interferences, achieved through a restriction of facts about yourself that are unknown or

unknowable This lead to two questions: "why have ICTs made privacy one of the most pressing issues in our hyperhistorical society?" and "what is privacy after the Fourth Revolution?"

Privacy can be defined as a function of the *informational friction* of the infosphere, which refers to the forces that oppose the flow of information within a region of the infosphere. In general given some amount of personal information available the lower is the informational friction, the higher is the accessibility of personal information about the agents embedded in that region, the smaller is the informational gap among them, then the lower is the level of privacy that can be expected. For example if you draw the curtains in your living room, you are increasing the informational friction in the environment. This because they unquestionably and influentially affect the informational friction in the infosphere.

Now ICTs may erode informational friction, but **anonymity** can counterbalance their impact. During the 19th and 20th centuries, new metropolises and urban environments fostered anonymity. Anonymity made modern societies enjoy an unprecedented degree of privacy. Now, in the digital community, anonymity cannot be taken for granted anymore. For instance, inferences of all sorts could be drawn for your credit rating by crossing the data from your supermarket, your bank and your phone company. We live in a glass house like Truman Show.

Old ICTs (radio, TV) affect informational friction by decreasing it as well as privacy, whereas new ICTs work in both ways, as they can empower users either by reducing or by enhancing the informational friction, as well as the degree of privacy they enjoy. Enhancing empowerment can be seen as inclusion in decision-making processes (equal opportunities, gender equality, minorities), and as improvement in the quantity and quality of available choices (consumers). Empowerment of inforgs happen through ICTs, so digital ICTs do not necessarily erode privacy, they can also enhance it and protect it. Some example of it are: PET (Privacy Enhancing Technologies), at the level of data protection (encryption), data storage (GDPR), data management (data mining), vs PIT (Privacy Intruding Technologies).

So the fundamental question is: "what is privacy after the fourth revolution?". Privacy is not seen as a simple right to property of your own information, but as having a self-constituting value (valore auto-fondativo). If we consider each person as constituted by his or her information, a breach of one's informational privacy is a form of attack towards one's personal identity. In this case, due to the fact that ICTs can both erode and reinforce informational privacy, the value of privacy is both to be defended and enhanced, because we basically are our own information. Identity Theft is one of the fastest growing offences in hyperhistorical societies.

Privacy is a form of **confidentiality**. Form "The Catcher in the Rye", by Salinger: "*Don't ever tell anybody anything. If you do, you start missing everybody.*". This means that the sharing of private information with someone is based on a profound trust that binds the involved agents intimately. The informational identities of the involved agents now overlap and form a single unity, a supra-agent, or a new individual multi-agent. An intimate bond that is very resilient, but very difficult to restore after an internal betrayal.

4.2.1 Privacy and Human Diginity

In GDPR the expression "human dignity" appears only once (in article 88), in which it is established that the regulation. In GDPR, human dignity is therefore the fundamental concept within whose framework we can place informational privacy, i.e. personal data protection. Ever more so, according to the European Data Protection Supervisor in a context of good politics, privacy protection should be based on human dignity protection, in a direct way, and not in an indirect way, i.e. through other rights, such as the right to property or to freedom of expression. This is ever more true if we interpret privacy protection in terms of personal

identity protection, considering the person as a collection of information, as an inforg. But what do we mean by "human dignity" in an information society?

It is therefore necessary to have a philosophical comprehension of the human nature that is suitable for the digital era and the information society. Nevertheless, the four main philosophical anthropologies available interpret human dignity based on human exceptionalism:

- Greek and Roman philosophies (Aristotle, Cicero)
- Christian philosophy (Saint Thomas Aquinas)
- Modern philosophy (from the Enlightenment to Kant)
- Post-modern era

The problem with these four anthropologies is that they are all anthropocentric. Copernicus, Darwin, Freud and Turing definitively weakened such anthropocentric approach to human exceptionalism. And so, how can we justify that man, who is not at the centre of anything, is endowed with a dignity which has absolutely exceptional characteristics compared to the other inforgs, and on which the need for the respect for privacy is based? Now, if human exceptionalism is still defendable, it is so only in an "eccentric" version, which places our special role in the universe in a marginal position, such "eccentric" perspective of the special role of human beings in the universe is not new. This is the case of the "ethics of care" that is based on the concept of decentralising the agent in favour of the patient (recipient of moral actions), this is an altruistic approach, orientated to the patient defended by medical ethics, environmental ethics, bioethics, "business ethics" and information ethics.

Accepting that human dignity, from an anthropological-eccentric (though still exceptionalist) point of view, lies in an absence (not in a presence), in a subtraction sign (not in an addition one): " *We are the fantastic anomaly of nature, the beautiful glitch*".

Chapter 5

Lecture 5: Political Issues in the Digital World

Topics

- What do we mean when we claim that the State is undergoing a slow gradual process of "political apoptosis"?
- The State as an ≪Information agent≫ from the Peace of Westphalia to Bretton Woods
- How ICTs foster the development of ≪Multi-Agent Systems≫
- In the digital era, has politics become a form of marketing?
- How to face the unsticking between sovereignty and governance?
- What is the most suitable form of democracy for the information society in the hyperhistorical era? Direct democracy, representative democracy or any other possible forms?

5.1 Political issues in the digital world

The Peace of Westphalia (1648) ended both the 30 Years' and the 80 Years' War (Siege of La Rochelle, 1628). The Peace of Westphalia represent a major milestone of modern history. The new emerging system, the so-called "Westphalian order", saw the coming maturity of sovereign states first and then national states as we still know them today. States became the independent agents that played the institutional role in a system of international relations, based on the principles of:

- Sovereignty (right to political self-determination)
- Legal equality (among them)
- Non-intervention (no interference with the internal affairs of other states)

Sovereign states act as independent agents that can raise taxes within their borders, contract debts as legal entities and, of course, dispute borders (often violently).

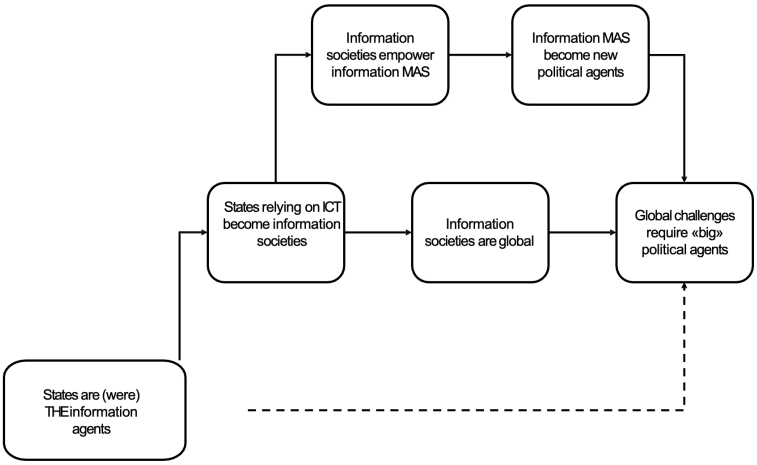
Montesquieu (1689-1755) suggested the classic separation of the State's political powers: legislative, executive, and judicial. The State, as a multi-agent system, organises itself as a network of these three "small worlds". The State arises as 'the information agent', which legislates on, and tries to control, the technological means involved in the information lifecycle: education, census, taxes, police records, written laws, press, and intelligence. The State fosters the development of ICTs as means to exercise and maintain legal

force, political power and social control. For example first system of optical telegraphy invented by Claude Chappe at the time of the French revolution.

Through the centuries, the State has evolved from being the ultimate guarantor of a laissez-faire society to a Bismarckian welfare system, which takes full care of its citizens, always by leveraging on the ICTs. In the long run ICTs contribute to transforming the State into an **information society**, which makes other information agents (even more powerful) possible (the beginning of the "political apoptosis"), so ICTs help shift the balance from a centralised government to a form of distributed governance and international coordination. The **Bretton Woods Conference** (1944) is the event that marks the beginning of the traditional State's political obsolescence. It regulated the international and financial order after the Second World War, and saw the birth of *3 powerful Multi-Agents*:

- The International Bank for Reconstruction and Development (now the World Bank)
- The GATT (now the World Trade organisation)
- The IMS (International Monetary Fund)

John Williamson coined the expression **Washinghton Consensus** in 1989, which became a significant aspect of our post-Westphalian, hyperhistorical age. This refers to a set of 10 recommendations representing a standard strategy of macroeconomic stabilisation to be applied by institutions like the IMS, the World Bank and the US Treasury Department when dealing with countries coping with economic crises. It is the case of the Troika in Greece (EU, ECB and IMF). Today we know that global problems (environment, financial crises, social justice, intolerant fundamentalisms) cannot rely on sovereign states as the only source of solutions because they involve and require a global approach and intervention by non-governmental multi-agent systems (NGEU).



The shift from a historical, post-Westphalian order to a post-Bretton Woods, hyperhistorical predicament may be explained by many factors, where ICT plays a major role:

1. **Power**: ICTs democratise data and the processing/control power over them (multiplying the power centres), thus, ICTs can create, enable and empower a number of non-state agents, such as single associations and groups, multinationals, international organisations and institutions. The democratisation brought about by ICTs is generating a new tension between informational power (elaboration and dissemination of norms) and physical force.

2. **Geography**: ICTs de-territorialise human experience. They have made regional borders porous or, in some cases, irrelevant. They have created regions where the "onlife experience" prevails, and which are intrinsically stateless. This is generating a new tension between global, non-territorial geopolitics and the State.
3. **Organisation**: ICTs fluidify the topology of politics, generating new tensions between the State, increasingly morphing into a flexible multi-agent system itself, and a variety of non-state, multi-agent organisations. For example terrorism is no longer a problem concerning internal affairs, but a confrontation with a distributed multi-agent system such as ISIS.
4. **Democracy**: ICTs certainly spur forms of direct democracy as complementary options for forms of representative democracy. But direct democracy has often turned into a mass media, led democracy, in the ICT sense of new social media. In such digital democracies, distributed groups, temporary and timely aggregated around shared interests, become sources of influence external to the State. So, other multi-agent systems have the data and the power to erode the modern State's political clout. For example the role of social media in spurring localism, populism and separatism (Catalonia, Scotland, etc.).

To sum up: Hyperhistory←¿ regionalism/pre-Westphalia→ subsidiarity→ local power

The Plitical Multi-Agent System A political multi-agent system is a single agent, constituted by other systems, which is:

- *Teleological*: The M.A.S. has a purpose, or goal, which it pursues through actions
- *Interactive*: the M.A.S. and its environment can act upon each other
- *Autonomous*: it can change its configuration without direct response to an interaction coming from the outside
- **Adaptable**: the M.A.S.'s interactions can change the rules by which the M.A.S. changes its states, in a way that depends on its experience

5.2 Human Interfaces

In Lecture 2 we talked about the role of technological interfaces and of the concept of "In-Betweenness", with technologies lying between a user and a prompter. Today we will talk about Human Interfaces. Today it makes sense to describe ourselves as inforgs, informational organisms, in order to understand why and how we can interact and develop, or suffer and do harm to one another, based on the information flows in which we are involved. However, we must be careful to accept not an ontological and absolute position, but an epistemological and relational one. This is the shift from things to relations, from the Aristotelian and Newtonian paradigms to the relational Ur-philosophy. Let's explore the possibility that it is not things but relations, which make up all things and which exist between them, that can play a foundational role in the 21st-century thinking.

Therefore, we are not only inforgs, and considering ourselves as inforgs is a useful approach to interpret our human concept of today, as relational nodes in an information society, and to try to improve it. Describing ourselves as inforgs too, who feed on information in order to produce, process and share other information, in an environment of data, artificial agents and computational processes, means adopting an ecological perspective. When the latter is interpreted in social, economic and political terms, we can perceive ourselves not only as inforgs, but also as a specific type of inforgs, i.e. **interfaces**.

Describing ourselves as interfaces enables us to better understand different crucial phenomena that characterise our digital era, among which the transformation of politics into marketing (marketisation of politics).

We are increasingly becoming human interfaces, i.e. spaces of interactions between *agents* (human, artificial or hybrid) that want something from us and something we have, and which these agents desire: our *resources*. The objective of these interactions is to enable, on the one hand, the effective and efficient functioning and control of resources and, on the other hand, the necessary feedback that helps the agents to optimise the functioning and control processes. The transformation of people into interfaces occurs in many contexts, among which three are crucial:

- For the world of social media, we are interfaces between them and our personal data
- For the world of trade, we are interfaces between it and our money/credit
- For the world of politics, we are interfaces between it and our attention, our consent and our vote

But who are the interfaces exactly? "We and They". For example as users we can be not only interfaces, but also agents using social media as interfaces between us and their services, even though, given our tendency to egocentrism, it is easier to see ourselves as agents using the world us an interface to obtain what we desire, rather than as an interface used by the world. Nevertheless, although this is not done for evil purposes, transforming people into interfaces (i.e. a kind of "human ATMs") is really ethically questionable. This is a contradiction of Kant's categorical imperative, according to which one should act in a way as to treat humanity (both in their own person and in that of others), always as an end and never as a means. Manipulating someone by transforming them into an interface with the aim of obtaining something else substantially risks being a form of dehumanisation. In order to improve things, one cannot ignore the need to act by respecting the principle of human dignity, a theme we addressed in the previous lecture.

5.2.1 Plitics as Marketing

The control and management of human interfaces is Marketing. Its goal is to identify more effective methods to use human interfaces, in a way as to obtain, in politics, attention, consent and vote (in a logical order). The digital revolution has made possible the upgrading of Marketing to Politics (thanks to myriads of personal data, connected people, sophisticated algorithms, network effects that dominate competition and social interactions). It is the sphere of Marketing that has expanded to include the political sphere, which has never moved.

The marketisation of politics has led to political messages which are like passwords: short and easy to remember. The post-truth politics is **non-alethic**. Political messages either work or don't work, it is a question of interactive success, not of factual accuracy. We must remember that "Quick-truth is truth that has been redesigned to be aerodynamic in order to reach the surface of the world: i.e, in order to be easily understood and catch people's attention". The political manifesto, identical for everyone and issued to an entire population of potential voters, is an obsolete approach. There is a new tendency to increasingly specialised messages, as well as to a **bubbling** of the audience, until the maximum granularity of a human interface is reached.

Therefore, if the condition of politics is to be improved, the marketisation of politics has to be improved too, by relying on the interfacing process itself. So, we have to improve the infosphere in which we live, as well as the socio-political marketing processes occurring in it, because the best forces can improve only in a healthier environment. For this reason, it is necessary to counter the negative impacts of two effects which are at the root of the replacement of good politics by bad politics: the Matthew effect and the Network effect.

- **The Matthew effect**: in sociology, it indicates any process for which, in certain situations, the new available resources are distributed among the participants in direct proportion to what they already have (the rich get richer and the poor get poorer).

- **The Network effect**: in economics, it indicates the phenomenon for which the value of a product or service increases progressively based on the progressive growth in the number of other users (and vice versa). So the more one loses, the more they continue losing, the fewer people participate in a network, the less useful it becomes.

Both processes can be inverted: but how can this inversion be triggered?

Democracy as Structure of Power

Representative democracy is a compromise due to practical constraints, whereas real democracy would be the direct one. (John Stuart Mill)

Is it true that digital, through platforms, apps, etc. is able to re-stick a direct democracy (which has never existed in the past) that guarantees a disintermediated, constant and universal political participation of all citizens? (Rousseau and the Pirate Party)

How to face the ""unsticking" between sovereignty and governance? Is it right or wrong to believe that today digital can paste , or "re-stick" *sovereignty* (the political power that can be legitimately delegated) and *governance* (the political power that can be legitimately exercised temporarily and, at the same time, legitimately withdrawn)? In other words, politics could be saved by the shift from representative democracy to direct democracy, which the Web would make possible?

Italy is a democratic Republic founded on labour. Sovereignty belongs to the people and is exercised by the people in the forms and within the limits of the Constitution. (Article 1 of the Constitution of the Italian Republic)

1. Actually, the structural separation between who holds and legitimates the political power (*popular sovereignty*) and who legitimately exercises it (*the representatives*) is an essential property of democracy, and not an obstacle which has to be overcome with political representation. As a matter of fact, its absence is a typical feature of *autocracies*
2. Representative democracy is not the ≪least worst≫ political system, but it is the most flexible (resilient), though it is not the most efficient. It is not a compromise, but the best option.

So, democracy is firstly a question of structuring of power and, only secondly, a question of semantics (values) or syntax (procedures) of power. A democratic regime is not only a way of exercising power, but first of all a way of structuring it: those who hold the power do not exercise it, whereas those who exercise it do not hold it. The merger (today the digital sticking) between the two parts leads to weak forms of dictatorship or control of the multitude. Brexit, Le Pen, Chavez, Trump, and other populist disasters brought by the ≪tyranny of the majority.

How to invert the Matthew effect and the Network effect, enabling good politics?

Here are a few ideas for the democratic replacement of bad politics:

- The "stealthy politics"
- Overcoming the "bacterial resistance" to democracy of the Italian democracy: the problem of populism pages
- Bridging the gap between politics and civil society by turning anger and disgust at bad politics into strength and passion in promoting a better society
- Today, democracy lacks the oxygen of a human project for the 21st century. For this reason, the therapy must start from the shared design of a common human project, worthy of our commitment

- "One hundred naïve Ideas to change Politics"

In conclusion we need to involve all good people in politics, and good people must coordinate.

Chapter 6

Lecture 6: The impacts of ICTs on society and the concept of "Network Society"

Topics

- Technology, society and historical change
  - Definitions and relationships: Technology - Society
- The revolution of Information Technology
  - From industrial revolutions to the revolution of information technology
  - Electronics, information, internet, pervasive computing and technologies of life
- Informationalism, industrialism, capitalism, statism
  - Mode of development and mode of production
  - The birth of the informational capitalism and the Network Society
- The Network Society in the Age of Pandemics

6.1 Technology, society and historical change

Lets explore the meaning of **technology**. From ancient greek: "tékhne- logìa", tékhne = art, craft + logìa = the study of. The formal definition say that technology is: *the study and knowledge of the practical, especially industrial, use of scientific discoveries*. Technology is usually defined as the use of scientific knowledge to set procedures for performance in a reproducible manner. Some examples of technologies are: fire, wheel, airplane, compass, automobile, gunpowder, turbine. Technology can affect the environment and people's lives. The most "recent: examples of technological revolutions are the industrial revolutions, which are guided by relevant technological revolutions.

- Steam engine→ First Industrial Revolution(late 18th century)
- Electricity→ Second Industrial Revolution(late 19th century)
- The Information revolutions are the most recent technological revolutions (ICTs→ 1980s, IoT→ 2010s)

Lets now see the meaning of **society**. The formal definition say that society is: *a set of individuals who form an orderly system of political, economical, legal, moral, and cultural relationships*. Society is a network

of social relationships, for examples: medieval society, industrial society. Societies change: Pre-Modern society→ Modern society→ Post-Modern Society. Society is the subject of sociology, that studies the change between different types of societies.

Technology and society has a strong relationship.

- **Technological Determinism**: Technology is an exogenous force, which enters a society and determines its dynamics. The changes introduced by technology are directed towards social actors (individuals, organizations or institutions) who can only bear them, without the right to choose.
- **Social Construction of Technology**: Technology is an endogenous force, which is shaped and conditioned by the society in which it works. Social actors have full control of the technology, they know it and how to use it to achieve their goals and needs. Technology itself is neither good nor bad, but it is a tool in the hands of a fully aware actor.
- **Social Shaping Technology**: Technology has specific features that define its uses and functions. Social actors can use it, attribute specific meanings to it and, in some cases, they can imagine uses that were not initially contemplated.

Castells think that technology does not determine society, nor does society define the course of technological transformation. This is the false problem of technological determinism. Technology "is" society: it is not possible to understand or represent the society without the technology. The *State* can stifle technological development or can promote it.

In this case state can be defined as a human community that claims the monopoly of the legitimate use of physical force within a given territory: bureaucracy, a legal system and military organizations distinguish the state. There are different kinds of state, like the absolute state, the liberal state, or the democratic state.

Lets see two examples: technology in China and technology in Japan. In the XV century Europe was still at the beginning of the Renaissance Era, while China was the most technologically advanced civilization in the world. In China the main inventions had already been developed for centuries. But what happened The State is considered a crucial element in explaining the technological delay of China in the modern era. There are three elements of explanation: technological innovation was traditionally driven by the Chinese State, after 1400 the Ming and Qing dynasties lose interest in technology and technological development, the Chinese leaders and bureaucrats were afraid that technology could undermine social stability and the status quo.
Between 1636 and 1853 (shogunate Tokugawa) Japan was in an "isolation phase" that lead to restrictions on navigation and trade. Slow path toward innovation (only endogenous and incremental innovation), technological enhancement was backward compared to the Western Countries. In 1868 the Meiji restoration was the beginning of a phase of state-driven modernization. In particular, innovation focused on electrical engineering, that lead to entry point in the era of electricity and telecommunication. After the second WW and in the second half of the XX century the Japanese government makes the country one of the global leader in the ICT sector.

6.2 The revolution of Information Technology

According to Manuel Castells, there are two types of technologies at the core of the information age: **information technologies** (microelectronics, information and communication technologies) and **technologies in the field of life sciences** (life technologies and genetic engineering). The technologies of the information age are a *convergent combination* of microelectronics, data processing (hardware and software), telecommunication/ transmission, optoelectronics and genetic engineering. Knowledge and information have been central in all the civilizations and the ages, but now there is a *new technological paradigm* that can manage them.

The main achievements in this field date back to the Second World War and the second after war, with the commercialization of the first programmable calculator (1951, UNIVAC-1) and the invention of the transistor (1947, Bell Laboratories); they would have been the true core of the IT revolution in the XX century. There are three relevant fields: microelectronics, IT and TLC. At the end of the 90s, the power of internet communication associated with new discoveries in telecommunications and processing produced a further technological change, from decentralized and independent microcomputers and main frames to pervasive computing through interconnected processing devices.

According to Castells, they can have more far-reaching potential consequences than those already induced by the digital revolution in the structure and dynamics of society: they affect the programs of life and therefore the fundaments of human existence. The effects of the technology of life have been less diffused throughout the entire social structure because of the nature of its implications has led to institutional resistance to their applications. Also according to Castells, while genetic engineering is often considered as an independent process from the Information Technology revolution, in reality it is not.

Internet is the turning point in the evolution of information technologies and society, it decides the birth of the so-called **Information Age**. Internet is a technology of freedom; it comes from the libertarian culture of California in the 70s. The expansion of the Internet from the mid-1990s onward resulted from the combination of three factors:

- The technological discovery of the World Wide Web by Tim Berners-Lee and the distribution of the source-code
- The "privatization" of the Internet, Internet is under the (loose) management of the global Internet community
- Relevant changes in social structure, culture and social behavior: the spreading of networking as the prevailing organizational structure, individualism as the main orientation of social behavior (me-centred society), and the "culture of autonomy" (entrepreneurship, the active audience, the prosumers, etc.)

6.3 Informationalism, industrialism, capitalism, statism

There are two main factor in societies:

- **Mode of production** (capitalism – statism): the output of the productive process is socially applied in two forms: consumption and surplus. The social structures interact with the productive process, establishing rules for appropriation, distribution and uses of the surplus. These rules are the mode of production, which in turn defines the social relations of production, determining the existence of the social classes that are consolidated through historical action.
- **Mode of development** (industrialism – informationalism): The mode of development represents the technological arrangements through which work acts on material to generate products, ultimately establishing the level and quality of the surplus.

In order to understand this concept is important to understand the differences between capitalism and statism, and between industrialism and informationalism.

- *Statism*: Strong presence and influence of the State in a social and economic system, i.e. Soviet Statism. The control of the surplus is external to the economic sphere, it resides in the hands of those who hold the power of the state.
- *Capitalism*: The separation between producers and their means of production, the commodification of labor and the private ownership of the means of production on the basis of the control of capital determine the basic principles of capitalist appropriation and distribution of surplus by capitalists.

- *Industrialism*: Industrialism, associated with the Industrial Revolution, is a paradigm characterized by the systemic organization of technologies based on the capacity to generate and distribute energy by human-made machines without depending on the natural environment, albeit they use natural resources as an input for the generation of energy.
- *Informationalism*: In the informational mode of development, the source of productivity lies in the technology of knowledge generation, information processing and symbolic communication. The peculiarity of the informational mode of development consists in the fact that its main source of productivity is the action of knowledge on the knowledge itself. The shift toward the manipulation of the information and the access to information is a key factor in the network society.

Informationalism is the technological paradigm that constitutes the material basis of the societies in the XXI century. In the last 25 years of the past century informationalism replaced industrialism as the dominant technological paradigm. But industrialism does not disappear it is incorporated by informationalism. Informationalism presupposes industrialism: energy and its associated technologies are still a fundamental component of all processes.

The main historical factor determining the acceleration, diffusion and development of the information technology paradigm is represented by the **process of restructuring of the capitalism** started in the 80s (informational capitalism). The restructuring of capitalism in the 1980s:

- Increased global economic competition (globalization)
- Greater flexibility in managing, decentralizing and interconnecting companies both internally and externally
- Strengthening capital over work
- Change in work organization and diversification of labor relations
- Decline in the influence of the trade union movements
- Increased female workforce (however often with discriminatory conditions)
- State intervention for selective market liberalization and contraction of the welfare state

6.4 The Network Society in the Age of Pandemics

What does Castells mean when he talks about **NetworkSociety**? The Network Society is the new social structure, which is characteristic of the information age, it is driven by a renewed mode of production (capitalism) and a new mode of development (informationalism). The new society is based on networks, that is a set of interconnected nodes. A node is the point where a curve intersects itself. Networks are open structures that can expand without limits if their nodes can communicate. But networks are not new as social structures, they have a major role in the information age because, thanks to the new technologies, they can keep their flexibility and adaptability, thus asserting their evolutionary nature; moreover, new technologies support the coordination and the management of the network.

Networks have proven to be both powerful tools for inclusion and exclusion, marginality and individualism. Social networks have become a tool of gigantic capital accumulation and destruction of privacy, and through social networks the traditional state can monitor and surveil citizens, it is **the surveillance state**. Pandemics themselves rely on network logic to spread pandemics as a phenomenon in the network society (distancing and social restrictions as systems to counter the spread).

Chapter 7

Lecture 7: How ICTs are changing the economy

Topics The Information Age and the Network Society set new rules and relationships between social and economic agents

- Do the principles of economics change? How does the mechanism of creating value evolve?
- The role of ≪information≫ in the information age
- The cost of producing information
- Information as an experience good
- The economics of attention
- The role of ≪technology≫ in the information age
- System competition
- Lock-in and switching costs
- Positive feed back, network externalities and standards

7.1 The information age and the network society

According to Manuel Castells, the Network Society is the new social structure that is representative of the information age. The Network Society is driven by a renewed mode of production (capitalism) and a new mode of development (informationalism). The new society is based on networks, that is a set of interconnected nodes, but networks are not new as social structures. Networks have a major role in the information age because, thanks to the new technologies, they can keep their flexibility and adaptability. Moreover, new technologies support coordination and management within the network.

The spread of "networks" change show production, experience, power and culture work and their outputs, it changes the economy. Castells defines this economy with three adjectives:

1. **informational**: productivity and competition depend on the capacity to generate, process and efficiently apply information
2. **global**: production, consumption and flows – and their components (raw material, work, capital, management, technology, information, markets), are organized on a global scale

3. **interconnected**: competition and productivity take place on a global net of interactions among corporate networks

This Economy is born in the last decades of the XX century thanks to the information technology revolution. Information and knowledge have always been major components of economic growth, and technological progress has always determined productivity and standards of living. What has changed? New technologies (**information technologies**) enable information to become the output of the production process. The new products of the "information industries" are both the devices to process information or the information processing itself.

Why can we talk about "informational economy"? Productivity is the key for the economy and economic growth, the ways to increase productivity determine the structure and functioning of an economic system. Are the sources of productivity in the informational economy different from those of other economic systems? According to Castells, the evidence of the impact of information technologies on productivity was not clear in the '80-'90, probably because of: inadequacy of economic statistics, and non-uniform effects.

7.2 The role of information in the informational economy

The term *information* is used very broadly, because anything that can be digitized is information, like: books, databases, magazines music, movies, stock quotes and web pages. Different information have different values (entertainment value, business value, ...), but people are willing to pay for information. Information has some specific characteristics:

- unique cost structure
- information as "experience good"
- information overload

Information is costly to produce but cheap to reproduce, the fixed costs of production are large, but the variable costs of reproduction are small (low marginal costs). The majority of fixed costs are sunk costs, i.e. costs that are not recoverable if production is stopped. The cost of producing an additional copy typically does not increase, even if many copies are made (there are no natural limits). The production of "information goods" involves high fixed costs, but marginal costs tend to zero. **Cost-based pricing** does not work, because information goods are priced according to consumer value, not to production cost, but people values information in different ways: from **value-based pricing** to **differential pricing**. There are three types of differential pricing:

- *Personalized pricing* (first degree): Sell to each user at a different price, design products optimized for each customer's interests and charged accordingly
- *Versioning* (second degree): Offer a product line and let users choose the version of the product most appropriate for them
- *Group pricing* (third degree): Set different prices for different groups of consumers, as in student discounts

Information can be seen as an experience good. A good is an experience good if customers must experience it to value it. Virtually any new product is an experience good, but information is an experience good every time it is consumed. There are different strategies in order to overcome the customers' unwillingness to purchase information before they know what they are buying: different forms of browsing information (i.e. information previews), or reputation and brand identity. Find a balance between tension between giving away an information and charging customers for that information (to recover the cost) is a fundamental problem in the information age.

Since information can be quickly, ubiquitously and inexpensively available, the risk of information overload exists, the issue is not information access but information overload. Information providers generate real value when they can provide filters, in order to communicate only what it is useful to the costumers (search engines). Internet offers a new channel for matching up customers and suppliers; it allows information vendors to move from the traditional media advertising to one-to-one marketing.

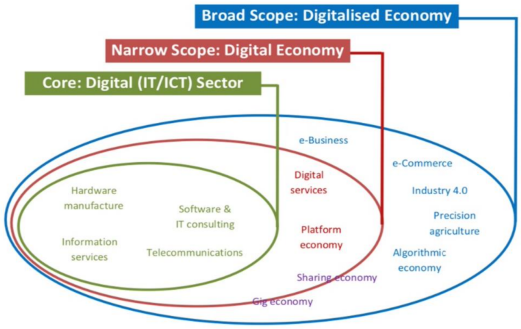
Informational economy is both about information and the associated technology. Technology is the infrastructure that allows to store, search, copy, filter, manipulate, view, transmit and receive information. Technology adds value to information. The value comes from technological changes and developments, the nature of information does not change. Content providers cannot operate without infrastructure suppliers and vice versa.

Systems show up everywhere in information technology:operating systems and application software, CPUs and memory chips, disk drives and controller cards, video cassette recorders end the videotapes themselves. The dependence of information technology on systems means that firms must focus not only on their competitors but also on their partners.

Technology users are subject to switching costs and lock-in.

- **Switching costs**: once a user chooses a technology (or a standard), switching to another one can be very expensive
- **Lock-in**: users invest in multiple, complementary and durable assets that are related to a specific information technology system.

Information goods exhibit network externalities (also known as network effects or demand- side economies of scale). Network effects exist if the demand for a good depends on how many other people purchase it. Positive feedback makes networks larger, because as the number of users grows, more users consider valuable to join the network.



Three dimension of the digital economy Manchester univeristy

Alibaba, Facebook, Uber, Amazon, Airbnb, Youtube and many others are all a **platform-based** (business) model. They are the new multinationals. We are in the midst of a "platform revolution", but 'what do we mean by platform?' *A platform is a business based on enabling value-creating interactions between external producers and consumers*, but keep in mind that platforms have always existed. A platform:

- Owns no resources, the value derives from users and the community it serves
- Is (at least partially) open and allows for curated participation
- Depends highly on its rules and architecture (competitive advantage)
- Scales much faster
- Leverages network effects

Chapter 8

Lecture 8: Countries, Companies and People in the 2020s

8.1 The industries of the future

According to Alec Ross the industries of the future are:

- Robotics and AI
- Genomics: The Future of the Human Machine
- Cybersecurity, Or "The Weaponization Of Code"
- The Code-ification of money markets and trust

How is the geography of these markets transformed?

As of today, 70% of total robots sales take place in Japan, China, US, South Korea and Germany. US and Germany lead in high value and medical robots, while South Korea and China lead in less expensive consumer robots, and Japan leads in sales, China is the fastest growing market. The big five's competitive advantage might accelerate in the future because they will own the name brands in consumer robots, and they will power the software and networks that enable the robotic ecosystem. There is a difference in the cultural acceptance of robots in the Eastern and Western culture, on one hand Ancient Shinto Religion beliefs in animism and propension to consider the inanimate just as alive as the animate, on the other hand the western threat of humanity creating things we cannot control.

South Korea, Japan and Germany are the countries that are best positioned as they are developing and manufacturing robotics for export, housing the headquarters, the engineers and the manufacturing facilities. China has historically relied on cheap labour, but is now at high risk, so the Chinese government is taking a two-pronged approach: focusing on developing employment by investing in industries of the future, and keeping labour cost low by continuing a forced urbanization policy.

Lets now look at *the Foxconn's case*, where Terry Gou announced a plan in 2011 to purchase 1 Million robots to supplement 1 Million human workers he employs. It is a trade-off in terms of expenditure because on one hand human labour involves very little Capex, or capital expenditures, but high Opex or operational expenditures, on the other hand robots have a diametrically opposed cost structure. As the capex of robots continues to go down, the opex of human becomes comparatively more expensive, according to this robots will kill many jobs while creating others, and also creating immense value (discuss the main areas). The

biggest wins will go to the societies and firms that can adapt and direct their citizens toward industries that are growing.

Robots has many applications. Life expectancy and robots as the new care-givers it is the cases of Japan's and Italy's aging societies where care-givers labour shortage and high job turnover rate. Toyota and Honda are entering the new industry of care-taking robots (Robina, Humanoid Robot, Asimo, Walking Assist, Riba, Paro). But can robots really take care of humans? A possible tasks can be helping the elderly move between rooms, or helping the patient get out of bed and helping them walk, or assist them in simple activities of the daily life. But difficult challenges remain, like forming a true emotional connection with human beings, being able to listen, not just to talk, or taking care of intimate activities, like bathing patients or brushing their teeth. Most of the industrialized world is on the verge of a period of advanced aging, so robots' caretakers could be a boon for the economy of the leaders of this new industry.

8.1.1 Genomics: the future of the human machine

Genomics is the future of the human machine The core of the **Genomics Industry** is sequencing the entire human genome. The price of mapping the human genome is dropping fast, unleashing private sector investments into the creation of a new industry, that is diagnostics, therapies and drugs based around genetics. A market of 11 Billion $ in 2013, bound to grow fast. Sequencing mean crunching DNA into hundreds of gigabytes of "Big Data", so to be able to parse out where proteins are mutating. on this basis you could know if and why you have cancer, and which medicines might stop these mutations. The biggest problem is the mismatch between the drug development process and the speed and precision allowed by genomics. In the future we will develop drugs targeted to the genetics of an individual as opposed to just treating every cancer patient with chemotherapy.

The challenge is to break the brain's code and leverage genomics to diagnose and treat neurological and mental illnesses. Treatments on offer are largely rooted in yesterday's science and technology. The discovery of antidepressants, tricyclic drugs reaching into the recesses of brain, treating chemical imbalances; but still serious side effects until the discovery of a new generation of antidepressants (Prozac, 1987) the first of the selective serotonin reuptake inhibitors (SSRIs). Despite that doctors still prescribe these drugs based on instinct and experience. The post-SSRI opportunity for innovation in mental illness is through genomics, by comprehensively mapping the genes relevant to the fields of psychiatry.

Lets see now leading Innovation leaders in the genomics industry.

- The Human Genome Project (US, Canada and New Zeland)
- China catching-up and challenging the US leadership
- The negative example of Russia and the 'Lysenko heritage' (genetics as a 'bourgeois pseudoscience')
-

The innovation came form narrowing the divide in access to health services in the rural areas through mobile technology. While the wealthy generally benefit most of the innovations over the short term, these ones have the potential to become cheaper over time and spread throughout the greater population. The adoption of new technologies finally occurs when ease of use, economic savings and trust all come together to work toward change.

8.1.2 Cybersecurity

The cybersecurity market is estimated at 175 Billion $ and is growing fast Lets see the main types of cyber attacks:

- On a network confidentiality, stealing or releasing secure information like credit cards in an illicit or unauthorised manner. Examples: Target (2013), North Korea against Sony (2014), China stealing intellectual properties or commercial secrets.
- Hitting a network availability, aiming at bringing it down by flooding it with a massive number of request, even by mobilizing several systems for the attack (DoS, DDoS, botnet). Example: Hong Kong, Georgia (2008), Estonia (2007), North Korea in retaliation for the Sony hacking.
- Affecting a network integrity, aiming at altering or destroying computer code and damaging hardware or infrastructures. Examples: Shamoon virus hitting Saudi Aramco.
- Attacks can be blended. Examples: "Phishing" may enable to transform a confidentiality break into an integrity attack, Ransomware (WannaCry, 2017), a crypto- worm encrypting data and requiring a ransom in bitcoins.
- Attacks against the **Internet of Things** (IoT), networks of objects with the potential of transmitting and receiving data.

The growth of the IoT has 4 main drivers:

- Number of internet connected cars on the road
- The advent of the wearable technology
- Home Automation or Domotics, i.e. the proliferation of smart controls in our homes
- Smart Manufacturing

Unfortunately critical issues are still outstanding. Unfortunately, as IoT is rising, cybersecurity has not kept pace, so this gave rise to a new set of vulnerabilities for cybersecurity hacks, starting from strategic infrastructures: the new privileged target for cyberwarfare. There are other future risks, like networked objects used as hacking platforms, Botnets of objects, for instance to extract cybervalues.

8.1.3 The sharing economy: coded markets of trust

The phone is now the bank? Mobile payments overcome the credit cards. Because they Cut inter-mediation costs and reducing friction in the marketplace, they refocus the economy towards bottom–up innovation and local experiences. And also mobile payments contribute to fighting the inequality that has proliferated alongside innovation, and code market to reach into the world's most isolated communities and link the emerging markets to the global economy. Money will be coded, broken down into 1s and 0s and wrapped within powerful tools for encryption (bitcoins).

Coding trust is the pre-assumption for the **code-ification** of money, markets and payments. The first steps is that: transactions are based on mutual trusts of buyers and sellers, not a blind trusts, but the product of algorithms, based on a two-way rating system monitored by the corporate owners of the platform. The next step is the **sharing economy**, that is based on a combination of technology platforms packaged as apps to create peer-to-peer marketplaces, taking underused assets and connecting them with people looking for a specific service.

Sharing economy has its implications, like dispersion and concentration effects.

- **Dispersion**: economic transactions pushed toward local people ...
- **Concentration**: ... but each of these transactions is redirected through a small number of digital platforms in California or China

We are going toward new forms of employment, with more flexibility but less protection and rights. As the sharing economy grows, we will need a better safety net, this is the challenge of designing and financing

a *new welfare*. Basically a new set of norms rooted in coded markets and algorithms will **challenge the norms traditionally set by governments**.

8.1.4 The geography of future markets

We wonder if "the competitiveness of a country/region/ territory in the industries of the future is based on the **control of the data and of the computing power** or on the **domain expertise**?" Domain expertise is based on a deep knowledge about a single industry (or industry model), which tends to concentrate in specific cities or regions, but at the moment is still broadly distributed, for instance, Silicon Valley's domain expertise made it very attractive to the world's best computer scientists and venture capital investments. This created a unique culture and a community, a kind of 'beacon' attracting waves of entrepreneurs and computer geeks. There are basically two school of thought.

- According to a *first school of thought*, big data will absorb and supplant other industries
- According to a *second school of thought*, they will serve instead as a broad tool that every industry will use to spur growth

As the big data market grows, it can be a source of revitalization of old industrial centres, where local domain expertise exists. If the domain expertise is everywhere, big data firms could easily expand far outside the US. It just takes the right combination of algorithmic expertise and domain expertise to generate a huge wealth creation at the global level. One of the main examples of this combination is **Industry 4.0**.

8.2 The revision of the social contract in the information age

The balance in the relationship between business, government and citizens depends on the **social contract**. The social contract outlines the rights and responsibilities of all social actors in each era and in each context. The way in which human activities are organized depends on the social contract, but a social contract is not immutable. Changes and transformations constantly put it to the test and require renegotiations of its terms, it is a real contract. Often the change is slow and uniform, almost invisible; in other cases, however, the change may be slow to take place. Technological revolutions often require an adaptation and change to the social contract.

The industrial revolutions had triggered a series of transformations and changes in the structure of society, at their peak the social contract that characterized the XIX and XX centuries was born. Strong transformation of Western economies consist in transition from the dominance of agriculture to that of industry, and then from the countryside to strong urbanization. The negotiation of the new social contract was late and confused. **Engels' pause** is a period of strong industrialization and inequality (Charles Dickens), stagnation of the level and quality of life, birth of Marxism and great wave of revolutions. There are checks and balances to maintain a balance between social actors and consequently society. Some example are: Antitrust laws, income taxation, prohibition of child labor, social security, environmental protection.

But the question is: "Do we need a new social contract?" In recent decades, we saw a combination of factors that have "shaken" our world: the digital revolution, globalization, deregulation, populism, the climate crisis. They are the basis for a transformation that requires a new renegotiation of the social contract, a new balance must be found in the relationship between businesses, government and citizens. Where is the main imbalance in this relationship today? **The growing weight of companies is especially worrying**. Global companies are increasingly becoming real "nations" and in many cases citizens are governed more by business than by government (e.g., privacy, climate change). Global corporations have entered the vacuum

left by developed governments in some areas and no mechanisms and counterweights have been implemented to balance their growing power (e.g., lack of anti-monopoly policies, reduced power of trade unions). New inequalities and imbalances are born, like in the US where in the last 30 years the richest 1% has become even richer by 21,000 billion dollars, while the poorest 50% have seen their wealth fall further by 900 billion and the middle class has remained stagnant.

The social contract, which was rewritten during the transformations of the industrial age, has been offset, it has lost its equilibrium. Today the future seems to depend also on how the social contract between business, government and citizens will be rewritten. The choices about what to do in these moments of change and transformation can lead societies in totally opposite directions. Digital transformation, climate change, cyber war, "new economies" require a **new social contract** that must define how to face these new challenges. How have the three pillars of the social contract (business, citizens and government) changed in the information age?

Since the 1970s, there has been an increase in the power of big companies and businesses. The rise of a capitalism increasingly oriented towards the value of shares (financial perspective) and less towards the value for stakeholders (employees, civil society, etc.), shareholder capitalism vs stakeholder capitalism. Economic expansion after World War II: governments and unions maintained strict controls and regulations on corporations, monopolies and the stock market. In 1962, Milton Friedman writes in the book "Capitalism and Freedom": "*There is one and only one social responsibility of business, to use its resources and engage in activities designed to increase its profits so long as it stays within the rules of the game, which is to say, engages in open and free competition without deception or fraud*", marked detachment from the existing social contract. Maximum benefit to society is obtained when individuals pursue maximum profit and then reinvest the gains; companies must be loyal only to shareholders.

The philosophy of profit optimization is the **shareholders' dominance**. The era of deregulation, of privatization of enterprises, of Reagan and Thatcher begins. In the 1980s, hostile takeovers and corporate takeovers, mergers and mass acquisitions, the concentration of companies and their market shares increase. Anti-monopoly laws are becoming less and less harsh, we are experimenting the return to the Gilded Age, a new "theory" which sees market concentration as negative only if it involves demonstrable damage in the form of a higher price for consumers.

The collapse of the Soviet Union made it commonplace to the idea that it was preferable to leave all problems to the market, privatize to make markets more efficient. But there are public goods and services that only the state can guarantee to all citizens: transport infrastructure, health, education, etc. The government can provide social support even when it is not convenient and other stakeholders step away. Moreover, the role of the government and its authority make it possible to maintain the logic of democracy, but today many Western governments are experiencing a moment of stagnation and paralysis, especially the United States. This happen for three key factors:

- political polarization ('Vetocracy' and inaction)
- legal clogging and administrative overhead
- the brain drain (Wall Street and the myth of the captain of industry)
- private influence and lobbying

Lets now see some examples of new social contracts. We have to distinguish **Open model**, **closed model**. The Closed system and model of control of China, it is authoritarianism and stability, but the social contract remains unbalanced, citizens are deprived of self-determination and remain at the mercy of government and business. While the open model is the Nordic model. In order to response to pandemic the Danish government nationalized private sector payroll by paying 75-90% of the salary of workers affected by the pandemic, delayed paying taxes and covered costs such as rent and sick leave. This is an example of focus

on small businesses and workers, not large shareholders. Nordic welfare system is among the strongest social security systems in the world (housing benefits, paid parental leave, family allowances, unemployment benefits, etc.). This system is financed by a system of taxes among the highest in the world, but they do not progressively affect the wealthy (equity extended to all). An example of positive vision of the government and its role is when the state makes sure to reduce the psychological costs related to taxes: simplification of tax returns, distribution of welfare through direct transfers (instead of with a logic of reducing a cost). This is possible also thanks to a less hierarchical and authoritarian and more supportive approach to society; link with the community (Fareed Zakaria).

Chapter 9

Lecture 9: The Big Data Revolution

Topics

- How do we define a ≪Datum≫?
- How do we define ≪Information≫?
- How do we define ≪Big Data≫?
- What is the difference between Data, Information and Knowledge?
- Correlation vs Causation
- Datafication and Data Justice

9.1 Difference between data and information

Lets see the general definiton of **datum**:

Definition 1 (Datum)**.** *X being distinct from y, where x and y are two uninterpreted variables and the relation of "being distinct", as well as the domain, are left open to further interpretation. In summary, a datum is ultimately reducible to a* ***lack of uniformity****. This definition of data can be applied in three different main ways:*

1. *Data can be lacks of uniformity in the real world (e.g. a red light against a dark background)*
2. *Data can be lacks of uniformity between two physical states in a system of signals (dots and dashes in Morse Code)*
3. *Data can be lacks of uniformity between two symbols (letters B and P)*

Now lets the general definition of Information (GDI):

Definition 2 (Datum)**.** *σ is an instance of information, understood as semantic content, if and only if:*

GDI.1) it consists of n data, for $n > 1$

GDI.2) the data are well-formed, i.e. they are rightly put together, according to the rules (syntax) that govern the chosen system, code or language being used

GDI.3) the well-formed data are meaningful, i.e. they must comply with the meaning (semantics) of the chosen system, code or language in question

9.2 Big Data

Big data has two different definition:

Definition 3 (Big Data def. 1)**.** *A new generation of technologies and architectures designed to economically extract value from very large volumes of a wide variety of data by enabling high-velocity capture, discovery, and/or analysis.*

Definition 4 (Big Data def. 2)**.** *Big Data refers to the inability of traditional data architectures to efficiently handle new datasets. The characteristics of Big Data that force new architectures are: Volume (i.e. the size of the dataset); Variety (i.e. data from multiple repositories, domains, or types); Velocity (i.e. rate of flow); Variability (i.e. the change in other characteristics); and Value.*

Lets see the definitions of Big Data according to NIST. *Big Data consists of extensive datasets primarily in the characteristics of volume, variety, velocity, and/or variability that require a scalable architecture for efficient storage, manipulation, and analysis. The Big Data paradigm consists of the distribution of data systems across horizontally coupled, independent resources to achieve the scalability needed for the efficient processing of extensive datasets.* Note that this definition contains the interplay between the characteristics of data and the need for a scalable system architecture in order to achieve the needed performance and cost efficiency. There are two fundamentally different methods for system scaling, often described metaphorically as "vertical" or "horizontal" scaling. Vertical scaling implies increasing the system parameters of processing speed, storage, and memory for greater performance. This approach is limited by physical capabilities whose improvements have been described by Moore's Law, requiring ever more sophisticated elements (e.g. hardware, software) that add time and expenses to the implementation. The alternative method is to use horizontal scaling, i.e. to make use of distributed individual resources which are integrated to act as a single system. It is this horizontal scaling that is at the heart of the Big Data revolution. This new paradigm leads to a number of conceptual definitions that suggest Big Data exists when the scale of data causes the management of data to be a significant driver in the design of the system architecture.

The main applications of Big Data are:

- Social Intelligence: Sentiment Analysis, Social Customer Care
- Predictive Analytics: Propensity, Price Elasticity, Anti-Fraud Analytics
- Segmentation Insights: Funnel Analysis, Behavioural Patterns
- Mobile Analytics: Ad-Targeting, Geo-spatial Analytics

9.2.1 Correlation vs. Causation in the age of Big Data

In 1997 Greg Linden joined a local internet start-up selling books online, Amazon.com. They employed techies, book critics and editors to write reviews and suggest new titles. "The nation's most influential books critics". From its start, Amazon had captured reams of data on all its customers, but had processed them in the conventional way, i.e. by taking a sample and analysing it to find similarities among customers and results were disappointing. They tended to offer you tiny variations on your previous purchase. So Jeff Bezos thought: "What if the company could recommend specific books to customers based on their individual shopping preferences rather than as a result of critics' reviews and advice?" According to Greg Linden the system didn't need to compare people with other people, but it needed to find correlations among products themselves. The method was very fast, versatile, and able to work across product categories, not just books, but movies, or toasters too. Thanks to this, recommendations were much better, because the system used all the data. The company ran a test comparing sales achieved by machine-generated content vs human editors the results were not even close and the editors' group was disbanded.

Linden's work revolutionised e-commerce. For Netflix, three-fourths of new orders come from recommendations. So **knowing WHY might be pleasant, but it's unimportant for stimulating sales, but knowing WHAT drives clicks**. This insight has reshaped many industries. Salespeople have long been told that they need to understand what makes customers tick, to grasp the reasons behind their decisions, but Big Data shows that there is another more pragmatic approach 'relying on valuable correlations without knowing the underlying causes'. So, do we really still need professional skills developed in many years of experience?

Correlations are useful in a small-data world, but in a context of big data they really shine. At its core, a correlation quantifies the statistical relationship between two data values. One example is "The Case of Google Flu Trends". Google Flu Trends was a project launched by Google in 2008 that aimed to use search data to track the spread of influenza in real-time. The idea behind the project was that if people were searching for flu-related terms, such as "flu symptoms" or "flu treatment", it could indicate that there was an increase in flu activity in that area. By analyzing these search terms, Google Flu Trends aimed to provide a faster and more accurate picture of flu activity than traditional methods, such as tracking doctor's visits or laboratory tests. The project was initially successful, and Google Flu Trends was able to accurately track flu activity in the United States. However, in 2013, it was found that Google Flu Trends was overestimating flu cases by a significant margin. This led to a number of criticisms of the project, and it was eventually shut down in 2015.

Correlations let us analyse a phenomenon not by shedding light on its inner workings, but by identifying a useful proxy for it. By letting us identify a really good proxy for a phenomenon, correlations help us capture the present and predict, with a certain likelihood, the future: "If A often takes place with 'proxy' B, we need to watch out for B to predict that A will happen". The case of Walmart and the hurricane. The case of Walmart and the hurricane refers to the actions taken by Walmart, one of the largest retailers in the world, during and after a hurricane disaster. Walmart has been known for being proactive in responding to natural disasters, by quickly mobilizing its resources to provide necessary supplies and aid to affected communities. For example, during Hurricane Katrina in 2005, Walmart was able to quickly re-supply stores in the affected areas with food, water, and other essentials. The company also set up mobile emergency supply centers and provided housing and support for displaced employees. Similarly, during Hurricane Harvey in 2017, Walmart distributed over 5 million bottles of water, 1.5 million meals, and thousands of other supplies to affected communities. The company also made donations to local organizations and provided support to employees affected by the disaster. In general, Walmart's quick response and ability to provide necessary supplies to affected communities during and after a hurricane is seen as a positive aspect of the company's disaster response efforts.

Long before big data, correlation analysis proved valuable (Sir Francis Galton, 1888). Yet, before big data, usefulness was limited because data was scarce and collecting it was expensive, so, statisticians often chose a proxy, then collected the relevant data and ran the correlation analysis to find out how good the proxy was. How could they select the right proxy? To guide them, experts used hypotheses driven by theories, abstract ideas about how something works. Knowledge progressed through the hypothesis-driven trial and error. It was a cumbersome process, but applicable in a small-data world. In the big-data age, it is no longer efficient to make decisions about what variables to examine by relying on hypotheses alone. Datasets are far too big and the area is too complex. But now we have so much data and computing power available to enable sophisticated computing analysis to identify the **optimal proxy**, so, no longer do we necessarily require a valid substantive hypothesis about a phenomenon to begin to understand our world. By subjecting big data to correlation analysis, we can use a *data-driven approach instead of the hypothesis-driven one*.

Predictions based on correlations lie at the heart of Big Data. Let's see a couple of proxies. The Case of "Aviva predictive model" for identifying health risks (pros and cons). The "Aviva Predictive Model" is a tool

developed by the insurance company Aviva to identify potential health risks among its policyholders. The model uses data from a variety of sources, including claims data, medical records, and lifestyle information, to identify individuals who may be at a higher risk of certain health conditions. One of the main criticisms of the Aviva Predictive Model is that it may not take into account all the variables that could affect an individual's health risk. For example, the model may not take into account an individual's social or economic status, which can have a significant impact on their health. Additionally, there are concerns about the privacy and security of personal health information used to create the model. Another criticism is that the model may perpetuate biases and discrimination, as it is based on past claims data, which may reflect historical inequalities and prejudice. This could lead to some groups of people being unfairly targeted for higher premiums or denied coverage altogether. Some unpleasant implications: The Target Case. The Target Case refers to the data breach that occurred at Target Corporation, one of the largest retailers in the United States, in 2013. The breach occurred during the holiday shopping season, and resulted in the personal information of up to 40 million credit and debit card accounts being stolen. The hackers were able to gain access to Target's point-of-sale systems and steal sensitive information, including customer names, credit and debit card numbers, expiration dates, and CVV codes.

Finding proxies in social contexts is only one way that big data techniques are employed. For instance, predictive analytic is used in business to foresee events before they happen. For instance, predictive maintenance(which did NOT happen with Morandi Bridge). The correlations show WHAT, not WHY, but knowing *what is often good enough*.

Furthermore, before big data, most correlational analyses using large datasets were limited to looking for linear relationships. In reality, many relationships are far more complex, so, with more sophisticated analyses, we can identify non-linear relationships among data. The case of the correlation between happiness and income refers to the relationship between a person's level of happiness and their income. The relationship between these two variables has been studied extensively, and it has been found that there is a positive correlation between income and happiness. However, the relationship is not a linear one, meaning that as income increases, happiness does not increase proportionately. Recent studies using big data have found that the relationship between income and happiness is more complex than previously thought. For example, some studies have found that there is a threshold income level beyond which additional income does not have a significant impact on happiness.

Does causation even exist? When we say that humans see the world through causation, we are referring to two fundamental ways:

- Through quick causation (a matter of how human cognition works)
- Via slow, methodical causal experiments

Daniel Kahneman say "*Thinking, fast and slow.* Both our fast and slow thinking modes will be subject to extensive reality checks, and their role will be transformed by big data correlations. Take the "case of the vaccine against rabies". On July 6, 1885, the French chemist Louis Pasteur was introduced to nine-year-old Joseph Meister, who had been mauled by a rabid dog. Pasteur had invented vaccination and had worked on an experimental vaccine against rabies. Meister's parents begged Pasteur to use the vaccine to treat their son. He did, and Joseph Meister survived. In the press, Pasteur was celebrated as having saved the young boy from a certain, painful death. But had he? As it turns out, on average only one in seven people bitten by rabid dogs ever contract the disease. Even assuming Pasteur's experimental vaccine was effective, there was about an 85 percent likelihood that the boy would have survived anyway. In this example, administering the vaccine was seen as having cured Joseph Meister. But there are two causal connections in question: one between the vaccine and the rabies virus, and the other between being bitten by a rabid dog and developing the disease. Even if the former is true, the latter is true only in a minority of cases.

In conclusion, much like correlation, causation can rarely if ever be proven, but only shown with a high degree of probability. Moreover, correlations are not only valuable in their own right but, by telling us which two things are potentially connected, they allow us to investigate further whether a causal relationship is present, and if so, why. So data driven correlation analysis are often superior not just to most results of "fast thinking", but even to slow causal thinking, that is epitomized by slow, carefully controlled esperiments.

9.2.2 The end of Theory

George Box say: "*All models are wrong, but some are useful*". As we transition from a hypothesis-driven world to a data-driven world, we may also be tempted to think that, in addition, we no longer need theories. "In the Petabyte Era, correlation supersedes causation, Correlation is enough, you don't need models anymore"

The facts would speak for themselves, if one accumulated enough of them (Bacon). "With enough data, the numbers speak for themselves" (Chris Anderson)

But, do data actually speak for themselves? Big data is based on theories (statistical, mathematical, computer science). It shapes both our methods and our results. Big data begins with how we select data.

What is the difference (if any) between Data, Information and Knowledge? **Knowledge** is more than information, because it requires explanations and understanding, not just truths and correlations (Plato, Cratylus).

9.3 Datafication and Data Justice

9.3.1 Datafication

Many people in the tech industry credit the transformation to the new digital tools, but the deeper reason for these trends is that we have far more data, because we are converting more aspects of our reality into a data format.

- The case of Commander Maury, pioneer of datafication by unearthing data from materials that no one thought held any value. Maury was a key figure in the development of oceanography as a scientific field, and his work focused on unearthing data from materials that were previously thought to hold little value. Maury's most notable contributions were in the field of oceanography, where he used data from ship logs and other materials to create a comprehensive map of ocean currents and winds. This information was used to improve navigation and reduce travel times for ships. He also used data from ship logs to create a "Sailors' Weather Guide", which provided sailors with information on the best times to travel and the best routes to take based on wind and weather patterns. Maury's work was groundbreaking because it demonstrated the value of data that was previously thought to be useless. He was able to extract valuable information from ship logs and other materials by applying a scientific method to the analysis of data. His work laid the foundation for the field of oceanography and set the stage for the use of big data in other fields.
- The case of Oren Etzioni at Farecast refers to the work of Oren Etzioni, a computer scientist and entrepreneur who founded the company Farecast, which used historical price information from the airline industry to predict future airfare prices. Farecast was founded in 2005, with the goal of using data and advanced analytics to predict future airfare prices. The company collected historical price information from the airline industry, including information on past prices, flight schedules, and ticket

sales, and used this data to create a predictive model for future airfare prices. Etzioni and his team used machine learning algorithms to analyze the data, and their predictions were often more accurate than those of the airlines themselves. Farecast's predictions were based on the historical prices, seasonality and other variables, and the company was able to offer users the best price for their flights, giving them an edge in the competitive airline market. Farecast's success was built on the idea that the airline industry's old price information could be used to create a lucrative business. The company's innovative use of data and advanced analytics helped it to become one of the most successful travel startups of its time.

- The engineers at Google who applied old search queries to understand flu outbreaks. The engineers at Google used historical search data to identify patterns and trends in flu-related search queries. They found that there was a correlation between certain search terms and flu outbreaks, and they were able to use this information to create a model for predicting flu activity. They also applied machine learning algorithms to the data to identify patterns and trends in the search queries.

All of them took information generated for one purpose and converted it into something else. So, **the use of data predates digitization**.

Definition 5 (Datafication)**.** *To "datafy" a phenomenon is to put it into a quantified format so it can be tabulated and analysed.*

Definition 6 (Digitalization)**.** *The process of converting analogue information into the zeros and ones of binary codes so computers can handle it.*

Brief history of datafication: Mesopotamia, the counting system of the Roman numerals, the diffusion of the Arabic numerals, the counting boards, the invention of the double-entry bookkeeping, the development of science in the 19th century. The arrival of computers made datafying far more efficient. In short, digitization turbocharges datafication. But it is not a substitute.

Datafying words has to approaches: the Google's vs Amazon's Models. Google's plan (2004) to digitize every book it could get hold of and then enable everyone to search for and access them through the Internet for free; but these texts were not searchable. Datafying texts through optical character recognition software made them indexable and thus searchable, and usable also for computers to process and for algorithms to analyse (quantitative analysis of texts), the result was a datafied text rather than a digitized picture of the text, that lead to an improvement of the text-translation service. Amazon has a different strategy with its Kindle e-book readers. Amazon has datafied books too and, differently from Google, it has focused on selling millions of them. They convinced hundred of publishers to release their books on the Kindle format, but they see their book business based on the content that humans read, rather than on the analysis of datafied texts. So Amazon understands the value of digitizing content, while Google understands the value of datafying it.

Datafying Locations:

- Prerequisites: Quantification, Standardisation, Collection: only then can we store and analyze location not as place per se, but as data
- 1978: launch of the first satellites of the Global Positioning System (GPS)
- Targeted advertising based on where the person is situated or predicted to go
- Discovering traffic jams by amassing locations data
- Tracking not only people but also objects (i.e. wireless modules inside vehicles transforming the idea of insurance)

Datafying Interactions: Web's social media companies datafying personal relationships, experiences and moods. The Datafication of everything:

- The case of tracking sleep patterns and the case of wine tasting by measuring brainwaves
- Data-rich markets

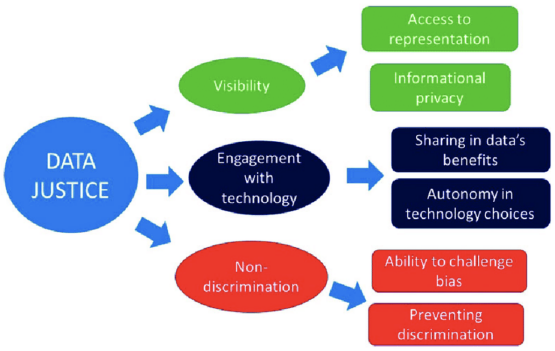
9.3.2 Data Justice

Definition 7 (Data Justice)**.** *Fairness in the way people are made visible, represented and treated as a result of their production of digital data.*

Just as an idea of social justice is needed in a (non-datafied) world to establish the rule of law, an idea of data justice is needed to understand justice in a world that is increasingly datafied. It is made necessary by the sudden availability of digital data on populations that were previously digitally invisible.

Many scholarly understandings of data justice.

- Heeks & Renken (2018) – four perspectives on data justice:
  - *Instrumental*: fair **use** of data (focus on outcomes)
  - *Procedural*: fair **handling** of data (focus on process)
  - *Distributive/rights-based*: fair **distribution** of data
  -
  - Structural: data as embedded in the **power relations** that characterise a given context
- A structural approach as the basis for studying data justice in a development context (Heeks Renken, 2018)
- Dencik et al. (2019): the **interdisciplinarity** of the data justice notion.
  - How data is generated, collected and used in society has become an issue across disciplines
- Data justice as related to **datafication**:
  - The conversion of previously existing processes into data (Cukier & Mayer-Schonberger, 2014)
  - It acquires a different meaning when related to populations made more vulnerable by the visualisation, capture and treatment of their data



Chapter 10

Lecture 10: Theoretical, Social and Ethical Issues related to Artificial Intelligence

Topics

- So, what are we talking about when we are talking about INTELLIGENCE? And what about Artificial Intelligence?
- Can machines think? The Turing Test and the Chinese Room Experiment
- The Frame problem and the AI symbol grounding problem
- Productive vs Re-productive Artificial Intelligence
- Why are we enveloping the world in digital technologies?
- The ethical implications of the successful divorce between agency and intelligence
- What do we mean by "human-based computation"?
- Is it possible to embed ethical behaviours into the algorithms of digital machines?

10.1 Artificial "Intelligence"

First of all, what do we mean by **intelligence**?

Definition 8 (Intelligence (L. Floridi))**.** *Common sense, experience, learning and rational abilities, communication skills, memory, the capacity to see something as something else and repurpose it, inferential acumen, placing someone in someone else's shoes: these are only some of the essential ingredients that can make a behaviour intelligent.*

Definition 9 (Intelligence (R. Sternberg))**.** *The mental abilities necessary for adaptation to, as well as selection and shaping of, any environmental context.*

The first definition of artificial intelligence is attributed to Marvin Minsky.

Definition 10 (AI (M. Minsky))**.** *Artificial intelligence is the science of designing machines capable of solving problems that would otherwise require human reasoning.*

AI as a form of **automation**:

Definition 11 (AI (R. Kurzweil))**.** *The automatic execution of tasks that usually require a certain intelligence to be executed by human beings.*

Definition 12 (AI (European Parliament, "Artificial Intelligence Act"))**.** *Systems that can, for a given set of human-defined objectives, generate outputs such as content, predictions, recommendations, or decisions influencing the environment the systems interact with, be it in a physical or digital dimension.*

Alan Turing (1950, "Computing Machinery and Intelligence") wrote that wondering if 'machines can think' was a trivial matter, also considering the difficulty of defining intelligence. Instead, he raised the question whether a machine can behave in a way as to look intelligent, i.e. to look like a human being to an outside observer who ignores its nature ('The Imitation Game'). "*Over the time, Artificial Intelligence has stopped trying to reproduce our way of reasoning; it is no longer an imitation game. It has become a different form of intelligence that, starting from data and experience, is capable of learning and thus of speaking, seeing, hearing, driving, moving and interacting with human beings*". Rita Cucchiara, said: "*L'intelligenza non è artificiale*", while Larry Tesler said more drastically that "*AI is whatever hasn't been done yet*".

In this case we have to relay to the difference of data and information, in order to apply it to AI, because real intelligence rely on information (so we understand in as semantic content), while AI rely on data and do not has the semantic ability.

One example can be "The Turing Test". The Turing Test is a test of a machine's ability to exhibit intelligent behavior that is indistinguishable from a human. The basic idea of the test is to have a human judge engage in a natural language conversation with another human and a machine, without knowing which is which. If the judge cannot reliably tell which is the machine and which is the human, then the machine is said to have passed the Turing Test and demonstrated human-like intelligence. So long no AI has passed this test.

One other example is "The Chinese Room Experiment". The Chinese Room experiment is a thought experiment proposed by philosopher John Searle in 1980 as a way to argue against the possibility of true artificial intelligence (AI). The experiment is a thought experiment that imagines a person, referred to as the "system," locked in a room. The person is given a set of rules and a large collection of Chinese symbols. The person is able to use the rules and symbols to respond to questions written in Chinese that are passed into the room through a slot in the door. The responses are so good that an observer outside the room would be convinced that the system understands Chinese. Searle argues that this thought experiment demonstrates that a machine could never truly understand a language, even if it can produce responses that are indistinguishable from those of a person who does understand the language. He claims that a machine that can pass the Turing Test is not truly intelligent, but is simply manipulating symbols in a way that mimics intelligence. The Chinese Room experiment is seen as a critique of one perspective of AI, which is the view that a machine can be made to simulate human intelligence by manipulating symbols according to a set of rules. The experiment is used to argue that such a machine would not truly understand the meaning of the symbols it manipulates, and therefore would not truly be intelligent.

According to the school of thought going from Turing to Searle to Floridi, our present technology is still unable to process any kind of meaningful information, being impervious to semantics (i.e. the meaning and interpretation of manipulated data). Our current computers never deal with meaningful information, but only with **uninterpreted data** (i.e. patterns of physical differences and identities).

- The Frame Problem: How can a situated agent represent a changing environment and interact with it successfully throughout the time? e.g. the relation with the wasps' environment: wasps can do far better than any AI system can achieve, compared to robotic lawnmowers or "smart" vacuum cleaners (sic).

- The Symbol Grounding Problem: computers as purely syntactic machines, able to process uninterpreted data according to some rules (syntax), but unable to appreciate the semantic characteristics (meaning) of the entities involved and of their mutual relations.
- The AI symbol grounding problem: the snag is semantics, how do data acquire their meaning?

Problems risk becoming insurmountable when their solutions require the successful manipulation of information (i.e. the manipulation of well-formed data that are also meaningful). According to this school of thought, we know that processing meaningful information is exactly what intelligent agents like us excel at, but we don't know how exactly the symbol grounding problem is solved in animals, including primates like us. So, from this point of view, there is a semantic threshold between us and our machines, and we do not know how to overcome it.

10.1.1 Two visions of Artificial Intelligence

Artificial Intelligence: Engineering or Cognitive Science? Productive vs re-productive Artificial Intelligence:

- **Re-productive AI** aims at achieving, with non-biological means, the outputs of our intelligent behaviour, i.e. resolving problems successfully to achieve a certain goal (example: the robotic lawnmower)
- **Productive AI** aims at achieving the non-biological equivalent of our intelligence, irrespective of the major or minor success of the result.

According to Turing, Searle and Floridi's school of thought, as a branch of engineering interested in reproducing intelligent behaviour (as-if), reproductive AI has been astoundingly successful in addressing extremely complex tasks thanks to myriads of data now available, the incredible computing power, the replacement of a logical /mathematical basis (if A then B) with a statistical one (B is often correlated with A), and the widespread datafication. However, as a branch of cognitive science interested in producing intelligence, productive AI has been a **dismal disappointment**, even because we know very little about what human intelligence really is. E.W.Dijkstra said: "*The question of whether a computer can think is no more interesting than the question of whether a submarine can swim*". Finally, trying to circumvent the semantic threshold, AI has opened a variety of new research areas, which we would call "**New AI**": situated robotics, neural networks, multi-agent systems, Bayesian systems, machine learning, cellular automata, artificial life systems, etc. So, in summary, in Floridi's view "Artificial Intelligence" looks like a "loose concept" referring to a number of disciplines, techniques and engineering solutions, but it represents a revolution not in the forms of intelligence, but in the forms of **agency** ('mimetic' vs 'poietic' sciences).

10.1.2 Re-productive AI

The Digital Revolution enabled the success of Re-productive AI by re-ontologising the world (the infosphere) to adapt it to AI Engineering. The result is that today AI is NOT the result of the marriage between artefacts and biology (intelligence), but the **divorce between agency and the necessity of being intelligent to be successful**. Ethical implications are such that in the past, *agere*, *intelligere*, and *intentionality* were three inseparable aspects of the same phenomenon, but in front of forms of agere without intelligere (i.e. not capable of intentionality), causal responsibility, accountability, liability and moral responsibility cannot be connected anymore. As a result, there are ethical implications in terms of responsibility, accountability, and liability when it comes to self-driving vehicles. As a consequence, **AI enormously increases human responsibility**.

The success of AI is due to the fact that we are building an AI-friendly environment, so the world is becoming an infosphere designed to adapt to the limited capabilities of AI, where the artificial agents are the real native

entities. For instance, we design the **environments** as envelopes compatible with robots, enabling them to overcome the "**frame problem**" (industrial robotics, Amazon warehouses, washing machines), so we are wrapping the world in digital technologies (smart cities), and we become more and more *analogue guests rather than digital hosts*. Enveloping the world enables the divorce between agency and intelligence, and raises important ethical issues.

Agere sine intelligere: the machine's memory (not as a set of recollections, but as digital recording of data and algorithms) and its combinatorial art outperforms intelligence and comprehension in a growing number of tasks.

- Problem 1: from the control in the process to the control on the process, to the risk that humans might remain outside the process in the case of third-order technologies.
- Problem 2: the human intelligere might be put at the service of agere, exploiting intelligence to the benefit of memory:
  - Human beings as ≪new artificial production means≫ (human-based computation – ≪human inside≫). e.g.: Amazon Mechanical Turk -¿ mturk.com: "An 'artificial' AI System", "Amazon Mechanical Turk (MTurk) is a crowd sourcing marketplace that makes it easier for individuals and businesses to outsource their processes and jobs to a distributed workforce who can perform 'Human Intelligence Tasks' (HIT) virtually." (for instance, tagging the negative contents of a movie..).
  - Human beings as "influenceable interfaces" (for instance: our rating and ranking activities are used in order to improve the performances of some ICT's: that remain stupid, but get smarter) (Business model: provision of "free" online services to "purchase" information on customer interfaces, which is necessary for the advertising industry to manipulate them better).
- Problem 3: is it possible to add ethical behaviours to the scripts of digital machines and thus to their algorithms?

Cabitza talk about algocracy, androrithm and algoretics.

- **Algocracy**: "*A form of information society based on the predominance of algorythms, alternative to the traditional forms of bureaucracy and market". Not a "Dictatorship of di algorythms", but a "Dictatorship through the algorithms*"
- "*AI as a methodology of rationality, aiming at codifying every moment of the lifetime*" (Eric Sadin).
- **Androrythm**: "*everything irreducible to the codification and symbolic representation; any way in which you can fight the diffusion of algorythms as an instrument of power, manipulation and exploitation*" (Gerd Leonhard, 2019)
- **Algoretics**: "*Can we translate the ethical values in something that machines can compute?*" (Padre Benanti)

In conclusion, the re-ontologising power of digital technologies and of the enveloping of the world poses both risks and opportunities. Risks are such that digital technologies might end up shaping our physical and digital environments, leading us to adapt to them (Human Intelligence Tasks). The Opportunity offered by the re-ontologising power of digital comes in three forms:

- Rejection
- Uncritical acceptance
- Proactive designing, in to ethical by design

The **intelligent human design** plays an essential role in shaping the future of our interactions with present and future intelligent artefacts, as well as with the environments we share with them.

The Singularity is the hypothesis that the invention of artificial super-intelligence will abruptly trigger runaway technological growth, resulting in unfathomable changes to human civilization. According to this hypothesis, an upgradable intelligent agent (such as a computer running software-based artificial intelligence) would enter a "runaway reaction" of self-improvement cycles, with each new and more intelligent generation appearing more and more rapidly, causing an intelligence explosion and resulting in a powerful super-intelligence that would, qualitatively, far surpass all human intelligence.

Kurzweil's Law of accelerating returns Ray Kurzweil postulates a law in which the speed of technological change (and, more generally, all evolutionary processes) increases exponentially, thus generalising Moore's Law. Kurzweil reserves the term "Singularity" for a rapid increase in artificial intelligence (as opposed to other technologies), writing for example that "The Singularity will allow us to transcend these limitations of our biological bodies and brains. There will be no distinction, post-Singularity, between humans and machines". He also defines his predicted date of the Singularity (2045) in terms of when he expects computer-based intelligence to significantly exceed the total sum of human brainpower

Chapter 11

Lecture 11: Metaverse Beyond the Hype

Topics

- Part 1
  - Metaverse: Centralization or Decentralization?
  - The 3 Ages of the Web
  - A brief Hystory of the Metaverse
  - Augmented vs Virtual Reality
  - Definitions
  - Cathy Hackl's ≪decentralized≫ approach
  - Matthew Ball's ≪more centralised approach≫
- Part 2
  - Payment Rails
  - Blockchains
  - Cryptocurrencies
  - Bitcoin
  - Ethereum
  - DAPPS
  - NFTs
  - DAOs – Smart Contracts
  - The Metaverse Economy

11.1 Is the Metaverse a Blip or a Trend?

Mark Zuckerberg, July 2021: Looking forward to transitioning FB from a Social Media Company to a Metaverse Company. Jensen Wang, Nvidia: "The economy in the Metaverse will be larger than the economy in the physical world" At the same time we saw the reaction of the Communist Party of China: its biggest-ever crack-down of its domestic gaming industry. For a centrally planned Country ruled by a single party,the potential of parallel world for collaboration and communiction is a threat A growing but controversial belief:

Personal Computer and fixed-line Internet of the 1990 → Today' era of Mobile and Cloud Computing → The Era of Web 3 and the Metaverse

The Metaverse is built on Web 3.

- Web 1.0: Static and Decentralized
- Web 2.0: Democratization and Centralization
- Web 3.0" Semantic Web by Tim Berners Lee. First declination of Web 3.0, based on ontological languages enabling machines to understand the cognitive context inside which they operate. Solid, Social Linked Data Project
- Web 3:. Democratization based on decentralization, tranparency and empowerment of the individuals, enabled by edge computing, Blockchain, NFT and cybervalues
  - Blockchain and NFTs would enable users to access on a peer basis the network and to be fairly compensated for the quantity of work and resources they provided (storage, computing power, mining, etc)
  - Cybervalues and tokens enable a decentralized exchange of value, disintermediating banks or other regulatory institutions.
  - And finally, edge computing would bring computing closer to the users, representing a revolution similar to the smartphone vs traditional PCs

According to Meta: the metaverse is the next evolution in social connection and the successor to the mobile internet. Imagine a set of digital spaces that you can move seamlessly between. Like the internet, the metaverse will help you connect with people when you aren't physically in the same place and get us even closer to that feeling of being together in person. The metaverse isn't just for gamers or developers, it will be for everyone. And our hope is that in the next decade it will reach a billion people.

According to Satya Nadella, CEO Microsoft: "Essentially, the Metaverse is about making games. It's about putting people, places and things into an engine that simulates the physical environment and connecting all these people, places and things". Even now, Nadella argues, interactions in video games happen like this; the only difference is that the interface of video games in the Metaverse will be even more immersive: "We will sit at a table in a meeting room via avatars, or holograms, or perhaps via 2D surfaces with surround sound. We've always done that, actually in games". With a small difference compared to what the future promises: the metaverse will allow you to really "enter" the virtual world. "Today, when I play a game, I'm not really in the game. But now we can start dreaming, thanks to the metaverses, of being able to really find myself inside the game, just as I can be in a conference room for a meeting. The metaphor and the technology will manifest themselves in different contexts".

Apple CEO Tim Cook doesn't like the metaverse, he predicts a different technology will shape the future. Tim Cook is the latest big name in tech to pour some cold water on the industry's excitement over the concept of a metaverse. "I always think it's important that people understand what something is, and I'm really not sure the average person can tell you what the metaverse is". Unsurprisingly, Apple hasn't yet publicly touted any plans for the metaverse, a term typically used to describe virtual reality (VR) platforms where people can interact, work, shop and play games using immersive technology like a virtual reality headset. Cook is also a big proponent of AR, and Apple is reportedly developing an AR/VR headset that could hit the market in 2023. The future of AR "will go much, much further than today's applications", Cook said. "I think AR is a profound technology that will affect everything," Cook said. "Imagine suddenly being able to teach with AR and demonstrate things that way. Or medically, and so on".

- The development of Augmented Reality applications enriches the surrounding environment with a whole series of information superimposed on the visual field. **AR, therefore, adds multimedia elements to the physical space**, allowing users to have a unique interactive experience. Augmented

reality also increases the human experience thanks to technological mobile devices such as smartphones, tablets and head-mounted displays (HDM) with which it is possible to observe virtual elements and interact with reality.

- **VR, on the other hand, creates a totally new world that exists nowhere else but in digital form**. Virtual Reality combines hardware and software devices and makes them work together to create a virtual space, within which the user can move freely. It is a simulated reality, created precisely on the computer, a three-dimensional digital world that appears real and allows the user to try totally new and immersive experiences.

The term 'Metaverse' was coined by Neal Stephenson in his 1992 Novel 'Snow Crash': no definition, but a vivid, dystopic, pre-Internet description of a virtual, interactive, infinitely interconnected world. From 'Neuromancer' by W. Gibson, to the Wachowskis concept of 'Matrix', to Jean Baudrillard coining the term 'Hyperreality': "A state in which reality and simulations were so seamlessly integrated that they were indistinguishable" (1981) (remember the definition of Infosphere by Floridi!). Many efforts to build virtual worlds over the past several decades:

- 1970: Text-based virtual world known a Multi-User Dungeons (MUDs)
- 1986; Release of the Commodore 64 online game "Habitat", a graphical world in 2D (introducing the term "Avatar" to refer to a user's virtual body)
- 90s: the age of the full 3D virtual worlds begins
- 2003: Launch of "Second Life". Many began to contemplate the prospect of a parallel existence that would take place in virtual space.
- 2010s: Virtual world platforms Minecraft and Roblox brought their ideas to a mainstream audience, focusing on children and teenagers
- 2018: Fortnite launches Fornite Creative Mode, and transforming into a social platform for non game experiences (Star Concerts, etc)
- 2018: "Ready Player One" by Steven Spielberg

So the mobile Internet had existed since 1990, but it was only in the late 2000 that wireless speeds, devices and applications actually enabled the transformation of digital information services and over the past 50 years, 'Proto-Metaverses' have grown from text-based chats and MUDs to vivid networks of virtual worlds with populations and economies that rival small nations.

There will be many wars for supremacy in and over this Metaverse.A Corporate Internet is the current expectation for the Metaverse From the Internet' non profit nature of the origins to the Tech Giants closing their ecosystems in the last decade. Teck Giants maneuvers have effectively closed much of the Internet: today a developer must receive permission and provide payment; and users have little ownership of their online identity, data and entitlements, including the birth of the Metaverse, pioneered and built by private business, for the purpose of commerce, data collection, advertising and the sale of virtual products. So fears of a Metaverse dystopia seem fair, rather than alarmist; the concern is that an ever- growing share of our lives will be spent inside virtual worlds, rather that just extended or aided through digital devices and software. It will be a parallel plane of existence for millions, if not billions of people, so there is a chance that the companies that control this virtual world will become more dominant than those who lead in today' digital econonomy. At the moment however the Metaverse is just a theory, an intangible idea, not a tangible product. That explains why every Tech Company explains it in the context of their own vision and technologies.

Let's discuss now the main implications in terms of data rights, data security, misinformation and radicalization, platform power and regulation, abuse, and user happiness and how they are going to be influenced by the companies that lead in the Metaverse era.

Definition 13 (Cathy Hackl's Definition of the Metaverse (or the **decentralized approach**)). *The Metaverse represents the top-level hierarchy of persistent virtual spaces that may also interpolate in real life, so that social,commercial and personal experiences emerge through web 3.0 technologies. The metaverse sits on top of all the blockains sistems out there.In the decentralized, bottom-up metaverse, consumers are more invested because they have vote inside the sytems they enjoy. In short , the metaverse should be synonimous with decentralization where people are in the driver's seat just as much as technology companies.*

The **characteristics** of the metaverse are:

- persistenza: prevede la permanenza degli oggetti virtuali nelle dimensioni spazio e tempo
- presenza: distingue e rende unica l'esperienza dell'utente perché immerso nel mondo virtuale
- interconessione: crea un'identità virtuale unica in grado di viaggiare in più mondi tra di loro connessi
- socialità: rende possibile la creazione di nuove comunità virtuali, dal volume potenzialmente illimitato
- decentralizzazione: si basa sulla community per la creazione di contenuti e la governance del mondo

Definition 14 (Matthew Ball's Definition of the Metaverse (or the **more centralized approach**)). *A massively scaled and interoperable network of real time rendered 3D virtual worlds that can be experienced synchronously and persistently by an effectively unlimited number of users with an individual sense of presence, and with continuity of data, such as identity, history, entitlelments, objects, communications, and payments.*

Let' s try to unpack each element of this definition, keeping in mind that 3 terms are missing: "decentralization", "blockchain" and "Web 3".

Virtual worlds refer to any computer-generated simulated environment. These environments can be in immersive 3D, 2.5D (or isometric 3D) 2D, layered atop the ≪real world≫ via augmented reality or just text-based (MUDs). Virtual worlds can reproduce exactly the real world (digital twins), or represent a fictionalized version of it (Super Mario Odyssey's New Donk City, Meta Horizon Worlds, su Oculus). The purpose of a virtual world can be "game-like" or "non-game-like", with obiectives like educational training, commerce, business, socializing,fitness, etc. Recently the biggets uptick has been via worlds that have no gameplay whatsoever (Digital Twins of entire Cities, Hong-Kong International Airport). Some virtual worlds are fully persistent, in other cases the experience is reset for each player. Some are limited to a specific device, some other are fully cross-platforms. Governance: some are centrally controlled by the developers (economy, policies, users) some others are self-governed through various forms of democracy.

Although virtual worlds come in many dimensions, ≪3D≫ is a critical specification for Metaverse, to make possible the transition of human culture and labor from the physical world to the digital one humans did not evolve for thousands of years to use a flat touchscreen. So the next great step for the Internet is 3D, that might finally disrupt industries that have largely resisted digital disruption. The case of Education: How 3D Virtual worlds will reshape our pedagogical pratices. Please note that no part of the Metaverse necessarily requires an immersive virtual reality or VR headset: this is just one way to access it "Arguing that immersive VR is a requirement for the Metaverse is like arguing that the mobile Internet can just be accessed via apps, thereby excluding mobile browsers" (Matthew Ball).

Rendering (visualization) is the process of generating a 2D or 3D object or environment using a computer program. The goal of this program is to ≪solve≫ an equation made up of many different inputs, data and rules, by using various computing resources (GPUs and CPUs) and of course an increase of resources available to solve the math problem means that more equations can be tackled, and more detail provided in the final visualization. However, experience set in virtual worlds require real time rendering, to avoid serious limitations to the size and visuals of virtual worlds as well to the numbers of participating users and to the options available to them. So immersive 3D require far more intensive computing power than 2D.

The metaverse should make it so that wherever a user goes, their achievements, history and finances are recognized across multitudes of virtual worlds as well as the real one (like the international passport system). So virtual worlds must first be ≪interoperable≫ (like the Internet through the TCP/IP protocol suite, JPEG for digital images, MP3 for Digital audio and HTML for linkages among different websites, webpages and web content). Unfortunately, almost all the most popular virtual worlds today use their own different rendering engines, file formats and have no systems to share data with other virtual worlds: they were not designed to be interoperable,but were intended to be closed experiences within controlled economies (a Post-Westphalian digital economy?). Standard are established through consensus , not discovery: it's a political issue, requires mediation and compromise that leave no party happy. So, what will be the possibile outcome?

1. The Metaverse will never happen, instead there will be many competing networks of virtual worlds (the Protocol Wars of the 1970s -1990s)
2. The Metaverse will be forced by the demand and by the economics (the strenght of a single integrated environment will force interoperability)

In this case, the leaders who will be able to establish the new set of standard of the Metaverse will establish an extraodinary soft power on the development of the new world.

To be really "The Metaverse", it must have a massively scaled (theoretically infinite) number of virtual worlds. So the Metaverse is intended to be a unifying layer that sits above and across all individual, computer generated 'universes' as well as the real world. Furthermore within the Metaverse there might be 'metagalaxies', a collection of virtual worlds that all operate under a single authority and that are clearly connected under a visual layer. For instance, we could think of Facebook role in the Internet as a today's version of a 2D Metagalaxy (a collection of tightly integrated FB pages and profiles).

Almost no current games demonstrate full persistence. Instead they run for a finite period before resetting part or all of their virtual worlds. For John Locke, identity is better understood as continuity of memory. If so, then we can never have a virtual one as long as everything we do and have done is gone. The more information that persists, the greater the computational needs and the less memory and power that is available for other activities: complexity is the enemy of real-time rendering. But the amount of data that must be read, written, synchronized and rendered to create and sustain this experience is far beyond anything possible today. Until then, the worlds most in need of persistence are those based around real estate, or tied to physical space (i.e. digital twins).

Concurrency is one of the foundational problems for the Metaverse, because it leads to exponential increase in how much data must be processed, rendered and synchronized per unit of time. The Metaverse will only become "The Metaverse" if it can support a large number of users experiencing the same event, at the same time and in the same place, without making substantial concessions in user functionality, world interactivity, persistence and rendering quality. However, we are far from being able to replicate the density and flexibility of the ≪real world≫. And it is likely to remain impossible for some time.

11.2 Metaverse as "The Next Generation Internet"

We should expect the establishment of the Metaverse to be broadly similar the metaverse ad "the next generation internet" o that of the Internet: many wil try to build or co-opt the Metaverse. One of these groups might even succeed, however it's more likely that the Metaverse will be produced by the partial integration of many competing virtual world platforms and technologies. Moreover, probably it will evolve to build on top of Internet's underlying architecture or protocol suite. Why video games are driving the next Internet (most technically capable CPUs and GPUs, the design orientation,the case of Nvidia.

Most payment rails are the embodiment of digital ecosystems difficult to build, hard to displace and quite profitable: Visa, Mastercard, Alipay, Google, Apple, Facebook, Amazon, Microsoft, JPMorgan Chase, Bank of America. But there is still a fight to become the dominant "Payment rail" in the Metaverse. In 1983 Namco approached Nintendo about publishing versions of its titles (Pac-Man) in exchange for a 30% fee (10% for licensing + 20% for manufacturing game cartridges). This 30% fee ultimately became an industry standard, has endured and expanded to all in-game purchases (including 2 or 3% for Paypal or Visa). The gaming industry's serves as the Metaverse's economic precedent: In 2001 Steve Jobs adopted the 30% commission as the business model for digital distribution through the iTunes music store... then 7 year after transposed it to the iPhone's app store, with Google following suit for its Android operating system. But remember that Ipod had gross margins above 50%, vs prior gaming consoles' below 0% and Jobs adopted the closed software model: on iOS, all sfw and content would need to be downloaded from Apple's App Store, and only Apple has a say over what sfw could be distributed and how users would be billed. Google followed with a milder, less effective approach. In June 2020 the EU sued Apple after Spotify and Rakuten alleged Apple used its 30% fees to benefit its own software service(Apple Music) and stifle competitors. Then Epic Games (Fortnite) sued both Apple and Google alleging their 30% fees and controls were unlawful and anti-competitive. Tim Sweeney tweeted that "Apple has outlawed the Metaverse", because:

1. Apple's 30% stifles investment in the Metaverse and adversely affects its business model.
2. It cramps the very companies that are pioneering the Metaverse today, namely integrated virtual world platforms.
3. Apple's desire to protect these revenues effectively prohibits many of the most Metaverse-focused technologies from further developing.

As a matter of fact, in the "real world" payment processing costs from 0% (cash) to 2.5% (standard credit card purchase), to a max. 5%, but in the Metaverse everything costs 30%, while average SMEs profit margins in the US range from 10 to 15%: so Apple and Google collect more for a new digital sale than those who invested (and took the risk) to make the digital product.

11.2.1 Blockchains

Blockchains are databases managed by a decentralized network of validators Unlike a centralized database, blockchain records sit in no single location, nor are they managed by a single party. Instead, a blockchain ledger is maintained through consensus across a network of autonomous computers situated around the world. Each of these computers, in turn, is effectively competing (and paid for) to validate this ledger by solving cryptographic equations that arise from an individual transaction. One benefit of this model is relative incorruptibility, but it is inherently more energy and time-consuming than using a standard database (because many computers are performing the same work). So most blockchain-based experiences store as much data as they can in traditional databases, rather than "on chain", so many critics say that anything that is not fully decentralized is actually centralized. In any case, what matters is that blockchains are programmable payment rails, or the first digitally native payment rail, vs the Paypals and Wechats that are little more than legacies. Why Blockshains are referred to as being "trustless" and "permissionless"? Because a transaction can not happen without the processor being compensated, no hidden fees, no risks of sudden policy changes. Of course, to use most of these platforms, interact and perform actions, however, you need to have a crypto wallet (crypto wallet) and some cryptocurrency. In the case of Bitcoin, anyone can become a network validator without needing to be invited, and anyone can accept, buy or use bitcoin. The greatest indicator of what blockchains might accomplish is what they have already achieved. In 2021, total transaction value exceeded $16 trillion, over 5 times as much than digital payments giants Paypal, Venmo , Shopify and Stripe combined and in the fourth quarter Ethereum processed more than VISA and this without central authority, managing partner, or even Headquarter.

!!!Pay attention to **Bitcoins**, **Ethereum** and **Dapps**, **NFT**!!!

Blockchains, in their capacity as digitally native ≪programmable≫ payment rails, enable greater indipendent collaboration and easier funding of new projects. So a blockchiain would enable two or more collaborators to write a ≪smart contract≫ and automatically take care of its execution. Smart contracts are software programs stored on the blockchain that automatically execute a verified transaction based on predefined and agreed parameters. Some envision smart contracts as the Metaverse version of limited liability corporations or non-profit organizations. The smart contract ≪trustlessly≫ manages most of the administrative work for the organization on an ongoing base. These applications are often governed by a decentralized autonomous organization (DAO), a form of collective governance by users of the application who own governance tokens of the smart contract. If the DAO is set up correctly, no company can unilaterally decide to change the parameters of the application. This stands in stark contrast to Web2 applications, which give companies sole discretion over specific parameters like pricing.

11.2.2 The Metaverse Economy

The Metaverse has the potential to interweave online and offline realities into something new. Through it , businesses get to connect their digital platforms with the real world in new ways. Businesses need to think of the metaverse as part of a whole, similar to an omnichannel strategy. Let's say a business launched NFTs into a dApp as part of a player-to-player competition. The NFTs become a sort of trophy. Now that this player owns a unique asset, it can further gamify the consumer experience. For example, the business could design the NFT as a key to exclusive discounts in stores, for early access to a product, as a ticket to private events, or some other real world experience. So companies can tie together the metaverse economy with their overall business strategy.

Education The problem of the low increase of labor productivity due to slow development of digital tecnologies and applications to Teaching. The assumption, (particularly in the age of Pandemic) was that schools would be fundamentally reconfigured and displaced by remote learning: but this did not happen, mainly due to ≪Loss of presence≫ and poor participation by the students. Now real-time rendered 3d technologies and rich virtual simulations can greatly augment the learning process. Not ≪visiting ancient Rome≫, but ≪building Rome in a semester≫. Unlike a physical classroom experience, these lessons will be available on demand from anywhere around the world.

Lifestyle Businesses

- Mindfulness, meditation, Psychoterapy and physiotherapy
- Dating
- Entertainment
- Betting and Gambling
- Sex and Sex Work
- Fashion ans Advertising
- Industry
- Aerospace and Defense
- Medicine and Healthcare

In Conclusion: **IS THE METAVERSE A BLIP OR A TREND?**