Digital oddities: technological change and cultural elaboration

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While observing the digital society, complexity appears as key dominant, most of all if compared to the analogic one. Complexity is intrinsic to the digital society, which enables a faithful description of reality: any heterogeneity is included thus highlighting the Reductionism limits in depicting the reality by simplifying it. The digital perspective allows for a new dimension in our daily life, especially in fields such as work, among the most engaged by the change. Data role is changing, too: from a means to represent the reality to a constituent of reality itself. Such a process is ongoing, for instance, in data protection and security: basically, a technical issue but ever more relevant in key aspects of life until touching individual rights. To handle the complexity, to govern technological change and eco-social transition, to make the best of the Big Data and AI, we need an adequate cultural elaboration allowing the social contract to upgrade to the digital dimension.

Osservando la società digitale, la complessità appare come fattore dominante, soprattutto se paragonata a quella analogica. La complessità è intrinseca alla società digitale che consente una descrizione fedele della realtà: ogni eterogeneità è inclusa evidenziando così i limiti del Riduzionismo nel rappresentare una realtà semplificata. La prospettiva digitale consente una nuova dimensione nella nostra quotidianità, soprattutto in ambiti come il lavoro, tra i più coinvolti dal cambiamento. Anche il ruolo dei dati sta cambiando, da mezzo per rappresentare la realtà a costituente della realtà stessa. Tale processo è in atto, ad esempio, in materia di protezione e sicurezza dei dati: una questione fondamentalmente tecnica ma sempre più rilevante in aspetti chiave della vita fino a toccare i diritti individuali. Per gestire la complessità, per governare il cambiamento tecnologico e la transizione eco-sociale, per sfruttare al meglio i Big Data e l'IA, serve un'adeguata elaborazione culturale che permetta al contratto sociale di allinearsi alla società digitale.

Preface

Nowadays, both individuals and institutions – often dramatically – are called upon learning to co-exist with the digital dimension: trying to find a new balance between opportunities and risks, people need to cope with new specific skills and to adapt their cultural references to the digital paradigm. The transition from analogic to digital communication allows much richer analyses due to the amount of information available, and to the

detail provided; therefore, the analysis capacity needs to be adequate to the amount of transmitted signal. Artificial intelligence operates on likelihood, cross-correlation, and weak associations. The digital assortment is profuse and requires cultural equipment to become social heritage, positive contamination, intangible asset, and progress.

People live daily social, ethical, and health (Covid-19) dilemmas, called upon dealing with financial and technological options, consumption and savings choices, educational and work issues, but often lacking the right competence, or supported by a limited information set.

To adequately comprehend a complex[1], heterogeneous and evolving reality, technological and cultural tools are necessary. Individuals find their own personality incompressible, claim identity not willing to give up personal history, place, food, culture, language, or passion. It is challenging to understand each person's cultural and personal background.

We recently heard from Parisi, Nobel Prize 2021, telling how he approached his studies on complexity moving basically from a philosophical age-old question: might the theory not be consistent?[2]. From physics, the doubt spread to several sciences. Interactions in the environment can change the relationships in a non-linear, chaotic, and – in social terms – irrational way[3]. For instance, economics has long imposed unrealistic assumptions about behaviours of citizens that have led to wrong social policies and unfair general solutions[4].

Today, the *research demand* is to understand how to manage this transition phase, adapting traditional institutions and European values set to the digital dimension, working to identify measures, and understand new ontologies to discern complexity (Gallegati 2021). How can we face such great challenges? A conceptual scheme follows.

Figure 1. Diagram of Complexity: 1) Entanglement, 2) Relationships, 3) Approaches, and 4) Resources
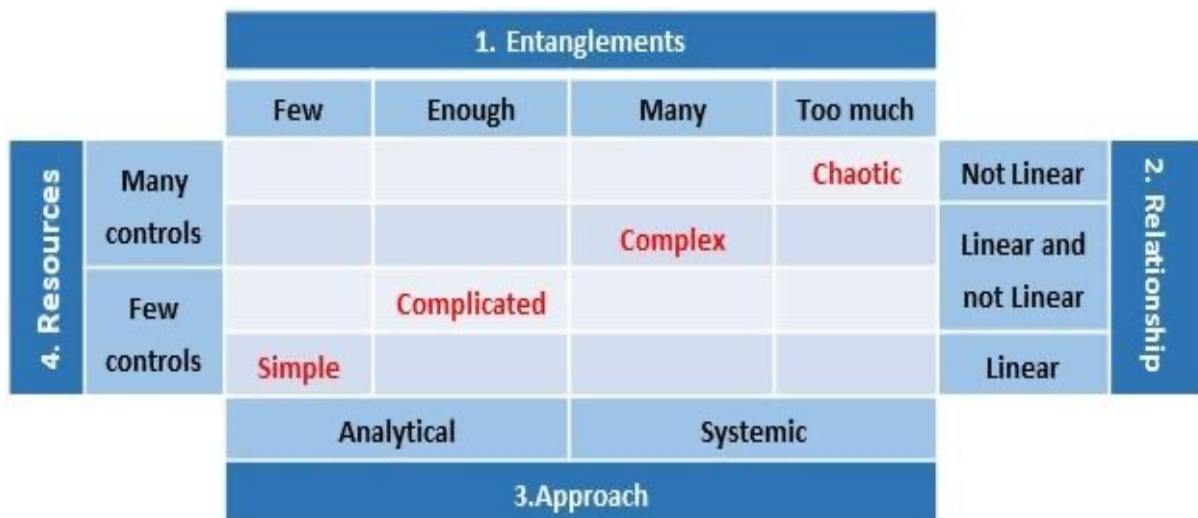
Source: Revision of Author of the scheme proposed by De Toni and Comello (2005)

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1 Complex comes from the Latin *complector* that means to understand, unite under a single thought.

2 The *philosophy of practice*: the difficult realization of theoretical principles. From Socrates to Kant and ahead, conjectures have been fed in facing the discrepancy between theory and practice. As a matter of fact, a theory, whether good it is, may not be consistent to the real world.

3 Bouchaud (2008) noted: "Modelling the madness of people is more difficult than modelling the motion of planets. But statistical regularities should emerge in the behaviour of large populations, just as the law of ideal gases emerges from the chaotic motion of individual molecules".

4 Gallegati well reconstructs the genesis of economy like a *science* and indicates some obvious limits. Walras (and Pareto) thought of systematizing it in the late 1800s on the model of *classical physics* to cleanse economic science of politics and philosophy, driven by that idea – still alive today – those technicians are better than politicians to manage the economy. It is evident, today; that the interaction between humans implies nonlinear relationships so, if anything, it was *quantum physics* that they should have followed. The basics of the economy are inadequate to understand and manage complex systems because they are steeped in determinism and refractory to heterogeneity and to eccentricity. Two very human characteristics, indeed!

Complexity is relative[5]: it varies based on the analysis depth of a phenomenon, resources available, time constraints and purposes to be achieved.

The human cognitive system is limited, so to solve complicated problems and make articulated decisions, it often uses heuristic processes: that is, the use of simple categories to solve complexity by successive approximations. The mechanism is adequate in most of the cases, but when issues are very complex, the decay of the process can quickly lead to gross estimation errors or easy solutions (totems, stereotypes). Therefore, often, what is unknown or different is called complex.

Bauman (2000) was the first to understand the ongoing transition from the 'solid and rigid' industrial modernity to the 'liquid and precarious' post-modernity. The content adapts to the container: workers adapt to the workplace, people adapt to the cities, consumers adapt to the product, often mixing environments, codes, and values. Recent years have only added to the traditional areas the digital one, perhaps even less reassuring because of the new risks: broadbandits, privacy, pervasive technology, mass surveillance.

In the *liquid society*, adaptability has become a value: the citizen has reduced his commitment to social claims, preferring an individual way to personal success. This process has transformed surreptitiously the individual who has adapted (or conformed) to the environment, assuming a softer, less defined, more ductile form until it becomes fluid in gender, social status, profession, economic role etc. This flexibility has often become precariousness or, more generally, uncertainty: in life, work, relationships, and rights too.

Technical, cultural, economic, legal, and social challenges need to be declined within the new digital perspective, nevertheless taking into account parameters linked to an evolving reference system, as a result of an unrestly expanding digital universe. This implies an effort of creativity to identify appropriate definitions and alternative measures.

To define this middle ground, in between analogic and digital, Floridi (2015) speaks of *mangrove society*: a mixture of salt and fresh water, where barrow and graphene coexist. The same disciplines have hybridized, contaminated, enriched: economy, law, computer science, psychology, sociology, math is used simultaneously to understand complexity. It is, in a sense, the revenge of general culture towards specialization. A paradox emerges in the study of the digital dimension: for the first time in history, we are not trying to understand one aspect of nature.

It is said that physics is what can be seen, chemistry what cannot be seen, biology what is alive.

We are trying to decipher the code that some person has created. More than research we should talk about the exegesis of a secular, contemporary, technological religion; new sacred writings not revealed but created (by some other people).

This paper aims to reflect on the commitment that technological change (Acemoglu 2002) will require to public institutions, private companies, schools, welfare, social relations, and personal capabilities in the coming years, stressing relevance on cultural elaboration as a key factor enabling people to be active part of progress. It is contradictory that in *knowledge societies* information asymmetry increases. For this reason, scientific dissemination – the *third mission*[6] of the Research – becomes fundamental.

The article will be structured as follows. Paragraph 1 proposes minimal literature. Paragraph 2 deals with private data, how they are generated, and the value they represent for the community. Paragraph 3 shows some quirks of the digital world and highlights the need for extensive cultural processing to accompany the ongoing technological change. Paragraph 4 addresses the issue of the role of the state in the distribution, storage, and use of data; it also introduces the idea of data as a public good. Paragraph 5 deals with a possible 'digital monopoly', that is, how technology is an instrument of power that should be controlled in order not to represent a democratic and economic danger. Paragraph 6 shows the profound implications these trends have on workers' status. The conclusions follow.

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5 Choosing a type of vaccine or a jam deserves a different cognitive effort.

6 This work is part of the Research Project: *Review of socio-economic indicators in the light of the digital transition* (Inapp PTA 2021-2023). Inapp has launched many studies to understand the epiphenomena and the socio-economic changes taking place in the eco-digital transition phase.

1. Essential literature

When thinking to the 20th century as the age of standardization (economies of scale, reductionism, average consumer, median voter), we can over look at the 21st as the era of customization (tailor-made medicines for the patient, personalized cars and so on).

Anderson (1972) wrote a famous article *More is different* against reductionism in Science and simplification of matters. We are witnessing in digital transition to a reverse diuresis: methodological reductionism is replaced by a holistic integration of the particular in the general (connection)[7].

Set up on the wake of Martin's work (1978) on Wired Society, the theory of the Network Society (Van Dijk 1991; Castells 1996), in its more general sense, refers to a community based on social and media networks. The *Information Society* – and then the *Digital Society* – is its evolutions, the result of further technology that increases the size of interactions, speed, and the power of processing. It is an escalation in the interaction of the elements that make up the community, it is the result of technical improvements and computer innovations, and it is the product of the convergence of the various devices and, therefore, the product of the exponential interactions that are created (digital multiplier). The social fabric is often unaware of this process. The transition is often suffered by people who are deceived by *Trojan horse-like techniques* (mass electronics, planned obsolescence, social networks) that have brought citizens into a new technological paradigm.

Van Dijk and Hacker (2018) highlighted how the public sphere has changed: from the mass society (analogic) to the network society (digital). The evolution of the relationship particular/general or individual/collective characterized *the connective society* (Rainie and Wellman 2012). Inevitably, technology has prevailed, and those who manage it have taken over, giving rise to the platform society (Van Dijck *et al.* 2018), where sociality is not spontaneous but induced and there is a huge asymmetry between the parts.

The web thrives on relationships: writers and readers; those who post and those follow; advertisers and customers; influencers and those who are influenced. These psychological mechanisms are fundamental because they make everyone part of the process, creating a community. Reciprocity is the strength of the web: it recognizes and guarantees everyone a role. Technology affects individuals, but this property is intransitive[8]. This corrupts the meaning of 'social', traditionally understood as community and peer relations, making the network's provider a predominant socio-economic agent, making the web illiberal and degenerating into a problem of democracy. The development of the platform society is in continuity with the process of transformation of the public sphere (Van Dijk *et al.* 2018).

The power of data is also the ability to connect intimately platform and user. We are experiencing a technological singularity: progress accelerates beyond our capacity for understanding. We can speak of an info-sphere (an ecosystem powered by Big Data) only if the volume of available data corresponds to the same processing capacity (Kersting and Meyer 2018).

The natural tendency of like-minded people to establish a relationship with each other through social media is amplified because the users change the structure of their social network by following someone, unfriending someone else, and so on. The result is that people end up separating into large dense and increasingly uninformed communities, often referred to *as echo rooms (or resonance chambers).*

Many times, individuals are so involved until they cannot recognize what is evident to those observing them from the outside. We can consider the *incompleteness theorem* formulated by the logician Gödel (1931), where it was found – trivializing – that only by leaving the rules of the paradox it can be solved (Davies 1992). In an echo room, many issues appear insoluble while they appear easily solvable or irrelevant from the outside, or you come to a stalemate, where you do not converge to an internal solution to the rules of the system[9].

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7 Logical discontinuity, non-linear relationships, counter-intuitive dynamics, lateral thinking resurfaces the irrational nature of human relationships, resurfaces the *animal spirits* of Keynes (1936).

8 Social networks, search engines, web platforms exclude, select, and manipulate unilaterally utilization conditions according to their own ethical codes, such as governments that issue laws.

9 An eminent example is the following: "The present proposition is a lie". If the proposition is true, then it is false; and if it is false, then it is true. It derives from an earlier medieval formulation: Socrates: "What Plato is about to say is false". Plato: "What Socrates has just said is true". A formal paradox not solvable with logic is easily solvable outside it, by deduction or symmetry or common sense (Russell 1903).

In addition, in many cases, some algorithms produce paths oriented according to commercial preferences, policies, research history, geolocation, marketing etc., the so-called *filter bubble*. According to Pariser (2011, 10), those algorithms create "a unique universe of information for each of us […] which fundamentally alters the way we encounter ideas and information". We find ourselves in a filter bubble any time we are only surrounded by views and opinions we agree with while being sheltered from opposing perspectives. Filter bubbles distort our understanding of the world and hamper our ability to make balanced decisions.

O'Neil (2016) called these application *weapons of math destruction*. The request to *democratize* algorithms begins to come forward (Morozov 2019) in the Marxist sense of collectivizing *the goods of production* or in the ethic approach (algorithmic fairness).

The algorithm often appears as a magic machine, an inscrutable arcane, a robot. The algorithm has taken on the role of the scapegoat too many times when it is, in fact, neutral. They are adjusted to achieve certain effects, the way they are set determines the results. The algorithm is informatics code – sophisticated, fast, and powerful – able to quickly find the solution to logical issues. Ruth Kikin Gil (Amerishi *et al.* 2019) says "Behind every great AI there's a great human", meaning that it is the man who makes the robot (and not vice-versa) but also that it takes human culture to better manage the machine (Brynjolfsson and McAfee 2011).

The algorithm is regulated by inputs, parameters, norms, limits, and operating margins that represent the degrees of freedom of the system, the operational perimeter of its action, and determine its choices, even the most ethically questionable ones. Algorithmic fairness is about ownership of the algorithm, not about the algorithm as a machine[10].

Fuchs (2014) come up with a systematization method on the development of processing the transformation of social media, their influence on adjacent disciplines, the evolutions (in technological terms) of the capabilities of communication systems, and many eccentric readings: the psychological, economic, legal, and social implications that the rise of these tools in the community has produced.

However, among the different implications, the work side of the digital platforms is the most relevant in social terms. Work platforms are generally of two types (De Minicis *et al.* 2021): online (crowd-worker) and on location (rider, gig worker):

a. *Web-based platforms*, in which the work is carried out completely online and mainly concerning image recognition activities, translations, programming, computer science and software. Tasks are broken down and recomposed through global platforms.

b. *Location-based platform*, in which the management is online, but the work performance is carried out offline. Workers – coordinated by algorithms – carry out activities concentrated in limited areas, realizing traditional services: transport, care, deliveries, assistance activities, and logistic. We can say that logistic workers are the new proletarians.

Nevertheless, what is most striking, is that Fuchs (2014, 2021), Van Dijk and Hacker (2018), Sholtz (2013) are observing digital capitalism with the Marxist lens of industrial capitalism. The undisputable similarities, the frequent analogies, the comparable dynamics raise strong and convincing suggestions. The outputs of the laws of the market, of the tendencies of capitalism, of the relations between workers and owners, are comparable. Marx's findings were premonitory of historical events produced several times worldwide in the 1900s. Marx himself states how "history always repeats itself twice: the first as a tragedy, the second as a farce"[11], predicting the repetition of the same dynamics in space and time and same reactions. We can see in many of his reflections a kind of prophetic capacity. This ability of Marx's writings introduces a psychoanalytic reading of socio-economic relations, for which the exegetes evoke – like wizards – premonitory suggestions.

The digital environment has become a further dimension of our day life allowing for all existing analogic activities to be somehow translated in it besides creating new ones, digital native activities not even having the classic (analogic) counterpart. "Tell me about your Twitter", Freud would say today. Johanssen (2019) illustrates how the digital

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10 For similarity, the person responsible for wrong conduct is the driver of the car, not the car as such.
11 In 18th Brumaio of Napoleon III, regarding the unequal stature between Bonaparte and his nephew.

dimension has become an important and pervasive aspect of personality, such as to get the attention of psychoanalysis. Social media become the theatre of personality's projections, and, at the same time, the cause of new paranoia[12]. This, briefly, leads to personality duplications as a function of social media and to a multidimensional behaviour that specializes in the field in which it takes place. Goldberd in 1995 introduced *internet addiction disorder* among psychiatric diseases (Cinti 2004, 6-7).

The pervasiveness of the digital society often attacks personal freedoms, democratic institutions, labour, and the common value set. With Big Data, AI, and Machine Learning the dilemma that involved physics or medicine reappears to be posing an ethical limit to scientific or technological possibilities. "With great power comes great responsibility" (Spiderman 1962), technology implies an ethic in use that is often inadequate for the power you handle.

2. Private data

There has been an intense convergence process in technology: the functions of hundreds of objects, professions, and knowledge have come together in a single device, more or less large, fast, or pleasant. The *fingerprint* we leave has thus made a tracing process possible in which everything – words, images, movements, and feelings – is enumerable. *Datafication* means converting a phenomenon into numerical form (Cukier and Mayer-Schönberger 2013).

Data is an inexhaustible mine. The volume of data globally produced is rapidly increasing, from 33 zettabytes in 2018 to an expected 175 zettabytes in 2025 (European Commission 2020). By the end of the next decade, we could have a trillion (1018) sensors running on Earth, most of which will not communicate to us but to each other.

In 2020, nearly 4.5 billion people accessed the Internet and created content for around 440 billion gigabytes. Google[13] processed 4 billion searches per day; the total searches were approximately 6.5 billion per day. Over 240 billion emails per day were sent. Facebook had almost 2.5 billion active users, YouTube 2 billion users, Instagram 1 billion, and WhatsApp 1.5 billion active users. Every minute we uploaded 50,000 photos to Instagram, watched 4.6 million videos on YouTube and published 90,000 posts on Tumblr, 300 new Facebook profiles, and 510,000 comments (Gs. statcounter 2019). The best is yet to come.

Big Data is for our society what strong wind is for a boat: it can make you go fast, but it is not easy to manage. The huge strength powered by Big Data must be handled with prudence, requires unconventional tools (quantum computers), accurate semantic analysis[14] (a photo has the same digital dimension of the Bible but not the same meaning) and information equipment (metadata).

When you have a huge information set, the distortion corrects itself well. Consistency – in the scale of Big Data – is understood as a ratio between millions of bad records (unmatched, missing, and wrong) and billions of good records: the result is an excellent confidence interval and outstanding levels of reliability of estimates.

Maybe worth to lay a short digression on data characteristics and sources.

The hierarchy of data sources is as relevant as that of laws.

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12 Increasingly, technology appears as a black box. The operation of a smartphone or an artificial intelligence is inscrutable to most. This implies having faith and a consequent loss of control. History teaches that there is a direct relationship between ignorance and fear, and this generates a demand for reassurance often supplied by the supernatural. Today, the need for the transcendent is increasingly satisfied by technological products that enjoy real 'Digital Virtues': *Immanence* (being in our life), *Transcendence* (being out of real life), *Ubiquity* (being everywhere), *Mercy* (makes you feel good, solves), *Special Relationship* (it is all for me), *Foresight* (anticipates you, shows you the way), *Faith* (reliability, trust), *Liturgy* (conventions, codes), *Church* (operating system, community), *Clerics* (masters, administrators) (Mandrone 2018).

13 Google processes over 40,000 search queries every second on average and 1.2 trillion searches per year worldwide. (Internet-stats 2019). 18% of queries that are asked every day to have not been asked before. Every query must travel on average 4,500 km. A single Google query uses 1.000 computers in 0.2 seconds to retrieve an answer. Google holds 92% of the market share (Gs. statcounter 2019).

14 Umberto Eco (1994) had stressed the growing relevance of semiotics within specific fields, also considering what could already be expected by web technologies development. On this regard, he had noted an impressive increase between themes in agenda at the 1st International Congress of Semiotics (Milan 1974) and those dealt in the 5th (Berkeley 1994). Within 20 years, new issues had definetely come to the attention of the scientific community, such as: Metatheory, Biosemiotics, Artificial Intelligence, Science Cognitive, Analysis of political discourse, Cyberspace, Legal Semiotics, Media, Process marks in humancomputer interaction, Postmodern, Library and information sciences, Cold war analysis, Medical semiotics, just to list some.

The data can be:
a. Structured primaries (from a survey or register)
b. Unstructured primaries (machine data, images, text, tweets, likes)
c. Secondary (derived from primaries).

Only 20% of the available data is in a structured form (tables, list) while the other 80% is not structured (free text, images). Human tasks generate only 20% of the information. Web scraping activities become relevant for the extraction of data from sites through specific software. To paraphrase Sraffa (1960), we could talk about 'production of data by means of data'.

The creation of secondary data often occurs by data-lysis: an information component is detached from a specific structure (survey, archive, IoT[15], and web) and joins another element creating a new component. This process generates specific features with their own properties.

Data brokers and web providers collect information and resell it to data empowering companies that, combining (aggregate, enhance, and model) it with other data (biomedical, financial, georeferenced), activate an enrichment process producing a kind of supercharged information.

This process exposes the quantitative information to a strong *hetero-genesis of the ends* because the data diverge from the original purpose. There is an underestimated epistemological matter relating to the reconstruction of phenomena from the observation, understood as measurement and inference. If a query on a questionnaire, a line in a text, a face in an image can provide adequate information to represent specific phenomena. How much of reality is omitted, how much heterogeneity is compressed. The result we have obtained can help us to make corrections, policies, services, or is only a part, perhaps distorted, of the truth.

Data mining becomes decisive to extract *salient value:* the ability to find the unexpected (serendipity) applied to huge amounts of data, for the Law of large numbers, becomes more than a pleasant surprise: it

is an expected value.

An abundance of data was available during Covid-19 and yet there were many opposing interpretations not allowing for effective comparisons between regions and countries.

Statistics based on unclear data, lacking precise criteria, lead to breakable, shaky and temporary measures. It is a plastic example of how only harmonized statistics allow effective analyses.

When the change is considerable, the transition to a higher order is not a trajectory that takes place but a real change of status. To the same extent, technological change needs to be accompanied by a cultural elaboration enabling to break the 'fourth wall' in science, while promoting those specific skills needed to manage uncertainty as well as the general knowledge to understand complexity.

People are more and more called upon dealing with multiple issues, thus resulting exposed to an increasing degree of uncertainty. Individuals are constantly exposed to an array of choices: ranging from credit cards to pension choices, from property valuations to labels, from tariffs to utilities, from hydrogeological or seismic risk to dangers connected to speed, vaccines, and contagion. As a whole, at the stake is the ability to distinguish truth from prevailing opinion (often in reputations, ratings, or likes), on this regard reminding to what Kierkegaard cautioned that numbers don't decide the truth (Mauriello 2015). Therefore, uncertainty[16] pervades all areas of our lives, so there is a growing need to equip people with the right tools allowing for *informed choices*. In this sense, the commitment of a public regulator is extremely hard: the citizens of the knowledge society need to possess sensitivity, culture, and good data available so to do as much informed choices as possible and resolve general and specific dilemmas.

Our society, typically, is governed by *vertical relationships*, where there is a hierarchy between those who teach and those who learn, between doctor and patient, between expert and client.

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15 'Internet of Things' describes a general network of things linked together and communicating with each other (Miller 2015).

16 The cultural change is like that occurred in the early 1900s when Heisenberg's *uncertainty principle* definitively diseased the idea that reality was governed by universal laws, and so classical physics was supplanted by quantum physics. Translated into the socio-economic sphere, this uncertainty leads to a kind of *quantum state* (Mandrone 2014b): an idea of institutions, rights, protections more nuanced, since it is conditioned on resources and personal situation.

Instead, in social networks, frequently, there is a *horizontal relationship*, between peers, in which the credentials of those who support something are not known, in which the knowledge of a speaker is not accredited by titles or licences but is based on relative and informal references.

Such a *flat architecture* contributes to the *echo rooms* in which the opinions are simply confirmed and amplified, uncritically. Echo rooms often become digital eddies: reels of obsessive messages that overwhelm the community (followers, users) generating psychological pressures, often dragging the weakest to the bottom. For the most fragile, inexperienced, lonely, young, echo rooms can become a real addiction leading to behavioural and social deviances. From food to aesthetics, from music to common values, a curvature is produced that leads the individual to conform to negative patterns. A long-time process started with newspapers, continued with TV, and exploded with the web.

The Internet is a formidable propagator of information but, since anyone feeds contributions on the web, every time you rely on a suggestion, there is a risk that it is incorrect, it is *like peeking at the desk mate's task:* it can be right or wrong[17].

There is not only a lack of information; there is also a poor understanding of (correct) information. Misperception creates unmotivated anxieties and wrong beliefs. The side effect of this permanent expansion of data is a reduction in the disambiguation capacity provided by the information, understood as the ability to bring the truth. The achievements of science require alternative metrics, new ontologies. The error in measurement can become the cause of the crisis of values: in other words, the cardinality in the value set is compromised.

Writing thousands of lines of code implies great skill but also the impossibility of transferring that knowledge to others. Documenting the procedure makes the information assets intelligible in a relatively easy way; otherwise, it is sterile knowledge, which implies much time in coding, interpretation, and transcribing of syntaxes. To avoid the risk of the 'lost in translation' the reproduction of knowledge and its transfer is crucial.

To this extent, both citizens and institutions must preserve the system of official international statistics. Measuring and comparing the socio-economic dimensions of such heterogeneous territories is a public heritage to be defended and encouraged.

3. Digital oddities

To produce the information you need statistical treatment, computing power and interpretative capacity. Social media, basically, are communication systems where the strength of the signal depends on the intensity, quality, effectiveness of the transmission.

Relying on measurement tools based on social media (exposed to manipulation, censorship, fake news, augmented reality, and marketing) is hazardous as it could under-estimate large but silent phenomena not concerning trending topics. An accurate diagnostic tool has always to guarantee a precise measurement, such as a thermometer, a compass, or a watch.

In the digital world, the speed in the propagation of information (trends) and distribution of goods produces a space-time collapse, expanding the present and contracting past and future. Geographical references such as far or near, north, or south and the orography, are reset. The emotional intensity of the needs (visibility, consent, possession) has a half-life of a few hours, requiring *instant satisfaction*. We need to be prepared to non-linearities that conflict with our values, economic hierarchies, and social conventions.

Machine learning or the AI[18] pick up many signals, finding countless useful connections and highlighting precious regularities but also many spurious or not significant associations. The concept to refer to is known as *Garbage in, garbage out!* If a measuring instrument is unreliable, uncertainty increases. Much worse than the absence of evidence are incomplete and badly collected data and mistakes. Partial measures often produce "more noise than signal" (Silver 2012), creating more uncertainty than they intended to solve. Believing something as true, when it is actually false, is a

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17 Web users are exposed to the *Dunning-Kruger effect:* a cognitive distortion that produces in an under-experienced individual an overestimate their skills, by proving to be often very bossy.

18 What is artificial intelligence? An example is *alpha zero*, software to play chess, which thinks on its own, with moves that no chess master would recommend to their apprentice: develop the queen before the other pieces, move several times the same piece in the same opening sequence or leave the king uncovered by using it with offensive purposes. Aggressive and eccentric - more than human - creative, free.

much worse condition than knowing nothing.

The epistemological implications are relevant: the measurement of a complex system is itself part of the phenomenon.

Statisticians are often called upon to estimate phenomena in presence of partial information[19] or resolve the problem of latency, the gap between the impulse and the system response. There is a trade-off between the accuracy of the estimate and the timeliness of the data. In politics, economics, logistics, and many other areas, the effectiveness of the response is more important than the efficiency of the result: better being timely than being precise.

Is Big Data for Official Statistics an opportunity or a trap? Is the advantage of having additional quantitative indicators greater or is the disadvantage of having competing data greater, of which little is known in terms of quality, reliability, accuracy, availability, and of all those trappings that make a datum an official datum? The European Statistical Governance precisely calls on the role of contrasting bad or false information, to overcome the paradox that the most open, transparent, and connected society is not much more aware of the past.

Google Trends or Analytics (to name the most famous) allow the creation of series based on keywords related to specific phenomena such as unemployment (key: 'looking for work') or the real estate market (key: 'mortgage') (Fasulo *et al.* 2017). The selection can be very accurate and correct any side effects (such as, for instance, when Steve Jobs died: the job search series associated with strings containing 'jobs' grew reflexively), however, it is still based on word types in a search engine.

Since Big Data is based on queries that are classified, enumerated, and weighed based on algorithms that evolve, there is the danger of making comparability disappear over time, with the resulting problem of comparability in the series. Furthermore, Big Data may suffer from selection bias, whose functional form we ignore (since data acquisition is not controlled), and the sources rarely give information on the distortion of the data collected, on the coverage of the topic, or the choices made (imputations, reclassifications, approximations). Let us consider the *Social mood on the economy index* (Zardetto 2018) carried out by the Italian National Statistical Office. The analysed string contains keywords or evocative or techniques that should precisely identify a set of reactions prompted by events falling under the 'Economy and Welfare' theme.

Chart 1. Social mood on the economy (daily Index and moving averages)
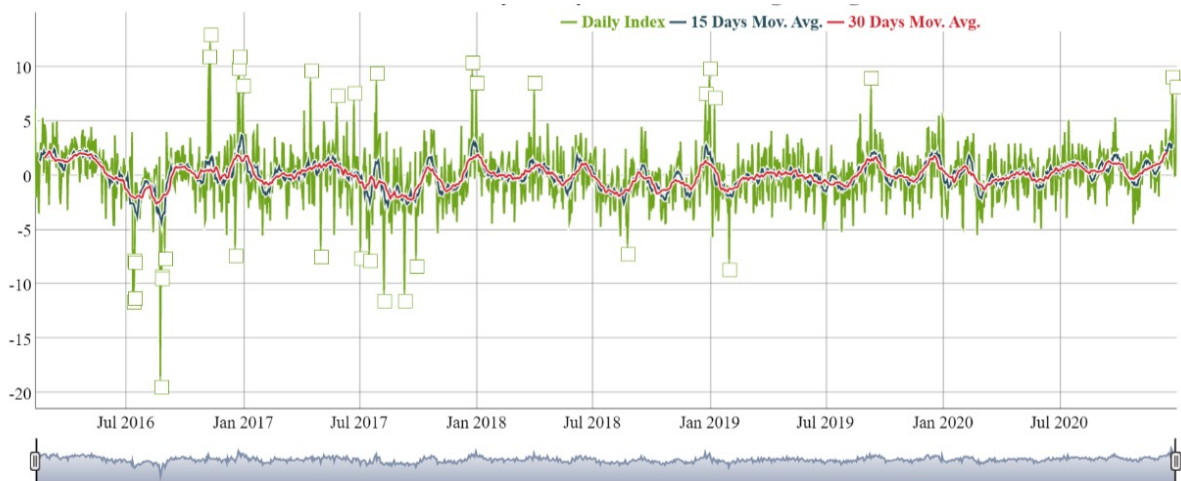
Note: Social Mood on Economy Index, a daily measure of the Italian sentiment on the economy based on twitter data. Web-site view dated back to December 2020. Continuously updating, available at: https://bit.ly/3JYY6uR.
Source: Istat

19 A famous example concerning survival bias refers to the British planes hit in battle and returned to base in World War II. The analysis of the shots on the cockpits showed white areas, without shots, and red areas often hit. The first, erroneous, conclusion was to reinforce the aircraft where they were most frequently hit. The points where they were hit were not vital parts of the aircraft, so much so that they returned to base. Those who had been hit in the other points (the white areas) obviously neuralgic for the aircraft had not returned so they were the missing observations. These evaluations emerged thanks to systematic checks (performed by Wald), but in daily life, these phenomena can lead to interpretative errors.

See Chart 1. The *bad markers* are events that have led to adverse reactions on social media, due to news such as high unemployment among young people, low female labour participation, worsening indications on social security requirements, and very low-income data. Instead, the *good markers* recorded comments relating to the good news: reforms in favour of women, numerous hiring of teachers, and Pope's exhortations about the economic trouble.

This rigorous, correctly, and widely documented work, describes how data analyses should be ideally presented, stressing how the Twitter data generation mechanism does not fall under the direct control of the statistician and is not known. These characteristics radically distinguish these analyses from statistics derived both from traditional sample surveys (whose design of the instrument is controlled) and from administrative sources (whose data generation mechanism is identified). No methodology guarantees the general validity of the statistical information derived from social media and, therefore, cannot be considered a representative sample of the population and cannot be guaranteed to be accurate (Zardetto 2018).

Superficial associations between digital variables are not a causal relationship[20]. Many analyses feed on para-data obtained from partial counters, unknown algorithms, or detection instruments not orthogonal to the observed phenomenon, so the measurements are not independent of the phenomenon. Statistics that are based on insignificant data produce breakable and inaccurate measures[21]: *ceci n'est pas une statistique!*

Poincarè (1905) noted that the accumulation of data does not equate to knowledge, as a pile of bricks is not a house. One hundred years later, Anderson (2008) claims that there are sensor everywhere[22]. Infinite storage. Quantic processors. Our ability to capture, warehouse, and understand massive amounts of data is changing science.

A traditional approach to science – hypotheses, models, tests – is becoming obsolete. There is now a better way: correlation is enough". Who is right? When Google guesses what we are intended to search or Amazon suggests the object we are looking for, are their algorithms using traditional logic (deductive approach, scientific method) or are they processing by repeated refinements (evolutionary method, heuristic approach) simply by exploiting the computing power?

The explanatory capacity of secondary data is closely linked to primary data. The relationship is direct but not causal. Big Data, according to a framework built by official statistics, can explain their power in a controlled environment. Big Data can offer proto statistics in areas without specific quantitative references (rural contexts, emergencies, epiphenomena, minor issues), performing a valuable *statistical advisor* function.

The recent exogenous shock represented by the pandemic is a natural experiment on the robustness of these indirect measures. We observe how the relevance of many matters falls by the pervasiveness of the health situation. Without official measurements, should we conclude that unemployment, migration, crime, hydrogeological instability, or poverty is no longer a problem since the signal is low?

The captivating graph and convincing slogans do not support themselves. There is an aesthetic matter[23]: a good/bad shape corresponds to a good/bad substance. The success of smart statistics also lies in visual aids: charts, tables, infographics, and presentations, *statistics prêt-à-porter*.

The excess of information has generated strong competition to get people's attention. The Nobel Prize Simon (1971) observed: "What information consumes is quite obvious: it consumes the attention of those who receive it". Two main consequences of *the attention economy* are the loss of high-quality information and the tendency to false starts. So,

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20 *Causality:* an event (cause) determines another event (effect). *Correlation* doesn't imply causality.

21 Du Bois in 1905 (Du Bois 2000) to distance himself from an aprioristic way of doing research introduced the idea of *car-window sociology* to stigmatize the analyst who superficially observes a phenomenon and tries to interpret it based on his senses, his experiences or reference anecdote. Perhaps via dialectically convincing considerations but without leveraging serious quantitative evidence. On the contrary, with the availability of abundant evidence, we risk falling into the opposite error: *sociology in vitro.*

22 There are about 8 apps that track users' habits, including their location, for each smartphone.

23 *If you kill a bug, you are good; if you kill a butterfly, you are bad.* Such an image sounds as evocative of what we find in Nietzsche's aesthetics of morality.

irrelevant facts take on an excessive and unmotivated relevance, such as *99 Luftballons*[24].

Disintermediation in the digital world is extreme. Producers and customers, politicians and voters, rock stars and fans are directly in touch. Forums, blogs, specialized networks connect people according to their needs, preferences, requirements. The Internet reduced the famous 'six degrees of separation' between two strangers, at least apparently, since many interactions are not real but virtual (managed by teams, AI, chat-boat, machine learning). Thus, formally, the incommunicability has been reduced (since everyone can communicate with everyone) but relationships are increasingly arid, and alienation has grown. The misunderstanding lies in the type of relationship: the fact that you can connect does not imply having an actual relationship with the other person. "I am not friends with an airline or a restaurateur just because every time I send an email the website replies".

4. Public good

The State – in Europe – is an active economic entity: it both produces and uses, controls and regulates, relaxes or intensifies its action, compensates the economic cycle or intervenes in case of failure of a sub-market. What role does the State play in the web society, in the digital world, in the era of Big Data? Data management represents a challenge in which the double role of the public sector – controller and player – remains.

The European strategy for data set by the European Commission (2020) notes that the data-driven innovation will bring enormous benefits for citizens, for example through improved personalized medicine, new mobility and its contribution to the European Green Deal. In a society where individuals will generate ever-increasing amounts of data, how

the data are collected and used must place the interests of the individual first, following European values, fundamental rights, and rules.

Indeed, the updated General Data Protection Regulation (GDPR) indicates that individuals own their data, regardless the context: spoken communication, written communication, financial transactions, supermarket spending, tax payments, criminal record, camera lens recording, SMS, device microphone recordings, social network, Internet browsing habits, biodata, GPS location, fitness, food and clothes preference. Can we set up their usage, respecting stringent privacy parameters[25]? Can we limit it only to someone (friends, State) or for certain uses (Health, Security)[26]?

This accumulation of signals represents, as stated by the European Commission, an intangible heritage. But is it public, or private? Why is it not regulated like the railway network? The digital environment, in line with the original spirit of the web, should be "not rival to and not excluded in use" the public: the GPS[27] can be considered the prototype of a *public digital good*.

A significant deception is the apparent gratuitousness of digital services, typical of public goods. The service used is paid for by transferring our identity, tastes, political orientation, and the images we share on social networks, our digital fingerprint that we leave each time we make a phone call, a search, or pay something. This cooperative and non-competitive dimension hides an underlying opacity. To achieve digital freedom, we will have to buy the truth on the web and, if ever, deduct it fiscally. Yet, we pay a fee to drive, to build, to trade.

President Von Der Leyen announced in 2020 that Europe should secure digital sovereignty with a common vision of the EU in 2030, based on typical European principles: European Cloud, leadership in ethical artificial intelligence, secure digital identity for all, and vastly improved data, smart city and areas,

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24 Nena (1984), the song lyrics is about 99 red ballons flying in the air, so triggering an exaggerated reaction from the air force.

25 *Informed consent* cannot be solved only by searching for the tick off to close the cookies' pop-up or quickly fill the approval space or move the mouse to activate the voluntary check. It is necessary to define which data we are willing to communicate as well as the relative conditions (social profile, behaviours, tax status or legal reputation).

26 Covid has shown how scientific research could improve through collaboration rather than competition. The health emergency blew up the time of peer reviews and bureaucracy, led to quick funding allocation, and the data was made available by all research teams. This approach led to effective vaccines in 1/3 of the time.

27 The Global Positioning System is a global navigation satellite system made up of a network of 26 satellites. GPS was originally developed for use by the U.S. military, but in the 1980s, the Government allowed the system to be used for civilian purposes. GPS satellite data is free and works anywhere: a device can retrieve location and time information in all weather conditions, anywhere on the Earth.

innovative firms, supercomputers, and connectivity infrastructures. The digital transformation is a condition to realize a sustainable economy and an ecologic transition.

The 2030 European Digital Compass (European Commission 2021) has four cardinal points: 1) *skills*: citizens with digital skills and highly qualified professionals in the digital sector; 2) *infrastructure*: sustainable, safe, and performing digital infrastructure; 3) *business*: digital transformation of companies; 4) *governance*: digitization of public services.

The EU will include a set of digital principles and rights in the European Pillar of Social Rights.

EU Fundamental Rights: a) Freedom of expression, including access to diverse, trustworthy, and transparent information, b) Freedom to set up and conduct business online, 3) Protection of personal data and privacy, and right to be forgotten, 4) Protection of the intellectual creation of individuals in the online space.

EU Digital Principles: a) Universal access to internet services, b) A secure and trusted online environment, c) Universal digital education and skills for people to take an active part in society and in democratic processes d) Access to digital systems and devices that respect the environment, e) Accessible and human-centric digital public services and administration, f) Ethical principles for human-centric algorithms, g) Protecting and empowering children in the online space, h) Access to digital health services. For a long time, statistics have been regarded as a technique serving other disciplines, now statistics have gone from data collections[28] to operating parameters: from analysis tools to policy tools, taking an active role in the allocation of public resources, in profiling users, in creating value. When

thinking about research, the thinking runs to biology, physic, or technology. Social sciences appear as a form of intellectual speculation. However, if the high life expectancy of our country is largely the product of genetic heritage, of the Mediterranean diet, and public health, the contribution of statistical risk management is also relevant. Social security, insurance, and prevention contribute in a tangible way to the care, well-being, and life expectancy of people – especially the least wealthy or educated – no less than tomato paste or antibiotics. Data driving public choices need necessarily to be falsifiable[29] (Popper 1934) and transparent. That including proper methodologies and yield reproducible results. Public statistics must guarantee impartiality, completeness, quality, reliability, independence, and confidentiality. Only then the evidence[30] obtained can be the basis for independent evaluations and aware choices. This is the Next Generation EU approach. We have in Italy a complex regulatory system, in which the formal component takes precedence over the substantive one. Priority is given to *ex-ante* formal control, not on ex-post real control, thus not conducting a rigorous assessment of the process. Formal fulfilment is preferred to substantive responsibility. We take advantage of the prerogatives of a modern digital process, instead of digitizing a process designed in analogic terms[31] (digital bureaucracy). The fluidity of procedures characterizes the different approaches that followed. We see the evaluation often *as a literary critic* ready for slating (Mandrone 2014a). Instead, it should be interpreted as a coach who promptly corrects the wrong behaviour. The health crisis has brought scientific evaluation to everyone's attention, the importance of evidence resulting from controlled and transparent studies. Vaccines are like bridges, like schools, like subsidies: collective tools for

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28 There are no technical limits to the convergence of multiple sources in an integrated system; digital incommunicability is zero, the degrees of separation have dissolved, and the technical problems have been overcome. The enrichment of the data and its use is now more a legal or political issue.

29 Falsifiability (or refutability) is the capacity for a statement, theory, or hypothesis to be contradicted by evidence. The forgery process gets a solution to both the problem of induction and the problem of demarcation. This method identifies science (refutable) from non-science (not refutable).

30 If the references are opinions, anecdotes, or rumours, it is not possible to proceed according to the deductive method and it does not converge in a univocal and shared solution.

31 When we use private providers (online companies, social networks) you fill in the personal data only once, then the various suppliers pass the basic information of the users (or consumers), to authenticate each other, adding additional details. Among public players, each subject (local authority, national institution, and agencies) asks each time for the registry, because they are not in synch. Reliability technology and information protection can only partially additional procedural constraints.

the protection and well-being of the community, and they deserve the same attention.

In Economics, many theories have become ideological symbols, cultural flags and even dogmas. The 2021 Nobel Prize in Economics David Card (together with B. Krueger) already undertook in the 80s a battle against *myths* in favour of *measurements* surrounding some neuralgic passages of the economy. The method has always been the prerequisite for a scientific reading of phenomena - especially social ones - for which it becomes difficult to identify causality, the direction of relationships, the magnitude of interacting factors.

Martini and Sisti (2009) propose that before adopting a large-scale public policy, it is useful to start a pilot project on a limited group of subjects to verify its effects. The Randomized Controlled Trials provides that two groups – 'treated' and 'untreated' – are constructed by drawing lots, so on average have similar characteristics (statistically equivalent) and lays the foundations for making a comparison on equal terms in possession of their components (evidence-based). The parametrizing of the prototype gives us some useful evidence to understand if the intervention has a significant and positive impact, in which contexts it best works; if there are unwanted side effects; costs, benefits, population coverage and so on.

To provide exemplification of such methodology, a scheme follows.

Statistics can make you drive safely[32], make you live for a long time, free you from the induced needs, avoid you to look for the answer in tarot cards, protect you from epidemics as from scams. Often, applied statistics could have prevented congestion in services or malfunctions, reduced waste or social costs, and significantly improved people's lives: from school to health, from work to retirement.

It should be clarified what is meant by a statistical forecast[33]: science is not a *fortune-teller*. The scientific forecast is a projection, the precipitate of information that is stratified, of trajectories that are accomplished: it is more ballistic-like than to a conjecture. A very topical issue is preventing an event[34] (criminal, natural, social, economic) and managing it proactively. A good example is health prevention: based on past evidence, it corrects behaviours or attitudes that are harbingers of negative outcomes in the future.

Technology continually offers new applications; it is up to us to make them opportunities.

Some new applications:

- *Homomorphic encryption* to perform calculations on encrypted data without decrypting it first. It can be used for privacy-preserving, for example, predictive analytics in healthcare.
- *Blockchain* is a freely accessible distributed register of transactions, based on the consensus

	Randomized	Features	Group	Policy	Outcome	Effective
Sample population	🎲	Statistically equivalent	Treated	Experimental	Y(t)	Y(t)-Y(u)>0
			Untreated	Control	Y(u)	

32 Humankind has shown a particular inclination for irrational behaviour. However, when artificial intelligence faces social dilemmas (Axelrod and Hamilton 1981) their choices are rational. Very good? Who wants to drive a car that may potentially kill you to save the lives of others? (Bonnefon *et al.* 2016).

33 Krugman uses Isaac Asimov's Foundation Trilogy (written in the early 1950s) to illustrate the potential of Big Data, artificial intelligence, and machine learning. The novel is set in the future, the events concern society's evolution, not technological gadgets, laser beams, or monsters. The main theme is psychohistory: the mathematical management of individual behaviours and related social interactions. For general people, it could be like our micro-simulation models. This novelty is an opportunity to practice making troublesome decisions: the composition of the particular interest with the general one, though often painful and unpopular choices, exclusively based on quantitative evidence. Krugman notes that in the novel there are prophecies but without mysticism: Seldon's foresight comes from mathematical skills.

34 In a famous exercise carried out at the University of Cambridge, S. Popov (2015) illustrates how psychometrics - understood as behavioural prediction models - observing 10 likes can predict some of our behaviours better than our colleagues; by increasing the information set on the observation of 300 likes, the AI recognizes our preferences better than our mother.

that takes place among the participants of the network, certified by encryption and digital signature. It overcomes centralization and hierarchic logic to move to a distributed and horizontal form.

- *Non-fungible tokens* are tokens that are bound to unique digital items. This means they cannot be divided into smaller pieces; you cannot send someone just a part of it; NFT could be used for domain names, certificates, art, medical reports and much more! You are in full control of your NFT tokens, and it is possible to trace the first creator and the date of publishing.

- *Digital nudging* is a technique that produces pervasive effects. The persuasion techniques should be regulated, especially if used on a large scale and for questionable purposes (political elections, adolescent behaviour, and mental traps). The digital environment often used the technique of Nudge[35] (Thaler and Sunstein 2008) to induce needs, fashions, belonging, orientations, and trends on the web.

- *Gamification* is introduced as a didactic tool for *deep learning*[36] and learning rules in a fun way. Thus, almost unconsciously, by trying to win a game, people become experts in certain topics or able to control complex equipment or understand complex social or economic dilemmas. Sometimes things get out of hand: there are role-playing games that lead people to alienation. Some people prefer virtual relationships to real ones. There are military training activities that hide the real consequences of certain behaviours, developing automatic reactions, so that when the player switches from simulation to reality, he does not have the slightest moral hesitation about what he is doing. Digital dopamine flows from games, smartphones, or social media. Besides, a soldier could remotely bomb a village with the triviality of a Little Boy playing a game on the PlayStation. Insensitive, without ethical implications for what he does.

- *Digital zombies.* Deep fakes will devastate society. Interviewed by BBC, Hawking (2014)[37] had expressed his view about AI, as something revolutionary but potentially devastating in our society, unless arranging the necessary knowledge enabling to recognize and manage potential risks. Which seems to be quite a common feeling, if Sundar Pichai (Google CEO)[38] too, admits there are well-founded concerns on the matter. The jeopardy of detachment from reality is serious. They are digital constructs so much so that the reality behind them is impossible to identify. They can manipulate a political leader's speech or a partner's phone call, the smile of a deceased loved one or the world cup final (making you play as a striker). The original purpose could be entertainment or the automation of routine activities, but the applications could get out of hand: distort democratic confrontation, erode trust in institutions, undermine public safety, manipulate information, and produce avatars that distract from real life.

- *Ecological implications.* Service variables, transcoding, mirroring, backups, love messages or holiday photos are metabolites of the digital process. Each ecosystem requires saprophagous agents that eliminate rubbish. The intensive use of PCs, servers, crypto technology (blockchain, bitcoin), and telecommunication networks are energy-consumptive. The Internet uses 10% of the world's electricity, with emissions equal to all international air traffic. The energy consumption of AI doubles every 3.4 months.

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35 Nudging proposes positive reinforcement and indirect suggestions to influence the behaviour and decision making of groups or individuals. The critique: nudging does not help people make long-term behaviour changes, it is a paternalistic approach, and tends to homologation and conservative mood.

36 Human capital and productivity are strictly connected. Chan, Zuckerberg, and Gates have identified AI as a surprising and effective educational tool for better-personalized learning. On this regard, Couch (2018) – among the few beside Steve Job since the very early stages of Apple – wrote a book which title, *Rewiring Education: How technology can unlock every student's potential*, is more than evocative.

37 Full videorecorded interview available at: https://bit.ly/35dAWku.

38 See Pichai participation at Davos 2020 (World Economic Forum, Annual Meeting): *An Insight, An Idea with Sundar Pichai - Quantum Computing*, available at: https://bit.ly/3nWqggH.

Video games in the United States alone absorb 2.4% of household electricity, generating emissions equal to 55 million heat-engine cars. Mining a dollar of Bitcoin takes 3 times more energy than making one out of gold. Greenpeace's Cleaning Click Report measures the ecological footprint of the digital industry: Google, Microsoft, Amazon, Facebook, and Apple have promised to become carbon neutral by 2030, and carbon negative by 2040. Therefore, the type of energy source used to power the technological infrastructure of the digital world determines its ecological impact. The digital expansion, considering that the bit also has its mass, has physics effects: Vopson (2020) believes that digital data will soon overwhelm our planet.

5. Digital Monopoly

A handful of businesses decide the fate of the web and make huge profits that are never adequately taxed, and they are known as digital nobility. Why does the web escape public control? The function of the public service – well present in many sectors such as infrastructures and telecommunications – is to have control of the system since an asset of general and strategic interest for the country is not fully realized for the web. Are social media new commodities? (Dyer-Witheford *et al.* 2019; Morozov 2019; Fuchs 2021; Sorice 2020).

The economic power of the big-tech companies is a typical problem of monopoly: we know what to do in these cases. Antitrust is one of the milestones of capitalism but does not manage digital concentration and does not correct the dominant position on the web. The web-tycoons are not so different from the great monopolists of the 1900s.

Men build conventions: rules to avoid getting hurt. Telephone licences or maritime law or the highway code. On the web – and more generally in the digital world, heavily armed with technology – every rule is passed off as a brake on progress, a constraint on the potential of the system, a reduction in individual freedoms. If the monopolists of the twentieth century (ship-owners, oil companies, industrialists, editors) were seen as a problem for competition, democracy, freedom, today their digital counterparts are seen as pioneers[39] and not as technological oligarchs. The size limit, a very clear physical parameter, which held back the excessive economic expansion or industrial concentration, fades and becomes inconsistent in the digital dimension[40].

The shyness of the antitrust is a problem. After years of praising their virtues, governments across the world are belatedly waking up to the problems posed by big tech (Srnicek 2019). Governments did not hesitate to regulate[41] natural monopolies where the services provided were essential public goods. Are web networks, search engines, and digital platforms public utilities[42]? If the answer is positive, they must work for the common good and not just private profit.

A hearing in the U.S. Congress[43] with web giants exposed all the difficulties that public authorities encounter in regulating their actions (Polo 2020). Barca (2019) asks to regain collective sovereignty over data through hubs, search engines and public social networks, and ethical data driven. The Public regulator finds it difficult to follow technological developments and continuous hybridization in the digital world: the rules age so quickly that they do not unfold their restorative effects.

The European Court of Justice, with Judgement

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39 The misunderstanding is the same as with the hacker. He is seen as a *charming pirate*: halfway between the adventurer and the bandit, a skilled sailor, a wandering cybernetic with equivocal morality, who hoists the flag that best suits him and if there is to raid, he does not back down.

40 Nothing is preventing a company from collecting data in the absence of common legislation at the planetary level. Many companies have bases in data-havens.

41 In many areas, the production of public 'goods and services' – of general or local interest and the provision of constitutional rights – can also be provided by private providers. But the public regulator – the entity implementing the rules democratically determined by the community – defines the perimeter of the functions, the characteristics of the services, the discipline of supply, and supervises the real and compliant provision of the 'public good or service' by the supplier.

42 Evgeny Morozov (2011) proposed to *socialize* data centres: servers, supercomputers and Big Data are too powerful and important tools to remain in the hands of digital oligopolies. Digital socialism?

43 Some Senators of Congress argue: they have too much power, are censoring political speech, spreading fake news, and killing the engines of the American economy.

C311/18 (modified in 2020)[44] made the US-EU agreement more stringent (no. 2016/1250 "GDPR") based on the assumption that U.S. law and practice do not ensure the data transferred to that country has sufficient protection against access by public authorities.

Currently, the strongest are Amazon web services (in 2019, it totalled $35 billion in revenue, 280 in revenue, and annual growth of 37%). Then there are Azure (Microsoft), Google, and Alibaba. Europe is not on the list. In 2025, the European data economy will be worth € 829 billion: much of that value, along with valuable information, will go to America and China.

Germany and France propose the European alternative: Gaia-X, a federated platform on the model of the GDPR. The goal is to retain much of the value generated by cloud platforms in Europe. Italy has realised the importance of governance for innovation and digital in the PNRR and therefore adheres to the project Gaia-X to provide Europeans with tools[45] that respect our values.

An interesting proposal to protect the web, albeit not simple to operate e, comes from its founder Berners-Lee: *a contract for the web* (contractfortheweb.org). Nine general principles[46] integrate privacy and human rights, intellectual property, the contrast of fake news[47], the use of Big Data and digital identity. The mood is positive, proactive, as it was thirty years ago!

Google (and social media in general) needs all of us. Our insignificant events (messages, photos, writings, choices, consumption) are the basis of very sophisticated analyses. The strength of Google is that ability inexplicable to most – almost paranormal – to find everything and respond to anything. And this is possible thanks to its universality. Its pervasiveness in all social strata and the widespread diffusion of technology and the internet on the planet allows it to keep track of everything and to draw on this boundless – but systematized – database. Contrary to sample surveys or administrative data, social networks have information on everyone: from the poorest to the richest, from the least to the most educated, from small towns to large cities or, in technical terms, they have well represented the queues of the population distribution (where internet users and population overlap). Any exceptions would constitute a violation of their effectiveness, which is why they are extremely determined in defending the *system*.

Europe is dissatisfied with the care of personal data collected by biotech on U.S. servers, but privacy is a European battle: China and the US, for different reasons, are much less alarmed and attentive. They are more interested in using AI to prevent hostile and antisocial behaviour, in the profits that can be obtained by exploiting the information present in Big Data, in facial recognition (biometric) for the control of people (tracking) than the freedom of their citizens.

The European Commission wants a global solution to bring corporate taxation into the 21st century by ensuring a minimum and harmonized tax on big-tech. Rules should be built on the distribution of profits of digital companies to define where taxes should be paid and what share of profits can be taxed by each jurisdiction involved, to counter tax strategies to elude the tax base. The *Global minimum tax* is a system of international taxation proposed in 2021 by the OECD (in favour 131/139) designed to combat tax havens through a double action: the *reallocation of profits* (tax base of 100 billion $ per year) and the *minimum rate of 15%* for each country where multinationals operate

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44 Court of Justice of the European Union, Grand Chamber, 16 July 2020, Data Protection Commissioner v Facebook Ireland Limited and Maximillian Schrems https://bit.ly/3mIE2mi.

45 Not only a legal framework or a commercial act but a *feasible kit* that allows everyone to play the personal prerogatives, to demand their rights, to have the necessary knowledge for full participation in the digital dimension. Tools provided by the community, free and fair: e-mail, digital identity, search engines, basic applications, wide access to the network, specific education, and training.

46 The digital dimension is an extension of our life: it must be subject, like every social domain, to the conventions that the community gives itself in the general interest, within two limits: everything is lawful except that which is forbidden; everything is forbidden except that which is lawful.

47 Misinformation on social networks generates more engagement than accurate news: on Facebook 6 times more (Edelson *et al.* 2021); 519 sites of 6,730 in Europe and the US regularly spread unfounded news and earn a lot of money ($2.6 billion a year) from advertising.

(150 billion $). Too much or too little?

The challenge for 5G[48] technological supremacy is becoming a *new Lepanto*: a battle between civilizations that is going to mark prosperity over the very next future. For years, there has been a struggle for coal veins, commercial routes, oil wells, the supremacy of the seas, and patches of land. Today, the object of the dispute is the data that we produce, its exchange, usage, and sale. America sees an enormous risk in allowing Huawei to build and manage the 5G system. The technological arms race is defining positions of strength.

Instead, the *Public Agency for National Cybersecurity*[49] was established in 2021 by Prime Minister Draghi, whose aim is to equip Italy with industrial and scientific skills and capabilities in the field of cybersecurity and cyber protection, to guarantee digital sovereignty. It promotes *network and information security* and defines *certification for cybersecurity*.

The U.S. (and its allies) believe it is risky to entrust the future digital network of their countries to the Chinese because they believe that Beijing cannot ensure the protection of information, thus jeopardizing national security. Giving the China-based company Huawei the task of creating a 5G network is not on the table. Huawei has a large technological advantage (quantifiable in years of delay) compared to Nokia or Ericsson (European). The concentration of power resulting from the data generated by Internet providers, social networks, search engines, applications, and games is very high, and places few U.S. and P.R.C. companies in a hegemonic position: a true 'information technology oligopoly'.

6. Fluid social status

Technology transforms work, making it very difficult to define, identify, and catalogue.
The web is rapidly shifting from a communication environment to a work environment. The web has become a working interface: a digital desk.

Roles are entangled[50]: if you change sides of your phone, if you take out your dog or someone else's, if you activate an online service or someone does it for you, the activity shifts from 'entertainment' to 'work'. Producers become consumers, managers become employees, and teachers become students: *the social condition is fluid*.

Using the Inapp Plus (Participation, Labour, Unemployment, Survey) of 2021, it is possible to quantify (Figure 2a) how many people in Italy earn directly from the web through specialized applications (obviously net of those whose job activity is done within a traditional company acting on the Internet): such a quantifying equal 2.2 million. Of these, 570,000 are employed in work platforms with location-based (200,000) and web-based (370,000) activities.

In Figure 2b, we can see the share of people resulting active on the internet or earning something through the network, but not perceiving themselves as employed, not even when declaring to carry out their main activity on the web. 40% of people earning thanks to web-based platforms do not declare as employed; besides, carrying out a secondary activity on the web does not change the perception of own status, while relevant is the share of people who carry out capital platform and brokerage and sale activities, even occasionally, that perceive themselves as employed. This evidence corroborates the hypothesis that the perception of being employed is a weak status, a temporary determination of a more articulated, fluid socio-economic framework.

Employment created through worker-platform-entrepreneur (Srnicek 2017) triangulation escapes the rules of national law. The web working environment is characterized by high informality and perfect substitutability, the modulation of the workforce is high (scalability), and performance often ends in the realization of a single work task (micro-task).

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48 5G is a revolutionary technology: it will allow you to transmit much information at very high speed (up to 10 gigabits per second) for communication between connected digital systems (autonomous driving, telemedicine, video surveillance, IoT). Many of its applications are still unpredictable, unknown, and unthinkable. The 5G system would be watertight; each agent of the system would be monitored in space and time, without interruption. It is a capillary control and the loss of privacy.

49 It is a direct emanation of the Government and acts in the context of National Intelligence.

50 To remain in the metaphor of the quantum state we can recall the famous thought experiment of *Schrödinger's cat* which illustrates the paradox of quantum entanglement. In a box there is a cat. But will he be alive or dead (or employed or unemployed; active or inactive, etc.)? Both outcomes are possible. Only the measurement (opening of the box or asking) will tell the result.

Figure 2. Share of people earning through the Internet and self-perceived employment status

(a) User web's earnings platform
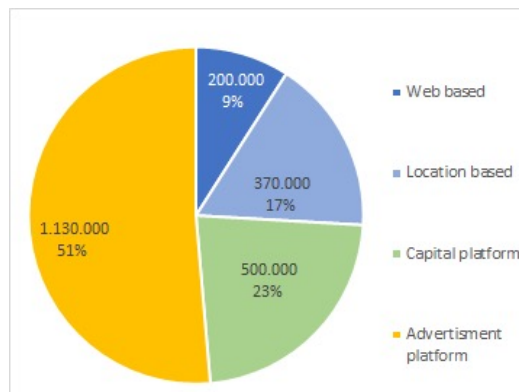
(b) Employment status, main and secondary activity, by type of
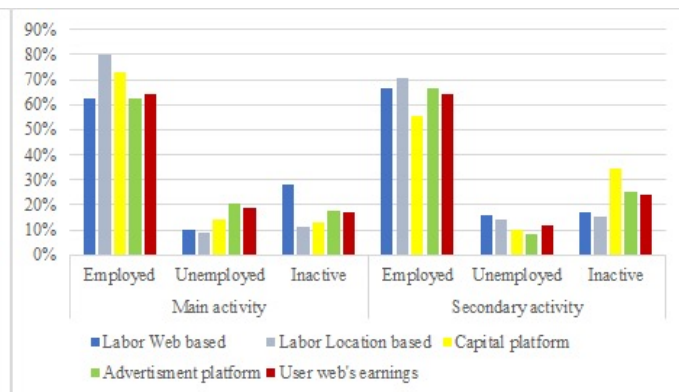
Source: Author's elaborations on Inapp Plus (data 2021) as in Inapp Policy Brief n.25, 2022

The *form of the work(er)* is increasingly confusing. The prevailing status is a weak condition. Technology will allow for immaterial, delocalized, and unstructured jobs. The relationships, roles and metrics of the work are changing, allowing the same person to accomplish multiple roles. The creation of value and the remuneration of work have new triggers, some to be understood and included in a general scheme, some others to be rejected, as alien to our system, and a dangerous breach in the walls of our framework. A seamless demand for non-standard work fluctuates in the web indifferent to economic geography, legal systems, trade accords, and tax agencies. Digital not-standard jobs (gig economy) lead to blatant circumvention, evasion, and omission with significant effects: it takes revenue away from the tax authorities, creates unfair competition and makes employees invisible to official statistics.

Digital tasks and intangible assets (code, string, translates, analysis) can be difficult to follow, count and protect. This evolution has consequences for the analogic world and its measurement systems that become not enough for the digital dimension. We need to adapt quickly so as not to lose control of the system in legal, fiscal, and cultural terms. We experiment with complex and articulated relationships, so the official socio-economic definitions are going to become increasingly ephemeral and obsolete. We have to rethink indicators, adapt them, or build new ones. Statistics are at risk of inconsistency: the crack opened in the system of traditional indicators is going to enlarge as far as proving them as inadequate.

The institutions responsible for the defence of workers and economic promotion try, in an often-disorderly way (De Minicis *et al.* 2021), to implement the new possibilities offered by technology in traditional schemes. The path of techno-regulation promotions data from the only function of information to real operating parameters. The organization of work in the digital world implies the preparation of a measurement system. The verification of economic and social relationships (legal rules) must therefore be integrated. The regulator must evolve through effective instruments and well-timed policies more in line with digital society (Lettieri 2017; 2020).

One example of integration is smart contracts: contracts transcribed in computer code that independently produce legal effects. This trend is fuelled by the digital customs and dynamics that are established on the web. On the one hand, the disintermediation typical of the digital world reduces the degrees of separation between people, businesses, and institutions, increasing direct connections. On the other hand, the production of goods and services through digital platforms makes social interaction an important and indispensable part of the work process.

The criticism that is often levelled at technology is that it hinders socialization at work, resulting in low wages, low negotiating power, polarization, poverty, social regression, and inequality. This Marxist vision fits very well the digital world

(Fuchs 2021; Van Dijk and Hacker 2018). Think about the debate on technological change, digital capitalism, the complexity of networks, and the new kinks of society. The Marx-oriented theories rebuild well the hyperbole of actual capitalism. However, these readings are once again the result of the analogic sensibility applied to the digital world: they use the experience, and canons of the past to comprehend the future[51]. They are not the result of original elaborations, and some incoherencies arise.

The association 'less work' therefore 'less power to the worker' is a derivation to be tested. There is a wider problem of democratic representation, of which work is only a part.

The reduction of working hours was wished in Marx's Capital. Keynes also suggested the modulation[52] of working time as a tool to temper social issues and the increase in productivity/automation, predicting weeks of 15 hours of work! It suggests that "this technological evolution will be synonymous with progress, of well-being, of reducing the work intended as physical wear to the point of losing the need to work to satisfy the primary needs. However, once freed from the need to work to survive, a man will have to learn to live, to find a reason in his existence, disconnected from his productive role"[53]. This awareness will be a process that will take time: it will not be easy to abandon the work dress.

From this perspective, *Baumol's disease* can (Baumol and Bowen 1966) only get worse! *Schubert D.703's string quartet No. 12 in C minor* takes the same time to be prepared and performed today as it was two hundred years ago but fortunately, the musicians do not receive the same pay as in 1820. In the coming years, the productivity of some sectors will be hyperbolic thanks to technology. This will further expand the gap between traditional (low-productivity) and innovative activities (high-productivity). Not only that: how will income be allocated if large parts of the population are out of work due to systemic crises or for technological unemployment?[54]

Similarly, Rifkin (2014) claimed that expanding the technology would lead us to a new economic system – *the collaborative commons* – that would replace the capitalist model. This can be a breeding ground: a democratic process to choose the allocation criteria of the wealth produced by machines[55]. Imagine robots taking care of everything: they cultivate, produce, deliver, clean, teach etc. How do citizens consume if they do not have an income from work? They will have a non-market income. It's not about turning us into zen workers who 'take what they give them', but about developing new value metrics for a different redistribution of wealth.

We are tripping over Marx trap: the unsolvable loop *who will educate educators*? becomes *who will give the money to who*?

The idea of basic income originates from these extreme scenarios. In the face of the failure of the market's laws and the resulting risk of social tightness, we must resort to an *extra-market authorising officer*: need, age, belonging, education, fortune. That is, social(ist) sensitivities are recovered without, once again, reproducing a Marxist scheme.

Beyond the reliability of the forecast, the knowledge society is an inescapable and pervasive process: even the nurse, the artisan or the secretary will have to deal with complexity. Not only to be understood as knowing how to manage technology but also knowing how to stay in a new economic, social, cultural environment (De Minicis *et al.* 2021) or knowing how to manage life uncertainty (Mandrone 2018).

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51 Lucas (1976) argues that the parameters are not invariant to policy shift.

52 OECD (2019) shows an association that confirms this interpretation: in Germany 79% of employees work 1356 hours per year, equal to 32 per week, in France 70% of employees work 1514 hours per year, 35 per week, in Italy 58% of employees work 1723 hours per year, 40 per week,. It can't just be a productivity or efficiency problem.

53 *Horror vaqui* resists the times. The Calvinist stigma falls on those who do not adhere to the system (market, network, society). The reduction of work commitment is seen not as liberation from material needs, prelude to the affirmation of an Epicurean world, but as debauchery and regression.

54 "Technological progress will run fast and sometimes its tendency to devour work will be faster than its ability to create new needs, new demand for employment, new opportunities" (Keynes 1936).

55 Part of the increase in productivity linked to technology recorded by big companies must be regained, if not in the form of income by work at least in terms of shorter working hours of teleworking.

The Economist (2021) reflected on the hundred years of established routines gone in pieces: from the office to the school, from crowded Bus to congested traffic, from weekend queues to rows at the restaurant. That regularity – nice or ugly – is over. It takes a little adaptation to overcome the initial disorientation but now we know that *it could work!* Covid-19 was the detonator of a series of reorganization processes that only a few countries had already started: remote working (Mandrone 2021b) or teleworking has become an available option, an irreversible achievement. Yet another case of serendipity: looking for a solution to the epidemic we have discovered new forms of provision of work performance (Mandrone 2020b).

The conservatism of the productive system, private and public, is strong. The hostility of management to innovation, especially organizational, was wrong: a few months ago, we looked in favour of control and sanction systems of the twentieth century such as turnstiles, fingerprints, cameras etc. The cornerstone of that productive culture was the physical presence: a requirement that has become unessential during the Covid-19 pandemic. A working attitude that now appears short-sighted, deeply inefficient, and often unjust. Ostracism has held back many changes that could have been implemented a long time ago and has diverted many resources towards jobs that appear anachronistic in a digital world and that have delayed and weakened the modernization process. There was no self-criticism: we need an upgrade, not a backup.

The *asymmetrical polarization* (Jenkins *et al.* 2013; Autor *et al.* 2006) is the result of multiple trends around income, labour, human capital, and social capital. A multidimensional phenomenon – the *Matthew effect* – that produces dis/advantage multipliers whenever the characteristics of individuals, of jobs, of background combine, creating an ever-deeper gap between rich and poor; high and low human capital, remote work activities or not (the new divide).

One of the most interesting aspects of this transformation is the content produced by people on the web: if I provide data, I share it,

I feed the system, and consequently, I am an integrated subject. If people do not adhere to this mechanism, the system will collapse; therefore, my participation has economic value, gives me a social status, and is also a deterrent. Those who participate in the digital network enjoy the same properties/rights/social identity as those who work in the analogic world. Data as Labour! However, people who use social media are not worried about what is done with their data (Pedemonte, 2019): we need a *digital class-consciousness* that guides the emancipation of the online masses.

This applies to work platforms as well as the apparent robot-worker substitution effect (the *routine biased technological change*)[56]. Technological populism is a high risk: *rage against the machine* assumes the same characteristics typical of racism towards immigrants: both are accused of stealing work.

The production and sale of goods and services through digital platforms make social interaction a relevant part of the matching process. So, the digitization of services implies an increasing amount of 'implicit work', understood as the activity entrusted by the producer to the user (dead time, registration, returned, composing, certifications, and relationship). How should this activity be considered? *Parasite work?* For the service provider, they are cost-saving, while for the user there are hidden costs (mystified like customization of service): it is a grey zone between implicit and explicit work, between pleasure and duty, relevant in terms of economic value and time-consumption.

In these few lines, we have tried to indicate which pitfalls are on the digital horizon of work. The complexity of the matters is such that they cannot be fully dealt with, but the intention was to bring together how many issues need to be dealt with, discussed, and settled.

Concluding remarks

Technology increases production, accelerates communications, and social transformations. Hobsbawm (1994) described the Twentieth Century as *a short Century* because revolutions and wars,

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56 It was believed (Autor *et al.* 2003) that technological change would erode the employment of only routine tasks, but technology has progressed and has also involved non-routine activities (lawyers, secretaries) then, with machine learning, the replacement also concerned cognitive activities (Brynjolfsson and McAfee 2014).

innovations and social, economic, cultural, even biological changes took place in a short time. Turning our gaze to the last twenty years, we see all the premises for a *very short Century*, a tumultuous succession of changes of planetary implication, of unbelievable impact, out of scale. Technology entered a hyperbolic phase: will society, economy, and citizens follow it?

Traditionally, technological progress has always 'added mass' to our lives: cars, household appliances, plants, etc. At a certain point we began to 'remove mass' according to a process in stages: first miniaturization (valves-transistors), then dematerialization (letters-fax-email) and, finally, convergence in a single instrument of multiple functions (smartphones, laptops). This evolutionary process has had a huge impact on our way of life.

In these last months, our world changed dramatically. Many aspects of our interactions mutated very fast: we redefined a new balance in our lives, a different ratio between work, travel, private life, care, and free time. It's changing our hierarchy of priorities. Many social and job conventions, which are the output of a long and formal cultural process, go down!

Over its short history, the Internet has already experienced various phases: from the pioneering of the origins, in which there was a spirit of great experimentation; to the phase where technology allowed a large and international community; to that of the euphoria of social media to expand our network and bring anyone closer with ease; until the current phase, where economic exploitation prevails over everything. As Lingel (2021) says "how we lost control of the internet and how to win it back". That is partly due to the *laissez-faire* policy that has characterized the approach of national institutions that have preferred a phase of experimentation by 'trial and error' (considering the side effects minimal) to a regulatory self-efficacy system. Now we need adjust arrangements that have stratified and consolidated over time, facing very strong

inertia. There has been *digital gentrification* too, leading people to move, changing principles and values. The digital space is afflicted by the same problems as our cities and analogic lands.

The enormous inflationary process involving data, information and evidence is, paradoxically, the cause of the end of the data as a result; the outcome of the evaluation is not the end of the discussion. Numbers have a great evocative capacity and an extraordinary synthesis property but do not have in themselves disambiguation or alethic[57] properties. Therefore, the data is no longer the 'final result'; we will have to consider it.

To effectively help countries after the Covid-19 crisis, the Next-generation EU as well as other public policies need to deeply understand the extent of change, rebuilding some key sectors (school, health, research) and updating them according to new needs. The priority should be improving cultural knowledge and technical skills in people through the upgrading of educational institutions so to provide them with the expertise to live in the digital society. An educational environment full of stimuli, examples, skills, care, solutions, human and financial resources that allow us to make informed choices, produces a magnificent *herd immunity* that defends the *mathematicians depressed* (Mandrone 2020c).

Technological change, which has been underway for some time, requires adequate cultural elaboration to address new moral dilemmas (autonomous driving, priority in care, conditionality, value), transform ethics into legislation, social norms, and techno regulation, and make informed choices in the face of strong uncertainty.

Money is also adapted, becoming increasingly electronic: dematerialized in form but not in function. Adapts to the times: *digital coin for digital goods* (Mandrone 2021a)[58].

The *Demon of Laplace* flutters in the info-sphere: through techniques of persuasion, economic incentives, tracking, and social control it is possible to change individual trajectories, life choices, or behaviours diverging from what the hegemonic

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57 Aletheia (α-λήθεια) means *disclosure* or *truth*, Mandrone (2017).

58 A cashless society could facilitate the government to help people in need in a timelier manner. It can overcome the problems of moral hazard that weaken public policies. It can contrast the informal economy, the fiscal infidelity, and the irregular work (Mandrone 2017). But it must not become an instrument of masses' control: we need a strong privacy authority, don't another *big brother*.

part of the community considers as the general standard. The suggestion that it is possible to influence the choices of individuals opens the way to the idea of *absolute determinism or conformist progress*[59]. Many movies (Black mirror, Minority report, Social dilemma) show how the risks of an illiberal oligarchy are real in a digital environment.

The *digital panopticon* (The Economist 2021) risks creating *dependence or repulsion* on surveillance. Men need empty spaces from rules, environments of discharge from the tensions produced by life in a community. Being always connected, evaluated, controlled, seen, and exhibited produces enormous discomfort, especially among digital natives.

The freedom[60] of the citizen must also be preserved on the web. *Creative destruction* cannot be only in the sense of Schumpeter[61], it must be the possibility of not having to align, of being able to cultivate lateral thinking, of being creative, free, and eccentric. In all open systems, minorities have the possibility of becoming the majority: in science, it is very frequent that consolidated theories are ousted, technology is constantly overcome, and culture develops new criticisms.

In the cultural landscape and artistic spheres, there is a permanent conflict between *conservation and enhancement of heritage*. The balance is delicate because it must preserve the system in space and time: it must be permeable to novelties, criticisms and change but, at the same time, it must defend and pass on the constituent values, the shared references, and the usability of the heritage.

This type of exercise is present in many social areas: social security, infrastructure, territory, natural resources, public debt, institutions that must be continuously enhanced, produced, and preserved. Often through unpopular and painful choices. Digital knowledge must also be understood in the following way: a personal and collective heritage, to be used without damaging it and to be shared without dividing.

Privacy is an approach to the digital dimension, it is not a procedure to be followed or a fulfilment to be achieved[62] but, rather, an awareness of one's rights (and duties) and of the opportunities available by technology. Is a further dimension of our life, with specific ethical implications to be acquired in addition.

Will the digital dimension be able to guarantee that critical mass, those creative collisions, that epistemological engine that was the factories, schools, and squares in the '900, that is, to be the breeding ground for technological innovation, social relations and civil and economic progress?

In the digital dimension, conventional references lose their effectiveness and traditional categories – legal, social, economic – seem not to work properly. The challenges pointed out in this work outline a new featuring row of research for Inapp to be explored under several aspects – theoretical, practical, and methodological – so to get the relevant implications as regard educational environment, world of work, public service supply, data ethics and social-economic relationships.

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59 Extreme gamification! The Chinese Social Credit Score is a single large social ranking that aims to give scores based on every aspect of life (volunteer hours, diet, physical activity, punctuality in payments, adherence to protests or strikes, fines, purchases and even dating) to reward model citizens – through preferential lanes for public competitions or ease in obtaining funding – and penalize others.

60 The question of *free-will* arises in the digital world where – although apparently there is endless availability of choices, opportunities, and information – those who act their faculties are a minimum share of the population, as the majority aligns with the mass. *The digital indifferent ones*, those who despite having the freedom to choose – out of fear or laziness or weakness – let others choose for them. It is the long wave of the fourth estate (Citizen Kane 1941): the role that the media play in our life.

61 Marx noted in capitalism some generative and destructive forces necessary for its reproducibility.

62 There is currently a great deal of attention in producing documents that attribute responsibility for the custody and use of data to users. This is essentially a liability release. This is bureaucracy. Data must be intrinsically safe, that is, beyond the expertise, care, and attention of the individual user. They must be kept on servers with high security levels and scheduled access. This is digital culture.

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