The impact of digital transformation on society and economy

Abstract: *Digital Transformation is one of the recurring buzzwords, starting from the early experiences carried out by forerunners the document outlines the role of platforms and the impact of them on society and occupation. Information as outlined far in advance by Bill Gates is the new wealth, how much information you access including personal data too often disclosed by users without knowledge about the potential drawbacks. Social media, IoT, CCTV, Open Data: is privacy evaporating? What about the impact of DT on government and education? Not only positive effects of this transformation, who is leading this process, where are we going?*

Keywords: *Digital Transformation, Data Ownership, Privacy, Ethics, Cybersecurity, Culture of cybersecurity*

The recurring buzzword

Nowadays there is a recurring buzzword: Digital Transformation (DX or DT) – it is an opportunity or a nightmare? The pandemic strengthened this trend, digital transformation will help to mitigate the effects of the crisis, improve resilience. “Resilience”, by the way, another recurring term in the pandemic time. We all agree on the meaning of the term “transformation” but “Digital” has different meanings. Jim Swanson, CIO of Johnson & Johnson says “Digital *is a loaded word that means many things to many people*”.

“*Say 'digital' to persons and they think of going paperless; another might think of data analytics and artificial intelligence; another might picture Agile teams; and yet another might think of open-plan offices*". A comprehensive definition of the term Digital transformation should be the integration of digital technology into all areas of activity, from business to public sector, fundamentally changing how we operate and deliver value to customers or citizens.

The “brave” forerunners

This paper will not consider the early stages of computer-based archives and accounting systems, as a legacy of that period of time we will mainly outline the difficulties and, some time, frictions encountered in the cooperation between humans and computers. We must remember that humans that times were skilled computer scientists playing the role of interfaces with employs.

To better introduce digital transformation, as we consider it nowadays, a first step was experienced by industries integrating digital technology mainly in the initial part of the value chain, from design to production and testing phases, later on, in factory automation, integrated management systems up to robotized warehouses and delivery systems.
The adoption of digital technology represented a true competitive advantage, literally "*Competitive advantage refers to factors that allow a company to produce goods or services better or more cheaply than its competitors. These factors allow the productive entity to generate more sales or superior margins compared to its market competitors.*"
Computer aided design systems allowed to speed up the design process, bettering the quality of the product through the opportunity to re-design and fine tune of the product in a fraction of time. The ability of computers to perform calculations enabled the "revolutionary" switch from empirical design methods to accurate mathematical dimensioning, sometimes adding even some best practice. Automated laboratories and test facilities, many times designed ad hoc from scratch, allowed to improve the performances and quality of the products or to acquire reliable information from testing machinery. Of course, these "transformations" were not "zero cost" for the companies, they needed to rethink the workflow, train personnel and more.

Impact on the Society

Nowadays digital transformation impacts the whole society. It's a cultural change that requires organizations and even citizens to continually challenge the status quo, experiment, and get comfortable with failure. Furthermore, on the citizens' side, even and more significantly, it is required the willingness to "go digital" even if sometimes this choice become a "must" to do not be "cut off". It is evident that digital transformation it is not a process "one size fits all", each specific sector and even activity requires a particular approach and custom solution; this starting from the three main branches: citizens, companies, public administrations.
Because digital transformation will look different for every company, it can be hard to pinpoint a definition that applies to all. Sometimes this means walking away from long-standing business processes that companies were built upon in favour of relatively new practices that are still being defined. In such a situation the "trial and error[1]" finding by continues improvements the optimal solution is the practical approach.

[1] "a way of achieving an aim or solving a problem by trying a number of different methods and learning from the mistakes that you make" – Cambridge Dictionary

Furthermore, everyone experienced in “ICT based innovation” knows that “It is not only a matter of technology”. Human factors are an essential tile of the whole process as well as a re-thinking of the whole organisation and process. We must keep humans in the loop and carefully consider the social and economic impact due to digital transition.

One of the potential benefits considered in the early phase of digital transformation was the unique opportunity to pour in the software procedures some knowledge about methodologies and procedures. Methodologies, or better, know-how accumulated in years and years of diligent activity traying to bridge the generational gap, this in addition to traditional coaching.

A different approach was generally used dealing with procedures, procedures must be reconsidered from scratch making “tabula rasa”. This mainly because procedures are, very often, the result of a “stratification” of layers of “reference points” included in the pipeline; this reshaping many times causes some friction due to the loss of some “power-nodes” within the organisation. The design phase must carefully reconsider one by one the “steps” checking the function of each of them within a well-defined rationale framework. The benefits using a platform is to guarantee the optimised workflow and offer to the citizens the opportunity check the progress of the process and related timing.

The Power of Platforms

Change in technology and user profiles cannot avoid impacting the market. The market is evolving in a very significant way. One of the first effects was the transition from the purchase of plastic boxes on the shelves containing DVDs plus printed user manuals to the on-line purchase and download of applications with pdf or eBook manuals. The idea to buy something “immaterial” on line transferring the right to use in an immaterial way is now largely accepted by the market. Reshaping, in an IPR/Biz compliant version, NAPSTER concept, iTunes, as a kind of rule breaker, promoted this approach in the field of the on-line music market many[2] years ago. Amazon followed a different path starting from the idea to sell on-line books in paper format, a kind of e-mall devoted to books but the real turning point was to extend the e-mall to almost every good overtaking eBay that was originally opening that market mainly on pre-owned items.

The diffusion of mobile position-aware devices can be considered a kind of third digital revolution after the first transition from mainframes to PCs and, in the middle of 1990s, the second one thanks to the popularisation of the Internet under the motto “Where do you want

[2] Many years in the ICT time scale of course!

to go today?[3]". At the same time, we witnessed a significant shift from few expensive software solutions to many "tiny" and cheap APPs.

The consumer software market changed getting closer to the music market. A short list of main changes is:

- Location-aware devices enabled a complete new set of services;
- Social media is pervasive and each new application that enables an active participation to cyber life is welcome (e.g. Snapchat[4], Tik Tok[5]);
- People are looking for the Top 10 Apps;
- The consumption of Apps is continuous;
- Voice interfaces in natural language are gaining more and more success;
- The market model is now based on low costs/big numbers;
- The IPR management is evolving in order to self-adapt to the new trends;
- Data are migrating from local storage to clouds;
- Crowdsourcing offer a new paradigm in software development and services;
- Open and big data open a new frontier to added value services;
- The most popular applications are embedded as components of the Internet browsers;
- The new generation of "makers" is entering the market . . . [1]
- Digital media are evolving ... enhanced reality and artificial intelligence are back, etc., etc.
- ...

This happened after a long period of time, software developers were mainly cut out from the market and the necessary skills and efforts to develop applications were relevant (hundreds thousand code-lines).

This is in some way related to the interesting re-opening of the software market to single and small groups of software developers due to the availability of new successful development platforms to be "populated" by applications and the advantage of the new software market model based on online distribution and support. The last aspect has relevant effects on the software industry because it bridges the gap between micro and small software enterprises and medium and big companies, both offering a set of very well-known e-Commerce platforms and creating business opportunities for compact and well-focused applications. This may recall the dilemma between multipurpose devices, many things at an average level, or ad hoc devices, few things in the best way. Many years ago, "many" of

[3] Microsoft Windows 95 advertising campaign, was launched in November 1994 through the advertising agency Wieden+Kennedy
[4] https://www.snapchat.com, last accessed January 2019.
[5] https://www.tiktok.com

course in the ICT time scale, a “guru” in the field of interaction design, Donald Norman [13, 14], proposed his own solution to this problem creating the iPod [15, 16]. Apps in general used to follow this last approach; you may need many single apps in order to accomplish a number of different tasks.

We are in the age of “platforms”, platforms make the difference. Platforms are the real “silver bullet” that created major opportunities and real impact on society and economy. Global markets are easily reachable via business (biz) platforms, revolutionary business models are based on platforms, innovative services, crowd [24] based initiatives and even innovative financial and trading activities share the same component. Thanks to digital platforms and a lack of legislation a number of market giants have grown up managing incredibly huge assets owning none of them, simply think about Airbnb or Uber but the list is almost endless. We all know the drawbacks created, and already evident, by some of these platforms, for instance, a number of local governments posed some limitations to Airbnb in order to avoid the risk to reduce the number of residents in some cultural cities or to ensure the opportunity to find available apartments to be long term rented.

This is not a full description of the power of platforms, apart from the transformation of the market there is the full control of social media and on-line digital communication, on one side these technologies are nowadays pervasive and everyday commodities on the other side due to the lack of legislation private tycoons have the full power to disconnect, emarginate, disable end users and even Governments or entire countries. Due to the increasing key role played by cyber technology and platforms there is a clear need to create and establish a global legal framework to regulate this sector, even if such global companies are private organisations they cannot rule the market without constraints.

A relevant part of digital transformation relies on platforms and standards, these aspects are directly linked with the “owners” of such platforms and standards, this can be considered a kind of monopoly not yet regulated, a kind of grey zone, so in the digital transition there is a potential risk to fall under control of few key players.

DT impact on occupation

The diffusion of platforms if on one side creates new opportunities on the other side “kills” a number of existent businesses. The access to global service platforms creates a shortcut between offer and demand cutting out major part of the traditional added value chain, as it was long time ago for malls it is now for platforms. The big difference is that you don’t need to invest relevant capitals to feed your business, the key investment is the creation of the digital platform, the asset you own is the number of users both on the offer and demand

side, this to do not consider the fiscal benefits they usually enjoy compared with the traditional retail system.

This new model led to positively evaluate and size on the market companies having a relevant number of “customers” paying zero money to the company, this is mainly valid for services not based on a triangular market model service/user/advertisement. This is part of the new “economy”, Mc Donald’s core business is in the real estate market, Ducati is a communication company, car manufacturer core business is finance and so on.

Following the schema of some of the recent revolutions the idea was: digital technology is disruptive cancelling a number of businesses but new businesses will be created, the key point is that the specific nature of digital technology is actually creating less positions than the one eliminated. The visible effect now is an increasing number of workless people replaced by software and robots. In some fields the transition is carried out adding some digital intelligence to optimize workers activity to evolve later on to fully robotized systems. By unit of product/service it costs less a hamburger of electric energy? Do we agree with this scenario, are we happy to live in symbiosis with “computers”? Environment experts and activists are carefully considering the impact of “cyber” and its specific “footprint” (energy, waste, etc). There is a clear and urgent need to rethink the role of technology together with ethical[6] and social issues [23].

Walking on the Clouds

Another relevant innovative trend in DT is the use of “crowds” to provide data and services not foreseeable before the Internet; simply think about APPs like TripAdvisor[7] or the one providing the local gas price daily or real-time traffic bottlenecks. It seems to be a completely new paradigm of software development beyond user groups and open software, the only way to face huge projects and compete with key software enterprises. The average “size” of “social” products and services is now affordable only by crowdsourcing. A number of services that do not find a proper economic dimension or even do not have the required appeal in order to be provided by companies may only rely on the crowd[8], crowds and platforms. This approach enabled innovative solutions like project funding or collaborative film production[9]. In the global society crowds are playing the role of “public services” [21].

[6] Christoph Stuckelberger, Pavan Duggal (2018), Cyber Ethics 4.0: Serving Humanity with Values, ISBN 978-88931-265-8, Globethics net
[7] Tripadvisor was one of the first on-line services enabling users to rete hotels and restaurants, http://www.tripadvisor.com, last accessed January 2019.
[8] James Surowiecki (2004) The Wisdom of Crowds: Why the Many Are Smarter than the Few, ISBN 978-0-385-50386-0, Doubleday; Anchor.
[9] http://www.wreckamovie.com, Tempere, Finland, last accessed January 2019.

The affordable availability of both access and connectivity together with the diffusion of smart mobile devices enabled a real universe of new applications and services, some based on voluntary information provision, some based on big or open data access. Such services were almost unthinkable before. To conclude, we cannot forget that the computer scientist concept of “Clouds” captured the users, so we moved from local storage and processing to cloud computing in its various declinations (SaaS, PaaS, IaaS, Haas); a number of hardware devices, such as tablets and smart phones, offer cloud services to their users. So, clouds are now populated by business data as well as by back-ups, photo albums, video clips and songs. Apart the rest of useful services, the introduction of clouds solved a typical nightmare of e-Citizens, the need to change their personal device, phone, tablet, or computer because it doesn’t work anymore, it was stolen or they bought a new model. The diffuse use of “clouds” contributed to adding another degree of freedom to e-Citizens; many times, this was a seamless transition, so the idea to show their “selfies” or share a document wherever they are and whenever they want from a notebook, a tablet or a smartphone is a consolidated habit and a powerful driver of innovation.

Information: the new gold rush

November 1990, on the occasion of COMDEX Fall, Bill Gates introduced the vision of “information at your fingertips”; few months later, to stress the concept, he said that the real wealth in the future will be access to information; people will no more ask “how many dollars do you own” but “how much information can you access to”. In a glimpse, this vision become reality and many years later “information” is still a powerful “transversal” asset: business, trade, policy, security, tourism, health, . . . rely on information, reliable information. Historically speaking, the idea of even owning [3,4] information is relatively new. The earliest copyright laws, which granted the creator of artworks, among the other rights, exclusive rights to duplication and distribution of said work, first appeared in the early eighteenth century. Nevertheless, it would still be hundreds of years, however, before the concept of “data” as we understand it even began to develop. The world we contributed to create, filled up with cutting edge technologies and fully connected, take us to a simple, even if uncomfortable to hear, truth: we are unable to prevent all possible data tracking.

Is really Privacy evaporating?

Lastly and equally concerning, we all are active or passive users of digital technologies, when we make a phone call or walking along the street in the eye-field of a CCTV.

Information is built on top of single or aggregate of data; for quite a long-time people used to think that cyberspace is a “black hole” without memory where you pour data without any side effect. Young generations shared on line sensitive information in order to access a videogame or chat with friends or, more recently, posted images and clips about their private life, does this mean that privacy evaporated? In the “Appification[10]” era there are almost no limits to data collection and reuse, “someone” knows exactly where you are now and where you have been, APPs may collect [10] your medical data, or fitness program, your expenses, or collect and analyse your contacts, your photos or video clips. In recent times crowd data collection, open and big data, more or less anonymised, has provided the big framework.

The world we contributed to create, filled up with cutting edge technologies and fully connected, take us to a simple, even if uncomfortable to hear, truth: we are unable to prevent all possible data tracking. We live in a world in which there are already countless sensors and smart objects around us, all the time. The car we drive, the phone in our pocket, our wristwatch, the clothes we wear, are smart and connected; then the concept of “private” becomes far more ephemeral.

Cameras, satellites, sensors and software virtually everywhere ensure that, no matter how much technology you eschew, someone can get some data off of you. Your credit card company “tracks” your purchases and, in one word, your life-style. Your phone carrier “tracks” your calls, social relations and geographic location. This is not enough; what it is not collected by APPs will be collected in a seamless mode by IoT [2]; of course, IoT will add a lot to our life but this will cost us a significant part of our privacy. The even increasing ability to interpret and correlate tiny portions of information create accurate profiles framing us. Your area’s law enforcement tracks the roads and intersections you walk through or drive down every day. Local administration CCTVs or private safety cameras follow you within shops or residential buildings, even inside the elevator. Unless we decide to move to the mountains, renouncing to today’s technology, some tiny data that describes our behaviour and us will probably be tracked. No matter, you may say, we have nothing to hide, but what about the use, abuse or misuse others may do?

Digital transformation directly involves the transition from “citizens” toward “e-Citizens” ignited by cyber technology; as a general feedback we will have a positive trend but it is worth considering even some drawbacks that are becoming evident.

As sometimes happens after revolutions, revolutionaries wonder if what they have got is actually what they were hoping for. The original idea of computer scientists in the “hippies”

[10] Kind of neologism stressing the incredible proliferation of APPs.6

counterculture era was aimed to empower citizens and provide them much freedom. The perspective in the early phase of ICT was probably to be “here and there”, immersed in the core of the business while lying on a hammock hanging between two palm trees on a Caribbean island, having much more quality time thanks to technologies. An Apple advertisement on the occasion of the launch of Macintosh in 1983 recalled George Orwell’s[11] most famous novel, stating “On January 24th Apple Computer will introduce Macintosh. And you will see why 1984 won’t be like ‘1984’”[22].

Almost forty years later, after the chimera of the “happy cyber-world”, some of us have started thinking that the foreseen “1984” has simply come true ten, fifteen years later: globalisation, always on devices, position tracking systems, CRMs and users’ profiles, CCTVs and IoT; are those technologies framing citizens?

Thoughts for some time have circled around how the speed of the new information revolution renders us less capable develop a critical approach able to foresee the social, ethic, economic impact of such revolution in a long-term perspective. So, in recent times we started facing a wave of criticism about the evolutionary path of the information and knowledge society, for quite a long time ICT gurus and humanists didn’t interact too much, the true power of cyber technology was largely unexpressed, there were some alerts as Artificial Intelligence, Machine Learning, Virtual Reality, Robots often seen by humanists as potential danger for the mankind, but nothing concrete happened. As we have seen the turning point was probably the exploitation of the Internet and the dissemination of information. As a consequence of a lack of “culture” in the use of emerging technologies now we have to deal, among the others, with serious problems related to information ownership, use, abuse and misuse, not mentioning cybercrimes. An additional drawback is due to the deep technological intrusion affecting our daily life, we feel framed by cyber devices more than supported.

Some evident outcomes of this feeling are the “right to disconnect[12]” controversial reform of French labour law by the labour minister Myriam El Khomri back in May 2016 and the “right to obsolescence” or the “right to be forgotten” due to Viktor Mayer-Schönberger, the author of “Delete: The Virtue of Forgetting in the Digital Age”[13]. All these to do not mention the

[11] George Orwell, Eric Arthur Blair’s pen name, English novelist, essayist, journalist, and critic. Most well-known novels: Animal Farm (1945), Nineteen Eighty-Four (1949).

[12] loi num 2016-1088 du 8 août 2016 relative au travail, à la modernisation du dialogue social et à la sécurisation des parcours professionnels https://www.theguardian.com/money/2016/dec/31/french- workers-win-legal-right-to-avoid-checking-work-email-out-of-hours, last accessed January 2019.

[13] Mayer-Schönberger Viktor, Delete: The Virtue of Forgetting in the Digital Age, ISBN-13: 978-0691138619, Princeton University Press 2009.

cultural, social and economic impacts not always positive especially in a long-term perspective.

Technologies originally conceived by idealists to provide much more freedom and wellness [27] to humans took then a wrong path framing humans due to all the constraints placed upon us with new technologies. For instance, as liberating as they are by providing flexibility and instant connectivity we have become enslaved to our devices, fearful of losing out information and access in an increasingly competitive and fast-paced world. Consequently, our bodies have suffered, as have our minds (due to information overload), what of our work-life balance and this is just to begin with! Ranjit Makkuni's paper "Betrayed IT Revolution"[14] outlines a vision for new design of devices, clutter-free access to web documents to create deeper learning experiences. At the implication level, the project rethinks implications for new design of web mark-up languages that support the creating of 'privacy' based secure browsing.

As a follow-up of the active discussion raised by the "IT betrayed revolution" panellists and some distinguished participants decided to activate a working group to further discuss about this relevant topic identifying the WSIS as the perfect framework to approach the human wellness centred development of the information society. The seeds for such a debate were already present since the 2003 Geneva phase of the WSIS, at that time Ethics and Info-Ethics[7] have been a key discussion topic. The actual "visual" trend is producing an incredible amount of photo/video documentation of our everyday life; does this mean "goodbye privacy?"

Public Administration / Government

Through the centuries, many centuries from the ancient Greeks, people studied many different forms of implementation of democracy [20]; among them two major forms arose; direct democracy and representative democracy. Of course, the ideal concept of a power structure ruled by citizens, direct democracy, is hard to implement even in the Internet era; the usual way to solve the problem is to elect a representative structure in order to mediate between citizens and the political power. This structure is usually termed representative democracy. The concept of representative democracy arose largely from ideas and institutions that developed during the European Middle Ages, the Age of Enlightenment, and later on was further developed during the French and American Revolutions.

[14] Outcomes WSIS Forum 2018. ISBN 978-92-61-25151-2. https://www.itu.int/net4/wsis/forum/2018/Files/documents/outcomes/WSISForum2018_ForumTrackOutcomes.pdf, last accessed January 2019.

More countries than ever before are working to build democratic governance as a potential tile of digital transformation. Their challenge is to develop institutions and processes that are more responsive to the needs of ordinary citizens, including the poor, and that promote development.

Nowadays a large number of states are ruled by representative democracy, structured in different manners, always structured on different layers of representative bodies directly or indirectly elected by citizens: town government, regional or county governments, etc. Sometimes this “interface” between citizens’ wills and expectations and everyday life generates a bad feeling and sentiment about bureaucracy and government.

In the following part of this paper we term governance the decision-making process that defines the guidelines of the government, we term government the implementation of the decisions and guidelines and the infrastructure of interaction with citizens.

What is e-Governance good for? The notion of e-Governance has its roots in attempts in many countries to ‘modernise’ government in response to perceived citizen dissatisfaction or disengagement. The manner of this disengagement varies, but has been reflected in many countries in falling voter numbers, and particularly in the ‘Anglo Saxon’ democracies, in a perception that public services are failing and of poor quality. This can result in ‘opting out’ on the part of the more affluent in favour of privately provided services including education and healthcare, with a consequent fracturing of the social consensus on the provision of these services.

This notion of ‘modernisation’ was intimately connected with what was sometimes called ‘joined up’ or ‘holistic’ government. The benefits of this were felt to be twofold: it was an attempt to reconstruct government in the interests of the citizens, rather than the producers, moving away from ‘departments’ and ‘silos’ towards ‘personalization’ and ‘life events’.

Secondly, there is widespread agreement that many social problems, from crime to poor educational performance, are the result of multiple interactions and the only way to tackle these issues more effectively is to understand these interactions better. And this means ‘joining up’ the information that we have so that, for example, if we know that much petty crime is committed by children who play truant from school, we can identify truants at an earlier stage (or even the behaviour that leads to truancy) and hopefully prevent some crime. This means having an integrated view of the information that is held on citizens, a sort of social “knowledge management”, that was impossible before the advent of widespread ICTs. This means basically a fully integrated information system collecting data from

different sources, including real-time information from sensors and Internet of Things. These solutions must evidently carefully consider privacy issues.

Sophisticated ICT systems are leading to a greater decentralisation of government. This can be particularly observed at the local level, where neighbourhood offices, one-stop shops[15] and call centres are replacing the walk to the town hall or housing benefit office. These newer forms of neighbourhood offices, or "one stop shops", seek to provide access to a complete range of services rather as the bank branch does to the banking network. This relies on having accurate information on citizens available across the system, but the opportunity it opens up is greater responsiveness to local needs often at the neighbourhood level. The closer to the 'front end' that decisions about service provision can be made, the closer they can reflect local needs.

In order for citizens to become really active users and indeed co-producers of public services, citizens have to be increasingly involved in and aware of the information on which decisions are made. Citizens can select different public service 'packages' in return for revealing different levels of personal information. This is an acknowledgement that joined up government requires a large degree of information about individual citizens' needs and preferences and that citizens can be empowered to decide what level of trade-off they want to make. Of course, there are dangers that over-personalised public services risk atomisation and reward those citizens that are easy to serve, make little demand on services and can use the Internet proficiently. In the public sector the data collected by personalisation is primarily a social resource and should be used for collective benefit. Thus, if we collect evidence that people who do X are more likely to do Y, we should be able to reduce the costs of production processes, by targeting resources more effectively—not just at individuals, but at society at large, by developing education programmes to demonstrate the benefits of doing X. A positive approach demonstrating the benefits of a particular behaviour instead of putting blocks, limits and fines is always better and provides the rationale and citizens' cooperation.

These trade-offs are likely to become even more apparent as smart card technology increases as a delivery vehicle. The utility of such cards is related to the amount of personal information they hold. Some early experiences in the use of smart cards[16] were carried out

[15] The idea of the "one stop shop" was one of the first innovations due to e-Government; it was in some way a reverse of the paradigm, no more to expose the internal structure of government as the direct interface with citizens but the interface with citizens shaped to better serve citizens. One single entry point (one stop shop) will provide the complete feedback/service to citizens.

[16] Back in 1988, a group of Thomson Microelec- tronics engineers founded, after preliminary studies on smart cards carried out at Thomson, the Gemplus14 company with the aim to further develop "smart cards", a thin microchip embedded in a kind of credit card. Originally marketed as gadgets

in the nineties opening the way to a wide range of services like mobile phones, digital signature, social security and more.

Among the new organisational vehicles that are resulting from e-Government are public/private partnerships, which bring together private sector systems and technology expertise with public sector services and values. Although the 'branding' implications of that may worry some local governments, it has been instrumental in turning around the perception of an authority that was failing and is now seen as more dynamic.

Further benefits are flowing from partnerships with other public sectors or civil organisations. One aspect of being able to offer a better service is access to a significantly wider range of information, much of which sits outside the Local Authority. Services produced at a reduced cost, or made more widely available, are becoming a feature of these e-Governance experiments, but genuinely transformed services are rarer. This is partly a result of uneven access to technology and again re-enforces the point that the bigger payoffs will only come when access is at, or close to, being universal. This is because running parallel systems remains expensive and because a (virtually) universal service, like income tax, cannot be transformed in part; the whole system has to be re-engineered.

What about Education 2.0 ... 4.0?

Dealing with digital transformation and future society it is wise to focus on digital transformation in education from kindergarten to university both degree and PhD levels. The pandemic has forced educational institutions to switch to online teaching, on the road to a better resilience of the educational system but very less efforts were devoted to an enhanced transmission and acquisition of knowledge. Nowadays after a sufficiently long period of test online education, as it was implemented on the fly due to the pandemic, showed some limits and drawbacks. We must adequately consider the different format due to different topics: anatomy, mathematics, physics, literature, etc. Main ICT approaches, of course, refer to a typical ex-cathedra lecture having a limited interaction with students, if we consider subjects that require a higher interaction such as design or architecture, that are much more maieutical processes, these solutions are not directly applicable. Researchers are looking for better solutions, some technologies are enabling new communication formats. Virtual reality, for instance, offers the opportunity to let humans interact with intangible objects bridging the gap between the two methods in cognitive sciences the perceptive-motory and

to open entry doors in clubs and lounges, smart cards become a key technology in 1990 thanks to the adoption of SIM (Subscriber Identity Module) cards by GSM mobile phones; the contract for the first million cards was signed with France Telecom. From that time onward, smart cards flooded the market, embedded in credit cards, identity cards, voting IDs, badges, etc.

symbolic-reconstructive. Today, people have the opportunity to create digital objects, a new class of objects from an ontological point of view. They can be infinitely duplicated and transmitted or accessed world-wide. A typical example is represented by virtual laboratories enjoyable by big number of users ideally all-over the world. With the spread of the coronavirus, the education system is facing a new crisis, extended school closures may cause not only loss of learning in the short term, but also further loss in human capital and diminished economic opportunities over the long term.

Before the outbreak of the coronavirus pandemic, the world was already dealing with crisis in the sector of education, traditional education methodologies were already outdated. An educational and communication divide was already on stage between millennials (generation Y) and the educational system. It is a common understanding that recent generations represent a discontinuity if compared with the past ones. Such discontinuity or, if preferred, singularity is recognised both by adults complaining because their children do not pay attention or are getting bored by learning and, by adults, that discovered new skills and capabilities in young generations. People that grown up playing video games, browsing the Internet, chatting and looking for help on line in communities, they use technology seamlessly. A new model for communication processes is required. This is a side effect of their special skills acquired in hours and hours of digital tasks. Social psychology offers compelling proof that thinking patterns change depending on an individual's experiences. A sufficiently long training may activate this phenomenon. In fact, some researchers believe multi-sensory input helps kids learn, retain and use information better. So, the Apple motto "think different!" is much more than a motto.

As already outlined a renovated approach to education it is not only a matter of network infrastructure and computers, it's a matter of humans so both students and teachers need to adapt to collective online learning, improve emotional and behavioural self-regulation. Having the evidence that traditional didactic doesn't match with young's expectations we need to take advantage from the additional need to make educational activities more resilient to start reshaping the system in order to fit with both requirements: resilience and generation Y compliance. Education system must cope with such requirements and take advantage from similar new skills even if there are some "side effects" that must be amended or at least mitigated.

Direct access to information and related hyperlinks may create some drawbacks, among the others, a kind of "surface knowledge", many times more suitably identifiable just as

“information”, without the required contextualization and logical connections with other items, plus the risk to lose the logical path related to the key topic. The overall effect is to create “archipelagos” or even “islands” of “surface knowledge” without connection with the rationale background or deep knowledge on the specific topic. In addition to this both the social networks and online resources could provide fake or unreliable information many times in absence of critical thinking on the student’s side. So, in parallel with the setup of education innovation, that is nowadays led by ICT, we must improve student’s critical thinking and technology awareness [8]. The latter includes specific knowledge about potential risks associated to an improper use of technologies.

Mentors need to upgrade their knowledge in ICTs possibly bridging the generational gap as much as possible that means to use social media activating a tight and multilateral interaction with students. Leading the change having proactive approach to the natural evolution of the content domain. Time will solve this problem, in fact the early generation X is coming on stage.

On the client-side students quickly learned how to use, sometimes everyday tools, as educational means. Accordingly, with the typology of the education institution chatting apps were used or multipoint conferencing systems.

To conclude, on the way of the digital transformation of the educational sector the global lockdown represents a unique opportunity to bridge a number of gaps and reshape our future, thinking out of the box, identifying what is useless, deleting biases due to habits, rethinking processes and protocols. Education system can take this opportunity to develop a new approach to improve its resilience and “generate deep knowledge” in millennials.

This is the time for action, the question is “Leading the change or missing the opportunity?”

The role of social media

The idea to share something with someone else, a group of people, sometimes generates a sense of belonging to a “community”. Memetics [11] used to consider this “something” as the “meme”. A meme is a cognitive or behavioural pattern that can be transmitted from one individual to another one. Consider young people that wear clothes in an unconventional way or use signs and gestures that show that they belong to a particular community. The basic mechanism is very simple; since the individual who transmitted the meme will continue to carry it; the transmission can be interpreted as a replication. A meme carrier, known as a replicator [12], is created when a copy of the meme is made in the memory of another individual. Replication or self-reproduction is the basis for the memetic life cycle. This leads to the spread of memes to more and more individuals, such that the meme acts as a

replicator, in a similar way to the gene, today this looks familiar if we refer to virus and pandemic effect.

Communities are an integral part of the history of technology; in the specific field of communication we find “amateur radio”, also called ham radio or OM (old man) and later on the citizens’ band (CB) community. Of course, technical communities are not limited to the field of communications; we have computer graphics, video games, and more, such as the Manga Fandom[17], but communication is the key player in the creation of communities and due to this, communities directly dealing with communication means are facilitated. In the early stages of computer intercommunication, apart from exchanging signals and data, a basic text messages service was implemented. Ancient timesharing computer systems had local “mail” services so its users could communicate. But the real power of “electronic” mail came true when mail could be distributed to distant computers and all the networked users could communicate[18]. Late in the 1980s the increasing use of bulletin board systems (BBS), file transfer protocol (FTP), Telnet and other communication tools such as Veronica and Gopher prepared the playground for the massive use of the Internet and the World Wide Web. Since the beginning of computer user’s communication, a sense of community arose and a common feeling on behavioural rules was implemented.

As already outlined social media are one of the milestones introduced in the digital domain and represent a powerful innovation without a “twin” the analogic world. Social media are the key of success of the digital domain, the real mass use of digital resources, the one creating “addiction”, is the social side. Since the creation of the first blogs opening the opportunity to share opinions and beliefs with a significant number of users, the number of “social” applications has grown very quickly: Blogs (’90), Wikis (’95), Semantic Web (’97), Wikipedia (’01), Picasa (’02), My Space (’03), Facebook (’04), YouTube (’05), Twitter (’06), VKontakte (’05), Instagram (’10), SnapChat (2011), Telegram (2013), Signal (2014), Tik Tok (2016) ... Social newspapers (e.g. YouReporter, Bambuser), and more, much more. This “addiction”, sometimes and in some social contexts, blurs the line between reality and cyber world, so a mix fake news, small communities pretending to represent the whole population, distortion of reality due to the long chain of word of mouth delivering news and theories, become “the reality”.

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[17] Manga fandom is a worldwide community of fans of Japanese cartoons manga.

[18] The official launch of ARPANET was a large, very successful demonstration that was organised and presented by Robert Kahn in 1972 during the International Computer Communication Confer- ence (ICCC). Early in the 1970 the French Institut de Recherche en lnformatique et en Automatique (IRIA), nowadays INRIA, sponsored the creation of the first network based on packet switching the CYCLADES computer network defining the basis for TCP protocol (refer to Louis Pouzin). The first hot application appeared in March of that year courtesy of Ray Tomlinson: electronic mail. Tomlinson wrote the basic email message send and read software, which was intended to aid cooperation between the distributed research team working on the network project.

Of course, freedom of expression is one of the most appreciated opportunities offered by the Internet and it is already evident that any kind of top-down censorship or control does not succeed even if the concept of Cyber Sovereignty exists and is promoted. If the early stage of Internet communication was based on the so-called "netiquette", a kind of Galateo[19] or Bon Ton of Internet users, the advent of Web X.0 and the social web requires more specific rules addressing first of all the field of ethics and privacy. The evident vocation toward freedom of expression is many times a direct cause of governmental censorship forbidding social applications in some countries. So, it happens that Twitter, Facebook, YouTube or even some thematic websites are not allowed. Here apart from political, ethical and philosophical issues may come to the fore the economic and financial aspect of entering that market adhering to the requested censorship or not[20].

The Internet Revolution gave a boost to data creation and dissemination, MAC addresses, web logs, and intentional or unintentional[21] applications to websites and services, and social platforms ignited the sedimentation of personal and many times sensitive information apparently lost in the cyberspace [19, 22]. Very soon the first drawbacks come on stage: privacy infringements, stalking, hacking, cyber-crimes, stolen identities, darknet and more [17].

However, Google, Facebook, Twitter, Apple, Microsoft, Amazon, and any of the other hundreds of companies that can and do collect data about you can use "your" data for all kinds of amazing things, how many of you use to carefully read the privacy [6] agreements and contracts plus related periodical updates before clicking on "accept"? Social and communication media complete the panorama adding a "private depth" to the general fresco, ad-hoc defined tweets or posts may collect and analyse users' feedbacks in order to guide or anticipate citizens 'actions and feelings. In recent times crowd data collection, open data and big data access, more or less anonymised, have provided the big framework.

Following the same *fil-rouge* on the borderline between licit and illicit activities, simply consider a typical example, an unseen observer that follows you and take notes about all the different places you visit and the time of your visits; he does nothing with this information, simply stores it in his notebook, he is unseen and you will never face him and discover his activity; basically in doing so he didn't break any law. His behaviour is unconventional but still legal. If you act in public spaces or visible by public there are no laws that state that you

[19] Monsignor Giovanni Della Casa was a Florentine poet, writer on etiquette and society; Galateo overo de' costumi was inspired by Galeazzo Florimonte, Bishop of Sessa.

[20] E.g. markets potentially offering "billions" of additional customers. Sometimes the censorship is not declared but the bandwidth devoted to the specific service or website is so narrow that it is practically impossible to connect.

[21] Sometimes the "applicattion to the service" is activated by hidden links or linked to the activation of a basic service.

are the sole proprietor and owner of the information regarding your public life; the collection of this information doesn't violate any right. If we look in law, the closest legal offence in such a situation is stalking even if this offence usually is directly connected with harassment; but the unseen observer does not ever interfere with you so no harassment, no stalking even because the unseen observer is your smartphone and it can't be convicted of stalking you. This is what happens when some "autonomous" on-line applications start showing you your yesterday's paths across the city showing some geo-referenced pictures you shot asking for the reason you went there and what you did in the 15 minutes you spent stopping on the way to your destination. Of course, the system recognises your friends in the pictures and next time probably will ask you why you met them.

Anyway, on the reverse there is a real risk of abuse, misuse and misinformation thanks to these technologies. The movie "Citizen Kane[22]" directed and interpreted by Orson Welles in 1941 outlined the relevant "power" of journalism[23], the movie "Network[24]" directed by Sydney Lumet outlined the power of television in 1996 and perhaps "The Net[25]" and "S.Y.N.A.P.S.E.[26]" together with "The Social Network[27]" started to outline the power of the Internet.

Computer biometrics is nowadays very advanced; so, starting from the Apple tools to recognize people appearing in your pictures once you gave the system two or three samples, a group of Russian developers released in recent times a powerful application, FindFace, that performs in real time the face recognition even of multiple persons and connects them to their V-Kontakte, the Russian version of Facebook, page. This enables users to take a picture with the smart phone on the street on in a disco and immediately discover the identity of the subjects. Is this a potential infringement of privacy? Is this a powerful tool for stalkers? Technological evolution does not have limits; it is already available for the professional market, e.g. law enforcement, a full version of FindFace offering far better performances without the limitation to V-Kontakte subscribers.

[22] Citizen Kane directed by Orson Welles, 1941 RKO Pictures.
[23] The Italian title of the movie was "The forth power" in analogy with the third "The workers" depicted in the extraordinary painting by Pellizza da Volpedo.
[24] Network, directed by Sydney Lumet, 1976 Metro-Goldwyn-Mayer United Artists.
[25] "The Net", directed by Irwin Winkler (Columbia Pictures Industries Inc.—1995).
[26] S.Y.N.A.P.S.E. (Antitrust), directed by Peter Howitt (Metro Goldwjn Mayer—2001).
[27] The Social Network directed by David Fincher (Columbia Pictures 2010).

The role of News and Media

News and Media are key elements in the global society. CNN, BBC, Al Jazeera[28], Al Arabiya[29] are writing the history of the planet 24/7 and on the grassroots side YouReporter[30] and Twitter are complementing this effort. The risk of misuse of such technologies and misinformation is probably higher than in the past. So, it might happen that we will watch an updated version of the movie "Wag the Dog[31]" in the near future.

In June 1993 The New Yorker published a cartoon by Peter Steiner. The cartoon features two dogs: one sitting on a chair in front of a computer, speaking the caption to a second dog sitting on the floor "On the Internet, nobody knows you're a dog". Right or wrong, that's one of the features of the Internet. That's the story of the Syrian "lady" blogging in 2011, the starting point for the "dark power" of the Internet, the realm of hackers and cheaters. The key point is: what is written or anyway appears on the Internet is news by itself. There is no more time to check everything; the Internet provides real-time news. The evolution of on-line news due to the social web and the birth of "prosumers" did the rest. Twitter, YouTube, Facebook and blogs represent a real revolution in the domain of news.

As already stated, the Internet is much more a counter-power than a power; the common idea about the Internet is "a powerful tool of freedom and democracy". This is probably true but the opposite is even true, the misuse of the network and misinformation disseminated and empowered by the Internet and its powerful mechanism.

Cyber IDs allow multiple IDs and potentially Dr Jekyll and Mr Hyde. We are flooded[32] by user-generated content (UGC) largely without any qualification and certification of the source. Many times, the drawback attributed to the amanuenses is affecting even web publishers: information and content is re-used and re-published adding or replicating errors and bugs. The short content production chain, sometimes even limited to a one-stop shop, does not include an editor in chief or a supervisor; so far, the overall quality of prosumer content and information is quite low.

As an IBM top manager told recently on the occasion of the Global Forum: "Do not trust in any information coming from unknown source."

[28] www.aljazeera.com/, last accessed January 2019.
[29] www.alarabiya.net, last accessed January 2019.
[30] A recent event in the field of newspapers is the birth of The Huffington Post, inventing a completely new approach to newspapers.
[31] Wag the Dog (1997), Dustin Hoffman, Robert De Niro and Anne Heche, directed by Barry Levinson.
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Wrapping up the overview

Digital transformation will deeply impact our daily life, our activities, social relations, spare time. It will increasingly impact economy, labour, distribution of wealth. A significant "injection" of human and social sciences, including ethics and philosophy, is needed to lead the process, looking forward to identify “where” we are going and what the results of the "transformation" will be.

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