# Need for Today's Time Data Economy & Connected Challenges

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## Society on the move

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 helps 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 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."

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. Let's now try to depict some of the potential tangible or intangible impacts. Of course the following one is not a complete list of impacts but provides a first glance.

## Impact on society

Digital technology in general had and still have a strong impact on society and the pandemic accelerated and amplified such impact especially on young generations. Leveraging on laziness and relaxation citizens spend less time outside home, they have shopping online, they buy food and drinks directly delivered on their table, "meet" friends on Zoom or WhatsApp, interact with the "outer environment" though the mediation of social media and video clips. These aspects are even more evident in young generations that add to the social media the gaming dimension. Of course, such trends are even amplified by other media such as television and news. Long time ago, in the cyber-domain timeline, we use to speak about virtual reality addiction, considering VR as a kind of drug, more than forty years later we face the real addiction not due to VR but to cyber media in general. One of the last technologies promoted by social media key players is Metaverse, halfway between the real world and "The Matrix", ideal showroom for NFT2. People is losing the connection

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[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
[2] Non-Fungible Token - https://en.wikipedia.org/wiki/Non-fungible_token

with reality and consider as "reality" the double offered by cyber media. Some recent event clearly outlined the impact of such cyber-reality projected by cyber-media.

## Impact on privacy

People use to think that cyberspace is a "black hole" without memory where you pour data without any side effect. Young generations shared online sensitive information to access a videogame or chat with friends or more recently posted images and clips about their private life. 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. In the "datafication" 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 your medical data, fitness program, your expenses or collect and analyse your contacts, your photos or video clips, access your smartphone's camera and microphone. In recent times crowd data collection, open and big data, more or less anonymised, provided the big framework.

Privacy has many dimensions, from concerns about intrusive information collection, through to risks of exposure, increased insecurity, or interference in their decisions that individuals or communities are subjected to when their 'private' information is widely known. Privacy is generally linked to individuals, families, or community groups, and is a concept that is often used to demarcate a line between a 'private' and 'public' sphere.

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. This is not enough, what it is not collected by APPs it will be collected in a seamless mode by IoT; of course, IoT will add a lot to our life, but this will cost us a significant part of our privacy.

Home assistant appliances like Alexa, wearable devices like smart watches, bracelets are becoming pervasive as well. Cyber technology is increasingly merging any sector of our daily life, we are witnessing relevant changes due to both technological enhancements and modification of user requirements/expectations. Freedom of expression is endangered due both to governments and social media and news platforms.

What about the push message asking to provide details about your activities yesterday evening, something that your digital "buddy" was unable to trace? Your bank will suggest, accordingly with some intelligent algorithms the average monthly expenses due to profiles matching with yours and send an alert if you are exceeding the limits. Computer vision will enable your smartphone to identify every single person in a group you photographed and video analysis plus 3D real-time modelling enable intelligent optimisation algorithms to improve human performances, wearable sensors and IoT complete the schema. 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 of preventing all possible data tracking. Cameras, satellites, sensors, and software virtually everywhere ensure that, no matter how much technology you eschew, someone can get some data from you. Your credit card company "tracks" your purchases and in one word your lifestyle. Your phone carrier "tracks" your calls, social relations, and geographic location. 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 nowadays 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?

## Impact on security

We all know that security and privacy are subject to risk as already stated thus it is important to identify and mitigate risks associated with privacy and security concerns. In order to reach this goal, as a first approach, we can perform the following steps: identify the persons at risk in the event of personal information exposure (not restricted to the data owner or collector), identify knowledge assets that can be extracted from the data collected (discrete data points, meta-analysis of data points, mash up of the collected data and external data sources); evaluate the importance of each knowledge asset to the potential goals/harms (little or no relevance, significant relevance, crucial). This approach, many times, will lead us to identify the crucial nodes that, if adequately protected, will ensure no harm. The level of privacy risk will be dependent on the likelihood that identification could occur from the release of the data and the consequences of such a release. Anyway, mitigation is many times linked to de-identification. Security is somewhat linked to privacy, adapt security protocols and tactics to encompass:

1) Digital information security.
2) Physical and operational security.
3) Psychosocial well-being required for good security implementation.

Nowadays the key concept is "holistic security", a "global" approach to security integrating all the different aspects and problems. A specific interest is devoted to digital security.

Digital security is more than focus on software or tools, integrating emotional well-being, personal and organizational security. Good implementation of digital security tools and tactics requires attending to the practitioners' psychosocial capacities to recognize and respond dynamically to different threats to themselves and to participants related to project data collection and communications (intimidation, social engineering.)

## Impact on decision making

The extensive use of AI, ML and Big Data, apart from several ethical issues, can led to some relevant drawbacks. As an example, let's consider "nudging".

The concept of nudge is already used in digital systems even if the nature of the mechanisms that characterise it is not always consistent, and some uses overflow into practices already prohibited by current legislation. In fact, the use of even "slight" and often morally irrelevant manipulations of the architecture of the decision is constrained both in the use of personal data to be able to construct a nudge mechanism (by the GDPR) and if the desired result falls within the category of fraudulent transactions (thanks to the UCPD[3]). The progress of AI has made it possible to develop much more powerful nudge mechanisms thanks to the effectiveness of statistical and inferential AI systems. The impact of AI powered technology on human autonomy is huge. AI-enhanced nudges reinforce the ability to achieve the designer goals using cognitive biases, emotional impulses, and other human behavioural mechanisms both intentionally and unintentionally.

In other words, a set of goals defined by human agents may be reached using decision-making mechanisms, recommendations, or other interaction influences. In addition, some nudge mechanisms are built unintentionally by the system to achieve its ends. This process may generate several ethical risks for individuals, groups, or society. We know that a "*moral harm can result from good intentions*"[4]. However, AI-enhanced nudges do not have an intention of their own but use inferential rules to obtain the most efficient result for a given purpose. Using a wide approach, AI-enhanced nudging mechanisms may include all gradations of decision incentives not-designed by

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[3] Unfair commercial practices directive https://ec.europa.eu/info/law/law-topic/consumer-protection-law/unfair-commercial-practices-law/unfair-commercial-practices-directive_en

4 Puaschunder J. (2020) Artificial Intelligence and Nudging. In: Behavioral Economics and Finance Leadership. Springer, Cham. https://doi.org/10.1007/978-3-030-54330-3_6

human agents: namely, when the creation does not take place in the design phase, but is an automatic process influenced by personal behaviours, collected data and the use of static models. During this process the system becomes a multi-agent system in which the initial well-intentioned purpose of the developers can be misrepresented and create damage to individuals, groups of people or the whole society. An example of this is fake news, for which it is often not their ethical nature that is in question, but their AI-enhanced method (i.e., using statistical models to empower the recommendation system of social network) of massive distribution over a long period of time to a specific group of people that can have large-scale social and economic implications. Impacts may be disrupting for society and democracies by limiting representativeness in the democratic process, augmenting social exclusion thank to the reinforcing recommendation mechanisms based on available personal data, decreasing diversity in executives' roles by reducing the opportunity to be recruited due to the lack of information that can be used to infer a profile, etc. In short, although some nudges may be used positively, monitoring the consequences of AI-enhanced nudging mechanisms is crucial to mitigate possible risks in European societies and democracies.

## Impact on opinion dynamics in social networks

Opinion formation is a complex and dynamic process mediated by interactions among individuals in social networks, both offline and online. Social media have drastically changed the way opinion dynamics evolve, in any case, they provide a reservoir of data for the study of opinion dynamics on social networks. Social media have become a battlefield on which opinions are, often violently, exchanged. In turn the behaviour of social media has become an important early indicator of societal change. This use case aims to study opinion dynamics in social networks by large-scale analysis of social media using state-of-the-art methods of natural language processing and semantic artificial intelligence. Opinion dynamics research has developed models of opinion formation, adjustment, and exchange for over 60 years[5]. The main mechanisms in these models are positive social feedback, opinion, and status homophily, negative social feedback, and the structure of the social network[6]. These models share the property that opinions are modelled as binary variables, finite sets, or low-dimensional vectors. While this is sufficient for toy models and allows to reproduce interesting qualitative behaviours, such as opinion cascades, opinion bottlenecks, gatekeepers, and opinion leaders, it is too coarse a description to connect these models to data from social media. Replacing these extremely coarse opinion representations by the devices that computer scientists use to represent opinion anyhow: knowledge graphs[7] it will be easier to analyse opinion dynamics.

## Impact on freedom of expression

If the early stage of Internet communication was based on the so-called "netiquette", a kind of Galateo[8] 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. Of course, freedom of expression is one of the most appreciated opportunities offered by the network and it is already evident that any kind of top-down censorship or control fails even if the concept of Cyber Sovereignty, exists and is promoted. 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, Instagram, YouTube or even some thematic websites are not allowed. Here apart

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5 Banisch, S., Olbrich, E., Tat Dat, T., Yamshchikov, I.P., and Rezagholi, S. (2017). Opinion dynamics on abstract conceptual spaces. Report on the horizon2020 project ODYCCEUS (grant no. 732942).

6 DeGroot, M.H. (1974). Reaching a consensus. Journal of the American Statistical Association 69(345): 118-121. / Holley, Richard A., and Liggett, Thomas M. (1975). Ergodic theorems for weakly interacting infinite systems and the voter model. The Annals of Probability 3(4): 643–663 / Axelrod, R. (1997). The dissemination of culture: A model with local convergence and global polarization. The Journal of Conflict Resolution 41(2): 203-226.

7 Ehrlicher, L., Wöß, W. (2016). Towards a definition of knowledge graphs. Proceedings of SEMANTiCS 2016.

8 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.

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[9].

Freedom of expression is usually associated with the terms hating, online libel, hoax, fake news this because the improper use of freedom of expression can generate such negative behaviours. Of course, such extensive and negative interpretation of freedom might generate some reactions that can be even worse than the problem itself. We must distinguish between two main branches "hating, online libel" and "hoax, fake news", the first branch must be censored as it was at the time of Netiquette, the second, if not related to the first, is much more critical to be managed without the risk of infringing freedom of expression. A typical and sometimes concrete example is the establishment of a "commission" in charge for the fight against fake news, the one owning the "truth", the risk in an "information society" is to cancel debates, silence alternate views and take a dangerous drift towards the "Pensée unique" or single thought.

## Impact on businesses

Change in technology and user profiles cannot avoid impacting businesses and markets. The market is evolving in a very significant way. The diffusion of platforms if on one side creates new opportunities on the other side "kills" several 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 because of malls it is now because of 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.

Following the schema of some of the recent revolutions the idea was: digital technology is disruptive cancelling several 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 to fully robotized systems.

In addition, today digital tools are blurring the boundary between personal and professional lives, this effect is often termed "time porosity" or "spill over".

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.

## Impact on commerce

An outcome of the merge of big data analytics and behavioural psychology is Internet of Behaviours (IoB). A very rough description of the IoB is the mash-up of three disciplines: Cyber Technology, Data Analytics, and Behavioural Psychology (Emotions, choices, augmentations, and companionship).

From a behavioural psychology standpoint, the IoB tries to comprehend the data acquired from users' online activities sometimes merged with IoT data. This mix offers important information on client behaviours, interests, and preferences Consumer data may be gathered from a range of sites and technologies, including a company's website, social media profiles, sensors, telematics,

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9 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.

beacons, health monitors, and a variety of other devices. When we accept "cookies" without checking them it may happen that some of them will "profile" our interests, other times the application offers the opportunity to save a "wish list". Cross referencing searches and queries the system can extrapolate the expectations of customers. It aims to answer the question of how to interpret data and how to use that knowledge to develop and promote new goods, all from the perspective of human psychology.

The term "IoB" refers to a method of analysing user-controlled data from a behavioural psychology standpoint. It aims to answer the question of how to interpret data and how to use that knowledge to develop and promote new goods, all from the perspective of human psychology. The findings of that study influence new ways to create a user experience (UX), search experience optimization (SXO), and how to advertise a company's final products and services. Both Google and Facebook utilize behavioural data to provide ads to users on their sites. This enables companies to interact with their target consumers and measure their behaviour in response to advertisements via "click rates." This branch of technology poses some Ethics and Legal concerns, how far can technology manipulate humans, who is going to protect citizens from misuse and abuse of this potentially powerful tool/weapon?

## Conclusions

Arguably, we haven't even discovered every type of data that can be recorded and any potential impact on society and economy. At the same time today, we have only a limited idea and vision on potential risks due to DT and "datafication" processes, in some way we are still in the digital Middle Ages both for positive outreaches and drawbacks. Anyway, back to "my data" until the legal infrastructure changes, this one is the simple fact: you don't "own" personal data just because it's about you.

In conclusion, don't you feel framed by such an "intelligent" environment? 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 to guide or anticipate citizens 'actions and feelings. In recent times crowd data collection, open data, and big data, more or less anonymised, have provided the big framework was to collect all the different tiles. Online malls and delivery platforms offer, in addition, to analysing your browsing, the opportunity to save a "wish list" to better focus on the market trends. So, again don't you feel framed?

## Future trends

First, one growing opportunity is the appropriate use of ICTs for development and for inclusivity of nations and regions. But as the Internet and its providers are transboundary entities, national access, or denial of access – inclusion or exclusion -- within any country also affects an entire region and beyond. The impacts of digital exclusion are now seen upon individual citizens, but also upon international markets, financial institutions, and regional economic development.

Second, work on hybridity – the potential of ICTs and of tech in general – to work non-hegemonically with populations that have and wish to maintain their traditional technologies, shows great potential. Further discussions of "low-tech no-tech" and "low-code no-code" showcase opportunities to benefit all societies, not only the least-developed. In addition, hybridity between ICTs and traditional tech can assist in sustaining the impetus for democratization and de-colonization of technology.

The challenges for the upcoming years are the ways to sustain the humanitarian part and the inviolable right to freedom and personal privacy in an era of unlimited supply of information and technological ventures. The need to find a proper balance is omnipresent. Social sciences and

humanities must establish a tight cooperation in designing or co-creation of cyber technologies always keeping humans in the loop.