# Statistical Agencies facing the digital era

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**Abstract**

*Digitalization has been called the Fourth Industrial Revolution. Comparison to industrial revolutions reveals that digitalization is first of all a societal change*. A very descriptive definition has been published by the National Science Foundation (US federal agency) on its Culture Digitally website: “Digitalization is *a way in which many domains of social life are restructured around digital communication and media infrastructures”.*

*Digitalization disrupts society in many ways. New technologies and the platform economy replace old business models and enable new models where nearly everyone can act as a producer with very small investments. Digitalization will not perish the media, but it will change the platforms and replace centralised dissemination of information. In this digital era, individuals process information from various sources. For statisticians it is critical to understand how information is processed by individuals.*

*The role of statistical agencies in a digitalized society is twofold: they should be able to describe changes in society with sufficient accuracy and, at the same time, they should reposition themselves as a strategic actor on the information market. At the moment, it is almost impossible to describe the size of digitalization with the current economic classifications and the decentralisation of information allows individuals to produce competing information.*

*Horizontal management, organisational change capability and continuous learning form the foundation for the ability to respond to change. IT should also align itself as a part of organisational development. Alignment will enable the emergence of new innovations, as well as the emergence of completely new business models; digital transformation. Understanding digitalization as a phenomenon is crucial for statistical agencies; they need to renew their business so that they can respond to the changes in society agile enough.*

*The author has made a study on the impact of digitalization on organisations. In this presentation, she applies the knowledge to the development of statistical agencies.*

**Keywords**: digitalization, organisational development, digital transformation, IT-alignment

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## A brief history of digitalization

The concept “digitalization”, as it is currently understood by the scientific community, was first used in an article published in 1971 by the North American Review, where Robert Wachal discussed the social effects of the digitalization of society. Wachal's study was a starting point for thinking where digitalization did not primarily mean converting analogue information into bits, but more about the effects of digitalization on the surrounding world. A little bit later, in the early 1980s, several researchers analysed the social, political, economic and cultural implications of networked digital information and emerging communications technologies. The research on the effects of digitalization came up in the sociologist Jan van Dijk’s study, The Network Society in 1991. Sociologist Manuel Castells’ book The Rise of the Network Society in 1996 dealt with the same subject. The precursors of the concept digitalization in social research were Information Age, Computer Age and Digital Age. The concept New Media Age also partly describes the same phenomenon as Castells’ Network Society, digitalization.

Technological development has provided the infrastructure for digitalization. The "core technologies" that have opened the door for the victory of digitalization are Internet, broadband and wireless communication via mobile devices. Already in 2009 sixty per cent of the world's population had a mobile device. In 2016, services offered by the Internet were used more with mobile technology than with traditional desktop computers. A wireless Internet that provides a network of all possible connected devices and offers a wide range of services is one of the key factors in the progress of digitalization. The use of television, radio and newspaper services is increasingly done through mobile devices. Mobile phones have already shaped people and the service providers. Watching a TV program or reading a newspaper article is no longer tied to time or place. The development of different fields of artificial intelligence, as well as exploiting the opportunities offered by so-called big data, are also the key dynamics for digitalization.

## Disruptive forces of digitalization

Digitalization has also created new media production by individual people alongside the official mass media. The boundary between official and informal mass media is blurred. Also, the boundary between official statistics and informal statistics, provided by ordinary people, is blurred. We've moved to a post-truth era where almost everyone can act as a content producer. Baldacci & Pelagalli write about the same phenomena in their white paper Communication of statistics in post-truth society: the good, the bad and the ugly. Baldacci & Pelagalli emphasise that social media platforms and all kind of network-based information have replaced the old centralised information environment. In the same white paper, it is also stressed that the consumers of information can rely on a variety of different information sources, not necessarily certified in terms of their quality and adherence to scientific statistical production methods.

The increase in computing power and the low costs of data storage have also opened the possibility to participate in data dissemination and communication for a significant part of the world's population. For the statistical agencies and all producers of official statistics it is a challenge to stand out in the crowd. In this digital era, everyone can choose the information that supports their own thinking from the media content, information which they want to believe is true. Modern technology has allowed each of us to live in our own world, separated from others. In our everyday online lives, we want to communicate only with people with similar thoughts to our own and not encounter those who think differently. That is why social media is sometimes also called an “echo chamber”.

Digitalization has also created a new kind of economy, where small financial investments make it possible to achieve economically profitable business. Non-commercial operators challenge commercial players, an example of social-production is an open source code that is distributed over the Internet for free to anyone who wants it. Open source developer communities can compete alongside traditional large commercial players. Digitalization is disrupting the market.

According to researchers, digitalization acts also as an accelerator of globalisation, while, at the same time, weakening national sovereignty. Digitalization is characterised by the fact that digital networks do not stop at the borders of nations, because the network society is a global society. Digitalization is estimated to be the most representative narrative of our time. When dealing with digitalization, one must also understand the central role of the global economy in the progress of digitalization. Capital moves from one side of the globe to another 24 hours a day, so that capital, deposits and investments are closely linked to each other globally. The globalisation of the financial markets is the backbone of a new global economy.

As the financial markets increasingly operate in the virtual world, the everyday life of a human being is at least partly also in the virtual world. Digital components are part of the end product, service or part of the production process of more and more industries. The automotive industry is a good example of an ever-digitizing production process where robotization has already advanced. In addition, the end product of the automotive industry, the car, has, like many other industrial products, turned from a mechanical product into a software product. Digitalization together with globalisation creates big challenges, especially for producers of economic statistics.

Digitalization is shaping society and it affects individuals by modifying their behavioural and consumption habits. In a digitalizing society, people constantly impose new demands on the products and services offered to them. Organisations that produce services/products must be able to meet the needs and preferences of the people who use them.

## The impact of digitalization for the working life

Digitalization of processes means the necessity to develop digital capabilities in almost all sectors of service production. In so-called white-collar work, change takes place in the same way as in industry, by reforming and digitizing processes. According to forecasts, the so-called digital workforce, will be part of an increasing number of work communities. The digitalization of knowledge work is challenging people as performers of office work.

The digitalization of the workforce creates a polarisation of work (and working life), resulting in the retention of highly educated and untrained workers. A trained middle-class workforce is forced by digitalization to evolution: to retraining or poorly paid undesirable work or unemployment. However, digitalization, *per se*, does not cause unemployment, even though it reduces the time it takes to produce a single output. Digitalization transforms the quality of work, determines what it is like, who does it and where. How does this appear in the production of statistics? Probably with automation, the need for labour will decrease in the production process, but the presumptive transformation of statistical agencies’ role will increase the necessary amount of high expertise in other fields.

## Facing the challenges of digitalization

In the era of digitalization, it is almost impossible to predict discontinuities in the surrounding society, but organisations need to be prepared for the changes. Whereas previous industrial revolutions played out over a relatively long period of time, in the era of digitalization, organisations must respond flexibly to surprising changes and constantly innovate to maintain their viability. Non-traditional data and new data sources, in addition to new technologies, are at the heart of this adaptability. This concerns especially all the producers of official statistics. In addition to new information sources and technologies, producers of official statistics must be able to produce statistics that are relevant for the end users. Also, the role of the management of the organisation is emphasised; it must be able to respond to changes in the operating environment of its own organisation early enough and identify the possibilities technology can offer. The pace of the digital transformation is rapid.

However, from the organisation’s point of view, one of the main interests is the improvement of work productivity that digitalization enables. It can help improve the profitability of activities, which often (in the private sector) has a direct impact on the value of shares. Public sector actors and all producers of official statistics should share the earlier mentioned interest, reducing operational costs by improving labour productivity but they are not in the same way at the mercy of the market as private sector actors. Indicators for assessing the labour productivity in the public sector are difficult to set up because competition, and quite often the alternatives to public sector services and products, are lacking. Citizens are often forced to use public sector services because the services they need are often not available elsewhere. Unlike the private sector, the public sector is not guided by the amount of return directed to the shareholders. Most of the public sector service providers have been operating in their own sector in a monopoly position, and the competitive position vis-à-vis other operators has not existed in the past.

However, profitability and improved competitiveness are key factors that guide the direction of technological innovation and productivity growth. Here, the public sector is the main beneficiary of the choices already made by the private sector. Researchers have especially emphasised organisations’ need to develop dynamic capability for Continuous Change and Continuous Development of current activities. This means that the organisation must established a coherent digitalization strategy.

## Leadership

Leadership is one of the key issues that is common for all actors in the private and the public sector. Facing the challenges of digitalization forces organisations to convert the leadership model from vertical to horizontal and creates an opportunity for flexible business, where, instead of getting the right answers, asking the right questions, making the most of everyone's skills and creating a sense of community are key. The ability of a bureaucratic organisation to practice vertical leadership and respond to economic and technological changes is weak. The well-known researcher, Manuel Castells has named some key points of horizontal leadership. One of the most important factors of horizontal leadership is low hierarchy and setting the leadership focus on team level. Another important factor Castells emphasises is the measurement of organisational performance through customer satisfaction. Castells’ list is complemented by rewarding work at team level, maximising customer contacts, and keeping all employees 'up to date' through information and training.

The role of the management is to act as a facilitator of learning. Expanding the role of leaders to facilitators of learning, is one of the preconditions for the organisation to respond to the challenges of digitalization. Digital transformation also requires transformation of the organisation, restructuring of structures and management. Statistical agencies share a risk of becoming resistant to change. The working culture and sometimes very bureaucratic processes can create challenges for innovation and digital transformation.

Leadership should also be the actor that makes decisions on which direction the organisation should focus on. Modern leadership should be able to take advantage of the opportunities offered by the information technology to create new business capabilities. Organisations that can effectively manage and utilise digital technologies are also able to create better customer experiences, streamline and renew their business. To achieve these business development goals, the organisation's management must have a clear vision of the direction.

## Future scenarios

Baldacci & Pelagalli describe three scenarios for official statistics. The scenario they have called the bad scenario is where official statistics competes against fake news in an environment where alternative information providers disseminate data on several platforms. Statistical agencies will keep focusing on their core business, when the alternative service providers would be reaching out to users with all kinds of tailored statistical products. According to Baldacci & Pelagalli, this scenario would lead to a gradual marginalisation of the producers of official statistics.

The most positive scenario in the white paper of Baldacci & Pelagalli, the so-called good scenario, describes a future where official statistics generate new sophisticated data analytics that cater to different users with tailored information services. It uses network technologies (e.g. blockchain, networks) to involve individuals, companies and institutions in the design, collection, processing and dissemination of statistics. In this so-called good scenario, the role of statistical agencies would not remain as it is now. This would mean setting up a totally new vision with a new business strategy; repositioning statistical agencies as a strategic actor on the information market.

Haishan Fu, a blogger on the World Bank’s web pages, also encourages national statistical offices to go beyond traditional data production and become a trusted and visible force for reason in people’s lives by building and embracing relevance and communicating better. In the post-truth society, the role of the official statistics community is to fight against disinformation and bring evidence-based information to the public.

Haishan Fu also emphasises the relevance of statistical information. With relevance she means that the information national statistical agencies disseminate should matter for people’s everyday lives. This would also mean that producers of official statistics should understand and use new resources to be able to disseminate new relevant information. If no official statistics are available, people will probably find the information needed somewhere else, for example, on social media.

The problem with the relevance of official statistics has become visible also in some public articles and working papers in Finland and in Sweden, where national statistical offices have been urged to update the way digitalization appears in statistics. For example, Swedsoft’s Whitepaper “Yttrande om Digitaliseringens transformerande kraft - vägval för framtiden” states: "Furthermore, the proposed audit of Statistics Sweden's mission is an absolute necessity, as current statistics do not capture what is the IT sector when all industries and businesses include IT operations”.

In 2018, Statistics Finland released a working paper “Digitalisation and GDP -how digitalisation is visible in economic statistics”. One of the main findings was that as a result of digitalization, services will shift from market services to services produced by consumers themselves and vice versa. How services produced by consumers themselves affect, for example, growth figures, is difficult to assess. National accounts manuals (and all classifications) change slowly. To solve the relevance problem, the authors of Statistics Finland‘s working paper suggest so-called satellite accounts to solve the problem. These satellite accounts could then describe the phenomena in a more detailed level than in the National Accounts manual.

The same white paper also detected that digitalization radically changes the industry and the product structure of production, and the ability of current economic classifications, like industry and product classifications, to describe these changes is very limited. One could say, that the relevance people want from official statistics is not reached.

## New role, social influencer

Haishan Fu also suggests that when the national statistical agencies won’t necessarily be able (and they don’t even have to try) to satisfy all of people’s statistical needs, statistical agencies could adopt a “coordinator” role in a broader ecosystem. This broader ecosystem would include voluntary sector and private sector data providers. Haishan Fu sees that here the national statistical offices would produce the core statistics and be an active co-worker with the other data providers. The role she is sketching out is some kind of a supervisor or administrator of statistics at a national level. She sees that the needs and interest of people can become so varied that it is not even possible for statistical agencies to satisfy all the needs.

Producers of official media have analysed the impact of digitalization on journalism. According to these studies, we are heading to an era when everyone has their own facts. Scientists, official media and producers of official statistics are all facing the same challenge, how to stand out from the crowd as a producer of information. The tight connection between scientific information, official journalism and statistical information should be made more visible. Making the connection between producers of official information more visible would strengthen the counterpower for producers of misinformation.

In order to avoid ending up in the bad scenario of Baldacci & Pelacalli would require a role change. Moving from the role of a producer of statistical tables to a visible social influencer. But, how to help statistical agencies change their role effectively? To be able to transform their role, the National statistical agencies should better understand the ongoing societal change, digitalization. The twofold role being the describer of the change and, at the same time, responder makes the situation very challenging for the producers of official statistics.

Transformation has been inherently challenging for the whole public sector, all national statistical agencies and producers of official statistics included. Change capability, has also traditionally been slower and more difficult for the public sector than the private sector. Producers of official statistics share the public sector’s hierarchical ways of solving problems that are in stark contrast with the values of modern ways of working. Rethinking hierarchy, streamlining governance and sharing decision making processes, would improve all public sector organisations’ capability to deploy new leading-edge technologies and services the customers expect from their private sector experiences.

## IT unit’s role in organisational development

An important aspect of a successful “digital leap” is also the change in the role of the information technology unit from a provider of services/saving opportunities to a new kind of innovative business activity. The IT unit must be able to proactively support management goals in implementing digital transformation. At the same time, management must also be aware of the dualistic role of the IT unit. It is not just about providing IT services to an internal customer, but also functions to develop the organisation's products and services.



*Picture 1. Capability levels of IT unit (Gartner)*

It is important that the organisation recognises the technologies that it can use to generate new business models in a timely manner. The organisation also needs to have the right tools, processes, and specialist staff to analyse the evolution of technology trends. The IT organisation is required to have a strategic vision and the ability to identify technical discontinuities at a very early stage. The most important feature of the IT unit’s capabilities is to understand and digest the opportunities that new technologies bring to business development, thus forming the basis for digital transformation. In practice, statistical agencies should have an innovation unit, which would look at emerging technologies that could have a positive impact on statistical production.

Digital capability at organisational level means the existence of a workforce that can make informed choices about existing tools and techniques that are used to achieve strategic goals in different parts of the business. An organisation's IT capability level should correspond to the depth of the change process in the organisation. In other words, if the rate of change is very high, the level of IT capability should be at the same level. An organisation's digital capability is not permanent capital if it is not adequately maintained. Digital capability may vary due to various internal or external factors. Such external factors may include, for example, new technical innovations or changes in the organisation's industry. In addition, internal factors affecting digital capabilities may include investment in digital capital and improved competence through learning.

The role of data has also changed during the last two decades. Masses of data is generated every minute. Social media produces data, retail trade produces transaction data, and all this available data has become incredibly important for nearly all businesses. This has led to a situation where tools and methods for analysing and processing data are no longer the private property of statistical agencies. Statistical agencies should better follow the private sector implementing new methods and technologies associated with processing and analysing mass data and big data. Following and adapting this technological development should be a capability of the IT unit.

## Understanding customers

Customers are more demanding than ever before. “Digi Generation” require a positive and seamless customer experience. Also, statistical agencies must be able to see everything from the customer's point of view, so that all customer interfaces together produce a positive customer experience of the “brand” created by the statistical agencies or other producer of official statistics.

The customer experience is a cumulative event consisting of emotions and concrete events that occur to a customer while dealing with a product, service, or organisation. The customer experience is much more than a single user-friendly product or service. A positive customer experience is an emotional state born in a single human being, which cannot be predicted with certainty. As Haishan Fu writes on her blog, producers of official statistics must become students of human behaviour.

Customers are more cautious today than ever before. If a product or service does not meet their values or needs, they will rapidly seek another service provider. The national statistical agencies must also identify and understand their customers better. But, quite often when we talk about customers we forget the real “heavy users” of official statistics, other public sector agencies, ministries, central banks and all the international actors to whom we disseminate data. How is our relationship with them? Instead of just disseminating data, we should strengthen our relationship with them, build a statistical network where the (national) statistical agencies should have a central position. For example, Statistics Netherland has built a strategy where it has a centralised position as a producer of statistics and other public sector agencies and ministries need to consult Statistics Netherlands on their official statistics. In the Netherlands, a statistical network where the national statistical agency operates as a kind of conductor has been created.

To better understand the customer experience let’s look at the research of Soudagar et al. (2012). They present four “blocks of trust” that are important for the customer experience. The first factor is the reliability of the product/service, the second is its suitability. The third factor is the ability of the product to respond quickly to changing needs and the fourth, the importance of the product/service to the customer (relevance). The key factors for the customer experience are not just the affairs of the marketing and sales department or IT department, but the factors that guide the entire organisation. Achieving customer confidence is a key factor in the organisation's operation and requires a change in culture throughout the whole organisation. The organisation's activities must not be guided by the internal needs or structures of the organisation. Looking at the organisation's activities from the outside, from the customer's point of view, also affects the processes that produce the services and products. Statistical agencies should also follow how these blocks of trust materialise in the services they offer, to try to avoid the dystopia, the bad scenario of Baldacci & Pelagalli.

In the private sector, the revenue from customers is a direct measure of success. Compared to the private sector, it is difficult to gauge the value of public services to customers. A good example of a new approach to produce official statistics is Statistics Netherlands’ way of improving the awareness of people’s behaviour. Cognitive science has had a significant role in understanding how to reach people and share the statistical truth with them.

Some “truths” cognitive science tells us about people and how this knowledge has been used at Statistics Netherlands. For example, people are visually oriented, people have difficulties in remembering things that don’t have emotional impact and people can’t remember facts but are built to remember stories. Statistics Netherlands uses this cognitive knowledge by disseminating statistical information in visual format, creating stories around the facts, working directly with media and using multi-channel format. The same knowledge that Swedish “data guru” Hans Rosling used when he converted statistics into engrossing stories and interactive graphics. Statistics should not be just grey bookkeeping if it wants to reach the audience.

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