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SMART AT ANY COST?

THE CHALLENGES OF DIGITALISATION IN THE TIME OF COVID-19

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The challenges of digitalisation
in the time of Covid-19**

Eva Paul and Pablo Demierre (Eds)



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Preface

I'm sure it has happened to you too: after coming home from a long day at work, the last thing you want to do is cook. So you grab your smartphone and in just a few taps you have exactly what you want delivered to your door – Indian, Chinese, Lebanese or whatever else suits your fancy. You can even track the delivery driver so you know exactly when your dinner will arrive.

This may be a mundane anecdote, but it belies a more complex shift that is taking place in our society. Our relationship with technology is changing, and digital systems have become part and parcel of our daily lives. Everyday tasks are cheaper and easier, yet the example we gave above, of a transaction which now takes just a few minutes, reflects a deeper concept that we will explore in this policy paper – the advent of Society 4.0.

The internet was first developed after the Second World War and was adopted widely by societies around the world, especially in the second half of the 20th century. This gave rise to what is known as Industry 4.0, or the fourth industrial revolution, in which internet technology – and more specifically, networks of interconnected data collection systems – paved the way for a new industrial era based on big data. Manufacturers can now collect and store reams of information to better manage their production and distribution lines.

So far, so good – ultimately, this so-called “smart” technology has enhanced the effectiveness of a marketing strategy that has been around for some time: knowing your customer so you can provide products and services better tailored to their needs. The tools used in Industry 4.0 are actually easy to operate, provided you know how to use a computer.

What people tend to overlook, and what we want to examine in this policy paper, are Industry 4.0's consequences on society. Whereas all previous industrial revolutions have modified our societal constructs (such as our lifestyles and urban development patterns) in some way, this is the first to

combine information and communications technology with industrial production systems, and therefore give rise to new consumption habits.

So while using an app to order your dinner is convenient, the underlying mechanisms have major societal repercussions; just look at the recent controversy over the employment practices of platform businesses like Uber and Smood, especially when it comes to labour law and worker protection.

SMART CITIES AS HUBS FOR THE DEVELOPMENT OF SOCIETY 4.0

Around half of the world's population now lives in cities, and this trend towards urbanisation will only continue. Urban households began installing internet connections on a large scale in the late 1990s, turning cities into real-world labs for testing new digital technology. While rural areas have also been affected by the digital transformation, it is in cities where the most possibilities abound for exploring new working arrangements, commuting methods and modes of social interaction. In other words, urban areas are where Society 4.0 has the greatest potential for development – and the smart city concept is a prime example.

However, there is still no clear definition of what a smart city is and what it is made up of, nor have the societal consequences of smart cities been well identified. An article appearing in Swiss daily *24heures* on 28 October 2021 named Lausanne as one of the five smartest cities in the world.¹ Lausanne, along with Zurich and Geneva, rank among the top ten in the Smart City Index established by the International Institute for Management Development (IMD).² But what exactly is meant by a “smart city”?

The Swiss Federal Office of Energy defines smart cities as cities that can offer residents a high quality of life with minimal resource consumption, thanks to an intelligent combination of infrastructure

¹ Clément Bonard, “Lausanne dans le top 5 des villes les plus intelligentes,” *24heures*, <https://www.24heures.ch/lausanne-dans-le-top-5-des-villes-les-plus-intelligentes-966234187087>, accessed 28 Dec. 2021.

² IMD, “Data shows effects of COVID-19 and climate change on citizens’ perceptions of how ‘smart’ their cities are”: <https://www.imd.org/news/updates/data-shows-effects-of-covid-and-climate-change-on-citizens-perceptions-of-how-smart-their-cities-are/>, accessed 22 October 2021.

and innovative technology. The goal of minimal resource consumption is also aligned with the United Nations' 17 Sustainable Development Goals for 2030. Smart cities therefore have an impact at the global, national and local levels, as they encourage various stakeholders – international organisations, universities, NGOs and policymakers – to take action towards achieving the Goals.

The term “smart city” generally has a positive connotation, but in this policy paper we want to examine how things stand on the ground. In what way are smart cities an element of Society 4.0? Are they a genuine phenomenon, or merely a marketing-driven vision of how cities will be in the future?

SOCIETY 4.0, SMART CITIES AND COVID-19

Covid-19, which first emerged in November 2019, has had a major impact on our society and ways of living. Public officials have developed a number of digital systems in response to the pandemic, such as contact tracing apps and electronic vaccination certificates, and many activities have been shifted online, including through remote working and virtual doctor's appointments. Significant advancements have also been made in health care technology; engineers were able to fabricate ventilators using 3D printers, for example, and to repurpose drones to deliver prescription drugs.

Although much of the technology had actually existed for a while, the 2020 pandemic accelerated its adoption by opening up applications in just

about every field. This has raised several important questions, however, particularly with regards to personal data collection and protection. Many of the systems developed in response to the pandemic have become mandatory for those who want to return to a normal life. For example, you must now have a certificate stating that you have received a certain number of vaccine doses. At the beginning of the pandemic, some police forces used security systems (like CCTV cameras) to detect gatherings of people when such gatherings were prohibited. What happened to the data that were collected? What about personal data protection? How will things stand once the pandemic is over? Are we becoming increasingly dependent on such technology?

All these issues need to be examined carefully, especially since some countries, like Japan, are already entering Society 5.0. The pandemic has given smart cities an entirely new playing field and the concept is being embraced by more and more urban areas. The French city of Nice, for example, is using its smart characteristics as a quality stamp in order to attract tourists and businesses.³ But at what cost?

This policy paper is intended to provide recommendations and topics for discussion so that smart technology can be implemented in a way that takes account of the different biases and problems it can create for society. To that end, our Foundation has compiled a selection of essays from professors and researchers at the universities of Neuchâtel, Lausanne and Geneva, in order to examine the complex topic of smart cities from every possible angle.

Smart cities require coherent digital strategies

*Interview with Ola Söderström
Full professor, Institute of Geography, Faculty of
Arts and Humanities, University of Neuchâtel*

1. WHAT IS A “SMART CITY”?

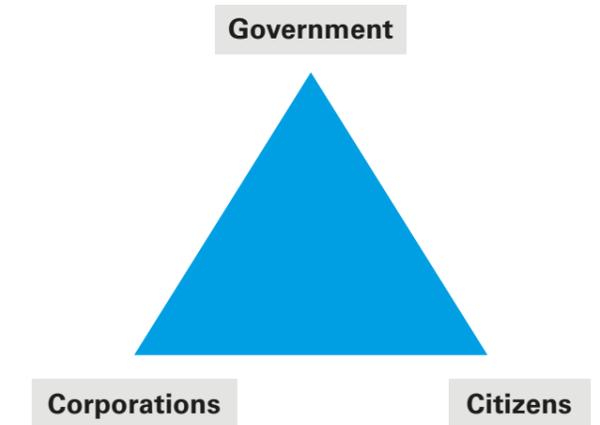
Most of the time when policymakers seek to define smart cities, they do it as a box-ticking exercise: a city is “smart” if it has smart e-governance policies and objectives, smart energy systems, smart transport systems and so on. This definition echoes the one used by IT companies in the early 2010s – but it is actually far removed from the true essence of what constitutes a smart city.

In 2008, IBM became one of the first to use the term “smart” with regards to cities,⁴ deploying it as a marketing tool to describe a place in which citizens' lives are greatly improved through urban data collection and networks of interconnected technology. This marketing discourse, employed by other IT companies as well, was then widely adopted and has become a cornerstone of policymakers' vision for the future of urban development.

The term smart city itself is a form of lexical glue. It portrays a concept, or a convenient label to stick on, but it has no concrete meaning behind it. Because there is no precise definition, the term has been used in many different ways and has led to rankings of the smartest cities (perhaps the most well-known is the Smart City Index) based on very disparate sets of criteria. The vague nature of the term and the ultra-modern, high-tech image it bestows are the main reasons it has become so popular.

If we wanted to establish a clear definition of a “smart city”, we could say it is one with a governance system that makes extensive use of data and technology. This definition has the advantage of placing the term in its historical context, since the use of urban data is an issue that has been around for decades. The idea of a cyber-city made up of a collection of interrelated, data-based systems was, for instance, introduced by the urban systems theory developed in the 1960s.

Today, urban governance systems that rely heavily on data and technology come in several forms. They generally fall into three categories depending on the predominant stakeholder group: the government, corporations or citizens.



Each point in this triangle corresponds to a different smart city model with its own structure and objectives. Of course, these different models are related and the lines between them can be blurry, but they are each oriented towards a different goal. For instance, in Hyderabad, India, whenever the local government tries to vaunt the effectiveness of its e-governance systems, local NGO volunteers respond with detailed data on the (often inexistent) lavatories in informal settlements.

Urban policymakers would do well to examine this triangle and identify where they are positioned, in order to develop a smart city strategy that is in the public interest. Currently, much of the discussion on smart cities is heavily influenced by the narrative and interests of multinational IT companies.

2. THE CORPORATE SMART CITY

Smart city policies have generally been shaped by the corporate strategies of major IT companies like IBM, which, starting in 2008, turned much of their focus to “computerising” cities. Because these companies' ultimate goal is to sell technology and services, this type of smart city can be described as “tech-solution driven”. With this approach, any

³ Nice Smart City, Nice Convention Bureau Official Website, <https://en.meet-in-nice.com/>

⁴ See https://www.researchgate.net/publication/263286217_Smart_cities_as_corporate_storytelling

urban issue – from energy systems to affordable housing and assistance for the homeless – can be addressed through data-driven technology. This approach is very appealing because it takes the politics out of these issues. It even goes as far as conveniently removing the need for policymakers in the decision-making process, since technology can be used to solve the problem instead. It works fairly well in some areas, like how to manage parking places, but much less so in others, like how to make housing more available. This is the predominant smart city model and it is based on a utopian vision that is lucrative for IT companies but not always in the best public interest. It side-steps certain questions, such as whether cities in the developing world should invest first in the large-scale roll-out of fibre optics or instead in basic services and infrastructure (like water, electricity and sewage systems).

The rhetoric around corporate smart cities has evolved over the years, but the basic model is still tech-solution driven. Today we are seeing smart cities being increasingly equated with sustainable cities. A smart city is a sustainable one, or so the saying goes. While it is true that some cities have installed smart technology to help reduce air pollution, for example, the link between smart and sustainable is not at all direct. This is above all another marketing message – one of the many examples of modern greenwashing. That is also true for the presumed correlation between smart cities and participatory democracy. In these cases, we need to ask exactly who is saying that smart cities are also sustainable and participatory? And what facts are they basing it on?

While IT companies have outlined their theory for smart cities, the way things work in practice is generally through a kind of “command-control centre” where data and images are collected from sensors and CCTV cameras. Such control centres can be used for good, such as to deliver aid to people during a pandemic-induced lockdown. But as with the example of Hyderabad we mentioned earlier, these centres raise a number of questions regarding democratic freedoms and personal data protection – questions that are mostly swept under the carpet by those promoting the corporate smart city model. The corporate storytelling has sold us a cyber-utopia, but on the ground, that has been only partially achieved. Most corporate smart cities consist primarily of a modern, police-run control centre equipped with the latest technological

gadgets (which become obsolete just a few months after being installed). There are, however, a few highly mediated examples of these kinds of smart cities, like Songdo in South Korea, that suggest that the utopia is possible – a corporate smart city can be merged with public policy.

3. THE CITIZEN SMART CITY

This is another model for a smart city, oriented towards other objectives. Citizens have joined forces in a number of areas to collect and analyse data in order to better understand a given problem and take the right action. In London, for instance, a group of citizens has set up an air quality measurement system in a polluted district where the government does not provide reliable data. And in South Africa, one vestige of the opposition to apartheid is a highly active civil society, especially on issues related to urban development. Cities like Cape Town have seen a number of data collection initiatives emerge in recent years. NGOs there now document living conditions in informal settlements, particularly with regards to housing, basic services and infrastructure, using computer mapping technology and ad-hoc WiFi networks. That helps them to better understand the difficulties faced by people living in the settlements and to support their requests for government assistance. Here, data and technology are used as tools to help citizens exercise their rights.

Just as technological systems are becoming part of the municipal government in corporate smart cities like Songdo, these systems are also becoming part of the local government in citizen smart cities. That is the case in Barcelona and Amsterdam, for example, and in all the other cities that signed up to the Cities Coalition for Digital Rights – an initiative launched by Barcelona, Amsterdam and New York in 2018. Over the past few years, Barcelona has been implementing a smart city model firmly anchored on the needs of its citizens. City officials have introduced a data protection policy that stands up to the extractive appetites of the Big Five tech companies, supported an ecosystem to develop applications that are in the public interest, set up an online platform for participatory democracy, and introduced regulations for platform businesses like Airbnb and Uber. It is one of the rare major cities in Europe where Uber has not been able to get a foothold. Barcelona’s mayor had plans to introduce a service similar to Uber in June 2021.

Barcelona, like cities in South Africa, has a long history of civic involvement, which partly explains why officials have been leaning towards the citizen model of a smart city. In general, we have seen that the way in which urban policymakers adopt smart technology is closely tied to their city’s political and societal roots. Smart cities are shaped by the history and social patterns of the region into which they are born.

It therefore follows that the political aspect of smart cities is very important. Policymakers need to dispel the marketing myths and many preconceived ideas that have built up around the technology, in order to develop a smart city strategy that is genuinely oriented towards the common good. Today we have enough knowledge and feedback from cities’ real-world experience to make informed decisions. We know that officials cannot just take generic, off-the-shelf technology and implement it in local contexts. Rather, they need to outline a coherent strategy for urban governance that is tailored to local political priorities and citizens’ needs and constraints. This has not yet become the standard smart city model, but today we have the resources to take a smarter approach to smart cities.

4. IS THERE A RIGHT WAY TO BE SMART?

Smart cities have benefits for totalitarian regimes, particularly in the area of surveillance. One example is the Chinese government’s social credit system, in which citizens are rewarded or punished based on data collected about their behaviour (for now the system has been implemented only partially).

The Covid-19 pandemic underscored these totalitarian benefits in two main ways: (i) it sped up the adoption of new technology; and (ii) gave

legitimacy to such technology. A study I conducted in India showed that the government, citing public health reasons, was able to start flying surveillance drones over cities in the space of just a few months, with very little protest. And it did so very strategically. The pandemic did not only serve as a reason for rolling out new technology – it was also used strategically for that aim.

Studying smart cities around the world has led us to another observation: there has been a major shift over the past decade in who collects and owns urban data. Up until recently, and going all the way back to when such data were first collected in the 18th century, information about citizens and regions was held mostly by government entities. But today, platform businesses are changing all that. If you want to have a good idea of how people actually get around in cities, you are best off looking at the (privately held) data collected by the likes of Uber, Lyft and Mobility. The catch is that these applications demand full transparency from their users – asking them to make their geolocation data and other information readily available – but are subsequently very opaque on how the data are handled. Exactly what data are collected? For what purposes? Where are they stored?

Determining who can access citizens’ data and how policymakers can strike the right balance between governments and platform businesses are two of the crucial issues today in the implementation of smart cities. Regulations must be introduced to oversee the process, and this is a key topic that city officials are paying growing attention to. The Decode project, funded by the European Union, is one of the few concrete steps currently being taken in this direction.

Work 4.0 and the Covid-19 pandemic

Jean-Philippe Dunand and Pascal Mahon
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Industry 4.0, also known as the fourth industrial revolution, has arrived. Just look at Airbnb, Mobility, Uber, the sharing economy, platform businesses, digital intermediation, big data, artificial intelligence, virtual reality, cloud computing, the internet of objects, smart factories and robotics. These are just a few of the disruptive technologies shaping the new industrial world. Some observers claim we are about to be hit by a “technology tidal wave” that will upend our entire society. This fourth industrial revolution – after the third one of automation in the 20th century, the second one of electricity in the late 19th century, and the first one of the steam engine and industrial machines in the 18th and early 19th centuries – is based on smart technology that connects production processes and units so that information can be swapped continuously. Some people believe that Switzerland, like the rest of Europe, is lagging behind on this issue, and that embracing Industry 4.0 has now become a matter of survival for our country. Others see it the other way – that the new industrial revolution is a cause for worry and stirs up existential questions. They raise the spectre of a Society 5.0 in which humans have essentially become slaves to robots. They are concerned about how the digital economy will affect production methods, what the threats and opportunities are and who will end up being the winners and losers.

Industry 4.0 will undoubtedly cause many changes to how we work and to our societal norms – and therefore to our laws. The smart technology it brings will transform not only how we produce and consume goods and services, but also our approaches to education, employment, health care

and our personal lives. We will have to rethink the basics of the workplace, including when the working day begins and ends and how suppliers are paid by those who receive their services.

1. THE FOUR INDUSTRIAL REVOLUTIONS

There have been at least three, and on some counts four, industrial revolutions, each of which had a major impact on working methods and the nature of employment relationships. The first took place in the last quarter of the 18th century and the first part of the 19th century. It arose from the invention of industrial machines, including the loom but even more importantly the steam engine, which required huge amounts of mined coal to run. It marked the first step in the transition from an agricultural and artisan-based economy (primary sector) to a manufacturing and commercial economy (secondary sector). The first industrial revolution led to profound changes in production methods, but also in lifestyles. Work was moved outside the home – which had previously been the centre of both family and working life (as in the case of farms and craftsmen’s shops) – and into factories, because the work had become more dangerous. For the first time, the home became separate from the workplace, and working hours became separate from family time (which later became leisure time). To a lesser extent, there was also a reallocation of roles within the family. Men left the home to go to a factory and exchange their physical labour for wages, while women and children became gradually excluded from the paid workforce.⁶ These new production methods and social and family constructs had lasting effects on civil law. In the early 19th century, men were designated by law as the head of the household⁷ with the responsibility of supporting their families, while women were tasked with

looking after their husbands, managing the household and raising the children.⁸ The first industrial revolution had other consequences too, such as the formation of trade unions to defend the new industrial working class – the wage-earners or proletariat – the creation of employer associations and the emergence of collective labour law. And finally, the first industrial revolution, with its consequences on society and family, led to the introduction of welfare and social security schemes in the last quarter of the 19th century. These schemes were designed to compensate families for any wages lost due to illness, an accident, disability, ageing, the death of a spouse or another unfortunate life event. They were subsequently expanded throughout the 20th century.

The second industrial revolution began towards the end of the 19th century (around 1870) and arose from the extraction of oil and natural gas and the invention of electricity. This revolution gave rise to large-scale factories with mass production lines and a scientific approach to the organisation of labour (e.g. the efficiency-oriented processes designed by Frederick Winslow Taylor, known as “Taylorism”, and by Henry Ford, known as “Fordism”).

The third industrial revolution took place a century later, around 1970. It was based on the use of new forms of energy (nuclear and solar) and on automation technology (electronics and computing). In this revolution, robots and automated systems were incorporated into production processes, paving the way for rapid growth in the tertiary sector of the economy.

The fourth industrial revolution, or Industry 4.0, is still very recent and we do not yet know its full scope and potential. Some believe it will merely be an extension of the third revolution, while others think it has the characteristics of a new revolution in its own right. Unlike the previous three, this industrial revolution has not been spurred by the discovery of a new form of energy, but rather by the merger of different technology (computer processing, artificial intelligence, 3D printing, etc.) so as to enable convergence between the virtual (or digital) world and the real world (i.e. physical objects). Today, all the different components of a production line can exchange data in real time and regulate

themselves automatically through computer code and algorithms. Industry 4.0 enables manufacturers to produce customised, singular objects at the same unit cost as large-scale production runs and with fewer employees.

2. IT SYSTEMS AND LABOUR LAW

IT systems have enabled businesses in many industries to improve interactivity, productivity and profit margins. They have made employees more independent and efficient. Yet at the same time, they have also brought a number of threats for both companies (e.g. the risk of data theft or destruction or of reputational damage) and their employees (e.g. it is harder to set limits on working hours, employees sometimes have to use their personal devices for professional purposes, managers can use IT systems for abusive surveillance, and work can encroach on employees’ personal lives).

The rampant implementation of IT systems has altered working relationships in profound ways. Some of the new technology is abolishing the very concept of a workplace with set working hours. Employees can now access company systems from just about anywhere via the internet and virtual private networks (VPNs), performing work-related tasks remotely, either at home (in their home office) or on the go (e.g. in satellite offices or through nomad working). Remote working has become increasingly widespread over the past few years. While there is no legal definition, it is generally understood to be work that meets three criteria: it is done outside the company’s premises; it involves using IT systems and telecom networks to transfer data; and it consists of tasks that could also be done in the office.

Working hours have likewise become more fluid, even for people working primarily on site, because employees are now often called upon to use the technology available to perform work-related tasks outside scheduled work hours. In addition, more and more employees have flexible hours, which gives them greater freedom in managing their time, but also blurs the line between their personal and professional lives, with potentially harmful consequences. While there are advantages to this

⁵ This synthetic contribution is the result of some reflections by the authors following various colloquia and scientific days they have organised in recent years. They will be developed and deepened in an article to be published in the *Festschrift für Adrian von Kaenel*.

⁶ Here it is worth mentioning that the first labour laws were intended to restrict or even ban the employment of children in factories, sometimes at a very young age, and to prohibit women from certain types of jobs (especially those at night).

⁷ As men were “freed” from the home to become producers, they also became citizens through the steady introduction of universal suffrage for men beginning in the mid-19th century (1848 in France and Switzerland) and over the subsequent 50 years.

⁸ It was not until women entered the workforce in the 20th century – during the First World War in some countries and the Second World War in others – that these roles changed in order to establish greater gender equality. Civil law also changed, as did women’s civic rights, through the introduction of women’s suffrage (starting in 1918 in several European countries, in 1944 in France and in only 1971 at the federal level in Switzerland).

greater freedom, we should not underestimate the attendant risks to employees' physical and mental health. We have seen this in the growing number of workplace-related psychosocial hazards, for example. Employees are under greater stress now that there are fewer boundaries (both physical and symbolic) between the home and the workplace and there is less face-to-face communication and discussion. What is more, even though workers are now more isolated, that has not removed the threat of harassment (in the form of cyberbullying), because bullies can still contact their targets frequently and instantaneously through electronic communication systems.

At this point, it is worth considering whether these changes in working conditions are reversing the divisions created in the first industrial revolution: the separation between the home and the workplace, and the separation between working hours and leisure time. Cracks are appearing in the widely accepted walls that labour law had established between these different aspects of life (e.g. the labour act in Switzerland⁹), especially in terms of worker protection.

3. DO ROBOTS AND THE GIG ECONOMY MARK THE END OF EMPLOYMENT AS WE KNOW IT?

It would be fair to ask whether the third and fourth industrial revolutions are not leading to the demise of the workplace. Experts' predictions are not encouraging. According to a study commissioned by the World Economic Forum (WEF), the fourth industrial revolution could lead to the loss of nearly five million jobs in industrialised nations, two thirds of which would be in white-collar office and administrative roles. Or put another way, two thirds of children starting primary school today will go on to have a job that does not yet exist.

Robots are mechanical objects that can automatically scan their surroundings, analyse the data they collect and execute tasks accordingly. When robots are equipped with artificial intelligence, they can also reason, adapt and learn in ways similar to humans. Today, robots are being implemented in all sectors of the economy at a rapid pace. Many

⁹ Switzerland's labour act set requirements for workplace health and safety, working hours (daily, weekly and annually), breaks, paid leave and more. However, these requirements could be rendered obsolete by the newly blurred lines between work and home and between working time and leisure time.

tasks traditionally done by humans are now being done by machines – some of them can even take decisions and give instructions to other robots or employees. A growing number of companies are using algorithms to make hiring decisions or at least conduct an initial screening of applicants. These changes are giving rise to a host of legal issues relating mainly to the rights of employees as they work with robots, such as in the areas of data protection, occupational health and safety, and equal opportunity.

As advancements in robotics are causing employees to be replaced with objects, the gig economy is essentially erasing the concept of employees and substituting it with a network of pseudo-freelance workers. The gig economy is the general term used to refer to a system in which individuals perform temporary jobs or one-off tasks for companies, connecting with them (and often with customers) through an online platform. The most emblematic gig-economy company is Uber. Because this way of working encourages self-employment and multiple concurrent jobs, it is changing the nature of employment. Lawsuits are popping up around the world to clearly establish the legal obligations of platform businesses like Uber towards the individuals who work for them. Should these platform workers be considered self-employed freelancers, as the businesses claim, or rather personnel who are more akin to contractual employees?

In two important rulings of 30 May 2022, the Swiss Federal Court confirmed that the Uber drivers and the "Uber Eats" delivery drivers in Geneva were bound to Uber by a contract of employment. In line with judgments in other European countries, the Swiss Supreme Court has therefore considered, depending on the circumstances of the case, that the service providers hired by Uber were acting as dependent workers. Governments have also taken up the issue. In Switzerland, National Councillors formally requested the Federal Council in November 2017 to study a proposed new legal status for platform workers that would give them employment benefits, albeit on a reduced scale. The Federal Council responded with a report on 27 October 2021 estimating that such a status was not necessary since the country's existing social security system was flexible enough to accommodate these new employment relationships, with regards

not only to employment benefits but also to the worker protection requirements set forth in Swiss labour law.¹⁰

4. COVID-19 AND THE DEVELOPMENT OF WORK 4.0

Let us now turn to what the link is – if any – between the trends described above and the Covid-19 pandemic that struck Europe and the rest of the world in the first few months of 2020. In our view, the pandemic had (and will continue to have) vast and varied repercussions on the workplace.

For the purposes of our discussion, the most visible consequence was the decision by governments in several countries to temporarily close businesses, shops, offices and schools. This resulted in many people working remotely (through work-from-home arrangements and videoconferencing, for example) – an option made possible by new computer and telecommunications technology. Here the pandemic did not really create a new trend, but rather amplified and accelerated one that was already visible. Once things get back to normal, it is unlikely that these new ways of working will be shelved entirely. Surveys indicate that employees are fairly evenly divided between those who would rather go back into the office and those who would prefer to keep working from home, at least partially.

Another consequence that is less visible, but still warrants further examination, is the creation of a new class divide – or of new social classes – in the working world and in society more broadly. At least, this is a theory that has been put forward by some observers, including Robert Reich, an economist and professor at the University of California at Berkeley (previously at Harvard University) and formerly the US Secretary of Labor in the Clinton administration. Mr Reich wrote an opinion piece for *The Guardian* in April 2020 in which he suggested that the pandemic had caused deep-seated changes in the very structure of our society, creating four new social classes: the Remotes, the Essentials, the Unpaid and the Forgotten.¹¹ The Remotes account for around 35% of the US

¹⁰ Swiss Federal Council, *Numérisation – Examen d'une flexibilisation dans le droit des assurances sociales (« Flexi-Test »)*, No. 5.1, 27 October 2021 (available in French, German and Italian).

¹¹ Robert Reich, "Covid-19 pandemic shines a light on a new kind of class divide and its inequalities", *The Guardian*, 26 April 2020.

¹² In his opinion piece, Mr Reich points out that many of the Unpaid had jobs in personal services which cannot be done remotely, like in the retail, restaurant and hospitality industries. But because consumers are now spending less, redundancies are also spreading to the news, technology and consumer-goods industries.

workforce and consist of managers, professionals and technical workers. These individuals spend long hours at their laptops attending videoconferences and scanning documents, and their pay is the same as before the pandemic. Many Remotes were anxious and worried about catching Covid-19, but they are better off and better protected than the other three classes. The Essentials make up around 30% of the US workforce and are the people on the front line of the pandemic: health care workers, public transport operators, police officers, child care workers, farmers, food processors, pharmacists, lorry drivers, refuse collectors, firefighters and the military, for example. The Unpaid could reach around 25% of the US workforce and are an even larger group than the unemployed. These are individuals who were furloughed, who had used up their paid leave or who had to shut down their businesses and did not receive any government aid; the Unpaid struggle to pay the rent and feed their families.¹² The Forgotten are those for whom the social distancing required to stop the spread of Covid-19 was virtually impossible because they were packed into places that are out of sight to most Americans: prisons, detention centres for undocumented immigrants, camps for migrant farmworkers, Native American reservations, homeless shelters, nursing homes and homes for sex workers, for example. Mr Reich concludes his article by noting that the Essentials, the Unpaid and the Forgotten are disproportionately poor, black and Latino and experienced disproportionately high levels of Covid-19 infections.

Whether or not you agree with Mr Reich's assessment, it is true that the pandemic has triggered profound shifts in our workplaces, lifestyles, methods of production and consumption, and society in general, at least temporarily. It has certainly highlighted and amplified, if not exacerbated, existing problems in society (even if it did not necessarily cause them) – problems that had perhaps been at least partially hidden, like the extreme poverty that forced many people living in cities to queue at food banks. In addition, studies have shown that the pandemic has affected men and women differently, aggravating gender inequality.

Looking more broadly, we could also hypothesise – but this would have to be verified – that by upending our lifestyles and ways of thinking, the pandemic (along with the trends mentioned above of the gig economy and the adoption of new computer and telecommunications technology) has also prompted us to become more individualistic and ego-centric and lose some of our community values, such as solidarity and democratic participation. Many of these values were championed by the major political movements and trade unions

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that were established in the 19th century but whose size and influence began to decline in the latter half of the 20th century and especially during the economic recessions of this century. The controversy we are currently seeing about how governments handled the pandemic, and the belligerent way in which opinions are being expressed and challenged – especially on social media – probably reflect at least some of what we can describe as a paradigm shift in democratic mechanisms and debate.

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Digital learning and Society 4.0

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Mankind has reached an important milestone in the evolution of civilisation. More than half of the world's population now lives in cities, and this trend towards urbanisation will continue. Over just a few generations, we have gone from a rural society to an urban one (and one that will become increasingly more urban). Cities themselves are evolving too, hence this policy paper on smart cities. But it is education that is the key to shaping the future of society. If we assume that smart cities will one day be a basic element of society, then we need to educate and prepare our children to live, work and carry out most of their activities in such cities. But what exactly does that mean? Should we prepare our children to live in a society where everything is done on a laptop or through an app? Not really – the future will likely be hybrid, at least for a while longer. However, if our cities will eventually be “smart”, then our universities and campuses should be “smart” too. Much remains to be done in terms of the technology, but there is more to it when it comes to education; simply installing smart systems in schools does not get to the heart of the matter – we need to also address the teaching content and methods used.

Where are we in the digital transformation of our educational systems? Until recently, we could have said that these systems (which generally consist of teaching methods, class materials, teaching programmes and curricula) were not very far along in the process, even though Switzerland's universities ranked well among their European peers. But all that changed with the pandemic. The pandemic opened our eyes to the many possibilities offered by digital technology, but also to the limitations of such technology, which has forced us all to ask some important questions. The pandemic will pass but these fundamental questions will remain.

Any assessment of digital learning needs to address two key aspects. The first is effectiveness. Does digital technology really enable us to teach more effectively? Which tools are the best? How should they be used? We could call this the “technocratic” aspect. The second aspect digs deeper and looks at the very purpose of education itself. Should it be

designed to merely teach skills to individuals? Or should it also prepare them for the future? And how should education contribute to society? This aspect examines the issue of digital learning from many angles. And it is this broader aspect that we are interested in here – without minimising the importance of research on the effective use of digital technology and platforms in education.

In this essay, we discuss how our educational systems still need to undergo a digital transformation, even if only to harness the potential that digital technology offers for improving the quality of the education we provide and – even more importantly – for preparing students for a world that will be considerably more digital and connected than it is today. But in doing that, we also need to consider the negative consequences that such a transformation can have on our community, whether in terms of cognitive skills, relationships, society, psychology, behaviour or even health. All technology comes with a downside. We therefore need to make sure our educational programmes include teaching methods and content that can offset these negative consequences on individuals and on society as a whole.

Many issues will need to be explored as we investigate the ways in which education can prepare students for Society 4.0 and for helping to build this society. Below we discuss just a few of them.

1. INCREASINGLY FASTER INNOVATION AND THE NEED TO CONTINUOUSLY ADAPT

Technological innovation – especially when it comes to digital technology – follows an exponential curve. We should brace ourselves for a disruption in the next 10–20 years that is unlike anything we have experienced since the turn of the millennium. Technological disruptions usually come hand in hand with disruptions to the very structure of our society. In the old days the role of education was to prepare people for life. Then it became standard practice to brush up your skills with additional training in mid-life. Those working today will probably have to retrain twice during their lives. And the next generation will probably have to retrain every ten years. What is more, the retraining will relate to all aspects of

their lives – professional and personal. Our educational systems therefore face a formidable challenge in getting young people ready for the future, as that will require not only imparting knowledge but also teaching them how to reassess their chosen path and possibly change careers, almost on a continual basis. This goes beyond the continuing education and retraining we are familiar with (an area where Switzerland is well ahead of its European peers). For example, advancements in artificial intelligence and machine learning will probably cause entire professions to disappear, such as wealth management, brokerage, trading, many legal services and even creative services like design. These are all areas where humans could eventually be replaced by algorithms that perform just as well. This will have some unintended consequences, of course, as we have seen with the use of algorithms in hiring decisions. But the business case for technology points in this direction. And if that is indeed where we are headed, we must update our educational systems accordingly. All educational programmes, regardless of their level, should also prepare students to retrain and adapt.

2. DIGITAL GAMES

Who's afraid of the big bad wolf? Times have changed, and so have the dangers. It is no longer a matter of telling children fairy tales about big bad wolves so they will be careful as they walk through the forest. The threats they will face

in the 21st century relate more to personal data protection, fake news, manipulation tactics and addiction.

As we mentioned in the introduction to this essay, digital technology can be used to both improve teaching methods and help to prepare children for the future. As such, our educational systems should go even further by taking an integrated approach. For instance, a large amount of educational research is being done on how methods from online video games can be used to boost students' motivation.¹³ There is even a name for it: the gamification of learning. The idea is to redeploy the addiction-forming techniques used by the video game industry for educational purposes.¹⁴ Inasmuch as it is proven to work, that is great – but why stop there? We could expand the gamification concept and use it as an opportunity to teach students about the phenomenon of addiction, its drivers and its impact, as well as how to stymie an addictive spiral, assess the risks, spot dangerous situations and identify personal limits. Our educational systems would have much to gain from taking such a broad approach, as this would make the learning process more efficient and better equip students to face the big bad wolves of Society 4.0. However, we would need to make sure that exposing students to video game stimulation in their formative years does not make them overly dependent on such stimulation to be motivated to learn. The members of Society 4.0 also need to be self-motivated.

¹³ See:

Abdul Razak, Aishah; Izani, Mohamad I.; Abidin, Zainal; Connolly, Thomas M. (2019). Transitioning to Digital Games-based Learning: The Case of Scottish Universities. In: Visvizi, A.; Lytras, M.; Sarirete, A. (éd.), *Management and Administration of Higher Education Institutions at Times of Change*, Emerald, 151-165. DOI: 10.1108/978-1-78973-627-420191009.

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¹⁴ See:

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3. SOCIAL NETWORKS

Many of the new teaching methods being developed today are based on employing social networks as new educational tools.¹⁵ Here too, our educational systems could be enhanced considerably by taking a comprehensive approach – one that also addresses how the networks are structured and function, their potential (including for professional purposes) and their limitations. Citizens 4.0 must be able to use social networks effectively, regardless of their profession, so we should start educating students on them as early as possible. And we should do so while helping them understand that genuine social connections are not formed on so-called “social” networks. Students need to comprehend the communication methods and norms used on social networks and, importantly, how they differ from those used in the real world, since people do not express themselves online in the same way as they would face-to-face.¹⁶

4. COMMUNICATION SKILLS

Many studies have looked at the issue of whether students (and teachers) prefer online or in-person instruction – and why. The findings differ based on the criteria used in the study, but one conclusion is universal. Students frequently complain about how hard it is to communicate in online classes and about the lack of face-to-face interaction with teachers and other students. But some students actually like the distance-learning environment. That is especially true for students who are reserved by nature. However, because it is unlikely these students will spend their entire careers working online, our educational systems need to counterbalance this aspect of digital learning. It is precisely those students who have

¹⁵ See:

Arnold, Nike; Paulus, Trena (2010). Using a social networking site for experiential learning: Appropriating, lurking, modeling and community building. *The Internet and Higher Education*, 13(4):188-196. DOI: 10.1016/j.iheduc.2010.04.002.

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¹⁷ See for example Miller (2014).

¹⁸ See for example Pauletto (2022a).

difficulty communicating who should be actively exposed to these challenges; letting them stay behind their computer screens, in their comfort zone, will not help them in the long run. But more broadly, communication skills – including all forms of communication, both verbal and non-verbal – should be taught to everyone. Teachers can serve as role models in this effort. Communication will always be the most important factor in a well-functioning society, even in the most advanced Society 4.0.¹⁷

Another issue that warrants close attention in Education 4.0 is the development of cross-cultural and interpersonal skills. These skills will form the basis of social cohesion in Society 4.0. Although students can technically learn a concept perfectly well on a computer – whether through educational games inspired by video games or through online classes – in the real world, they will have to work with other people who each have their own personality, moods, habits, baggage and defects. Our generation probably does not realise it, but working with people is not a skill you can learn in one day, nor can it be improvised. If we are not careful in how we design Education 4.0, the next generation of adults could have difficulty getting along well with others, working effectively in groups and accepting people of different backgrounds and cultures. This is especially important since our society is becoming increasingly international and multi-cultural. Here too, our educational systems will need to counterbalance the detrimental effects of digital technology.¹⁸

5. WRITING OF ALL TYPES

When I was a student, back in the days of punched cards and the first mainframe computers, I took a touch-typing course. At the time, I had no idea

how much that course would help me throughout my life. Society 4.0 will be filled with keyboards of all kinds, and today's students will need to get accustomed to using them (and the earlier they do so, the better). But we stand to risk losing something valuable in the process. Our hands are one of the rare things that set us apart as humans; being able to move our hands and fingers was a key factor in our evolution and quite literally shaped who we are today. It is not surprising, then, that studies have shown that taking handwritten notes (as opposed to typing them on a keyboard) helps students memorise what they write, structure their thoughts and map out their reasoning. In short, writing by hand supports and stimulates an array of cognitive functions. It is therefore essential that the next generation is not just comfortable on all types of keyboards, but also able to write well by hand.

6. CONCENTRATION SPANS

Above we discussed how computer games and social networks can be incorporated into educational practices by teachers. This is based on observations that it is hard to retain the attention and motivation of students who are behind a computer screen, especially when classes are being taught remotely. Teachers therefore need to draw on powerful techniques to capture students' attention, which includes bombarding them with stimuli. This is actually nothing new; just look at how scene lengths in TV and radio programmes have decreased, to the point where each scene is now just five, three or even one minute long. It logically follows that viewers' concentration spans have reduced as well. But in the real world, there are many situations where it is important to be able to listen attentively to what someone else is saying – whether that person is your boss, spouse, parent or friend – for as long as needed. And these situations often spring up when we least expect them. If we reach the point where students have trouble concentrating for an hour in the classroom, how will they be able to concentrate for eight hours at work to draft a report or review a proposal that absolutely has to be finished by the end of the day? Being able to focus over long periods will be an essential personal skill to develop as part of Education 4.0.

7. PERSONAL SOVEREIGNTY

Digital sovereignty is high on many countries' political agendas, especially in Europe. But we also need to consider the digital sovereignty of individuals – that is, the capacity for individuals to independently think, decide and act when they employ digital technology. Humans should be the masters of the instruments they use and should guard against the tendency to blindly follow a computer's instructions. For example, an experienced 61-year-old lorry driver from Germany followed the directions given by his GPS (which apparently was not working properly) and found himself stuck on a small road in the village of Bad Aussee in December 2016 – even though road signs (and especially common sense) instructed him to do otherwise. This mistake ended up costing him his life. Similar accidents have happened in Switzerland. Digital assistants will be ubiquitous in Society 4.0 and we need to teach tomorrow's adults how to use them wisely and not be slaves to their devices. For instance, every day a program on my computer tells me that if I liked X, then I will probably also like Y and Z – but should I not be the one to decide what I might like?

8. CONCLUSION

My intention with this essay is not to paint a bleak picture of Society 4.0. In general, mankind has always progressed and improved through the development of new technology, including in the last century. There is no reason to think this will suddenly change. But while this is true for the bigger picture, things are more nuanced when it comes to the details. The path of technological advancement has shown us that even positive steps forward contain some aspects that are less beneficial. In this essay, I want to point out that our educational systems should fully incorporate digital technology to prepare students for Society 4.0, but that this will inevitably create some risks that will need to be assessed comprehensively and as soon as possible through a cross-disciplinary approach. I also want to stress the importance of counterbalancing digital technology with teaching methods and content that can mitigate the potentially damaging effects on individuals and society. This will require a vast amount of effort, but that effort will be crucial to building a Society 4.0 that is not only well-functioning, but also well-balanced and harmonious.

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“Smart” thanks to apps, or how copyrights can be used in the public interest

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1. INTRODUCTION

Many applications have been rolled out to help Society 4.0 manage the pandemic – SwissCovid, SocialPass and Covid Certificate, for example. However, the legal underpinnings of these apps often come under scrutiny due to the data protection issues they raise.

But there is another legal issue we want to discuss here: that of intellectual property. Developing such apps requires a great deal of intellectual work involving hefty amounts of time and money. This leads to a variety of intellectual property challenges, particularly in the area of copyrights.

Copyrights give the author of a work exclusive ownership of that work. The author is given a monopoly over the work with the personal right to decide if, when and how the work will be used. But how does this kind of monopoly fit in with the broader public interest of combatting the pandemic? How can we balance the intellectual property rights of one party without impeding the good health of the other?

These are the questions we will explore in this essay.

2. THE CONCEPT OF PROTECTED WORKS

The Swiss Federal Act on Copyright and Related Rights (the Copyright Act, or CopA) defines works subject to copyright protection as “literary and artistic intellectual creations with individual character” (Article 2, Paragraph 1). This definition applies to all types of artistic creations. Paragraph 2 goes on to list some examples, such as linguistic works, musical and other acoustic works, works of art, architecture and applied art, and photographic and cinematographic works.

The term “intellectual creation” used in the Act implies that the work should be new. Creating by definition entails coming up with a completely original idea that has not been seen before. We could

therefore say that copyrights encourage innovation by protecting the authors, giving them exclusive rights over their creations and making it possible for them to earn income from their work. Copyrights encourage inspired individuals to share their creative vision and develop their capacity to innovate. But according to the Swiss Federal Supreme Court, it is the “individual character” of a work that determines whether it is eligible for copyright protection. A work must be inherently unique and cannot be ordinary. More specifically, the Federal Supreme Court stated in a decision that: “The individual character of a work means that it cannot be ordinary or routine, that it is the consequence of many different decisions taken by its author, and that it consists of surprising and unusual combinations, such that no other person faced with the same task would come up with an identical piece of work” (ATF 136 III 225, cons. 4.2, translation from French). This distinction is important because something that is new does not necessarily have an individual character – an intellectual creation may be new, but if it could just as easily have been thought up by someone else, it will not be eligible for copyright protection.

3. FACTORS DETERMINING WHEN COPYRIGHTS ARE APPLICABLE

Article 2, Paragraph 3 of the CopA states that computer programs (software) are also works protected by copyright. Computer programs are generally understood to be procedures intended to execute specific tasks, that is, a series of instructions given to a computer so that it executes a set of desired tasks. But apps are not made up only of computer programs as defined by Swiss copyright law. While they do incorporate computer programs, they also include text, images, graphics and other features – including literary and artistic works that are also eligible for copyright protection if they meet the “individual character” criterion. However, the copyright laws governing literary and artistic works are not always the same as those for computer programs. They differ in how they treat works created under an employment contract (Article 17 of the CopA), the private use of works (Article 19, Paragraph 4 of the CopA) and the duration of the copyright (Article 30, Paragraph 1 of the CopA).

Apps that incorporate pre-existing works (whether computer programs or literary and artistic works) are considered “derivative works” as defined in Article 3 of the CopA and can be copyright-protected as works in their own right provided that they meet the “individual character” criterion. This protection holds as long as the individual character of the pre-existing work can still be identified within the app. This results in duplicated copyright protection – that of the app and that of the pre-existing work.

Apps often contain works that have been developed specifically for the app; here, the legal question is whether the developers of these features can be considered co-authors of the app as a protected work. Under Article 7 of the CopA, joint authorship occurs when two or more individuals contributed to the creation of a work – that is, when they worked together, with each person making a contribution to a common goal. In the case of joint authorship, copyright belongs to all such individuals jointly.

In short, apps are made up of several components – some original, some pre-existing – that may be subject to copyright protection. Entities developing apps for the public interest need to make sure that these copyrights do not throw up obstacles to the rapid roll-out of their apps. And because copyrights can be assigned under Article 16 of the CopA, they can also be a way for entities to make sure their apps are genuinely used to uphold the public interest. If an entity acquires all the copyrights associated with an app, it will have the monopoly allowed for under intellectual property law.

4. COPYRIGHTS ASSOCIATED WITH APP DEVELOPMENT

a. Copyrights for computer programs

Apps like SwissCovid and Covid Certificate employ a variety of programs available under free software licences.¹⁹ These licences are public statements, often published online, in which the rights-holders of a computer program authorise anyone else to use it free of charge, sometimes under certain conditions.

Free software licences nevertheless raise some legal questions. It is not clear whether they constitute binding contracts as defined in the Swiss Code of Obligations. Although they contain an offer made by one party (the software rights-holder), there is no clear acceptance of the offer by the other party (the software user). Some clauses, like those concerning the national law governing the licence or the court of competent jurisdiction in the event of a dispute, do not always have legal consequences. But free licences can be useful from a copyright perspective, as they allow rights-holders to determine if, when and how their work will be used. As long as users comply with the conditions set forth by the rights-holder, there is no copyright violation. It is therefore a good idea for public sector organisations to use computer programs available under such free software licences, as that will enable them to develop apps more quickly, keep costs under control, avoid any legal complications and best serve the public interest.

When a computer program is developed specifically for an app, the copyrights are handled differently depending on whether it was created by employees or commissioned from a third party. In the case of the former – that is, for programs created under an employment contract while the employee is fulfilling their contractual obligations – the employer alone has the rights of use to the program (under Article 17 of the CopA). In the case of the latter, the third party will have to contractually assign the copyrights to the entity that commissioned the program. This assignment of rights should not be problematic, however, since it can be incorporated into the service agreement for developing the program.

The legal nature of Article 17 of the CopA is under discussion, and this debate could affect an employer’s ability to transfer copyrights to third parties. Therefore, in order to remove any uncertainty, it is advisable for an employer to get employees to contractually assign to it the copyrights to the programs they create, irrespective of the provisions of Article 17.

¹⁹ Mozilla Public License, Version 2 (www.mozilla.org/en-US/MPL/2.0/), Apache License, Version 2.0 (www.apache.org/licenses/LICENSE-2.0), Bouncy Castle licence (www.bouncycastle.org/license.html), BSD-3-Clause licence and MIT licence (www.opensource.org/licenses), and SIL Open Font License (<https://opensource.org/licenses/OFL-1.1>).

Copyrights on literary and artistic works

For literary and artistic works developed specifically for an app (such as text, diagrams and illustrations), there is no legal clause on copyright ownership similar to Article 17 of the CopA for computer programs. The entity commissioning the literary or artistic work must get the author to contractually assign the copyrights – even if the author is an employee of the entity. Article 332 of the Swiss Code of Obligations does not apply to copyrights. This assignment of rights should not be problematic, however, since it can be incorporated as a provision of (or added as an amendment to) the employment contract.

When pre-existing literary and artistic works are used for an app, the entity developing the app has two options for acquiring the copyrights quickly and easily:

1. The entity can use works available under free licences. Many photographs and illustrations are available under Creative Commons licences, for example. These licences contain complete, detailed legal provisions that are summarised in pictograms which appear when the work is viewed (usually online), with a link to the full text of the licence terms and conditions. Creative Commons licences were designed to provide copyrights that are better suited to the internet era and to decriminalise activities that had become commonplace for internet users, while keeping some sort of protection in place. The Creative Commons system, which was developed in 2002 by Harvard Law School Professor Lawrence Lessig, is recognised worldwide. Some licences are international and are the same in all countries, while others have been adapted to individual countries' legal systems. This is the case in France, for example, which has French Creative Commons licences that are slightly different from international ones.
2. The entity can use literary and artistic works managed by a copyright collective. These collectives are organisations created by the authors of works to help make sure their copyrights are enforced. They are generally structured as societies or cooperatives and must be non-profit in nature; their members may be composers, photographers, illustrators, writers or producers, for example. There are five copyright collectives in Switzerland:

ProLitteris for literature and the plastic arts; Société Suisse des Auteurs (SSA) for stage works and some types of audio-visual and multimedia works; SUISA for non-theatrical music; Suissimage for other types of audio-visual works; and Swissperform for related rights (for performers, producers and broadcasting organisations). Members can decide whether to authorise their collective to grant licences (for the copyrights managed by the collective), although there is little likelihood of a licence request being refused. The collective then charges a licence fee to the user of a given work, based on a rate schedule or on the licence terms and conditions. That has the benefit of giving the user visibility on the costs.

5. COPYRIGHTS ASSOCIATED WITH THE USE OF AN APP

An entity developing an app holds the copyrights for all the works contained within the app if the entity has been assigned those rights by the authors or, in the case of a computer program, if the program was developed by the entity's employees (working under an employment contract and while fulfilling their contractual obligations). This means the entity can decide how the app and the copyrighted works can be used.

This confers a broad set of powers. Under Article 10, Paragraph 1 of the CopA, rights-holders have the exclusive authority to determine if, when and how their work will be used. This is the monopoly we mentioned earlier. Paragraph 2 of Article 10 gives examples of when users must request permission from the rights-holder. The rights-holders of computer programs have even greater control than those of literary and artistic works, mainly because there is no copyright exception for the private use of computer programs (Article 19, Paragraph 4 of the CopA). Text, photographs and illustrations, for example, can be used within a circle of people closely connected to each other (such as relatives or friends) – but that is not true for computer programs. When such programs are acquired legally, they can be used or distributed in only accordance with their intended purpose, which includes loading, displaying, running, transmitting and storing a program as well as producing a copy of the program as required for carrying out these activities (Article 12, Paragraph 2 of the CopA and Article 17, Paragraph 1a

of the Swiss Federal Ordinance on Copyright and Related Rights, or CopO). Programs can also be observed, studied or tested in order to determine the ideas and principles underlying a specific feature, when this is done as part of operations conducted in accordance with the program's intended purpose (Article 17, Paragraph 1b of the CopO). Programs can also be decoded as described in Article 21 of the CopA and archived and backed-up as described in Article 24, Paragraph 2 of the CopA.

If a public sector organisation commissions an app and owns all the associated copyrights, it can make use of the broad powers conferred by those rights to ensure that the app is used in a way that supports the public interest. The SwissCovid and Covid Certificate apps state in their terms of use (Article 8.1 for both apps) that the Swiss federal government holds the copyrights. That means the government can make sure the apps' content is not altered or distributed by third parties in a way that would distort the official information the government intends to communicate. But here it is worth pointing out that the monopoly granted by copyrights does not extend to controlling exactly how an app or its individual features are used. Article 4.4 of the SwissCovid terms of use states that users of the app are responsible for making sure the data they enter are complete and accurate. But it is doubtful that the Swiss federal government could use its copyrights to enforce this clause. Data entry is an operation carried out through the app, but not a usage of the app *per se*. But in another example, the general terms and conditions of the SocialPass app state that customers are not allowed to get third parties to use the computer program or to allow third parties to access it (Article 2, third bullet point). And because this relates to a computer program, copyright law prohibits the app from being transferred to another person, even if that person is within a circle of relatives or friends. Such a transfer would not be consistent with "use of the program in accordance with its intended purpose" as set forth in Article 17, Paragraph 1a of the CopO, and the exception for private use would not apply. SocialPass is operated by two private companies rather than by a public sector organisation, but because these companies work closely with public health officials, we can consider that these kinds of prerogative also serve the public interest.

There are some instances where an entity developing an app cannot acquire all the associated copyrights, especially if the app draws on pre-existing works distributed under free licences. In this case, the entity needs to be aware that some kinds of free licences (for both computer programs and literary and artistic works) can be "contaminating" because – even though they allow users to modify a work and use it in a derivative work – this can be done only if the modified or derivative work is then distributed under an identical free licence. This is what is known as "copyleft" or "share-alike" licencing. Using pre-existing works distributed under such licences could "contaminate" features of an app and prevent copyright owners from freely exercising their rights. We therefore advise entities that plan to use their copyrights in the public interest to not include such works in their apps.

6. CONCLUSION AND RECOMMENDATIONS

Copyrights can very much be exercised in the public interest. To that end, we would give the following recommendations to entities planning to develop such an app:

- Make sure you are contractually assigned the copyrights for all works created specifically for your app (such as text, illustrations, photographs and computer programs), even if the works were created by your employees. That will give you the monopoly needed to ensure that the app and its content are used in a way that upholds the public interest.
- If your app is based on pre-existing works (including computer programs), you can use works distributed under free licences or literary and artistic works managed by copyright collectives in order to speed up the development and implementation of your app (to better serve the public interest) and give you greater cost control and visibility.
- If you do use works distributed under free licences, you should make sure they are not "contaminating" so that your monopoly over the works making up your app is not weakened.

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Territorial policies through the prism of innovation and the smart city²⁰

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Innovation has become a political tenet invoked to make businesses and regions more competitive and to meet major economic, environmental and social challenges. This tenet does not simply convey how decision-makers believe we should respond to our society's contemporary problems. It also gives them a tool for interpreting these challenges and pursuing solutions to them.

This rhetoric of innovation did not always permeate strategies and the discourse like it does today. During the post-war period of economic prosperity known as the “Glorious Thirty”, public support for innovation was limited mainly to the role of public spending – particularly in the military and space sectors – aimed at developing technology that could lead to new economic opportunities. Specific policies dedicated to spurring innovation from fundamental research did not exist.

1. THE “INNOVATION” OF PUBLIC POLICY OVER THE PAST 40 YEARS

Innovation became a crucial government policy tool in Western countries in the 1980s and 1990s, in the midst of industrial crisis, liberal economic globalisation and the rise of information and communications technology (ICT). It became a principle of action and a principled solution in the effort to promote the economic value of research and industry. Public authorities promoted their country's or region's competitiveness by focusing attention on knowledge transfer, entrepreneurship and the creation of business networks. A growing number of policies targeted the development of regional clusters of innovative industries (such as biotech,

medtech, cleantech, microtech, tourism and agrotech) and science parks modelled after success stories like Silicon Valley.

The “innovation” of government action gained momentum:²¹ innovation became both a general guideline and a public policy objective in and of itself. This was based on the implicit principle that innovation is the source of competitiveness upon which people's (material) well-being depends. Innovation was also used to justify the push for a “new form of public management” based on promoting services to innovative companies in an economically liberal and decentralised way. The terms “smart specialisation” and “regional innovation systems” were added to the European Union's public policy jargon on territorial cohesion and economic promotion aimed at making the region “the most competitive and dynamic knowledge-based economy in the world”.²²

2. FROM SCIENCE PARKS TO CREATIVE CITIES

Territorial innovation policies were then gradually expanded to cover all economic sectors, from artisan work to high-tech industries, and including agriculture and tourism. These policies also emphasised the value generated by intangible (service- or culture-oriented) activities that take place upstream or downstream of the production of goods and services (e.g. research and development, finance, communications and marketing).

From this perspective, cities are a cultural and creative “post-industrial” environment with a special role to play in innovation and competitiveness management at the territorial level. Cities produce cultural activities and knowledge-intensive services within global production and innovation networks. They are also attractive places for tourists and high-skilled workers to spend time and money.

²⁰ This essay presents ideas set out in the scientific article written by Jeannerat, H. and Huguénin, A. (2021) “Innovation, transition, valuation: quel référentiel pour les politiques territoriales”, *Revue française de gestion*.

²¹ The idea of introducing innovation into public policy was first set out in Jeannerat, H.

²² Presidency Conclusions of the Lisbon European Council, 23 and 24 March 2000.

Attractive activities, facilities and cultural events (art, sport and leisure) were promoted strategically in order to make cities and the surrounding territory into places where people, companies and knowledge intermingle. “Creative city” policies set the stage for cities to continually renew their economic activity internally and attract new “talents” from the external “creative class”.²³

The 2008 financial crisis was a symbolic watershed for the “innovisation” of territorial development policies. National and local governments no longer viewed innovation as only a motor of technological and economic change, but also as a motor of institutional and societal transformation that could help usher in sustainable development.

Public policymakers focused more than ever before on the creative potential of cities, which were called on to develop innovative local solutions to today’s economic, social and environmental challenges. Because cities are complex sites where people produce, consume and live, they are fertile ground for the development of technological and social innovations driven by a combination of entrepreneurial projects, citizen initiatives and sustainability-friendly urban policies.

3. FROM ISSUES OF COMPETITIVENESS TO “MAJOR CHALLENGES” OF CONTEMPORARY INNOVATION

In view of the major challenges to achieving sustainability, innovation is currently considered a driver of societal change that transcends the competitiveness of individual countries. This qualitative and inclusive approach to innovation is apparent in the terms “social innovation” and “responsible innovation” set out in the European Union’s 2020 strategy to support the development of innovative initiatives and solutions both by and for society.

In a perpetually unstable economic environment, global warming, the energy transition, demographic change and urbanisation have created a shift away from the existing economic, technological and social system. Because these issues are interdependent, a wide range of stakeholders with varying – and sometimes opposing – interests will have to come together and take action.

Researchers, businesses and governments will have new roles to play, as will new agents of innovation, including citizens, consumers and NGOs.

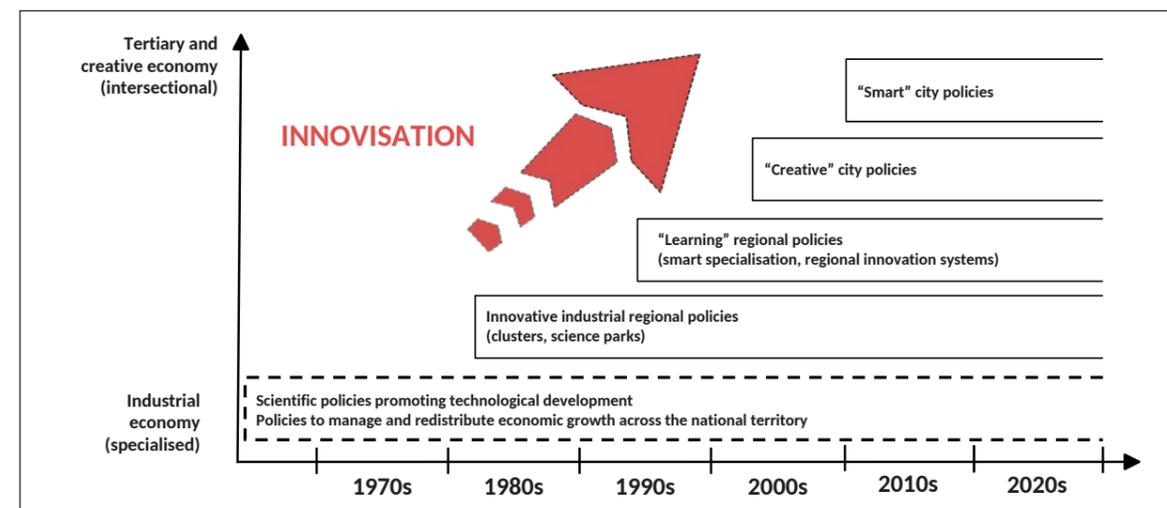


Figure 1: How innovation was brought into territorial development policies over the past 40 years.

Source: Adapted from Jeannerat and Huguenin 2021

²³ According to Richard Florida, the innovation race is, for cities, a global race for “talents” from the “creative class” (artists, professionals working in sophisticated business services, and so on) who are lured by highly attractive social and cultural living conditions. See Florida, R. (2005) *Cities and the Creative Class*, Routledge, New York.

Participative and democratic processes have become integral to the creation and ongoing development of innovation systems.

When it comes to public management, innovation has two purposes. First, there is the goal of providing strategic support to niche innovations that are both experimental and demonstrative. Second, innovation underpins the form of participative governance and institutional change characterised by democratic and networked public management. This collaborative approach requires and gives legitimacy to new government practices and new ways in which society can function.

Innovation policies are no longer seen only as catalysts of systemic change for technology and its markets; they are also able to transform the existing system and play an active role in it. “Political innovation” is an inherent and fundamental aspect of such innovation policies.

4. THE “SMART CITY” CONTROVERSY IN FUTURE TERRITORIAL INNOVATION POLICIES

Today’s territorial policies struggle to bridge the gap between the following two approaches to innovation: the historical approach, based on the clear objective of achieving quantitative and competitive growth, and the broader contemporary approach, based on the drive towards more inclusive and sustainable development.

The very term “smart city”, increasingly used to promote a digitalised and democratised policy of innovation and urban management, reveals the controversy surrounding these two approaches and public injunctions to innovate. First, within the discourse of *competitive innovation*, technological innovation and digital businesses are considered the drivers of sustainable development. City officials and communities are viewed as pioneering users who will ensure effective solutions are developed and can be used (and sold) elsewhere. Second, the discourse of *transformative innovation* focuses on the local and inclusive use of new technology in order to find specific solutions, which can be hard to export as such. City officials and communities

are more involved in trying out and then distributing these solutions, which are capable of changing society on a larger scale.

This second discourse points to three transformative roles for cities:²⁴ they are (i) breeding grounds for innovation within which solutions are found for sustainability-related problems that are more salient and complex than those found elsewhere (transformation *in* the city); (ii) places where urban models can be tried and tested in order to imagine, plan and organise cities of the future (transformation *of* the city); (iii) arenas of power and influence that give legitimacy to public values and institutional changes on a broader scale (transformation *by* the city).

5. TERRITORIAL INNOVATION POLICIES SHOULD NOT ONLY BE SOLUTIONS-DRIVEN

The controversy surrounding what a “smart city” policy should be today shows that the political dimension of innovation goes well beyond promoting local solutions in response to certain societal challenges. This dimension includes building new narratives, new best practices and new, legitimate public values that advocate innovations capable of transforming the economy and society.

In this respect, government action contributes to the quest for and development of social values by spreading awareness of public problems while at the same time trying out new and concrete local solutions. The model projects supported by current green transition policies are instructive. There are, for example, new eco-neighbourhoods, new ways of producing, managing and consuming energy, and new models of local commerce.

It is by exploring new, locally implemented social and technological solutions that unexpected issues are brought to light – issues that not only give rise to controversy, but that lead to trials elsewhere. Such projects are of interest in part because they can be used to test and spread the use of new technology capable of being standardised in new products and new sustainability solutions.

²⁴ The “in”, “of” and “by” distinction was set out by Hölscher, K. and Frantzeskaki, N. (2021) “Perspectives on urban transformation research: transformations in, of, and by cities”, *Urban Transform*, 3(2).

By supporting such action, local governments can help to create and (together with the private sector, citizens, associations and so on) give legitimacy to values that mark a departure from established practices and institutions. The process of constructing legitimacy and new values is a fundamental part of the public and private management of innovations able to transform institutions and society.

6. HOW INNOVATION POLICIES ARE DESIGNED

The current challenges of sustainable development amplify the role of innovation as a principle of government action while at the same time questioning its underlying definitions and fundamental objectives. This ambiguity is a reflection of a “society of innovation” in which innovation is *ubiquitous* (sought in all areas of economic and social life), *heterogeneous* (combining various approaches and interpretations in a single concept) and *reflexive* (focusing on what could be rather than about what is).²⁵

The semantic slipperiness of the term innovation may be why it has been possible to incorporate these changes into the political agenda, but this ambiguity can also make it difficult to create concrete and coherent mechanisms that are able to accomplish the desired changes. In general, however, it is interesting to note that, regardless of the approach taken, public authorities usually look to innovation to solve the economic, social and environmental challenges we now face. So the focus is most often on “how to innovate”; the question of “why innovate” is usually taken for granted.

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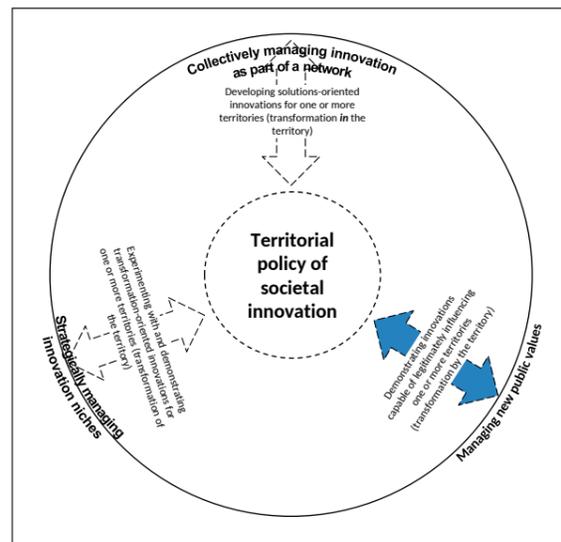


Figure 2: One possible design of future territorial innovation policies for society

Source: Adapted from Jeannerat and Huguenin 2021

In reality, the large and small “societal” innovations that policies now call for also consist of stating and re-stating the concrete problems and social values that should guide the search for solutions. Beyond promoting innovative solutions, future societal innovation policies must also ensure that these solutions create territorial value.

From this perspective, collective and networked innovation management *within* a given territory must be combined with the strategic management of innovation niches so that they lead to the transformation *of* the territory more broadly. And new public values can also be managed *by* the territory through, for example, the creation of new business activities with short distribution channels, citizen participation initiatives and decentralised energy solutions.

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Can smart cities bolster sustainability?

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1. INTRODUCTION

Cities will play a critical role in the urgent transition to environmentally and socially sustainable models, as urban areas are now home to more than half of the world's inhabitants and account for three quarters of carbon emissions and global GDP. Many governments and businesses consider the smart city concept to be one of the main ways of successfully completing this transition. The concept is being applied in numerous cities today and is strongly promoted by the European Commission.

The smart city concept was first developed in the 1990s, yet there is no accepted definition as to what it represents. Initially, and to keep things simple, we will use the one proposed by Girardi and Temporelli, which we will circle back to in our conclusion: “a smart city can be defined as a city able to facilitate and satisfy citizens', companies' and organisations' needs, by an integrated and original use of information and communication technology (ICT), especially in the areas of communications, mobility, environment and energy efficiency”.²⁶

The potential contribution of smart cities to sustainability is the subject of much discussion among researchers. On the one hand, this approach is seen as an opportunity to enhance the efficiency of urban systems and to increasingly dematerialise the economy, so that cities become more sustainable. The smart city concept has also profoundly changed the discourse on cities and could lead to a bottom-up and cooperative approach to urban development, with a greater focus on sustainability and social equity.

On the other hand, this concept has been criticised for the impacts that the production of ICT have on the environment and on people, for the

possible rebound effect and for the unpredictable consequences of the use of new technology. Furthermore, its conceptual foundations are at times criticised for their potential implications, such as technological determinism, the risk of socio-technical lock-in, the race for economic growth and the depoliticisation of urban governance.

Against this backdrop, we will explore the following questions in this essay:

Do smart cities have the potential to bring about the profound change in societal functioning that sustainability requires? Or can they merely optimise the current situation without really challenging our societies' underlying way of working?

In the first part of this essay, we review the opportunities and risks associated with smart cities as they relate to sustainability, as discussed in the literature in this field. We then look at what sustainability represents and the societal changes necessary to achieve it. We go on to consider the transformative potential of smart cities in the light of sustainability goals. We conclude the essay with a discussion of the conceptual haziness surrounding the smart city concept, and its ramifications.

2. SMART CITIES: OPPORTUNITIES AND RISKS FOR SUSTAINABILITY

Opportunities identified in the literature

The literature on smart cities reveals three main opportunities. First, ICT is regularly touted for its ability to make urban systems more efficient and for its contribution to dematerialising the economy. This could potentially reduce greenhouse gas emissions by some 15% around the world and substantially reduce the use of resources, including water and energy.

Second, the smart city concept has profoundly changed the way we talk about cities, making it possible to bring in issues of sustainability.

Lastly, most of the hopes pinned on the smart city concept in the literature derive from the alternative form of urban governance that it implies, one in which a cooperative and bottom-up approach driven by citizens and communities can incorporate technological and urban choices that favour sustainability and social equity.

The collaborative redistribution of intelligence implied by this third opportunity is demonstrated in the *Human Smart Cities Manifesto*,²⁷ which was signed in Italy in 2013 by several cities around the world. It sets out simple, cost-effective and small-scale technological solutions in order to equip and empower local communities to reconfigure the urban environment. This fosters more complex and varied ways not only of *experiencing cities*, but also of understanding technology and allowing citizens to reappropriate it, setting the stage for a new way of producing urban knowledge and of deciding whether a given technology achieves the goals that were set for it. In terms of sustainability, this means shifting and reorganising innovative capacity (e.g. away from universities and urban centres), thereby changing how citizens relate to technology and giving them a chance to re-think the dominant political and economic model and its underlying tenets (e.g. globalisation and weak market regulation, maximising profits, and economies of scale).

Risks identified in the literature

In addition to the opportunities offered by smart cities, the literature identifies six main risks to sustainability posed by this concept. First, the technological determinism at the core of most interpretations of this concept relates to the risk of dangerous simplification, where people are led to believe that the intensive use of ICT is not just compulsory but will necessarily improve the quality of life and the level of sustainability in the urban space. Left unchallenged, this assumption reduces social and environmental issues to purely technical challenges. It also overestimates the transformative power of technology by disregarding the need for societal and organisational transformation as well.

Second, the nature of this technology, most of which is owned by private, and in many cases multinational, companies, could entail socio-technical lock-in if it is used on a large scale; this would

prevent or greatly slow the development of alternative, more egalitarian ways of operating, which will be required to achieve a sustainable society.

Third, there are questions surrounding the ability of technology to improve the overall sustainability of society, particularly in view of the Jevons paradox – also called the rebound effect – which shows that when new technology increases the efficient use of a resource, the overall consumption of that resource often increases as well. That effect has been confirmed by well-established documentation and has been observed since 1865. The literature also underscores the fact that the use of technology in smart cities can have unintended consequences, such as a gap between expected and actual effects, as well as effects that were not identified during the planning phase.

The fourth problem discussed in the literature is probably the most obvious one from a sustainability perspective: the social and environmental impacts of producing the ICT required to make cities smart (sensors, artificial intelligence, etc.) but also to sustain the high-tech lifestyles of connected citizens (smartphones, IoT, etc.). There are clearly numerous significant direct and indirect impacts, in terms of rare resources and grey electricity, production and transport processes, recycling, and the required infrastructure and servers.

Fifth, the more critical literature shows that, in a process similar to technological determinism, smart cities can be viewed as a driver of economic growth that accelerates the circulation of private capital and the extraction of higher rents, encourages residents to participate in the community more as consumers than as citizens and, as a result, prevents alternative approaches to the political and green transition from emerging (voluntary moderation, local currencies, food sovereignty, cooperatives, urban space managed as a public good, etc.).

Lastly, various writers point to the depoliticisation of urban governance. Indeed, the dominant discourse about smart cities promotes technological solutions and win-win situations while subtly shifting urban challenges out of the deliberative space of politics and into the technical and commercial space, whose underlying vision has little to do with real urban issues. As a result, the focus is on citizens' right to use technology rather than

²⁶ Original from: Girardi, P. and Temporelli, A. (2017) “Smartainability: A Methodology for Assessing the Sustainability of the Smart City”, *Energy Procedia*, 111, 810-816: <https://doi.org/10.1016/j.egypro.2017.03.243>.

²⁷ See de Oliveira (2016).

on the right to shape the city using human intelligence and technology to improve urban spaces and make them more sustainable. This obscures both the relationships that pave the way for and maintain these technological arrangements, but also the social and political configurations that could be used in order to achieve more effective and sustainable solutions.

3. SUSTAINABILITY MEANS RADICALLY CHANGING HOW OUR SOCIETIES WORK

The word *sustainability* is used to describe how human societies can operate – particularly with regard to the natural environment – in a way that ensures their long-term stability and enables generations of humans to flourish. This implies containing the impact of human activities within the planet’s ecological boundaries while meeting everyone’s fundamental needs and promoting equity in all its facets.

When viewed in this way, sustainability consists of both social and environmental dimensions. These two dimensions are closely connected by a series of complex interactions, as social and economic dynamics affect environmental processes which, if destabilised, can have consequences for the quality of life in human societies. In its more robust version, which we are promoting in this essay, achieving sustainability means assigning a predominant role to environmental stability, where the preservation of certain ecological parameters (climate, biodiversity, etc.) is the pre-condition for all future prosperity. This idea echoes the concept of planetary boundaries set out in 2009 and illustrated in Kate Raworth’s Doughnut model.²⁸

Radically changing how our societies work

On a planet with finite resources and where the ecological balance is under considerable pressure, the goal of sustainability cannot be achieved simply by using new ways of pursuing undifferentiated growth objectives, as was done throughout the second half of the 20th century. According to numerous specialists and expert committees, we will only be able to drastically reduce our impact

on the biosphere, in terms of energy and material resources, in a timely manner if we substantially transform our economic system.²⁹ Achieving sustainability worldwide will require not just technological changes, but also organisational, economic and social ones, in key areas such as transport and travel, housing, food, consumption, production, leisure and labour.

A growing number of studies and reports³⁰ lay out the systemic changes required to reduce CO₂ emissions by 95% by 2050, as recommended by the Intergovernmental Panel on Climate Change, and are starting to provide a more accurate image of the effort that will be needed. In the construction industry, for example, this would require putting a moratorium on new builds and implementing a renovation rate of 4% per year (versus around 1% per year in Switzerland today) and limiting living space to an average of 10–25 m²/person. In the area of transport and travel, the number of personal vehicles on the road – including electric cars – would have to be reduced by 90%, and the distance travelled would be limited to around 6,000 kilometres per person per year for a country like Switzerland, not including active travel. In terms of the consumption of digital devices, it would be possible to return within the planetary boundary with one laptop computer per family of four, replaced every ten years, along with one smartphone per person, replaced every five years. The role of technology and the exact scope of the changes to our lifestyles that will be necessary are still the subject of lively debate, but these examples from the literature clearly show that we are facing a massive change in how our societies function, rather than just some minor tweaks.

4. COULD SMART CITIES TRANSFORM OUR SOCIETIES?

Before embarking on such an ambitious transformation in all sectors of our lives, we must first give serious thought to what we mean by development, well-being and prosperity and, more broadly, to our collective goals. This discussion must be inclusive and detailed with regard to the environmental, social and ethical impact of current modes of

production and consumption. For the various reasons mentioned above, it seems unreasonable to believe the premise that a new, urban technological arsenal, no matter how smart, will overcome the immense challenges of the transition.

The smart city concept, at least when it is understood as making greater use of ICT in order to increase the efficiency of energy services and economic and social activities, does not spare us the necessary public debate about the objectives of the socio-ecological transition. It could surely help to achieve these objectives, but only if there is absolutely no ambiguity about its role. Smart cities should be a means to shared, discussed and politically decided ends.

That said, two important questions arise concerning the extent to which the smart city concept can actually contribute to achieving sustainability. The first is specifically about whether this concept can be a vector for true citizens’ dialogue and for a transformative vision of cities and their economic fabric. The second is about knowing whether, once the vision and the ways to achieve the transition have been politically defined, the smart city concept can effectively help us get there, while at the same time reducing environmental impacts and enhancing social well-being.

For the first question, some visions of the smart city do in fact appear to go hand in hand with the idea of facilitating a more inclusive citizens’ dialogue and developing a new vision of the city. The “integrated and original use” of ICT, as mentioned in the introduction to this essay, in order to “facilitate and satisfy citizens’ [...] needs” is in keeping with this line of thought, as is the approach described in the *Human Smart Cities Manifesto*. Yet technological pledges of this type are subject to certain caveats.

First, while ICT clearly has something to offer in terms of sharing and pooling information and ensuring it is transparent, it also comes with a risk that users will be passive and that the technology will be employed for other purposes. The smart city concept itself is based on an ideal of streamlining and efficiency that draws on the possibilities that artificial intelligence brings. Yet it could also spawn a hands-off attitude whereby users delegate to technology the task of making our lifestyles sustainable without themselves seeking to change the practices, standards and values that lie at the root of the environmental crisis. If we focus excessively

on the technology itself rather than on redefining our collective objectives, there is a real risk that the future trajectory of our societies will be guided more by a concern for further developing existing technologies than by an accepted approach determined through considered debate.

The second caveat is linked to the first. Careful attention will have to be paid to the form of governance applied to any new technology involved in the smart city approach, to ensure it is developed in response to and always serves the needs of the city’s residents and users, particularly with regard to sustainability. This means, at the very least, some government control from the design phase and during implementation, as well as heightened transparency about the objectives of the model and how it functions. A counterexample in this respect is social media: they were developed and are operated by private interests, and their societal, political and economic consequences far exceed their creators’ initial objectives – and not always for the better.

The second question is about whether the smart city concept will significantly reduce environmental impacts and enhance social well-being. Smart and adaptive technologies and the use of big data for optimisation purposes could certainly help to reduce the environmental footprint of today’s complex and interconnected societies to the extent described above. However, we must tread lightly, in view of the points raised in the first part of this essay, i.e. the rebound effect, the environmental impact of digital technologies and the risk of socio-technical lock-in. If future urban development is driven by the smart city concept yet not rigorously guided by the need for an ambitious green transition, there is a good chance that the use of energy and other resources will increase. This risk is even greater if the embedded economic, cultural and ethical factors that underpin today’s unsustainable model are not changed at the same time as new technologies are developed.

Yet there is good reason to think that the smart city concept will have to adapt to existing structural constraints, as the technical and architectural infrastructure in most cities will be difficult to modify. This means that this concept will lead to only “marginal” optimisations, rather than the radical transformation in the way we live, travel and consume that is needed for the green transition to succeed. We must have no illusions about the ability of a given technology, however sophisticated

²⁸ See Raworth (2017) and Steffen et al. (2015).

²⁹ See, for example, the following publication of the European Environment Agency: <https://www.eea.europa.eu/publications/growth-without-economic-growth>.

³⁰ See, for example, the article by O’Neill et al. (2018) and the report from the French firm B&L évolution: <https://www.amisdelaterre.org/wp-content/uploads/2019/10/190226-blevolution-etude-trajectoire-rapport-special-giec-v2.pdf>.

it may be, to resolve this century's biggest challenge if it does not come hand in hand with a broader transformative push that is the result of political decision-making and has widespread democratic backing.

5. CONCLUSION: A VAGUE AND CONTRADICTIONARY CONCEPT WITH AN UNEVEN IMPACT ON SUSTAINABILITY

This critical analysis of whether the smart city concept will help cities live within planetary boundaries shows that the lack of a robust definition of this concept is a major limitation. More specifically, various interpretations of the smart city concept, discussed above, point to at least three contradictions. Firstly, the classic version of the concept, in which ICT and artificial intelligence play the key role in improving energy efficiency and societal well-being, comes up against the idea of a city being "smart" based primarily on the notions of innovation, creativity and cooperation. Secondly, the literature draws a distinction between cities built from scratch and those already in existence. The former group is found mostly in Asia, and their infrastructure can be designed from the start to accommodate the features of a smart city; the latter group includes most cities in the globalised North, which would have to be retrofitted to some degree, with a focus on technology and social changes. Thirdly, while less bold versions of the smart city go no further than marginal improvements, other visions set out a truly new paradigm, in a break with the cities of the past and implying a change in power relations in the urban space.

FURTHER READING

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March, H. (2018) "The Smart City and other ICT-led techno-imaginaries: Any room for dialogue with Degrowth?", *Journal of Cleaner Production*, 197, pp. 1694-1703: https://www.sciencedirect.com/science/article/pii/S0959652616314950?casa_token=roXcUQi_OiUAAAAA:0keqycBoaA1Ysbt-37ggYW1IC_eohnYY7BzyeFTW0TJ_5iPvmZ-zUkq1Ym5xUlmxy7t8W8ERadVGmIuQ.

These permutations of the smart city concept reflect widely varying levels of ambition, ranging from simple technological add-ons – whose potential contribution to sustainability is limited, if not negative – to a complete overhaul of the city and of the collective mindset, on which the societal transformations required to achieve sustainability depend. This conceptual haziness has led various writers to consider smart cities to be an ambiguous or even illusory notion that lends itself more to the page than to practice. Yet its influence on the discussions surrounding sustainability and urban competitiveness cannot be denied.

As a result, the definition chosen by a given territory will greatly affect the potential levels of sustainability and the extent to which the concept challenges the dominant, non-sustainable model currently evident in society. This means that any entity interested in the smart city concept must pay close attention to the conceptual framework it uses – that is, the precise definition of a smart city that will be adopted – and its impact on future decisions.

Regardless of which version is selected, technology must be consigned to its proper place. It is a means of working towards a sustainably functioning society, and it will be of greater or lesser relevance depending on the situation. But no technology of any type should be an end in itself for our societies. If we focus on how to achieve our goals rather than *on the goals themselves*, we have little or no chance – with or without smart cities – of accomplishing the sufficiently robust transformation needed to achieve carbon neutrality by 2050 and to return within our planetary boundaries.

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Power relations and smart technologies

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1. HOW HUMANS FIT IN WITH TECHNOLOGY

A smart city is one “that employs and incorporates automated and interconnected technologies”. Such “smart” technologies rely more on software than hardware. In other words, a number of algorithms will gather and analyse a certain dataset in accordance with predefined criteria. Based on that information, a response, a reaction or access (to services or to a site, for example) will be triggered or approved. It is also crucial to point out that these technologies are interconnected, meaning they systematically communicate with each other based on a human-designed blueprint.

As a result, a “sociotechnical” approach to this issue shows that, for smart cities, both humans and technological tools are involved at every level. In other words: “where there is technology, there have to be humans”. We can only determine whether a given technology is beneficial or problematic by assessing the interaction between these two worlds.

Let’s take a motorway as an example. Our motorway is equipped with a series of sensors and measurement equipment – from exhaust sensors in tunnels to speed cameras – able to collect huge amounts of data. But these data are then viewed and processed by operators working at a control centre, whose task it is to determine what actions to take and which process to follow. In reality, human involvement occurs further upstream, when the new technological system is acquired and installed; just think, for example, about all the decisions that go into determining the technical specifications of a new CCTV camera and where it should be located. And before the system is installed, the people in charge of designing and selling it also have to select which algorithm to use in their product. In view of these many touch points, we can safely posit that smart technology consists of both human and non-human variables. This means that when we discuss these technologies, we cannot look only

at the object itself; rather, we must consider how it fits into the broader context. That is the only way we can assess how effective it is.

So it is crucial to understand that even if the algorithms are used to automate the management of day-to-day practices and processes, they are no more objective than if the same task had been given to a human located on site. The truth is that one of the main impacts of the introduction of algorithms has been to shift decision-making authority in both time and space. Decisions are now taken earlier on and by a coder, rather than on the spot and in real time by a regulatory agent (such as a police officer). The underlying risk of this shift is that the decisions involved in managing our daily lives are taken outside our collective control and are not subject to individual analysis. You can try explaining things to a law enforcement agent, but you would not dream of pleading your case to an algorithm.

This observation shows that democratic debate and our ability to engage in practical and individual resistance in our everyday lives could be jeopardised. Decisions would become more opaque, even though the issues at stake are inherent to any democratic society. The proportionality and relevance of the power of algorithms is another critical question. Is it fair to assume that whatever is acceptable and relevant in Singapore, Beijing, Tokyo and New York is also necessarily acceptable and relevant in Geneva, Bern or Neuchâtel? The uniqueness of each city must be taken into account to avoid simply duplicating predefined, standardised algorithmic solutions.

2. IS TECHNOLOGY A PANACEA OR AN INSTRUMENT OF TOTAL CONTROL?

First, one must not forget that smart technologies are fundamentally fragile: they can crash, be hacked and contain coding errors. We must also understand that they are not good or bad in and of themselves; rather, they can be more or less beneficial or problematic for the communities concerned depending on how they are used. The targeted use of technology can make our lives more comfortable and help us lead more sustainable lives on a daily basis, such as by making the most efficient use of

certain resources. Yet smart technologies can also have a harmful effect if they are used to oppress, subjugate, exclude or discriminate against people. In this latter respect, we simply need to look at totalitarian countries as examples.

There is a fine line between positive and negative influence, since the add-on “smart” – e.g. smartphone, smart city and smart farming – always implies surveillance. That is because “smart” is linked to collecting, compiling, analysing and cross-indexing people’s data. A mobile phone is smart because it tracks our movements, activities, interests and preferences and can then combine these and other data to provide us with relevant information. If I’m looking for a restaurant in Paris, for example, Google will recommend somewhere based not only on my location, but also on other restaurants I have been to.

3. TECHNOLOGICAL SOLUTIONISM?

We began using smart technologies more and more in our daily lives as a result of the Covid-19 restrictions. For example, tracing apps were created to curb the spread of the virus, and drones were sent into the skies above some French cities to detect gatherings of people. I don’t find this surprising. The initial reaction to any crisis is usually to put very stiff controls in place, bringing things to a halt; we saw this, for example, when various countries closed their borders. Technology can then be used to manage such situations in a differentiated manner, with certain groups allowed to move around more than others. To put it differently, a system of regulation can be made more flexible and granular with technology, so that specific forms of travel can again take place. This process of opening up again is gradual and limited – and it has a cost: our data are required, giving access to our private lives.

Figure 1.



One of my concerns with this process is its legacy, i.e. the long-term effects of the systems put in place. When we employ specific instruments to manage a crisis situation, we should also be able to return

to how things were once the situation has been resolved. It is then that we need to evaluate the long-term pros and cons of using those tools and consider their proportionality and relevance once the crisis has ended. As it turns out, however, once a technological measure is introduced, it tends to stick around: since launching it implied a cost, whether political or monetary, making it obsolete could be seen as a step backwards.

The cost of these technologies is indeed a major issue, as we can demonstrate by looking at the British and Swiss approaches to video surveillance. In the UK, between 2000 and 2010, three quarters of the crime prevention budget was allocated to CCTV infrastructure. This led to a decrease in the number of police officers, in order to offset the cost of investing in these cameras. The opposite happened around 15 years ago in Zurich’s Langstrasse neighbourhood. Although politicians had set aside money to install CCTV cameras, the police preferred to maintain their physical presence, as they did not want to reduce their numbers and undermine the community policing strategy that they had developed in previous years. This example points to the numerous decisions and the deeply political dynamics involved in delegating control to a technological system.

Going one step further, when new technological systems are imposed from the top, the people themselves are not likely to buy in. The video surveillance example is again instructive: rather than simply installing new CCTV cameras in a neighbourhood, a good compromise could be found by establishing a dialogue with residents and other stakeholders. This compromise should make everyone feel they are involved in the chosen solution and ensure that people understand that system, see how it is relevant and, possibly, contribute to it in some way. Such an approach would lead people to be more accepting of the presence of CCTV, and this would bolster this technology’s reassuring effect over the long term.

This participatory solution could be a good fit in Switzerland, a country with a strong democratic culture and tradition. The Swiss people are also keenly attuned to the question of data privacy. They are thus in a very good position to take a moderate and informed approach to these issues, and to find a way of using and incorporating these technologies into their lives.

The political class has a key role to play here too. That is because a situation of dependence is created when a solution is purchased from a company. It is the company, not the government, that is most familiar with and knowledgeable about the technology. Nowadays, this indispensable technical expertise is held by economic agents, through private companies.

If we again look at the Covid-19 pandemic, a series of technological solutions was implemented in Switzerland, including the SwissCovid app, which was co-developed by ETH Zurich. The country attempted to come up with a local solution yet could not avoid involving international partners. Data storage was outsourced to Amazon, for example, which soon raised the question of technological dependence. In situations such as this, it is hard to know which jurisdiction would prevail in the event of a dispute.

4. IS POPULAR TRUST IN TECHNOLOGICAL SOLUTIONS COMPATIBLE WITH FREEDOM?

In our daily lives, there is a growing dependence on technological tools: it is increasingly difficult to live without them. Things change quickly – and quickly become obsolete. Can we really hope to safeguard our own privacy if we are also undermining it by using social media like Facebook, Instagram and Twitter? Can we really be against video surveillance, which does not identify people directly, when our mobile phones are already tracking us ten times more effectively? One of the only possible answers to these questions has to do with cost and efficiency. As noted above, the budget required to install CCTV cameras could, for example, be used to increase the number of police officers on the beat.

Again taking our cue from the Covid-19 pandemic, we have seen how people are prepared to pay a certain price for greater freedom, as with apps like SwissCovid. Yet initiatives like this have proven, over time, to have only a limited impact. While most people trusted these initiatives, particularly the data privacy aspect, the technology's main achievement was that it reassured people, although only for a limited period. More broadly, the appeal of technological measures, like symbolic political measures, should never be underestimated.

In this respect, it is worth noting that such symbolic actions can also work in favour of a politician's election campaign. Such "direct" measures are used because they work wonders in terms of winning people's trust and buy-in – installing CCTV cameras in a neighbourhood is a visible action that shows something is being done about people's safety. Investing in education, on the other hand, is less visible and, therefore, less symbolic.

In conclusion, we must understand that smart city projects are also linked to urban entrepreneurialism, a system in which cities act as entrepreneurs, staking out their position both domestically and internationally. In keeping with this idea, cities need to stand out, or at least not lag behind other cities, since they are in direct competition for funding. Money that is not invested in Geneva, for example, will go to Lausanne. In this competitive constellation, it is not easy to set one's city apart, either domestically or internationally. Given the pressing need to rise above the rest, promoting a city's "modernisation" can do the trick: numerous smart city projects have been created for that purpose. These projects and the accompanying discourse can make cities visible and attractive, not only for the city's residents but also to bring in investments that could be used to develop other projects.

Civic tech: the opportunities and challenges of citizen participation in Society 4.0

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The smart city concept, which dates back around ten years, comprises technological solutions to the problems of urban densification and opens territorial governance up to citizens' participation.³¹ In other words, smart cities bring together technological and social innovation. Within smart cities, and more broadly at different levels of governance, civic technology – or civic tech – proposes digital tools to enhance citizen participation³² at a time when individuals, organisations and governments have access to a wide range of both data and information and communications technology (ICT). The proportion of households in the European Union (EU) with internet access reached 92% in 2021, and four fifths (80%) of people used the internet daily that year.³³ As we see, digitalisation and political participation are increasingly intertwined,³⁴ and it is even getting harder to be politically active

without using digital infrastructure.³⁵ This boosts the appeal of civic tech, but it also highlights the need to analyse the related challenges.

It is hard to provide a precise definition of civic tech. Most authors associate it with more proactive governance and the increased participation of citizens and other stakeholders.³⁶ In other words, civic tech relies on digital technology to boost interaction between citizens, public administrations and the government.³⁷ Civic tech can be divided into five groups: (1) more responsive and efficient city services; (2) open data portals and open government data publishing; (3) citizen engagement platforms; (4) community-focused organising services; and (5) geo-based services and open mapping data.³⁸ The civic tech concept has been mapped out at both country level (including in Switzerland³⁹ and France⁴⁰) and internationally (such as *civictech.guide*⁴¹ and *participedia*⁴²).

It is also possible to distinguish between bottom-up civic tech (initiated and managed by civil society) and top-down civic tech (put in place by public administrations and governments).⁴³ First,

³¹ Cerema (undated) "Définition: qu'est-ce qu'une smart city?": <https://smart-city.cerema.fr/territoire-intelligent/definition-smart-city> [consulted on 17 January 2022].

³² Knight Foundation and Rita Allen Foundation (2017) "Scaling Civic tech: Paths to a sustainable future": https://knightfoundation.org/wp-content/uploads/2020/03/Scaling_Civic_Tech_final.pdf [consulted on 10 January 2022].

³³ Eurostat (2021) "Digital economy and society statistics – households and individuals": https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Digital_economy_and_society_statistics_-_households_and_individuals [consulted on 10 January 2022].

³⁴ Tolbert, C. J. and McNeal, R. S. (2003) "Unraveling the effects of the Internet on political participation?", *Political research quarterly*, 56(2), pp. 175-185.

³⁵ Leander, A. (2019) "Sticky security: the collages of tracking device advertising", *European Journal of International Security*, 4(3), pp. 322-344.

³⁶ Patel, M., Sotsky, J., Gourley, S. and Houghton, D. (2013) *The emergence of civic tech: Investments in a growing field*, Knight Foundation.

³⁷ Dietrich, D. (2015) "The role of civic tech communities in PSI reuse and open data policies", *European Public Sector Information Platform Topic Report*, 5, 2015.

³⁸ Verhulst, S. (2015) "Unpacking civic tech – Inside and outside of government", *GovLab Digest*, New York.

³⁹ See the Swiss civic tech barometer: <https://www.epfl.ch/labs/lasur/fr/barometre-des-civic-tech-2019/> [consulted on 10 January 2022].

⁴⁰ Assemblée nationale Mardigital (2016) "Les pouvoirs publics ouvrent leurs portes aux startups", Press kit, 13th edition, 24 May 2016, #CivicTech: https://www.economie.gouv.fr/files/files/PDF/Mardigital_24052016.pdf [consulted on 10 January 2022].

⁴¹ See <https://civictech.guide>.

⁴² See <https://participedia.net>.

⁴³ Knight Foundation and Rita Allen Foundation (2017) *Scaling Civic tech: Paths to a sustainable future*: https://knightfoundation.org/wp-content/uploads/2020/03/Scaling_Civic_Tech_final.pdf [consulted on 18 January 2022].

bottom-up civic tech engages in various forms of technological activism, community-centric services⁴⁴ and collaborative initiatives that employ open data – and sometimes open access software – to address challenges that the public powers may neglect or be unaware of.⁴⁵ For example, the Robin Hood Co-op⁴⁶ uses blockchain technology to offer new ways of financing and safeguarding community goods.⁴⁷ The rest of this essay focuses on top-down civic tech.

Governments and public administrations have developed civic tech in response to the growing demand for public action to be digitalised.⁴⁸ This need for digitalisation comes on top of the need for participation that already poses challenges for the construction, implementation and evaluation of public policies.⁴⁹ The aim of these technologies is to develop new online services (e-governance) and make it easier for citizens to participate in various decision-making processes (e-participation). Civic tech supports the decision-making and operational processes of governments and public services.⁵⁰ For example, some local governments have created a social bot powered by artificial intelligence (AI) to facilitate online interaction with citizens and answer the most frequently asked questions.⁵¹

In 2015, the European Commission commissioned a study to explore how technological innovation could be used in the development of public policies.⁵² But the EU's interest in digital technology

began earlier. For example, it had already created a platform called “Futurium” for European citizens to discuss EU policies.⁵³ The initial aim of this initiative was for people to submit their visions and political ideas on the future of Europe. It gradually evolved into an online foresight platform that facilitates the joint creation of ideas to help design future policies. This platform engages citizens and stakeholders and harnesses their views and creativity, so that they can improve public policies that matter to them. It does so by leveraging social media, open data, semantic and knowledge-mining technologies, and participatory brainstorming techniques.⁵⁴

The EU also gives citizens the chance to take part in public consultations. A dedicated section of the European Commission's website, called “Have your say”,⁵⁵ provides all citizens with the opportunity to share their views on public policies under development. Citizens can submit feedback on a number of policy initiatives. There is also a search function with various filters, such as topic (e.g. climate action), the stage in the process (e.g. in preparation), the type of act (e.g. legislative proposal) and the document category (e.g. impact assessment report). Each initiative is summarised, and the full document can be downloaded.

The Conference on the Future of Europe is another EU consultation platform. It consists of a series of debates and discussions in which people from all

over the EU can share their ideas and help to shape the EU's future⁵⁶ through a dedicated website.⁵⁷ Several topics are available (such as climate change and the environment), and for each topic, citizens can organise and take part in events and share their ideas online (such as: “The European Union could set up a program for returnable food packaging made from recyclable materials”).⁵⁸ Users can then provide feedback on each idea and endorse it. AI is used to automatically translate the content into different languages.

Before the conference, the Commission had already initiated a direct dialogue with citizens in a series of debates called “Citizens' Dialogues”, which began in 2012. The first was held on 27 September 2012 in the Spanish port city of Cádiz with Viviane Reding, the Commission's then-Vice-President.⁵⁹ The White Paper on the Future of Europe, published in March 2017,⁶⁰ marked another step in citizens' direct engagement in shaping the future of the EU. Hundreds of thousands of citizens took part, either through the 1,600 Citizen Dialogues held in 583 different places in EU Member States or through an online consultation launched on 9 May 2018.⁶¹ The online consultation consisted of 12 open- and closed-ended questions, in all EU languages; more than 87,000 people completed the survey.⁶²

AI was used to analyse the many responses in two ways: by specifically identifying recurrent topics in the responses and by grouping the responses by topic. The resulting analysis linked each response to several topics.⁶³ When hundreds of thousands of comments are received and have to be sorted through, this AI-based text analysis system is

particularly useful; significant human resources would have been required to read each submission and connect it with the relevant opinion groups. In this case, AI can be used to overcome humans' limited text processing capacity and increase the public administration's ability to hear what citizens have to say. The preliminary analysis conducted by AI was then reviewed by experts.

But the use of AI poses some challenges. The way the data are processed, for example, can be biased by the algorithm itself or by the dataset. These data processing techniques can also be opaque for users and make the participatory process less transparent. In a recent survey on the use of AI by the European Commission, the respondents perceived the independent algorithmic decision-making process regarding the EU budget to be illegitimate.⁶⁴ In other words, the citizens who responded to this survey did not recognise the legitimacy of a decision taken by AI without human oversight. This can be attributed in particular to the black box effect, where the AI decision-making process is not transparent and cannot be audited.⁶⁵ This technology should therefore only be used to help or inform policymakers.

Broader challenges associated with civic tech have also been identified. First of all, the choices made by the designers and developers of civic tech have an impact on how it works and on actual participation rates. Their choices are made within the digital infrastructure and cannot be seen by citizens. In addition, participative processes can obscure the other power structures at play,⁶⁶ such as the interests of small groups or of a political party. This

⁴⁴ Mačiulienė, M. and Skaržauskienė, A. (2020) “Building the capacities of civic tech communities through digital data analytics”, *Journal of Innovation & Knowledge*, 5(4), pp. 244–250.

⁴⁵ David, N., McNutt, J. G. and Justice, J. B. (2018) “Smart cities, transparency, civic technology and reinventing government”, *Smart technologies for smart governments*, pp. 19–34, Springer, Cham.

⁴⁶ See <https://www.robinhoodcoop.org>.

⁴⁷ Leander, A. (2021) “Redesigning the political with blockchain”, in Duberry et al., *Artificial intelligence and civil society participation in policy-making processes: Thinking about AI and participation*. Proceedings to the workshop on AI and civil society: <https://ssrn.com/abstract=3817666> [consulted on 18 January 2022].

⁴⁸ de Feraudy, T. (2019) “Cartographie de la civic tech en France”, *Observatoire de la civic tech et de la démocratie numérique en France, Décider ensemble*.

⁴⁹ de Feraudy, T. and Saujot, M. (2017) “Une ville plus contributive et durable: crowdsourcing urbain et participation citoyenne numérique”, *Iddri Study*, 4, pp. 1–72.

⁵⁰ Boehner, K. and DiSalvo, C. (2016) “Data, design and civics: An exploratory study of civic tech”, *Proceedings of the 2016 CHI Conference on Human Factors in Computing Systems*, pp. 2970–2981.

⁵¹ See <https://mr-bot.fr/chatbot-ville>.

⁵² Poel, M., Schroeder, R., Treperman, J., Rubinstein, M., Meyer, E., Mahieu, B., Scholten, C. and Svetachova, M. (2015) “Data for Policy: A study of big data and other innovative data-driven approaches for evidence-informed policymaking”, *Report about the State-of-the-Art*, Amsterdam: technopolis, Oxford Internet Institute, Center for European Policy Studies.

⁵³ European Commission (undated) Futurium Platform: <https://futurium.ec.europa.eu/en/discover-futurium/pages/about> [consulted on 10 January 2022].

⁵⁴ Accordino, F. (2013) “The futurium—A foresight platform for evidence-based and participatory policymaking”, *Philosophy & Technology*, 26(3), pp. 321–332.

⁵⁵ See the “Have your say” website: https://ec.europa.eu/info/law/better-regulation/have-your-say_en [consulted on 10 January 2022].

⁵⁶ European Commission (undated). Conference on the Future of Europe: https://ec.europa.eu/info/strategy/priorities-2019-2024/new-push-european-democracy/conference-future-europe_en [consulted on 10 January 2022].

⁵⁷ See the Future EU website: <https://futureu.europa.eu/?locale=en> [consulted on 10 January 2022].

⁵⁸ Idea submitted by François Weykmans on 19 April 2021: <https://futureu.europa.eu/processes/GreenDeal/f/1/proposals/83> [consulted on 10 January 2022].

⁵⁹ European Commission (2018) Citizens' dialogues and citizens' consultations. Key conclusions. Publications Office of the European Union, Luxembourg: https://ec.europa.eu/info/sites/default/files/euco-sibiu-citizensdialogues_en.pdf [consulted on 10 January 2022].

⁶⁰ European Commission (2017) White Paper on the Future of Europe: https://ec.europa.eu/info/future-europe/white-paper-future-europe_fr [consulted on 10 January 2022].

⁶¹ European Commission (2018) Op. cit.

⁶² European Commission (2018) Op. cit.

⁶³ European Commission (2019) Online consultation on the Future of Europe Second interim report. Publications Office of the European Union, Luxembourg, p. 43: https://ec.europa.eu/info/sites/default/files/online-consultation-report-april-2019_en.pdf [consulted on 10 January 2022].

⁶⁴ Starke, C. and Lünich, M. (2020) “Artificial intelligence for political decision-making in the European Union: Effects on citizens' perceptions of input, throughput, and output legitimacy”, *Data & Policy*.

⁶⁵ Poel, M., Schroeder, R., Treperman, J., Rubinstein, M., Meyer, E., Mahieu, B., Scholten, C. and Svetachova, M. (2015). Op. Cit.

⁶⁶ Pickard, V. (2008) “Cooptation and cooperation: institutional exemplars of democratic internet technology”, *New Media and Society*, Vol. 10 No. 4, pp. 625–645.

digital infrastructure can be vulnerable to preconceived notions about users' needs and to the institutional bias of their designers.⁶⁷ Furthermore, digital tools are sometimes geared more towards appearing modern than towards truly transforming citizens' participation. In other words, the development of civic tech is sometimes guided by the need for catchy features (such as the ability to like people's feedback) and not based on a clear and preliminary needs analysis,⁶⁸ and the resulting technology often provides little or no feedback on the outcome of the public's participation.⁶⁹ Lastly, given their nature, the collected data require a high level of security and confidentiality, which cannot always be guaranteed by ageing equipment that is vulnerable to cyberattacks.⁷⁰

Furthermore, personal and social factors affect the level of participation via civic tech: as the digital divide clearly shows, not everyone in our societies has the same access to technology. The differences can be seen in terms of both access to technology and the skills needed to use that technology. Indeed, civic tech faces considerable limitations when it comes to developing a diversified base of active users.⁷¹ The Design Justice Network⁷² offers a novel approach to analysing who designs the technology and who benefits from it. This network of researchers provides innovative solutions based on the principles of co-creation and participative design in order to promote the adoption of technology by a broader public, including traditionally marginalised groups (e.g. the most disadvantaged, the least educated, women, the LGBTIQ+ community, people living with disabilities and migrants).⁷³

In addition to these "technological" inequalities, there is an elitist bias that affects numerous consultations run by EU institutions, which tend to be monopolised by a small group of participants who are very knowledgeable about EU issues.⁷⁴ Committees and interest groups benefit first and foremost from these processes, although this is not in keeping with the spirit or the primary aim of these systems, which is to bring citizens into the process of public policymaking. A further bias has to do with the rules and procedures, which can steer discussions and thus influence their results, or even result in a pseudo discussion.⁷⁵

The relationship between technology and citizen participation is highly ambiguous.⁷⁶ On the one hand, civic tech provides numerous opportunities to bolster citizens' participation, something that is particularly crucial at a time when our societies are deeply divided.⁷⁷ By creating new channels for people to be heard, civic tech can heighten citizens' belief that they are responsible for promoting the public good (civic identity) and can help to achieve desirable changes (political efficacy). However, we must steer clear of technological solutionism. Civic tech is not a panacea for the challenges posed by citizen participation and by our pluralist democracies. And its growing popularity reminds us of the importance of combatting the digital divide and of addressing technological literacy, so that citizens can develop their critical spirit and digital know-how. Failing that, we could be doubly disappointed: by the technology itself, and by the quality of citizen participation.

⁶⁷ Skaržauskienė, A. and Mačiulienė, M. (2020) "Mapping International Civic Technologies Platforms", *Informatics*, Vol. 7, No. 4, p. 46, Multidisciplinary Digital Publishing Institute.

⁶⁸ Albarède, M. de Feraudy, T., Marcou, T. and Saujot M. (2018) *Gouverner et innover dans la ville numérique réelle*, Audacities project, IDDRI: https://fing.org/wp-content/uploads/2020/02/Audacities_Cas_CivicTechParticipation.pdf.

⁶⁹ Santini, R. M. and Carvalho, H. (2019) "The rise of participatory despotism: a systematic review of online platforms for political engagement", *Journal of Information, Communication and Ethics in Society*.

⁷⁰ Schia, N.N. (2018) "The cyber frontier and digital pitfalls in the Global South", *Third World Quarterly*, 39(5), pp. 821–837.

⁷¹ Mačiulienė, M. and Skaržauskienė, A. (2020) "Building the capacities of civic tech communities through digital data analytics", *Journal of Innovation & Knowledge*, 5(4), 244–250.

⁷² See <https://designjustice.org/>.

⁷³ Costanza-Chock, S. (2020). *Design justice: Community-led practices to build the worlds we need*, The MIT Press, p. 85.

⁷⁴ Costa, O. (2010) "La responsabilité politique dans l'UE: une logique fédéraliste?", in Esposito, F., Levrat, N. (eds), *Europe: de l'intégration à la Fédération*, Louvain-la-Neuve : Academia-Bruylant, 2010, p. 128.

⁷⁵ Gaudin, J.P. (2007) *La démocratie participative*, Paris, Armand Colin, p. 88.

⁷⁶ Barber, B.R. (1998) "The New Telecommunications Technology: Endless Frontier or the End of Democracy?", in *A Communications Cornucopia: Markle Foundation Essays on Information Policy*, edited by Noll, R.G. and Price, M.E., pp. 312–333, Washington, D.C.: Brookings Institution Press.

⁷⁷ Sidjanski, D. (2018) *Europe's Existential Crisis. Facing the Threats and Challenges*, Global Studies Institute of the University of Geneva.

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