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Editorial JeDEM Vol. 12, No. 1 (2020)

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Welcome to the new issue of JeDEM!

This issue is a combination of a very special selection of papers from the IFIP EGOV-CeDEM-ePart conference held in September 2019 in San Benedetto del Tronto (Italy) and the ongoing papers submitted during the first months of 2020 that made it over the hurdle of our 50% acceptance rate. But before you start reading the papers in this issue, let us tell you about some of the major and minor changes we have made to the journal since our last issue. The biggest change is that as from January 2020, we have a new Chief Editor. For the next 4 years, Anneke Zuiderwijk, from TU Delft will be guiding the strategy of JeDEM. As many of you know, Anneke is Assistant Professor at the Faculty of Technology, Policy and Management and her research focuses on open data and to develop theory for the development of infrastructures and institutional arrangements that incentivize open data sharing and use behavior by governments, researchers, companies and citizens. You can find out more about Anneke and her ideas and visions on the Digital Government blog[1]. A sneak preview for you: she is currently preparing a call for papers for JeDEM that focuses on Open Data – so watch out for a dedicated call for papers in this area this year!

We conducted a survey amongst the JeDEM registered users and included the results we gained – we are always looking into ways of improving the quality of the journal so please let us know if you have any suggestions or feedback. Quite a few changes have been made. The OJS platform has been updated and offers new features such as compliance to OpenAIRE Guidelines but also by linking with Google Analytics (although this requires that you have already setup a Google Analytics account) and allows readers to get a published article's citation in one of several formats supported by the Citation Style Language. Reviewers' efforts can be recorded with ReviewerCredits.com if they register for this - ReviewerCredits.com is a great tool for authors and lecturers and we very much recommend checking out their website, instructions, free training and how-to! All papers published with JeDEM as from 2019 are also listed with Scopus. Furthermore, all papers published with JeDEM are aggregated with CORE, one of the world's largest collections of Open Access research papers, offering authors several options for disseminating their work.

[1] https://wp.me/ptoXX-4wR

This issue contains two different types of scholarly papers from the IFIP EGOV-CeDEM-ePart 2019 that broadly focus on digital governance. We invited the conference keynotes to write a full version of their presentation.

Ingrid Schneider, Professor for Political Science at the Centre for Ethics of Information Technology, University of Hamburg, in her keynote contribution *Democratic Governance of Digital Platforms and Artificial Intelligence? Exploring Governance Models of China, the US, the EU and Mexico* discusses the challenges to democracy presented by the world's seven largest digital platforms and discusses them in terms of four different governance models. She points out not only the dominance of big digital platforms, their control of data, but also focuses on their capacity to create and capture the ensuing value, their ability to accentuate consolidation and concentration rather than try to reduce inequalities between and within countries. Another contribution by a keynote at the conference was made by Daniela Battisti, from the Italian Digital Transformation Team. Like Ingrid, Daniela focuses on digital governance but in *The Digital Transformation of Italy's Public Sector: Government Cannot Be Left Behind!* looks at Italy, in terms of the digital transformation of the Italian public administration by introducing a series of building blocks upon which digital services for citizens and enterprises are developed. This is to not only help reorganize IT projects but also to provide citizens with a richer service experience. Also we asked the authors shortlisted for conference Best Paper Awards to re-write, update and re-submit their papers. Following the second round of peer-review, we are pleased to be able to publish the following three papers, that consider digital governance in the public sector from three different perspectives, including the role of AI, how to benefit from the use of disruptive technologies and the involvement of users through co-production.

The paper of Daniel Toll, Ida Lindgren, Ulf Melin & Christian Ø. Madse offers a qualitative perspective on *Values, Benefits, Considerations and Risks of AI in Government*. Specifically, authors studied AI policy documents in Sweden by applying a value ideas model. As the global race to develop and implement AI in public sectors is well underway, we need to create realistic expectations of what such technology can do for society. Thus, such inquiries can enlighten us about AI's attributed values and provide important clues about current policy discourse, which might not always be realistic and may be too optimistic or too pessimistic. What do you guess applies? Find out by reading the paper!

Volunteer Co-production in Emergency Management is the focus of Sofie Pilemalm's paper – a particularly up-to-date field in today's times of uncertainty. Using civil citizens and semi-professionals as volunteer first responders in excluded areas, readers learn from this case study what the major challenges are with engaging volunteers as civil citizens or first responders in socially vulnerable areas and how ICT artifacts can act as a catalyst in this context. The study also presents a brief comparison between these groups. As governments are planning for digitalized coordination of volunteers in such scenarios (for example in the case of wild forest fires or pandemics), we welcome this highly relevant perspective.

Maria A. Wimmer, Gabriela Viale Pereira, Alexander Ronzhyn and Vera Spitzer, in their paper *Transforming Government by Leveraging Disruptive Technologies* describe how disruptive technologies can help achieve aims of making modernization in the public sector, such as making governments

more efficient, effective, open and transparent, in other words, to Government 3.0 and thus lead to a way services are produced and consumed. At the same time, such technologies may also have an impact on competition and performance management. They therefore suggest that the public sector, in the context of a wide and successful implementation of Government 3.0, must be based on an identification, systemization and deployment of training needs.

The following papers were submitted to us as part of our ongoing submission process (JeDEM accepts submissions throughout the year and is striving for a rapid publishing process).

Focusing on A*lgorithmic Decision-making and the Law*, the paper by Dirk Brand is a valuable read for anyone interested in the legal aspects of algorithmic decision making and accountability. The focus of this article is on the key features of such a framework, including dimensions like ethics, fairness and respect for human rights. As AI is already applied in so many daily activities around the world, we urgently need to take part in a discussion that can frame and guide the design of algorithms and the social impacts of algorithmic decision-making.

Finally, we present an article on *the Use of Social Media for Political Participation by Youths in Oyo State, Nigeria*. This is a topic that has been covered by JeDEM before but what is unique about Funmilola Omotayo's perspective is its focus on early adopters and the identification of the types of social media and political activities they engage with. Other studies have shown that social media have redefined the methods of political communication in the country, leading to shifts in the usage of technology for electoral processes and an increasing use of social media for political participation among youth. This study goes further to ask about the factors influencing this usage. Do you think gender or academic discipline play a role in this context? Check out the results of this empirical study on young people in Nigeria!

Enjoy reading this diverse selection of papers!

About the Editors

Noella Edelmann completed her Psychology Degree at the University of Strathclyde, UK and Masters' Degrees at the University of London, UK and the Danube University Krems, Austria. She received her PhD from the Tallinn University of Technology, Estonia where she focused on the importance of online lurking in the context of e-participation. Currently she is a senior researcher at the Department for Governance and Administration at the Danube University Krems. Her main research interests are the digital transformation and the use of social media in the public sector, e-participation, Open Access and scholarly communication. She is involved in the EU-funded projects such as Gov 3.0, Cap4City, and national projects funded by the Lower Austrian Regional Government, the Austrian Ministry of Digital and Economic Affairs (BMDW) and the Ministry of Civil Service and Sport. Noella is the Managing Editor of the international Open Access eJournal for E-Democracy and Open Government (JeDEM), Chair of the Social Media Track at the EGOV-CeDEM-ePart Conference and a member of IFIP WG 8.5.

Judith Schoßböck is a research fellow at the Centre for E-Governance at Danube University Krems, Austria and a HKPFS award recipient at the Department for Media and Communication at City University Hong Kong. She is managing editor of the open access e-journal JeDEM (jedem.org). At Danube University, she was inter alia involved in research projects covering electronic participation, civic online engagement, e-literacy, e-governance and open access.

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Democratic Governance of Digital Platforms and Artificial Intelligence? Exploring Governance Models of China, the US, the EU and Mexico

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Abstract: The article addresses the digital transformation and new power asymmetries and challenges to democracy by the world's seven largest digital platforms. Four different governance models are examined: The Chinese authoritarian model, the libertarian US-model, the European regulatory model and the Mexican hybrid model. The challenges of digital sovereignty and democratic governance of platform capitalism are explored.

Keywords: Governance, digital platforms, sovereignty, democracy, data economy

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1. Introduction

The story of the political economy of the digital transformation is often told as a rivalry between two states, sometimes even as a new cold war for geostrategic spheres of influence. The 2019 UNCTAD Report on the Digital Economy states: "The economic geography of the digital economy does not display a traditional North-South divide. It is consistently being led by one developed and one developing country: the United States and China. For example, these two countries account for 75 percent of all patents related to blockchain technologies, 50 percent of global spending on IoT and more than 75 percent of the world market for public cloud computing. And, perhaps most strikingly, they account for 90 percent of the market capitalization value of the world's 70 largest digital platforms. Europe's share is 4 per cent and Africa and Latin America's together is only 1 per cent

(UNCTAD 2019: xvi). This article aims at taking a broader approach by including Europe and Mexico into the picture thus broadening the horizon towards the varieties of digital capitalism. The paper has a descriptive dimension in exploring different governance models which have emerged. Moreover, it also has a normative dimension, namely whether and how to tame the new digital economic powers in a democratic way. Its special focus is dedicated to the aspects, whether and how digital platforms can be democratically regulated.

To this purpose, it is necessary to analyze first, which governance models of the digital transformation have emerged over the last decade and to consider their opportunities and risks for democracy. Special attention will be paid to large digital platforms which have gained dominance. I will present two dominant governance models, the US and China. Furthermore, I will explore Europe's struggle for digital sovereignty and analyze how Mexico addresses de digital transformation and whether and to what extent it follows one of these models.

In referring to democracy, of course there are different theoretical versions of liberal, pluralistic, or deliberative models of democracy. The shortest definition is that in Lincoln's famous 1863 Gettysburg address, "government of the people, by the people, for the people". According to political scientist Larry Diamond (2008), democracy consists of these four key elements: (a) A political system for choosing and replacing the government through free and fair elections; (b) The active and inclusive participation of the citizens in politics and civic life, including a lively public sphere and independent media; (c) Protection of the human rights of all citizens and (d) A rule of law, in which powers are separated and the laws and procedures apply equally to all citizens.

At least according to European understanding, it has been generally acknowledged that basic or constitutional rights are at least indirectly valid also between private parties, such as citizens and private corporations. Thus, democracy is not restricted to the relationship between the citizens and the state. The state has some oversight and supervisory duties. Therefore, civil rights are not only defensive rights to protect citizens *from* the state, but also positive rights to be protected *by* the state.

The structure of this article will start with some introduction into the current digitalization process and relate to some concerns about distortions of democracy in the digital transformation. Then, some characteristics of digital platforms will be defined. For the geopolitical arena, it will present first, some features of China's digital transformation model and contrast it secondly, with the digital platform model developed in the US. Third, the European digital regulatory model will be explained. Fourth, it will explore which road Mexico is embarking on. Finally, some conclusions will be drawn.

2. Digitalization and Democracy

Digitalization today is penetrating all spheres of social life, from cradle to grave and in all societal sectors. If asked, most people may associate digitalization first and foremost with changed patterns of communication. People using cellphones and looking at their screens are a familiar sight in many countries, cultures and across different social milieus. Many people embrace the digital opportunities and enjoy it as convenient and often entertaining. This is also true for many people in

the Global South, even though the digital divide is still prevalent and other socio-economic gaps have not vanished. Of the seven billion people on planet earth, five billion have a mobile phone, but only three billion have toilets with good sanitary conditions and two billion don't have access to clean drinking water. At present, one third of the world's population active on the internet is under 18 years old (UNICEF, 2017).

All sectors, agriculture, industry and services are currently undergoing a digital transformation process in which data is becoming a crucial asset. These acts of digital usage create lots of data traffic and transnational data flows. Many people are hardly aware that this traffic requires a large physical infrastructure in the background, like satellites, radio towers, undersea cables and broadband cables. The use of all the internet services – streaming, searching, working, chatting – creates an ever increasing amount, tera-, peta-, exa-, and zettabytes of data, to be stored in large data centers, so-called server farms. If cloud services are used, the location of citizen's data can be in another territory and will thus be subjected to the laws and jurisdiction of another nation state.

In the first decades of the internet, many believed that it would almost automatically be a force of and for democracy. New methods of data analytics, like Big Data, artificial intelligence (AI) and Machine Learning have been perceived as fostering progress and welfare. In 2013, the MIT Technology Review titled on its cover page "Big Data will save politics". However, only 5 years later, its cover contradicted by titling "Technology is threatening our democracy. How can we save it?" (Lichfield, 2018). Also in 2018, a new word entered Silicon Valley's lexicon: the "techlash", or the risk of consumer and regulatory resistance to big tech companies. The tide seems to have turned. So what happened? And why does there appear to be such a shift in the general sentiment and public opinion? In the context of this article and its focus on digital platforms, I can only point to some keywords.

In the beginning, social media were regarded as a welcome broadening of the public sphere which would promote free speech, attention and resonance for everyone and thus become a tool of participation and force for democratisation. Some political scientists proclaimed a move from the spectator to the participatory democracy. And indeed, social media is useful to mobilize people, to create alternative sources of information, networks, and enable protests.

In the meantime, however, what we see is a strong fragmentation of the public sphere. Quality newspapers are in decline. People are not always friendly to each other but create hate speech, shitstorms, and cyberbullying on the internet. Social media platforms are accused of creating filter bubbles and echo chambers, in which the users only receive information which confirms their already existing beliefs. The spread of "fake news", mis- and desinformation, conspiracy theories, or even radical propaganda is on the rise, especially in times of election and crisis like the Covid-19 pandemic and it is increasing social polarization. Hence, many scholars and policy-makers call for more digital literacy and media competences (Hendricks & Vestergaard, 2019).

At present, there is a race between developed countries to take the lead in Artificial Intelligence and many states have started digital agendas and pursue national AI strategies. These will lead to even stronger transformations in all social spheres. Big Data and Artificial Intelligence can be de-

fined shortly as "the collection and aggregation of large masses of (publicly, commercially, proprietarily and/or illicitly available data and its analysis, largely in the form of correlation, pattern-recognition and predictive analysis" (Saetnan/Schneider/Green 2018: 6). However, Big Data and AI are not only technologies that employ new statistical and probabilistic tools for analysis, they are also driven forward by normative arguments, the involved actors' beliefs, as well as economic and political interests (Kitchin 2014). They have socially transformative and "mythological" aspects, namely "the widespread belief that large data sets offer a higher form of intelligence and knowledge that can generate insights that were previously impossible, with the aura of truth, objectivity and accuracy", as danah boyd & Kate Crawford have put it in their seminal article (2012, p. 665).

Many people think that computers are more neutral than humans in making automated decisions. However, there is more and more scientific evidence showing that algorithms are not neutral. Human prejudices, stereotypes and bias enter the training data and algorithms and are being reproduced. As data analyst Cathy O'Neil in her book "Weapons of math destruction" (2017) has demonstrated, Big Data often increases inequality, reinforces social gaps in education and access to health, and threatens democracy. Data aggregation and analytics allows for the profiling and categorization of users. It harbors potential for discrimination and stigmatization, for instance in applying for credit or buying real property. Vulnerable people might have to pay more for car, health and life insurance, or have less chances of employment. These processes are analysed as social sorting and individualization of risks (Lyon 2003). All in all, this may threaten basic human rights and societal ideals of equity and solidarity, such as equal access to health services; predicting and individualizing risks may become discriminatory and undermine the insurance principle (Barocas & Selbst, 2016; Schneider & Ulbricht, 2018; Orwat 2019).

Access to personal data can also be used for political purposes and manipulation. As the Cambridge Analytica case has shown, Facebook via an API gave at least 60 phone and other device makers access to data of 87 million users and their friends. These data were used not only in the 2016 US election campaign by advisors for Donald Trump and in the UK Brexit vote. Cambridge Analytica has influenced more than 100 elections in 30 countries, based on data mining and data analytics. In Brazil, the spread of disinformation and conspiracy theories on WhatsApp groups contributed to the election of Jair Bolsonaro as president (Schlereth, 2018; Cadwalladr, 2019; EDPS, 2018; Ghoshal, 2018; House of Commons, 2019).

Many states are taking part in social media manipulation or even employ internet shutdowns when protests occur, as did 33 countries in 2019 (Internet Society, 2019). It may be no wonder that contemporary headlines ask questions like "Can Mark Zuckerberg Fix Facebook Before It Breaks Democracy?" (Osnos, 2018) and that even Chris Hughes, a former co-founder of Facebook wrote: "It's Time to Break Up Facebook" (Hughes, 2019). Google has also been accused by its own employees of doing work they see as unethical, such as "Project Maven" a contract with the U.S. Department of Defense to track people and vehicles in video footage captured by drones, which raised fear among engineers that the technology would be used to single out targets for killing. There were also misgivings around the consideration to reenter the Chinese market at the cost of censoring search results on behalf of the Chinese government. Several staff people were fired for organizing protests (Scheiber& Conger, 2020).

Many of the concerns for democracy are summed up in a recent Pew Study (2020) from the US, which concluded that many experts are rather pessimistic about the implications of the digital transformation. About half of the experts (49%) interviewed predicted that humans' use of technology will weaken core aspects of democracy and democratic representation between now and 2030, due to the speed and scope of reality distortion, the decline of independent journalism and the impact of surveillance capitalism. Digital illiteracy and the collapse of quality journalism may create an ill-informed public which easily falls prey to disinformation. In short, they warn that technology empowers the already powerful and that technology "diminishes" the governed. Experts fear that information technology is easily weaponized to manipulate and distort facts, which affects people's trust in public institutions and each other. This might incite a downward spiral toward disbelief and despair. Moreover, many experts surveyed said they worry about the future of democracy because of the power of major technology companies and their role in democratic discourse, as well as the way those companies exploit the data they collect about users. A third part (33%) of the experts is more optimistic, they expect technology to strengthen democracy and democratic representation, as reformers may find ways to fight back against "info-warriors and chaos". Only 18% of the experts expect no significant change in the next decade (Pew Research Center, 2020). Even if readers might not be as pessimistic as many of these experts, it is certainly worthwhile to analyze the power of digital platforms which I will do in the next chapter.

3. Digital Platforms - Definition and Characteristics

Let me start with some analytical considerations on digital platforms. "The world's most valuable resource is no longer oil, but data" (The Economist, 2017) is a common saying. Platforms extract and process data. However, the oil metaphor is contested, as data is neither scarce nor a rival resource, as it can be used by many without being diminished. However, de facto ownership of data has definitely turned into an intangible asset of firms. In analytical terms, according to Nick Srnicek (2017, p.47), digital platforms have the following characteristics:

- Platforms are digital infrastructures that enable two or more sides to interact, such as customers, advertisers, and service providers.
- Platforms produce network effects: The more users, the more valuable that platform becomes for everyone else. (Therefore, for instance, most people are on WhatsApp, Facebook, and Instagram, not on Telegram, Signal or Threema, because they can reach most other people on these messengers and social media platforms.)
- Platforms often use cross-subsidisation: one arm of the platform company provides a service or good for free, another arm – often the advertising section - creates revenues to compensate for the costs of the free services. In return, customers provide heaps of data to be profiled for targeted advertising.

The rules of service and product development are set by the platform owner. In particular, the latter aspect of Nick Srnicek's analysis has to be emphasized, as he adds: "In that respect, platforms 'embody a politics' as they not only gain access to data but also 'control and governance over the rules of the game" (Srnicek, 2017 p. 47). In a nutshell, it can be stated that new business models of the digital economy are disruptive and have an impact on democratic culture.

"Tech culture prizes speed, scale, efficiency, convenience, a disregard for the law (… ask forgiveness not permission) and a dislike, if not hatred, of government" (Pew Research Center, 2020 p. 11). Mark Zuckerberg asked his employees to "Move fast and break things", and many other start-up companies have followed suit. Most internet companies and app revenue models rely on tracking online activity and selling ads. Hence, value chains from data and big data analytics became a source of power for large platforms. Economic mechanisms such as network effects lead to the oligopolisation of platforms or even to digital monopolies: "Seven 'super platforms' – Microsoft, followed by Apple, Amazon, Google, Facebook, Tencent and Alibaba − account for two thirds of the total market value [of the 70 largest digital platforms]" (UNCTAD, p. xvii). The growing dominance of digital platforms has global implications. According to the 2019 UNCTAD report, the combined value of the platform companies with a market capitalization of more than $100 million was estimated at more than $7 trillion in 2017, thus 67 per cent higher than in 2015. Some global digital platforms have achieved extremely strong market positions in certain areas. Google for instance, has some 90 percent of the market for Internet searches. Facebook accounts for two thirds of the global social media market, and is the top social media platform in more than 90 percent of the world's economies. Amazon boasts an almost 40 percent share of the world's online retail activity and its Amazon Web Service accounts for a similar share of the global cloud infrastructure services market (UNCTAD, p. xvii).

Thus, in many digital technological developments, "the rest of the world, and especially Africa and Latin America, are trailing considerably far behind the United States and China. Some of the current trade frictions reflect the quest for global dominance in frontier technology areas" (UNCTAD 2019, p. xvi). This also creates gaping power asymmetries between platforms and users, as it decreases consumer choice. Not to use certain platforms is not an option if one doesn't want to self-exclude from important parts of contemporary social and economic life.

Within only one or two decades, previous small platform companies turned into digital giants. The rapid rise of these seven "super platforms" can be explained by several factors. The first is related to the above mentioned network effects. The second is the platforms' ability to extract, control and analyze data collected. More users mean more data and more data mean a stronger ability to capitalize on first-mover advantages and to outcompete potential rivals. Thirdly, once a platform begins to gain traction and starts offering different integrated services, the costs to users of switching to an alternative service provider start to increase. These factors have led to the rapid rise to dominance of these large platforms (van Dijck, Poell & de Waal 2018; UNCTAD 2019, p. xvii).

Issues concerning 'digital sovereignty' arise, since data generated by the citizens, businesses and organizations of a particular state are a major economic resource in the digital economy, which can be harnessed to create economic value. These are related to control, access and rights over the data at the global level and the extraction and appropriation of the value that could be generated from refining them (Bendiek/ Schallbruch 2019: 6). Under the current regime, the platform that collects the data from the users is the one that controls and monetizes such data. As a result, big digital platforms have an advantage in terms of capturing data-related value (Pew Research Center 2020, p. 11).

4. China's Digital Transformation and AI Model

China has become very ambitious, the rising star in Artificial Intelligence and wants to become the digital and economic world champion. Xi Jinping, the President of the People's Republic of China has set the goal of China replacing the USA as world market leader by 2025 (Hausstein & Zheng, 2018). China has its own platforms: Alibaba is similar to Amazon, WeChat is the messenger like Whatsapp, and China's search engine is Baidu, similar to Google. WeChat, owned by Tencent, has more than one billion active users and together with Alipay (Alibaba), its payment solution has captured virtually the entire Chinese market for mobile payments. Meanwhile, Alibaba has been estimated to cover close to 60 per cent of the Chinese e-commerce market.

These platforms and their data are closely integrated in China's Big Data and digital tech strategy, as heaps of data are needed for machine learning, AI and training of neural networks. China also invests heavily in face recognition and biometrics. One of the key areas in which investments are being made is – in addition to military applications – the total monitoring of the population. Already now, several hundreds of millions of monitoring cameras are hanging from buildings and light masts. These are increasingly being equipped with "smart" monitoring technology and integrated into comprehensive systems, such as the social scoring system.

By this year 2020, China wants to introduce a nationwide Social Credit System. In some regions like Shanghai and Rongcheng, different pioneer models have already been in place for some years (Ohlberg & Lang: 2017). Local governments and agencies have been piloting aspects of the system, which will eventually attribute to every Chinese citizen a personalized score that includes all the data collected on their behavior. In short, the idea is that every citizen will have an individual "social score" or "social credit". "Good" behavior will result in bonus points, "bad" behavior in deductions of the points received on the individual score account. The social credit system aims to incentivize "trustworthy" behaviour through penalties as well as rewards. According to a government document about the system dating from 2014, the aim is to "allow the trustworthy to roam everywhere under heaven while making it hard for the discredited to take a single step" (Kuo, 2019).

The data for this system originates from many areas: It comes from the employer, from banks and distributors, from the house administration and also from governmental agencies. What enters the score are correct tax payments, loan repayments, paying bills and court judgments. But also social inputs like adherence to traffic rules, family planning limits, filial piety (like visiting and caring for your parents) and criminal records are included in the score. Moreover, data from large digital platforms like Tencent and Alibaba are also included in the system and contribute to the allocation of points, such as credit card bills, shopping habits, and the reliability of information posted and reposted online, for instance on WeChat. Another thing to be measured is the interaction with other internet users – who if spreading false information or criticizing the government will receive deductions in the score. If you interact with friends with low scores, this will also negatively affect your own (Strittmatter, 2019).

In terms of output, a high or low score will affect social opportunities like eligibility to loans, high school, jobs and travel. The individual score decides on who gets an apartment or a work place.

Other penalties for individuals include being barred from buying insurance, real estate or investment products. Citizens with a low score are placed on black lists for social credit offences and cannot travel on planes and express trains any more. By the end of 2018, according to the Chinese National Public Credit Information Centre, would-be travelers were banned from buying flights 17.5 million times and citizens were prevented 5.5 million times from buying high speed train tickets (Kuo, 2019).

In many Chinese cities, jaywalking is already immediately responded to by the naming and public shaming of the person who crossed at a red traffic light. The ubiquitous video cameras equipped with facial recognition software enable the individual attribution of rule violations. In addition, these and other sensors provide an enormous amount of data that AI systems are trained with. Many advances in the field of artificial intelligence are based on general surveillance, being it state-sponsored or by data acquired from private platforms. Finally, in some regions the social scores are also made public in order to distinguish especially "good" citizens and to identify socially "negative" elements (Strittmatter, 2019; Ohlberg & Lang, 2017). Most extensive surveillance methods are executed in the Xinjiang province where the Muslim minority of the Uighurs is kept under repressive digitized control (Zand, 2018; ICIJ, 2019; Buckley & Mozur, 2019). Furthermore, the Covid-19 pandemic has been used by Chinese authorities to invigorate surveillance by obliging citizens to wear a contact tracing app which tracks their location and grants or denies access rights to many facilities of the outside world (Giesen, 2020; Böge, 2020).

China justifies its system as a way to create harmony and social stability (Au & Kuuskemaa, 2019). In the Western world, it is regarded as the attempt to create a digital totalitarian state. To sum up, the Chinese governance model of the digital transformation is an authoritarian model of mass surveillance and aspired total control by the state. Here, platforms are not democratically controlled, there is a tight collaboration between states and platforms and these platforms are used by state authorities to control the citizens and to intimidate potential critics or opponents. China's ambition seems to create a digital panopticon, in which all the citizens are under permanent supervision and conform to this surveillance by self-censorship and internalized control.

5. The United States' Digital Platform Model

Let us move to the next, contrasting model. The US digital transformation model is a libertarian, free market model in which as yet hardly any governmental regulation of digital platforms is taking place. Disruption as exercised by these platforms is seen as positive both for innovation and economic growth and hence is fostered. Not least as a result of high finance and venture capital investments, low regulation and the so-called "Californian Ideology"(Turner, 2006 and 2017), most platforms are based in the Silicon Valley. In the business-to-consumer sector, a few US platforms dominate the markets in the western world.

Platforms, acting as intermediaries and data brokers have gained enormous power as economic titans and as gatekeepers. Some years ago, the German magazine "Der Spiegel" (2015) on its cover page declared the large platform owners to be the new "world government" – that is certainly highly exaggerated but it is interesting how platforms describe themselves. Eric Schmidt, former Executive

Chairman of Google (2011 – 2015) and Alphabet Inc. (2015-2019) wrote: "We believe that modern technology platforms, such as Google, Facebook, Amazon and Apple, are even more powerful than most people realize (...) and what gives them power is their ability to grow – specifically, their speed to scale. Almost nothing, short of a biological virus, can scale as quickly, efficiently or aggressively as these technology platforms and this makes the people who build, control and use them powerful too" (Schmidt & Cohen, 2013). Often, the Big Five Western internet companies Google, Alphabet, Facebook, Amazon, and Microsoft are clustered together by the acronym GAFAM. In the following, I will explore, what their main sources of power are.

The first source of power is their market value: Four of them, Alphabet, Amazon, Apple and Microsoft in 2019 have exceeded the "magical threshold" and have become worth more than $ 1trillion each. In February 2020, Facebook's market value was $620 billion (The Economist, 2020; Macrotrends, 2020). This means that each of these platforms are more valuable than any oil, pharmaceutical, bank, credit, airplane or film company (Schoen, 2018). And there seems to be hardly any end in sight: The Economist in February 2020 reported "a bull run over the past 12 months, rising by 52%" on the combined shares of the five GAFAM firms. These five big tech firms, worth $5.6 trillion make up almost a fifth of the value of the S&P 500 index of US shares. Just only the increase in the firms' combined value, of almost $2 trillion, is reported to be "roughly equivalent to Germany's entire stockmarket". The magazine stated this to be "an alarming concentration of economic and political power." (The Economist, 2020). At present, it is unclear whether this trend of big tech firms' supersized valuations will continue or whether investors have stoked a speculative bubble. Even though it seems as if the tech giants emerged unscathed by the Covid-19 pandemic, it is probable that the economic turndown during and after the Covid-19 crisis will negatively affect their revenues from advertisement.

A second source of platform power derives from the number of users: 2.9 billion monthly users makes Facebook the largest social app. With 1.6 billion users WhatsApp is the most popular messenger service. And with more than 1 billion users Instagram is the largest photo exchange site (Statista, 2020a). The number of people using one of the former services is larger than the population of almost any nation state. The social networks with the largest extensions, WhatsApp, Facebook Messenger, and Instagram are all owned by Facebook. This large audience makes the designers of these platforms and the algorithms they produce not only highly powerful but also puts a lot of responsibility on them. The question is how to program the algorithms and how to rank the content. It must be emphasized that these software design decisions determine what you see or you don't see on your timeline, what is ranked first on a search engine, which priority is given to the products offered and which videos are proposed to be watched.

The scope of users translates as an audience for advertisers, as this is how these platforms are making their revenue. On most of these platforms, users get services for free, but "pay" with their personal data, often without their own knowledge. Therefore, it is often said, "if you don't pay for the product, you are the product being sold". These more or less hidden data extracting and profiling practices have raised concerns about violations of privacy and clashes with human rights and civil liberties (EDPS, 2014, 2015; Zuboff, 2019). Platforms create detailed profiles of their users, their preferences, inclinations and weaknesses, to be exploited for targeted ads by advertisers. The platforms

also exchange profile information data with commercial data brokers like Axciom and Oracle. Datasets given to third parties include for instance credit worthiness, taste preferences but also most sensitive health issues such as chronic diseases, tabacco, alcohol and drug (ab)use, or pregnancy and abortion issues (Christl, 2017).

A third source of power is the market dominance in smart phones engines and search engines. In December 2019, Android maintained its position as the leading mobile operating system worldwide, controlling the mobile OS market with a 74 percent share. Google Android and Apple iOS jointly possess almost 99 percent of the global market share (Statista 2020b). The Android smartphone operating system has a market share of two thirds (64%) both in the EU and in the US, whereas Apple's iOS has a 33% market share. In Latin America, the situation is even more pronounced: Google's Android operating engine dominates the market in Mexico with 86% of all cellphones, whereas Apple's iOS has a 14 percent market share. With respect to search engines, Google / Alphabet is dominating the European market even more strongly than in the US. Google as a search engine dominates 90 percent of the search market in the EU and 76 percent in the US. Both systems are crucial for the infrastructure of the internet (Statcounter Global Stats, 2020).

A fourth source of power is the acquisition of smaller players who could become rivals or have developed innovative technologies. Major acquisitions by digital platform companies include Facebook's acquisition of WhatsApp, Instagram and Oculus. Alphabet (Google) and Microsoft have invested in telecommunications equipment, Microsoft has taken over of LinkedIn, Skype and Nokia. Google has not only acquired Motorola but also the video platform Youtube, the advertising company Doubleklick and the smart home firm Nest (Statista 2020a). Major platforms have also made other large acquisitions in the retail industry, advertising and marketing industry and in non-residential real estate (UNCTAD 2019, p. xvii). Digital platforms heavily invest and spread also on to other sectors, such as transport, health, education, and media (van Dijck, Poell & de Waal, 2018; Zuazo, 2018).

To sum up on the US platforms, their market value, a giant user base, market dominance and high revenues from the advertisement market and large acquisition power translates in economic and geopolitical power in the western world. Sophisticated tax evasion schemes and extremely high revenues allow these companies also the power to lobby governments and to pay lawyers for strategic litigation cases (Schneider, 2018, p. 145f).

The US federal state as yet does hardly interfere and regulate. On the contrary, it has demonstrated desires to use the data collected by these private entities for its own political purposes. Even though president Trump seems to have some personal quarrels with some of the internet platform's top brass, such as Amazon's Jeff Bezos, the US economy profits heavily from the dominance of its platforms in large parts of the world. As has been revealed by the Snowden files, bulk data collected and processed by GAFAM are intercepted by the NSA and used not only to combat terrorism but also for economic espionage and gains in international diplomacy (Snowden, 2019; Schneier, 2015; Lyon, 2014; Greenwald, 2014).

Julie Cohen has argued that in the contemporary US "informational capitalism" it is not a political regulation which is taming platforms' power but it are the platforms themselves who are reshaping

legal institutions, gradually "optimizing" them towards their own interests (Cohen, 2017 and 2019). Only recently, due to stronger discussion about a "techlash", competition law inquiries have started. In September 2019, 50 attorney generals from US and territories launched a joint review into Google's advertising and search practices to assess whether it has abused its dominance to stifle competition. Akin to that, the US Department of Justice launched a wide-ranging review of GAFA companies. And the Federal Trade Commission (FTC) is investigating possible antitrust violations (Giles, 2019). For the upcoming 2020 US elections, two of the candidates for the Democratic party's presidential nomination, Elisabeth Warren and Bernie Sanders, had even called upon "Breaking up Big Tech". These calls resonated with some constituents but did not have a decisive impact on the Democratic party's final nomination which chose Joe Biden running for president.

6. The European Union's "Third Way" – a Quest for Digital Sovereignty

Europe and its platforms are dwarfed by the digital giants in the US and China and lagging behind in technical advances. And it is not only Europe but also the rest of the world, as it seems. So, are Europe, Canada, Japan, Australia, New Zealand and the Global South squeezed between the US and China and will only be able to choose between those two governance models to compete in the international digital competitive race? Europe is confronted with technology leadership by the US and China. Some policy-makers have even gone so far to speak of a new "Cold War" in digital predominance, referring in particular to the Huawei/ 5G case, in which the world seems to have only the choice between an US-American and a Chinese tech sphere (Bendiek/ Schallbruch 2019). This struggle for supremacy is not only related to technical standards but also to "geopolitical power projection through 'technopolitical spheres of influence'" in which the development and usage of data and technologies thus "become part of a systemic competition" (Lippert & Perthes 2020: 2). The German foreign minister Heiko Maas in a 2019 speech referred to digital technological leadership as "a super power factor, a game changer", affecting all other power factors: "Whoever has the best access to data controls the crucial raw material for machine learning. Those who set standards and own patents will hold the key to the competition between the major powers in the future. If there are additional breakthroughs, for example in computing capacity, the balance of power will shift again" (Maas 2019). Thus, European perceptions and attitudes are expressed in quotes such as that by Arnaud Montebourg, the (former) French Economy Minister who said in 2014: "We don't want to be a digital colony of US Internet giants. What's at stake is our sovereignty itself" (Stone & Silver 2015).

As a response, Europe has proclaimed a "Third Way", a third, regulatory model of the governance of the digital transformation. "Digital sovereignty" has become a new keyword, not only for individual informational self-determination but also for states. Both the French President Emmanuel Macron and the German Chancellor Angela Merkel have referred to this term. It signifies that Europe should follow a path independent of both the US and China. Europe's quest is to be capable of self-determination in the digital space, empowered to act and decide for itself. In a report for the French Parlament, Cédric Villani emphasized that the European AI strategy must be significantly oriented towards the goal of sovereignty (2018, p. 8,19,22,31,37, 47, 51, 106, 123). This is not only a matter of improving the competitiveness of the European economy, as the Data Ethics Commission

(2019) of the German Federal Government has stressed in its expert report. Rather, the digital strategy must be based on key ethical and legal principles, such as human dignity, self-determination, privacy, security, democracy, justice, solidarity and sustainability (Data Ethics Commission 2019: 43-48). In doing so, investment, research promotion and regulation shall be interrelated to assert "that the defining feature of European technologies be their consistent alignment with European values and fundamental rights" (Data Ethics Commission, 2019, p. 227). Therefore, the European idea of a digital society is "centred on the individual and the common good, at the same time. New technologies must, therefore, also be judged by whether they are conducive to democracy and whether their use respects human rights. Regulatory measures can make a decisive contribution to balancing the opportunities and risks of a technology with the interests of companies, consumers, the state and civil society" (Bendiek & Schallbruch 2019, p. 3). In this vein, a European Data Space initiative called GAIA-X was started in the end of 2019 which is supposed to become akin to a European data cloud, imagined as federated data infrastructure which aims at creating a European data and AI driven ecosystem and ensuring data sovereignty. Another recent project is the Open Search Foundation, a network of research centers which wants to establish a European, non-commercial search engine (Braun, 2020).

In the following, I will present the most important European regulatory initiatives in order to strengthen both privacy, fundamental rights, and international competitiveness. A core element is the EU General Data Protection Regulation (2018). But Europe also advances economic and ethical regulations with the EU Digital Single Market Agenda, antitrust inquiries and the trustworthy AI ethics initiative.

6.1. The EU's General Data Protection Regulation (GDPR)

The first field of the EU's regulatory intervention is data protection policy. The General Data Protection Regulation (GDPR, EU Regulation (EU) 2016/679) took effect from 25 May 2018 after a two year transition period. GDPR is not the first privacy regulation of the EU, as in 1995 already an EU Data Protection Directive (95/46/EC) had entered into force which was replaced by GDPR in 2016. The GDPR confirms and emphasizes principles such as informed consent of the data subject to the data collection and individual's right to transparent information, correction and deletion, as well as data minimization, purpose limitation of data collection and data safety to be adhered to by the data processors. Europe has also introduced the "right to be forgotten" which means a right of citizens to demand from platforms like the Google search engine to de-link outdated possibly stigmatizing or wrong information on them, causing reputational or defamatory harm. Data portability and interoperability of data is to be incentivized and fostered, demands the GDPR (EU, 2016).

Data protection authorities have gained enhanced enforcement powers. One of the sticks assigned to them via GDPR is the stricter framework of sanctions: Private companies violating the rules can be punished with a maximum fine of 20 million euros or up to four per cent of total worldwide annual turnover (whichever is higher) (Art. 83 (5) GDPR). Not least because of these potentially very high fines, GDPR is regarded as a global game changer, because this can make the executives of internationally active companies pay attention to data protection. To give an idea of the amount

of possible penalty payments, four percent of worldwide turnover revenues for each of the five GAFAM companies could amount to possible penalties of several billion US-dollars. This potentially high fine – of which is uncertain whether it will ever be imposed – may work both as a carrot and a stick to incite GDPR compliance.

Compared with the US and China, the EU has the strongest data protection regime worldwide. And its reach has extended beyond Europe. The EU has codified the so called market location principle (lex loci solutionis): This means, EU data protection law also applies to companies based outside the EU with activity in the EU market, whenever data of EU citizens are processed or digital products offered in the EU. Moreover, GDPR principles are also enshrined into international trade agreements (Bendiek & Römer 2019). Both protect EU's citizens, the effect, however, goes beyond this, as it becomes international standard setting. This is often called "California effect" – or nowadays it has been coined "Brussels effect". The term "California effect" was introduced by David Vogel (1995) and refers to the strengthening of consumer, environmental and other standards towards the direction of political jurisdictions with stricter regulation. The name originally derived from new environmental regulations in California in the 1980s, proscribing rigid standards for car emissions. In order not to lose the (large) California market, the US automakers did not produce cars with two different standards, but generalized the stricter standards for the entire US market and a little later for the rest of the world. The same applies today to the comparatively strict European data protection law. For global companies like Google, Facebook or Amazon, leaving the lucrative European market is not an option. At the same time, it would be an extraordinary burden to them to organize their business according to two or more different sets of legal regulations. The inherent mobility of data flow requires de facto transnational regulation. For the time being, it seems to be far more efficient to implement the stricter European regulations on a global scale. This is called the "Brussels effect" – companies offering services and products in the EU have to comply with GDPR, and market participants in other jurisdictions join in. So all in all, the GDPR has extraterritorial effects and has become sort of a global baseline (Bendiek & Römer 2019; UNCTAD 2019, p. 135).

More generally, data protection legislation has become an international success story: To date, 120 countries have adopted comprehensive data protection and privacy laws to protect personal data held by private and public bodies. Another almost 40 countries and jurisdictions have pending bills or initiatives (Banisar, 2018). The US is one of the few countries which does not have a nationationwide, federal comprehensive data protection legislation. However, at least the California Consumer Privacy Act (CCPA), "a light version" of GDPR, took effect on January 1, 2020, and the states Nevada, New York, Texas, and Washington consider passing a similar bill.

6.2. Further EU Regulations: Tax and Competition Policy and AI Ethics

As it would go beyond the scope of this paper to provide details of further EU regulations, I will only shortly refer to some other measures taken or envisioned in Europe to tame the tech platform titans. A second field of regulatory intervention is tax policy. Europe wants to counter tax evasion strategies. The GAFAM digital platforms hardly pay any taxes outside of the US. Apple pays 1%, Google 3%, Amazon 5% on taxes abroad. The European Commission ordered Apple to pay €13 billion after it ruled that Ireland broke state aid laws: Apple paid a maximum tax rate of just 1%. In

2014, this was even less – Apple paid only 0.005% (which is €500 on €100.000 revenue). This happened although the usual corporation tax rate in Ireland is already very low, at only 12.5 percent (Schneider, 2018 p. 162-164). Further debates focus on a "digital tax", and there is also an OECD initiative about a global "minimum tax rate" for corporations. Spain announced in February 2020 that it will impose a digital tax of three per cent on the turnover of Google and other large platforms in the 2020s. France had also introduced such a digital tax in 2019 but withdrew it quickly because of US trade retaliation measures (Bayona, 2020).

A third field of regulatory intervention is competition policy. As mentioned above, this has also become an issue in the US. In Europe, policy interventions sound less radical than "breaking up big tech" but are possibly more stringent. The European Commission already imposed high punishments on Google in three cases for its abuse of market dominance. In the Google Shopping Case, Google was found to give its own comparison shopping service prominent placement and to demote rival services. Therefore, the Commission imposed a fine of €2.24 billion. In the Google Android Case, the Commission charged Google €4.3 billion for abusing its dominant Android mobile operating system by shutting down rivals. In the Google AdSense Case, Google was found to reduce choice by preventing third-party websites from sourcing search ads from Google's competitors and thus a penalty payment of €1.49 billion was inflicted (Schneider, 2018, p. 156-158). Further European investigations and regulatory initiatives relate to the data economy in which data is seen as a currency in the digital world and which aim at forcing large platforms to open their data troves for more or less mandatory data sharing (Crémer, de Montjoye & Schweitzer, 2019).

A fourth field of EU's regulatory intervention are rules for trustworthy Artificial Intelligence. In February 2020, the European Commission (2020) published a respective White Paper for further consultation. One of the proposals is to categorize risks associated with applications of AI. High risk applications such as face recognition in public spaces or use of AI in order to select candidates for job employment may in the future either be banned or put under very strict regulatory control. The White Paper is based on "Ethics Guidelines for Trustworthy AI", a report published by the European Commission's High-Level Expert Group on AI (2019). According to this, ethical design principles for AI should be incorporated in the software and in the usage of AI. Similarly, both the French Report by Cedric Villani (2018) and the German Data Ethics Committee (DEK 2019) already cited above emphasize in their expert recommendations for their respective governments that the European AI strategy had to be significantly oriented towards human-centric and value oriented AI. It remains to be monitored whether and how such noble principles on paper will be put into practice.

To sum up, Europe pursues a Third Way, as a form of self-assertion. Aimed at "digital sovereignty", it offers a regulatory model for the digital transformation which tries to enhance its international competitiveness and to provide safe data protection as well as protect fundamental rights for its citizens. Europe wants to become a trustworthy source of AI and digital services and thus become a reference model for other countries.

7. Which Digital Transformation Model in Mexico?

The digital transformation strategy is not only an issue in the industrialized world but also in the Global South, in particular for middle-income and newly industrialized countries. The example of Mexico as a rising power will provide some insights into how these states encounter the digital transformation, an area which to date is rather under represented and under researched.[1]

Mexico has a population of 131.5 million inhabitants, and has more than 110.7 million mobile phone subscribers. Two thirds of the Mexican population (88 million people), use the internet and almost all of them also use social media. On average, every Mexican spends eight hours per day in the digital world, of which more than three hours on social media, almost three hours on TV (streamed and broadcasted) and 1,5 hours on streamed music. For Mexico, the preferences in social media are similar to many other countries. In 2019, YouTube was the social network with most active user rates in Mexico (97%), followed by Facebook with 93%, then Instagram with 64%, Twitter with 57%, Pinterest with 40%, LinkedIn with 33% and Snapchat with 31%. Thus, Facebook alone reaches 86 million Mexicans (Yi Min Shum, 2020). Mexico, similar to European countries, does not have a national large digital platform with substantial market value or economic scope.

Throughout Mexico, there are numerous organizations and institutions studying AI, its applications, working on training talent and developing technological solutions for the market. From an academic perspective, the Mexican Society of Artificial Intelligence (SMIA) has existed for thirty years as a scientific community that seeks to promote the dissemination of research projects, teaching and linking the discipline. It is accompanied by the Mexican Academy of Computing (Amexcomp), which since 2015 has become a central reference for computer science and technology in Mexico. Communities of practice are for instance The Data Pub, which focuses on education and market awareness of Data Science and Machine Learning. Governmental publications include the report "Artificial Intelligence and Economic Growth: Opportunities and Challenges for Mexico", prepared by the Center for the Implementation of Public Policies for Equity and Growth (Cippec), which indicates that the accelerated adoption of AI-associated technologies could translate into an additional sustained growth of 1% of GDP overall over the next decade (Gómez Mont & Martínez Pinto, 2020). However, as yet, there is no explicit digital agenda and national AI strategy. The current Mexican government of President Andrés Manuel López Obrador has set the fight against corruption, poverty reduction and the reduction of inequality gaps as its main priorities. However, there are a number of initiatives and also existing legislation which show that Mexico is aware of the

[1] This chapter is based on two months of field research in Mexico-City in February and March 2020, employing the methodology of expert interviews, participatory observation as well as literature and document research. I am very grateful to all the interviewees for having dedicated their time as well as effort, and to the Instituto Mora for its hospitality in providing both space and inspiring discussions. The research is part of the EU-H2020 funded project PRODIGEES ("Promoting Research on Digitalisation in Emerging Powers and Europe towards Sustainable Development") which aims at transnational knowledge sharing on the intersection of digitalization and sustainability.

challenges of the digital transformation and proactively participates in becoming a Latin American reference and in developing perspectives and visions for its own digital model. This also includes awareness and counteraction to threats to democracy and privacy as posed by the digital transformation (Maqueo Ramírez & Barzizza Vignau, 2019).

At present, the Mexican model can be categorized as a hybrid model: In business issues, Mexico is very much aligned with the US, when it comes to data protection, its orientation is towards Europe.

Many Latin American countries have taken up data protection and privacy as a constitutional right and have passed respective data protection laws. In Mexico, privacy and data protection is protected in Article 16 of the Mexican Constitution. Privacy legislation is divided in two separate laws: The Mexican data protection law for the private sector dates from 2010 (Federal Law for Personal Information in Possession of Individuals / Ley Federal de Protección de Datos Personales en Posesión de Particulares or LFPDPPP). The data protection law for the public sector was passed in 2017 (Ley General de Protección de Datos en Posesión de Sujetos Obligados - General Law on the Protection of Data in the Possession of Obligated Subjects or LGPDPPSO). Citizen's rights to data protection rules for both sectors are codified as "ARCO" rules – rights to access, rectification, cancelation and opposition. In particular, the 2017 data protection law for the public sector has high standards which are similar to the EU's law and indeed were modeled according to the GDPR at the time of the EU's law being under preparation. The public sector law has very modern clauses, such as privacy by design and privacy by default and also demands techniques for the portability and interoperability of data.

Thus, Mexico's data protection legislation has high standards and it is advanced. Its weakness lies as yet in its ambit, as the most modern law is only valid for the public sector. The Mexican law for the private sector does not have an extraterritorial clause as has the GDPR and also lacks some other provisions. However, at present, there are seven reform initiatives in the Mexican Congress and another one in the Chamber of Deputies to reform the law for the private sector. Among them are proposals to establish a right to be forgotten, portability obligations for the private sector, opt-in clauses for informed consent and clauses on privacy by design and privacy by default.

What might be favorable for a stricter regulation also for the private sector is Mexico's ratification of Convention 108 of the Council of Europe in 2018. At present, this Convention 108 is the only binding international convention on data protection and it is open also for non-members of the Council of Europe. Mexico's Senate of the Republic has also signaled its willingness to reform the ley to be able to ratify Convention 108plus, which is the modernized version of this Convention and includes new principles and rules for the age of Big Data and AI. Mexico's accession to the Convention 108plus, however, will require previous changes in its national law. Therefore, this Convention may become a lever for improving data protection and fundamental rights for Mexican citizens. An important event in this regard was the International Forum on Personal Data Protection in Mexico-City on 30-31 January 2020. Another impetus will be the International Computers, Privacy and Data Protection Conference CPDP to be hosted in October 2020 in Mexico-City which will create more public attention and awareness among policy-makers.

As already mentioned, Mexico does not yet have an extraterritorial clause in its law. Therefore, platforms like GAFAM but also Uber and other companies operating in Mexico always argue their legal seat to be in California or in the Netherlands, so that they cannot be subjected to Mexican data protection law. Even Mexican domestic firms have threatened to shift their data centers to US territory, should data protection rules be enforced too rigidly. Such a market location clause as present in the GDPR (see above) could possibly be introduced in the upcoming legal amendment but the new free trade agreement USMCA might contravene such attempts, as its regulations on data localization prohibit the use of local computer facilities or the establishment of such facilities as a condition for doing business in the country. To date, on the one hand, both domestic and foreign companies engage in forum shopping for the least rigid privacy standards. On the other hand, however, Mexican firms selling to the European market have to comply with GDPR rules, which puts pressure upon them to adjust their respective standards and internal data handling rules (– the "Brussels effect").

With the INAI (Instituto Nacional de Transparencia, Acceso a la Información y Protección de Datos Personales), Mexico has a strong, autonomous organism for data protection which also has sanctioning power. However, compliance with and enforcement of Mexican data protection laws is facing a number of challenges. Among them, especially in the private sector, are the lack of knowledge about the legal implications of the processing of information, a weak data protection culture, little sensitivity in the case of abuse of information and ignorance of the legal mechanisms to enforce the privacy rights (Mendoza Enriquez 2018, p. 289).

As yet, there is not a strong public discourse about digital issues in Mexico but the civil societies forces are awakening, among them hackers, data scientists and human rights organizations. Mexico has several non-governmental organizations which defend digital rights from the civil society's perspective, like R3D (Network for the defense of digital rights), SocialTIC promoting digital technology for social goals and Articulo 19, defending freedom of expression and right to information. Current campaigns for net neutrality and open data create more awareness and public mobilization about such digital issues. Mexico is also part of the Ibero-American Data Protection Observatory and the respective Latin American network of mostly professional data protection lawyers. Hence, with respect to data protection, Mexico seems to be more inclined to take part in the European search for a "Third Way".

With respect to competition law, Mexico is taking a more cautious approach. The Mexican Federal Economic Competition Commission COFECE is observing the international discussion very closely and is up to date with international debates (COFECE, 2018 and 2020). However, it does not want to inhibit market entries for new start-up companies. It also does not want to deter companies from innovating and its commissioners think that some disruptive forces can well be favorable for some sectors, such as for instance fintechs for the oligopolistic banking sector.

To date, the first case in which Mexico's competition authority COFECE prohibited an acquisition was with Walmart which was blocked from buying Cornershop, a company providing an App for home-delivery services. According to COFECE, this would have given too much power to Walmart which already possesses market dominance in Mexico. In other cases, mergers were authorized by COFECE (see cases in COFECE 2020, p. 9-10).

To sum up, Mexico has an AI and digital transformation strategy but its concrete agenda seems to be still in its infancy. Mexico doesn't have a market huge enough to be capable of exercising credible threat potential to large digital platforms, as does Europe whose huge domestic market is also politically integrated. In contrast, the 2020 United States-Mexico-Canada Agreement (USMCA) is hardly linked to political regulations related for instance to data protection issues. Therefore, Mexico has a smaller carrot and stick potential to deploy than European countries when it comes to platform regulation. Moreover, large companies can easily evade Mexican data protection laws. The proximity of the USA as a neighbor and main trading partner also suggests that the economy is leaning and aligning itself accordingly. Hence, the Mexican model can be characterized as a hybrid model between the US and the European model, still seeking for its own path in digital transformation and AI strategy.

8. Conclusions

We live in a time in which a struggle for digital supremacy is fought with increasing harshness. Technological races and platform economics have created power asymmetries, new geostrategic tensions and threats to democracy on an international scale. The four key elements of democracy indicated in the beginning are challenged by the following, a) free and fair elections are threatened by disinformation campaigns and manipulative use of social media, b) participation of citizens is enabled but also potentially distorted by social networks and the decline of quality media, c) human rights and privacy are often intruded and d) digital platforms try to escape the (national) rule of law by forum shopping and other forms of escaping regulation. The dominance of big digital platforms, their extraction and control of data, as well as their capacity to create and capture the ensuing value, tend to further accentuate consolidation and concentration rather than reduce inequalities between and within countries.

In the context of international competitive races, these governance models have emerged:

- The first, China's authoritarian surveillance state model, sees technology as a means of control, of maintaining and gaining power. Mass surveillance and censorship, including the social scoring system are exercised on the domestic level, while at the same time expanding technological power in the external arena. Technology thus is at risk of becoming a totalitarian and hegemonic instrument.
- The second, the US libertarian market model, rejects almost any regulation as an encroachment on the freedom of the market, the right to open speech and to the autonomy and self-regulation of the digital economic sphere. Network effects and other mechanisms work in favor of dominance and oligopolization. Moreover, it is those who develop and enact disruptive digital technologies who draw the line at what is possible. Facts created in the digital economic thus create digital norms, what is technologically possible is perceived as allowed.
- The third model is the European regulatory model which wants to foster the positive potential of digitalization, aims at catching up in digital competitiveness but also cares about maintaining its social contract. The EU's Third Way of a quest for digital sovereignty aims at defending the social welfare state, democracy, the market system and liberal values and has emerged as a "regulatory superpower" in the digital terrain. GDPR, anti-trust law, AI ethics

and the fight against international tax evasion have shown teeth and become role models for other countries to foster innovative international governance approaches.

- The fourth, Mexican model is a hybrid model which is aligned with US business standards and practices but takes Europe as a reference model in data protection. In competition law, the Mexican approach is cautious and pragmatic. Mexico's academic digital community and legal system have high standards but implementation of the norms leaves room for improvement.

Whether digital platforms, in particular the GAFAM and Tencent/Alibaba tech titans and Artificial Intelligence can and will be democratically tamed by regulations, is a challenge for the future. That they should be so, is a normative impetus for the digital transformation. This task is to be encountered with imagination, human intelligence and human agency. In scholarly terms, it is important to watch out for further paths and models, thus contributing to the visibility of the varieties of digital capitalism, in which alternatives are certainly possible.

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The Digital Transformation of Italy's Public Sector: Government Cannot Be Left Behind!

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Abstract: Digital transformation is a big challenge for governments, as the speed of transformative technologies is very fast while, governments are generally slow. New ways of 'being government' need to be found to increase the pace of policy response to emerging challenges. The greatest danger of falling behind is a declining trust in policy makers, and the possible emergence of extreme policy reactions which undermine innovation. Governments should transform themselves, if they do not wish to become progressively irrelevant. What is a digital transformation?

Keywords: Digital transformation, policy making, innovation, digital transformation

1. Digital Transformation

Digital transformation is a big challenge for governments, as the speed of transformative technologies is very fast while governments are generally slow. New ways of 'being government' need to be found to increase the pace of policy response to emerging challenges. The greatest danger of falling behind is a declining trust in policy makers, and the possible emergence of extreme policy reactions which undermine innovation. Governments should transform themselves, if they do not wish to become progressively irrelevant.

What is a digital government transformation? According to the broadest definition, it is the process of implementing digital government while transforming the organisational structures and the way services are provided; it relies on the use and reuse of data analytics to simplify transactions for citizens, businesses, government agencies; it creates information from data to support and enhance decision making[1].

In the international rankings, Italy does not fare well in terms of digital government. Italy has tried a range of options to digitally transform the public sector. Throughout the years, different governments have introduced different types of governance but, unfortunately, the situation has not improved.

[1] *Going Digital: Shaping Policies, Improving Lives* OECD: Paris (2019).

Most recently, however; there have been signs of change. The country is experiencing a new awareness; the new challenges that the digital transition is generating are becoming a policy priority. Continuity and consistency in the country's digital strategy are reasons to believe that the digital transformation of the public sector may be on the right track at last.

September 2016-December 2019: The High Commissioner for the Digital Agenda and the Digital Transformation Team

The Italian Government wished to accelerate the implementation of the digital agenda and re-launch e-government projects. On September 16, 2016 the Italian Government's High Commissioner for the Digital Agenda,Diego Piacentini,was appointed by a decree of the President of the Council of Ministers to lead and relaunch the implementation of the "Digital Agenda".

The same decree introduced the 'Digital Transformation Team' under the direction and supervision of the same commissioner. The team is composed of experts in technology, law, international relations, public administration and communication. The mandate of the first commissioner expired at the end of Sept. 2018. A new commissioner, Luca Attias,was appointed, whose mandate, together with the team's, expired at the end of Dec. 2019.

As an organisation within the Presidency of the Council of Ministers, the team was modelled on the United States Digital Service and the UK Government Digital Service. The political endorsement by the President of the Council of Ministers and a strong and centralised governance enabled the team to work expeditiously and free from excessive constraints. The commissioner had ample power in coordinating and setting the rules for the PA digital projects. Also, he was entrusted with sufficient resources for the execution. The commissioner had a dedicated budget that allowed recruitment of the best technical people for the team. The team had access to national and European funds to launch and/or re-launch projects.

The team's mission was that of making public services for citizens and businesses easily accessible, via a mobile first approach, with reliable, scalable and fault tolerant architectures, based on clearly defined APIs. Furthermore, the team supported the central and local government administrations in making the best and most data driven decisions, thanks to the adoption of big data and machine learning technologies.

The team coordinated the different stakeholders (government, public administrations) to manage existing and future digital programs in an integrated manner with an agile methodology and an open data approach, and identified new digital and technology transformation initiatives.

Furthermore, it created a community of developers and designers and a shared a wealth of tools and services which could contribute to the development of application programming interfaces and digital services.

The "Three-Year Plan for Digital Transformation in Public Administration" and the "EU eGovernment Action Plan 2016-2020"

In order to outline their digital transformation plan, the Commissioner and the team needed a framework, which was provided by the EU eGovernment Action Plan 2016-2020 and which is one of the pillars of the EU Digital Single Market.

The *Three-Year Plan for Digital Transformation in Public Administration*[2] guides the digital transformation of the Italian Public Administration and is consistent with the EU's objectives and the OECD policy recommendations. It is the reference document for digital policies, and identifies, for a specific time horizon, the principle objectives and the most innovative technological solutions necessary to accompany and accelerate the pace of Italy's digital development. The Plan's first release is dated March 2017; the Plan is updated yearly. With the Three Year Plan, Italy has developed a shared vision and goals, since the plan provides for a strong national/local level collaboration, and requires that local administrations draw up strategic plans, consistent with the European and national vision.

The country's operating system

The Team has introduced a new model for digitising the public administration sector to build the "operating system" of the country as a series of building blocks, upon which digital services for citizens and enterprises are developed. It helps to reorganise IT projects to provide citizens with a richer service experience (eg. for taxpayers, transportation, digital documents/dematerialisation).

The Team relaunched some projects that were stuck: ANPR (National Resident Population Register), PagoPA (a central node of payments for all public administrations, SPID (Digital identity for easy access to digital public services) and launched new projects such as the API ecosystem (an API management system, standards and guidelines to allow the public administration to communicate via API), Designers Italia (the open design platform for the community of designers of digital public services), Developers Italia (the open development platform for the community of developers of digital public services), the project "IO" (a simpler way for central and local public administrations to communicate with citizens, notarise documents and remember deadlines), the Data & Analytics Framework (DAF) and open data.

The Team provides building blocks e.g. "enabling platforms" like SPID, PagoPA and ANPR to help third parties create better services, as these components are meant to be reused by local agencies or the public sector. For example, the "IO" project allows services to communicate with citizens based on his/her contact preferences. PagoPA enables users to pay fees or taxes via a wallet of payment methods. SPID leverages certified companies to act as identity providers for authenticating citizens on government platforms.[3]

[2] https://teamdigitale.governo.it/en/

[3] For a complete overview of the projects see https://teamdigitale.governo.it/en/report.htm; https://teamdigitale.governo.it/assets/pdf/Report_DigitalTransformationTeam_09_30_2018.pdf

2. Looking at the Future

On the expiration of his mandate (Sept. 2018), the first High Commissioner Piacentini published a white paper which, besides offering a deep analysis of the accomplishments, the failures and what was left to be done, provides *specific recommendations*[4] to foster and hasten the transformation of the Italian public sector into an actual digital government.

Main Recommendations

1) Update the Three-year Plan Strategy and Advance the Execution Phases;
2) Continue on the path traced out by the Three-Year Plan for Digital Transformation by completing the implementation of the "operating system" component;
3) Implement the large-scale adoption of the tools needed for the development, design, collaboration and sharing partners: Developers Italia and Designers Italia, Docs Italia, Forum Italia and the National Digital Data Platform;
4) Complete the development and deployment of the project IO to allow citizens to communicate digitally with the entire public administration;
5) Create a permanent body that sits within a Department of the Presidency of the Council of Ministers with a strong mandate and a significant spending budget, in order to guide and supervise the Digital Transformation of the Public Administration;
6) Create the role of Chief Technology Officer within each Ministry and main body of the central Public Administrations; the CTOs will be in charge of the digital transformation and the implementation of the Three-Year Plan;
7) Invest in central in-house and in public bodies that have a critical role to play in the development of enabling technologies and in the provision of major public services;
8) Create programs to attract talented young graduates with modern technological skills to the PA such as a "digital civil service," to work closely with high-level administration executives on digital transformation projects;
9) Implement initiatives for the "digital" training of PA executives and officials by introducing specific mandatory courses, focusing on digital skills, for all public employees;
10) Involve students through work experience programs with the dual objective of bringing them closer to the world of public administration and using them to explain digital services to citizens.

And… Beyond

Some of the most significant recommendations were indeed applied.

In particular, art. 8 of Decree Law 135/2018 (Official Journal February 12, 2019) extended the Commissioner structure up to 31/12/2019 (Article 1-bis).

Art. 1-ter provides that from 1 January 2020, in order to ensure the implementation of the objectives of the Italian Digital Agenda, also in line with the Digital Agenda for Europe, the functions,

[4] https://teamdigitale.governo.it/en/future.htm

tasks and powers conferred to the Commissioner (..) are assigned to the President of the Council of Ministers or to the Minister delegate who exercises them through the structures of the Presidency of the Council of Ministers identified by the latter, together with the Ministry of Economy and Finance … (DPCM June 19, 2019).

The decree brings significant innovations in the governance of the digitalisation process, since it assigns to the President of the Council of Ministers the direction and coordination of public sector digital projects, and provides for a new state-owned company, under the supervision of the Presidency of the Council of Ministers, which will implement and manage: pagoPA; the IO Project and the NDPD (National Digital Data Platform Project, formerly known as Data & Analytics framework).

3. A new Governance: the new Minister for technological innovation and Digitization and the new Department of Digital Transformation

The Minister for Technological Innovation and Digitization, Paola Pisano, was appointed on Sept. 5, 2019.

The Minister's portfolio includes the definition of the Government's strategic guidelines, coordination, promotion, guidance, and control over the implementation and use of policy instruments, funds, and resources for the development, dissemination, and use of digital technologies in all sectors.

Furthermore, in order to attract new companies and enhance the innovation ecosystem, the Minister is in charge of researching, disseminating, and promoting access to innovative and emerging technologies. The Minister is also entrusted with the development and fostering of digital skills.

The Minister is working to establish new governance to address all the assigned tasks.

After the formation of its cabinet and the establishment of the Department for Digital Transformation, the Minister has been working on the integration of the Digital Transformation Team with the Department and the establishment of a Taskforce for the coordination of the strategy on digital transformation and innovation, together with the representatives of Ministries, local authorities, stakeholders, and think tanks focused on technological, social and ethical innovation.

The execution phase is right on track and the large-scale deployment of the strategy building blocks is accelerating.[5]

[5] https://innovazione.gov.it/

4. Government in slow motion, still! Big challenges still remain, when it comes to modernising and digitising administrations

Citizen-driven service delivery and policy-making can only be unlocked if public sector operations and decision-making processes are transformed to overcome the legacy of analogue structures and systems, and functional silos become digitally integrated.

The current status of the public digital infrastructure shows the consequence of the lack of agile central coordination. Much has been done in the recent past, but most of the programs are not aligned and many systems and websites were built with outdated technology, insufficient attention to user experience, poor integration and, often, a lack of interoperability.

Italy, like many other countries, is faced with old technological systems that don't talk to each other (are not interoperable) and that have, until today, limited themselves to translating processes created for an analogue bureaucracy. When these processes are digitalised the inefficiencies are not solved, but remain, as digitalisation is not an assemblage of technological projects.

In the last few years, some inefficiencies were addressed but what is missing is a clear execution and the reengineering of processes.

It is not just about solving Italian problems. This type of problem exists everywhere when it comes to public administrations, although at different levels of digital maturity. It exists in the EU, the United States and Australia, as well as in the wider global community.

Furthermore, public administration information systems must connect with each other and speak the same language, so that information can be available whenever and wherever is necessary. All applications should be required to use an application programming interface (API) and work in an integrative, collaborative and secure way, facilitating the use of existing applications upon which to build more powerful and innovative solutions. Only then, citizens will be able to enter their information into the system once and once only.

The limitation in sharing public sector data is another major challenge. Data are at the core of the digitalisation of the public sector; public information is a public good and a precious resource for the country and can be explored and mined to extract value.

As a member of the e-government Action Plan Steering Board, in May 2017 Italy volunteered to launch a survey among MS on public sector data analytics with the objective of 1) initiating the discussion about the potential of big data for public service delivery and better decision-making and 2) identifying new digital and technology transformation initiatives. Very few of the responding countries (13) have started advanced analytics or big data projects, although they all indicate data is important.

The most common difficulties that were pointed out are: data availability; data silos; lack of skills; privacy framework. Some regulatory adjustments are needed to facilitate the exchange of data between PAs. Ironically, the private sector is not bound by the same strict rules as PA are; yet, PAs would use data to offer more efficient and more customised public services.

The potential of public procurement as a driver of innovation in public services has not yet been sufficiently utilised. In the push to develop a structured approach to ICT procurement and investment, governments have established centralised units or bodies in charge of ICT procurement policy; however, too much centralisation should be avoided, otherwise it risksmaking digitization slow, rigid and inefficient. Many current problems depend on how the procurement process is carried out and its effect on the products and services purchased: typical public tenders are designed to contract mostly large vendors, for a period of time of 5-7 years and with budgets of several hundred million euros.

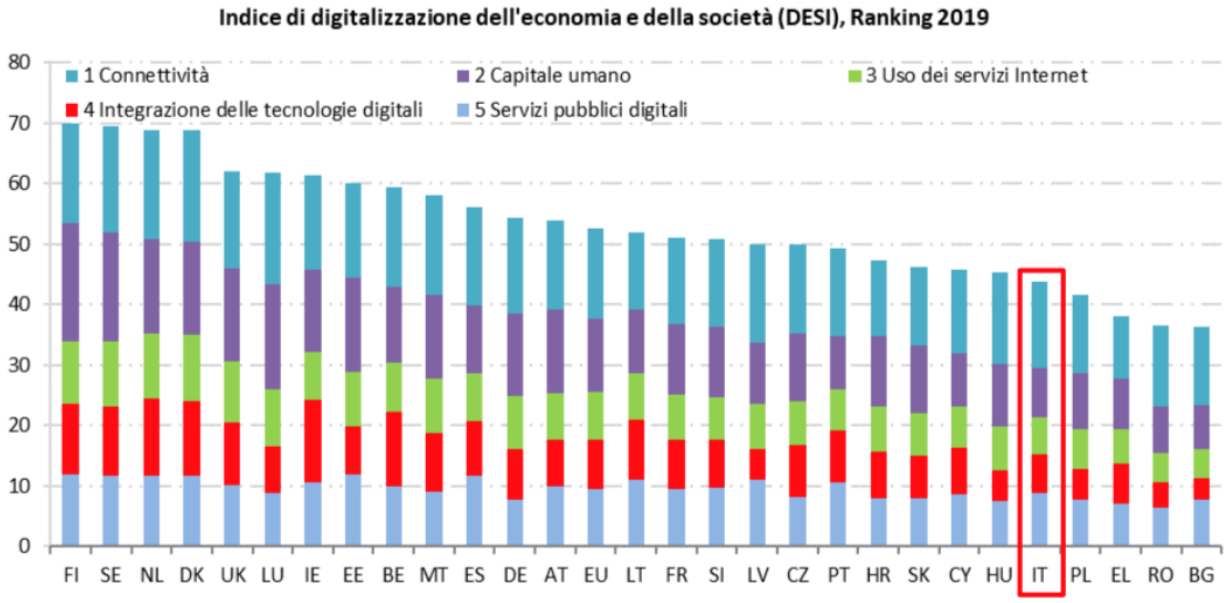
This approach, which privileges an *old waterfall development process*, is not in line with a modern public procurement that should boost instead agile and iterative software development by small and very innovative SMEs and startups.

5. Digital divide and digital services uptake

Italy is characterised by a strong digital divide, and a high level of digital illiteracy.

Digital illiteracy discourages and hampers users to comprehend the full potential of the digital world.

According to the European Commission's *Digital Economy and Society Index (DESI) 2019*[6], Italy ranks 24th out of the 28 EU Member States.



Italy performs relatively well, although still below the EU average, as regards connectivity and availability of digital public services. Online public services and open data are readily available, and

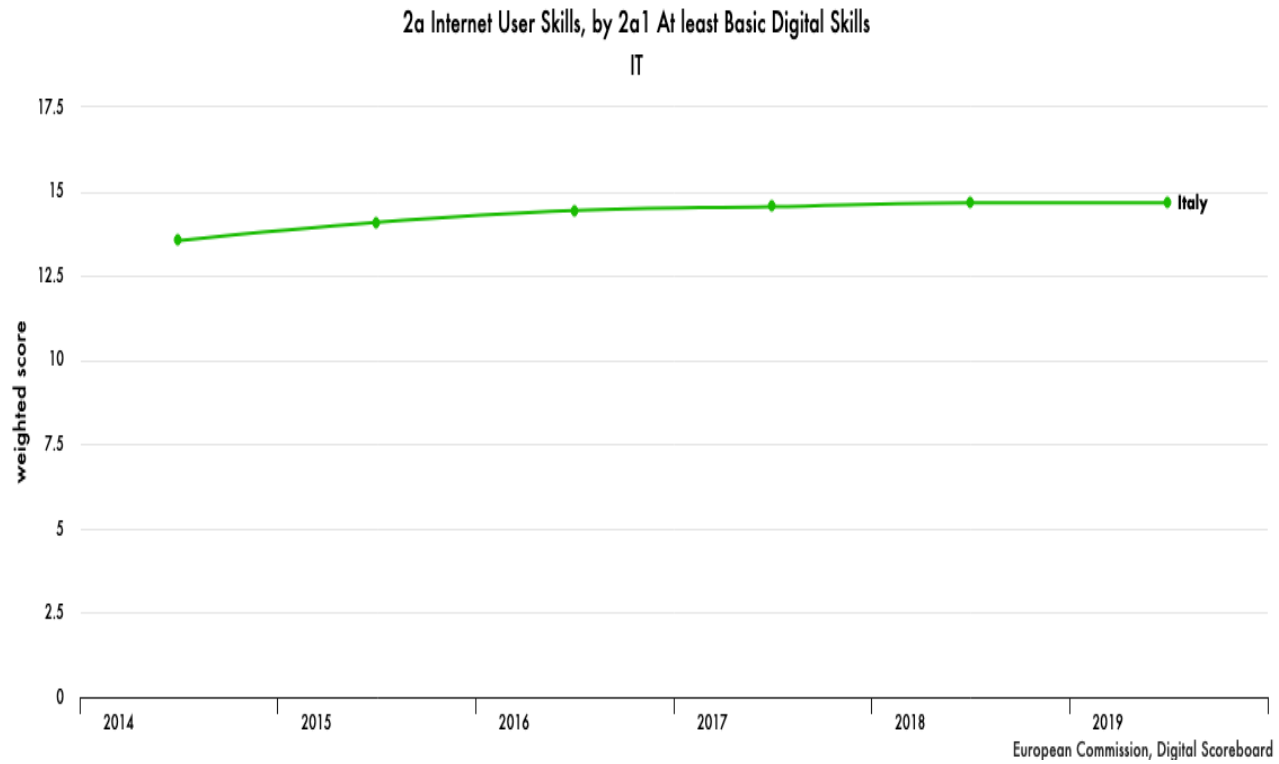
[6] https://ec.europa.eu/digital-single-market/en/desi

take-up of e-health services is good. Fast broadband coverage and take-up are progressing well (although the latter remains below average), while ultrafast connectivity is progressing far more slowly. Italy is advanced in the assignments of 5G spectrum.

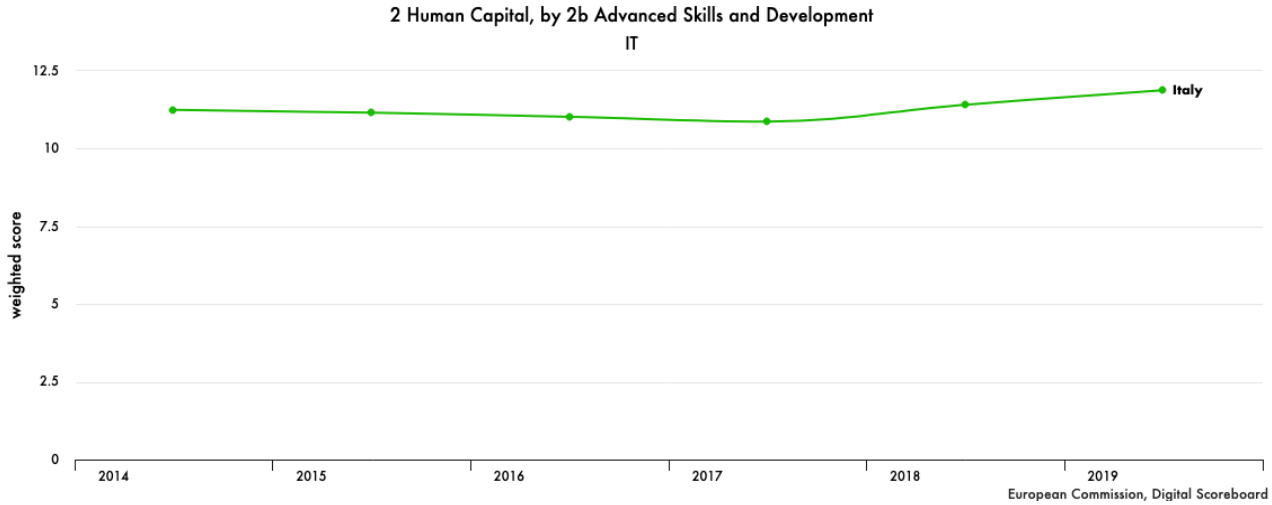
However, three out of ten people are not regular internet users yet, and more than half of the population still lacks basic digital skills. This shortfall in digital skills is also reflected in low use of online services, with which little progress has been made. Low demand also affects supply, with fewer Italian SMEs selling online than their EU peers. However, Italian enterprises score better on the use of electronic information-sharing software and social media.

5.1. Human Capital

Regarding the Human Capital dimension, the *DESI 2019*[7] shows Italy in the 26th position out of 28 member states, confirming that our country is facing a severe lackof digital skills.



[7] https://ec.europa.eu/digital-single-market/en/desi

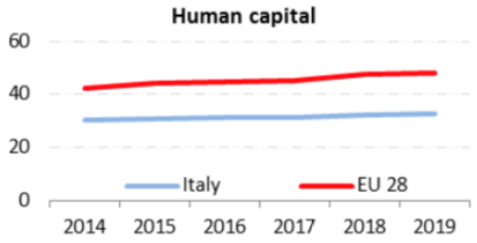


The basic and advanced digital skills levels of Italians are below the EU average. Only 44 % of people aged 16-74 years have basic digital skills (57 % in the EU as a whole). The percentage of ICT specialists has remained stable. ICT specialists still account for a lower proportion of the workforce compared with the EU as a whole (2.6 % compared with an EU average of 3.7 %). When it comes to graduates holding an ICT degree, Italy performs well below the EU average with only 1 % of ICT graduates. Only 1 % of female workers are ICT specialists.

Italy has no national digital skills and jobs coalition, but a wide range of private enterprises, NGOs and public organisations have made 56 pledges for specific measures such as training digital experts, re-skilling and up-skilling the labour force, and equipping people with the digital skills they need for their lives.

Only 92 % of 16-24-year-olds are regular internet users, which puts Italy last in the EU28 (the EU28 average being 97 % of people in this age group).

2 Human capital	Italy		EU
	rank	score	score
DESI 2019	**26**	**32.6**	**48.0**
DESI 2018	25	32.2	47.6
DESI 2017	26	31.1	45.4



	Italy				EU
	DESI 2017	DESI 2018	DESI 2019		DESI 2019
	value	value	value	rank	value
2a1 At least basic digital skills % individuals	**44%** 2016	**NA** 2017	**NA** 2017		**57%** 2017
2a2 Above basic digital skills % individuals	**19%** 2016	**NA** 2017	**NA** 2017		**31%** 2017
2a3 At least basic software skills % individuals	**48%** 2016	**NA** 2017	**NA** 2017		**60%** 2017
2b1 ICT specialists % total employment	**2.5%** 2015	**2.6%** 2016	**2.6%** 2017	***22***	**3.7%** 2017
2b2 Female ICT specialists % female employment	**0.8%** 2015	**0.9%** 2016	**1.0%** 2017	***20***	**1.4%** 2017
2b3 ICT graduates % graduates	**0.9%** 2014	**NA** 2015	**1.0%** 2016	***28***	**3.5%** 2015

5.2. The most affected segments

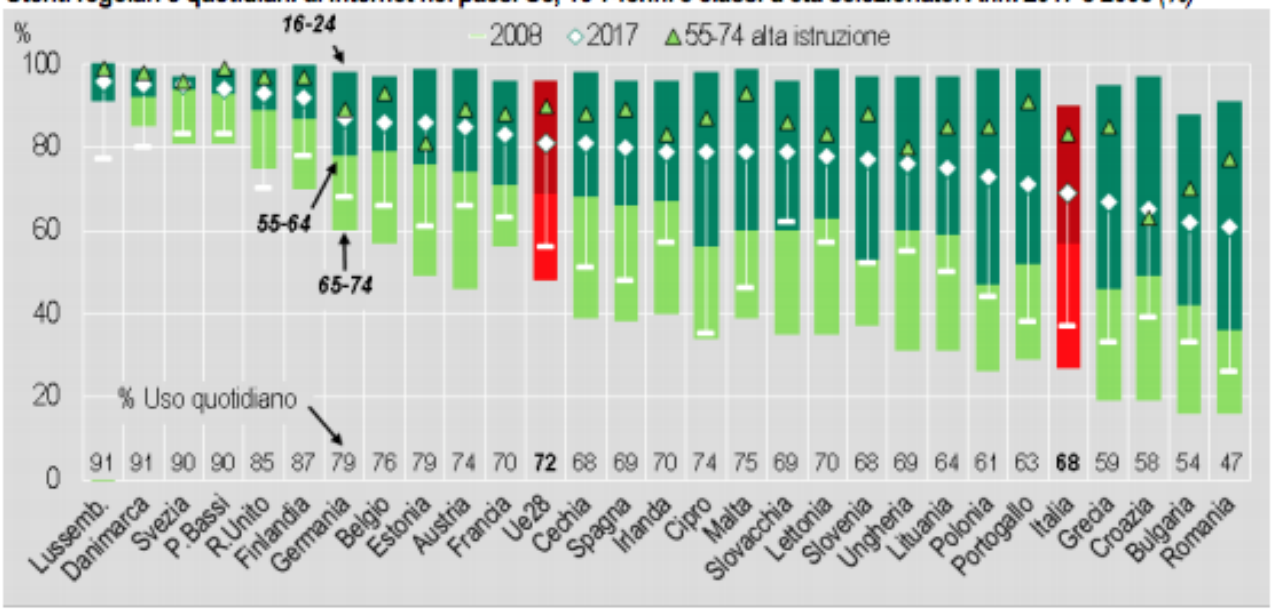
Certain brackets of the Italian population are more at a disadvantage than others. The National Institute for Statistics - *Rapporto sulla conoscenza in Italia*[8] highlights a positive correlation between the use of the Internet and the skill of the population. This correlation sharpens if specific age brackets are considered. In particular, there is a huge gap in the use of Internet in the age bracket 65-74. Within this category, only the 27% of people with a low level of education declare they use the Internet frequently, while individuals with tertiary education use it quite often (73,3%).

The OECD's *Going Digital Toolkit*[9] highlights a similar gap in the age bracket 55-74. Within this category, only 35% of people with a low level of education declare they use the Internet daily, compared to 83% of people with a high level of education.

Among the younger generations there are similar difference even if a lower gap is displayed. Similarly, the *Going Digital Toolkit* shows that only the 90% of individuals aged between 16-24, with a low level of education, use the Internet frequently, against 94% of individuals of the same category, but with a high level of education.

[8] https://www.istat.it/storage/rapporti-tematici/conoscenza2018/Rapportoconoscenza2018.pdf
[9] https://goingdigital.oecd.org/en/

Utenti regolari e quotidiani di Internet nei paesi Ue, 16-74enni e classi d'età selezionate. Anni 2017 e 2008 (%)



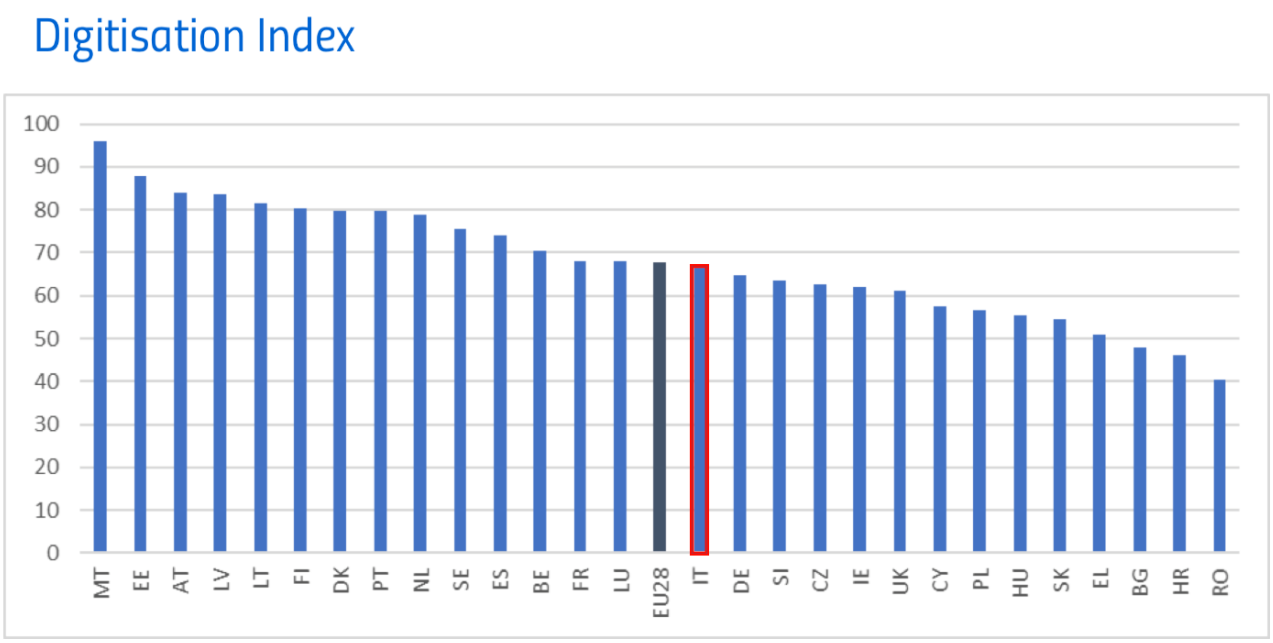
Fonte: Eurostat, ICT usage in households and by individuals. Vedi note

Doi.org/10.1481/Istat.Rapportoconoscenza.2018.4.2.2

5.3. Digital Public Services - Digitisation

In terms of eGovernment, Italy is progressing slowly and remains underperforming compared to certain European countries. According to the *eGovernment Benchmark 2019*[10], Italy reaches a value of 67%, almost matching the EU average of 68%.

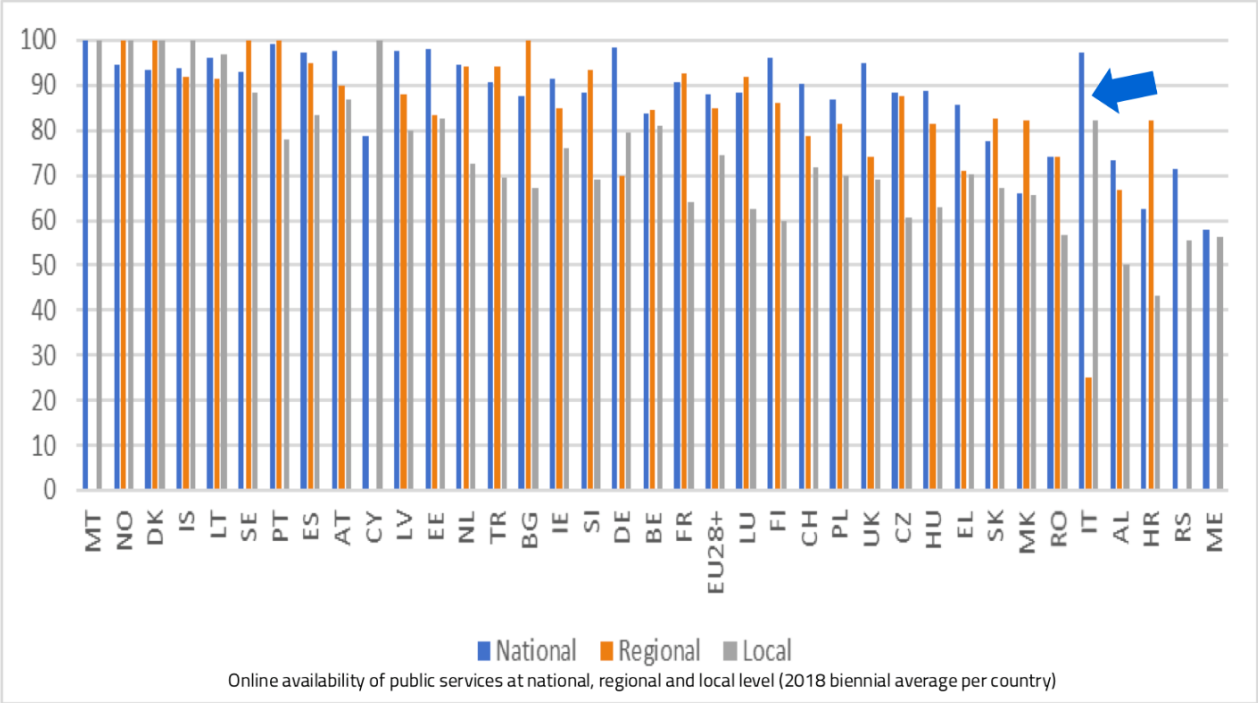
[10] https://ec.europa.eu/digital-single-market/en/news/egovernment-benchmark-2019-trust-government-increasingly-important-people



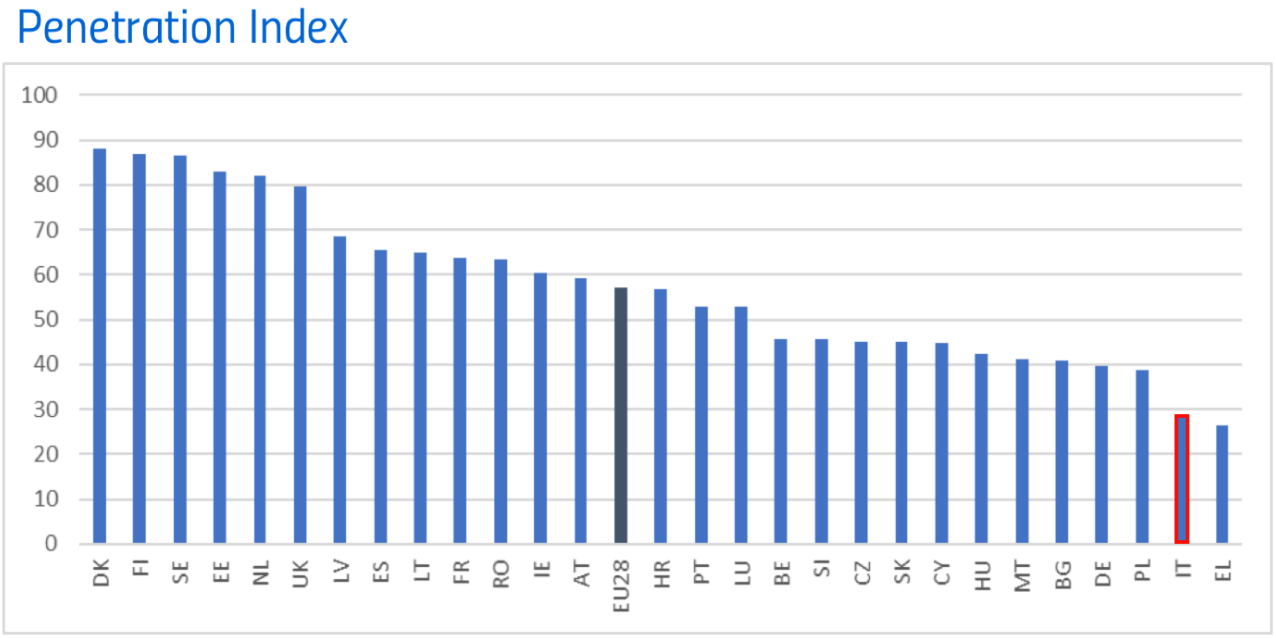
5.4. Digital Public Services - Penetration

However, despite this constant progress at the national level, there are still severe disparities at the local level with a dramatic gap in terms of penetration (the effective use of online public services). According to the *eGovernment Benchmark 2019*[11] sub-indicator of online availability of public services at national, regional and local level, in Italy there is a substantial performance gap between the national, regional and local level. Indeed, this indicator evaluates the availability of online public services for citizens and companies, and shows how despite a good performance at the national level, severe shortages are present at the regional and local level, creating a disruption in the delivery of services. The following chart shows how in Italy, in particular at regional level, the gap is significant.

[11] https://ec.europa.eu/digital-single-market/en/news/egovernment-benchmark-2019-trust-government-increasingly-important-people



In fact, as mentioned above, the penetration level (the effective use of online public services by the citizens) is very low compared to the EU average, 28% against 57%.



The OECD *Going Digital Toolkit*[12] shows similar data: in Italy only 24.3% of individuals use the Internet with the purpose of contacting the public authorities, compared to an OECD average of 56.8%.

[12] https://goingdigital.oecd.org/en/

This lack of coherent approach also has a negative impact on the eGovernment users, which ranks last among EU countries. This is even lower than the rank registered for the use of other online services which could signal issues of usability of public services.

Furthermore, in Italy, skill mismatch is pervasive. Around 6% of workers in Italy are under-skilled while 21% are underqualified. Surprisingly, despite the low average level of skills proficiency, skills surpluses are also present, reflecting the low demand for skills in Italy. Over-skilled (11.7%) and over-qualified (18%) workers represent a substantial part of the Italian workforce. In addition, around 35% of workers are working in fields that are unrelated to their studies.

Hence, skills policies need to be well-aligned with industrial and innovation policies, so that employers can access the skills they need to move their firms to higher value-added and innovation-intensive activities. Innovation and industrial policies can also be designed to encourage skills development through training and knowledge transfer. Innovation requires strong STEM skills, as well as soft and entrepreneurial skills. Investing in research and development (R&D), helps to develop knowledge and skills, spurs innovation and enhances a firm's ability to absorb and exploit the available knowledge base, particularly in Italy, where current levels are below the average of other OECD countries.

Italy has already put in place a set of policy initiatives to promote innovation, support R&D investments and facilitate the transition to innovative skills and digital technologies, such as with Industry 4.0 initiative (which is also fostering innovation and competence creation through Digital Innovation Hubs and Competence centres).

More actions are needed, in particular, to reduce the skill mismatch, increase higher skills mobility, and generate the expertise required for the future in technology, AI, etc. by introducing appropriate measures for the enrichment of the education system, for instance through coding courses, and create the ecosystem for innovative skills development, leveraging better relationships across big corporations, SMEs and the public sector. [13]

6. Conclusion

To conclude, it is not enough to have a national digital strategy, if all policies through different ministries/agencies are not mutually reinforcing and aligned with one coherent vision. There is a need for a whole-government effort and significant inter-institutional coordination; the digital transformation will only work if the entire public sector is ready to adopt a more strategic approach to strengthen interactions, linkages and collaborations within it, and understand that it should be conceived as a whole system.

In Italy, after two extraordinary Commissioners, the digital transformation of the public sector is becoming the new normal. The Minister for Technological Innovation and Digitalization is fully committed to make the digital government happen.

[13] See OECD *Skills Strategy Diagnostic Report*: *Italy*. OECD: Paris (2017).

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Values, Benefits, Considerations and Risks of AI in Government: A Study of AI Policy Documents in Sweden

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Abstract: There is currently an ongoing, global race to develop, implement, and make use of AI in both the private and public sectors. How AI will affect responsibilities and public values to be upheld by government remains to be seen. This paper analyzes how AI is portrayed in Swedish policy documents and what values are attributed to the use of AI, based on an established e-government value framework. Statements are identified in policy documents and are coded into one of four value ideals, as well as being either a benefit, a consideration, or a risk. We conclude that there is discrepancy in the policy level discourse concerning AI between the different value ideals and that the discourse surrounding AI is overly optimistic. A more nuanced view of AI in government is needed to create realistic expectations.

Keywords: Artificial intelligence, e-government values, public sector, benefits, risks

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1. Introduction

Artificial intelligence (AI) is currently discussed as an enabler for transforming society and a solution to administrative challenges, regardless of industry or sector (Cave & ÓhÉigeartaigh, 2018). In recent

years, AI has gone from being constructed as 'science fiction' or something that is out of reach, to being developed and applied on a large scale. This is happening for a multitude of different reasons, in different ways, in different types of organizations and it seems as if AI is quickly becoming ubiquitous. AI is also portrayed as the next big "thing" of digitalization; some even call it a revolution, albeit a revolution of substantial uncertainty into uncharted waters (Makridakis, 2017).

AI is often discussed as something 'new' and in terms of its application areas this may be correct, as AI has previously mostly been of interest only to scholars. Since its birth in the 1950s, AI as a phenomenon has had an unstable trajectory consisting of AI winters and AI springs (Natale & Ballatore, 2017). During AI winters, funding, efforts, and interest in AI have diminished dramatically. Such periods have occurred when the technology has failed to meet the high expectations set by scholars and others. It appears that we now find ourselves in the midst of an AI spring. The current spring is different than previous ones, as everyone, (not just scholars) is on board with the AI hype; the tech industry, consultancy firms, media, and governments. With its history of unmet expectations, there is the question of whether AI will finally deliver as promised, or whether we will soon experience another AI winter. Cruz and Treisman (2018) have investigated why the current AI spring has come, and what can be done to prevent it from turning into yet another AI winter. They attribute the current AI spring to deep learning, a branch of machine learning, which itself is only a small category of all the different AI technologies that exist. In their paper they describe deep learning as the silver bullet that sparks positivity and enthusiasm, not only for deep learning itself, but for AI in general. Cruz and Treisman (2018) also point out an interesting contrast of the perspective on AI in government; that in 1973, the British government criticized AI as a mirage, but is now spending millions of pounds on AI research, showing how the winds have changed. Funding of AI research and development is taking place all over the globe.

It is not only by funding research that governments involve themselves with AI. AI is already in use by governments, and more usage is on the horizon (Margetts & Dorobantu, 2019). One reason for governments' emerging application of AI is the portrayal of AI as a solution to problems related to poor efficiency, a lack of resources and a lack of competence in the public sector. This echoes the praise of previous technological solutions in different waves of e-government (Chadwick & May, 2003; Heeks & Bailur, 2007; Madsen, Berger, & Phythian, 2014; Rowe & Thompson, 1996). Consequently, there are great expectations for what AI can do for public sector organizations, citizens, and society at large, in terms of e.g. improving service quality, reducing lead times, and making unbiased decisions in case handling (Lindgren, Madsen, Hofmann, & Melin, 2019). While these beneficial outcomes are inherently desirable, there are also concerns about the destructive power of AI and that an artificial intelligence arms race may be a possibility as a result of AI development (Ramamoorthy & Yampolskiy, 2018; Taddeo & Floridi, 2018). Some scholars also emphasize the importance of data protection and integrity, with data being the lifeblood of many AI systems (Agbozo & Asamoah, 2019). There are several examples of the contrasts between utopian and dystopian accounts of the future with AI; Gurkaynak, Yilmaz, and Haksever (2016) portray AI as humankind's best hope to prevent extinction, whereas others fear an Armageddon caused by AI (McCauley, 2007). While these examples may be extreme, they nevertheless exemplify the diversity and polarity in the discourse surrounding AI. These optimistic and pessimistic views of IT are a common theme that most new

technologies are subject to (Rowe & Thompson, 1996). Rowe and Thompson problematize these contrasting perspectives and make a point about them having different characteristics; for example, the optimistic perspective being focused on invention and reskilling of workers, while the pessimistic perspective is focused on innovation and the deskilling of workers. This fits well with the narrative that is occasionally heard of AI, on the one hand freeing up time for other types of work, but on the other hand possibly leading to increased unemployment. This discourse also points towards the fact that AI as a tool is not inherently good nor bad; it is up to us to use AI in a way that creates the values we want as a society. Here, values are not monetary values, but rather things that we want and desire; positive outcomes. For example, democracy may be a thing that we value and therefore want and desire.

As AI enters the public sector, it is likely to affect organizations and the lives of citizens. Since AI is fairly new in governmental settings, there is a lack of research analyzing how AI is portrayed in policy documents and the values associated with this technology. This and the conflicting portraits of AI calls for further research. It is imperative that we scrutinize how AI comes into play in the government domain, whether the expected transformative potential is realized, and what the implications for policy making are (Lindgren et al., 2019). The utilization of most types of AI solutions does not merely involve installing and using just another computer application. Most of these systems are complex and their use requires effort and specific competence, which is sometimes new or newly developed. Al-Mushayt (2019) points towards challenges that make using AI within e-government difficult, e.g. a lack of competence or experts, low trust in these types of solutions, or a lack of computational power. Across the globe, legal-regulatory frameworks and ethics guidelines for the use of AI are being considered by academics, industry, and governments (Cath, 2018). These challenges and considerations become part of policies that act to encourage beneficiary development and use of AI. It is not uncommon for governments to use policy documents to encourage and stimulate innovation and technological development (Dolfsma & Seo, 2013). Indeed, Sundberg (2019) notes that material produced within the scope of e-government, for example a policy surrounding a technology, represents the views of what this technology is and is simultaneously a call to action. A policy therefore represents the view of a certain technology and also aims to instigate change. Because of this, a policy document can be seen to be predicative to some degree of future, upcoming change. How AI is portrayed, and its associated values, may therefore affect how it is used and for what purposes.

1.1. Aim of the paper and research objective

This paper aims to investigate how AI is portrayed in a set of policy documents for public sector organizations in Sweden. The analysis focuses on which value ideals are attributed to the use of AI, and further seeks to explore the potential impacts of AI.

We depart from a case where the Swedish Government asked a number of organizations to map the usefulness of AI for Swedish industry and society. The resulting documentation from this initiative sets the frame for the discourse on AI in the Swedish public sector. This sampling is further explained in our research approach. We contribute to e-government research and practice by identifying which values are attributed to the use of AI for public sector organizations and relate these

to previous discussions on technology in the e-government research field. We choose to not unpack the definition of AI and focus on specific AI technologies; instead, we take an inclusive approach and the study is focused on the discourse surrounding AI on a general level. This paper is a continuation of a previous paper (Toll, Lindgren, Melin, & Madsen, 2019), and more details about this is presented at the end of the 'Research approach' section.

The paper is organized as follows: First, we present our theoretical framework. Next, we describe the policy documents in our analysis and their origin, followed by our method and analytical strategy. We then present our findings from the analysis, and discuss our findings in relation to the analytical strategy and previous analyses of e-government policy and technology. Finally, we present our conclusions, discuss the limitations of the study and share some reflective thoughts on future research.

2. Theoretical framing

Previous e-government research shows that IT development and implementation in government organizations is difficult to plan and organize and that IT often results in unexpected outcomes (Hood & Dixon, 2015). Why should the implementation of AI technologies be any different? One possible reason for the difficulties of managing e-government initiatives is the multitude of public values that government organizations are designed to uphold (Almarabeh & Abuali, 2010). The public sector can be said to exist to serve the people and to create various values. The study of these values can easily become abstract. For example, 'democracy' may be a value but its definition and measurability are difficult to formalize. Values may also exist on different levels of abstraction and in hierarchies relating to each other (Jørgensen & Bozeman, 2007). There is also a distinction between values on a personal or individual level and those of the public collective. Sundberg (2019) concludes that public values are distinct from individual values and that public values are subject to the public ethos. Bannister and Connolly discuss how the use of new types of information and communication technology (ICT) may transform such public values (Bannister & Connolly, 2014). Sundberg also notes that certain technologies are prone to promote certain values more than others. AI as a type of technology may then be associated with and have the capability to transform certain values more than others. This makes it interesting to study which values are associated with AI, as this may be indicative of where its transformational power lies.

There have been several efforts by scholars to create inventories and models of values for use as analytical lenses for studying ICT's transforming power (Beck Jørgensen & Bozeman, 2007; Rutgers, 2008). A model synthesized of pre-existing research in this area and grounded in theory is put forward by Rose, Persson, Heeager & Irani (2015). Their model consists of four value ideals: professionalism, efficiency, service and engagement (see Table 1). The professionalism ideal concerns legality, durability and infrastructure. The efficiency ideal concerns value for money, efficiency, productivity and automation. The service ideal concerns utility of the government for the citizen, accessibility and service quality. The engagement ideal concerns engaging with the citizen, democracy and participation. We present an overview of these value ideals in Table 1.

Table 1. Four value ideals for e-government management (adapted from Rose et al., 2015, p. 542) (Toll et al., 2019).

Value ideal	Definition and representative values
Efficiency	Providing lean and efficient administration, which minimizes waste of public resources paid for by taxpayers. Representative values: value for money, cost reduction, productivity and performance.
Service	Maximizing the utility of government to civil society by providing services directed towards the public good. Representative values: public service, citizen centricity, service level and quality.
Professionalism	Providing an independent, robust, and consistent administration, governed by a rule system based on law, resulting in the public record, which is the basis for accountability. Representative values: durability, equity, legality and accountability.
Engagement	Engaging with civil society to facilitate policy development in accordance with liberal democratic principles; articulating the public good. Representative values: democracy, deliberation and participation.

Much of the research on public values in e-government is theoretically oriented and scholars have therefore called for empirical research that puts these models to use (Twizeyimana & Andersson, 2019). We apply the model proposed by Rose et al. (2015) in this paper as our analytical lens. Rose et al. themselves mention that predecessors (models/frameworks) within this area are often without substantial empirical or theoretical support. Their model, however, has both of these. It was initially formed by investigating the major trends in public administration literature over the last 15 years, and was then tested empirically in a case study and subsequently refined based on their findings. This model has been applied in several other studies as an analytical lens (Pedersen, 2017; Persson, Reinwald, Skorve, & Nielsen, 2017; Sundberg, 2019). In the case of Persson et al. (2017), the model is used to analyze policy documents and they conclude that they found the model useful. Additionally, the model is of a Scandinavian origin and corresponds well with the Swedish culture and welfare systems of the public sector. The model also represents the expectations and responsibilities of Scandinavian government organizations. For these reasons we find Rose et al.'s (2015) model useful and fitting for this study. We will not attempt to develop this model further in this study. Instead, we will apply the model as-is and will reflect on its use as an analytical lens.

3. Research approach

In this section we present our research approach and method. First, we explain the selection of documents used for our analysis and present these documents. Second, we explain the type of analysis that has been performed and its steps.

3.1. Documents used for analysis

In 2017, the Swedish Government started an initiative to map and investigate the role of AI in Sweden. This initiative was led by VINNOVA, the official innovation agency of Sweden. As a result of this initiative, VINNOVA and other related organizations produced reports on this investigation. This continued and built upon an ongoing snowball effect of other investigations into what AI could

be used for in Swedish society. Together, these form a generative and representative sample of the discourse on AI for Swedish society and the Swedish public sector. They also represent a contemporary snapshot in time, as they were all published within two years of each other in 2017 and 2018. Policy documents may also encapsulate certain biases and analyzing these documents enables these biases to be accessed (Abraham, 1994; Bryman, 2016). The reports that are used in this study were published by the following organizations:

- VINNOVA – Sweden's innovation agency, under the Ministry of Enterprise and Innovation, acts as the Swedish Government's expert authority regarding innovation policy.
- Governo – a Swedish management consultancy firm, known for its close collaborations with public sector organizations, e.g. VINNOVA.
- The Swedish Association of Local Authorities and Regions (SALAR) – an interest organization working for municipalities and regions in Sweden.
- Inera – an organization under SALAR, focusing on healthcare.
- WASP – The Wallenberg Artificial Intelligence, Autonomous Systems and Software Program. A research initiative initiated and financed by the Wallenberg Foundation.
- The Swedish Government.

We treat the documents as policy documents in the sense that their content is likely to trickle down through the governmental structures in Sweden and constitute the foundation of policies in this area for both public sector and private sector organizations. This is because there is a strong tradition in Sweden of governing society using policy documents and recommendations, with a high degree of trust in public agencies. Several initiatives strongly indicate that these types of documents have led to impact, with the initiatives echoing the discourse in these policy documents. One such initiative of note is the WASP foundation, which is the largest research initiative in Sweden, funding AI research with a total of SEK 5.5 billion, 400 PhD students, and 60 new research groups (WASP, n.d.). Another example is that the Swedish innovation agency, VINNOVA, is investing millions of SEK in AI projects in both the public and the private sectors (e.g. VINNOVA, 2019). Similar reports mention AI in the Swedish public sector but without an explicit focus on AI, focusing instead on automation or digitalization in general. We did not consider these types of documents in our analysis. Instead, we only included those documents in which AI has a dominant role. We apply a broad and inclusive treatment of AI in this paper and have not defined AI in a technical sense, as this would limit AI to a subset of specific AI technologies. The analysis is instead focused on the discourse regarding AI, and as such encompasses a broad variety of AI technologies and definitions associated with the term 'artificial intelligence'.

We present the policy documents used for our analysis in Table 2, with their respective title, year of publication, author organization, number of pages and a document ID used for reference throughout this paper.

Table 2. The policy documents used for our analysis (Toll et al., 2019).

Document (title, translated if originally in Swedish)	**Year**	**Author organization**	**Doc. ID**	**Number of pages**
Mapping and analysis of artificial intelligence and machine learning's capabilities and application in Swedish industry and society (Regerenskansliet, 2017)	2017	Government Offices of Sweden	#1	3
Artificial intelligence – possibilities for welfare (SKR, 2017a)	2017	SALAR	#2	17
AI and automation of first line care (Inera, 2017)	2017	Inera	#3	51
Artificial intelligence in Swedish business and society (VINNOVA, 2018)	2018	VINNOVA	#4	188
Artificial intelligence in the public sector (GOVERNO, 2018a)	2018	Governo	#5	50
Correct payments with the help of AI (GOVERNO, 2018b)	2018	Governo	#6	33
Automation of work (SKR, 2018)	2018	SALAR	#7	36
Decisions within 24 hours (SKR, 2017b)	2017	SALAR	#8	4
Collecting ideas and identifying challenges for future AI research in Sweden (WASP, 2018)	2018	WASP	#9	28
National alignment for artificial intelligence (Regerenskansliet, 2018)	2018	Government Offices of Sweden	#10	12

3.2. Analysis process

We have performed a qualitative content analysis (Krippendorff, 2004). The research presented in this paper is hence qualitative and interpretive (Walsham, 1995), although we quantify the results as part of exploring patterns of different dimensions. As an analytical lens, we used the four value ideals presented by Rose et al. (2015). We combined these value ideals with an inductive and iterative approach for analyzing the documents.

The analysis was performed in the following steps:

1) Identification of statements. Each document was read to identify statements describing the nature and use of AI. In total, 522 statements were identified.
2) Condensation of statements. Each statement was condensed by highlighting its main message, e.g. the statement *"AI can contribute to shortening lead times for case handling"* (Doc. #10, p. 4) was condensed to "Shortened lead times".

3) Coding of value ideals. Each condensed statement was coded in relation to Rose et al.'s (2015) value set. This coding was performed in an interpretive manner, seeking to find a match between the statements and the value ideals in the analytical framework. The condensed statement "Shortened lead times" was categorized as belonging to the "Efficiency" value ideal.

As the analysis progressed, it became evident from the empirical material that the statements could also be characterized along a different dimension, highlighting negative and positive outcomes of AI for the public sector. Thus, additional categories were formed inductively, including benefits, considerations, and risks associated with use of AI. (These additional categories are further described in the 'Findings' section.) We then returned to each statement and categorized it in relation to the inductively generated categories:

4) Coding of inductively created categories. Each statement was coded in relation to the inductively created categories. As with the coding of the value ideals, this was also performed in an interpretative manner. For example, the statement *"AI can contribute to shortening lead times for case handling"* was categorized as a "Benefit".
5) Finally, we combined the two sets of categorizations for each statement, thereby integrating the theoretical and empirical dimensions in order to explore patterns.

A rule we applied for the coding was that a single statement could only be coded to belong to one value ideal and one inductively created category, where the interpretation in deciding on its condensation depended on its main message. However, an exception was made for 'list statements', which were statements that listed several things in one and the same statement. A statement was considered a list statement when it proved impossible to decide on just one single condensation that represented the statement in its entirety, i.e. the statement contained more than a single main message. An example of a list statement is *"AI is used to get more cost-efficient processes, better and more personalized offers to customers and to increase the quality of products"* (Doc. #5, p. 7). As can be seen in this statement, three things are highlighted; cost-efficiency, personalization, and quality. These were considered to be three different condensations that existed in one and the same statement. To remedy this, the list statement was split into the following three statements; "*AI is used to get more cost-efficiency processes*", "*AI is used to get better and more personalized offers to customers*" and "*AI is used to increase the quality of products*". In essence, the statement was split according to its present condensations and its subordinate clauses. This means that in the original document this is one statement, but for our analysis it is three separate statements. This splitting of list statements was carried out in order not to lose data, as would have happened if the above example was only considered as a statement concerning cost-efficiency, thus ignoring the personalization and quality aspects. This made the analysis more thorough and precise in its content.

This paper is a continuation of a previous paper presented at the 18th IFIP WG 8.5 International Conference of E-Government (EGOV) in San Benedetto del Tronto, Italy, in September 2019 (Toll et al., 2019). The paper received a best paper nomination at this conference, and we were therefore invited to submit this extended version to the Journal of eDemocracy and Open Government (JeDeM). For this version of the paper, we continued working on the study by doing the following:

- Extending the overview of prior research related to the concepts involved.

- Explaining the method and analytical process with increased acuity and examples.
- Describing the findings with more nuance and empirical examples.
- Extending the discussion based on feedback from the EGOV conference as well as our own reflections since the first version of the paper.

4. Findings

In this section we present the findings of our study. First, we present the inductively created categories that were generated during the analysis. Second, we present empirical examples of the coding, showing empirical examples (statements) with their corresponding condensation, value ideal and inductively created category. Third, we present the two integrated dimensions (the theoretically grounded value ideals and the empirically grounded inductively created categories) with the frequency distribution of statements across these dimensions.

Table 3. The inductively generated categories, with empirical examples (Toll et al., 2019).

Category	**Definition**	**Empirical example**
Benefits	Desirable, positive effects or statements about how AI solutions will affect society in a positive way.	*"The [AI] system makes the process more effective and saves time for personnel."* (Doc. #7, p. 10) *"High risk work environments do not need to be populated by people and strenuous jobs can be performed by automatons."* (Doc. #4, p. 56)
Considerations	Things that public sector actors must carefully think about and keep in mind when using AI.	*"This is an area that needs to be investigated and where it may be necessary to change laws and regulations."* (Doc. #7, p. 15) *"Naturally, it has to be performed in a safe and transparent way."* (Doc. #5, p. 33)
Risks	Undesirable, negative effects or statements about how AI solutions will affect society in a negative way.	*"AI can involve new types of intelligent cyberattacks or manipulated data which can have serious consequences."* (Doc. #10, p. 12) *"An example of such a risk could be decision support systems in the area of jurisdiction falling into the hands of criminals, enabling them to find ways to avoid prosecution."* (Doc. #7, p. 12)

4.1. Empirical examples and the results of the coding

During the coding, each statement was condensed down to a condensation representative of the main message of the statement. These condensations were then matched to one of the four value ideals used as our analytical lens. For the sake of transparency, and to give an idea of the kind of statements that this study is based on, we present four tables that showcase empirical examples (statements) with their corresponding condensation, coded value ideal and inductively generated category. The number of condensations here does not represent all of the condensations used in the analysis. Instead, the number of condensations here roughly represents the relative frequency of

statements within each intersection of value ideal and inductively created category. The most prevalent condensations were picked for these tables to form a representative overview. In some cases, the same condensations appear in several categories, for example the condensation Costs appears within both Benefit and Consideration, within the Efficiency ideal, as can be seen in Table 4. This relates directly to the definitions of the categories and how the statement has been interpreted in its context. As such, condensations as codes are not exclusive to a single category. This is because statements relating to a certain condensation (e.g. Costs) were interpreted in some instances to be positive (Benefit) but in other instances to be neutral (Consideration).

For the sake of readability, we present four tables that focus on each value ideal: efficiency (Table 4), service (Table 5), professionalism (Table 6) and engagement (Table 7). As only one of the documents used in our analysis was in English, most of the following empirical examples have been translated from Swedish to English. Again, we have included representative quotations with references to enhance traceability. The following table, Table 4, presents empirical examples (statements from the policy documents), their condensations and their corresponding categories within the 'Efficiency' value ideal.

Table 4. Empirical examples of condensations and their categories for the 'Efficiency' value ideal.

Value ideal	**Category**	**Condensation**	**Empirical example**
Efficiency	Benefit	Costs	*"The [AI] system makes the process more effective and saves time for personnel."* (Doc. #7, p. 10)
		Competitiveness	*"For companies of all types there are opportunities to develop their competitiveness using AI."* (Doc. #10, p. 8)
		Profits/savings	*"But there is also a potential to save money by automating time-consuming methods that are currently part of the routine."* (Doc. #4, p. 41)
		Automating processes	*"Artificial intelligence is used in different ways to make commerce smarter and more automated."* (Doc. #2, p. 7)
	Consider-ation	Costs	*"The cost to develop new technological solutions, especially within AI, are big and will increase."* (Doc. #3, p. 25)
		Resources	*"Some of the speakers stressed how limited network capacity and latency can be a challenge."* (Doc. #9, p. 25)
	Risk	Economic harm	*"AI can lead to discrimination, lower trust, cause economic harm, and affect how democracy functions."* (Doc. #10, p. 4) Note: This is a list statement.

The following table, Table 5, presents empirical examples (statements from the policy documents), their condensations and their corresponding categories within the 'Service' value ideal.

Table 5. Empirical examples of condensations and their categories for the 'Service' value ideal.

Value ideal	**Category**	**Condensation**	**Empirical example**
Service	Benefit	Service quality	*"There also are significant opportunities to improve quality by implementing assessments/analyses that are beyond human capabilities."* (Doc. #4, p. 41)
		Personalization	*"The focus in this area has so far been on tools that help to better understand the customer and contribute to a better customer experience."* (Doc. #6, p. 12)
		Accessibility	*"Accessibility has increased in two ways, in terms of time of day and in terms of location."* (Doc. #8, p. 2)
	Consideration	Loss of jobs	*"One challenge is a loss of jobs due to rapid changes to tasks and jobs in society."* (Doc. #4, p. 74)
		Service quality	*"It may require other types of data, although this leads to questions regarding ownership, quality assurance and accessibility. These questions need answering."* (Doc. #3, p. 7) Note: This is a list statement.
	Risk	Data quality	*"Risks can arise in the form of inaccurate or otherwise undesirable results if the data quality is insufficient, for example due to mistakes in registrations, systematic (known as well as unknown) faults in the collection [of data], choice of sources or labeling of data."* (Doc. #10, p. 10)
		Loss of jobs	*"A fear that has been voiced is that the type of job many junior legal practitioners have previously carried out is no longer required, making it more difficult for them to enter the profession in a natural way."* (Doc. #6, p. 22)

The following table, Table 6, presents empirical examples (statements from the policy documents), their condensations, and their corresponding categories within the 'Professionalism' value ideal.

Table 6. Empirical examples of condensations and their categories for the 'Professionalism' value ideal.

Value ideal	Category	Condensation	Empirical example
Professionalism	Benefit	Security	*"Processing applications for damages has thus far been monotonous and time-consuming. The monotony can lead to mistakes. When AI is used in this context, the case handlers focus on the more complex cases and the risk for mistakes decreases."* (Doc. #6, p. 19)
		Sustainability	*"AI can be used to optimize processes, ensure better sustainability and integrate value chains."* (Doc. #4, p. 55) Note: This is a list statement.
	Consideration	Competence	*"A fundamental prerequisite for the whole of Sweden benefitting from AI is that enough people have the knowledge needed to develop and use the AI technology. Knowledge and competence within AI must exist in many areas of society, in both large and small businesses, in municipalities, in regions and in agencies."* (Doc. #10, p. 6)
		Infrastructure	*"Different types of infrastructure are also of significance for the development and utilization of AI. For example, certain aspects of AI development require access to large data sets and big computational capacity."* (Doc. #10, p. 11)
		Data availability	*"Data availability and opportunities to combine different data will be of fundamental importance for which implementations [of AI] are possible to develop."* (Doc. #4, p. 9)
		Legality	*"This is an area that needs to be investigated on a general level, and it may be necessary to alter laws and regulations."* (Doc. #3, p. 28)
	Risk	Security	*"There is a risk of increased vulnerability as the systems become more advanced with more connections."* (Doc. #4, p. 57)
		Integrity	*"Other risks concern security and integrity in handling personal data and information."* (Doc. #5, p. 8)
		Misinformation	*"Risks of deliberate data manipulation to affect organizations and society in a negative way."* (Doc. #10, p. 8)

The following table, Table 7, presents empirical examples (statements from the policy documents), their condensations, and their corresponding categories within the 'Engagement' value ideal.

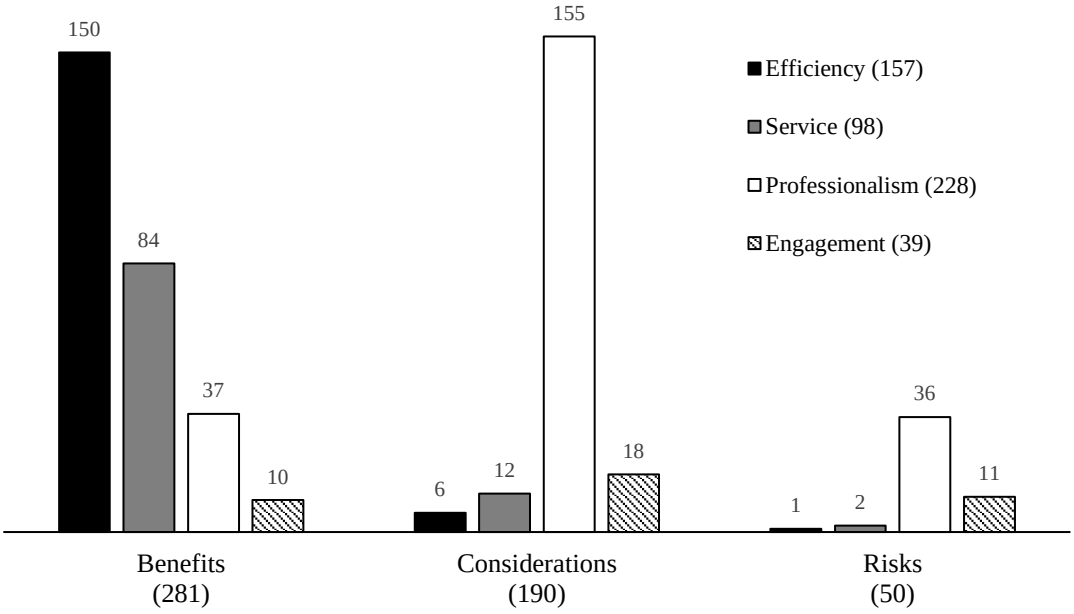
Table 7. Empirical examples of condensations and their categories for the 'Engagement' value ideal.

Value ideal	Category	Condensation	Empirical example
Engagement	Benefit	Citizen interaction	*"Just like banks, insurance companies seem to be heading towards chatbots and are focusing on automating different processes to improve customers' contact experience."* (Doc. #6, p. 13)
	Consideration	Transparency	*"Issues relating to personal integrity and legal prerequisites for privacy protection were highlighted at WASP AI4X. Data protection, transparency and the need to develop systems for anonymization were issues raised by several speakers."* (Doc. #9, p. 25)
		Trust	*"The Swedish-American professor and cosmologist Max Tegmark points towards the research needed into security and dependability, and is of the opinion that this will be a deciding factor if people accept a growing role of artificial intelligence in areas where up until now there has been a need for human input."* (Doc. #3, p. 27)
		Co-operation	*"Co-operation in research, development, data availability and competence development for AI innovation that connects needs within different value chains and sectors for joint forceful development."* (Doc. #4, p. 14)
	Risk	Transparency	*"The risks concerning AI are not only technical, but also ethical, especially concerning applications in the public sector. The use of AI algorithms needs to be transparent and understandable."* (Doc. #10, p. 8)
		Trust	*"Both overly optimistic faith in AI and overly pessimistic skepticism can be a threat."* (Doc. #4, p. 57)
		Democracy	*"AI can also lower the threshold of attacks against democratic functionality, for example via misinformation."* (Doc. #10, p. 8)

4.2. The two dimensions integrated

In the previous section, we presented statements according to value ideals and inductively created categories. Next, we want to present a quantified overview of these two dimensions. The purpose of this presentation is to show the relationship and explore patterns. Note that this integration focuses only on the frequency distribution of these dimensions. Figure 1 presents the distribution of the 522 statements of AI in the policy documents according to value ideals (efficiency, service, professionalism, engagement) and the inductively created categories (benefit, consideration, risk).

Fig. 1. The distribution of categories and value ideals associated with the use of AI (Toll et al., 2019).



For the inductively created categories, most statements concern benefits associated with AI (281 statements), followed by considerations (190 statements). Notably, only 50 statements concern risks.

For the value ideals, most statements fall into the 'Professionalism' value ideal (228 statements), followed by 'Efficiency' (157 statements), 'Service' (98 statements), and 'Engagement' (39 statements). 'Professionalism' is therefore the most frequent value ideal, and occurs almost six times as frequently as the least frequent ideal ('Engagement').

5. Discussion

In this section, we discuss our findings in relation to the analytical strategy and previous analyses of e-government policy and technology. The discussion will consider the findings from the perspectives of both the value ideals of Rose et al.'s (2015) model and the inductively created categories. As such, the discussion will act as a go-between between these two dimensions.

This study aims to investigate how AI is portrayed in a set of Swedish policy documents and which value ideals are attributed to the use of AI. We depart from a Swedish case in which the Swedish Government asked a number of organizations to map the usefulness of AI for Swedish society. In the research discourse on AI, we identify a strong polarization, where some scholars describe AI as a necessity for creating and maintaining a functioning society (Gurkaynak et al., 2016), while others claim that AI is a threat to the world we live in (McCauley, 2007). In the documents analyzed in this study, we identify a strong tendency towards the former (positive) view of AI; AI is presented as a way to maintain and improve the already effective Swedish welfare system. This optimistic view fulfills many of the characteristics that Rowe and Thompson (1996) present as belonging to the optimistic view of IT.

The main finding from our analysis is that the benefits of AI are highlighted extensively (281 benefits), whereas the potential risks of AI are relatively few (50 risks). Relating these statements on AI in the Swedish public sector to the value ideals presented by Rose et al. (2015), we conclude that most benefits relate to the increased efficiency of public sector processes. It is interesting that the discourse does not explicitly regard risks to efficiency as a result of AI; using AI to increase efficiency is seen solely as creating desirable and positive effects. There is only one statement that considers the opposite (which is the single and only risk within the efficiency value ideal). The second most frequent type of benefit concerns service quality; hence, AI is described as a way to increase efficiency, competitiveness, profit and savings but also as a way to increase the quality and effectiveness of public sector processes. Quality and efficiency therefore seem not to be seen as competing with each other but that AI is capable of achieving both at the same time. It is worth noting here that efficiency can be seen as an aspect of quality, and vice versa. We were aware of this in our analysis and interpreted the statements in the policy documents at face value regarding this distinction when categorizing the efficiency and service ideals, meaning that if the word 'quality' was mentioned it was categorized as the service ideal and words alluding to efficiency in terms of speed and productivity were categorized as the efficiency ideal. The focus on benefits may be explained by the purpose and nature of the documents included in the analysis; they are a result of an initiative to map the usefulness of AI for Swedish industry and public sector organizations. Hence, the purpose of the document is, in a positive and rather optimistic way, to inspire organizations to adopt and implement AI technologies.

Overall, the discourse on AI is much in line with the general discourse on digitalization in the public sector, highlighting the positive impact of different kinds of technology. In particular, technologies are promoted as means for increased efficiency and effectiveness (e.g. Chadwick & May, 2003b; Heeks & Bailur, 2007; Madsen et al., 2014; Rowe & Thompson, 1996). Consequently, our analysis confirms that the discourse on AI for the public sector is characterized by an optimistic outlook on AI and that there are great expectations on what AI can do for public sector organizations, citizens and society at large.

In spite of the purpose of promoting and inspiring AI use in the public sector, some considerations and risks are mentioned in the policy documents. The considerations typically fall under the 'Professionalism' value ideal (Rose et al., 2015). We believe this to be a result of the particular context highlighted in the professionalism ideal: functioning bureaucracy. AI challenges the focus on the

internal stability of government (status quo), e.g. in terms of how AI may lead to job redundancies in the public sector and a need for new competences. AI also requires new and different digital infrastructures and poses questions about how the legality of public administration can be upheld. For these reasons, it is perhaps not surprising that the risks of AI highlighted in the policy documents were related to the values of the professionalism ideal, e.g. security, integrity and misinformation. There were a great number of considerations: 190 statements out of the total of 522. A consideration – in comparison to a benefit or a risk – constitutes the neutral middle ground and is therefore less impactive. These considerations are however of vital importance. For example, some considerations concern competence and infrastructure. The definition used for considerations in this paper is "Things that public sector actors must carefully think about and keep in mind when using AI", corresponding well to how competence and infrastructure was portrayed in the policy documents. These are also prerequisites for AI to be developed and used. If competence and infrastructural needs are not met, this would result in something of a roadblock that jeopardizes progress. Considerations, then, can be viewed as risks-to-be, or simply as nascent risks that have yet to mature. The sheer number of considerations we identified in the policy documents (190) shows that there is widespread awareness of the potentially negative impacts of AI, even though these are not explicitly stated as risks in the documents.

Based on the findings in this paper, we claim that there is a likelihood that the discourse on AI is overly optimistic and resembles previous hype on various uses of technologies in the public sector (cf. Natale & Ballatore, 2017; Rowe & Thompson, 1996). However, there are also explicit risks stated concerning AI, constituting more of a pessimistic perspective. Concerning the risks of AI, there are only a few risks mentioned that concern engagement. The engagement ideal is about engaging with society, about citizen participation and democracy – the communication between the citizen and the government (Rose et al., 2015). Engagement is relatively underrepresented in the AI discourse; AI is not presented as an enabler of engagement and democratic discussions. This is interesting, because the Swedish Digital Agenda explicitly mentions citizen engagement as a benefit of digitalization (Näringsdepartementet, 2017). However, in the discourse on AI we have analyzed, the values related to citizen engagement in policy making are notably absent. This finding is somewhat worrying, but corresponds to previous policy studies in the e-government field, which have found that the democratic ideals are often sidelined in favor of New Public Management ideals of increased efficiency and effectiveness (Chadwick & May, 2003; Jæger & Löfgren, 2010; Persson et al., 2017). The absence of engagement in this analysis does not necessarily indicate that engagement on a general level is overlooked. Certain technologies promote certain values more than others (Sundberg, 2019). It may be that AI as a type of technology is not capable of being – or suited to be – a technology that increases engagement. However, as chatbots and virtual assistants (such as Siri, Alexa, or Google Assistant via smartphones and smart speakers) are a common use of AI, this is something that could be investigated further through empirical studies.

Returning to the metaphor of AI winters and springs discussed in the introduction to this paper, it appears that we are indeed in the midst of an AI spring (Natale & Ballatore, 2017). A core issue for future research will be to investigate whether we will soon find ourselves in a new AI winter, or if the AI spring will turn into an AI summer where AI technologies are widespread and meet the high expectations attributed to them, meaning that AI is here to stay for good. An interesting difference

that we see, compared to previous AI springs, is that the interest in AI is now widespread and is seen not only in academia but also in most sectors of a contemporary society. It also appears that AI technology is likely to become more generally applied. As AI becomes more mainstream, the expectations on this particular technology are likely to evolve and become more nuanced; therefore, it is vital that the e-government research community continues to follow this development.

Finally we would like to reflect upon the use of the model by Rose et al. (2015) as an analytical lens for this study. The model, according to Rose et al., is aimed at management and public sector managers. In spite of this, we found it to be applicable and useful as the analytical lens for our study. An initial worry we had was that the sheer number of values that exist (for example, Rutgers (2008) lists over 100 values) would be difficult to fit into just four value ideals and that there would be grey areas where it would be difficult to decide which value ideal a statement belongs to. This did occur in a few cases, especially with more abstract statements and values that can have multiple interpretations. However, only a small number of statements were difficult to classify, with a marginal impact on the overall results.

6. Conclusions, limitations, and future research

In this paper, we performed a content analysis on ten policy documents describing the usefulness of AI for public sector organizations and industry in Sweden. We applied the value ideals model presented by Rose et al. (2015), combined with three inductively generated categories for coding value statements in the documents. We found that;

- AI is described as an enabler of increased efficiency and effectiveness in the public sector. This reflects an optimistic view of AI, highlighting the benefits of AI for public sector organizations.
- AI challenges the values related to professionalism, reflected in an emphasis on considerations and risks concerned with legality, security and integrity.
- AI is not described as an enabler of citizen engagement in government. This is an interesting contrast to general national policies stating that digitalization should be used to increase citizen engagement.
- The AI discourse analyzed in this paper is in line with previous e-government research.
- A more nuanced view of AI is needed to create realistic expectations of what this technology can do for society.

This paper has several limitations. First, the analytical model gives a simplified overview of the values guiding e-government management. In the future, the findings presented here could be supplemented with additional value conceptualizations or a modified version of the current analytical lens with improved suitability for analyzing AI. A second limitation concerns the particular discourse analyzed being taken from one national context at one point in time. Furthermore, the documents we have analyzed dealt with both industry and public sector organizations combined. Future research could add additional national contexts to the analysis and focus on the public sector context alone (but from multiple perspectives, e.g. from the viewpoints of trade unions, citizens, and businesses). We also see potential for investigating the discourse on AI in a longitudinal manner and

seeing whether and how the policy documents come into practice. A third limitation concerns our interpretation of AI. AI encapsulates a variety of different technologies and we have not unpacked the meaning of AI here. Instead, we have dealt with AI in the same overarching manner as found in the policy documents that we analyzed. As AI evolves, the meanings attributed to this concept are likely to become increasingly differentiated and hence more important to state explicitly.

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Volunteer Co-production in Emergency Management in Excluded Areas: Using Civil Citizens and Semi-professionals as First Responders

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Abstract: This study explores ICT-enabled co-production using civil citizens and semi-professionals as volunteer first responders in excluded areas, in order to identify key factors and to compare the groups. It shows that volunteers can make a major difference if arriving first at an emergency site, e.g. saving lives, administering CPR and extinguishing fires. The semi-professionals are more protected than civil citizens where challenges relate to individual versus collective engagement, gender aspects, language barriers or insufficient legal protection. However, the citizens have an advantage in relying on easily accessible ICT support installed on their own mobile phones. For the initiatives to expand and enable long-term engagement, calibrated ICT solutions matching competence, role and language with incident and area are needed. The study confirms previous research arguing for the merging of policy science and information systems research in times of rapid digitalized public-sector transformation but adds that they need to be complemented by perspectives from sociology in initiatives involving excluded areas.

Keywords: public-sector innovation, citizen co-production, volunteer engagement, ICT, excluded areas.

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1. Introduction

At a governmental level, transformational government refers to an increasing awareness over the past decade of the need to address the broad and complex set of cultural and organizational changes that are needed for ICT to deliver significant benefits to the public sector, including government interaction with civil citizens (Bannister & Connolly, 2011). This is also relevant to local, bottom-up public services and public-sector innovation collaborations, where digitalization has paved the way for various initiatives built around ICT-enabled volunteer engagement. In an e-government context,they are sometimes referred to as "do-it-yourself government" or "we-government" (Linders,

2012). Volunteer engagement has been explored using different perspectives and theoretical lenses; for example, co-production (Alford & O'Flynn, 2012).

The public sector is undergoing rapid transformation in response to increasing global challenges, in terms of such aspects as natural disasters, migration streams, increased socio-economic gaps, urbanization, aging populations, war and terrorism, financial cutbacks and resource shortages (Haddow & Bullock, 2013), which have put an enormous strain on emergency response organizations worldwide. In terms of socio-economic gaps, the tendency in many western countries is towards growing segregation, whereby an increased number of urban sub-areas are characterized by poverty and social exclusion, sometimes to an extent where societal structures are deemed absent and are replaced by parallel structures, and where criminality increases (Guldåker & Hallin, 2014; Chalfin & McCrary, 2017). In such areas, research reveals poorer health and school results, higher unemployment, and, not least, a larger number of emergencies than for the rest of the population (David & Enarsson, 2012). For instance, those exposed to intentional urban fires in Sweden more often live in socio-economically disadvantaged sub-areas (Guldåker & Hallin, 2014). In emergency response, volunteerism initially expanded rapidly within large-scale crisis management (Diaz, Carrol & Aedo, 2016). Over the past decade, organizing citizen volunteers and semi-professionals (i.e. people who have another occupation than first responder but with training, and/or competence in an occupation that could be used for emergency response) as first responders have also gained some attention in relation to common accidents on a smaller scale (Diaz, Carrol & Aedo, 2016). In Sweden, which has been progressive in developing the concept, the idea was first applied in small municipalities where semi-professionals can complement the professional response organizations, and in sparsely populated rural areas where civil citizens are often closer to an incident site than the official organizations (Pilemalm, 2018; Ramsell, Pilemalm & Andersson Granberg, 2018). More recently, it has spread to socially vulnerable municipalities and excluded sub-areas in large cities. The concept is enabled by modern ICT, such as people having access to mobile devices with GPS positioning, which can be integrated with the emergency response organizations' systems for dispatching resources. To date, there have been few if any studies on ICT-enabled volunteer engagement in first response in excluded areas within western countries, since the phenomenon itself is rather new. This study focuses on a brand-new initiative using semi-professional (security guards) and citizen volunteers as first responders in collaboration with the municipal fire services, in two municipalities outside the capital of Stockholm. The initiative is aimed at improving safety and the effectiveness of first response and reducing the consequences of emergencies in areas exposed to high rates of crime and accidents. The initiative is studied here as an example of public-sector, ICT-enabled change under the lens of co-production.

1.1. Study aim and objectives

The aim of this study is to explore the concept of engaging civil citizens and semi-professionals as volunteer first responders in socially vulnerable, excluded areas. Specifically, the objectives include:

- Describing the recruitment and tasks of the volunteers and identifying key factors to implement the concept in terms of benefits, challenges and needs.

- Identifying the distinct features of the ICT artefacts as a catalyst for the initiative.
- Comparing the two volunteer groups to see what aspects of the concepts apply to both groups and what differences there are.

The study is a continuation of a previous study of the initiative's early phases with only the citizen volunteers included, presented in Pilemalm (2019). This study adds data from security guards working as first responders in the studied areas, referred to in the study as semi-professionals, and also a comparison between the two groups. Semi-professionals are also seen as volunteers in the study because, even though their engagement is regulated as a collaboration between the fire rescue services and a private security company, the engagement is voluntary, i.e. each individual chooses whether to engage or not, to receive training for the task or not, and can always choose whether or not to respond to an alert from the fire services. Also, theoretical and practical perspectives from the domains of transformational government, co-production, e-government/e-participation, and how they have thus far been applied to citizen engagement in excluded areas, have been added. The intended audience is researchers and practitioners in emergency response, those involved in public-sector transformation, ICT-enabled change and volunteer co-production initiatives in general, and in excluded areas specifically. The study should have international relevance since both volunteerism and excluded areas are growing globally and since our society shares the challenges, even though various countries' structures, regulations and legal mechanisms differ.

2. Background

In this section, public-sector innovation and co-production are first described from a general perspective, then they are related to emergency response and excluded areas. This is followed by a brief description of the initiative under study.

2.1. Public-sector innovation and co-production

Public-sector innovation can be traced back to the 1960s. Recent decades, however, have seen an increasing trend of replacing random initiatives with more systematic work and planned innovations, as a response to pressing societal challenges in an era when the public sector's own resources are constrained (AvBason, 2018). This can take various forms and involves public–public, public–private, and/or public–third-sector partnerships. Another form concerns citizen engagement, which is described from various perspectives, sometimes depending on research discipline.

In relation to this, it is possible to speak about co-production, where different actors, e.g. volunteers, are increasingly involved in public-service delivery, as part of the conception, design, steering and management of services (Ostrom, 2016; Alford & O'Flynn, 2012). From the perspective of e-government, it has also sometimes been described as a form of "do-it-yourself government" or "we-government," where it is argued that, with digitalization, the possibilities to co-produce have increased (Linders, 2012; de Filippo et al., 2016). In comparison with earlier forms of e-government, we-government implies that a certain group of citizen volunteers takes on certain tasks from the authorities, not only for themselves, but also for their co-citizens. This, in turn, requires that their ICT artifacts are integrated with the authorities' own information systems (IS). Speaking in terms of

IS development and research, co-production and we-government can thus be related to concepts of co-creation, co-design and participatory design (PD) (AvBason, 2018; Ostrom, 2016; Alford & O'Flynn, 2012; Schuler & Namioka, 1993). Of particular relevance to this study, it has been argued that designing for and co-creating with vulnerable groups is a key priority to advance and benefit the contemporary service field (Ostrom et al., 2013). From a wider perspective, volunteer co-production opens up opportunities for interesting mergers of research disciplines; for example, policy science and IS, a cross-fertilization which has recently been pointed out in relation to government and a public sector undergoing change (Gil-Garcia, Dawes & Pardo, 2018; Melin & Wihlborg, 2018; Janowski, Pardo & Davies, 2012). This study therefore applies intertwined co-production/we-government/IS perspectives and relates these to the on-going discussion.

In relation to excluded areas, it is sometimes claimed that the social contract between citizens and the authorities is crumbling (Wijkström & Zimmer, 2011). This is especially notable in an increasing number of urban sub-areas characterized by segregation, ethnic diversity and few opportunities for inclusion in society. In these areas, residents experience insecurity and a lack of trust in the authorities and perceive themselves as having little possibility of influencing their environment or even their own lives (Guldåker & Hallin, 2014). Unemployment is usually higher than average, resulting in low socio-economic status, and recruitment to criminality is correspondingly growing, especially among young people (Urinboyev, 2016). Accidents also tend to strike according to patterns related to such aspects as gender, ethnicity, class and living area (Sefyrin & Pilemalm, 2019; David & Enarson, 2012). In this study, these areas are referred to as socially vulnerable areas, or excluded areas. This trend is global and in need of handling. Increased co-production could be one way forward. At the same time, several studies during the recent decade have highlighted that disadvantaged people, such as racial minorities, the less educated and those in lower socio-economic situations, are less willing to participate in co-production (Holmes, 2011). To date, however, there are few if any studies that focus on co-production in the rapidly growing excluded areas in many western countries, e.g. in Scandinavia, simply because they are rather recent phenomena relating to recent global societal development. The same goes for (w)e-government, where there are several studies on citizen engagement in general (e.g. Linders, 2012) but where those on vulnerable or excluded groups tend to focus on the branch of e-participation, often taking place in poor or under-developed countries (e.g., Huffman, 2017; Filho, 2010). There is thus a need to explore co-production (or we-government) in this context, to identify key factors in terms of benefits, challenges and needs and, based on this, to suggest ways forward.

2.2. Volunteer co-production in emergency response in excluded areas

This study took place in the context of Swedish emergency response, referring to actors, technologies, procedures and rules which aim to save lives and minimize human suffering and material damage in emergencies such as traffic accidents, fires and medical situations. In Sweden, various co-production initiatives have been undertaken over the past decade to improve efficiency and overcome long distances by the involvement of various societal resources in day-to-day emergency response, in collaboration with the professional operative response organizations (fire services, ambulance services, and the Public Safety Answering Point (PSAP)). The first example includes cross-

sector collaboration using entirely new occupations; for example, security guards, home-care personnel, taxi drivers and park guards, as first responders. The occupations that are involved have competence and/or equipment suiting first response (e.g. medical training, vehicles) and are already on patrol in society, which means that they might be close to an incident site. Voluntary semi-professionals are employed, or paid, by some level of government (typically local, e.g. municipal) to take on additional tasks in emergency response (SOU, 2018). Thus, they already have their regular full-time employment and add on the new voluntary responsibility as a first responder (Sund & Jaldell, 2018; Venema et al., 2010). The most prevalent group thus far is the collaboration between security guards and the rescue services. In the context of this study, the semi-professionals are guards employed by a large Swedish security company chain, which is privately owned. In public-sector innovation/co-production terms, it is thus a public-private partnership. The concept was first applied in small municipalities which have limited resources at their fire station, or where the fire station was even located in another municipality.

The second example concerns civil volunteers. Citizen volunteers have no formal organizational affiliation (Jaeger et al., 2007; Linders, 2012; Venema et al., 2010; Whittaker et al., 2015). Here, the concept first emerged in sparsely populated rural areas in northern Sweden, where the response organizations are located a long distance from small villages. There is thus a large chance that civil volunteers will arrive first at an emergency site, providing basic first aid while waiting for professional resources (Pilemalm, 2018; Ramsell, Pilemalm & Andersson Granberg, 2018).

Over the past few years, similar initiatives of both kinds have emerged in urban areas, above all located near Stockholm. Stockholm has a population of about ten million people, when the surrounding municipalities are included, and has expanded rapidly in recent decades, due to both urbanization and refugee immigration, not least during 2015-2016. The studied initiative is taking place in two municipalities outside Stockholm, each with about 100 000 inhabitants. Here, the major Swedish Fire Response Association has started an initiative that involves direct collaboration with the two groups of volunteers.

3. Methods

In this section, the general research approach is presented first, followed by the specific data collection methods.

3.1. Case study and action research

The study can be characterized as a case study inspired by action research. The overall study design is an explorative case study (Flybjerg, 2006) in that it views volunteer co-production in emergency response as the overall phenomenon being studied, with comparisons between two volunteer groups. The part involving the citizen volunteers has the twofold character of action research and case-study research, meaning that the study takes place within a project where the researchers aim to develop and improve the initiative together with the participating actors (Denzin & Lincoln, 1998), including the citizens.

3.2. Data collection: semi-structured interviews, pairwise interviews and focus groups

The study was performed as a qualitative study, including five semi-structured interviews, consisting of four individual interviews and one pairwise interview, and one focus-group interview with five respondents (Table 1). In semi-structured interviews, a template or set of themes is usually applied to guide the interview, but no strict adherence to the template is required and respondents are allowed to make other associations during the course of the interview. Pairwise interviews and focus groups work similarly, but enable interaction of respondents, intra-group dynamics and collective views on a particular phenomenon to emerge from a group whose members have experience or knowledge concerning the topic in question (Myers, 2009). A snowball sample approach (Myers, 2009) was chosen since the initiatives are new, emerging and undergoing expansion. For instance, when the civil citizen project started in spring 2018, only about 10 civil volunteers were involved in the system in the excluded areas and it was deemed important to interview those who had responded to several alerts. It was also deemed necessary to include both the operative and the management level in both volunteer groups.

For the civil volunteer initiative, first, a focus-group interview was held with a fire team consisting of one fire chief and three firefighters. Another fire chief joined for the second half of the interview and continued responding to questions after the team had to respond to an incoming emergency alert. The focus group lasted in total for 90 minutes. All focus-group respondents played a role in the citizen volunteer initiative. This was followed by interviews with the instigator of the initiative and the current project leader, who took over from the instigator (both had a background from the fire services but also experience from the ambulance services), and two civil volunteers who were residents of excluded areas and had acted on several alerts. Each interview lasted about one hour. For the semi-professionals, the pairwise interview included the business developer/project leader for the collaboration from the security company and a security guard who was a volunteer first responder. It lasted for about two hours and was carried out during the same period of time as those with the citizen volunteers, in order to enable comparisons.

For all data collection, the same basic templates were applied, but adapted depending on whether someone from the fire services, a semi-professional or a civil volunteer was being interviewed. All interviews were audio-taped and transcribed. For the analysis, a thematic approach was used (Myers, 2009), clustering data into overall themes based on the empirical data and in line with the action-research approach, with a focus on development; for example, key factors, perceived benefits, challenges and needs. Two researchers are involved in the study and performed the data collection together. The author of this paper was involved in all the data collection described below, including the construction of interview templates for both groups, carrying out several of the interviews and the data analysis. The author received feedback from the other researcher on the identified themes.

Table 1: Respondents participating in the study.[1]

Focus group	Fire chief (1+1)	Firefighters (3)		5
Interviews	Project instigator (1)	Project leader (1)	Volunteers (2)	4
Pairwise interviews	Project leader from security company (1)		Security Guard (1)	2
Total number of respondents				11

4. Results

The identified themes are presented in the following. They include an overall description of the respective co-production form, the recruitment process, the ICT artefacts used for dispatching, first-response tasks and the identified key factors in terms of benefits, challenges and needs associated with each initiative. A comparison between the two volunteer groups will be integrated throughout the results section.

4.1. Using civil and semi-professional volunteers as first responders

In the first initiative, the fire association recruits citizens living in socially vulnerable/excluded areas as first responders. The volunteers are provided with one day of basic training in such areas as first aid, heart-and-lung rescue (CSPR), extinguishing small fires and acting in single-vehicle traffic accidents. They also receive a backpack containing a first-aid kit, reflective vests, pocket masks and hand-held fire extinguishers. In the second type of initiative, a large security company is hired by the fire association. This collaboration is much more formalized in that the company has signed an agreement and the security guards can also bring their own equipment to the emergency site. For instance, they have uniforms, fire extinguishers and body armor. They also have their own vehicles, provided by the security company for their ordinary occupation, and have their own training programs in addition to the first-response training provided by the fire association.

But there are also similarities between the groups. In both cases, the idea is not to have the volunteers replace the professional response organizations, but rather for them to carry out first response while waiting for the professionals, in order to reduce first-response time. In addition, acting on the alert is always voluntary. The aims of both initiatives are also twofold; firstly, to create a sense of presence, security and social relations in these areas, and to decrease the incidence of intentional fires (mostly in cars), assaults and vandalism. The security guard claims that their presence patrolling the areas is of great importance, not only to prevent incidents but also to hinder them from escalating:

[1] Table not correctly formatted as to headings in table Should be in bold but this function is dimmed when using table format.

Through my mere presence, I can see to it that they [adolescents] don't do anything against the rescue services or start something else. We have a calming effect. It's taken a few years to achieve this effect, but now we have it.

Secondly, if an emergency occurs, the aim is to have the volunteers act as first responders for certain alerts. To receive alerts, volunteers have to be less than five kilometers away from the emergency site. There is thus the hope of a more effective response if an emergency arises, even if the initiative is taking place in an urban area, where the response times for professional response organizations are relatively short.

4.2. Recruitment of volunteers

During the recruitment process, as for the civil volunteers, the fire services have deemed it important to engage people who have a certain social status in the sub-areas. An example could be the priest of a local church. Another idea is to build on family and social relations; for example, if your relative is a volunteer first responder, you may think twice about setting a car on fire nearby. It has also been shown to be crucial that volunteers who are active in a certain area speak its dominant language and can acts as interpreters, since many people in these areas do not speak Swedish:

A problem was also that everybody believed the entire block was going to burn to the ground. Everybody who lives there ran to their balconies and were about to jump because they thought they were going to die. There were huge problems and no interpreter in place, no one from the fire station. Then I thought, what the hell, it's time to find out if I can be of any help. (Volunteer 1)

A similar motivation is gender related, with the hope that immigrant women will improve their prospects for integration into Swedish society by becoming volunteers. The responders from the fire services described how they have used local-interest associations, the municipalities and related real-estate companies for recruitment campaigns. The volunteers confirmed that they received information about the initiative from their respective real-estate companies. The interest has generally been much higher than the fire services expected. One of the fire chiefs provided an example in which an entire Syrian Orthodox association of about 200 women signed up their interest. This forced the fire services, which pay for all related expenses, to initially turn down many of those who wanted to join in.

An initial fear was that they may recruit individuals who are involved in criminality. Before volunteers undergo training, therefore, they are first checked with the police to discover if they have a criminal record. To date, this fear appears to be groundless:

Even though it is possible that an individual is known to be a criminal by those living in the area but not by us and we recruit them, then they might feel increased trust in us for creating social benefits… Or it will have the reverse effect [on trust] ….it's a break-even.…Those into heavy criminality spreading fear will not show interest; they have so much capital violence to manage, a full-time assignment… (Project leader)

For the semi-professional volunteers, the situation is rather different because the security guards are recruited on the basis of their ordinary job, not because they live in a certain sub-area. Still, the security guard notes that many of the guards who have volunteered for the first response tasks live

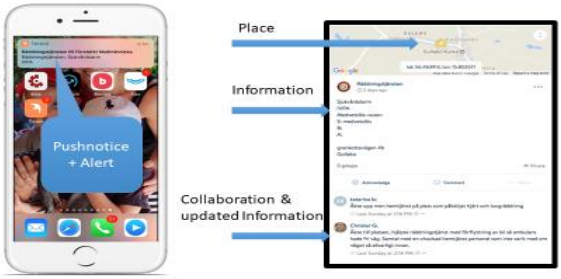
in the sub-areas in which they work, and that the security company has actually attracted people with a previous record of juvenile crime:

When….they actively seek us out to get a job. Then we've reached pretty far in our communications with the community residents…(Security Guard)

4.3. Dispatching of volunteers

The civil citizen volunteers are dispatched by means of a commercial app that was originally developed for security alarms when an elderly person has lost his or her way, and which has been adapted for the current purpose. The volunteers' mobile phone GPS functions are connected to the fire services' system for handling incoming alerts. If the type of emergency is one of those described below, the volunteers will receive an alert with a distinctive signal if they are within a radius of five kilometers of the emergency. The app displays the position coordinates, the address (road, but not specific number), municipality and type of emergency, giving basic information (Figure 1). It also includes a map, and when the alert is triggered a red button appears on the map, indicating the emergency site. Through this button, the volunteers (receivers of the alert) can also communicate with the rescue services and each other, to some extent, and provide updated information about the emergency. It is the fire services' back-office systems that provide the GPS coordinates, the addresses and the information about the emergency, i.e. the volunteers receive the same basic information as the professional first responders.

Figure 1. Dispatching of volunteers through the app. The type of incident here is a single-vehicle traffic accident in which the victim is unconscious.



In the case of the semi-professional volunteers, the dispatching is achieved using hand-held RAKEL terminals. RAKEL is the national radio communication system used in Sweden, used by all the blue-light response organizations, e.g. the rescue services, the ambulance services, the police and the public safety answering point (PSAP). This means that they use the same ICT artefact as the professional response organizations and can communicate with all of them, in real-time. On the other hand, RAKEL is primarily for audio communication, the scope for text-based information is much more limited and the possibility to send pictures and movie clips does not exist. RAKEL is currently in transition from analogue to ICT based, implying that semi-professionals may receive and overhear the analogue communication among the professional response organizations.

4.4. First-response tasks

The civil citizen volunteers are dispatched to the following types of emergency: outdoor fires (e.g. vehicle), fires in buildings, heart failure, single-vehicle traffic accidents and drownings. The emergency should not be risky for them (e.g. uncontrolled fires or a shooting), and they should be able to carry out first response using the kit in their small equipment backpack. The volunteers perform a range of tasks at the emergency site but those reported as most frequent by the volunteers are: extinguishing small fires, checking if the fire has spread and in this case informing the fire services, and backing bystanders and keeping them at a distance when the latter arrives. They have also acted in some single-vehicle traffic accidents and after assaults (but here they must never intervene but await the police) with basic first-aid tasks (band aids, stopping minor bleeding) and providing comfort, and on heart-failure alarms.

The semi-professional volunteers act on a wider range of incidents and perform a broader range of tasks, all of which are regulated in the formal agreement with the fire rescue services. In addition to the types of incidents to which they are alerted, e.g. unintentional fires outside and in buildings and burglar alarms (but this is in collaboration with the police), they are allowed to break into buildings and have the equipment to cut up cars with victims in them. For the semi-professionals, the distinction between what they are and are not allowed to do seems more difficult to control than for the civil volunteers. For instance, the security company's project leader is clear that security guards will not act on suicide alerts. In reality, the security guard interviewed has gone on several of these as he "has never rejected an alert". This is probably a consequence of the guards sometimes overhearing the RAKEL analogue communication among the involved response organizations, which thus enables them to make a personal choice to go, even if this is outside the regulations and they have not been directly alerted. Also, the security guards are not supposed to intervene in assaults. However, the security guard claims that he has been knifed several times. On the other hand, the establishment of successive agreements with the fire services, in other cases, seems to protect the semi-professionals from potential danger:

We found out…that in one of our missions, response operations on drownings were included. But our personnel were not equipped with life jackets, they had not checked this when they trained them. And we ourselves, we never perform swimming tests on our employees. So we basically sent individuals who we had work protection responsibility for, independent of season, to do rescue operations in the water but had not equipped them with life jackets and did not know if they could swim… We have limited this task and written contractual agreements…(Project leader, security company).

The civil volunteers receive a debriefing from fire service personnel immediately after a response operation, but no follow-ups. But, as stated by one of the volunteers, "the fire station is always open". The civil volunteers are collectively insured by the fire association. The semi-professional volunteers, on the other hand, have access to their own debriefing activities, are insured by their own employer and are also provided with vaccination programs, e.g. for Hepatitis B.

4.5. Perceived benefits

In the case of the civil volunteers, it is deemed too early to say whether the major aim of the initiative has been fulfilled. However, it is clear that there is great engagement on the part of the volunteers, and a desire to create a safer neighborhood. Also, when something does happen, volunteers sometimes arrive before the fire services and a single first response can make a major difference, as illustrated by the following quotes:

I was at home and received an alert concerning a fire near a health center. Thought that they wanted to test me to check how I function. I was the first person at the site, it was a car on fire. I extinguished it completely. (Volunteer 1, first alert).

Was at home, 200 meters from me, went there, they are screaming from the balcony that he's died. Seven floors up. He was on the floor, not breathing, I started heart and lung rescue. He comes back, starts breathing. Two minutes later, the ambulance arrives. He's alive. (Volunteer 1, heart failure alert).

Again, communication and acting as an interpreter are central, as well as having knowledge about the area and knowing the people who live there. This is something the fires services and volunteers agree upon:

I believe very much in this. Above all, they might have knowledge of the area and who is the leader, so to speak. When the police take action, the outcomes are often not that good. (Fire chief, focus group, volunteers backing crowds of people)

I have learnt how to "back" a crowd of people. I know the language, I can tell them that this smoke is a cancer risk. (Volunteer 1).

For the semi-professional volunteers, the perceived benefits are very similar, the major reason being that the guards are continually on patrol in the sub-areas so they have no turnout time (the time it takes to leave the fire station). The estimated average time to reach the incident site is 3 minutes and 56 seconds for the entire municipality X, including the most remote areas. For the central municipality, the average time is even shorter.

4.6. Challenges

The major perceived challenge is ensuring that the civil citizen volunteers actually respond to alerts and go to the incident site. Massive interest in recruitment is not the same thing as actually patrolling the neighborhood or taking action when something happens. There are a few enthusiasts who respond to many alerts, but they are often the only ones responding to that particular alert, making first response an individual task. The project leader believes that a potential explanation is that few volunteers know any firefighters and that "the fire services work in an end room". This might result in hesitancy about intervening in an emergency. He also argues that it might have been better to start on a larger scale:

I think I would have started on a larger scale. More volunteers from the very beginning [training/equipping]… to kind of create a feeling of local and not individual engagement.

A related challenge concerns gender aspects. As already mentioned, there was a hope that the initiative would pave the way for women to move into society, and many women did express interest. However, one year later, all the active volunteers are men and the project leader expresses uncertainty when considering how a female volunteer would be seen; for example, when backing people. Also, a common notion among all the fire-service respondents is that communication and learning are top down; i.e., the fire services train the volunteers and tell them what to do, but there is no mechanism for the volunteers to provide feedback or share their knowledge. The project instigator is somewhat self-critical about this:

This is true, and we devoted no time to them teaching us. It's an important point, that this should go both ways…It's not completely unproblematic having a group of more or less ethnic Swedes going to XXX [sub-area] and telling people "this is how it works".

As the initiative progressed, Facebook (FB) groups were started in various sub-areas of the municipalities. However, there is much more activity in those groups that are based in more well-off areas, where the majority of civil volunteers are of Swedish ethnicity. Neither of the two volunteers in the interviews have joined a FB group.

Another perceived challenge is, again, language. It is not optimal to send just any volunteer, but rather one who knows the particular language of those involved in an emergency or the dominant language in the given sub-area. There is also the general challenge of evaluating the concept, both qualitatively and in terms of efficiency; for example, lives saved, response times and monetary value. Since this is an initiative in progress, no such plans had been made at the time of this study. However, they are important for motivating the spread of the concept among municipalities and for decision-making by politicians, among others.

For the semi-professional volunteers, the associated challenges seem rather different. Two-way communication is provided in real-time through the RAKEL system, both with the professional response organizations, and among the security guards themselves. Thus, even though a security guard is trained to go on a mission by him- or herself, also in their ordinary occupation, first response often becomes a collective engagement. The security guard interviewed mentions that he has two colleagues patrolling in the same areas on similar time schedules and that, often, all three of them show up at the site. Neither, somewhat surprisingly, language is not mentioned as a problem; but there is also a difference here because the semi-professionals do not patrol a specific sub-area but rotate between them. As mentioned before, several of them have also been recruited from their own neighborhoods. The semi-professional volunteers also have their own FB groups administrated through the security company. For the security guards, the perceived challenges rather revolve around the agreements regulating their first-response missions and tasks. As mentioned earlier, it has happened that security guards are dispatched to types of incidents for which they are not prepared (e.g. drownings), since this is stipulated in their contracts. Conversely, they sometimes go to incident types that they should not attent, based on personal judgements. Suicide has been mentioned; another example is traffic accidents on the highway E4 passing through one of the municipalities. The security guards' cars are not supposed to go because they do not possess emergency response vehicles and there might be a potential danger to passing traffic if they stop. Nevertheless,

it has happened that guards go on these alerts. Also, in Sweden, the Public Procurement Act currently stipulates that the Swedish municipalities that want to use security guards must in the future perform procurement processes. The security guard company's project leader argues that this may lead to a situation in which those companies providing the service for the lowest price will receive the assignment since no other quality indicators currently exist:

The Public Procurement Act with pricing makes it more difficult for us... I have difficulties imagining that there are companies or branches that have succeeded so well in their integration work as XXX [company name] or the security branch. Because we recruit people from the areas in which we receive the assignment…from the societal categories in which we are and work. Which means that often someone knows someone and so on. And if you can then use them, it's a strength…so that we actually have the possibility to work with an economy so that we can work preventively.

There is thus a fear that the Procurement Act will not only lead to a lower-quality response but that the preventive work, i.e. patrolling the area and talking to young people, preventing them from engaging in crime and creating social relations perhaps leading to recruitment, will diminish.

4.7. Needs

The fire-service respondents agree that the major need is to expand the initiative, in terms of having more civil volunteers acting as safety persons/first responders, making it locality-based rather than individual-based, as expressed by the project leader. The volunteers also see the need to expand, and one of them suggested that they could take part in the recruitment process; for example, by engaging colleagues at their workplace so that they could go on alerts together, knowing each other beforehand.

Apart from this, the volunteers did not express many needs, even though they were asked explicitly. One of them mentioned a warmer jacket and that exercises are good. A concrete need, however, concerns the ICT solution. In the app, the supplier has included a map to more easily navigate to the site. However, the volunteers being interviewed mentioned that they sometimes receive the wrong address from the rescue services, a problem they share with the fire services (since it is the back-office systems that sometimes send incorrect coordinates or information e.g. indicating roads), thus delaying response time:

I don't always know exactly what building or tenement. With a straight address, it would be perfect. In…[sub-area] there are two roads that are often mixed up in the SMSs. Not even the fire station always knows. [Volunteer 2]

The volunteers would thus like to have an extended app version that includes an inbuilt GPS guidance system to the emergency site.

The project leader also mentioned the importance of the app but added that some structure, templates and matching are needed to send the "right" volunteer to the "right" site, reaching different roles, competences and language groups:

If a certain group of immigrants becomes so dominant that we can't reach that group, then we would need an app that could reach that specific group.

As regards the semi-professional volunteers, the need for quality indicators and clear regulations is repeatedly stated by project manager, as described previously. As for ICT, the security guard is content with being able to communicate with the other response organizations through RAKEL, but still describes it as heavy, old-fashioned and clumsy. He requests Android-based mobile solutions through which he can send text-based information, pictures and even video recordings from the incident site, in order to prepare the arriving response organizations better. The project manager suggests a common app/platform for all security guards in Sweden that has taken on first-response tasks, not the least to exchange experiences.

Also, it is likely that the semi-professional volunteers would benefit from the same calibrations of ICT solutions as the civil-citizen volunteers. By matching competence with situation, they might avoid potential risky situations they sometimes encounter today.

The most distinct similarities and differences perceived between the two volunteer groups are summarized in Table 2.

Theme	**Similarities**	**Differences between civil citizens/semi-professional volunteers**
Basic assignment	• Prevention and response • Voluntary and IVPR	• Level of equipment and training • Agreements versus absence of agreements
Recruitment	• In own sub-area	• Gender and social relations aspects more pronounced in case of civil citizens
ICT/dispatch	• Co-production enabled by GPS functionality • ICT support needs to include calibration	• RAKEL radio-communication system versus mobile phones and app
First-response tasks	• First response and aid in relation to e.g. intentional fires, traffic accidents, heart failure	• Semi-professionals are alerted on a broader range of incidents and tasks
Benefits	• On-patrol and near incident lead to shorter response times and sometimes saving lives	• Semi-professional engagement is collective, based on two-way communication, which creates protection and a sense of security.
Challenges	• N/A	• Civil citizens' first response: few individuals may lead to a fear to act, top-down communication, language barriers and low activity on social media • Semi-professionals' first response: agreements, the Public Procurement Act

Needs	• Expanded functionality and calibration of ICT support	• Civil volunteers: basic equipment • Semi-professionals: quality indicators and complementary ICT support with text and picture-based information

5. Discussion

In this section, first co-production and we-government in excluded areas is discussed, including comparisons of the various volunteer groups. The co-production experiences are then related to co-creation and end-user involvement in the design of ICT artefacts. This is followed by a more general discussion of digitalization as an enabler of public-sector innovation and co-production and a more comprehensive comparison of how different volunteer groups can complement and learn from each other.

5.1. Co-production in excluded areas

Public-sector innovation is rapidly transforming our society at a global level, as are initiatives directed specifically towards co-production (Linders, 2012; Alford & O'Flynn, 2012). At the same time, socially vulnerable and/or excluded areas are not new phenomena, in either western or non-western countries, and parallel societal structures and gang criminality have been studied for a long time (Chalfin & McCrary, 2017; Klein & Maxson, 2006). Relating this to co-production, there are studies arguing that security in these areas is not delivered by the police or an authoritarian attitude, but is rather the product of relationships, negotiation and collaboration (Holmes, 2011). Rather, initiatives from "the inside", whereby a community's own residents are recruited to handle criminality and to work with (instead of against) the police have long existed, for example, in shantytowns across the world; albeit not without challenges. Boonyabancha and Keerr (2018), for example, define co-production as:

a process that opens space for poor communities to work with their local governments and other public and private stakeholders to deliver various development goods. (p.44)

However, as mentioned in the background section, several researchers claim that it is more difficult to engage citizens in poor areas in co-production, and these researchers fear that this will strengthen inequality between such residents and citizens living in wealthier areas. Thijssen and van Dooren (2015) argue that more research is needed on how city neighborhoods, social capital and status affect the will to engage in co-production. At the same time, the majority of recent studies on co-production in relation to disadvantaged groups in terms of ethnicity have tended to take place in non-western and/or underdeveloped countries (Holmes, 2011). However, socio-economic gaps are expanding rapidly and related challenges now also include countries where thus far they have not been so tangible. Sweden is a typical example. The country took many immigrants during the refugee streams of 2012–2016 and is currently struggling to provide them with opportunities for integration and access to the Swedish labor market. The term we-government stems from the e-government field, and was coined by Linders (2012) to refer to digitalized citizen co-production, but it has

no current widespread use. Also, when taking the e-government perspective, studies on poor communities or excluded areas also tend to take place in non-western parts of the world and often in studies on e-participation to enhance democracy (e.g. , Huffman, 2017; Filho, 2010). In conclusion, regardless of what term or perspective we choose to apply, studies like this one, reflecting recent societal developments, seem to be needed.

Relating the above research to this study's results, it is clear that the civil volunteers seem willing to engage but do not always feel secure about acting as a safety person or first responder. When making a brief comparison with sparsely populated areas dominated by people of Swedish ethnicity, a different picture emerges (a full comparison is not possible since these studies have spanned longer time periods with more volunteer respondents). Here, volunteerism is a collective effort based on long-term social relations, sometimes also including the victims of accidents. Volunteers never go on an alert alone, and they have been more active in putting explicit requests to the fire services; for example, for trauma support (while one of the volunteers in this study claimed that this is not needed because he had seen worse things in his home country). They also suggested added functionality to their dispatch ICT solutions, sometimes even implementing their own functions (Ramsell, Pilemalm & Andersson Granberg, 2018). This is also true for well-off rural areas surrounding Stockholm, where the same concept is applied within the same fire association initiative and where the civil volunteers are also very active on social media channels (FB groups for each volunteer area).

Of specific interest for this study is also a comparison with the semi-professional volunteers as co-producers of first response. Here, the co-production is rather based on a public-private partnership (Avbason, 2018) where first response is voluntary but where the semi-professionals are much more protected as a volunteer group by the infrastructure and regulations provided by their own employer. For the security guards, taking on first-response tasks implies doing things that are often familiar from their own occupation, but it also denotes acquiring higher status since many guards initially aspired to become firefighters or police officers. Also, first response is much more of a collective effort, based on direct, two-way communication with the professional response organizations. As to co-production, we acknowledge that the choice to see semi-professionals as co-producers in the study context, might be challenged. As argued by Brandsen et al (2018), co-production as applied e.g. in economics and public administration, usually refer to citizen engagement and involvement in public service delivery, not to occupational categories signing up for security contracts with a public authority. At the same time, they point out how increased multi-disciplinary spreading of the concept has caused some blurredness around it and its original definition. In this study, we chose to take the co-production perspective also on the semi-professionals, based on their engagement as voluntary (even though contracts they can always choose to go on they dispatch or not, can always prioritize their ordinary work tasks and do not replace professional response organizations). While we see that this choice might be up to debate, it also opens up for interesting potential of expansion of the co-production concept use, especially in relation to cross-fertilization of various related research disciplines, as discussed in 5.3. Also, the future of semi-professionals in, in this case, emergency response, will play a role in the discussion. For the time being, the security guard company involved in this study have plans for further formalization and steering of the collaboration with the rescue services, which may make them move away from co-production. On the other hand,

in Sweden an increasing number of occupations are seen as candidates for semi-professional response e.g. home care personnel and taxi-drivers. Also, in the (at the time of writing) on-going Covid-19 pandemics, medical students are currently signing up for voluntary work at the hospitals without contracts, thus blurring the concept between semi-professional and voluntary/citizens engagement even more.

A conclusion regardless of what we chose to call it, is that the civil citizen volunteer concept can learn from the concept of semi-professionals in relation to these aspects, e.g. by developing two-way communication and learning with the rescue services and by aiming for collective, larger-scale recruitment through the snowball effect. Such active support for collective, long-term engagement might reduce the potential fear about acting on an alert, and thus reduce some of the challenges faced by citizen co-production in excluded areas, as suggested by the research above. Some of these support measures have also been suggested by the respondents themselves. Another suggestion is that civil citizen volunteers could receive some kind of certification to put on their CVs, stating that they have received basic first-response training and acted on alerts. This could motivate and stimulate long-term integration into working life, or even enable their engagement as part-time fire fighters, of whom there is an insufficient number in Sweden. In the USA, the government has tried a similar approach with CERT projects, referring to certified volunteers who are trained to work in emergency response teams (Brennan, 2005). Certification aspects also relate to gender aspects, even though the gender issue seems tricky and requires many more aspects to be considered in the recruitment and engagement process.

5.2. Co-creation and end-user involvement

Co-production is often related to co-creation (Alford & O'Flynn, 2015) but as increasing numbers of ICT applications are easily available off the shelf from commercial suppliers, co-creation of the artifact itself is often forgotten. This is also evident in this study, where the commercial app has thus far not been created together with users, and does not include the functions for GPS navigation, calibration, language or withdrawal suggested by participants in this study. Additionally, the standardized RAKEL radio communication system has been handed over to the semi-professionals without their co-creation; and even though, overall, the two respondents seem content with, primarily, the function of real-time communication with the professional response organizations, they miss functions related to the transfer of text and pictures from the incident site, and have requested smartphone solutions. Of interest when comparing the two volunteer groups is Ramsell, Andersson Granberg and Pilemalm's (2019) work, in which a mobile app prototype was developed together with semi-professional and civil volunteer first responders in rural areas (end-users), along with the surrounding infrastructure (e.g. training, equipment, legal aspects), even though commercial applications for the purpose existed. First, this resulted in additional and partially different functions from those available in the app in this study, which were based on user needs and in line with other features of the collaborations, which might contribute to a more efficient first response and long-term engagement. Second, the study suggests that the same ICT solution, with only slight modifications, will function with both volunteer groups. In the study, basic functions had been developed and tested, and these tests gave rise to new suggestions about needs and functions; for example, to

receive information about when professional responders will arrive, to be able to see which equipment the responders are bringing, to detect when a responder has arrived and log this automatically, and the ability to send coordinates, pictures and video from the incident site. This strongly reflects the needs identified by this study and was discussed by both voluntary groups. Differences among the two groups related rather to the prioritization of importance of various functions and some design features. This indicates that, even though the incident types, tasks and, above all, the surrounding infrastructure of the respective volunteer groups differ to a certain extent, the same or very similar ICT artefacts and functions apply. An interesting, but challenging, future co-creation task is to determine how to combine the best of both solutions; i.e. RAKEL's direct communication possibilities and straight connection to the back-office systems of various response organizations with the advantages of the mobile app solutions, and whether this is feasible, both practically and legally.

From a wider perspective, co-creation has become something of a buzzword, not the least in urban governance and often for the purpose of including and empowering marginalized groups (Hedensted Lund, 2018). Corresponding IS development approaches that include user involvement rely on the active participation of users, when developing both the ICT artifacts themselves and the surrounding infrastructure (Schuler & Namioka, 1993; Hillgren, Seravalli & Emilson, 2011). In particular, Participatory Design (PD), which has clear political and ideological roots, has been applied to provide exposed societal groups with an opportunity to influence their own situation and environment; for example, in urban planning, in third-world countries and among charities working for homeless people (Halskov & Brodersen Hansen, 2015). Gender relations have also been highlighted by the PD community; for example, how they affect power structures in design groups (Balka, 1997). The need to achieve the co-creation/PD of the collaboration and ICT support is also highlighted by this study. But this implies that you have volunteers to work with in the first place. To date, relatively few citizen volunteers go on the alerts and female volunteers do not exist at all. This reveals a distinct difference from the semi-professionals, many of whom have chosen to take on the tasks, including female security guards. It was also perceived to be difficult to access the citizen volunteers as study respondents (they did not want to be interviewed, which may have been due to such issues as language barriers). These challenges are in line with a recent study on six co-design sessions, suggesting that vulnerable user groups cannot be approached in the same way as in conventional user-involvement processes, and proposing alternative design frameworks involving various games and card exercises, along with intersectional perspectives (Dietrich et al., 2017). On the other hand, Hedensted Lund (2018) concludes that there might be benefits to gain from including citizens in innovation and co-creation processes based on their knowledge, resources, assets and competences, rather than as representatives of certain societal groups, at the same time as this implies a risk of urban development becoming depoliticized.

In conclusion, applying co-creation, co-design and PD alternative frameworks and methods to encourage user involvement may certainly be considered in any future expansion of the collaboration and design of related infrastructure and ICT artefacts in the studied initiative, above all to overcome potential language barriers. However, since the study results rather suggest that the most significant challenge is to involve the citizen volunteers in the first place, it seems much more important to view them as assets based on their achieved competence and experience of first response. Here, it is also possible to consider workshops bringing together the rescue services, semi-professionals and

citizen volunteers. Having the rescue services act as a kind of facilitator between researchers and citizen volunteers might contribute to overcoming barriers, and mixing the two volunteer groups might add to the dynamics and joint design of future ICT applications. On the other hand, this must be carried out carefully because there might also be competitiveness between the two groups. In particular, the project leader from the security guards stated that he saw citizen volunteers in general as a risky group to involve in first response and that semi-professional volunteers are more suited to the task.

5.3. Digitalization as an enabler of public-sector innovation and co-production

The emerging trends all feature digitalization and modern ICT as an enabler. Nevertheless, as argued by Ramsell, Pilemalm and Andersson Granberg (2018) there are relatively few studies that focus explicitly on the direct relation between co-production and ICT artifacts, even though it has been pointed out that ICT can support co-production (Verschuere, Brandsen & Pestoff, 2012). In emergency response, Díaz, Carroll and Aedo's (2016) study is an exception. Even fewer, if any, studies focus explicitly on the ICT artifact itself as a catalyst of co-production. This is true for public-sector innovation in general, including in emergency response. The increased importance of effective emergency response, the transformation of over-stretched public-sector organizations in general having to serve increasing populations in an area of social unrest, and this study's findings, illustrate the need to bridge this gap.

At first glance, the citizen volunteer initiative seems broad and the ICT artifact plays a less-than-central role, with a basic app solution working sufficiently in most cases, even though GPS guidance has been requested. However, the data analysis indicates that, for the initiative to be successful and to expand, the design of the ICT artifact can contribute significantly. Future app solutions should be able to handle calibration of the volunteer concept by adding functions that allow for dynamic resource dispatching, as outlined in the results section. This is also the case for semi-professional volunteers. Although, at first glance, RAKEL seems an effective communication system, lack of calibration and steering actually provides the semi-professionals with the possibility to go on alerts which they are not allowed to act upon, and they sometimes do so. Also, it is interesting that the civil volunteers have Android solutions with more modern interfaces and the possibility to communicate by text and send pictures. In contrast, the semi-professionals have an older solution that provides them with direct communication to the response organizations and with geographical positioning but lacks the above, and where the remaining analogue information sometimes actually exposes them to danger. Again, ICT solutions incorporating the best functions of the two may positively affect both collaborations. In order for the whole system to work, there is also a corresponding need for a thorough analysis of the necessary features and interfaces in the fire services' back-office systems which are to provide this information. Also, here, the overall infrastructure needs to be handled, not least because the office systems sometimes provide the wrong address and/or inexact coordinates. In terms of service design, an emergency response process can be divided into two parts, the service-providing process and the service-supporting process (Kling, McKim & King, 2003). Paying attention to both these processes, including giving correct information to mobile solutions with attractive, easy-to-handle interfaces, and offering improved communication between the fire ser-

vices and volunteers, may also contribute to more volunteers acting on the alerts. This in turn includes the necessity to involve additional stakeholders, such as the fire services, the PSAP, the suppliers of the back-office systems and possibly the ambulance services.

In many sub-areas there are frequent alerts but few civil volunteers responding to them. A more secure solution, with an added function allowing withdrawal if an emergency should turn into something that is dangerous to the volunteers (e.g. toxic fumes, gunfire), may reduce fear about responding to an alert and stimulate long-term engagement. For the semi-professional volunteers, a withdrawal function also seems suitable, but in this case it should also prevent them from going to events at which they should never be present in the first place. In relation to this, similar studies in rural areas (Ramsell, Pilemalm & Andersson Granberg, 2018) have shown that, even when collective insurance is provided, the volunteers are not sufficiently protected by the current Swedish legal system. It seems even more important to address policy and liability issues in areas exposed to high rates of criminality risk, and this may also influence civil volunteer engagement in a positive way.

From a wider, public-sector perspective, the bi-directional influence of technology and various forms of governance has been recognized for over a decade, and was again pointed out recently (Shan, Wang & Li, 2012; Loukis et al., 2016). Relating this to the research field of IS, the discipline has often drawn upon other disciplines when needed (Watson et al., 1997). Several recent studies have claimed the benefits of and need for a cross-fertilization of policy science and IS research perspectives, relating explicitly to emerging forms of government in this era of digitalization (Gil-Garcia, Dawes & Pardo, 2018; Melin & Wihlborg, 2018; Janowski, Pardo & Davies, 2012). This study's findings are in line with this research since digitalization/ICT development needs to consider such issues as the regulations and laws determining what volunteers are allowed to do and what information the alerts can and cannot include. The author of this study has previously argued that there is a need for pronounced interdisciplinary development teams in the case of emerging collaborative forms of public-sector innovation, including cross-sector collaboration and the use of volunteers (Pilemalm, 2018). Adding the above competences to more traditional systems (or business) development teams seems crucial in the context of the current study. On a more theoretical level, it is also interesting to note the dual use of co-production and we-government stemming from the e-government in this study, even though co-production may be viewed as a perspective or theory, while we-government is a term that is used in only a limited number of studies (e.g. de Filippo et al., 2016; Linders, 2012). However, they refer to the same phenomenon and the distinction between them does not seem clear, even though digitalization is more pronounced in the case of we-government. The same goes for the more practical level, where co-creation and participatory design actually set out to do the same basic things, often with ideological connotations, even though they stem from different research fields. Also, as discussed in 4.1., there might be a need to expand on the co-production concept itself with regards to how it relates to volunteerism. Finally, and taking this one step further, this study argues for an even wider exploration and integration of research disciplines, especially when turning to excluded areas, and initiatives involving the residents living there. From both a co-production and a co-creation perspective, it is plausible that the initiatives would benefit from adding research perspectives from other disciplines, in order to expand the knowledge base and enable participation. Examples may include sociology, intersectional perspectives and criminology.

6. Conclusion and future work

This study set out to explore the concept of volunteer co-production, engaging volunteers as civil citizens or semi-professional first responders in socially vulnerable areas, with a focus on identifying the key factors to consider in the implementation aspects and with the ICT artifact as a catalyst. The study also includes a brief comparison between the two groups.

The study concludes that volunteers with basic equipment and training can make a significant difference if they arrive first at an emergency site. The major challenge is actually having civil volunteers respond to an alert and go to the site. Other challenges relate to gender and increasing the opportunities for immigrant women in Swedish society, to language barriers, and to changing the one-way communication from the fire services to volunteers into a two-way flow. Semi-professional volunteers are much more protected because they already belong to a private-public co-production partnership within which their own organization provides regulations, training, debriefing, complementary equipment and so on. Here, the challenges relate rather to quality indicators, handling the Swedish Procurement Act and actually, in contrast to citizen volunteers, preventing eager volunteers from acting on alerts they are not allowed to attend. The ICT solutions provided for citizen volunteers are basic and accessible because they are installed on the volunteers' own mobile phones. Still, they are central to engagement, allowing for the dispatching of volunteers who are near to an emergency. Current solutions for both groups work sufficiently well, but for optimal usage and expansion of the initiative, ICT solutions supporting dynamic resource allocation (role, competence, language, situation), communication among volunteers that also employs text and pictures, and withdrawal functions are suggested. It is interesting to note that, even though the semi-professionals in the study to a certain extent saw the citizen volunteers as competitors, if they could complement and learn from each other (e.g. providing language knowledge versus equipment) and act jointly, both groups, emergency response, victims, the public sector and society as a whole would be likely to benefit.

Previous research has argued that the need to mix perspectives from IS research with policy science becomes particularly pressing in a public sector where new forms of government relying on digitalization – for example, governance, policy networks, co-production/we-government and citizen engagement – are rapidly emerging (Gil-Garcia, Dawes & Pardo, 2018; Melin & Wihlborg, 2018). In particular, policy and liability issues need to be addressed in the emerging volunteer first-responder initiatives. Perhaps most importantly, the issue of directing volunteers to the right situations, i.e., those that do not put them in danger (e.g. shootings) or incidents that they are not psychosocially prepared to handle (e.g. suicide) must be addressed urgently. As mentioned earlier, the past decade of studies of co-production in excluded areas have thus far almost exclusively focused on shantytowns and/or poor countries (e.g. Cepiku & Filippo Giordano, 2014). The same goes for the (w)e-government perspective, where digitalization has often been seen as an enabler of e-participation and online citizen engagement (e.g. voting) aimed at increasing democracy in poor countries. This is nothing remarkable given that excluded areas in many well-off western countries like Sweden are a phenomenon that has emerged and expanded rapidly only during the past five years. Nevertheless, if something happened to a volunteer, this would probably endanger the entire initiative, especially in the case of civil volunteers that are not currently sufficiently legally protected.

Since the initial version of this study (Pilemalm, 2019) was written, it has occurred that also citizen volunteers have been exposed suicide alerts by mistake (but not sent since the dispatching is overheard by the PSAP). Again, the ICT artefact and the surrounding back-office systems are central to the entire collaboration since they notify, dispatch and direct the volunteers. A conclusion drawn from this study, taking the empirical data into a wider public-sector innovation context, is also that many theoretical aspects, approaches, concepts and terminologies used in policy science and IS research, respectively -- for example, co-production/we-government, co-creation/participatory design -- overlap in many respects. More research in terms of distinctions, similarities, differences and potential synergy effects (or challenges) of using them in complementary ways, is needed. Also, relating to the definitions and discussion by Brandsen et al (2018), and in times of volunteerism urgently needed in public service delivery, not the least in emergency response and crisis management, co-production stands at the cross-roads. An expansion and renewal of the concept might be needed. An additional conclusion is that additional intersectional perspectives and disciplines, not least from the field of sociology, become equally important, in this and similar initiatives, in a society where their number is likely to increase.

6.1. Future work

A limitation of this study is that only two citizen volunteers and two semi-professionals were interviewed, and thus the perspective of the fire services is most prevalent. At the same time, the pictures painted by the fire services and the civil volunteers overlap in many respects, somewhat compensating for this. Since this study was performed, more interviews with more civil volunteers, e.g. pointing at similar needs for working with all ICT solutions involved, to avoid incorrect or risky dispatching. In the case of semi-professionals, more security guards at the operative level should be interviewed to provide a more comprehensive picture. Relating current limitation to future work, the app is currently being further developed and also connected to fire detectors in a number of selected tenements, allowing it to also include unintentional fires, for which excluded areas are also over-represented (Sefyrin & Pilemalm, 2016). Research and co-creation/co-design will be continued, with specific attention being given to vulnerable groups; for example, in upcoming workshops and focus groups, to reach more volunteers (both civil and semi-professionals), the municipalities, the fire services, the PSAP and other relevant stakeholders, in order to address the challenges and needs identified in this study. The gender and ethnicity aspects will be addressed by involving a researcher who has studied them previously in IS, public-sector and emergency-response contexts and by working closely with a person employed by the involved real-estate company to involve more female volunteers. Qualitative and quantitative variables are currently being identified and integrated into the app solution, in order to be able to evaluate the citizen initiative and its transferability to other, similar contexts, both in Sweden and internationally.

At a more general level, it is of specific interest to look further into how the original concept, first developed in sparsely-populated, rural areas (civil volunteers) or small municipalities (semi-professionals), can be transferred to urban contexts, what modifications should take place, and also whether the volunteer groups can learn from each other and work together. Sweden is perceived as progressive in terms of organized, long-term, volunteer engagement in emergency response, while

most international studies tend to focus on issues such as on-site volunteers, large-scale crisis management and crowdsourcing (Ramsell, Pilemalm &Andersson Granberg, 2018). As pointed out by these authors, the types of emergencies have both similarities and differences, but being able to use the same volunteers in all of them would be beneficial, because they would be accustomed to the ICT solutions and work procedures. In relation to large-scale crises, future research could thus focus on this dual use of volunteers, not least in Sweden since the government is currently planning for the large-scale digitalized coordination of volunteers, in the aftermath of the widespread wild forest fires in 2014 and 2018 and, not the least, the ongoing COVID- 19 pandemics.

Finally, in the general context of public-sector innovation and digitalized transformation, it would be of interest to perform a conceptual study of how various research disciplines, theories and practices relate to and can enrich each other in the fields of policy science, IS and (w)e-government.

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Transforming Government by Leveraging Disruptive Technologies: Identification of Research and Training Needs

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Abstract: While the public sector traditionally lags behind business in innovation, significant changes are anticipated with the broad diffusion of so-called disruptive technologies. The use of such technologies in public service, along with possible benefits, need to be well researched, and challenges be carefully discussed, analysed and evaluated. This paper applies scenario-based science and technology roadmapping to identify research and training needs in the implementation of disruptive technologies in public service. 70 experts reviewed 13 future scenarios and derived a number of research and training needs regarding internet of things, artificial intelligence, virtual and augmented reality, big data and other disruptive technologies. The identified needs serve as a starting point for a broader and more informed discussion about how such new (disruptive) technologies can be successfully deployed in the public sector - leveraging the benefits of these technologies while at the same time constraining the drawbacks affiliated with them.

Keywords: digital government, disruptive technologies, research needs, training needs, scenario-technique

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1. Introduction

The emergence of new innovative technologies leverages faster digital transformation in the public sector. Disruptive technologies offer potentials of making governments more efficient, effective, open and transparent, which are core desiderata of public sector modernization (Cordella & Bonina, 2012; Heeks, 1999; Milakovich, 2012; Weerakkody, Janssen, & Dwivedi, 2011). Therewith, citizen and stakeholder involvement in data provision and co-creation moves on to a next level of engagement.

Digital transformation characterizes the attempt of modernizing government and public service provisioning through the use of information and communication technologies (ICT). Digital government or electronic government (both concepts are used synonymously) coin the core concept for the provision of digital public services. Both terms characterize the desire of increased efficiency, effectiveness and improved quality of services for citizens and businesses through the use of ICT as is argued in many scientific publications (see e.g. (Brown & Brudney, 2001; Fang, 2002; Gil-Garcia & Martinez-Moyanoc, 2007; Yildiz, 2007)). Over the past two decades, both conceptual terms adjusted their breadth and depth of the understanding along with the changes in the expectations and needs of citizens and the increasing ubiquity of technology in society. While recently, 'digital government' is more commonly used in international scientific literature, the term 'electronic government' is maintained mostly in more practitioner-oriented strategies and implementation contexts of government actors. In this paper, we therefore continue to use digital government.

The changes in the way public services are provided evidence distinct stages of the digital government evolution (Baumgarten & Chui, 2009; Mukabeta Maumbe, Owei, & Alexander, 2008). Cathegorizing the initial digitalization with Government 1.0, the increase in participatory services and social media use by the public bodies parallel to the emergence of Web 2.0 allowed speaking of Government 2.0 or participatory government (Baumgarten & Chui, 2009; Bonsón, Torres, Royo, & Flores, 2012; Chun, Shulman, Sandoval, & Hovy, 2010). This stage corresponds to Janowski's third stage "Engagement or Electronic Governance" in his four-stage classification (Janowski, 2015), which the author describes with increased participation and engagement, trust-building and focus on transparency and accountability.

Lachana et al. argue that the use of new disruptive technologies in the public sector moves digital government to a new stage: Government 3.0 (Lachana, Alexopoulos, Loukis, & Charalabidis, 2018). This new stage is characterized by the extensive use of disruptive technologies for the provision of customized services and data-driven evidence-based decision making (Pereira, Charalabidis, et al., 2018). The term "disruptive technology" refers to the technologies, whose application has potential to drastically alter the processes and operations in a particular field of the public sector (Christensen & Raynor, 2003; Kostoff, Boylan, & Simons, 2004). Artificial intelligence (AI), Internet of things (IoT), natural language processing (NLP), Virtual and Augmented reality (VR, AR), big data and block chain are such examples of technologies, as they may lead to significant changes in the way services are produced and consumed both in the private and recently in the public sector (Brennan, Subramaniam, & van Staden, 2019). Disruptive technologies may impact competition and the way performance is measured (Danneels, 2004, p. 249). In the public sector, this also means that citizens' expectations (both technological and organisational) are changing. Recent literature calls this phenomenon 'digital Government 3.0' (Pereira, Charalabidis, et al., 2018), which embodies its own

unique challenges. Government 3.0 largely corresponds to the fourth stage of Janowski's classification: "Contextualization or Policy-Driven Electronic Governance", which emphasizes the contextualization of the digital government efforts (Janowski, 2015).

The diffusion of Government 3.0 poses a number of research and training needs to foster success in digital transformation of governments using disruptive technologies. This paper aims to identify and systematize these research and training needs by using an adapted approach of policy-oriented science and technology roadmapping (for an overview see (Wimmer, Codagnone, & Ma, 2007)) paired with the scenario technique (Janssen, Van Der Duin, & Wimmer, 2007). The work was carried out along the Gov 3.0 project (Gov 3.0, 2018a), which is concerned with establishing Government 3.0 as a research domain and with creating a Master curriculum addressing the needs of this new digital government stage. It extends previous work from the Gov 3.0 project on applying the scenario technique (Ronzhyn, Spitzer, & Wimmer, 2019) and on identifying new research and training needs (Ronzhyn, Wimmer, et al., 2019).

The remainder of the paper is as follows: Section 2**Fehler! Verweisquelle konnte nicht gefunden werden.** reviews literaure of digital transformation and the evolutions of digital government towards Government 3.0. Furthermore, different disruptive technologies are briefly summarized to ensure common understanding of these technologies. The science and technology roadmapping methodology for identifying research and training needs on Government 3.0 is described in section 3. It is based on the collection of inputs from experts and students participating in four workshops, where scenario technique was used. Therefore, in subsection 3.2, one scenario is sketched textually and with a poster visualization to exemplify the artefact used in the interaction with experts and students. Section 3.2 summarizes the research needs, while section 0 outlines the training needs identified so far. In section 5, the findings are discussed in view of current research. Finally section 6 concludes with further research.

2. Digital Transformation of the Public Sector

Digitalization emerged as a main driver of human socio-cultural evolution and changing society by increasing connectivity and converting process and information from analog to digital, enhancing communication and interaction between people, organizations and things (Linkov et al., 2018; Loebbecke & Picot, 2015; Scholz et al., 2001). Driven by the technological transformation, new institutional arrangements emerge requiring a change on the roles and competencies to deal with new societal and business models (Hinings, Gegenhuber, & Greenwood, 2018; Loebbecke & Picot, 2015). According to (Hinings et al., 2018), altought being driven by rapid and disruptive changes, digital innovation and digital transformation have an important role in institutional change as a socio-cultural process.

In the public sector, the use of innovative ICTs is an integral part of governments' modernization strategies including digitalization (OECD, 2014). Beyond the generic understanding of this concept as outlined in the introduction, digital government is affiliated with a number of value expectations along this transformation. For example, Lindgren and van Veenstra review the literature and summarize the concept as a combination of organizational change and new digital technologies, creating

new forms of governance with three main objectives: deliver public value, improve service delivery and increase government responsiveness and openness (Lindgren & van Veenstra, 2018).

The digitalization in the public sector follows an evolutionary (but not necessarily linear) process of adopting necessary capabilities and models of electronic and smart government, followed by the development of effective smart governance settings and the collaborative environment, which characterizes them (Pereira, Parycek, Falco, & Kleinhans, 2018). According to Janowski, the digital government evolution goes from no governmental transformation, to internal government transformation, transformation that also affects the relationships between government and non-government stakeholders, and finally transformations that depend on the national, local or sectoral government context (Janowski, 2015).

The aforementioned characterizations of digital government help in understanding public sector transformation and its manifold directions. Different authors relate government's digital transformation to a new way of delivering public services through the integration of innovative technologies and through changing needs, which requires a user-driven administration and clear value delivery (Eggers & Bellman, 2016; Mergel, Edelmann, & Haug, 2019). Mahmood and Weerakkody summarize these ultimate goals as better performing government, more satisfied citizens and the restoring of citizens' trust in governments (Mahmood & Weerakkody, 2016).

In the past decade, society is being reshaped by new and innovative technologies that are envisaged to making the world smarter and more interconnected, embedding services, products and people in broader ecosystems (Scholz et al., 2001). In the public sector, this is expanded towards smart and connected public services (including e.g their related co-design and development), smart decision-making processes, integrated public policies, and new governance structures. Thereby, digital technology, which is defined by Scholz et al as general-purpose technoplogies, including pervasive computing, distributed systems, networks, systems of systems, or the Internet of (Every-) Thing (IoT) (Scholz et al., 2001), is employed.

Taking the above expectations of government's digital transformation and emergence of innovative technologies one step further brings us to Government 3.0. Government 3.0 is a recent evolution, which receives the attention of academia and practice alike. Charalabidis et al review the three generations of electronic (or digital) government and outline Government 3.0 along the following characteristics (Charalabidis, Loukis, Alexopoulos, & Lachana, 2019):

- Main goal: Societal problem-solving, citizen well-being, optimization of resources
- Main method: Smart governance and data-intensive decision- and policy making
- Usual application level: Local to international
- Key tool: Ubiquitous sensors, Smart devices, Applications (Apps), Artificial Intelligence (AI)
- Key ICT area: AI and Internet of Things (IoT)
- Most needed discipline, beyond ICT: Wide variety, depending on the application area.

Given these many facets of Government 3.0, substantial research is needed to better understand

a) how and where these disruptive technologies can be effectively and efficiently employed in government decision-making to create added value,

b) what organizational, legal, governance, socio-cultural and other changes are needed to successfully realize digital transformation and to leverage the benefits of the new technologies in policy-oriented decision-making and in public service provisioning, and
c) what the potential positive and negative impacts and consequences of using the above-mentioned disruptive technologies are, on society and economy as a whole, as well as on individual citizens and employees.

Identifying and systematizing the research needs emerging from Government 3.0 is similarly substantiated by Chun et al, who argue that creating "innovative disruptions" "*requires governments to develop strategies and models for how to use these enabling technologies to achieve a transformation of every aspect of government, such as service provision, decision and policy making, administration, governance and democracy*" (Chun et al., 2010). Innovative disruptions are defined as processes of change which are substantially different from the classical approaches or ways of delivering services or products (Christensen & Raynor, 2003; Kostoff et al., 2004). Effectively exploiting the benefits of new and emerging technologies in the public sector also requires such substantial changes.

In order to identify and systematize the research and training needs to foster success in digital transformation of governments using disruptive technologies that emerged with the diffusion of Government 3.0, we first briefly outline some key disruptive technologies studied in the work of Gov 3.0:

Artificial Intelligence (AI) and Machine Learning (ML): AI refers to capabilities of machines to demonstrate cognitive functions typically associated with human intelligence, usually to solve certain non-trivial problems or make decisions (Russell & Norvig, 2009). Computers use machine and deep learning algorithms to collect information and acquire knowledge to make autonomous decisions. Thus, ML is considered as an enabling technology for AI. Chui et al consider ML as "*the field of study that gives computers the ability to learn without being explicitly programmed*" (Chui et al., 2017). According to Luger, AI and ML are important components of many other technologies like social bots, natural language processing, computer vision, gaming-based simulations and others. Applications in the public sector are e.g. in healthcare, military, finance and economics (Luger, 2005), especially in relation to automatic decision-making, perception and planning (Russell & Norvig, 2009).

Big Data and Data Analytics: Big data is characterized by the three V's: big volume, velocity and variety of data (Laney, 2001). Big data can help governments improve their efficiency, effectiveness and transparency (Milakovich, 2012) by e.g. enabling better and more informed decision- and policy-making (Janssen & Kuk, 2016) through analysis of available data, faster and richer images of evolving reality, and improved services based on better insight into citizen demands and needs (Chen & Hsieh, 2014).

Augmented and Virtual Reality (AR and VR): Virtual reality is a simulation, in which computer graphics are used to create a dynamic realistic-looking world, which a user can interact with by using certain input methods (Burdea & Coiffet, 2003). Augmented Reality seamlessly bridges the gap between the real and the virtual by adding virtual elements to the user's view of the reality aiming to enrich it and to provide additional information or features (Lee, 2012). AR and VR are applied to visualize data e.g. in healthcare, urban planning, transportation, policing, surveillance

and more effective collaboration between public workers (Bermejo, Huang, Braud, & Hui, 2017; Huang, Hui, & Peylo, 2014). AR has also a great potential for increasing the interactivity of citizen-oriented services, for example to increase engagement of the young generation as a part of gamification of e-participation initiatives (Argo, Prabonno, & Singgi, 2016).

Gamification: Gamification is a technique to enhance "*a service with affordances for gameful experiences in order to support users' overall value creation*" (Huotari & Hamari, 2017). In the public sector, it is applied to leverage the motivational potential of games and game-play in order to promote participation, engagement, persistence and achievement (Hassan, 2017; Richter, Raban, & Rafaeli, 2015), e.g. in education, democratic engagement or healthcare (Kim & Werbach, 2016), or to influence citizen behaviour to tackle smart city concerns (Schouten et al., 2017; Kazhamiakin et al., 2016).

Simulation and Policy Modelling: Policy Modelling refers to the use of different theories and quantitative or qualitative models "*to analytically evaluate the past (causes) and future (effects) of any policy on society, anywhere and anytime*" (Ruiz Estrada, 2011). Therewith, simulation models are generated to explain causal effects on behaviour, circumstances and influence factors on (public) policies. Policy modelling and simulation techniques can be used on micro or macro level, or to simulate and understand social behaviour (Majstorovic, Wimmer, Lay-Yee, Davis, & Ahrweiler, 2015). Therefore, better informed decision- and policy-making is supported.

Internet of things (IoT): IoT refers to the "*interconnection of sensing and actuating devices providing the ability to share information across platforms through a unified framework, developing a common operating picture for enabling innovative applications*" (Gubbi, Buyya, Marusic, & Palaniswami, 2013, p. 4). IoT is often used as a supporting technology which aids in the realisation of smart city and smart healthcare paradigms.

The different technologies outlined above are not to be considered in isolation in the subsequent work; in fact, some of these technologies substantially increase their potential in the combination of different disruptive technologies. The scenarios developed in the Gov 3.0 project (see an overview in the next section) demonstrate such combinations.

3. Methodological foundations

To identify research and training needs for digital transformation in the context of Government 3.0, we applied an adapted approach of policy-oriented science and technology roadmapping, which was customized over the years to develop a) a research roadmap for e-government (Codagnone & Wimmer, 2007), b) ICT-enabled governance and policy modelling (Bicking & Wimmer, 2011), c) to define the grand challenges of ICT-enabled public policy-making and governance (Majstorovic & Wimmer, 2014), or d) to spot the research and implementation requirements to successfully implement the once-only principle[1].

[1] SCOOP4C, see https://www.scoop4c.eu/index.php/node/527 (last access: 10th February 2020)

3.1. Research approach for the study

The overall approach for identifying research and training needs on Government 3.0 consists of four steps, which we applied in a similar way to the work at hand (see Figure 1):

i) review of the current status of research/development;
ii) scenario development to depict potential future applications;
iii) analysis of the research and implementation needs / gap analysis; and
iv) development of a roadmap / spotting key research needs.

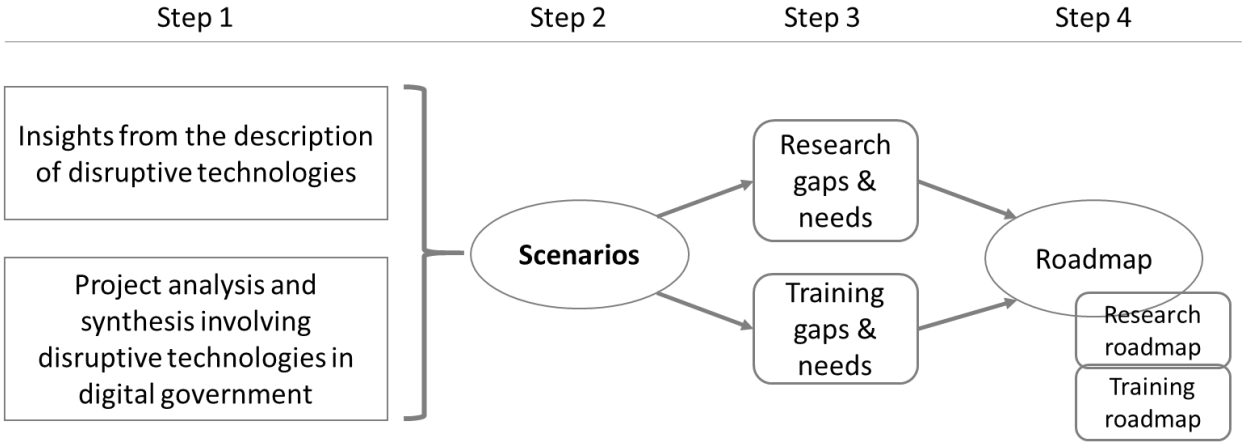

Figure 1: Research design to investigate research and training needs on Government 3.0

The **first step** was conducted using literature reviews on the use of disruptive technologies in Government 3.0 (1039 articles, see (Gov 3.0, 2018b)) combined with analysis of existing projects (a total of 281 projects, see (Gov 3.0, 2019)). The findings of the status-quo analysis built the foundations for developing future scenarios.

In **step two**, the scenario technique was used. The use of future scenarios is an established method to explore research needs along possible futures in various fields, both public and private (Ratcliffe, 2000; Schwartz, 1996). Scenarios typically describe possible future developments in a specific area (Johnson et al., 2012), detailing the involvement of various stakeholders and interplay between these stakeholders (Carroll, 1999). Scenario technique helps to enligthen a problem from different view-points and to better understand possible future evolutions (Janssen, Van Der Duin, Wagenaar, et al., 2007), thus improving decision-making (Ringland, 2002). In contrast to forecasts and prognoses, scenarios depict possible developments with varying degree of probability, rather than identifying the most probable future (Bohensky, Reyers, & Van Jaarsveld, 2006; Peterson, Cumming, & Carpenter, 2003).

The scenario method as used in this research was employed in the following way: First, future scenarios describing the use of a set of disruptive technologies were developed by the research team. In total, thirteen different scenarios were developed (some of them were discussed at more than one workshop, others were evaluated by experts outside the workshops). Scenarios included possible future implementations of AI, ML, NLP, IoT, AR, VR and Blockchain technologies as well as implementations of the broader concepts of smart city, gamification and co-creation of public services (see

Table 1 for an overview of the scenarios developed, including the disruptive technologies embodied in each scenario). To exemplify the scenario technique, subsection 3.2 outlines the scenario "Virtual Reality and Augmented Reality for emergency training".

Table 1. Scenarios developed and used for the analysis, including indications of technologies embodied

Scenario Name	**Short summary of the scenario**	Big Data	Open (Linked) Government	IoT	Smart City	AI/ML	Cloud Computing	NLP	Co-creation	OOP	Service Modules	AR/VR	Gamification	Gaming-based Simulation	Blockchain	eID/ eSignature
Smart City AI-aided emergency monitoring system	AI system is monitoring data and is making automated decisions based on data from sensors and social media	☑		☑	☑	☑	☑	☑								
Intelligent citizen portals connected across Europe using chatbot interface for easy interaction with	Citizens use the chatbot interface to interact with government portals that implement the OOP in cross-border public services (e.g. when moving)					☑		☑		☑	☑					☑
Virtual and Augmented Reality for emergency training	VR and AR are used for emergency training of the employees of public buildings. Virtual environments allow to play scenarios similar to real-life emergencies.											☑	☑			
Open Data lifecycle: maximizing OGD benefits	Leveraging the benefits of OGD along the full Open Data lifecycle		☑						☑						☑	
Digital government through Cloud Computing	Realizing government services via Cloud Computing to improve the quality of service and to cut costs						☑									
Using IoT to monitor soil erosion and degradation	Using sensors (IoT) to collect realtime environment data, analysed through an AI system to provide policy recommendations and action plans	☑		☑		☑	☑									
Gamification in energy consumption	Principles of gamification are used to promote environmental outlooks of the citizens and to decrease the use of energy by individuals and businesses				☑								☑			
Gaming-based simulation and policy modelling	Gaming-based simulation is used to further input for formulating better policies in the domain of policing								☑					☑		
Natural Language Processing in tourism	NLP is used for analysing big data collected in social media and allows to formulate concrete improvements to tourist sector propositions	☑						☑								
Blockchain for vehicle lifecycle management	Blockchain is used to store information about the vehicles to ensure optimal lifecycle management														☑	
Using e-ID and e-Signature for verified health data sharing	Using e-ID and e-Signature technologies to ensure health data ownership and increase its value						☑									☑
Co-creation of APIs using OGD	Reusing Open Government Data through the use of open APIs, co-produced by citizens and businesses		☑				☑		☑							
Community Awareness Platforms for behavioural change	Using OGD, data from sensors and social media data to create a platform for raising citizen awareness about important societal issues	☑	☑	☑			☑				☑					

The scenarios were exposed to experts participating in four workshops, which were organized along thematically relevant scientific events (roadmapping workshop at Samos Summit (Samos, Greece) in July 2018, roadmapping workshop at EGOV-CeDEM-ePart 2018 conference (Krems, Austria) in September 2018, workshop at the NEGZ autumn conference (Berlin, Germany) in November 2018 and workshop with students of public administration sciences (Koblenz, Germany) in February 2020). The experts and students were first invited to provide their views on the consistency and persuasion of the scenarios. Second, they were asked to identify possible research and training needs for successful implementation of the scenario from the perspective of their domain of expertise or from their professional work context.

A total of 70 experts participated in the workshops, among them academics, public officials, government representatives, private sector representatives and students. Experts involved were also rather varied geographically: the majority of participants came from Europe (63 persons from 17 countries); other participants came from the Americas (4), Asia (2) and Australia (1). The diversity among experts allowed gathering varied and original input based on experts' individual backgrounds and experiences. The students from the second German workshop complemented the experts' view with insights from young people who are trained to become public servants (dual education program). Internal evaluation of scenarios involved discussions among the experts from within the Gov 3.0 project, primarily from academic background.

The workshops were also used to conduct **step 3** of the approach. Group discussions along the scenarios (led by group moderators from Gov 3.0 project) were used to elicit research and training needs from the scenarios. As a result of the discussion, experts provided a list of research and training needs along with the assessment of how important or pressing a particular need is (using three colours for priority). The assessment was a result of the expert consensus within a group. For prioritisation, a three-level system was used: green – low importance, yellow – medium importance, and red – high importance. This prioritisation helped in summarizing and prioritizing different needs at the later steps of analysis. More details about the scenario development and the organization of the workshops is available in (Ronzhyn, Spitzer, et al., 2019).

The result of the workshops in step 3 were 62 research needs and 54 training needs identified by the experts and students. Additional notes were taken by workshop moderators along the discussions. Both inputs from the workshops were fed into the **fourth (and final) step** of the approach (together with the insights of steps 1 and 2) **-** the analysis and synthesis to elaborate the roadmaps of research and training in Government 3.0. The 62 (resp. 54) needs have been synthesized and grouped by four researchers of the project team into similar needs and areas of concern. In sum, six research needs and five training needs were extracted, which are desribed in sections 0 and 5. These are fed into the two roadmaps (which is currently ongoing research). For the needs analysis, the researchers employed a method of qualitative content analysis (Flick, 2007; Strauss & Corbin, 1990), finally getting to a proper label for each group of needs.

3.2. Scenario example presented during the workshops

As mentioned above, thirteen scenarios were described textually and with a poster to visualize the story to the workshop experts graphically. In the following, we exemplify the scenario description

for "Virtual Reality and Augmented Reality for emergency training" by summarizing the textual description (a more detailed version was presented to the workshop participants). The scenario details a possible use of Virtual and Augmented Reality technologies to facilitate emergency training for public employees. It also embodies IoT and Data Analytics to support rescue staff in emergency.

In a case of emergency, people in public buildings have to be rescued quickly and efficiently. Possible emergencies include e.g. fires, earthquakes, floods, other natural disasters, terrorist attacks. In many EU countries, all employees in public buildings have to participate in mandatory emergency trainings. Those trainings take place at least once a year and the participants learn how to implement first aid measures and how to handle the alarm equipment and fire extinguisher. Additionally, public buildings are required to perform fire drills or evacuation drills. In some cases, the fire brigade and police officers are called in for support.

In the future, public employees are able to translate their learned theoretical knowledge into practice through using virtual reality. The whole public building is displayed in virtual reality simulation, where different crisis scenarios can be played out. While the instructions are currently only theoretical, with the help of virtual reality the employees experience and train the evacuation in a realistic setting. The gamification approach can also help make the simulation more immersive. To achieve a realistic surrounding and higher plausibility, multiple human senses are addressed. The VR glasses display dense smoke in the public buildings and corridors in case of an alarm. Additionally, the sense of smell can be stimulated through artificial fragrances, the sound of the fire, sirens or voices of other people are provided via headphones, while radiant heaters can be used to stimulate the aural and temperature sensation. The employee's behaviour, the interactions between the employees and with other persons who are in the building (e.g. patients) are recorded and analysed by special consultants from the fire and police force. Those specialists then give improvement suggestions to the employees. And they can implement these advises in the next training which takes place twice a year. It is also possible to include situations when something does not go "according to the book", for example if there are missing or injured people. If there is such an emergency in the reality, those who participated in the virtual reality training may react better. They will be calmer because they have already experienced such a situation several times.

Augmented reality in turn is implemented to aid the public employees in case of real emergency situations. The employees wear AR glasses connected to the coordinators from the rescue force. The AR glasses are fitted with a GPS module to determine and transmit the exact position. The GPS data are sent to the coordinators at emergency services; thus, they know the exact position and are able to navigate the employees using a map or a building plan. They can also use external databases to get more information about certain important aspects for managing the situation (e.g. piping, electrical wiring, etc.). Furthermore, the coordinators can receive additional data from sensors placed in different areas of the building (e.g. such sensors may sense heat near a specific exit). This allows the rescue coordinator to determine the fastest and safest way out of the building. More efficient than just voice support, the rescue coordinator sends the exit route to the employee's AR device, which displays the guidance overlaid on top of the reality.

Figure 2 demonstrates the visualization of the poster used in the workshops. On the poster, the arrows represent the exchange of information between the actors, while the boxes show technological enablers that are involved at each of the steps for information processing, e.g. Geographic Information System (GIS) and for information exchange (e.g. encryption). Both artefacts were used to deliberate research and training needs with the experts in the different workshops.

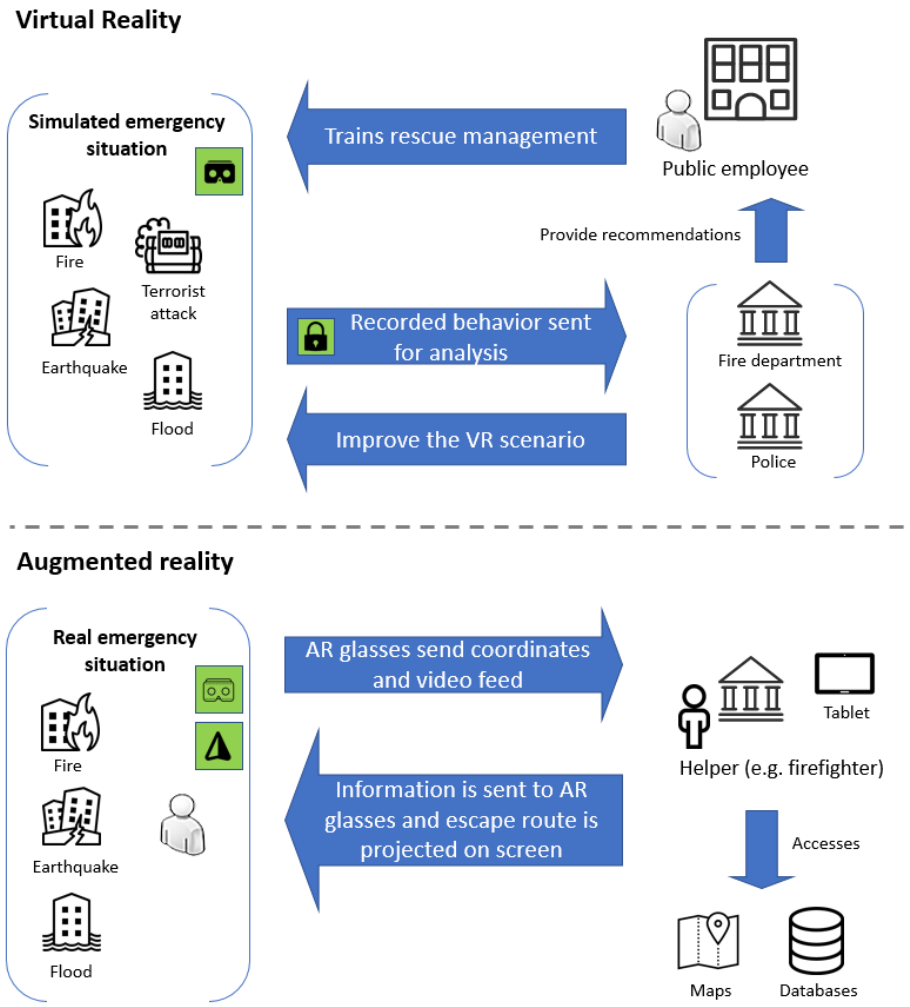

Figure 2. Scenario poster – "Virtual Reality and Augmented Reality for emergency training"

As described in the methodology, the scenario provides an example of possible future implementations of disruptive technologies in public service provision. While most of the relevant technologies can be implemented today, there are still aspects that need to be developed further (e.g. room mapping technology (3D scanning and creation of virtual spaces based on real ones) is still costly to realise). The next two sections outline the main research and training needs (step 4 of the approach) extracted from the thirteen scenarios and informed from the analysis and synthesis in step 3.

4. Research needs on realizing government 3.0

Along the analysis and synthesis of the research, six research needs were extracted in step 4 as listed in column 1 of Table 2. The research needs are outlined in the subsections below.

Table 2: Correspondence of research needs with disruptive technology use in public service

	Disruptive Technologies									Concepts of Government 3.0 using disrupt. t.						
	AI/ML	Big Data	IoT	Gamification	AR/VR	NLP	Blockchain	Cloud (fog) Computing	eID/ eSignature	Smart City	Co-creation	Community Awarenes Platforms	Once-only Principle	Open (Linked) Government Data	Service Modules	Gaming-based Policy Modelling and Simulation
Standardisation and interoperability of disruptive technologies	☑	☑	☑										☑	☑		
Analysis of stakeholders	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑
Evaluation and policy making	☑	☑	☑							☑						☑
Data security and data privacy	☑	☑	☑				☑			☑			☑			
Automated decision-making	☑	☑														
Ethical issues	☑	☑	☑													

4.1. Standardisation and Interoperability of disruptive technologies

Further research is necessary on interoperability and standards in order to better lift the potentials for the use of AI in automated decision making, standardisation of collected data by IoT and the standardisation of the IoT devices. Common standards are especially important in IoT as different models of sensors can be used as a network to provide valuable results, so the data collected by these sensors needs to be compatible and interoperable. The successful use of IoT devices is highly dependent of the implementation on effective and interoperable standards (Saleem, Hammoudeh, Raza, Adebisi, & Ande, 2018). In the development and construction of smart cities, standardization of enterprise architecture and requirements for monitoring technical and functional performance has an essential role (Pourzolfaghar, Bastidas, & Helfert, 2019). Another major issue can be seen in the development of IoT security standards. In research, two main gaps can be identified: First the deviation between reviewed standards and IoT security safety, consumer trust, trustworthiness and system integrity. Second, limited information in the adaption, implementation and review rate of government and industry standards for IoT security, which burdens the effectiveness to monitor and evaluate those (Brass, Tanczer, Carr, Elsden, & Blackstock, 2018).

Linked to standardisation, interoperability research needs deal with ensuring that different implementations of the same technology are able to effectively "talk to each other". In this context, the standardisation of intelligent interoperable agents needs to be researched. Such standards address several sectors like economy, industry and service to ensure the interface, compatibility and synergy of their specific applications (Bryndin, 2019). These needs are of high priority in IoT, especially tech-

nical interoperability of different sensors (Khan & Kiani, 2012), and in AI/ML applications. Interoperability and standards are likewise key in the implementation of the once-only principle or in the use of big and open (linked) government data.

4.2. Stakeholder analysis and stakeholder engagement

The engagement of stakeholders in the implementation of modern technologies is a fundamental requirement for successful implementation and use of these technologies. Stakeholders are those who affect or are affected by decisions or actions (Freeman, 1984). In the implementation of disruptive technologies, it is necessary to understand who the stakeholders are, how to engage various stakeholders effectively and identify the needs of target groups to involve them adequately in the implementation process. In particular, most of smart city initiatives uncover existing gaps in collaboration, cooperation and coordination account of private and public actors due to diverging interests (Janssen, Luthra, Mangla, Rana, & Dwivedi, 2019). Technologies like Blockchain, AI and Machine Learning have been the biggest research needs in stakeholder (citizen) engagement, co-creation and improvement of the already existing solutions both in public and private sectors. Further research needs include the user studies comparing the use of traditional web search functions and modern solutions such as Chatbots or NLP-based solutions. How far can a Chatbot based on AI and ML take over the functions of traditional web and how can the digital divide between different user groups be overcome in the future, with the use of AI-driven technologies?

Another research need arises as to whether citizen engagement/ co-creation and outsourcing to the private sector could increase the acceptance of and trust towards IoT, AI/ML and other disruptive technologies. Similarly, it is necessary to examine existing architectures of technologies for their suitability in the public sector: in some cases, organizational change and adaptation of government processes is a necessary prerequisite for the effective implementation of systems based on the disruptive technologies.

4.3. Evaluation and Policy making

The assessment of impact and costs of the deployment of disruptive technologies is another research area. It is not yet clear what the real costs are for platforms who realise such technologies, how many technologies are funded and what exercised impact on cities could be determined (Batty, 2016)? The research needs were raised when discussing AI (adapting legislation to the use of cross-border data) and IoT (automated policy making based on IoT data). Further research is necessary to identify the ways to adapt legislation for effective implementation of some technologies in public sector (like surveillance/face identification regulation for AI/ML) and the implications of using AI for the creation of regulations and policy (e.g., exploring the dangers of bias in ML (Baeza-Yates, 2016; Yapo & Weiss, 2018).

The proper way of using simulation and data modelling for digital government services is another research need. Simulation can be used for policy making in different settings and in the design of predictive models. In both cases it may be used as a basis for data-driven decision making. The issues of accuracy of data and accountability need to be addressed when using simulation and data

modelling for making decisions. Policy modelling research needs to redirect its focus from disruptive technologies themselves to the outcomes these tools could deliver (Leifman, Fay, Rozenberg, & Nicolas, 2019).

Research in evaluation and policy modelling is often transdisciplinary and also very much dependent on the field, where the concepts are to be used. For different scenarios involving IoT, research should analyse and bring forward successful implementation models as well as a clear understanding of the relevant 'soft' factors e.g. on IoT in urban environments (e.g. when IoT is implemented as a part of a Smart City initiative) or in "earth/water evaluation" (when IoT sensors are used in agriculture). For this reason, analysis of piloting cases can prove a very important step here and allow identifying the criteria for evaluation, build new and adapt existing evaluation frameworks, and identify the benefits and drawbacks of the technology implementations.

4.4. Data security and Data privacy

Data security and data privacy are two important topics for research on the use of disruptive technologies in the public sector. The willingness to allow collection, sharing and the use of sensitive citizen data is contingent on high trust in these technologies and in public administrations deploying them. In particular, the security and privacy of the Blockchain technology needed to be addressed in the context of public services.

Further issues can be identified in Big Data research. The main problems in Big Data security are related to infrastructure problems, privacy issues and data integrity. While implemented private-sector solutions (e.g. in finance) are being used and further developed, the potential for the use of Blockchain in the public sector needs to be researched and evaluated further in the context of digital government (Ølnes, 2016; Yang, Elisa, & Eliot, 2019). Most of the current studies tend to focus on benefits of the technology rather than possible challenges or risks of its implementation (Ølnes, Ubacht, & Janssen, 2017). Privacy and security issues need to be researched in the context of storing sensitive personal data and allowing specific actors the access to these data (Jun, 2018).

Data privacy is a significant issue in IoT as well, especially in urban setting. In case studies (Brous & Janssen, 2015), data privacy and security were found to be the main impediments on the strategic level for the introduction of IoT for digital government. Data accuracy is another issue, which is critical for the implementation of IoT in smart cities. Research needs in data quality are also connected to the standardization issues described in 4.1.

4.5. Automated decision-making

The use of modern technologies and automation mechanisms is indispensable for the public sector. Thus, the possibilities of using disruptive technologies and their possible effects must be investigated. The big data collected by sensors can be automatically processed and analyzed using the AI and ML technologies to provide real-time decisions. Such system may offer significant advantages over "manual" regulation and improve the quality of life in cities (Song, Cai, Chahine, & Li, 2017), yet it poses a number of challenges concerning transparency and accountability and consequently the legal status of such systems. There are also concerns related to adaptability of such

systems: as different environments offer different challenges, there might be no one standard way of organizing automated decision-making based on the collected environment data. Further case-study research is necessary to see how AI and ML may be adapted on the local level (Zanella, Bui, Castellani, Vangelista, & Zorzi, 2014). Further challenges in the adoption of such challenges need to be considered, including lack of experts, computational resources, trust and AI interpretability (Al-Mushayt, 2019).

Due to the digitization of the public sector processes, the use of modern technologies and automation mechanisms is indispensable. Thus, the possibilities of using disruptive technologies and their possible effects must be investigated. The big data collected by sensors can be automatically processed and analyzed using the AI and ML technologies to provide real-time decisions. Such systems may offer significant advantages over "manual" regulation and improve the quality of life in cities (Song et al., 2017), yet they pose a number of challenges concerning transparency and accountability and consequently the legal status of such systems. There are also concerns related to adaptability of such systems: as different environments may embody different challenges, there might be no one standard way of organizing automated decision-making, based on the collected environment data. Further case-study research is necessary to see how AI and ML may be adapted on the local level (Zanella et al., 2014). Further challenges in the adoption of such challenges need to be considered, including lack of experts, computational resources, trust and AI interpretability (Al-Mushayt, 2019).

4.6. Ethical issues

A common research need in the discussion of the disruptive technologies is ethics and moral issues. By far, AI is the most ethically controversial technology. Research directions regarding AI include privacy research (surveillance, profiling), ethics of automated decision making (especially concerning sensitive decisions, e.g., in law enforcement and health), issues of responsible research. The consequences of discrepancies between the real world and the data used for AI-based decision making were identified as a high-priority research issue as decisions based on incomplete (or even biased) information may be unfair and problematic (Dameski, 2018). Aligning the values of autonomous AI system designers with the public interest is a major research need, which need to be addressed before such systems are implemented on the large scale. However, ethical and social barriers can be identified in the adoption of AI, and resulted from lacks in citizen trust on machine intelligence and the anxiety on the replacement of employees by machines (Androutsopoulou, Karacapilidis, Loukis, & Charalabidis, 2019).

One of the ethical issues raised in regard to the implementation of IoT is the sustainability of sensors infrastructure; if IoT sensors are used in rural environments, they are much more difficult to control and recycle properly. Possible pollution is an ethical concern that needs to be researched.

(Ronzhyn & Wimmer, 2019) conducted a research on the ethical isues with disruptive technologies, concluding that there is a significant number of ethical issues connected to the implementation of disruptive technologies in public services. In addition, (Alexopoulos et al., 2019) recommend further research in privacy and ethical issues in the collection of personal data and the ownership of such data by machine learning in government services.

5. Training needs

Along the analysis of the scenarios and discussions with the experts and students in the workshops, five training needs were identified in step 4 of the approach as listed in column 1 of Table 3. The table also indicates, for which disruptive technologies the specific capabilities are particularly required. The training needs are outlined in the subsections below.

Table 3: Correspondence of training needs along with disruptive technology use in public service

	Disruptive Technologies									Concepts of Government 3.0 using disrupt. t.						
	AI/ML	Big Data	IoT	Gamification	AR/VR	NLP	Blockchain	Cloud Computing	eID/ eSignature	Smart City	Co-creation	Community Awarenes Platforms	Once-only Principle	Open (Linked) Government Data	Service Modules	Gaming-based Policy Modelling and Simulation
General technology skills	☑		☑		☑		☑	☑	☑							
New technologies in public management & digital government	☑		☑				☑									
Management and economics capabilities on the use of disruptive technologies	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑
Capabilities in data science, data security and legal compliance	☑	☑	☑	☑	☑		☑		☑	☑			☑	☑		☑
Capabilities in responsible research and in sustainability	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑

5.1. General technology skills

AI and Machine Learning, Blockchain and IoT are the technologies with most technical requirements for using and implementing them in the public sector. When using AI/ML, field experts in multidisciplinary domains are required to have expertise in analysis, modelling and tool use, which requires professional training. Public officials must be able to deal with non-standard situations in requests through digital agents and addressing multiple identities in the system. For the implementation of these technologies, skills on app development, security encryption and access rights are fundamental. For implementing blockchain technical training of identity providers, employers, public sector and social workers is necessary, as well as understanding the impact of decentralized distributed systems on current administrative processes. Public officials' training on the use of specific devices are important for the use of VR/AR equipment and IoT sensors. Implementing IoT also requires skills on decision system modelling, monitoring systems and cloud (fog) computing/infrastructure.

5.2. New Technologies in Public Management & Digital Government

Training on public management and digital government is important for applying most of the discussed disruptive technologies. For government employees using AI/ML, Blockchain and IoT, skills on new technical components (IT systems) and new legal basis are required, as well as the ability to establish a framework for cooperation with private companies. For blockchain, including a basic training for public sector specialists on the technology use in government is required. When using IoT in government applications, training needs refer to introductory topics of digital government such as enterprise architecture, public administration and public sector innovation, as well as the emergent digital transformation domain, which refers to completely redesigning government services to fulfil changing user needs (Mergel, Kattel, Lember, & McBride, 2018).

In addition to the major training needs of this area, our research indicates the lack of knowledge mainly for the public officials and citizens regarding acceptance of disruptive technologies such as AI and blockchain. A "train the trainers" approach seems to be an efficient means to cover this need.

5.3. Management and economics capabilities on the use of disruptive technologies

Considering that digital transformation affects citizens, business and the public sector and requires organizational change and new digital technologies, management training is found to be relevant for applying any of the disruptive technologies in the public sector. Considering AI/ML applications, relevant aspects include the ability to involve citizens in the process, as well as knowledge management and business models of social work (social innovation). Training on process/change management is important for using VR/AR as well as eID and eSignature in government. Similarly, blockchain, cloud computing or IoT applications require training for public employees on project management, entrepreneurship, doing business and cost-benefit analysis. Likewise, these capabilities are of high importance in different concepts of Government 3.0 that employ disruptive technologies in order to leverage the benefits of these technologies in the specific contexts and to reduce potential risks.

5.4. Capabilities in data science, data security and legal compliance

Most of the training needs concerning data science and security are connected to the implementation and use of the AI, ML and IoT technologies. It is worth mentioning that these technologies have been used in different scenarios. Our results reveal a lack of knowledge on data analysis and artificial intelligence tools, the ways of achieving trust and data security including accuracy of the IoT devices and user input for the target groups of civil servants, professionals and citizens. Legal competencies are identified as a very important training need for all target groups including researchers, especially concerning the blockchain and AI technologies.

5.5. Capabilities in responsible research and in sustainability

When disruptive technologies are employed, responsible research and sustainability of the applied solutions are further crucial capabilities needed. In regard to AI, a need to train the researchers in ethics was identified, specifically concerning the ethical solutions to the problems of automated

decision-making. For public servants, the focus is on the managerial training needs: sustainability assessment of the applied solutions (IoT) in the public sector understanding what technology should be applied, if this technology is covering the current needs, and especially on sustaining the sensors infrastructure. Energy consumption and environmental sustainability have also been identified by Kankanhalli, Charalabidis, & Mellouli (2019) amongst the main challenges for IoT-enabled AI applications to provide benefits to public governance and citizens' life.

6. Discussion

Several of the research needs discussed in section 0 have already been mentioned by researchers of the specific technologies in individual publications: for IoT in public services, interoperability and standardisation is seen as major issue (Ahlgren, Hidell, & Ngai, 2016). In the AI research, ethics has been a steady concern (Dameski, 2018) and privacy is a huge pressing issue in ICT generally (Smith, Dinev, & Xu, 2011), especially with the implementation of the once-only principle. The above research needs were highlighted in the context of disruptive technologies in public service representing an overview of current demands for research and innovation, along Government 3.0 evolutions. This overview aims to stimulate the discussion and help to further advance the digital government research and practice. While the research needs in this paper reflect the results from the Gov 3.0 project and its interaction with 70 students and experts along four workshops, the digital government community is invited to expand and complement the findings. In particular, the research needs demonstrate avenues for innovative PhD research to perform extensive literature review and develop case studies or expand existing theories and concepts to successfully implement disruptive technologies in innovative public service provisioning in the future.

The analysis of training needs reveals two types of training that are needed. For the academics and professionals who are going to conceptualize new services and concepts, where disruptive technologies are used, training in the technology is necessary: both general training regarding data security, privacy and sustainability, and specific training on particular technologies. At the same time, for public officials, soft and managerial skills are particularly important for ensuring citizen trust towards the use of disruptive technologies and concepts of Government 3.0. Services based on these technologies are significantly different from the ones of traditional digitalization attempts and acceptance of the new services by the public and by the businesses is a critical issue. In this regard, training the trainers (public officials, administrators) is a critical need so that stakeholders are able to use the new technologies and explain the benefits and functionality to the public. Outlining these training needs along the Gov 3.0 project serves as a trigger to reflect and embody knowledge and skills on the use of disruptive technologies in the education and training programs of higher education institutions and professional training offerers, targeting professionals and students.

Involving experts and students in the discussion of new technologies in public services is very important. The chosen scenario-based technique has shown good results in stimulating the discussion and gathering diverse insights on disruptive technologies in digital government. Still, the workshop-based scenario approach has some limitations that need to be acknowledged: First, the competence area of an expert (and level of education a student brings in) has an effect on the type of sug-

gested needs. Experts from public service tend to view problems from the perspective of a government employee, while people with background in informatics are more interested in issues connected to the technical realisation and data. This means that if a particular discussion group at the workshop lacked experts from the scenario's field, the importance of some of the research and training needs was conceivably underestimated. Policy makers and representatives of the NGOs/public institutions (largely absent from the workshops) could also provide a unique vantage point and new useful needs. Further research would require involvement of experts from these areas. Similarly, the geographic scope should be expanded, as there were some differences between the input from public sector representatives from different regions of the world: e.g., more focus on the people-related issues from countries where digital government is less developed. Such differences and viewpoints need to be examined further by involving a more diverse range of experts as well as more people representatives.

Finally, it should be mentioned that, while in the Gov 3.0 project research and training needs have been identified, the dialogue with the experts and students does not produce 'ready' research and trainings. The project team needed to refine the participants' contributions and to draw powerful conclusions after the workshops. An iterative step of validation of the resarch findings involving the experts and students that contributed in the workshops would add rigor to the research method.

7. Conclusions

In this paper, six overarching research and five training needs were identified and systematized for the wide and successful implementation of Government 3.0. The research was developed using an adapted approach of policy-oriented science and technology roadmapping, with a review of the state of the art of research and implementation in digital transformation and the use of disruptive technologies in public service provisioning. Subsequently, thirteen future scenarios were developed from the insights from the literature review and analysis of existing projects, which were then exposed to a critical validation and discussion to identify research and training needs regarding internet of things, artificial intelligence, virtual and augmented reality, big data and other disruptive technologies to be deployed in newly emerging concepts of Government 3.0 such as smart city, once-only principle implementations, policy modelling and simulation, co-creation, etc. 70 experts and students reviewed these 13 future scenarios and spotted 62 research and 54 training needs on Government 3.0 and disruptive technologies. These research and training needs were subsequently consolidated and validated among the authors in iterative steps to receive the above six research and five training needs.

As stated in the Introduction, this paper does not aim to provide an exhaustive list of research and trainings needs. Instead, the goal is to specify a starting point for a broader and more informed discussion about how such new (disruptive) technologies can be successfully deployed in the public sector, therefore leveraging the benefits of these technologies in digital government while at the same time constraining the drawbacks affiliated with them. Fifteen examples of the latter have been elicited as unintended consequences of disruptive technologies in digital government, such as digital divide (particularly regarding vulnerable groups) and digital illiteracy, lack of government capacity, social media jeopardizing democracy, data as the new currency and the bias on data-driven

decision making, etc. (Pereira et al., 2020; Scholz et al., 2001). The research and training needs outlined in this paper aim to create awareness that the diffusion of disruptive technologies has a wide impact on the way government and its constituency will interact in the future and how societies' cultures and behaviour will potentially change. Such dramatic impact needs profound research and professionals that are capable of estimating these potential impacts.

In the Gov 3.0 project, the research and training needs will be further consolidated into recommendations regarding the implementation of disruptive technologies in public service. The insight gained through the scenario-based workshops and described in this paper will be used further within the Gov 3.0 project (Gov 3.0, 2018a). First, in the elaboration of the Government 3.0 research roadmap and, secondly, for the development of the joint Master curriculum, addressing the identified training needs.

As already indicated in the previous section, the findings presented in this paper invite scholars and PhD students to extend the research and deepen findings through extensive literature review and case study research to add theorectical and conceptual contributions as well as to expand the practical experiences with the use of disruptive technologies along digital transformation.

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Algorithmic Decision-making and the Law

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Abstract: In the data driven digital era there has been rapid technological development in fields such as artificial intelligence and the use of big data, which has a huge impact on society. This poses many challenges for individuals, in particular related to privacy and personal data. There are also questions about accountability relating to algorithmic decision-making. Algorithms and artificial intelligence are key concepts at the core of the digital era, and have an impact on society. In this article the focus is on the need for a legal framework for algorithmic decision-making and the key features thereof. A good basis was laid in 2018 with the development of a set of ethical and legal principles, which includes the promotion of accountability, fairness and respect for human rights. This should be translated into international and national legal documents to support the further development of algorithmic decision-making.

Keywords: Algorithm, algorithmic decision-making, algorithmic accountability, artificial intelligence, legal framework

1. Introduction

The Fourth Industrial Revolution[1] is reshaping the world we know dramatically and is characterised by a close interaction between the biological, digital and physical spheres. Digital technologies are impacting all facets of our lives and create a series of new opportunities but also various challenges. In this data driven digital era there is rapid technological development in fields such as artificial intelligence, big data, robotics, Internet of Things, biotechnology and nanotechnology which has a huge impact on society. This poses many challenges for individuals, in particular related to privacy and personal data. At the same time governments and legislators are faced with questions about the impact on society and the need for regulation relating to these new technological developments. Etzioni suggested that there is a need to regulate artificial intelligence in order to steer its development and application, but is not as concerned as the technology entrepreneur Elon Musk, who referred to AI as an existential threat to humanity.'[2] In this digital era, the diverse nature and rapid pace of technological developments has meant that the development of the law relating to artificial

[1] Davis, N. (2016) What is the Fourth Industrial Revolution?, from www.weforum.org/agenda/2016/01/what-is-the-fourth-industrial-revolution/

[2] Etzioni, O. (2017) "How to Regulate Artificial Intelligence", New York Times, 2 Sept. 2017, p. A19(L). Gale Academic Onefile (accessed August 15, 2019).

intelligence and the use of algorithms has generally been slow and unable to match the pace and scope of technological developments.[3] Questions such as who is responsible when a self-driving car causes an accident, or to what extent can the data my mobile phone collects about me be used by third parties, or how does algorithmic decision-making affect administrative decisions, are examples of important legal issues in this context. In this paper the focus is on a specific key aspect of digital technological development, namely algorithmic decision-making, in view of the important role it plays in various technological applications.

Algorithms form an integral part of artificial intelligence (AI) and can be defined as follows:

"An algorithm is a self-contained step-by-step set of operations that computers and other 'smart' devices carry out to perform calculations, data processing, and automated reasoning tasks."[4] In its simplest form an algorithm is a prescribed set of steps to solve a (mathematical) problem by producing one numerical answer. Diakopolous defines an algorithm as "a series of steps undertaken in order to solve a particular problem or accomplish a defined outcome".[5]

In the context of public law there are many questions and challenges relating to individual rights for example the right to privacy, and regarding the role and responsibilities of government relating to policy development and regulation dealing with technological developments. Issues such as the impact of biotechnology on health services, use of big data in public governance, algorithmic decision-making and the use of algorithms that influence customer's shopping behaviour, are some of the examples that give rise to questions about the values, ethical standards and regulatory environment relating to the current digital era, also referred to as the Fourth Industrial Revolution. In its deliberations about the ethical framework that should underpin the Fourth Industrial Revolution, the World Economic Forum identified three universal values; namely human dignity, common good and stewardship.[6] These values should help to shape the ethical framework, normative standards and a value-based governance model relating to the diverse range of technological developments in the digital era. This view suggests a quite wide range of issues that include a variety of technological fields. The scope of this paper is much narrower, and it aims to explore the need for regulation of algorithmic decision-making and to provide some recommendations for the development of an appropriate legal framework.

A short introduction to the public law context within which the discussion of algorithmic decision-making is presented in this paper, is provided here. The development and eventual adoption of the Universal Declaration of Human Rights by the United Nations in 1948 signified a commitment to develop a world in which human rights would be central and which should guide development

[3] Schwab, K. (2016) The Fourth Industrial Revolution: what it means and how to respond, from www.weforum.org/agenda/2016/01/the-fourth-industrial-revolution-what-it-means-and-how-to-respond/

[4] ACM US Public Policy Council, (2017) Statement on Algorithmic Transparency and Accountability, www.acm.org/binaries/content/assets/public-policy/2017_joint_statement_algorithms.pdf ; Busch, C. (2018) Algorithmic Accountability, Abida Gutachten, www.abida.de

[5] Diakopolous, N. (2015) Algorithmic Accountability, Digital Journalism 3(3): p400.

[6] Sutcliffe, H. & Algrove, A-M. (2018) How do we build an ethical framework for the Fourth Industrial Revolution?, from www.weforum.org/agenda/2018/11/ethical-framework-fourth-industrial-revolution

around the globe.[7] For the first time fundamental human rights were recognised and it was agreed they must be protected. This is the global framework and it provides a normative framework for societies throughout the world. Various other international instruments, such as the European Convention of Human Rights,[8] as well as national bills of rights, were developed during the second half of the 19th century and form part of the constitutional architecture of many countries. These legal documents on human rights provide the value-base for the development of societies and have a human-centred focus.

The concept of a Rechtsstaat or a constitutional state, as it is described by the South African Constitutional Court, defines the nature of constitutional democracy in various countries. The Rechtsstaat, which is one of the pillars of the German constitutional system, is described by Klaus Stern as follows:

> *'the exercise of the power of the state on the basis of laws adopted according to the Constitution, with the purpose of guaranteeing freedom, justice and legal certainty'.*[9]

The Rechtsstaat has both formal and substantive elements which define the character of the German constitutional order. The substantive Rechtsstaat means that the exercise of power must not only be formally in accordance with the law, but it must also ensure justice, according to Von Munch.[10] It is clear that the Rechtsstaat is both a normative feature of the German constitutional system as well as a substantive one, namely that adherence to the social and democratic values with a focus on social justice is also very important.

Other constitutional democracies have followed the German example and also adopted the concept of the Rechtsstaat as a cornerstone of their constitutional system for example in South Africa in 1994. The South African Constitutional Court referred to these foundational values as follows:

> *"In reaction to our past, the concept and values of the constitutional state, of the "regstaat", and the constitutional right to equality before the law are deeply foundational to the creation of the "new order" referred to in the preamble."*[11]

The Rechtsstaat or constitutional state, due to its supreme legal character, indeed provides a guiding foundation and stimulus for further development of the law. Included in the concept of the Rechtsstaat or the constitutional state is the recognition and protection of fundamental human rights, which strengthens a human-centred approach to development, and which is also relevant in this digital era. It is argued that such a legal framework, that acknowledges a human-centred focus,

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[7] United Nations, Universal Declaration of Human Rights, 1948, www.un.org/en/universal-declaration-human-rights/

[8] Council of Europe, (1950) European Convention on Human Rights, from www.echr.coe.int/Documents/Convention

[9] Stern, K. (1984) Das Staatsrecht -der Bundesrepublik Deutschland, vol 1, 2d ed, Beck Verlag, München, 1984, 781; Art. 20, 28 German Basic Law, 1948.

[10] Von Münch, I. (1993) Staatsrecht, Band I, 133-134.

[11] S v Makwanyane and Another [1995] ZACC 3; 1995 (6) BCLR 665; 1995 (3) SA 391, at para. 156; Venter, F. 'South Africa, a Diceyan Rechtsstaat?', 57 McGill L. J. 2011-2012, 721 743; sec. 1, 2 Constitution of South Africa, 1996.

could provide guidance on shaping the appropriate legal framework for the further development and application of algorithmic decision-making and artificial intelligence in society.

The key question to be answered in this article is: what is the need for a legal framework for algorithmic decision-making and what should be the key features of such a legal framework? The structure of this paper consists of an introductory section that provides the context for the article. An overview of the use of algorithms and algorithmic decision-making is then provided, followed by a discussion of algorithmic accountability, as well as human rights implications, from a public law perspective. This is followed by an analysis (in the form of a desktop study) of key current international legal developments relating to artificial intelligence and algorithmic decision-making. The paper concludes with some recommendations for an appropriate legal framework that could guide the further development and use of algorithmic decision-making.

2. Algorithmic Decision-making

Artificial intelligence, big data, machine learning and algorithmic decision-making are key concepts well-known to computer scientists and are central to current technological developments. It is, however, judicious that some clarity about these concepts and how they are used should be provided here, in order to reflect on the ethical and legal implications for society.

A comprehensive dictionary definition of artificial intelligence (AI) is 'the theory and development of computer systems able to perform tasks normally requiring human intelligence, such as visual perception, speech recognition, decision-making, and translation between languages.'[12] Mitrou argues that the development of AI is driven by social and economic demands and is a key driver of the Fourth Industrial Revolution.[13] Since the pioneering work by Alan Turing in 1950, the concept of artificial intelligence has grown into a multi-faceted concept that is applied in various ways in our daily lives. AI can perform various human intelligence functions such as speech recognition, problem solving, data analysis, perception and learning,[14] and it can do it much faster than the individual human brain can. Search engines, self-driving cars and language translation software are some of the applications of AI.

It is in the field of computer science and in particular artificial intelligence where algorithms, which are developed as computer code, play a key role. In machine learning it is not only human-designed algorithms that are used, but computers can also create algorithms, so-called self-learning algorithms. There is a growing range of applications where machine learning is used; e.g., in search engines (Google), social media (personalised news), health services (predictive medication) and online shopping (suggested products). The use of algorithms in these cases is aimed at providing

[12] https://en.oxforddictionaries.com/definition/artificial_intelligence

[13] Mitrou, L. (2019) 'Data Protection, Artificial Intelligence and Cognitive Services: Is the General Data Protection Regulation (GDPR) Artificial Intelligence-Proof? (April 2019), https://ssrn.com/abstract=3386914

[14] Mitrou supra 10; Ishii, K. (2019) Comparative legal study on privacy and personal data protection for robots equipped with artificial intelligence: looking at functional and technological aspects, AI & Soc, (2019) 34:509–533 (online publication).

interpreted information or analysed data on which the user of the particular service can base a decision, whether it is to buy a specific product or service, or simply to get answers from an internet search. Mitrou described this use of algorithms as 'narrow AI' that supports human decision-making by probabilistic reasoning.[15] Artificial intelligence in its wider definition includes machine learning, analysis of big data (large sets of data), predictive modelling and it exhibits more cognitive features normally associated with human decision-making.

Machine learning can be defined as the science of getting computers to learn and act like humans do, by using algorithms and learning from this, and by having the ability to learn without being explicitly programmed.[16] In machine learning, computers learn from data and create solutions to complex problems, including predictions based on the knowledge gained. Such algorithms analyse data, apply a systematic process to produce results and could also define and adapt the decision-making rules. Algorithms can be categorised according to their nature as deterministic algorithms, which are those conventional algorithms designed by humans and commonly used in a variety of applications, or probabilistic algorithms. A deterministic algorithm is linear in nature and will always produce the same output given the same input. Probabilistic algorithms, in contrast, include an element of probability and could produce a variety of results.[17] This last category is what is used in machine learning, where the results and the way in which they are produced depend on probabilities of statistics. The Declaration on Ethics and Data Protection in Artificial Intelligence acknowledges the rapid development of artificial intelligence, including machine learning,

> *'in particular with the development of deep learning technologies, allowing algorithms to solve complex operations leading to potential decisions, making however, such processes more opaque.'*[18]

The use of algorithms in artificial intelligence is essentially about automated decision-making, which can and does influence human decision-making. The different functions that algorithms perform are prioritisation, classification, association and filtering.[19] Prioritisation of information through algorithms provides some form of ranking based on the design criteria of the algorithm. This is commonly used in search engines such as Google and travel websites such as TripAdvisor and Airbnb. Classification of data is not concerned about prioritising the data, but rather about grouping data in classes which could be pre-determined or determined by the algorithm.[20] This is, for example, used by financial institutions to determine the risk class of a client. When an algorithm is used for association, the focus is on linking data by finding the relationship between various elements, for example the use of predictive text in mobile phone messaging software. The algorithm identifies possible links or associations with the input data and provides the user with suggested decisions, e.g. predictive text. Filtering is an important function of algorithms and is used to either include or exclude certain data. This is commonly used in e-mail programs to limit junk mail. In all

[15] Mitrou supra 10.
[16] Mitrou supra 12; World Wide Web Foundation Algorithmic Accountability, (July 2017) 7.
[17] https://www.techopedia.com/definition/18830/deterministic-algorithm
[18] 40th International Conference of Data Protection and Privacy Commissioners Declaration on Ethics and Data Protection in Artificial Intelligence (23 October 2018), Brussels.
[19] Busch 17; Diakopoulos, N. (2016) Accountability in Algorithmic Decision-making, Communications of the ACM 59 (2): 56-62 (2016).
[20] Busch 18.

the functions of algorithms there is some form of human influence, whether it is in the design criteria, selection of data sets, the semantics of categories or in other ways.

Algorithmic decision-making is concerned with decisions produced by algorithms or based on algorithms. Examples of decisions produced by algorithms are programming for self-driving cars, credit scoring software and spam filters in e-mail systems. The required result is determined by the algorithm, which has a set of design criteria for the specific application. In most cases where algorithms are used, results are produced to be used for a specific purpose and to aid human decision-making. So, the decision is still made by a person, but it is based on information produced by an algorithm. This category covers a wide spectrum and includes the following examples:[21]

Predictive policing software	Police determine where high crime areas are and how to prioritise the use of resources
Medical apps for diagnosis and treatment of specific diseases	Doctors use it for earlier and better diagnosis of cancer
Ranking of holiday accommodation	Businesses such as Airbnb use it to provide suggested accommodation to clients who can then make a better-informed decision
Online trading software	Algorithms produce suggested products for clients based on their user profiles

Considering the example of predictive policing software, the algorithmic decision-making works as follows: an algorithm is developed based on a set of design criteria and applied to a huge amount of data about crime in a town. The algorithm would then produce information about where the highest likelihood of particular crimes would be. This algorithmic decision then enables the police to make a better-informed decision about when and where they must use their human and other resources and what the scope of such deployment should be. The decision is thus still a human decision, but it is based on an algorithmic process. The goal in this case is more effective policing.

However, there could be questions about the application and impact of a particular algorithmic decision; for example, if the predictive policing algorithm leads to a biased profiling of a specific community.[22]

Algorithms are designed and applied in a specific context where the human interaction with the algorithm in providing the design criteria, as well as the data on which the algorithm will be applied, play an important role. The design criteria or the applicable data or both could include a bias that might be discriminatory, or as Mittelstadt described, an algorithm as essentially value-laden.[23]

[21] Busch p12 – 17.
[22] Council of Europe, (2018) Algorithms and Human Rights 11.
[23] Mittelstadt, B. (2016) The ethics of algorithms 1.

When the legal implications of algorithmic decision-making is then considered, the human influence in this process is very relevant.

3. Algorithmic Accountability

The fact that algorithms are used to analyse huge amounts of data to produce specific outcomes, that might cause damage or could be discriminatory against individuals or groups of people due to an algorithmic bias, raises questions about accountability. The concept of accountability is well-known in constitutional law and in public governance. It often forms part of the constitutional design of a country, for example in South Africa, where it is part of the checks and balances in the system to ensure that people are held to account for their actions. In the context of constitutional law it means inter alia that members of the executive must report to the legislature on how they fulfill their mandates, and they must be accountable to the citizens. They must account for the budgets and policy implementation within their field of responsibility. But how can accountability be applied to an algorithm?

There is not yet a commonly accepted definition of algorithmic accountability. Transparency, which is a well-known concept in constitutional and administrative law, or openness, is often used in conjunction with accountability in discussions on good governance. Citizens want to see and understand the decisions of public officials in order to keep the officials and the government accountable.[24] Transparency of administrative decisions supports accountability and adherence to the rule of law. It also contributes to fighting corruption and maladministration. There are, however, limits to applying transparency to algorithmic decision-making. Ananny and Crawford have analysed the possible use of transparency to understand and govern algorithms and have concluded that transparency is of very limited help to explain and understand complex systems such as algorithms.[25] One of the limitations relating to transparency of computer code is the time dimension, for example, is it continuous visibility, an ad hoc image of the source code or an ex post facto view of the algorithm and its training data that should be visible? This is complicated by algorithms in adaptive systems which learn and change over time. Due to the nature and complexity of most algorithms, in particular in the context of machine learning, it makes looking into that black box of computer code not very useful for citizens and consumers seeking to establish some form of algorithmic accountability.[26] In linking transparency to accountability in this context it means that 'making one part of an algorithmic system visible—such as the algorithm, or even the underlying data—is not the same as holding the assemblage accountable.'[27] If it is not possible to see and understand

[24] See Finck, M. (2019) Automated Decision-Making and Administrative Law, Max Planck Institute for Innovation and Competition Research Paper No. 19-10, for a discussion on transparency in automated decision-making.

[25] Ananny, M. & Crawford, K. (2016) 'Seeing without knowing: Limitations of the transparency ideal and its application to algorithmic accountability', New Media and Society, 1-12.

[26] Mittelstadt supra 6.

[27] Ananny & Crawford supra 12; Zerilli, J. et al. (2018) Transparency in Algorithmic and Human Decision-Making: Is There a Double Standard?, 3–5; World Wide Web Foundation Algorithmic Accountability, (July 2017), 11 – 12.

the reasoning behind an algorithmic decision, the basis for establishing accountability is in question. Therefore, new approaches to accountability in this context will have to be considered. The fact that algorithmic decision-making is opaque and could in fact be very complex, for example in the case of machine learning, which includes predictive modelling, means that looking into the system should rather be replaced by looking across the system in order to get a holistic view. The limitation or lack of transparency regarding algorithmic decision-making may prevent aggrieved citizens from obtaining an effective legal remedy.[28]

Algorithmic accountability is about a focus on the design and implementation of algorithmic systems in publicly accountable ways to mitigate harm or negative impacts on consumers and society.[29] Various experts in computer science have approached this complex matter by describing a set of principles that should apply to the design and use of algorithms in order to support public accountability. A group that calls itself the Fairness, Accountability and Transparency in Machine Learning community (FATML) propose five principles for algorithmic accountability, namely fairness, explainability, auditability, responsibility and accuracy, which is described in the following table:

Principle	**Description**
Fairness	"Ensure that algorithmic decisions do not create discriminatory or unjust impacts when comparing across different demographics"
Explainability	"Ensure that algorithmic decisions as well as any data driving those decisions can be explained to end-users and other stakeholders in non-technical terms."
Auditability	"Enable interested third parties to probe, understand, and review the behaviour of the algorithm through disclosure of information that enables monitoring, checking, or criticism, including through provision of detailed documentation, technically suitable APIs, and permissive terms of use."
Responsibility	"Make available externally visible avenues of redress for adverse individual or societal effects of an algorithmic decision system and designate an internal role for the person who is responsible for the timely remedy of such issues."
Accuracy	"Identify, log, and articulate sources of error and uncertainty throughout the algorithm and its data sources so that expected and worst case implications can be understood and inform mitigation procedures."

[28] Finck supra 12.

[29] World Wide Web Foundation Algorithmic Accountability, July 2017, 11; Diakopoulos, N. et al. www.fatml.org/resources/principles-for-accountable-algorithms; Mittelstadt et al 2.

[Source: Diakopoulos, N. et al. (2016) Principles for Accountable Algorithms and a Social Impact Statement for Algorithms, from Fairness, Accountability, and Transparency in Machine Learning (FATML), www.fatml.org/resources/principles-for-accountable-algorithms]

This is a helpful guide but does not provide all the answers to issues relating to algorithmic accountability and further research is thus needed. The World Wide Web Foundation argues that improving algorithmic accountability should be a systemic approach that involves a whole range of stakeholders, such as algorithmic designers, regulators, consumers and interest groups, and further stated 'Making algorithms more accountable means ensuring that harms can be assessed, controlled and redressed. Ensuring algorithmic justice implies finding the right remedies and identifying the responsible parties to take action.'[30] Such an approach which contextualises the concept of accountability is in line with the general understanding and application of accountability in the Rechtsstaat.

4. Human Rights Implications of the Use of Algorithms

While algorithmic accountability is an important legal issue relating to algorithmic decision-making, there are also some human rights issues that should be considered. Individual freedom is in the spotlight today, not only where authoritarian regimes infringe the rights of citizens, but also in the context of many technological developments that span geographical borders. Social media is a good example of how people can express themselves online, but also how freedom of expression and the right to privacy and protection of personal data might be threatened. The use of algorithms and artificial intelligence in so many fields of human activity raises various human rights questions. What is the impact of algorithms on freedom of speech, the right to a fair trial, the right to equality, human dignity, and the right to privacy and protection of personal data? How can society safeguard human rights and freedom in this high-tech environment? Who will be accountable when harm is caused by the application of algorithmic decision-making? This section casts a spotlight on only some of the human rights implications of the use of algorithms and artificial intelligence.

In order to determine the existence and scope of possible human rights implications in algorithmic decision-making, a focus on the specific algorithm in isolation is not useful. It is necessary to consider the application of the algorithm, the character of the input data which might cause harm to individuals or categories of people, as well as the context within which the specific algorithmic decision-making takes place. Face recognition software, for example, is based on algorithms (performing a classification function) which are applied to large datasets of personal data. The algorithm is then applied to new input data such as the passport photos of flight passengers to prevent known terrorists from entering a country through a commercial airport. So, in this context, although the algorithm is biased against persons on such a list of unwanted visitors, it is justified since the protection of society is of primary importance. In a different scenario the use of algorithms to predict the likelihood of academic success in a particular society or school can be helpful to indicate trends and the potential for success, which can assist teachers in identifying needs for academic support. It can, however, be prejudicial to individual learners due to the fact that subjective factors such as

[30] World Wide Web Foundation supra 16.

the learning environment and how individual leaners respond to academic support to improve their performance, are not taken into account in the datasets on which the algorithm is applied.

An important human rights issue that is frequently discussed in the context of the use of algorithms and artificial intelligence is the prohibition against discrimination on a variety of grounds, for example on race, gender or age. Algorithms often have a built-in bias; for example, when used in search engines which rank the results of a search in a particular way such as relevance in relation to the search term. Social inequality and prejudices in society related to factors such as race or gender could be influenced by the use of algorithms, but it might not necessarily be an algorithmic design issue. The algorithm could learn from data collected from humans and by implication also adopt the biases of humans attached to that data, for example shopping preferences of people living in a specific area might display some racial or gender profiles.[31] Care should thus be taken in the design and application of algorithms to prevent unlawful discrimination. If an unlawful bias in algorithmic decision-making can be identified, software could potentially be designed to detect and act on it, but this complex matter warrants further research.

The rights to privacy and to protection of personal data have taken centre stage during the last couple of years and still do. This is perhaps due to the right of consumers and citizens to protect their interests, but also because so many applications over a wide spectrum of algorithmic decision-making use personal data, for example search engines, social media platforms and citizen registration software. Through the use of algorithms, large amounts of personal data can be collected, stored, analysed and used and this potentially has a significant impact on the right to privacy and the right to protection of personal data. An algorithm could, for example, be used to form a profile of a consumer by collecting and analysing the online buying activities of that person, which is then used to market specific products or services to them. A study by an expert group of the Council of Europe titled 'Study on The Human Rights Dimensions of Automated Data Processing Techniques (in Particular Algorithms) and Possible Regulatory Implications' indicated the difficulty in ensuring the protection of personal data in cases where algorithms connect different sets of data to produce new data.[32]

In the only international treaty so far, which regulates the protection of individuals regarding automated processing of personal data, a multilateral legal framework is provided for the protection of personal data while ensuring a smooth flow of data between countries. The Protocol amending the Convention for the Protection of Individuals with regard to Automatic Processing of Personal Data was approved by 21 countries in October 2018.[33] Processing of personal data must, according to Article 5 of the protocol, be done lawfully and in a fair and accurate manner and with the explicit and free consent of the data subject (individual person). Provision is also made for further legal measures to provide protection for a data subject against infringement of individual rights and

[31] See, for instance, Devlin, H. (2017) AI programs exhibit racial and gender biases, research reveals from www.theguardian.com/technology/2017/apr/13/ai-programs-exhibit-racist-and-sexist-biases-research-reveals [accessed on 29 August 2019]; Busch supra 46; Zerilli et al 11-14.

[32] Council of Europe, (2018) Algorithms and Human Rights, 17.

[33] www.coe.int/en/web/conventions/full-list/-/conventions/treaty/223.

freedoms by the use of algorithmic decision-making.[34] A fairly comprehensive legal framework for the European Union came into operation in May 2018, namely the General Data Protection Regulation (GDPR) (Regulation (EU) 2016/679 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data), which inter alia established standards for the use of algorithms in data collection and processing. The GDPR contains a list of rights relating to the protection of personal data. As far as the use of algorithms in data processing is concerned, a data subject (person) has the right to request that decisions based on automated processing, including profiling, concerning him or her or significantly affecting him or her and based on their personal data are made by natural persons, not only by computers.[35]

The right to privacy and the right to protection of personal data are multi-faceted rights in view of the diverse and often complex use of algorithms in AI and machine learning. The situation is even more complex when one considers that personal data could be gathered automatically through the interaction of different devices such as mobile phones from different users. Profiling is another technique which uses algorithms to compare personal information to patterns in collected data to determine if a person fits a specific pre-determined profile, and this could also be used to predict future behaviour based on that profile.[36] Such profiling often occurs without the explicit consent of the person and could infringe the right to protection of personal information, including to control information about yourself.[37] These examples raise the question about suitable and adequate protection of the right to privacy and the right to protection of personal data.

There are many more human rights questions relating to the use of algorithms and artificial intelligence, which fall beyond the scope of this article. In view of the scope of algorithmic decision-making in all spheres of life, a review of the notion of human rights protection against interference by the state should perhaps be done. The Council of Europe study on Algorithms and Human Rights states in this respect:

> *'The traditional asymmetry of power and information between state structures and human beings is shifting towards an asymmetry of power and information between operators of algorithms (who may be public or private) and those who are acted upon and governed.'*[38]

5. Designing an Appropriate Ethical and Legal Framework

In view of the impact of the use of algorithms in many facets of our daily lives as indicated in the discussion above, it is necessary to explore what legal framework should underpin the further development and use of algorithmic decision-making. Parts of such a legal framework already exist and as the use of algorithmic decision-making further evolves, adapting the rules or developing new rules should obviously be considered.

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[34] Council of Europe, Algorithms and Human Rights, (2018) 18.
[35] Art. 22 GDPR.
[36] Mitrou supra 21-23.
[37] Council of Europe Algorithms and Human Rights 19.
[38] Council of Europe Algorithms and Human Rights 37.

It is evident that various human rights issues relating to algorithmic decision-making warrant regulation, and some international and national rules have been developed already. Some recent examples are discussed in this section, which concludes with a set of guiding principles for legal frameworks to be developed in the future.

The focus of the European Union's GDPR[39] is the protection of personal data and it includes a range of measures dealing with the rights of data subjects (individual persons), namely:

the right to:

- information about the processing of your personal data, which must take place in a lawful, fair and transparent manner (Art. 5,13, 15);
- an explanation (meaningful information) about the logic involved in the processing of your personal data (Art. 14 (2));
- obtain access to the personal data held about you (Art. 15);
- ask for incorrect, inaccurate or incomplete personal data to be corrected (Art. 16);
- request that personal data be erased when it is no longer needed or if processing it is unlawful (right to be forgotten) (Art. 17);
- object to the processing of your personal data for marketing purposes or on grounds relating to your particular situation (Art.18, 21);
- request the restriction of the processing of your personal data in specific cases (Art. 18);
- receive your personal data in a machine-readable format and to send it to another controller ('data portability') (Art. 20);
- request that decisions based on automated processing concerning you or significantly affecting you and based on your personal data are made by natural persons, not only by computers. You also have the right in this case to express your point of view and to contest the decision (Art. 22).

Some of the measures dealing with the protection of personal data in the GDPR also provide some response to the search for more accountability relating to algorithmic decision-making; for example, the right to an explanation about the logic involved in the processing of personal data as described in Article 14.[40] Accountability of data controllers regarding the processing of personal data is also stipulated in Art.5. Mitrou argues that

> *'accountability and transparency are mere tools to support the protection of values and principles while developing and using AI technologies.'*[41]

The 2018 Protocol amending the Convention for the Protection of Individuals with regard to Automatic Processing of Personal Data contains a range of provisions that strengthen the protection of personal data and which are similar to those contained in the GDPR, for example:

[39] General Data Protection Regulation, effective from 25 May 2018. See also Mitrou 27–28 regarding the GDPR and use of algorithms in processing personal data.
[40] Mitrou 71.
[41] Mitrou 78.

- the right of an individual not to be subject to a decision which significantly affects him or her based only on automated processing of data, without taking his or her views into consideration; and
- the right to a meaningful explanation about the logic applied to data processing where the results of that process are applied to him or her.[42]

The GDPR applies to the processing of data wholly or partly by automated means (Art. 2) in 'the context of the activities of an establishment of a controller or a processor in the Union, regardless of whether the processing takes place in the Union or not' (Art. 3). This means that the GDPR is also relevant outside the EU; for example, in the case of processing of personal data in the context of online trading of goods and services.

There are also examples of national legislation dealing with the protection of personal data, for example the Data Protection Act 2018 in the United Kingdom, and the Protection of Personal Information Act (POPI) (Act 4 of 2013) in South Africa, which is aimed at the protection of personal information by both public and private bodies. While the focus of these national laws is the protection of personal data, the issue of automated decision-making is often included in such legislation in view of the interrelatedness of the rights of individual data subjects (persons) and algorithmic decision-making.

Some legal frameworks, such as the GDPR in the European Union, contain both appropriate legal principles as well as detailed protection measures to safeguard the right to privacy and the right to personal data protection in general, but also in the context of algorithmic decision-making and artificial intelligence. Such provisions do, however, not cover the complete field of algorithmic decision-making, since it is not their primary focus. It should nevertheless be acknowledged that the right to privacy and the right to personal data protection are key issues when regulation of algorithmic decision-making is concerned. National laws and international regulations such as the GDPR should also be treated as part of an evolutionary process that warrants further research and adaptation or the development of new legal provisions as the use of algorithms in artificial intelligence, machine learning, Internet of Things and big data is evolving. The digital revolution requires a continuous consideration of appropriate legal arrangements.

Algorithmic decision-making clearly has a range of potential legal implications, as is evident from the discussion above. It is therefore appropriate to consider dedicated legal frameworks that focus only on algorithmic or automated decision-making. A recent example of specific rules dealing with algorithmic decision-making is the 'Canadian Directive on Automated Decision-making' issued in 2019. It aims to ensure more efficient, accurate, consistent and interpretable decisions in automated decision-making processes. It also links algorithmic decision-making with the core administrative law principles such as transparency, accountability, legality and procedural fairness. [43]

[42] Art. 9(1) of the Convention.
[43] Art 4 of the Directive on Automated Decision-making from www.tbs-sct.gc.ca/pol/doc-eng.aspx?id=32592.

The development of appropriate legal frameworks, both in domestic law as well as internationally, should have an ethical basis that includes key principles such as accountability and the respect for fundamental human rights. Buttarelli said, with reference to the need for an ethical approach, that

> *'there is a shift in the respect for privacy. This shift is towards establishing a sustainable ethics for a digitised society.'*[44]

In 2018 The focus of the 40th International Conference of Data Protection and Privacy Commissioners was on ethics in the digital and data driven economy. The conference published a 'Declaration on Ethics and Data Protection in Artificial Intelligence', which provides a comprehensive ethical basis for the recognition of human rights in the further development of artificial intelligence. The Declaration inter alia states:

> *'The 40th International Conference of Data Protection and Privacy Commissioners considers that any creation, development and use of artificial intelligence systems shall fully respect human rights, particularly the rights to the protection of personal data and to privacy, as well as human dignity, non-discrimination and fundamental values, and shall provide solutions to allow individuals to maintain control and understanding of artificial intelligence systems.'*

The Conference further endorsed the following principles:

- Artificial intelligence and machine learning technologies should be designed, developed and used with respect of fundamental human rights and in accordance with the fairness principle.[45]
- Continued attention and vigilance, as well as accountability, for the potential effects and consequences of, artificial intelligence systems should be ensured.
- Artificial intelligence systems' transparency and intelligibility should be improved, with the objective of effective implementation.
- As part of an overall "ethics by design" approach, artificial intelligence systems should be designed and developed responsibly, by applying the principles of privacy by default and privacy by design.
- Empowerment of every individual should be promoted, and the exercise of individuals' rights should be encouraged, as well as the creation of opportunities for public engagement.
- Unlawful biases or discriminations that may result from the use of data in artificial intelligence should be reduced and mitigated.

These principles adopted by a prominent group of Data Protection and Privacy Commissioners from EU Member States and a range of other countries fit well within the context of the Rechtsstaat or constitutional state. In 2019 the Council of Europe Commissioner for Human Rights published recommendations to deal with artificial intelligence and human rights in line with these principles, which include the following statements:

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[44] 'Choose Humanity: Putting Dignity back into Digital', Opening Speech of Debating Ethics Public Session of the 40th Edition of the International Conference of Data Protection Commissioners, 24 October 2018.

[45] See with respect to 'fairness' Mitrou supra 42.

'The use of an AI system in any decision-making process that has a meaningful impact on a person's human rights needs to be identifiable.

Oversight over an entire AI system must also be enabled by transparency requirements.

In all circumstances, discrimination risks must be prevented and mitigated with special attention for groups that have an increased risk of their rights being disproportionately impacted by AI.'[46]

Respect for fundamental human rights and acknowledgement of key principles of accountability and explainability or interpretability (adapted transparency) should clearly be the ethical basis for any legal framework dealing with algorithmic decision-making.[47]

6. Conclusion

In the data-driven economy of the 21st century the pace and scope of technological developments that impact humanity requires the development of appropriate legal frameworks to reflect and accommodate the needs of society, in particular relating to the recognition of fundamental human rights. Artificial intelligence is for many people something alien, despite the fact that it is already applied in many daily activities around the world. In response to the research question posed, this article shows the need for and importance of relevant and appropriate legal frameworks that can guide the design and application of algorithms in artificial intelligence, not for the sake of regulating the use of technology, but in order to create appropriate frameworks for human and technological interaction that will satisfy the needs of society. The development of relevant and appropriate legal frameworks relating to algorithmic decision-making is a journey which warrants regular reflection and adaptation in view of the continuous advancement of technology.

What is important to establish on a global scale, since artificial intelligence does not know national borders, is a broad set of ethical and legal principles that can guide the development of international and national legal frameworks that regulate algorithmic decision-making. Such a set of ethical and legal principles was adopted at the end of 2018 by the 40th Conference of Data Protection and Privacy Commissioners and provides a very good basis. This should be translated into international and national legal documents to support the further development of algorithmic decision-making.

In the debates about the regulation of algorithmic decision-making, some scientists argue that giving algorithms a separate legal personality should be considered, so that they can be sued in case of unfair or harmful application.[48] The increased use of multi-algorithmic systems might well warrant such a development, but this is not yet clear and more research needs to be done on this issue. In view of the discussion in this article, it is suggested that possible areas for future research include:

- The scope of algorithmic accountability;
- The possibility of creating a separate legal personality for an algorithm; and

[46] Council of Europe, (2019) Unboxing Artificial Intelligence: 10 steps to protect human rights, from https://www.coe.int/en/web/commissioner/-/unboxing-artificial-intelligence-10-steps-to-protect-human-rights.

[47] Busch 60-62.

[48] Treleaven, P. et al (2019), 'Algorithms: Law and Regulation', Computer, 22 March 2019, 40.

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A sound ethical basis that includes respect for human rights should be the key guiding approach for any future developments.

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Use of Social Media for Political Participation by Youths in Oyo State, Nigeria

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Abstract: This study investigated the use of social media for political participation among youths in Oyo State, Nigeria; specifically, the types of social media used for political participation, the types of political activities social media are used for, as well as factors influencing the use of the media for political participation. Survey research design was adopted for the study. Data was collected through a questionnaire from 322 youths in three Nigerian universities. Findings reveal that social media was highly used by the youths for political participation. Facebook was the most used, followed by Whatsapp, Instagram, Twitter and Yahoo Messenger respectively. Majorly, the youths used social media to participate in political advocacy, political campaigns, communicating with politicians, political discussions, monitoring and reporting electoral malpractices, public consultations, joining interest groups that engage in lobbying, blogging about political issues, and writing letters to public officials respectively. Perceived usefulness, perceived ease of use, subjective norms, and computer self-efficacy significantly influence the use of social media for political participation, which suggests that these factors could be considered when promoting the use of social media for political participation among youths. Given the growing popularity and penetration of social media and the way they influence peoples' lives, the empirical findings of this study add to understanding how and why social media use will function in motivating citizens to be involved in political activities.

Keywords: computer self-efficacy, perceived usefulness, perceived ease of use, political participation, social media use, Nigerian youths

1. Introduction

Social media have penetrated all levels of the information society and have catalysed the process of democratisation and political development. The media, a modern trend in information and knowledge dissemination, has taken communication beyond the limitations of the traditional way of communicating and socialising, making it an essential part of people's lives; affecting their social, political and economic activities. While some decades ago, the Internet was considered a news media, societies now turn to social media as sources of information. One of the major applications of social media is social networks, where millions of people are connected to utilise an open domain for interacting with others and socialising with all types of media such as text, voice, images, or

videos (Alquraan et al., 2017). The interactive nature of social media makes them fit to be used for many purposes such as job search, socialisation, education, entertainment, governance, political participation, among others. Hence, social media, as social instruments of communication, promote participation, connectedness, opportunity to disseminate information across geographical boundaries and the fostering of relationships and interactions among people. Commonly used social media are Facebook, WhatsApp, Twitter, Instagram, Imo, 2go, YouTube, Telegram and Flikr.

Social media technologies have engaged many Internet compliant individuals to build their lives around it. However, studies have shown the proliferation of the use of social media among the youths, who are considered to be more technology savvy than older adults. The term "youth" can be used to describe individuals from physical adolescents to those in their adulthood. Ahn (2011) explains that the youth identity presents those in their teens and their 20s as participants in a shared social experience that is dissimilar from that of other age or cultural groups, while Heaven and Tubridy (2007) describe the youth as a person whose identity and age falls between being children and adults. The United Nations (2011) defines youths as people between the ages of 15 and 24 years inclusive. The youths are critical to the existence, survival and socio-economic development of nations because they are young, energetic and able. Little wonder, they are associated with being referred to as 'the leaders of tomorrow' or the 'future of the society'. According to the latest United Nations estimates of the world's population in 2019, there are about 1.2 billion youths aged 15 to 24 years globally, or 16 per cent of the global population, accounting for one out of every six people worldwide (United Nations, 2019a, 2019b). It has been noted that, in some parts of the world, not only do the numbers of youths grow but so does their share of the population. In some countries, the growth of the youth population is outpacing the growth of the economy as more than one in three is a young person, (UNFPA State of the World Population, 2014). This brings to fore the importance of youths to nations development.

The second National Youth Policy Document of the Federal Republic of Nigeria (2009: p. 6) defines youth as comprising "all young males and females aged 18-35 years who are citizens of the Federal Republic of Nigeria." The Nigerian government adopted this definition because the age range, 15-24, defined by the United Nations and others for statistical purposes, is too narrow for countries like Nigeria. The reason for this is that, in many countries in Africa, the male transition to adulthood, in terms of achieving the economic and social stability that comes with steady employment, may extend into the late twenties and mid-thirties. By this policy, the youths are defined as characterised by energy, enthusiasm, ambition, creativity and promise; and faced with high levels of socioeconomic uncertainty and volatility. They represent the most active, the most volatile, and yet the most vulnerable segment of Nigeria's population. The policy also understood that this is a period in life when most young people are going through dramatic changes in their life circumstances as they move from childhood to adulthood, hence, they require social, economic and political support to realise their full potential.

Majorly, youths adopt social networking media for communication with friends, family members and the general public. As far back as 2010, Lenhart et al. (2010) reveal that about 72 per cent of American youths (age 18-29 years) used social networking sites such as Facebook and MySpace. Johnston et al. (2013) equally found that Facebook and Twitter were two social computing systems

that were popular among university students in Cape Town, South Africa, while Onah and Nche (2014) found that Nigerian youths were more disposed to social media technologies than other types of technologies. Supporting these claims are more recent studies, (e.g. Abodunrin, 2017; Ahmad *et al*, 2019; *Draškovic et al*., 2017; Fasae and Adegbilero-Iwari, 2016; Jamil (2018), Mahmud and Amin (2017) and Williams and Adesope, 2017), who have found that youths, especially students of higher institutions, are innovators, early adopters, as well as early majority adopters and users of social media for various activities. No wonder Wilson and Boldeman (2011), as well as Adaja and Ayodele (2013), describe youths as ICT natives and prolific users of social media. This assertion was corroborated by Nche (2012: 19), who states that "in the manner of a wildfire in harmattan, the phenomenon of social media (networking) has spread to all nooks and crannies of Nigeria, engulfing a large number of her youths and that social media usage has become so common among the youths, that it has become unfashionable for youths not to engage in at least one of the social networking sites." Nnamonu (2013) sums it up by describing the Internet as the chief host of social media sites, while the youths are the most predominant clients.

Social media has multiple usage values; usage can be negative or positive, depending on users' intentions and purposes of using. However, in some cases, users fall victim of negative usage experiences beyond their control, such as bullying, extortion, hacking, trolling, propaganda, impersonation, etc. Even though some studies have found that the youths can use social media in many negative ways, such as exposure to pornographies, bullying and blackmailing; social media use can be centred on positive use, like education, entertainment, politics, brainstorming, and religious matters. One of the many uses of social media is that it supports the democratisation of knowledge and information, thereby making people both information producers and consumers. The ubiquitous access to social media has democratising effects as they offer citizens opportunities to engage and participate in political processes. Social media offers engagement in a medium that fits comfortably with peoples' mode of life and facilitates political participation of citizens by helping them monitor and influence government decisions. The growing popularity of social media has motivated scholars to explore the roles social media play in everyday life and democratic society; specifically, the role of the media in facilitating political participation and engagement.

Political participation means "citizens' involvement in the acts, events or activities that influence the selection of and/or the actions taken by political representatives" (Okoro and Nwafor, 2013: 33). It is the various mechanisms through which citizens express their political views and/or exercise their rights and influences on the political processes (Chatora 2012). Thus, it is a civic activity and a critical part of any democracy; an action taken by a citizen to influence the outcome of a political issue. Political participation could also be explained as a set of activities that citizens perform to influence government's structured policies or officials. Through political participation, citizens can elect political representatives, who make policies in favour of the citizens who are the ultimate beneficiaries of social programmes put in place by the representatives. Political participation also entails citizens' engagement in the discourse of socio-political and economic issues which serve as yardsticks for choosing would-be leaders. It may also include assessing the capabilities of the incumbencies and advocating ways of ameliorating societal ills for a more prosperous country. Political participation, therefore, includes such activities as political discourse, political campaigns, voter registration, voting, writing and signing of petitions, civil protests, public consultations, donating money

towards elections, joining interest groups that engage in lobbying, political advocacy, monitoring and reporting of cases of violation of the electoral process such as frauds, rigging, intimidation, violence, monetary inducements, underage voting, etc. (Abubakar, 2011; Gibson et al., 2005; Unwuchola et al., 2017).

The emergence of the Internet, which in turn gave birth to social networking sites, brought a paradigm shift in the electioneering process and radical transformation of the society where the populace is no longer passive in government activities; as the media provide new avenues for political engagement. The platforms have "exponentially multiplied the possibilities for the retrieval and dissemination of political information, thus affording any Internet user with a variety of supplemental access points to political information and activity that come at little cost in time, money and effort" (Breuer and Groshek, 2014: 165). No wonder Diamond (2010: 70) refers to social media as a "liberation technology that expands political, social and economic freedom." Milakovich (2010) also presents social media as a tool for increased citizen participation in the political environment. Unlike the other mass media, social networking media provide two-way and even multi-way forms of communication channels (Diamond, 2010; Milakovich, 2010), which enhance the feedback process and encourage interaction among users. It is this interactive nature of social networking media that creates opportunities for citizens to participate in online electioneering processes which Medimorec et al. (2011) referred to as electronic participation (e-participation). Online political activities (e-participation) include writing emails to politicians, visiting politicians' campaign websites, donating money online, electronic campaign, electronic voting and so forth.

The many benefits of using social media for political participation include granting citizens the opportunity to participate actively and get involved fully in the political discourse by adding their voices on issues posted on social media sites. The platforms also afford electorates a friendlier avenue of assessing candidates for political offices and promoting transparency in governance, thus, advancing the tenets of participatory democracy that sees the media as debate avenues which aid tremendously the actualisation of involvement in politics. Social media also offer a range of potentials for innovating governance and finding new ways of governing by creating an opportunity of listening to citizens' opinion pool online, thereby setting ideas about citizenry needs including the possible reaction of people towards public decision-making processes. The platforms equally provide politicians with the opportunity to be informally free with the public as politicians can reach the masses to assess the political atmosphere even before venturing into the campaign. This connection helps politicians to appeal to citizens, communicate their humour, indicate their approachability, as well as accessibility to the public, thereby making them seem more personable and in constant contact with their supporters.

Even though the advent of social media in the political arena has drastically impacted the politicians and voters alike; the use of social media for political participation has its drawbacks. Misinformation, political harassment, rumours, fake news, propaganda and trolling are some of the problems of using social media for political participation. Besides, the topic of bots affecting the outcome of elections has recently become a mainstream topic during elections. Bots are used to leak fake news stories, spread dissension and create fake profiles on social media platforms that sow divide between people and political parties. Usage of social media for political participation also exacerbates the

problem of echo chambers, with everyone feeling the need to be on one side or the other. People only see contents and viewpoints they agree with when they scroll down their news feed, which makes it unlikely that voters will ever have to sincerely defend their political stance unless they actively seek people and media outlets with opposing political views. In addition, the use of social media for political participation also allows for foreign interference in elections.

The advantages associated with the use of social media, however, have made political leaders, all over the world adopt the platform to campaign during elections, solicit for votes, maintain closeness and transparency with citizens and mobilise citizens and candidates towards active participation in the political processes (Abdulrauf et al., 2015; Abubakar, 2012; Aharony, 2012; Ekwueme and Folarin, 2017; Unwuchola et al., 2017). This has been demonstrated in recent elections conducted in many countries. For instance, the report of the Pew Research Centre's Internet & American Life Project by Smith (2009) found that social media platforms such as blogs, social networking sites and video-sharing sites played a key role in the United States of America's 2008 elections as many people got information about candidates and campaigns through using the platforms. Not only did users get their news and campaign information from these media during the elections but they were also able to post their thoughts and comments, allowing them to play a more active role for citizens in the political process. Recognising these benefits, Nigerian politicians also embraced and exploited the media for political campaigns during the 2011 presidential elections. The 2011 general elections in Nigeria were, in fact, the first litmus test of the use of social media by political parties, political candidates and civil society organisations. The election was historic in the sense that it was the first time that social media facilitated political communication and participation. Since then, social media have been deployed in the electoral processes in Nigeria.

Studies have investigated the use of social media for political participation in Nigeria. Chinedu-Okeke and Obi (2016), for instance, explore the extent of South-eastern Nigeria electorates' involvement with social media for electioneering process and found that political campaigns through the social media had a significant effect on electorate's decision-making and participation in Nigeria's 2011 and 2015 elections. Similarly, Okoro and Santas (2017) appraise the utilisation of social media for political communication in the 2011 Nigerian presidential election to determine whether voters' choice of presidential candidates was influenced by their social media use. The results reveal that the majority of the respondents' choices of presidential candidates was influenced by the use of social media. Similarly, the respondents were of the opinion that the two selected presidential candidates were popular because they used social media in their political campaign. Ekwueme and Folarin (2017) examine the role of social media in the Nigerian 2015 presidential electioneering processes. Findings show that social media played a major role in mobilising people, creating awareness, as well as participation and circulation of information about candidates. Apuke and Tunca (2018) also examine the implications of social media usage in the electoral processes and campaigns in the Nigerian 2011 and 2015 general elections. Findings show that social media was employed due to its participatory nature and that social media was applied to influence the thoughts of many young people, increasing their political awareness. Thus, these studies establish that the voting patterns during the 2011 and 2015 elections were influenced by social media usage. Besides, in the 2015 elections, it was found that during the collation of results, social media was used to inform the public of the results in several states across the country, making it difficult for manipulations of results.

Also, Adegbola and Gearhart (2019) investigate the relationship between media use and political engagement across three countries - the United States, Kenya, and Nigeria, using a secondary analysis of a worldwide survey (N = 1,775) collected by Pew Research. Results identify differences in the effects of traditional and new media use on political engagement between countries and also found that media use was predictive of political engagement. Specifically, accessing news from social media and online news platforms was related to higher levels of political participation across the three countries. Thus, these studies have shown that social media have redefined methods of political communication in Nigeria, leading to a significant shift towards the utilisation of the technology in electoral processes. The integration of social media into the political realm in Nigeria, therefore, necessitates this research.

While there are several studies which have investigated the influence of social media on the political dimension of the society, few (e.g. Abdulrauf, 2016; Onyechi, 2018; Dagona et al., 2013) have explored the use for political participation among youths in Nigeria. The findings of Abdulrauf (2016) on cognitive engagement and online political participation on Facebook and Twitter among youths in Nigeria and Malaysia reveal that access to political information on Facebook and Twitter was one of the factors that influence online political participation of youths via Facebook and Twitter among the youths. Onyechi (2018) also found that Nigerian students who spent more time on social media participated in campaigns during elections, while Dagona et al. (2013) found a significant relationship between social media usage and political participation and mobilisation among Nigerian youths. These studies have been able to reveal increasing use of social media for political participation among youths; however, failing to identify the types of political activities social media are used to perform, as well as the factors influencing the use of social media for political participation.

The population of youths in Nigeria, according to the 2006 population census, reveals that the youths constituted about 36% of the total population. The 2017 Demographic Statistics Bulletin published by Nigeria's National Bureau of Statistics in May 2018 report Nigeria's projected population as a youthful population. Thus, it can be said that a large proportion of the Nigerian population is made up of youths. The constitution of the Federal Republic of Nigeria gives ample opportunities to youths to participate in politics as the minimum age for voting is 18 years. Studies have shown that, with the emergence of social media, the participation of youths in politics has increased because social media are veritable platforms of political socialisation that are used to attract young citizens to the processes. Thus, over the years, social media have become important sources of political participation for young people (Yamamoto, 2015), who are normally not attracted to politics and the platforms have become one of the best tools to assess the popularity of a political candidate among youths. Consequently, this study investigates the use of social media for political participation among youths in Nigeria. This study, thus, provides answers to the following questions:

1) What are the various types of social media used for political participation by youths in Oyo state, Nigeria?
2) What are the types of political activities youths in Oyo state, Nigeria use social media to participate in?
3) What are the factors influencing the use of social media for political participation among the youths in Oyo State, Nigeria?

2. Research framework

Two theories provides the framework for this study: the theoretical extension of Technology Acceptance Model (TAM2) introduced by Venkatesh and Davis (2000) and the Social Cognitive Theory (SCT) by Bandura (1986). Four variables - perceived usefulness (PU), perceived ease of use (PEOU), subjective norms (SNs) and computer self-efficacy (CSE), were adapted from these theories to investigate their influence on the use of social media for political participation (USMPP) among youths in Oyo State, Nigeria. The TAM is generally referred to as the most influential, commonly employed and well-recognised theory in information systems because it is a well-established, powerful and parsimonious model for predicting user acceptance and has been widely applied by researchers to a diverse set of technologies and users (Adams et al., 1992; Davis et al., 1989; Benbasat and Barki, 2007; Venkatesh et al., 2003). The original TAM, a specific adaptation of the Theory of Reasoned Action was developed by Davis (1986) to explain why users adopt or reject an innovative information system. It offers a powerful explanation for user acceptance and usage behaviour of information technology. The TAM theorises that an individual's behavioural intention to adopt a system is determined by two beliefs (PU and PEOU) and that these two key independent variables determine behavioural intention to use and actual system use, with intention to use serving as a mediator of actual system use. PU is also seen as being directly impacted by PEOU, meaning that, all other things being equal, the easier the system is to use the more useful it can be. TAM includes the very important assumption that the behaviour is volitional (voluntary) or at the discretion of the user.

TAM2 extended the constructs of TAM and included additional determinants of the TAM's perceived usefulness and usage intention constructs. This model helps to understand how the effects of these determinants change with increasing user experience over time with the target system. TAM2 incorporates additional theoretical constructs spanning social influence processes and cognitive instrumental processes and explained that the additional constructs - social influence processes (subjective norm, voluntariness, and image) and cognitive instrumental processes (job relevance, output quality and result demonstrability) significantly influenced user acceptance. TAM2 performed well in both voluntary and mandatory environments. The TAM2 was found by Venkatesh and Davis (2000) to account for 40% - 60% of the variance in usefulness perceptions and 34%--52% of the variance in usage intentions. Thus, our research framework consists of some constructs (PU, PEOU and subjective norm) adapted from TAM2, while an additional construct, computer self-efficacy, was adopted from the SCT. The SCT is one of the most powerful theories of human behaviour theory (Bandura 1986), which has been applied to the context of computer utilisation (Compeau and Higgins, 1995; Compeau et al. 1999) and acceptance and use of information technology in general.

2.1. PU and use of social media for political participation

PU is a person's subjective perception of the usefulness of a system. It is defined as 'the degree to which a person believes that using a particular technology would enhance his or her job performance (Davis, 1989: 320). In this case, PU denotes the youths' perception of the usefulness of social media for political participation. According to Davis, PU is a strong correlate of user acceptance and use

of technology. Many other studies (e.g. Elkaseh et al., 2016; Dzandu et al, 2016; Kim and Sin, 2017; Sago, 2013; Shirazi, 2013; Sumida-Garcia and Costa-Silva, 2017) have found a significant relationship between PU and use of social media for various purposes. For instance, Sago (2013) found that the frequency of use of social media services is positively impacted by the level of perceived usefulness provided by social media services. Shirazi (2013) explored the role of social media in communication discourse in the Islamic Middle East and North African (MENA) countries and found that social media help citizens partake in conversations and mobilisation. It is envisaged that the perception of the usefulness of social media could influence their usage for political participation by youths in Oyo State, Nigeria; thus, the first hypothesis is proposed:

H1: There is a significant relationship between PU and the use of social media for political participation by youths in Oyo State, Nigeria.

2.2. PEOU and use of social media for political participation

Davis (1989) defined PEOU as "the degree to which a person believes that using a particular system would be free of effort" (Davis, 1989: 320), which means that such system should be easy to use without stress. PEOU, in this study, depicts Nigerian youths' perceptions of how easy social media are to learn and use, which may include ease of navigation, ease of using the media to communicate, response time, feedback mechanisms, among others. It is assumed that the more the youths are at ease with using social media to communicate and socialise, the higher likelihood for them to use the media to participate in politics, as many studies (e.g. Dzandu et al, 2016; Elkaseh et al., 2016; George et al., 2014) have confirmed. Thus, another hypothesis is proposed:

H2: There is a significant relationship between PEOU and use of social media for political participation by the youths.

2.3. SNs and use of social media for political participation

SNs is a person's perception that most people who are important to him think he should or should not perform the behaviour in question (Fishbein and Ajzen, 1975: 302). These norms represent the expectations of other people regarding the performance of a particular behaviour. Thus, SNs represent how the youths are influenced to use social media for political participation by reference people such as families, friends, colleagues, classmates, neighbours, etc. Fishbein and Ajzen explain that intention originates from two determining factors; the first factor is personal and is reflected in one's attitude, while the second factor is SNs, which reflects social influence. Given that SNs are strongly associated with behavioural intention and actual behaviour by many studies (e.g. Bataineh et al., 2015; Kim et al., 2011; Peslak et al., 2012; Taylor and Todd, 1995; Venkatesh and Davis, 2000), our research framework also suggests that SNs of Nigerian youths could influence their use of social media for political participation; hence, another hypothesis is proposed:

H3: There is a significant relationship between SNs of the youths and the use of social media for political participation.

2.4. Computer self-efficacy and use of social media for political participation

Self-efficacy is the judgment of one's ability to use technology (e.g. computer) to accomplish a particular job or task (Venkatesh et al., 2003: 432). Computer self-efficacy (CSE) has been a popular and important construct in information system research, which is based on the broader construct of self-efficacy. It is a key concept in SCT that has been found relevant in many information technology research settings. CSE represents the students' perceptions of their ability to use social media for political participation. Just like self-efficacy, it reflects individuals' beliefs in their abilities to organise and execute the courses of action needed to complete specific tasks successfully in a given context such as, in tasks involving computers (Compeau et al., 1999). Consistent with self-efficacy research, findings from various organisational settings and research in information systems have found CSE to be significantly associated with a wide range of cognitive, attitudinal and behavioural outcomes. CSE is found to be related to users' attitudes toward technology (Compeau et al., 1999), intentions to use technology (Hasan, 2007; John, 2013), and actual technology use (Sam et al., 2005; Schlebusch, 2018). Other studies such as Fabunmi and Awoyemi (2017), Karsten et al. (2012), Liebenberg et al. (2018), as well as Shank and Cotten (2014) have confirmed the influence of CSE on the acceptance and use of various ICT among youths across a wide range of settings and countries. Based on the foregoing, we can argue that youths who have high CSE would tend to use social media for political participation; the fourth hypothesis is then proposed:

H4: There is a significant relationship between CSE of the youths and the use of social media for political participation.

2.5. Demographic characteristics of youths and the use of social media for political participation

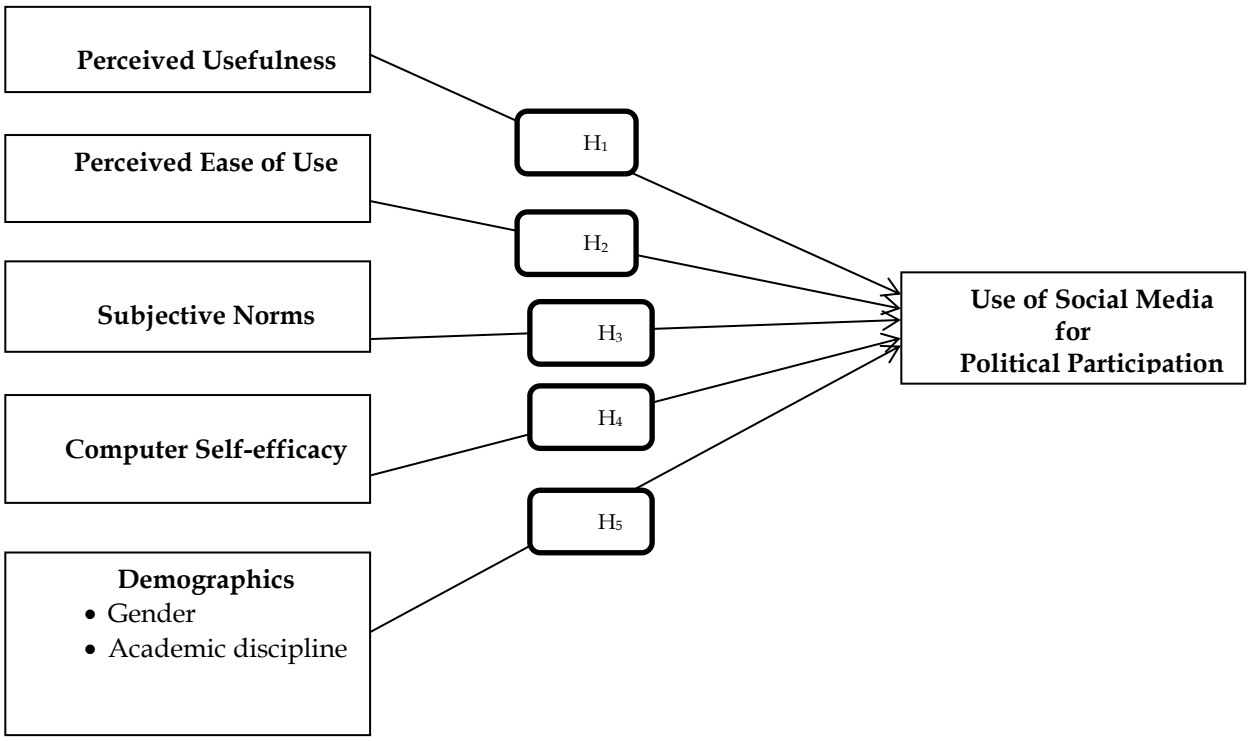
Demographic characteristics can be conceptualised as socioeconomic characteristics of a population expressed statistically, such as age, gender, educational level, income level, marital status, occupation, religion, etc. Several studies (e.g. Dzandu et al., 2016; Morris and Venkatesh 2000; Venkatesh and Morris 2000; Venkatesh et al., 2003) have investigated the influence of demographic variables on use of various technologies and found different results. This study also examined the influence of gender and academic discipline of the youths on their use of social media for political participation with the hope of finding if there would be a significant difference with the use of social media for political participation between male and female and among the various academic disciplines of the youths. On this basis, hypotheses 5a and 5b are postulated:

H5a: There is a significant difference between the gender of the youths and the use of social media for political participation.

H5b: There is a significant difference between the academic disciplines of the youths and the use of social media for political participation.

The conceptual framework, as presented in Figure 1, shows the relationship between the independent variables (perceived usefulness, perceived ease of use, self-efficacy and subjective norms and demographic characteristics of youths) and use of social media for political participation (dependent variable).

Figure 1: The conceptual framework



3. Methodology

The study adopted a survey research design. The location of study is Oyo State, Southwestern, Nigeria. The population of the study consists of youths in three selected institutions [University of Ibadan (UI), Ladoke Akintola University (LAUTECH) and Ajayi Crowther University (ACU)], in accordance with university ownership in Nigeria. UI is a federal University, LAUTECH is a state university, while ACU is private. Students were chosen to represent the Nigerian youths because the majority of them fall within the definition of youths adopted for this study. Moreso, they are literate, prolific users of social media and are also politically active. The second National Youth Policy Document of the Federal Republic of Nigeria (2009) definition of youths was adopted as the study's working definition. Hence, undergraduates of these institutions, within the age bracket 18 to 35, were sampled. Four faculties were purposively selected from each of the universities to have a mix of youths with a Science and Humanities background. Disproportionate stratified random sampling was used to select the sample of 377 as shown in Table 1.

Questionnaire was used to collect data from the respondents. The questionnaire is divided into two sections. The first section collects data about the demographic characteristics of the youths. The second section elicits data about the type of social media the students use for political participation, the type of political information the students use social media to share, the frequency of use of social media for political participation, the benefits derived from using social media for political participation, the challenges in using social media for political participation, as well as the influence of the four variables (PU, PEOU, SNs, and CSE) on USMPP. The items used to measure the variables were measured on four-point Likert scale ranging from Strongly Agree (4), Agree (3), Disagree (2), and

Strongly disagree (1). Measurement items were adapted from studies of Abdulrauf (2016), Compeau (1995), Dzandu et al. (2016), Ezema et al. (2015), Yang and DeHart (2016) and Venkatesh et al. (2003). PU, PEOU, CSE and USMPP have 5 measurement items, while SNs has four. Cross-check questions were incorporated into the questionnaire items to ascertain discrepancies in the answers. The instrument went through face and content validity, while the internal consistency and reliability were established, as all items went through a reliability test through the use of Cronbach's alpha to pick constructs with higher values of alpha, desirable to measure the variables. All items have high alphas except for that of SNs which is below the 0.7 threshold but considered good enough to measure the construct. The results of the reliability test are as presented in Table 2.

Table 1: Population of students at the three institutions based on selected faculties

Institution	Academic Disciplines	Population*	% Selected	Sample Size
UI	Arts	2902	1%	29
	Education	3286	1%	33
	Science	3543	1%	36
	Social Sciences	2635	1%	26
	Total	12,366	1%	124
LAUTECH	Environmental Sciences	1048	1%	11
	Engineering and Technology	3072	1%	31
	Management Sciences	1630	1%	16
	Pure and Applied Sciences	4714	1%	47
	Total	10,464	1%	105
ACU	Humanities	174	10%	18
	Management Sciences	359	10%	36
	Social Sciences	441	10%	44
	Natural Sciences	500	10%	50
	Total	1,474	10%	148
	Overall Total	24,304		377

Source: Academic planning unit of the institutions.

Table 2: Summary of alpha levels for the adopted and modified scales

Variables	Alpha levels	Number of Items
PU	0.782	5
PEOU	0.811	5
SNs	0.686	4
CSE	0.704	5
USMPP	0.799	5

Copies of the questionnaire were administrated at the faculties and departments of the respondents between August and October 2018. Each respondent was requested to fill the questionnaire immediately and return after filling. However, some could not fill immediately and were picked up later. Three hundred and seventy-seven copies of the questionnaire were administered, 335 copies were retrieved, out of which 322 copies were considered useable for data analysis, giving 85.4%

response rate. Table 3 shows the retrieval rate of the instrument at each of the institutions. Spearman rank correlation and one-way ANOVA were used to test the hypotheses.

Table 3: Copies of questionnaire retrieved

Institution	Number of Copies Distributed	Number of Copies Retrieved	Percentage
UI	124	96	29.8%
LAUTECH	105	96	29.8%
ACU	148	130	40.4%
Total	377	322	100.0

4. Findings

The findings of the research are presented in this section.

4.1. Respondents' distribution based on demographic characteristics

Table 4 presents the frequency and percentage distribution of the respondents. Males (56.2%) were more represented than females (43.8%). Youths in the age range 21-25 constituted the majority (58.1%), while those from the Science discipline were the most represented (35.4%). All the youths were using social media.

Table 4: Respondents' distribution based on demographic characteristics

Variables	Items	Institution			
		UI (Freq/%)	LAUTECH (Freq/%)	ACU (Freq/%)	Total (Freq/%)
Age	18-20	8(8.3%)	7(7.3%)	12(9.2%)	27(8.4%)
	21-25	47(49.9%)	64(66.7%)	76(58.5%)	187(58.1%)
	26-30	31(32.3%)	22(22.9%	24(18.5%)	77(23.9%)
	31-35	10(10.4%)	3(3.1%)	18(13.8%)	31(9.6%)
Gender	Male	58(60.4%)	65(67.7%)	58(44.6%)	181(56.2%)
	Female	38(39.6%)	31(32.3%)	72(55.4%)	141(43.8%)
Academic disciplines	Arts	24(25.0%)	0(0.0%)	0(0.0%)	24(7.4%)
	Education	22(22.9%)	0(0.0%)	0(0.0%)	22(6.8%)
	Social Sciences	21(21.9%)	0(0.0%)	48(36.9%)	69(21.4%)
	Sciences	29(30.2%)	46(47.9%)	39(30.0%)	114(35.4%)
	Management Sciences	0(0.0%)	13(13.5%)	25(19.2%)	38(11.8%)
	Humanities	0(0.0%)	0(0.0%)	18(13.9%)	18(5.6%)
	Engineering and Technology	0(0.0%)	26(27.1.0%)	0(0.0%)	26(8.1%
	Environmental Science	0(0.0%)	11(11.5%)	0(0.0%)	11(3.4%)
Social media use	Yes	96(100.0%)	96(100.0%)	130(100.0%)	322(100.0%)
	No	0(0.0%)	0(0.0%)	0(0.0%)	0(0.0%)

4.2. Results of social media type used for political participation

Table 5 presents the results of the types of social media used for political participation. Facebook (98.8%) was the most used social media for political participation by the youths. This is followed by Whatsapp (93.8%), Instagram (60.2%), Twitter (55.3%), and Yahoo Messenger (50.9%) respectively. Other social media have less than 50% usage level.

Table 5: Distribution of social media type used for political participation

Social Media Type Used	**Items**	**Institutions**			Total (Freq/%)
		UI (Freq/%)	LAUTECH (Freq/%)	ACU (Freq/%)	
Tumblr	Used	1(1.0%)	45(46.9%)	47(36.2%)	93(28.9%)
	Not Used	95(99.0%)	51(53.1%)	83(63.8%)	229(71.1%)
Snapchat	Used	4(4.2%)	47(49.0%)	58(44.6%)	109(33.9%)
	Not Used	92(95.8%)	49(51.0%)	72(55.4%)	213(66.1%)
Pinterest	Used	4(4.2%)	48(50.0%)	55(42.3%)	107(33.2%)
	Not Used	92(95.8%)	48(50.0%)	75(57.7%)	215(66.8%)
Periscope	Used	2(2.1%)	45(46.9%)	51(39.2%)	98(30.4%)
	Not Used	94(97.9%)	51(53.1%)	79(60.8%)	224(69.6%)
Imo	Used	10(10.4%)	51(53.1%)	52(40.0%)	113(35.1%)
	Not Used	86(89.6%)	45(46.9%)	78(60.0%)	209(64.9%)
YouTube	Used	16(16.7%)	60(62.5%)	78(60.0%)	154(47.8%)
	Not Used	80(83.3%)	36(37.5%)	52(40.0%)	168(52.2%)
Google+	Used	23(24.0%)	54(56.2%)	74(56.9%)	151(46.9%)
	Not Used	73(76.0%)	42(43.8%)	56(43.1%)	171(53.1%)
Yahoo Messenger	Used	34(35.4%)	58(60.4%)	72(55.4%)	164(50.9%)
	Not Used	62(64.6%)	38(39.6%)	58(44.6%)	158(49.1%)
Instagram	Used	40(41.7%)	68(70.8%)	86(66.2%)	194(60.2%)
	Not Used	56(58.3%)	28(29.2%)	44(33.8%)	128(39.8%)
LinkedIn	Used	31(32.3%)	52(54.2%)	62(47.7%)	145(45.0%)
	Not Used	65(67.7%)	44(45.8%)	68(52.3%)	177(55.0%)
Twitter	Used	41(42.7%)	62(64.6%)	75(57.7%)	178(55.3%)
	Not Used	55(57.3%)	34(35.4%)	55(42.3%)	144(44.7%)
Whatsapp	Used	86(89.6%)	92(95.8%)	124(95.4%)	302(93.8%)
	Not Used	10(10.4%)	4(4.2%)	6(4.6%)	20(6.2%)
Facebook	Used	95(99.0%)	94(97.9%	129 (99.2%)	318(98.8%)
	Not Used	1(1.0%)	2(2.1%)	1(0.8%)	4(1.2%)
Others (Telegram)	Used	15 (15.6%)	0	26(20%)	41(12.7%)
	Not Used	0	0	0	0

4.3. Results of types of political activities participated with social media

Table 6 shows the types of political activities the youths used social media to participate in.

Table 6: Distribution of types of political activities participated with social media

Political Activities*	**Institutions**			Total (Freq/%)
	UI (Freq/%)	LAUTECH (Freq/%)	ACU (Freq/%)	
Political discussions	77(80.2%)	93(96.9%)	111(85.4%)	281(87.3%)
Political campaigns	86(89.6%)	91(94.8%)	119(91.5%)	296(91.9%)
Political advocacy	91(94.8%)	93(96.9%)	123(94.6%)	307(95.3%)
Voters' registration	22(22.9%)	34(35.4%)	47(36.1%)	103(32.0%)
Voting exercises	29(30.2%)	34(35.4%)	79(60.8%)	142(44.1%)
Writing and signing of petitions	12(12.5%)	28(29.2%)	48(36.9%)	88(27.3%)
Donating money towards election	3(3.1%)	0(0.0%)	15(11.5%)	18(5.6%)
Communicating with politicians	81(84.4%)	93(96.9%)	118(90.8%)	292(90.7%)
Writing letters to public officials	45(46.9%)	33(34.4%)	87(66.9%)	165(51.2%)
Joining interest groups that engage in lobbying	67(69.8%)	71(74.0%)	71(54.6%)	209(64.9%)
Public consultations	78(81.3%)	93(96.9%)	88(67.7%)	259(80.4%)
Blogging about political issues	51(53.1%)	67(69.8%)	91(70.0%)	209(64.9%)
Monitoring and reporting electoral malpractices such as frauds, rigging, intimidation, violence, monetary inducements, underage voting, etc.	88(91.7%)	70(72.9%)	116(89.2%)	274(85.1%)
Others (Please specify)	0	0	0	0

* Multiple choice question.

Majorly, the youths used social media to participate in political advocacy (95.3%), political campaign (91.9%), communicating with politicians (90.7%), political discussions (87.3%), monitoring and reporting electoral malpractices (85.1%), public consultations (80.4%), joining interest groups that engage in lobbying (64.9%), blogging about political issues (64.9%), and writing letters to public officials (51.2%).

4.4. Test of hypotheses

The pre-set level of significance for all hypotheses is 0.05. The hypotheses (denoted as Ho) were tested in the null forms, with the assumption that no significant relationship exists between the independent variables (PU, PEOU, SNs, CSE, Gender and Academic discipline) and the dependent variable (Use of social media for political participation). The alternative hypotheses assume that significant association or relationships exist. Thus, if the p-value (the significance of the test) exceeds the pre-set level (0.05), the null hypotheses will not be rejected, while the alternative hypotheses will be rejected. However, if the p-value is less than or equal to 0.05, the null hypotheses are rejected, while the alternative hypotheses are not rejected. Spearman rank correlation was used to test hypotheses 1-4 and one-way ANOVA for hypothesis 5. The results are presented in Table 7.

Table 7: Spearman correlation results for the hypotheses.

Analysis	**Null Hypotheses**	**Independent Variables**	**Results**	
Spearman's rho	Ho1	PU	Correlation Coefficient	0.463**
			Sig. (2-tailed)	0.000
			N	322
	Ho2	PEOU	Correlation Coefficient	0.425**
			Sig. (2-tailed)	0.000
			N	322
	Ho3	SNs	Correlation Coefficient	0.411**
			Sig. (2-tailed)	0.000
			N	322
	Ho4	CSE	Correlation Coefficient	0.400**
			Sig. (2-tailed)	0.000
			N	322
Dependent Variable: USMPP **. Correlation is significant at the 0.01 level (2-tailed).				

Table 7 shows a significant relationship between PU and use of social media for political participation among the youths at the three selected institutions ($p=0.000<0.05$) and also a moderate positive correlation coefficient of ($r=0.463$). Thus, null hypothesis 1 is rejected, while the alternate hypothesis is not rejected. This means that there is a positive correlation and significant relationship between PU and the use of social media for political participation among the youths. The results also show that both variables (PU and use of social media for political participation) move in the same direction; an increase in perception of usefulness of social media would result into an increase in the use of social media for political participation by the youths. This result implies that the youths perceive that social media is useful for them to participate in politics.

Table 7 also reveals a moderate positive correlation ($r=0.425$) and a significant relationship ($p=0.000<0.05$) between PEOU and use of social media for political participation, thus null hypothesis 2 is rejected. The results also reveal that an increase in perception of ease of use of social media would cause a corresponding increase in the use of social media for political participation among the youths. The youths perceive social media easy to use and the more they have this perception, the more they use the media. The results for hypothesis 3 also show a moderate positive correlation ($r=0.411$) and a significant relationship ($p=0.000<0.05$) between SNs and the use of social media for political participation. These results show that for a unit increase in SNs, there will be an increase in the use of social media for political participation among the youths. The implication is that the opinion or influence of friends, colleagues, or families of the youths, made them use social media to participate in politics. The relationship between CSE and the use of social media for political participation was also found to be moderate and positively correlated ($r=0.400$) and significant ($p=0.000<0.05$). Hence, null hypothesis 4 is rejected and the alternate hypothesis not rejected. Thus, it implies that an increase in CSE of the youths would increase the use of social media for political participation.

One-way ANOVA was used to test for differences in the use of social media for political participation among the youths with respect to their gender and academic disciplines. The results for gender, as presented in Table 8a and 8b, show no significant mean difference between male and

female youths in their use of social media for political participation (p=0.891>0.05). This indicates that the use of social media for political participation does not differ based on the gender of the youths. Results in Table 8b also show that use of social media for political participation among the youths that fell within gender difference of male and female has no difference of mean (male = 8.8343; female = 8.7872) if compared. Thus, the gender of the youths has no significant relationship with their use of social media for political participation.

Table 8a: One-way ANOVA test for gender

ANOVA
USMPP

	Sum of Squares	**Df**	**Mean Square**	**F**	**Sig.**
Between Groups	0.175	1	0.175	0.019	0.891
Within Groups	2972.645	320	9.290		
Total	2972.820	321			

Table 8b: One-way ANOVA test for gender

Descriptive
USMPP

Gender	**N**	**Mean**	**Std. Deviation**	**Std. Error**	**95% Confidence Interval for Mean**		**Minimum**	**Maximum**
					Lower Bound	Upper Bound		
Male	181	8.8343	2.86844	0.21321	8.4135	9.2550	5.00	20.00
Female	141	8.7872	3.26411	0.27489	8.2438	9.3307	5.00	29.00
Total	322	8.8137	3.04321	0.16959	8.4800	9.1473	5.00	29.00

The results for the one-way ANOVA test for the academic disciplines of the youths are presented in Table 9a and 9b. No significant mean difference in the students' faculties concerning their use of social media for political participation (p=0.602>0.05) was also observed. This implies that the use of social media for political participation does not differ based on academic disciplines of youths at the three institutions.

Table 9a: One-way ANOVA test for academic disciplines

ANOVA
USMPP

	Sum of Squares	**Df**	**Mean Square**	**F**	**Sig.**
Between Groups	51.027	7	7.290	0.783	0.602
Within Groups	2921.793	314	9.305		
Total	2972.820	321			

Table 9b: One-way ANOVA test for academic discipline

Descriptives
USMPP

Academic discipline	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Arts	24	8.8750	3.05475	0.62355	7.5851	10.1649	5.00	18.00
Education	22	8.0000	2.39046	0.50965	6.9401	9.0599	5.00	12.00
Social Sciences	69	8.7246	2.09961	0.25276	8.2203	9.2290	5.00	14.00
Sciences	114	8.9561	3.47784	0.32573	8.3108	9.6015	5.00	29.00
Management Science	38	8.3158	2.96926	0.48168	7.3398	9.2918	5.00	18.00
Humanities	18	9.7222	4.32238	1.01880	7.5728	11.8717	5.00	20.00
Engineering and Technology	26	8.7692	3.10236	0.60842	7.5162	10.0223	5.00	16.00
Environmental Sciences	11	9.7273	1.90215	0.57352	8.4494	11.0052	7.00	13.00
Total	322	8.8137	3.04321	0.16959	8.4800	9.1473	5.00	29.00

5. Discussion

This study found that Facebook, Whatsapp, Instagram, Twitter, Yahoo Messenger, Youtube and Google+ were the widely used social media for political participation by the youths. This finding is consistent with the findings of previous studies (e.g. Asogwa and Ojih, 2013; Ekwelem et al., 2012; Ezema et al., 2015; Fasae and Adegbilero-Iwari, 2016; Johnston et al., 2013; Nwafor et al., 2012; Omotayo and Salami, 2018; and Yang and DeHart, 2016) who have confirmed that Nigerian youths are active users of social networking media. Fasae and Adegbilero-Iwari (2016) found that science students of public universities in Southwest Nigeria used social media daily to remain up to date with trending events/news and to share knowledge. Johnston et al. (2013) also found that Facebook and Twitter were two social computing systems that have become increasingly popular among university students in Cape Town, South Africa and that Facebook was a more popular method for communication among the students. Supporting this claim is Wilson and Boldeman (2011), who posited that youths are ICT natives and prolific users of technologies. Our results, therefore, establish the fact that youths, especially students of higher institutions are prolific users of social media.

The youths also used social media to participate in various political activities, chiefly among which are political advocacy, political campaign, communicating with politicians, political discussions, monitoring and reporting electoral malpractices, public consultations, joining interest groups that engage in lobbying, blogging about political issues and writing letters to public officials. Since youths are prolific users of social media, it is easy for them to use it to also participate in political activities. Ahmad et al. (2019) have found that the younger generations (university students) are very active on social media to participate in online and offline political activities. Our findings are

also in line with the findings of Ezema et al. (2015), Jamil (2018), Mahmud and Amin (2017), Onyechi (2018) and Yamamoto (2015) who have found that the youths use social media to participate in both offline and online politics. Diamond and Plattner (2012) explains that social media enable citizens to report news, expose wrongdoing, express opinions, mobilise protest, monitor elections, scrutinise government, deepen participation and expand the horizons of freedom during elections, which help to strengthen the capacity of individuals, aid liberated communication and mobilisation, and reinforce civil society. These results are consistent with previous studies (e.g., Gil de Zúñiga et al., 2009; Valenzuela et al., 2012) showing that use of such social media has a positive influence on citizens' political participatory behaviors. As a space where citizens share information and discuss public affairs, social media serve as resources for engaging in political activities, playing positive roles and providing useful avenues to reinvigorate participatory democracy (Gil de Zúñiga et al., 2012; Kim et al., 2011). Our study, therefore, establishes that youths in Oyo state, Nigeria engage with social media to participate in politics.

The test of hypotheses reveals that PU and PEOU have a positive correlation and significant relationship with the use of social media for political participation by the youths. These findings validate previous studies which have confirmed the significance of usefulness and ease of use in predicting ICT use. PU and PEOU, as widely popularised by Davis (1986), Davis et al. (1989), as well as numerous other studies (Dzandu et al., 2016; Elkaseh et al., 2016; Kim and Sin, 2017; George et al., 2014; Sago, 2013; Shirazi, 2013; Sumida-Garcia and Costa-Silva, 2017) are fundamental determinants of user acceptance and use of various ICT, social media inclusive. Thus, the more the benefits and ease of using social media as perceived by the youths, the greater the likelihood of using them to participate in politics. Since youths are generally technology savvy and the use of social media is simple, entertaining, clear and understandable and does not require a lot of mental effort, it is expected that the youths would not have difficulties in using social media to participate in politics as they use the media for other activities.

Our findings with respect to the influence of SNs on the use of social media for political participation support a significant body of theoretical and empirical studies (Bataineh et al., 2015; Hasbullah et al., 2016; Kim et al., 2011; Peslak et al., 2012) regarding the importance of the role of SNs on the use of social media and other technologies, directly or indirectly. Bataineh et al. (2015) for instance, found that that the strongest predictors, based on beta values, on both users' satisfaction and continuance intention to use social media is SNs. A person's SNs are determined by his or her perception that salient social referents think she/he should or should not perform a particular behaviour. Such a person is motivated to comply with the referents even if she/he does not favour the behaviour. The referents may be superiors (parents, bosses, teachers, opinion leaders, etc.) or peers (friends, classmates, colleagues, family, children, etc.). This implies that the opinions of people in the youths' social environment, as well as the importance attributed to the opinions of these people are influenced the youths' behavioral intention and actual usage of social media for political participation. Even though usage of social media is not compulsory in this setting, the SNs, peer-pressure or the youths' views of what their friends/families/mentors think they should do, actually encouraged their use of social media for political participation. Given the importance of normative perceptions in determining individuals' behaviours on social media, our finding indicates that the youths' networks and interactions on social media can be considered a norm-controlled behaviour

which influences the contents they post as well as their interactions within their social networks. Therefore, it is expected that the more the youths perceive behavioural expectations to use social media from these significant others, the more they feel the pressure or are likely to use the social media to participate in politics, in addition to some other activities they use social media to perform.

Many studies (e.g. Bandura, 1997; Heinz and Rice, 2009; Liebenberg et al., 2018; Shank and Cotton, 2014; and Sohl, 2014) have led credence to the fact that CSE plays a major role in intention and use of information technologies, as this study also found out. Sohl (2014), for instance, studied youth's political efficacy, sources, effects and potentials for political equality and found system efficacy as one of the factors influencing youths' political activities. Hence, the level of the CSE of the youths in this study goes a long way to influence their use of social media for political participation, as they also use it for some other activities.

Surprisingly, demographic variables (gender and academic discipline) have no significant influence on the use of social media for political participation. Hence, the use of social media for political participation by the youths does not differ based on their gender differences (male and female) and academic disciplines. Gender differences have been shown to exist in technology adoption contexts (Morris and Venkatesh 2000; Venkatesh and Morris 2000; Venkatesh et al., 2003). However, some empirical studies, within and outside the IT context (e.g., Ashmore, 1990; Dzandu et al., 2016; Eichinger et al., 1991; Twenge 1997) have shown that gender roles have a strong psychological basis and are relatively enduring, yet open to change over time. Gender effects may be driven by psychological phenomena embodied within socially-constructed gender roles. Non-significant influence of gender experienced in this study could be driven by cognitions related to gender roles (Lynott and McCandless 2000; Wong et al., 1985), which may not be so prominent among the youths because of their age range. Our findings could be interpreted to suggest that as the youths mature and assume gender roles and responsibilities, gender differences in how they perceive social media use for politics may increase. This implies that the oft-mentioned gender differences in the use of IT may be transitory, at least as they relate to a younger generation, raised and educated in the digital age. It was also envisaged that the academic disciplines of the youths could influence their use of social media for political participation, with the Arts/Humanities and Social science disciplines expected to be more involved in political participation than the core Science-based disciplines. However, the study found no significant relationship between the two variables. This shows that, the youths use social media to engage in political activities irrespective of their academic disciplines.

6. Conclusion

Given the growing popularity and penetration of social media and the way they influence peoples' private and public lives, this study adds to the understanding of how and why social media use functions in motivating citizens to engage in political activities. The study has been able to expand the current literature by explicating that youths in Oyo state, Nigeria use social media to participate in political processes. The study also concludes that PU, PEOU, SNs and CSE influence use of social media for political participation among youths in Oyo state, Nigeria. This suggests that these factors could be considered when promoting the use of social media among youths. This information could

assist social media developers and stakeholders in becoming well informed about the factors that need to be put into consideration when designing social media platforms that would be accepted and used by intended users. Thus, this study is justified to add value to the existing research in the areas of technology use; most especially, for political participation. The findings of the research certainly encourage future studies to expand understanding of how social media use influences citizens' political participation. The empirical findings of this study add to the body of knowledge on political participation.

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