

*Towards a digital democracy
Opportunities and challenges*

EPTA Report 2018

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1. Topic of the EPTA Conference 2018

1.1. Towards a digital democracy - opportunities and challenges

Topic and methodology

STOA proposed and the EPTA Directors agreed, during their meeting of 30 May - 1 June 2018 in Strasbourg, that the annual EPTA Conference 2018, to be held this year under the 2018 STOA presidency in the morning of 4 December 2018, would focus on the topic of democracy in the era of artificial intelligence, quantum technologies and blockchain. EPTA Directors considered this topic to be appropriate for attracting the attention and interest of MEPs, stakeholders and the wider public. The working title of the event provided here is still subject to discussion. The conference, thematically linked to the STOA Annual Lecture 2018, will feature contributions from technical/scientific experts from the EPTA member organisations addressing the interplay between democracy, on the one hand, and artificial intelligence, blockchain and/or quantum technology, on the other. It will address the impact of current and expected developments in these new technology fields on democratic processes and institutions, and will examine this impact from multiple perspectives. The conference aims to foster debate on the opportunities and challenges arising from the new technologies in shaping the future of democracy in Europe and the world. It will encourage participating M (E) Ps and other policy-makers, experts and stakeholders, as well as interested citizens at large to consider desirable and adverse futures, and to discuss ways of exploiting the opportunities and confronting the challenges.

Democracy and new technologies

The debate on the impact of new technologies on democratic processes and institutions is relevant in the context of the so-called 'post-truth society', where objective facts seem to be less influential in shaping public opinion than appeals to emotion and personal belief. This is not only a challenge for scientists, experts and the media, but also for policy-makers and society as a whole. Science and technology are crucial to democracy and there is a clear need to create the conditions for a vigorous dialogue between scientists, politicians and the public. Such a dialogue, based on mutual respect and trust, could help all sides understand why and how scientific evidence plays its proper role as an essential part of policy-making. What are the main objectives of democracy? The answers to this question can vary. Some views of democracy put their main emphasis on a high degree of representativeness, others promote the protection of fundamental rights and freedoms, and still others strive for inclusive and comprehensive involvement of the citizens.

New technologies have the potential to substantially change the conditions of political communication and democratic practice.

The numerous claims that have been made about effects of new technologies on democracy can be summarised as follows:

- New technologies increase the scale and speed of providing information. Does this help create better informed citizens?
- Political participation is made easier and certain obstacles, such as apathy, shyness, disabilities or lack of time, can be reduced;
- New technologies create new ways of engaging subject-specific groups in discussion;
- They also allow new political communities to arise free of state intervention;
- A hierarchical political system becomes more horizontal;

- Citizens will have more voice in creating agendas for government;
- Politics will be able to respond more directly to citizens;
- New technologies will help resolve long-standing problems of representative democracy, such as the territorial base of constituencies.

In contrast to these, mostly positive, visions of the effects of new technologies, there are also various dystopian visions, which depict potential risks to democracy: for example, they regard direct democracy as inadequate, given the complexity of modern societies; digital tools would speed up deliberation to a superficial level; they would support populism and increase information inequality, while being incapable of countering a basic lack of political motivation among the citizenry; new media would be more concentrated than traditional media and the ease of placing messages on the Internet would not be matched by similar options of being heard. Finally, a serious threat gaining attention in connection with recent dramatic events is the increased radicalisation and mobilisation potential of the Internet.

One can legitimately raise a multitude of questions: Would it be reassuring to have private entities like Facebook making policy assessments instead of public authorities? Are the responses of public authorities to fake news inclusive and transparent? Do they lead to a better understanding of the impact of disinformation and propaganda on democracy, freedom of expression, journalism and civic space? What are the key opportunities and challenges facing all these technology-driven initiatives in Europe? How can we ensure that Member States and the Commission refrain from adopting unnecessary measures aimed at exerting control over digital technologies, i.e. blocking, filtering, jamming and closing down digital spaces or the de facto privatisation of control measures by pressuring intermediaries to take action to restrict or delete internet content? What kind of policies or safeguards are needed that could prevent such measures from being adopted by private operators?

1.2. Impact of new technologies

Artificial intelligence

Artificial intelligence (AI) is emerging as one of the most hotly debated technologies on the horizon. In some application areas AI is already here. This has prompted debates about what AI means for the future of humanity, which occasionally include extreme predictions on employment (such as a job-free society), and existential threats (such as a human-free earth). Most of the time, however, experts can imagine a range of possible outcomes of AI development, and are calling for more serious reflection on how we can meet the challenges and opportunities it presents and ensure a responsible development path.

Debate on the potential impact of AI needs to include the perspectives of different scholarly disciplines: the science and engineering community holds a prominent role, because it is well positioned to reflect upon the boundaries of what is technically possible and the limits of control mechanisms, but social scientific expertise is also essential to understand how technology develops in society.

It is crucial to create cross-disciplinary spaces where scholars can bring diverse insights on a topic that could have a great impact on our future. A centralised AI might be able to control what we know, what we think and how we act through various sophisticated manipulation technologies and techniques. For example, 'persuasive computing' platforms will be able to steer us through entire courses of action, be it for the execution of complex work processes or to generate free content for the platforms. The trend goes from programming computers to programming people. Search algorithms and recommendation

systems can be influenced. Companies can bid on certain combinations of words to gain more favourable results. Governments are probably able to influence the outcomes too. During elections, they might nudge undecided voters towards supporting them – a manipulation that would be hard to detect. Therefore, whoever controls this technology can win elections – by nudging themselves to power.

Over-customisation and the echo chamber effect lead to getting your own opinions reflected back at you. This causes social polarisation, resulting in the formation of separate groups that no longer understand each other and find themselves increasingly at conflict with one another. In this way, personalised information can unintentionally destroy social cohesion.

Quantum technologies

Quantum technologies (QT) offer fascinating possibilities which have yet to be fully explored, and progress in this area could be accelerated by boosting public investment and attracting more private investment. There is considerable public and private interest in developing QT: the Netherlands and the United Kingdom have programmes that have attracted hundreds of millions of euros both from public bodies and from industry.

Also, the European Commission announced a plan to invest € 1 billion in a quantum technologies flagship initiative within its investment in Future and Emerging Technologies. Among those technologies, a quantum computer is perhaps the one that would be the most disruptive. There are several known applications of a quantum computer: calculating how other quantum systems behave, which could be very useful in the development of new chemicals, medicines and materials; another application is in breaking our existing cryptography protocols.

The most commonly used protocol, the Rivest-Shamir-Adleman (RSA) protocol, has been shown to be vulnerable to attack from a hacker with a quantum computer. Indeed, a quantum computer could be used not only to decrypt current transmissions, but also data that were intercepted and recorded in the past, which may include the bulk of all communications passed over the internet and even by satellite transmission.

The disruptive potential of such quantum decryption is extremely high. At the same time, new forms of quantum cryptography could emerge, which promise protection from future attacks. This, however, may not be able to improve protection of historical data.

The link between quantum computing and quantum cryptography means that, if the progress in developing a quantum computer were to be faster or slower than expected, there might be a corresponding increase or decrease in the amount of investment in quantum cryptography. Therefore, unless quantum computing is shown to be unfeasible for practical purposes, organisations wanting to keep their current information secure in future decades will likely maintain an interest in quantum cryptographic systems.

Blockchain technologies

Blockchains (BC) are a remarkably transparent and decentralised way of recording lists of transactions. Their best-known use is for digital currencies such as Bitcoin. Blockchains are particularly well suited to situations where it is necessary to record transactions. For example, they could help manage supply chains better, certify the origin of products, and

resolve the problem of music and video piracy, while also presenting opportunities in public services such as health and welfare payments.

Blockchains shift some control over daily interactions with technology away from central actors, redistributing it across the whole user base. In doing so, they make systems more transparent and, perhaps, more democratic. In current elections, a central authority records, counts and checks the votes. Blockchain could be applied allowing all citizens to hold a copy of the full voting record on their own devices. While the identity of individual voters would be protected, anyone could check that all the votes comply with the rules and are counted properly. Because blockchains are immutable, the historical record cannot be changed.

It has been suggested that blockchain could help voters to engage more deeply and could make decision-making more fluid. People could vote regularly, updating their vote if they change their mind, or setting it to 'follow' the votes of other individuals. This raises the potential for a massive shift to more direct democracy, and perhaps even the upheaval of the current system of political representatives.

However, the need to ensure all citizens have suitable devices and the opportunity to vote in private could limit the degree of decentralisation possible. Furthermore, voting systems have to be understandable and trustworthy enough so that, even when voters are disappointed with the result, they can accept it as fair and valid. The complexity of blockchain remains a serious barrier to its implementation for essential democratic services such as vote management.

1.3. Questions to be answered

EPTA members were invited to contribute to a comparative report on the above topic, the inputs stemming from a national or regional perspective. This study should shed light on the implementation of and political debate about the impact of these new technologies on democratic processes and institutions in Europe and beyond.

Status quo: current legislation on new or emerging technologies in the country or region

- Is there any legislation regarding these new technologies?
- If so: at which level does it apply (national, regional, local)?
- What is its scope? How is it implemented?

Interactions between these technologies

- If BC data is immutable and encrypted, what happens if QT enables mass decryption of historical data?
- Could an advanced AI find a way of hacking a blockchain?
- Are QT and AI development synergetic, so that AI agents could help us to develop QT, and vice versa?
- Could AI help us to decide whether it is a good idea to proceed with transformative technologies, such as BC and QT?
- What are the implications of the three technologies and their interactions for our democracies and democratic processes?

Societal and political debate

- Is there ongoing debate on the impact of these new technologies on our societies and democracies?
- How about their political and public acceptance? Which arguments are used? Which stakeholders are involved?
- Are there currently political or legislative proposals on these topics? Is there resistance and, if so, from whom and why?
- New technologies increase the scale and speed of providing information. Does this help create better informed citizens?
- Can new technologies facilitate or even boost political participation by helping overcome certain obstacles like apathy, shyness, disabilities or lack of time?
- What are the technical, legal or political challenges linked to micro-targeting in political campaigns?
- Can new technologies, such as social media applications, facilitate the creation of new political communities and new forms of public representation, as well as provide a communication channel for politicians?
- Can new technologies break down the hierarchical and top-down character of the political system and make it more decentralised?
- Can new technologies empower citizens in voicing their interests and concerns in a more effective way? If yes, how? Can e-participation (e-petitioning etc.) by citizens in parliamentary affairs create stronger connections between citizens and the decision-making process?
- Do new technologies pose a threat to traditional mediators, such as journalists, and political representatives and parties?
- Can new technologies contribute to the resolution of long-standing problems of representative democracy, such as the territorial base of constituencies?
- Can the transparency of parliamentary activities be improved by technological means?

Experiences and outlook

- What are the possible impacts of these new technologies on the democratic system?
- Is there any form of evaluating the effects of these technologies upon the quality of democratic procedures in terms of increasing their transparency and accountability?
- Have new technologies been integrated into the day-to-day operation of the institutional and legislative system in your country/region?
- How can the recent fake-news initiatives possibly affect the exercise of the freedom of speech, freedom of expression, media pluralism and democracy? What are the possible remedies (technical, educational, societal, and regulatory)?
- Could automated content recognition (ACR) technologies represent a threat to freedom of expression and media pluralism, rather than protect it?

2. Programme

EPTA¹ Conference 2018

Towards a digital democracy – Opportunities and challenges

4 December 2018, European Parliament, Brussels, PHS 3C050

Agenda

08:15 – 08:45 Arrival at the EP (*ASP entrance Agora Simone VEIL*)

09:00 – 09:05 **Welcome** by EP Vice-President **Ramón Luis VALCÁRCEL SISO**

09:05 – 09:15 **Introduction** to the topic by **Paul RÜBIG**, MEP and STOA First Vice-Chair

09:15 – 09:25 **Scene-setting** by **Pilar del CASTILLO VERA**, MEP

09:30 – 10:20 **First session on ‘Interactions between BC², AI³ and QT⁴’**

Chair: *Eva KAILI, MEP and STOA Chair*

- Presentations by representatives of *Sweden, the United Kingdom, Austria, Japan and Catalonia (region of Spain)*
- Panel discussion

10:25 – 11:15 **Second session on ‘Societal and political debate’**

Chair: *Mady DELVAUX, MEP and STOA Panel member*

- Presentations by representatives of *Mexico, Greece, Norway, Switzerland and Denmark*
- Panel discussion

11:20 – 12:10 **Third session on ‘Experiences and outlook’**

Chair: *Wolfgang HILLER, Director for Impact Assessment and European Added Value, DG EPRS, EP*

- Presentations by representatives of the *United States, France, STOA, Germany and The Netherlands*
- Panel discussion

12:15 – 12:25 **Conclusions** by **Theo KARAPIPERIS**, Head of STOA unit

12:25 – 12:30 **Closing remarks** by **Eva KAILI**, MEP and STOA Chair

¹ European Parliamentary Technology Assessment network

² Blockchain

³ Artificial Intelligence

⁴ Quantum Technology

3. National reports

3.1 Austria

Introduction

Austria ranks 10th out of the 28 EU Member States in Europe's Digital Progress Report. In digital public services, where Austria scores particularly well, it is now among Europe's top 5.⁵ Overall, it progressed in line with the EU average over the last years, keeping the same position. It performs best in digital public services, where its strengths lie with the improving quality of the online offer, followed by human capital. In order to maintain or even improve in such rankings the former government presented the "broadband billion", dedicated to funding broadband expansion, and the 5G strategy⁶. Digitization is high on the political agenda in Austria. The former government established the *Digital Roadmap Austria*⁷ in 2016. The Roadmap provides an overview of the current challenges and of existing and planned measures and activities. These are based on twelve guiding principles for shaping the digitization process in Austria. The Roadmap's approximately 150 specific measures in twelve fields of action are intended to ensure that Austria can optimally exploit the potential of digitization. The Roadmap brings together the activities of all government departments in a joint Federal Government strategy paper for the first time. In order to manifest the high priority, following the election of 2017 the responsible ministry has been provided with additional competences in the field of digitization with a view to form the *Federal Ministry for Digital and Economic Affairs* (BMDW). Central elements of the Digital Roadmap are inter alia artificial intelligence (AI), blockchain and quantum computing. In the first half of 2018, the Federal Government established a *Digitization Agency* (DIA)⁸ as a central platform for the implementation of important digitization measures under the motto "Actively shape digital change and use it economically".

Artificial Intelligence

In Austria we observe several activities and debates in two areas: first on the issue of (crisis-prone) democratic developments, and second on the (economic) necessity to take specific measures in the field of AI in order not to be disadvantaged in international competition. However, in these debates hardly any links are established between the two areas, with only few exceptions. There are ongoing discussions on the topic of AI, but this has not yet led to concrete steps towards regulation. In 2017, the Austrian Robotics Council⁹ was established, which was soon renamed to the *Austrian Robotics and Artificial Intelligence Council* after expanding their competencies. The Council shall advise the Federal Government on the development of a strategy for dealing with AI and robotics and develop corresponding recommendations. Currently it is drafting a *White Paper "Shaping Austria's future with robotics and AI positively"*, which should become the basis for a nationwide AI strategy. Under the leadership of the Federal Ministry for Transport, Innovation and Technology (BMVIT), this White Paper should be available by spring 2019. The extent to which the future strategy will also result in legal requirements remains to be seen. Especially when

⁵ http://ec.europa.eu/newsroom/document.cfm?doc_id=44285

⁶ <https://www.bmvit.gv.at/en/service/publications/downloads/5Gstrategy.pdf>

⁷ <https://www.digitalroadmap.gv.at/>

⁸ <https://www.ffg.at/presentation-digitalisierungsagentur>

⁹ <https://www.bmvit.gv.at/innovation/forschungspolitik/robotikrat.html>

one considers that the BMDW would like to strengthen the industrial location by a stronger use of AI, among other things this is to happen by reducing bureaucracy, i.e. by abolishing rules so that innovations can be brought to the market more quickly.

The Austrian society addresses and discusses the topic in a variety of different ways. AI is being debated both in a series of established events (e.g. "Digital Business Trends", "Alpbach Technology Talks") and in specific panel discussions. The media debate is predominantly concerned with ethical issues and the effects on the labour market, which are being discussed controversially. Tensions between digitization and democracy are also discussed in various information events (e.g. "Europe in Discourse - Is digitization threatening democracy?"¹⁰). As with the issue of the labour market, there are controversies here as well. Views that democracy is threatened by AI and Big Data are contrasted by opinions that AI can provide an opportunity for democracy if participation of citizens can be increased. Media are attributed an important role here as a counterweight to fake news and hate postings, requiring improved media literacy in society.

The public debate also includes criticism of Austria's lack of political commitment in the field of AI and the resulting gap between Austria and other countries. According to the critics, this would counteract the goal contained in the current government program to make Austria fit for the challenges of digitization and to become one of the international leaders in innovation in the future. In this context, one opposition party submitted a written parliamentary inquiry¹¹ concerning the AI strategy and new data policy for Austria. In the reply to the question,¹² reference was made, among other things, to ongoing projects on digitisation, e.g. the Digital Roadmap Austria⁴ and the Action Plan Automated Driving¹³ as well as to the Austrian Council for Robotics and Artificial Intelligence and the planned White Paper. In addition, funding provided for projects with an AI focus was mentioned. The inquiring MP, Stephanie Cox, published her own strategy paper¹⁴ on dealing with AI in Austria.

At a symposium entitled "Shaping the Digital Future Socially Equitably"¹⁵, the Austrian Federal Council (Bundesrat) discussed ways of using digitization as a tool for enhancing democracy. The Council also published a *Green Paper on "Digitization and Democracy"*¹⁶ as a basis for a public online discussion and an expert hearing in 2017. In this context, a working paper of the Democracy Centre Vienna "Virtual Agora and Digital Civil Courage",¹⁷ which addresses problems of democratic societies in digital change, is worth mentioning.

In autumn 2018 plans of the Public Employment Service (AMS) stirred a heated debate around AI: The AMS plans to use an algorithm that will divide jobseekers into three categories. The three categories represent the chances on the labour market. The different weightings of age, gender and country of origin, which should not actually play a role in labour market opportunities, were criticised. Many people accuse this new system of discrimination, against which the AMS defends itself by arguing that it only takes into account the actual opportunities on the labour market.¹⁸

¹⁰ <https://www.burgtheater.at/de/spielplan/produktionen/europa-im-diskurs-bedroht-digitalisierung-demokratie/>

¹¹ https://www.parlament.gv.at/PAKT/VHG/XXVI/J/J_01779/index.shtml

¹² https://www.parlament.gv.at/PAKT/VHG/XXVI/AB/AB_01087/imfname_707510.pdf

¹³ https://www.bmvit.gv.at/en/service/publications/downloads/actionplan_automated_driving_2016-2018.pdf

¹⁴ <http://www.stephaniecox.at/ki-strategie-oesterreich>

¹⁵ https://www.parlament.gv.at/PAKT/PR/JAHR_2018/PK0783/index.shtml

¹⁶ https://www.parlament.gv.at/ZUSD/PDF/Gruenbuch_Digitalisierung_und_Demokratie_ACC.pdf

¹⁷ http://www.demokratiezentrum.org/fileadmin/media/pdf/Materialien/WP2_VirtuelleAgora_online_LF.pdf

¹⁸ <https://derstandard.at/2000089325546/Beruf-Ausbildung-Alter-Geschlecht-Das-sind-die-Zutaten-zum-neuen>

Blockchain

The Federal Ministry of Digital and Economic Affairs has launched the *Blockchain Austria initiative*¹⁹ in late 2017 and explained its main steps in a nine-point plan. The plan includes the implementation of pilot projects and the installation of regulatory sandboxes; promoting existing civil society activities; providing support to interdisciplinary sustainable research institutions; systematic training of skilled workers; a broad blockchain information platform; an Austrian Crypto Report; citizen services for blockchain topics and crypto currencies; an *Austrian Blockchain Cluster (ABC)*; and a public institutional task force. The government program²⁰ of the current coalition explicitly refers to the "unpredictable effects" of the blockchain (BC) technology and the need for pilot projects to use it in public administration. In order to foster R&D as well as pilots in business, the Austrian Research Promotion Agency (FFG) provides a *technology promotion program on smart and digital devices*,²¹ including blockchain applications. An economically interesting aspect of BC in Austria is the ecologically problematic high energy consumption of BC mining. In order to avoid network fees, mining firms pay high fees to be connected directly to the hydro power plants, which creates extra business for small hydropower plants in Austria.

So far, there is no specific legislation on BC in Austria. For instance, Bitcoin and other cryptocurrencies are officially neither acknowledged as a financial instrument, nor as a means of payment in Austria. In early 2018, the governor or the Austrian Federal Reserve asked for value-added tax on Bitcoin, as it is not considered a currency,²² and the Federal Finance Minister started a regulatory initiative on cryptocurrencies.²³ Political parties from the opposition argued in favour of establishing a legal framework as soon as possible.²⁴ The Federal Ministry of Finance established a *FinTech Council*, which will investigate the idea of regulatory sandboxes. The need of "playgrounds" like sandboxes clearly shows the insecurity in the early phases of technology development.

In practice, Austria officially used blockchain technology for the first time as an additional notarial service for an auction of federal bonds in autumn 2018.²⁵ Other public applications include the first *blockchain pilot of the City of Vienna*²⁶. The project is to ensure the integrity of OGD (open government data). Since the 14th of December 2017, the OGD checksums of the City of Vienna have been stored in public blockchains and can be accessed by the interested public. Users can thus view and check the authenticity and history of the data independently of an intermediary institution.

The general public is recently confronted with more and more media reports, mostly on Bitcoin, but increasingly also on BC applications in general. Apart from some criminal cases involving cryptocurrencies²⁷, there is no broad public debate on this issue in Austria so far. Due to its complex character it seems self-evident that only concrete examples will induce public debate. However, there are some open questions worth considering: consumer risks have to be understood and protection is to be maintained; BC is not necessarily privacy-friendly and anonymity is not built in – both features depend on technology design. Even

¹⁹ <https://www.blockchain-austria.gv.at/>

²⁰ https://www.bundeskanzleramt.gv.at/documents/131008/569203/Regierungsprogramm_2017-2022.pdf

²¹ <https://www.ffg.at/programme/smart-and-digital-services>

²² <https://derstandard.at/2000071381536/Notenbankchef-Nowotny-fordert-Bitcoin-Mehrwertsteuer>.

²³ <https://derstandard.at/2000074842865/Loeger-will-Kryptowaehrungen-aehnlich-wie-Gold-und-Derivate-regeln>

²⁴ https://www.parlament.gv.at/PAKT/PR/JAHR_2018/PK0691/

²⁵ <https://orf.at/stories/3044342/>

²⁶ <https://digitalcity.wien/stadt-wien-trifft-wiener-blockchain-community/>

²⁷ <https://derstandard.at/2000074599576/Bitcoin-Betrug-Spuren-von-Optioment-Geldern-fuehren-in-Karibik>,
<https://diepresse.com/home/wirtschaft/economist/5371989/Kriminalfall-um-BitcoinSekte-aus-Oesterreich>,
<https://help.orf.at/stories/2926897/>

the Head of the *Research Institute for Cryptoeconomics* at the Vienna University of Economics and Business²⁸, Shermin Voshmgir, warns that it is possible that instead of constituting a “universal liberating machine” bringing more democracy, we might end up with a universal “surveillance machine”.²⁹

Quantum technology

Quantum technology is currently a purely scientific topic and does not yet play a role in concrete application. Austria, especially Vienna and Innsbruck with the two related *Institutes for Quantum Optics and Quantum Information IQOQI*³⁰, ³¹ have long played a significant role in the international research landscape. In 1997 Anton Zeilinger³², almost simultaneously with Sandu Popescu, Francesco De Martini and others³³, demonstrated quantum teleportation through quantum optical experiments with photons.

In 2011, physicists from Innsbruck created the largest completely entangled quantum register with 14 individually manipulable quantum bits (qubits).

Now, together with colleagues from Vienna and Ulm (Germany), they have set a new record: They succeeded in creating such a system of 20 individually controllable qubits, as report in the scientific journal "Physical Review X".³⁴ Although there are already quantum computer prototypes with more qubits, especially in the USA, the team led by Nicolai Friis from the University of Vienna does not believe that these can be handled so precisely.³⁵

Recently, Zeilinger conducted the first quantum cryptologically secured satellite telephone conversation between Vienna and Beijing in September 2017 with the Chinese Academy of Sciences. The basis for this was the first quantum communication satellite "Micius" launched into space by Chinese researchers in 2016. In cooperation with the Austrian physicists, it was possible to prove that absolutely bug-proof quantum communication is possible over 7600 kilometers.³⁶ Another cooperation within Austria is the *Vienna Center for Quantum Science and Technology (VCQ)*, which is a joint initiative of the University of Vienna, the Vienna University of Technology, and the Austrian Academy of Sciences. The VCQ intends to give new impulses for research and teaching through its unique spectrum of research topics – from fundamental quantum physics to novel quantum technologies.³⁷ Researchers from Innsbruck are also leading members of the EU lighthouse project's executive committee. Among other things, the Federal Ministry of Education, Science and Research has now made it possible to participate in the spin-off *Alpine Quantum Technologies GmbH (AQT)* through specific funding for the University of Innsbruck. Its goal is to build a commercial quantum computer in Austria over the next few years.³⁸ It is important in terms of technology policy that quantum technology is also listed in the Digital Road Map Austria⁷ and in the current government program.²⁰

²⁸ <https://www.wu.ac.at/cryptoeconomics/>

²⁹ https://science.apa.at/dossier/Von_Bloecken_und_Ketten/SCI_20171025_SCI76854348438738944

³⁰ <https://www.iqoqi-vienna.at/about/mission-statement/>

³¹ <https://iqoqi.at/en/>

³² https://de.wikipedia.org/wiki/Quantenteleportation#cite_note-4

³³ https://de.wikipedia.org/wiki/Quantenteleportation#cite_note-5

³⁴ <https://journals.aps.org/prx/abstract/10.1103/PhysRevX.8.021012>

³⁵ <https://www.spektrum.de/news/20-verschraenkte-qubits/1558450>

³⁶ <https://www.krone.at/1663861>

³⁷ <https://vcq.quantum.at/about-vcq/>

³⁸ <https://www.uibk.ac.at/newsroom/quantencomputer-made-in-austria-kommt.html.de>

3.2 Catalonia - region of Spain

Status quo

Current legislation on new or emerging technologies in the country or region: Is there any legislation regarding these new technologies? At which level does they apply (national, regional, local)? What is its scope? How is it implemented?

New or emerging technologies are not an area in which first legislation is issued on the matter and then it is developed in practice. Nor are they a field in which there are fully comprehensive regulations; instead problematic aspects or those related or connected to existing regulations are regulated, such as data protection or citizen rights.

In this vein, there is Spain-wide legislation on cybersecurity and data protection (but not a specific regulation on data protection because of the massive use of personal data). There is also more defined Spain-wide legislation on specific applications of these emerging technologies, such as drones.³⁹ Likewise, the Spanish Parliament has approved non-legislative recommendations and proposals to promote autonomous cars.⁴⁰ However, there are specific aspects which still have no legal regulations either Spain-wide or in Catalonia (crypto-currencies, autonomous vehicles, blockchain and labour rights stemming from remote work). These legislative shortcomings do not mean that these fields are not developing measures through planning instruments. For example, the Government of Catalonia has spearheaded the implementation of these advanced technologies through programmes and sectoral plans. In 2014, the Government of Catalonia approved the SmartCAT strategy, which is aligned with the Europe 2020 strategy of the European Commission. Its goal is for Catalonia to become an internationally renowned smart region which makes use of the digital technologies to innovate in public services, foster economic growth and promote a smarter, more sustainable and integrative society.⁴¹ Subsequently, it promoted the idea of making Catalonia an international benchmark Smart Country.⁴² The “SmartCatalonia” brand was also created so that citizens could identify the projects that are being developed within the framework of the SmartCAT strategy.⁴³

As part of the SmartCAT strategy, a big data programme is being planned in the Catalan Government which stipulates how data, analytics, tools and professionals related to this speciality can contribute to better management of the data that the Catalan Government and Catalonia as a whole generates with the goal of improving public services and promoting economic activity. Measures have also been approved in the area of big data to foster research into this field.⁴⁴

With regard to big data, it is worth noting that Catalonia and its capital Barcelona are one of the European regions with the highest density of companies and entities devoted to this field. Furthermore, it is also the home to multinationals like Nestlé, Zurich, Volkswagen,

³⁹ See: <https://www.boe.es/buscar/act.php?id=BOE-A-2018-10751> (measures to adapt the European data protection regulations); <https://www.boe.es/buscar/act.php?id=BOE-A-2018-12257> (security of networks and information systems); <https://www.boe.es/buscar/act.php?id=BOE-A-2010-1330> (national security scheme in the sphere of e-government); <https://www.boe.es/boe/dias/2017/12/29/pdfs/BOE-A-2017-15721.pdf> (drones).

⁴⁰ See: http://www.congreso.es/public_oficiales/L12/CONG/BOCG/D/BOCG-12-D-232.PDF#page=9.

⁴¹ See: http://smartcatalonia.gencat.cat/web/.content/01_SmartCAT/documents/SIG14EMO0858.pdf.

⁴² See: http://smartcatalonia.gencat.cat/web/.content/01_SmartCAT/documents/AG-impuls-SmartCAT-per-a-Smart-Country-diligenciat.pdf.

⁴³ See: http://smartcatalonia.gencat.cat/web/.content/01_SmartCAT/documents/AGOV_marcaSmartCatalonia.pdf.

⁴⁴ In 2017, the Government of Catalonia approved the “Advanced Digital Technologies Research and Innovation Programme”. The programme seeks to promote and coordinate the different research and innovation agents within the field of ICTs and make Catalonia a European and global hub in digital technologies that can transform its economy and society. See: http://presidencia.gencat.cat/web/.content/departament/transparencia/acords_govern/2017/2017_03_21/SIG17PRE0148.pdf.

Oracle, IBM, HP and T-Systems, which have invested in Catalonia as the site of their world datacentres, which contributes to promoting Catalonia as a global big data and data centre hub. With regard to blockchain technology, Agreement 65/2018 of the Government of Catalonia (dated 24 July 2018) is worth citing, which promotes the implementation of blockchain technologies in the activity of the Catalan public administrations.⁴⁵ This Agreement of the Government of Catalonia is framed as a planning instrument, not a rigid, closed-ended regulation, and for this reason a Plan to Promote Blockchain Technology in Catalonia must be approved.

Societal and political debate

Is there ongoing debate on the impact of these new technologies on our societies and democracies?

In Catalonia, the debates are mostly limited to experts outlining their views in a variety of conferences, seminars and chats, but it is difficult to find long-term objectives in the discussion about the good and bad aspects of the new technologies. A few topics, such as robotics, seem to be better known because of their impact on the labour market. However, other debates have not reached a significant part of Catalan citizens. Apart from that, the media generally seem more interested in the negative aspects of the issue.⁴⁶

Organised public debates on the quality of democracy (information, fake news, privacy, etc.) are less common. However, there is an increasing debate on digitalisation that is more geared towards its effects on future work opportunities, media and the loss of privacy than its advantages and dangers for democracy.

For this reason, the Government of Catalonia is preparing a framework for debating digital democracy and citizens' rights and responsibilities which began with a workshop entitled: "eDemocracy: Digital rights and responsibilities".⁴⁷ The idea is for it to become an open, participative process that culminates with the drafting of a charter of citizens' digital rights and responsibilities.

How about their political and public acceptance? Which arguments are used? Which stakeholders are involved?

In general, the political and public acceptance is positive. This return channel for peer-to-peer communication is a big opportunity for the public transparency of policymakers and the administration. No doubt it is great step forward in shaping the meaning of democratic participation. The only regret is that again the "appeal" of the technology hides the potential problems derived from malicious use of it. The rule is that democracies have to spend the same time in deployment as in resources to define access rules and responsibilities derived from a use that is not aligned with basic ethical rules.

The major actors in the advantages and solutions to the problems are information providers and communications operators. Policymakers have to start thinking about incentives for operators to reward those operators and information providers who cater to us by providing (or trying to provide) confidentiality in our communications and reliable content. Assuming

⁴⁵ See: <http://portaldogc.gencat.cat/utillsEADOP/PDF/7672/1688840.pdf>.

⁴⁶ It is hard to find reports in general-audience newspapers on projects such as equipping the Barcelona Supercomputing Center with a quantum computer. See: http://smartcatalonia.gencat.cat/en/detalls/noticia/projecte_qilimanjaro_bsc_ordinador_quantic. One exception is this news item: https://www.elconfidencial.com/tecnologia/2018-05-01/ordenador-cuatico-espanol-quilimanjaro_1557163/.

⁴⁷ See: http://smartcatalonia.gencat.cat/.content/03_Actualitat/Actualitat_Comunicats/2018/11/edemocracia.html.

this code of ethics is recommended (along with gender equality, equal opportunity, etc.), it has to be a minimum requirement to be a service provider of our administration and public services. There is very little positioning by politicians. From the viewpoint of citizens, again, the quality of information is sensed not to be very high. Likewise, citizens are mostly unaware of the social media's capacity to "build the truth". This is the same as saying that the quality of our democracy is questionable.

The main stakeholders involved are related to political or economic power, more specifically: Government (regional ministries of Education, Enterprise and Knowledge, Digital Policies and Public Administration), civil society organisations, management and labour organisations, universities and research centres, political parties, media and digital platforms.

Can new technologies empower citizens in voicing their interests and concerns in a more effective way? If yes, how? Can e-participation (e-petitioning etc.) by citizens in parliamentary affairs create stronger connections between citizens and the decision-making process? Can the transparency of parliamentary activities be improved by technological means?

The use of technologies does not imply citizen empowerment per se if the specific technological applications implemented are not accompanied by a design with this purpose in mind, monitoring and reformulation according to what is evaluated. For example, the number of petitions to the Parliament of Catalonia grew the first year in which the e-petition system was implemented, and later plateaued.⁴⁸ This e-petition system did not lead citizens in general to use the system of signing e-petitions, with the exception of very specific e-petitions. It is difficult to claim that the e-petition system has increased citizens' connections and that they have viewed it as a way of increasing their participation in the decision-making process.

The Parliament of Catalonia made a citizen participation space called "Escó 136" (because the Parliament of Catalonia has 135 seats, and "escó" means "seat") available to citizens so that they could make their contributions, comments or suggestions about the bills and draft laws that were in process. The tool was not as successful as expected and only worked for specific draft laws. The experiment is currently being analysed in order to redefine it.

On the other hand, the transparency of the Parliament of Catalonia's parliamentary activity has increased through transparency portals and the institution's own website. Its priority was to increase the amount of information published in open format, along with the need to constantly structure the information in order to make it more understandable and accessible.

Experiences and outlook

Have new technologies been integrated into the day-to-day operation of the institutional and legislative system in your country/region?

The day-to-day integration has only been partial. There are attempts to use new technologies in the health system, for example, essentially an effort to be more efficient in terms of budget, as well as for professionals to offer better healthcare.

Our public administrations have significantly incorporated digital technologies and the use of the new connectivity, although not in a general way; they are much more common in

⁴⁸ See: <https://www.parlament.cat/document/bopc/149811.pdf#page=7>.

economic, administrative, fiscal and security matters than in political or legal matters, or to make information open and to share it. In general, right now our administrations are not characterised by being at the cutting edge in the use of technologies. We can notice a certain push in their desire to improve services by using the best technology at hand; however, resources are not always available.

As mentioned above, the Government of Catalonia has approved several agreements to plan and promote the use of the new technologies in the institutions of Catalonia. Two projects are worth mentioning. First, the Government of Catalonia has used big data tools and strategies to improve the quality and efficiency of its citizen hotline 012.⁴⁹ Secondly, the Catalan Government has sent a bill to the Parliament of Catalonia to regulate the e-voting procedure for Catalans living abroad.⁵⁰

3.3 Denmark

The Danish perspective

In 1998 the Danish Board of Technology (DBT) published the results of a project on *Influence in the information society*⁵¹. The project took a starting point in gathering myths about the role of ICT in the development of democracy. The myths were assessed for their plausibility in workshops with experts, stakeholders and citizens. For those 12 myths that came out as probably valid, policy options were made to protect against adverse effects or to support the development of the positive effects for democracy. In the public presentation of the results, the project manager *Steffen Stripp* was asked if he could summarise the outcome in one sentence, and he answered “the negative effects will come by themselves, and we will have to work actively to gain the positive effects”.

Now, 20 years later, it is reasonable to conclude that this statement has proven right. I have arranged the 12 myths according to my personal ranking of their materialisation:

- 1) “Big Brother and Big Mother” described that surveillance would increase reasoned in care and protection. Has certainly become reality.
- 2) “Loss of common debates” foresaw the echo-chambers in the internet and the weakening of channels for all, such a TV and printed news.
- 3) “Free access to information” is increasingly realised, even for scientific information.
- 4) In “Globalisation as risk for democracy” ICT was a driver for globalisation, which weaken the national decision power. Has happened and protectionism appears as a reaction.
- 5) “Market-driven media” was about an increase in internet advertisement financed media at the cost of critical journalism. A hot topic today.
- 6) “New channels for political parties” has certainly come true, but if it has been a plus for democracy is up for discussion.

⁴⁹ The project consisted in the application of advanced analytical and big data techniques in the records of 694,763 calls to 012 in the months of January to October 2016 with the goal of identifying and quantifying the factors that influence the assessment of the service. See: http://www.govern.cat/pres_gov/AppJava/govern/notespremsa/300566/generalitat-utilitza-copines-estrategies-big-data-millorar-qualitat-leficiencia-servei-telefonc-012-datencio-ciudadana.html.

⁵⁰ The vote issued will be deposited in an electronic urn, and its integrity will be guaranteed by an electronic seal. All the phases of the electronic voting process will be encoded. The vote issued will also be transmitted and stored in encoded form until the day the votes are counted. See: <https://www.parlament.cat/document/bopc/280804.pdf>.

⁵¹ DBT Brief no. 116, June 1998 (in Danish)

- 7) In “Technology and media of the citizens” joined citizens would create software and media for all. Not profound, but a few – e.g. Open Source and Wikipedia.
- 8) “Increased social inequality” focused on ICT skills as determining the social chances of the individual, resulting in inequality. It is a mixed picture we see.
- 9) “Tele-voting” envisioned increased participation in democratic processes, and increased direct democracy, based on internet voting. Not at all prominent now.
- 10) “Strengthened organisations” envisioned increased involvement in parties and association. Many organisations have lost members, but new campaign mobilisations have appeared.
- 11) “Weakened local communities” foresaw that local community life would suffer because of ICT stealing the attention. Local communities suffer, but because of ICT?
- 12) “Tele-hearings among citizens” was about participatory democracy facilitated by online citizen hearings. Not coming, unless governments and Europe invest.

The reason I describe this old project is that it instantly came to my mind when the topic “Towards a digital democracy” was brought up. I couldn’t help thinking that Steffen Stripp was dishearteningly prophetic in his summary of the project results: If our societies want to strengthen democracy by digitalisation, then we need very strong policies, strategies and investments to make it happen – else it will go in the opposite direction.

With that lesson, or hypothesis, in mind, the impact on democracy from future technologies seems much easier to discuss and assess.

Status quo – current legislation

Current relevant Danish legislation regarding digitalisation of relevance for democracy embraces a range of legislative areas. First of all, of course GDPR is prominent. There is so far no specific Danish legislation regarding AI, quantum technologies or Blockchain. However, regulations of e.g. public insight into public administration⁵², on procedures of elections⁵³, and the Act on Public Administration⁵⁴ are examples of regulations that are or will be relevant for the defence of democracy in a future with deeper, wider and more powerful and “intelligent” digitalisation.

To exemplify, the Danish Act on Public Administration defines that administrative decisions should be transparent, be followed by a clear reasoning behind the decision, and should be open for redress. All of these demands will presumably be challenged by AI-based administrative decision-making systems, and the more AI develops into “intelligent” systems, the bigger the challenges must be expected to be.

There has for long been a discussion in Denmark about making experiments with eVoting. A former government put forward a suggestion for such experiments in the election for municipality councils, but after intense public debate the idea was abolished. The present government recently decided to close all activities towards eVoting because of risks in an international political climate where certain states might hack an election.

As an example at the positive end for democracy, the current rules on public insight into public administration could be reinforced by both AI and Blockchain in the future, since AI

⁵² <https://www.retsinformation.dk/Forms/R0710.aspx?id=152299>

⁵³ <https://www.retsinformation.dk/Forms/R0710.aspx?id=194769>

⁵⁴ <https://www.retsinformation.dk/Forms/R0710.aspx?id=202013>

may help citizens to find what they look for and Blockchain may help ensuring the authentication and validity of found documents. However, referring to the hypothesis of this paper, this would require a clear political willingness to allow citizens to get easy and fast access to public administration files – a willingness that has certainly not been demonstrated during the last couple of decades.

Interaction between AI, quantum technologies and Blockchain

In connection to the Human Brain Project⁵⁵, an integrated infrastructure for massive supercomputing, called FENIX⁵⁶, is being built, aiming at integration of traditional High Performance Computers, Neuromorphic computers⁵⁷, and other forms of computers in the future, including Quantum Computing. The infrastructure will be able to allocate computing jobs to the forms of computers that do them the best.

Looking into the not-so-far future, this means that as soon as AI develops into being more “intelligent”, and Quantum Computers become practically useable, they, and massive computing power, memory and data, will be at the service for those who can pay.

Although technically seen there is no hindrance for these technologies, adding to that Blockchain solutions, to be used to strengthen our democracies. But it is difficult to find initiatives that can ensure that weakening our democracies will not happen instead.

Societal and political debate

In European academic debates these issues are to some extent being scrutinised. For example, the European Human Brain Project, of which the DBT is partner in the “Ethics and Society” sub-project, has set off to provide a White Paper on AI, which looks into “Bio-AI” futures, including their societal, democratic and ethical implications.

In the Danish frame, there have been different initiatives on future digitalisation.

The Danish Association of Engineers IDA and a Danish MP in 2016 established the so-called *SIRI Commission*⁵⁸ as a private initiative of stakeholders and experts which debate and make recommendations about Danish exploitation of AI and disruptive technologies. The main focus is to increase Denmark’s growth and job creation. Ethics is a cross-cutting issue, which mainly deals with ethics towards the individual (e.g. the capability of the individual to live in a world under influence from AI; set up rules about who takes a decision; ensure anonymity, etc.). Considerations about how to manage and take control over connected mega-trends and their consequences for democracy are scarce.

The Danish Government in 2017 established a *Council on Disruption*⁵⁹ with aims very close to the SIRI-Commission: To ensure a strong Denmark that captures the technological opportunities for the best of all Danes, and to keep and expand a Danish labour market, which is dynamic and provides proper conditions and which excludes social dumping. The council has a broad representation of experts and stakeholders and is led by the Prime Minister. The word Democracy does not appear in the Terms of Reference for the Council and democracy has so far not been a theme for its discussions.

Lately, there has been a debate on the option of establishing a *Council on Data Ethics* and the Government has as a reaction to a suggested Parliamentary decision by the party *Alternativet*, and in connection to the proposed State’s Budget 2019 decided to establish such

⁵⁵ <https://www.retsinformation.dk/Forms/R0710.aspx?id=161411>

⁵⁶ <https://www.humanbrainproject.eu/en/massive-computing/>

⁵⁷ <https://fenix-ri.eu/about-fenix>

⁵⁸ Computers, such as SpiNNaker and BrainScaleS, which implement aspects of neural networks into analogue or digital computing devices, also called neuro-inspired computing <https://www.humanbrainproject.eu/en/silicon-brains/>

⁵⁹ <https://ida.dk/ida-star/siri-kommissionen>

a council. The Terms of Reference is not yet written, but according to the parliamentary debates it will have a main focus on data protection and privacy. Wider democratic consequences of digitalisation seem not to be within its mandate.

Final remarks

Danes in general have very big trust in the Danish authorities and in the use of their data⁶⁰. This is to some degree in contradiction with the fact that Danes is one of the – if not the – most registered populations in the world and ranks as number 1 of the 28 EU member states in EU's *Digital Economy and Society Index*⁶¹. Not that data are mistreated in Danish administration⁶², but the mere fact that so much data on everybody is gathered in registers provides a threat for severe attacks on privacy and fundamental democratic rights in a future, where data protection will on the one hand be more in focus, but on the other also can be compromised by new technologies⁶³.

The effects of digitalisation on democracy are not only about data protection and privacy, and they are not captured by a traditional concept of ethics. They are just as well about impacts on democratic culture, the media landscape, public conversation, political and civil society organisation, trust in facts and expertise, democratic freedom and equality, surveillance, transparency, on the balance of power between the State and the individual, and on many other functions and principles behind a true and lived democracy.

Given the historical impacts of digitalisation on democracy it seems that the focus of debate and policy in Denmark needs a turn towards the development of strong strategies and targeted investments into a defence for democracy in times where very powerful technologies are being developed, which can weaken democracy, but also can be used to strengthen it – if there is willingness to actively fight for it.

3.4 Finland

Status quo: current legislation on new or emerging technologies in Finland

Finland has very few acts that focus expressly on the regulation of new or emerging technologies. The Act on Transport Services (320/2017), which was prepared in 2015–2018, is the clearest act of this kind, merging legislative regulation of transport services into a single act. The Act on Transport Services facilitates the interoperability of different components of the traffic system, the introduction of new innovations, digitalisation and automation, as well as the implementation of the MaaS (Mobility as a Service) concept.

Technology-related regulation is, generally speaking, technology neutral. In practice, regulation therefore focuses primarily on new operating models and procedures. Regulation is partly national and partly implements EU regulation. There is no regional or local regulation.

Several AI- and robotisation-related projects are currently under way in Finland. AURORA, for example, is a public-sector AI programme that aims to create a proactive Finland, using artificial intelligence and public data resources. Software robots are utilised in the processing of central government invoices (<https://www.palkeet.fi/yhdessa-kehittaen/digitalisaatio.html>). Experimentation is also carried out in the fields of transport (<https://www.trafficlab.fi/>), communities and well-being.

⁶⁰ <https://www.regeringen.dk/partnerskab/>

⁶¹ Documented in numerous surveys. The trust in Danish authorities further was documented in a participatory public consultation in the European project SurPrise <http://surprise-project.eu/>

⁶² <https://ec.europa.eu/digital-single-market/en/desi>

⁶³ There have been breaches of data protection and of privacy rules in specific cases, though

Guidelines on the application of legislation have been complemented by instructions concerning new technology as well as by statements made by overseers of legality regarding the use of new technologies to make administrative decisions. For example, the tax administration issued guidelines on 29 May 2018 (A49/200/2018) regarding the taxation of virtual currencies in connection with personal taxation, company taxation and value-added taxation. The guidelines contain interpretive statements on income taxation in different practical situations involving virtual currencies and in-game virtual currencies used in online games.

The suitability of regulation in terms of new technologies has already been assessed regarding the responsibility of officials for the legality of their actions, the automation of administrative decisions and the overall utilisation of robotisation. For example, some of the Government's research programmes have examined the relationship between current legislation and new technologies (*VNTEAS 2018: 5.2 Tekoälyohjelmakokonaisuus B. Tekoälyviranomaistoiminnassa ja tietoinfrastruktuurin muutosvaateet*, VNK/1782/48/2017 (Artificial intelligence programme B. Artificial intelligence in the activities of the authorities and the change demands for data infrastructure)). On 10 September 2018, the Parliamentary Ombudsman requested a statement (EOAK/3379/2018) about the tax administration's automated taxation procedure and, more specifically, about the measures taken to ensure the legal protection of taxpayers, good administrative procedures and the responsibility of officials in automated decision-making.

The significance of blockchains and other distributed technologies has been taken into account in national and EU-wide legislative drafting as well as in development projects. In early 2018, the Ministry of Finance set up a blockchain technology network for public administration. The network is tasked with providing information about the development of distributed technologies and with cooperating with companies to come up with solutions to some of the most interesting cases.

The government proposal for virtual currencies, drawn up to implement the fifth anti-money laundering directive ((EU) 2018/843), was introduced to Parliament in October 2018. The proposal extends anti-money laundering regulation to cover wallet service providers and exchange platforms for virtual currencies. The government proposal also includes a number of national elements, which are not required in the directive. These include the obligation to register virtual currency offerings (ICOs) and a few related regulations, such as the partial oversight of the markets. Moreover, the definition of exchange platforms used in the proposal is broader than the one used in the directive: the government proposal also regulates crypto-crypto exchange (instead of only crypto-fiat exchange as required by the directive). The enforcement of the bill is tasked to the Financial Supervisory Authority.

Interactions between new technologies

In the Finnish political system, the Parliament's Committee for the Future plays a key role in assessing technological development. In this role, the Committee has developed methods for anticipating technological development and has published appraisals of radical technologies and their impact. In its latest technology review, the Committee examined the 100 most impactful technologies as well as 100 legislative objectives regarding their utilisation. The Committee's report on Finland's one hundred new opportunities 2018–2037 (*Suomen sata uutta mahdollisuutta 2018–2037* (TuVJ 1/2018)) also considers the changes in procedures and actions brought about by new technology. The report will be translated into English in autumn 2018, and the translated version will be available at:

In its assessment of radical technologies, the Committee for the Future does not limit itself to artificial intelligence, blockchains and quantum technologies. Instead, the Committee assesses technological change overall. Nevertheless, artificial intelligence features prominently in the results. Some of these results are described in this section.

The technologies were assessed based on how radical an impact they are expected to have on the world by 2037. One hundred “technology baskets” were rated for twenty different “value-creation networks”, including transport, nutrition safety, and health. The technologies were then ordered based on, for example, how generic their impacts were expected to be. This revealed the breakthrough of AI-related technologies: of the ten most generic technology baskets, three were “pure AI” and four were very closely linked to them (see the Table 1 below).

Genericity ranking	Technology basket	Relation to AI
1	Neural networks and deep learning	AI technology
2	AI performing local work on global basis	Utilizes AI technology
3	Autonomous cars and trucks	Utilizes AI technology
4	Material scanner - hyperspectral camera	
5	Radical growth in computing power	Enables AI technology
6	Ubique environment and internet of things	
7	Facial and emotion recognition and projection	AI technology
8	Speech recognition/synthesis and interpreting	AI technology
9	Memristors and neural processors	Enables AI technology
10	Commercial platforms for sharing economy	

Table 1. The top 10 radical “technology baskets” in terms of anticipated genericity by 2037. The right column shows that many of these relate to artificial intelligence technologies.

As part of the growth in computing power, quantum technologies are also expected to have a generic impact in the future. Blockchain technology, on the other hand, is as far down as place 37 on the list in terms of genericity. Commercial platforms for the sharing economy, in tenth place, may benefit greatly from blockchain technology in the future, however.

In its assessment of radical technologies, the Committee for the Future also compared the latest update (2018) to its previous prediction (2013), aiming to identify technology baskets for which the expectations have grown proportionally most rapidly since the previous report. This type of an assessment also highlights technology baskets that are not yet at the head of the list, but that are experiencing the fastest growth in terms of the expectations set on them. According to the Committee’s assessment, blockchain technology and peer-to-peer (P2P) trust solutions are the most rapidly developing (1/100) field of technology in many areas of society: blockchain technology and P2P trust solutions were the most rapidly developing technology in most (13/20) value-creation networks (freight traffic, automation of work, nutrition, manufacturing of goods, built environment, exchange, observations and knowledge, safety, remote influence, materials, energy, collaboration, competence and its proof). This shows that, despite being in the early stages of development, blockchain

solutions have quickly raised considerable interest. Experiments abound in various fields of application.

The project report also contains an analysis of the fields of society where the accumulation of radical technologies is the fastest at the moment. If 20 value-creation networks are ordered according to their potential for transformation, it becomes clear that the speed of technological change is highest in passenger and freight traffic, followed by work performance and automation. After these three, the fastest change is taking place in the value-creation networks focused on food production and goods manufacture.

The value-creation network related to power structures and decision-making is in place 13/20 in terms of the speed of technological development. According to the findings, the increasing prevalence of location-independent and subject-specific decision-making has the potential to lead to big changes in decision-making processes. The target of the assessment was to recognise the potential of different technologies, not the risks. There is no crosschecking what happens if quantum technologies or AI enables mass decryption of blockchain.

According to the report, radical progress seen in the following “technology baskets” would be of particular significance in transforming the value-creation network of power structures and decision-making: *Neural networks and deep learning* (because artificial intelligence could be used to highlight the backgrounds to decisions and the aspects that influence decisions as well as to assess the quality of decisions and pinpoint the best options in terms of the objectives); *Global work performed by AI* (because decision-making may become highly challenging if a large number of AI services optimise the big picture and control details, leading to many decisions being made at the global level); *Associative memories and neural network processors* (because enhanced artificial intelligence will enable the analysis of increasingly more detailed phenomenon, diminishing the role of decision-makers in favour of the new strategic player, that is, AI); *Radical increase in computing power* (because the enhancement of simulations and artificial intelligence improves the quality of data available to decision-makers); *Crowdfunding and other microfunding* (because crowdfunding shifts the power from production companies and investors to the customers); *Flipped learning and proficiency demonstrations* (because decisions are often based on outdated competence, seeing as, in many fields, the demonstration of proficiency is not required after the completion of studies); *Robotised physical remote work, AI as the superior* (because AI has demonstrated its ability in many optimisation and game-strategic tasks). As we can see, the transformation of decision-making is expected to be strongly dependent on advances in AI.

The committee for the future is currently evaluating, in co-operation with other public organisations, the possibilities of AI to recognise emerging technologies based on the model created in the assessment of radical technologies.

Societal and political debate

The global reach and speed of technological development are such that even significant technologies are now being adopted in both Finland and abroad before any specific provisions have been issued and before we clearly understand what the technology or phenomenon at hand really involves. This is true of, for example, artificial intelligence (AI), blockchain technology, cryptocurrencies, robotisation, geographic data and the digitalisation of various services. One of the questions that needs to be answered is what

law governs the Internet and/or cloud services. Another question is how Finland, for one, can influence these technologies and developments through its legislation.

In Finland, in Prime Minister Sipilä's Government Programme, a culture of experimentation and deregulation were adopted to solve problems and to narrow expanding gap between current legislation and the needs of society that encounters rapid technological development and global creative destruction, which is often initiated by interest groups and proceeds from the bottom up. One of the Government's strategic priorities is: Digitalisation, experimentation and deregulation. It encompasses measures that make use of new technologies and a culture of experimentation to promote innovative solutions, better services, individual initiative and entrepreneurship. One of the goals of experimentation is to strengthen regional and local decision-making and cooperation with the help of citizen-focused methods.

The goal of deregulation (<http://www.norminpurku.fi/en/deregulation/>) is to make everyday life easier and also promoting digitalisation by lighter and reformed regulation. Experiments are used to create better regulation and also to find such regulation that prevents the use or development of emerging technologies.

New technologies offer new ways to put democracy into action and help citizens participate in social decision-making. However, they also make it easier to negatively influence the stability of society. AI applications can either promote or hinder democracy, depending on the objective of the algorithm creator.

A few assessments have been made of the impact that new technologies have on Finnish democracy - especially on representative democracy. According to the democratic policy report (2014) and the democratic policy action plan (2017-2019) prepared by the Ministry of Justice, technology can have a positive impact on citizen participation.

The preliminary survey of online voting, coordinated by the Ministry of Justice, indicated that the general trust in the electoral system and the loss of such trust suffer the greatest risk from the employment of new technologies in elections. This risk can materialise, for example, through fake news produced with the help of artificial intelligence. A decline in trust can result from the mere spreading of false information and rumours. Assessments have also been made of the various uses of blockchain technology in the election processes. In spring 2018, the working group for electronic voting proposed that electronic voting should not be promoted in national elections. According to the group, the benefits gained from electronic voting were smaller than the risks posed to the reliability of elections.

In connection with the media policy programme prepared by the Ministry of Transport and Communications in 2017-2018, measures have been devised to ensure the diversity of the Finnish media and the citizens' right to information. The programme also includes a fact-checking measure, which involves the authorities and participants in the field and aims to promote the development of fact-checking activities that meet the international standards for data security, as well as cooperation with social media platforms. Such activities also provide a way to participate in the European cooperation that is in the process of being launched.

Finland has actively promoted the use of new technologies to ensure that citizens have access to information and opportunities to participate. The citizen participation policy programme, which ran from 2003 to 2007, built a foundation for technology-based citizen

participation. In 2003, the otakantaa.fi website was published as a forum for hearing citizens' opinions regarding legislative proposals, among other things. Other similar online democracy services run by ministries include kansalaisaloite.fi, kuntalaisaloite.fi, lausuntopalvelu.fi, nuortenideat.fi and demokratia.fi.

Citizens can now launch citizens' initiatives (kansalaisaloite.fi) and take part in the development of, for example, legislative projects and other significant measures (lausuntopalvelu.fi). As a rule, all legislative proposals are published and submitted for an open round of statements. The statements made through the lausuntopalvelu.fi service are public.

Experiences and outlook

There is growing interest on public debate how technologies will effect on democratic system and especially what are the ethical and moral aspects we need to solve. The national program for AI (www.tekoalynaika.fi) has launched an ethical challenge for Finnish companies to create joint ethical guidelines for using and developing AI.

Various degrees and methods of automation may create opportunities to more extensively take citizens' experiences into account and promote everyone's chances to be heard. Distributed technologies and artificial intelligence can be used to promote citizens' opportunities to obtain information and, perhaps, to create new ways of participating in the decision-making process. No need for legislative amendments have yet been identified in Finland regarding the impacts that fake news and automatic content recognition has on democracy, citizen discussion and citizen influencing.

Projects related to distributed ledger technologies are being actively conducted in Finland. For example, the use of distributed ledger technologies in the buying and selling of housing company shares has been prepared jointly by companies (OP, Nordea, Tomorrow Labs) and the authorities (the National Land Survey of Finland, the tax administration). A few Finnish real-estate agencies and banks intend to introduce the service in 2019, after the legal reform regarding the apartment data system (HE 127/2018) enters into force. The tax administration actively carries out various experiments in the field of distributed technologies and virtual currencies. Examples include the use of software robotics, taxation of assets and digital real-estate business. The Finnish Standards Association represents Finland in international blockchain standardisation work.

In the European Blockchain Partnership (EBP), launched in spring 2018, Finland is represented by the Ministry of Finance. EBP will prepare the European Blockchain Services Infrastructure (EBSI) initiative and choose a few cases as cross-border services that can be enhanced using blockchains. On 3 October 2018, the European Parliament adopted the resolution on distributed ledger technologies and blockchains: building trust with disintermediation.

3.5 France

Towards a digital democracy - opportunities and challenges

This contribution is mostly based on two reports recently published by OPECST:

- ‘Towards a Controlled, Useful and Demystified Artificial Intelligence’, published in 2017 by Claude de Ganay, Member of the National Assembly, and Dominique Gillot, former Senator⁶⁴;
- ‘Understanding Blockchains⁶⁵: challenges and issues of these new technologies’, published in 2018 by Valeria Faure-Muntian and Claude de Ganay, Members of the National Assembly, and Ronan Le Gleut, Senator.

These reports deal with many challenges concerning artificial intelligence and blockchain technologies. They show how these technologies are major vectors of political and societal transformation and call for an ethical reflection on current developments and the principles that frame them. Thus, these reports help us think about democracy in the era of artificial intelligence and blockchains. On 25th October 2017, a public debate was devoted to artificial intelligence issues in the French Senate. A report was also prepared for the Prime minister by the 1st Vice-chair of OPECST, Cédric Villani, as member of Parliament, proposing a new French and European strategy for artificial intelligence⁶⁶. So far, OPECST has not dealt with quantum technologies; therefore, this contribution will not tackle their interaction with democracy. Be that as it may, these technologies are a new field of engineering, and their real impact remains uncertain, although they may question the methods used in the current computer and especially cryptographic engineering. OPECST is only beginning its investigations on this subject focusing on three themes: QT hardware, QT software and cryptography.

Current legislation on technologies

Artificial intelligence, quantum and blockchain technologies are not yet the subject of a general approach and have not yet resulted in general legislation. These topics continue to be characterized by sectoral regulations implemented at European, national or more local level. There are many uncertainties on regulatory issues that may be of concern to stakeholders, especially with respect to blockchain technologies. OPECST did not take a stand on blockchain legislation, but did so on artificial intelligence: it recommended avoiding excessive legal constraints on research and use of artificial intelligence, the main justification being not to discourage research and innovation. If a legal framework regulating artificial intelligence is to be adopted, it should be European or international, rather than national.

Interactions between technologies

There is an interaction between democracy, artificial intelligence and blockchain technologies. The consequences of these technologies are real challenges for our societies. Furthermore, they can be combined to create synergies: artificial intelligence can, on the one

⁶⁴ Report in French: <http://www.assemblee-nationale.fr/14/rap-off/i4594.asp> and synthesis in English: http://www.assemblee-nationale.fr/14/cr-oecst/4594_synthesis.pdf

⁶⁵ Report in French: <http://www.assemblee-nationale.fr/15/rap-off/i1092.asp> and briefing in English: <http://www2.assemblee-nationale.fr/content/download/68360/696321/version/1/file/note+4+pages+blockchains+ENG+final.pdf>

⁶⁶ https://www.aiforhumanity.fr/pdfs/MissionVillani_Synthese_FR.pdf

hand, benefit blockchain technology (for instance for scalability, privacy, energy consumption or smart contracts). Blockchains can, on the other hand, be useful to artificial intelligence (for example by securing processes and data, which would increase confidence in artificial intelligence applications).

Their interactions with our democracies and democratic processes involve political participation, voting processes, privacy, decentralisation and deterritorialisation, as evidenced by the societal and political debate that has irrupted with the rise of artificial intelligence and blockchain technologies.

Societal and political debate

Besides the current debate on public acceptance of artificial intelligence, a remaining but decreasing challenge, there is a generally accepted view (*doxa*) that these technologies would increase the scale and speed of transmission of information and thus create better-informed citizens. This optimistic view underestimates the new gaps induced by search and recommendation algorithms, which could generate 'filtering bubbles' and social polarisation, as recently highlighted with one of the GAFAM's recruitment software, rejecting women's applications through its artificial intelligence learning processes. The possible confinement in these information bubbles is that personalised information reduces social cohesion, as groups and individuals find it increasingly difficult to understand each other. These are real potential risks to our democracies. Actually, these technologies do not facilitate or even help political participation; they lead to greater political marketing, with a seemingly paradoxical mix of catch-all strategies and personalised messages.

Other aspects of these new technologies on the democratic system may affect the voting process. This goes beyond 'clicktivism' and e-democracy: if we particularly consider the role of blockchain technology, new applications can be implemented. Blockchain is recognised as the underlying technology of many different cryptocurrencies (cryptocurrency being a predominant use case). However, these protocols also facilitate transactions record and can be applied to many sectors, creating various new applications outside the specific context of finance: for instance, civil licensing and certification, land/title registry, notarisation as well as protection of intellectual property, supply chain management, and even voting and elections. Experiments have been conducted for these different uses, and a much wider use seems possible. Nevertheless, even though blockchain technologies are safer than other digital processes, security issues remain a concern. The protection of privacy is another issue related to the interaction between democracy, artificial intelligence and blockchain. The protection of personal data should be a priority but it should be balanced by the positive impact of these growing technologies. The EU General Data Protection Regulation (GDPR) seems relevant from this point of view.

This privacy challenge is directly linked to transparency issues. These technologies can lead to more transparent activities, in the private sphere but also in social life and in Government. With the rise of 'open government' it has become increasingly clear that Internet and computer technologies are able to generate more transparent public activities, including in the parliamentary sphere, and thus increase public accountability. Artificial intelligence and blockchain technology can contribute to transparency but they are not the main factors underlying this trend.

In this context, decentralisation and deterritorialisation are side effects of these technologies, threatening in part our approach to democracy, traditionally rooted in geographical entities.

Regarding the more sociological and political science aspects, a short document (annex 1) has been prepared by a member of the scientific council of the OPECST, Mrs. Virginie Tournay (Cevipof).

Experiences and outlook

We need to go beyond the simple interaction between artificial intelligence, blockchain and democratic procedures, to analyze other important issues raised by these technologies in relation to the political system. First, governments do not seem to be sufficiently involved in these technological innovations: private research plays a dominant role, driven by American and potentially Chinese companies. It is a fact that private entities, such as Google or Facebook, have recently become political actors capable of influencing and even reshaping political life. Private companies will play an increasingly important role in the reorganization of political parties, in elections, as well as in the definition and assessments of policies (they will do so more and more often in place of public authorities). This digital political revolution is especially accelerated by artificial intelligence, which contributes to the transition to a globalised economy dominated by GAFAM platforms. Furthermore, the content of public policies is also changing dramatically. More and more public policies are based on Big Data and algorithms, which is a profound change for governments. This fundamental evolution also raises new issues because algorithms and data have many statistical biases. Therefore, there is a need for a fair and ethical artificial intelligence, which implies fair and ethical algorithms and data.

In addition, the recently draft bill designed in France to fight fake news, particularly in the run-up to political elections, not yet put into effect, could have an impact on freedom of speech, freedom of expression, media pluralism and democracy. This legislative initiative would challenge traditional misinformation issues in a new way. Possible remedies are not obvious, yet most people agree that education and culture remain probably the best answers to date. With the exception of fake-news initiatives, OPECST's report on artificial intelligence addresses the various topics mentioned above, which simultaneously constitute ethical, political, legal, and scientific challenges. The report proposes various policies or safeguards: for instance, by recognising the need to promote fundamental research and reaffirming the place of public research in comparison with private research; encouraging cooperation, especially in Europe; and supporting the creation of European champions in artificial intelligence. It also suggests that the public debate on the ethical principles guiding these technologies should be led by a national body for artificial intelligence and robotic ethics. With regard to these technologies, the report also addresses other challenges, such as the labor market transformations induced by the automation of tasks; the questioning of liability rules; or even the so-called 'black box' issue of deep learning.

To summarise the report, it advocates a controlled, useful and demystified artificial intelligence: controlled, because these technologies should be as safe, transparent and fair as possible; useful, because while respecting humanistic values, they must above all benefit the general public; and finally, demystified, because the social acceptability difficulties encountered by artificial intelligence are largely the result of unfounded alarmist visions and lack of understanding. In conclusion, the irruption of these technologies in our political system and in everyday life appears at least ambivalent, with promises but also threats, especially with regard to humanistic and democratic values, and thus reflects a less optimistic approach compared to the way 'digital democracy' is generally considered.

3.6 Germany

Introduction

The German government has set ambitious goals in the field of digital technologies. It sees digitalisation as a huge chance for prosperity and social progress and seeks to promote conditions so that everyone can benefit from these effects. Priority areas include an improved provision of (broadband) Internet access, digitalisation of trade and industry, cybersecurity, digital public services and regulation of data collection and use. A considerable increase in public investments in research on AI, robotics, cybersecurity, and blockchain and quantum technologies aims to push Germany to join the world leading nations in research and development in these fields. These plans for an "innovation push" are motivated by a frequently voiced perception that recent progress in these areas has been sluggish and Germany is falling behind its competitors e.g. in the fields of digitalisation of public services or digital learning in schools. At the same time, public debate - and concerns - are increasing about topics like looming threats of AI to replace humans in the workplace or social networks, misinformation and algorithms distorting the democratic public discourse and corrupting the results of elections. Incidents like the recent hacking attacks on the German Bundestag (2015) and the German governmental IT network (2016) as well as the international debate about the Facebook - Cambridge Analytica data leak fired up such concerns, among other news.

With 77 % of citizens using the Internet daily (Frees/Koch 2018) and 71 % accessing mobile Internet at least sometimes, Germany is among the European countries with higher Internet use, but not a front runner. Social media uptake is less strong, with 51 % of citizens participating in one or the other social network (Eurostat 2017). A strong industry base and a sophisticated yet fragmented public administration pose an interesting case for the digital transformation of an economy at large scale. Germany has a solid track record of inventions and innovations, but people as well as the constitutional court also have a watchful eye on the protection of privacy and civil liberties in the digital era, resulting in a sometimes more reserved public attitude towards new digital technologies.

Political push for innovation

The government's initiatives are threefold, consisting of drafting strategies, increasing R&D funding, and establishing new government authorities and advisory bodies. E.g. with respect to digitalisation as such, the German government has established a central position within the cabinet (Staatsministerin für Digitalisierung bei der Bundeskanzlerin), and the "Digitalrat", a board of international experts to advise the government (Bundesregierung 2018a). On the side of Parliament, already in 2014 a standing committee was established devoted to issues of digitalisation ("Ausschuss Digitale Agenda"). This committee helped to focus Parliament's competences in the digital field, not least with public hearings on quantum computing and other issues.

Artificial Intelligence

Towards the expressed target to become a world leader in AI, the German government has recently published a first draft of its strategy in this field (Bundesregierung 2018b) - following earlier such initiatives by the US, Chinese, French (Villani 2018) and other governments - that is to result in a final strategy to be announced in December 2018. The development of the strategy is accompanied by expert and stakeholder consultations. Whereas basic research by national institutes in this field is considered to be of high quality,

applied research and the transfer into commercial products are regarded as less well developed. Public (national) funding for AI research has amounted to 500 Million Euro over the last 30 years (Bundesregierung 2018c). AI is to be developed in a responsible, human-centred and welfare-oriented way and with a view to consumer rights. Views from science, industry, state and civil society are to be integrated in the process. The strategy also emphasizes international cooperation, especially with France and Poland.

In its current term, Parliament has established the Study Commission on AI (Deutscher Bundestag 2018a) that was inaugurated in September 2018 with rather broad-reaching goals to explore the potential, but also the risks associated with AI in various societal fields.

Public perception is characterised by reservations and fears about AI-technology. More than half of the population sees AI as a threat for humanity. About one in four is of the opinion that AI could help to solve complex societal problems. A major concern is the loss of jobs as a consequence of increasing use of AI systems (Civey 2018). Against this background, the Federal Ministry of Education and Research, BMBF, has decided to feature "Artificial Intelligence" for its 2019 Year of Science (Wissenschaftsjahr), a major national science communication initiative that focuses on one specifically selected scientific topic each year (www.wissenschaftsjahr.de). The aim is to foster the understanding of AI among citizens and to empower them to participate in a fact-based assessment of the technology (BMBF 2018).

Quantum Technologies

An important aspect of innovation policy in the field of digital technology is the security of digital infrastructure and applications. In this regard, *quantum technologies* play a special role. In the near future, quantum computing algorithms are expected to crack open current cryptography (BSI 2018, S. 17f.). Quantum technologies, however, are also linked with the hope to deliver new means of cryptography. In Germany a national 4-years framework programme for research into quantum technologies has been established that seeks to pave the way towards industrial/commercial exploitation of second generation quantum technologies, building on a strong international position of German research institutions in the field. The programme is endowed with 650 Million Euro funding.

Quantum technologies are also the subject of several policy statements by German scientific academies (Leopoldina et al. 2015) and lobby organisations (Förtsch et al. 2017), which point out the potential of quantum technologies and call for investments in the research infrastructure, and in education.

Blockchain / distributed ledger technologies

The development of a national blockchain strategy was announced, but has not yet been realised (Bundesregierung 2018d). The government seems to be more sceptical about the potential of blockchain applications to improve life and well-being of the citizens, as the technology is still in an "experimental phase". Funding has been granted for several research projects and pilot application studies to explore the future potential. A main focus are applications in public administration. The digitalisation of public administration is of central interest for the government, and a planned "E-Government Agency" and the existing "IT-Planning Council" are expected to support development in this field. But questions of transparency and accountability call for a cautious approach.

The role of personal data and privacy

It is clear that with the Internet of things and machine learning, but also big social data (the application of AI on behavioural data from social network users), the relevance of personal data and how it is being used by private companies as well as public institutions increases drastically. The German government in its "Digitalstrategie 2025" (BMWi 2016) has called for a "paradigm change in data policy" and a move toward "data sovereignty", but it has not yet clarified what the implications of such a move would be for e.g. consumers. Currently a vivid discourse is underway with regard to questions of protection vs. use of personal data (Deutscher Ethikrat 2017; DSK 2017; Schwerk et al. 2018). The German Constitutional Court sets high standards with respect to the protection of personal data. The recent European General Data Protection Regulation has established a new fundamental framework that will act as a guideline for future developments. To develop ethical guidelines for a new data policy in the fields of algorithmic decision making, AI and use of data, a data ethics commission of independent experts has been established by the government (Bundesregierung 2018e).

Other societal implications and corresponding legislative activities

One important area of the use of digital data is public administration. Germany is currently not well positioned in this area being "one of the EU countries with the lowest online interaction between public authorities and citizens" (DESI 2018). To remedy this, a law has been passed in 2017 that demands that all administrative services of the federal as well as the states level are offered online via one or more interconnected portals by the year 2022. The government also intends to experiment with the use of blockchain technology in public administration and has begun to plan pilot projects in the administration of migrants (Bundesregierung 2018d). At the same time, it wants to make available all public data for cost-free reuse (Open Government Data) - without compromising individual rights. It hopes to stimulate innovative applications based on such data.

A controversial issue with regard to e-administration is the degree to which citizens will be subjected to automated decision making systems, e.g. based on machine learning algorithms (WEF 2018). A debate is underway whether such systems are to be used in public administration (IFB 2018), health institutions and private businesses (Busch 2018) and how they should be regulated. They could improve the quality and efficiency of decision making, but might also lead to biased and wrong decisions (COE 2017).

Another issue of concern is the effect of social media platforms on public opinion formation. There are various ways in which misinformation, misleading microtargeting or hate speech via social networks can interfere with the democratic process particularly in the run-up to the elections. Although studies on the role of social media in the 2017 Bundestag election campaign have not confirmed the existence of powerful algorithmic filter bubbles which skew the diversity of opinion in search results or news portals (Krafft et al. 2017, 2018), the awareness of potential negative effects has increased in public as well as political discourse in Germany. The scandal of the fraudulent misuse of the data of German Facebook users by Cambridge Analytica played a major role here.

To fight against hate speech and other actionable forms of online communication, Parliament in 2017 has adopted the Network Enforcement Act (Netzwerkdurchsetzungsgesetz), a law that requires large social networks (>2 Million users) to act against unlawful content such as insults, discrimination, certain forms of propaganda etc. A controversial implication of the law is that the platforms themselves have

the obligation to judge the lawfulness of postings. Critics see this as a potential infringement of the right to free speech and fear that the platforms "overblock" content. An evaluation of the law is planned by 2020. Despite the considerable interests from abroad, this type of regulation has not yet been adopted by other countries, the European Commission currently prefers a system of voluntary commitments of the platforms (Code of conduct, WD 2018). Even earlier, Facebook had announced to cooperate with independent fact-checking organisations to fight against online disinformation (Facebook 2017). Nevertheless, the German parliament debates stronger forms of control of social networking platforms by means of media or competition regulation (Deutscher Bundestag 2018b, pp. 2732ff.).

The effects of online platforms and social media on public opinion and democratic discourse are not easy to identify and analyse. The TAB is currently investigating the effect of algorithmic media, especially intermediaries, on public opinion formation (www.tab-beim-bundestag.de/en/research/u40000.html). In general, issues related to digitalisation have been a prime focus of TAB's investigations in the last years (see for example: TAB 2016a, 2016b, 2017, 2018). A complete list of current and completed research can be found here: <http://www.tab-beim-bundestag.de/en/research/current-research.html>).

The Government's research policy also addresses investigations of the societal implications of digitalisation. For example, the project "Assessing big data" (ABIDA) is researching the role of data privacy and algorithmic decision making in relation to big data. The German Government also funds the Weizenbaum Institute dedicated to researching the ethical, legal, economic and societal aspects of the Internet and digitalisation (with 50 Million Euro for 5 years).

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3.7 Greece

Status quo: current legislation on new or emerging technologies in the country of region

The interplay between democracy, on the one hand, and artificial intelligence, block chain and/or quantum technology, on the other has spurred a lively scientific, social and political debate over the last decade. In the field of current legislation, there have been developments in two different directions, one employing new technologies to create procedures that strengthen democratic participation and transparency (e-democracy) and another one, creating legal safeguards against the use of new technologies for criminal purposes.

E-democracy

Pursuant to article 5A of the Hellenic Constitution, as revised in 2001, "All persons have the right to participate in the Information Society. Facilitation of access to electronically transmitted information, as well as of the production, exchange and diffusion thereof, constitutes an obligation of the State, always in observance of the guarantees of articles 9 (inviolability of home and private life), 9A (protection of personal data) and 19 (secrecy of correspondence)." This article constitutes the basis of the legislative developments that followed in 2010 and, also, indicates the limitations that should be observed regarding the protection of rights that could be jeopardized through the application of new technologies. Thus, the constitutionally recognized "right of information" and "right to participate in the Information Society" were further specified and actually realized with a set of subsequent reforms in administrative procedures, introducing a series of new mechanisms, electronic databases and instruments facilitating public access to government information and empowering transparency within the framework of the "Open Government Initiatives".

More analytically, relevant reforms include, but are not limited to, the following:

OpenGov Project

Opengov.gr has been designed to serve the principles of transparency, deliberation, collaboration and accountability and includes three initiatives:

Open calls for the recruitment of public administration officials. Top level and mid-level openings in the public sector are available on the Internet. Applications are submitted on-line using a platform available on the opengov.gr website.

Electronic deliberation of proposed legislation. In 2010, a formal procedure for direct participation of individual citizens in the law-making process was introduced, in the form of e-deliberation of draft legislation, prior to its submission to the parliament. Since then, every piece of draft legislation or even policy initiative by the government, are posted in a blog like and stay there for a set deadline before their submission to the parliament, during which citizens and organizations can post their comments, suggestions and criticisms article-by-article (the platform may be found here). The outcome of e-deliberation (also referred to as "public consultation") reaches the strictly parliamentary procedure of elaborating and voting on a proposed bill through the mandatory completion of a public consultation report that, pursuant to article 85 of the Standing Orders, should accompany all bills submitted to the Parliament.

Labs OpenGov. Special reference should be made to Labs Open Gov, an open innovation initiative that brings together ideas and proposals from citizens, the public and the private sectors. Within those on-line labs, citizens may propose ideas on innovative policies, still

such there is no formal procedural rules or conditions on how such propositions reach the levels of formal political decision-making process by the Government or the Parliament.

Cl@rity Program

Pursuant to L.3861/2010, the decisions of the public entities (with the exception of decisions that contain sensitive personal data and/or information on national security) cannot be implemented if they are not uploaded on the Cl@rity Program website and if each document is not digitally signed and assigned a unique transaction number produced automatically by the system. This number is automatically written to each page of the posted document, constitutes the identity of each posted act and follows it from here on. Pursuant to the amendments made by L. 4210/2013 to the program "Diavgeia", it is sufficient to invoke this number for the ex officio search of the posted acts both in the handling of citizens' cases and in the communication between institutions. Clarity covers all public institutions, regulatory authorities and local government. In this way, citizens are able to fully exercise their constitutional rights, such as the right to be informed and to participate in the Information Society. The use of Internet guarantees wide publicity and access to information, progressively contributing to a culture change in the whole of the Public Administration.

Law on E-Governance

The Law 3979/2011 on e-governance introduces many innovations, such as the right of citizens to transact with public authorities using ICT's and forms a robust legislative framework for the use of ICTs throughout the public administration. The law emphasizes on transparency and citizens participation introducing the "issue tracking model" for any citizen issue and the constant evaluation of services provided by the Greek government. The United Nations "E-Government Survey 2018" upgraded our country by 8 positions in relation to the general index (EGDI), placing it on the 35th since the 43rd in 2016. Indeed, the results are even better on special indexes, such as the E-participation index, in relation to which the country is upgraded by 31 positions.

Geodata.gov.gr

Geodata.gov.gr provides a focal point for the aggregation, search, provision and portrayal of open public geospatial information. Its operation is included in the Road Map to support the enforcement of Law 3979/2011 for e-Government, as a best practice example for the application of Information & Communication Technologies (ICT) in the public administration, and as an open data repository for the provision of geospatial information.

Government Portal "ERMIS"

The Government Portal «Ermis», provides information related to administrative procedures for Citizens and Business. It also provides the contact details for public organizations in Greece using a specific structure and metadata that allow the reuse of information by other portals and services. Finally this portal also provides e-government services and hosts the Point of Single Contact in Greece.

Start Up Greece

StartUp Greece is a digital information and networking space aimed at giving way to a new generation of entrepreneurs in Greece, bringing together people and ideas and changing the country's perception of doing business and entrepreneurship. StartUp Greece combines an online entrepreneurship community with a knowledge and information database

specialized in the field of doing business. The knowledge and information database includes mainly:

- Public or private funding initiatives so that all available resources can be brought together on one website and accessed by entrepreneurs or anyone interested in starting a business
- Procedures, laws and regulations with a view to creating a coherent database, a guide for entrepreneurs, existing or aspiring
- Events on entrepreneurship, innovation, as well as mentoring events since face-to-face contact and networking remain invaluable for inspiration and motivation
- Entrepreneurship and innovation competitions so that young people, be they entrepreneurs or not, have a fixed information point and the opportunity to put their talents and expertise into good use.

E-voting

E-voting is not applied in Greece. The principle of simultaneously holding elections, provided for in the Constitution, as well as the current electoral law does not allow for the introduction of an e-voting procedure and vast constitutional and legal reforms will be required for such a development to take place. Still, our Constitution theoretically allows for such a development with regard to Greek citizens residing abroad. More analytically, pursuant to the Hellenic Constitution (article 51 paragraph 4) “[...] Matters pertaining to the exercise of the right to vote by persons living outside the Country may be specified by statute, adopted by a majority of two thirds of the total number of Members of Parliament. Concerning such persons, the principle of simultaneously holding elections does not impede the exercise of their right to vote by postal vote or by other appropriate means, provided that the counting of votes and the announcement of the results is carried out when this is also carried out across the Country.” Nevertheless, such required executive law has not yet come into force and Greek citizens residing abroad cannot vote from their place of residency.

Mechanisms and legislation including safeguards against illegal use of new technologies

Presidential Decree 178/14 provided for the establishment and structure of the Electronic Crime Prosecution Directorate, the mission of which includes the prevention, investigation and repression of crimes or anti-social behaviors committed through the Internet or other electronic communications media. The Electronic Crime Prosecutor's Office is an autonomous central service and falls directly under the Chief of the Hellenic Police Force. It currently operates a series of different on-line platform for the protection of citizens, minors, consumers, enterprises, etc.

Furthermore, the obligatory application of GDPR has increased the safeguards regarding the protection of private life and personal data. The Greek Penal Code contained no specific provisions on cyber-criminality. Cyber-crime cases have been tried by Greek Courts with analogous application of related provisions for conventional crimes, a problematic issue that had not been addressed for a long time.

Gradually, special penal laws made explicit reference to the internet, i.e. the anti-racism law (L.4285/2014) provided for crimes of racist violence committed through the internet. Finally, L. 4411/2016 updated the national penal legislation in the field of cyber-criminality

through the ratification of the Budapest Convention on Cyber-criminality of the Council of Europe.

3.8 Japan

Policy in general

The Abenomics economic policies advocated by the Abe administration put AI, the Internet of Things (IoT), big data and robotics at the heart of their revitalization strategy. The strategy is called “Society 5.0 (Super Smart Society)”.⁶⁷ The council of ministers on integrated innovation strategy plans to develop a comprehensive AI strategy by spring 2019.

Legislation

The Basic Act on the Advancement of Public and Private Sector Data Utilization (Act No. 103 of 2016), submitted by bipartisan members of the parliament, formulates basic principles for public/private data utilization and promotes taking advantage of advanced technology such as AI, IoT and cloud computing. The amendment of the Copyright Act in 2018 provides clauses regarding the restriction of copyright to allow flexible future development of ICT: copyright holders’ permission is unnecessary when making use of services such as Google Books and literary works on the internet for the purposes of AI research and development or services. Most of the prospective legislation related to the practical use of AI are now under consideration, with the examination of legal topics related to medicine and autonomous driving having made considerable progress. The government is considering clarifying the law so that a doctor will assume primary responsibility for the diagnosis in case of using AI medical devices, and establishing comprehensive rules on their safety.

As for autonomous driving, in April 2018 the government decided on a policy named *Jido unten ni kakaru seido seibi taiko* (outline of preparation for systems of autonomous driving), describing future policy options to be considered from legal perspectives as well: in principle, accident liability is to be borne by the person putting the automobile into operational use for their own benefit up to level 4 (high automation); clarification of product liability and personal injury liability for accidents resulting from software malfunctions; compulsory instalment of a trip recording device, etc. Concrete measures for practical application of level 3 (conditional automation) driving are reported to be under consideration. By the Act on Special Measures for Productivity Improvement (Act No. 25 of 2018), a Japanese regulatory sandbox was established and demonstration tests for emerging technologies including AI and autonomous driving became possible without being restricted by existing regulations, promoting their implementation in society. The Council for AI Technology Strategy, consisting of representatives from the government, industry, and academia, is discussing the “Social Principles of Human-Centric AI”, guidelines for research, development, and utilization of AI.

Social and political debate and legal matters

Although the level of familiarity with AI has been rising among private citizens and businesses, that the lack of understanding of AI is considered a problem. People feel a mix

⁶⁷ Tatsuhiko Yamamoto ed., *AI to kempo* (AI and the Constitution), Nihon Keizai Shimbun Shuppansha, 2018, p.295. (in Japanese)

of expectation and anxiety towards AI, with more expectation in general. Concerning labor and employment, not many people believe AI to be a threat. It has been noted that the state of employment and work will change because of the utilization of AI, and AI experts who connect technology and society will be needed.

The government is promoting the improvement of productivity through new technologies such as AI as a pillar of their economic growth strategy, with the Liberal Democratic Party making successive proposals to the government from March 2016. Though one party suggested basic income for the AI age during the election for the House of Representatives in 2017, AI is not often debated at the national level. Utilization of AI for deliberation at the Diet is gradually attracting interest from politicians: there are some opinions that AI should be applied to making questions. For the Administrative branch, the huge amount of work done to prepare answers to questions in the Diet is problematic, and the Ministry of Economy, Trade and Industry conducted a demonstration test of using AI to write answers. It became clear that ambiguous expressions could not be understood, and it would take time before implementation was practical.

Concerning ideas of using AI to make rational political and social decisions, if AI replaced politicians, it would be a constitutional issue in light of the representative system and the principle of popular sovereignty (The Constitution of Japan, preamble, Art. 41, Art. 43 Sec. 1, Art. 66 Sec. 1, Art. 67, Sec. 1). It has also been pointed out that the decision making process would become a black box in the case AI was used for politics⁶⁸. Among legal scholars, though AI is recognized as having the potential to change the current legal order based on reciprocal relationships between autonomous individuals (The Constitution of Japan, Art. 13; The Civil Code, Art. 3, Sec. 1), a person's intent when using AI is considered as a basis in contract law in the USA and Germany⁶⁹. The Ministry of Economy, Trade and Industry showed the same interpretation concerning electronic commercial transactions using AI speakers in their Interpretative Guidelines on Electronic Commerce and Information Property Trading (2018).

Profiling of persons by AI has been noted as being contradictory to the constitutional principle of respect of individuals. According to judicial precedent, the freedom of personal information neither being disclosed nor publicized to a third party without permission is recognized by the Art. 13 of the Constitution, and the Act on the Protection of Personal Information has provisions indicating the same (Art. 23, Art. 28), but there is no legal regulations dealing directly with profiling⁷⁰. In June 2018, the Ministry of Internal Affairs and Communication published their proposal for having individuals entrust management of their personal information to an "information bank" in the Guidelines of Certification Schemes Concerning Functions of Information Trust ver. 1.0.

Blockchain

Blockchain technology was originally devised as the underlying technology for virtual currency, also referred to as cryptocurrency, called Bitcoin. The developers expected that it would enable fast and costless transactions under its decentralized structure using a peer-

⁶⁸ "Society 5.0" is defined as a human-centered society, attaining the balance between economic growth and resolution of social problems by a system which highly integrates cyberspace with physical space.

⁶⁹ Masao Yanaga and Joji Shishido eds., *Robot AI to ho* (The laws of robots and artificial intelligence), Yuhikaku 2018, pp.60-63; 157-158. (in Japanese)

⁷⁰ *Supra* n. ii, pp.67-74.

to-peer network which connects users directly. Though in an unintended way, virtual currency transactions have become popular in Japan, and the country has pioneered the development of cryptocurrency legal regulations.

In 2014, about ¥48 billion worth of Bitcoins disappeared from the Tokyo-based company, Mt. Gox, the largest Bitcoin exchange in the world at that time. With this as a turning point, Japan started a discussion on developing new regulations for virtual currency exchanges. As a result, the Payment Services Act was amended in May 2016, and the amendment took effect in April 2017.

One feature of this amendment is that it legally defines “virtual currency.” The Act states that virtual currency has proprietary value and can be used in payment, trade or exchange among unspecified persons and is transferable via information processing systems, and is not currency or a currency-denominated asset. The other feature is that it introduces a registration system for virtual currency exchanges. Every service provider of virtual currency business is required to be registered as a “Virtual Currency Exchange Services Provider (VCE Service Provider)” with the Financial Services Agency (FSA), a Japanese financial authority. VCE Service Providers are required to establish internal systems to protect users and their information, and they are under the supervision of the FSA.

The Act on the Prevention of Transfer of Criminal Proceeds was also amended at the same time. Under the act, the VCE Service Providers were added to the list of entities subject to money laundering regulations, following international demand indicated in the leaders’ declaration of the G7 Summit at Schloss Elmau and the guidance of the Financial Action Task Force (FATF) in 2015. They are obligated to verify the identity of customers and to notify authorities when a suspicious transaction is identified.

Since people accepted these changes as virtual currencies being officially recognized, transactions in Japan gained more popularity after the enforcement. Even some large retailers started to accept payments with virtual currencies. However, virtual currencies attracted even more attention as a means of speculation, and their market value went up sharply in late 2017. Soon after, in January 2018, Coincheck, one of the largest virtual currency exchanges in Japan, which was operating under transitional measures while applying for registration with the FSA, lost ¥56 billion worth of NEM, a virtual currency, by cyber-attacks. The FSA’s inspection revealed that there were deficiencies in the company’s management of their customers’ assets. Following this incident, the FSA has strengthened supervision of all VCE Service Providers and imposed administrative measures, including business suspension orders for some companies.

Several economic and social problems have been pointed out regarding virtual currency businesses. First, the fairness of the VCE Service Providers’ operation is unclear because they make profits through proprietary trading of virtual currency. Second, there is no system to compensate losses of customers when a VCE Service Provider goes bankrupt. Third, the volatility of virtual currencies’ value can disturb the financial market since it has no system to limit volatility. Investor protection for Initial Coin Offerings (ICO), a financing method using virtual currency, has also been controversial. In October 2017, the FSA published a document to alert enterprises that the regulations of securities-related laws could apply to the issue of ICO tokens and to warn investors of the risks of fraud and sharp declines in tokens’ value.

The FSA established the Study Group on the Virtual Currency Exchange Services in March 2018, and has been discussing countermeasures to deal with the problems. The FSA has tried to strike a balance between promoting innovation and protecting users. A group of VCE Service Providers formed a new industry trade group, the Japan Virtual Currency Exchange Association (JVCEA), in April 2018, and are discussing making rules for self-regulation.

Despite the Coincheck heist, virtual currency businesses are expected to become common in Japan for the time being, as it is reported that more than 100 companies plan to register as VCE Service Providers. However, experts are divided over their prospects for the future. Some expect that virtual currency will stabilize as a payment measure as its users voluntarily regulate the system, while others predict that it will decline because of economic, technological, and legal problems, such as price instability, delays in the transaction process, and regulations by authorities. Even so, most of them hope for more practical uses of blockchain technology in financial activities. Some experimental trials have begun in such areas as the monetary transactions of financial institutions and the issuing of community coins by enterprises and municipalities, and these practices are predicted to go farther in the future.

Quantum technology

The Cryptography Research and Evaluation Committees (CRYPTREC)⁷¹, which evaluate cryptographic technology essential for electronic government and publish a list of recommended ciphers, are now conducting a survey of post-quantum cryptography (PQC). It is pointed out that quantum computers may make existing cryptographic techniques less secure, and so a coordinated response is needed. At the moment, hardly any unique or concrete consideration on the effects of progress in quantum technology has been carried out in Japan. The arguments over quantum technology in the legislative and administrative branches are focusing upon research and development for practical applications, such as quantum computers. As of now, no cross-governmental organization regarding quantum technology has been established, unlike for AI. There is also no comprehensive research center like Qu Tech in the Netherlands, created to cover the quantum information technology field, such as quantum computing, quantum communication, quantum encryption, quantum sensing, and quantum simulation, which have attracted public interest in recent years.⁷²

In spite of some notable achievements in basic research such as producing solid-state quantum bits (qubit), and the formulation of quantum annealing, Japan is said to be behind the US, Europe, and China in international competition for practical applications, due to a shortage of funds and human resources.

The government designated “photonics and quantum technologies” as an important area in its “Integrated Innovation Strategy” in June 2018, and each ministry has strengthened their related initiatives (see table).

⁷¹ CRYPTREC Website <<https://www.cryptrec.go.jp/english/index.html>>

⁷² Takenobu Seito, “Ryoshi computer ga kin-yu service no security ni ataeru eikyo to sono taisaku” (influence of quantum computer on security of monetary service and countermeasures), *Bank of Japan Review*, 2018-J-4. http://www.boj.or.jp/research/wps_rev/rev_2018/data/rev18j04.pdf (in Japanese)

Major government programs for quantum information technology from FY2018

Programs	Ministries concerned	Period	Covered quantum information technologies	Budget for FY 2018
Strategic Innovation Promotion Program (SIP)	Council for Science, Technology and Innovation, Cabinet Office	2018-2022	Quantum cryptography Quantum information processing	19.2 M€
Public/Private R&D Investment Strategic Expansion Program (PRISM)		2018-	Quantum computer / Neurocomputer Quantum sensing	2.8 M€
Photonics/Quantum Leap Flagship Program (Q-LEAP)	Ministry of Education, Culture, Sports, Science and Technology (MEXT)	2018-2027	Quantum computer Quantum sensing	16.9 M€
Research and Development of quantum cryptography in satellite communication	Ministry of Internal Affairs and Communication (MIC)	2018-2022	Quantum cryptography Quantum communication	2.4 M€

(by the author)

E-democracy: Use and influence of ICT: public elections

Internet voting is not legally recognized in Japan, and so has never been implemented. However, in August 2018, the Ministry of Internal Affairs and Communication (MIC), which has jurisdiction over the electoral system, considered internet voting for expatriates to be technically feasible and announced its policy to undertake a demonstration test in FY 2019. The all-party parliamentary group for youth policy formed in May 2018 is discussing the introduction of internet voting as a measure to raise the voter turnout of younger generations.

Online donation of political funds is sluggish. There exists no particular regulation on online political contributions in the Political Fund Control Act. How to record and disclose donations in the form of crowdfunding is currently a matter for debate.

Since the House of Councilors election in 2013, candidates, political parties and constituents have been permitted to use the internet, such as email, websites, video streaming, and SNS, for election campaigns.

Since then, national elections have been held four times, and the usage of SNS such as Twitter and Facebook by candidates has been rising. Political parties are adopting public relations and media strategies, aimed at the youth in particular, and making use of SNS. However, it has been observed that politicians use the internet more for the dissemination of information rather than interactivity, presumably due to regulations being difficult to understand.

According to opinion polls, the internet, including SNS, is perceived to be essential as an information source for elections, but also inferior in quality and reliability compared to other sources. TV is still the most important information source for the majority across all generations, and contrary to expectations, the voting rate has not risen. There was a

candidate who ran their election campaign mainly on the internet and received many votes in one of the national elections. The Liberal Democratic Party, part of the ruling coalition, uses online voting open to non-party members as well for the selection of its candidates for the House of Councillors. While election campaigns using the internet have been becoming mainstream, there is a study which found that 80% of tweets related to the election were made by bots, contributing to extremism in political debates during the 2014 House of Representatives election⁷³ In the 2017 House of Representatives election, a large amount of unreliable information was disseminated via SNS and otherwise, some of which was believed to be disinformation. There are no regulations specifically covering fake news, other than some existing stipulations applicable to offenses such as publication of false matters (Public Offices Election Act Art. 235, Sec. 2), but some legal measures have been taken: if a candidate or a political party send a complaint about online slander to an internet provider, the length of time for providers to obtain the sender's consent to delete this data will be shortened from 7 days to 2 days (Law on Restrictions on the Liability for Damages of Specified Telecommunications Service Providers, Art.3-2.).

The Diet

There is no e-petition system: it is stipulated by law that any petitions for the houses of the Diet should be presented in paper through introductions by members of the Diet (Diet Act, Art. 79)⁷⁴. All of the minutes of proceedings since the establishment of the Diet in 1890 have been digitized⁷⁵ although associated documents are not included, and deliberations have been broadcast online from 1998.

3.9 Mexico

Status quo: current legislation on new or emerging technologies in Mexico

In December 2017, Mexican congress passed a federal law that covers the so-called Financial Technologies (Fintech Law), making it one of the few countries to have such a regulation and a pioneer in the Latin American region. Within this law, the usage of Blockchain (BC) for financial services is regulated with a special emphasis on virtual assets (cryptocurrencies). However, other uses of BC remain mostly unregulated.

The Fintech Law aims not only to provide certainty to the service providers and the customers but is also aimed at tackling money laundering. In doing so, the stewardship of virtual assets is given to the central bank (Banxico)⁷⁶. Although the Fintech Law has been well received in general, some criticism has arisen as not only this centralization goes against the distributed nature of the technology, but it renders cryptocurrency transactions unnecessarily slow and prevents institutions such as universities from creating their own ICO (initial coin/currency offering), which hinders innovation projects.

⁷³ Fabian Schäfer, Stefan Evert, and Philipp Heinrich, "Japan's 2014 General Election: Political Bots, Right-Wing Internet Activism, and Prime Minister Shinzō Abe's Hidden Nationalist Agenda," *Big Data*, Vol.5 No.4, 2017.12. <<https://doi.org/10.1089/big.2017.0049>>

⁷⁴ On the other hand, public comments for the administrative branch can be submitted online, and a bill named the Digital First Bill is currently being prepared to stipulate that all administrative procedures should be processed online in principle.

⁷⁵ *Kokkai Kaigiroku Kensaku System* (Full-text Database System for the Minutes of the Diet) <http://kokkai.ndl.go.jp> (in Japanese)

⁷⁶ Cortés Poza, David. Fintech: Tecnología Financiera. 2017. INCyTU-Notes. [Spanish] Available at: <http://www.foroconsultivo.org.mx/INCyTU/index.php/notas/68-6-fintech-tecnologia-financiera>

There are also many other laws that interact with these technologies although in an indirect way. For example, there are federal laws that cover the usage of personal data, which is a fundamental step towards building public policy based on AI analysis of data. These laws cover both personal data held by particulars and personal data held by obliged subjects, where “obliged subjects” refer to all those entities that benefit from public funding. These laws were inspired by the Spanish regulation and are more aligned to the European take on personal data than the American one.

Interactions between these technologies

Quantum Technologies (QT) offer a whole new way of performing computations that are impossible to do with current technologies, and so this has raised wild speculations about its advantages and benefits. Nonetheless, most of these remain just as promises or conjectures as they have not found solid evidence that prove them correct. The advantages that have been found, however, are astounding and can trigger a revolution in the cybernetic world. One of such advantages is the ability to break common cybersecurity protocols. This relies in the fact that QT can decode prime number cryptography in an efficient time, whereas all known classic algorithms are inefficient in this regard.

Prime number cryptography is the base of most modern cybersecurity protocols. In BC these are implemented by the use of private and public keys, where private keys are the prime number factorization of the public key. Public keys are, as the name suggest, in the public record and they hold the transaction or interaction between users, whereas a private key is only held by a user and it is what allows the user to control its data/wallet. QT can provide a way of efficiently inferring the private key from a public key and therefore provide access to the target data/wallet.

Currently, only QT can break this sort of security in an efficient time. However, it has not been ruled out that classical computers could do this, it is just that such an algorithm has not been found yet. Although unlikely, that could be found by an advanced AI or by a human at any time.

Besides the security and privacy of BC users being compromised by QT, it is not necessarily true that QT could control BC. BC is a way to reach consensus. The consensus is achieved by balancing the computational power among all the users, which is normally done by assigning difficult to compute tasks (numerical challenges) to them. If a user were to have an overwhelming computational power it could control and manipulate the network, altering not only current decisions but also past ones. As of today, it has not been proved that QT (nor AI) could present a substantial advantage over normal computing in solving these numerical challenges and therefore network manipulation is not more at risk than with the current technology.

In opposition to classical cryptography, QT⁷⁷ can also offer quantum cryptography, which adds another layer of security that cannot be broken by the aforementioned methods. There are some firms that can provide this service but none are found yet in Mexico. Here, the development of QT is restricted to the academic sector, where recently a national system of research labs for this purpose has been created. Unfortunately, the interaction with the private sector is minimal or non-existent. It also lacks the synergetic development with AI, something that is observed elsewhere in the world. Despite the fact that both technologies are being developed in Mexico, here the interaction between them is non-existent.

⁷⁷ Job One for Quantum Computers: Boost Artificial Intelligence. Available at: <https://www.quantamagazine.org/job-one-for-quantum-computers-boost-artificial-intelligence-20180129/> [visited 12/09/2018]

Societal and political debate

*Impact on society*⁷⁸

Mexico is a vast and complex landscape, composed by a widely diverse cultural, social and economic mosaic. According to official numbers, only 63.9% of the population above 6 years old has access to the internet, so the acceptance and adoption of new technologies is not a trivial task. Moreover, the different cultural backgrounds along the country present many challenges in how these technologies can be implemented, mostly because they tend to be skewed towards an urban and richer population. However, there have been some efforts to use them to boost the economic growth and social development, and try to involve the communities into the development of these technologies so they can be shaped to address their necessities⁷⁹.

For example, a case-study of an application based on BC technology, Govchain, shows that migrants can become more involved with social programmes in their communities if they are able to keep track of their money at all times. Sometimes, due to the lack of jobs, the members of segregated and marginalized communities are forced to migrate to other places, mainly USA⁸⁰. Those who are able to reach this goal, send money back to support their families and are even willing to help fund projects that are beneficial for their hometowns. In total, the amount of money sent by this group rivals that of the oil sales, historically the largest source of income for Mexico.

Unfortunately, this migrant group is uncoordinated and initiatives towards creating social impact programmes are often hampered by a generalized distrust to the government. BC⁸¹ has opened a window of opportunity for distributed platforms to rise where centralized ones cannot. Through the use of a transparent and distributed platform they have an increase trust that their money will be put to good use, increasing their social impact.

Also there are many places where the widespread access to mobile phones (95% of 3G coverage) can help overcome the lack of good basic services⁸². This gave rise to the public health programme “Mi Salud”, which is a SMS-text based service that, through the use of artificial intelligence, keeps track of the health status of pregnant women. This can have a very meaningful impact as the nearest hospitals or health centers may be very far away and may represent a costly trip.

Contribution to the democratization of information and the creation of better informed citizens

The adoption of digital technologies is triggering a radical change in traditional news media outlets in Mexico. Historically, the main source of news has been the television, which has been dominated by two main private corporations (Televisa and TV Azteca). Television is

⁷⁸ Bradshaw S, Howard PN. Troops, Trolls and Troublemakers: A Global Inventory of Organized Social Media Manipulation. Vol. 12, Computational Propaganda Research Project. 2017

⁷⁹ Paris Mandoki, Asaf. Tecnologías Cuánticas. [Spanish] In preparation

⁸⁰ British Embassy in Mexico, Oxford Insights & C Minds. TOWARDS AN AI STRATEGY IN MEXICO: Harnessing the AI Revolution. 2018

⁸¹BlockchainHACKMX. 2018. [Spanish] Available at: https://www.gob.mx/cms/uploads/attachment/file/329074/BlockchainHACKMX_Proyecto_Piloto_Jalisco_Talent_Land_1.pdf [visited 12/09/2018]

⁸² Glowacki M, Narayanan V, Maynard S, Hirsch G, Kollanyi B, Neudert L-M, et al. News and Political Information Consumption in Mexico: Mapping the 2018 Mexican Presidential Election on Twitter and Facebook. 2018

still the most popular source, way above printed media, but recently it is facing fierce competition by online platforms⁸³.

Despite the country having a relatively low internet penetration, online sources have become very important. From those with internet access, most of the users use the smartphone and social media as their main source of news, with an online-born source (Aristegui News) being the most trusted source, beating printed media and the television.

In recent years, both Mexico and the rest of the world have seen a huge increase of automated and AI scripts (bots) designed to manipulate and control the flow of information. In Mexico, these bots are widespread and users are well accustomed to them, to such extent that they have names according to their political affiliation (e.g. "Peñabots" for those that supported president Peña). Last July Mexico had general elections, triggering fierce competition among political contenders. Notoriously, despite their great abundance, the bots in Mexico had failed to exert a significant influence on voters, especially when compared to other countries. The percentage of news shared from junk (unprofessional) news sources remained very low, being below 1% for Twitter. People were remarkably participative in social media conversations, with 41% commenting on news, a percentage way above other countries such as, say, the United Kingdom (14%). However, there was a notorious partisan and ideological bias in the professional news sources.

New technologies may offer Mexico a new way to improve its freedom of speech, as the journalists are in a critical situation⁸⁴. Mexico is one of the most dangerous countries in the world for journalists and, according to some sources, it is the most dangerous one outside a conflict zone. Decentralized platforms and BC⁸⁵ in particular can help independent journalism, by providing means of securing funds and distributing content in a safe manner, avoiding the standard means of communication which might be compromised or infiltrated.

Experiences and outlook

*Transparency*⁸⁶

Mexico has a great problem of corruption and lack of transparency, ranking 135 out of 180 countries in terms of perception of corruption according to Transparency International. In order to improve this situation, the government has incorporated digital technologies as part of the main strategy. For example, following OECD recommendations, Mexico has become a leader of the region in terms of Open Government Data. This has had a positive resonance with BC technologies. There are current efforts to implement BC in government procedures. One prime example is the development of a BC network (called Red Blockchain HACKMX) to allow for public procurement. Users have been involved in this project as the technology behind it was developed in a public Hackathon, and currently there is a public consultation to establish the governance of the BC network.

AI has had also a role in the pursuit of transparency. A case-study of 700,000 procedures of public procurement contracts was analyzed with AI to evaluate their financial efficiency and integrity, signaling possible cases of corruption. The study was made in collaboration

⁸³http://www.beta.inegi.org.mx/contenidos/saladeprensa/boletines/2018/OtrTemEcon/ENDUTIH2018_02.pdf [Spanish] [Visited 12/09/2018]

⁸⁴ Consulta del Modelo de Gobernanza para crear la Red Blockchain México [Spanish]. Available at: <https://www.gob.mx/participa/consultas/redblockchainmexico> [visited 12/09/2018]

⁸⁵ Chiang C-W, Betanzos E, Savage S. Blockchain for Trustful Collaborations between Immigrants and Governments. 2018

⁸⁶ https://www.transparency.org/news/feature/corruption_perceptions_index_2017 [Visited 12/09/2018]

between a think tank devoted to public policy, IMCO (Mexican Institute for Competitiveness), and a start-up dedicated to Big Data and AI, OPIanalytics.

One final note on the social acceptance of these new technologies

As side note, tax declaration in Mexico has become digital since 2002⁸⁷. This means that citizens have become accustomed to using and safeguarding digital signatures (private keys) and that lawmakers have had valuable experience understanding and legislating digital services. The knowledge and skills involved in the safe use of digital signatures are the same as those required to use most BC services, which might give Mexico an edge in adopting further new technologies based on this system⁸⁸.

3.10 The Netherlands

Introduction

Artificial Intelligence, Blockchain and Quantum Technology are important in Netherlands, but in different ways. Artificial intelligence and block chain are part of general debates on digitalisation in Netherlands (para. 2). Block chain also plays a role in a different debate that is actually about bitcoins and dominated by on one hand a deficit of knowledge and on the other hand sky-high expectations (para. 3). At this moment there is no societal debate on Quantum Technology. Quantum Technology is seen as very promising technology that is worth for a major financial investment (para. 4)

The Rathenau Institute wrote several reports on digitalisation and identified five blind spots in the governance of the ethical and societal aspects of digitalisation that needed to be addressed urgently⁸⁹:

1. translating emerging societal and ethical issues into policy;
2. safeguarding fundamental rights and human rights in the digital society;
3. strengthening supervisory bodies and seeing to it that they consult one another;
4. new responsibilities for companies that develop digital products and services;
5. facilitating opposing voices by strengthening civil society, augmenting the public's knowledge and skills, and promoting public debate on digitalisation.

Digitalisation (including Artificial Intelligence and Blockchain Technology)

Societal and political debate: impact on society and democracy

Artificial Intelligence and Blockchain Technology are two of the eight major technologies which are part of a general digitalisation in the Netherlands. Apart from Artificial Intelligence and Blockchain Technology these are: robotics, internet of things, biometrics, persuasive technology, virtual and augmented reality, big data and algorithms.

Digitalisation has a major impact on several major societal and ethical questions. Themes that play a role in the societal debate on digitalization are: privacy (data protection), autonomy (freedom of choice, manipulation), safety (identity fraud, safety), transparency (understanding algorithms), human dignity (dehumanisation, instrumentalisation,

⁸⁷ Nic N, Fletcher R, Kalogeropoulos A, Levy DAL, Nielsen RK. Reuters Institute Digital News Report. Vol. 1, University of Oxford and Reuters Institute. 2018

⁸⁸https://imco.org.mx/articulo_es/indice-riesgos-corrupcion-sistema-mexicano-contrataciones-publicas/ [Spanish][Visited 12/09/2018]

⁸⁹ Kool, L., J. Timmer, L. Royakkers en R. van Est, Opwaarderen - Borgen van publieke waarden in de digitale samenleving. Den Haag, Rathenau Instituut 2017.

Kool, L., E. Dujso, en R. van Est (2018). Doelgericht digitaliseren - Hoe Nederland werkt aan een digitale transitie waarin mensen en waarden centraal staan. Den Haag: Rathenau Instituut

deskilling, desocialisation), justice (exclusion, equal treatment, discrimination), en balance of power (unfair competition, relationship citizens government).

The societal debate on digitalisation in Netherlands broadened the last years both from a technological and social perspective. There is a turning point in the debate on the impact of digital technologies: from a focus on technology and the assumption that this will lead to social progress, to a focus on social and ethical issues like in the field of: freedom of expression, protection of democracy, equality and justice, and the limits to the self-sufficiency of the citizen.

Topics that receive relatively few attention are biometrics (facial recognition), Internet of Things (IoT), virtual and augmented reality, and human rights, while these technologies develop rapidly and are already broadly applied in society.

Public and political acceptance: stakeholders, themes, arguments

In the *public* debate in the Netherland particularly privacy and digital security got a lot of attention. This was demonstrated in intense debates on a new legislation for the intelligence services, and in the discussion on a new law on cybercrime. These extensions of the ability to digital information collection by government services, is seen by the public as an attack to privacy.

The *media* payed a lot of attention to the power of platforms, disinformation and protection of democratic systems. The Cambridge-Analytica-scandal brought the relevance of persuasive technology for the first time under the attention of a wide audience. Also the impact of digital technology on the health of people and the addictive nature of social media got attention in the media.

Civil society organisations had much attention to privacy issues and digital security in recent years. Compared to a few years ago also themes as control over technology, human dignity and justice are now on the agenda of civil society organisations. This is not just attention to data collection, but also to new techniques to analyse data and to profile people. Civil society organisations brought up issues as understanding and review of algorithms (control over technology), and the possible discrimination or exclusion by algorithms. Also the safety of connected devices in the Internet of Things was brought up by civil society organisations.

An increasing number of *Advisory Councils of the Government* ask for attention to the meaning of digitalisation. They conclude that digitalisation will lead to a change of the relationships between Government, businesses, civil society organisations and citizens. They also ask attention for the limits of the self-reliance of citizens. The Advisory Councils usually call for more control and direction of the Government to control digitalisation and to do so in conversation with society.

The two chambers of the Dutch *Parliament* have regularly spoken on digitalisation. The senate talked among others about social and ethical aspects of digitalisation, : on the state of the rule of law and digitalisation. The house of representatives conducted debates on the part-time economy, privacy, digital security, technology and the future of the financial sector, cryptocurrency, data analysis, and the power of platforms. Relatively new themes in the House are: control over technology, justice and autonomy.

The House of representatives wants to have more insight into algorithms and their possible negative effects. In the field of autonomy questions were asked by MPs about persuasive technology, political micro targeting, disinformation, digital skills and freedom of choice for consumers. The subjects robotics, biometrics (facial recognition), and augmented and virtual reality were less prominent on the agenda of the House.

Policy or legislative proposals

Strategies and agendas. The Dutch digitalisation strategy appeared in June 2018. This strategy focuses on the economic possibilities of digitalisation, but also on the knowledge infrastructure, on digital resistance and on fundamental rights and ethics. In addition, the Agenda on Digital Government (July 2018) appeared which focuses on the operational contacts between governments and citizens and entrepreneurs. Attention is also paid to protecting fundamental rights and public values. In the field of cyber security a separate agenda, the Dutch Cyber Security Agenda, appeared. Points of interest are standards for IoT devices, software liability, promotion of cyber security research and improvement of information campaigns.

In a response to reports of the Rathenau Institute the Government formulated a general framework to assure public values and human rights in the digital society.⁹⁰ The Government will focus on more monitoring, civil dialogue, increasing digital skills, experiment with innovations, and strengthen the knowledge base.

Legislation. Digitalisation has led to new legislation, even a change of the Constitution. The first step for a constitutional amendment is adopted by the Dutch Parliament to expand the scope of the article on the confidentiality of correspondence to all means of communication, and so to come to a technique independent protection. Furthermore, a law on Cyber security was adopted. This law obliges the providers of services, such as drinking-water companies, banks and operators of gas and electricity mains, to meet certain security requirements. Another example of new legislation is a law on pseudonyms for pupils: pupils who use digital resources, get a pseudonym, to protect their identity.

Legislative studies. Different ministries started a large number of studies to establish whether legislation is needed in the field of: the meaning of algorithms, block chain, data analysis, biometrics, disinformation, secure hardware and software, platforms, big data, taxation of digital services, competition.

Evaluating the effects of digitalisation upon democratic procedures

The impact of digitalisation on the functioning of the parliamentary system is being investigated by a State Commission. In an intermediate report this Commission calls for strengthening the digital citizenship to cope better with dangers for the democratic rule of law and to increase, and for enhancing the participation of citizens in the public decision making.

Day-to-day operation of the institutional and legislative system

Nearly all Governmental *services* and supervisory authorities have increased attention for social and ethical aspects of digitalisation. Many authorities are orienting themselves on the meaning of digitalisation for (new) aspects of their field of work. This also raises new points of interest for some authorities, such as crypto-currency, which are until now largely outside their jurisdiction.

Local governments search for new possibilities to strengthen local democracy. In the Netherlands a limited number of experiments with e-participation is performed. Various local governments are working on the online availability and standardisation of reports,

⁹⁰ Van Est, R. & J.B.A. Gerritsen, with the assistance of L. Kool, Human rights in the robot age: Challenges arising from the use of robotics, artificial intelligence, and virtual and augmented reality – Expert report written for the Committee on Culture, Science, Education and Media of the Parliamentary Assembly of the Council of Europe (PACE), The Hague: Rathenau Instituut 2017.

proposals, voting results, etc. Other variants of e-participation at local level are online consultations, citizens proposals or participatory budgeting. Despite these experiments the Netherlands is, however, no front runner in this area.

Blockchain

Block chain technology is technically still in its infancy. Reducing costs, improving traceability, and transparency are the key drivers for block chain investments. The efficiency gains are still disappointing: applications are not fast enough, cost too much disk space or are energy consuming. Currently 159 companies in the Netherlands are working on block chain. This ranges from companies that develop applications, patent offices up to part-time consultancies. Of all experiments at most 5 to 10 percent is developed further after the exploration phase.

In the *public* debate blockchain is relatively unknown. Many have vaguely heard about problems with bitcoins or cryptocurrency in general and look at blockchain from this perspective. Recently the argument that bitcoins require much energy, is heard more and more in the public debate.

There is yet no *legislation* on blockchain, though it is studied by some Ministries if this is necessary. These include the legal value of transactions in blockchains, especially the 'smart contracts' used in blockchain applications.

An organisation called the Dutch Blockchain Coalition is at the forefront of the blockchain developments in the Netherlands, playing a coordinating role with a roadmap. This is a public/private partnership in which ministries, universities, banks and insurers explore the potential of block chain technology. The goal is to create a secure, reliable digital block chain infrastructure. The Coalition pays also attention to questions on the nature of anonymity, privacy, and the protection of personal data.

Blockchain and democracy. Blockchain is a decentralised, irrefutable and immutable database of transactions. From this qualities, blockchain technology could make a contribution to the reliability and efficiency of the electoral process. There is a successful experiment with blockchain voting in Groningen, but in a recent report to the House of Representatives was negatively advised on using blockchain to vote. A blockchain is particularly suitable if there is not one trustworthy organising actor, and if the order of transactions is important. Both criteria are not relevant for elections in the Netherlands.

Quantum Technology

Quantum Technology has potentially a great societal value and can probably contribute to some of the biggest challenges of our time. New startups, sme's and large companies are working on applications in various fields. Already there are quantum key distribution systems for securing communications with a quantum bit as encryption key. But in general, the applications of Quantum Technology will last many years. Especially quantum computing and the quantum internet raise high expectations.

Netherlands has good position in research on Quantum Technology, especially with the Research Center QuTech in Delft. QuTech leads the Quantum Internet Alliance, part of the European Quantum Flagship. This Alliance consists of twelve European research groups and more than twenty high-tech companies. Their goal is to create a blueprint to come to a European quantum internet. In addition to the Research Center QuTech there are also Dutch quantum research laboratories in Amsterdam, Leiden and Eindhoven.

Quantum Technology plays no role in Dutch *public* debates. If Quantum Technology is in the *media*, then it is mostly described as technological breakthrough in a positive way.

Researchers emphasize in particular the urgency: the research is close to a number of breakthroughs. They indicate that it is important that Government, business, and society begin to think about the societal meaning of Quantum Technology. Quantum Technology is uniquely suitable for applications that require security and privacy: voting, paying, confidential communication. But Quantum Technology can also be used to crack existing forms of encryption. However, this kind of questions is still only discussed among experts. In government policy Quantum Technology plays only a role in the research and innovation policy. It is for instance designated as a Key Enabling Technology and as a national Icon project. These choices are encouraged and supported by the national business federation VNO/NCW. As a result of these choices, there is ample funding available for quantum research.

Up to now, Quantum Technology plays no role in *legislation* or in operational policy *implementation*.

3.11 Norway

Introduction

Norway is ranked among the top European countries, both when it comes to use of digital technologies among the population, and online public services.⁹¹ 91 percent of citizens own a smartphone and 90 percent use the Internet daily.⁹²

Free access to information and the ability to participate in the public debate is a prerequisite for democracy. In 2004, article 100 of the Norwegian Constitution⁹³ was revised based on recommendations by The Freedom of Expression Commission (1999). A significant change was the “infrastructure requirement” – authorities are obligated to “create conditions that facilitate open and enlightened public discourse” by securing access to information and channels of communication.

At the time there was great optimism related to how the Internet and digital media could improve democracy by securing better access to public debate. More recently, the impact of social media and the Internet has come into question. Fake news, disinformation and echo chambers have become common terms to describe how the public discourse is influenced.

New media and democracy

Media consumption has changed drastically in recent years. 20 years ago, over 80 percent of Norwegian citizens read print newspapers, compared to 32 percent today. 50 percent of the population read news online, and 2 of 3 use social media every day.⁹⁴

Social media can make debates appear polarized. Individuals with the strongest opinions post more often, while news feed-algorithms highlight posts with emotional and strongly worded content. However, it is still an open question whether polarization in social media leads to a more divided population.⁹⁵

⁹¹ <https://ec.europa.eu/digital-single-market/node/66889>, <https://ec.europa.eu/digital-single-market/en/news/new-study-e-government-services-europe-improving-cross-border-availability-services>

⁹² <https://www.ssb.no/en/teknologi-og-innovasjon/artikler-og-publikasjoner/nine-in-ten-use-internet-every-day> (between ages 9-79)

⁹³ <https://www.stortinget.no/globalassets/pdf/english/constitutionenglish.pdf>

⁹⁴ <https://www.ssb.no/en/teknologi-og-innovasjon/artikler-og-publikasjoner/nine-in-ten-use-internet-every-day>

⁹⁵ A comparison of polls between 2007-2017 does not show a significant increase in differences of opinion on politically charged topics. Article in Norwegian: <https://nrkbeta.no/2018/09/21/blir-norge-mer-polarisert/>

Politics and social media

Norwegian politicians are active users of social media. Especially Facebook is widely used to communicate directly with voters.

In 2016, the influence of Facebook got the headlines. Aftenposten, a Norwegian newspaper, addressed Mark Zuckerberg in an open letter which protested that Facebook's algorithm automatically censored the iconic photograph "The Terror of War" from the Vietnam war.⁹⁶ Prime Minister Erna Solberg joined the campaign by sharing the banned photograph on her Facebook page.

In May 2018, a Facebook post by then Minister of Justice Sylvi Listhaug, about revoking citizenships from terror suspects and foreign fighters, led to a heated debate and the opposition parties threatening with a motion of no confidence.⁹⁷ Listhaug chose to resign after the turmoil.⁹⁸

Countering disinformation and fake news

Digital judgement as part of the national curriculum

Digital judgement is one of five digital skills formulated by Norwegian Directorate for Education. All pupils are expected to learn how to compare and interpret digital material in a critical way.⁹⁹ In an increasingly complex media landscape, this should ideally enable them to detect and disclose false information.

Fact-checking the news

Fact-checking could be a remedy for countering fake news. Faktisk.no is an organization for fact checking the public debate in Norway. It was launched in 2017 and has since then controlled 225 claims that have been made in the media, of which 46 percent have been deemed false and 22 percent true.¹⁰⁰ It is owned and run by three important media outlets; the Norwegian Public Broadcasting Service, NRK, and the newspapers VG and Dagbladet. Faktisk.no is part of The International Fact-Checking Network.

Freely available and fact checked encyclopaedia among top websites

Although Wikipedia is an excellent source of freely available, crowdsourced information, there is also need for other types of sources. Facing competition from Wikipedia, Store Norske Leksikon ("Great Norwegian Encyclopaedia", SNL) was restructured as a freely available online encyclopaedia. It is now owned by the Norwegian universities and funded by several non-profit organizations. All articles are signed by an author and the encyclopaedia strives for transparency.

In a report, the European Parliament points to freely available national online encyclopaedias as a tool for countering disinformation and providing reliable information sources. The report highlights the Norwegian version for finding a viable financial model

⁹⁶ <https://www.aftenposten.no/meninger/kommentar/i/G892Q/Dear-Mark-I-am-writing-this-to-inform-you-that-I-shall-not-comply-with-your-requirement-to-remove-this-picture>

⁹⁷ <https://www.reuters.com/article/us-norway-politics/norways-justice-minister-quits-to-avert-government-collapse-idUSKBN1GW0LW>

⁹⁸ In Norwegian: <https://www.regjeringen.no/no/aktuelt/statsministerens-kommentar/id2594382/>

⁹⁹ https://www.udir.no/contentassets/fd2d6bfbf2364e1c98b73e030119bd38/framework_for_basic_skills.pdf

¹⁰⁰ As of 04. October 2018. In Norwegian: <https://www.faktisk.no/statistikk>

and striking a good balance between co-creation from citizens and academic review.¹⁰¹ 750 subject editors review and edit contributions. SNL's website was the third most visited Norwegian published website for some weeks in 2017 and is the largest forum for communicating research and science.¹⁰² The encyclopaedia has 2 million unique visitors per month and is much used by students on all levels.

Transparency and e-participation

Accessible data from Parliament

All information on parliamentary proceedings like debates, hearings, legislative processes etc. are available on Stortinget.no, the web site of the Norwegian Parliament.

Datasets with information on what happens in Parliament are openly available on data.stortinget.no and can be used to create new data driven services. One example of this is "Holderdeord.no" ("Do they keep their promises?"). This is a private, non-partisan initiative with the intention of delivering data driven analysis of Norwegian politics. They provide insights into who votes together in Parliament, political promises – and whether they have been kept, votes in Parliament, and keep track of every time an MP votes against his or her political party.

Digital access to public documents

The Norwegian Freedom of Information Act ensures access to public documents. eInnsyn.no is a joint publication service for government agencies and the City of Oslo. The agencies use the service to publish their public records online, and the public records are then gathered in a common database that is searchable for users. In eInnsyn citizens may search full text documents and request access to public documents that have not yet been published.

Local participation

Digital technologies could facilitate more active participation in the democracy. This is being done on a local scale in Norway. The Ministry of Local Government and Regional Development (KMD) is responsible for minsak.no, which was launched in 2014. The service aims to improve local democracy and strengthen citizens' opportunities to come forward with issues that they think the local authority should consider. Any case that is signed by more than 2 percent¹⁰³ of the local population will be processed by the local government.

Artificial intelligence and democracy

The political debate in Norway on AI and digitalization has so far focused more on the economic impact than on the influence on society and democracy. However, Artificial Intelligence and Machine Learning have some characteristics that may have serious impact on society. These concerns are mainly related to the way new algorithms learn from data and their complexity and lack of transparency.

Machine Learning algorithms often reflect the data they learn from. There is a risk that the data are biased, which can lead to discrimination or maintain prejudices. Non-transparent algorithms, or so-called black boxes, can make it difficult to explain how an algorithm

¹⁰¹ [http://www.europarl.europa.eu/RegData/etudes/IDAN/2018/614657/EPRS_IDA\(2018\)614657_EN.pdf](http://www.europarl.europa.eu/RegData/etudes/IDAN/2018/614657/EPRS_IDA(2018)614657_EN.pdf)

¹⁰² https://meta.snl.no/%C3%85rsmelding_-_2017

¹⁰³ Alternatively 500 citizens in a region or 300 citizens in a municipality

reaches its decision.¹⁰⁴ This makes it difficult for citizens to complain, in cases where an algorithm might decide whether benefits are granted or the outcomes of legal cases. Other algorithms with reinforcement learning are geared towards reaching some defined goals, and not necessarily taking ethical concerns into consideration. AI can also be used with malicious intentions, which can threaten digital, physical and political security.

To address these challenges and stimulate responsible and socially desired development of AI, the Norwegian Board of Technology has recently published a report calling for a Norwegian strategy for artificial intelligence.¹⁰⁵ Such a strategy should address the challenges concerning trusted data sharing and ethical algorithms:

- *Open more public data* in reusable formats usable for machine learning.
- *Enable Data Trusts*, to facilitate data sharing that serve the public interest. This includes assuring that rights, values and responsibilities are shared fair and equitable between organisations in the private sector, and between the private and public sectors.
- *Introduce a digital social contract*, giving citizens real tools to shape and control their digital profile, and to decide if and how data about one self can be shared.
- *Develop ethical guidelines* addressing the challenges AI raises with respect to autonomy, democracy, fairness, equality, solidarity and responsibility.
- *The right to an explanation* should be statutory and decision support systems should not be used if they cannot give a satisfactory explanation.
- *Open algorithms in public sector*: Algorithms funded and used by public sector should be open to the extent possible.
- *Auditing algorithms*: If algorithms are not open, due to e.g. security reasons, they should nevertheless be subject to an assessment. This could be done by an audit or a certification from an independent third party that reviews whether the decision is fair, correct, explainable and verifiable.
- *Ethics by design*: Developers should be stimulated to address ethical questions from the design phase using guidelines for “ethics by design”, inspired by the practice of “privacy by design”. Such considerations require the education of AI-developers to include expertise in ethics.
- *National dialogue about artificial intelligence*: Norwegian authorities should actively involve citizens and society in discussions about artificial intelligence, take advice on the desired development and revise the strategy based on the feedback.

3.12 Poland

New digital technologies as a subject of parliamentary debate in the Polish Sejm

New digital technologies relatively rarely become the subject of attention of the Polish Parliament. Discussions on the latest and potentially ground breaking inventions and phenomena such as artificial intelligence (AI), blockchain technologies or quantum technologies are mainly held among entrepreneurs connected with start-ups and academic circles. Currently, no legislative initiatives directly related to these technologies are undertaken in the Sejm. Among the above mentioned group of digital technologies, issues

¹⁰⁴ The opaqueness can be due to commercial, security or privacy reasons, or because the neural networks are too complicated for humans to understand.

¹⁰⁵ To be updated with English translation

related to artificial intelligence arouse the greatest interest of Members of Parliament. The economic use of blockchain technology is also receiving some attention. The topic of quantum technologies was not discussed at all, neither in the works of parliamentary committees, nor in interventions (statements, interpellations) of individual deputies. The debate on the impact of new technologies on democratic processes has yet to be initiated. The most important issues presented in the speeches and discussions concerning new digital technologies, which took place at the forum of the Sejm, will be listed below.

Artificial Intelligence

The issue of artificial intelligence was the subject of meetings of the Parliamentary Committee for the EU (September 2018), and of the Committee on Digitalization, Innovation and Modern Technologies (October 2018). In both cases, the starting point for discussion was the Communication from the European Commission "Artificial Intelligence for Europe" (COM (2018)237). In the discussion on the above communication, deputies stressed that its aim is to launch a debate on a strategic approach to the development of AI. Attention was drawn to the opportunities, but also to the potential threats posed by the development of this technology. For example, the wider use of artificial intelligence will change the labour market - some professions will disappear, but new ones will also emerge.

Technologies can make it easier for people to do their jobs, for example, by performing repetitive or very dangerous tasks. But by replacing people's work, smart machines can lead to new social divisions in the future: the caste of people working in knowledge and skills-intensive occupations and those whose work has been automated. These challenges will require looking at a number of areas that may seem unrelated to the purely technical side of the issue, such as social assistance and education models, including approaches to lifelong learning. There will also be the problem of helping workers in professions that will undergo the greatest transformations or disappear altogether.

It has been pointed out that the development of artificial intelligence will have a major impact on the evolution of the road transport model, in particular on its automation and the gradual achievement of autonomy. In this case, it is essential to develop AI solutions in an open manner, enabling test data to be reused to avoid making the same mistakes. It is also important to address the question of ethics and the choices that artificial intelligence systems will make in real traffic conditions. At the same time, the question arises as to who should take legal responsibility for the operation of machines based on artificial intelligence. The rapid development of autonomous vehicles proves that this is no longer a purely theoretical issue. This also applies to other legal issues, such as the possibility of giving robots legal personality.

With regard to the ethical aspects of the development of this technology, it was also stressed that systems based on artificial intelligence will collect huge amounts of data. Therefore, the issue of privacy protection should be addressed, inter alia, in the context of access to and anonymization of data collected in this way. Technological progress makes it possible to create an artificial neural network. This raises the question of how to gain insight into the decision making process of robots and maintain real control over AI-based systems in which machines themselves will build and redesign learning algorithms. This requires appropriate management and real control capabilities for Artificial Intelligence.

Although the various risks associated with the development of artificial intelligence have been recognised, the assessment of this phenomenon focuses on the potential benefits. The

deputies' point out that due to the economic potential of artificial intelligence solutions, it is necessary to strengthen international cooperation so that products based on AI technology become a European industrial specialisation. Such an approach was taken by Poland as the initiator of the common position of the Visegrad Group countries with regard to artificial intelligence.¹⁰⁶.

Blockchain technology

None of the parliamentary committees has so far dealt with an in-depth analysis of perspectives related to the dissemination of blockchain technology. However, the interest of deputies in this subject was reflected in several parliamentary questions (interpellations). They have been submitted relatively recently - the earliest date is 2016 and the majority comes from 2018. It can therefore be said that this subject is gaining popularity, which proves the growing awareness of the importance of blockchain technology. A kind of catalyst, which aroused interest in these issues, became a speculative boom in the cryptocurrencies market, especially bitcoin, in the case of which blockchain technology is used to record transactions.

The parliamentary inquiries included the following issues:

- Reduction of regulatory barriers that slow down the uptake of blockchain payments, including issues related to the definition of clear tax rules, e.g. VAT rules for bitcoin transactions.
- Prospects for the use of blockchain technology by the Polish Financial Supervision Authority and the National Bank of Poland.
- Possible blockchain technology applications by Polish energy companies such as PGNiG, Energa and Tauron in order to simplify transactions on the electricity market.

The answers to parliamentary inquiries from the Minister of Development, the Minister of Finance and the Minister of Energy include the following information:

In 2016, the government set up an expert group called "Blockchain and cryptocurrencies", part of the task force responsible for the implementation of the "*From paper to digital Poland*" programme. This group analysed various aspects related to virtual currencies, one of the effects of the work was a review of Polish law in the context of blockchain technology and digital currencies - e.g. within particular branches of civil, commercial, criminal or administrative law.

As a result of the analyses, it was indicated that the greatest needs in terms of legislation exist in the area of administrative and tax law, however, it was stated that at this stage there is no justification to start work on a separate legal act dedicated to blockchain technology or digital currencies. It was stressed that their application in Poland is fully legal. As part of further work, the sub-group was entrusted with the preparation of proposals to amend the current regulations, which constitute unjustified barriers to specific blockchain applications.

Neither the National Bank of Poland nor the Polish Financial Supervision Authority are currently working towards using blockchain technology in the performance of their tasks. However, in their joint communiqué issued in July 2017, both institutions indicated that blockchain technology - which should not be identified with cryptocurrencies operating on

¹⁰⁶ <https://www.gov.pl/cyfryzacja/stanowisko-grupy-wyszehradzkiej-dotyczace-sztucznej-inteligencji>

the basis of this technology - may have many applications in the long term, e.g. in electronic databases, services and the financial sector. However, the implementation of blockchain technology on a mass scale should be preceded by thorough analyses and research.

Due to the significant potential of blockchain-based solutions on the capital market, in 2017 the National Depository for Securities launched a research project devoted to the identification of these technologies. The project is implemented in the form of the so-called "technological sandbox" dedicated to examining blockchain-based solutions in terms of capital market participants' requirements. Out of several potential applications of this technology, a solution enabling remote voting (e-voting) at the general meeting of shareholders was selected. At the first stage of the project implementation, the application will not be intended for business access to the outside world. The pilot phase is to provide the necessary technical and business knowledge, as well as to assess the potential of the technology and the costs related to the creation and maintenance of the solution.

The pilot phase is planned for 2018, and possible dissemination - in the case of commercialisation of the achieved results - not earlier than in 2019. It is assumed that the proposed solution will have a beneficial impact on the capital market by activating shareholders and encouraging them to take an active part in the life of companies of which they are co-owners. This applies in particular to minority shareholders who, today, due to the lack of easily accessible and uniform information on general meetings, a formalised voting process, or the costs associated with physical participation in general meetings; in many cases renounce this privilege. Blockchain technology offers an opportunity to develop a modern, safe and cost-effective tool that would significantly facilitate access to reliable information about general meetings, enable them to follow and participate actively from anywhere and at any time, while ensuring transparent and reliable insight into the results of voting.

Blockchain technology is also of interest to Polish energy companies. These companies look at blockchain from the point of view of facilitating electricity trading and applications in smart grids, power balancing, tracking the origin of energy resources in the supply chain, or electromobility. Companies are particularly interested in using blockchain technology to simplify transactions in the electricity market. This is due to the expected increase in the number of decentralised transactions (e.g. in energy clusters or charging stations for electric cars). A potential area of application is also the management of the distribution network in the context of the growing role of distributed generation. However, at this stage, the activities of energy companies are limited to analytical work on possible applications and safety of blockchain technologies.

Quantum technologies

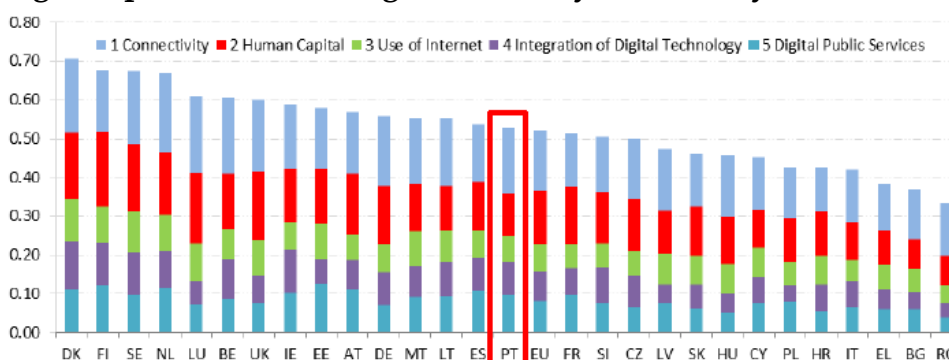
Quantum technologies have not yet been analysed at parliamentary level. Issues related to the essence of these technologies, their potential applications and impact on social and economic life have not been taken up by parliamentary committees, nor in the form of parliamentary questions.

3.13 Portugal

Introduction

This report was prepared by the authors that represent the national Observatory of Technology Assessment of the research centre CICS.NOVA (Interdisciplinary Centre for Social Sciences) of NOVA University of Lisbon. This version is a result of own research and information received from several stakeholders, although it show deserve further inputs from other AI experts, once the parliament dis not have done any legislative initiative or report on the issue. In terms of Digital Economy and Society Index ranking, Portugal occupied the mid position among EU member states, as shown in the next figure.

Fig. 1 - Portuguese position in the Digital Economy and Society Index ranking, 2017

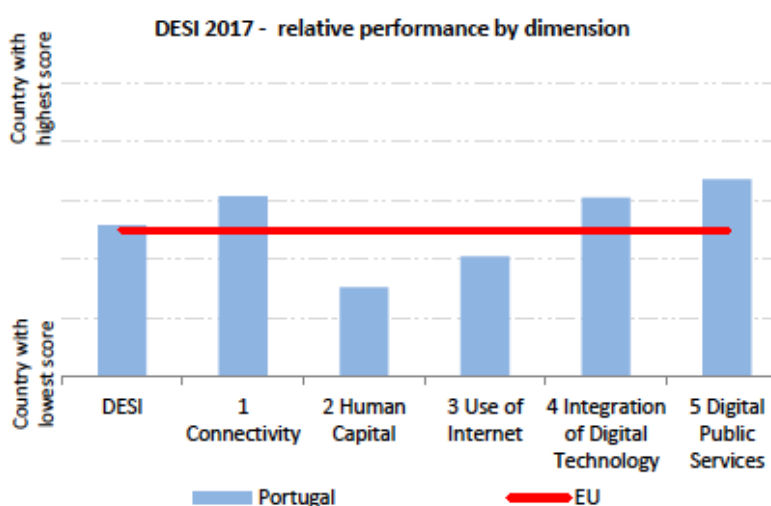


Source: Europe's Digital Progress Report (EDPR) 2017, Country Profile Portugal

In April 2015 Portugal undertook an extensive revision of the country's Digital Agenda Strategy (*Agenda Portugal Digital, APD*)⁴, which was first launched in 2012. This included updates of the Strategy's objectives and measures. Two major initiatives on, respectively, digital skills and digitisation of the economy, have been launched in 2017.

Considering the different elements of this index, their relative position towards the EU average can be registered in the following figure.

Fig. 2



Connectivity, integration of digital technology and digital public services are the only index elements that are above the EU average.

Portugal further improved its overall connectivity ranking in 2016, moving into 10th place in the EU. In Portugal, broadband is available to all homes. Moreover, networks capable of

providing at least 30 Mbps are available to 95 % of households. Noteworthy progress occurred with regard to corporate use rates of both of social media and e-Invoicing, which increased respectively by 42 % and 46 % from a year earlier (2016). There are difficulties to further expand digital public services uptake in a context where parts of the population lack the necessary digital skills. The amount of data being pre-filled in public services' online forms as well as the levels of online service completion decreased slightly. In order to perform this report, the leader of the parliamentary Committee on Science and Education of the Portuguese Parliament, Prof. Alexandre Quintanilha, was contacted. We received also contributions from Dr. Sandra Costa, General Secretary of the Regional Parliament of Azores, that provided feedback and relevant information related with the Azorean experience. The President of the Azorean Parliament, Dr. Ana Pereira Luís, is also president of the Conference of European Regional Legislative Assemblies (CALRE). The aim of this regional parliamentary organization "is to go in depth in the democratic and participative principles within the framework of the EU, to defend the values and principles of regional democracy, and to reinforce links among Regional Legislative Assemblies" (No. 2, Art 1, CALRE rules). One of their Working Groups is about "Interactive Democracy" (<https://www.calre.net.eu/working-groups/interactive-democracy>).

Current legislation on new or emerging technologies

Status quo: current legislation on new or emerging technologies in the country or region

- Is there any legislation regarding these new technologies?
- If so: at which level does they apply (national, regional, local)?
- What is its scope? How is it implemented?

The first step to answer this question would be the definition of "new or emerging technologies" once the terms are time related. But probably, and as far as we know, we can answer that there is no legislation on new or emerging technologies. The one known is about e-commerce, but it does not comply with the mentioned technologies, as blockchain, quantum technologies and artificial technology.

Indirectly related is the Law n° 119/XIII, approved in March 2018 by the Ministers Council, and is based on the EU Directive 2016/1148 (NIS - Network and Information Security), of 6 July. These juridical instruments will be transposed to the Portuguese juridical order during May 2018. There is mentioned the creation of a National Authority for Cybersecurity. It had a close dependence from the military authorities, but in public debate (especially held by the APDSI in 2018) it was proposed that it should be close to the aims of ENISA, the European Centre of Cybercriminality, ORECE, and the eu-LISA.

Interactions between these technologies

- If blockchain (BC) data is immutable and encrypted, what happens if quantum technologies (QT) enables mass decryption of historical data?
- Could an advanced AI find a way of hacking a blockchain?

Theoretically, we can respond affirmatively, but the question requires further research in the field with interviews with AI experts.

- Are QT and AI development synergetic, so that AI agents could help us to develop QT, and vice versa?

The same applies to this question, while it requires research in the field (interviews with QT and AI experts).

- Could AI help us to decide whether it is a good idea to proceed with transformative technologies, such as BC and QT?

To a certain extent it had already done so, once BC and QT have been developed mainly in the field of computer sciences and with AI experts. However, as AI provides limited answers instead of a wide comprehension of the phenomena, that governs the world, it will be difficult that such transformative technologies could be just developed on the basis of AI knowledge. The question requires further research in the field.

- What are the implications of the three technologies and their interactions for our democracies and democratic processes?

These three technologies will become critical once they will influence the way we can take decisions, and they will influence those decisions. And there are direct implications of these technologies in our present lives:

- Russian interferences in electoral processes were significantly enhanced by AI bots. There is also evidence that these Russian bots have also been casting deviations in difficult democratic debates, such as about refugees, emigration, nationalism, independence and religion.
- Block chain-based cryptocurrencies failed, and its spread to other fields are yet to prove any successful applications. When they do, one can expect it to be contained by hacks and other alternative possibilities.
- News related to quantum technologies describe significant technology-related difficulties (e.g. freezing problems) and abound with speculation. There are whisperers of a possible use of QT in a Chinese communications to satellite, although they are probably fake.

These types of problems will surely grow with time, but contained by difficult technology leaps. I would expect that only major state-sponsored (or hyper-capitalist sponsored) projects can make any significant leap forward.

Interactions of AI, BC and QT can in theory impact our democracies in terms of the way we think about reality, polarize our positions and vote, or democratic processes in terms of the casting of the vote in itself. Interactions could even substitute the process of debate and our traditional decision-making processes in democratic societies. But, we find it very difficult to foresee interactions of the three, as practical applications of a single technology are yet restricted to specific fields, if existent at all (i.e. QT).

Societal and political debate

- Is there ongoing debate on the impact of these new technologies on our societies and democracies?

No. The debate remains mostly limited to AI. A few commentators have mentioned the dangers to our democracy arising from AI bots, mostly in terms of financial security and defense. Some news channels invited specialists to debate Russian interference with AI, but interviewees were defense specialists (old retired military with little knowledge on the topic). There are debates in internet forums related to BC, but significantly restricted to the engineers, scientists or enthusiasts.

In the national initiative Portugal INCoDe.2030 (described below) it is aimed to promote scientific activity in four major key areas:

- Advanced Cyberinfrastructure (ACI) - including all advanced scientific computing fields.

- Computing and Communication Foundations (CCF) - including quantum computing, among other areas of R&D.
- Computer and Network Systems (CNS) - including big data, cloud computing, and IoT, among others.
- Information and Intelligent Systems (IIS) - including artificial intelligence, as well as human-centred computing in relation to digital media.

As mentioned in the brochure about the initiative, it “is framed in the international context and aims to improve Portugal’s position and competitiveness, working towards securing a prominent place in terms of digital competences in the period 2017-2030” (p. 6).

- How about their political and public acceptance? Which arguments are used? Which stakeholders are involved?

Just the Portuguese Association for the Development of Information Society (APDSI) is taking positions and developing arguments through public debates. The debate is almost based on mediatic debate.

These questions are in themselves research projects, and this research was not developed yet in Portugal. They need interviews with specialists to be answered, and scenario discussions. We never heard of a political stance on the three technologies. No study related to the public acceptance of the three technologies was sponsored in Portugal. Stakeholders are limited to some (not many) TV commentators, former military and engineers/scientists working with these technologies. In terms of the national initiative INCoDe.2030, it was established an “Observatory for Digital Competences” that has been set up by the Directorate-General for Statistics on Education and Science (DGEEC), which, in collaboration with National Institute for Statistics (INE), monitors and reports on the programme’s development. The Technical Coordination, whose role is to monitor the development of the activities, includes experts from academia, and also the Directorate General for Education, the Institute for Employment and Vocational Training, the Directorate General for Qualification of Public Employees, the Telecommunications Institute, the Foundation for Science and Technology, the Agency for Competitiveness and Innovation, the Agency for Administrative Modernization and the National Institute of Administration.

- Are there currently political or legislative proposals on these topics? Is there resistance and, if so, from whom and why?

In principle, no, but this question needs further research. It needs interviews with experts to be answered.

The General Secretary of the regional parliament of the Autonomous Region of Azores (RAA), Dr. Sandra Costa, mentioned that some AI applications related to the parliamentary activity can be used. Such applications are related to the availability of support systems to the presentation of legislative initiatives by the citizens, which can have automatic and intelligent mechanisms to formalize such initiatives.

It is also possible to make available intelligent systems that cross analyse and assess the legislative impact at multi-level and multi-sector stages.

- New technologies increase the scale and speed of providing information. Does this help create better informed citizens?

Information-related technologies appears to have a side-effect in the population. Although some citizens learn how to use them properly and thrive, others experience confusion with

the sudden increase of information and fell a sense of overload of information resulting in extreme positioning, conspiratorial attitudes, spread of fake news, divisions, annihilation etc. The Portuguese government acknowledged that it “needs to reinforce basic Information and Communication Technologies (ICT) competences, especially in terms of human capital and internet usage levels, preventing them to stay at a worrying threshold. This is also true for specialists, who need to be able to make the most of the growing availability of jobs in the digital market” (cf. <http://www.incode2030.gov.pt/en/initiative>). In this direction it was held the “National Digital Competences Initiative e.2030, Portugal INCoDe.2030”, that is a “public policy integrated action that aims to stimulate and guarantee the development of competences as tools to help prepare the new generations for the “unknown”, investing increasingly in new knowledge and in the capacity to create new jobs - more qualified and better paid - encouraging entrepreneurship in young people” (idem). Anyway, these questions are in themselves topics for further research projects. They need interviews with specialists and data collection to be answered.

- Can new technologies facilitate or even boost political participation by helping overcome certain obstacles like apathy, shyness, disabilities or lack of time?

Yes, but this question should be a research hypothesis for further analysis in scientific projects.

- What are the technical, legal or political challenges linked to micro-targeting in political campaigns?

Some challenges linked to micro-targeting in political campaigns can be linked to the following questions: who are the arbiters of free speech? What is acceptable? What is foreign interference?

- Can new technologies, such as social media applications, facilitate the creation of new political communities and new forms of public representation, as well as provide a communication channel for politicians?

Yes. Social media applications are facilitating the creation of new political communities and new forms of public representation, as well as provide a communication channel for politicians. Some examples:

- <https://www.facebook.com/pages/Assembleia-Da-Rep%C3%BAblica-De-Portugal/544577758977669>
- <https://www.facebook.com/grupoparlamentarPS/>
- <https://www.facebook.com/psd.parlamento/>
- <https://www.facebook.com/GPBlocodeesquerda/>
- <https://www.facebook.com/OrcamentoParticipativoPortugal/>
- <https://www.facebook.com/observatoriodeavaliacaodetecnologia/>

- Can new technologies break down the hierarchical and top-down character of the political system and make it more de-centralised?

No. This answer needs further research.

However, in the RAA, the Legislative and referenda Citizen Initiative (article 46 of the Political and Administrative By-Law of the RAA enables proponent citizens, as in other legislative initiatives, and under certain requisites and formalities, to propose and follow-up (through a specific site) the whole legislative procedure of his/her initiative.

- Can new technologies empower citizens in voicing their interests and concerns in a more effective way? If yes, how? Can e-participation (e-petitioning etc.) by citizens in parliamentary affairs create stronger connections between citizens and the decision-making process?

Yes. e-participation is already increasing. Examples:

- Parliamentary platform for petitions: <https://participacao.parlamento.pt/initiatives/?type=petitions>
- Portuguese section of Amnesty International
- Association for the Defense of Consumers (DECO)
- Public petitions platform <https://peticaopublica.com>
- Petition platform: https://www.activism.com/pt_PT/.

But some forms of direct democracy (as in “5-star movement” in Italy and its constitutional proposal) can be extremely dangerous to democracy.

- Do new technologies pose a threat to traditional mediators, such as journalists, and political representatives and parties?

Yes, if they (journalists and politicians) maintain their activities in a just traditional way. One can witness the impact of the populist movements in Italian political representation and in Italian journalism, the Trumpism and the way they are using new technologies (several scandals could prove it). Events in Turkey, Brazil, Russia or Hungary can also present similar examples.

- Can new technologies contribute to the resolution of long-standing problems of representative democracy, such as the territorial base of constituencies?

Very unlikely. It's a problem of political science and we do not see how can ICT help contribute to such resolutions.

- Can the transparency of parliamentary activities be improved by technological means?

Yes. See e-parliament initiative: Parliamentary Working Group for the Digital Parliament (<http://www.parlamento.pt/sites/COM/XIIILeg/GTARPD/Paginas/default.aspx>). This parliamentary working group produced their final report on March 2018. Several measures were proposed and are applied.

The Azorean regional parliament approved the resolution for the transparency and citizen participation portal (Projeto de Resolução n.º 50/XI (PS) - “Recomenda a criação do “Portal da Transparência e Participação Cidadã” no âmbito do sítio eletrónico da Assembleia Legislativa da Região Autónoma dos Açores”) in December 2017.

Experiences and outlook

- What are the possible impacts of these new technologies on the democratic system?

Impacts can be evident on elections forecasts, emergence of e-participatory activism, etc. A new form of public participation is the “participatory budget” (<https://opp.gov.pt/>). The Portugal Participatory Budget (PPB) is a democratic, direct and universal process that allows civil society to decide on public investments in different governmental areas. Through the PPB, the Portuguese population is having a voice to decide where to invest part of the National State Budget: in 2017, 3 million euros in the areas of education and adult

training, culture, science, agriculture and justice. In 2018, the PPB budget will consider 5 million euros and citizens will be able to propose ideas in all areas of government.

The Participatory Budget is deliberative. This means that the Portuguese people are presenting investment proposals and they will be the ones to choose, through voting, which projects are to be implemented. It is a democratic, direct and universal process through which the citizens will have the opportunity to propose projects and ideas, in a complete collaborative and participative way, effectively contributing to real social impact.

Besides this model, and until now, in Portugal, the use of on-line petitions and parliamentary petitions have been effective. It can be increased and it is expected that it may be on the basis of several citizen initiatives.

- Is there any form of evaluating the effects of these technologies upon the quality of democratic procedures in terms of increasing their transparency and accountability?

Yes, it is possible, but the answer needs a research project to understand effectively how far these technologies have an effect on the democratic procedures in terms of increasing transparency and accountability of the decision processes.

- Have new technologies been integrated into the day-to-day operation of the institutional and legislative system in your country/region?

Yes, e-government, e-parliament, and the participatory budget, as mentioned above.

- How can the recent fake-news initiatives possibly affect the exercise of the freedom of speech, freedom of expression, media pluralism and democracy? What are the possible remedies (technical, educational, societal, regulatory)?

In Portugal they are not yet very important. Knowing about other realities, it might become very important. However, the spread of fake, half-truths, misinformation in critical media. The intention may be to avoid unnecessary polarization in democratic debates and decision making processes where rationality and impartiality should reign.

A good example is the spread of measles in many European countries, and the role of the public information provided by the health authorities. The same applies to the use of glyphosate and herbicides by municipalities. Several other examples are possible to illustrate the case

- Could automated content recognition (ACR) technologies represent a threat to freedom of expression and media pluralism, rather than protect it?

Yes, it could, but it depends on the quality capacities of the media professionals. We should address the question of who should regulate and reach consensualized ethical norms to proceed with defining ACRs.

3.14 Sweden

Current status: Inquiry initiative for new legislation in Sweden on disruptive technologies

Artificial intelligence (AI) is gaining ground in Sweden and is already applied in certain areas such as information searches, image interpretation and as support for decision-making in healthcare services. According to a new report¹⁰⁷, AI has great potential to be of benefit in both the private and the public sector. At the same time, AI can involve various risks and threats, for example, in connection with the publication of disinformation and efforts to influence elections, which both pose a threat to democracy. The central government¹⁰⁸, public authorities and the business sector¹⁰⁹ and research funders¹¹⁰ are currently investing in AI with the aim of increasing knowledge and spreading the application of AI within the sphere of public administration. In September 2018, the Government established a new agency in Sweden, the Agency for Digital Government¹¹¹.

In parallel with the application of, and investments in, disruptive technologies, the importance of updating the regulatory frameworks and adapting them to developments is highlighted, as reflected in the Government's Digital Strategy¹¹². In addition, the Government has prepared a policy document for AI¹¹³ which sets out that the development and use of AI need to be guided by rules, norms and ethical principles. Important regulatory frameworks at the European and international level include, for example, rules dealing with the transfer of data across national borders. The incorporation of the EU data protection regulation¹¹⁴ is another important element of the regulatory framework for AI, as it provides enhanced privacy protection in connection with the processing of personal data. Furthermore, the importance of various actors implementing the regulation in their activities is underlined, and that this will have an impact on how well Sweden succeeds in addressing both the opportunities and risks associated with AI.

A new government inquiry (SOU 2018:25) analyses the extent to which any existing legislation unnecessarily obstructs digital development and collaboration within public administration. It is, according to the inquiry, too early to propose further regulations regarding the use of AI within public administration. The inquiry proposes that public authorities that use or are considering using AI systems in their activities collaborate with the Swedish Association of Local Authorities and Regions, the Agency for Digital Government and supervisory authorities within digital administration in order to draw up proposals as to how third parties can carry out audits, supervision, certification or other forms of control regarding the algorithms that will be applied. Furthermore, it proposes that

¹⁰⁷ VINNOVA (2018) *Artificiell intelligens i svenskt näringsliv och samhälle. Analys av utveckling och potential – Slutrapport* [Artificial intelligence in the Swedish business sector and society. Analysis of development and potential - Final Report]. VR 2018:08

¹⁰⁸ The Government is allocating funds for a knowledge platform, cf. Government decision U2018/02720/UH and press release about earmarking SEK 40 million for further education (www.regeringen.se, 14 June 2018)

¹⁰⁹ "Fakta om VINNOVA'S AI-satsning" [Facts about VINNOVA'S AI initiative], www.vinnova.se

¹¹⁰ The Knut and Alice Wallenberg Foundation is investing SEK 1.6 billion over a period of ten years in education and research in the fields of quantum technology and AI, kaw.wallenberg.org

¹¹¹ www.government.se

¹¹² The Government Offices (2017) for sustainable digital transformation in Sweden - a Digital Strategy. File no. N2017/03643/D

¹¹³ The Government Offices (2018) *Nationell inriktning för artificiell intelligens* [National policy for artificial intelligence] file no. N2018/03008/FÖF

¹¹⁴ Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation)

authorities that use or plan to apply AI report to the Government if adaptations or amendments to current legislation are needed. The importance of collaboration with the business sector and the research community are underlined in connection with the forthcoming assignment, and of monitoring international developments. The inquiry also emphasizes that the legislative requirements within a number of legal areas need to be reviewed in connection with the development of blockchain technology.

In a study¹¹⁵, the legal conditions for responsibility and accountability regarding autonomous vehicles are raised. A government inquiry (SOU 2018:16) lists legislative proposals with the aim of creating better legal conditions for an introduction of automated driving of vehicles in everyday traffic. The Government has decided to appoint a commission of inquiry (terms of reference 2018:85) with the aim of identifying policy challenges and helping to reduce uncertainties regarding rules, and of speeding up the development of policies linked to the fourth industrial revolution technologies (at a first stage, within, for example, precision medicine and connected vehicles and systems).

Interaction between technologies

Together with the new data protection regulation (GDPR), blockchain technology and quantum computers have a significant impact on the financial sector, according to Computer Sweden¹¹⁶. The GDPR can generate a better data quality which, in turn, can lead to better data analyses and data mining. When a company is open about its data use with its customers, this can increase the chances of the customers wanting to share data. The more blockchain technology is used, the easier it will become for more actors to develop financial apps, which, in turn, will give more actors the opportunity to influence the financial sector. Once in use, quantum computers can provide new opportunities to develop IT solutions for financial technology, which Computer Sweden predicts will become a reality this year.

In addition to application within the financial sector, blockchain technology may have considerable potential for application within other areas of society and can, according to a study, contribute to a more transparent and equal society¹¹⁷. For consumers, blockchain technology can help to build trust, for example, by helping consumers to find information about a product's origins and to trace sources of false information¹¹⁸.

According to IBM¹¹⁹, technology with cryptographic anchors¹²⁰ and blockchain technology will be able to ensure a product's authenticity. IBM further states that in order to avoid cyber-attacks, a technology known as lattice-based cryptography will be developed with the purpose of enabling calculations of a file without ever seeing sensitive data or exposing it to hackers.

¹¹⁵ Svedberg W (2016) Nya och gamla perspektiv på ansvar? En rättsvetenskaplig studie om ansvar i en straffrättslig kontext gällande självkörande/ uppkopplade fordon [New and old perspectives on responsibility? A jurisprudential study of responsibility in a criminal law context regarding autonomous/connected vehicles]. VTI Rapport 915

¹¹⁶ Computer Sweden, 11 July 2018, "3 trender som förändrar fintech" (refers to a report, *3 disruptive fintech to watch in 2018* prepared by Jupiter Research 2018)

¹¹⁷ Al.Saqaf W and Seidler N (2017) Blockchain technology for social impact: opportunities and challenges ahead. Journal of Cyber Policy. <https://doi.org/10.1080/23738871.2017.1400084>

¹¹⁸ Dagens industri 18 December 2017, "Sara Öhrvall: Blockkedjan skapar ny tillit" [Blockchain generates new confidence]

¹¹⁹ Dagensanalys.se IBMs teknikspaning - 5 innovationer med potential att revolutionera [5 innovations with the potential to revolutionise] 20 March 2018

¹²⁰ Cryptoanchors are digital fingerprints that cannot be manipulated. They are included in a product, and are connected with a blockchain.

Societal and political debate

AI will contribute to a societal transformation in a number of areas but, at the same time, our knowledge of how society will develop is limited as the analyses are carried out with an excessively narrow perspective and often separately, within different policy areas¹²¹. It is essential that the ability to carry out systems analysis of AI is increased and that skills for identifying opportunities and the desired direction of social developments are improved. In order to make it feasible, according to the Swedish Association of Local Authorities and Regions, specialists within the field of natural sciences and technology need to collaborate with other academic fields such as the humanities¹²². One of Sweden's AI experts¹²³ considers that, while AI involves a fundamental impact on and changes to society, there is no public debate on the issue in Sweden. In his opinion, we will see a redistribution of wealth and a demand for new skills, and there will be a need to organise society in a new way.

According to a survey¹²⁴, Swedes are generally positive to increased digitisation, but just 3 in 10 are positive to AI. Younger, well-educated people tend to be more positive to AI. A survey¹²⁵ from 2017 shows that an increasing number, or 81 per cent of the population between the ages of 16 and 85 read online newspapers and follow the news via the Internet, compared with 54 per cent in 2010. The survey also reveals that two out of three people have used social network sites, 13 per cent have participated in online votes or signed online petitions, and 16 per cent have posted contributions containing personal opinions on politics or social issues. The younger age groups are consistently more active than the older ones.

The results of a new survey¹²⁶ on the effects of digitisation on democracy show that there is considerable confidence in the ability of social media to influence politics, but at the same time great scepticism about security and concern about manipulation through digital media. More than one third feel that it is possible to influence politics in Sweden through social media. This opinion is especially strong among the youngest age group under 29, where as many as 43 per cent regard this as possible. According to the survey, people are also worried about expressing their political opinions in social media as they are afraid of personal attacks. More than half believe that there is a risk that some political party in Sweden is manipulating social media with the aim of influencing the election results in Sweden, or that there is a risk that foreign powers are spreading false information in order to influence the election results.

Experiences and outlook

E-voting has been debated for many years in Sweden, but has not yet been implemented in the electoral system. An all-party commission of inquiry with the task of conducting a review of parts of the electoral system proposed in its final report (SOU 2013:24) that e-

¹²¹ Vinnova (2018) *Artificiell intelligens i svenskt näringsliv och samhälle* Analys av utveckling och potential – Slutrapport [Artificial intelligence in the Swedish business sector and society. Analysis of development and potential - Final report]. VR 2018:08

¹²² SKL 2017. *Artificiell intelligens – möjligheter för välfärden* [Artificial intelligence - opportunities for welfare]. ISBN: 978-91-7585-511-0

¹²³ Intervju med Göran Lindsjö "AI förändrar hela samhället - det måste vi börja diskutera" [Interview with Göran Lindsjö "AI changes the foundations of our society - we need to discuss this"] Computer Sweden. 11 February 2018

¹²⁴ Kantar Sifo and Tieto 2018. *Digitalisering i offentlig sektor* [Digitisation of the public sector]. The survey was conducted among 1050 Swedes between the ages of 16 and 79.

¹²⁵ New statistics from Statistics Sweden, 1 December 2017.

¹²⁶ www.comhem.se a survey among 1255 Swedes conducted in 2018 by Comhem together with Kantar Sifo.

voting should be implemented on a trial basis in the 2018 elections. The inquiry considered that e-voting would make it easier for the voters to exercise their democratic rights, for example, by being able to vote digitally from their computers at home. The Government chose not to proceed with the proposal, mainly based on the argument that it would be very difficult to maintain secrecy of the vote and to ensure that no one had been unduly influenced¹²⁷. Researchers¹²⁸ and security experts¹²⁹ have also voiced criticism of electronic elections.

The problem with IT security and the risk of the election result being manipulated which can create doubt and undermine the legitimacy of democracy are arguments that have been highlighted. Despite the fact that there are new systems which are claimed to offer secure and secret voting through advanced cryptographic methods, with end-to-end verifiable voting, a lack of understanding among the public about how the system works poses a risk as it can create doubt about the election results. Blockchain technology has also been studied¹³⁰ as a possible solution for secure electronic voting, and could solve problems associated with storage and counting of ballot papers, but according to the study, the technology cannot currently meet all the needs associated with the security of electronic voting. A Swedish study¹³¹ examined whether e-participation could mobilise citizens who generally show little engagement and participation in democratic processes. The results are unanimous with other research and show that the group of active e-participants is characterised by both well-educated people and individuals who are otherwise critical to traditional democratic processes. The authors draw the conclusion that e-participation can mobilise critical citizens, but cannot fill the function of bridging the gap between political commitment and influence to socio-economically weaker groups.

Civil society organisations often use digital media as a complement to other traditional media (demonstrations and debate articles in traditional media) in order to reach out with their message and influence politics. This is revealed in a Swedish study¹³², which also draws the conclusion that the age of the organisation is the factor that is most connected with use of social media. Younger organisations use social media to a greater extent than older organisations to disseminate their messages.

Election campaigns are increasingly making use of digital media to reach their voters. An analysis¹³³ of the 2010 and 2014 election campaigns illustrates differences between parties, where the large parties tend to use both traditional methods and digital media to reach their voters, while smaller parties with more modest campaign budgets use digital media in a strategic way to reach their voters. The authors of the study believe that a future challenge

¹²⁷ "Regeringen nobbar e-röstning" [The Government rejects e-voting], radio interview with Morgan Johansson, published 10 March 2016

¹²⁸ Interview with Henrik Ekengren Oscarsson in *Forskning och Framsteg* published 8 February 2018

¹²⁹ Interview with security expert Jonas Dellenvall in *Ny Teknik* 14 June 2017 "E-röstning är ett hot mot demokratin" [E-voting is a threat to democracy]

¹³⁰ Norman S, Hellner F (2017) *Internetröstning i Sverige* *Internetröstning i Sverige. En möjlighet med blockkedjan?* [Online voting in Sweden. Possible with blockchain technology?] Uppsala University

¹³¹ Åström J and Karlsson M (2016) *Will e-Participation Bring Critical Citizens Back In?* IFIP International Federation for Information Processing 2016. pp 83-93

¹³² Scaramuzzino G and Scaramuzzino R (2017) *The weapon of a new generation? – Swedish Civil Society Organizations' use of social media to influence politics.* *Journal of Information Technology & Politics* 14: 46-61

¹³³ Grusell M and Nord L (2016) *Setting the Trend or Changing the Game? Professionalization and Digitalization of Election Campaigns in Sweden.* *Journal of Political Marketing* 0:1-21

for the parties will be the difficulty of controlling their messages when they abound on various blogs, as well as Facebook, Twitter and YouTube.

In the run-up to the Swedish elections on 9 September 2018, a study¹³⁴ shows that the number of bots¹³⁵ that are tweeting about Swedish politics has increased, and doubled between July and August. Most of the tweets have a message that is nationalistic or hostile to immigration. At the same time, the study shows that the bots are not particularly effective, as they are not included in any network of “retweeting” each other.

The purpose of the study was to increase awareness of these attempts to influence the elections, so that the citizens can make their own, independent, decisions without being affected by them.

3.15 Switzerland

Status quo: current legislation on new or emerging technologies in Switzerland

At this time, there is no specific regulation in Switzerland regarding the three technologies addressed in this report: quantum computing, artificial intelligence and blockchain. However, the legislator is showing great interest in the fields of FinTech and blockchain in particular. Indeed, Switzerland, especially the areas of Zug and Zurich as well as the Lake Geneva region, hosts many activities related to these technologies and is witnessing the emergence of numerous start-ups. The country’s political stability and flexible regulations are contributing significantly to this development. In response to this increasing popularity, two government initiatives are worth noting: the Swiss Financial Market Supervisory Authority (FINMA¹³⁶) has set legal conditions intended to provide a favourable framework for FinTech in general, and for Initial Coin Offerings (ICOs) in particular¹³⁷ which have been consistently rising. It has also published a guide for leading stakeholders. Meanwhile, a task force supported by the Finance and the Economy Ministers has been set up to bring together the field’s main stakeholders. It published its first white paper in June 2018, the purpose of which is to reinforce technology’s position in Switzerland¹³⁸. The task force recognises the strong political dimension of blockchain technology and puts forward a number of recommendations for the attention of the political world – inter alia, it admits that technology can reach its full potential only once it is fully integrated into society and in the legal system. Bearing this in mind, global acceptance should increase.

As for the other two technologies, questions relating to artificial intelligence are the subject of several postulates laid down by members of the Federal Parliament. However, they still very much focus on purely robotic aspects and are primarily concerned about the dangers of “robotisation”, for example, or the need for a tax on robots. It can also be noted that the Federal Council very seldom broaches such matters, and that challenges specific to AI are rarely addressed. TA-SWISS is currently conducting a study on artificial intelligence¹³⁹ and hopes to bring the debate into the political arena. Quantum computing is a topic yet to be covered and addressed by members of parliament.

¹³⁴ Fernquist et al. (2018) Botar och det svenska valet. Automatiserade konton, deras budskap och omfattning [Bots and the Swedish elections. Automated accounts, their messages and extent]. FOI MEMO 6458

¹³⁵ A bot is a computer program that has been created to automate a process - in the current study with the aim of creating and spreading tweets. The contents may have been produced by a human being or a computer, but they are disseminated automatically. Bots that are used to spread a message without revealing the sender are known as trolls.

¹³⁶ <https://www.finma.ch/en/>

¹³⁷ <https://www.finma.ch/fr/autorisation/fintech/>

¹³⁸ <https://blockchaintaskforce.ch/2018/06/11/the-white-paper-of-the-blockchain-taskforce/>

¹³⁹ <https://www.ta-swiss.ch/en/projects/information-society/artificial-intelligence/>

Interestingly, a survey conducted by TA-SWISS within the federal administration, with the assistance of the Federal Chancellery¹⁴⁰, shows that there are many concerns and expectations regarding digitalisation, yet, none of these technologies are being specifically addressed. The issues raised mainly concern technocracy, the redistribution of roles between elected officials and citizens or power relationships among political parties. However, in its action plan¹⁴¹ for a digital Switzerland in September 2018, the Federal Council remains focused on e-voting when it comes to digitalisation and citizen involvement. At the same time, the Federal Council has been reviewing the findings of a report by a group of experts it had mandated in 2015 on the topic of security and data processing. Specific chapters of this report are devoted to blockchain and algorithms. The experts make a number of specific recommendations that will be evaluated over the next few months in order to be implemented if possible¹⁴².

Interactions between these technologies

TA-SWISS is soon to publish a study on blockchain¹⁴³ and it has just begun a new project about artificial intelligence. Hence, the answers we provide here are based on work not yet fully completed.

However, it can already be noted, that the development of quantum computing will have obvious repercussions on blockchain technology. For example, new computers' unprecedented processing potential will make decryption much easier, posing a threat to computer security systems as a whole. This risk, however is not specific to blockchain. As for the possibilities artificial intelligence might provide, it is difficult to envisage today the wide spectrum this technology will cover, in particular regarding blockchain or quantum computing.

Evidently, these three technologies will have definite consequences for democracy and the democratic process. In our opinion, digitalisation as a whole will have a major impact. It is obvious that blockchain and artificial intelligence in particular are revolutions in their own right which will reshape society and in turn democracy, particularly in a system of direct democracy such as the one in Switzerland, where every citizen is strongly involved in the democratic process.

Societal and political debate

Over the last few months, numerous internal and external discussions have made TA-SWISS aware that the political and societal debate about the digitalisation of democracy is of concern to many stakeholders in Switzerland. Academic institutions, administrations and public authorities as well as various private institutions and a multitude of citizens are all taking an active part in the debate. In Switzerland, the reflection is being conducted on a large scale and the first concrete initiatives are starting to emerge. The political and social debate on digital democracy in Switzerland outlined hereinafter is in line with TA-SWISS's view to date.

Like many other countries, Switzerland is facing fundamental questions: what will be the impact of technological developments on the regulatory environment and on the state's political scope of action? What is the state's new role considering that administration is now predominantly driven by products and technology? According to the Federal Chancellery,

¹⁴⁰ <https://www.bk.admin.ch/bk/en/home.html>

¹⁴¹ <https://www.admin.ch/gov/en/start/documentation/media-releases.msg-id-72053.html>

¹⁴² <https://www.admin.ch/gov/fr/accueil/documentation/communiques.msg-id-72083.html>

¹⁴³ <https://www.ta-swiss.ch/en/projects/information-society/blockchain/>

the main focus of administrative action no longer lies on Parliament, but on new technological systems and innovation. The government believes that it will soon be submitted to greater pressure from technological developments than from politics itself. This raises other issues, such as the level of legal and technical security that can be expected by citizens. The drastic decline in the importance of political parties that is becoming apparent has been confirmed, for example, by surveys conducted among young voters. The use of social media is accelerating this trend. The forming of communities using digital tools such as e-voting, e-collecting and digital opinion-making, via Twitter, for example, is challenging traditional rituals and hierarchies in the political opinion-making process. This is changing not only the relationship between the state and its citizens, but also the relationship with "traditional intermediaries" such as political parties, unions and associations as well as other institutions in civil society. Switzerland is also experiencing a growing indifference towards traditional political institutions, whereas there is an increasing interest in disparate, consumption- or needs-oriented (ad hoc) communities in which - people hope - results or benefits can be achieved quickly. Whether these trends are unfolding at the sole cost of the political parties, but with the benefit of having more information and greater citizen participation, is the subject of controversial debate.

Switzerland's political system is unique, with its direct democracy instruments (initiatives, referendums, petitions), its multilingualism (German, French, Italian and Romansh), the small scale of its territory and its federalist structure (principle of subsidiarity where the municipalities and cantons hold most of the responsibilities) and a broad consultation process in which numerous intermediaries participate, such as cantons, parties, media, associations, as well as civil society's structures and actors. Against this backdrop, digitalisation poses specific challenges to Swiss democracy, much more so than in other democracies.

Data privacy specialists at cantonal level fear that the trend towards the centralisation and standardisation of administrative processes unleashed by the rise of digitalisation might undermine Swiss federalism. National IT programmes and standards make it practically impossible for municipalities, but also small cantons to develop their own programmes. The federal administration is considering promoting a digital language translation programme specific to Switzerland, so that its specific characteristics and political system are not impaired by the understanding of language and politics that other forms of government or foreign companies might have.

Direct democracy has explicit requirements for protecting the private sphere. It cannot function without a high level of freedom of expression and the guarantee of voting secrecy which both form the basis for freedom of choice and electoral freedom as well as for wild political candidacies. But the more the state and administration rely on a digital organisation, the more transparent their voters become. Discussions TA-SWISS has been conducting with various research institutions have shown that there is a need for action in particular in the areas of digitalisation and political education and opinion forming, both at research level and in the practical implementation of the so-called digital revolution in education. But the efforts in Swiss secondary schools and senior high schools are primarily limited to technical solutions or the development of a digital infrastructure as well as the teaching of programming languages. This suggests that digitalisation is often viewed as an end in itself. In contrast, little research has been conducted to assess the social consequences of programming the world using algorithms, a world that young people will be confronted with going forward.

Experiences and outlook

Although it is obvious that digitalisation will have a tangible impact on the democratic process, it is difficult today to evaluate in what way and to what extent. Politicians involved in the Swiss militia system fear that it will increase workloads, for example through the proliferation of platforms enabling citizens to engage in dialogue with elected officials. While administrations do see the benefits of digitalisation through improved processes and contact with citizens, they are also aware that implementation requires skills that come at a cost in terms of human resources, and that not everyone will be in a position to afford. There is a danger of creating a two-tier society in which the degree of digitalisation would depend upon the wealth of communes and cantons. The consequences for citizens and constituents are likely to be significant, although

it is difficult to assess exactly how, as technology is still rarely used in the democratic process. For the most part, digitalisation still consists in digitising physical processes, by replacing paper forms with digital replica, for example. This is the first stage towards e-government. The digital transition of democracy requires to reconsider the processes involved and a much more global way of thinking.

Nevertheless, initiatives are starting to emerge in Switzerland. A book recently published sets out a digital agenda for Switzerland¹⁴⁴, highlighting the need to address these issues quickly and concretely. A group has been set up at parliamentary level to deal with the question of sustainable digitalisation¹⁴⁵. It focuses on the topics of open data, open access, etc.

At cantonal level, the example of the Canton of Geneva is worth mentioning: It has set up “Genève Lab”, whose specific mission is to help administrations make the transition towards digitalisation in the most suitable and efficient way¹⁴⁶. This laboratory has, for example, tested blockchain technology within the cantonal trade register. At national level, the “Staatslabor” project does not have applications within institutions, but this association shares the same goals¹⁴⁷. It advises public institutions in need of support in this context of rapid change and evolution.

In the academic world too, these questions are given much thought. At the initiative of researchers at the University of Zurich, for example, a manifesto for a digital democracy was published to encourage reactions and interactions among the field’s various stakeholders¹⁴⁸. The publication points out that digitalisation allows for a more direct democracy, but does not guarantee it in any way. Digitalisation must also make it possible for more people to become involved in the democratic process. Finally, the manifesto recommends to move forward on these matters by first setting up tests on a small scale.

A further project, “primaire digitale”, was set up by citizens in the Canton of Valais to establish a constituent assembly in the run-up for the elections¹⁴⁹. The purpose of this initiative is to bring together citizens and get them elected outside of the traditional partisan system.

The next national elections in Switzerland are due to take place in autumn 2019. It is already obvious that a great deal of attention will be devoted to the use of social media in this context. It will be interesting to observe and understand how they are used during the campaign, with the question of “fake news” still a topical issue.

¹⁴⁴ Agenda for a Digital Democracy, Daniel Graf and Maximilian Stern, NZZ Libro Publishing House, 2018

¹⁴⁵ <https://www.digitale-nachhaltigkeit.ch/de/>

¹⁴⁶ <https://www.ge.ch/dossier/geneve-lab>

¹⁴⁷ <https://www.staatslabor.ch/en>

¹⁴⁸ <http://digital-manifest.ch/manifeste/>

¹⁴⁹ <https://appelcitoyen.ch/>

In this perspective, but also in view of the evolution of society towards digitalisation, TA-SWISS intends to conduct a partly participative study, to answer the questions posed by the digitalisation of democracy, with a focus on the unique direct democracy system in Switzerland.

3.16 United Kingdom

Status quo: current legislation on new or emerging technologies in the UK

Blockchain technology¹⁵⁰

In the UK there is currently no legislation specific to the use of blockchain or distributed ledger technology (DLT). It is currently unclear to what extent new regulation will be required as this is likely to be best directed to specific applications rather than the technology per se¹⁵¹.

In 2017, the Financial Conduct Authority (FCA) published a paper to stimulate discussion around the implications of DLT for the financial sector.¹⁵² Based on responses to this paper, the FCA concluded that current regulation is sufficient for companies using or planning to use DLT, and that no regulatory amendments are needed in this sector at present.¹⁵³

There are ongoing discussions globally around the regulation of cryptocurrencies, cryptocurrency exchanges, cryptocurrency wallets and Initial Coin Offerings (ICOs). As discussed above, cryptocurrencies are currently not regulated in the UK (provided they are not part of other regulated products or services). However, the recently published EU 5th Anti-Money Laundering Directive requires that anti-money laundering obligations apply to some cryptocurrency exchanges and wallets.¹⁵⁴ This will require them to be registered in each member state and for steps to be taken to identify and report suspicious activity. Member states have 18 months to transpose the directive into national law. It is unclear how this will be affected in the UK by Brexit.

Most ICOs are not regulated in the UK and many are based overseas. Some ICOs have features similar to Initial Public Offerings (IPOs), private placement of securities, crowdfunding or collective investment schemes. Therefore, depending upon how an ICO is set up, some aspects of it may fall under existing regulation. This is determined case by case and depends upon the characteristics of the ICO.¹⁵⁵ Concerns have been raised recently after several ICOs and cryptocurrency exchanges were uncovered as scams, leading to financial losses for investors. This prompted regulators in China and South Korea to ban them completely. The FCA has warned consumers about the risks of investing in ICOs and is currently investigating whether there is a need for them to be regulated in the UK.

¹⁵⁰ POST. POSTbrief 28: Distributed Ledger Technology [Internet]. 2018 [cited 2018 Oct 2]. pp. 1-16. Available from: <https://researchbriefings.parliament.uk/ResearchBriefing/Summary/POST-PB-0028>

¹⁵¹ SWIFT. SWIFT on distributed ledger technologies [Internet]. 2016 [cited 2018 Oct 2]. pp. 1-20. Available from: <https://www.swift.com/resource/swift-distributed-ledger-technologies>

¹⁵² Financial Conduct Authority. Discussion Paper on distributed ledger technology [Internet]. 2017 [cited 2018 Oct 3]. pp. 1-33. Available from: <https://www.fca.org.uk/publication/discussion/dp17-03.pdf>

¹⁵³ Financial Conduct Authority. Distributed Ledger Technology [Internet]. 2017 [cited 2018 Oct 3]. pp. 1-32. Available from: <https://www.fca.org.uk/publication/feedback/fs17-04.pdf>

¹⁵⁴ European Union. Directive (EU) 2018/ of the European Parliament and of the Council of 30 May 2018 amending Directive (EU) 2015/849 on the prevention of the use of the financial system for the purposes of money laundering or terrorist financing, and amending Directives 2009/138/EC and 2013/36/EU. Official Journal of the European Union Jun 15, 2018 pp. 1-32.

¹⁵⁵ Financial Conduct Authority. Initial Coin Offerings [Internet]. 2017 [cited 2018 Oct 3]. Available from: <https://www.fca.org.uk/news/statements/initial-coin-offerings>

Quantum technologies¹⁵⁶

There is no current legislation in the UK directly related to quantum technologies.

Interactions between these technologies

If BC data is immutable and encrypted, what happens if QT enables mass decryption of historical data?

As it is in its infancy, quantum computing does not pose an immediate threat to blockchain systems. Experts agree this is unlikely to be an issue for the next 10-15 years. However, it is also widely agreed that quantum computing could be a future threat to distributed ledgers. Distributed ledgers use two main cryptographic techniques: public key encryption and hashing.¹⁵⁷ Public key encryption connects data entries to their creator and is used to ensure that the person who updates the ledger has permission to do so. It works using 'keys': one used to encrypt the string (the public key) and one used to decrypt it (the private key). Hashing is a process that uses an algorithm to compress a data file into a series of letters and numbers unique to that piece of data. In a distributed ledger, hashing is used to verify that data entries are not tampered with; if a data file is changed, its hash will also change, and it will be evident that the data has been modified. The best hashing algorithms are designed so that it is almost impossible to turn a hash back into its original data.

Quantum computing poses a risk to public key encryption, but less of a risk to hashing since most hashing would still be resistant to the increased computational power of a quantum computer. There are some public key encryption schemes that are resistant to attack by quantum computers. The United States National Institute of Standards and Technology is currently evaluating post-quantum encryption algorithms submitted by cryptography experts and plans to publish a selection of the best that will be used as industry standards in the US for the post-quantum era.¹⁵⁸ In the UK, the National Cyber Security Centre published a whitepaper on quantum key distribution (QKD, a type of public key cryptography that exploits quantum properties).¹⁵⁹

This report concluded that QKD:

- has fundamental practical limitations
- does not address large parts of the security problem
- is poorly understood in terms of potential attacks

Quantum computing could also be used in cryptocurrency mining, the process by which users compete to add a set of a valid transactions to a distributed ledger by solving a complex mathematical problem. Miners would be able to validate blocks of transactions more quickly and therefore these miners will take control of the blockchain.¹⁶⁰ However,

¹⁵⁶ POST. POSTnote 552: Quantum Technologies [Internet]. 2017 [cited 2018 Oct 3]. pp. 1-5. Available from: <https://researchbriefings.parliament.uk/ResearchBriefing/Summary/POST-PN-0552>

¹⁵⁷ World Bank Group. Distributed Ledger Technology (DLT) and Blockchain [Internet]. 2017 [cited 2018 Oct 3]. pp. 1-60. Available from: <https://www.worldbank.org/en/topic/financialsector/brief/blockchain-dlt>

¹⁵⁸ National Institute of Standards and Technology. Post-quantum cryptography [Internet]. csrc.nist.gov. 2017 [cited 2018 Oct 3]. Available from: <https://csrc.nist.gov/projects/post-quantum-cryptography>

¹⁵⁹ National Cyber Security Centre. Quantum key distribution [Internet]. [ncsc.gov.uk](https://www.ncsc.gov.uk). 2016 [cited 2018 Oct 3]. Available from: <https://www.ncsc.gov.uk/whitepaper/quantum-key-distribution>

¹⁶⁰ MITRE Corporation. Blockchain and Quantum Computing [Internet]. 2017 [cited 2018 Oct 3]. pp. 1-16. Available from: <https://www.mitre.org/publications/technical-papers/blockchain-and-quantum-computing>

some experts suggest that this threat will not materialise for at least a decade, when quantum computing does become faster than conventional computing.¹⁶¹

What are the implications of the three technologies and their interactions for our democracies and democratic processes?

Blockchain has been proposed as a way to run e-voting. King's College London and the University of Surrey are currently engaged in the VOLT Project (Voting over Ledger Technology), funded by the EPSRC.¹⁶² This is currently looking at applications of DLT in domains involving voting and collective decision-making, such as voting on proposals or elections in charities, professional organisations, clubs, trades unions, political parties and private companies. It is not currently investigating the use of DLT in political voting. The UK Government is also interested in using DLT to improve its processes.¹⁶³

Current trials being undertaken include:

- The Department for Environment, Food and Rural Affairs and IBM initiated a proof-of-concept project in 2017 to explore how DLT could be used for tracing the origin of food, specifically focusing on ensuring the provenance of British beef.
- The Department for Work and Pensions (in collaboration with industry) carried out a proof-of-concept project in 2016 whereby benefits claimants in Tameside used a mobile phone app that recorded transactions on a distributed ledger.
- The Department for International Development is exploring the potential of DLT technology to track humanitarian stockpiles.

So far, POST's work has not focused specifically on the impact of AI on democracy, however our Automation and the Workforce POST note does identify concerns that automation may lead to increased inequality in the UK.¹⁶⁴ While there is little research on how the future effects of automation may vary across the UK, it has been suggested that job losses could differ between regions. For example, if job losses are focused on low-skill workers, then poorer areas that have a higher proportion of low-skill jobs, may experience greater job losses. Regional differences may also be exacerbated if job creation and losses do not occur in the same areas.¹⁶⁵ Deloitte found that between 2001 and 2015, the Midlands, South West, and North West all experienced above average losses in jobs they considered to be at high risk of automation.¹⁶⁶

¹⁶¹ Aggarwal D, Brennen GK, Lee T, Santha M, Tomamichel M. Quantum attacks on Bitcoin, and how to protect against them. arXiv [Internet]. arXiv.org; 2017 Oct 1. Available from: <https://arxiv.org/abs/1710.10377>

¹⁶² University of Surrey, King's College London. The VOLT Project [Internet]. [volt-project.org](http://www.volt-project.org). [cited 2018 Oct 3]. Available from: <http://www.volt-project.org>

¹⁶³ Government Office for Science. Distributed Ledger Technology: beyond block chain [Internet]. 2015 [cited 2018 Oct 3]. pp. 1-88. Available from: <https://www.gov.uk/government/publications/distributed-ledger-technology-blackett-review>

¹⁶⁴ POST. POSTnote 534: Automation and the Workforce [Internet]. 2016 [cited 2018 Oct 3]. pp. 1-5. Available from: <https://researchbriefings.parliament.uk/ResearchBriefing/Summary/POST-PN-0534>

¹⁶⁵ Mazzolari F, Ragusa G. Spillovers from High-Skill Consumption to Low-Skill Labor Markets. *Review of Economics and Statistics*. 2013 Mar;95(1):74-86

¹⁶⁶ Deloitte. From brawn to brains [Internet]. 2015 [cited 2018 Oct 10]. pp. 1-16. Available from: <https://www2.deloitte.com/uk/en/pages/growth/articles/from-brawn-to-brains--the-impact-of-technology-on-jobs-in-the-u.html>

Are QT and AI development synergetic, so that AI agents could help us to develop QT, and vice versa?

A number of reports produced to date hypothesise that quantum computing might enhance the capabilities of AI.¹⁶⁷ In turn, the use of AI could enable the automation of processes, increasing productivity, but may also create challenges, such as for employment, privacy and attributing responsibility for actions arising from its use.¹⁵ Recent developments in this area include a team within Google AI that is using quantum computing as a way to develop AI.¹⁶⁸ They are currently developing quantum processors and novel quantum algorithms to help researchers and developers tackle both theoretical and practical problems. Conversely, AI could also be used to understand quantum states, which could represent a step towards developing quantum computers. The scientific literature is growing in this area, with recent publications using machine learning to analyse large volumes of experimental data relating to the quantum properties of matter,¹⁶⁹ and to design more complex experiments.¹⁷⁰

Societal and political debate

Blockchain technology¹

The use of blockchain is not very widespread in the UK or globally. However, there are several commonly discussed application areas where blockchain could have an impact on society and democracy.

Energy sector

DLT has been proposed as a way to help manage the future UK electricity system. Transactions between multiple parties such as power producers, suppliers and consumers could be recorded using DLT. This would facilitate 'peer-to-peer' electricity trading, helping to manage supply and demand at a local level without the need for a central intermediary.¹⁷¹ DLT could also provide a consistent register for different kinds of assets such as smart meters, network infrastructure and battery storage, which could increase the system's efficiency and reduce costs.¹⁷²

There are several companies worldwide that are trialling DLT in the electricity sector. US company LO3 Energy are running a DLT-enabled peer-to-peer trial in Brooklyn, where up to 50 homes that are connected to a network via smart meters can buy or sell electricity (for

¹⁶⁷ Networked Quantum Information Technologies. Commercial prospects for quantum computing [Internet]. nqit.ox.ac.uk. 2016 [cited 2018 Oct 10]. Available from: <https://nqit.ox.ac.uk/content/commercial-prospects-quantum-computing>

¹⁶⁸ Google AI. Quantum [Internet]. 2018 [cited 2018 Oct 10]. Available from: <https://ai.google/research/teams/applied-science/quantum-ai/>

¹⁶⁹ Zhang Y, Mesaros A, Fujita K, Edkins SD, Hamidian MH, Ch'ng K, et al. Using Machine Learning for Scientific Discovery in Electronic Quantum Matter Visualization Experiments [Internet]. arxiv.org. 2018 [cited 2018 Oct 10]. Available from: <https://arxiv.org/abs/1808.00479>

¹⁷⁰ Melnikov AA, Poulsen Nautrup H, Krenn M, Dunjko V, Tiersch M, Zeilinger A, et al. Active learning machine learns to create new quantum experiments. Proceedings of the National Academy of Sciences. National Academy of Sciences; 2018 Feb 6;115(6):1221–6.

¹⁷¹ PwC. Blockchain - an opportunity for energy producers and consumers? [Internet]. 2016 [cited 2018 Oct 3]. pp. 1–46. Available from: <https://www.pwc.com/gx/en/industries/energy-utilities-resources/publications/opportunity-for-energy-producers.html>

¹⁷² Electron. Electron [Internet]. electron.org.uk. 2018 [cited 2018 Oct 3]. Available from: <http://www.electron.org.uk>

example, from rooftop solar panels) to or from each other.¹⁷³ In the UK, energy company Centrica have announced the launch of a similar DLT trial in Cornwall.¹⁷⁴

Supply Chains

Supply chains often involve a large network of different organisations, many of which still use paper-based documentation. Data about a product typically need to be recorded at many different stages along a supply chain, particularly as they pass through different locations and organisations. DLT provides an infrastructure for registering the trade and transport of physical items by associating them with a digital profile; for example, participants can digitally record information such as the item's origin, appearance, location, price and serial number. Key updates can be added to the database as goods pass through the supply chain.¹⁷⁵ DLT may have the potential to reduce the losses that can arise from counterfeit goods or fraud and could also increase trust in supply chains by assuring the provenance of goods.¹⁷⁶¹⁷⁷ UK food regulator, the Food Standard Agency (FSA), has recently completed a pilot using blockchain technology in a cattle slaughterhouse.¹⁷⁸

Quantum technology

There are four main areas of ongoing debate and discussion surrounding QT:

Privacy & Automation

A universal quantum computer would dramatically increase data analysis capabilities, while quantum sensors (if they became widely used) could enable the collection of more accurate data, for example relating to a person's location or health. This may exacerbate existing concerns about data collection and analysis, leading to potential infringements of privacy.

Trade

Some QTs, such as aspects of quantum encryption, are 'dual-use' and therefore subject to export controls that may limit the trade of some quantum products produced in the UK.

Access to technologies

The infrastructure needed for QT is currently too expensive for all but large corporations and governments. Some suggest that unequal access to QT may cement or increase power imbalances between nations, or between more powerful actors and citizens.

¹⁷³ Siemens. A microgrid grows in Brooklyn [Internet]. siemens.com. 2018 [cited 2018 Oct 3]. Available from: <https://www.siemens.com/innovation/en/home/pictures-of-the-future/energy-and-efficiency/smart-grids-and-energy-storage-microgrid-in-brooklyn.html>

¹⁷⁴ Richardson J. Centrica trials blockchain energy trading for local market [Internet]. cleantechnica.com. 2018 [cited 2018 Oct 3]. Available from: <https://cleantechnica.com/2018/05/15/centrica-trials-blockchain-energy-trading-for-local-market/>

¹⁷⁵ Hackius N, Petersen M. Blockchain in Logistics and Supply Chain: Trick or Treat? Proceedings of the Hamburg International Conference of Logistics. 2017 Nov pp. 1-17

¹⁷⁶ Deloitte. Using blockchain to drive supply chain innovation [Internet]. 2017 [cited 2018 Oct 3]. pp. 1-12. Available from: <https://www2.deloitte.com/us/en/pages/operations/articles/blockchain-supply-chain-innovation.html>

¹⁷⁷ DHL Customer Solutions Innovation. Blockchain in logistics [Internet]. 2018 [cited 2018 Oct 3]. pp. 1-28. Available from: <https://www.logistics.dhl/gb-en/home/insights-and-innovation/insights/blockchain.html>

¹⁷⁸ Food Standards Agency. FSA trials first use of blockchain [Internet]. food.gov.uk. 2018 [cited 2018 Oct 3]. Available from: <https://www.food.gov.uk/news-alerts/news/fsa-trials-first-use-of-blockchain>

Quantum encryption

Quantum computers would be able to break widely used encryption protocols. Such protocols are a cornerstone of electronic security and undermining them could lead to the misuse of sensitive financial, identity or national security data. New approaches are being developed that could be resistant against decryption by a quantum computer. A third party might intercept encrypted messages today and store them until a quantum computer became available. On the policy front there are a number of initiatives underway looking at QT. The UK Government has been investing heavily, with £270m (over 5 years) announced in 2013 to create the National Quantum Technologies Programme.¹⁷⁹ £120m of this was used to create a national network of four QT hubs: focusing on imaging (QuantIC), sensors & metrology, computing (NQIT), and communications.¹⁸⁰ In 2018 the Government has allocated a further £80m of funding for the hubs.¹⁸¹ QT were also identified as one of 14 challenges in the Industrial Strategy Challenge Fund.¹⁸² This challenge area has up to £20m of pioneer funding to support the development of new quantum-enabled devices and products. The House of Commons Science and Technology Committee is currently running an inquiry on QTs.¹⁸³ They have completed oral evidence sessions and expect to publish shortly.

3.17 United States of America

Status quo

Legislative bodies around the United States, including the U.S. Congress, have been paying attention to emerging technologies such as artificial intelligence (AI), blockchain, and quantum technology. However, the focus of their attention has not been as much on the potential implications of these technologies on the democratic process; rather, the focus is on promoting the beneficial uses of these technologies and realizing their economic potential. For example, the recently enacted National Defense Authorization Act¹⁸⁴ tasks the Defense department to develop, mature, and transition artificial intelligence and quantum technologies into operational use. Relevant congressional committees have also approved the National Quantum Initiative Act¹⁸⁵, which, if and when enacted, would establish a coordinated program for federal research and development of quantum

¹⁷⁹ Innovate UK. Quantum technologies: a new era for the UK [Internet]. gov.uk. 2015 [cited 2018 Oct 10]. Available from: <https://www.gov.uk/government/news/quantum-technologies-a-new-era-for-the-uk>

¹⁸⁰ UK National Quantum Technologies Programme. UK National Quantum Technologies Programme [Internet]. uknqt.epsrc.ac.uk. 2018 [cited 2018 Oct 10]. Available from: <http://uknqt.epsrc.ac.uk>

¹⁸¹ Department for Digital, Culture, Media & Sport, HM Treasury, Hammond TRHP MP. £80 million funding boost will help Scottish universities and businesses develop “quantum” technology that could help save lives [Internet]. gov.uk. 2018 [cited 2018 Oct 10]. Available from: <https://www.gov.uk/government/news/80-million-funding-boost-will-help-scottish-universities-and-businesses-develop-quantum-technology-that-could-help-save-lives>

¹⁸² Innovate UK, Department for Business, Energy & Industrial Strategy, UK Research and Innovation. Industrial Strategy Challenge Fund: for research and innovation [Internet]. gov.uk. 2018 [cited 2018 Oct 10]. Available from: <https://www.gov.uk/government/collections/industrial-strategy-challenge-fund-joint-research-and-innovation>

¹⁸³ House of Commons Science and Technology Committee. Quantum technologies inquiry [Internet]. Science and Technology Committee (Commons), editor. parliament.uk. [cited 2018 Oct 10]. Available from: <https://www.parliament.uk/business/committees/committees-a-z/commons-select/science-and-technology-committee/inquiries/parliament-2017/quantum-technologies-17-19/>

¹⁸⁴ John S. McCain National Defense Authorization Act for Fiscal Year 2019, PL 115-232, August 2018. <https://www.congress.gov/115/bills/hr5515/BILLS-115hr5515enr.pdf>

¹⁸⁵ National Quantum Initiative Act, H.R. 6227, 115th Congress, 2nd Session, 2018. <https://www.congress.gov/115/bills/hr6227/BILLS-115hr6227ih.pdf>

information science and technology. In a recent report¹⁸⁶, the U.S. Congress has recognized that blockchain technology may enable secure and efficient functioning of the economy as well as help government improve efficiency in its own operations. Some U.S. states have enacted legislation¹⁸⁷ on blockchain such as recognizing information stored on a blockchain as legally valid.

Although AI-specific legislations have not yet been enacted, existing legislations on privacy, cybersecurity, due process, and health and safety rules cover technologies that now fall under the AI umbrella. However, the U.S. Congress is specifically concerned about the use of automated AI systems (sometimes referred to as “bots”) on social networks such as Facebook and Twitter to disseminate propaganda and misleading news to large swaths of targeted individuals on social media; thereby manipulating public opinion and potentially affecting the outcomes of elections. Congress has held hearings where lawmakers have questioned executives of social media companies such as Facebook and Twitter about the spread of misinformation, lack of online privacy, and alleged political censorship in social media.

Interactions between these technologies

The interactions between artificial intelligence, blockchain, and quantum technology come from their connection to computing and data processing. AI relies on machine learning algorithms implemented in artificial neural networks that “learn” by processing large training data sets.

Blockchain provides a distributed, cryptographically secured ledger that can store both data as well as algorithms (for example, smart contracts in Ethereum). Quantum technology promises extraordinary computing capabilities, far exceeding what we have in today’s computers, so much so that it could easily break conventional cryptography. At the same time quantum technology also makes possible quantum cryptography that can withstand quantum computing, which means that, although quantum technology may break current blockchains, it could also enable quantum-secured blockchain¹⁸⁸ in the future. Quantum technology could also boost¹⁸⁹ AI’s machine learning algorithms, which could use data stored securely in a blockchain as well as manage the blockchain itself. Additionally, AI algorithms could themselves be stored in blockchains and executed when specific conditions are met.

AI and blockchain are already beginning to play a role in the democratic processes. AI has been used to disseminate tailored information to targeted audience, to sway public opinion and potentially affect elections. Blockchain has been proposed as a way to store ballots cast by citizens during voting. The full spectrum of interactions between AI, blockchain, and quantum technology will become evident when quantum computing and quantum cryptography become commercially available.

¹⁸⁶ *The 2018 Joint Economic Report*, Joint Economic Committee, U.S. Congress, March 2018. <https://www.congress.gov/115/crpt/hrpt596/CRPT-115hrpt596.pdf>

¹⁸⁷ *Blockchain and State Law: Five Legislative Developments*, Baker Donelson, March 2018. <https://www.bakerdonelson.com/blockchain-and-state-law-five-legislative-developments>

¹⁸⁸ *First Quantum-Secured Blockchain Technology Tested in Moscow*, MIT Technology Review, June 2017. <https://www.technologyreview.com/s/608041/first-quantum-secured-blockchain-technology-tested-in-moscow/>

¹⁸⁹ *A Startup Uses Quantum Computing to Boost Machine Learning*, MIT Technology Review, Dec 2017. <https://www.technologyreview.com/s/609804/a-startup-uses-quantum-computing-to-boost-machine-learning/>

Societal and political debate

AI has been in the news because of its use in disseminating toxic and divisive content through non-human accounts or bots in social media platforms such as Facebook and Twitter. This is a major concern for the United States because today around 70% of U.S. adult population use social media to get their news, share information, and entertain themselves¹⁹⁰. Social media's power to amplify messages¹⁹¹ can be used by citizens to express themselves and take action, but it can also be used to spread misinformation and erode democracy. Social media is now seen as a force that can undermine democracy by sowing divisions among people. Intentional manipulation of social media has reportedly played a role¹⁹² in elections in several countries last year, including the United States.

There is considerable societal and political debate over AI's negative impact¹⁹³ on the integrity and quality of information disseminated through social media. To counter the problem, social media companies have cited AI itself as a source of potential solutions that can be used to automatically flag false stories and detect bots in social networks. However, some express doubt that AI can detect the subtlety involved in most current disinformation campaigns.

Experiences and outlook

In 2002, U.S. Congress enacted the Electronic Government Act¹⁹⁴ to promote the use of the Internet and emerging technologies to provide citizens with government information and services, improving decision making by policy makers, and making the government more transparent and accountable. Since then, government agencies have made significant progress in digitizing government services and the experiences have been mostly positive. Along the way, cybersecurity and privacy have emerged as the main concerns and legislation and government action have been focused on these issues, particularly on improving cybersecurity. State and federal legislative bodies have also become digital, making it possible for citizens and activists to track progress and mobilize support for or opposition to a proposed legislation. A recent study¹⁹⁵ finds that although the Internet has changed how individuals interact with communities and has changed what "community" even means, digital civic engagement is working well for young people.

AI, blockchain, and quantum technology are expected to further facilitate and accelerate the digitization of democratic processes, from citizen engagement to conducting elections. For example, West Virginia plans to offer a mobile blockchain voting option¹⁹⁶ for overseas military service members in the November 2018 elections.

¹⁹⁰ *Social Media Fact Sheet*, Pew Research Center <http://www.pewinternet.org/fact-sheet/social-media/>

¹⁹¹ *Technology as Amplifier in International Development*, Kentaro Toyama, February 2011. <http://www.kentarotoyama.org/papers/Toyama%202011%20iConference%20-%20Technology%20as%20Amplifier.pdf>

¹⁹² *Manipulating Social Media to Undermine Democracy*, Freedom House, 2017. <https://freedomhouse.org/report/freedom-net/freedom-net-2017>

¹⁹³ *Understanding Media and Information Quality in an Age of Artificial Intelligence, Automation, Algorithms and Machine Learning*, The Berkman Klein Center for Internet & Society at Harvard University, Jul 2018. <http://cyber.harvard.edu/story/2018-07/understanding-media-and-information-quality-age-artificial-intelligence-automation>

¹⁹⁴ *E-Government Act of 2002*, PL 107-347, Dec 2002 <https://www.congress.gov/107/plaws/publ347/PLAW-107publ347.pdf>

¹⁹⁵ *Digital Democracy in America - A Look at Civic Engagement in an Internet Age*, Journalism & Mass Communication Quarterly, Mar 2017. <https://doi.org/10.1177%2F1077699016681969>

¹⁹⁶ *West Virginia to offer mobile blockchain voting app for overseas voters in November election*, Washington Post, Aug 2018. https://www.washingtonpost.com/technology/2018/08/10/west-virginia-pilots-mobile-blockchain-voting-app-overseas-voters-november-election/?utm_term=.489355b1c2a1

However, recent experience with the negative impact of “fake news” spread by AI bots on social media has highlighted the potential unintended consequences of these technologies. Some organizations argue¹⁹⁷ that AI’s machine learning algorithms, through the extensive use of people’s personal information, could have a detrimental impact on two mutually reinforcing rights: (1) right to privacy and (2) right to freedom of expression and information. Because these rights are foundational for open and democratic societies, any weakening of privacy and right to freedom of expression would also weaken democracy. A recent technology assessment¹⁹⁸ of AI notes that the widespread adoption of AI raises questions about the adequacy of current laws and regulations and cites the need to develop and adopt an appropriate ethical framework to govern the use of AI in research, as well as explore factors that govern how quickly society will accept AI systems in their daily lives.

After considering the benefits and challenges of AI, policymakers need to explore ways to (1) incentivize data sharing, (2) improve safety and security, (3) update the regulatory approach that will affect AI, and (4) assess acceptable levels of risk and ethical considerations. In addition to these policy considerations, the report¹⁵ identifies several areas of further research in AI, including (1) establishing regulatory sandboxes where AI products can be tested, (2) developing high-quality data labeled to facilitate their use with AI to produce more accurate outcomes, (3) understanding the implications of AI on training and education for jobs of the future, and (4) exploring computational ethics and explainable AI, whereby systems can reason without being told explicitly what to do and inspect why they did something, making adjustments for the future.

In spite of its rapid progress, quantum technology is still in its infancy, so its outlook remains speculative. AI and blockchain would benefit greatly from the exponentially powerful computing capabilities as well as the unbreakable cryptography that quantum technology promises. Some experts^{199,200} assert that the future of information technology will be defined by the symbiosis of (1) advances in quantum computing, (2) use of blockchain to manage and store data immutably, and (3) the rapid evolution of AI embedded in systems and devices. Considering how information technology permeates through every aspect of our modern world, it is certain that AI, blockchain, and quantum technology will play an important role in the future of democracy. Right now, we are seeing the manifestation of the negative consequences of AI in spreading misinformation through social media, but the same technologies could be used to bolster digital democracy. For example, blockchain could return ownership of data to individuals and enable AI algorithms to perform privacy preserving computations on personal data. Given that we are in the very early stages of symbiotic use of AI, blockchain, and quantum technology, it is incumbent upon Technology Assessment organizations to help legislative bodies develop and pursue policies that nudge the democracy-enhancing uses of these emerging technologies.

¹⁹⁷ *Privacy and Freedom of Expression In the Age of Artificial Intelligence*, ARTICLE 19, Apr 2018. <https://www.article19.org/wp-content/uploads/2018/04/Privacy-and-Freedom-of-Expression-In-the-Age-of-Artificial-Intelligence-1.pdf>

¹⁹⁸ *Technology Assessment: Artificial Intelligence: Emerging Opportunities, Challenges, and Implications*, GAO-18-142SP, March 2018. <https://www.gao.gov/products/GAO-18-142SP>

¹⁹⁹ *Quantum Computing, AI and Blockchain: The Future of Information Technology*, Shoucheng Zhang, Jun 2018. <https://talksat.withgoogle.com/talk/quantum-computing-ai-and-blockchain-the-future-of-information-technology>

²⁰⁰ *Buzzword Convergence: Making Sense of Quantum Neural Blockchain AI*, Stephen Wolfram, Apr 2018. <http://blog.stephenwolfram.com/2018/04/buzzword-convergence-making-sense-of-quantum-neural-blockchain-ai/>

3.18 STOA

Status quo: EU legislation on new or emerging technologies

In May 2017, the European Commission published its mid-term review of the Digital Single Market strategy (Commission Communication on the Mid-Term Review on the implementation of the Digital Single Market Strategy – A Connected Digital Single Market for All, COM(2017) 228 final) announcing that the Commission will consider the possible need to adapt the current legal framework to take account of emerging digital technologies, especially from the angle of civil law liability and taking into account the results of the ongoing evaluation of the Product Liability Directive and the Machinery Directive. The European Council of October 2017 stated that the EU needs a sense of urgency to address emerging trends such as AI "while at the same time ensuring a high level of data protection, digital rights and ethical standards" and invited "the Commission to put forward a European approach to artificial intelligence." The European Parliament made wide-ranging recommendations on civil law rules on robotics calling for updated civil liability rules that duly take into account the development of autonomous and cognitive features in cars and robots including their safety aspects. It called on the European Commission to assess the impact of Artificial Intelligence (AI) and made wide-ranging recommendations on civil law rules on robotics.

Following the call of the European leaders call for a European approach on AI, the European Commission (EC) released its Communication COM (2018) 237 'Artificial Intelligence for Europe' on 25 April 2018, setting out a European initiative on Artificial Intelligence (AI), which is part of its "Delivering on the Digital Single Market – 3rd Data package." The Communication is proposing a three-pronged approach to increase public and private investment in AI, prepare for socio-economic changes, and ensure an appropriate ethical and legal framework. This includes forthcoming guidance on existing product liability rules, a detailed analysis of emerging challenges, and cooperation with stakeholders, through a European AI Alliance, for the development of AI ethics guidelines. Building on the approach set out in this Communication and the declaration of cooperation signed by 24 Member States on 10 April 2018, the Commission will work with Member States on a coordinated plan on AI.

In June 2018, the Commission appointed 52 experts to a new High-Level Group on Artificial Intelligence, whose aim is to support the implementation of the European strategy on AI. The Commission has indicated in its letter of intent accompanying the 2018 State of the Union speech delivered in September 2018 that a coordinated plan on the development of AI in Europe will be launched. In parallel, the Commission announced they will issue a Communication on the future of connected and automated mobility in Europe, and a Communication on the future research and innovation ambitions for Europe (including for fostering AI). The Commission will present ethical guidelines on AI development by the end of 2018, based on the work of the High Level Group on Artificial Intelligence. By mid-2019 the Commission will also issue guidance on the interpretation of the Product Liability Directive in the light of technological developments, to ensure legal clarity for consumers and producers in case of defective products. It needs to be mentioned that the General Data Protection Regulation (GDPR) has provisions on decision-making based solely on automated processing, including profiling (AI-based systems). In such cases, data subjects have the right to be provided with meaningful information about the logic involved in the

decision. The GDPR also gives individuals the right not to be subject solely to automated decision-making (except in certain situations) such as automatic refusal of an online credit application or e-recruiting practices without any human intervention.

As for blockchain, in May 2017, in the Digital Single Market mid-term review, the Commission recognised blockchain-inspired technologies as having huge potential for our administrations, businesses and the society in general. Also, the Council conclusions of 19 October 2017 highlight blockchain, along with AI, as "key emerging trends". The European Parliament passed a resolution of 3 October 2018 on distributed ledger technologies and blockchains: building trust with disintermediation. On February 1, 2018, the European Commission launched the EU Blockchain Observatory and Forum, an action plan designed to encourage member state governments, industry and citizens to explore new opportunities that blockchains and distributed ledger technology can offer.

Interactions between these technologies

If BC data is immutable and encrypted, what happens if quantum technologies enables mass decryption of historical data? Given that blockchain data is said to be immutable and encrypted, one can expect that quantum technology might enable mass decryption of historical data, but next to encryption, blockchain is also based on hashing. The main difference between encryption and hashing is that hashing cannot be modified. In fact, if the hash were modified, it would remain as a trace and completely change the input. And while quantum technology has enormous potential, assuming that a quantum computer could modify data in the blockchain requires changes to all data subsequent to the modification of interest on all servers on the network at the same time - a feat hardly imaginable even for quantum technologies. The more extended the BC-based networks are, the less feasible such an attack is. Quantum technologies would therefore be a minor threat to the security of hashing algorithms compared to cryptography. That is not to say, though, that decryption of historical data itself is not a problem and a way to get to sensitive information that may serve malicious use.

Could an advanced AI find a way of hacking a blockchain?

One would expect that for the reasons above, the answer could be no, but we can further reflect on the subject. Firstly, due to the safe nature and almost complete impenetrability of the blockchain, if it were combined with artificial intelligence, we would have three main benefits:

- Keeping track of every single change of data, the blockchain could help us understand and explain the decisions made by otherwise opaque AI algorithms.
- AI and encryption work very well together: researchers discovered that intelligent algorithms are able to process the data even in an encrypted state. Blockchain databases store their information in an encrypted state. This means that only private keys must be kept safe so that all data on the chain is safe.
- AI can handle the data that travels on the blockchain more efficiently and effectively than both human beings and conventional 'slow' computers, especially if we think about the fact that they can 'think' with encrypted data.

Secondly, large multinationals are currently the main users of AI systems, AI being a technology that helps to monopolise power in the hands of a few who are able to acquire, process and sometimes sell large amounts of data. Assuming that blockchain technology is a cryptographically secure, decentralised, distributed database of information, one may

conclude that it helps people to protect their personal information and the values exchanged. In this perspective, AI and blockchain technologies can be seen in dynamic opposition to one another.

Are quantum technologies and AI development synergetic, so that AI agents could help us to develop quantum technologies, and vice versa?

The simultaneous development of AI and quantum technology could be the key to enabling both to develop effectively. The main feature of quantum technology is to work quickly with huge amounts of data, and if it were combined with AI - whose purpose is to solve problems - the result could be surprising.

Could AI help us to decide whether it is a good idea to proceed with transformative technologies, such as blockchain and quantum technologies?

Our current legislative frameworks for dealing with machine learning could show us if we are successful in managing the downsides and taking full advantage of the upsides of similar disruptive technologies. It could act as a regulatory stress test from which we can learn when designing regulation for blockchain and quantum technologies.

What are the implications of the three technologies and their interactions for our democracies and democratic processes?

Technological innovations have had and will have a significant impact on democracy at the global level. In addition to responding effectively to citizens' demands, they have been able to improve the way they think and to make governments accountable. However, while civil society has been able to take advantage of technological innovation, the institutions have reacted much more slowly. The positive interaction between these technologies could, however, update the system and make it more transparent and usable by everyone in complete security and respect for privacy.

Social and political debate

The digital democracy (or e-democracy) represents a variety of participative instruments, practically all of which make use of digital tools in one form or another (e-deliberative designs, e-consultations, e-petitions, e-voting, social media etc.). Making a balance after about two decades following its appearance, a number of reports concluded that the primary achievement of digital democracy in Europe is a significant improvement in access to and exchange of political information. However, evidence on the positive expectations regarding the support of public debate, deliberation and community building is mixed, and most disappointing from the point of view of a real political impact of new technologies. The general conclusion is that e-participation is largely confined to the initial and the final stages of the policy cycle (agenda setting, policy preparation, policy evaluation), and that it rarely allows for entries into the core stages of decision-making and policy execution (STOA, 2018) In other words, it seems that e-participative processes provide an added personal value for participants and community capacity, but suffer from a lack of direct, or even indirect, political impact.

E-democracy instruments are applied at supra-national, national and sub-national levels. However, the supra-national nature of the EU poses at least three additional challenges: large scale, language diversity and trans-nationality.

Several studies found that bottom-up initiated e-participation was more successful than top-down initiatives and that the required set of digital skills was one of the greatest barriers to an effective enhancement of participation (van Dijk, 2012; STOA, 2011; STOA, 2018) However, other authors highlighted an increase of trust in local government as a result of e-participation application. (Kim, 2012)

In the European Commission's approaches to citizen participation, several studies found a tendency to reduce the role of citizens to just posting statements or commenting on statements by policy-makers rather than engaging in a European citizens' debate and jointly working out policy options to be forwarded to policy-makers. Most disappointing was the lack of any follow-up activities and of visible impact of the deliberative experiments on policy-making (Smith, 2013; Kies, 2013).

Other reports, observed that the approaches for dialogue between EU institutions and civil society failed to support the construction of a European demos due to a lack of commitment by the EU institutions and the "discretionary" patterns of participation (Friedrich, 2013) Some argued that there is a danger that the contribution of civil society could be perceived more as a promotional instrument than as a serious attempt to engage the European citizenry in EU policy-making (Kies, 2013).

A general problem that applies to all e-participatory procedures and tools is that a balance must be struck between structuring e-participative events and the aspect of inclusivity, which appears incompatible with high expertise levels and complexity. Among those making use of e-voting, e-deliberation, e-petitioning and other participative instruments, there is currently a noticeable overrepresentation of young people with a high educational background. These individuals tend to migrate from offline voting, deliberation and petitioning to online versions, without this, however, leading to a more general increase in participation. (STOA, 2018) Other factors, such as membership in civic and political organisations and various social networks, can mitigate the impacts of socio-economic status and education. However, it is clear that- unless corrective processes are introduced- participation is often distorted and not representative of the society as a whole (Ryfe, 2012). Although e-democracy is far from reaching expectations of a fundamental reform of modern democracy, there is no doubt that it will add new modes of communication among citizens and between actors of representative democracy and their constituencies. These changes do not only add to the online political processes, but they also affect the modes and conditions of online political processes in many ways. They are dependent on the great variety of e-democracy tools applied, the nature of the political process these are embedded in, and the skills, demands and expectations of those involved in their application.

Experiences and outlook

The new technologies have already begun to affect our democratic system and society. A study of the European Parliamentary Research Service (EPRS)²⁰¹ shows that interactions between AI and democracy already affect the legislative, executive and judiciary powers, the relations with citizens and media, security and defence. The same study proposes four scenarios on the future of AI and democracy. The first consists in an evolutionary

²⁰¹ Article 'Democracy in the age of artificial intelligence' by Leopold Schmetzing, within the Study 'Trendometer Essays on medium- and long-term global trends', EPRS, July 2018
[http://www.europarl.europa.eu/thinktank/en/document.html?reference=EPRS_STU\(2018\)612835](http://www.europarl.europa.eu/thinktank/en/document.html?reference=EPRS_STU(2018)612835)

development of AI with a democratic backsliding, the second considers an AI evolution with a democratic resurgence, the third stands for an AI revolution with a decline of democracy and the fourth considers the establishment of a general AI while democracy being reinforced. Those scenarios highlight the fact that the new technologies bring threats and opportunities at the same time.

Among the threats there are computational propaganda techniques such as algorithms on social media and search engines, bots, trolls, sphere phishing, distributed denial of service, brutal force attacks on internet of things devices and digital technology²⁰². Together with automated content recognition (ACR) technologies, they also have an impact on the democratic system. Another issue is the use of electronic voting machines and an even more controversial one is the idea of internet voting. To date, only Estonia among European countries provides all voters with the option of online voting in national elections²⁰³.

How to tackle the use of these technologies, so that citizens and democracy can benefit from them? In particular, it is important to preserve freedom of expression and media pluralism, while guaranteeing adequate and true information. Compared to the US and China, where AI is developed with a minimum of regulation to boost a technological breakthrough, Europe has chosen to accompany the spread of AI for the development of a digital democracy, putting forward a comprehensive European approach regulated by law. It will take into account technological, ethical, legal and socio-economic issues, while considering the issue of democracy²⁰⁴.

With particular regard to misinformation and fake-news, it may be very important to encourage education. This can bring responsibility back on the individual, to be in a better position and assess autonomously most of the foundation of news and sources of information.

Maurizio Ferraris, philosopher, Professor of theoretical Philosophy at the University of Turin, and Antoinette Rouvroy, philosopher of law, doctor of legal sciences at the European University Institute and researcher on algorithmic governmentality, both agree on the relevance of *ethics of artificial intelligence*. As other experts in the domain, they support the idea of tackling the issue from a philosophical discipline perspective. In particular, it is important to link the AI to the Western anthropogenic law, which cannot be only a series of data justified by their quantity. There should be a *dominus* of the data. This approach can be helpful to understand not only the impact of new technologies on the individual but also on society and democracy²⁰⁵.

²⁰² ‘Computational propaganda techniques’ At a Glance publication by Naja Bentzen, EPRS, October 2018 [http://www.europarl.europa.eu/thinktank/en/document.html?reference=EPRS_ATA\(2018\)628284](http://www.europarl.europa.eu/thinktank/en/document.html?reference=EPRS_ATA(2018)628284)

²⁰³ ‘Digital technologies in elections. Efficiency versus credibility’ Briefing publication by Martin Russel and Ionel Zamfir, EPRS, September 2018 <https://epthinktank.eu/2018/09/12/digital-technology-in-elections-efficiency-versus-credibility/>

²⁰⁴ Measures proposed by the European Commission: http://europa.eu/rapid/press-release_IP-18-3362_en.htm

²⁰⁵ Conference on ‘Ethics and artificial intelligence. Will artificial intelligence worsen or improve human life’, Brussels, Bozar, 14/11/2018 <https://www.bozar.be/en/activities/146970-ethics-of-artificial-intelligence>

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4. About EPTA

The European Parliamentary Technology Assessment (EPTA) partners advise parliaments on the possible social, economic and environmental impact of new sciences and technologies. The common aim is to provide impartial and high-quality accounts and reports of developments in issues such as for example bioethics and biotechnology, public health, environment and energy, ICTs, and R&D policy. Such work is seen as an aid to the democratic control of scientific and technological innovations, and was pioneered in the 1970s by the Office of Technology Assessment (OTA) of the US Congress. EPTA aims to advance the establishment of Technology Assessment (TA) as an integral part of policy consulting in parliamentary decision-making processes in Europe, and to strengthen the links between TA units in Europe.

What is Technology Assessment?

TA has been defined in numerous ways. One definition, which fits Parliamentary TA well is the following:

"Technology Assessment (TA) is a scientific, interactive and communicative process, which aims to contribute to the formation of public and political opinion on societal aspects of science and technology."

TA explores the relationship between science, technology and society. Is a concept which brings together researchers from different disciplines such as business economics, sociology or biology, to name a few. The common goal is to explore how current technological developments affect the world we live in.

More concretely, TA could for example make policy analysis about:

- The energy situation.
- Working conditions in the light of increasing ICT work.
- Globalisation and labour market competences.
- GMOs and the environment.
- Privacy issues in e-government.
- The potentials of nanotechnology in health care.

TA has three dimensions:

- i. The cognitive dimension - creating an overview on knowledge relevant to policy-making.
- ii. The normative dimension - establishing dialogue in order to support opinion making.
- iii. The pragmatic dimension - establishing processes that help decisions to be made.

And TA has three components:

- i. The issue or technology;
- ii. The social aspects;
- iii. The policy aspects.

Organisational rules

The EPTA network was formally established in 1990 under the patronage of the then President of the European Parliament, Enrique Baron Crespo. The network has a light structure, guided by the EPTA Council and by meetings of the Directors of the EPTA partner organisations.

The EPTA Council is the steering committee of the EPTA network, and consists of Members of Parliament or representatives of the advisory boards of the respective EPTA organisations. The Council decides on organisational matters such as co-operation within the network and the status of members and associates.

The presidency of EPTA moves each year. The tasks of the EPTA member organisation holding the presidency are to coordinate the EPTA network activities and to host the annual EPTA Conference, Council Meeting and Directors' Meeting.

Membership

The members of the EPTA network are European organisations, which carry out TA studies on behalf of parliaments. Parliamentary TA is institutionalised in different ways, ranging from permanent parliamentary committees for TA; separate TA units as part of the parliamentary administration; to independent institutions with a mandate to serve as a permanent consulting institution for the parliament.

Associates are involved in all EPTA activities, but have no voting rights in the EPTA Council. Further, units interested in the work of EPTA can act as observers. The decision to grant membership (both full and associate) is taken by the EPTA Council. Observer status is granted by the current EPTA presidency. Members contribute financially to the EPTA meetings, common projects and the website & database.

Common EPTA projects

EPTA can decide to make 'common EPTA projects', in which EPTA members and associates can join forces and organise trans-European TA activities. EPTA projects are based upon the 'Joint EPTA Project Framework', which makes use of a bottom-up principle, according to which three or more members can initiate a project if it is open for active participation from other EPTA members. The project is decided during a Directors' meeting or Council meeting after being scrutinised by the boards of the members. The outcome of an EPTA project is the sole responsibility of the participating members.

Current member organisations of the EPTA Council:

- Panel for the Future of Science and Technology (STOA), European Parliament
- Committee for the Future, Finnish Parliament - Tulevaisuusvaliokunta
- Office Parlementaire d'evaluation des choix scientifiques et technologiques - Parliamentary Office for Evaluation of Scientific and Technological Options (OPECST), French Parliament
- Büro für Technikfolgen-Abschätzung beim Deutschen Bundestag (TAB) - Office of Technology Assessment at the German Parliament
- Committee on Technology Assessment, Greek Parliament

- Rathenau Institute, the Netherlands
- Teknologirådet - Norwegian Board of Technology (NBT)
- Zentrum für Technologiefolgen-Abschätzung - Centre for Technology Assessment at the Swiss Science and Technology Council (TA-Swiss)
- Parliamentary Office of Science and Technology (POST), UK
- CAPCIT (Consell Assessor del Parlament sobre Ciència i Tecnologia) - The Advisory Board of the Parliament of Catalonia for Science and Technology, Spain
- Institut für Technikfolgen-Abschätzung (ITA), Austria
- The Parliamentary Evaluation and Research Unit, Swedish Parliament

Associate members (no right to vote in the Council) are the following organisations:

- Teknologirådet - Danish Board of Technology Foundation (DBT)
- Sub-Committee on Science and Ethics of the Parliamentary Assembly of the Council of Europe, Strasbourg
- The Bureau of Research (BAS), Polish Parliament
- U.S. Government Accountability Office (GAO), USA
- Parliamentary Technical Advisory (ATP) of the Library of the National Congress of Chile
- Research and Legislative Reference Bureau (RLRB), National Diet Library (NDL)
- Office for Information of Science and Technology (INCyTU) for the Mexican Congress
- Analytical Department of the Russian Council of the Federation
- SPIRAL Research Centre, Université de Liège, Belgium
- Observatory of Technology Assessment (OAT), Portugal

5. About STOA

Panel for the Future of Science and technology (STOA) forms an integral part of the structure of the European Parliament. Launched in 1987, STOA is tasked with identifying and independently assessing the impact of new and emerging science and technologies.

The goal of its work is to assist, with independent information, the Members of the European Parliament (MEPs) in developing options for long-term, strategic policy-making.

The STOA Panel

The STOA Panel consists of 25 MEPs nominated from nine permanent parliamentary committees: AGRI (Agriculture & Rural Development), CULT (Culture & Education), EMPL (Employment & Social Affairs), ENVI (Environment, Public Health & Food Safety), IMCO (Internal Market & Consumer Protection), ITRE (Industry, Research & Energy), JURI (Legal Affairs), LIBE (Civil Liberties, Justice and Home Affairs) and TRAN (Transport & Tourism).

Ramón Luis VALCÁRCEL SISO, MEP, is the European Parliament Vice-President responsible for STOA for the second half of the 8th legislature. The STOA Chair for the second half of the 8th legislature is Eva KAILI with Paul RÜBIG and Evžen TOŠENOVSKÝ elected as 1st and 2nd Vice-Chairs respectively.

The STOA approach

STOA fulfils its mission primarily by carrying out science-based projects. Whilst undertaking these projects, STOA assesses the widest possible range of options to support evidence-based policy decisions. A typical project investigates the impacts of both existing and emerging technology options and presents these in the form of studies and options briefs. These are publicly available for download via the STOA website: www.europarl.europa.eu/stoa/. Some of STOA's projects explore the long-term impacts of future techno-scientific trends, with the aim to support MEPs in anticipating the consequences of developments in science. Alongside its production of 'hard information', STOA communicates its findings to the European Parliament by organising public events throughout the year. STOA also runs the MEP-Scientist Pairing Scheme aimed at promoting mutual understanding and facilitating the establishment of lasting links between the scientific and policy-making communities.

Focus areas

STOA activities and products are varied and are designed to cover as wide a range of scientific and technological topics as possible, such as nano-safety, e-Democracy, bio-engineering, assistive technologies for people with disabilities, waste management, cybersecurity, smart energy grids, responsible research & innovation, sustainable agriculture and health.

They are grouped in five broad focus areas: eco-efficient transport and modern energy solutions; sustainable management of natural resources; potential and challenges of the Internet; health and life sciences; science policy, communication and global networking.

ESMH

The European Science-Media Hub (ESMH), operating under the political responsibility of the STOA Panel, is a new platform to promote networking, training and knowledge sharing between the European Parliament, the scientific community and the media. The ESMH creates a network among policy-makers, scientists and media involving educational and research entities, and professional associations of journalists and scientists.

For journalists and media representatives, the ESMH organises trainings and workshops on current technological developments, both as subjects of their reporting and as means of facilitating their work. Via media monitoring and media intelligence tools, the ESMH follows the most popular topics in the field of science and technology on different platforms including magazines, newspapers and social media.

The ESMH will make information available to journalists, other media and citizens about new scientific developments, as well as about scientific topics that attract media attention and promote information based on evidence.

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 <p>Kosma ZŁOTOWSKI (ECR, PL)</p> <p>TRAN Committee</p>	<p>Parliamentary Committees: AGRI: Agriculture and Rural Development CULT: Culture and Education EMPL: Employment and Social Affairs ENVI: Environment, Public Health and Food Safety IMCO: Internal Market and Consumer Protection ITRE: Industry, Research and Energy JURI: Legal Affairs TRAN: Transport and Tourism</p>