Token

Uncertainties and futures of DLT in the European Public sectors

TOKEN Policy Observatory Briefing Paper

Token Website DLT4Gov Community

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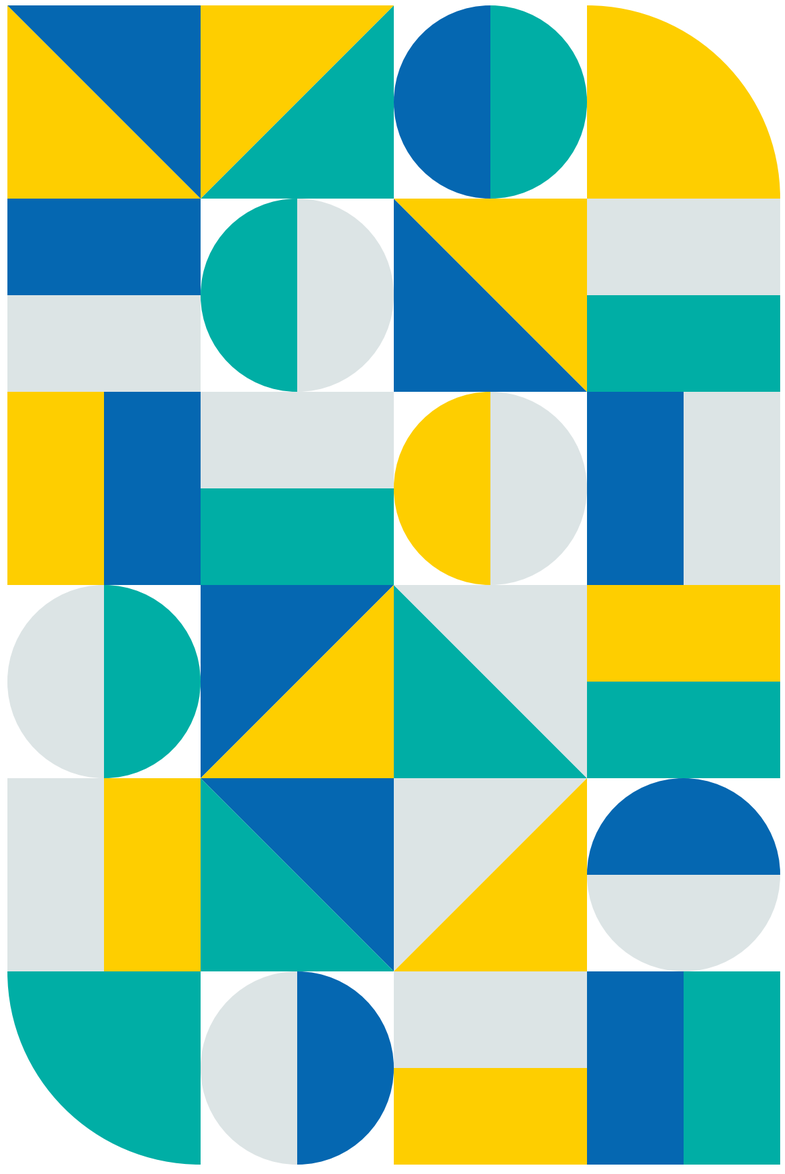

Table of contents

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With a special thanks to all the participants of the TOKEN Policy Observatory meeting in April 2021

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You can navigate it much like a website. Clicking on the table of contents will take you to the relevant section, and the “menu” icon in the top left corner will return you here. Many pages include links to related pages, and most of our citations lead directly to the source. You can also scroll through the document as you would a regular PDF.

For the reader

This briefing paper is a reflection of the potential transformative role of distributed ledger technologies (DLT) in the public sector.

Based on work done in the context of the TOKEN Policy Observatory, it gathers together what currently seems like key uncertainties around the future utilisation of DLT in the European public sectors. Further, it uses these uncertainties to develop images of possible futures – snapshots of a society in 2035 where these uncertainties have been developed and related tension solved in different ways, shaping the capabilities and possibilities of the European public sectors to utilise DLT.

This briefing paper is a part of TOKEN, a European Union Horizon 2020-funded project working to explore the value of DLT in the public sector through the development of an experimental ecosystem. The paper also forms a part of the co-creative foresight activities that form a part of the TOKEN

Policy Observatory. If you are interested in staying in the loop or participating in TOKEN activities, do join the DLT4Gov Community or reach out to us.

Introduction

New opportunities for the public sector

Distributed ledger technologies (DLT), such as blockchain, are creating new opportunities for the public sector. With meaningful implementation of the emerging technological solutions, the public sector and government at different levels could improve its capabilities to tackle societal challenges and inter-connected crises, deliver better services to citizens, increase transparency and accountability, and offer new ways of participation.

The TOKEN Vision of trust-based transformation via DLT describes what kinds of approaches the public sector broadly could use to deliver the promises of DLT and thus, improve societal trust. However, the realisation of these promises requires a holistic approach to developing technology – not only building appropriate technology but also new structures and processes, relevant skills and capabilities, and a supportive culture and mindset to utilise innovations. This requires efforts from a wide variety of societal actors, not only policymakers and technology innovators.

To identify the actions to support the TOKEN Vision, the TOKEN Policy Observatory is engaged in a foresight process defining the possibilities of implementing blockchain in the European public sectors. This means imagining alternative possible futures, assessing different scenarios, and analysing the opportunities and capabilities of the European public sector to utilise DLT within different futures. The work with futures supports identifying actors and actions that should be

prepared for change, and helps assess the implications of past and present policy choices. Within the process, TOKEN aims to **support civil servants and decision-makers** throughout different governmental levels of Europe to **navigate the rapidly changing environment of new technological possibilities and required societal transformations**.

This paper reflects the co-creation process in the TOKEN Policy Observatory, joint efforts of the TOKEN consortium, and previous work done by the think tank Demos Helsinki. It identifies the seven most crucial current uncertainties surrounding the utilisation of DLT in the European public sectors by 2035.

These uncertainties highlight unresolved conditions, whose development will significantly shape European public sectors' capabilities to utilise DLT in trust-based transformation.

What is DLT?

Distributed ledger technology refers to technologies whose databases exist across several locations or between multiple participants. It eliminates the need for a central authority or intermediary to process, validate or authenticate transactions. It requires a peer-to-peer network (open and public or limited and private), as well as consensus algorithms, to ensure replication across nodes. One type of distributed ledger design is the **blockchain system**, which is designed to record transactions or digital interactions and bring much-needed transparency, efficiency, and added security to the organisations who utilise it.

Based on the uncertainties, we have constructed three distinct images of the future – snapshots of a society in 2035 where these uncertainties have been developed and related tension solved in different ways, shaping the capabilities and possibilities of the European public sectors to utilise DLT. These images of the future are not predictions of the future and none of them will be realised as such. Rather than clear expressions of a desirable or undesirable future, these alternative snapshots urge us to think of the possibilities of different futures and in so doing create the conditions for strategic and responsible actions in the present.

We would like to thank the Observatory participants as well as the entire TOKEN community for their insights and inputs and we look forward to continuing the foresight process within the TOKEN Policy Observatory.

TOKEN eases the adoption of DLTs as drivers for far more open, trusted, and efficient public services.

Launched in January 2020, TOKEN (Transformative Impact Of Blockchain Technologies in Public Services) is an EU Horizon 2020 funded project whose ultimate goal is to develop an experimental ecosystem to enable the adoption of DLTs as a driver for the transformation of public services towards an open and collaborative government approach with trust, transparency, and efficiency at the core. During the 32 months of the project, the ecosystem is developed and its value is proven through four highly replicable use cases common to many European public administrations. Throughout the project, the TOKEN Policy Observatory brings together policymakers, practitioners, researchers and forward-looking thinkers around the future of DLT in the European public sectors.

Uncertainties

Key uncertainties to shape how DLT can be utilised in the public sector

The TOKEN foresight process aims to explore future uncertainties that we constantly encounter in our economy and society. These are likely to shape the possibilities of the European public sector to utilise DLT in public service transformation. ***Uncertainties*** refer to trends that have alternative development prospects without one clear direction. Uncertainties comprise several forces of change that can alter the direction of how a certain future looks like. This means that they are as of yet unresolved – there is space within each uncertainty and the tensions within it for the agency of different actors. The first four uncertainties are **endogenous**, i.e. they shape the DLT implementation in the public sector, while three last ones are **exogenous**, i.e. they shape the operational environment of the European public sectors.

1. Data control and ownership
2. Development of DLT and related technologies
3. Public service production modes
4. Concentration of power in governance systems
5. Social cohesion
6. Responses to environmental crises
7. Global politics and economics

1 Uncertainty

Data control and ownership

The digital world revolves around information exchanges, and the future use of DLTs in public governance depends on a capacity to collect and utilise data. This ties the question of DLTs to broader uncertainties faced by social stakeholders surrounding the use of data – specifically, to issues of data control and ownership models employed to determine how data is collected, owned, stored, analysed, and used[1]. The models that end up being adopted, and the citizens' response, will play an important role in shaping our societies and economies.

Identified tensions

Individual and collective data rights VS. Convenient digital services

Approaches to data ownership and use: highly democratic (data as democratic commons) VS. Individual dignitarian (data as an individual's right) VS. Propertarian (data as property)[2]

BACK TO UNCERTAINITY

1 Berryhill, Jamie, Bourgery, Théo, & Hanson, Angela. *Blockchains Unchained: Blockchain Technology and its Use in the Public Sector* (OECD, 2018).

2 Viljoen, Salome. *Democratic Data: A Relational Theory For Data Governance* (Yale Law Journal, 2020). [Forthcoming]

2 Uncertainty

Development of DLT and related technologies

Development of DLT and related technologies refers not only to the pace of technological advancement but also to perceived attractiveness of the technology, public and private investments and funding into the technology and the processes for developing new innovations. These will determine the extent to which DLT is able to effectively overcome existing barriers and limitations such as **scalability**, **resource-efficiency** and **price**. While their public sector use has been growing steadily, it tends to be concentrated in specific projects or particular governmental departments[3]. Cross-sector innovation and collaboration, alongside significant investment, would be required to propel the development of DLTs as genuine drivers of transparent and efficient public services.

Identified tensions

Scalability of innovations
VS. Intellectual property rights

Open VS. Closed innovation ecosystems

3 Shahaab, Ali, Lidgey, Ben, Hewage, Chaminda & Khan, Imriaz. *Applicability and Appropriateness of Distributed Ledgers Consensus Protocols in Public and Private Sectors: A Systematic Review* (IEEE Access, 2019): 43622

BACK TO UNCERTAINITY

3 Uncertainty

Public service production models

The role of public services varies in different countries and political contexts according to e.g. quality, comprehensiveness, and models of production and delivery. Although public services can be produced by the public sector, there are increasing examples of the private sector taking on public services.These accompany a rise in different networks and public-private partnerships involved in service provision. With the development and application of DLTs in the public sector, the boundaries between the public, private and third sectors are becoming increasingly uncertain and interlinked[4]. The future direction of this complex public-private nexus will also have a significant impact on the landscape for the development and use of DLTs and public services generally.

Identified tensions

Limits of public finances VS. Wide service promise & public expectations

Equality VS. Effective public service production

Digital giants VS. Legitimacy of the the public services

BACK TO UNCERTAINITY

4 Pólvora, Alexandre, et al (eds). *Scanning the European Ecosystem of Distributed Ledger Technologies for Social and Public Good: What, Why, Where, How, and Ways to Move Forward.* (Luxembourg, Publications Office of the European Union, 2020): 14

4 Uncertainty

Concentration of power in the governance system

Concentration of power in the governance system refers to how power and responsibilities are distributed in different levels, vertically and horizontally, on the local, regional, national and international levels of public governance, and the interactions between them. Depending on the power structures of public governance, they may introduce new stakeholders and agendas into the picture and limit the capacity of governments to deliver major DLT and public sector projects. There are also questions about how the technology itself may disrupt these power networks, with proponents of DLTs arguing they will create more equitable processes for decision-making, and enable autonomous infrastructures that can be controlled and governed by the user rather than a government or corporation[5].

Identified tensions

Distributed VS. Centralised governance

Global challenges VS. Localised power

5 Pólvora, Alexandre, et al (eds). *Scanning the European Ecosystem of Distributed Ledger Technologies for Social and Public Good: What, Why, Where, How, and Ways to Move Forward.* (Luxembourg, Publications Office of the European Union, 2020): 20

BACK TO UNCERTAINITY

5 Uncertainty

Social cohesion

Social cohesion refers to the sense of unity among groups in society, including both a sense of belonging and the relationships between the different members of a community. The use of DLTs within the public sector has implications for social cohesion primarily through its (positive and negative) effects on accessibility, inclusion, and participation. Access to this technology requires technological skills and equipment unavailable to some, in effect leaving them further behind.

Conversely, DLTs have potential for increasing equal opportunity through offering new forms of participation and trusted digital identities, for example to the estimated one billion people in the world unable to prove who they are (Desai 2018)[6]. Additionally, DLTs may increase financial inclusion by providing increased access to services for people working in more disconnected or rural economies (Thomason 2011 p. 95)[7].

Identified tensions

Narrowing the digital divide in skills and access VS. Increasing digitalization of services

High VS. Low trust in public services related to level of social cohesion

6 Desai, Vyjayanti, Diofasi, Anna & Lu, Jing. *The global identification challenge; Who are the 1 billion people without identity.* (World Bank, 2018)

7 Thomason Jane. *Blockchain for Growth: Applying DLTs to the UN Sustainable Development Goals.* (Cham, Palgrave Macmillan, 2021): 93

BACK TO **UNCERTAINITY**

6 Uncertainty

Responses to environmental crises

Responses to the environmental crises are changing public organisations' roles and processes as well as the fundamental societal and economic structures in society.

These responses will limit or expand the possibilities of DLT in public service transformation, be it in the form of available total funding for technological development or focusing on discovering how DLT could aid in the twin digital and green transition.

This could mean the development of DLT for increasing transparency in supply chains and logistics, while also coming to terms with tackling the environmental costs of public chain solutions.

In order to meaningfully implement DLT-based solutions, it is important to explore and unblock the potential for DLTs

Identified tensions

Sufficient VS. Insufficient climate action and the resulting impacts on societies

Increasing demand for digital solutions VS. Increasing environmental impacts of growing demand related to level of social cohesion

DLT opportunities to increase environmental efficiency VS. Environmental costs of public chain solutions

BACK TO UNCERTAINITY

to aid responses to the environmental emergency. For example, within the financial sector, research is underway to examine the potential of blockchain to unlock new climate finance possibilities[8].

More broadly, we may see new impulses to collaborate across governments and communities, with for example increased transparency bringing possibilities for highly detailed supply-chain solutions, digital identities providing a possibility for broad cross-border participation for those affected by policy choices and so on.

8 *SDFA and HSBC Launch Pivotal Report on Unlocking Climate Financing By Scaling The Green Bond Market Through Emerging Technology.* (Fintech News, 2019)

7 Uncertainty

Global politics and economics

Global politics and the global economy that is invariably entangled with it play a large part in determining the operational environment of societies and government on different levels. From trade wars to real wars, effectiveness or the lack of in global governance, the relationships between states and also non-state actors in a global scale can foster cooperation, competition or antagonism that is reflected widely in society. This question of international relations in the political and economic spheres remains key to understanding how effectively and multilaterally DLTs will be implemented across public sectors. Competition between states and protectionist economies could put collective technological advancement and the scalability of the innovations at risk. On the other hand, DLT is a technology that governs the users and global technological solutions are likely to change the political and economic power structures as we have seen in the increasing influence of digital platforms.

Identified tensions

Cooperation VS. Competition in regulatory and standardisation approaches

Bilateral VS. Multilateral approaches to international relations

Multipolar VS. Unipolar global politics

BACK TO UNCERTAINITY

Three images of possible futures for DLT in European public sector

Local loops

1

Privatised Innovation Ecosystems

2

Integrated Oligopolies of the Giants

3

The uncertainties and their related tensions can be resolved in a myriad of ways. On one hand, they represent a wide set of choices – implicitly or explicitly the strategies, plans, and policies of actors have an impact on the future. Government and the public sector at different levels (local, national, the supranational EU and global governance) has a large part to play, but on the other hand are not the only actors whose choices and actions have an impact. These wider collections of choices, developments and possibilities can be distilled into **images of the future**. The three images of the future presented below can be seen as snapshots of the year 2035, with a special focus on Europe and the European public sectors. In each one, the uncertainties presented above have been resolved (or left wholly unresolved) in a certain way. These images are not forecasts – rather than predictions of most plausible futures, the images are a set of possible alternatives that enable actors in the present to assess strategic and responsible choices. These distillations of alternative futures are tools that policymakers, civil servants, practitioners and all those working with DLT in the public sector can use to reflect, assess, imagine and increase agency in decision making.

Main characteristics of the future images

Local loops

Cities, regions, and local communities are the most significant actors of the public sector.

Data is collected and utilised for the good of local and digital communities and public services are produced with new kinds of community-based solutions utilising DLT.

The EU has limited power, and people have very different positions depending on their access to the different digital or local communities – some are thriving in communities but also this also produces disparities in access to services and inclusion for traditionally marginalised groups.

Privatised Innovation Ecosystems

Through-out Europe, there is a strong focus on industry-led digital transformation and short-term economic development. Multiple small enterprises take care of public services.

EU-based standardisation and interoperability requirements enable convenient, digital services and the development of DLT-based solutions in competitive yet open innovation ecosystems.

This digital transformation is premised on the vast data market, made up of individuals selling their data as property – privacy is a luxury not all can afford.

Integrated Oligopolies of the Giants

Heightened regional tensions between China and the USA have led to the two superpowers to back up their few huge digital platform companies as politics through other means.

The EU, united by these tensions, strikes an uneasy balance amidst the tensions, allowing access to these digital giants, who do provide a growing number of integrated, convenient services for people.

Public sector DLT development and uptake has been hindered, mainly in separate pockets of innovation.

BACK TO THREE IMAGES

Differences between the images of the future

Local loops Privatised Innovation Ecosystems Integrated Oligopolies of the Giants

Data control and ownership	Development of DLT and related technologies	Public service production models	Concentration of power in the governance systems	Social cohesion	Responses to environmental crises	Global politics and economy
Data is defined as a public commons.	The rapid development of DLT allows for major improvements in scalability, efficiency, and security.	New forms of local public service production by alliances, communities, and co-operatives.	Regions and cities increase their role.	The rapid changes in society leave some social groups behind.	Nordic & island nations are leading the fight against crises, but that strongly divides the countries into different groups.	Traditional intergov institutions' significance decreases, but global governance is strong via different informal forums such as G7.
Data is defined as a form of property that can be bought and sold.		The private sector produces services in a decentralised way.	Increased privatisation of power.		Focus on short-term economic growth hampers solving the crises.	Multilateral cooperation between nation-states via inter-governmental institutions.
Individuals are the primary actors controlling their data.	Innovations happen mostly in closed, private ecosystems.	Public services are replaced by services of digital platforms.	Strong EU centralization - gets more power over national governament.	Polarization and social unrest	Strong, global civic movements force nation-states to fight the crises together.	Global tensions rise, with political (and economic) conflict between China and EU/ US-based platforms.

Local Loops

1

In 2035 Europe, the culture of data sharing has shifted across societies. Governments, transnational organisations and citizens are now endorsing data as a democratic, public commons and generally aim its utilisation to benefit society as a whole. These views have been strongly backed up through regulation on the EU level, with the subsidiarity principle being innovatively applied to how data should be treated. This means that data is largely controlled through digital communities and networks that the individuals create or participate in – neighbourhood data cooperatives, labour union -led initiatives, online user-innovator networks and so on. Further EU-wide agile regulation processes help tackle the possible challenges and risks of misuse in advance.

The communal approach to data has encouraged frontrunner organisations and companies to develop new kinds of value creation models and mechanisms for data sharing. Combined with public investments of creating standards and open source solutions, this has led to a burst of new community-

Cities, regions, and local governments increase their significance

Data is collected and utilised for the good of local and digital communities

Services are produced with new kinds of community-based solutions

Europe is fragmented and people have different positions depending on their access to different digital or local communities

BACK TO THREE IMAGES

based services and interoperable digital solutions that utilise DLTs effectively. In 2035, a variety of alliances and communities, such as platform co-operatives, produce public services locally. The public sector aids and urges them to do so and therefore supports this development. Nevertheless, the community-based approach has meant that for those present in active, digital savvy communities, services are more readily available, while the move to heavily community-based solutions has meant a disparity in access and availability to some traditionally marginalised groups.

Cities and local communities have taken responsibility for addressing the multiple effects of the climate crisis and other societal challenges, leading to very different local circumstances in different parts of Europe. Differences between local contexts are also visible in the development of DLT-solutions which vary according to different regions and digital communities. That's why even though improvements in DLT solutions enable improved storage and energy efficiency, challenges remain in terms of capacity, scalability, and cost.

BACK TO THREE IMAGES

Privatised innovation ecosystems

2

In 2035 European digital transformation has taken huge steps forward. Multiple small enterprises and companies produce digital public and private services, often acting as members of flexible networks and ecosystems. Data is collected, analysed, and used by private companies and defined as a form of property that is bought and sold in the markets. This has created a new form of revenue, but has also meant that in a Europe of widening inequalities, privacy has been traded away for a small sum. The public sector regulates data markets, listening carefully to the wishes of the private actors and industries in order to preserve the innovative capabilities of markets. However, regulation in standards and interoperability enables combinatory innovations and cross-border services that are convenient and easy to use.

Public and private investments in research and development have led to strengthening collaboration between sectors and actors, giving rise to open innovation ecosystems where technology is developed rapidly, including DLT allowing for

Focus on industry-led digital transformation

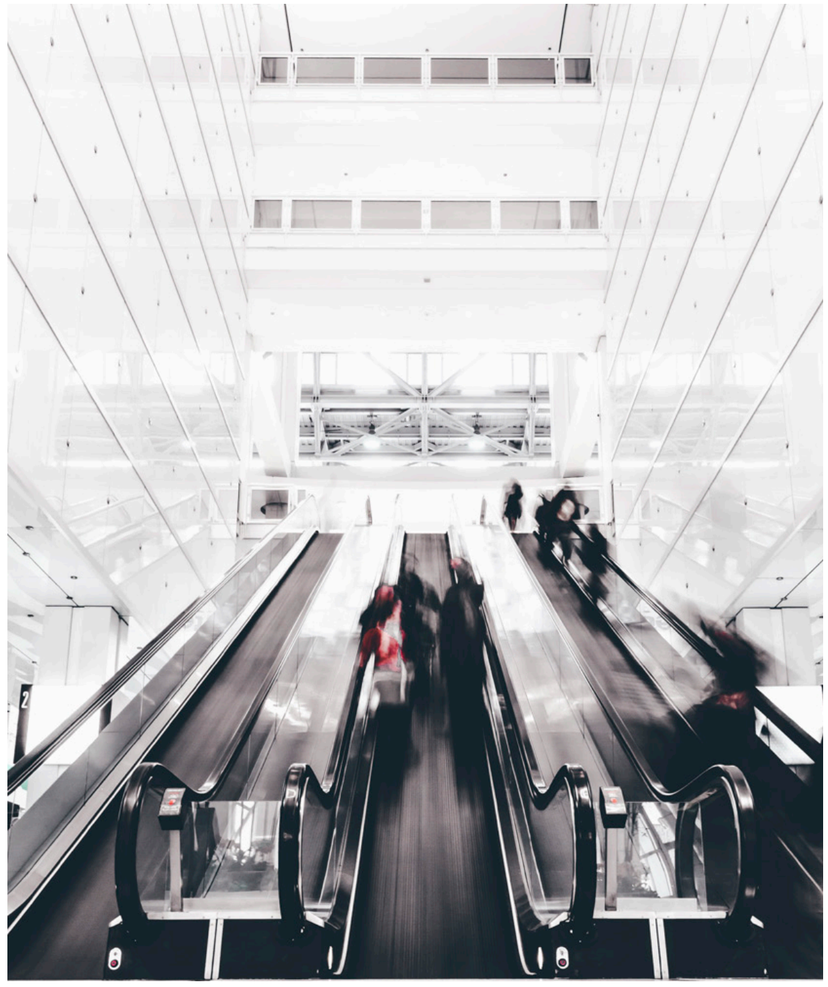
Multiple small enterprises and companies take care of public services

European-wide standardisation enables convenient services

The digital transformation is premised on the vast data market, made up of individuals selling their data as property – privacy is a luxury not all can afford

BACK TO THREE IMAGES

major improvements in scalability, efficiency, and security. On the other hand the strong focus on digitalisation, market-based action, and short-term economic growth has hampered solving of the climate crisis, which in turn challenges economic development and people's living conditions. Also, rapid changes in societies and industry-led transformations lead to inequality and dissatisfaction among different social groups in Europe.



BACK TO **THREE IMAGES**

Integrated Oligopolies of the Giants

3

By 2035, the global political and economic tensions between China, Europe, and the USA have accelerated, leading to protectionism and trade wars between the regions. Especially China- and USA-based platform companies embedded in these three markets – the digital giants – are able to dominate technological development and link varied services into their platforms. The geopolitical tensions of the two superpowers are reflected in the digital giants, with increasing covert state-aid and a backing away from antitrust schemes.

Europe aims to position itself in the global tensions, maneuvering between the digital giants by regulating the digital world, giving to individuals the primary role in controlling data. The EU's "third way" of value-based digitalisation however does not attract investments and the juxtaposition with deregulation in other parts of the world, added together with geopolitical tensions has led to a Europe lagging behind in technological development. This has given dominance to Chinese and USA-based digital platform companies. Despite the MyData principles[9] widely adopted in

Strong geopolitical and economic tensions between China, Europe, and USA

Europe lags behind in the digital transformation, and USA-based platforms are dominant

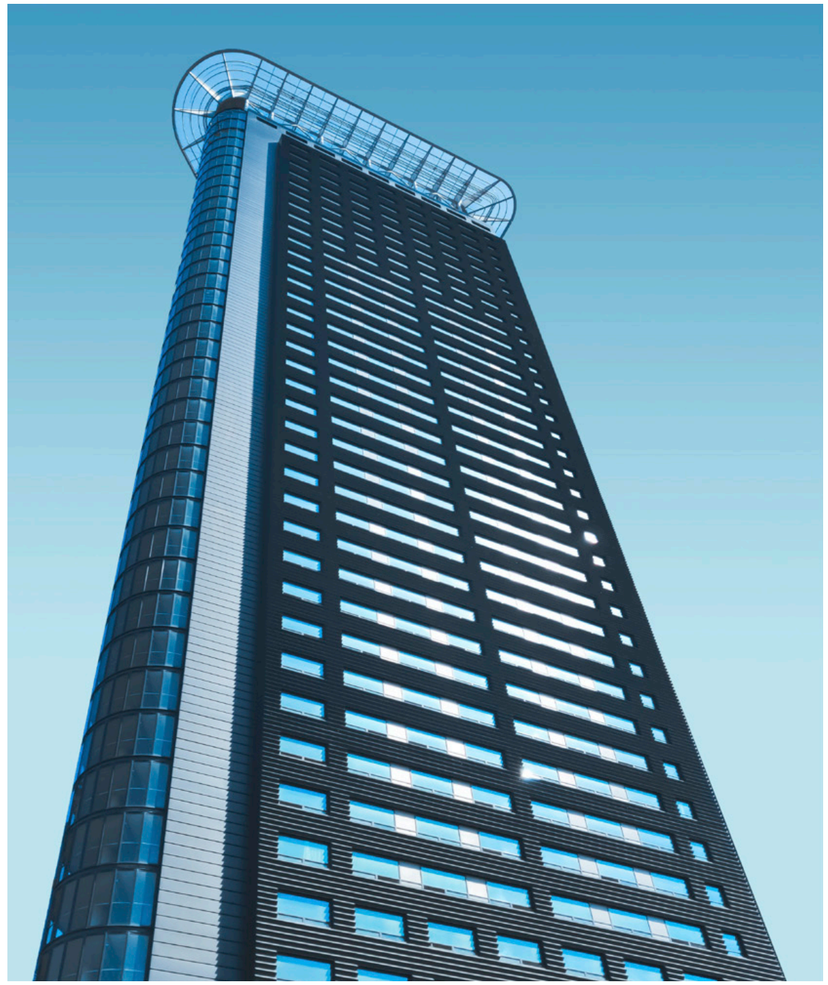
Despite strong data regulation, individuals remain committed to sharing their data with digital giants in exchange for convenient services

9 Poikola, Antti, et al. *My Data: An Introduction to human-centric use of personal data*. (Helsinki, Finnish Ministry of Transport and Communications, 2020)

BACK TO THREE IMAGES

the EU, people are willing to share their data with big companies in exchange for integrated, convenient and effective services – a tradeoff ultimately accepted by many individuals and the EU. DLT solutions are developed by platform companies for their benefit and transparent solutions in the public sector remain small-scale and within certain, specific pockets of innovation.

Due to the platformisation, European public sectors are fragmented and incapable of leading the digital or societal transformation. However, regional tensions unite (most) nation-states inside the EU, who increasingly positions itself as a value-based union, priding itself in e.g. strong climate movements whose demands the EU is translating into progressive climate policy.



BACK TO THREE IMAGES

Coming together for building futures

Meaningful implementation of DLT and generally new technologies within the existing structures, processes and culture of the public administration bring several challenges. Often, these challenges are not merely technological but related to a wide array of other factors from regulation to standards, failure modes, accountability and even more widely to skills, inclusion, legitimacy and so on.

In other words, assessing the possibilities of DLT for the public sector and finding the suitable paths towards its possible implementation cannot be viewed through a narrow lens. That is why we have created the foresight process in the TOKEN Policy Observatory and this briefing paper as an outcome of it. Without the best possible information and sight, what are likely, desirable and avoidable changes in the operational environment, responsible decisions cannot be made at the right time. At the same time, foresight based on co-creation produces more nuanced analyses and also helps to build community, legitimacy, and agency towards the desirable changes.

For this briefing paper we built three alternative future images in order to 1) imagine and understand alternative future developments and their impact on DLT usage in the public

sectors, 2) define the directions of actions based on alternative future developments 3) begin to identify leverage points for achieving the desirable futures. Within the images of possible futures we aim to inspire policy-makers, developers and citizens to address following questions:

1) What are the most desirable directions of the identified uncertainties that shape the opportunities of the DLT utilisation in the European public sectors?
2) What kinds of changes and actions are needed to take us towards these desirable developments?
3) What are the roles and responsibilities of different actors to implement these actions?
4) How alternative future images support identifying the right contexts and problems, which DLT-based solutions bring benefits?
5) How to conduct regulation and governance related to technologies that are very contextual in a rapidly changing operational environment?

In the next phases, we will conduct scenario paths towards alternative future images identifying the points of actions and turnings in the different futures. Scenarios will be co-created in the TOKEN Policy Observatory session and will be published during spring 2022. They'll feed into the TOKEN Toolkit for Policymakers, ensuring that the policy recommendations and tools are effective, timed right, and feasible. The toolkit will support European cities and public organisations to increase their capabilities to utilise DLT-based solutions in the trust-based transformation of the public services and public administration.

For making the foresight process alive and adjustable we want to collaborate with you. Share your feedback, comments, ideas, and join the DLT4gov community to co-create the future scenarios and policy recommendations. The desired change will be achieved only if the whole of society is equipped to envision and work together towards a better future.

Join the discussion and come work with us towards making the vision a reality.

Be part of the conversation and join the Community

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