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Review of the implementation of the programmes of work 2018-2019 and 2020: land administration and management

Scenario Study on Future Land Administration in the UNECE region to Encourage Strategy Consultations and National Interventions

Note by the Bureau of the Working Party

Summary

Decision makers in the field of land administration need a broad understanding of emerging issues and developments that are expected to shape the future of the sector. To this end, the Bureau of the Working Party on Land Administration has initiated a study to develop future scenarios for the land administration sector in the UNECE region based on the relative importance and anticipated impacts of global megatrends within the next 10 to 15 years.

The objective of the study is to support land administration authorities in the UNECE region and beyond to identify common challenges, share best practices for solutions and risk mitigation measures, and improve preparedness for future disruptive changes.

Ultimately, the study is aimed at identifying long-term strategies for the sustainability of the work and services provided by land administration authorities.

This information note presents the intermediate results of the study conducted by the Bureau of the Working Party. It will be presented at the twelfth session of the Working Party on Land Administration to discuss the scenarios and the self-assessment. Considering the outcomes of this discussion, the study will be finalized in 2021.

The Committee is invited to take note of the information provided in the study.

EXECUTIVE SUMMARY

Decision makers in the field of land administration need a broad understanding of the emerging developments that are shaping (or are expected to shape) the future of the sector. The pace of change in the sector we are experiencing today, in combination of unprecedented level of disruption, are challenging our ability to properly adapt. To this end, the UNECE Bureau of the Working Party on Land Administration (WPLA) has initiated a study to develop future scenarios for the land administration sector in the UNECE region based on the relative importance and anticipated impacts of global megatrends, as well as specific drivers related to administration within the next decade. The challenges and opportunities for land administration authorities to remain relevant and provide trustworthy services well into the future are related to their ability to continuously incorporate new user expectations, perform an often widening role as a key partner in solving emerging inter-sectoral state priorities (e-government, smart cities, spatial data infrastructure, forced digitalization, land development process integration, climate change initiatives, etc.), as well as managing the evolution of various constraints (financial, technological, HR, legal, organizational etc.). A central consideration in this continuously changing situation is how land administration authorities can create, increase, and retain value with respect to relevance, liability, stewardship and trustworthiness.

The scenario study is intended as a dialogue instrument for use in strategic planning, shaping visions and self-assessment as to where land administration authorities need to develop as agencies within their relevant land administration ecosystem. The study refers to land registry, cadastre and geospatial information management directly, while land use, land valuation and land development are covered implicitly. This intermediate report, which is expected to be taken note of by the UNECE Committee on Urban Development, Housing and Land Management at its eighty-first session on 6-8 October 2020, is aimed to be a useful basis for consultations concerning the justification, use and application of the suggested scenarios and self-assessment tools. The dialogue is planned to be held at the twelfth session of the WPLA in May 2021 and will be followed by a peer-reviewed Final Report. The long-term objective is to establish a continuous dialogue forum in support of land administration authorities within the UNECE region and beyond for their durable strategic planning based on scenarios.

The work to determine the scenarios and the tools for self-assessment has been carried out through a set of round table workshops with senior practitioners, policymakers and academics from Austria, Finland, the Netherlands, Norway Sweden and Switzerland. The listed scenarios were first presented by the Conference of the Permanent Committee on Cadastre (PCC) in Helsinki (20 and 21 November 2019), with the presentation incorporating real-time interactive feedback from the audience on the expected impact of the megatrends and specific drivers, as well as predictions for the scenarios.

“Forced digitalization” has already been observed as an effect of the COVID-19 pandemic. Efficient measures to prepare for similar disruptive events through scenario analysis can be informed by this study. The study could, for example, support decision to take early actions regarding expected impacts on the land market, support measures to promote sufficient responsiveness and resilience within national land administration ecosystems and be used for analyzing the impact of a chosen strategy. The impact of the pandemic on land administration, as well as the possibilities for using the scenarios to inform similar possible and unexpected events, will be part of the consultations at the WPLA workshop in May 2021. The adherence and contribution to the *2030 Agenda for Sustainable Development* of the scenarios will also be reflected.

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1. Introduction

The lives of people across the world, regardless of location, are increasingly being influenced by similar global trends and developments. These trends include urbanization, climate change, technology advancements, cybersecurity and migration. These so-called “megatrends” are universal phenomena that are profoundly shaping all over the world over time (United Nations, 2020). Although challenging due to their complexity, these megatrends also provide tremendous opportunities, including for land administration. Megatrends can, as such, have both positive and negative impacts. Drivers complement these megatrends. As with megatrends, some drivers are particularly relevant to land administration. Those that are more relevant include new emerging data sources and data integration options, structural shifts in collaboration opportunities, data privacy ethics and related legal considerations, and the introduction of new technology or analysis tools, to name a few. Megatrends and drivers, however, should not be considered in isolation. On the contrary, it is in combination that they generate faster and greater impact, shaping the ongoing transformation of the land sector.

This study aims to provide a “compass” for use by national land administrative authorities to navigate these megatrends and benefit from them. By setting out possible future scenarios for the land administration sector, the study can enhance broad understanding of decision makers of the emerging developments that are expected to shape the future of the sector. These scenarios are based on the relative importance and anticipated impacts of megatrends in combination with sector-specific drivers. It is hoped that this study can initiate an ongoing dialogue among national land administration authorities that draws on the scenarios and the self-assessment tool and guides them in the development of long-term strategies for their authorities.

The challenges and opportunities for land administration authorities to remain relevant and provide trustworthy services well into the future are related to their ability to continuously incorporate new user expectations, perform an often widening role as a key partner in solving emerging inter-sectoral state priorities (e-government, smart cities, spatial data infrastructure, forced digitalization, land development process integration, climate change initiatives etc.), as well as managing the evolution of various constraints (financial, technological, HR, legal, organizational etc.). A central consideration in this continuously changing situation is how land administration authorities can create, increase, and retain value with respect to relevance, liability, stewardship and trustworthiness. The authorities should provide a foundation of trust on the basis of which society and individuals can develop.

The initiator of this study is the United Nations Economic Commission for Europe (UNECE) Working Party on Land Administration (WPLA), an intergovernmental body covering 56 countries across the pan-European region. Operating under the auspices of the UNECE Committee on Urban Development, Housing and Land Management, members of the WPLA are the national land administration and other related authorities of UNECE member States. The Working Party provides a forum for dialogue in identifying methods to strengthen and modernize land administration systems. Overall, WPLA aims to support security of tenure, improve and create more effective land registries and promote sustainable land use policies. This is done through capacity-building workshops and land administration reviews at country level upon requests from governments. The Working Party contributes to the formulation, implementation and monitoring of land policy and the promotion of sustainable land management programmes and projects through developing guidelines, carrying out research studies and benchmarking, as well as providing policy advice and expert assistance. With the

growing complexity of many societies, the role of WPLA to facilitate collaborative endeavors across borders and contribute to a holistic perspective on land administration is gaining importance.

2. Objective of the study

Scenarios, in general, are used to understand potential future directions of development and to assess readiness of an organization for this possible future environment. Moreover, they can support efforts to define and realize strategies for appropriately responding to the implications this future brings.

The scenario study is intended as a dialogue instrument for use in strategic planning, shaping visions and self-assessment as to where land administration authorities need to develop as agencies within their relevant land administration ecosystem. The study refers to land registry, cadastre and geospatial information management directly, while land use, land valuation and land development are covered implicitly.

This draft version of the study will provide a basis for consultations on the justification, use and application of the suggested future scenarios and the self-assessment tools for strategic planning purposes. The consultation of land administration authorities and other actors in the UNECE region and beyond is planned to be held at the twelfth session of the Working Party on Land Administration (Malta, 31 May and 1 June 2021). The outcomes from this consultation will be reflected in the final version of the text.

Scenario analyses are neither predictions of the future nor expressions of intent for the future development of the land administration systems. Rather, scenarios are developed as stories to stimulate discussion on the future development of land administration organizations. By engaging in discussion of possible scenarios the risk of a simplistic approach being taken by land administration decision makers is reduced and their preparedness to adapt to the future, increase their flexibility and build resilience for disruptive events is enhanced.

The long-term objective of the study is to establish a continuous dialogue forum to support land administration authorities in their durable strategic planning based on scenarios. This will also include aspects such as identification of challenges and opportunities in a transformative environment, sharing of best practices for solutions and risk mitigation measures, improvement of preparedness for future disruptive changes and assessment of impacts from national interventions. The study explicitly encourages nations to elaborate and regularly reassess country strategies on future land administration. A self-assessment framework is included in this study and will be further developed and refined at the twelfth session of the Working Party.

The scenarios and the self-assessment tool have been elaborated during a set of round table workshops with senior practitioners, policymakers and academics from Austria, Finland, the Netherlands, Norway, Sweden, Switzerland and the United Kingdom. The scenarios were presented for the first time at the Conference of the Permanent Committee on Cadastre (PCC) conference in Helsinki (20 and 21 November 2019), with the presentation incorporating real-time interactive feedback from the audience on the expected impact of the megatrends and specific drivers, as well as predictions for the scenarios.

The outbreak of the COVID-19 pandemic in early 2020 is affecting the land administration sector. This will be reflected in the forthcoming revised version of this study. Immediate

impacts from the pandemic that have been observed include, among others, an opportunity for “forced digitalization”. This involves an increase in the use of e-services and online applications. Efficient measures to prepare for similar disruptive events through scenario analysis can be linked to this study. The study could, for example, support decision to take early actions regarding expected impacts on the land market, support measures to promote sufficient responsiveness and resilience within national land administration ecosystems and be used for analyzing the impact of a chosen strategy. At the same time, the pandemic will also impact the elaborated scenarios, trigger implementation schemes and lead to the revision of priorities. The impact of the pandemic on land administration, as well as the relevance of using the scenarios for similar possible and unexpected experiences, will be included in the study in preparation of the consultations at the WPLA twelfth session in May 2021.

In summary, this intermediate report presents the current status of the study. It aims to initiate a continuous dialogue between national land administration authorities to further strengthen the reasoning and justification of the scenarios and to make recommendations for self-assessment and possible actions at country level. This is done with the overall purpose of assessing the current status of national land administration authorities, as well as shaping long-term visions and strategic planning within these institutions.

3. Megatrends and drivers

Prior to building scenarios on a possible future, the underlying external factors on which the scenarios will be based, need to be defined and analyzed. These factors comprise both global megatrends and specific drivers related to the land administration sector. It is then needed to estimate the possible impact of these factors and the degree of uncertainty likely to occur within the given timeframe. For this study, the scenarios have been based upon a 10-year horizon.

It was first necessary to define the breadth and coverage of the study and to outline the notion of land administration. The chosen definition was developed by Stig Enemark in 2005 and covers the four land administration functions (land tenure, land valuation, land use and land development) in the context of a defined land policy framework, institutional arrangement and information infrastructure.¹ Land tenure and land valuation are the main functions relevant to this study. The study applies a comprehensive and holistic approach to the assessment of scenarios for land administration systems.

Also included in the study is discussion of the management of geospatial information and its potential for generating societal benefits. In other words, the study aims to outline a comprehensive and holistic perspective on land administration. The study has also been aligned with the United Nations Committee of Experts on Global Geospatial Information Management (UN-GGIM) *Integrated Geospatial Information Framework* (UN-GGIM, 2018) and the *Framework for Effective Land Administration (FELA)* (UN-GGIM, 2020a). The latter has recently been endorsed by UN-GGIM² as a reference for member States when developing, reforming, strengthening and modernizing effective and efficient land administration processes and systems. Reference is also given to a recently finalized UN-GGIM report on *Future trends in geospatial information management: the five to ten year vision – Third edition* (UN-GGIM,

¹ Information infrastructure: refers to the communications networks and associated software that support interaction among people and organizations.

² Tenth session of the United Nations Committee of Experts on Global Geospatial Information Management (New York and online, 26 and 27 August 2020, and 4 September 2020), see <http://ggim.un.org/meetings/GGIM-committee/10th-Session/documents/>.

2020b) which reflects on a wide set of emerging and developing trends regarding the collection, management and use of geospatial information in the future.

Overall, this study follows a pragmatic approach by engaging recognized land practitioners, researchers and policy leaders in a dialogue of ideas and visioning, combined with a verification process of synthesizing feedback from various stakeholders throughout the process. In this regard, intermediate results of this study have been presented at a joint event of WPLA, International Federation of Surveyors (FIG) and the Technical Chamber of Greece in Athens (November 2018), the UN World Geospatial Information Congress in Deqing, Zhejiang Province, China (19 to 21 November 2018) and the eleventh session of WPLA in Geneva (27 and 28 February 2019).

3.1 Megatrend identification

The first step in the study was to investigate recent and ongoing megatrends. Most publications discussing scenarios have been conducted by industry and focus on the development of cadastral systems without analyzing how different megatrends will impact them. For instance, two studies produced in New Zealand and Australia have outlined expectations for the future of cadastres (LINZ, 2014 and ICSM, 2014). FIG has also published a study titled *Cadastrre 2014 and Beyond* describing future visions for cadastres. Only research carried out in Finland seems to have similar objectives as this study; it examined the perceived importance of 21 global megatrends in the context of cadastral systems and the implications of relevant megatrends for the Finnish cadastral system (Krigsholm et al., 2018).

3.2 Megatrend analysis

The concept of megatrends has been explained by various authors (e.g. Naisbitt, 1981; Mittelstaedt, 2014). In comparison to regular trends, a combined definition of megatrends is their inevitability, the extent of their impacts and the duration of time within which they evolve. The WPLA Bureau agreed to use 11 out of 12 megatrends, as defined by Z-punkt³ in 2018, as the basis for the analysis of this study. A short description of the characteristics of these megatrends are given in Table 1 below. They were complemented by drivers specifically related to land administration (section 3.3). Eight senior international land administration experts⁴ were requested to describe possible impacts of these megatrends on land administration. They were asked to score the relevance and comparative importance of megatrends for land administration systems on a 10-point scale from 1 (none or very low relevance) to 10 (very high relevance). Since they were not asked to rank the megatrends, it was possible to use the same score multiple times (see table 2 below).

Table 1 - Megatrends and their brief characteristics (Z-Punkt, 2017)

Megatrend	Indicator
1 Demographic change	Regional development asymmetries Global population ageing
2 Societal disparities	Increase wealth concentration Intensification of social conflicts
3 Differentiated life worlds	Weakening of traditional gender roles New forms of individuality

³ A consulting company specializing in trends and futures research. <http://www.z-punkt.de/en/>.

⁴ David Boman, Lantmäteriet (Sweden); Wernher Hoffmann, BEV (Austria); Kirsikka Riekkinen, Aalto University (Finland); Martin Salzmann, Kadaster (Netherlands); Mats Snäll, Lantmäteriet (Sweden); Daniel Steudler, Swisstopo (Switzerland); Rik Wouters, Kadaster (Netherlands); Fredrik Zetterquist, Ordnance Survey (United Kingdom).

4 The digital transformation	Digital networking in everyday life New opportunities through “big data”, artificial intelligence, robot process automation etc.
5 Volatile economy	Global debt overload Concentration of productivity and profits
6 Business ecosystems	Expansion of the platform economy Sharing as a business model
7 Anthropogenic environmental damage	Anthropogenic climate change Increasing environmental pollution
8 Decentralized environments	Decentralized organization Assisted and automated working arrangements
9 New political world order	Multipolar world Asymmetrical conflict lines
10 Global/regional power shifts	Growth of the global middle class Increasing influence of non-state actors
11 Urbanization	Unmanaged urban growth Modernization crisis in municipal infrastructures

Table 2 - Megatrends scored by their importance to land administration.

Megatrend	R1	R2	R3	R4	R5	R6	R7	R8	Average	Ranking
1. Demographic change	4	3	6	6	3	8	7	2	4.9	7
2. Societal disparities	3	2	6	4	6	5	4	3	4.1	8
3. Differentiated Lifeworlds	2	2	2	2	8	2	7	6	3.9	10
4. The digital transformation	10	10	10	10	10	10	8	10	9.8	1
5. Volatile economy	8	6	3	7	8	4	5	3	5.5	6
6. Business Ecosystems	8	7	8	8	10	4	8	10	7.9	3
7. Anthropogenic Environmental Damage	5	8	7	7	8	2	8	6	6.4	5
8. Decentralised environments	8	6	5	5	10	6	6	8	6.8	4
9. New political world order	3	5	3	3	3	7	6	2	4.0	9
10. Global/regional power shifts	3	5	5	4	2	-	4	3	3.7	11
11. Urbanisation	7	5	9	8	10	-	8	10	8.1	2
Average	5.5	5.4	5.8	5.8	7.1	5.3	6.5	5.7	5.9	

Average scoring by the respondents turned out to be similar, indicating that there is a shared view on the relevance of megatrends for the land administration sector. Similarly, the scoring for the respective megatrend was distributed relatively equally among the respondents (see table 2). Discrepancy in scoring can be partly explained by different interpretations of these megatrends. The megatrend “differentiated life worlds”, for example, was considered by some respondents to also be covering “individualization” and therefore was scored higher than those of other respondents. This overall high degree of consensus statistically strengthens the precision of the scored relevance of each megatrend relative the land administration sector.

To facilitate the analysis of importance of these megatrends for the land sector, they can be divided into five categories using the so called “PESTE framework”: political, economic, social, technological and environmental megatrends. This framework is often applied in future studies (Krigsholm et al., 2017). In the megatrends scoring by the expert group, political megatrends (see megatrends 8, 9, and 10 in Table 1) and social megatrends (megatrends 1, 2, and 3) were generally considered to be of lower importance for the land sector compared to technological (megatrend 4), economic (megatrends 5 and 6) and environmental (megatrends 7 and 11) megatrends. This observation confirms earlier studies which also concluded that technological, environmental and economic megatrends are expected to have the most significant impact on future land administration (Krigsholm et al., 2017; Riekkinen &

Krigsholm, 2018). Nevertheless, social and political megatrends have a certain importance that should not be neglected. The experts attached lowest importance to the megatrends 10: global/regional power shifts and 3: differentiated life worlds. However, overall, these trends still score almost four points on a scale from 1 to 10 points.

For the purpose of this study the megatrends identified as the most important will be considered. In this context it is important to note that megatrends reflect the time of their appearance and might change over time (Mittelstaedt et al., 2014).

Not surprisingly, the megatrend “digital transformation” scored the highest according to the land administration experts. This megatrend is already affecting many, if not all sectors. Major initiatives are being taken by the land administration sector to leverage digitalization. This megatrend is already transforming the land sector from a technical, organizational and legal perspective, as well as from a financial perspective. As this megatrend will have a significant impact on all possible future scenarios, it will be considered as cross-cutting or “background” megatrend in the study.

3.3 Drivers related to land administration

In addition to the global megatrends, there are also land administration related drivers which will also impact on future land administration systems. In this section, some of the most relevant drivers are discussed.

3.3.1 Cybersecurity, privacy aspects and digital ethics

Cybersecurity and integrity aspects of data ownership, access and use are at the top of the agendas of many leaderships. The importance of these aspects is expected to rise as collaborations are becoming more complex, data integration business models are being extended and new concepts and technologies such as cloud services, artificial intelligence (AI) and distributed network systems are being introduced. Machine-to-machine processing will have the potential to produce new sets of data that might pose a risk to security of individuals and raise ethical concerns. Another challenge is to secure privacy aspects without at the same time postponing or impeding the innovations necessary for further development. The fact that “forced” digitalization and technological advancements are often faster than the implementation of legal measures further jeopardizes cybersecurity and the protection of data privacy.

An important debate is what makes data “personal data”. It can in some circumstances be difficult to identify any land related data that is not also related to persons. Since there is a risk that data might be transferred and used by nations with lower or nonexistent security and protections for personal data of individuals, the use of cloud services for land administration arrangements may be excluded in some countries. This would consequently affect other nations engaging with those countries. In general, integrity and cyber security is a global challenge in the context of open and data-driven societies.

3.3.2 Next generation demands

The young generation of today - or “digital natives” as they are also called - is the first generation of citizens and customers that has grown up in a digital society with little or no memory, reference or usage experience of analogue procedures. In that sense, this generation

is used to and expects digital workflows, automated case handling and decisions, including work conducted through machine learning, artificial intelligence and robots.⁵

Public agencies and their services thus need to respond to the new attitudes and values of their customers in order to stay relevant in the future. A priority in this regard will be the ability to operate entirely digitally. The most important aspect of this is that this shift should not just be a transfer of analogue and computerized workflows to new models and technical systems without realizing the full value of other possibilities at hand. The profound difference between “just converting and transferring” versus “inventing and implementing” digital workflows, information models and processing into new business models adapted to the digital transformation should not be underestimated.

Today’s young generation will thus shape future customer demands on land administration information and services. Land administration executives need to adopt a future perspective approach, include change management in their strategic leadership and use applicable tools and analysis to be able to look ahead and identify what the new and next generation of property owners and service users expect and request.

3.3.3 *Open data and new data sources*

Geospatial and land information are one the most important data sources when it comes to open data. People and society expect free anytime access to public data. Evidence also suggests that providing official data publicly can lead to increased levels of innovation and new developments. The value that can be created through open data, moreover, exceeds the initial value of data by far. Consequently, tax revenues available to fund services and products increase.

Some nations have taken a liberal approach, allowing open data. This has stimulated innovation, as well as increasing the diversity of applications, business models and collaboration arrangements. Other nations have restricted open data due to risks that free data flows involve. These risks include the potential use of cloud solutions located outside national boundaries as well as potential reorganization of existing financial models. In many public systems the data processing cycle - collection, storage, maintenance and dissemination - is linked to an authoritative data quality guarantee. This must be financed, either through fees and charges on users or state grants. When switching to an open data system, the state must find alternative ways to finance those businesses and services that are based on privileged access to data of societal interest. A big challenge during the transition to open data often occurs in cases where data is financed by fees. Open data also conflicts with some important security and integrity aspects, as described in section 3.3.1.

The general consensus in the regulated data sector is that open data is the preferred way to go. However, concerns around security and financial aspects hold back development in many countries. Those nations that do transition to open data will be in a better position to exploit the data to support innovation and development. However, evaluation of the risks and consequences with regards to security and integrity must not be neglected. If the concept of open data is adopted, it is important that states develop new digital data models. If data is managed in the same way as prior to the transition to open data, then problems in dissemination and restrictions in data availability are inevitable. A likely consequence to consider when introducing open data is that in order to strengthen confidence in the data processes a solution

⁵ These are either physical robots or “software” robots, often referred to as robot process automation (RPA).

will be required that encodes the origin and source of the data, as well as verifying the sender and receiver as “true”. Further discussion of this can be found in section 3.3.5.

New data sources and data collection applications involving drones, high-resolution satellites, crowdsourcing using smartphones and social media are expected to have a significant impact and to drive the development of solutions and arrangements that are both more user and data centric. At the same time, however, using a variety of data sources makes establishing proper interoperability solutions, as well as harmonizing standards and licensing, more difficult.

3.3.4 Artificial intelligence and robot process automation

Even if data is not openly accessible, the management of “big” (amounts of) data requires new methods of processing to achieve desired outcomes and extended values. Artificial intelligence (AI) is rapidly being developed into something that almost anyone can adopt in one way or the other. With proper adjustment and configurations of information, innovation and development, along with a realistic budget, the implementation of AI-based services - including machine learning - may be a solution to both private and public businesses in order to become more effective.

One benefit of AI is that it can facilitate the automation of processes that are normally handled manually or semi-manually and which are easy to replace with automated procedures. This in turn enables organizations to reallocate staff to areas where human resources are more essential. The next step is then for AI-based services to predict and foresee customer behavior and meet customer demands in a pro-active way.

With proper technical configuration, skills development and collaboration with AI-savvy private sector partners, AI may well be used to improve business cases related to land administration. Robot process automation (RPA) is a common development, closely related to AI, that is comparably easy to adopt. One example of RPA is customer relations departments using chat-bots to provide adapted services and generating predictions concerning customer behavior through analytics.

It is important to consider relevant ethical questions when adopting AI, especially if it is used for automated procedures involved with decision-making. New data is likely to be generated with an increased usage of AI and machine-to-machine processing. This data might be of a sensitive nature and necessitate changes in legal considerations.

3.3.5 Confidence in the digital world

Trust in the land administration system stems from several built-in mechanisms that are used, practised, and confirmed in courts. Examples of these include diaries and logs of applications and cases, public and transparent registers, contracts, decisions that can be appealed to court, rationales for decisions, and salary levels that motivate civil servants to resist corruption.

The era of digital transformation is leading to changes in this established system of trust. Not only are the ways things are done changing, but we are also experiencing changes in who is making the decisions. With the advent of digital transformation, now the system is automated and executes decision-making through a complex network of technical components, including machine-to-machine communications etc. Actions of importance for users, customers and citizens are made by logically programmed software, robots and AI. In future automated systems will be used more frequently in all kinds of areas and become more autonomous. Systems and components will also communicate with each other in wider aspects than just

reporting status of things or situations, the process is described by the concept of the “internet of things” (IoT). An application for land registration, for example, might be handled by AI on behalf of a person and land registration might also be executed by AI, rather than registrar as before.

Transactions often depend on the authority, competency and authenticity of the parties involved. While today it is important to verify the identities of those involved in the transaction, along with their capacity to conduct a transaction, systems must in future be able to verify the capacity and identity of digital objects. Here the relevance to land administration is obvious. Most land administration authorities are responsible for property IDs, addresses, coordinates, boundaries, buildings, apartments etc. These will all need a proper, secure and valid identification along with a description of their capacities, as well as any other information relevant to the transaction.⁶

Another concept relevant in this context is the idea of creating a “digital twin”. A digital twin is a digital representation of a real physical object. The twin can be used as part of almost any action or transaction that the physical object is part of. So far digital twins are used in manufacturing and machines maintenance. It is possible to monitor machines and predict problems in the machinery using sensors and data from the IoT. This practice is adaptable to property and is thus becoming part of smart cities and urban development concepts. “Building information modelling” (BIM) is one way in which these practices are being used in urban development. A digital model of a building may require both digital coordinates and marks relating to the real world. Developers may be able build a digital twin of the building and then, using sensors in the real building, gradually add further information to the model.

Blockchain is an example of a technology that has the potential to add trust into systems. This is because it has the ability to keep digital values in original form, making them impossible to tamper with or corrupt.

It is of utmost importance that the system of trust is understood, and work is done to develop successful mechanisms to retain this trust as the world gradually transitions to digital. It is recommended to further explore and test blockchain and AI as well as to combine these technologies.

3.3.6 *Collaboration, sharing, ecosystems and distributed solutions*

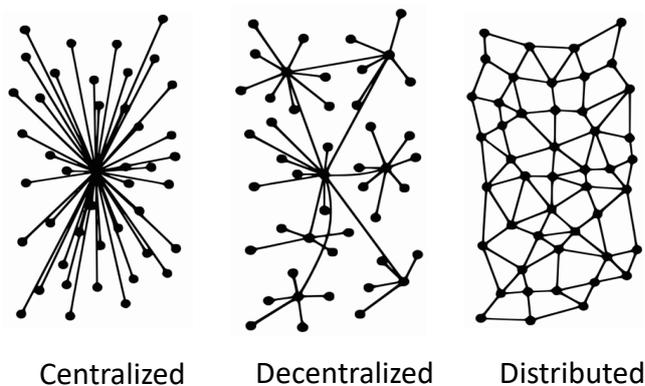
No organization can stay relevant on its own and in isolation. Co-operation, collaboration, co-work and networking are key words covering something that almost everyone today sees as a strategical prerequisite for success. Networking, or being a part of an ecosystem (referring to “business ecosystems”⁷), is often a task given by governments to state agencies. Still there is

⁶ A relevant example is a Swedish consortium inventing a language to exchange information between buildings/properties and IoT and even to communicate among each another. The language is called RealEstateCore (<https://www.realestatecore.io>).

⁷ The concept first appeared in Moore's May/June 1993 Harvard Business Review article, titled "Predators and Prey: A New Ecology of Competition. Moore defined "business ecosystem" as: “an economic community supported by a foundation of interacting organizations and individuals—the organisms of the business world. The economic community produces goods and services of value to customers, who are themselves members of the ecosystem. The member organisms also include suppliers, lead producers, competitors, and other stakeholders. Over time, they coevolve their capabilities and roles, and tend to align themselves with the directions set by one or more central companies. Those companies holding leadership roles may change over time, but the function of ecosystem leader is valued by the community because it

much to learn about how these kinds of networks work and how the giving, sharing and earning look like for the different nodes in the network. It is important to understand that there is a big difference between (i) a traditional network for public entities where the network is built around one central body, i.e. a centralized network, (ii) a decentralized network where there might be several central entities and (iii) the fully distributed network where all nodes may depend or contribute to one another more organically.

Figure 1. Types of networks



One example of public administration networking are networks for specified areas of interest. In several countries you find networks for public sector agencies on AI and blockchain. Land administration authorities have an important role as the custodians of location data which is of importance in many technology systems and applications today. Cross-border networks on similar subjects are also emerging.

The practice of networking and forming a part of an ecosystem is crucial today and needs to be analyzed by high level management as a strategic area in itself. A “network strategy” could be created in some cases.

3.3.7 Innovation through open source, incubators and hackathons

Innovation is more important than ever, the rapid pace of development driven by technology is well documented. There are, however, still many challenges associated with innovation. Many policies, legal frameworks and governance are legacies of the past with diminishing relevance in modern contexts. These might be a burden and a restriction, preventing innovation and development instead of enabling it. In “old” democracies with a long tradition of law-making in an open and democratic environment, legal framework and governance have often helped to support societal development. However, the procedures for taking decisions and translating acts into law are often complicated and take a very long time. Waiting for this process to reach its conclusion is rarely convenient or possible in the case digital innovation.

It is important for both developed and emerging economies to find ways to exploit innovation and meet demands for rapid legal development. Short and quick processes to achieve changes or introducing new regulations must be adequately balanced with the aspect of confidence to the (legal) system. This is not an easy task.

enables members to move toward shared visions to align their investments, and to find mutually supportive roles.”

There are several methods practised in innovation that may accelerate policy development and/or innovation. “Open source” code programming, where code is open for use and developed in open communities, may assist considerably in reaching implementation faster, with development supported by experience and input from outside the organization. Although they are “open”, open source applications and similar should still be regulated in ways that can be known and considered by the user. A “society hack” is a crowdsourced workshop on a subject of interest for a certain group or category of people/organizations. It may be carried out in real time in one or several locations or entirely virtually. It is often organized to focus a very specific task that needs a solution, while at the same time acting as an opportunity to inform and communicate on the chosen subject matter. A “policy hack” is a workshop setup with the purpose of solving a regulatory issue that needed to be handled quickly in order to move forward with a certain task or innovation. Service design and customer views are approaches to apply here. Incubation centres are becoming popular, allowing public bodies to play a major role in supporting entrepreneurs through mentorship, funding and making public data available, stimulating the development of new applications to address different societal challenges.

3.3.8 Crowdsourcing

In land administration, the term “crowdsourcing” may be applied when the general public, citizens or groups of people (e.g. real-estate owners), collect or add, improve or verify information and data. One example in this regard is currently under development in Sweden: a process of using an online application conducted using augmented reality to collect verifications or opinions on the correctness of the property boundaries given in the cadastre. With the crowdsourced data it would then be possible to have a quality declaration attached to the public data in registers.

For public agencies, crowd activities may be used to collect information and improve data quality and coverage. The key to achieving this is, firstly, finding a proper channel through which the agency can have contact with people in a wider sense than just having a portal or a webpage and, secondly, finding incentives for people to participate. Many of the various processes used for data capture in the era of computerization are quite similar to the concept of crowdsourcing. The tools, however, may differ.

3.3.9 Skills requirements and education programmes

In order to properly respond to new challenges, megatrends and drivers need to be carefully considered when revising education and training programmes; particularly in regard to legal, technical, managerial and data development aspects. Traditional land administration competencies need to be complemented by new areas of expertise, including data science and analytics, behaviourism and geospatial technologies.

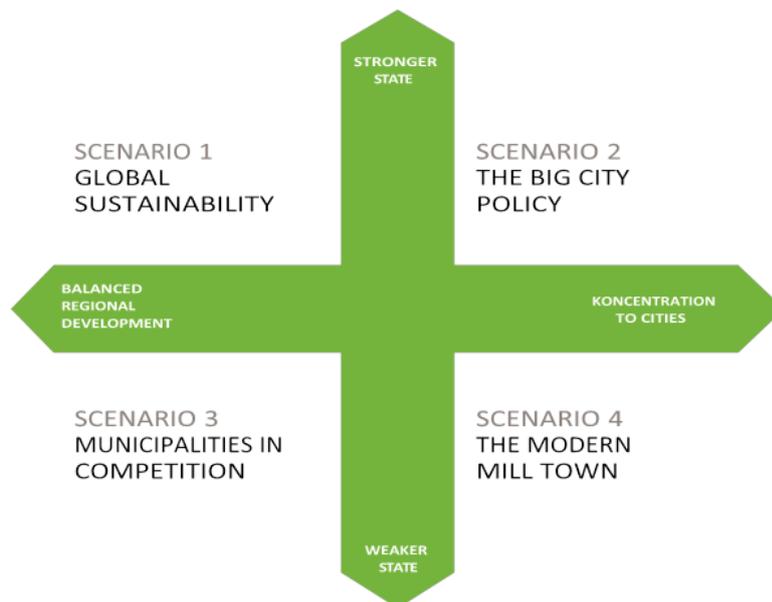
4. The scenarios

The global megatrends and specific domain drivers described in the previous section constitute the basis for forming the scenarios. As mentioned, the scenarios describe possible futures and development directions in order to help an organization estimate its readiness for this new possible environment. Moreover, they can support efforts to define and realize strategies for appropriately responding to the implications this future brings.

4.1 Definition of the scenario cross and the scenarios

There are different approaches to describing scenarios. This study applies the so-called “scenario cross” approach. This approach can be best described by giving the example of the Lantmäteriet, the Swedish mapping, cadastral and land registration authority. The Lantmäteriet used the scenario cross to better understand how future spatial and land use planning will be conducted based on the influence of external trends and, consequently, the expected role of Lantmäteriet in that context. They aimed to understand what will be the major processes, who are the most important actors and what will be the most prominent and determining questions for spatial change. Analyses of trends determined the two axes in the scenario cross. The vertical axis defined the influence of the state, that is, will the state influence spatial planning more strongly or will other actors, such as municipalities and the private sector, take the lead? The horizontal axis defined regional development: will we face a continued concentration on larger cities, or will regional development be more balanced? Then, for each quadrant a possible scenario was elaborated.

Figure 2 - An example of a “scenario cross” application

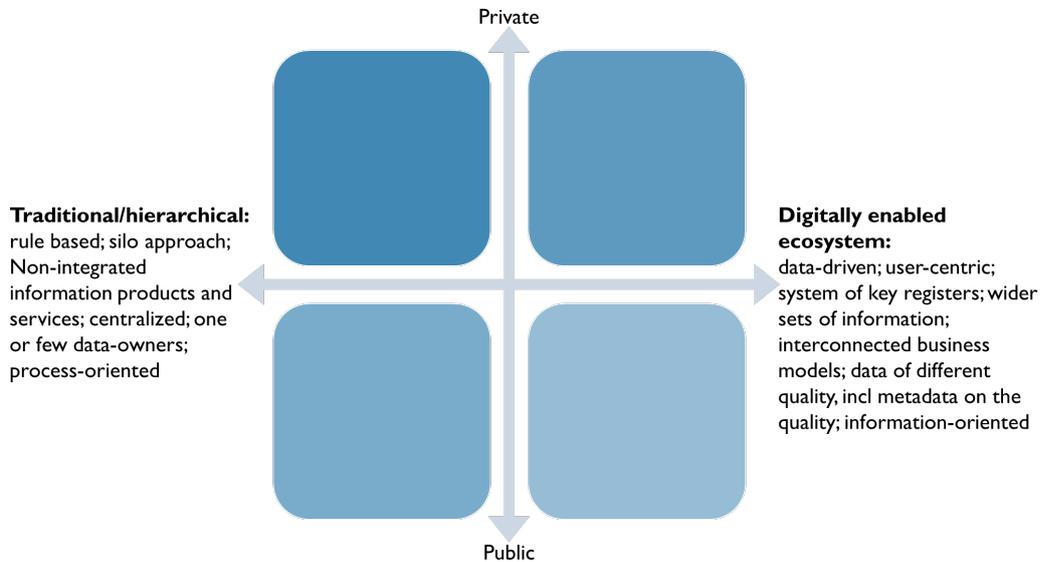


During the development of possible scenarios of future land administration, the conclusions by the expert group on the importance of certain megatrends and drivers for land administration were used as input for two roundtable sessions on scenario development, organized in Stockholm in June 2018 and in Amsterdam in December 2018. The roundtables first identified a shared point of departure: how land administration authorities stay relevant, liable and trustworthy and/or increase their relevance, independently of where they currently position themselves in the scenario cross and/or if they intend to move in a certain direction within the cross.

The scenario cross was outlined from clustering the 11 megatrends combined with the land administration related drivers and the collective experience of experts. The megatrend “business ecosystem” was selected to explicitly be part of one of the axes. “Urbanization” and “digital transformation” are two megatrends that were considered to affect all scenarios highly. Therefore, they could not be used for defining the axes as such. Rather they were used as “influencers” when interpolating the trends to define the scenarios.

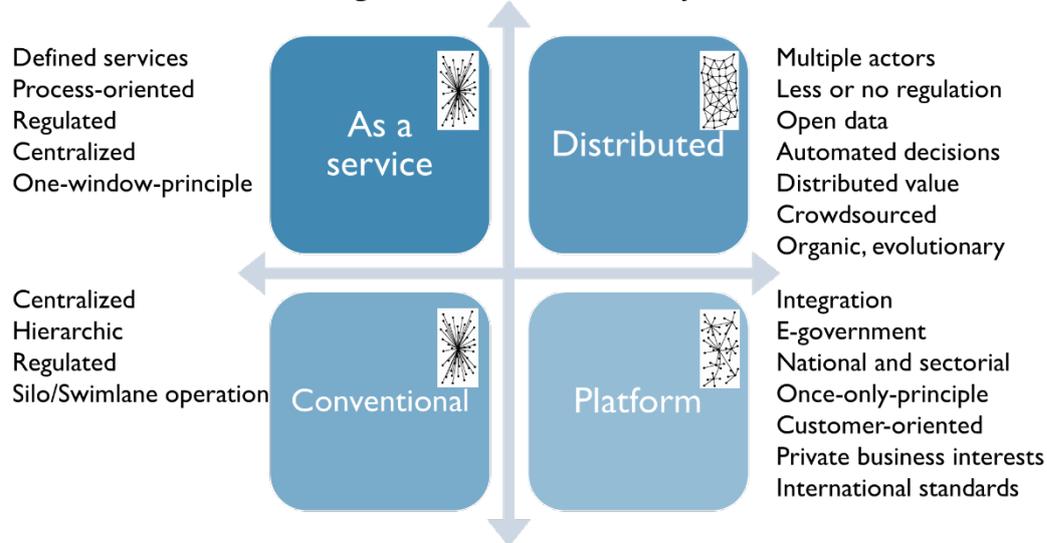
The elaborated scenario cross is defined by the horizontal axis representing land administration governance with traditional/hierarchical to the outer left and digitally enabled ecosystem to the outer right. The vertical axis defines the responsible actors for land administration operations with the upper end representing private and the lower end public actors (see figure 3):

Figure 3 - Defined axes of the scenario cross



The scenario cross is completed by adding the four land administration scenarios (see figure 4).

Figure 4 - Characteristics of the scenarios



4.2 Characteristics of the four scenarios

4.2.1 “Conventional land administration”

This scenario characterizes the most common situation in UNECE countries (and beyond) today. It represents a centralized land administration where functions, operations, services and data are typically managed and governed by the state. It is characterized by a hierarchic organization, top-down management, limited delegation downwards and often limited transparency of the financing of services. Data is captured and updated in a controlled way resulting in authoritative data. Services and processes are regulated in detail. The conditions and performance of professionals, representing both private and public sectors, are also strictly regulated. Often the various data sets are stored in several silos, such as buildings, property, parcel, title, address, land use. There is a risk of work redundancy and overlap of information at attribute level. Much of the information products and services are non-integrated. The scenario tends to have system solutions characterized by constraints on their ability to evolve, develop new capabilities and meet new expectations. This is particularly true when geospatial data is included, as this attracts many producers and users. It also drives applications that require an open and more integrated environment. Expected increased complexities in people-to-land-relations (rights, restrictions and responsibilities) and e-services challenge land administration systems positioned within this scenario. The fact that land administration authorities are to an increasing extent involved in state priorities in the vicinity of their core responsibilities, for example e-government, integration of building and land development processes, spatial data infrastructures, smart cities and climate change initiatives, puts additional pressure on land administration authorities represented in this scenario.

4.2.2 “As-a-service land administration”

This represents a scenario where one or a few private sector actors execute all or some land administration services, often through a long-term as-a-service model, with the state still governing the data and setting the rules for land administration. The private actor(s) might also be responsible for the technical system and its maintenance. The idea that capital, technology and skills can be leveraged from the private sector to enhance land administration is increasingly gaining traction. Often a private-public partnership (PPP) model is applied with revenue-sharing using, for example, transaction fees, data/service fees and property tax. Existing use cases are typically from developed countries where the land registry is operated by private companies (e.g. Western Australia and Ontario in Canada). Several emerging economies (Vietnam, Liberia, Ghana etc.) are now investigating PPP/as-a-service solutions for parts of their services such as the operation of continuously operating reference stations (CORS), first registration processes, land registry, valuation for taxation and mortgaging etc. The World Bank has conducted a global PPP consultation to further explore these opportunities.

4.2.3 “Platform land administration”

In this scenario, land administration is executed within a national/sectoral framework which includes several state bodies. Each state body has its designated functions, responsibilities and defined data sets. Typically, a range of key registers with national data sets (for example cadastre, land registry, business register, mortgage register, statistics, utility register and address register) are included, sometimes within a government cloud. The updating process considers all registers and the once-only principle is applied for data capture in order to avoid work redundancy, data duplication and inconsistency. Key identifiers, and not the data content,

are exchanged. National architecture of key registers thus overarches agencies and institutions. The updating process therefore embraces all relevant registers and each attribute is linked to a specific custodian, that is, the authority responsible for the defined data set. This approach facilitates the provision of data-centric applications, extended state services with integrated governmental data and automated processing. E-government initiatives are often a driver towards this concept and have the potential to provide economies of scale for the government while at the same time improving the sharing of national data sets and capabilities across organizations and sector boundaries for extended integrated public products and services.

4.2.4 “Distributed land administration”

This is considered the most visionary scenario. It represents an environment with highly automated and multi-stakeholder land administration where the private sector has a large stake and where governance is moving to an ecosystem of technologies, platforms and diverse set of stakeholders. Thus, there is a high level of trust “within the system”. Trust is distributed among the stakeholders, private as well as public. Governance is aligned with distributed liabilities. The services and information products are fully digital. Distributed value chains, for example, blockchain, are implemented. A set of configurable building blocks (technology and services) are implemented to meet various user requirements and societal needs. This will require extensive cooperation and clear distribution of responsibilities and risks. The widened opportunities for integration of data from multiple providers, including crowd-sourced data combined with an open data policy, will require a high degree of standardization and stringent policies on compliance with data privacy and data security regulations. The concept facilitates process automation and transparency and enables a wide spectra of user applications. It will also provide for a built-in evolutionary environment that in a complex context can transform and adapt to new expectations and requirements over time (e.g. starting from 2-dimensional to 3-dimensional, introduction of blockchain, AI, big data analysis etc.). It has the potential to trigger digital engagements and efficiently leverage digital trust.

5. Guiding principles for future proof land administration systems

To ensure a robust land administration system, a set of guiding principles have been developed by the group of senior land administration experts. They are provided in this section. These principles are suggested to complement the scenarios. When making strategic planning based on the scenarios, it should be verified that these principles are followed, irrespectively of the predicted scenario.

The following guiding principles should be ensured:

1. The land administration system provides security of tenure and guarantees the integrity and transparency of both information and transactions with property. This is for the benefit of people and the state in order to support social stability and economic growth.
2. The land administration system is resilient to cyber-attacks, natural disasters and other events that could destroy or damage the register and its information.
3. The land administration system is fully digitalized, including maps on property and geospatial information.
4. The land administration system is uniform throughout the country, and contains information about all properties regardless of type, use and ownership.
5. The land administration system contains information about rights, restrictions and responsibilities relevant to all properties.

6. The land administration system is robust and capable to reflect the dynamic nature of information stored in it over time, including information on rights, responsibilities and restrictions, thereby the land administration system contains historical data on properties, such as information about changes to ownership and to parcel boundaries.
7. All professional and private users can access all information about the location of properties, as well as information related to land and property rights, restrictions and responsibilities.
8. Information contained in the land administration system is open for remote inspection by all professional and private users to ensure transparency and accountability.
9. Users of the land administration system should be able to trust that information provided in the system is correct, and that they will be compensated should they have a loss due to erroneous information.
10. The land administration system provides information about the origin and quality of information, including the origin and quality of the details in the cadastral maps, such as boundary points.
11. The land administration system takes into account the dynamic nature of geodetic reference systems, reflecting that the surface of the Earth is moving horizontally and vertically.
12. The land administration system is integrated with the overall national spatial data infrastructure and is able to provide the most accurate information about the location of a property and the wider territory.
13. The land administration system provides 3D information about the vertical and horizontal limitation of properties with their related rights, restrictions and responsibilities. Hence, the land administration system contains information about properties under or above the surface of earth, such as apartments, tunnels and underground storage facilities.
14. The land administration system facilitates linkage with building information modelling systems (BIM), both for data production and data dissemination.
15. The land administration system facilitates the registration of different tenure types such as freehold, leasehold, occupancy right, and common property. The system incorporates the fact that the tenure could be dynamic over time and that related limitations could be fixed or fuzzy.
16. The land administration system is providing access to information supporting registration of transactions, such as contracts, deeds and survey reports. If relevant, this is organized in a digital archive integrated with the land administration system.
17. The land administration system information is available on a variety of fixed and mobile platforms and electronic devices.
18. When relevant, crowdsourcing is used for data preparation and for verification of data contained in the land administration system.
19. Preparation of data for registration in the land administration system is well integrated with digital processes of private agents, such as notaries, real estate agents, lending banks and land surveyors.
20. The land administration system offers real time registration of transactions, largely subject to automatic digital checks only. Transaction documents are standardized for machine reading. Only complex cases are checked manually by the land administration authority.
21. Fees and taxes for property transactions are transparent to users and digital payment is facilitated.

22. The land administration system contains legally valid information. The land administration system can disseminate information to users, which replicates the content of the system with full integrity.
23. International standards are applied for the design and operation of the land administration system.
24. Licensing and monitoring of private agents is adapted to facilitate electronic communication with the land administration system, both for registration of transactions and for dissemination of registered information to their clients.

6. Self-assessment framework

The scenario study is intended as a dialogue instrument for use in strategic planning, shaping visions and self-assessment as to where land administration authorities need to develop as agencies within their relevant land administration ecosystem. To help estimate readiness of an organization and define what strategy is appropriate for the respective scenario, the scenarios have been complemented with a set of questions to facilitate self-assessment. The questions are preliminary. It is anticipated that they will be reviewed and refined during a consultation at the twelfth session of WPLA, planned to be held in May 2021.

As mentioned, the overarching objective of the scenario study is for land administration authorities to stay relevant, liable and trustworthy and/or gain relevance in a rapidly changing environment. The study explicitly encourages countries to design strategies for their future land administration. In this section a self-assessment framework is suggested, including a set of pre-prepared questions, that can be used to facilitate this exercise.

Which of the scenarios is preferred depends on local context of each jurisdiction, the maturity of its land administration and the degree of pressing societal needs in relation to land present in the country. Other central considerations are also how land administration systems can create, increase and retain value with respect to the relevance, liability and trustworthiness of the land market and with respect to policy and societal issues related to land.

When assessing the scenarios, it should be ensured that the outcomes are aligned with the goals of the recently endorsed UN-GGIM *Framework for Effective Land Administration* (FELA). Hence, effective land administration caters to all people, and must:

1. Accelerate the proportion of population with tenure security;
2. Develop confidence and trust, promote security, safety, peace and peace building;
3. Promote efficient and vibrant land market taking into consideration aspects of land values and land development;
4. Allow economic development through revenue systems that are equitable and fair,
5. Contribute to smart and resilient societies;
6. Cater to all circumstances, situation and people – in times of peace and prosperity, in times of stress and hardship (disaster and conflicts, migration and human displacement, poverty, food and water scarcity);
7. Promote preparedness, resilience (with increasing climate vulnerabilities), sustainable consumption and strong institutions (UN-GGIM, 2020a, 16).

These objectives are deemed valid for all jurisdictions in the world today. In contrast, the guiding principles formulated in section 4 are more specific and designed for countries of the UNECE region, focusing on their mid- and long-term future.

To assess the extent to which these objectives and guidelines have been achieved in the scenarios, it is proposed that countries assess the scenarios based on the underpinning principles that have been initially formulated as part of the UN-GGIM *Integrated Geospatial Information Framework (IGIF)*. These seven principles (see box 1 below) are generic and relate to key characteristics and values that should underpin the land administration system in every country.

7 principles of the Integrated Geospatial Information Framework

PRINCIPLE 1: Strategic Enablement

The implementation of the Framework requires political and financial support and should therefore align with and support government's strategic direction on issues such as economic growth, social well-being, job creation, natural resource monitoring, and environmental management and preservation.

PRINCIPLE 2: Transparent and Accountable

Government geospatial information is developed and shared according to key accountability and transparency guidelines so that all citizens, government agencies, academia and the private sector have access to this valuable and underpinning national resource.

PRINCIPLE 3: Reliable, Accessible and Easily

Used geospatial information is reliable and made accessible and usable so that it can be leveraged for research and development, used to stimulate innovation, and support the creation of sustainable services and products to advance social, economic and environmental development.

PRINCIPLE 4: Collaboration and Cooperation

Collaboration and cooperation (between government, business, academia, civil society and donors) are factored into the implementation of the Framework to strengthen information sharing between providers and users, reduce duplication of effort across the government sector, make for a robust system, as well as providing clarity on roles and responsibilities.

PRINCIPLE 5: Integrative Solution

The implementation of the Framework is to be integrative in nature – and consider how people, organizations, systems, and legal and policy structures work together to form an effective system for managing geospatial information and its use.

PRINCIPLE 6: Sustainable and Valued

The implementation of the Framework will be conducted in such a way that it enhances national efficiency and productivity; is sustainable in the long term; and is deployed in a way that provides improved government services to citizens.

PRINCIPLE 7: Leadership and Commitment

Importantly, the implementation of the Framework will require strong leadership and commitment, often at the highest level, to enhance the long-term value of investments in geospatial information. This will be achieved through careful analysis, prioritization and sequencing to develop an action plan that carefully applies interventions in the short, medium and long term, and that can receive high level endorsement and support by government.

6.1 Guiding questions to assess the scenarios

To assess the value of each of the four scenarios for a country and its land administration arrangements, several questions have been prepared by the group of land administration experts. They relate to the seven principles of IGIF:

Strategic enablement

- Is land administration considered as an essential strategic resource in the (national) political, administrative and societal context?
- Is there a robust legal basis underpinning the land administration system?

Transparent and accountable

- Have all stakeholders access to the land administration system, based on shared and transparent guidelines?
- Is the accountability of all stakeholders involved in land administration established and maintained?
- Is the accountability established for all elements in the value chain?
- Are the costs for users fair and transparent?
- Are the roles and responsibilities of all parties in the system clear transparent and adhered to?

Reliable, accessible and easily used

- Is the information on land available, easily accessible and usable to all stakeholders?
- Is land information authoritative and/or subject to state guarantees?
- Is all information on land (rights, restrictions, responsibilities) available, over multiple dimensions (3D) and over time (4D)?
- Is coverage of land information national and complete?

Collaboration and cooperation

- Are all parties in the (public sector, private sector, academia, civil society) involved in the operation and development of the land administration system?
- Are duplications within the system avoided?
- Is the system open to new entrants or information sources?

Integrated solution

- Is the proposed system integrated in or at least connected with the information society (both public and private)?
- Is the system effectively managed by the stakeholders?

Sustainable and valued

- Is there a sustainable business model for the whole system in place and for each party in the land administration value chain?
- Are appropriate mechanisms and incentives in place to further develop the land administration system?
- Is the system responsive and able to absorb new needs related to land from society?

Leadership and commitment

- Is strong political leadership and commitment in place to warrant continuity and long-term investment in the system?

7. Next steps

Following the consideration by the Committee on Urban Development, Housing and Land Management, this intermediate report will be presented at the twelfth session of the Working Party (Malta, 31 May and 1 June 2021) to discuss the scenarios and the self-assessment. Considering the outcomes of this discussion, the study will be finalized in 2021.

It is planned that the Working Party will discuss and, if necessary, review the scenarios for actors in the land administration sector on a regular basis. This will ensure that recommendations for the improvement of the land administration systems remain relevant to changing realities and continue to respond to changes in expectations and needs.

Land administration authorities are encouraged to use the scenarios to enter into a continuous strategic dialogue and regularly use the scenario and self-assessment tool to assess expectations and changes in needs over time.

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