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Land use decisions in the future

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Abstract	<p>The development project concerning land use decisions to be made in the future was implemented in broad cooperation between the relevant stakeholders during 2019. The aim of the project was to promote the digitalisation of decisions relating to land use planning and building, i.e. land use decisions, knowledge-based decision-making and usability of information on the national scale.</p> <p>The project concerning land use decisions in the future established harmonised national guidelines to promote digitalisation. The project defined the objectives and roadmap for digitalisation and the measures to support this.</p> <p>In the measures implemented during the project a particular focus was on information flows between municipal zoning and building permit procedures and national-scale access to information on decisions and initial data related to these. Among the important first-stage measures was the launch of the work on a reference architecture for land use decisions and promotion of national dialogue on the processes, information flows and national services we should aim for in the land use planning and building sectors. It is also important to assess the societal impacts of digitalisation, especially in terms of the costs and benefits to the different stakeholders.</p> <p>This report presents the key results of the project and the measures implemented during the process.</p> <p>The findings of the project will be used in the overhaul of the Land Use and Building Act and in the implementation of the national register and data platform for the built environment proposed in the Government Programme.</p>	
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Tiivistelmä	<p>Tulevaisuuden maankäyttöpäätökset on vuoden 2019 aikana laajassa sidosryhmäyhteistyössä toteutettu kehittämishanke. Hankkeen tavoitteena on ollut edistää maankäytön suunnitteluun ja rakentamiseen liittyvien päätösten eli maankäyttöpäätösten digitalisointia, tietoon perustuvaa päätöksentekoa ja tietojen valtakunnallista käytettävyyttä.</p> <p>Tulevaisuuden maankäyttöpäätökset -hankkeessa on luotu yhtenäiset kansalliset linjaukset digitalisaation edistämiseksi. Hankkeessa on määritelty maankäyttöpäätösten digitalisaation tavoitteet, tiekartta ja sitä tukevat toimenpiteet.</p> <p>Hankkeen aikana toteutetuissa toimenpiteissä on keskitytty erityisesti kuntakaavoituksen ja rakentamisen luvituksen välisiin tietovirtoihin sekä niihin liittyvien päätös- ja lähtötietojen kansalliseen saatavuuteen. Merkittävä ensimmäisen vaiheen toimenpide on ollut maankäyttöpäätösten viitearkkitehtuurityön käynnistäminen sekä kansallisen keskustelun edistäminen maankäytön suunnittelun ja rakentamisen tavoiteltavista prosesseista, tietovarannoista, tietovirroista ja kansallisista palveluista. Tärkeäksi on tunnistettu myös maankäyttöpäätösten digitalisaation yhteiskunnallisten vaikutusten arvioiminen, erityisesti eri toimijoiden kustannusten ja hyötyjen osalta.</p> <p>Tähän raporttiin on koottu hankkeen ja sen aikana toteutettujen toimenpiteiden keskeiset tulokset.</p> <p>Hankkeen tuloksia hyödynnetään niin maankäyttö- ja rakennuslain kokonaisuudistuksessa kuin hallitusohjelmassa esitetyn rakennetun ympäristön valtakunnallisen rekisterin ja tietoaalustan toimeenpanossa.</p>		
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Nyckelord	markanvändning, byggande, planering av markanvändningen, planläggning, digitalisering		
Referat	<p>Framtidens markanvändningsbeslut är ett utvecklingsprojekt som genomförts i brett samarbete med intressegrupper under 2019. Målet med projektet har varit att främja digitaliseringen av beslut som hänför sig till markanvändningsplanering och byggande, dvs. markanvändningsbeslut, liksom även kunskapsbaserat beslutsfattande och möjligheterna att använda informationen nationellt.</p> <p>Inom projektet Framtidens markanvändningsbeslut har det skapats enhetliga nationella riktlinjer för främjande av digitaliseringen. Det har satts upp mål för digitaliseringen av markanvändningsbeslut, tagits fram en färdplan och fastställts åtgärder som stöder den.</p> <p>De åtgärder som har genomförts under projektets gång har i synnerhet varit inriktade på dataflödet mellan den kommunala planläggningen och tillstånd för byggande samt på den nationella tillgången till besluts- och källinformation i anslutning till dessa. I den första fasen har en viktig åtgärd varit att inleda arbetet med en referensarkitektur för markanvändningsbeslut samt att främja den nationella debatten om de processer, datalager, dataflöden och nationella tjänster som eftersträvas när det gäller markanvändningsplanering och byggande. Det har också upplevts vara viktigt att bedöma de samhällsliga konsekvenserna av digitaliseringen av markanvändningsbeslut, särskilt när det gäller kostnaderna och nyttan för olika aktörer.</p> <p>I denna rapport sammanställs de viktigaste resultaten av projektet och de åtgärder som vidtagits under projektets gång.</p> <p>Resultaten av projektet kommer att utnyttjas såväl i totalreformen av markanvändnings- och bygglagen som vid genomförandet av det riksomfattande digitala register och den dataplattform som enligt regeringsprogrammet ska skapas för den byggda miljön.</p>		
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KEY TERMS AND CONCEPTS

The following list includes the key terms and concepts used in this report to the extent that it was considered necessary to provide more specific definitions. As the vocabulary and data models for built environments are currently being developed, the terminology is in a constant state of flux.

Baseline data for planning

An up-to-date data set used as reference for drafting and amending a plan.

Source: [Future land use glossary](#).

Built-up area; covered area

A land use area with a certain permitted building volume, within which one or more buildings must be fully located.

Source: [Future land use glossary](#).

Conceptual model

A data model that defines concepts of a universe of discourse as terms assigned to its elements and relationships between concepts. The presentation format may be informal.

Source: [Future land use glossary](#).

Data model

An abstraction of a limited area of the intelligible universe that can be used to mechanically describe the attributes and quality of the elements considered essential in a specific application area and of the interrelationships between these.

Source: [Future land use glossary](#).

Data set

An information entity composed of documents or other corresponding information related to a specific task or service.

Source: [Future land use glossary](#) (in Finnish), adapted from section 2 of the Act on Information Management in Public Administration (906/2019).

Draft plan

A proposed solution to amend a plan so as to fulfil the requirements of a certain plan amendment need.

Source: [Future land use glossary](#).

Information pool An entity containing data sets that is processed through an information system (or manually).

Source: [Future land use glossary](#).

Intended use of an area

A description of the human activity planned for a certain area, based on a classification.

Source: [Future land use glossary](#).

Land use area

A spatial, two-or three-dimensional land use object.

Source: [Future land use glossary](#).

Land use decision

A decision by a competent authority that steers or restricts land use or construction activity.

Source: [The Terminology of Built Environment](#) (superseded, in Finnish).

Land use detail

A detail located within a land use area, typically concerning construction activity.

Source: [Future land use glossary](#).

Land use object

A geographical object with a fixed location included in a land use plan.

Source: [Future land use glossary](#).

Land use plan

A plan that steers land use and construction activity in a certain area.

Source: [Future land use glossary](#).

Logical data model

A data model that describes the selected data contents and their interrelationships in a precise and comprehensive manner, using language independent of storage and data transmission technologies. A logical data model is a description taken to a more precise level beyond a conceptual model.

Source: [Future land use glossary](#).

Logical information pool

A set of data collected on the basis of operational needs.

Source: [Finnish Public Sector Terminological Glossary](#).

Permitted building volume; building rights

The maximum and/or minimum volume of construction allowed within a land use area. Building volume is indicated in terms of the maximum and/or minimum floor square metres or cubic capacity of a building.

Source: [Future land use glossary](#).

Physical data model

A physical data model describes the structure and content of selected data at a technical level, such as in terms of a file or a database structure.

Source: [Future land use glossary](#).

Plan adoption decision

An administrative decision to adopt a plan amendment.

Source: [Future land use glossary](#).

Plan amendment

A substantive amendment made to a plan.

Source: [Future land use glossary](#).

Plan amendment need

A recognised need to define or amend a plan within a limited geographical area.

Source: [Future land use glossary](#).

Plan notation

A standard visual presentation of a plan regulation or recommendation.

Source: [Future land use glossary](#).

- Plan proposal** A proposed solution considered feasible to amend a plan so as to fulfil the requirements of a certain plan amendment need.
Source: [Future land use glossary](#).
- Plan recommendation**
A recommendation on a planning object, aiming to steer land use or construction activity for the object.
Source: [Future land use glossary](#).
- Plan regulation** A regulation governing a planning object to steer land use or construction activity for the object or to identify the object.
Source: [Future land use glossary](#).
- Plan statement** An account of a plan amendment that presents the details required to assess the objectives of the amendment, their effects and the rationale for solutions.
Source: [Future land use glossary](#).
- Planned plot; planned cadastral parcel**
A land use area intended to form a plot. A planned plot is binding if it was formed in a binding subdivision plan; otherwise it is normative. A planned plot becomes a registered plot when it is entered into the Cadastre.
Source: [Future land use glossary](#).
- Planning investigation**
Investigation work considered necessary in the land use planning process in order to draft a land use plan.
Source: [Future land use glossary](#).
- Planning object** A land use object included in a plan.
Source: [Future land use glossary](#).
- Register** A logical information pool composed of data related by intended use, stored at unit level.
Source: [Finnish Public Sector Terminological Glossary](#).
- Shared information pool**
An information pool designed and maintained for several actors, the information in which can be disclosed and exploited for different purposes.
Source: [Future land use glossary](#).
- Plan** An up-to-date land use plan formed as part of a land use planning process.
Source: [Future land use glossary](#).
- Subdivision plan; property division; plot division**
Division of a land area into geographical planning objects that form or are intended to form plots through an applicable real estate formation procedure. A subdivision plan may be drafted in either a binding or a normative form.
Source: [Future land use glossary](#).
- Up-to-date data set**
A data set designed to be constantly updated, such that each data update unambiguously describes the change made to the data set and that any changes made to the status history of its data content are recorded.
Source: [Future land use glossary](#) (in Finnish).
- Zoning element** UA land use area reserved for one or more intended uses in a land use plan.
Source: [Future land use glossary](#).

1 Introduction

1.1 Background

Land use decisions are decisions made by a competent authority to steer or restrict land use or construction, with links to municipal and regional functions. They include local detailed plans, local master plans and regional land use plans, other plans and restrictions related to land use, and building permits. Land use decisions are made by virtue of the Land Use and Building Act (132/1999), but some are also included in other laws. A key attribute of land use decisions is location. The decisions steer various functions and related construction activity in geographical terms in order to ensure sustainable development.

Digitalisation of land use decisions is being developed with a view to promoting the opportunities of the built environment and construction sectors to respond to the most significant challenges of our time, such as climate change, urbanisation and biodiversity protection. These decisions have far-reaching effects on our environment. Digitalising decisions relating to land use planning and construction and developing national access to data can contribute to informed decision-making and nationwide data usability.

As land use decisions and plans made by various public authorities are currently scattered, information is often difficult to access, combine and use. The land use planning and construction system has become blurred for citizens and even experts find it challenging to comprehend. Since current processes have been created for a 'paper world', they are inefficient and involve plenty of overlapping work. People find it difficult to digitalise processes and coordinate sub-processes. In order to digitalise land use decisions, it is necessary to alter both data structures and legislation relevant to land use decisions. The terminology to be used also needs to be harmonised.

This project aimed to form a vision of the short- and long-term measures required to digitalise land use planning and construction and to assess the resource needs and benefits of these measures, the roles of different parties, the required competencies, and the feasibility of schedules. Some of its results can be put to immediate use, while

others can be implemented as part of the reform of the Land Use and Building Act that is currently being drafted. The project produced valuable information for the upcoming legislative reform on areas such as customer-driven and digital working methods, use of data in decision-making processes, and critical interdependencies between legislation and different measures.

In the future, digitalisation of land use decisions will benefit both those working with land use planning and construction and anyone applying for a building permit or interested in their local land use planning projects. It is also expected to bring benefits to a wide range of activities, such as the forestry industry and energy, trading, financial and construction businesses. Open access to land use decision data will facilitate efficient use of information, more open and transparent drafting and informed decision-making processes.

1.2 Project objectives

The project aimed to contribute to digitalising land use decisions and support the reform of the Land Use and Building Act. It specified guidelines for the digitalisation of land use decisions through to 2030, the phases of progress, and concrete measures for the next few years.

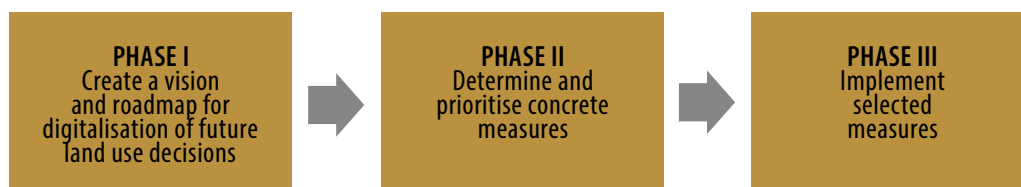


Figure 1. Project work consisted of three phases.

Create a vision and roadmap (Phase I, Jan–Apr 2019)

The first project phase focused on specifying the objectives to digitalise land use decisions and creating a vision and roadmap for 2019–2030. The roadmap meets the following two needs:

1. to identify short-term digitalisation measures (with special focus on key measures relevant to the legislative reform);
2. to identify long-term measures to digitalise the overall land use process through to 2030.

The vision and roadmap for land use decisions were based on prior studies and the results of national development projects relevant to land use decisions that were ongoing during the project. The project team worked on the contents of the vision and roadmap in very broad cooperation with experts and other parties operating in the sector.

The first phase aimed to answer the following questions:

- What measures are required to digitalise land use decisions?
- What are the most significant land use decision data sets under the Land Use and Building Act and other laws, which at least should be made digitally available nationwide?
- What measures are key from the cost-benefit perspective?
- What is the appropriate timetable for the measures?
- How can Finland make use of the digitalisation plans produced by other Nordic countries?

Determine measures (Phase II, May–Jul/2019)

The second project phase involved determining the first concrete measures to be launched in autumn 2019 on the basis of the vision and roadmap and preparing project plans for the measures. During Phase II, opinions on the tentative measures were also gauged through an online survey in the otakantaa.fi service and several seminars and workshops.

Key questions to study in Phase II:

- What are the impacts and costs/benefits of the measures?
- What are the key measures to digitalise and structure data?
- On what schedule can the measures be carried out and how should they be phased?
- What key terms of land use decisions are missing from the interoperability toolkit?

Implement selected measures (Phase III, Aug–Dec/2019)

The third phase focused on implementing the measures selected in Phase II. The following measures were selected for implementation:

- simulation of data flows, development of conceptual models and logical data models;
- technical feasibility testing;

- separating decision and baseline data and national availability of baseline data;
- reference architecture of land use decisions 2030, version 0.7;
- stakeholder cooperation, communications and events;
- social impact analysis.

1.3 Linkage to legislative reforms and other projects

Reform of the Land Use and Building Act

The currently ongoing **reform of the Land Use and Building Act** aims to clarify and simplify the land use planning system; develop the steering of construction; support the opportunities of citizens' participation in planning and decision-making processes concerning their own living environments; and ensure that the law will be clear and consistent. A further objective is to ensure that the potential of digitalisation will be exploited in planning built environments, increasing interaction and management by knowledge. The Ministry of the Environment is responsible for the legislative drafting process. The aim is to complete the Government Proposal for a new Land Use and Building Act by the end of 2021.

The key points relevant to the land use planning system include:

- roles at different planning levels and issues to solve at each level;
- reducing the burden of informative content on plans;
- separating plan-related data and matters decided in plans and ensuring access to data;
- presentation method of plans (cartographic, verbal);
- legal effects and planning system hierarchy (rights and responsibilities).

The key points relevant to construction include:

- How to improve the systematic use and maintenance of a building across its life cycle?
- How to ensure that the building stock will become low carbon?
- How to arrange liability issues involved in construction and organise the roles and responsibilities of different parties involved in the construction chain?

- How should legislation take digital tools into account in construction projects and property maintenance?
- How to organise building control in the future?
- How to streamline building permit procedures?

The purpose of this project was to support the reform of the Land Use and Building Act in order to ensure that it would achieve its objectives with regard to promoting digitalisation. Consequently, this entailed close coordination with other areas of the legislative reform project.

Reform of information management legislation

The Act on Information Management in Public Administration (the ‘Public Information Management Act’, 906/2019) entered into force on 1 January 2020. The Act aims to ensure harmonised and high-quality management and secure processing of data sets of authorities to implement the principle of openness. Furthermore, the Act enables secure and efficient exploitation of the data sets of authorities so as to ensure that the authorities can attend to their tasks and provide their services to public administration clients effectively and to a high quality standard in compliance with good governance. It also promotes the interoperability of information systems and information pools.

Among other things, the Public Information Management Act includes provisions on:

- General information management obligations in public administration.
- Further provisions on the scope of application are laid down in the Act.
- General governance of information management in public administration and a new organ, i.e. the Information Management Board of Public Administration.
- Principles of data security in public administration.
- Production of data sets and electronic disclosure.
- Use of technical interfaces.
- Case management and information management of services.

The Public Information Management Act lays down the following provisions on the use of technical interfaces: “The authorities shall implement electronic disclosure of information of a regularly repetitive character and standard content between information systems via technical interfaces if the receiving authority has a statutory right of access to the information. Electronic disclosure of information of a regularly repetitive character and standard content may be implemented in another manner if the implementation or use of the technical interface is not technically or financially appropriate. The authority may open

the technical interface to an authority with the right of access also in other situations.” In addition, it is necessary to ensure that information is processed securely, taking into account the rights of public administration clients.

Under the Act, an authority may not request its client to present or submit certificates or extracts if the authority is entitled to obtain the same information from another authority in a timely manner via a technical interface or viewing access. The aim is to ensure that the authority will not ask its client to resubmit any information already obtained from the client or registered by the authority. This will ease the administrative burdens of citizens and businesses and improve the realisation of the ‘one-stop-shop’ principle.

The Public Information Management Act also has a bearing on the modification of documents submitted to the authorities into electronic format. If a document provided to be permanently preserved or archived by law or under an act is received by an authority in other than electronic format, the Act requires that it be modified into electronic format. The authority is responsible for ensuring that the document modified into electronic format retains its reliability and integrity.

The new Public Information Management Act also contributes to the interoperability of information systems and information pools. It brings public authorities’ information management procedures up to date and promotes the harmonised and secure processing of citizens’ information by the authorities.

The Act also supports the implementation of the objectives of the Future Land Use Decisions project and the reform of the Land Use and Building Act.

Table 1. Transitional provisions of the Public Information Management Act

Within 12 months	Descriptions of information pools (section 28) Use of an interface or viewing access (section 20)
Within 24 months	Modification into electronic format (section 19) Compilation of log data (section 17) Case management (sections 26–27)
Within 36 months	Data security (section 12–16)
Within 48 months	Implementation of an interface and viewing access (sections 22–24) in existing information systems; applicable to new ones from the start

Other key laws

- Real Estate Formation Act [554/1995](#) (available in English): plays a key role in the Future Land Use Decisions project;

- Government Decree on Spatial Data Infrastructure [725/2009](#) (in Finnish) and
- Act on Spatial Data Infrastructure [421/2009](#) (in Finnish);
- Act on the Provision of Digital Services [306/2019](#) (in Finnish);
- Act on Electronic Services and Communication in the Public Sector [13/2003](#) (available in English);
- Administrative Procedure Act [343/2003](#) (available in English);
- Archives Act [831/1994](#) (in Finnish);
- Act on the Openness of Government Activities [621/1999](#) (available in English);
- EU [General Data Protection Regulation](#) and national Data Protection Act [1050/2018](#) (available in English);
- Act on Shared Support Services for eGovernment (the ‘KaPA Act’) [571/2016](#) (in Finnish);
- Highways Act [503/2005](#) (available in English);
- Act on Private Roads [560/2018](#) (in Finnish);
- Railways Act [110/2007](#) (in Finnish);
- Church Act [1054/1993](#) (in Finnish);
- Nature Conservation Act [1096/1996](#) (available in English);
- Environmental Protection Act [527/2014](#) (available in English);
- Forest Act [1093/1996](#) (available in English);
- Act on establishing certain state-owned lands as mire reserves [851/1988](#) (in Finnish);
- Wilderness Act [62/1991](#) (in Finnish);
- Water Act [587/2011](#) (available in English);
- Noise Abatement Act [382/1987](#) (in Finnish);
- Act on the protection of rapids [35/1987](#) (in Finnish);
- Heritage Protection Act [498/2010](#) (in Finnish);
- Antiquities Act [295/1963](#) (in Finnish);
- Outdoor Recreation Act [606/1973](#) (available in English);
- Cross-Country Traffic Act [1710/1995](#) (in Finnish);
- Waterways Traffic Act [463/1996](#) (in Finnish);
- Mining Act [621/2011](#) (available in English);
- Rescue Act [379/2011](#) (available in English);
- Act on the Organisation of River Basin Management and the Marine Strategy [1299/2004](#) (available in English);
- Temporary Act on the Financing of Sustainable Forestry [34/2015](#) (available in English);
- Flood Risk Management Act [620/2010](#) (available in English);
- Act on the Delimitation of the Territorial Waters of Finland [463/1956](#) (available in English);

- Water Services Act [119/2001](#) (available in English);
- Animal Diseases Act [441/2013](#) (available in English);
- Firing Range Act [763/2015](#) (in Finnish);
- Land Extraction Act [555/1981](#) (available in English);
- Aviation Act [864/2014](#) (available in English).

Principles and reports

- Primary role of digital services ([in Finnish](#));
- Information policy report ([available in English](#));
- Report on spatial data policy ([available in English](#)).

Other projects

A considerable number of studies and surveys relating to the digitalisation of land use and construction have been conducted in recent years. Alongside the Future Land Use Decisions project, there have also been several other projects relevant to the subject.

Key projects include:

- Subprojects of the [Geospatial Platform Project](#):
 - the [Land Use Plans](#) project and its [work packages](#),
 - the [Municipal Pilot Project](#) that ended in the summer of 2019,
 - the [National Topographic Database](#);
- [terminology development](#) as part of the Joint Metadata and Information Management (YTI) project.
- The [interoperability platform](#) consists of terminologies, code lists and data models required for data flows and information management. With regard to land use and construction, these interoperability data specifications will be administered on the interoperability platform. In the target state outlined in the vision, the platform could replace some JHS Public Administration Recommendations for these data specifications. The platform is currently being developed.
- The [KIRA-digi](#) project (Digitalisation of the built environment and construction sectors) and its [experimental projects](#);
- [ASREK 2.0](#) (electronic housing share register);
- [local plan simulation](#).

The results and conclusions of existing studies were thoroughly scrutinised during the first project phase. This project took the results of previous studies into account when determining its vision, roadmap and measures.

The project involved close dialogue with other, concurrent development projects. During the autumn of 2019, the project's experts participated in real estate formation and terminology workshops as well as in the workshops organised by the Association of Finnish Local and Regional Authorities as part of the local plan simulation project, etc. At the same time, the observations and conclusions made in the Future Land Use Decisions project were also actively communicated for use in the work packages carried out as part of the Land Use Plans project (Study on the plan background map, Study on archiving plans, and Version management and validation of model-based plans).

2 Development needs in the current system

The current Land Use and Building Act was mainly drafted at a time when digital planning tools and data flows were far from today's standards. Furthermore, the current national data structures relevant to land use planning were mostly created to provide a digital equivalent to or to archive land use decision data available in print format (YM [*Ministry of the Environment*] 2018). This means that the opportunities to make use of this data are limited (Lexia 2019).

Legislation relevant to land use has been drafted sectorally, gradually and at different times, often to meet the needs of individual (new and changing) official processes, not necessarily looking at the bigger picture – the Land Use and Building Act alone has been amended 46 times since the turn of the millennium. The overall system has become blurred for citizens and even experts find it challenging to comprehend. The processes are partly inefficient and involve plenty of overlapping work (TIPPI 2017). It is difficult to digitalise processes and coordinate sub-processes.

The challenges and development needs of the current system can be outlined more specifically from the perspectives of different parties. The challenges have been addressed in several previous reports (incl. TIPPI 2017 and the Land Use Plans project's action plan, 6/2018).

General challenges identified in the current system:

- The roles of different parties are partly unclear and involve plenty of overlapping work.
- Data production, conversion and maintenance require significant resources; 'resource loss' is considerable and misinterpretations are common.
- The availability, quality and up-to-dateness of data present challenges; cross-analysis is difficult and the data utilisation rate is low.
- Decision-making and other processes related to land use (planning) are slow.

- Procurement of information systems and data production and maintenance involve risks, while the interoperability of different systems presents significant challenges.
- Local authorities and other parties are unclear/uncertain about purchasing, deploying and developing information services.
- The current system does not support the development of innovations and business concerning built environments (incl. 3D, VR, AR, etc.).
- Real estate asset management is challenging.

Key challenges in terms of **plan data as part of information infrastructure**:

- Instead of being consistent, data sets vary in terms of structure and quality.
- Data is not comprehensively available in a consistent format.
- In many cases, data needs to be obtained separately for each municipality and local authorities have varying data disclosure policies (pricing, terms of use, file formats, etc.).
- It is not known what data sets exist (because local authorities have failed to produce comprehensive metadata on their data sets, etc.).

Key development needs relevant to **residents and property owners** are related to improving access to information about and opportunities to participate in their local environments:

- Access to timely and understandable information presents challenges.
- There are challenges with data flows between citizens and public authorities (e.g. submission of information required for permit processes).
- It is necessary to facilitate the opportunities of residents to participate in planning their living environments.

From the perspective of the **business community**, the key challenges involved in the current system include:

- The data produced by different types of planning software is difficult to combine or exploit for business purposes.
- Businesses need better information about the environmental status and planning situation to provide a basis for their business, investment and location decisions.

- Some businesses have access to better information about the land use planning situation, creating an unlevel playing field for businesses (transparency).
- The poor availability of information may affect the opportunities of businesses for service improvement, process automation and business development.
- Information service businesses face a high threshold for improving services as the course of future development is uncertain.
- Consultants using land use decision data spend a great deal of their resources on addressing requests for information and harmonising data sets (high costs of planning).

From the perspective of **local authorities**, the key challenges identified in the current system include:

- inefficient municipal and regional land use decision-making processes:
 - considerable resources spent on collecting and compiling baseline data required for land use planning and converting it into a compatible format,
 - data produced in planning processes is often difficult to exploit elsewhere,
 - inefficiency of building permit procedures,
 - quality or incommensurability of impact assessments;
- data production and maintenance processes and costs and competencies relating to systems:
 - procurement risks and ‘vendor lock-ins’ involved in information systems,
 - uncertainty with information system purchases, in particular in small municipalities;
- rigid manual obligations of reporting on land use decisions; need to be replaced with modern, automated procedures;
- availability and usability of plan data;
- significant human resources spent on requests for information (customer service questions, separate deliveries of land use data sets);
- challenges involved in engaging municipal residents.

From the **central government’s** perspective, key development needs concern enhancing operational efficiency in government agencies:

- The environmental administration requires land use decision data in its operations. At present, data is being copied from different sources to environmental administration systems and updated manually. In many cases, data is only available on paper.
- The National Land Survey of Finland needs plan data for cadastral procedures and to maintain the Official Purchase Price Register. Data sets are obtained by manual delivery.
- The knowledge base for property taxation and tax collection involve significant challenges.
- Land use decision data should be made available for supervision under the Forest Act.

3 Key land use decisions

3.1 Classification of land use decisions

Land use decisions are decisions made by a competent authority to steer or restrict land use or construction, with links to municipal and regional functions. They include local detailed plans, local master plans and regional land use plans, other plans and restrictions related to land use, and building permits. A key attribute of land use decisions is location, i.e. the geographical targeting of regulations.

During 2017 and 2018, the Ministry of the Environment identified the land use decision data used in built environment processes included in the Land Use and Building Act and, to some extent, in other pieces of legislation. The aim was to form an overview of key land use decisions and list the land use decisions governed by other laws that require data contents from those under the Land Use and Building Act or vice versa.

In cooperation with the Finnish Environment Institute, the Ministry of the Environment identified a total of 45 land use decisions under the Land Use and Building Act. These have been tentatively linked to 86 land use decisions governed by other laws. One of the purposes of this project was to determine the most significant land use decisions under the Land Use and Building Act and other laws, which at least should be made available in a digital format nationwide. Since the process of reforming the Land Use and Building Act was still ongoing, it was necessary to examine the situation in terms of both the current and the post-reform status.

As this work essentially catered to the reform of the Land Use and Building Act, **the decisions, permits and regulations under the Land Use and Building Act were placed at its core.** The decisions that should be made digitally available nationwide during the first phase defined in the roadmap include at least the legally binding municipal and regional council land use plans and restrictions that fall within the scope of the Land Use and Building Act. Besides these, however, it is also necessary to take account of a wide range of other land use decisions and other decisions with indirect effects on these. Their

data should be made available in an interoperable format to public authorities and other parties that require it, for example via an interface specified in the Public Information Management Act. Moving forward, it is also necessary to enable the key baseline data sets relevant to land use decisions, decisions made by virtue of other laws and spatial data sets required for analysing qualitative requirements to be made available as mostly open, free-of-charge and interoperable spatial data.

Depending on the perspective, current land use decision data can be classified in different ways. The classification presented below in order to identify the key land use decision data relevant to this project helps outline the relevance of different types of decisions and the extent to which it is desirable to address these as part of the reform of the Land Use and Building Act and possibly at a later date. From the perspective of data interoperability, it would be essential to outline the land use decisions that are frequently required in various processes and are currently difficult to transfer, integrate and utilise.

Table 2. Main categories of land use decisions. The decision-making body listed for each specific category is the one primarily responsible for making the decisions. The ‘Number’ column shows the number of the land use decisions falling within each main category when not all of the decisions are divided into specific categories (e.g. shoreline planning needs).

Main category	Description	Decisionmaking body	Number
1 Land use restrictions and protection	Not dependent on plans but taken into account in plans. Plans also include their own specific restrictions. Examples of land use decisions in this category include <i>nature conservation areas, nationally significant built heritage sites, archaeological relics and groundwater areas.</i>	Central government	23
2 Property rights and dimensions	Real estate formation (e.g. subdivision) and any rights and easements of a property. Not usually dependent on plans. a) Rights include personal rights to properties: titles, easements (special rights). b) Dimensions include the rights and easements of properties, which serve or encumber a property.	Central government	13
3 Planning	All plans, national land use objectives, infrastructure planning, etc. Restrictions independent of plans taken into account while creating conditions and restrictions for construction and activities.	Regional council, local authority	30
4 Construction	Building permits etc. are produced with due consideration for the requirements and restrictions under Categories 1–3.	Local authority	35
5 Activity	Environmental permits, etc. Determine the parameters within which existing activities can be carried out. Not therefore relevant to enabling construction; instead, relevant to land use as regards steering the activities and their scope.	Central or local government	18

Most decisions under the **land use restrictions and protection** category fall outside the scope of the Land Use and Building Act and typically provide key baseline data for land use planning. These are frequently required and outline significant parameters for

subsequent decisions. Many of the data sets under this category are already fairly well available nationwide. The relevance of decision data within this category must be assessed with due consideration for their social significance and importance to other processes. The most relevant sets of data in terms of digitalising land use planning can be considered to include built heritage, archaeological relics, nature conservation and groundwater protection. The main focus of analysis is on contributing to the national availability and harmonisation of these data sets.

Decisions under the **property rights and dimensions** category do not have any significant effects on other land use decisions. However, a significant need to promote interoperability has been identified between plot division and real estate formation. As regards this main category, this project especially focused on the needs and opportunities to develop the automation of practices and data flows between local detailed planning and real estate formation.

Most decisions under the **planning** category fall within the scope of the Land Use and Building Act, creating conditions and restrictions for construction and activities. The main focus of this project was on these decisions. It is essential to identify the measures to promote the interoperability and national availability of these land use decision data sets.

In the process, decisions under the **construction** category – such as building permits, action permits and planning requirement decisions – typically follow on the decisions under the previous category. As regards this category, this project mainly focused on the decisions that steer construction and on how to promote the data flows and interoperability across the whole process from local land use planning to permit procedures.

Decisions under the **activity** category determine the parameters within which activities can be carried out in built environments. This category includes decisions such as environmental permits, land extraction permits, and mineral rights and mining permits, which can be used to steer activities and their scope.

The classification of land use decisions presented above helps outline the current practical procedures and the challenges that these bring for digitalisation of land use decisions and planning based on data models. One of the key challenges is that the land use decision data describing the same item in different plans and at different plan levels are often slightly divergent in terms of accuracy and data content. Moreover, it often remains unclear which decision was made by which body. Regional land use plans, for example, have presented objects within the 'land use restrictions and protection' category as such. The decision data included in plans can also easily become outdated, making it difficult to assess whether it is up to date. In order to solve these issues, it is necessary not only to

consider the development of structured land use decision data, but also to examine the development needs of all land use planning practices more broadly as a whole.

3.2 Need to separate baseline and decision data

In the context of the reform of the Land Use and Building Act, it has been proposed that plan decisions should no longer include any other land use decisions and baseline data. The need to separate baseline data and decision data, clarify their respective roles and promote their national availability was also raised during the process of classifying land use decisions.

At present, land use plans include other land use decisions, blurring the clarity of the actual content and steering effect of each decision. The steering instruments relevant to land use frequently contain details that are slightly divergent or outdated in terms of data content. An up-to-date overview of land use decisions and other baseline data is not available from any other source. At present, both the interested parties and the decision-making bodies are often unclear about what matters were decided previously and by whom, and for what purposes each land use decision in question can be used.

The following list provides examples of the most typical baseline data and other types of decision data included in plans, with land use decisions indicated by an asterisk (*):

- areas covered by nature conservation programmes*;
- areas protected under the Nature Conservation Act*;
- sites listed in the Natura 2000 network*;
- groundwater areas*;
- nationally significant built heritage sites*;
- UNESCO world heritage sites*;
- areas and sites protected under the Antiquities Act*;
- landscape conservation areas of national interest*;
- SEVESO sites*;
- plan reports and impact assessment;
- plan background map;
- other baseline data;
- other reports and decisions;
- areas included in the POSKI project (for the reconciliation of groundwater conservation and mineral material supply);
- areas relevant to development needs for the purposes of national defence, border security and control, and security of supply.

In order to ensure genuine engagement and decision-making based on the best available information, it would be necessary to outline the means by which baseline and decision data could be separated more easily and consider the operating models to move this forward. Another area for improvement is promoting the national availability of baseline data – as a general rule, the data should be made nationally available based on the ‘one-stop-shop’ principle.

4 Values and principles

Land use decisions should be digitalised in a **customer-oriented** manner. Rather than being an end in itself, digitalisation should bring concrete benefits to customers, prioritising their needs. Development must be carried out in cooperation with the relevant parties, such as land use planners, software vendors, planning consultants and various public authorities. Development must be based on **openness and transparency**.

Development is carried out in keeping with the following proposed principles for digitalisation of built environments, which highlight **ease of use, security and interoperability** alongside customer orientation and a culture of experimentation. The digitalisation principles of built environments draw on the principles of digitalisation outlined by the Government in 2016, which are applied to reforming public services.

DIGITALISATION PRINCIPLES OF BUILT ENVIRONMENTS

1. We will provide customer-oriented services

Solutions and services are, above all, made for users, i.e. customers. We will test what users want to achieve with the solutions or services.

2. We will cut unnecessary red tape

We will streamline and facilitate communication between companies and organisations. End customers will have the opportunity to use primarily digital services.

3. We will build easy-to-use and secure services

Services will be easy to use securely on different devices. We will pay attention to the specific needs of individuals, businesses and organisations. *The needs of public authorities will also be taken into account. Land use decision data should form a structurally and semantically consistent and interoperable whole, contributing to its ease of use.*

4. We will produce benefits for our customers quickly

We will identify the most valuable features for customers and start development from these. Feedback on the service will be quickly available. Time and money will be saved. We will learn by doing and testing.

5. We will be prepared for disruptions and emergencies

We will communicate on these clearly and accurately.

6. We will make use of existing information and digital services

We will ask for new information only once. We will develop services cost-efficiently. We will use various services, including the National Architecture for Digital Services (KaPA). We will ensure that our services are also available for others to use.

7. We will provide businesses and citizens with open data, open access to information and open interfaces.

In principle, we will provide the public with open access to information and interfaces, unless there is a particular reason to restrict access. We will make the information available for developing new kinds of services. Openness will benefit everyone. *We will open up open access to machine-readable structured data interfaces.*

8. We will designate an owner for data

Built environment data will have a designated owner for its entire life cycle. The owner will be responsible for keeping the data up to date and facilitating dialogue between different parties. *We will define the data owner's rights and responsibilities with regard to the opening and interoperability of data.*

9. We will follow international standards

International standards will form the basis for all development. Due consideration will also be given to national harmonisation needs.

10. We will link the legal force of decisions to digital access

A land use decision will become legally final once it is registered in the national system.

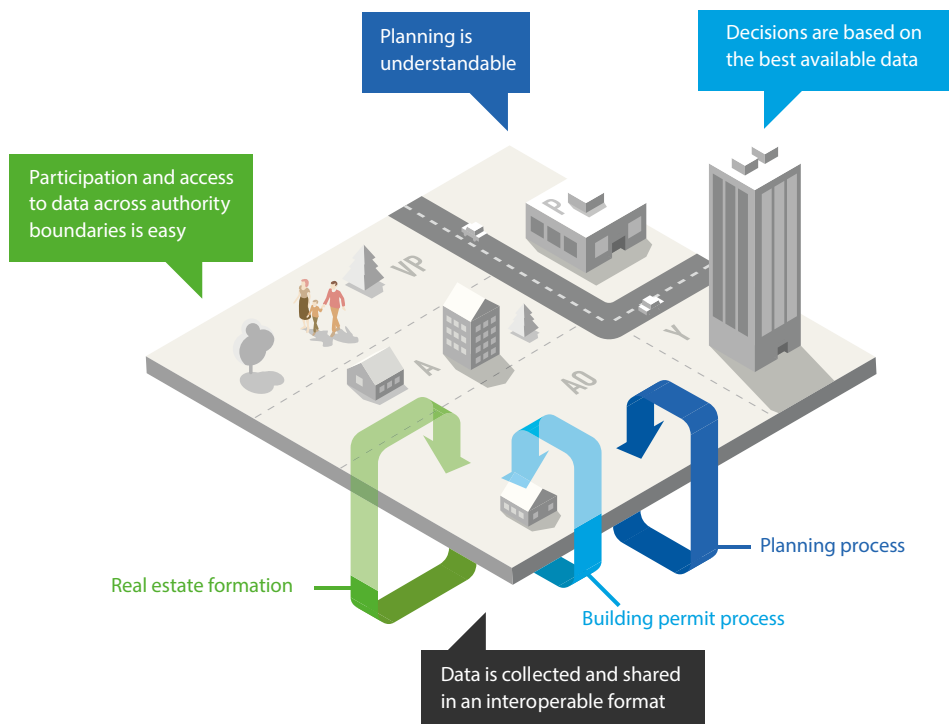
NB! The italics indicate specifications with regard to land use decisions.

5 Vision for 2030

The vision for digitalisation of future land use decisions for 2030 sets the course for developing digital land use decisions. The vision describes the target state of development – what is pursued with the development process. The vision was prepared drawing on the results of prior reports and plans and it was further developed in broad cooperation with parties involved in the sector in seminars, workshops, etc.

The vision consists of the following four broad strategic objectives:

1. Participation and access to data across administrative boundaries is easy;
2. Data is collected and shared in an interoperable format;
3. Decisions are based on the best available data;
4. Planning is understandable.



1. Participation and access to data is easy

Living environments will be built together. Interaction between public authorities and other parties will be smooth. Data related to land use planning and construction will be up to date, comprehensible and easily available.

People will be able to participate in the process of drafting decisions on land use by means of user-friendly services. Services will be intended for both individuals interested in their own environments and businesses planning their operations.

People's privacy and personal data will be protected.

2. Data is collected and shared in an interoperable format

The decisions that steer land use and their history data will be compiled at the national level. Data will be shared digitally in keeping with national and international open standards. Land use decision data will be structured on the basis of location and updated in a controlled manner from beginning to end of each project.

Decision data will be easy to find through coherent services. Services will be developed on the basis of feedback provided.

Interoperable service platforms and data structures will lower the threshold for businesses to participate in developing new services and business operations.

3. Decisions are based on the best available data

Decision-making will be based on reliable, nationally and internationally comparable data. Local authorities will be able to make active use of data to develop their communities and environments.

It will be increasingly easy to assess the economic, ecological and social sustainability of communities in land use and construction. This will help respond to challenges such as climate change, urbanisation and biodiversity protection.

4. Planning is understandable

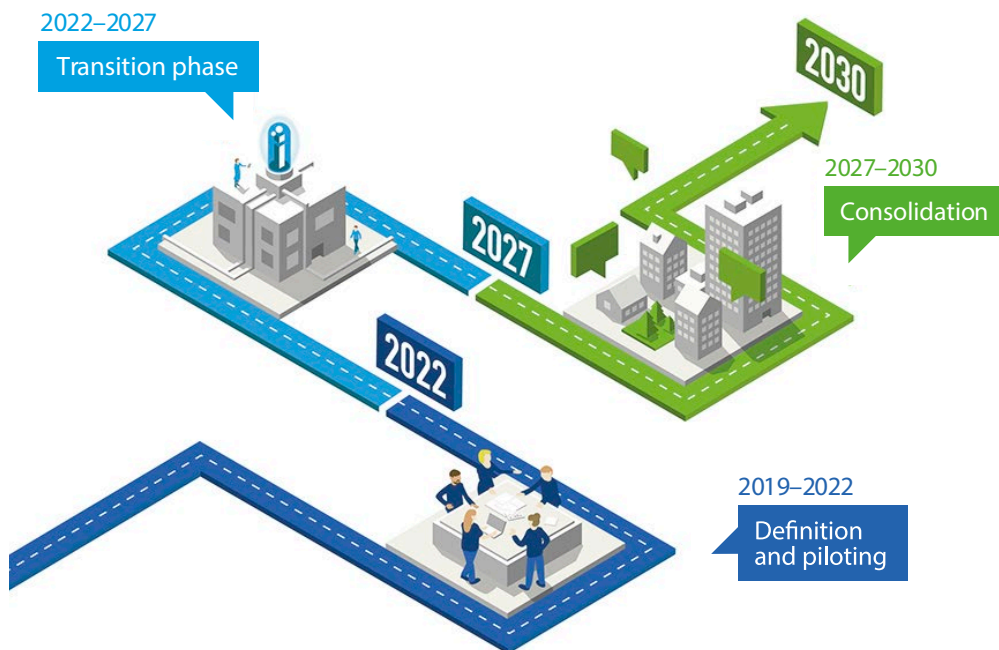
A coherent decision-to-decision path will be in place in land use and construction. It will be easy to examine both the process as a whole and the interdependencies between individual decisions.

Planning will be efficient. Overlapping work and costs will be reduced by a well-managed data structure, harmonised practices and national services.

6 Strategic roadmap

The roadmap for future land use decisions breaks down the strategic objectives of the vision for 2030 into concrete milestones. The roadmap describes what should be achieved within each specific time frame to make transformation possible by 2030.

The development path for digitalising land use decisions is roughly divided into three phases. The first phase is the definition and pilot phase (2019–2022). This phase will lay the foundation for transformation – the groundwork for digital ways of working in the sector. The second phase, i.e. the transition phase (2022–2027), will involve a controlled transition from current land use decision-making processes to new, digital processes, guided by legal statutes and recommendations. The third phase (2027–2030) will see the consistent planning practices being established as a permanent part of expert work and the effects will begin to be widely reflected in different sectors of society.



6.1 Definition and pilot phase 2019–2022

The **definition and pilot phase** focuses on creating conditions for effective digital processes in cooperation with parties involved in the sector and ensuring their functionality with tests. Key steps for transformation over the 2019–2022 period:

Defining shared terms

- Comprehensible terminology will be defined to enable smooth interaction between different stakeholders and systems – a common language.
- The terminology and other definitions will be described on the national interoperability platform at yhteentoimiva.suomi.fi (in Finnish).

Identifying key land use decisions and ensuring their interoperability

- Key land use decisions most relevant to land use planning and construction will be identified.
- The data models of the identified decisions will be defined and tested.
- The national availability of key baseline data most relevant to land use planning and construction will be ensured.

Securing central government support for implementing the transformation

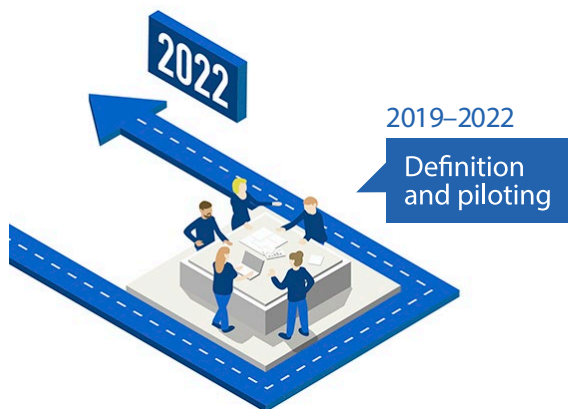
- The measures required to achieve the objectives and the costs involved will have been carefully assessed from the perspectives of different parties.
- The central government will commit to promoting the objectives and will provide funding to ensure that these are achieved.
- The Ministry of the Environment will support the implementation of the requirements of the new Public Information Management Act within its own administrative branch.

Engaging stakeholders actively in the transformation

- Digitalisation is not an end in itself. The benefits of digitalising land use decisions for practical operations will be widely recognised.
- Stakeholders will get involved and will together contribute actively to making the transformation.

Defining, implementing and testing the systems

- Effective digitalisation of land use decisions requires building a national information system and services.
- Client software will be developed in cooperation with various vendors and stakeholders.



- Basic requirements for digital procedures are created.
- Public authorities produce interoperable, reliable and geographically based data.
- Key data is available in one place nationwide.

6.2 Transition phase 2022–2027

The **transition phase** will involve a controlled transition from current land use decision-making processes to new, digital processes, guided by legal statutes and recommendations. Key steps for transformation over the 2022–2027 period:

Phasing in the obligations of revised legislation

- The new Land Use and Building Act will probably be adopted in 2022.
- The parties responsible for land use decisions will modernise their processes to meet the requirements of the new law. The Public Information Management Act will set the framework for the transformation of information management as part of process modernisation. Parties will rely on data transfer via interfaces.
- During the transition phase, different parties will have access to national support services for transformation.

New planning system practices taking shape

- The new planning system will be in place.
- Parties making land use decisions will develop plans based on data models in keeping with new planning practices.
- Many decision-making practices will take shape gradually. This will be taken into account in further development of the planning system.

Plans available nationwide

- Existing adopted plan data will mostly be digitised and stored in the national information system during the transition phase.
- All land use plans prepared under the new legislation will always be entered into the national information system.

Land use planning supported by the national information system for land use decisions

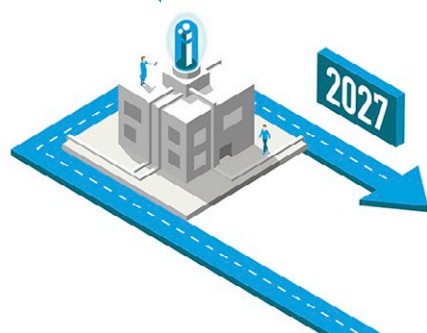
- Parties responsible for land use decisions will phase in national information system services.
- National services will support and streamline planning processes, enabling better decisions by means such as engagement and interaction.
- The information system will be developed on the basis of experience gained from production use.

Improving interoperability between land use, cadastral and permit data

- The processes and interoperability of land use, cadastral and permit data generation will be developed as a whole.
- Data will flow and retain its integrity from the start of planning through to the end of implementation and deployment.

2022–2027

Transition phase



- People will find it easy to take part in the planning of their own living environments as information is understandable and easy to access.
- Active participation helps in decision making and brings savings.

6.3 Consolidation phase 2027–2030

During the **operational consolidation phase**, digitalisation of land use decisions will be widely reflected in knowledge management and in the increased efficiency of other processes making use of the data. Key steps for transformation over the 2027–2030 period:

Consistent planning practices established as part of expert work

- Planning practices will be widely established among experts.
- The national information system will be efficiently exploited as part of different official processes and expert tasks.

Land use planning and implementation integrated into an interoperable whole

- The overall land use process will form a chain of interoperable processes, creating high-quality living environments.
- The shared services of the national information infrastructure will be integrated as part of the overall land use process in this phase at the latest.

All land use decisions and related data available nationwide

- Any remaining key land use decision data will also be integrated as part of the national information system.
- The system's data content will be enriched by plan background data, such as investigation materials.

Ensuring the interoperability of laws relevant to land use

- The interoperability of laws relevant to land use within different administrative branches will be ensured.

Services and processes improved by high-quality digital land use decision data

- Data relevant to land use will be exploited nationwide, improving services and processes provided by different parties and sectors.
- New services will be actively developed on the basis of digital land use decision data.



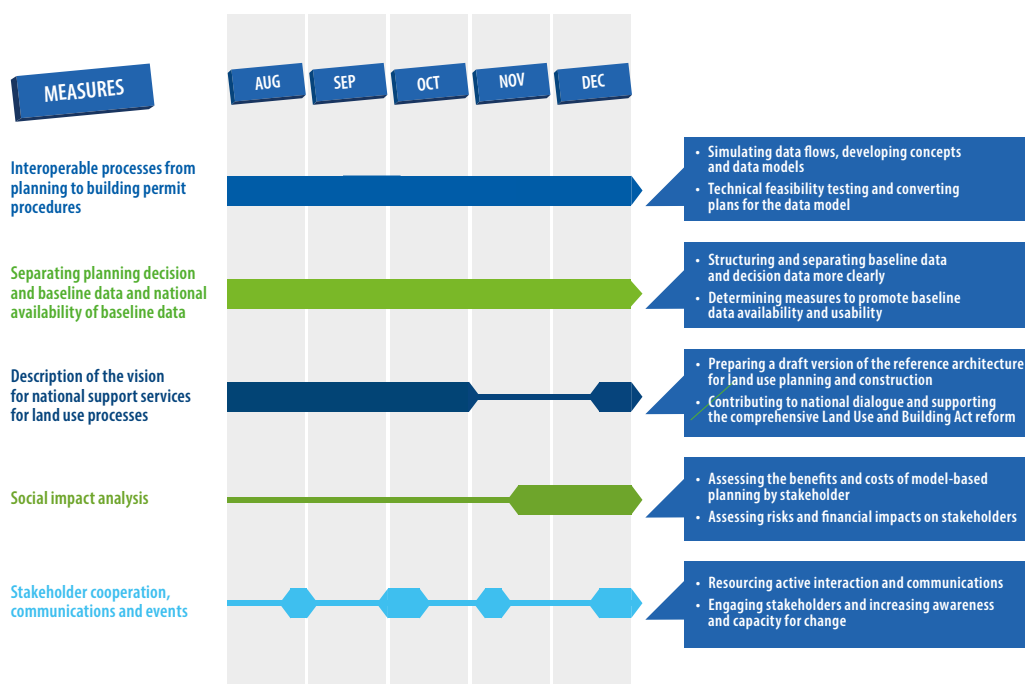
- Participation and access to data is easy.
- Data is collected and shared in interoperable format.
- Decisions are based on the best available data.
- Planning is understandable.

7 Measures completed

The vision for 2030 and the milestones specified in the strategic roadmap were used as a basis to determine the first concrete measures, which were carried out in the autumn of 2019. The measures implemented within the project framework were determined with due consideration for the effectiveness and interdependencies of the measures and for ongoing parallel processes and projects. Feedback obtained through cooperation with a wide range of stakeholders was also taken into account when the measures were being determined and developed.

In the autumn of 2019, five distinct packages of measures were launched as part of this project and developed in close mutual cooperation. The packages and their timetables are described in the figure below.

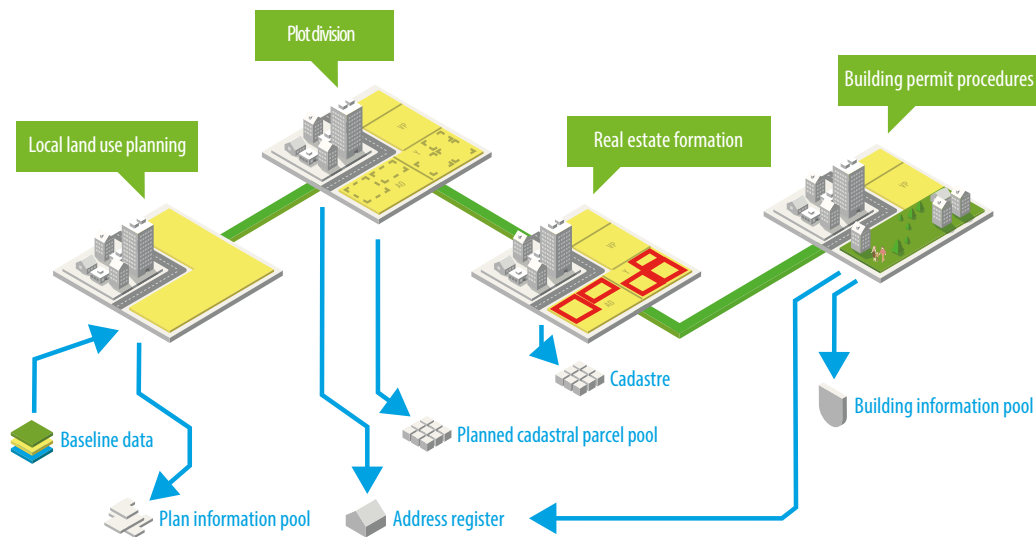
Alongside the packages, the project also contributed to conceptual modelling on the **interoperability platform**, especially in terms of land use planning and real estate formation. At the same time, the project's experts actively participated in the workshops organised as part of a local plan simulation project, which was led by the Association of Finnish Local and Regional Authorities. They also actively communicated the observations and conclusions made in the Future Land Use Decisions project for use in the work packages carried out as part of the Land Use Plans project in the autumn of 2019 (Study on the plan background map, Study on archiving plans, and Version management and validation of model-based plans).



The contents and key results of the measures are briefly described below.

7.1 Interoperable processes from land use planning to building permit procedures

The autumn of 2019 saw the launch of a package of measures focusing on the development of data flows between local land use planning, real estate formation and building permit procedures and the relevant terms and logical data models. At the same time, the Association of Finnish Local and Regional Authorities initiated the local plan simulation project with a view to testing one local plan model in a municipal environment and assessing its functionality as part of the planning and steering system. The projects worked in close cooperation through intensive workshop sessions.



The package of measures involved extensive investigation into the development needs of data flows between local land use planning, real estate formation and building permit procedures and the relevant terms and logical data models. The aim was to identify the needs by looking into the current planning and permit procedures, processes, data flows and systems of five different cities (Iisalmi, Jyväskylä, Tampere, Hämeenlinna, Helsinki).

The work outlined the special features of current local master plans and local detailed plans and assessed the kinds of challenges that they entail for model-based planning. The challenges identified include the vast number of different plan regulations and problems caused by normative notations and ambiguous regulations. Particular challenges are presented by local master plans, which are drafted in very different ways in Finland and involve considerable differences in terms of steering effects and level of detail. While local detailed plans are fairly consistent in terms of presentation method and structure when compared with local master plans, the strong legal and binding elements involved introduce their own challenges and parameters to data model development.

Analysis of data flows from local land use planning through to building permit procedures revealed that demand for data is highest between planning and building permit procedures. The volume of data is lower in plot division and real estate formation processes. Building permit procedures require almost all the details presented in a plan in order to ensure that the permit processes are in compliance with the plan. Permit procedures also require information about the stage between plot division and real estate formation processes. It should also be noted that the data generated at different stages of the process will return to the start of the process as baseline data for land use planning. Since municipal data structures and processes vary considerably, the processes and data sets do not form an interoperable whole at the national level. It is essential to harmonise

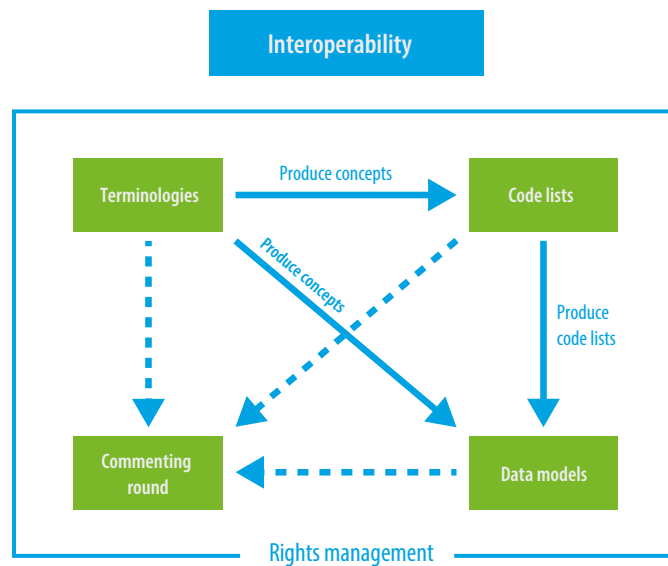
plan data in order to bring about national interoperability. The work also explored data flows between core processes and national registers. Based on this analysis, data from planning processes, in particular, is currently submitted to the Finnish Environment Institute (SYKE), the National Land Survey of Finland (NLS) and the Finnish Tax Administration using fairly manual methods. The current operating models are considered to consume municipal resources unnecessarily.

The work on data modelling concentrated on modelling a general term for 'plan' and a term for 'land use plan', defined as a special case of the former, and the terms essentially related to these, as well as on the link between land use planning and real estate formation. As for 'plan', the primary focus was on the level of local detailed plans referred to in the current Land Use and Building Act, however, aiming to create terms that could also be used at other levels of land use planning (local master plans, regional land use plans).

As part of data modelling, the project team also extensively analysed the relationship between a subdivision plan drafted during or after a land use planning process and the data content of the actual plan, on the one hand, and the ambiguous 'planning unit' term, on the other. In current municipal registers, the latter is typically linked to the building rights of planned plots to be subsequently registered. From the perspective of designing data models for land use planning and real estate formation, it is important that the data contents and structures of the models will enable seamless model-based planning of plots and plot construction at all stages of their life cycles, both before and after plots are registered in the Cadastre. With regard to the amendment process of planned cadastral parcels and land use plans, the conceptual modelling of real estate formation was implemented as part of the Built Environment core vocabulary in the interoperability tool. However, it would still be necessary to also develop a more specific conceptual model as an application profile, in order to integrate the terminology of the real estate formation process into the more general terminology of land use plans.

The application of the conceptual model developed in the project as the physical data model for plan data was preliminarily tested towards the end of the project's run in November–December 2019. The aim was to obtain experiences from implementing a physical data model conforming to the conceptual model as an XML schema and using a conformant XML data structure to describe the data included in a simple plan amendment.

In the course of the work, shared terminologies, conceptual data models and code lists were developed directly on the **interoperability platform**.



The conceptual modelling work has progressed furthest in terms of land use planning and real estate formation. The key idea was to shift from separate plans to up-to-date land use planning data sets, with rigorously controlled change and version management of the planning objects included. It is necessary to continue this development work, especially with regard to the standard data models for construction steering, permit processes and existing buildings.

7.2 Separating planning decision and baseline data and national availability of baseline data

The package of measures focusing on baseline and decision data explored the prerequisites for separating baseline and decision data and improving the national availability of baseline data. As a general rule, the process of drafting plans involves two types of data: baseline and decision data. Once a decision is made, it becomes baseline data for other land use decisions.

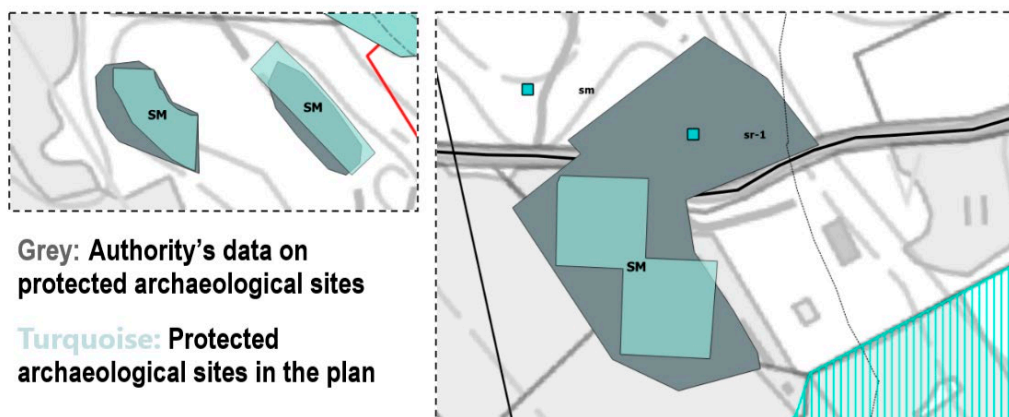
1. Baseline data

- Background map generated from baseline data;
- Other baseline data:
 - Other land use decisions (e.g. plans and decisions by central government authorities);
 - Other data sets:
 - produced before the process
 - (existing inventories, follow-up data, etc.),

- produced at the early stages of the process (studies and investigations related to the plan),
- produced towards the end of the process (impact assessments related to the plan).

2. Decision data

Considerable resources are currently being spent on compiling baseline data required for land use planning. Planning is subjected to an increasing range of different interests and data needs. The role assumed by plans as data-compiling tools is becoming more and more difficult in the face of the aim of keeping decisions comprehensible. Plans include plenty of other land use decisions (e.g. nature conservation, environmental disturbances, permits), which tends to blur the content actually decided in the plans. Different kinds of data on the same subject may be collected in different places (see the example below of Kangasala's draft component shoreline master plan for the Kuhmalampi area, archaeological sites). An up-to-date overview of land use decisions and other baseline data is not available from any other source.



The purpose of separating baseline data from land use decisions is to ensure that decisions are comprehensible and the data used in different processes is correct and up to date, while also reducing the resources required to compile baseline data. The following table provides a collection of key problems involved in current practices and proposed solutions to the identified problems.

Identified problems	Proposed solutions
Besides plans, no other instruments exist to describe the land use steering system as a whole. As a result, planners have aimed to add all possible data content to the plan.	Build a national information pool of land use decisions and baseline data, providing open and easy access to data via an interface.
Data is extracted from asynchronous land use processes for the purposes of drafting plans, although the baseline data may already be obsolete by the time a plan decision is made. Baseline data updates slow down the land use planning process to some extent. Implementing a plan requires up-to-date data. It is not appropriate to include asynchronous baseline data in plans – moving forward, plans and baseline data should be considered as parallel entities.	Lay down provisions on the quality requirements of plans at least at the current level. Facilitate the fulfilment of these requirements by means of a national baseline data service. Decision-makers must be provided with visualisation of the plan with key baseline data (incl. background map and other land use decisions) as part of the decision-making process.
Even if up-to-date data from land use decisions and baseline data were to be available from national services in the future, it is sometimes necessary to be familiar with the history – mostly in court proceedings. An example is the overview made up of the plan and baseline data at the time of making the decision.	Automatically capture a ‘snapshot’ of the visualised overview of the plan and baseline data for archives for use in court proceedings, etc.
In order to ensure that plans and their baseline data are presented in a sufficiently commensurable manner (e.g. from the perspectives of individuals, stakeholders or court instances), there must be a coherent framework for how to present these details.	It is imperative to set up presentation and visualisation services linked to national information pools and services, also enabling the capture of above-mentioned ‘archival snapshots’ and consistent interpretation of plans.
‘Paper-world’ plans include generalisations in terms of content and visual presentation. The notations do not always explain the rationale for or effects of this practice. Plan and baseline data must be identified unambiguously to avoid this. This is also a prerequisite for separating baseline and plan data.	Specify general code lists for plan notations and baseline data. Some of the existing plans need to be broken down into components when digitised. The options are: a) not to digitise everything, in which case the data will not be comprehensive; or b) digitise everything, which means that the workload will increase and that there will continue to be overlapping, partly conflicting data in the future as well.
Blending baseline data with plans is largely a result of gradually evolved traditions and practices (e.g. procedures for negotiations between authorities and for submission of opinions), where different authorities generally require matters falling within their sector to be presented on plan maps.	Provide public authorities involved in land use planning with training on changes and embed new practices in different organisations. Update instructions and guides concerning land use planning.
Many public authorities and other parties have opened up their data. However, there is still plenty of public sector data which is not available in a sufficiently structured and open format.	Separating baseline data from plans requires a lot of work on opening up the data. It is likely that there is still plenty of digitalisation work to be done even in terms of baseline data. Not all data is currently available in a digital format.

In addition to the proposed solutions described above, this project also considered the rationale for separating baseline data. In support of this exercise, the project team analysed numerous plan notations and regulations and relevant additional regulations. The results highlight the types of baseline data sets that can either be found both on plan maps and in plan notations and regulations or are themselves land use decisions or parts of such decisions, or were produced by another organisation in some other context and are updated asynchronously with plans.

7.3 Description of the vision for national support services for land use processes (reference architecture)

The work on the reference architecture aimed to contribute to national dialogue on the preferred land use planning and construction processes, shared information pools and data flows. The core of the work was to outline what types of national systems are required and what it would be appropriate to provide on these by acts and decrees. Its main focus was on the processes between land use planning and building permit procedures (local land use planning, plot division, real estate formation, building permit procedures). This package of measures resulted in a draft version and summary of the reference architecture of land use decisions 2030.

The purpose of the reference architecture is to steer the drafting of land use decisions in public administration processes and, in particular, make the data generated as part of municipal land use decision processes, such as land use planning, widely available to cater for the different processes of society. The reference architecture describes the vision defined for 2030, where services supporting land use decision processes will contribute to making high-quality land use decisions. These services will enable land use decision processes that build on shared information pools and may be partially automated. The reference architecture provides a general description of the processes of drafting land use decisions, shared information pools and data flows as well as information system services supporting these processes. Below is the proposal for the vision for processes and data flows created as part of the reference architecture work, followed by the key guidelines produced.

The description of the reference architecture is especially intended for organisations making land use decisions and parties using land use decision data, as well as businesses providing support services for these.

The vision for the reference architecture concerns the development of interoperability within the administrative branches of several different ministries, while also identifying other spatial and baseline data sets as part of the built environment information system alongside land use decisions. While the draft reference architecture developed during the project (version 0.7, unpublished) was not produced in cooperation with different ministries, it does lay the groundwork for this cooperation. The final solutions may differ quite significantly from the proposals developed during the project.

Proposal for the vision for processes and data flows

▶ Kick-off

National baseline and background map data sets will be used in the process of drafting a decision. The geographical limits/area concerning the decision being drafted will be stored in the national register.



▶ Drafting

The status of drafting will be indicated in the register. At least the plan proposal will be stored in the register.



▶ Adoption

The adopted decision, such as a plan or permit, will be stored in the register. The decision's entry into force and period of validity will be indicated in the national register.



▶ Utilisation

Decision data will be easily available for users.



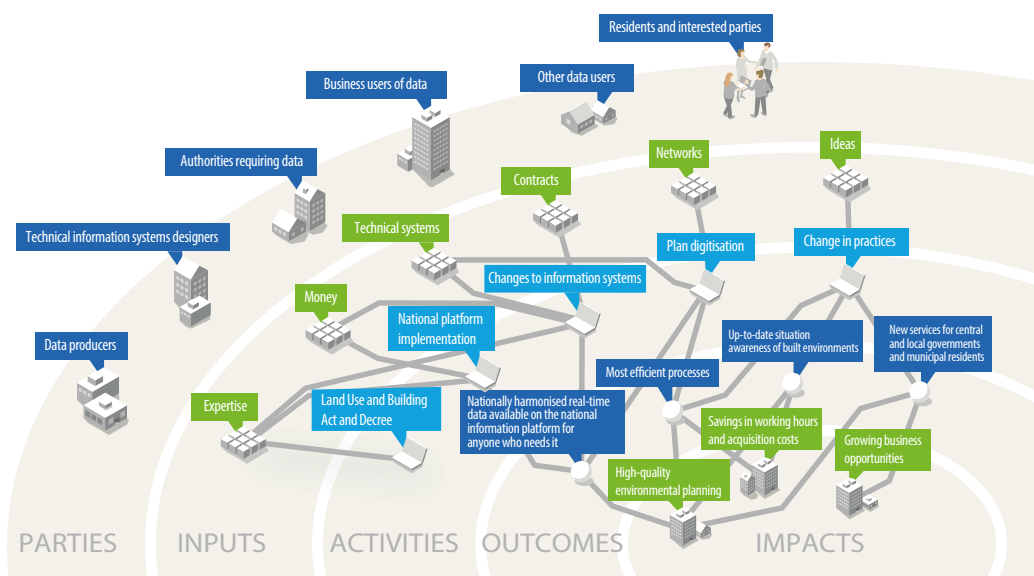
Key guidelines for the reference architecture

When a land use decision process is launched, the competent authority will designate the location of the decision being drafted.
All parties are entitled to follow and obtain information about pending land use decision processes (Act on the Openness of Government Activities).
The authority will receive and process any feedback provided as part of drafting the decision.
The baseline data set used to draft the land use decision must be quality-assured, up to date and of sufficient positional accuracy.
The land use decision and baseline data set will always be available as two-dimensional and, where necessary, three-dimensional models.
During the process of drafting the land use decision, the jointly specified data will be stored in the shared information pool.
When a land use decision, such as a plan, is examined it will be possible to view the baseline data set at the time of the decision.
The land use plan proposal and the adopted decision should comply with the technical validation and life-cycle rules specified for its content.
The land use plan proposal and the adopted decision should comply with the rules for the quality requirements specified for its content.
The land use decision data included in the land use plan proposal will be integrated as part of the shared information pool.
The land use decision data included in the adoption decision will be integrated as part of the shared information pool.
The land use decision data included in the legally final adoption decision will be registered in the shared information pool.
In order to implement support services, it is necessary to put to use a management model that ensures service continuity and development.
Conceptual data models will be described on the interoperability platform.
Interoperable information pools will be based on shared data models, validation rules and life-cycle rules.
Application profiles are data models applicable in practical terms and they should comply with the generic data model structure and principles.
The digital built environment website should provide support and guidance on developing and storing the validation rules and life-cycle rules.
The digital built environment website should provide support and guidance on describing and linking the quality requirement rules.
Support services should be assigned security roles.

7.4 Social impact analysis

In order to successfully implement the digitalisation of land use decisions and achieve the vision by 2030, it is necessary for all parties involved in the built environment ecosystem to commit to cooperation, concrete action and financial investments. However, the national built environment register and data platform, national availability of land use decisions and model-based planning practices will widely benefit society as a whole.

The social impact analysis drawn up as part of this project presents the key parties involved in the built environment ecosystem, the necessary measures and an assessment of benefit and cost impacts. The analysis also identified risks related to the reform and assessed the advantages and disadvantages of centralised, hybrid and distributed information pool solutions.



The entire society will benefit when the plan, cadastral and building data and other decision and baseline data produced in municipal core processes in a data model format are easily available from the national built environment register in a timely and comprehensive manner. Local authorities will save time and costs in areas such as access to data, public announcements of plans and submission of data to different authorities. Various public authorities will also see substantial savings in annual working hours and costs of acquiring land use decision data. Forestry and construction businesses will be able to enhance their operational efficiency by developing automated decision-making systems and planning systems that utilise plan and building data in a data model format.

The national register and data platform will enable businesses to develop and implement value-added services and new business operations in the data economy. Businesses will improve their competitiveness and find opportunities to export advanced services to international markets. Individuals will find it easier to participate in interaction between parties and co-design efforts through visual and interactive 3D services. The overall land use process will form a chain of interoperable processes, creating high-quality living environments and improving people's quality of life.

In order to promote the digitalisation of land use decisions and build the national built environment register and data platform, it is necessary to make substantial financial investments from the very beginning of the 2020s. The benefits, such as smoother planning, improved productivity and more efficient business, are estimated to materialise a few years later, starting from around 2023.

7.5 Stakeholder cooperation and communications

One of the key objectives of the Future Land Use Decisions project was to promote awareness, engagement and capacity for change among stakeholders. From the outset, the participants aimed to carry out the project in keeping with the principles of openness and transparency.

The project included two online surveys organised in the otakantaa.fi service: the first one aimed to gauge opinions on the vision, roadmap and the tentative packages of measures, while the second sought support for the proposals for improvement outlined as part of the packages carried out in the autumn. The project also covered numerous seminars, webinars and workshops, where the project team worked on development ideas in cooperation with parties operating in the sector. The feedback provided by the parties played a key role in determining further measures for digitalisation of land use decisions.

8 Proposals for further measures

In this context, further measures were determined with focus on concrete short-term measures. The aim was to lay the groundwork for digital ways of working in the sector.

During the project, several critical near-term measures were identified as prerequisites for achieving the objectives outlined in the roadmap for digitalising land use decisions by 2030. In this context, the 'near term' especially refers to the 2020–2022 period, covering measures that are crucial to fulfil in practical terms the requirements of the revised Land Use and Building Act, planned to enter into force in 2023. **The scheduling of the measures is indicative and takes account of their interconnections and interdependencies.** The following passages summarise the measures for the next few years according to the Phase I strategic objectives that they will advance.

Defining shared terms

The built environment data platform is based on information pools. Relevant shared terminologies were developed on the interoperability platform during the autumn of 2019. **The conceptual modelling work must continue in cooperation across administrative boundaries** with regard to the standard data models for land use planning and real estate formation as well as for construction steering, permit processes and existing buildings. It is necessary to ensure that terminological and data modelling efforts are closely linked to the work on the enterprise and reference architectures for land use decisions.

Ensuring the interoperability of key land use decisions

The data models and code lists used in land use planning play a key role in the reform. Their development and finalisation require sufficient certainty about the prospective planning system. The data models used in land use planning must gain sufficient acceptance among experts, which requires plenty of repetitive testing in cooperation with local authorities, gradually giving shape to the technical practice of future land use planning and any possible needs to change data models and classifications.

With regard to the baseline data for land use planning, the following concrete near-term measures are put forward relating to the development of the background map and baseline data code lists. In the simplest terms, baseline data code lists refer to unambiguous names for plan notifications and their unique identifiers.

It is proposed that **baseline data code sets** be developed gradually such that the national baseline data service would be in place before the revised legislation enters into force as follows:

- draft version of baseline data code lists independent of planning levels (Q1/2020);
- proposal for the baseline data code list, with revisions for planning levels (Q2/2020);
- organisation of baseline data digitalisation measures into projects (Q3–Q4/2020);
- implementation of baseline data digitalisation measures, opening of data sets, harmonisation of licensing, interface integration (2021–2022);
- construction of the baseline data service for land use planning.

It has been proposed to launch the **technical specification of the background map product** no later than the summer of 2020. This would make it possible to start building the background map service in early 2021.

It is proposed to proceed with the **development of the plan data model** as follows:

- draft version of plan data model code lists (spring 2020), updating and expanding the Municipal Pilot Project code lists and checking these against baseline data code lists;
- proposal for the plan data model code list, with revisions for planning levels (summer 2020);
- specification of the technical architecture for the plan information pool and the planned cadastral parcel pool as well as digital archiving (spring/summer 2020) -> construction of prototype pools (autumn 2020);
- construction of the prototype plan data pool for digitisation (autumn 2020–).

Once the plan data model code lists start to take shape, it is proposed to start **organising the digitisation of existing plans into projects** (Q2/2020). The earliest point when **digitising existing local master plans** could start is the autumn of 2020.

It is proposed that the **reference architecture of land use decisions 2030** be completed (0.7 -> 1.0) during the spring of 2020. Implementation of the reference architecture is based on a hybrid model, which means building centralised solutions for national support services, information pools and maintenance and development services, as well as significantly modernising the distributed municipal information systems. As some registers already exist in the domain targeted by the reference architecture, it is necessary to analyse their role as part of the core process data flows. Developing the interoperability of the target domain requires cooperation across several administrative boundaries. Responsibility for steering these concrete measures and managing the enterprise architecture rests with the Ministry of the Environment.

The further measures required to achieve the vision according to the reference architecture include specifying and implementing information pools, presentation styles, validation and life-cycle rules, quality requirement rules and support services. Support services and data product specifications should be implemented in keeping with the proposed phasing, as there are dependencies between the specifications and their prototype implementations.

Securing central government support for implementing the transformation

The central government will commit to promoting the objectives and will provide funding to ensure that these are achieved. The key factors in supporting the sector's transformation include the reform of the Land Use and Building Act and the preparation of the digital register and data platform for built environments set out in the Government Programme.

Embedding the change in planning practices will not only require financial resources but also **updating guides and instructions** for land use planning. It is proposed that drafting these be launched as soon as the national conceptual models, data models, code lists and terminologies have been specified to a sufficient level. The roadmap proposes that updating the guides be initiated in late autumn 2020. Local authorities have expressed wishes that instructions should also be drawn up for consultancy and software purchases. It is also proposed to revisit these once some further progress has been made in the specification work.

Engaging stakeholders actively in the transformation

Building a national built environment data platform and a digital ecosystem to utilise it in Finland is a major concerted effort calling for cutting-edge expertise and commitment from several different administrative branches, local authorities, private parties and universities engaged in research. **In December 2019, the Ministry of the Environment**

appointed a broad cooperation group to develop the interoperability of built environment data. Its work will support the implementation of the built environment register and data platform. The group's term will run until the end of 2022.

The interoperability working group aims to ensure the semantic interoperability of built environment data, such as data relating to land use planning and building permits, by means of developing shared terminologies, code lists and data models, for example. In its work, the group will also pay attention to legislative development needs and the technical interoperability of information systems. A further objective is to develop public–private cooperation to promote digitalisation.

Operating alongside the cooperation group and its secretary, there are also three thematic groups focusing on open co-creation:

1. The role of the semantic interoperability group is to create and harmonise the necessary terminologies, code lists and data models.
2. The standardisation group supports the implementation of open international standards and related national cooperation and contributes to the development of standards.
3. The enterprise architecture group coordinates the key built environment processes and data flows as part of the public sector enterprise architecture.

The work of the thematic groups is open to anyone interested and it is possible to participate as an active contributor or as a follower.

Defining, implementing and testing the systems

The development of digitalisation of land use decisions and model-based planning is firmly grounded on a culture of experimentation and customer orientation. Several measures proposed in the roadmap essentially involve various specification and testing stages. In early 2020, extensive piloting will especially be required as part of the measures to develop the plan data model and baseline data code lists. Over the spring of 2020, technical piloting will also be required to specify the presentation method and validation and life-cycle rules. As a general rule, various practical testing efforts will be necessary over the entire definition and pilot phase (2019–2022).

9 International benchmarking

Finland is not the only country where digitalisation of land use decisions and related legislative and information infrastructure reforms are currently on the agenda. In order to learn from the best practices and plans already created elsewhere in support of the transformation being carried out in Finland, this project analysed expert interviews, laws and technical documents to establish the status of digitalisation efforts relating to land use in Sweden, Denmark, Norway and the Netherlands. These countries were specifically selected for analysis due to their societal similarities, such as planning practices, and in light of the known measures that they had already partially implemented.

The reference countries mostly have about 300 to 400 municipalities, with the exception of Denmark, which has 98 municipalities following a municipal reform. The numbers and roles of regional authorities operating in the area of land use vary between the countries. Their municipal situations have plenty of similarities. On the one hand, there are cities with relatively large resources to develop the overall land use process and the technical implementations involved; on the other, there are medium-sized or sometimes even small municipalities that are engaged in active development efforts, albeit often driven by specific individuals or consultants. Municipalities, their residents and other parties are currently placed on an unequal footing and most local authorities have few resources to implement major technical and process transformations.

All of the countries analysed have made or are currently drafting legislative amendments relevant to land use decisions. They have generally recognised that the current legislation does not offer sufficient support for the development of the land use and construction sectors. Their legislations recognise digitalisation as a key tool – but not as an end in itself. Several countries have also identified the need to clarify their planning systems that have become complex over the years. Planning systems have been reformed both ahead of and in parallel to technical reforms, as well as afterwards – when its necessity has only been realised while technical reforms were already underway. The most radical legislative amendments are currently being made in the Netherlands, where dozens of acts and decrees are being reformed into a handful of new ones. The key considerations in the legislative drafting efforts include clarification and harmonisation of practical processes,

national specification of technical standards, as well as assignment of responsibilities for these.

All of the countries analysed have identified the overall land use and construction process. There is widespread dissatisfaction with the way in which data is – or is not – currently flowing between the land use planning and implementation processes. It is essential to link land use planning, cadastral data and permit processes seamlessly. The weakness of the current processes and related information management has been considered to result in significant costs and inefficiencies in public administration, which is frequently depleting resources from the actual substantive work. The drivers of change vary between countries to some extent. The number one priority in some countries is to improve the knowledge base of property taxation, whereas others focus on improving the operations of central and local government authorities and the management and use of information with societal significance. In general terms, however, the key is to better serve citizens and business communities.

Local authorities have reservations about national development measures in cases where they see that these will result in considerable extra work or costs for municipalities. If the majority of resources come from the central government, in turn, they take a positive view on change. It is crucial to secure central government support for the transformation. All of the central governments concerned have contributed or are contributing significant funding because they have considered the benefits to outweigh the costs. Denmark, for example, has estimated the payback time of the reform at six years. Sufficient time must be allowed for national development – especially in view of competence development and embedding the reform in practical processes. It is advisable to set aside at least three to five years for specification and development of technical implementations and four to five years for embedding processes and gradual further development. An extensive nationwide transformation process of the land use and construction sector will take eight to ten years – in order to achieve the situation outlined in current visions.

All of the reference countries have identified the need to manage national land use and construction information. This includes terminologies, code lists and data models defined at the national level. All of the countries have likewise implemented or are currently implementing a national information pool, system or service for land use decisions. While their implementations are slightly different, the most common solution is an actual national information pool for land use decisions and related data, as well as various services linked to this, which in turn are generally connected to other parts of the national service architecture.

There is a legal obligation to use harmonised specifications and certain technical solutions. Besides the national minimum standards, local authorities and other parties

may otherwise do things as they see fit. However, it is common that, in order to become legally final, land use plans must be produced in a data structure format conforming to the national specifications and registered in the national system. Existing, legally final plans have been or are being integrated into the national system. The aim is to provide clarity between decisions made at different levels and by different parties. Norway already has in place a national baseline data model for land use planning and Sweden is emulating its content in its own reform efforts. Baseline data has largely been separated from plans to be adopted. In Denmark, the national planning framework has mostly been defined in national plans.

The reform efforts relating to the digitalisation of land use decisions are usually led by the ministries responsible for land use and subordinate agencies – e.g. the Danish Business Authority (*Erhvervsstyrelsen*) or the Swedish National Board of Housing, Building and Planning (*Boverket*) – and the bodies responsible for technical implementation and, in particular, cadastral parcels and surveying, i.e. the Swedish Land Survey (*Lantmäteriet*), the Netherlands' Cadastre, Land Registry and Mapping Agency (*Kadaster*) and the Norwegian Mapping Authority (*Kartverket*). The exception is Denmark, where the business and economic sector also plays a particularly significant role – the agency mostly responsible for steering land use is the Danish Business Authority (*Erhvervsstyrelsen*) and the costs of the reform are covered by the Danish Tax Agency (*Skattestyrelsen*). Reforms are carried out in close cooperation with local authorities and other parties, albeit local authorities have occasionally wished for the central government to provide them directly with clear guidelines because their own capacity to play an active role in determining the reforms can be very limited. The central government, in turn, has considered that some matters are progressing too slowly because full consensus about progress pathways cannot always be reached with local authorities, for example, in which case the central government has outlined 'top-down' policies for the progression.

The next table provides a summary of key findings from the international benchmarking exercise and a comparison with the situation in Finland. It is followed by summaries of the situation in each country.

Table 3. Key findings from international benchmarking and comparison with the situation in Finland.

Observation	Denmark	Sweden	Norway	Netherlands	Finland
Land use digitalisation steered and instructed by law	Yes	Yes (drafting authorised); mainly being drafted in 2019–2022	Yes	Yes	Being drafted (deadline 2022)
National data model for plans, etc.	Yes	Yes (being drafted)	Yes	Yes	Planned (piloting completed)
National system for management or distribution of land use decision data	Yes	Being planned, target schedule for implementation 2019–2022	Yes	Under construction	Preparatory work to start in 2020
Digital data archiving at national level	Yes	Only considered realistic after 2025; no decisions made	No (municipal level)	Under construction; precise division of archiving responsibilities unknown	No decisions made, preliminary study conducted
Digitisation of old decisions (especially plans)	Yes	Considered requisite; approach being studied	Not comprehensively at national level; partly from prioritised municipalities	Unknown; initial position already relatively good in terms of digital plans	No decisions made, preliminary study conducted
National one-stop-shop view service	Yes	Planned	Yes	Under construction	To be studied in 2020
Central government funding for technical reforms	Yes, substantial	Yes; funding granted for specifications; negotiations on very substantial funding for implementations currently underway	Yes, substantial	Yes, very substantial	Preparatory work to start in 2020
Main responsibility for reform	Central government authority (business, incl. land use planning)	Central government authority (land survey)	Central government authority (land survey) + cooperation network	Central government authority (land survey)	Co-ordination responsibility with the Ministry of the Environment
Time-span for technical reforms	Gradually, incl. 1995–2006 and 2016–2019	Phase 1 in 2019–2022, followed by Phase 2 in 2022–2025, to continue after	2010–2020, to continue after	2016–2024, probably beyond	Proposed target in 2020–2027

Denmark

- The Danish national planning information pool, PlanData, includes a national web-based service and interfaces and file services in different directions.

- Development of the current service started in 2016 (based on plan boundaries already collected in 2006).
- The Danish Business Authority attempted to digitise plans together with local authorities. No result -> the Authority outsourced the digitisation of about 100,000 plans to India. The work took a year. Since its quality was not good enough, local authorities started to improve the data set on their own. This work is still ongoing and will probably last up until 2020.
- The Danish Tax Agency is the primary motivator and funding body (due to its deficient knowledge base on plans).
- The central government also compensates local authorities for their work.
- National data models have been expanded and extended gradually.
- The first step was to select an appropriate thematic level to serve national information needs.
- Fragmented land use legislation has increased the costs of technical implementations. This will possibly be addressed as part of the ongoing legislative reform.
- Currently on the agenda: consolidation of maintenance and activities, history data, version management.

Norway

- A national service (SePlan) for viewing plans has been developed in the 2010s.
- Rather than integrating all municipal data into the service at the same time, the aim is to connect about 200 municipalities (47%) to the system by 2020.
- The municipalities were selected by prioritising their needs and benefits.
- The central government has provided support for technical implementations. Participation has been voluntary.
- The technical solution is geosynchronisation – the plans remain in municipalities but are regularly synchronised with the national view.
- Norwegian law includes the following provisions on digitalisation of land use decisions:
 - the national baseline data set for land use planning;
 - methods of producing and distributing plan data, access to data;
 - the national plan data model and the responsibilities involved;
 - archiving/registers of plan data.
- Ongoing projects include comprehensive digitalisation and partial automation of building permits, BIM connections, development of

the relationship between real estate formation and the Norwegian Planning and Building Act (*plan- og bygningsloven*), and linking building and permit data to cadastral data.

Sweden

- Several land use digitalisation measures are currently underway, incl. building a national plan database. The options considered include ‘geosynchronisation’ and a centralised information pool, which is more likely due to the fact that municipal resources and competencies are not sufficient to set up and maintain the systems.
- Responsibility for building and technical specifications of the plan database and the required information infrastructure rests with the Swedish Land Survey (Lantmäteriet). Several technical, legislative and other such packages are being developed alongside the national plan database.
- The need to develop the system was raised by the central government, in particular. Other identified customers include builders and developers, residents and planners. Local authorities have wished to have a single service to view their plans.
- Due to scheduling reasons, centralised digital archiving of plans and other such data will probably not be explored until 2025 onwards. For the time being, PDF or digital plans will probably be stored in municipalities as ‘file copies’.
- Plan data has been collected in several locations and for several purposes at different times.
- Sweden is currently developing a national package for plan baseline data similar to the Norwegian solution.
- Responsibility for many measures has been assigned to the Swedish Land Survey. Local authorities have already been engaged to a large extent, but they feel that the central government will ultimately have to issue top-down decisions.
- The schedule is tight – specifications were mostly produced in 2019 and systems should be up and running in 2022, because legislators want to bring implementations into synchrony with legislative reforms.
- According to the Swedish Land Survey, a realistic estimate for the time required to carry through an extensive land use digitalisation reform is eight to ten years, allowing for data conversions, embedding operating models, modernising local processes, etc.

Netherlands

- The Netherlands has been working on a reform of legislation governing land use.
- Legislation is being simplified into a single 'Environmental Act', four decrees and one separate statute, in lieu of the previous 26 acts, 60 decrees and 75 ministerial decrees.
- A significant reform underpinning the Environmental Act is the 'Digital Environmental Act', enabling specification of details such as national system components, harmonised specifications and standards, data flows to and from the system (interfaces), data quality requirements, and roles and responsibilities of different organisations.
- A specific problem identified for the current situation is the fact that the current 'digital one-stop shops' differ in terms of specifications, availability and reliability.
- As a result of the reform, documents such as permit applications, extracts and regulations and plans concerning each location will be made gradually available from a 'national one-stop shop' starting from 2021.
- This requires construction of several key registers (for land use decision data, etc.) and specification of standards (incl. data models, terminologies and terms). Rather than a single large information system, there will be a collection of interoperable laws, regulations, agreements, standards, data and sources, which are systematically linked to each other.
- Resources are larger when compared with the Nordic countries (note the different population sizes). The budget for 8-year development work amounts to EUR 150 million, while the amounts allocated to embedding the systems and technical support stand at EUR 35 million and EUR 10 million, respectively.

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Future Land Use Decisions was a development project carried out in 2019 in cooperation with a wide range of stakeholders. The project aimed to promote the digitalisation of decisions relating to land use planning and construction, i.e. land use decisions, informed decision-making and nationwide data usability.

The Future Land Use Decisions project established harmonised national guidelines to promote digitalisation. It also defined the objectives and roadmap for the measures to support digitalising land use decisions.

This report presents the key results of the project and the measures implemented during the process.

The project's results will be put to use in both the reform of the Land Use and Building Act and the implementation of the national digital register and data platform for built environments set out in Prime Minister Sanna Marin's Government Programme.

