ESPON

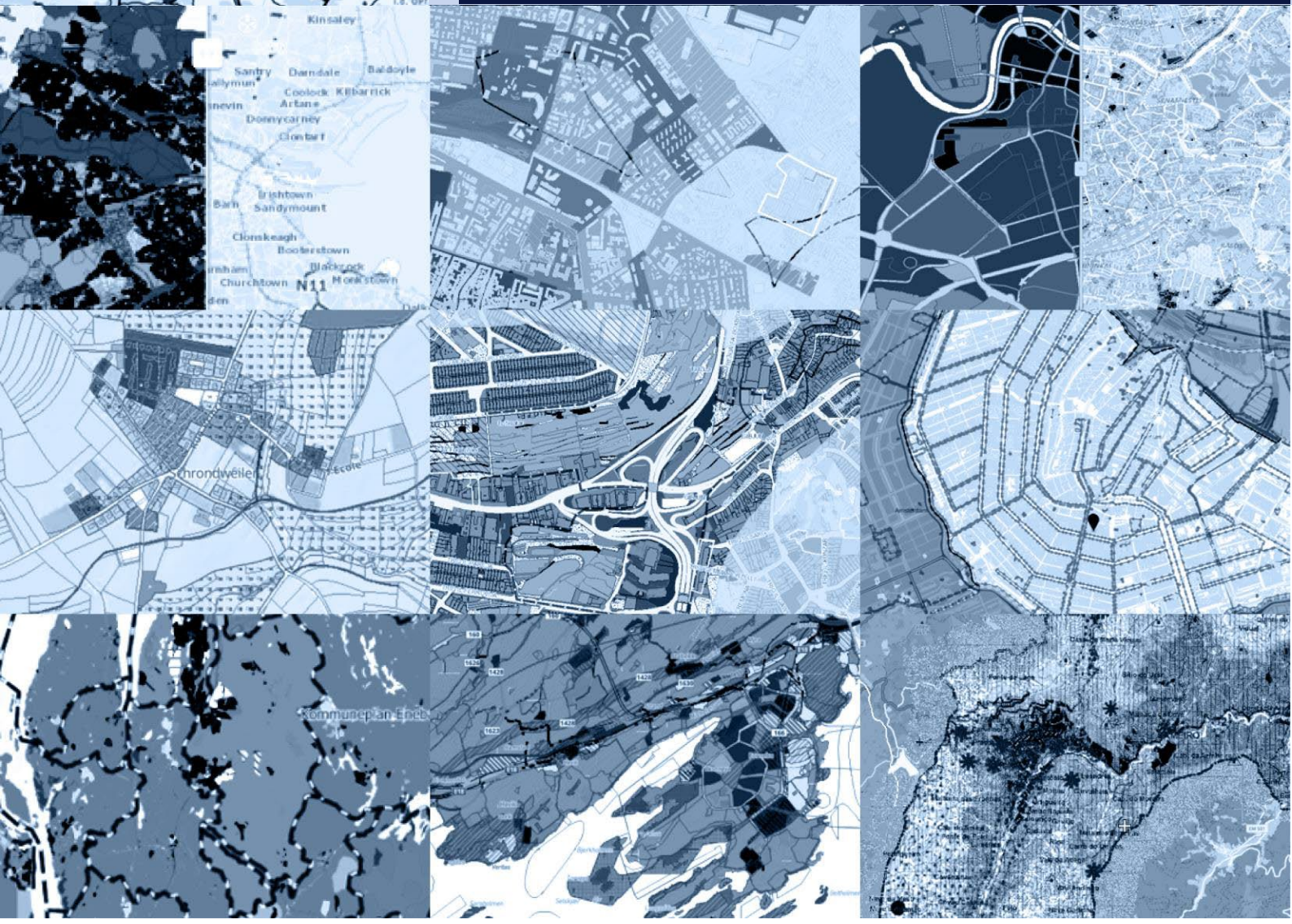
EUROPEAN UNION

Co-financed by the European Regional Development Fund

Inspire Policy Making with Territorial Evidence

WORKING PAPER

Potential and challenges of digitisation in planning practice



Contents

Context

The coronavirus disease 2019 (COVID-19) pandemic has accelerated the Fourth Industrial Revolution, expanding the digitalisation of governments, human interaction, e-commerce, online education and remote work. The crisis has shown how important it is to ensure the continuation of government activities when social distancing measures are in place. The continuation of life during the pandemic requires robust digital public services throughout the Member States and the use of advanced technologies to enhance public services. Public access to plan data is part of these services.

Recently, the EU's cohesion policy put the implementation of the Digital Single Market in focus, by supporting digitalisation in society and the economy, improvements in digital infrastructure and investment in innovative technologies (European Commission, 2019). For the investment period 2021–27, the European Commission has proposed two specific policy objectives that prioritise digital investments:

- a smarter Europe, through innovation, **digitisation**, economic transformation and supporting small and medium-sized businesses;
- a more connected Europe, with digital networks.

Other policy objectives also include digital investments, in particular the take-up of digital solutions:

- a greener, carbon-free Europe;
- a more social Europe;
- a Europe closer to citizens.

According to ESPON's policy brief (2017) on the digital transition, many cities provide various services around planning, including exploring land use plans with geographic information system (GIS) servers and obtaining data online through land registries. At the national level, however, the study finds that only a few services have been digitised. Nevertheless, many countries have digital plan registers or are in the process of establishing them.

The European Commission, in its 2019 and 2020 European Semester country reports, recommended investments in **digitisation** for all Member States. Across Europe, municipalities, regions and countries have started digitising plan data. This digitisation process, defined throughout this paper as the transformation of data from an analogue format to a digital format, has reached different stages, depending on, among other things, the amount of resources allocated to it, when it started and the level of competence in spatial planning of the public authorities involved.

This working paper is based on results from the ESPON Digiplan targeted analysis (2020–21). The Digiplan research team, led by the University of Copenhagen under the guidance and steering of the stakeholders from Denmark, Norway and Switzerland involved in the analysis and the ESPON EGTC, explored the development and state of digital plans and plan data in several European countries.[1] ESPON Digiplan is the first research of its kind, and the topic of inquiry was broad from the beginning. An explorative approach was necessary to shed light on more- or less-advanced digital practices in different spatial planning contexts.

This paper addresses:

- digitalisation and planning practice;
- drivers of digitisation of plan data;
- the state of digitisation in Europe;
- access and users' involvement;
- recommendations for policy and practice.

[1] Austria, Belgium, Denmark, France, Germany, Ireland, Italy, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Portugal, Slovenia and Switzerland.

1 Digitalisation and planning practice

For planning authorities, digital plans and plan data have primarily **increased the efficiency** (i.e. reduced the time needed for the same task) of workflows. Even though systems are in constant development, the availability of digital plan data is a huge advantage in formal planning processes compared with the time when only analogue data were available. Furthermore, where digital and analogue plans are handled in parallel, and new tasks regarding comparison need to be introduced, a digital plan is seen as an advantage, as at least some of work can be based on digital data.

Digital plan data and associated standards and data models enable **data exchange**. This means, for example, closer integration with the building sector, nature management, infrastructure and service provision. The standardised data also improve the potential for analysis and innovative practices, for example following up on plan implementation. Many planning authorities are starting to conduct more **structured analyses** and are still exploring the potential. In general, the digital format allows the data to be interrogated for information that had not been considered when the data were produced. Open and structured data support innovation in a wide sense. However, there is a risk that plan data will be used out of context. Certain plan regulations make sense only when viewing the bigger picture, such as a regional setting. An analogue plan can present the necessary context. Digital plans and plan data can be disaggregated without limitations.

Nevertheless, digitisation this also allows users, for example citizens, to obtain the **exact information** they need. Many plan data portals allow users to select and analyse plan data, create excerpts or download geodata, often additionally listed in open data portals. This increases **transparency** and **involvement** in planning matters, especially for professional interest or lobby groups, but limits access for potential users if technical barriers are too high. In this respect, digital plans and plan data can support participatory processes when used appropriately. The formal **participatory** processes related to plans (**official hearings**) have, in some cases, already been integrated into digital plan data platforms.

The use of digital plans and plan data requires appropriate education for developing **new skills** for plan making and the adaptation of technology in planning authorities and planning consultancies. The introduction of new technologies and systems does not always make planning on the ground easier or better. In particular, system development that has been driven by national/regional authorities or policy domains that are not directly connected to planning (e.g. because of a general requirement in public administration) can result in long transition periods or even a dysfunctional system.

With digitisation, planners need to provide **highly detailed data**, often much more detailed than necessary for the equivalent analogue plan with a fixed scale and no possibility of overlaying with other data. Requirements for **plan accuracy** are changing, even if these are not stated in planning laws. Issues of scale, ambiguity, context, accessibility and legal status also illustrate that traditional plans were not designed for a digital format. In some cases, planning processes have been adapted to **new digital routines**. Nevertheless, not all planning instruments (especially those that are more visionary or strategic) are digitised to the same degree as, for example, municipal land use plans, while some, such as the Danish maritime spatial plan, are set up from scratch in a digital format.

DIGITISE TO ENABLE INNOVATION

Technological progress holds much potential for digital planning practice. For example, 3D visualisations are still rarely used in planning processes. The ability to create 3D representations of plans, buildings and entire cities has a lot of potential. Firstly, it means that stakeholders do not have to rely as much on their imagination, as they can see the planned changes in front of them, which supports the discussions in participatory processes. Secondly, these visualisations can be used to evaluate plans to identify unused building potential, which may result in the alteration of plans.

With the implementation of digital process chains, it is possible to reuse the same plan data multiple times. This saves time and resources, as data are captured only once and information loss during transformations into different formats can be prevented. The benefits of digital process chains will become apparent only once they have been fully implemented. For example, planning can be evaluated efficiently only if the plan data are used all the way through to implementation. Digitalisation, by facilitating more innovative working practices, may also make workplaces more attractive .

The transparency of plan data has already been increased in cases places by publishing the digital plan data on the internet. This has the advantage that the data can be viewed by anyone at any time. However, transparency in planning processes can still be increased by presenting opportunities for participation more clearly through the internet and by making decision processes transparent.

2 Drivers of digitisation of plan data

Across Europe, municipalities, regions and countries have started digitising plan data. This digitisation process has reached different stages, depending on the amount of resources, when it started and the level of competence in spatial planning of the involved public authorities. With these differences in mind, this chapter introduces the main purposes and drivers of the digitisation of plan data. These were identified by a qualitative survey conducted at different administrative levels across Europe as part of Digiplan.

2.1 Main purpose

Table 1 lists the main purposes identified in some of the cases. Having plan data available online makes such data more easily accessible than when it was in an analogue format. Providing plan data with a high level of transparency to potential users has been an explicit purpose of many digitisation processes and is closely connected to key notions such as open data and open governance. For instance, providing transparency of governmental processes is the main purpose in the Netherlands. Easy access to digital plan data also addresses the need to provide easy access to metadata online. The desire for transparency, including access to metadata, is, for instance, one of the main purposes of digitisation in both Denmark and the region of Tyrol (Austria). Digitisation of plan data provides an opportunity to establish standards that determine how such data should be digitised and, consequently, allows such standardised plan data to be published on a single platform. Creating a nation- or region-wide digital portal containing harmonised plan data is one of the main aims of the digitisation process.

Table 1
Examples of main purposes

Case	Main purpose
Austria (Tyrol)	Increase efficiency (digital processes) and transparency (accessibility) and allow combination with other data.
Denmark	Establish a digital register for spatial planning that ensures that plan data are unambiguous and digitally accessible, in compliance with the law on planning.
France	Make data available to public services, planners and citizens on a unified geoportal.
Ireland	Provide data for analysis and to give a national overview of digital plan data.
Lithuania	Integrate national datasets and harmonise previously scanned data plans.
Luxembourg	Provide access to high-quality plan data (i.e. standardised and with a limited number of errors) from all municipalities on a single platform.
Netherlands	Facilitate open governance through increasing the transparency of government processes by making legal and current digital plan data available on a portal.
Switzerland	Open government: visualise and communicate spatial information for the population (Federal Office for Spatial Development).

Source: Authors of Digiplan, based on expert interviews and desk research.

2.2 Main drivers

Three main drivers of the digitisation of plan data have been identified: a top-down process, the Inspire Directive, and the general movement towards digitalisation and technological development (Table 2). The ministry or authority responsible for spatial planning is usually the lead actor in a top-down process. In general, the lead actor reflects the spatial planning context and the administrative structure: the national actor in spatial planning is the main driver in centralised states, whereas the regional actor is the main driver in federal states. For instance, the Ministry of the Interior is the clear driving force in Luxembourg, as is the Ministry of the Environment and Spatial Planning in Slovenia, which combined all the plan data provided by the municipalities. In Switzerland, the regional actors, that is, the cantons, demand digital plan data from the

municipalities. In Tyrol (Austria), the 2011 spatial planning law was changed to stipulate that, from 2013, land use plans had to be published online. In Bavaria (Germany), an amendment to the Building Code in 2017 means that the municipalities now have to publish their land use plans on the state's central internet portal.

Table 2
Examples of main drivers

Case	Main drivers
Belgium (Wallonia)	The regional level through internal organisation (transversal function of the Department of Geomatics since 2010). The Inspire Directive.
Germany (Bavaria)	The project 'Establishment of a geodata infrastructure in Bavaria', which was launched in 2003 following an e-government initiative to publish geodata through the internet. The Inspire Directive, which is crucial for state and regional planning. The amendment of the Building Code in 2017, which meant that the municipalities had to publish their land use plans on a central internet portal of the state.
Italy (Bologna)	The Inspire Directive and planning reform.
Malta	Technological developments improving the quality, effectiveness and efficiency of planning.
Norway	Requests for adequate information from large municipalities, and to some extent small municipalities with motivated individuals. The national authority (i.e. the Ministry of Local Government and Modernisation).
Portugal	Decision by the Directorate-General for Territory to create the National System of Territorial Information and digitise all plans in force at that time. National and European financial resources.
Slovenia	The Ministry of the Environment and Spatial Planning implementing an initial digitisation of all municipal spatial plans in 2003.

Source: Authors of Digiplan, based on expert interviews and desk research.

Even though the Inspire Directive does not mandate the digitisation of data, it is clearly connected to the digitisation of plan data, as the two processes run in parallel. The directive contributed to making the authorities responsible for plan data consider digitising their data and was, therefore, identified as one of the main drivers either at the beginning of the digitisation of plan data or at a later stage in the process.

Finally, the general move towards digitisation and technological developments has also been a key driver of the digitisation of plan data, for instance enhancing the quality of the digital plan data, and facilitating more efficient integration of digital plan data into one system.

2.3 Potential and challenges

Potential

The digitisation of plan data facilitates national and regional analyses not only because it provides greater coverage of plan data (allowing, for example, the extent of development in urban zones to be determined), but also because it facilitates harmonisation of datasets (useful in land use zoning).

Digitisation also improves workflows and planning practices. Indeed, municipalities often benefit directly from digitisation, as it is easier to submit digital plan data than analogue plan data. The autogeneration of plan data reduces the workload of municipalities.

These improvements generally help to reduce costs, mostly thanks to more efficient processes.

Challenges

A lack of experience in the digitisation of plan data and the relative absence of technical expertise among public authorities and private consultancies was one of the main initial challenges. Indeed, this can still be a challenge, for example in the introduction of new processes. A lack of knowledge about transforming plan data in specific models is one example.

The low quality of some input data is another challenge. Low-quality data make the digitisation process time-consuming and resource intensive, as it is necessary to vectorise complete datasets, create new standards, correct data specifications and gather plan data from various sources.

A lack of financial resources was an initial challenge in countries or regions where digitisation had not been prioritised in the preceding decade. Furthermore, limited financial and human resources in municipalities slowed the digitisation process.

3 State of digitisation in Europe

Many European countries and regions, for example federal states, are **collecting digital plan data** and establishing registers. Some collect and even scan plans themselves; others require plans or certain data to be uploaded by local planning authorities, or have implemented a completely different digital plan processing system.

The desire to provide harmonised and standardised plan data on a digital and open platform among spatial planning actors is especially clear from 2010 onwards. There is often a difference between the **plan data that are accessible** online to the public and the data that are available internally or to restricted user groups. Such differences include how the data can be accessed (e.g. the data can be viewed but not downloaded), its format (vectorised or image) and the type of information available (e.g. draft plans available only to restricted users). In this respect, the EU initiative Infrastructure for Spatial Information in the European Community (Inspire) has fostered open data (and metadata), but has not necessarily driven digitisation. However, differences have become clearer, which puts pressure on those lagging behind.

DIGITISATION IN 15 COUNTRIES

The qualitative exploration of the digitisation of plans and plan data in 15 European countries[2] highlighted the following.

- There has been an eagerness among spatial planning actors to provide harmonised and standardised plan data on a digital and open platform in the past 10 years.
- Digitisation has improved workflows and planning practices, thereby contributing to cost reduction.
- The ways in which countries have organised and published digital plan data differ, which reflects the diversity of spatial planning traditions and competences.
- Digital plan data that have been harmonised and standardised facilitate innovative practices.
- Future planned developments in the digitisation of plan data may be affected by the reordering of priorities and restriction of budgets due to the COVID-19 pandemic.

In terms of the role of digital plans or plan data, the investigated cases demonstrate the breadth of the diversity. In the majority of countries, digital plan data (geodata) are only a representation of the actual binding analogue plans, which are published in town halls. The representations can also include more or less detailed plans, and are for information purposes only, reinforced by disclaimers in the online portals. In some administrative areas (e.g. in some cantons in Switzerland and some states in Austria), both digital and analogue versions are available, as is a mechanism for comparing the two. Digital plan data are legally binding in only a few countries (the Netherlands and Portugal). In other areas, the PDF version of a plan is binding (Denmark and Austria/Tyrol). In practice, however, digital plan data are often used as if they were legally binding (*de facto*), at least where data are of high quality and are easily accessible.

Differences in the organisation and publication of digital plan data reflect differences in spatial planning traditions and competences. For example, where there is 'division of power' (i.e. a supervisory authority exists), the higher power may demand access to digital plan data when inspecting plans. Furthermore, the starting point for digitisation can differ depending on whether a legally binding symbology for plans is in place or plan requirements and standards are more loosely defined.

[2] Austria, Belgium, Denmark, France, Germany, Ireland, Italy, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Portugal, Slovenia and Switzerland.

In general, planning authorities apply many digital tools in formal planning process to support everyday practice. These include data repositories, access platforms and management systems, online communication and dissemination platforms, and open governance data services or open data.

3.1 Degree of digitisation of plans

The digitisation of plan data began to emerge with the availability of GIS software with graphical user interfaces in the 1990s and of innovative towns and individuals, who began to explore its potential. However, in the latest development, digital plan data have become embedded in established planning practices. Increasingly, systematic approaches across whole countries are applied. Digital plans are becoming mainstream in planning processes. In addition, plan data have been integrated with other sectors and are now used beyond the traditional planning sphere, becoming part of a wider 'integrated digital governance'.

Although plans and plan data have been standardised and harmonised in planning systems, a look across Europe reveals a wide variety of situations and approaches. This results in different forms and formats of digital plans and plan data.

In the context of planning, 'plan' refers to (1) a (georeferenced) drawing of the intentions or regulations and (2) the output of the planning and decision-making processes in terms of a text and (often) an associated drawing. The focus here is on plan data, which are not the same as planning data. Plan data represent planning intentions and regulations and generally include a spatial reference (e.g. plans) and a text reference. In contrast, planning data provide input to the planning process (e.g. traffic data, land use modelling data).

In a narrow sense, we define digital plan data as a specific form of geodata. Whereas geodata, in general, are digital georeferenced data that relate to a specific position on the Earth, digital plan data are produced by spatial planning authorities and describe regulations and intentions, and rights to the use of land (or space in general), now and in the future. They include metadata on, for example, validity periods. A similar definition of digital plan data is used by the Inspire initiative for the theme 'Planned land use' (Inspire, 2013). Analogue plan data, in contrast, are the traditional output of plan making, that is, plans that are drawn and printed on paper. Even if we can agree on such a definition, digital plan data include a wide variety of forms and formats. The data may be available as raster (e.g. georeferenced images) or vector (polygons that are scalable) images. Different parts of a plan may be available in different technical formats. Moreover, the procedural role and the legal status of digital plan data can range from a simple digital representation of an analogue plan, solely for information purposes, to a fully digital plan that is the sole legally binding plan.

Figure 1 presents the concept of digital plan data on a continuum of digitisation, from zero digitisation on the left, to full digitisation on the right. Analogue plan data (left) are traditional plans drafted on paper and their related text (e.g. zoning maps and booklets with zoning regulations). These days, the text is often available in a word processor format. PDFs (or similar universally readable computer file formats) of the drawings and text constitute an intermediate step towards full digitisation. These are generated by scanning or photographing and further processing the analogue plan, and it is often possible to manipulate the PDFs to a certain extent by, for example labelling or highlighting them using suitable software. However, the data are not in a GIS environment. Plan data in a GIS environment are defined as digital plan data in a narrow sense, whereas plan data in readable file formats (e.g. PDF) together with plan data in GIS environments are defined as digital plan data in a broader sense. Data portals are a common way of visualising georeferenced digital plan data as points, lines and polygons with attributes and links to text such as zoning regulations. Excerpts from geoportals can be produced in readable file formats (e.g. PDF). Fully digital plan data can be produced directly in the GIS environment or by digitising analogue plans.

Figure 1
Degree of digitisation of plans

Note: The stage 'Plan as machine-readable system?', is a possible future format in some of the investigated cases.
Source: Authors of Digiplan.

3.2 Plan data on digital portals

The digitisation of plans and plan data occurs at all levels of government in the cases studied in Digiplan. However, digitisation is most widespread at the local level, reaching a coverage of 90 % across the investigated cases. Plan data from municipal land use plans are generally available in digital portals across Europe (Table 3). Typically, designations for different zoning categories are shown and it is possible to click on the zones to obtain further information on regulations or the PDF version of a plan. The majority of portals include vector data. Some portals provide georeferenced scans of plans, but in this case zooming is limited and illustrations can be pixelated.

At the national level, about two thirds of the available planning instruments are accessible on digital portals. It is mainly planning instruments with a strategic or framework nature that have been digitised, and most more visionary plans have not. At the subnational level, only about half of regional and inter-municipal instruments are currently available on digital portals.

Plan data typically illustrate the currently valid plans. Historical plan data are not usually available on these portals. It is not possible to look up previous planning regulations. However, depending on the system and the database, this information is available. For example, on the Danish portal, historical data are available in the sense that cancelled plans (since 2007) remain in the database but are marked as having been cancelled. Some planning authorities have separate digital archives for historical plans.

Table 3
Examples of digital plan data included in the geoportals

Case	Type of digital plan data included
Austria	Tyrol/Upper Austria: Vector data on planning, nature protection and risk areas. Lower Austria: Georeferenced scans of land use plans, heritage zones and wind power. Geoland (joint portal): Harmonised and simplified plan data on different themes.
Belgium (Wallonia)	Vector data on sectoral plans, regional planning frameworks, communal development schemes, local orientation schemes and municipal planning frameworks.
Denmark	Vector data from all national planning directives and municipal plans.
France	Vector data on public services, local urban plans and municipal maps.
Germany (Bavaria, Baden-Württemberg)	Data on state/regional development plans and municipal land use plans. For land use plans, the raster-ring method is often used (scan of land use plan, georeferenced, with digitisation of area of validity or 'ring'). Legends, among other things, are also scanned and linked.
Ireland	Vector data on development plans and local area plans.
Italy (Emilia Romagna)	Vector data on regional territorial landscape plans and municipal structure plans.
Lithuania	Vector data on comprehensive plans of the municipalities and localities.
Luxembourg	Vector data on sectoral plans, land use plans, municipal land use plans and partial land use plans.
Malta	Vector data on strategic plans of the ministry and local plans (boundaries only).
Netherlands	Vector data on zoning plans at the national, regional and municipal levels.
Norway	Vector data on municipal plans, area zoning plans and detailed zoning plans.
Portugal	Vector data or images on coastal area spatial plans, nature protected area spatial plans, regional spatial plans, intermunicipal spatial plans, municipal master plans, urban development plans and detailed plans.
Slovenia	Vector data on national spatial plans, municipal spatial plans and detailed municipal spatial plans.
Switzerland	Vector data on sectoral plans and building zones, raster data on concepts (e.g. wind energy) and vector data on municipal land use plans.

Source: Authors of Digiplan, based on expert interviews and desk research.

While digital plan data obviously have many advantages compared with analogue plans, some planners prefer to work with analogue plans because they represent a whole. In contrast, the use of digital plan data seems to result in the plan fracturing into its constituent parts.

3.3 Phases of digitisation

The digitisation of plans and plan data can be divided into four phases, approximately corresponding to each of the past three decades and the current decade (Figure 2). The first phase, the **experimental phase**, took place in the 1990s. In the first half of this decade, administrations started to experiment with digital plan data. In the second half of the 1990s, the first WebGIS platforms went online, some of which also included plan data.

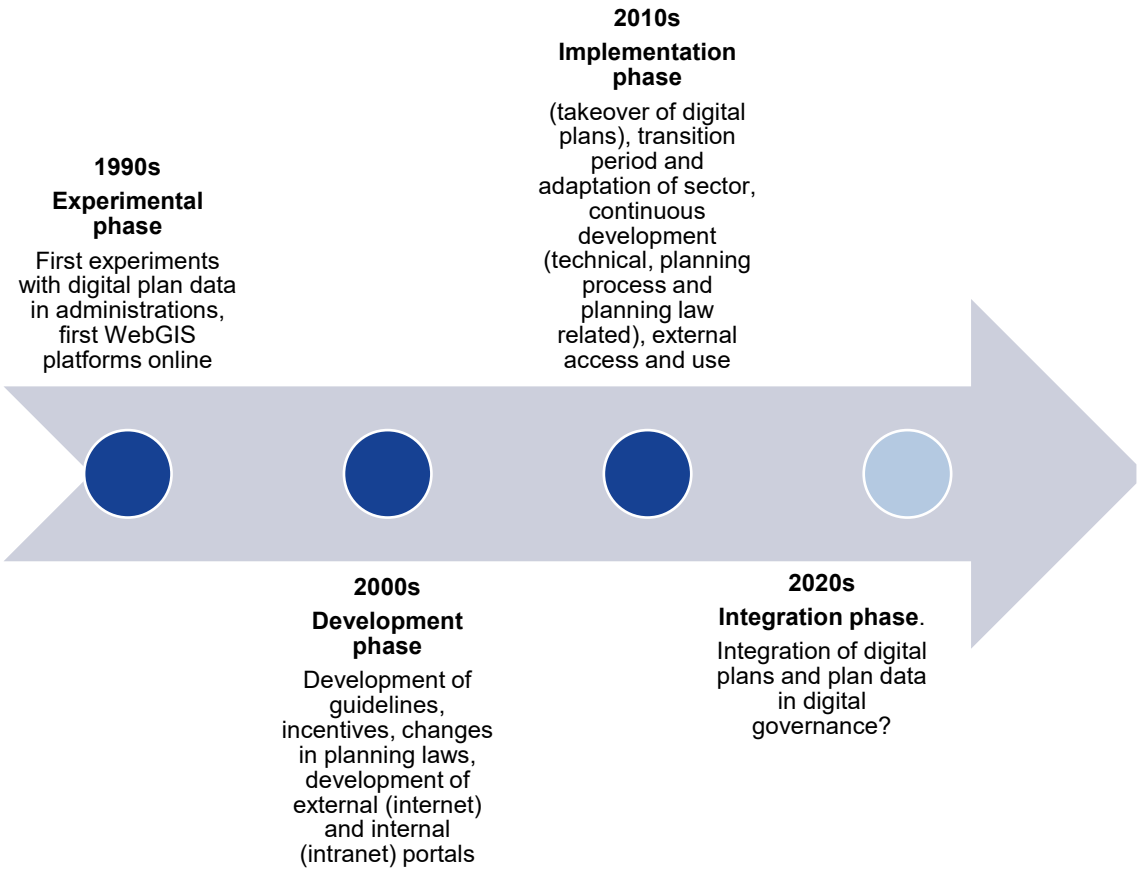
The 2000s constitute the **development** phase, during which the first guidelines for data formats were drawn up, often through voluntary collaboration between different planning authorities. Subsequently, guidelines

and standards were implemented formally in planning laws. The digital portals were developed further for internal and external use.

The 2010s decade can be considered the **implementation** phase. Laws were in place, but a period of transition from predominantly analogue data to predominantly digital data was necessary. In parallel, the development of the portals continued, with improved plan data submission methods, the introduction of new functions for users and the adaptation of planning processes.

The current phase can be called **integration**. Digital plans and plan data are becoming increasingly integrated in digital administration and governance. Plan data are available on open geoportals and, as quality and accessibility improve, are increasingly used.

Figure 2
Phases of digitisation



4 Access and user involvement

4.1 Access to digital plans and plan data

The Digiplan analysis reveals that the type of digital plan data available reflects the planning competences of the various administrative levels in a country as well as the nature of the planning instruments. Digital plan data at the national level are available in all unitary countries included in the analysis[3] (with the exception of Ireland). In the case of the federal countries included in the analysis,[4] digital plan data are usually available at the subnational level (e.g. Belgium) but not necessarily at the national level.

Case study: Denmark – platform with several entry points

In Denmark, all plans prepared in the context of the Danish Planning Act have to be registered in the public digital plan register, 'Plandata.dk'. The platform allows users to download plan data as PDF files or as geodata (directly from the portal or using the web map service or web feature service). Anyone with an internet connection has access to and can download all digital plan data and planning documents.

The platform has several entry points depending on the purpose. The primary platform gives access to all plan data (national, municipal and local); the interface can appear overwhelming, with a vast number of data layers available, many of which are of relevance only to public authorities. The local plans are the only plans that are of direct relevance to citizens. Another entry point for the register is, therefore, solely for local plans. This interface is simpler; the data layer with current local plans is activated by default, and clicking on the local plan reveals a link to the relevant local planning documents. The last entry point for the register is a search module for all municipal and local plans. Through this, it is possible to obtain a list of relevant plans based on certain parameters, for example municipality, plan status, and date and type of plan, with links to the legally binding planning documents.

Case study: Germany – sensitive data and legal discrepancies

Based on information gathered during the interviews with experts carried out in spring 2020, in Germany all geodata should, as far as possible, be available through GDI-DE (Spatial Data Infrastructure Germany), which serves as a collection portal for the metadata, with data providers being responsible for providing the datasets. This means that data providers are also responsible for protecting access to any sensitive data.

The city of Freiburg's preparatory land use plan (*Flächennutzungsplan*) has been available in digital format internally within the administration body for several years. However, as the plan is at a scale of 1:25 000, it was initially published only as a PDF file. Publishing the geodata at parcel scale was undesirable, as this could lead to erroneous conclusions. By providing only a PDF file, parcel-by-parcel interpretation was avoided. In 2020, about seven years after first being made available in PDF form, the preparatory land use plan was published on Freiburg's new geoportal. To avoid the potential problem discussed previously, external users cannot zoom in and view the dataset at the level of individual parcels.

Case study: Norway – request for data

In Norway, digital plan data are available to the public. Any private actor who proposes a plan has to request the latest geodata, or plan data, from the municipality. In the majority of cases, the data are not available free of charge, but once they have been paid for the new owner can use them as they please. Any plan is submitted to the municipality must be made accessible to the public. The plan data produced in the planning process are then the property of the municipality and, if the plan is adopted, the existing data need to be updated as and when the plan is amended.

[3] Denmark, France, Ireland, Italy, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Portugal and Slovenia.

[4] Austria, Belgium, Germany and Switzerland.

Case study: Switzerland, Thurgau canton– barriers to access

In Switzerland, geodata from the cantonal structure plans in the canton of Thurgau became available in around 2013 for a fee through the ThurGIS Shop. Since 2018, these data have been available free of charge through the shop and, since 2019, all geodata from the cantonal structure plans can be obtained directly from opendata.swiss as a web feature service. At the time of the interviews, to obtain data through the ThurGIS Shop, interested parties needed to first create a free account. This could be considered a small barrier to the acquisition of data. Prior to 2013, the data were also shared with planning offices as shapefiles on request.

4.2 User involvement

Users of digital plan data

Each of the 15 cases studied in Digiplan considered three aspects of the use of digital plan data: the profiles of users, the monitoring of users and the permissions given to use digital plan data. In terms of the profiles of users, there are five main types of users of plan data in the case studies: planners, public authorities, researchers, companies and individuals. Other users include notaries (who use the plan data to determing the existence of any pre-emptive rights), land registries and architect (who need the plan data to list all the planning-related rules for a parcel). The same types of users generally used analogue plan data prior to digitisation. However, planners and local or regional authorities are the most common users in almost all cases. They may, for example, use the digital plan data to prepare reports on planning permits and assess municipal and private plans.

Few of the cases examined have a reliable way of monitoring who uses their digital plan data. Some interviewees offered assumptions based on communications from users received through the channels available on the portal, such as contact forms or emails, or on statistics on use of the portal. For example, in Norway, statistics identify the principal users as planners and architects in public authorities and the general public. In Bavaria and Baden-Württemberg, the types of users are not monitored, but it is assumed that they are the same as the target groups, that is planners, staff of the administration body and the general public.

There are several models for regulating access to data. For instance, in France, the following types of licence are issued to users: anonymous, service provider, delegated, local authority and local administrator. Anonymous users can see and collect data but cannot modify them. Service providers are professionals who can check the data and validate them. Delegated users are professionals who have the right to send planning documents on the behalf of a local authority. Finally, the local administrator profile has a technical licence. In St. Gallen (Switzerland) and Austria, a distinction is made between internal and external users. Internal users are those in the municipal administration, while external users comprise planners or interested citizens.

Benefits of digital plan data

Two main aims of the digitisation of plan data were identified in the 15 case studies. The most commonly mentioned, in 12 cases, was to provide easy access to planning data and a high level of transparency. This aim was expressed in different ways in the interviews through phrases such as ‘open data’, ‘open governance’, ‘provide transparency’ and ‘easy access to data and metadata’. The other main aim was a desire to create a national (or regional) digital portal containing harmonised plan data or plan data of a better quality than would be possible with an analogue format.

Improved workflows and planning practices are among the most common benefits of the digitisation of plan data. These improvements are mostly seen at the municipal level in the case studies. For instance, in Denmark, it is simpler for municipalities to submit plans to the state in digital than in analogue form. In addition, the national platform provides a better overview of all municipal plans across the country. Similarly, municipalities in Luxembourg do not have to manually extract plan data to prepare requested planning reports for parcels in their territory. Such reports can now be autogenerated through the national geoportal, which reduces the workload of municipalities.

Case study: Austria – market changes

In Austria, the digitisation of plans has not affected the small municipalities, as those that have been unable to adapt to the new requirements regarding GIS data have subcontracted the task of preparing plans and conducting planning processes to private consultancy firms. However, increased digitisation in some regions

has led to a market shake-out in the consultancy sector, such that a small number of companies now serve the majority of planning offices. In addition, a few software providers are playing a larger role in some regions. The fear of a potential market shake-out may also have delayed digitisation in some Austrian regions and may have contributed to long transition periods.

Case study: Denmark – digital citizen involvement

In Denmark, the digital plan register does not directly support the actual planning process or planning hearings or communication between actors. This is intentional, as these activities are considered the responsibility of municipalities and not of the state. Nevertheless, plans are made public on Plandata.dk, and parties are notified automatically by the system when a plan is in hearing or has been approved. However, the hearing process from this point on leaves the system; hearing parties do not reply on Plandata.dk. Instead, the process is managed by the municipalities.

The Danish Town Planning Institute, which is a private, independent institution that aims to showcase planning in Denmark, has started online courses that aim to inspire digital citizen involvement. The courses are targeted at municipalities' planning departments. The courses focus, among other things, on how to facilitate digital citizen involvement through, for example, debates, polls, group work and questionnaires.

Case study: Germany – empowered public through participation

In Germany, the public has been empowered by participatory processes in which digital data are used and plan information is combined and displayed, for example in the form of large data tables that act like a giant tablet. Digital plan data can facilitate evaluations and analyses, which can be presented to politicians and provide a solid foundation for projects or planning. In spring 2020, in Hamburg, a digital participatory project (DIPAS) to involve the public in the conception of land use plans was ongoing. The effects of digitisation on participatory processes and planning were difficult to determine; however, it was found that criticism about a lack of transparency in the preparation of plan data decreased with digitisation and the provision of plan data.

In Hamburg, a transparency portal was established on the basis of the Transparency Law. In addition, Hamburg provides digital plan data and strives to provide the planning regulations in digital form. Although it is not yet clear whether planning practices have changed as a direct result of digitisation, there has at least been an increase in transparency as a result of making the digital plan data accessible to the public.

Case study: Switzerland – transparent plan data

Overall, the case study from Switzerland showed that, in most cases, everyone has access to the digital plan data, which benefits all actors. In the context of the public law restrictions cadastre, ensuring the transparency of plan data with public law restrictions on ownership is an objective that has been achieved in practice. Making plan data publicly available has advantages not only for authorities and investors, but also for private parties, as easy access simplifies planning. Thanks to the transparent plan data, authorities can appear more visible to private parties. In the canton of Thurgau, private companies (planning firms etc.) are more progressive than the municipalities, as they have to position themselves on the market and, therefore, take advantage of consulting opportunities. In addition, the public is becoming more aware of the issue of digital plan data, now that they have easier access to such data.

Cooperation within the authorities has changed in various ways. In some cantons, for example Thurgau, overlapping work on geodata has led to closer cooperation between departments. In others, interdepartmental cooperation has decreased because the digital data are more readily shared for comment without the need for human interaction. This was reported by interviewees to be the case in Basel-Stadt. Thus, digitisation can lead to increased or decreased cooperation within authorities

The development of the public law restrictions cadastre facilitated collaboration between the cantons and the federal government. To create the data models for this cadastre, intensive cooperation was required in working groups and experience exchange groups.

4.3 Potential and challenges

Potential

Accessible digital plan data have considerable potential. Having a digital plan portal allows the visualisation of plan data, which supports hearing processes and increases participation. For planning professionals, a digital portal can also facilitate the creation and editing of digital plan data.

Improved workflows and planning practices are some of the most common benefits of the digitisation of plan data mentioned in the 15 case studies. Digital plan data can be accessed much more easily and more quickly than analogue plan data, with the additional benefit that existing planning documents are also more transparent. Transparent governance and increased participation are other advantages that were identified in the case studies; for example, in Germany and Switzerland, the public was empowered by being involved in participatory processes made possible by access to digital data and combined information.

If digital plan data are to be available through a single digital portal, then they must conform to the same technical requirements, which makes it possible to achieve higher data quality and data accuracy.

Challenges

One of the advantages of digital plan data is also one of the challenges. It can be a challenge to develop, comply with and maintain the technical requirements for digital plan data, as an extensive and coordinated effort is required to ensure data quality and accuracy. Even when the technical requirements have been met, delivering the data on time and ensuring that they are of sufficient quality can be a challenge. A coordinated data review may be necessary to ensure quality.

In the case of the digital plan portal, a user-friendly interface with intuitive commands and graphic visualisation is necessary to ensure accessibility. While access to digital plan data has often been a significant improvement for experienced users, some portals can be very complex and confusing for non-experts, and there is a possibility that citizens will be overwhelmed by the myriad of digital tools, which can cause them to lose focus on what is relevant for them. It is important to consider the barriers to availability, such as the requirement to create an account to see or download plan data or the cost of plan data. Another aspect of the portal is map representation. This is especially important in the case of plans designed at a specific scale or more strategic plans, as viewing such plans at different scales is undesirable because users could draw misleading conclusions based on the scale. Furthermore, the possible discrepancy between digital plans and analogue plans can be confusing.

5 Policy and practice recommendations

DIGITISE TO IMPROVE EFFICIENCY

1 Know your planning system

The digitisation of the public sector, planning systems and planning practice is ongoing and evolving with technology. To anticipate the path of digitisation and improve efficiency, it is important to understand the planning system and the historical roots of planning instruments. The potential of digitisation varies, and it faces different challenges depending on the division of power in a planning system, the level of the planning authority, the regulations on plan content and the wider legal system.

2 Develop standards

A good starting point for the digitisation of plans and plan data is to define standards and data models, establish metadata and develop technical requirements for digital plan data that work across the whole country (planning system). Digitisation offers many new opportunities and advantages. To ensure future use and continued development, it is crucial to establish a comprehensive data structure. A coordinated data review, involving all stakeholders, may be necessary. In Germany, XPlanung is an example of a feasible approach to creating digitisation standards in spatial planning, and one that could be particularly useful in other federal countries. In France, a multistakeholder council develops joint standards.

3 Ensure compatibility between plans and plan data/standards

If plans are not yet fully digital, a challenge in the development of digital plan data can be the compatibility and comparability of the digital plan data and the legally binding plans, for example in the form of PDFs. This is the case in Denmark. The data models for reporting the digital plan data do not always correspond with the explanatory texts of the legally binding plans themselves. As a result, the digitised plan data can be different from those which have been politically adopted, as the plans are translated to the available data model. In Norway, digital plan data must be formatted strictly in accordance with the country's standards and respect the need for harmonisation of regulatory planning instruments. At stake here is the scope of digitisation, whether 'everything' needs to be digital or whether the focus should be on producing and exchanging more targeted and relevant data on the topic of a decision. This may reduce the amount of information needed, and the costs related to its production and consumption.

4 Implement digitisation to reduce workload for plan administration

Digital plan data can reduce workload in the everyday administration of plans and plan regulations. For example, the possibility of retrieving planning excerpts has helped to reduce the workload and costs and sped up the planning processes in Luxembourg.

5 Use digitisation to improve access and collaboration

In general, digital plans and plan data are viewed as highly advantageous in terms of being accessible online to everybody, allowing everyone to use the data for any purpose. Digital plans and plan data also seem to improve exchange between authorities. This is further boosted if digital plans are legally binding or are at least *de facto* used as if they were the original data.

6 Develop digital process chains to facilitate cooperation

Digital process chains can be developed to increase the efficiency and coherence of various administrative processes. The German standards of XPlanung and XBau enable the link between strategic planning, land use planning, architectural design, construction and monitoring of the built environment. If they can be pursued together, they foster unprecedented synergies in the planning and construction contexts.

7 Use digitisation to improve flexibility in the planning process

During the COVID-19 crisis, planning departments with a high degree of digitalisation had an advantage with regard to workflows, especially when people had to work from home and needed to access plans. Furthermore, digitalisation was able to compensate, at least partly, for the fact that building site meetings that were previously mandatory could not take place during lockdown'. Even when public life opens up again, digital processes could improve such meetings.

8 Develop a clear strategy (and funding) to implement efficiency gains

The development of digitisation is often slowed by the absence of financial support and the need to prioritise tasks related to digitisation, as total digitisation is a massive undertaking. Having clear strategies instead of focusing on short-term developments is recommended.

9 Aim to achieve fully digital plan data

Many countries do not implement fully digital plans, but, for example, use the raster-ring approach (Germany) or have parallel systems, with both analogue and digital plans (Austria). This may be a feasible solution for the transition period, but fully digital plan data (e.g. in the Netherlands) offer better opportunities to satisfy future spatial planning needs.

10 Address digitisation in rural areas

Smaller and/or rural municipalities, which are not part of metropolitan or intercommunal cooperation, lag behind in some countries (France and Germany). This gap may even widen over time, as digitisation, based on experience so far, seems only to get ever more complex, with more standards, more data, more portals and more demands. This makes it difficult for those lagging behind to catch up. A review of the standards to ensure they fit smaller authorities as well as larger ones could be considered. In addition, authorities at the national or regional level could help in digitising plan data in less resourceful municipalities, for example by providing funds or expertise.

DIGITISE TO ENABLE INNOVATION

11 Ensure accessibility to digital plans and plan data

Accessibility of plan data is key in facilitating business and open to new actors, for example the real estate, and building sectors, and citizens. Digital plans enable municipalities to reach more citizens, and make it easier for citizens to find the right planning information.

12 Consider the active involvement of citizens or the private sector in the development of digital plan data

The current plan data governance structures are often restricted to public authorities. While being cautious with the influence of non-elected bodies in public administration, it could still be beneficial to consider the more active involvement of citizens or the private sector in the development of digital plans and plan data, and see citizens as more than data consumers. Citizens and the private sector have insights from specific places, practices or professions and have valuable knowledge to share. Involving them could contribute to making plans and plan portals more useful to a wider audience and enable innovative practices.

13 Share knowledge and examples of national and international digital plans and plan data use

Cities can be very advanced in digital plan data use. Sharing these and similar experiences in communities can inspire good practice and accelerate digitisation. Project work undertaken during Digiplan showed that there is a high level of interest in sharing knowledge internationally.

14 Make use of digital plan data to evaluate planning

The steady increase in building land is a recurring topic of public debate. Digital plan data can help to summarise and analyse what, where and when new building land is zoned. These data can provide the highly necessary evidence on which to base future spatial planning policy.

15 Consider improving the monitoring of plan data use

Very often, knowledge on data use is missing from the portals and data providers. Typically, general online statistics are available, but it is unclear who is using which data and for what purpose. More qualitative monitoring, getting in touch with users directly, is important in maintaining the relevance of the portals and data and ensuring that they actually fulfil their purpose. This is particularly important if digital plans are legally binding. Regular workshops and networks, as organised in Denmark and France (although they are mainly targeted at experts in these countries), may be a first step.

16 Consider parallel systems as a compromise for transition

Having parallel systems in place, whereby an analogue version of a plan coexists with a digital version (legally binding or not), may be a practical compromise during transition periods (e.g. in Austria). Even if this

results in redundancies, it can help to ensure a smoother transition, while at the same time having benefits related to accessibility, analytical insights and an increase in skills internally and in the wider planning community.

17 Adapt the planning system

It may prove necessary to adapt existing planning instruments so that they are compatible with digitisation. Such adaptations range from the need to make changes to aspects of plan layout, such as symbologies and annotations, to regulations that stipulate how plans must be published and how they should be accessed. At the same time, it is necessary to be aware of the potential of losing plan information when digitising, for example losing contextual information if there are no limits to the scale.

18 European institutions can support exchange, not least in cross-border areas

It is very likely that in the next few years digital plan data of rather good quality and detail will be available from all EU Member States. European institutions such as Eurostat and ESPON can provide support in the area of plan data, especially regarding data collection and provision of important metadata (e.g. what a certain plan/regulation implies). They can also support knowledge exchange. Inspire could be the technical platform to build on.

19 Support exchange between planning and GIS communities and interdisciplinary collaboration

Minimising the knowledge gap between planners/politicians and GIS technicians will lead to improved use of existing plan data and geodata. In general, interdisciplinary communication should be supported. Increasing the amount of information available enables discussion of land use, because everything has a clear spatial reference.

DIGITISE TO INCREASE TRANSPARENCY

20 Use digital plans to improve transparency regarding current regulations

Improved transparency, in terms of making available tailor-made information on plan regulation for a specific parcel, is in many cases rather advanced, as is the more general goal of making plan information more easily accessible over the internet.

21 Employ digitisation to make the whole planning process visible, not only the final document

The use of digital plans before they are adopted, for example in participatory processes, is not yet widespread. Most plan data portals document only the current state of plan regulations. Digitisation and new ways of communicating and accessing data and plans could also be used to improve and open up planning processes, as well as the implementation and evaluation of plans.

22 Have the users in mind, provide different entry points and use an open data approach

The digitisation of plans and plan data also results in an increase in complexity. Digital portals often enable access to a range of data related to, for example, nature, socioeconomics and public services. However, visualisation of combined information is often not as good as in the case of printed products, as a great deal of effort often goes into improving readability of the latter. Consideration should be given to providing different groups of users with different entry points to plans and plan data, to reduce complexity. The depth of information, the tools to interact with and the presentation of data can then be tailored to the selected purpose. For example, the Danish digital plan platform has been further developed to become easier to use, more logical and intuitive regarding both the reporting module for municipalities and the interface for users. In Norway, local portals have proven to be an important feature of the planning system, at its current state of digitisation. Accessibility is also supported by a general open data approach. This allows innovative use and will assure universal access in the future.

23 Develop the portals collaboratively

The development of digital plans and access portals needs to be conducted in dialogue with all target groups (planners, software producers, municipalities and municipal associations, and citizen's groups) to ensure that the digital plans can actually be used for planning and are not just there because they are technically possible. In many cases, this has been done by formal (e.g. specific councils/conferences) and informal (e.g. workshops) collaborations between different planning authorities and other stakeholders. Informal and voluntary collaboration can play a rather important role in increasing the acceptance of new standards, processes and technologies, among other things, and ensure their relevance.

24 Implement digitisation to benefit all levels of governance

Although different levels of governance have different and purposes in mind, all levels of governance may benefit from the digitisation of the planning system. The funding of digitisation therefore needs to account for the wider effects of digitisation.

25 Enhance communication with and participation of stakeholders through digital plan data

Making access to digital plan data easier not only expands the user community but enables communication with various stakeholder groups and supports their involvement in planning processes. This recommendation is supported by the results of recent open data decisions of the Swiss federal government.

References

ESPON (2017) Policy Brief “The territorial and urban dimensions of the digital transition of public services”. Available at https://www.espon.eu/digital-transition

ESPON DIGIPLAN (2021) *DIGIPLAN – Evaluating spatial planning practice with digital plan data*. Final report. ESPON EGTC. Available at: www.espon.eu/digiplan.

European Commission (2019), 2019 European Semester: Country Reports. Available at https://ec.europa.eu/info/publications/2019-european-semester-country-reports_en

European Commission (2020), Digital Economy and Society Index (DESI) 2020

European Commission (2020), 2020 European Semester: Country Reports. Available at https://ec.europa.eu/info/publications/2020-european-semester-country-reports_en

INSPIRE (2013) *D2.8.III.4 INSPIRE Data Specification on Land Use – Technical Guidelines, v. 3.0*. 10 December. Thematic Working Group Land Use, European Commission-Joint Research Centre. Available at: https://inspire.ec.europa.eu/file/1521/download?token=rC4oOlLA.

World Economic Forum (2021) “The Global Risks Report 2021” available at https://www.weforum.org/reports/the-global-risks-report-2021

Co-financed by the European Regional Development Fund

Inspire Policy Making with Territorial Evidence

ESPON 2020

ESPON EGTC
11 Avenue John F. Kennedy
L-1855 Luxembourg
Grand Duchy of Luxembourg
Phone: +352 20 600 280
Email: info@espon.eu
www.espon.eu

The ESPON European Grouping of Territorial Cooperation (EGTC) is the single beneficiary of the ESPON 2020 cooperation programme. The single operation within the programme is implemented by the ESPON EGTC and cofinanced by the European Regional Development Fund, the EU Member States, the United Kingdom and the Partner States, Iceland, Liechtenstein, Norway and Switzerland.

Disclaimer
This delivery does not necessarily reflect the opinion of the members of the ESPON 2020 Monitoring Committee.

ISBN: 978-2-919816-28-6

© ESPON 2020

Editorial team

Coordination: Piera Petruzzi, ESPON EGTC

Authors of Digiplan

University of Copenhagen (Denmark) – Christian Fertner, Sara Folvig and Andreas Aagaard Christensen; Norwegian University of Life Sciences (Norway) – Marius Grønning, Daniel Galland, Bjørnar Rutledal and Marc Le Diraison; Swiss Federal Research Institute WSL (Switzerland) – Anna Hersperger, Silvia Tobias and Corina Wittenwiler; Nordregio (Sweden) – Julien Grunfelder and Alex Cuadrado

Advisory group of Digiplan

Ole Pagh Schlegel and Bent Lindhardt Andersen, Danish Housing and Planning Authority, Denmark; Hilde Johansen Bakken, Ministry of Local Government and Regional Development, Norway; Silvia Jost, Yves Maurer and Marc Pfister, Swiss Federal Office of Spatial Development, Switzerland; Piera Petruzzi, ESPON EGTC

Published in January 2022