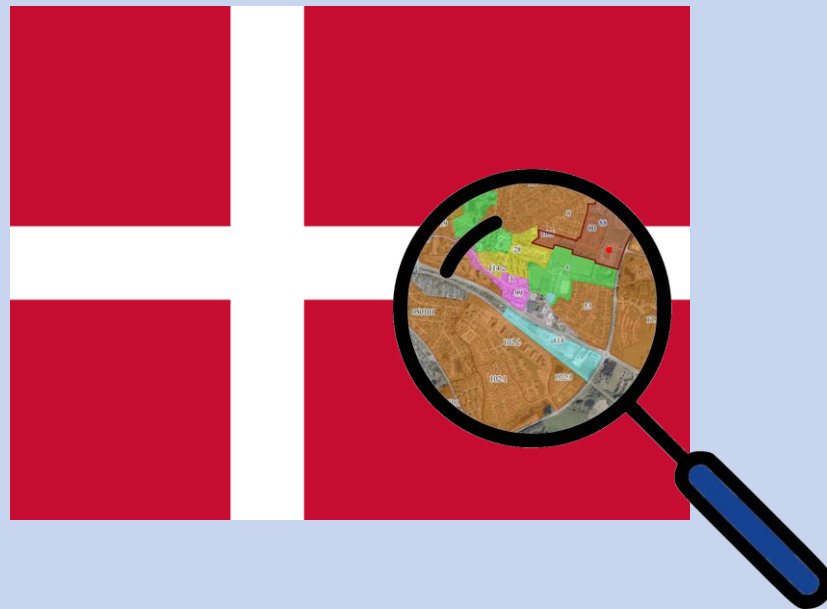Inspire Policy Making with Territorial Evidence

TARGETED ANALYSIS //

DIGIPLAN – Digital plans and plan data in Denmark

Annex 4 of final delivery

Final report // June 2021

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Abbreviations

WMS Web Map Service
WFS Web Feature Service
GIS   Geographic Information System
SOAP Simple Object Access Protocol

Foreword by the Danish stakeholder and the research team

The ESPON DIGIPLAN project explored the development and state of digital plans and plan data in several European countries. It is the first of its kind; no similar research has been conducted before and the topic of inquiry was spanning wide from the beginning. The project employed therefore an explorative character to shed light on digital practices in different spatial planning contexts but also presents an early systematisation of general concepts, key terms and approaches describing emerging digital plans and plan data and related practices. This Annex reports on Denmark, one of the 6 in-depth case studies. In this report, there is focus on the Danish digital plan register Plandata.dk.

There is a long history of developing digital plan data in Denmark. From the very beginning in the early 1980s until today, where a common national platform for plan data, Plandata.dk, has been established. At Plandata.dk, all plans are registered and accessible digitally and the legally binding plans can be found. The digital data is freely available to ensure one place where everyone has access to all plan data (dictated by the Danish Law on planning) across administrative boundaries, to facilitate municipal workflows by simplifying the submission of plans to the state, and to assign geography on all plans in order to precisely identify plan boundaries. The development of digital plan data has largely been in a voluntary collaboration between municipalities and the national planning authority to ensure a sustainable and long-term development of digital plan data. The Danish case therefore provides a great insight into how the process and development of digital plan data can take place.

In Denmark, the focus is now shifting towards putting digital plan data to use. This is not to say that the digitalization process has stopped – but Denmark is at a state where the digital plan data can now be used for different purposes. Showing the benefits of digital plan data is an important step in order to get as many as possible on board before continuing the digitalization processes.

At the beginning of the DIGIPLAN project, the responsibility for planning and the development of digital plan data was located under the Danish Business Authority. The Danish Business Authority's main purpose is "to create the best conditions for growth in Europe and to make it easy and attractive to run a business in Denmark"[1]. However, on the 21st of January 2021 the planning department was transferred to the newly established Danish Housing and Planning Authority (Da: Bolig- og Planstyrelsen) under the new Ministry of the Interior and Housing (Da: Indenrigs- og boligministeriet). The purpose of the Danish Housing and Planning Authority is to contribute to developing a cohesive Denmark with opportunities and development in country and city[2]. As a result, the planning department has a more centered place in the new institution, and is, in addition getting closer to other parts of authorities working with planning – e.g. building permit processing integration. It will be exciting to follow the future development of Plandata.dk and the digital plan data in Denmark as a result of this change. Perhaps it will be an occasion for widening the use of digital plan data into new areas that are within the responsibilities of the new ministry.

The writing and information in the case study for Denmark has not been updated to reflect the transition to the new Danish Housing and Planning Authority, as this change has taken place after completion of the interviews and data collection for the case study.

Enjoy reading!

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Danish Housing and Planning Authority

Christian Fertner, Sara Folvig, Andreas Aagaard Christensen, Sophie Ingeholm

University of Copenhagen

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[1] https://danishbusinessauthority.dk/mission-and-vision, accessed 03.06.2021

[2] https://bpst.dk/, accessed 03.06.2021

1   Introduction and data

ESPON DIGIPLAN provides an overview on digitalisation of plan data in 15 ESPON countries, insight information from case studies in 6 countries and thematic practice papers, synthesizing the state of the art in topics related to digital plan data and digital plans.

This Annex reports on Denmark, one of the 6 in-depth case studies. The methodological framework for the case studies is described in Annex 1. The main empirical basis for the case study are interviews with experts in the field. Interviewees were chosen with the help from the Danish stakeholder in the project, the Danish Business Authority, based on written material on the theme authored by them, or based on the snowball method, where they were mentioned by pervious interviewees. Interviewees include experts and planners from the national level, from municipalities, and from private consultancies. All interviews were conducted in Danish. Citations are own translations based on transcription. Information from interviews in the text are indicated by (DK01) to (DK07), referring to an internal interview reference table. In addition, several reports, websites and further literature on the case study have also been included.

Table 1.1
Interviews held

Affiliation	Position
National planning authority (Danish Business Authority)	Planner from national planning authority, expert on digital plan data in Denmark and the digital plan register
	Expert from the national planning authority on the digital plan register
Danish Maritime Authority	Expert for the Marine Spatial Plan, first fully digital plan in Denmark
Danish municipalities' association, Local Government Denmark	Expert on municipal and local plans
Municipality	Municipal planner from sub-urban municipality
	Municipal planner from rural municipality
Private consultant	Former municipal planner, now private consultant. Developed a digital solution for local plans

In this report, we especially focus on the Danish digital plan register Plandata.dk and its relation to the municipal plan, which is a land use plan covering the whole municipal area, and the local plan, which defines more specific use and regulations of a specific sub-area, e.g., the town centre or a new residential area.

The regional level has no planning competences in Denmark today. Until 2006, county planning existed which especially addressed spatial development outside of urban areas. Those regulations are today part of the municipal plan. In a separate section, we will also touch on those, by reviewing the digital planning process for the "Green map of Denmark", an attempt to harmonize municipal plan regulation on nature areas. Furthermore, we will report on the development of the Danish Marine Spatial Plan, the first fully digital, legally binding plan in Denmark.

1.1   The Danish planning system

Spatial planning in Denmark is regulated in the Planning Act (da: Lov om planlægning). The purpose of the Planning Act is "to ensure that the overall planning unites the interests of society with respect to land use and helps protect the country's natural environment, so that the development of society is sustainable in respect of people's living conditions and the conservation of wildlife and vegetation" (The Danish Nature Agency, 2012: 8)

The planning system has its roots in the planning legislation reform from the 1970s, but the system significantly changed in 2007, when spatial planning instruments at the sub-national/regional level were abolished. The Minister for Industry, Business and Financial Affairs is responsible[3] for all national legislation and planning (e.g., Planning Act) as well as spatial planning policies and guidelines, i.e., the national planning reports (da: Landsplanredegørelse), national planning directives (e.g., for coastal protection, retail trade, test centres for windmills etc.), and national planning directives for Greater Copenhagen (da: Fingerplan). National planning directives can set a binding framework for the content of municipal planning (Danish Business Authority, 2020c).

All planning at local level is done by the 98 municipalities, which have a high degree of autonomy. Planning instruments include the municipal plan strategy, municipal plan, local development plan, specific service plans, as well as specific regulations for rural areas. All plans done in the framework of the planning act have to be registered in the publicly available digital plan register Plandata.dk.

Figure 1.1
Planning instruments in Denmark
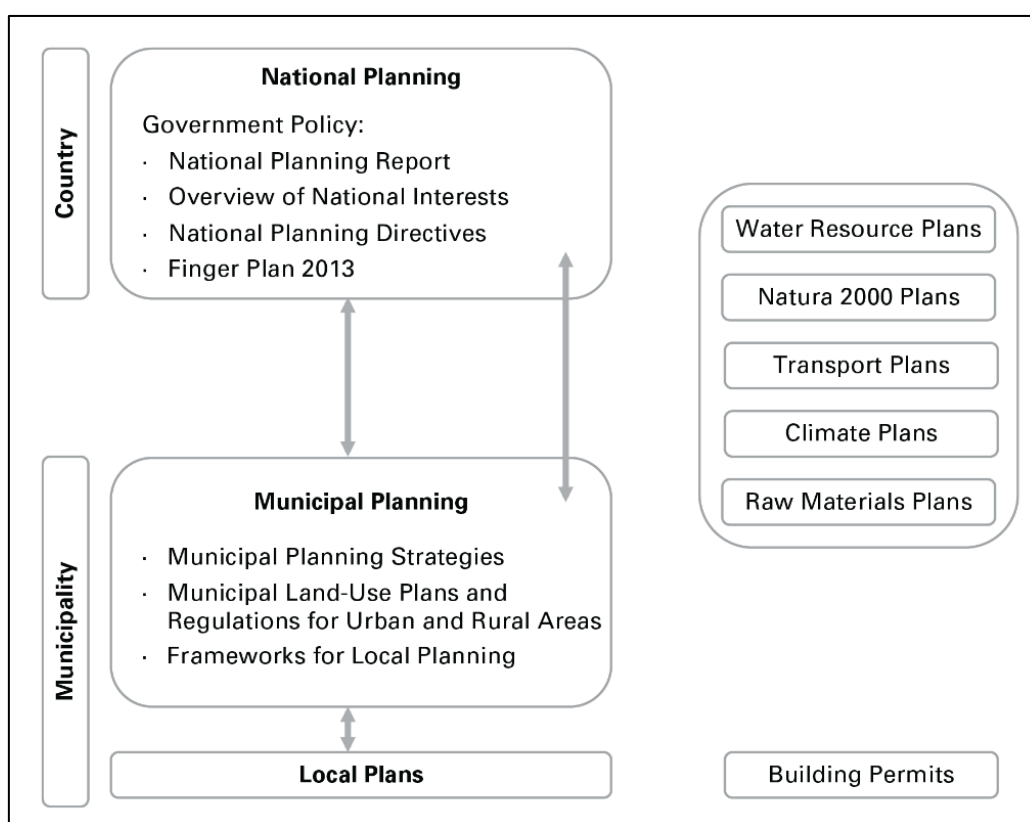
Source: Galland and Enemark, 2015

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[3] At the time of finalising this report, the Danish government changed some ministerial competences. From 21 January 2021, spatial planning shifts to the responsibility of the a new Ministry for the Interior and Housing, https://www.stm.dk/presse/pressemeddelelser/nyt-indenrigs-og-boligministerium, accessed January 2021

2   Scope of digital plan data

2.1   The current state of digital plan data

All plans done in the framework of the Planning Act have to be registered in the publicly available digital plan register Plandata.dk. There are several platforms to access the register:

- http://kort.plandata.dk (all plan data: national, municipal and local)
- https://visplaner.plandata.dk/visplaner/lokalplaner.html (only local plans)
- http://kort.plandata.dk/searchlist/#/ (a search module for all municipal- and local plans)

It is via Plandata.dk that the official and legally binding planning documents, in the form of pdfs or links to legal texts by national planning directives, can be accessed. The geodata, which is available via Plandata.dk, is alone used as cartographic representation of the plan elements; the geodata is not legally binding. The platform allows download of plan data as pdfs or as geodata (direct in the portal or WMS/WFS). Anyone with an internet connection has access to see and download digital plan data and planning documents.

On Plandata.dk, digital plan data from the national and local level is available (see Table 2.1). There are differences in the digitalisation in the different planning instruments (e.g., because of scale and character of the plan), which range from general strategic orientation to cartographic representation of binding and not binding elements (for further information on each planning instrument see Table 2.2)

Most municipalities have, in addition to Plandata.dk, their own geoportals where they have digital plan data for the municipality displayed.

Table 2.1
Planning instruments

Level	Planning instruments	Included in the geoportal as geodata
National	National planning reports (Landsplanredegørelse)	No
	National planning directives	Yes
	National planning directives for Greater Copenhagen (Fingerplan)	Yes
	Summary of national interests	No
Local	Municipal strategy for planning (Kommuneplanstrategi)	Yes
	Municipal plan (Kommuneplan)	Yes
	Local plan (Lokalplan)	Yes

Source: Authors

Table 2.2
Representation of selected planning instruments on Plandata.dk

National planning directives

For national planning directives, there are differences in how the directives are digitised and what information is available via the platform, due to scale and the nature of the directives. Overall, this is a cartographic representation of binding and not binding elements. It varies whether it is a specific area delimitation for specific projects or an overall strategic area of interest. For the main part of the directives, only the date of adoption is stated, which ministry has adopted the directive, and a link to the legally binding legal text.
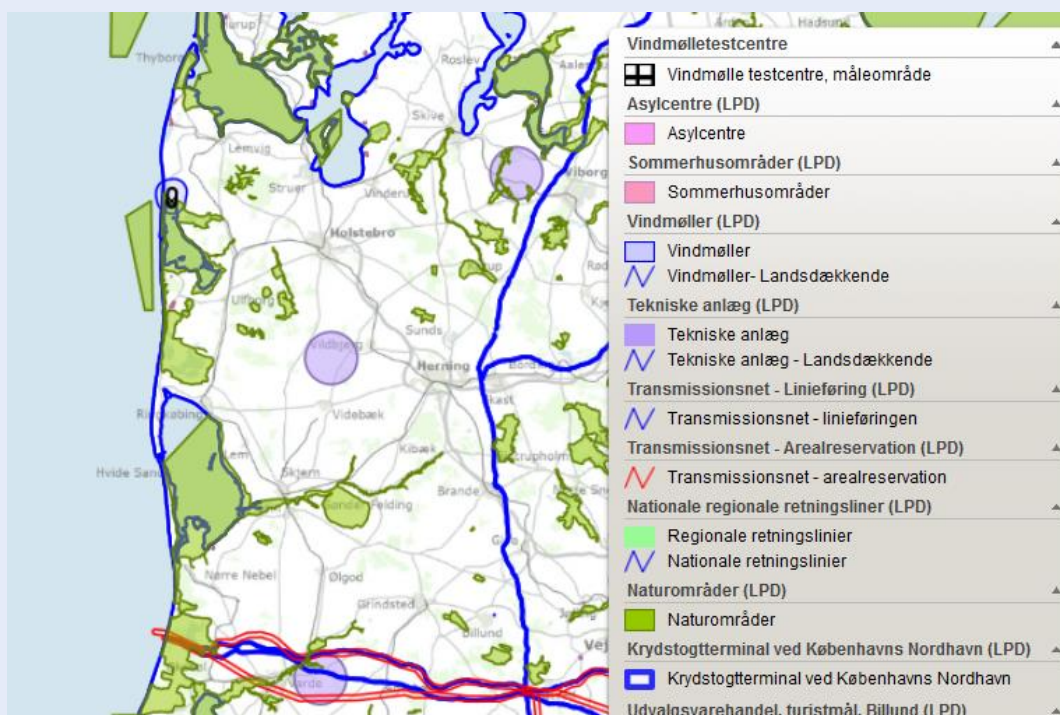
National planning directives for Greater Copenhagen

For the National planning directives for Greater Copenhagen, the map appendixes for the directive are available in digital format with 59 data layers. This is a cartographic representation of binding and non-binding elements for each individual map appendix. There is only information about the specific names of the individual boundaries. There is no link to the planning documents or further information about each map appendix.
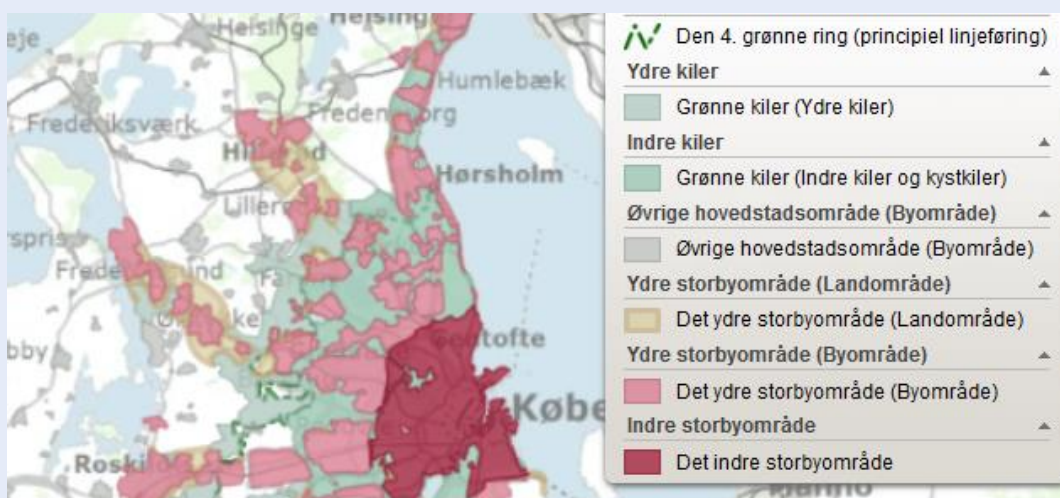
Municipal plan strategy

The municipal plan strategy must be updated every 4 years for each municipality; however, the municipalities may also publish a planning strategy when it deems it necessary or appropriate. In Plandata.dk, the municipal strategy for planning is available in three versions: adopted, proposed and cancelled. The municipal strategy for planning is digitised on the basis of the municipal boundaries (cartographic representation of binding and non-binding elements) with basic information about plan status, plan name, dates for proposals, adoption, creation, etc. (procedural information). In addition, there is a link to the legally valid planning document in pdf. For all municipalities, an adopted municipal strategy for planning is available. Not all municipalities have a proposal for or a cancelled municipal strategy for planning reported.

Municipal plan

The municipal plans are divided into three elements: main structure, guidelines and framework. The municipal plan must contain maps that relate to guidelines and frameworks. If there is a discrepancy between the map and the text part, the text applies (Ministry of Environment, City and Landscape Agency, 2008: 19).

The main structure is digitised on the basis of the municipal boundaries (cartographic representation of binding and not binding elements) with basic information about plan status, plan name, dates for proposals, adoption, creation, etc. (procedural information) with a link to the legally valid planning document in pdf.

The guidelines concretize the main structure and cover all subjects mandated by the Planning Act (The Danish Nature Agency, 2012: 20) The guidelines can differ substantially and cover e.g. zoning and nature protection. The different guidelines are viewed as individual layers with cartographic representation of binding and non-binding with basic information about plan status, plan name, dates. For some guidelines additional information is available, e.g. for retail zoning.

Example of guideline: regulations for nature protection

The framework determines what can be planned locally in the individual parts of the municipality. The framework is most digitised elements of the municipal plans. For each digitised zone there are basic information about plan status, plan name, dates etc. In addition, regulations for the entire plan and the specific uses in the zone are digitised as well as a body text containing detailed instructions.

Example of zoning in the municipal framework
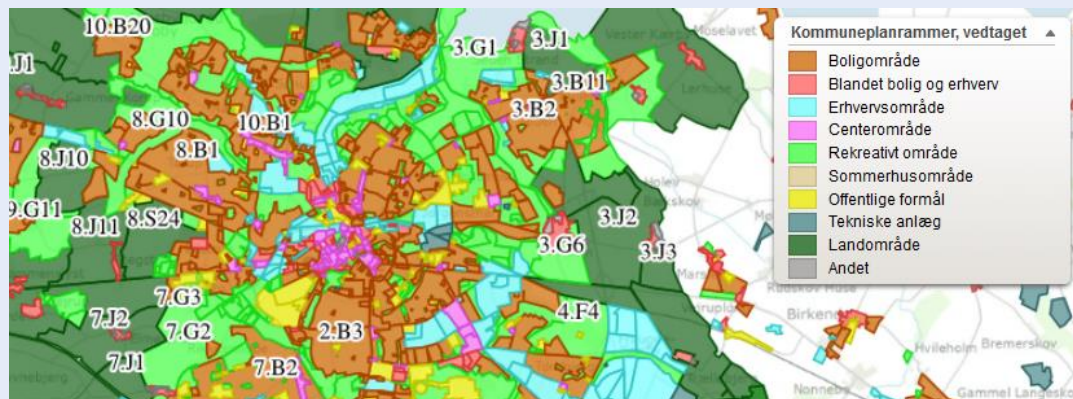
Local plan

Local plans regulate a wide range of issues concerning e.g. use, the extent and location of buildings, roads and paths as well as the architectural design of an area (The Danish Nature Agency, 2012: 24). Local plans are legally binding for landowners. The local plans can be very different in content and there are no binding guidelines on structure of local plans. Overall, this is a cartographic representation of binding and not binding elements. For each digitised plan there are basic information about plan status, plan name, dates etc. Only selected plan data is digitalised from the local plans, e.g. regulations regarding use.
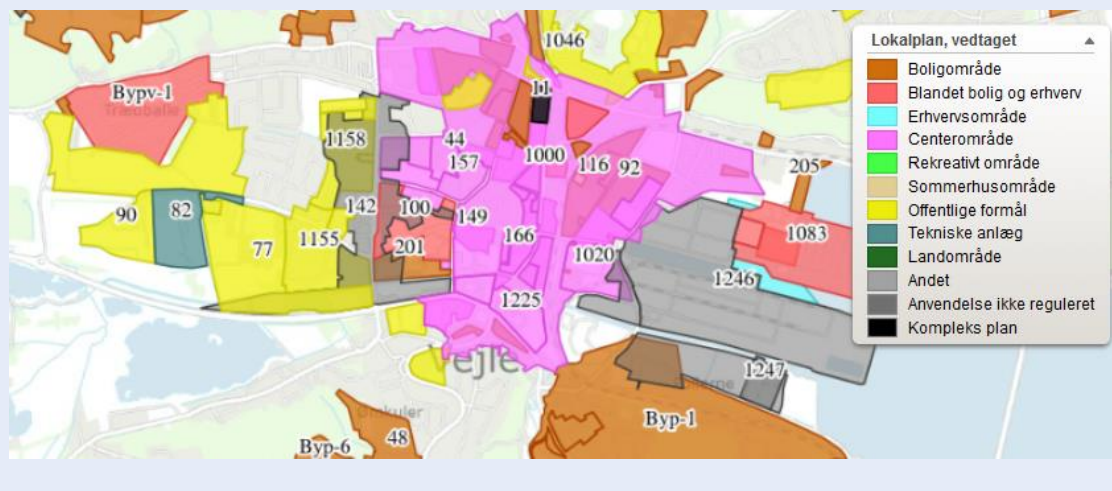
Screenshots from Plandata.dk, accessed December 2021

2.2   The historical background

The first registry of planning data in Denmark (da: Planregistret), was established in 1986 with the purpose to "form the basis of the public property assessments, give citizens easier access to planning information, act as an analysis tool, e.g., in connection with the actual land use, and generally facilitate and improve the work in the municipal administration" (Trollegaard, 1989). While the Ministry of City and Housing (da: By- og Boligministeriet) was the data responsible authority, the municipalities had the responsibility to report data to the registry and reporting was not compulsory. In addition, the registry was text-based and did not directly allow the plan data to be displayed graphically and as a result, the registry did not successfully become part of the more digital planning process.

The idea that plan data should be accessible for everyone further arose in the 90s, with the general digitalisation and increase of computers. Some municipalities could see the benefit of digital plan data, and wanted maps digitised for their own purposes, e.g., to display on websites. Around the millennium, an increasing number of municipalities started using the internet for distribution of plan data (Jensen, 2002). In one early initiative, municipalities began emailing pdfs with plans instead of sending them by post to the national planning authorities (DK01).

In the beginning of the 1990s a plan information system (da: Planinfo) was developed in connection with Planregistret, in hope of supporting the planning processes (Trollegaard, 1992). There were options to produce thematic maps from the system however, this attempt to use GIS in the planning process did not gain any noteworthy significance (Hansen, 2002). By 2001 the plan registry was little used by the municipalities, among other things, due to outdated data structure and organization as well as lack of flexibility, e.g., in relation to geographical representation of plan data (Jensen, 2002). In general, there were significant differences between the municipalities regarding storage and distribution of plan data. In addition, the plan data collected at different levels of public administration often took place without any kind of coordination.

In the middle of the 1990s, a voluntary collaboration of 7-10 municipalities was started (DK01). The group coordinated their GIS processes, which prompted them to develop a common data model, planDK. Subsequently, Planforsyningen.dk was established in the middle of the 2000s, a system where the municipalities could voluntarily register their plans, which were shown on a map. It continued successfully on a voluntary basis for a few years, and it was therefore pursued to making it a requirement for all municipalities. As a result, PlansystemDK was established in 2006, where all plans covered in the Planning Act had to be reported as a pdf in order to be valid, including the geography of the plans. Thus, a central register of plans was consolidated.

Until 2013, there were many considerations for further digitisation. In 2013 the Danish digital strategy (da: Fælles Offentlige Digitaliseringsstrategi), a working group with broad participation of ministries, Local Government Denmark, and other stakeholders, worked on a proposal for digital local plans. No funding was found for the digitisation, however the collaboration between the Ministry of Business and Local Government Denmark continued informally. This collaboration was intensified in 2016, when the Ministry of Taxation saw opportunities in using plan data for property assessment. A very intensive work was initiated to expand the register in PlansystemDK to contain more data from the plans. In 2017, the expanded PlansystemDK was developed, and the system was renamed Plandata.dk. At the same time, a first registration of the additional data from 33.500 local plans and 50.000 municipal plans was carried out.

Figure 2.1
Phases of digitising plan data in Denmark

1980-90s	2000s	2010s	Future
First experiments with voluntary digital plan registries	Establishment of digital plan platforms with mandatory registration of plans	Development leading to of the current plan platform Plandata.dk	Further development of Plandata.dk with greater focus on planning and fully digital legally binding plans.

Source: Authors

3   Organisation of digital plan data

3.1   Actors and their role in digitalisation

The respective planning authorities are responsible for entering the plan data in Plandata.dk. Municipalities continuously update by reporting new plans, update old plans, and are responsible for the quality, accuracy, and legality of the data for local and municipal plans. The Danish Business Authority is responsible for registering the plan data for the national plans and are in addition responsible for the quality and accuracy of the national plans.

There are several actors involved in the digital plan data; the main actors are

- The Ministry of Industry, Business and Financial Affairs, responsible for all national legislation and planning
- The Danish Business Authority (under the Ministry of Industry, Business and Financial Affairs), responsible for Plandata.dk
- The municipalities, responsible for the local planning
- Other public ministries/agencies (e.g., the Danish Tax Agency, the Nature Agency)

In addition, Local Government Denmark (da: Kommunernes Landsforening, KL) and various private consultancies are important actors.

3.2   Formal structure in which digitalisation is embedded

While the Danish Business Authority and the municipalities have the daily operation of the systems and reporting of data, there is a close collaboration between all actors on the development of future digitisation and use of plan data and improvement of Plandata.dk.

The digitalisation of plan data and the register Plandata.dk is currently driven as a top-down process. However, it is, to some extent, not with the national planning authority representing "the top", but rather the Danish Tax Agency (DK02). The digitalisation is steered by the direct demand of a national authority, the Danish Tax Agency, which is external to the planning authority and municipal planning units, in order for them to utilize the harmonized datasets for property valuation.

Several actors were invited to participate in the Danish Business Authority's process of developing Plandata.dk, e.g., both municipalities and Local Government Denmark were involved. Local Government Denmark had already been in dialogue with the national planning authorities over the last many years to expand the digital basis for the planning, e.g., the possibility of preparing digital local plans (DK05). However, it had not been possible to find the necessary funding for this development.

According to a private consultant, the purpose was initially to develop a fully digital plan system, however the Danish Tax Agency changed direction to a system which could disaggregate plan data to single parcels when the government made the decision to develop a new property valuation system (DK06). This also stopped the slower process of digitising local plans. As a result, funding for digitisation was established but this funding had to be prioritized for the new property valuation system. Although the dialogue on the development of digital plan data continued, there was a tight schedule for development of the new system, where there was only time to digitise data for use in property assessments, and not data for use in the municipal planning (DK05). From a planner's point of view, the project did not develop in an optimal direction (DK06). The Danish Tax Agency was not responsive when the municipalities, and as far as possible the Danish Business Authority (DK05), pointed out the requested data was not necessarily available via the local plans. The focus was predominantly on the political ordering of the property tax valuation, and less so on, whether this was feasible within the municipalities' data set (DK05). This finally resulted in individual municipalities in collaboration with Local Government Denmark withdrawing from the process, as it could otherwise appear as a professional stamp of approval of Plandata.dk on their part (DK05, DK06). Some municipalities continued in the collaboration.

According to a municipal planner, there are challenges in the way that Plandata.dk is structured regarding what data the municipalities can and must report (DK03). While the municipalities essentially are receptive to reporting existing data and in new systems, they are not interested in delivering data that they do not have

(DK05), i.e., data at cadastral level. It is not the municipalities who have dictated what is to be reported from the municipalities' plans and how, as the system adheres to the Danish Tax Agency's requirements. The reporting of plans therefore follows specific rules, which do not necessarily benefit the municipal planning or were part of the current planning in the municipalities, where the plan data is written in the plans to a more or less digitised and detailed degree (DK03, DK04, DK06). In order for the Danish Tax Agency to have easy access to the data they need, only specific information from the plans have been selected for reporting. As a result, not all information from the plans is necessarily included.

Consequently, there is a translation of the plans when reporting the data to Plandata.dk (DK03). As an example, it is possible to report a building percentage from the local plans; however, it is not possible to register the perhaps several exceptions to the building percentage, as this is not part of the data the Danish Tax Agency have required. The municipal planner acknowledges that while there can be sense in not reporting the entire plans, it is necessary to be careful about how accurate the digital plan data is and how the digital data is used (DK03).

Following the recent expansion of Plandata.dk, two obstacles for the digital plan data have been data quality, especially regarding old plans and their digitalisation, and Plandata.dk's development having been more focused on meeting the tax authority's demands rather than the municipal planners' interests (DK02). According to the planning expert, the data quality has however improved recently, and planning and the municipalities' needs have come into focus again with a major update, also financed by the Danish Tax Agency, where specific plan data which the municipalities (and planning administration) are interested in, will be possible to digitise and report to Plandata.dk (DK02).

3.3   Financing

The Danish Business Authority finances the daily operation of Plandata.dk (DK02). The Danish Tax Agency has also been a major actor, as they have commissioned and financed digitisation of plan data, for use in calculating property tax.

End users do not pay to use the system – all data is available for viewing, download, and use.

It is possible for the municipalities to purchase services from consultancies for digital municipal and local plans. A municipal planner respond that their municipality only has a solution for municipal plans (DK03). The municipality have considered a solution for their local plans for several years however, the switch to a new platform for digital plans costs a significant amount of money and the municipality has not had the finances so far.

3.4   The role of different actors

Digitalisation

The respective planning authorities are responsible for entering the plan data in Plandata.dk. The Danish Business Authority is responsible for entering the plan data for the national plans. Municipalities continuously register plan data by reporting new plans and update old plans, e.g., municipal- and local plans. It is the Expert on municipal and local plans perception that in most municipalities planners report data to the system (DK05). Before the final reporting of plan data to Plandata.dk, the reporting can be tested in a sandbox module. The sandbox module can also be used for training, e.g., of new employees in how the registration and Plandata.dk itself works (DK02). In addition, the module is used to test new developments e.g., of data models and third party developers can test their system (DK01).

A municipal planner reports that their municipal plan is an online webpage, i.e., the municipal plan is, through the municipal itself, only available via a webpage and not as a pdf or similar written document (DK03). The digital municipal plan is developed through a planning consultant and the software automatically reports the framework part to Plandata.dk. The framework is reported from the webpage literally. Opposite, the guidelines are more complex and do not follow the same data model. The software used is not developed to handle the registration of the guidelines to Plandata.dk (DK03). Here there is a manual process to register the guidelines, which is unavoidable. Fortunately, according to the municipal planner, the guidelines are not frequently updated or changed (DK03). The municipal plan is still available as a pdf through Plandata.dk, which is mandatory and legally binding. The pdf is a print of the municipal webpage.

A municipal planner reports that their municipal plan is digital (DK04). They do not have digital local plans, even though all the underlying work is digital. The municipality has planned to start with digital local plans, but postponed it several times to await developments of Plandata.dk. However, they will probably start working on digital local plans themselves very soon. The local plans are currently uploaded as PDFs to the municipal website and Plandata.dk.

According to a municipal planner, the digital municipal plans have advantages; however, there are also challenges when the national planning authority changes the systems (DK03). Changes on the national level affect plans on the municipal level, as there is a close interaction between the digital plans and the system where they are reported. An important aspect in digital development is therefore integration of the systems.

Standardisation

The Danish planning law focuses on the planning process and thus no map symbols are defined in the law. This means the municipalities have different ways of defining regulations and intentions in their plans, which requires flexible definitions in the plan register.

The Coordination Committee on Geographic Information Infrastructure (da: Samordningsudvalget) is an interdisciplinary committee working on the further development of geo data infrastructure and coordination of common public standards (The Danish Agency for Data Supply and Efficiency, no date). The committee is coordinated by The Danish Agency for Data Supply and Efficiency. The committee consists of representatives from public authorities, the utilities sector and other organizations with special knowledge of the geographical information infrastructure, e.g., universities. In recent years, the Committee has, among other things, dealt with data quality in georeferenced legislation, the interaction between new technologies and the geographical infrastructure, the quality of metadata and the use of geo data for differentiated and automated regulation (DK01).

Each type of plan has its own data model. All data models must adhere to the overall data models. The data models for Plandata.dk are made up of a number of registrations (attributes), each of which tells something about the data being reported (Danish Business Authority, 2020a). The Danish Business Authority is in process of adapting all data so that it can be read by the INSPIRE data model. For a given plan type, the data model is made up of:

* General registrations associated with all plans in Plandata.dk (e.g., PlanID).
* Common registrations linked to several different plan types (e.g., codes for categories of use).
* Specific records relating to one specific type of plan (e.g., regulations in a local plan).

The digital municipal plans could make it easier to familiarize the municipal planners with neighbouring municipalities' plans and workflows; the main hindrance however is that the planning categories is not unified across municipalities (DK04). According to the municipal planner, this merging will only happen if it is dictated from the national planning authorities, as for some municipalities this may mean changing, perhaps completely well-functioning and efficient, workflows due to modification of land use designations and other categories (DK04). This has already been unsuccessfully attempted in the former counties and considering the number of municipalities today, the municipal planner believes that this can become a considerable problem if forced by the national planning authority (DK04).

The private consultant is only interested in standardisation in areas where it is needed (DK06). According to the private consultant, there is a risk that too extensive standardisation can exclude or limit planning options that were formerly available (DK06). E.g., that in some cases there only will be standard solutions available within a number of provisions instead of local planning from case to case. There is a value in being able to plan freely every time. Not that you necessarily do it every time, but the value lies in the opportunity.

3.5 The relation between digital plan data and various institutions

The Danish Geodata Agency is responsible for cadastral maps in Denmark. The cadastral maps are updated daily. Corrections in the cadastral maps occur, but the plans applicable to the cadastral records in question are not automatically updated. The Danish Business Authority has a minimum tolerance that sorts out the smallest changes in the cadastral map. It has been discussed whether the plans should be automatically adjusted by changes in the cadastral map, but there are divided opinions about this (DK02).

The municipalities often use cadastral identification numbers and cadastral boundaries to designate the applicable scope in the local plans. If the local plans do not follow the cadastral boundary in the local plan, it will most often result in a subdivision of the cadastre in question.

The plan information is used as input for property assessments. Once a month, the Danish Business Authority recalculates all sub-cadastre and the calculations are subsequently used in property assessments (a sub-cadastre is considered the smallest geographically delimited area, for which only one set of planning provisions applies) (DK02). When calculating, it is most convenient to follow the cadastral boundaries but the municipalities may draw their boundaries in the plans as desired. If the calculation of the sub-cadastre cannot be extracted automatically, e.g., by inaccurate and overlapping geometries, the calculations will be sent to manual control by the municipalities. Thus, the municipalities are also interested in the plans following cadastral boundaries to reduce their subsequent workload.

3.6   Relation within different levels of government

There is a voluntary collaboration between The Danish Business Authority, municipalities, and other stakeholders, e.g., public agencies and third-party developers, where they discuss, among other things, current deficiencies in the system as well as aspirations for future digitisation of municipal and local plans (DK01, DK02). The collaboration is exclusively voluntary, with a visionary and future-driven focus. There are four aspects to the collaboration:

- User Interests: use of Plandata.dk, what is the need for digitalisation in the municipalities
- Legalization: what will it take to make digital plan data legally binding?
- Standardisation: agreement on future standardisation of digital plan data
- Fast track: identifying 'low hanging fruit'; small changes and adjustments that at little cost can have a considerable impact, improving the system user interface, the created dataset's usability and bringing it closer towards full digitalisation

In addition, there is a more formal collaboration (da: Brugergruppe til plandata 2020) driven by Local Government Denmark together with the Danish Business Authority. The user group also consists of nine municipalities. In addition, the Danish Property Assessment Agency (da: Vurderingsstyrelsen) and the Danish Agency for Development and Simplification (da: Udviklings-og Forenklingsstyrelsen) participate in selected meetings. This collaboration focuses on the systems itself, e.g., around operation and use (DK05). There is some overlap between the participants in the two collaborations.

The Coordinating Committee on Geographic Information Infrastructure (da: Samordningsudvalget) has been established by the Minister for Climate, Energy and Utilities. The committee consists of representatives from public authorities, the utilities sector, and other organizations with special knowledge of the infrastructure for geographical information. In recent years, the committee has dealt with, among other things, the quality of data in georeferenced legislation, the interplay between new technologies and the geographical infrastructure, the quality of metadata and the use of geo data for differentiated and automated regulation (The Danish Agency for Data Supply and Efficiency, no date).

For one municipal planner, the internal cooperation in the municipality or inter-municipal cooperation has not become easier as a result of digital municipal plans (DK04). Similarly, another municipal planner does not feel that the cooperation within the municipality has changed (DK03). However, their municipality has a collaboration with seven neighbouring municipalities regarding local plans (DK03). A municipal planner initiated this collaboration in order to provide input to the national planning authorities for an earlier project on digital plans from The Danish Business Authority and Local Government Denmark (DK06), which lacked necessary funding to continue. The municipalities looked at finding a common standard in their local plans, e.g., to follow the same structure and to use the same definitions to ensure similar interpretations of the plans. This has not been the perfect solution according to a municipal planner (DK03); however, it is only a cosmetic application, which ensures that all the plans are easy to navigate.

According to a municipal planner, there is a good collaboration between the municipality and The Danish Business Authority and Plandata.dk (DK04). The municipal planner informs that the municipalities sometimes have to point out if there are some missing boxes or criteria to report in Plandata.dk (DK04). Some of these has already been adjusted and others are on a list of things that The Danish Business Authority will work on adjusting. The other municipal planner agrees that there generally is a good collaboration with The Danish Business Authority (DK03).

The Danish Business Authority also has good experiences with cooperation with the municipalities (DK01). One of the experiences they have gained is the importance of starting new development as a voluntary collaboration, where the municipalities are part of the process, as this will also ease new legislation if the development turns out to an obvious advantage for all parties. If a development starts with the national authority announcing, e.g., new digitalisation with complete data model, which must be used, it will be met by a lot of resistance from the start.

3.7 Relation between governmental and not-governmental actors

Participation

Plandata.dk does not directly support the actual planning process, hearing, or communication between actors or the implementation. This is deliberate, as it is not seen as the state's task to provide such a solution on behalf of the municipalities (DK01). Nevertheless, plans are made public through Plandata.dk, and Plandata.dk notifies mandatory and optional hearing parties automatically when a plan is in hearing or finally approved (DK02). However, the hearing process from there on leaves the system. Hearing parties cannot reply on Plandata.dk. The municipalities handle hearings in different ways.

Even if a single hearing module would be integrated in Plandata.dk, it will not be able to deprive citizens of the right to submit hearing responses in other ways, e.g., via regular mail or emails (DK06). Thus, it will still be necessary to include hearing responses not given through the portal. Such a hearing module can however still increase participation as there are more opportunities for submitting hearing responses.

A municipal planner reports that their municipality is continually considering whether it is possible to improve the cooperation between the municipality and citizens (DK04). It is their experience that digital plans enable the municipality to reach a greater number of citizens and in addition, the digital plans make it easier for citizens to find the right information. For several years, the municipality has had forums where, e.g., citizens have been able to public make objections or give opinions (DK04). However, these public forums can, according to the municipal planner, result in some citizens not wanting to participate in the debate or express their opinions, e.g., due to inability to articulate or a desire to keep the opinion within the municipality (DK04). This balance of openness is something the politicians and municipality are very aware of when they use digital tools. In addition, there is a possibility that citizens can be overwhelmed by too many digital tools, which can cause them to lose focus on what is relevant for them.

The municipal planner informs that they reach more citizens with digital plans, but that it is necessary to be aware that some generations still have difficulty with the digital world (DK04). The municipal planner does not believe that the municipality needs extra efforts in relation to the employees, e.g., in the form of extra training, but it is important that the employees in the administration have time to help e.g., citizens who feel insecure about the digital platforms (DK04). The municipality has good experiences working with people who are not IT-skilled and guiding them to the digital municipal plan, e.g., over the phone. This way the citizens discover how they access the information on the municipality's websites. In addition, both the municipality and the citizens save time and resources through digital plans. According to the municipal planner, the municipality previously spent considerable resources sending entire paper plans by post, even though the citizen just needed plan information on a few pages (DK04).

A municipal planner does not believe that digital plans have changed the dialogue between the municipality and companies, citizens, etc. due to the way the plans are displayed digitally (DK03). The current platforms do not give citizens an easy overview of the scope of the plans. According to the municipal planner, their municipality is attractive, and the municipality generally receive many inquiries, it is not the impression that e.g., citizens necessarily look into plans before contacting the municipality (DK03).

The municipal planner expects that there will be an increasing number of cases from citizens in relation to the new property tax (DK03). Although there is nothing new in the way the tax authority uses plan data to assess property tax, it now will become clear to the citizens what information the tax is based on and therefore the citizens can inquire further regarding the decision.

Role of consultancies as digital (system) experts

Many different consultancies offer solutions for digital municipality- and local plans. It is possible to connect third-party software, e.g., tools provided by planning consultants, to Plandata.dk via the SOAP interface

(Simple Object Access Protocol). Approximately 50% of all plan data registrations are done through third party solutions, the rest via the registration module on Plandata.dk and the use of third party solutions are increasing (DK01).

There is wide variation in the various solutions that the private consulting companies offer. It also varies whether all plan information can be reported automatically to Plandata.dk via the consulting solution or whether there are parts of the plans that must be reported manually via Plandata.dk.

Private consultancies are also a part of the various collaborations on digital plan data facilitated by the Danish Business Authority.

4   Use of digital plan data

## 4.1   Digital plan data in the formal planning process

Digitisation of plan data in Denmark started as a voluntary project. Several of the previous systems functioned on a voluntary basis, where there was varying support for the systems from the municipalities. There were several voluntary collaborations and committees in different parts of the country, which worked on developing common models and guidelines for the use of digital plan data. In order for all the municipalities to be brought together under one public system, however, a legislative intervention was seen necessary. Today, all municipalities must report their plans under Plandata.dk.

Despite the developments with Plandata.dk, the legally binding plans are still the pdf-version, not the geodata (Baaner et al., 2019). However, even if plan data on Plandata.dk becomes legally binding, the system is essentially a system for documentation, a public information portal. It does not support the actual planning process, hearing, or communication between actors or the implementation. This is deliberate, as it is not seen as the state's task to provide such a solution on behalf of the municipalities (DK01).

A new plan will always be created first as a "Draft Proposal" (da: Kladde), after which it can be published as "Proposal" (da: Forslag). In the same way, it is subsequently possible to prepare a "draft for adoption", which can later be published as "adopted" (da: Vedtaget). Finally, the plan can be cancelled when it is replaced by a new plan or it no longer applies, the plan will now be in the status of "Cancelled" (da: Aflyst).

Plans with status proposal, adopted, and cancelled are publicly available on Plandata.dk. That means, through metadata, e.g. when a plan was cancelled, it is possible to create historical data. However, a specific model to archive historical versions of plan data is currently in discussion (DK01). Plans with draft status are not publicly available but only available through the reporting module. Figure 4.1 shows the number of local plans with the three different status currently in the database. Around 600-800 local plans are adopted in Denmark every year.

Figure 4.1
Number of Local plans in Denmark becoming effective, cancelled or proposed* since 2007
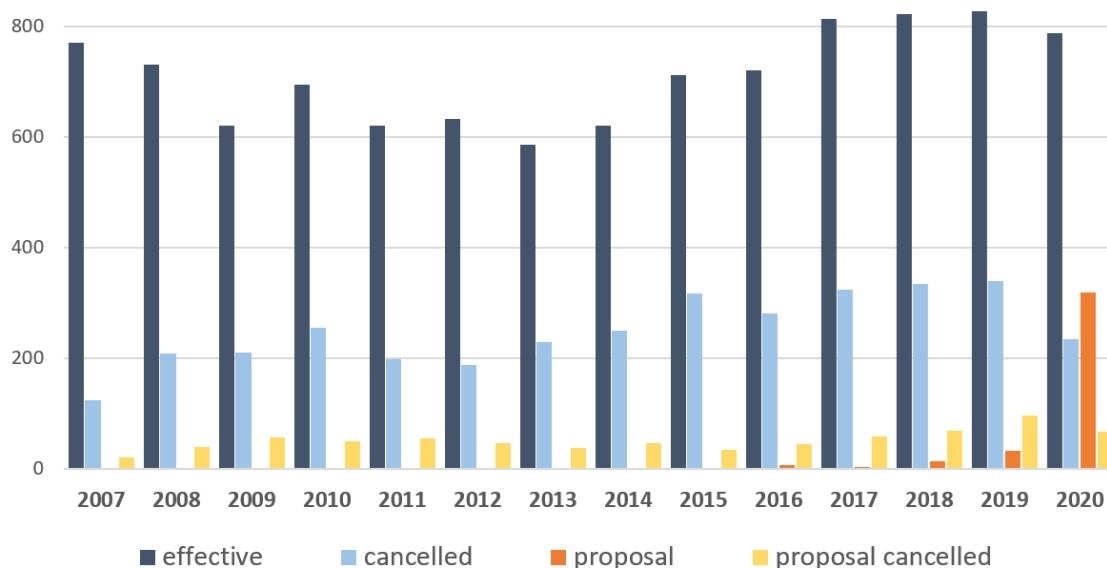
* Proposed plans usually will transform to effective plans if adopted, otherwise they are cancelled.
Source: Own calculation, data from Plandata.dk, accessed 30 January 2021

There are no automatic sanctions if a municipality does not report the plans to Plandata.dk (DK01) and the Danish Business Authority does not register whether municipalities report data on time. If it is found that municipalities have not reported plans, citizens can complain to the Board of appeal in planning matters (Da: Planklagenævnet) and the municipalities may then be required to rectify it. There are also legal requirements (through the Planning Act) as to how long certain plan types need to be in public hearing as proposals before their adoption (DK02). The hearing process for certain plan types needs to be initiated through Plandata.dk. While the Danish Business Authority is not responsible of taking legal actions if the hearing process is violated, they log and can make data that can support such actions available.

The Danish Business Authority has the overall coordinating role in the plan supervision (Da: "Plantilsyn"), which ensures that municipal and local plans do not conflict with national interests and the planning law (DK01). In this supervision, data from Plandata.dk is used. In addition, the Danish Business Authority uses plan data from Plandata.dk for government services and ministerial services.

How plan data gets into the register

Plans are registered manually via a module in Plandata.dk. Geodata can be uploaded or directly drawn and edited in the system – however, the latter is rather basic as there are missing some snap functions (DK02). It is possible to connect third-party software, e.g., tools provided by planning consultants, to Plandata.dk via the SOAP interface (Simple Object Access Protocol).

Each type of plan has its own data model. When registering plans via Plandata.dk, the limitations of the data models are automatically built in. There are also GIS templates with examples of geometries and associated attributes that meet the requirements of a specific plan type's data model. A number of registrations for Plandata.dk are filled out automatically. Therefore, only a few fields need to be filled in when reporting and uploading plans, some of them mandatory (DK02).

Screenshot from the online input module of plandata.dk, where zoning category, pollution class and building volume can be added.

4.2   Digital plan data in other parts of the planning process

Although all municipalities must report to Plandata.dk, there are still large differences in how the municipalities work with digital plan data and planning. Several municipalities are working with digital solutions developed by third-party consultants; with modules connected to Plandata.dk.

According to a municipal planner, they experience that Plandata.dk is not suitable for use in an internal discussion in the municipality, as Plandata.dk does not contain the content of the plans but only an interpretation of the plans (DK03). The municipal planner states however that they use the draft function a great deal (DK03). The draft function makes the process of reporting plans easier, as it is possible to save the drafts and resume the reporting at another time. In the old system, the reporting process could not be stopped without having to start all over again next time. In addition, the draft plans cannot be used as a hearing tool with the current plan content, this may happen when the plans become fully digital.

The municipal planner reports that the digital municipal plans are often used by the civil servants working with building permits (DK03). The digital plans allow the administrators to see all relevant plans, framework etc. for a single property when evaluating building permits. The digital plans are therefore used as a work tool differently from the planners. The planners only prepare the plans once a year while others, e.g., the building permit administrators, then administers the plans on a daily basis. The municipal planners prepare the plans via the planning consultant's software, which is not necessarily that user-friendly, and consequently the building permit administrators often use the municipality's public digital platform instead to view the plans (DK03). An important aspect to consider regarding digital plans is a close dialogue with the target group of the plans in order to ensure that the digital plans can be used to its fullest potential.

The private consultant also sees a great advantage in the fact that the plans and plan data are digital, especially in relation to a more adaptable building permit processing (DK06). Today, the administrators often need to familiarize themselves fully with the relevant local plan. Although the administration usually builds a great routine in doing this quickly, for each new building permit there is a new local plan they need to be acquainted with. With a digitised local plan, it will be possible quickly to locate the most relevant information for the specific cases. The consultant also adds that planners generally do not have a good overview of the municipality's plans (DK06). Planners often base their work on own experience from previous local plans. With digital local plans, it is also possible to get a much better overview of all existing plans.

4.3   Digital plan data outside / beyond planning

According to planning expert, several major private companies are recipients of all plans, i.e., every time a new plan is created in the system, a message is automatically sent to the company (DK01). For example, a major supermarket chain is interested in where new residential and commercial areas will be developed and has therefore subscribed to get information on all new plans in Denmark. In addition, there may be plans, which involve for other retail businesses, in which the company might be interested.

4.4   Accessibility

Who has access to the digitised data and when in the process?

The respective planning authorities are responsible for entering the plan data in Plandata.dk (DK01).

Anyone with an internet connection has access to see and download digital plan data and planning documents. While users are not monitored, users of Plandata.dk include public authorities, planners, private citizens, and companies such as real estate agents and land surveyors (DK01). Only registered users have access to the plan registration modules and only planning authorities (e.g., municipalities) can register users. The data is also registered in the Danish geodata metadata base, the Danish search service according to the INSPIRE directive, on https://www.geodata-info.dk under the search term 'PlanDK'.

According to a municipal planner, their municipal plan is accessed both via the municipality's website and via Plandata.dk, regardless of whether it is users, consultants, or citizens (DK04). The municipality has benefited greatly from the digital municipal plans and the accessibility and use of the municipal plans has been increased over a number of years, as the plan has become increasingly digital. The municipal planner believes it is possible to reach more users with digital plans and it is a great advantage for the professional

users, which are the primary users of the municipal plans (e.g., surveyors and consultants) (DK04). It is usually only local plans, which are relevant and useful for the citizens and the municipal planner hopes to broaden their reach when the local plans are digitised (DK04).

According to a municipal planner, it is difficult to generate a pdf of the digital municipal plan, as the plans will often cover several hundred pages (DK04). Samples from Plandata.dk shows that the pdfs can even reach over 1000 pages. The old, non-digital, municipal plans also covered several hundred pages, but were easier to read due to e.g., a table of contents. At the political level, a digital municipality plan can, e.g., in the adoption of the plan, be cumbersome for the politicians. With a digital plan, it is necessary to work very structured through all pages, sub-pages and links to e.g., government guidelines. The digital plans are great for users, but politicians in the city council may have a hard time identifying what is important politically in an adoption process (DK04).

The private consultant added that the plans are traditionally structured as a book, which must be read from start to finish (DK06). In many places, there are references, which are only understandable if the plan has been read chronologically. Today this is not the way to access this type of information, as most questions are simply googled. Here, digital plans can make a difference, as they to a greater extent encourage the content to be merged and where you can enter search terms to find what you are looking for.

4.5 Purpose / added value

The purpose of Plandata.dk is to comply with the Law on planning (da: Lov om planlægning, latest version from April 2018). The law specifies which plans, decisions, etc. must be digitised and published trough the platform. The main purposes of Plandata.dk is according to a planning expert (DK01):

- To ensure one place where everyone (citizens, businesses, municipalities, the state, etc.) have access to all plan data (dictated by the Law on planning) across administrative boundaries such as municipal boundaries
- To facilitate municipal workflows by simplifying the submission of plans to the state
- To assign geography on all plans in order to precisely identify plan boundaries

Plandata.dk ensures easy access to public plans i.e., local, municipal and national planning. In addition to these plans, plan data from other agencies and authorities are also displayed via Plandata.dk. This applies to data from e.g., the Agency for Culture and Palaces, the Danish Transport, Construction and Housing Authority, and the Danish Road Directorate. In addition, geodata for themes within e.g., building and protection lines, nature protection and conservation or geology are also displayed.

A municipal planner agrees that Plandata.dk provides a good overview of plans across the country and what is currently planned for and in proposals (DK03). The advantage is that in Denmark there is a uniform way of registering local plans and that the plans, as a pdf, can be read in their entirety via Plandata.dk. In particular, the possibility of searching for plans via keywords in the search module is mentioned as a fantastic tool for inspiration for the municipality's own plans, e.g., where retail is planned in other local plans or how does a local plan for a wind power station look. However, this search function also depends on how the municipalities have been reporting the categories of use in the plans. The municipal planner does not necessarily believe that the 98 municipalities have the same practices (DK03). In addition, there may be very different ways of interpreting the categories of use in the municipalities, which is why it is necessary to have the planning documents open at the same time while looking at plan data.

A planning expert express that compared to the previous platform, the user interface in Plandata.dk has been improved significantly (DK05). The whole system for reporting and the interface in general has become easier, more logical, and intuitive, despite the fact that the municipalities have to spend more time reporting additional plan data. In addition, communication with civil society has been boosted, which is one of the very positive outcomes from Plandata.dk. The Danish Business Authority is aware that the platforms must be simple, intuitive, and targeted, as they know that the platforms can quickly become cumbersome (DK01). In addition, companies and private individuals have different needs from planners. They are therefore constantly working to improve the communication of the plan data.

4.6   Process changes and challenges

While the systems are rather advanced, standardisation has not been actively pushed, resulting in very diverse data entries. This however might change with integration and new uses of the data. In turn, digitalisation can and already has altered planning. A major concern is currently the use of plan data as input for a new assessment of property values by the Danish Tax Authority. Plan data (e.g., density allowances) is disaggregated to single parcels, which is often not directly foreseen in plans as well as it is not possible to account for many side conditions.

There are some challenges with the reporting of local plans to Plandata.dk. The data model for local plans does not always correspond with the decrees and explanatory texts of a local plan (DK03). As a result, the digitised plan data can be different from what has been politically adopted (DK03) as there is a translation of the plans to the available data model. As informed by the municipal planner, this can mean a lot in relation to how the municipality communicates with their citizens (DK03). Being bound to the land use categories in Plandata.dk can lead to discussions that are not pertinent, as the categories are not the one the municipalities themselves would have chosen.

A municipal planner has experienced categories of use, which they have not been able to report because the development has surpassed the system (DK04). The municipal planner mentions as an example a local plan for a larger solar park, where this particular use has not been applied in the development of Plandata.dk (DK04). Is this agriculture, business, technical infrastructure? The challenge lies in how this use is to be categorized when reporting to Plandata.dk and the discrepancy that may arise between the legally applicable pdf and the digital version of the plan.

According to the municipal planner, it is a major point of attention throughout the planning environment that local plans are adapted to specific boxes, which limits the use of local plans as a tool and the way they are intended through the Planning Act (DK04). The latest development of Plandata.dk has been driven by political goals and has happened so quickly, that it has not been possible to consider all concerns.

The private consultant agrees that this is a challenge and a good example of how planning changes due to standardisation (DK06). Sometimes the municipalities plan for something that is not on the list of categories and as a result, the category chosen in Plandata.dk is not necessarily the best possible way to explain reality. The consultant has experienced that some municipalities use the categories from Plandata.dk in their planning; this makes the plan data easy to report to Plandata.dk but it is also a self-limitation as the municipalities may compromise on what they actually would have planned (DK06). The same is happening with the municipal plans according to the planning expert (DK05). This is one of the challenges of having an exhaustive list of categories, which is also discussed among planners, as well as the collaboration in Local Government Denmark and the voluntary collaboration in The Danish Business Authority. For local plans, there will most likely be a much higher degree of differentiation, as the municipal plans to a greater extent contain more general dispositions.

One aspect of planning is to inform citizens of spatial planning. The categories in Plandata.dk are not necessarily the most comprehensible to the general population (DK06). The consultant continues and says that this is also a challenge with the Danish Business Authority, as the Danish Business Authority is far from the municipal planning and does not actively work with administration of the local plans and e.g., building permits (DK06). The categories have a great influence on, for example, construction case processing but not from the Danish Business Authority's perspective. The list of terms that has been chosen in Plandata.dk is however continuously revised and the categories that are not in demand are deleted from the list (DK06).

The process of developing the property valuation system has yet not been completed, therefore the outcome of this and the digitisation of plan data that has emerged are not known. At present, the process is in an intermediate stage between the submission of plan data at parcel level and the planning authorities awaiting how this data will be used in the property valuation. Only when this process has been completed and there has been feedback on the property assessments, e.g., from the citizens, it is possible to assess what pressure it can generate on planning and, by extension, how the municipalities should plan in the future (DK05). In addition, it is possible that a new allocation of resources will be needed in the municipalities for a revision of the digital plan data.

4.7   Challenges

The two main planning instruments at the municipal level, the municipal plan (a land use plan for the whole municipality done every 4 years) and the local plan (a development plan for a smaller area, project-driven) also imply different challenges for digitalisation. Parts of the municipal plan, the zoning regulations, are typically done fully digital – often through a specific software solution which also communicates with the state's Plandata.dk – in many municipalities. The practice regarding local plans is more diverse (DK06). Various private companies offer solutions, but many municipalities use simple text processing software and work with their own templates.

In the voluntary collaboration with the Danish Business Authority, a municipal planner informs that there is a discussion about the role of Danish Business Authority as a supervisory authority and as a planning authority for the national plans (DK03). The Danish Business Authority has an interest to ensure that all citizens as a minimum have the same level of accessibility to plan data across the municipalities. The actual interaction between the municipality and citizens, however, are still the municipalities' responsibility, which the Danish Business Authority will not interfere with. While there are discussions about how user-friendly the Plandata.dk should be, it is not in a national system that the plan processes should be determined. This is, according to a municipal planner, largely the task of third-party consultants as they sell platforms with interfaces for reporting and plan processes (DK03). If the Danish Business Authority assume this role, then all third-party systems have been outperformed. According to the municipal planner, it is important to be aware of the role of the national system as well as third parties' systems, which the municipalities use (DK03).

There are several challenges in developing fully digitised plans, which in particular concerns the legal aspects. According to the private consultant, the municipalities are prepared to work with a digital planning system that they can also use in their everyday work; however, they still need a legally binding text (DK06). What Plandata.dk contains today is not the legal content of the plans, but information about the content of the plans. When investigating if a planning decision is in accordance with, e.g., a local plan, the authorities or lawyers must be able to use the planning text as a legal document. As data appears differently from screen to screen and from browser to browser, it is according to a private consultant necessary that, the legal guidelines appear as text, as it is important here that the presentation is unambiguous if the legal data is to be in a planning system (DK06).

According to a planning expert, there is an extensive demand for legally binding digital plan data in the municipalities, due to a parallel digitisation, which is difficult for the municipalities to use in their daily work (DK05). Today the municipalities are operating with two different kinds of data sets, a legally binding and a non-legally binding. In order for the municipalities to simplify their work processes, it will require that the digital plan data is as legally binding as the pdf. The municipalities cannot make decisions based on parallel data, but only the legally binding data, i.e., the pdf. There are never discrepancies in the pdf of a plan but there may be variation in the associated digitised plan data. If only the digital plan data is used to form an overview of the selected plans, it can therefore go wrong. It is endeavoured to get the digital plan data as close to the pdf as possible, however when it is required to digitalise data, which does not appear in the plan, it is necessary to compromise and translate the plan data. According to the planning expert, this is further complicated by the consultancies' third-party solutions, as there may be uncertainty as to which data has been taken directly from the legal plan and which has been rewritten or put together in another way (DK05). Some municipalities experience difficulties deciphering which data actually is legally binding in the platforms. As a result, the employees often end up with the analogue versions (the pdf).

4.8   Future use scenarios

In 2021, Denmark will have its first maritime spatial plan (see Perspective on the Danish Maritime Spatial Plan, p. 34). It will become a legally binding digital map – the first of its kind in Denmark. The legally binding text and the regulating geography will be shown together, which will mean that the user does not first have to read the legal text and subsequently orientate himself on a separate map (DK07). In addition, the plan will have a specific digital hearing module.

The current plan reviews done by the Danish Business Authority, e.g., to determine if municipal or local plans are in conflict with national interests, takes place via a manual process. The Danish Business Authority is working on a development for the system to automatically identify conflicts in the planning (DK02). Initially, the plan is for automation to take place only in the Danish Business Authority's processes. However, the

automation could later be extended to also include the municipalities' reporting of plans, e.g., by receiving a notification during the reporting to Plandata.dk about any conflicts and be prompted to take a position on the conflict, either to resolve the conflict or to provide information for the plan review.

It is currently considered, if the democratic planning process could be enhanced by automatically informing affected/relevant citizens about hearing processes of plans, by identifying them through an overlap-analysis based on their registered place of residence and a suggested plans geometry (DK02).

In beginning of 2020, the Danish Business Authority organised an open hearing of the future planning law. Several topics were proposed for commenting. One of them was "Topic 7: Digitalisation of plans and data" (Danish Business Authority, 2020b). 19 out of 90 hearing replies commented on that topic. Six were municipalities; the others included planning consultants, individual professionals, and associations. Several highlighted that it is difficult, especially for citizens, to get an overview. Suggestions for the future development included a standardisation (and simplification) of municipal plans, to have digital data legally binding, to integrate hearing features in Plandata.dk, and to improve the dialogue with municipalities.

5 Perspective on the digital process around the Green Map of Denmark

The "Green map of Denmark" (GMD) (Ministry of Environment and Food, Environmental Procection Agency, 2017) is a fully digital planning instrument intended to deliver seamless national scale maps of priority zones for nature conservation. Plan elements are currently being produced in each of the 98 municipalities individually on the basis of standard national guidelines and criteria. The GMD represents an attempt to combine locally held planning expertise with national target-setting through the use of digital infrastructures designed to deliver synthetic yet locally relevant datasets encompassing several scales of application. However, Danish municipalities have developed widely varying plans based on the same criteria, using the same digital tools and similar workflows. Our study indicates that plans vary greatly among municipalities concerning their geometry, scale and thematical emphasis, and with respect to how plans are understood within the respective bureaucracies where they are produced. This is despite efforts from national policy makers and authorities to ensure consistency between plans in preparation for subsequent aggregation and synthesis of plan designations produced locally. Such efforts include the following processes, which were made mandatory in the planning process:

1. Use of digital land use suitability and biodiversity maps prepared at a national scale as input to the planning process
2. Documented bottom-up coordination of plans across municipal boundaries using a range of digitally mediated processes
3. Reporting of plans digitally as geodata to national data storage and visualization platforms, thereby creating a seamless national map of nature conservation priorities from municipal scale data.

Some of these elements of digitalisation, for example the use of national scale digital baseline datasets, had never been tried before at the time of implementation. The digital maps used as a basis for planning in this context provide a normalized overview of biodiversity conservation priorities at national scales, based on national datasets of biodiversity observations and associated indicators. Use of such datasets was seen as a necessary supplement to existing expertise and local datasets in the municipalities. However, it was also intended explicitly to provide an outset for later auditing and analysis of how local planning was done. As such, digitalisation and particularly the use of digital platforms and datasets was seen both as a means to mediate between various competences and knowledge types, and as a way to evaluate these. We here provide a brief overview of the GMD development and implementation process, which is still ongoing at the time of writing.

5.1 About the Green map of Denmark

The green map of Denmark was designed to be embedded within existing municipal plans in the form of a range of thematic data layers indicating "existing nature areas" and "potential nature areas", as well as "existing ecological corridors" and "potential ecological corridors". As such, the planning framework is designed to combine a future-oriented perspective on what planning authorities envision, with a descriptive perspective aimed at identifying existing values to protect.

Digital plan outputs are currently in the process of being reported by all Danish municipalities, while associated mandatory documentation processes and implementation within existing municipal plans are pending. The digital plans exhibit a wide range of variation concerning (1) *Geometric characteristics*, reflecting various mapping strategies, spatial logics, paradigms and traditions present in the planning communities of the municipalities involved; (2) *Thematic characteristics*, reflecting various conceptions of nature and naturalness captured by the planning categories used; and (3) *Performative characteristics*, reflecting various ways of relating to data and designations, ascribing it importance or lack thereof and using or not using it, which are present in the different municipalities. The perspective of municipal authorities varies greatly with respect to how they expect these plans to be used and by whom.

Table 5.1 illustrates the timeline of the GMD process. The process was initiated in 2012. In 2014, the Danish Government published a new nature policy called "Our Shared Nature" wherein the GMD framework is formally introduced for the first time. The new nature policy emphasised a multifunctional approach to conservation and management combining biodiversity, recreation, and landscape connectivity, all of which the GMD framework was projected to encompass through a streamlined and digitally based process, resulting in homogenous maps which could be used at both local and national scales (The Danish Government, 2014).

Table 5.1
Timeline of invention and implementation of the GMD from 2012-2021*

Time	Agency/ authority	Event and content
2012	The Economic Councils	A memorandum regarding a model for national nature networks if published, including research looking into cost-effectiveness and if it is adequate to prioritize efforts where existing biodiver-sity values are located. Recommendations include the perspective that creation of new nature areas should not be begun until existing values are in sufficient conditions of conservation.
Aug 2013	Ministry of the Environment	Preparation of "Udredning om en model for et nationalt naturnetværk". The Commission on Na-ture and Agriculture recommends that a national nature network should be established.
2013	DCE - Danish Centre for Environment and Energy	Research report analysing the potentials for a national nature network is published. It is con-cluded that a national nature network could constitute a robust management tool. At a national scale the network is envisaged as the primary tool to fulfil national and international goals re-garding nature. It would be used at a local level to secure a cost-effective prioritization and co-ordination crossing administrative boundaries.
Oct 2014	The Danish Government	The Government publishes "Our Shared Nature" where the Green Map of Denmark is first for-mally introduced. It constitutes a new nature policy focusing on biodiversity, recreation, and landscape connectivity.
24 May 2015	Ministry of Industry and Business	Law no 179 of 24/02/2015: Law regarding the change of the Planning Act and the Nature pro-tection Act. It follows up on "Our Shared Nature" on establishing the GMD.
June 2016	The Danish Parliament and the Government	A political agreement called "A more well balanced Denmark - better conditions for municipali-ties, citizens, and businesses all across the country" is agreed by a coalition of parties in parlia-ment (the Social Democrats, the Danish People's Party, the Conservative People's Party). The agreements includes a focus on establishing larger and more well connected nature areaes in support of biodiversity, thereby explicitly fulfilling selected intentions presented in "Our Shared Nature."
7 April 2017	The Danish Business Authority	Proposal for guidelines for the GMD, Development Areas and Local Nature Councils is pub-lished and undergoes a public hearing. The public commenting deadline is May 5th.
1 June 2017	The Danish Parliament and the Government	Changes to the Planning Act are passed. It is based on the agreement "A better balanced Den-mark." The new Planning Act states that the municipalities must plan for and designate the GMD by including it in their municipal plans as a "nature theme". This means that the municipal-ities have to implement and plan the GMD in their next municipal plan revision. It also includes a strengthened effort for more significant and more well-connected nature areas based on the GMD.
7 July 2017	Ministry of Food and the Environment	The proposed guidelines and notes for the GMD framework are made final and published.
7 Aug 2017	Ministry of Industry and Business	The consolidated Act on the establishment of local nature councils is passed
10 Aug 2017	Ministry of Industry and Business	The proposed guidelines for establishing local nature councils is passed.
2018	Municipalities	At the beginning of 2018, all municipalities are tasked with establishing local nature councils whose job it is to assist the municipalities in appointing the GMD. The local nature councils most often cover 4-5 municipalities.
July 2018	Local nature councils	In July of 2018, all of the local nature councils are tasked with finishing their work and prepare recommendations.
22 Nov 2018	Local Government Denmark (KL)	KL Publishes "The local nature councils and the Green Map of Denmark" - a complete collection of all of the local nature council recommendations.
2018-2021	Municipalities	Digital plan outputs are in the process of being reported by all Danish municipalities, while asso-ciated mandatory documentation processes and implementation within existing municipal plans are pending.

* Sources consulted: De Økonomiske Råd, 2012. Økonomi og Miljø 2012. Horsens; Erhvervsministeren, 2017. L 121 Forslag til lov om ændring af lov om planlægning, lov om naturbeskyttelse og lov om aktindsigt i miljøoplysninger. Folketinget; Erhvervsministeriet, 2016. Aftale mellem regeringen, Socialdemokraterne, Dansk Folkeparti og Det Konservative Folkeparti om Danmark i bedre balance-Bedre rammer for kommuner, borgere og virksomheder i hele landet; Erhvervsstyrelsen, 2020. Grønt Danmarkskort | Planloven [WWW Document]. URL https://planinfo.erhvervsstyrelsen.dk/groent-danmarkskort (accessed 1.12.21); Erhvervsstyrelsen, 2017. Forslag til bekendtgørelse om lokale naturråd med tilhørende vejledning og kort, udkast til vejledning om Grønt Danmarkskort samt vejledning om udviklingsområder; Kommunernes Landsforening, 2018. Naturråd og Grønt Danmarkskort; Lov om ændring af lov om planlægning og lov om naturbeskyttelse - LOV nr. 179 af 24/02/2015, 2015. Erhvervsministeriet; Miljøministeriet, Ministeriet for Fødevarer, L. og F., Klima-, E.B., 2013. Udredning om en model for et nationalt naturnetværk; The Danish Government, 2014. Our Shared Nature - Danish Nature Policy; Vejledning om etablering af

lokale naturråd - VEJ nr. 9737 af 10/08/2017, 2017. Erhvervsministeriet; Vejledning om Grønt Danmarkskort og naturbeskyttelsesinteresser - VEJ nr. 9687 af 07/07/2017, 2017. Miljø- og Fødevareministeriet.

The study of the GMD indicates three aspects of digitalisation, that have been especially challenging to implement in practice: (1) balancing and negotiation of local as opposed to national scale perspectives and imperatives, (2) encompassing variation in planning practices within national guidelines, and (3) reflecting and correctly representing differing ontologies of nature and naturalness, including differing and/or complementary professional and political aims embedded within plan designations and associated documentation. These challenges represent critical aspects of how digital platforms inform and transform planning processes locally when enforced and promoted through top-down dissemination processes at the interface between general and specific professional perspectives, which was the case with respect to the GMD.

Figure 5.1 illustrates the variety of geometrical paradigms employed within Danish municipalities when tasked with prioritizing nature conservation areas spatially, i.e., in concrete plans. The great variety of approaches highlight the fact that similar guidelines, use of the same infrastructures and designation categories may lead to widely differing results depending on how categories are interpreted, and workflows designed. Figure 5.2 outlines the geometric characteristics of the three most widespread approaches to digital planning present in the GMD. The figure shows how a generic landscape containing existing conservation priority areas, which

(a) is subjected to digital planning processes as part of the national GMD planning framework, may be planned based on three discrete approaches (which are able to exist empirically, side by side, within the GMD). These include:

(b) a *pattern-oriented approach* taking point of departure in the distribution and spatial density of existing landscape elements, on this basis seeking to connect and solidify local scale patterns of nature areas across the landscape.

(c) a *binary approach* where a distinction is made between protected and non-protected landscapes at a regional scale, leading to plans focused on dividing the land area into two contrasting zones, one of which constituting nature conservation landscapes.

(d) a *core-corridor approach* focused on identifying and mapping corridors between existing priority areas and enlarging existing landscape elements by outlining buffer zones around them.

Figure 5.1
Geometric variation in plans made as part of the GMD in three municipalities

Source: plandata.dk, accessed February 2020. Maps in same scale

Figure 5.2
Parallel spatial planning approaches within the GMD framework
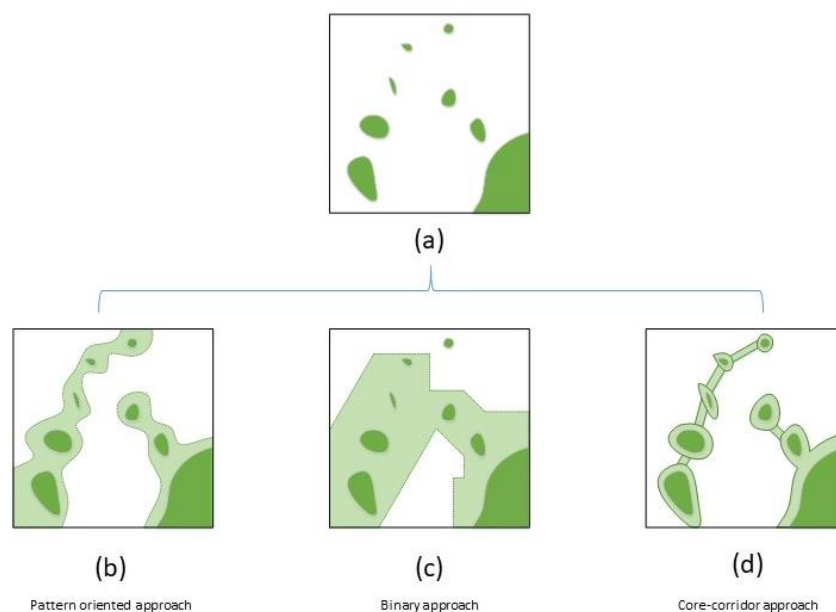
5.2   Findings: learning from digitalisation in practice

The GMD implementation process opens a range of questions regarding how the introduction of digital work-flows and platforms affect the relationship between levels of government, differences in scale, balances between case-specific and general types of knowledge and local as opposed to national planning interests. These questions are relevant for a wide range of contexts across Europe, given that similar processes of multi-scale digital nature conservation plans are becoming widespread at both a European level and globally (UNEP, 2020). Therefore, a lot may be learned by studying the Danish experiences with this type of digitally mediated planning, which was implemented earlier here than in most other contexts. Considered as a digi-talisation process, the GMD highlights two critical characteristics of digitalisation within environmental plan-ning and countryside planning, which we outline below.

Shifting balances between centralized and decentralized planning practices

The introduction and promotion of digital tools, infrastructures, and workflows may affect the thematic and geometric scale of planning practices, thereby profoundly affecting how planners work and how decisions in individual cases are reached. However, such impacts on planning are remarkably unpredictable concerning how they affect planning. Loosely structured or un-coordinated digitalisation processes may empower local authorities, increasing the precision of local decision-making processes at the cost of losing national scale oversight, synthesis and intervention capabilities. Conversely, strict guidelines for data production, use of data, definitions of plan content, and workflows may serve to harmonize and normalize planning. This can lead to increased coordination and homogenization of decentralized planning practices based on common standards. However, such an approach may also foster non-compliance in cases where planners consider themselves unable to conduct their tasks at relevant scales, based on relevant types of information inputs, and/or with relevant thematic emphasis within the auspices of the digital infrastructures being implemented. Our results show that this may lead to the creation of parallel local decision support systems, GIS-infrastruc-tures, and digital platforms designed to enable digitalisation to occur despite national coordination efforts. This is a widespread phenomenon indicating that planners prioritize compliance with political and profes-sional adequacy targets higher than methodological, technical, and thematic guidelines forming part of offi-cial digitalisation processes. It also indicated that digitalisation processes are more likely to be successful if they balance local and national scale expertise systems effectively.

Translating and combining alternative and complementary planning ontologies

The GMD project in Denmark illustrates that introduction of digital tools and platforms can bring together data stemming from a wide range of people, workflows, administrative cultures, and political imperatives, which would otherwise not have met in exchanges as intimate and concrete as is the case when formulating plans. Resulting datasets and designations, which are characterized by being produced in a decentralized way based on centrally agreed guidelines, encompasses various viewpoints held together by more or less strictly enforced common perspectives. This thematic variation potentially include various ways in which key topics of the planning processes taking place can be defined. One way to conceptualize this is by the concept of *planning ontologies* – ways in which the objects mapped and planned for are defined. The fact that Danish municipal planners can define nature in a wide variety of thematically and geometrically differing ways within a standard set of guidelines, illustrates the existence of a wide array of planning ontologies with respect to nature. It also illustrates an absence or lack of ability within national scale agencies involved in the planning process to extinguish and/or order such definitions as to make them comparable and similar. This may be considered as a strength of the digitalisation process, in that it enables plans to encompass diverse ontologies and cultures without diminishing or reducing them. It may also be considered as a weakness of the digitalisation process in that it fails to fully harmonize and/or coordinate worldviews and ontologies through the exertion of potentials for definition-power embedded within the digital infrastructure being implemented.

6 Perspective on the Danish Maritime Spatial Plan

The Danish Maritime Authority is responsible for the establishment of Denmark's first maritime spatial plan. The maritime spatial plan is planned based on an EU directive that requires all EU countries with marine waters to make a comprehensive plan of the area. The directive does not determine the framework for the plan, therefore it up to the individual countries to interpret the directive. The task was first circulated between different ministries, e.g., the Ministry of Environment and the Ministry of Industry, Business and Financial Affairs, to consolidate planning for land and maritime waters. However, the Danish Maritime Authority took on the task in 2015, despite the fact that they had not previously had planning competencies, as the plan has to do with shipping (DK07). The development of the maritime spatial plan has taken place in close collaboration with the Danish Business Authority, the Danish Geodata Agency, and the Danish Agency for Data Supply and Efficiency. The digital maritime spatial plan started an inter-public cooperation between authorities, which that have already worked with digitisation and are interested in the further development of digital plan data.

The maritime spatial plan became binding when the 6-month public hearing process was launched March 31st 2021. The maritime spatial plan can be accessed online at https://havplan.dk/.

Built from scratch

As the maritime spatial plan is the first of its kind in Denmark, the Danish Maritime Authority has been free to choose how to approach the task (DK07). This has the additional advantage that they did not have to take into account a planning history with specific and established practices. This is one of the challenges in digitising municipal and local plans, a long history of data models and different practices in the municipalities. While the Danish Maritime Authority has the planning competence, the individual sector authorities designate the area reservations for the maritime waters. The Danish Maritime Authority's task is to combine the area reservations in a map and make the necessary considerations about coexistence between the zones. If the Danish Maritime Authority was to compose the plan as a classic executive order, e.g. by stating the coordinates for each individual zone together with the regulatory text, this would result in a document of an estimated 5.000 pages, with additional maps of poor quality in pdf. Nor was it a workable solution only to have a guiding digital map, as the long executive text would still be necessary. As part of the process, the Danish Maritime Authority conducted a user survey among future users of the maritime spatial plan. What was made clear was that everyone expected it to be completely digitally. This became a central guideline for the development of the plan (DK07). With the new plan the hope is to create a more user-friendly solution, based on a use of maps that users are already familiar with, e.g., from Google Maps, with a higher map data quality, to improve legal certainty.

In order for the maritime spatial plan to be fully digital and legally binding, it was necessary to deviate from the guidelines of declaring executive orders. In the beginning, the Danish Maritime Authority met a lot of opposition from the Ministry of Justice, e.g., due to lack of precedence but also in relation to security (DK07). However, the Danish Maritime Authority eventually received an exception. As the maritime spatial plan is legally binding, there are high requirements for the system safety, e.g., in relation to access management, control and approval procedures. Authenticity is controlled using digital fingerprints on the code, data, and configuration. If the digital data is manipulated either internally or externally, it is possible to authenticate the changes based on the fingerprint.

The Danish Maritime Authority had originally intended a solution where the individual authorities could submit their data to the maritime spatial plan. However, as there are different data practices in the various authorities, the current solution is that the GIS data is sent to the Danish Maritime Authority, who processes and adjust the data and uploads it to the platform (DK07). As the maritime spatial plan is legally binding for authorities, the maritime spatial plan is generally not used for more strategic plans; therefore, there have been no major challenges in terms of scale, as precision in the data is already needed. The maritime spatial plan will be displayed as WMS (INSPIRE data) and it is possible to download the entire maritime spatial plan on the digital platform as GIS data. There are also several service layers available on the platform, which can be relevant for the maritime spatial plan, e.g., geological or archaeological data. The service layers are not legally binding, which the readers are informed about when the layers are turned on (DK07).

Historical data available

It is not possible to read the maritime spatial plan from beginning to end as a traditional executive order. Instead, the plan will be shown as the different zones are chosen on map. Both the legally binding text and the associated geography will be displayed at the same time in the same window for easy orientation (see Figure 6.1). When an authority references the maritime spatial plan, it will be via a link to the maritime spatial plan. It is possible to link directly to a specific zone. Via the link, the map will automatically zoom in on the selected zone. In the digital maritime spatial plan, it is also possible to see historical versions via a timeline in the platform. When viewing a historical version, the plan will appear with a watermark over both the map and the binding text. Links to the plan, which have subsequently become historic, will continue to lead to the historic version. If a specific zone is selected, it is possible easily click through the previous or newer versions as the map view will remain on the selected zone.

Figure 6.1
Screenshot of the Maritime Spatial Plan
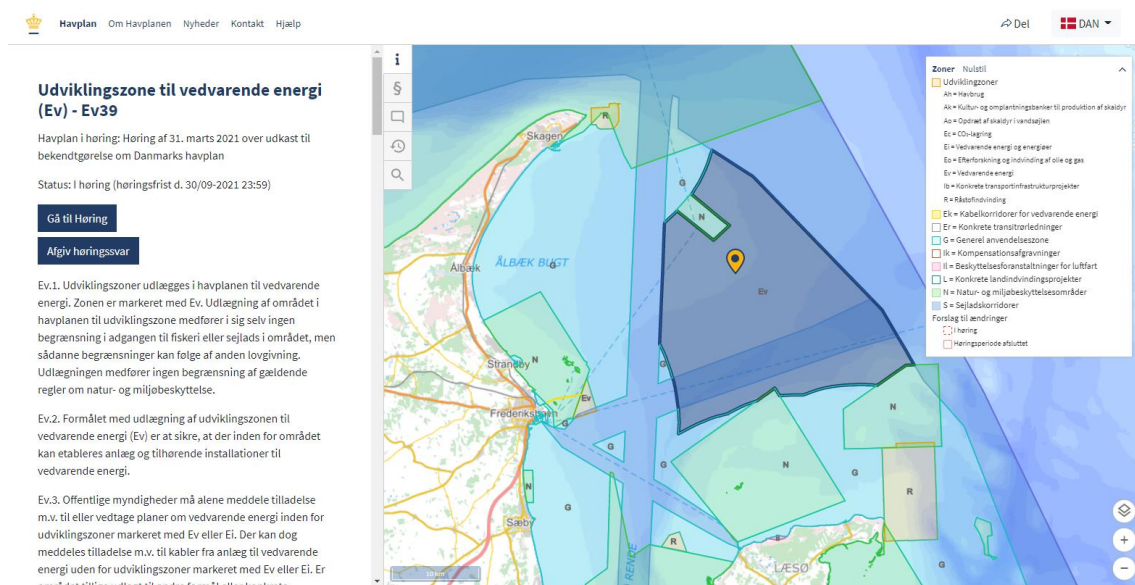
Integrated public hearing module

A public hearing module is integrated into the digital maritime spatial plan. Changes to the plan will first be in an internal hearing between the relevant authorities before it is sent to the Danish Maritime Authority. The Danish Maritime Authority is responsible for the following public hearing process (DK07). If a selected a zone is in hearing, it is possible to access the hearing via the platform. Hearing responses will be published on the website and it possible to see already submitted hearing responses. Hearing responses are linked to a geography and it is possible to submit hearing responses either to a specific zone, to an area the user has drawn via a tool in the platform, or to the entire hearing proposal. The subsequent hearing results will only be available as a pdf via the platform. The expert would have preferred the hearing results to be available in the same way as the maritime spatial plan, i.e., digitally (DK07). However, the Danish Maritime Authority as operated with tight schedule and not every intention has been realised. It is possible that hearing results will be digitalised in a future development of the platform.

The Danish Maritime Authority hopes that the experiences gained from developing the maritime spatial plan can be a basis for a common public standard for legal digital maps, e.g., that the user interface on the digital platforms and map solutions will be the same across authorities (DK07), as this will facilitate citizens and companies' accessibility to digital legislation.

7 Synthesis and recommendations

How does the availability of digital plan data empower different actors?

The role of the national planning authority has increased as they are responsible for the system of Plandata.dk and have a leading role in discussion of future development of data plan data. In addition, there has been a further centralization in connection with the continued digitisation of digital plan data and plans in Plandata.dk. The Danish Tax Agency has become a very important actor, as the agency has, to a large extent, determined the development of digitisation of plan data, primarily with its own interests in focus at the expense of the municipalities who are responsible for providing the data.

Plandata.dk has given the public easier access to plans and plan data in Denmark. Compared to the previous platforms for digital plan data, the user interface in Plandata.dk has been raised significantly regarding reporting of plan data. The whole system for reporting has in general become easier, more logical, and intuitive, despite the fact that the municipalities have to spend more time reporting additional plan data (DK05). In addition, communication with civil society has been boosted, which is one of the very positive things that has transpired from Plandata.dk. One municipal planner does not believe that digital plans have changed the dialogue itself between their municipality and companies, citizens, etc. due to the way the plans are displayed digitally (DK03).

How does the availability of digital plan data change collaboration within the administration and between administration and stakeholders?

The interviewed municipal planners express that the internal cooperation in the municipality has not changed with the availability of digital plan data (DK03, DK04). Both planners agree that there generally are a good collaboration between the municipality and The Danish Business Authority and Plandata.dk. Likewise, the Danish Business Authority also has good experiences with cooperation with the municipalities (DK01). One of the experiences the Danish Business Authority have gained is the importance of starting new development as a voluntary collaboration, where the municipalities are part of the process, as this will also ease new legislation if the development turns out to an obvious advantage for all parties.

Since the start of digitalisation of plan data in Denmark, there have been formal and informal collaborations between the national planning authorities and the municipalities, which has helped to influence the direction of digitalisation and digital platforms. While the collaboration has at times been challenged by the Danish Tax Agency's influence on the development of Plandata.dk, the collaboration between municipalities, the Danish Business Authority, and Local Government Denmark continues regarding the development of digital plan data. The future collaboration will without doubt include discussions on solutions for legally binding digital plan data.

How does the driver and funding source of digital plan data affect planning practice?

During the interviews, it has been expressed that the municipalities essentially are interested in digital plan data and digital planning processes. However, as Plandata.dk is implemented today, municipalities must register their plans in a system that is not directly supporting the planning process, but rather collecting information for various uses, as e.g., the tax authority. Municipalities are concerned that the implementation of fully digital plans in such a system would limit their planning options and processes with municipal and local plans (DK03). For the municipalities it is important that the digital planning process will still be within the framework in the planning act, a frame that today is very wide. In the future digitisation of plan data and planning in Denmark, the balance between digital plan data and freedom of planning will therefore play a major role.

The process of developing the property valuation system has yet not been completed, therefore the outcome of this and the digitisation of plan data that has emerged are not known. At present, the process is in an intermediate stage between the submission of plan data at parcel level and the planning authorities awaiting how this data will be used in the property valuation. Only when this process has been completed and there has been feedback on the property assessments, e.g., from the citizens, it is possible to assess what pressure it can generate on planning and, by extension, how the municipalities should plan in the future (DK05).

Patterns

The Danish planning law focuses on the planning process and thus no map symbols are defined in the law. This means the municipalities have different ways of defining regulations and intentions in their plans, which requires flexible definitions in the plan register. The development of digital plans has therefore largely taken place in a voluntary dialogue between the municipalities and the national planning authorities on what digital solutions should contain and how plan data can best be digitised, e.g., by data models and standards. In addition, there have also been collaborations between municipalities themselves, to provide input to the national dialogue on digital plan data. Only when it was clear that digitisation of plan data was an obvious advantage for all, was it pursued to make digital registration of plans a nationwide requirement. This development has taken place over a number of years.

In recent years, however, this development has been taken over by the Danish Tax Agency, which has imposed a direction for the digitisation of plan data. There are indications that the dialogue between the municipalities and the national planning authorities has been challenged by the Danish Tax Agency's entry and that the municipalities have been frustrated by this development. With the next expansion of Plandata.dk, it is hoped, however, that Plandata.dk will have a greater focus on the municipalities' needs and wishes as well as increased focus on planning itself.

Policy recommendations

Develop digital plan data through formal and informal collaborations

Since the start of digitalisation of plan data in Denmark, there have been formal and informal collaborations between the national planning authorities, the municipalities, and other stakeholders, which has influenced the direction of digitalisation and digital platforms. The development of digital plans has largely taken place in a voluntary dialogue between the municipalities and the national planning authorities on what digital solutions should contain and how plan data can best be digitised, e.g., by data models and standards.

One of the experiences the Danish Business Authority have gained is the importance of starting new development as a voluntary collaboration, where the municipalities are part of the process, as this will also ease new legislation if the development turns out to an obvious advantage for all parties. In addition, there have also been collaborations between municipalities themselves, to provide input to the national dialogue on digital plan data. If a development starts with the national authority announcing, e.g., new digitalisation with complete data model, which must be used, it will be met by a lot of resistance from the start. Only when it was clear that digitisation of plan data was an obvious advantage for all, was it pursued to make digital registration of plans a nationwide requirement. This development has taken place over a number of years.

Ensure compatibility between the planning system and the digital plan data

A challenge in the development of digital plan data in Denmark has been the compatibility and comparability between the digital plan data and the legally binding plans in the form of pdfs. The data models for reporting the digital plan data do not always correspond with the decrees and explanatory texts of the legally binding plans themselves. As a result, the digitised plan data can be different from what has been politically adopted, as there is a translation of the plans to the available data model. This can mean a lot in relation to how municipalities communicates with their citizens. Being bound to specific data models can lead to discussions that are not pertinent, as the possible digitisation is not one the municipalities themselves would have chosen. This can also limit the use of plans as a tool and the way they are intended through the Planning Act.

In addition, it is important to consider that changes to the national plan platform affect plans on the municipal or lower level, as there is a close interaction between the digital plans and the system where they are reported. An important aspect in digital development is therefore integration of the systems.

Consider digital plan platforms with different entry points

One of the positive outcomes from Plandata.dk is that communication with civil society has been boosted. Digital plans enable the municipalities to reach a greater number of citizens and in addition, the digital plans make it easier for citizens to find the right planning information. There is however, a possibility that citizens can be overwhelmed by too many digital tools, which can cause them to lose focus on what is relevant for them. Over time, the digital plan platform has been developed to become easier, more logical, and intuitive regarding both the reporting module for municipalities and the interface for users.

The Danish Business Authority is aware that the platforms must be simple, intuitive, and targeted, as they know that the platforms can quickly become cumbersome. In addition, companies and private individuals have different needs from planners. It is important to continually work on improving the communication of plan data.

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