



# Understanding the future of the Finnish cadastral system – A Delphi study



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## ABSTRACT

Decision-makers in the field of land administration and surveying need a broad understanding of emerging developments that are expected to shape the future of the industry. This study examines the relative perceived importance of several megatrends in the context of cadastral systems. In addition, we discuss the implications of relevant megatrends for the Finnish cadastral system and synthesize the anticipated impacts into key points. Our results are based on a two-round Delphi survey among Finnish experts in cadastral systems. The respondents identified digital culture, ubiquitous intelligence, and a tendency towards transparency, accessibility, and open data as the most important megatrends shaping the future of the Finnish cadastral system. Technological megatrends were also expected to have major impacts on the Finnish cadastral system by 2035. According to the panel technological advances will shape user preferences in the future. They anticipate that new forms of public services and collaboration between the public and private sectors in producing cadastral information will emerge by 2035. Our results indicate that Finnish experts view the development of the cadastral system as a technology-driven process.

## 1. Introduction

A cadastral system<sup>1</sup> is a method of recording the physical location of real properties and listing real property rights. It is the ‘where’ component of the property rights system, securing the legal status of real properties and providing the foundation for effective land tenure transactions. In Finland, some 70 per cent of the national wealth is tied up in property and land (KTI, 2014). An efficient and reliable cadastral system is therefore invaluable. The varying nature of cadastral systems over time and the need for their re-engineering has been recognized by many authors before (see e.g. Williamsson and Ting, 2001 and Zupan et al., 2014). This article builds on the argument that current global megatrends<sup>2</sup> are changing the way people relate to spatial objects. Furthermore, we maintain that these megatrends call for new strategies of adaptation. As there is nothing to be done to halt or reverse these trends, it makes sense to explore their anticipated impacts and to start preparing for them. It is indeed paramount to gain a better understanding of emerging megatrends that are driving the future development of the Finnish cadastral system, and cadastral systems in general.

In recent years, many countries have been working to improve their cadastral systems in order to better meet the current and future needs of

society (see e.g. LINZ, 2014). However, future-oriented studies in the field of land management are still scarce. Most publications have been industry-led and heavily focused on the development of cadastral systems. New Zealand and Australia have been leading the way with publications outlining expectations, visions and goals for a future cadastre (LINZ, 2014; ICSM, 2014). The International Federation of Surveyors (FIG) has also published two publications *¼ Cadastre 2014 – A Vision for a Future Cadastral System* and *Cadastre 2014 and Beyond* (Kaufmann and Steudler, 1998; Williamson et al., 2014) <sup>¼</sup> that specifically focus on the reconstitution of the role of land administration and cadastral systems. The FIG publications underline the importance of cadastral systems to sustainable development: since land is a crucial enabler of many of the functions of modern society, such as housing and energy and food production, it is imperative that cadastral systems are adapted to the changing conditions (Kaufmann and Steudler, 1998).

Foresight is often used to support strategy work since it helps to assess the potential impacts of recognized developments from multiple perspectives as well as to identify the most suitable strategies and means of implementation (Haegeman et al., 2013). Views on potential futures are often explored using expert-based methods, such as expert panels and Delphi surveys (e.g. Hjelt et al., 2001). For our own study we

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<sup>1</sup> A rough equivalent to the land administration system in this study.

<sup>2</sup> We follow the definition by Naisbitt (1982) and make a distinction between a trend and a megatrend.

have conducted a Delphi survey to collect expert perceptions about the implications of a wide array of megatrends for the Finnish cadastral system. Delphi is often mentioned as a useful tool under conditions of severe uncertainty, when searching for expert judgements regarding a complex issue and when objective factual data is scarce (Winkler and Moser, 2016). This is true in our case as well. All we know for with certainty is that anticipated changes such as the evolution of inexpensive, high quality location instruments or improved public access to information will most likely have a huge impact on the field of surveying. We cannot, however, base our views on made observations, since the future is as yet unknown. The choice of an adequate time horizon is always a critical point in foresight studies. We have opted for the year 2035 on grounds that a long enough time perspective is necessary to generate thought-provoking input to support strategy work.

As in many other foresight studies, our principal aim is to gain an improved understanding of possible and preferred developments and their underlying (mega)forces. To be more precise, we are interested to see how experts perceive and foresee the influences arising from the megatrends selected for closer examination. Our research questions are as follows:

RQ1: What is the perceived relative importance of the identified megatrends for the Finnish cadastral system and the field of surveying in 2035?

RQ2: What are the expected impacts of the most important megatrends on the cadastral system?

To answer RQ1, we collect expert opinions about the perceived importance of different megatrends in a Delphi questionnaire. Moving on to RQ2, the impacts of the megatrends that are considered important for the cadastral system are then examined in more detail.

This article is structured as follows. We start by describing the role and current state of the Finnish cadastral system. The concept of megatrends with reference to the future of cadastral systems is discussed more closely in Section 2. The third section describes our research design and the foresight approach we apply. In the fourth section we present and discuss the results. Finally, Section 5 concludes the paper.

## 2. Background

### 2.1. The Finnish cadastral system today

This study aims to identify possible and preferred developments of the Finnish cadastral system. To this end it is necessary to understand the role and structure of the *current* Finnish cadastral system.

A cadastral system is part of the property rights system. Existing national systems have often evolved over a long period of time to support multiple purposes such as legislation, taxation, and land development (e.g. Van Oosterom and Lemmen, 2015; Niukkanen, 2014). In recent years, the academic interest has mainly been focused on three-dimensional (3D) cadastral systems (for an overview, see Paulsson and Paasch, 2013). The need for a 3D cadastral system is easily justified: complex 3D land information has become increasingly available along with the intensified use of land resources, especially in urban areas. The current Finnish cadastral system can only handle 2D data on real property units. However, a new legislative proposal on 3D real property formation and registration is under examination (MFA, 2017).

The Finnish cadastral system is a variant of the German model (see e.g. Niukkanen 2014). It consists of the cadastre (the real property register), land register (the title and mortgage register), and cadastral map, which are all maintained by the National Land Survey of Finland (NLS). Currently, cadastral surveys may only be performed by land surveyors employed by central or local government. The country is divided into basic property units consisting of one or several parcels and having a unique identifier. The Finnish cadastral system identifies four *main objects*: basic property units, parcels, their boundaries and right-of-use units. Property rights are allocated into either the cadastre

or the land register component. Place of registration can be seen as one way of classifying property rights. Other than person-to-property rights<sup>3</sup> are always registered in the cadastre, whereas person-to-property rights are registered either in the cadastre or the land register (Niukkanen, 2014).

Coverage and reliability are critical requirements for an efficient cadastral system. Coverage refers to the requirement that the register comprises all register units and their identifications, and reliability to the fact that it is the responsibility of the relevant authority to maintain the register (Niukkanen, 2014). The Finnish land register has full negative and positive faith and credit, which means that a third party can trust that the rights specified in the register exist (positive) and that there are no rights besides those specified in the land register (negative). The cadastre does not enjoy the same level of faith and credit due to some known shortcomings resulting from differences in practices of registering rights of use, easements and restrictions (Kartio, 1996; Vitikainen, 2013). Several user groups make use of cadastral data. Banks, insurance companies and real estate agents, for instance, need to have access to up-to-date information on property rights and ownership rights in particular. Tax authorities and municipalities also use the data content of the cadastral system for various purposes.

### 2.2. Megatrends in the context of cadastral systems

How, then, should the cadastral system be developed for future needs? To answer this question we need to make some assumptions about the development of society at large  $\frac{3}{4}$  the underlying megatrends or megaforges  $\frac{3}{4}$  within the chosen time frame. In this section, we shortly discuss the nature and expected impacts of specific megatrends in the context of cadastral systems.

The term megatrend was coined by Naisbitt (1982) in his book “Megatrends: Ten New Directions Transforming Our Lives”. He used the term to describe the significant political, economic, social, and technological movements that shape our lives. More recently, Retief et al. (2016) have suggested that the term refers to global influencing factors that have a high degree of certainty, but over which there is little control. The previous literature offers a set of elemental criteria for understanding the concept of megatrend: megatrends are larger in magnitude, longer in duration and deeper in their impacts than regular trends (Mittelstaedt et al., 2014).

We here identify current megatrends based on an annual report prepared by a German consulting company (Z punkt, 2016). To validate the report's accounts, we critically evaluate the fit of these megatrends to the three conditions specified by Mittelstaedt et al. (2014). Since our main concern is not with global megatrends, but rather with the possible impacts of specific megatrends in the context of the Finnish cadastral system, the megatrends are further examined against the results of the previous cadastre literature. Our intention was not to confine ourselves exclusively to what has been done before, but rather to anchor our study to the previous academic literature and to confirm the scope and design of our questionnaire. Riekkinen et al. (2016) have recognized 14 themes relevant to the future operating environment of the Finnish cadastral system. All these themes, including the development of technology, globalization, transparent society, and economic pressure, were included in our final list of megatrends.

Other ‘practitioners’ (mostly consultancies) frequently produce megatrend reports as well (e.g. KPMG, 2012; Sitra, 2017). Although they are not peer-reviewed, these sources can provide valuable clues in the search for trends that drive current practices in businesses and other organizations (see e.g. Retief et al., 2016). These sources can provide valuable clues since megatrends are always ‘embedded in the contexts

<sup>3</sup> For more information about the classification of property rights, see Paasch (2012): Standardization of Real Property Rights and Public Regulations – The Legal Cadastral Domain Model.

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