

Cadastral Development in Norway and Need for Improvements

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SUMMARY

The Norwegian cadastral system is a German style cadastral system and origins from the 1600s. The land register originates from provisions concerning protocols introduced by the local courts in early 1600s for the purpose of documenting and protecting property transactions. The cadastre has its origins in the old tax cadastre established in the latter half of the 1600s for the purpose of levying tax.

While other European countries with German style cadastral systems modernized the cadastral systems by developing cadastral mapping and surveying professions in the 1800s, this development did not take place in Norway. Land subdivisions should be undertaken by laymen and written descriptions in rural areas until 1980. Cadastral mapping developed in cities and towns.

After World War II there was increased focus on land use planning and control in Norway as in many other countries. While neighboring countries had developed detailed large-scale maps suitable for such purposes, Norway lacked such maps. A large-scale mapping program based on photogrammetry was therefore initiated about 1960 - the economic survey. Efforts to modernize the land subdivision process were initiated, leading to the 1980 cadastral reform and requirements for nationwide cadastral surveying. The municipalities were assigned the task to undertake cadastral surveying, but without specific qualification requirements for the municipal cadastral surveyors or putting in place measures for institution building. From the mid 1980s and onwards, property boundaries in economic maps and survey certificates were digitized. After year 2000 this material was integrated in a new nationwide cadastral map, in force from 2010.

The paper describes the Norwegian cadastral development with focus on cadastral mapping, quality issues in the cadastral map, and some proposals to improve the situation with special focus on the need for professional development.

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1. INTRODUCTION

Cadastral system in Norway means, in this context, the registration system that provides information about real properties and in which the main elements are the land register and the cadastre. Cadastral development in this context means the development of the cadastral system and the institutions surrounding this information system.

The Norwegian Cadastral development and history falls into two periods – from the 1600s to 1960, and after 1960. The reason for this division is that up to 1960 the cadastral system in rural areas was based on the old tax cadastre and it included no spatial representation of the property objects. Urban areas – cities and towns – had systems of their own, based on cadastral surveying and maps from late 1800s and onwards. The cities of Oslo and Bergen introduced cadastral surveying even earlier.

The economic mapping project started circa 1960, combining topographic mapping and mapping of boundaries in scale 1:5,000. Economic mapping marks the start of modernization of the cadastral system, leading up to a land registration and cadastral reform from in 1980. With this reform, nationwide cadastral surveying and a new multipurpose cadastre – the GAB system – were introduced. The events of the modernization period following 1960 have led to the present Norwegian cadastral concept and spatial information system.

The main focus of this paper is establishment and maintenance of the cadastral map, and the quality issues herein. Quality issues in building and address information fall outside the topic of this paper.

The paper is based on the author's dr-philos. thesis from 2016.

2. CADASTRAL DEVELOPMENT FROM EARLY 1600s TO 1960

Cadastral system development

The land register originates from provisions concerning protocols introduced by the local courts in early 1600s for the purpose of documenting and protecting property transactions.

From mid 1600s to the latter 1800s the Norwegian land tenure system should change from tenant farmers to owner-farmers. This change was totally market driven. The transformation of land tenure system was driven by changes in society making investments more profitable in trade and industry, thus moving capital from land to trade and industrialization. This development and the development of the modern credit/mortgaging system made it possible for the farmers to buy the land they were using.

Throughout the 1700s the land register should develop as a system to protect land transactions and the land market and support the changes in tenure systems.

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The cadastre has its origins in the old tax cadastre established in the latter half of the 1600s for the purpose of levying tax – the *matrikkel* of 1670. In the *matrikkel* of 1670 the farms (no:*gard*), which could comprise several individual farms, were identified by name and not by any numbering system. The tax authorities soon started assigning identification numbers to the farms within their district and by 1722-1723 all farms were assigned identification numbers.

In 1804-1805 a process started in the Kingdom of Denmark - Norway to modernize the tax system by cadastral mapping. In Denmark the modernisation was to be based on land consolidation maps from the enclosure process in the late 1700s, in Norway by cadastral surveying. The union was dissolved in 1814 and Norway came into a loose union with Sweden. In 1815-16 the cadastral survey was stopped in Norway due to poor financial situation and resistance from the farmers. In Denmark, the modernization was implemented and completed in 1822, and a modernized cadastre based on cadastral maps was introduced in 1844. In Norway, a new cadastre was introduced in 1838. The 1838 cadastre was not based on any kind of surveying and mapping, but purely on valuation. In addition to revising the valuation value, the individual property units within the farm were in this revision assigned identification numbers. When identification numbers were assigned the individual property units, the foundation was laid for the reform that was to come in 1848, by coordination of the land register and the tax cadastre, with folios in the land register for the individual property units. The property units were not identified by a cadastral map showing the parcels, but by a number identifying the property, which could comprise numerous parcels.

In parallel with the international development, the Norwegian taxation system would become gradually more income based throughout the 1800s. State property tax was abolished in 1838. The cadastral tax became income for the municipalities which were now established. The state had thus little interest in cadastral mapping.

After 1900 the tax cadastre should gradually lose its role and importance, and throughout the 1900s the land register should develop as the totally dominating element in the cadastral system, where boundary descriptions and survey certificates were recorded.

In cities and towns there were different situations. Cadastral mapping systems were introduced stepwise, similarly to international developments and standards, but with little state control. When the first building laws were introduced in the major cities around 1830, these laws had statutes introducing cadastral surveying and chief surveyor. A cadastral survey was made a prerequisite for registration of change of ownership in the land register, if there was no previous cadastral survey. From latter 1800s, cadastral surveying was introduced in cities and towns on individual basis, based on the building law. With the building law of 1924 cadastral surveying was made mandatory for all cities and towns, and from 1947 survey certificates were to be registered in the land register by the municipality.

Professional development.

In 1719 legislation was introduced making boundary mapping mandatory when boundary disputes were brought to court. As a consequence, a small group of licensed surveyors (no: *kartkonduktør*) should establish. They were normally military officers. There were protests because of the costs, and the mandatory mapping should in the latter 1700s be limited to cases for the supreme court. The licensed surveyors should operate throughout the 1800s and well into the 1900s, when they disappear. Probably outdone by municipal surveying and the land consolidation courts. They should not achieve any role in cadastral surveying.

In 1764 legislation was adopted introducing written boundary descriptions when land was subdivided in rural areas. Land subdivisions were from 1764 to be conducted by 6 laymen appointed by the local judge. It is from now and onwards written boundary descriptions can be expected. In 1845, new land subdivision legislation was passed, stating that the number of laymen should be 4 and to be appointed by the tax man. The new law also stated that the land subdivision protocol with boundary descriptions was to be registered in the land register. In 1909 a new land subdivision law was passed, now with more focus on boundary marking and boundary descriptions, corresponding to the change in character of the system away from taxation purposes and toward legal protection of owners and creditors, and dispute prevention. Now the land subdivisions were to be conducted by three laymen appointed by the local sheriff. This situation persisted until 1980.

When the first building laws were introduced in the major cities Christiania (Oslo) and Bergen around 1830, these laws had education requirements for the chief surveyor. The chief surveyor should be skilled in mathematics and architecture. Throughout the 1800s, however, the state would take a passive role and no central authorization system or control system for cadastral surveying in cities and towns was developed. In the latter 1800s the education requirement is removed. It became the responsibility of the city or town to ensure the skills and competence of the surveying team.

The land consolidation courts were established in 1859 due to the need for property rearrangement in rural areas. The main task was initially to consolidate fragmented land and to dissolve or otherwise rearrange the use of farm commons. The land consolidation courts conducted massive rearrangement of agricultural land, and produced huge volumes of maps, showing boundaries prior to and after the land consolidation process, especially for the following 60-70 years. The maps were however "island maps" and not connected to the geodetic reference system.

The land consolidation courts were given authority to resolve boundary disputes already in 1882, but then only regarding disputes within the area of a land consolidation case. In 1934 the land consolidation court was given authority to conduct boundary surveys as independent court cases, including judgment in disputes. In 1950 this authority was extended to include rights. Surveys of boundaries and rights were to become a dominant type of cases for the land consolidation courts. The land consolidation court was also given authority to subdivide properties, but this was little used, probably because it was more expensive than the laymen.

3. CADASTRAL DEVELOPMENT AFTER 1960

3.1 The economic mapping project

As described above, the first cadastral mapping initiated in 1804-05 was stopped in 1815-16. Attempts around 1900 and in the first decades of 1900s to introduce economic mapping and combine the resources of the land consolidation courts and the Norwegian Mapping Authority, failed.

After World War II, there was increased focus on land and society planning. The lack of maps in greater scales and land information to support public planning and control activities in rural areas was apparent. In 1957, after local initiatives were taken by counties and municipalities to make economic maps based on photogrammetry, the government started to elaborate how these regional and local mapping activities could be coordinated and fit into a future national economic map. The national economic mapping project started circa 1960, with final approval of guidelines and financial plan by the Parliament in 1964.

Throughout the 1960s and 70s and well into the 80s, the economic mapping project should be implemented based on photogrammetric mapping. The project was in principle administered at the county level. A unit within the Geographic Survey which is today the Norwegian Mapping Authority was given responsibility for national coordination. The organizational model varied across county borders.

Property boundaries were determined on basis of aerial photographs, and initially only properties larger than 5000 m² were to be mapped. The boundaries were marked on the ground by markers (white plates 60x60cm) visible in the aerial photographs, but there was no boundary adjudication process, and there was no formal approval process.

3.2 Land registration and cadastral reform from 1980

Work to revise the land subdivision law of 1909 started circa 1966. The system of laymen undertaking land subdivisions was considered outdated and inadequate for future maintenance of the economic maps. There were two alternatives for replacing the laymen system: either use the land consolidation court, or introduce municipal surveying also outside of cities and towns. The law committee delivered their proposal for a new cadastral law in 1972, proposing municipal surveying.

A new cadastral law passed the Parliament in 1978, and came into force in 1980.

With the enactment of the new cadastral law in 1980, the municipalities became “first line” cadastral authority. This included responsibility for carrying out cadastral surveys when land was subdivided or land leased for more than 10 years, for assigning new property identifications and issuing survey certificates, and for updating the new cadastre replacing the old tax cadastre – the GAB system. The survey certificates were to be recorded in the land register. From 1995 this was limited to survey certificates for new properties and land leases, cadastral surveys for “existing” properties or boundary changes were now only recorded in the municipal archives. GAB was a computerized register of the different kinds of cadastral (property) units, addresses and buildings,

but with no maps. Cadastral surveying was introduced nationwide when new property units were established. But at the same time the compulsory surveying when title was conveyed (if there was no prior proper survey), was abolished. The GAB system was to be developed by the Ministry of Environment, but updated by the municipalities. There were no institutional building activities implemented to meet the increased demands for cadastral surveying services. No specific requirements for education or licensing of surveyors were introduced.

In the mid-1980s establishment of digital cadastral maps started. In general we can say in the Norwegian Mapping Authority by digitizing economic maps, and in the municipalities by digitizing survey certificates. Initially uncoordinated, but a national standard for digital cadastral maps was developed in 1991. In the mid-1990's the situation was considered not satisfactory. There was lack of personnel with the necessary qualifications and the quality of cadastral surveys and information in GAB and the cadastral map could be poor. In 1996 the Government established a law committee and a draft new land subdivision and cadastre law was presented in 1999. Proposals were presented to integrate the GAB-system and the cadastral maps into a new national cadastre, and to introduce a system of authorized surveyors to replace the system of municipal cadastral surveying. Reintroduction of the system of cadastral surveying when a title deed was registered, which had been in place in cities and towns prior to 1980, was also proposed.

A new cadastral law was passed by the Parliament in 2005 introducing authorization of municipal surveyors and private companies conducting cadastral surveys. Municipal surveyors resisted privatization, and after change in parliamentary majority the legislation introducing authorized surveyors were abolished. A new cadastre replacing the GAB system and the cadastral maps was, however, developed and established from 2007 to 2009. The new act of land subdivision and cadastre, and the new cadastre to replace the GAB and DEK systems, were to be put into force on January 2, 2010.

The cadastral law of 1978 also facilitated the future digitalization of the land register by introducing a nationwide and uniform cadastral identification number system. The digitization of the folios of the land register took place 1987 – 1994, but still land registration was to be carried out at the local courts.

In 2002 it was decided that land registration should be moved from the local courts to the Norwegian Mapping Authority due to the need to modernize the court system. From 2004 to 2007 the local land registries were moved court by court to a central Land Registry at the Norwegian Mapping Authority in Hønefoss.

Since 2010 the land register and the cadastre are central registers managed by the Norwegian Mapping Authority at Hønefoss.

4. DEVELOPMENT AFTER 2010 - THE PRESENT SITUATION.

In this final section the situation that has been in place since 2010 when the present cadastral law was implemented, will be presented and discussed. A special focus will be on quality issues and needs for improvement.

4.1 Cadastral management

The land register is a central register kept by the Norwegian Mapping Authority, as registrar. There are no notaries in Norway, but real estate agents are involved in the majority of formal land transactions. The land market is well functioning and the cadastral system gives the necessary information for land transactions and mortgaging.

The cadastre (no: *matrikkelen*) is a central register kept and maintained by the Norwegian Mapping Authority. The cadaster is an integration of the digital cadastral maps (DEK) which was established from the mid-1980s, and the GAB system. While the 1978 law imposed few limitations for the municipalities to add supplements (missing properties) and changes (corrections) in the cadastral map, the new legislation in force from 2010 put extensive restrictions on updates undertaken by the municipalities. Since 2010 correcting, changing or adding information in the cadastre are subject to notifications to parties with interest.

The municipalities are responsible for conducting cadastral surveys and updating the cadastre. The vast majority of cadastral surveys are undertaken by the municipalities and related to land subdivisions. A land subdivision is subject to application to, and permit from, the municipality. Granting of permission to establish new cadastral units, with the exception of sections in condominiums, will initiate a cadastral survey. A cadastral survey is a prerequisite for registration of a new property unit or a new land lease in the land register. If the boundaries are unclear or disputed and an agreement cannot be reached, the cadastral surveyor is to register the boundary as unclear/disputed, or survey both parties' claims.

There is a "second way" for a cadastral survey: through the land consolidation court. The land consolidation court can conduct cadastral surveys as separate cases when the boundaries are "uncertain." These are typically boundaries established prior to 1980 under the laymen system (no: *skylddelingssystemet*). The land consolidation court can decide in the matter, if there is a boundary dispute. A cadastral survey conducted by the land consolidation court is a mixture of cadastral surveying and court procedures. The court can not normally conduct ordinary subdivisions, but subdivision of a property that is involved in a land consolidation case will be carried out by the court if the court decides to do so. Under certain circumstances the land consolidation court can conduct a land subdivision as a separate case, for example when a property is to be subdivided according to ownership fractions, typically properties in co-ownership. Cadastral surveys undertaken by the land consolidation courts are registered in the cadastre by the municipality. The municipality also always assigns new property identification numbers, if needed.

Cadastral surveys by the municipality are handled according to the cadastral law and the public administration law. A cadastral survey brought to the land consolidation court is handled according to the land consolidation law and the civil litigation law.

The municipal surveyor and the land consolidation judge are responsible for ensuring that the case is examined, but neither of them have duty to carry out investigations. It is the responsibility of the parties to make investigations, present relevant documents or evidence, and identify the boundaries in the field. Many municipal surveyors will assist the parties in reconstruction of previous surveys,

but reconstruction and determination of a boundary is the responsibility of the adjoining land owners.

Costs for municipal cadastral surveys are normally determined by a fixed fee system, adopted by the municipality itself. Costs for a cadastral survey conducted by the land consolidation court are determined by a fixed fee system uniform at national level.

There are still no specific education requirements or licensing system for cadastral surveyors. Ensuring that the cadastral surveyor has the necessary competence is the responsibility of the individual municipality. For municipal cadastral registrars a 5-days course given by the Norwegian Mapping Authority is required. A land consolidation judge must fulfil the educational requirements which is a formal master education decided by the Norwegian Courts Administration.

A national cadastral map has been established and in force from 2010. In general one can say that the origin of the cadastral map for rural areas is the economic mapping project that started circa 1960, while the origin in cities and towns are the survey certificates and municipal maps. After 1980 and especially in the period between 2000 and 2010 there was a major focus on completing the maps with “missing” properties” after a variety of methods. Quality control was not in focus. The focus was on massive establishment. Generally one can say that in cities and towns the quality is better than in rural areas. When more remote, poorer quality must be expected. In 2014 approximately 10 % of the properties were registered only by a central point (not with boundaries) or not registered at all in the cadastral map. Registered boundaries can have poor quality.

4.2 Need for improvements

A nationwide cadastral map is in place and we have procedures to register new properties and boundaries in this information system, but there are problems with implementation. Procedures for correcting errors in registered information and capturing changes in existing properties are poorly developed, and there is little pressure to resolve these matters.

A characteristic of the system is a high and increasing frequency of disputes. One aspect that can contribute to the increasing number of disputes is poor quality in cadastral surveys. Another aspect is poor quality in the cadastral map, and that map and coordinates are perceived as “something more than it is”. This aspect is reinforced by easy access to the map through the internet. A third aspect that gives cause for concern is what seems to be an increasing focus in the land consolidation courts on following court procedures and basing boundary determination on evidence presented by the parties and their lawyers, rather than recognizing the need to investigate the case for correct boundary determination from a more technical approach.

My view on the situation is that as long as we do not have a profession of cadastral expert surveyors responsible for handling situations characterized by poor quality and uncertainty, the problems in the system will increase. I suggest that a two-part strategy for improving the cadastral system, prevent disputes from escalating into conflicts in court, and in the long term improve the land information system, can be: 1) First, strengthen education and develop a profession of cadastral expert surveyors and introduce authorization. 2) Second, introduce sporadic cadastral surveying

(based on cadastral surveying when land is conveyed for the first time after a fixed date if the cadastral map does not show the legal situation) and methods to capture changes.

4.3 New initiatives for a surveying profession

In August 2016 the Ministry of Local Government and Modernization presented a proposal for privatization and authorization of cadastral surveyors, after initiatives from private surveying companies for introduction of private cadastral surveying (Ministry of Local Government and Modernisation, 2016). The proposal has been on a public hearing but not presented to the Parliament (May 2017).

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BIOGRAPHICAL NOTES

After graduating in land consolidation from the Norwegian Agricultural University in 1983, Leiv Bjarte Mjøs worked for three years as a cadastral surveyor in Municipality of Bergen. From 1986 he worked for the Norwegian Mapping Authority, then leaving for the Bergen University College in 2004. Leiv Bjarte Mjøs is now an Associate Professor at Western Norway University of Applied Sciences, Department of Civil Engineering, in Bergen. He has made a dr. philos thesis with the title *Cadastral development in Norway*. Research interests are within land administration.

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