

# OVERVIEW OF SWEDISH CADASTRE SYSTEM

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## **ABSTRACT**

*The aim of this paper is to look into the cadastre system in Sweden. This is done by studying the Swedish country background information, cadastral system, development of 3D property formation and the need for new legislation, which is based on the Country Report on Cadastral Template (2003) (Osterberg, 2003) by the Permanent Committee on GIS Infrastructure for Asia and the Pacific (PCGIAP). Last, it will draw a summary of these studies.*

**Keywords:** cadastre, cadastral system, 3D property, National Land Survey

## **1. COUNTRY BACKGROUND INFORMATION**

### **1.1 Geographical Context**

Sweden has a land mass of about 450,000 km<sup>2</sup> including lakes and watercourses. It is 1572 kilometres long and approximately 500 kilometres wide at its widest point. At the time of writing, the total population of Sweden is nearly 9.5 million and the population density is approximately twenty-two persons per square km. At the time of writing, about 80% of the population in Sweden live in urban areas.

### **1.2 Historical Context**

Sweden developed from settlements after the last ice-age and the present country was unified into one kingdom around the year 1000 AD. In medieval times, Norway, Sweden and Denmark were unified at various periods. The modern kingdom of Sweden was established around 1500 and the democratic state emerged around 1900. Finland and the Baltic States had, for different periods, been included in the Swedish kingdom; hence, they have been influenced by the Swedish Cadastral System.

### **1.3 Political and Administrative Structures**

Sweden has been a constitutional monarchy since 1809 and is nowadays known throughout the world for its neutrality. The country is one state governed by a central government and parliament, with the king wielding no political influence. There are three democratically elected levels of government, namely the *Riksdag* (Swedish Parliament) at the national level, the county councils at the regional level and the municipalities at the local level. Each has different duties and areas of responsibilities, and elections take place on the same day every four years for all three levels.

For administrative purposes, Sweden is divided into twenty-one counties and two hundred ninety municipalities. At county level, the state has a regional administration through the County Administrative Board. There is also a direct elected council with rights to levy taxes and that is responsible mainly for health care at the county level. Most social welfare and land use planning are the responsibility of the municipalities, which also have direct elected parliament and rights to levy taxes.

The ministries in the central government are small organisations, mainly dealing with policy formation and preparation of proposals to the parliament. The central administration is carried out by national authorities and agencies which implement policies independently within the framework of the legislation and budget frames. All government decisions are taken collectively within the government. The government cannot interfere in the decision-making in a national agency.

#### **1.4 Government Organisation**

Before 1st June 2008, Swedish land registration and cadastral surveys were carried out by two independent organisations. Land registration was performed by the Land Register Authority, which was part of a District Court under the jurisdiction of the National Courts Administration within the Ministry of Justice. However, each Land Register Authority made its decisions independently. At the same time, the *Lantmäteriverket* (National Land Survey), established in 1628 and is today a part of the Ministry of Environment and Natural Resources, was responsible for the cadastral surveying. It decentralised the task of cadastral surveying to twenty-one county cadastral authorities.

The rationale for this arrangement was that the land information management and the land registration would be managed and coordinated more effectively. It was felt that the conditions for management and control of the land registration offices would be better with only one single organisation. Another reason for the decision was the overall objective to refine the courts to handle court matters only. About 90 registration offices which previously belonged to the Administrative Courts were reformed and were reduced to seven local registration offices under the purview of the National Land Survey.

Although the National Land Survey is entrusted with the responsibility for real property formation and official real property as well as geographic information in Sweden, it has a regional organisation in each county and local offices in all the municipalities. Hence, some large municipalities have established their own cadastral survey organisations and offices for real property formation. Many municipal offices do not have institutional links with the National Land Survey, which is responsible for the land information system that supports cadastral and land registration, but they are expected to operate according to the same principles and standards. However, owing to

administrative and bureaucratic structures, there seems to be some resistance to adapting to technological progress and new national *Lantmäteriverket*'s standards are not always adhered to (Steudler, 2004).

The National Land Survey operates in three main areas, namely real property formation, geographic and land information as well as commercial services. The County Cadastral Survey Authority is handled as part of the real property formation area. Its responsibilities are connected to real property registration as well as supervision and support related to real property assessment, land use matters and development related to these tasks. As for geographic and land information, the *Lantmäteriverket* provides information pertaining to national mapping, basic geographic information, the Land Data Bank System and national boundaries. Providing access to information in the Land Data Bank System and the emerging geographical databases is one of the more important tasks in this area of work. Furthermore, in areas of commercial services, the tasks are performed on a purely commercial basis for municipal and land information. Among the services provided are production, digitising, measurements and calculations.

Although the overall responsibility for the data and registration functions are carried by *Lantmäteriverket*, various organisations cooperate in order to have an integrated cadastre and registration system in Sweden. First, for legal cadastre, i.e. Land Register, there is cooperation within the Ministry of Justice, National Land Survey and Local Courts. Second, for physical cadastre, i.e. Property Register, there is cooperation within the Ministry of Environment and Natural Resources, *Lantmäteriverket* and Cadastral Authority. Finally, for fiscal cadastre, there is cooperation within the Ministry of Finance, National Tax Board and Regional Local Tax Authority.

After 1st June 2008, *Lantmäteriverket* has been entrusted with the cadastral registration of real properties and rights to them in Sweden. It is responsible for cadastral surveys, property formation acts, registration of properties, rights and encumbrances through its local offices and for dealing with any related information about the real property. Furthermore, *Lantmäteriverket* also deals with developers and manages the Property Register, the Mortgage Deeds Register, the Real Property Price Register and the Register of Joint Property Management Associations. Updates are taken care of by the Cadastral and Survey Authority and others.

## **2. COUNTRY CADASTRAL SYSTEM**

### **2.1 Historical Outline of Cadastre**

The modern Swedish cadastre is based on cadastral books from 1530 that were written for taxation purposes by the king. These cadastral books listed real properties according to each village and gave every unit a number in the village. This numbering system is still used for designation of real properties. During the seventeenth century, these cadastral books were complemented by village Cadastral Maps, showing all real parcels in the village. The purpose of these Cadastral Maps was mainly to improve the taxation of land and to make it equal by surveying the area and value of each land parcel. In order to carry out this task, *Lantmäteriverket* (National Land Survey) was created in 1628 as a governmental organisation.

Land registration has been confirmed since the beginning of history by Local Courts in order to make it known that a property has changed ownership. Written documents are available from the medieval times. In 1875, a title registration system was introduced. Court proceedings were compared to the cadastral books and Cadastral Maps. A special registry, the Property Register, was established during a 20 year period (1910 – 1930) in order to give definition to real property and a designation to this unit. The title registration system was based on it and its description of the property.

In the 1930s, work to establish a comprehensive and coherent national map in one national geodetic system was started. From the beginning, these maps were based on aerial photography, photo mosaics and later orthophotos. The maps were named economic maps and were produced in scales from 1:5,000 to 1:20,000. Cadastral boundaries were transferred from the old village maps to the new system by mainly photo interpretation of the boundaries and comparison with the old maps. There were no attempts to calculate new areas for the property units in that period. This mapping programme finished in 1978 and is now maintained and complemented with land use plans, regulation and other features of importance for land use rights. Another important development was that the original cadastral books with its division of the village into real properties that also started around the 1600s were used by the State church for recording the population, births, deaths and places of residence. Such records have been maintained over the years. In present times, they have been taken over by the Tax Authority. In this way, all the people living in Sweden are connected to real property in a continuously updated census. Such records provide important data for use in land information and social data for public as well as private planning and administration.

In the 1960s, the Swedish government attempted to modernise the cadastral books in the Property Register with the proposal to computerise the Property Register. One of the main advantages was seen in the possibility of combining information in the Property Register with the Population Register through the property designation, thus making spatial analysis a support for physical and economic planning. For this purpose, each real property was assigned a central coordinate in the national system. This was actually one of the pioneer works which later led to the development of Geographic Information System (GIS). The decision to computerise the Property Register and Land Register was taken in 1968 and 1970 respectively. After the system was developed, Sweden became the first county to implement it with legal force in 1975. The system was completed for the whole of Sweden in 1995.

To conclude, up to the thirteenth century, land in Sweden was regarded as a family or kinship property and the emphasis of the law was rather to prevent rather than assist in trading land. In the fifteenth century, influences from Germany led to more modern dealings in land with written transfers and mortgages. The development of a centralised state, with its need for systematic taxation systems, led to the introduction of the Land Registration System in the sixteenth century. This became tied to land transactions and land mortgages. The eighteenth century brought an end to aristocratic privileges and a codification of existing land customs was declared. Proposals for a new Land Code were put forward in 1909 but were not adopted until 1970.

## 2.2 Types of Cadastral Systems

Over the centuries, the cadastral system in Sweden has evolved into a very well-developed infrastructure. The Swedish system is based on the title registration system, which in turn is divided into cadastral units. The Swedish Cadastral System was developed systematically from simplified taxation records that were later linked to a comprehensive cadastral mapping system, covering the whole country and connected to a common universal reference system with a high degree of reliability.

The objectives of the cadastral system, including the land information system, are to promote and control sustainable and efficient land use, as well as to provide land information for land titling, land use planning, land taxation, environmental control and business development. From previous situations with different systems for urban and rural areas, the cadastral system is today with one unified system valid for all types of land and government. Sweden is probably one of the first countries to implement a nationwide database system that includes information from different organisations responsible for land information (Steudler, 2004).

Technologically, the Swedish system is one of the more advanced registration systems in the world. Presently it is fully functioning and computerised. The computerisation of the Land Data Bank System in Sweden was launched in 1970 and completed by 1995. Its two main databases contain information from the Property Register of *Lantmäteriverket* and municipalities, as well as from the Land Register. From the outset, the system includes information on the assessed value of the individual properties taken from the tax administration. Nowadays, the system has expanded to include buildings as well as information on addresses. In order to safeguard the data from damage, unauthorised access, unlawful changes and destruction, significant funds were allocated for the development of high security mechanisms.

Physically, the database is located in the central server of *Lantmäteriverket* (National Land Survey) which is the only authority that can make changes in this data bank. The messages from its terminal sent by the registration body can be edited by the authorised registrar. The functions of the Land Data Bank System include establishing certainty of land ownership and rights, giving publicity and legal protection for land tenure, facilitating the transfer of land, and providing easy access to information about any parcel of land in the country. The system also plays important roles such as property taxation, agricultural statistics, land surveying, environmental monitoring, urban and regional planning as well as population registration.

All land in Sweden is divided into real property units that are subject to compulsory registration in the Land Data Bank System. Property units could be divided only in the horizontal plane before 2004. The government guarantees the content of the system, which has legal power. There are provisions for compensation for owners, should they suffer losses under specified conditions. The Land Data Bank System provides for constitutional openness and public accessibility. Documentary records can be accessed online for inspection purposes free of charge but there is a fee for copies. The contents of Land data Bank System are divided into the Land Register and the Property Register that have been computerised; these constitute the fundamental parts of the Land Data Bank System.

Finally, the Land Data Bank System also contains information from other registers, such as from the Real Property Assessment Register that includes tax assessment values, properties of tax

payers and types of land use. Another data source is the Population Register that provides the population density code, and the Register of Building that provides the identification numbers, addresses, locations, owner names, types of use, and values of buildings. Meanwhile, the property index maps are part of the Property Register kept separately from the textual part. The property index maps for rural areas are based on the land use map. They have been printed in the scale of 1:20000, but are maintained on originals in the scale of 1:10000 at the regional authorities. On the other hand, the property index maps for urban areas are based on large scaled municipal base maps in a scale of either 1:1000 or 1:2000, and in some major cities 1:400 or 1:500.

### **2.3 Cadastral Concept**

The Land Code of 1970 deals with all important aspects of private real estate laws. It includes rules about fixtures, purchase of land, mortgages, easements and registration of rights to real property. The code states that all land in Sweden is divided into real properties and it defines the legal boundaries between properties and the rights between neighbours. A property may consist of one or several land parcels or a water parcel with specific rights like hunting, fishing.

According to the Swedish Land Code, objects or elements permanently fixed to a piece of land or constructions are belongings of the real property unit. Hence, a real property consists not only of the land but also of its fixtures. The most common fixtures are trees and buildings, although buildings are not parts of the property if they have been brought to the property by someone else other than the owner of the property, for instance a lessee.

A building's construction, fences, joint facilities, servitudes and others are regarded as fixtures to the land parcel. The fixtures can also be machines and other equipment if the immovable property is partly or fully used for production purposes. However, the fixtures cannot be related to the immovable property if the owner has declared this in the special form in the register of rights of immovable property. The territory of Sweden is thus divided into units of immovable property with their fixtures. The process of division of territory into the units of the immovable property is called property formation and its procedures are regulated by a special law in Real property Formation Act.

The Land Code was amended on 1st July 2000 and on the same date, a new law called the Property Register Act was passed. The law of Property Register regulates the register and the selling of information from the register. This change and the new law brought about the full computerisation of the land and property register. The Land Code now regulates the system of computerised registration.

In short, a property unit is delimited horizontally or both horizontally and vertically. As such 3D properties are included. Real property is owned by the state, local municipalities or any other public body and by a private individual. Property units are registered and have unique identities as the registers are based on the property designations. A property does not exist legally before it has been registered in the Property Register. All transfers of real property must be registered in the Land Register within three months. The relevant legislation states explicitly what shall be contained in the registers and what can be registered. The interests that have been registered are of higher priority compared with unregistered interests. Apart from ownership, Swedish law recognises leaseholds,

mortgages, tenures, building leases, easements and rights for electric power. The title registration is compulsory in Sweden. Therefore, the Property Register plays a very important role in the lives of the people of Sweden.

## **2.4 Content of Cadastral System**

The most fundamental purpose of property and land registration in Sweden is to establish certainty of ownership and rights to land. Other important purposes are to facilitate the transfer of land and other land related activities and to provide accessible information about land. The Property Register, the Land Register, the Land Data Bank System and the registration processes are vital tools to achieve these objectives. The content of the registers is guaranteed by the government for compensation in the case of losses suffered under certain conditions. An extract from the Land Data Bank System containing the Property Register and Land Register contains assessment data which includes the use of the land and building. Stamp duties as well as the registration fees are set when applications for transfers and mortgages are registered.

The Property Register is the basic administrative register for real properties in Sweden. The register includes a cadastral index map. This map is kept separately from the textual register. The register is used in land registration, property taxation, agricultural statistics, land surveying, environment monitoring, urban and regional planning and other related matters. The documents, maps and marks on the ground produced in the property formation process form the legal basis for the division of land into real properties. The Property Register contains records of the area of real properties and the property designation. The register also contains information on easement, land control and zoning regulations and graphic references. The central coordinates for each parcel of the property are also registered as well as the street address of the properties.

On the other hand, the main purpose of the Land Register is to give publicity and legal protection for land tenure. An orderly and successful land registration system is a prerequisite for guaranteeing security and facilitating economic transactions. The state guarantees the content of the Land Register which has legal power. The register contains information about the name, address and civil registration number of the legal owner. It also contains information about mortgages and other encumbrances. The Land Register also receives notification from other authorities on matters such as bankruptcy and restoration orders.

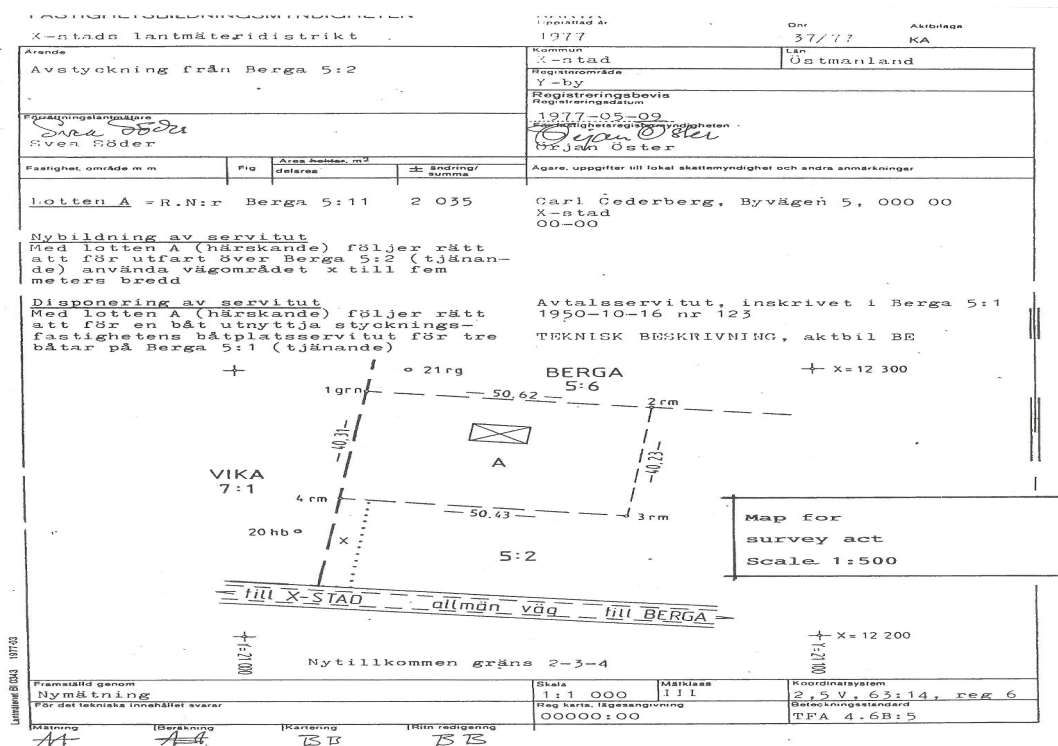
## **2.5 Cadastral Map**

Since the middle ages, Swedish urban cadastres have been linked with large-scale maps. Later, photomaps in the scale of 1:10000 were developed in Sweden. All land inputs in the rural areas with their boundaries were clearly indicated in photomaps that were established as a registration index map. The current Swedish Cadastral System is based on historical maps that came from the cadastral founded in 1530. The primary purpose of the establishment of such a cadastral book was for taxation purposes by the king. The numbering system of the real properties by village Cadastral Maps was developed and used for designation of real properties. In the seventeenth century, the cadastral books were modified by village Cadastral Maps again. All real parcels of each village were

indicated on the map. The map was established in order to improve the taxation system and promote equal shares considering the area and value of each parcel.

The initial example of the computerised real property register was developed by the force of law in 1970, and completed in 1995. The computerisation of Cadastral Maps developed in two directions. In the first direction, the cadastral parcels were digitised from an existing economic map that had been fully digitalised and renamed as the real property map. The second direction saw the Cadastral Map digitised and connected with the land information system forming more accurate cadastral databases. The organisation responsible for dealing with the issues of real property formation is the National Land Survey. The focal government point is the Ministry of Environment and Natural Resources that has its own regional organisation in each county and local office in municipalities. In fact, bigger municipalities also have offices for real property formation.

In brief, the Cadastral Map is mainly used in land administration as a reference system especially for planning purposes. It can be viewed through accessible software in digital format for general use and on the internet. The Cadastral Map is used to describe and document changes in the land use, land ownership and land use regulations. The Cadastral Map is one of the legal documents in the collection of Sweden Geographic Data, together with other official maps. In the municipalities, it is a part of the urban base map system, which is used for planning and management of municipal functions regarding education, health, public utilities and other such matters. It is also principally used for land valuation for taxation purposes and forms the bases for the definition of value areas by using Geographical Information System technology. A sample copy of a traditional Cadastral Map is shown in Figure 1 below.





### **3. DEVELOPMENT OF 3D PROPERTY FORMATION**

The Swedish Land Code is the primary source of legislation with respect to real property. The Land Code is divided into two parts. Part one describes legal relations affecting real property. It defines real property unit and its boundaries, property fixtures, legal relations between neighbours, purchase, exchange of gifts, regulation of real property rights, mortgage, lien, right of user. It also defines easement and right to electric power, leasehold, rent, site leasehold, prescriptive right to real property and priority on the grounds of title registration and finally the rules concerning the bona fide acquisition. Meanwhile, Part Two is concerned with title registration. It sets out the general provisions regarding registration, and regulates registration of ownership, registration of site leasehold, mortgages, certain user rights and fixtures (Swedish Land and Cadastral Legislation, 2007).

Despite the Land Code being the essential base for property legislation, other acts also support the legislation. Although there are numerous real property related acts, they fall within the purview of the regulations outlined in the Land Code. There are four groups of regulations according to the scope of issues. First are cadastral procedures acts. This group includes Real Property Formation Act, Adjudication and Legalisation Act, Utility Easements Act, Joint Facilities Act and Joint Property Units (Management) Act. Second are executor procedures acts, for example, Fishery Conservation Areas Act and Game Conservation Areas Act. Third are registration acts and ordinances, for instance Real Property Register Act, Real Property Register Ordinance, Land Register Ordinance, Mortgage Certificates Register Act, Mortgage Certificates Register Ordinance, Apartments Register Act and Apartments Register Ordinance. The final group covers other acts and ordinances, such as Expropriation Act, Pre-emption Act, Leasehold Properties (Acquisition by Lessees) Act, Property Acquisition Rights (Conversion to Tenant-Ownership or Co-operative Tenure) Act, Estate Agents Act, Estate Agents Ordinance, Public Water Areas (Boundaries) Act (excerpts) and Panel Code (excerpts from Chapter 14 and Chapter 20) (Swedish Land and Cadastral Legislation, 2007).

A legislation for 3D real property formation (3D Cadastre) came into force in Sweden on January 1st 2004 to replace the plane cadastral system. The 3D property formation was developed to make 3D cadastral system possible. In my opinion, it would be useful to look at the current legal situation in the real property domain in Sweden considering the fact that it has a long history of property ownership legislation. This would enable a better understanding of a tested system before proposing any new legislation regarding 3D property ownership.

All land as well as water areas in Sweden are divided into property units and joint property units that are entered in the property Register. One important principle regarding land ownership and the content of property rights is the indivisibility of land ownership, i.e. individuals cannot own different functions within one property unit. There is only one exception to this principle, *viz.* the ownership of a water area can be separated from the ownership of fishing rights in the same area of water, resulting in the water area and fishing rights forming two different property units (Julstad and Ericsson, 2001).

Before the introduction of 3D property into the Swedish legislation, real property was equal to land with the ownership extending into space and into the ground, but in practice only as far as in reasonably possible to use (Julstad and Ericsson, 2001). The ownership of real property is theoretically considered as reaching to the centre of the earth and upwards towards the universe but

disputes concerning the right to this space occurs only when there may be real conflicts of interests in cases where the space really can be used for a purpose (Paulsson, 2007). It means at least that no one but the property owner is entitled to use the space above or below ground for the construction of different facilities (Julstad and Ericsson, 2001). The traditional properties are plane delimited but with a three-dimensional extent (Mattsson, 2003b).

The building and other facilities erected by the property owner on a property are categorised as fixtures, as well as forest and other vegetation. National resources (with the exception of some minerals specified in law), and water are included in the title to the land but in many cases, their extraction requires a permit. Swedish legislation contains no provisions on how far a property unit extends above the ground or below it in the old law. The extent of the property unit cannot be changed upwards or downwards, for example by forming one property unit out of the space above ground surface and another out of the space below the ground surface. In other words, property rights are not stackable. Consequently, land and building or different parts of a building constituting real property cannot form different property units and thus, separate parts of them cannot be owned by different individuals (Julstad and Ericsson, 2001). Therefore, there are no explicit provisions for 3D property formation in the old Swedish legislation. Nevertheless, it is possible to provide for 3D property use by creating rights of user in favour of a property unit. There are three registered types of the rights of user of this kind, namely easements, joint facilities and utility easements. In all cases, three-dimensional space in another property unit is granted for the exercise of the right to user and the utilisation of an existing facility.

A demand for three-dimensionally delimited properties has existed in Sweden for quite some time, including the possibility of dividing ownership of buildings or space below the ground, so that there may be units owned by separate parties (Julstad and Ericsson, 2001). The building industry in particular has been requesting this, mainly for the possibility of providing more accommodations in cities by adding an additional storey on existing buildings, obtaining a more rational use of public owned land, and implementing major infrastructure projects (Eriksson, 2005). The need for forming 3D property units can be found especially in large projects where significant capital is involved and where there is competition for the use of land in the area. To facilitate the administration and financing of such projects, it is often necessary to divide the ownership, separating parts with different uses such as housing, office, retail, and parking (Mattsson, 2003b).

Other means were previously used to meet this need before the possibility of 3D property was introduced, such as the formation of easements and other transfers of rights in land. Easements is a way to meet a property unit's need of space for a particular purpose in another property unit, for instance to provide a property unit with a necessary road across another property unit. An easement in Sweden may not be granted in favour of a person, but is a right granted in favour of one or more property units. It may be formed either by official cadastral order or created by a written private agreement between property owners (Julstad and Ericsson, 2001). Utility easements are used to secure the right to land for utilities of public importance, such as power and telecommunication lines. It entitles the proprietor of the utility to use the space in other property units for the construction and maintenance of the utility, where this right can be granted to either a property or a person.

Joint facilities are established when several property units have a collective need for different types of facilities that are not publicly provided, such as roads, play grounds and car parks. It is a form of common property, where the facility will be common to the property units (Mattsson, 2003b). The right to use a certain place in one or more property units for such a purpose is granted to the property units included in the joint facility. Different kinds of leasehold are also possible, where the right of user is granted to a person for a limited period. However, one disadvantage with such solutions is that rights of use constitute personal property and cannot be separately registered or mortgaged as real property (Julstad and Ericsson, 2001). The lack of possibilities to form 3D properties has also led to some unusual and not always suitable solutions (Mattsson, 2003b).

These problems led to the amendment to the legislation in January 2002, making it possible for buildings or other facilities to be legally transferable without the fixtures being physically removed from it. Before this amendment, a separate transfer of objects pertaining to a property was not valid with respect to any third party unless the object was separated from the property. This principle that fixtures could not be segregated from the property without the object being physically removed was questioned in several cases, leading to the need for a change. One situation where such a change was needed was the incorporation of local public infrastructure (which is mostly owned by municipalities) with the ownership of the land and of the facilities concentrated in the same hands, making the facilities fixtures of municipal properties. In recent years, it has become more common to transfer infrastructure and space for facilities to companies, which is done through utility easements, and not by transferring the ownership, which would have been a better solution, but not possible, since the facility remains a fixture of the municipality's property. Another situation concerned joint facilities, where space had been granted for existing facilities while the ownership remained with the original property owner. Uncertainty in such situations could arise concerning responsibility for maintenance, the party responsible for insurance, the right to rebuild facilities and other similar problems.

The new legislation is aimed at making buildings or facilities legally transferable from one owner to another holder without the fixture being physically removed. However, transferring a facility may only be done by special order of a cadastral authority, in order to obtain legal certainty and efficiency. The new rules make it possible for the link between real property and fixtures to be broken without removing the fixture, and thus prepared the way for 3D property (Mattsson, 2003b). Under the new amendment, it is possible for property units to be defined three-dimensionally. These property units will be incorporated into the existing regulatory structure for traditional properties by setting the suitability conditions. The property units cannot be arbitrarily altered or cancelled, the title should be independent of the land within which the space for a 3D property is located, and they should be separately transferable and able to be mortgaged. The new rules are in accordance with the existing principles of real property laws.

In order for the formation of 3D property units to be possible, amendments had to be made to the Land Code and the Real property Formation Act. Two new concepts were defined, namely 3D property and 3D property space. The first is a property defined both horizontally and vertically, while the latter is a space attached to on surface property and defined as both horizontal and vertical planes. One of the main stipulations of the amendments is that the facility property units are only

permitted if they occupy, or intended to occupy a building or some other facility. The creation of 3D property is thus possible only if the facility has already been constructed or a building permit has been obtained before the property formation is permitted, and there must be a presumption of the property being applied to its purpose within the near future. Therefore, it is not possible to create properties consisting merely of air or a volume of rock.

In Sweden, the 3D properties are formed by order of a cadastral authority. Boundaries can be marked, or if it is impossible to do so, they should be described with the aid of a map. Rights and obligations are also described and registered. The 3D property can then be title registered and mortgaged. Together with the introduction of 3D property formation, the formation and use of freehold-stratified buildings were also investigated. The cadastral authority proposed that stratified buildings should also be true delimited 3D property. In short, the 3D cadastral law looks at the possibility of creating freehold multi-storey buildings as three-dimensionally defined and independent property for housing purposes.

The purpose of introducing 3D properties in Sweden is to create pre-conditions for a more efficient management of property units containing different types of activities where large capital investments are made. Such properties can include, for example, subdivision of a building into parts, where one part is for dwelling purposes and the other for commercial activities (Eriksson, 2005). Another reason is to overcome the difficulties connected with buildings located partly on top of each other, for instance houses along hill slopes. Another purpose for such legislation is the formation of property units for bridges, tunnels and underground storage (Paulsson, 2007). The 3D property form is also intended to make it possible to build new structures on and above existing buildings, hence facilitating an increased development of accommodations and dwellings in the cities (Eriksson, 2005).

In the short time during which the 3D property legislation has been in force, there is not as much interest in forming such properties as expected. Of the around 20000 cadastral procedures carried out in Sweden each year, approximately fifty dealt with 3D property formation in 2004. However, it is expected that the number of 3D property units formed each year will increase during the coming years when there is more awareness of the significance and value of the new 3D property legislation (Eriksson, 2005). According to Paulsson (2007), as of 15th November 2006, a total of 112 3D property units had been registered since the legislation was introduced, including both 3D property units and 3D property space, the latter being space included in a traditional property unit, but that just like the 3D property, is delimited both horizontally and vertically. According to Eriksson and Jansson (2010), as of 2008, 240 3D property units had been formed and there had been a trend towards an increased annual demand. At the end of 2007, the Land Registry had 175 3D properties with 3D space property registered, with an average of about 44 newly formed properties per year. Nevertheless, the number of new properties has since seen a slight increase. The first half (89 properties) was formed in 2½ years until 30th June 2006 and the other half (86 properties) for 1½ years to date. In 2007, 45 new properties were created.

The first 3D property formation procedures mainly involved the subdivision of existing buildings into dwelling and commercial units (Eriksson, 2005). A few parking garages have been subdivided to form 3D property units. Most of the registered 3D property units are of the building type,

and only a few are bridges and tunnels. Registration of 3D properties is more common in Stockholm City, due to a shortage of available land there and the number of different interests to be coordinated within the same area.

After four years of enforcement of the three-dimensional legislation, at the end of 2007, *Lantmäteriverket* carried out an evaluation of the implementation of the legislation. It was found that the Act had functioned well. There is a trend showing an increase in the number of new 3D properties formation each year. Although the 3D legislation offers many new possibilities for property formation, it is clear that it will take time for full awareness of the significance and value of the new legislation to be developed. Nevertheless, there is great interest in this type of real property formation, particularly for forming 3D real property dwelling units. Certain limitations in the 2004 legislation that prevented the formation of strata titles units have since been removed. Earlier, a real property unit could not be a space consisting of only one dwelling unit, which meant that the legislation did not permit the creation of strata titles. Therefore, at that time, a multi-dimensional real property unit for dwelling purposes could only be created if it comprised at least five dwelling units (Eriksson and Jansson, 2010).

The government that came into power in 2006 decided that changes to the legislation to make it possible to create strata title properties. The changes to the legislation meant that it is now possible to form a strata title property that comprises only a single dwelling from subdivision of at least three dwelling units. It is also possible to own, rent out or transfer the property without any special restrictions. Later, a parliamentary bill was presented and passed during the spring of 2009. From 1st May 2009, it has become possible for individuals to own an individual parcel in multi-storey buildings. A strata title property is defined as a 3D property unit that is intended only to contain a single parcel. This has been a warmly welcomed change to the Swedish real property legislation (Eriksson and Jansson, 2010).

To summarise, the development of 3D property formation in Sweden is a new trend, but it is unlikely to bring about great changes in the concept of real property as the concept is linked to the existing legislation and only minor amendments would be needed. A 3D property is in principle the same as a normal one from a legal point of view. The difference is that they are differently limited and that 3D properties can be abolished more easily if they are not appropriate to their purpose.

#### **4. NEED FOR NEW LEGISLATION**

Three-dimensional land use has been insignificant for a long period in Sweden. On the other hand, recent developments have increased the need for legal separation of property ownership three-dimensionally. These situations have subsequently increased the need for larger, capital intensive and sometimes highly complex projects, where buildings or other structures are designed to accommodate different activities. These projects usually take place in areas with higher land use intensities, especially urban areas. For management and financial reasons, stakeholders frequently want to segregate the properties and facilities so that facilities or parts thereof can be owned and pledged separately, as is the case with independent properties. Given these circumstances, transportation and communications are often an issue. This can be exemplified by some road and

railway tunnels and bridges that cut straight through properties, which are contrarily used for completely different purposes. There are also cases of partial or total integration of transportation and communication sites such as station halls, bus terminals and other transport facilities with facilities of completely different nature, such as shops, offices and housing.

The ongoing and planned densification of buildings in cities also yields other examples. Due to the inadequacy of land for new settlements, the appeal of maintaining parks and other undeveloped areas and the utilisation of existing infrastructure for new development, diverse kinds of construction projects now necessitate the use of spaces above or below existing properties. This usually concerns building height, thus spaces above commercial buildings, public places or communication utilities can be utilised for residential or other purposes. The ability to multi-layer buildings and other structures in detached parts is appealing, for example a building that consists of two parts, for commercial and residential purposes respectively. This detachment for each part of the building may be better, as each part would be managed in a suitable manner. Hence, the stratification of a building allows for completely different ways in managing the premises.

There have been questions on whether 3D property subdivision really needs to be as restricted as intended by the legislature. Experience shows that demand has not increased for what is regarded as unreasonable reorganising, which can result in a considerably fragmented real estate subdivision. Although a careful application is still regarded as desirable, there are doubts whether all the different criteria and conditions for three-dimensional reorganising are actually required.

3D property is selected if it is the best option in meeting the intended purpose, in line with the existing requirements. A fundamental condition for three-dimensional reorganising is that the measure is clearly more appropriate than other measures in fulfilling the intended purpose. Given that it may be hard to determine whether 3D property is the most appropriate in individual cases, this raises the question on the formation of 3D property as it is uncertain whether other measures would meet the purpose equally well or better. Usually, it is normal for the new system to be implemented cautiously until more experience can be gained. The three-dimensional solution must be supplementary to traditional measures in compliance with the precautionary principle.

Hence, the equilibrium between the three-dimensional reorganisation and other alternative solutions in land survey is to be determined by appraisal and then choosing the most appropriate measure. There must be no risk that the application and modification would be in a generally unfavourable direction.

## **5. SUMMARY**

A general view of experts and practitioners working with 3D property formation in Sweden is that while the legislation is working well, it has not been used to the extent anticipated. It is thought that more amendments would be made to accommodate cases where large investments have been made and the rights of owners of 3D properties need to be protected. The future for this system is regarded to be generally positive. There are opportunities to involve more interested parties. It is likely that the interest in 3D property formation will increase in the coming years, and would spread

from the cities to the suburbs as more multi-storied buildings and are constructed (Paulsson, 2007) where the land has premium value.

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