

# **CADASTRE 2014: New Challenges and Direction**

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**Key words:** Cadastre, Cadastre 2014, Land Administration

## **SUMMARY**

Land and land related activities form part of the basis of all economies and therefore the societies they support. Land is managed through land administration, with successful economies relying on effective land administration systems. At the core of land administration is the cadastre.

Cadastre 2014 is a strategic document published in 1998 by FIG that contains six core statements and a vision for future cadastral systems. However, many developments, issues and challenges have emerged since 1998, requiring that Cadastre 2014 be re-assessed in light of these, to ensure that its statements and vision align with current and future needs of society. This paper provides an analysis of the Cadastre's strategic statements against the current needs and challenges of society, offering recommendations for each statement. The aim is to contribute to Cadastre 2014 to ensure it most effectively supports cadastral systems of today and in the future.

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## **1. INTRODUCTION**

Land is fundamental to the successful functioning of a society and is managed through land administration. Throughout history, people to land relationships have changed and they continue to evolve today (Williamson 2006). The dynamic nature of these relationships results from global drivers such as technology, sustainable development, globalisation and economic reform (Ting and Williamson 1999). Over the past ten or so years, specific developments that are altering people to land relationships include: the increased use of the internet, web applications, launch of Google and its related Google Maps and Google Earth, Spatially Enabled Government (SEG), Spatial Data Infrastructures (SDIs), spatial enablement, eServices and eGovernment, the growing recognition of climate change and sustainable development as important issues, along with poverty reduction and natural resource management. It has been recognized that it is essential for land administration and cadastral systems to adapt accordingly to support these changing relationships.

## **2. BACKGROUND**

### **2.1 Cadastre 2014**

Part of the recognition of the need for adaptation of land administration systems to support the present needs of society resulted in the establishment of the FIG (International Federations of Surveyors) Commission 7. This Commission was formed in 1994 to study cadastral trends; especially the automation and role of cadastres within larger land information systems. The strategic document Cadastre 2014 was created as a product of the Commission's work. Cadastre 2014 defines a vision for cadastres in twenty years time, i.e. 2014; a vision of a "comprehensive land recording system" (Kaufmann and Steudler 1998, p.14). It includes six core strategic statements and was published in 1998.

### **2.2 Cadastre 2014 – Strategic Statements**

Cadastres form the basis of land administration, providing unique parcel identification and other related information. Cadastre 2014 was written as a response to the growing recognition that traditional cadastral systems were not meeting the requirements of modern societies. Commission 7 recognized that traditional cadastral systems should be reformed to address the new needs of 20<sup>th</sup> century societies. Cadastre 2014 is described by Williamson (1998, p.iii) as an important document "which will have an impact on cadastral reform world-wide for many

years.” The six statements in Cadastre 2014 provide technical guidelines and direction for future cadastral systems. These six statements and a short description of each are detailed below.

*Statement 1: Cadastre 2014 will show the complete legal situation of land, including public rights and restrictions*

Cadastre 2014 states that “[It] must cover a wider field than the traditional cadastre has since its introduction” (p.16). Increasing amounts of information are connected with land. The Cadastre needs to manage and provide all this information.

*Statement 2: The separation between ‘maps’ and ‘registers’ will be abolished*

Statement 2 of Cadastre 2014 states that there will be no separation between ‘maps’ and ‘registers,’ i.e. the two components of the land recording system, namely the cadastral part and land registration, will function under one lean organisational structure.

*Statement 3: The Cadastral mapping will be dead. Long live modelling*

Statement 3 asserts that modelling will replace traditional cadastral mapping methods, implying that cadastral mapping will be ‘dead,’ i.e. it will be non-existent by 2014.

*Statement 4: ‘Paper and pencil – cadastre’ will have gone*

Statement four states that technology will be used for cadastral work rather than the traditional ‘paper and pencil’ system.

*Statement 5: Cadastre 2014 will be highly privatized. Public and private sector are working closely together*

Statement five places the cadastre and land management within the spheres of deregulation and privatization and indicates the increasingly closer relationship the public and private sectors will share.

*Statement 6: Cadastre 2014 will be cost recovering*

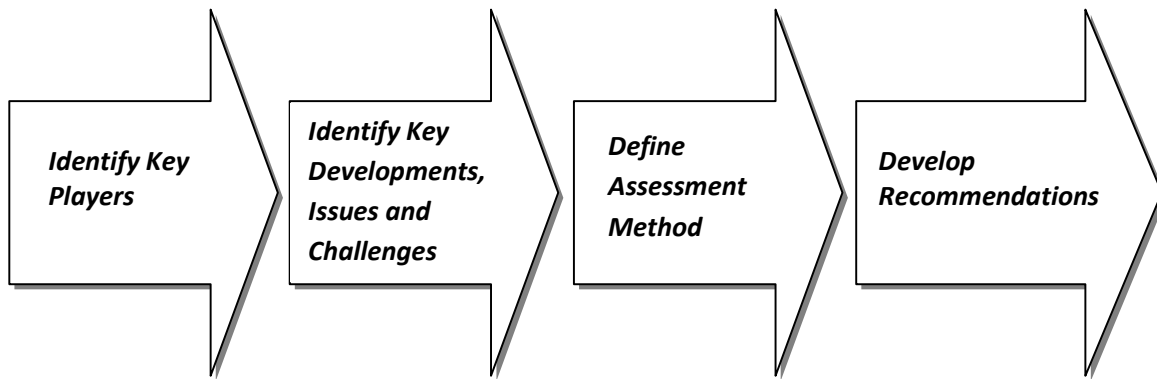
Statement 6 asserts that through the appropriate management of fees and taxes, Cadastre 2014 will be cost recovering.

Since its publication, Cadastre 2014 has been widely adopted by many countries as a reference for management, design or improvement of their cadastral systems. Cadastre 2014’s extensive global use is evidenced through its translation into more than twenty languages. Currently, it is undergoing even more translations. It is important that such a widely used and referenced document aligns with current needs of society and fully incorporates and addresses the developments and activities of today and future years. It is for this reason that Cadastre 2014 - in particular its six core statements - needs to be re-addressed within the current context; ensuring that it incorporates the many developments, issues and challenges that have emerged since its publication in 1998.

### 3. ASSESSMENT METHODOLOGY

In order to assess the six statements, the research was undertaken using an exploratory approach which involved the identification, assessment and comparison of the key players in land administration. Specifically, the key players were identified under three broad categories: technology (such as Google), organisations (such as FAO) and activities (such as climate change). From these three broad categories the major developments, issues and challenges were identified.

The identification of the developments, issues and challenges of the key players that have emerged since 1998 formed a picture of the current context in terms of the issues and challenges facing societies today. This approach then involved the specific assessment of the six statements of Cadastre 2014. More specifically, the research was broken down into four key stages, designed and developed by the authors as illustrated and detailed below in Figure 1.



**Figure 1:** Assessment methodology

#### 3.1 Stage One: Identification of Key Players

Key players were those whose developments, issues and challenges have an impact on cadastres and land administration. These key players were classified under the three broad groups of technology, organisations and activities.

#### 3.2 Stage Two: Identification of Key Developments, Issues and Challenges of the Key Players

The major developments, issues and challenges of each of these key players identified in Stage One were then established. The developments, issues and challenges for each key player were analysed, then compared across key players, to determine any important crossovers or common areas of focus. The outcome of this second stage produced a complete picture of the nature and scope of developments, issues and challenges relevant today which affect Cadastre 2014.

### **3.3 Stage Three: Definition of Assessment Method**

Stage three defined an assessment method for the evaluation of the six statements in Cadastre 2014. The assessment method consisted of the following parts:

#### 3.3.1 Examine Cadastre 2014's Six Statements

An examination of each statement in Cadastre 2014 was undertaken. This involved identifying the objective of each statement, along with its key elements. Key elements were defined as any factors that were referred to in the statement at the time of publication, or any that have emerged since 1998 and which now directly apply to the statement. To analyse the complete scope of each statement further, supporting elements were also identified. Supporting elements were defined as any factors which were implied or were necessary parts of the key elements. The outcomes and benefits of each statement, as well as potential implementation challenges, were then identified.

#### 3.3.2 Cross Examination of Each Statement

A cross examination of each statement against the developments, issues and challenges of the current context developed in Stage Two.

#### 3.3.3 Identification of any Necessary Changes

An assessment of whether each statement fully addresses all components of the current context, or whether there are missing elements, re-wordings or expansions needed within the statements to align them with the issues and challenges and the needs of society today.

### **3.4 Stage Four: Develop Recommendations**

Following on from this analysis of the six statements, recommendations regarding the relevance of the six statements of Cadastre 2014 for today and in the future were developed. From any gaps or necessary re-wordings or expansions identified in Stage Three of the methodology, written recommendations were formulated, outlining how such recommendations could be incorporated into the statements.

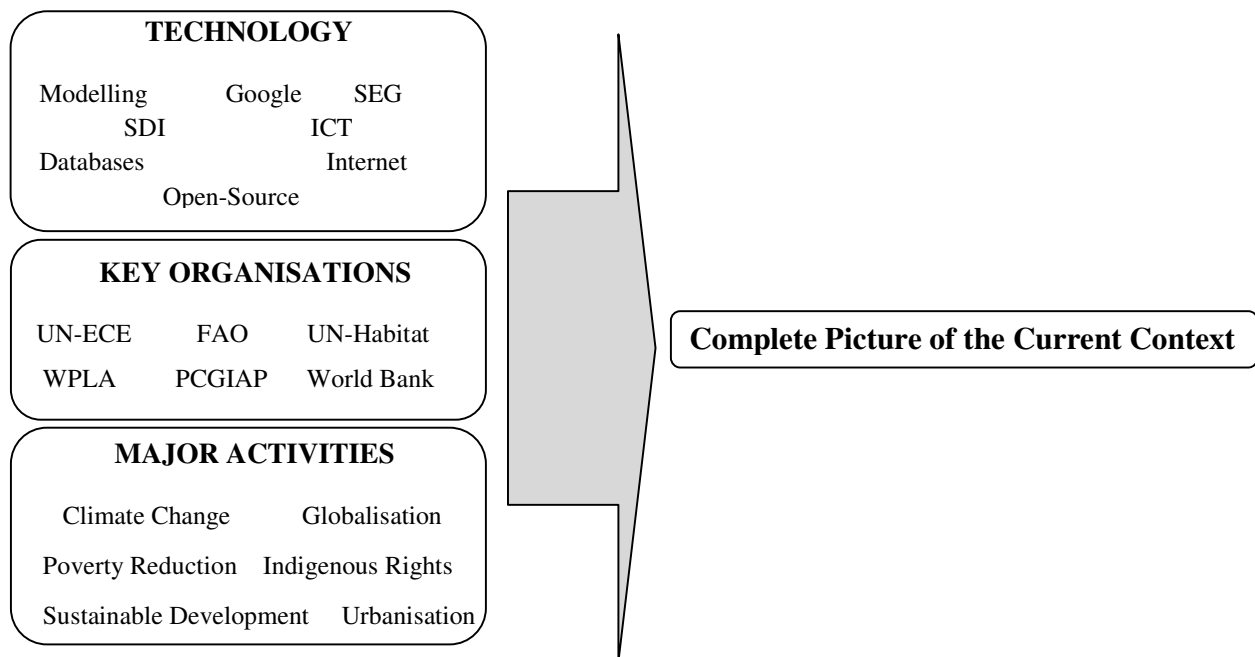
## **4. ASSESSMENT RESULTS**

The above assessment methodology can be summarized into two broad areas. The first involved the identification of key developments, issues and challenges that have arisen since the document's publication in 1998. These were identified to better understand the current needs and challenges of society, and how cadastres can be developed in the future to meet these needs and support growing issues such as climate change and urbanization. This holistic view then allowed the second activity to be undertaken, which was the assessment of the six statements in light of

current and future society needs and challenges. The results of this analysis are detailed in the following.

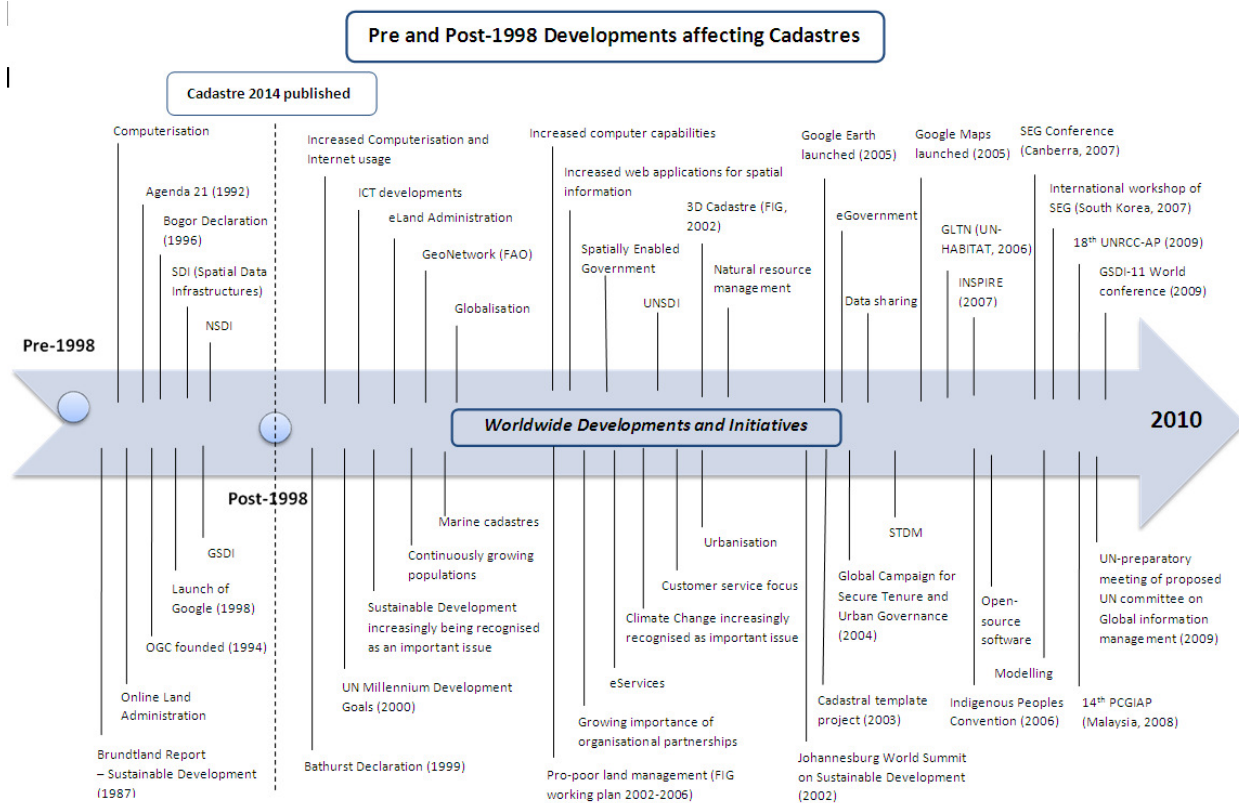
#### 4.1 Identification of Key Developments, Issues and Challenges

Using the above assessment method, key players relevant to cadastres and their respective developments, issues and challenges since 1998 were identified to form a picture of the current land administration context. The key players were identified from the broad areas of technology, organisations and activities and the developments, issues and challenges of each were then specified. Examples of some of the developments, issues and challenges which led to the development of the complete picture of the current context are shown in the following Figure 2.



**Figure 2:** Key players relevant to land administration and the major developments, issues and challenges

The identification of the key developments, issues and challenges in the area of land administration for each of the key players resulted in the following trend (Figure 3). This trend depicts the key activities and developments since 1998 and assists understanding of the changes that have occurred since Cadastre 2014's publication.

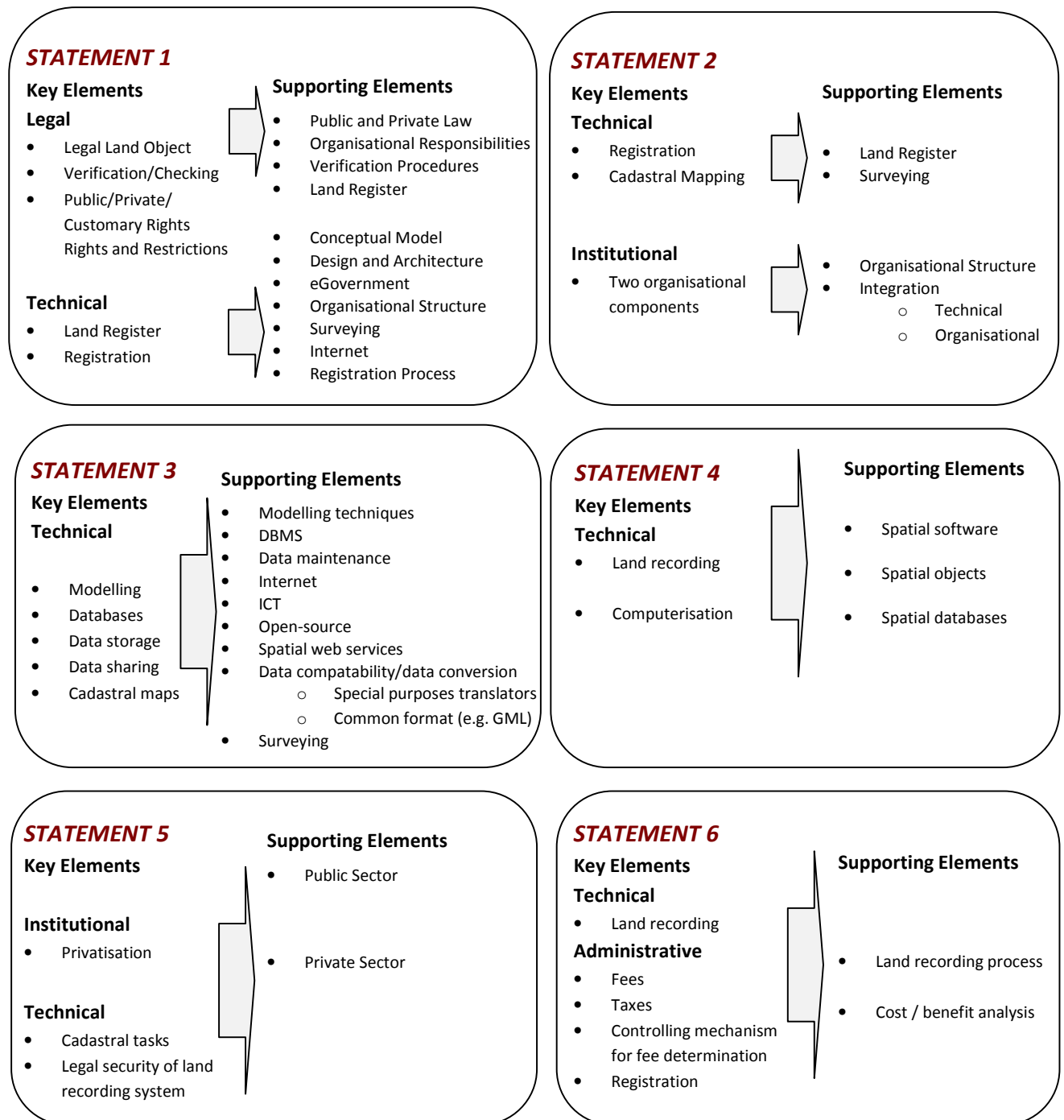


**Figure 3:** Developments and activities since Cadastre 2014’s publication in 1998

## 4.2 Assessment of Cadastre 2014’s Statements

The current context identified previously was used as the basis for the assessment of the six statements of Cadastre 2014. Each development, issue and challenge was cross examined against the six statements.

The analysis of Cadastre 2014’s six statements involved the identification of each statement’s key elements, supporting elements, any benefits and potential implementation challenges. Key elements were those that were directly involved or mentioned in the statement, covering all technical, legal and institutional components. Supporting elements were those that were implied by, or necessary for, the functioning of the key elements. As a result of this assessment the key and supporting elements of each statement were identified, as illustrated in Figure 4.



**Figure 4:** Key elements and supporting elements of each statement

The statements were then analysed in terms of their position against current needs of society, and the developments, issues and challenges that have arisen since they were published in 1998. This analysis for each statement is detailed below.

*Statement 1:*

Cadastre 2014 states that “[It] must cover a wider field than the traditional cadastre has since its introduction” (p.16). This is even more imperative in 2008, as is the need to effectively record the complete legal situation of land, which remains an important part of land management. In addition to rights and restrictions, responsibilities have also become another important component of the legal situation of land. It is essential that Statement 1 incorporates all of this.

However, the recording of these rights, restrictions and responsibilities must also be supported and managed by an appropriate framework or model. Rights and restrictions have power against third parties. Responsibilities, which are attached to the owner, must also be incorporated into these frameworks or models in order to align with rights and restrictions. Some suggested frameworks are the “RRR Toolbox” and the “Property Object” (Bennett 2007) which effectively describe and record RRRs (Rights, Restrictions and Responsibilities). The need for such frameworks must be acknowledged in Statement 1, along with the recognition that they must be adaptable and flexible to accommodate new RRRs that emerge in the future.

*Statement 2:*

Statement 2 of Cadastre 2014 states that there will be no separation between ‘maps’ and ‘registers,’ i.e. the two components of the land recording system, namely the cadastral part and land registration, will function under one lean organisational structure. This is an appropriate and achievable vision for many countries, with potential benefits especially in regard to the following:

- Reduced costs for users
- Increased efficiency of processes
- Easy information updates
- Reduced redundancies
- Reduced risk of errors

However, for certain countries this organisational structure is not yet a reality, and/or may not be appropriate under their institutional structures. As the recommendation states, Statement 2 must accommodate such cases. The technical governance for such cases should be such that:

1. Guidance is provided to ensure the existence of effective linkage between the two components. Additionally, overall governance or management of these two components should be in place

2. Planning and design are necessary for effective management of the interaction and communication between these two components and the interoperability of their datasets to maximize efficiencies and benefits

With technological advancements, particularly in the area of data sharing and the internet, the management of these two components, as two organisational structures, becomes much more achievable.

*Statement 3:*

Statement 3 asserts that modelling will replace traditional cadastral mapping methods, implying that cadastral mapping will be 'dead,' i.e. it will be entirely non-existent by 2014. While modelling has certainly developed and become more prominent as a tool in the cadastral field due to technological advancements, from this research it is evident that cadastral mapping still has a role and will continue to exist in the future. This is the reality of the situation.

Value would be added to Statement 3 if some of the available modelling techniques were incorporated into the statement. Examples of such modelling techniques are:

- A spatially-referenced data model, developed by Saeid Mohsen, based on the legal property object (Mohsen 2008)
- FIG CCDM (Core Cadastral Domain Model) under development since 2002
- STDM (Social Tenure Domain Model) developed as part of the CCDM and in response to increased pro-poor land management and efforts to address poverty reduction and existence of slum dwellings

*Statement 4:*

Statement 4 implies a certain level of technological advancement for all countries. It fails to acknowledge vast differences and levels in this area between particular countries, especially the developed and the developing, and particularly in regard to their cadastral systems. To achieve this statement, there must be recognition of the vastness and complexity of the issue, and acknowledgement and incorporation of the varying social and cultural environments in which these cadastral systems operate. Focus must be applied to the following factors in order to address the gaps in this statement:

1. Country readiness and awareness of the benefits of a digital cadastral system.
2. Capacity - not only in terms of technology, but also human resources and institutional and support structures to manage a technological system; as well as individual capacity with regard to developing skill levels to operate and manage the system.
3. While this statement will be challenging for developing countries, it is certainly applicable to those which are developed. To further enhance this statement for developed

countries, encouragement should be made for developed countries to invest in such developments as SDI and eGovernment to add value to their cadastral systems and society as a whole.

*Statement 5:*

Statement five places the cadastre and land management within the spheres of deregulation and privatization and indicates the closer relationship the public and private sectors will share. While the public sector has traditionally provided most cadastral services, it has been recognised that the private sector can provide these services much more efficiently and flexibly and with a greater customer service focus. The public sector will continue to provide the checking and validation of data and information, which is essential for a secure land market and stable society. Statement 5 is very applicable today, with a high level of relevance particularly in developed societies that have infrastructures to operate in this manner. It aligns with the pressures from society for customer service approaches and efficient and reliable services. Additionally, it follows trends of increased investment from private sectors into the area of spatial information, as evidenced by developments such as Google Earth, Google Maps and Microsoft's Virtual Earth.

However, the level to which this statement can be applied is very contextually based and driven. Country context, such as whether there is a centralized or de-centralised government system in place, the type and form of the operating institutional structure, the capacity of organizations and governments to carry out their respective roles and the readiness of the society as a whole need to be acknowledged in Statement 5 for it to be reflective of and applicable in all countries.

*Statement 6:*

Statement six asserts that through the appropriate management of fees and taxes, Cadastre 2014 will be cost recovering. This is definitely an achievable goal for many countries. However, the achievability of this cost recovery can be enhanced through promotion of the value the cadastre and its applications can add to business processes and decision making. This will ultimately lead to greater investment in cadastres and aid their cost recovery. Technological developments and applications of the cadastre will continue to develop, and it is the investment into these by private business, including those that are non-cadastral based, that will lead to cost recovery. This need should be highlighted in statement six of Cadastre 2014. While many countries will be able to meet the goal of this statement, significant challenges may apply for some to do likewise. These variations in country context should be acknowledged within the statement. Capacity is an important issue again for this statement. Awareness of the benefits and value of cadastres needs to be present within the society. This requires a country development plan and agenda. Guidance and direction for achieving cost recovery should be available for those countries facing such challenges.

The assessment of the Cadastre 2014's six statements illustrated above was then formulated into recommendations in the following section. These recommendations respond to the new needs and challenges of society and put forward suggestions to adapt these statements to best support society and cadastral systems.

## 5. RECOMMENDATIONS

Based on the above analysis and discussion, the following recommendations were developed to contribute to Cadastre 2014. They suggest a way of aligning the six statements with present needs of cadastres and society and do so in light of the developments, issues and challenges that have emerged since Cadastre 2014's publication in 1998.

### *Statement 1:*

Statement 1 of Cadastre 2014 should incorporate the addition of two new elements:

1. The inclusion of responsibilities in addition to rights and restrictions as part of the complete legal situation of land.
2. Recognition that these rights, restrictions and responsibilities must be supported and managed by an appropriate framework or model, in order to successfully achieve sustainable development.

### *Statement 2:*

Statement 2 should be expanded to cover different institutional structures. This can be achieved by:

1. Acknowledging that for certain countries the operations of these two components under one organizational structure does not fit their institutional framework.
2. Providing technical governance guidance for such countries to effectively manage the interaction, communication and data interoperability between the two components.

### *Statement 3:*

Statement 3 should incorporate the following changes:

1. Re-wording to acknowledge the continued existence and viability of cadastral mapping, i.e. it will not be 'dead' despite the continued growth of modelling applications
2. Acknowledgement of specific modelling techniques available today

### *Statement 4:*

For Statement 4 to be of value to all countries, the following three amendments are required:

1. Re-wording to reflect that for many countries, what is outlined in the statement is not a current reality for them and not achievable by 2014.
2. Country context, awareness, readiness of society and strategic planning must be acknowledged as essential factors for achieving this statement.

3. Adding of value to the statement for developed countries by encouraging developments such as SDI and eGovernment which accompany fully digitized cadastres, in order to maximize potential benefits.

*Statement 5:*

Statement 5 requires the addition of a new element:

1. Acknowledgement that country context and institutional arrangement affect the degree to which Cadastre 2014 can be highly privatized

*Statement 6:*

This statement requires the addition of several new elements:

1. Acknowledgement of the potential new developments such as SDI (Spatial Data Infrastructures), SEG (Spatially Enabled Government), Google and others can offer in order for Cadastre 2014 to be cost recovering.

2. Acknowledgement of the country context in which the statement is applied so as to allow provision in the form of guidance and direction to achieve cost recovery.

## **6. CONCLUSIONS AND FUTURE APPLICATIONS**

The strategic document Cadastre 2014 is used globally, in both developed and developing countries and since 1998, has become a tool that many are using to manage, design or improve their cadastral systems. It provides a framework for countries to work towards the vision developed for future cadastres in the document Cadastre 2014. All economies depend on land and land related activities. Land related activities and land management rely on effective land administration systems. Therefore, it is crucial that effective land administration and cadastral systems are in place to ensure this occurs. Cadastre 2014 is vital to this effectiveness.

This paper aimed to establish whether Cadastre 2014 is fully relevant in terms of the developments, issues and challenges of today and the future. Recommendations were developed which outlined necessary changes. Such adaptations and additions will ultimately benefit any country or society that uses Cadastre 2014. By ensuring that Cadastre 2014 is currently relevant and that it aligns with present societal needs, the potential benefits of the document can be maximised. An up to date and relevant Cadastre 2014 means that cadastral objectives, such as security of tenure, economic development and efficient land markets, can be achieved most effectively. This research assessed the six strategic statements of Cadastre 2014 and developed recommendations so that this strategic document provides maximum benefit to the user countries, their economies and hence the societies that they support.

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## BIOGRAPHICAL NOTES

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