

# Securing Land Rights for the World

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**Key words:** world, land administration, cadastre, land rights, leadership, Land tools, methods, capacity, Fit For Purpose, visual boundaries, automatic feature extraction, users, citizens.

## SUMMARY

Over the last few years, the need for good land administration has been recognised world wide. Estimations show that about 70% of the people-land relationships are not documented.

World wide many initiatives are taken in the last decade(s), that create the momentum for fit for purpose land administration. Multilateral organisations, national governments, private companies and community based initiatives emerge.

The present state of play is encouraging: UN GGIM starts formulating global needs, UN FAO has developed the Voluntary Guidelines. The World Bank started monitoring good practices in the land sector with a land Governance Assessment Framework (LGAF). Together with FIG, they also promote Fit for Purpose Land Administration approaches. National governments take action. Examples from Tanzania, Mozambique, the Americas and the Netherlands are given.

Securing land rights for the world is a challenging but feasible objective. Being active in projects all over the world and participating in global discussions on this issue leads us to this belief. Methods and land tools do exist and develop rapidly, supported by excellent private companies, modern technology and new information and communication possibilities. Land administration is a process of continuous upgrading to higher levels of detail, quality and usability. By adding capacity building to the game, implementation and true action can be generated.

Satellite imagery and new sensor techniques allow for fast basic inventory of general boundaries, using feature extracting technologies. This is where we need the private sector. The possibility of crowd sourced data, open source software and national open data policies are an opportunity, not a threat: community involvement can be organised now.

Awareness, leadership and financing are crucial. Coordination and organisation ask for a professional approach. We want to show you what is already there and what could be done. We think that securing land rights for the world within one generation is feasible and we challenge you to share our ambition and become active in making it happen.

# Securing Land Rights for the World

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## 1. INTRODUCTION

Over the last few years, the need for good land administration has been recognised world wide. Well structured land administration approaches and insights have been published by many authors (*e.g.* Augustinus, 2010, 2014; Barry, 2005; Bogaerts and Zevenbergen, 2001; Byamugisha, 2013; Enemark 2012; Enemark *et al.*, 2014; Lemmen, 2010, 2012; Van der Molen, 2015; Williamson, 2010; UN Habitat, 2003, 2004, 2012; UN ECE, 1996, Van Oosterom *et al.*, 2006; Zevenbergen, 2002). Land Administration Systems form a crucial part of Spatial Data Infrastructures (SDIs) that provide information services to society for sustainable development (De Zeeuw, 2012; De Zeeuw and Lemmen, 2012).

Estimations show that about 70% of the people-land relationships are not documented. This, while population grows and the pressure on land and natural resources increases. Often, the poor suffer most through dispossession, disputes and distrust. This results in many land conflicts and competing claims on land. Appropriate administration of land is the start for conflict resolution and sustainable land use planning anywhere in the world. Appropriate administration of land normally marks the start of land related conflict resolution and subsequent sustainable land use planning and natural resource management. This is crucial for people's fundamental needs – including food security, housing and gender equality – and it is a human right (Lemmen *et al.*, 2014).

The introduction of the Fit for Purpose Land Administration (Enemark *et al.*, 2014) can be considered a following step in achieving faster and more appropriate land administration systems for the world. This would not have been possible if appropriate standards and knowledge models like the Land Administration Domain Model (ISO, 2012; Lemmen, 2012) and Social Tenure Domain Model (Augustinus 2006, 2010; Lemmen, 2010) were developed. Also tooling as developed by the Global Land Tool Network are inevitable for this work. See for an overview the GLTNs website: [www.glttn.net](http://www.glttn.net) as well as a sound scientific basis (see for example Landac: [www.landgovernance.org](http://www.landgovernance.org), Landesa: [www.Landes.org](http://www.Landes.org)).

In this paper we will try to identify the present state of play at different levels worldwide. Without being complete, reference is made to initiatives that we believe contribute to the ambition to obtain land rights for the world within an acceptable time frame.

By putting our professional world in a 'cooperative mode' this ambition can be translated into actions. As an example experiences of Kadaster International are given.

Finally, this paper tries to identify new approaches and techniques and the next steps that are needed. Relevant aspects for that are the used paradigms and international cooperation of all

involved stakeholders. The anticipation to the trends of tomorrow and the acceptance of new roles for governmental bodies and the private sector are considered to be part of this. The challenge can be defined with one question: 'Can we register the people – land relations on this world, within one generation?'

## 2. OVERVIEW

Recognising the need for global registration of land rights different organisations and professionals start acting and developing initiatives. No longer, land administration is the domain of one specific professional group, or just a national governmental issue. Leadership is evolving at different levels:

- different professional worlds converge,
- global initiatives are started,
- national initiatives emerge,
- an important role for private sector and innovation becomes more evident, and:
- community based initiatives pop up.

### 2.1. Different professional worlds converge

Boosting land administration is becoming also a concern outside the professional world of surveyors and land administration professionals. This development deserves support, while solutions can not be delivered any more by one professional group solely. The developments at the Global Geospatial Information Management initiative of the United Nations (UN-GGIM) have become a good example of this. The world of statistics has encountered the geospatial world. And also professionals from the Remote Sensing world and the Land Administration world are joining in now. Four different professional groups, four different languages, converge for the benefit of all. See Figure 1.



*Figure 1. Integration of worlds. Statistics, mapping, Remote Sensing and Land Administration professionals need to share their knowledge, language and ambitions.*

### 2.2. Global initiatives

Some relevant global initiatives are recognised as being the basis for achieving the ambition to secure land rights for the world. The 'Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests in the Context of National Food Security' – VGGT

(FAO, 2012) are the first comprehensive global instrument on governance of tenure and its administration. They are initiated by FAO, negotiated and endorsed by the Committee on World Food Security and promoted by the UN General Assembly, the G8, the G20 and Rio+20. Based on an inclusive consultation process, the VGGT's principles and internationally accepted standards are practices that governments and other actors can refer to when defining policies, making laws and administering tenure rights. They allow all stakeholder groups to judge whether their proposed actions and the actions of others constitute acceptable practices (Munro-Faure and Jansen, 2014).

Land tools are being developed by the Global Land Tools Network (GLTN). In an interview in GIM International Clarissa Augustinus (UN-Habitat/GLTN) explains that a land tool is a practical way to solve a problem in land administration and management. It is a way to put principles, policies and legislation into effect. The term covers a wide range of methods: from a simple checklist to use when conducting a survey, a set of software and accompanying protocols, or a broad set of guidelines and approaches. The emphasis is on practicality. To reach the overall goal of poverty alleviation through land reform, improved land management and security of tenure, the GLTN Partners are in the process of developing 18 key land tools. Some of these tools are at an advanced stage of development and are being tested in selected countries. Examples of those tools are the Social Tenure Domain Model and Gender Evaluation Criteria (Lemmen, 2013).

The Land Governance Assessment Framework (LGAF) can be used for identifying and monitoring sound practice in the land sector. The LGAF is motivated by the fact that land policy analyses and interventions are often fragmented. They are taking a view that focuses only on specific aspects (such as land administration or surveying). And thus may not only miss important synergies to other parts of the system but, in the end also prove to be ineffective and unsustainable. LGAF is structured in five key thematic areas: (i) how land rights are defined and enforced; (ii) how land is managed, used and taxed; (iii) how public land is managed; (iv) how information on rights are maintained and accessed; and (v) how land disputes are managed and resolved (Burns, 2014).

The FIG Young Surveyors Network (FIG-YSN) must be the agents of change. Securing land and property rights for all by our generation is imperative to bring a positive change for communities around the world. FIG-YSN is aware of its role. They embrace new concepts and innovative approaches that can secure land rights for all. The meetings provide a forum for young surveyors and experts to connect and consider, informing and discussing on the latest developments and approaches (Unger and Dijkstra, 2014).

### **2.3. National governments start acting**

Several practical and present-day cases are presented in this section. These cases are illustrations of the international requests that are presented to Kadaster and demonstrate the need for national initiatives. Tanzania demonstrates the importance for the identification of needs; Mozambique typifies the need for capacity development; the 'Inter-American Dialogue on Cadastre and Property Registry' dialogue illustrates the importance of advice and

advocacy. But also the start of a multi-stakeholder dialogue in the Netherlands shows the importance of global land administration to developed economies like the Netherlands.

The Government of Tanzania (Ministry of Lands) has formulated a well thought out national policy to move from a traditional land administration system to a modern approach, using innovative methods and techniques. At the Workshop ‘Modernising Land Agencies Budgetary Approach’ (October 2014, Bangkok, Thailand; organised by FIG, GLTN, Kadaster) 21 participants from 15 countries discussed the costing and Financing of Land Administration Services in Developing Countries. One of the participants, advisor of the Prime Minister of Tanzania, urgently asked for assistance to review their new policy and align it with the new insights such as the “fit for purpose” approach, and new models for land administration as LADM and STDM.

Mozambique has experienced accelerated rates of growth over the past decade. Points of concern regarding land administration are the high level of interest in acquiring large tracts of land for investment and the estimation that only 3-5% of landholdings are formally registered. The National Directorate of Land and Forestry (DNTF) of the Ministry of Agriculture has the responsibility for land administration and cadastre. In September 2014, a delegation of seven representatives of the National Directorate of Lands and Forests of Mozambique visited The Netherlands to learn and discuss best practices and lessons learned of well-functioning land administration organisations, not only in the Netherlands, but especially from our experiences in the African Region. The study visit included visits and intense discussions with partner and stakeholder organizations in the Netherlands and resulted in excellent results. However, due to the lack of technical capacity and financial means, results in cadastral services operating below their potential (DFID, 2013).

An interesting initiative has been launched by the Organisation of American States (OAS) and the World Bank. This is on putting together a hemispheric initiative to work on cadastre and property registry in the Americas. A first Inter-American Dialogue on Cadastre and Property Registry dialogue session was held in Washington, December 2014. In the Initiative, various high level governmental representatives participated (e.g. from Colombia, Guatemala, Nicaragua and Uruguay), as well as predominantly USA and Spanish companies and organisations participated and shared their experiences.

The Multi Stakeholder Dialogue on Land Governance (MSD-LG) is an imitative of the Dutch Ministry of Foreign Affairs. Participants to the dialogue endorse to invest time and energy in making an effective contribution from the Netherlands to improve land governance world wide. The stakeholders explicitly promote practical implementation and monitoring of improvement measures by Dutch business, government, research institutions and NGOs in a manner that is in line with the principles adopted in the VGGT. The objective of this multi-annual MSD-LG process is to work on the following objectives:

- obtain an objective perception and understanding about the actual nature, extent and severity of land governance issues and to understand the impact and coherence in real live situations at different levels in different contexts,
- collect examples of successful implementation and application of recommendations that

- improve demonstrably land governance in line with the VGGT principles,
- give examples of effective collaboration between Dutch stakeholders within complex systems that can be implied in other situations as well,
  - give speedy, actionable and timely recommendations based on these examples for scaling up and application in Dutch companies, NGOs, research institutions and government,
  - give examples of interventions that promote effective cooperation between different stakeholders from the Netherlands and partners abroad, contributing effectively and structurally to the reduction of the risk of irresponsible investments,
  - design, test, evaluate and implement one or more early warning systems helping investors and other stakeholders to reduce risk of abuses and conflicts, and:
  - organise regular involvement in international processes, roundtables, coalitions, conferences etc., in which the aspirations and recommendations of the Netherlands are discussed and dealt with.

## **2.4. Private sector involvement**

Without participation of the private sector it will not be possible to achieve the goal of property rights for the world. Innovative technology, approaches and business models have to be developed in cooperation with the private sector. The demand should be well defined by the users and governmental organisations representing citizens. Existing technology should be applied in a cost effective way, but more important, new innovations should be made to make it really happen. The understanding that Public Private Partnerships (PPP) is needed will be crucial in achieving land rights for the world.

Good public private partnership will help in meeting the objectives. However, essential roles for both private and public organisations will continue to exist – likewise, this goes for scientific organisations and NGOs. The private sector is developing user-centric approaches, while governments will focus on citizens, being citizen-centric. No confusion should exist. Users are people who can potentially pay for a service or product of a company. Citizens are people that rely on their government, representing them. These are two different things. Both need attention, but they shouldn't be mixed. It is also the reason that both private and public bodies will be needed in the future.

## **2.5. Community based initiatives**

When citizens or customers do not have the feeling to be well represented community based initiatives appear. Today these are not longer only Non-Governmental Organisations (NGOs), but also web based communities (using social media for example) or crowd sourced initiatives.

Many NGOs have found that land rights are an essential issue for the community they represent. Dutch NGOs like BothEnds ([www.bothends.org](http://www.bothends.org)) and Oxfam Novib ([www.oxfamnovib.nl](http://www.oxfamnovib.nl)) are campaigning on the issue of land rights and investing in projects to help resolve land conflicts world wide.

The Land Matrix ([www.landmatrix.org](http://www.landmatrix.org)) is a global and independent land monitoring initiative that promotes transparency and accountability in decisions over land and investment. Using the internet, information on land deals is published online in a public database. The goal is to facilitate an open development community of citizens, researchers, policy-makers and technology specialists to promote transparency and accountability in decisions over land and investment.

The global initiative MapMyRights is one of the new innovative solutions that are required to improve security of tenure in the world. It will democratise the capture of evidence of land rights through fit-for-purpose and crowd sourcing approaches. It is supported by the Social Tenure and Land Administration Domain Models (STDM/LADM). This initiative reflects a move from legal to trust (societal evidence) based systems. The objective of MapMyRights is to provide tools and data to non-government and government actors. Citizens and communities are supported in defining and recording their evidence of land and resource rights, primarily using mobile technologies. Initially, a network of trusted intermediaries and para-surveyors, trained by NGOs, will mobilise these efforts within communities. Eventually, true crowd sourcing will be introduced. The captured crowd sourced data will be posted and maintained on MapMyRights global repository, that will be open and transparent. Another value add of MapMyRights data is its expected support to other development interventions such as microfinance, micro-insurance, informal settlement upgrading, policy advocacy, disaster recovery and increased government transparency. This informal starting point on the continuum of rights can be upgraded towards formality and legal status. MapMyRights will work with governments, wherever possible, to establish a roadmap for formal recognition of the land rights (source: Robin McLaren, Know Edge).

Does this mean that there is no need for certifying organisations or authoritative data any longer? In our opinion not. Governmental organisations will always have a role to represent citizens in society. NGOs and community based initiatives cannot take over that role. Theoretically, with a maximum level good governance, the need for community based initiatives would be limited in the domain of land registration.

## **2.6. What is still missing in leadership**

In the overview above, leadership is still missing. It concerns amongst others:

- Knowledge. Decision makers need to be aware of land administration as a tool for implementing land policies. Land administration can bring tenure security and support in land development. Also a well organised and transparent taxation system;
- Policy tools for convincing world leaders. The VGGTs provide a solid basis (FAO, 2012);
- Guidance. Promoting a vision, defining a strategy and setting the goals;
- Organisation. This is about co-operation between countries but also on developing infrastructure for land administration with UN organisations ad GGIM, FAO and Habitat;
- Networks for sharing experience. Professional platforms and communities are relevant.

The sector has the potentials to provide this leadership, which is essential to achieve the shared objectives to register land rights for the world within one generation.

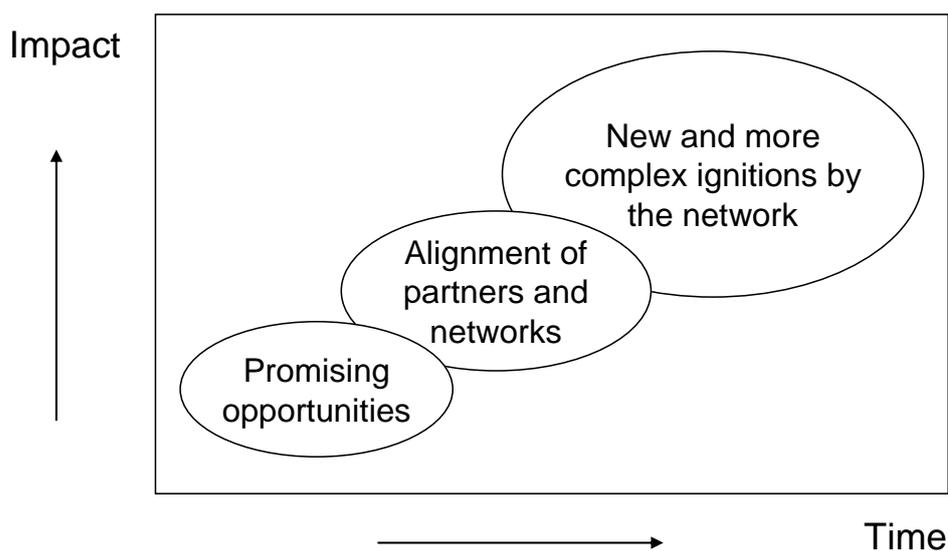
### 3. THE AMBITION

Securing land rights for the world within one generation is a challenging but feasible objective, we think. Being active in projects all over the world and participating in global discussions on this issue leads us to this belief. Methods and land tools do exist and develop rapidly, supported by excellent private companies, modern technology and new information and communication possibilities. Land administration is a process of continuous upgrading to higher levels of detail, quality and usability. We estimate that with 50 – 100 billion US dollar and a ‘one generation time frame’ secured land rights for the world is attainable, based on evidence from the field: the undocumented people to land relationships are estimated to concern a number of 4.5 billion. Documentation in average is possible for 10 – 20 USD.

#### 3.1. Cadastre’s experience

Providing international advisory services at a cost recovery basis, Kadaster International is active in more than 20 countries on a yearly basis. A vast network of expertise is available, of both Dutch and international experts from our national, bi-lateral and multi-lateral contacts.

When we join forces, we can break down barriers in land administration. This will result in practical collaboration within the network. The impact pathway can increment over time, as visualised in figure 2.



*Figure 2. Impact pathway in Land Administration.*

We advocate a multi level approach, allowing for activities at the level of municipalities (in Latin America, for instance, land administration is often carried out at the level of municipalities), states, countries, or even supranational activities. This approach also allows

for requests from other organisations, such as NGOs, professional organisations, or businesses.

Different parties in the domain of Land Administration have developed, and continue to develop, methods and tools for a variety of social tenure systems. For instance: the IS Academy on Land Governance, LANDac, develops methods; GLTN, the Global Land Tools Network develops tools; and numerous private companies develop a variety of modern technology and innovative information and communication possibilities. Also capacity building programmes are existing to develop knowledge base and skills such as ITC-Enschede and the International Land Coalition (ILC).

But what is missing at the cross road of tools, methods and capacity is the generation of action; the spark that ignites implementation. Figure 3 reflects how present tools, capacity and methods should be aligned more in order to create more true implementation of land administration systems.

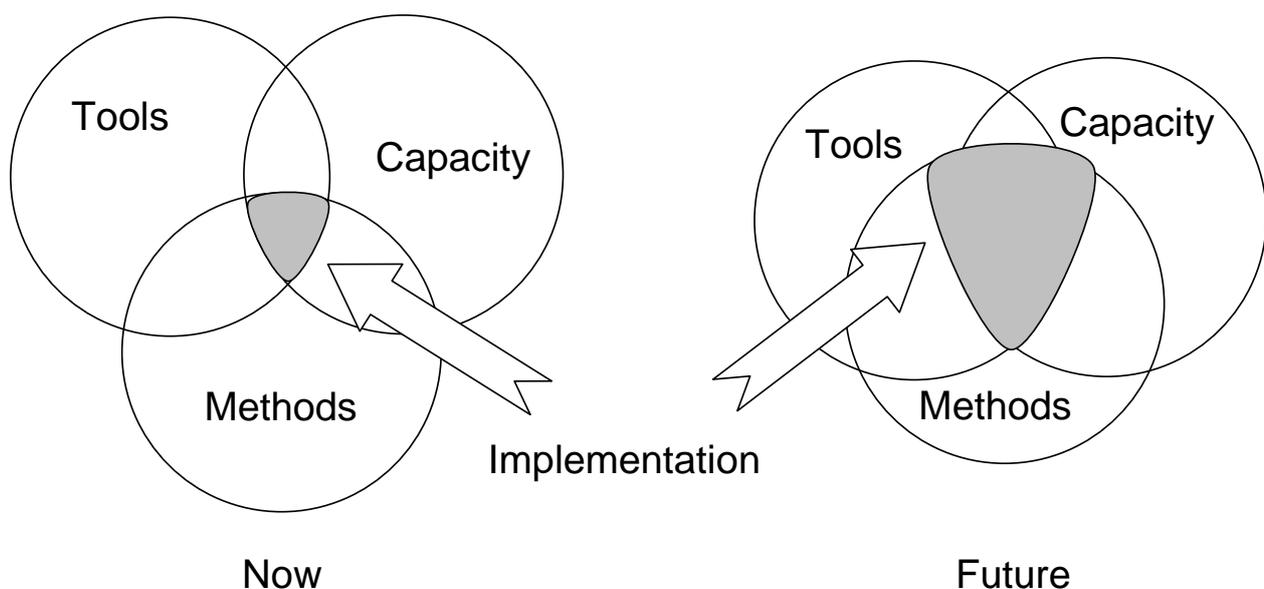


Figure 3. A focus on implementation by better alignment of tools, capacity and methods.

## 4. NEW TECHNIQUES AND APPROACHES

### 4.1. Fit for Purpose Land Administration

Securing land rights in the world is a challenging but feasible objective. “Fit for Purpose” Land Administration is an approach developed by the World Bank and FIG and means that land administration should be designed to meet the needs of people and the environment and

identify the way land is occupied and used within a relatively short time and at a relatively low costs (Enemark *et al.*, 2014).

For instance: simple indication of properties and boundaries is often adequate to meet basic land administration needs as opposed to developing and enforcing rigid regulations and demanding spatial accuracy of objects and boundaries which are time consuming and not affordable and thus not Fit For Purpose.

Therefore, the approach used for building land administration systems in less developed countries should be flexible and focused on citizens' needs, such as providing security of tenure and control of land use, rather than focusing on top-end technical solutions and high accuracy surveys.

A country's legal and institutional framework must be revised to apply the elements of the fit-for-purpose approach. This means that the fit-for-purpose approach must be enshrined in law, it must still be implemented within a robust land governance framework, and the information must be made accessible to all users.

The recent technological developments are fast and in our favour. Satellite imagery and new sensor techniques allow for fast basic inventory of general boundaries, using feature extracting technologies. The possibility of crowd sourced data, open source software and national open data policies are an opportunity for fast, affordable and participatory land administration.

This flexibility can be visualised in the 'fit for purpose equaliser', see Figure 4 (see also Saers *et al.*, 2015):

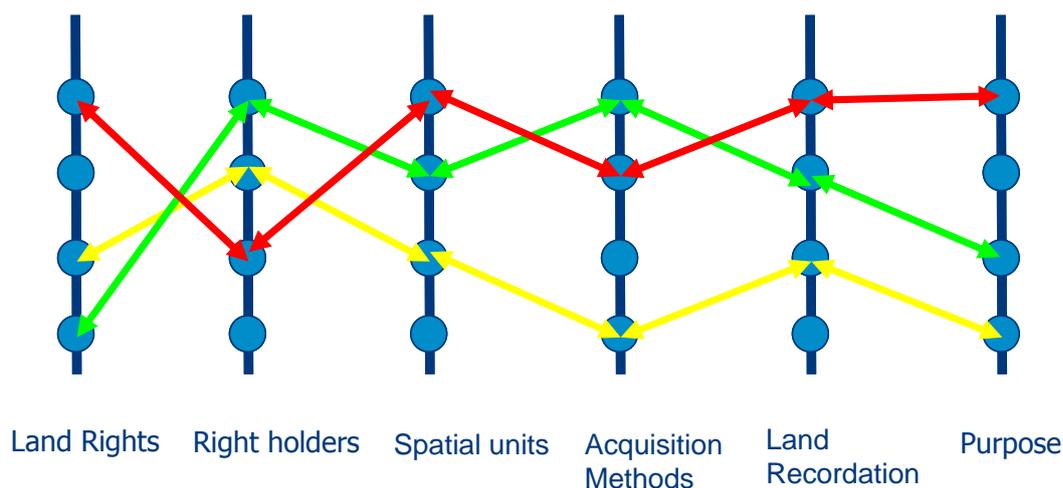


Figure 4. Fit for purpose equalizer.

The term ‘continuum’ applies to land rights, but also to other key dimensions relevant in fit-for-purpose land administration (Enemark *et al.*, 2014).

Great variations in methods and results are possible, depending on the particular implementation context – there is a ‘continuum in continuums’ with a continuum of parties, of spatial units, of data acquisition methods/technologies (with a related continuum of geometric accuracy), of recordation/contents/quality, of information management/organisation and a continuum in purposes of land administration, see figure 5 with some examples.

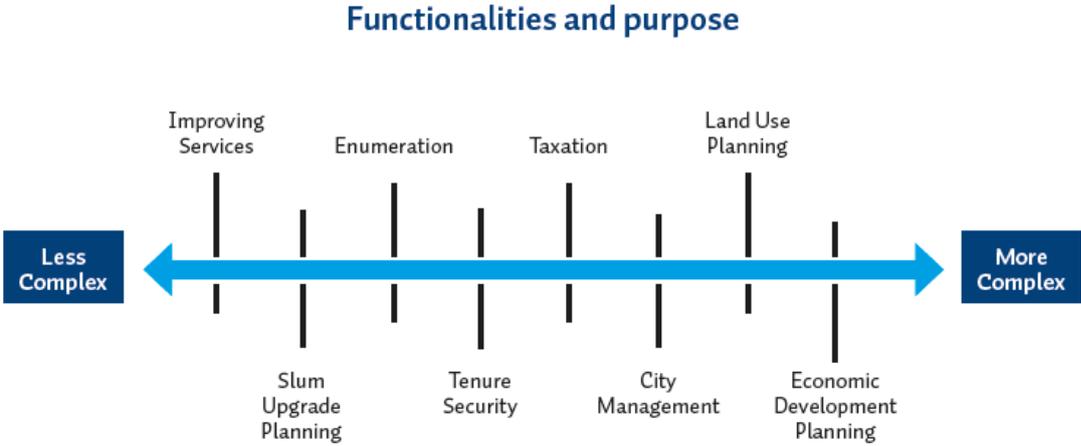


Figure 5. Purpose of land administration

The equaliser concept (Lemmen *et al.*, 2015) can be used to set a goal for strengthening land administration services, and then each of the nodes on the slider is a range that can be achieved depending on a factor, such as cost, or time, or quality, or all three.

Different sets of equalisers may also be used to address different goals in a jurisdiction, for example a land administration policy that is striving to improve social stability through tenure security, could involve large rural areas and low cost alternatives. This may be assessed differently on an equaliser to a land administration policy that aims to improve the economic stability by increasing land market development, thus focusing on urban market development and foreign direct investment requiring higher accuracy cadastral surveying and a computerised registration system.

The equaliser is a useful tool as can be adapted to highlight the different options to suit different needs, and is not only presenting expensive, unobtainable options often seen as ‘best practice’. This concept can be carefully arranged to also show the assessment based on quality, benefit or value trade-offs in the instrument or service it delivers.

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For example:

- An administration for customary tenure (in order to protect against ‘external threats’ as land grabbing): group person type, customary right type, spatial unit type with fuzzy boundaries
- An point cadastre in a slum area in order to improve services: natural person type, informal right type, point spatial unit type
- A conventional parcel based land administration in a residential area (taxation, tenure security): (non-) natural person type, ownership right type, parcels type
- 3D Cadastre in business area: (non-) natural person type, ownership holding, volume spatial unit type
- State lands: government person type, state land right type, set of lines spatial unit type

Requirements vary on the approach; but in all cases standards (LADM), software and capacity is needed. Capacity is required to guide the participatory approaches and to process and handle the data. Quality, cost and time criteria have to be brought in balance in the most optimal way. This requires professional support.

#### **4.2. The need for automatic feature extraction**

There are alternative data acquisition approaches that can be adopted within the context of purpose, budgets and availability of human resources. This ranges from accurate measurements supported by Continuously Operating Reference Stations, through total stations, handheld GPS, plane table, tape, chain and even rope. Unmanned Aerial Vehicles (UAVs) are emerging as a promising alternative in cases where only high accurate data are accepted. Imagery data sources such as GoogleMaps or Microsoft VirtualEarth can be used, and the inclusion of high-resolution data at those sites may be agreed. Administrative data collection can be paper based or digital. Quality labels are crucial for later improvements.

Monumentation in the field should be avoided – unless people organise this themselves. Placing beacons is expensive, time consuming, and not efficient for achieving land administration with complete coverage. High resolution imagery is normally sufficient resolution to resolve conflicts about landholdings. The approach is not new and has been successfully used in several countries during the last few decades, for example Cambodia, Ethiopia, Kenya and Rwanda (Enemark *et al.*, 2014). The new aspect is that it is now scalable and can be applied in a massive way including management of big volumes of data. In the near future applications using mobile phones can be expected.

Satellite imagery and new sensor techniques allow for fast basic inventory of visual (‘general’) boundaries, using feature extracting technologies. This is where we need the private sector. The possibility of crowd sourced data, open source software and national open

data policies are an opportunity, not a threat. Automatic feature extraction from ortho-imagery to support topographic mapping is now mature and can be used to assist the spatial data collection for land administration purposes. See Figure 6 for a visualisation of the process.

This assumes a cloud free satellite imagery composition. Images from fieldwork can be scanned and then compared with the result of automatic feature extraction from the imagery in a GIS environment. First a pass generalisation can be completed to obtain a set of vectors, which reasonably represents the visual boundary. Some interpretation and editing will be required as there may be topographic features inside a spatial unit of a right-holder. In the case of invisible boundaries on the imagery, some extra field observations may be needed.

As a next step, the vectors obtained as a result of feature extraction can be re-used in the spatial unit layer for land administration. Then the polygons can be closed and corresponding spatial units will then be automatically referenced to their final identifier. Administrative data collected by paper can be linked based on the preliminary identifier.

Proper geo-referencing and automatic feature extraction can be done later through post processing, once resources and capacity/expertise is available. From an information management perspective, this requires versioning and management of historical data. The scanned imagery from the field has to be archived as source data. In case automatic feature extraction is not available then digitisation on top of the scanned images with boundaries drawn in the field can be executed.

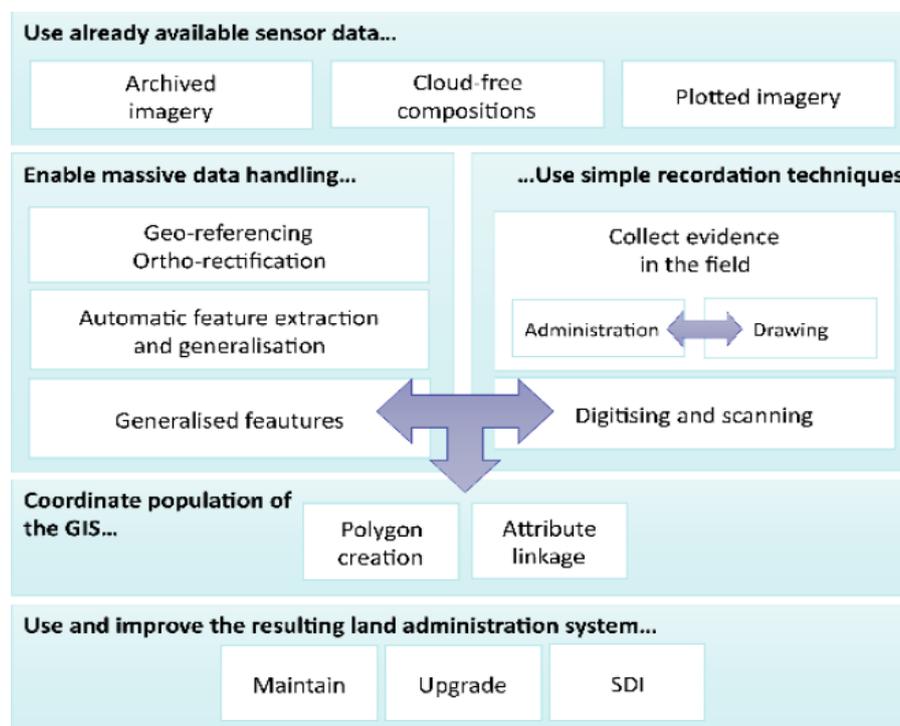


Figure 6. Automatic Feature Extraction.

## 5. NEXT STEPS

In our present solutions we are thinking in the paradigm of making choices; Good and fast land administration won't be cheap, fast and cheap land administration won't be good and cheap and good land administration won't be fast. It is the challenge to abandon this mindset and to develop a new paradigm where cheap, good and fast go together.

The information technology as such, will continue to develop with respect to technology, size and protocols. It goes without saying that technology will be a driving force for making good, fast and cheap land administration systems happen. The development of software, both commercial and open source, is in full progress. Social media will fill in new communication possibilities and (consumer) hardware will keep on boosting the possibilities.

Capacity building will remain a concern for the near future. Are we able to develop a professional arena of sufficient size, in which people are willing to set the user demands central and change the paradigm to thinking in good AND fast AND cheap? See Figure 7.

Good, fast and cheap land administration must be achieved for the next generation. This can be done by mobilizing leadership and by stimulating international cooperation, innovation of methods and the adaptation of modern technologies. These are essential parts of the cadastral actions needed and can no longer be achieved by one professional sector alone.

If well maintained, land administration will be an essential part of national spatial data infrastructures. Awareness, leadership and financing are crucial. Coordination and organisation ask for a professional approach.



*Figure 7. The new paradigm: Good cheap AND fast.*

## 6. CONCLUSIONS

The land issue is recognised in the global agenda. We are not entering a new era, we are already in it. Initiatives from international organisations, national governments, the private sector and community based initiatives emerge world wide.

Leadership is needed at different levels (global, national, private sector and communities).

The ambition is to register land rights for the world within one generation. This requires:

- cooperation between different professional worlds
- action at different levels
- new approaches and technologies

Based on the advisory work of Kadaster International it is believed that this ambition is feasible. The impact pathway can be incremental and the future implementations can grow by better coordination between tools, methods and capacity.

Fit For Purpose Land Administration offers the opportunity to build Land Administration Systems that meets user demands and evolve over time, with the societal needs. Automatic feature extraction is one of the challenges we face.

The way forward ask for a paradigm shift where the devils dilemma is changed from OR to AND if it comes to good, cheap and fast. Also we have to keep on anticipating to the trends of tomorrow and new roles for involved parties should be accepted.

Taking this in account, we think that the ambition to bring land administration in place worldwide in this generation, is feasible.

## ACKNOWLEDGEMENT

This paper reflects much of the work carried out last period by the team of Kadaster International. Contributions of Paul Saers, Suzanne Valkman, Mathilde Molendijk, Paula Dijkstra and Co Meijer are integrated in this paper.

Also we would like to recognise the valuable opinions, debate and informal contributions that have been the basis for this paper from people within our professional network at Kadaster, Dutch partners and international organisations worldwide. This recognition can not be captured by literature references only. Naming of people would be too long and always incomplete.

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