Towards effective land administration: what is striking about the digital transformation for Land Administration in Developing Context

Christelle VAN DEN BERG, Netherlands, Eva-Maria UNGER, Austria, Rohan BENNETT, Australia and Christiaan LEMMEN, Netherlands

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SUMMARY

The report "Land Information and Transaction Systems – State of Practise and Decision Tools for Future Investments" (prepared by Land Equity International for the Millennium Challenge Corporation, MCC/LEI) gives a very clear overview of the ongoing debate in developing Land Information Systems in developing countries with the financing and maintenance aspects.

The present paper shares experiences in the fields of ICT and land administration by Kadaster International - as a case to draw attention to and learn from for future applications, specifically the need for recognize and bridge the gap between the domains of land administration (including surveying, mapping, and land law) and ICT, in terms capacity and system continuity. This paper serves to initiate a discussion to contribute to solutions from within the profession. The MCC/LEI report was the trigger and strong inspiration for this.

We are trying to start a discussion. In many countries, ICT and land administration have a continuity problem. When the donor leaves, in many cases the development of ICT stagnates. With the commitment of all those involved, the question is if this can be done differently? This question is central to this paper. And: how can we secure long-term investments in ICT in land administration in environments where there is strong political will and political support to modernise the land administration?

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1. INTRODUCION

The report "Land Information and Transaction Systems – State of Practise and Decision Tools for Future Investments" (MCC/LEI, 2020) gives a very clear overview of the ongoing debate in developing Land Information Systems in developing countries with the financing and maintenance aspects.

Figure 1. The MCC/LEI Report 'Land Administration Information and Transaction Systems'- inspiration for this paper

The report was prepared by Land Equity International (LEI) for the Millennium Challenge Corporation (MCC). The information for the report was gathered from a wide-ranging desk-survey of available information and materials and a program of interviews with leading actors in the land sector.

The present paper shares experiences in the field of ICT and land administration by Kadaster International - as a case to draw attention to and learn from for future applications. The paper aims to initiate a discussion on ICT solutions/approaches from within the profession. The MCC/LEI report was the trigger and inspiration for this.

Experiences within Kadaster International have been gained while working with software providers (GIS and DBMS), local application developers and with sister government

organisations, the National Mapping and Cadastral Organisations (NMCA's) that, like Kadaster, are responsible for land registration and cadastral mapping in the respective countries.

In many countries, ICT and land administration have a continuity problem. When the donor leaves, in many cases the development of ICT stagnates. With the commitment of all those involved, the question is if this can be done differently? How can we secure long-term investments in ICT in land administration in environments where there is strong political will and political support to modernise the land administration? What can organisations do to take up their role? These questions are central to this paper.

This paper presents a brief overview of the MCC/LEI report. Even though the report was written for donors, organisations itself can draw value from this document. We share our most important lessons learned in section 3. Above all we discuss what steps to take further in sections 4 and 5. Section 6 gives some concluding remarks.

2. BACKGROUND ON THE MCC/LEI REPORT

The MCC/LEI (2020) report sets out the current state of play of investing in Information and Communication Technology (ICT) for Land Information Systems. It identifies lead thinking around how and when to address the opportunities and challenges of designing, implementing, and sustaining the performance of Land Information Systems (LIS). This requires long term thinking. A total cost of ownership analysis is needed for at least the first 10 years of operation of a Land Information System. Large international ICT contracts are often difficult to execute and often experience major delays. Investors and donor partners start to be hesitant in huge ICT investments because of continuity and sustainability problems. In-house ICT system development and incremental approaches have proven to be easier to implement.

Support for land sector programs should look at the land administration system as a whole, not only to record initial registration. The report states that dimensions such as 'political economy, incentives and the needs of local government and local financial institutions, and the development and linkage of decentralized systems to regional/national systems' can be considered in a more integrated manner, covered under the topic of land market services. This needs a more coordinated and integrated approach between development partners. Countries which lack a comprehensive policy on ICT will likely struggle to implement and maintain LIS reforms and investments.

The LEI report furthermore explains that previous LIS investments may no longer be used because of poor infrastructure, lacking IT competency, system complexity, harsh office environments, insufficient operating budgets, poor management practices, unmotivated staff, lack of client focus, dual processing of land administration services, no commitment or funding for completing the digitization of key "active" land records and declining quality of digital records.

It is highly desirable that local expert capacity is available. However, this approach does not preclude there being international partners and private companies involved, in a facilitating role to provide specific LIS expertise including upskilling local software developers. Nevertheless, the land administration agency staff should be involved and actively participate to understand the LIS and to be able to exercise their governing role towards private companies.

Two key strategic questions are: i) What service delivery modes do governments use to provide land administration services?; and ii) How is the ongoing provision of land administration services going to be financed? Users of land administration services are willing to pay for efficient, reliable, affordable, and timely land administration services. Land agencies can generate significant income from user fees and charges. Services should reflect users requirements. Revenue will vary depending on the completeness of the land administration, the efficiency and accessibility of services, the level of public perception and awareness of the benefits of registering property transactions, the affordability of the fees and charged services; and the level of land market activity and demand for such services. If these factors are not in place 'there will be limited participation in the formal land administration system and thus high levels of informality in land markets'.

Furthermore the LEI report states that (based on international experience) property owners seem prepared to accept transaction fees and charges up to about 5% of the property value. High fees and charges can have an increased risk of i) informality as people opt out of the formal system, ii) lack of reliable information on property values due to systemic under-declaration and, iii) corruption with officials in return for accepting low declared property values.

3. EXPERIENCE OF KADASTER INTERNATIONAL

Kadaster International fully endorses the MCC/LEI report and recognises the issues, concerns, and opportunities being described in our daily work worldwide.

We believe that we can have further enhance the discussion on ICT and land administration in developing countries. We have been involved in ICT development for land administration in several countries. Our experiences suggest that implementations of IT systems for the land sector are always complex, if not complicated, and never easy. Things never go as expected, there is always something unexpected. Optimism in making feasible time and budget plans often turns into pessimism at a certain point. Above all, we have learned not to create exaggerated expectations. Good, transparent land administration relies on ICT. ICT can only be implemented if the decision-makers and politicians are willing to be co-responsible and accountable. This is in line with the findings of the MCC/LEI report.

What we often see when ICT projects are completed by donors (because the agreed deadline expires) is that people are busy finding budgets to sustain they system without thinking about what will be needed in the future. We are often trying to point this out to donors. But long-term cooperation is often difficult for donors to set up, for example, because they cannot make agreements that go beyond the government's term of office, which is typically a 3-5 years mandate. This is the reason why it is so important to think about a business case, and sustainable business model, in advance. We try to raise these kind of issues well in advance with our project partners. But often they are confident to be able to use ICT expertise for a few years without considering a long term strategy. Sometimes, experience has taught project partners that there may be another donor in the near future.

Hence, the challenge 'how to create a sustained effort to establish and maintain this ICT infrastructure and capacity long term' is predominant.

It is the experience of Kadaster International that it is relevant to think about a business model before implementing a Land IT system: What does the implementation and maintenance of such a system cost and what revenues can be generated? Here, two aspects are important to consider:

- Are the data in the Land IT system (allowed to be) disseminated and being paid by the user? If yes, do the revenues (partly) flow back to the NMCA or to the state treasury? These are political decisions that have to be made;

- The amount of (reliable) land data that is stored in the land IT system. The more land data is stored, the lower the fees can be. Generally, it can be said that the system becomes more affordable, the more people are using the system.

If sufficient land data (e.g. land titles) are not yet available, systematic land registration might be considered. The process for systematic registration is, according to the MCC/LEI report, typically a participatory process where the government works directly or through a contractor to systematically engage with the community. The costs of this process may range from about US$10 to US$50/property or more depending on the methodology and should ideally be part of the business case.

As said in section 2 of this paper, it is relevant to establish a culture of maintenance, including an adequate budget line and capacity. It is our experience that 10 – 40% (depending on the complexity of the system) of the investment costs of IT systems are needed on a yearly basis to maintain a Land IT System. See for example "*A framework for the lifetime Total Cost of Ownership of Application"* (Kyte, 2010). In this publication it is estimated that 42% of the investment cost is the recurring budget needed to maintain applications, but we know cases in developing countries were this percentage is much lower or even worse, not even taken into account at all. If no attention is being given at the start of the implementation of a Land IT System how to cover these recurring costs, it is questionable whether it is wise to start implementing such a system at all.

We would like to indicate that the experiences of Kadaster International have contributed to the development of globally accepted land administration frameworks and concepts including the United Nations adopted Framework for Effective Land Administration, FELA (UN-GGIM, 2020), Fit-For-Purpose Land Administration methodology, FFPLA (Enemark et al., 2016, Enemark et al., 2016), the Land Administration Domain Model, LADM (ISO, 2012, Lemmen et al., 2015), the Social Tenure Domain Model, STDM (Lemmen, 2010) and the OGC White Paper on Land Administration (OGC, 2018). Those concepts are briefly introduced here.

FELA acts as an overarching global policy guide, providing a reference for member states when developing, renewing, strengthening, modernising, or monitoring land administration. The FELA is endorsed in August 2020 by the United Nations Committee of Experts on Global Geospatial Information Management (UN-GGIM).

Challenges of developing land administration systems are in complexities of modern technology, the complexity in legal changes, time-consuming institutional transformations, lacking political will and availability of budgets for investments. To face those challenges the International Federation of Surveyors (FIG) in cooperation with the World Bank developed the Fit-For-Purpose Land Administration methodology that proposed to simplify most processes.

The LADM is an ISO Standard. The model enables the combination and sharing of land administration data from different sources in a coherent manner. It includes agreements on data about administrative and spatial units, land rights in a broad sense and source documents. The model provides terminology for land administration, based on various national and international systems.

The Social Tenure Domain Model (STDM) is a specialisation of the LADM. The concept of the STDM is to provide a standard for representing ‘people – land’ relationships independent of the level of formality, legality and technical accuracy.

Further Kadaster International was involved in the development of the OGC White Paper on Land Administration. This White Paper (OGC, 2018) provides an overview of the land administration domain and proposes actions needed for the design and the development of implementation standards in this domain. Additionally, in 2021 members of the Kadaster International team undertook a broader analysis of the land administration maintenance issue, going beyond IT aspects (which are recognised here as key), to consider other aspects of continuity including institutional, legal, financial, data, standards, innovation, partnerships, training, and awareness (*c.f.* Bennett et al, 2021).

4. ANALYSES OF KEY ISSUES

4.1. Donors underestimate the effort

Despite the appreciation of the importance of land administration, in both theoretical and practical terms, our experience shows that there is a systematic, and perhaps even increasing, underestimation of the complexity in the establishment and maintenance of these systems. This applies to all concerned. In our opinion the donors underestimate that a digital land administration means bringing in a new discipline for which permanent coordination must be established. Donor projects have a separate ICT component with a limited timeframe but there is no time horizon in ICT development, implementation and maintenance. If donors provide for application maintenance or pay licenses for DBMS or GIS for one or a few years, they must ask themselves how sustainable this is. Suppliers will also have to ask themselves this question - as will the organisations for land administration, the NMCA's.

4.2 No commitment to long-term maintenance

Grass roots pilots and bottom-up local initiatives face limitations when it comes to the integration to the land administration system in place. Donor projects aimed at building country-wide systems, without plans for sustainable long-term maintenance will, and do, fail. Sustainable land administration is shown to be premised on the building, training, and maintenance of a national, state and local level land administration system with its capacity and related institutions. These institutions carry the longer term, 30-40 year view, that is needed to effectively complete, update, upgrade, and protect the integrity of a national system. In more recent times, this has come to include recognition of the importance of ICT capacity and its related professionals, processes, and products.

4.3 Lack of ICT professionalisation in developing contexts

In developed contexts, ICT, for a long period, already is recognised as a full professional discipline (alongside from surveyors and conveyors) and is often represented at the highest management level in roles such as CTO and CIO. A modern land administration organisation is expected to be able to take the lead in ICT developments. Hence, a national strategy for the coordinated introduction of ICT infrastructures is relevant, with interoperability being a centrepiece. Meanwhile, in developing contexts, this profession seems, in our experience, not to be recognised as a full professional discipline yet. Or at least it does not appear to be a substantial part of the land administration organisation(s) yet.

4.4 Minimal global representation of ICT professionals from developing contexts

Whilst there is (mostly) representation of developing countries in UN organisations – there is much less representation in professional organisations such as the International Federation of Surveyors (FIG, see Figure 2), or in standardisation organisations like the ISO, see Figure 3. Whilst this is both due to the costs involved and due to a lack of technical capacity. Developing contexts, including many countries in Africa, would benefit from engagement in these initiatives and in return the organisations would also benefit.

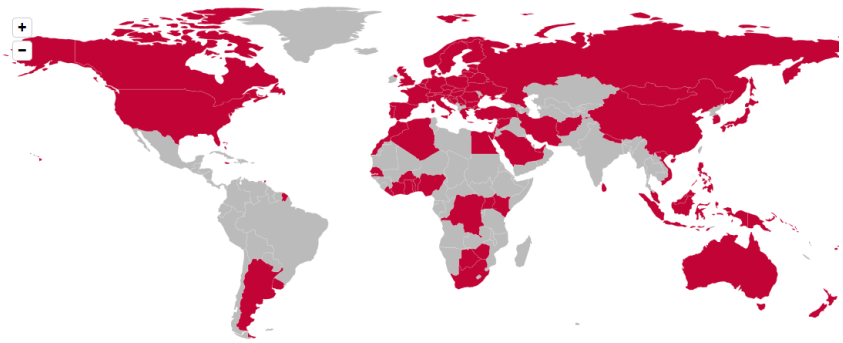

Figure 2. FIG Member Associations 2022 (source FIG)

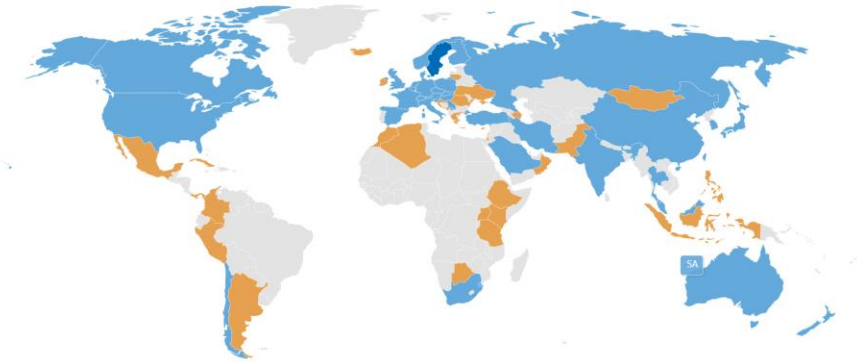

Figure 3. Members of the ISO Technical Committee ISO/TC211 on Geographic Information/Geomatic. In blue the participating members (36) with voting rights. In orange the observing members (34) without voting rights in development of standards. The secreteriat of TC211 is in Sweden (source ISO/TC211)

The maps above visualise this issue. Colleagues and sister organisations in developing countries lack the money to participate in the development of the profession – even within the FIG. Nor do they have the money to support the development in standards.

4.5 Misunderstandings about Open Source

Another issue may be Open source software. Open source software is popular because it seems to be for "free". But in reality, the communities that develop these software packages expect a contribution in knowledge, not in money. It is often difficult for developing countries to bring such contribution.

4.6 Institutional Silos and Lack of Cooperation

In many countries land administration is organized in a distributed environment (‘silo’s). This can make the land administration domain very complex. Improvement efforts may, roughly speaking, take two directions. The first is a cooperation between institutions to achieve better services without changing the mandates, and the second is the merging of institutions under one umbrella. The latter is often hampered by conflicting interests and traditions. The first

direction requires data, process and service interoperability and is feasible if there is good cooperation between the organisations – 'institutional interoperability'. This interoperability can be organized based on the LADM.

Good cooperation between organisations can lead to data sharing, avoidance of data duplication, increased data quality, and making new products and services available. These products and services may integrate information coming from different organisations, for example, name and date of birth from the population register, type of right and share in a right from the registry and the plot on which the right is held from the cadastre. To set this up properly, there must be agreement on the definitions and meaning of the data. This is a crucial step in the development of land administration systems. As a conceptual data model, the LADM can be used in support of the development of software applications for land administration purposes.

A close cooperation between FIG, the Open Geospatial Consortium (OGC) and Technical Committee 211 on Geographic Information/Geomatics of the ISO is expected to accelerate those developments. Therefore, it is important that also developing countries are represented in those forums. It is recommended to have an equally distributed participation in the standard development processes. This is relevant for the organisations themselves but also for software supplier and donors. An inclusive and participative approach amongst all stakeholders relevant is imperative for a global standard.

WHAT TO DO?

The introduction of ICT is a substantial change as it also introduces a new discipline. Since this discipline is different from common land administration disciplines preparations and a common understanding is needed. From examples, and as mentioned above, these disciplines also need to be represented at the highest level eg. Management board etc..

Since the future of governments (NMCA's in our case) in the 4th industrial revolution is driven by information and communication technologies (ICTs), NMCA's must take digitisation more serious. With ICT, a land information infrastructures can be set up that can serve as a backbone for society. Governments simply need information to govern.

What can be done at the side of NMCA's to minimise the risks/ to move forward? How can they become a serious and reliable partner for those parties who want to invest? Digitisation means a transition of the NMCA organisation. This means that the IT department and IT experts must be represented in the Board of NMCA's, at the highest level. There must be an ICT Policy aligned with the business. In addition, here must be a business plan in place to maintain the Land IT System. Last but not least, capacity within the organisation needs to be arranged.

There may be contracts with software providers - always under the direction and in cooperation with the organisations own staff. Even if NMCA's choose to outsource IT to private companies, they need IT knowledge within their (governmental) organisation to be able to define specifications for those companies. Governments need to understand the Land IT system that is being built for them. That is why NMCA's have to make sure that they become an attractive employer for (young) IT professionals.

CONCLUDING REMARKS

Land administration is in many countries distributed among a host of different units. Land administration units include land registries and cadasters, which are linked to conveyors and surveyors, respectively. Efficient administration calls for the interoperability of information exchange. This is where the IT profession comes in place.

Land administration methods and tools develop rapidly, supported by private companies, modern technology, and new information and communication possibilities. Further steps are needed to operationalise those methods and tools at scale. Innovative thinking coupled with quickly maturing, scalable approaches is needed in many countries to create full coverage in land administration.

NMCA's need to take their role in digitization serious, with the aim to have the knowhow and finances to govern the ICT activities of world-leading private companies. NMCA's cannot do it all themselves, support is needed by world-leading private companies, modern geospatial technologies, and a new professional mindset: the provision of global land administration that supports good land governance appears to be a feasible objective within the current generation – this would be in alignment with the UN Sustainable Development Goals.

REFERENCES

Bennett, R. M., Unger, E. M., Lemmen, C., & Dijkstra, P. (2021). Land administration maintenance: A review of the persistent problem and emerging fit-for-purpose solutions. *Land*, *10*(5), 509.

Enemark, S., McLaren, R. and Lemmen, C. (2016) Fit-for-Purpose Land Administration — Guiding Principles for Country Implementation; GLTN; UN-Habitat: Nairobi, Kenya, 2016. https://gltn.net/download/fit-for-purpose-land-administration-guiding-principles-for-country-implementation/

Enemark, S., Bell, K.C., Lemmen, C. and McLaren, R. (2014) Fit-for-Purpose Land Administration. FIG Publication No 60. Joint Publication: International Federation of Surveyors (FIG), World Bank: Copenhagen, Denmark, 2014. https://fig.net/resources/publications/figpub/pub60/figpub60.asp

Kyte, A. (2010) A Framework for the Lifetime Total Cost of Ownership of an Application, Gartner Research, 2010

ISO (2012). ISO 19152:2012. Geographic information – Land Administration Domain Model (LADM). International Organization for Standardization (ISO). Geneva, Switzerland. https://www.iso.org/standard/51206.html

Land Equity International (2015), Costing and Financing of Land Administration Services (CoFLAS), report prepared for GLTN with support from UN-Habitat and FIG https://www.landequity.com.au/wp-content/uploads/2020/06/CoFLAS-Report-FINAL.pdf

Lemmen, C.; Van Oosterom, P.; Bennett, R. (2015) The Land Administration Domain Model. Land Use Policy 2015, 49, 535–545 https://doi.org/10.1016/j.landusepol.2015.01.014

Lemmen, C. (2010) The Social Tenure Domain Model. FIG Publication No 52. Joint Publication: International Federation of Surveyors (FIG), Global Land Tool Network (GLTN) and United Nations Human Settlements Programme (UN-HABITAT): Copenhagen, Denmark, 2010
https://www.fig.net/pub/figpub/pub52/figpub52.pdf

MCC/LEI (2020) Land Administration Information and Transaction Systems – Final State of Practise Paper (2020) Millenium Chalenge Cooperation. Land Equity International
https://www.landequity.com.au/wp-content/uploads/2020/11/LAND-INFORMATION-AND-TRANSACTION-SYSTEMS-STATE-OF-PRACTICE-FINAL.pdf

OGC (2018) OGC White Paper on Land Administration. Editor: Christiaan Lemmen, Peter van Oosterom, Mohsen Kalantari, Eva-Maria Unger and Cornelis de Zeeuw. Open Geospatial Consortium
https://docs.opengeospatial.org/wp/18-008r1/18-008r1.html

UNGGIM (2020) Framework for Effective Land Administration (FELA). Geneve
https://ggim.un.org/meetings/GGIM-committee/9th-Session/documents/E_C.20_2020_10_Add_1_LAM_background.pdf

BIOGRAPHICAL NOTES

Christelle van den Berg works as a regional manager for Kadaster international and is responsible for the portfolio of Kadaster advisory projects in Africa. In this profession she ignites and maintains partnerships with ministries and foreign governmental organisations in African countries responsible for land administration. From 2010-2016 Christelle was member of local and provincial parliament in the Netherlands and in that role a.o. spokesperson for spatial planning and spatial developments.

Eva-Maria Unger works with the international arm of the Netherlands national mapping, land registration and cadastral agency (Kadaster International) as a Senior Land Administration Advisor. She gives advice, assessments, designs and oversees the conceptualisation and implementation of affordable and effective land administration systems. She is responsible for developing deeper relationships with international donors, partner countries and other consultants. She is co-editor of the UN GGIM Framework on Effective Land Administration. Dr. Unger completed a secondment with UN-GGIM while still being employed by the Kadaster. She holds a MSc. in Geodesy and Geoinformation, and a PhD in Land Administration. As a researcher Eva-Maria is involved in teaching at KU Leuven and University of Twente. Eva-Maria was chair of the FIG Young Surveyors Network from 2014-2018 dedicated to the STDM Training of Trainers Program and initiator of the Volunteer Community Surveyors Program (VCSP) supporting the GLTN's county-level implementation plans and programmes.

Rohan Bennett is a Geodetic Advisor with Kadaster International, Netherlands. He also acts as an Associate Professor in Information Systems with the Swinburne Business School, Australia, and is Co-Director of Bennett Cleary and Associates. He specializes in spatial information systems and land rights management. He is currently involved with project work on application of fit-for-purpose approaches, smart contracts, UAVs, auto feature extraction, in land rights management in South-East Asia and sub-Saharan Africa. He is co-editor of the UN GGIM Framework on Effective Land Administration. He is chair elect of FIG Commission 7 on Cadastre and Land Management

Christiaan Lemmen is full Professor Land Information Modelling at the Faculty of GeoInformation Science and Earth Observation of the University of Twente in the Netherlands. His other main job is as Senior Geodetic Advisor at Kadaster International, the international branch of the Netherlands Cadastre, Land Registry and Mapping Agency. He is director of the OICRF, the International Office of Cadastre and Land Records, one of the permanent institutions of FIG. He is co-editor of the ISO 19152 Land Administration Domain Model

CONTACTS

ir. Christelle van den Berg
Cadastre, Land Registration and Mapping Agency
PO Box 9046
7300 GH Apeldoorn
NETHERLANDS
+31 88 183 3110
Email: christelle.vandenberg@kadaster.nl
www.kadaster.com

Dr. Eva-Maria Unger
Cadastre, Land Registry and Mapping Agency
NETHERLANDS
Email: Eva-Maria.Unger@kadaster.nl

Dr. Rohan Bennett
Cadastre, Land Registry and Mapping Agency
NETHERLANDS
Email: rohan.bennett@kadaster.nl

Prof. Christiaan Lemmen
Cadastre, Land Registry and Mapping Agency
And:
University of Twente, ITC Faculty Geo-Information Science and Earth Observation
NETHERLANDS
Email: chrit.lemmen@kadaster.nl