

**Report to the 41<sup>th</sup> General Assembly  
FIG Congress 2018, Istanbul, Turkey**

**FIG Commission 7 – Cadastre & Land Management**

**Report of Activities 2017-18 (15-18)**

**General Remarks**

The Mission of Commission 7 is:

- to provide a global forum for enhancing and exchanging knowledge about cadastre, land administration and land management
- to encourage the development of pro-poor land management and land administration tools
- to promote the importance of sustainable land administration infrastructures as being essential for sustainable development and economic growth
- to underpin the use of innovative and advanced technology in cadastre and land administration;
- to raise awareness of the role of surveyors in land administration matters to the public and among stakeholders.

Based on results from previous years, Commission 7 has provided assistance and knowledge for the implementation of the overall FIG strategy as far as related to cadastre and land management.

There is a focus on

- providing visions for future cadastre and land management
- taking the role as a mastermind in developing effective land management
- thinking about new models of land administration for sustainable development
- initiating professional discussions on new business models as required by a changing society
- securing land tenure and advocating citizens' rights

acting from a pragmatic perspective of what is achievable in a surrounding of cultural and social diversity and how commitment among stakeholders can be created for the benefit of the society and for the reputation of the profession in providing sustainability and advocacy to citizens, land owners and stakeholders.

Besides organizing or co-organizing events within the scope of Commission 7, representatives of the Commission have participated in a considerable number of events all over the world. The list of events would be too long to be published here, reports are to be obtained from [www.fig.net](http://www.fig.net) and from relevant websites of the events. As far as Commission 7 was co-organising, more details are given by the WG in charge of organising the event.

## Working Groups

### Working Group 7.1 – Fit-For-Purpose Land Administration

#### Policy Issues

- identify role of Fit-For-Purpose Land Administration in relation to sustainable land use, food security, climate change etc. in the post-2015 Development Agenda
- implementing the ‘Continuum of Land Rights’ and the STDM into operation at country level including innovative methodologies for fast and low cost recording of land rights and appropriate land rights for future housing, including proposals for innovative land rights (new models of leasehold, tenure of public land etc.)
- identify the value of land consolidation and land readjustment for rural and urban areas in poverty prevention programmes
- develop the second edition of the Land Administration Domain Model with ISO on behalf of FIG by integrating partners from local-national, regional and international organisations, NGOs, NPOs, insurances, re-insurances, bank companies, bar associations
- promoting the development of innovative hard- and software solutions for land administration
- identify the needs for further development, quality improvement and system optimisation after Fit-For-Purpose Land Administration is implemented

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#### Specific project(s)

Working Group 7.1 aims at generating answers to the globally growing demands on land governance, the Continuum of Land Rights and on responsible tenure by continuing its work on developments of STDM, LADM and Fit-For-Purpose in cooperation with partners from UN FAO and UN Habitat/GTLN and others for the goals of the post-2015 Development Agenda.

Cooperation on the implementation of Voluntary Guidelines with UN FAO will continue. Further activities will focus on providing appropriate models including innovative land rights and tools for improving global coverage of evidence. Aspects of land consolidation and readjustment of land will be investigated in cooperation with FIG Commission 8.

Trainings will be developed in cooperation with the YSN.

#### Co-organised events

- 7th FIG Workshop on the Land Administration Domain Model, Zagreb, Croatia, April 2018
- 6th FIG Workshop on the Land Administration Domain Model (GLTN, FIG, ISO), Delft, The Netherlands, March 2017
- Organising a review session on a OGC Draft White during the World Bank Conference on Land and Poverty in March 2018 and in March 2017
- UN GGIM - United Nations Expert Group on Land Administration and Management, Expert Group Land Administration, Expert Group Meeting, Delft, The Netherlands, March, 2017
- International Symposium on Land Consolidation and Land Readjustment. Apeldoorn, The Netherlands, 2016

- Organising an event on ‘Architecture and Services for Imagery Based Land Administration Registration’ during the Worldbank Land and Poverty Conference in March 2016
- Contributing to the FIG Commission 7 and Commission 9 Annual Meeting, Cartagena, Colombia, December 2017
- FIG Commission 7 Annual Meeting and GeoConference "Cadastre 4.0 - Transparency-Participation-Collaboration", Coimbra, Portugal 2016
- FIG Joint Commission 7 and Commission 7 Annual Meeting, Malta, 2015

### **Standardisation in Land Administration**

The LADM standard ISO 19152 is very much alive and under attention, development and implementation in more and more countries.

A second edition will be developed – with inclusion of functionality for valuation. More comprehensive support to 3D and 4D Cadastre is required. In order to better support implementations also technical model/encodings (BIM/IFC, INTERLIS, RDF, InfraGML, CityGML) are proposed. The possibility of a blockchain in support to transactions will be considered as well as the inclusion of processes using imagery.

App based solutions are another relevant development.

FIG submits a New Work Item Proposal (NWIP) in June 2018 to the ISO Technical Committee 211 on Geographic Information in order to develop the second edition in close co-operation with global stakeholders and member organisations.

Very important will be the piloting of LADM implementations in real world environment. This will be organised by the Domain Working Group Land Administration of the Open Geospatial Consortium.

OGC established the ‘OGC Land Administration Domain Working Group’ in June 2016. This group is chaired by Prof Peter van Oosterom from Delft University of Technology, The Netherlands, Dr Mohsen Kalantari from Melbourne University, Australia and the Chair of the WG 7.1. A Draft White Paper is available for discussion in the FIG Standards Network.

A special section on the Land Administration Domain Model was published in Land Use Policy, Volume 49, December 2015, pp. 527-689. Land Use Policy is an international and interdisciplinary journal concerned with the social, economic, political, legal, physical and planning aspects of urban and rural land use. The special section in December 2015 was guest edited by Prof Peter van Oosterom and Christiaan Lemmen and contains 16 articles.

### **Fit-For-Purpose Land Administration**

During a pre-conference multi-stakeholder workshop of the GLTN Partnersmeeting a Fit-For-Purpose (FFP) Land Administration Guide was introduced and discussed. The FFP approach provides a new, innovative and pragmatic solution to land administration. The solution is directly aligned with country specific needs, is affordable and flexible to accommodate different types of land tenure, and can be upgraded when economic opportunities or social requirements arise. The Guide provides structured guidance on building the spatial, legal and institutional frameworks in support of designing the country specific strategies for implementing Fit-for-Purpose land administration. Very impressive was the visit to the Mashimoni informal settlement where the Social Tenure Domain is implemented. STDM supported residents in organising the community and helped in gathering evidence in land tenure and in the legitimacy of people to land relations in litigation and negotiation. Using STDM is experienced as alternative way of managing land information. There is, for example, reduced conflict in cases as double or triple selling of structures.

The United Nations Committee of Experts on Global Geospatial Information Management (UN-GGIM) has attention to the approach via its Expert Group on Land Administration. The presented guidelines are widely recognised.

### **Land consolidation and land readjustment**

The Symposium on ‘Land consolidation and land readjustment for sustainable development’ was organised on 9-11 November 2016 in Apeldoorn/the Netherlands. Over 200 participants from 50 countries from all over the world took part. Co-organisers were the FAO of the UN, Landnet, FIG Commissions 7 and Commission 8 and Kadaster, Netherlands – with support from UN Habitat, the Global Land Tool Network and the World Bank. Focus was on urban and rural environment and to applications for sustainable development. Land consolidation and land readjustment is basically about improving the structure of people to land relationships for one or more purposes. This is usually associated with broad economic and social reforms. As an implementation tool for spatial planning this can be combined with the development of infrastructure, public services and water management. The symposium was concluded with the ‘Apeldoorn declaration on land consolidation and land readjustment for sustainable development’. Here it is said that there are some common principles in the use of the tools – but no one-size-fits-all-solutions of land consolidation and land readjustment exist. A comprehensive approach in land consolidation and land readjustment favours a sustainable development in the way that it benefits the people, planet and economic profit. The FAO Voluntary Guidelines, the UN 2030 Agenda for Sustainable Development and the New Urban Agenda from UN Habitat should guide the application of Land Consolidation and Land Readjustment. In all cases it is relevant to recognise a plurality of tenure types that are relevant in negotiations around and planning for land consolidation and land readjustment.

### **Working Group 7.2 – Land Management in Climate Change and Pre- and Post-disaster areas**

#### **Policy issues**

- assessment of land tenure in post-disaster areas
- pre-disaster assessment / documentation of land tenure
- legal/institutional/technical fit-for-purpose methods to secure land rights in post- and pre-disaster areas
- impact of climate change on land tenure / loss of land, land use changes
- compensation for value changes, consolidation of agricultural land, adjustment of urban land in post disaster regions
- New technologies for data capture in pre-disaster and post-disaster areas / validation of third party data
- co-operation models with public authorities / voluntary guidelines in conflicts
- capacity building in disaster response bodies
- Spatial data infrastructures for pre, during and post disaster response

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## **Specific projects**

Working Group 7.2 aims at building upon results of co-operation with FAO and at establishing links to the networks of professionals from land administration institutes and organisations and international and national bodies who are in charge of disaster management in order to raise awareness about the need of appropriate documentation of land rights in disaster situation and to facilitate co-operation with the relevant institutions in terms of securing rights of land owners in areas of high risks (e.a. with SIDS Small Islands Developing States and others).

Climate Change entails long-term impacts on land and land tenure which may effect citizens significantly in their economic situation. Working Group 7.2 work on analysing about long-term strategies for compensating impacts on land owners.

The group is also interested in supporting the development of better land information systems that reduce risk, optimise resources during response activities and help reconstruction efforts after a disaster has occurred.

In this, it is proposed the incorporation of new data collection technologies, such as drones, as a core element of better land management for disaster response

## **Mayor Achievements**

### **Commission 7 Annual Meeting 2017**

Working group 7.2 organized the 2017 FIG Commission 7 Annual Meeting in Cartagena, Colombia. This meeting was a complete success with over 100 participants, including 47 international delegates. There were presented over 35 papers and a successful Annual Meeting was conducted.



### **Support to the Colombian government**

Working Group 7.2 led the support to the Colombian government to ensure better land administration existent in complex situations including after disasters.

In particular, WG 7.2 coordinated a mission to support the disaster in the two of Mocoa in where a landslide affected over 3000 parcels. Additionally, WG 7.2 helped in the development of the technical platform for sharing information and supported the visit of Professor Rajabifard to key Colombian institutions in 2015.



**PointShare** is an initiative of the WG 7.2 of FIG Commission 7 in association with the University of the Andes (Colombia), in order to inform, investigate and gather information by sharing data and developing technologies for land management in climate change and pre-post disaster areas.

What can you find?

- Commission 7 (Cadaster & Land Administration) of the International Federation of Surveyors (FIG) sharing information tool
- Self-help tool and free Access to information, publications and researches
- e-Learning development for information sharing and downloading

1. Publications and general information



Daily publications and general information of interest.

Recent researches, regional, thematic and global publications, in topics related to climate change adaptation, land administration, disaster risk management or natural disasters will be published.

2. e-Learning material and social networks

Sharing service blog, self-help and interactive material is available here. Users can share information, ask for questions, suggestions or just comments about topics of interest. Social network component is necessary to share information.



3. Sharing data, cloud points, orthophotos

Free Access Data for sharing. Cloud points and orthophotos available for downloading.

**Events attended**

The Chair of the Working Group as well as delegates participated in the following events:

- FIG Working Week Sofia, Bulgaria 2015
  - Chair two meetings
  - Developed workshop on new technologies
- FIG Working Week Christchurch, New Zealand 2016
  - Chairing of two meetings
  - Site visit to Melbourne University risk and public policy centre
- FIG Working Week Helsinki, Finland 2017
  - Chairing and moderating two sessions
  - Site visit to Denmark and Stockholm in Sweden

- FIG Commission 7 Annual Meeting in Malta 2015
  - Participating with a presentation
- Commission 7 Annual Meeting in Coimbra, Portugal 2016
  - Presentation of documents
  - Development of the Agenda and chairing a session

#### Other important participations

- Contact with global community (UN), NGOs and NPOs
- 2nd Assembly and Conference of the Interamerican network for Cadastre and Land Registration, 29 Sept – 1 Oct 2016, organised by the Organization of the American States (OEA), 25 countries attended, Panama City/Panama
- UN-GGIM: Americas and Latin America Geospatial Forum, 3-6 April 2017, Santiago/Chile
- International FIG Workshop of Commission 7 on Security of Land Rights in PP disaster areas in 2017 (Bogota - Colombia)
- Presentation of results and findings in international and national Workshops, Conferences and particularly in events of the global community (UN-FAO, UN-Habitat, WB)
- World Bank Land and Poverty Conferences 2015, 2016, 2017 and 2018, Washington D.C.
- UN-GGIM expert Meeting 2017, New York

### **Working Group 7.3 – Crowdsourcing Land Rights**

This final report has been prepared by Dr Robin McLaren, Chair of Working Group 7.3 Crowdsourcing Land Rights and details progress against the agreed work plan 2015-2018.

### **Work Plan 2015 - 2018**

This section describes the originally agreed work plan for Working Group 7.3 for the period 2015 – 2018.

### **Policy issues**

- Family of mobile devices supporting remote and in-situ capture of evidence of land rights;
- Global platforms managing evidence of land rights and obligations;
- Service delivery models;
- Scalability and capacity building of trusted intermediaries and land owners;
- Role of social media / validation of third party data;
- Impact on perception of security of tenure;
- Managing unintended consequences and privacy;
- Cooperation with Public Authorities in recognition or conversion of informal rights;
- Link to Working Group 7.1 Fit-For-Purpose Land Administration; and
- Impact on Land Professionals and associate curriculum.

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### **Specific project(s)**

The aims of Working Group 7.3 were modified and reduced compared to the original

ambitious aims originally established. The Working Group provided an international joint FIG Commission 7 and Commission 3 Seminar in Malta in 2015 and through support of the World Bank Group, created a Guide for “**New Technology and Emerging Trends: The State of Play for Land Administration**” - an inventory of existing crowdsourcing approaches to capturing evidence of land rights within the Land Administration domain; both formal and informal. This activity was directly aligned with the objectives of WG 7.3.

### **Workshop(s)**

- International joint FIG Commission 7 and Commission 3 Seminar 2015 (Malta/Europe).
- Commission 7 Annual Meeting in Coimbra, Portugal in 2016.
- The chair of WG 7.3 was unable to attend the Commission 7 Annual Meeting in Cartagena, Columbia in 2017.
- Participation in World Bank Land and Poverty Conferences, Washington

### **Publication(s)**

- A World Bank Group (2018) publication - a Guide for “New Technology and Emerging Trends: The State of Play for Land Administration”<sup>1</sup>

### **Beneficiaries**

Citizens, FIG member associations, international and regional NGOs and NPOs, CSOs, governments, decision makers, GIS developers and users, producers of survey equipment and software providers.

### **Deliverables**

**International joint FIG Commission 3 and Commission 7 Seminar on “Crowdsourcing of Land Information,”** Malta, 16-20 November 2015

A major deliverable from WG 7.3 was the International joint FIG Commission 3 and Commission 7 Seminar on “Crowdsourcing of Land Information,” held in Malta. Is crowdsourcing feasible for capturing evidence of land rights and can it help to rapidly shrink the security of tenure chasm? These were the central questions during the joint workshop. About 90 participants attended this joint workshop.



The United Nations’ 2030 agenda for sustainable development includes new Sustainable Development Goals (SDGs) with six of the goals having a significant land component

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<sup>1</sup> [https://www.conftool.com/landandpoverty2018/index.php/14-07-McLaren-186\\_ppt.pdf?page=downloadPaper&filename=14-07-McLaren-186\\_ppt.pdf&form\\_id=186&form\\_index=2&form\\_version=final](https://www.conftool.com/landandpoverty2018/index.php/14-07-McLaren-186_ppt.pdf?page=downloadPaper&filename=14-07-McLaren-186_ppt.pdf&form_id=186&form_index=2&form_version=final)

mentioned in the targets. For example, in Goal 1, that calls for ending poverty in all its forms everywhere, and Target 4 states that by 2030 all men and women will have equal rights to ownership and control over land and other forms of property. These goals and targets will never be achieved without having good land governance and well-functioning, countrywide land administration systems in place. Conventional approaches in land administration have failed so far in developing countries. There is a need for new and scalable approaches in land administration. The workshop showcased the innovative crowdsourcing approaches emerging as one of the potential solutions to reducing the global land tenure divide.

Although the crowdsourcing solutions presented at the workshop have not yet gone to scale, they have clearly demonstrated success in piloting environments: the USAID Mobile Application to Secure Tenure (MAST) project in Tanzania; the Landapp (now Meridia) pilots in Ghana and Indonesia to support smallholder farmers; and the Kadaster / Esri / Trimble pilot in Columbia. The approach is certainly proven from a technical and ICT perspective: Apps for the collection of land administrative data are available for mobiles with GPS; extensions are available for positioning with lightweight GNSS devices with sub-meter accuracy; and software tools are available to share the collected data in the cloud for transparent access and for maintenance purposes. Services were presented where countries or communities can store and manage land data and organise access to the land data. Key issues were discussed around standards, certification for Apps, formalisation of crowdsourced land rights, trusted intermediaries within communities and business models to sustain the crowdsourcing initiatives. There was agreement that 'legitimate land rights' and related spatial units can be integrated into formal land administration solutions in step-by-step approaches.

Integration of crowdsourcing with the Fit-For-Purpose approach to land administration is possible. However, the concept of crowdsourcing needs to build trust with society to be ultimately accepted and adopted.

Papers and presentations are available on the Commission 7 website.

## **World Bank Group Guide: New Technology and Emerging Trends: The State of Play for Land Administration**

### Background to Guide

Two of the WG 7.3 members, Robin McLaren and Kate Fairlie, were invited by the World Bank Group to author (along with Giles D'Souza) a guide on "New Technology and Emerging Trends: The State of Play for Land Administration" that provides decision support to designers of Land Administration programs requiring guidance on what new and emerging technologies could be effectively adopted and integrated within their programs. The Guide, sponsored by the Nordic Trust Fund, is positioned within the context of implementing Fit-For-Purpose (FFP) land administration solutions where technical solutions supporting the implementation of the spatial framework need to be complemented by appropriate legal and institutional frameworks. The Guide has the following target audience:

- **World Bank:** Staff providing guidance to developing countries designing their land administration programs; staff specifying land administration programs for developing countries;
- **Donors:** Donors providing guidance and aid to developing countries designing their land administration programs;
- **Policy & Strategy Makers:** Senior civil servant decision-makers involved in formulating policies in the land sector; senior level staff in land administration / management agencies; and

- **Implementers:** Public and private sector land professionals involved in land administration; NGOs / CSOs. FIG members are a prime focus.

### **Fit-For-Purpose (FFP) Land Administration Context of Guide**

The FFP Land Administration approach (UN-HABITAT / GLTN, 2016) provides an innovative and pragmatic solution to land administration. The solution is focused on developing countries, where current land administration solutions are not delivering, with often up to 90 per cent of the land and population left outside the prevailing formal version. The approach is directly aligned with country specific needs, affordable, flexible to accommodate different types of land tenure, and also upgradable when economic opportunities or social requirements arise. It is highly participatory, can be implemented quickly and aimed at providing security of tenure for all. Most importantly, the FFP approach can start very quickly using a low risk entry point that requires minimal preparatory work. It can be applied to all traditions of land tenure across the globe.

To significantly accelerate the process of recording land rights, the FFP Land Administration approach advocates the use of a range of scales of imagery as the spatial framework, wherever feasible, on which to identify and record visible tenure boundaries. This fast, affordable and highly participatory approach is appropriate for the majority of land rights boundaries. Using imagery also allows the spatial framework to be used by many other land administration and management activities and generate wider benefits.

Security of tenure does not in itself require precise surveys of the boundaries. The most important aspect of security of tenure for the majority of unregistered land parcels is identification of the land object and its relation to neighboring objects, in relation to the connected legal or social right. The absolute precision of the survey is less important, except perhaps in high value land and properties, and non-visible or contested boundaries when higher precision, but more costly conventional ground survey methods and monumentation, may be necessary.

Rather than mandating a single surveying specification for capturing land rights across an entire country, the FFP approach supports flexibility in adopting a variety of techniques to capture the land rights depending on local circumstances, a flexibility that will ensure lower costs and higher speeds in the capture of land rights. However, this does require that those designing the FFP projects are familiar with and able to select the most suitable options from the myriad of emerging technologies and solutions that show significant promise in accelerating the process even more. This raises questions such as:

- Which imagery (satellite, aerial or drone) and what resolution are appropriate?
- Should we continue with paper orthophotomaps to support mapping and adjudication participation? Or should we adopt mobile technologies?
- How does urban density influence our choice of survey technique?
- Do community mapping and rights adjudication tools have a role to play within formal land administration systems, and can they support mainstream activities?
- Is automatic extraction of linear and settlement features suitable for land administration?
- Are modern SMS or other mass media approaches appropriate to raise public awareness of land registration programs?
- What are the key technological gaps and emerging trends?

The purpose of this Guide on “New Technology and Emerging Trends: The State of Play for Land Administration” is to provide designers of country-specific FFP Land Administration strategies with guidance on the current status of technology and emerging trends. This should allow the most appropriate technical solutions to be adopted in designing and implementing

the Spatial Framework for the FFP Land Administration approach. This guidance aims to ensure that the capture, management and dissemination of land rights information will be achieved using the most cost-effective solutions, meets the precision and accuracy requirements, matches the technical resources within the country, is compatible with social cultures and can be implemented quickly over large areas.

Therefore, this Guide should be used in conjunction with the GLTN sponsored “Fit-For-Purpose Land Administration: Guiding Principles for Country Implementation.”<sup>2</sup> (UN-HABITAT / GLTN, 2016). The FFP concept includes three core components: the spatial, the legal, and the institutional frameworks – see Figure 1. Each of these components includes the relevant flexibility to meet the actual needs of today, yet can be improved incrementally over time in response to societal needs and available financial resources. The three framework components are inter-related and form a conceptual nexus underpinned by the necessary means of capacity development. Each of the frameworks must be sufficiently flexible to accommodate and serve the current needs of the country within different geographical, judicial, and administrative contexts.

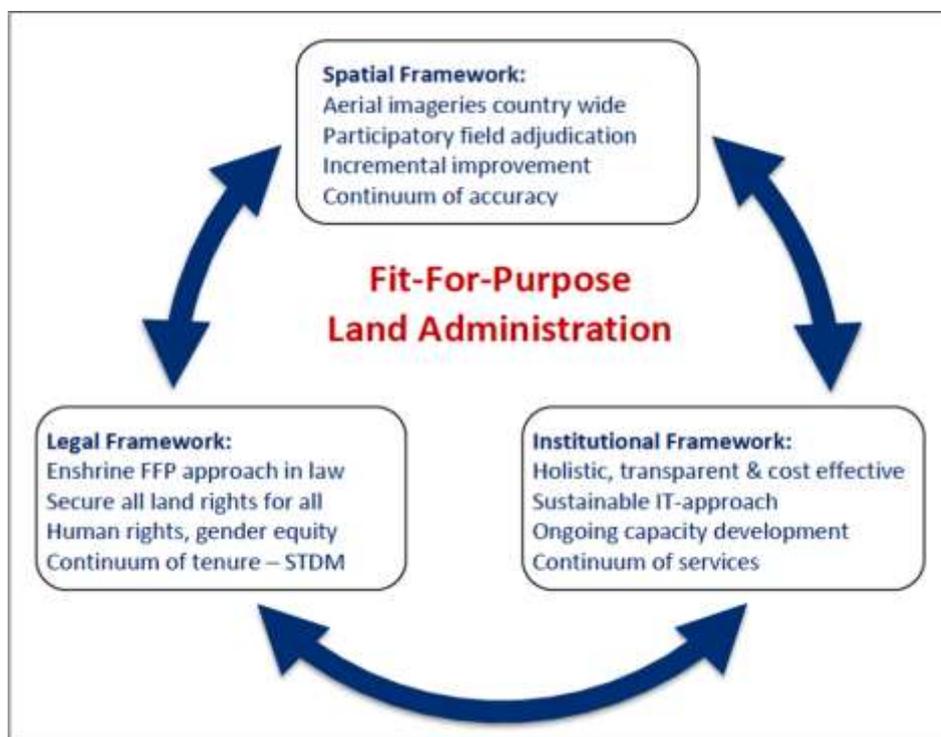


Figure 1: The Fit-For-Purpose Concept and associated Frameworks (UN-HABITAT / GLTN, 2016)

Hence, although this Guide covers technology solutions, it is imperative that the decision-making process on technology is made with the full understanding of the impact on the legal and institutional frameworks. Importantly, prior to building the spatial framework and issuing any certificates of land rights, it must be ensured that the regulations and institutions for maintaining and updating the FFP land administration system are in place. Without the institutional capacity and also incentives for the parties to update the system in relation to the transfer of land rights and land transfers, it will quickly be outdated and unreliable and lead to waste of investments for building the system in the first place.

### Scope of Technology Solutions and Approaches in this Guide

This Guide reviews and assesses new technology solutions that are currently operating successfully in land administration systems, but also emerging disruptive technologies that could significantly

<sup>2</sup> <http://www.gltn.net/index.php/publications/publications/publications-list/send/2-gltn-documents/2332-fit-for-purpose-land-administration-guiding-principles-for-country-implementation>

accelerate the land administration processes. This will allow the risk of when, and if, to adopt this emerging technology, to be judged. Although there have been advances in supporting technologies such as enterprise content and document management, optical character recognition and biometric recording of individuals, these are not considered within the Guide. This emerging technology includes, for example:

- Use of social media to engage with land stakeholders;
- Use of appropriate imagery sources (satellite, airplane or drone) to map parcel boundaries, with AI or crowd-sourced solutions to extract features from imagery, and/or extraction of land parcel boundaries from point clouds if LiDAR is collected simultaneously;
- Use of effective emerging methods for capturing rights in the field using smartphones or tablets, and/or auto geo-referencing of interpreted, participatory map-sketching; and
- Use of cloud and/or blockchain technology for immutable recording and management of rights.

These are particularly powerful when combined with less recent technologies, such as:

- Use of freely-available satellite imagery and OpenStreetMap (OSM) data for reconnaissance mapping of the study area to identify possible issues and stakeholders;
- Use of portable digital devices and crowdsourcing techniques to record inhabitants and attitudes (hopes and fears) about land rights; and
- Use of modern data model standards (LADM and STDM) for defining, recording and managing rights, restrictions and responsibilities, especially ensuring no gender or other bias.



[Source: <http://dai-global-developments.com/articles/using-mobile-technology-for-first-registration-of-land-lessons-learned-in-tanzania/>]

The Guide clarifies which of the identified techniques are fully operational, what is still in the early piloting phase and what is still pure research. It is emphasized that the technologies and approaches reviewed by the Guide do not represent an exhaustive nor exclusive list, but provides an indication of good practice and emerging trends that should be reviewed alongside additional consultations. The following technologies and approaches are included in the Guide:

- Global Property Rights Index (PRIndex)
- Social Media (for Land Administration)
- Use of Unmanned Aerial Vehicles (UAVs)
- Feature Extraction from Imagery
- Paper Orthophotomaps
- Field Papers
- Smart Sketchmaps
- Mobile Applications to Secure Tenure (MAST)

- Cadasta Platform
- Landmapp (now Meridia)
- Solutions for Open Land Administration (SOLA) – Open Tenure
- STDM Software
- Mapping For Rights
- Blockchain Based Land Administration
- Advara
- what3words

### **Structure of the Guide**

The Guide leads the reader through the decision-making process in identifying the most appropriate technology options to be adopted in their land administration programs. There are four main parts to the Guide:

1. Role of Technology – Information Capture
  - Public Awareness and Preparation
  - Background Information Capture
  - Capturing Land Rights in the Field
2. Role of Technology – Managing, Maintaining and Disseminating the Information.
  - Data Management
  - Data Access
3. Further Key Considerations
  - This section identifies additional considerations largely beyond the scope of technologies and approaches reviewed, including institutional and legal frameworks, capacity development and sustainability.
4. Appendices
  - Appendix A: Detailed descriptions of the new and emerging technology solutions.
  - Appendix B: Detailed discussion on key considerations to support choice and implementation of the technology solutions.

Sections 1 and 2 provide the following decision support structure:

- A short description on the land administration component processes covered by the selected section.
- A decision support diagram guiding the user through the key decisions.
- The main body of text then directly addresses key considerations and decisions to be made, referring to the corresponding existing and emerging technology/approach descriptions in Appendix A and additional ‘key considerations’ sections in Appendix B.
- Short case study examples provide experiences with applying the technologies.

### **Working Group 7.4 – Citizen Cadastre**

#### **Policy issues**

- land tenure and culture and society needs
- multi-dimensional and multi-temporal cadastre
- security of land tenure
- alternative forms of land tenure in changing society (generation property, affordable land, temporary urban and agricultural land tenure) complementary to WG 7.1
- role of land owner as key stakeholder
- privacy issues / access to data for citizens
- responsibilities of public authorities / cooperation models / fraud prevention
- analysis of trust in different land administration models

- assessment models for performance of land administration systems
- training of land owners / capacity building in institutional bodies
- building codes and IPMS
- standards for data in land administration
- representation in Joint WG on 3D Cadastre of Commission 3 and 7

### **Achievements**

At the FIG Working Week 2015 in Sofia, Bulgaria, Dr. Conrad Tang and his PhD Student Haongdong Zhang recommended a scientific method for the assessment of cadastral systems. The method was presented in detail at the FIG Commission 7 Annual Meeting 2015 in Malta as well. WG 7.4 is preparing to disseminate the questionnaire to professionals and relevant institutions all around the world to get to a clear situation about the quality of cadastral systems.

In April 2015, the World Cadastral Summit was held in Istanbul, Turkey. At this meeting the Istanbul Declaration was signed by most of the participating countries. It is very important from the point of view of WG 7.4, that :

„A “Cadastral Affairs” initiative on a global scale is needed within the pattern of the United Nations or other similar global organizations. In this context, an “International Association of Cadastre” and a “Cadastre Research & Development Center” is to be formed at the global level; to contribute to the further developments of the country's cadaster services by training and consulting and producing solutions to solve problems“. WG 7.4 planned to be active in following to support this initiative, connected to the activities of the WG.

Due to the structural changes in the Hungarian Land Administration, to which the chair is affiliated, there were no major achievements from the Working Group directly. However at the Annual Meeting 2016 of Commission 7 and in the Geoconference in Coimbra/Portugal many issues of the WG 7.4 policy were presented and discussed, but these were not directly influenced by the leadership of the WG.

WG 7.4 supported the thematic preparations for the Cadastre 4.0 Workshop in 2016.

The WG was represented at FIG Working Week 2017 in Helsinki Finland, and made a presentation at GeoPrevi 2017 International Symposium in Bucharest, Romania, 14-16 September 2017.

### **Publications**

Conrad Tang's and Haongdong Zhang's questionnaires <http://goo.gl/forms/O34LVGyTbQ> were prepared and sent out and results analysed for presentation in various events inside and outside FIG.

Gyula IVÁN: Challenges in technology, society and policy - how they influences Cadastre and Real Estate Management. Proceedings of GeoPrevi 2017 International Symposium, Smart Solutions for a Secure and Valuable Property, 14-15 September, 2017., Bucharest, Romania.

### **Co-operation**

There is no direct cooperation with other FIG Commissions or WGs till now. Since FIG WW 2015 Sofia, the HongKong University of Technology has shown their interest for permanent involvement into the work of WG 7.4. This partnership has been developed continuously and will be further extended by additional interest groups.

### **Specific project(s)**

Working Group 7.4 aims at investigating about quality criteria and benefits of involvement of stakeholders in all kind of land administration processes as well as about strengths and weaknesses of established land administration systems in a changing environment and from changing society requirements.

The role of the UN FAO Voluntary Guidelines and criteria to assess the performance of systems in order to optimize trust of citizens and land owners into systems will be a topic of interest on the agenda.

### **Results**

Before the establishment of the new WGs of Commission 7, the new leader of the Hungarian Institution (Institute of Geodesy Cartography and Remote Sensing, former affiliate member of FIG), which delegated the chair of this WG, was informed about this chairmanship. He promised a full support of WG chair's activities, including financial, professional and moral support. Due to organisational reasons the Chair had challenges mainly on the financial support which was not made available. Therefore the Chair was not able to participate in any of the FIG Commission 7 events during this period. This fact led to the unsuccessful work of this WG. The WG chair feels bad about this unsuccessful story, but this work cannot be executed without financial support.

*Gyula Iván (M.Sc.), Chair of WP 7.4  
Vice Chair of FIG Commission 7*

### **Cadastral Template 2.0**

The Cadastral Template is a collection of cadastral systems descriptions. It has been launched in 2003, and updated and maintained since then. The intention at that time was "to develop an appropriate generic template for country profile analyses describing the status of cadastre and land administration, and the need for improvements, facilitating benchmarking and the development of performance indicators". The data have been published on the Internet since the very beginning; in 2010, the webpage structure and layout have been adapted, so that delegates can directly update their own country data.

The Work Plan 2015-18 of FIG-Commission 7 – in close cooperation with the Centre for SDIs and Land Administration (Dept. of Infrastructure Engineering of the University of Melbourne), and swisstopo – foresaw the following aims:

- to increase the number of participating countries,
- to initiate regular updates of the content,
- to evaluate the indicators and information provided by delegates, and
- to further develop the structure according to user needs in cooperation with the FIG-HO and member associations and delegates.

At the Annual Meeting 2015 of Commission 7 in Malta, the national delegates put a special focus on Section C of the template, updated and discussed the issues involved. At the Annual Meeting 2016 in Coimbra, Portugal, the focus was on Sections D (Cadastral Mapping) and E (Reform Issues) of the template. With the planned updates at the FIG-Congress 2018 in Istanbul, a total of three rounds of updates will have been achieved. The number of participating countries has increased to 56 (from 47 in 2014).

Aims 3 and 4 proved to be more challenging. There was an expression of interest from UN-GGIM for extending and adapting the data structure, but the plans did not materialize so far.

In 2017, there was also a request by the Land Portal to have the Cadastral Template data included in their website. This request has been rejected by FIG and a suggestion for a less inclusive cooperation has never been answered from their side.



*Fig. 1: 56 participating countries as of March 2018*

At the 7th UN-GGIM Expert Committee Meeting in August 2017 at the UN Headquarter office in New York, we have proposed and offered to UNGGIM to use our Cadastral Template as an official resource for their Working Group activities, in which it was well received and approved. Meaning that we now have UN-GGIM as an official supporter for this important resource. The CT platform will be an important resource and a reference for UN member states.

The challenges to maintain and further develop a data collection such as the Cadastral Template are not to be underestimated. It takes time and energy to motivate the involved institutions and delegates in order to get the updates done. The benefits, however, are manifold: it seems that many universities are accessing the data for education purposes. Also, professional associations and public institutions are interested in the data and descriptions in order to compare and learn from each other. Not to forget, the Cadastral Template provides visibility and presence for FIG-Commission 7.

The CT system will continue its existence and will be maintained and hosted by the CSDILA particularly as we are now offering service to UN-GGIM, however contribution and participation of FIG (Commission 7) members are crucial for the validation and updating of the data. We recommend to Commission 7 to have this data collection as a standing item in their future work plan and closer collaboration with the current owners and supporters.

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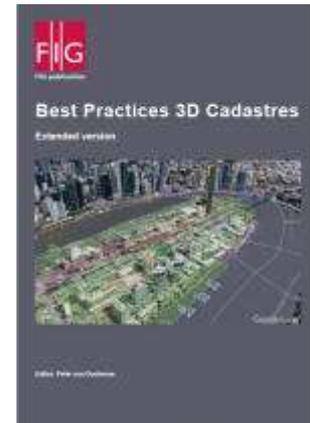
## Joint Working Group on 3D Cadastre of Commission 3 and 7

Chair: Prof. Dr. Ir. Peter van Oosterom, Commission 3, The Netherlands

email: [P.J.M.vanOosterom@tudelft.nl](mailto:P.J.M.vanOosterom@tudelft.nl)

### Results

- 6th International Workshop on 3D Cadastres, Delft, the Netherlands, 2-4 October 2018 as part of the Geo Delft 2018 conferences <https://www.tudelft.nl/geodelft2018/>
- 7th Land Administration Domain Model Workshop in Zagreb, Croatia, 11-13 April 2018 in conjunction with Sixth Croatian Congress on Cadastre (VI.HKK) attracting about 80 participants. Proceedings and videos are published by FIG at <http://isoladm.org/LADM2018Workshop>
- As a result of the work of WS4, FIG has submitted a NWIP (New Work Item Proposal) to ISO TC211 to start the revision of LADM (ISO 19152)
- A book on **Best Practices 3D Cadastres - Extended version**, Editor: Peter van Oosterom, International Federation of Surveyors, Copenhagen, Denmark, March 2018 (ISBN 978-87-92853-64-6, ISSN: 2311-8423) will be launched at the FIG Congress in Istanbul, see [http://www.fig.net/news/news\\_2018/04\\_FIGPub\\_3DCad.asp](http://www.fig.net/news/news_2018/04_FIGPub_3DCad.asp)
- The 3D Cadastres special issue of ISPRS International Journal of Geo-Information has been published in April 2018, [http://www.mdpi.com/journal/ijgi/special\\_issues/3d\\_Cadastral](http://www.mdpi.com/journal/ijgi/special_issues/3d_Cadastral)
- FIG publication '3D Cadastres best practices' will be published in a long version of about 250 pages and in a short version of about 80 pages as a FIG report as both hard-copy and online version



### Cooperation

Throughout the term of office Commission 7 performed cross-commission work mainly with Commission 3, Commission 8 and Commission 9 and on few subjects with Commission 2.

Aus Commission 3.

YSN with regional representation was involved into the Annual Meetings of Commission 7.

Permanent co-operation with partners and organisations from outside FIG have been reported by the relevant WGs.

### Thanks

At this stage the Chair of the Commission 7 wants to offer special thanks to the Chairs of the Working Groups, to the Chair of the Joint Working Group on 3D and to the project leaders for the Template 2.0 for their strong support and active participation and engagement for the aims of the Commission. Thanks to local organisers of the Annual Meetings and Conferences for making these events such successful and thanks to Delegates and friends of the Commission who make things happen.

Thanks to FIG President Prof. Chryssy Potsiou for her support and her participation in many of the Commission 7 events and to the FIG office team around Louise Friis Hansen for their excellent support in daily business and in preparing for the FIG Working Weeks and Congresses.

*Gerda Schennach*

*Chair, FIG Commission 7*

[www.fig.net/commission7](http://www.fig.net/commission7)

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