National Technical University of Athens
School of Rural and Surveying Engineering

THE RAPID RESPONSE OF SURVEYORS TO CHANGE

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Where we are

We are living in an era of constant and rapid change:

- changing technology that challenges us to maintain our proficiency
- changing markets that challenge us to adapt to international processes and standards
- changing societal needs especially in land administration and spatial information management

But every incoming administration of FIG, since the time of logarithms and the steel tape, has acknowledged change as a reality of our occupation.

Now the changes we face are more than technological:

they are global and they are fast

Where we are

We understand about the four megatrends that are affecting our world:

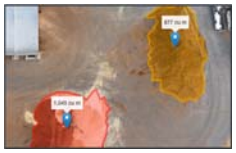
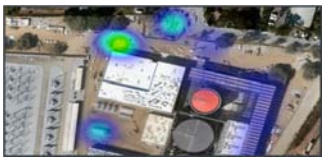
- population growth: the world's population is projected to reach over 9 billion by 2050)
- urbanization: by 2020 it is expected to be 35 mega cities with more than 10 million residents and another 48 cities with 5 million); China is 51% urbanized
- the tendency of development to cluster on the coastal zones of the oceans, the seas and the major river deltas (80% live within 60 miles of the sea)
- interconnectivity: the Internet is providing this interconnectivity. The so-called big data phenomenon is appearing in all areas of our economies, our cultures, our governmental operations and our private lives.

Changing technology & the current market dynamic in the geoinformation sector

- The rise of UAVs with cameras (but also with laser scanners) to capture images that can be processed into point clouds or orthoimages; accompanied by advanced software to process the images and render them into beautiful 3D scenes and accurate point clouds
- Developments in point cloud processing are also moving fast

Changing technology & the current market dynamic in the geoinformation sector

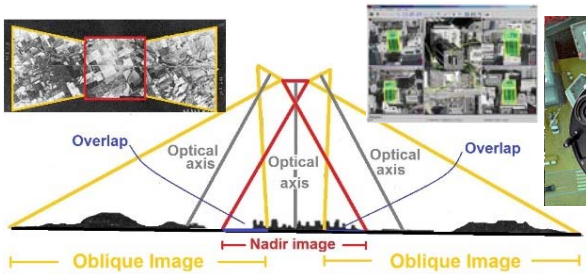
- High resolution orthophotos and 2D site maps, at multiple zoom levels
- 3D (point cloud or textured surface) map that can be navigated online
- 2D (distance, length, and area) and 3D (volume) measurements
- Change detection over time using change-detection heatmaps
- Automatic feature extraction such as vehicle counts
- …


Changing technology & the current market dynamic in the geoinformation sector

- Airborne Lidar
- Advanced aerial multi-camera systems, able to capture oblique and nadir imagery at the same time, allow a full and intuitive view of both building footprints and facades which is a great benefit when creating 3D city models
- Dense image matching allows point densities similar to the ground sampling distance of the imagery from which they are derived.

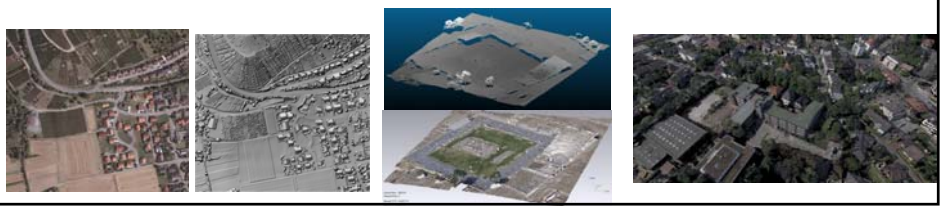




Changing technology & the current market dynamic in the geoinformation sector

Future trends:

- Modernization of software to be more ‘app-like’; ‘ready-made’, ‘all-in-one’ smart solutions, that make the entire process as simple as possible ‘from sensor to information’
- Total stations, GNSS, mobile devices and everything else connected together – *interconnectivity is the key to moving forward*
- Google and Microsoft have served as a catalyst for making geomatics techniques familiar to a wide audience

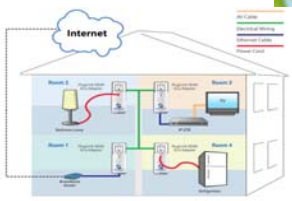


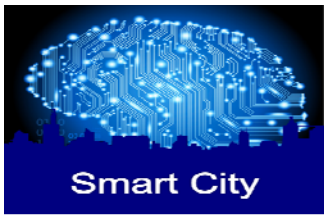
Changing markets

- There is a tendency towards more open data – everything must be open; while this brings possible risks, such as terrorist threats, the potential advantages outweigh the disadvantages
- There is a need countries to develop national information strategies
- m-government
- Interconnectivity creates new *security concerns*, but it offers huge benefits, as well. Not only are we able to generate, process, store and communicate information within our profession and with allied professions, but we are applying the innovative process of crowdsourcing in compiling data sets.
- New answers must be found to questions which concern society as a whole and the surveying profession has a key role to play

Changing markets especially for spatial information

- The urbanization of the world's population requires massive development of public infrastructure that must be supported by all the disciplines of surveying such as data collection & measurement, positioning & navigation, land administration, valuation, planning, construction management, coastal zone management & marine cadastre, etc, to support municipal governments in their growth along with the development of the national cadastres in support of the real estate industry.
- spatial information with real-time update is important; Internet of Things; sensor applications e.g., for parking, traffic update, smart lighting, waste management, water monitoring, energy management, etc.
- Spatial information is vital because it shapes policy-making; spatial information needs to be reliable and reusable, there lies a challenge for the surveyor of tomorrow



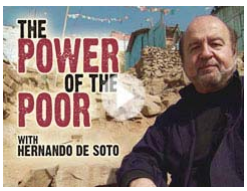
Changing land & real estate markets

To serve the rising population, technology has taken it up to transform regular cities into smart cities. Cities that will be connected, will interact with people freely, give people the opportunity to manage basic amenities in the most efficient manner, eco-friendly, and safe.

- ❑ 3d, 4d, 5d, 6d cadastre, smart buildings; BIM
- ❑ standards, IPMS
- ❑ smart cities
- ❑ global property markets that challenge us to adapt to international processes and standards


Changing societal needs

- The continuing massive influx of populations to the cities will be accompanied by a growth of peri-urban areas of informal development, creating ever more social unrest and "economic exclusion" as shown by Hernando De Soto's essay, "The Capitalist Cure for Terrorism".
- Modern registration systems and a regularization of land transfer supported by the requisite legal frameworks will be required. The surveying profession will be called upon to serve these developments.



http://www.trillfilm.com/projectstest.html

As anyone who's walked the streets of Lima, Tunis and Cairo knows, capital isn't the problem—it is the solution. Edel Rodriguez

Changing societal needs: access to capital

- Many people live in areas with flooding risks, dry lands, and other disaster risks. Informal markets, informal development do not provide access to capital.

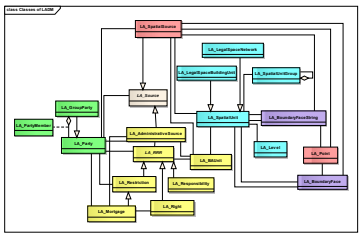
The Post-2015 UN Development Agenda

FIG /GLTN pro poor tools

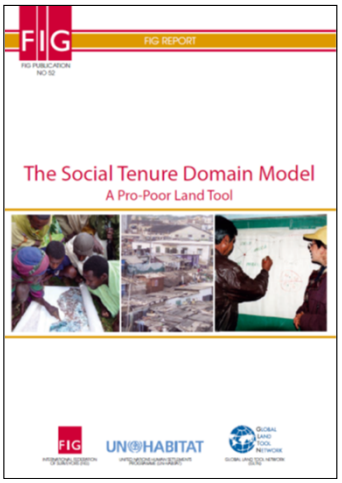
Model for building Land Administration Systems

<u>Components</u>

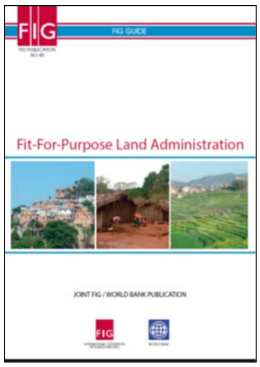
Parties (green)
Rights (yellow)
Spatial Units (blue)
Surveying (pink)
Geometry (violet)



UML diagram with a separate colour for every component
by Chrit Lemmen



Fit-for-purpose solutions *by Stig Enemark*



- Fit-for-purpose means that the framework should be designed for the purpose of managing current land issues – rather than being guided by high tech solutions and costly/time consuming field survey procedures.
- Scale and accuracy relate to geography, density of development, and the budgetary capacity that the system is intended to serve.
- Western style technical standards may well be seen as the end target but not as the point of entry.

Fit-for purpose – Key principles *by Stig Enemark*

- General boundaries rather than fixed boundaries
  - General boundaries will be sufficient for most LA purposes in rural and semi-urban areas. Fixed boundaries may be used where relevant or necessary for any specific purposes.
- Satellite images/orthophoto rather than field surveys
  - Large scale satellite images (50 cm resolution) or orthophoto (1:2000) will be sufficient for most LA purposes. Non-visual boundaries can easily be added using field surveys.
  - Using Satellite images/orthophotos are by far cheaper (3-5 times) and less capacity demanding.
  - Furthermore this methods provides not only the framework of the parcels but also the general topography (building, infrastructure, etc.) that is fundamental for a range of LA functions.

Fit-for purpose – Key principles *by Stig Enemark*

- Accuracy relates the purpose rather than technical standards
- Accuracy should be seen as a relative term related to the use of the information.
- Need for accuracy is generally lower in rural than in dense urban areas.
- Importantly, demands for accuracy should be determined by the purpose of using this information for the LA functions.
- Land registration is focused on identification of the object, and does not require high accuracy in itself. Also planning processes is focused on spatial objects rather than accuracy per se.
- High accuracy should only be provided when needed and paid for by the beneficiaries.

- Opportunities for updating, upgrading and improvement
- Building the spatial framework is **not** a one stop process – it should be seen in the perspective of opportunities for on-going updating, sporadic upgrading, and incremental improvement whenever relevant or necessary for fulfilling land policy aims and objectives.
- This, in turn, will establish a spatial framework in line with modern and fully integrated LAS

Continuum of Land Rights/accuracies/etc

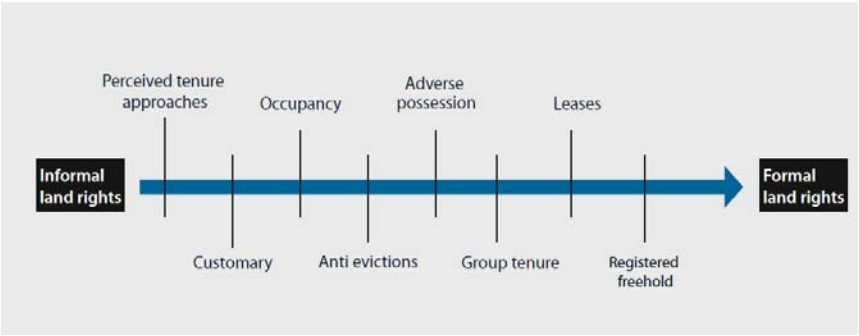
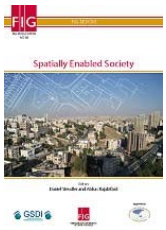
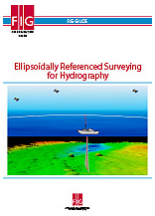


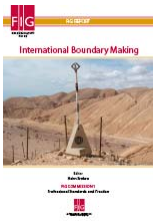
FIG recent Publications



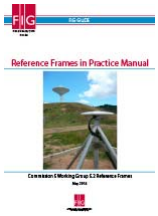
by Dr. Daniel Steudler



By Dr. Michael Sutherland



by Dr. Haim Srebro



By Matt Higgins

by Prof John Hannah

The Surveyor of Tomorrow

At the same time we experience a changing profession of surveying in which measurement and positioning may be also accomplished by others in a merging and mixing of disciplines

We know that our profession is in competition for the best and brightest;
it is our role and our responsibility, not only to attract the finest talent but to support careers and positions worthy of their promise

The Surveyor of Tomorrow

We see our role as ensuring the surveyor of tomorrow

We mean to ensure the continuity of our profession

- by encouraging continuing education of surveyors,
- while defining the profession and
- creating a tradition of competence in public service to make our occupation worthy of the dreams and aspirations of a new generation of gifted young people.

FIG YOUNG SURVEYORS