

Land Administration and Management – Towards the Fifth Dimension

Daniel STEUDLER, Xavier COMTESSE, Switzerland

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SUMMARY

For a long time, we tried to represent the land and territories in a simple, portable but still realistic way. The map was the answer. The representation of the land by maps, that is to say the projection of the real world in two dimensions (2D) has thus prevailed. Rather soon, more information has been added in order to express more dimensions, such as contour lines to represent the third dimension (3D). With the advent of computers and the power of databases, it became possible to also create volumes and to represent the information in layers representing different attributes of the territory.

Since then, and due to the huge computer storage power, we even can keep digital data over several years – without having to delete it as in earlier times. This helped to enable and make simulations over time, which has led to bring in the fourth – temporal – dimension (4D).

The intersection of "Big Data" and "Data Mining" brings up a whole new set of questions. For example, can we anticipate the management of territories and not only simulate it? Should and can we somehow develop a new dimension, i.e. the fifth dimension (5D)?

This article describes identified trends and discusses potential opportunities and challenges that land administration and management systems may face in the future.

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For a long time, we tried to represent the land and territories in a simple, portable but still realistic way. The map was the answer. The representation of the land by maps, that is to say the projection of the real world in two dimensions (2D) has thus prevailed. Rather soon, more information has been added in order to express more dimensions, such as contour lines to represent the third dimension (3D). Land surveying and the cadastre, however, remained limited in their function through the representation on the map, confining all in two dimensions.

With the advent of computers and the power of databases, it suddenly became possible to also create volumes and to represent the information in layers representing different attributes of the territory. A whole new science of geographic information is born: geomatics!

Since then, and due to the huge computer storage power, we now even can keep digital data over several years – without having to delete it as in earlier times. This helped to enable and make simulations over time, which has led to bring in the fourth – temporal – dimension (4D).

TOWARDS A NEW DIMENSION

Nowadays with the intersection of "Big Data" and "Data Mining" a whole new set of questions are coming up: Can we anticipate the management of territories and not only simulate it? Should and can we somehow develop a new dimension, i.e. the fifth dimension (5D)?

This will somehow become the dimension of anticipation, a derivate of the temporal dimension. To anticipate is the ability to foresee an event or an outcome in advance. To anticipate (5D) is more than simulate (4D), since a simulation does not take other data into account, it only is a guess.

There is a fine line between anticipation and simulation, but important to understand. Between anticipation and simulation, time changes dimension! On one side, there is the prediction of the future and the on the other hand the projection of the past. And although we often try to draw an idea for the future from the simulation, it will ultimately remain a projection of the past.

Consider some examples:

1. If it is possible to find social media discussions of younger people about music they like, then one can anticipate future hits or winners of the music charts. A company such as "The Next Big Sound" is able to analyze music preferences through the collaboration with Spotify. The basic idea is simple: if the frequency or occurrence certain singers' names in

the conversation on social networks rises, then it probably can be concluded that the sale of this this singer will soon take off.

2. With the geolocation of mobile phones, we invented the "floating car data", which allows to get an idea of real-time traffic. Google Maps has launched this feature a few years ago already. Nowadays, virtually all cartographic apps offer that possibility.
3. The comparison of commodity price changes – in real time – has become an important issue of anticipation for consumers. By monitoring the frequency of changes of certain issues, comparison website-portals can make fortunes. For example: Kelkoo.com (eCommerce advertising platform), Prixing.fr (information platform for local products and services) or FireAmazon offer this type of service, while Idealo.fr/Idealo.de compare prices from different online shops.
4. Twitter detects earthquakes: News about earthquakes spread quicker via Twitter than via the official channels.
5. Unusually frequent activities of employees on LinkedIn may give hints to economic difficulties of the company.
6. An increased number of requests on real estate portals for particular areas can give hints to where people may want to live; such information may be taken into account for land-use planning.

We can look at an example, in order to understand the importance of this change in dimension. If we can listen, watch and analyze where people would really like to live, then we can also "anticipate" urban development. But how to do that? In fact, this is quite simple: if we can follow what people are searching on websites on rentals and sales ... we can see not only what they are buying or leasing, but also, more importantly where they want to do so without necessarily pass the act. If we can read their wishes and intentions, then we can define favorable development zones.

We could also probe the areas of urgent land and building development, future recreation areas, or areas for work, mobility, etc. Every time when we need to find the right way to listen to the desires and wishes of the people and implement appropriate tools for "data mining".

Fields of research and investigation seem immense. In any case, this would be a remarkable instrument for policy, because we do more than just develop public policies when it suits them professionally, but where people actually want! It is a big difference, especially from a political point of view.

With this simple example, one can understand how the "5th dimension" would become an essential tool for the successful development of tomorrow's public policies. This would boost anyway the important field of measurement in the political field. So "ANTICIPATE" is the strength of the 5th

dimension, which is exactly what the policy level needs because, as the saying goes, to govern is to foresee, therefore anticipate.

BIOGRAPHICAL NOTES

Daniel Steudler holds a PhD degree from the University of Melbourne, Australia and is a scientific associate with the Swiss Federal Office of Topography swisstopo, working for the Federal Directorate for Cadastral Surveying. He is active in FIG-Commission 7 for many years and was chair of the FIG-Task Force on «Spatially Enabled Society». He published widely in the cadastral field and consulted internationally in land administration and cadastral issues. Since March 2015, he is chair of the EuroGeographics "Cadastre and Land Registry" Knowledge Exchange Network.

Xavier Comtesse gained a degree in mathematics and a PhD in computer science from the University of Geneva, Switzerland. He has been passionate about communication and computers since the 1970s. In addition to being the creator of three start-ups in Geneva, a pioneering digital work in publishing (Zoe editions), communication (one of the first Swiss local radio stations: Tonic), telecommunications (an Internet start-up: Concept Modern), he is also an innovator in diplomacy (Swissnex Network, a kind of science & technology consulate). In 2002, he was appointed as the first director of the French-speaking think tank Avenir Suisse. In 2012, he launched, in co-creation on behalf of the Chamber of Commerce of Neuchâtel and Industry, the 'Swiss Creative Center' dedicated to the new industrial revolution (FabLab, Design Thinking and Think Tank).

CONTACTS

Dr. Daniel Steudler
Swiss Federal Office of Topography swisstopo
CH-3084 Wabern
SWITZERLAND
Email: Daniel.Steudler@swisstopo.ch
Web site: www.swisstopo.ch or www.cadastre.ch

Dr. Xavier Comtesse
Swiss Creative Center, SWITZERLAND
Email: xavier@comtesse.io
Web site: www.swisscreativecenter.ch

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Daniel Steudler and Xavier Comtesse (Switzerland)

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