

# **The Potential of Open-Source Software in Cadastre and Land Registration – A General View**

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**Key words:** Cadastre, Land registration, Open-source software

## **SUMMARY**

Cadastrals and land registration systems in developing countries often struggle to provide appropriate and affordable services for tenure security. Reasons are related to governance but also to technological and financial shortcomings. Systems are often geared for serving well paying clients rather than poor peasants.

Information technology plays a crucial role in operating cadastrals and land registration systems. In developing countries, the on-going license costs of proprietary software often created serious constraints and have even stopped programmes. Over the last few years, open-source software solutions in fields such as database management and geographic information systems became powerful and credible alternatives to proprietary software. FIG working group 7.3 in cooperation with FAO is investigating the potential and the prospects that open-source software might offer for the cadastre and land registration field. The FAO is undertaking a project known as «FLOSS Cadastre» and aims to investigate the issue and to support country case studies. This article describes the project and its achievements so far.

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## **1. INTRODUCTION**

The open-source development is gaining more and more attention and is increasingly used as an alternative to commercial and proprietary software products. In cooperation with FAO, FIG Working Group 7.3 is looking into this topic.

The motivation for the FAO to become active in the field of Open-source products for cadastre and land registration comes from the observation that many systems and projects in developing countries struggle to provide appropriate and affordable services for tenure security. Reasons are related to governance but also to technological and financial shortcomings.

Information technology plays a crucial role in operating cadastres and land registration systems. In developing countries, the on-going license costs of proprietary software often created serious constraints and have even stopped programmes. Over the last few years, open-source software solutions in fields such as database management and geographic information systems became powerful and credible alternatives to proprietary software.

## **2. STEPS IN PROJECT**

### **2.1 Exploratory phase**

In a first step, FAO commissioned a scoping paper, which explored the open-source field for cadastre and land registration. The main findings of this scoping paper were very encouraging and showed that open-source products for data bases as well as GIS are equal in their performance to commercial software products (Pieper, 2008).

FAO decided to pursue the project and fostered the cooperation with the World Bank and FIG through an Expert Meeting in October 2007.

A first presentation was given at the FIG-Working Week 2008 in Stockholm (Pieper, 2008).

### **2.2 Gaining input from potential users**

In a second phase, FAO commissioned the University of Otago to organize a Users' Needs Conference, which took place in Dunedin, NZL in May 2008. The conference was carried out by the School of Surveying and participants came from New Zealand, Australia, Switzerland, Albania, Kyrgyzstan, Nepal, Fiji, Samoa, Cambodia and the FAO. Each of the participants gave a presentation about the situation of the cadastre and use of FLOSS in their countries.

The presentation of the Kyrgyz delegate showed that the Kyrgyz Land Information System (KLIS) has chosen FLOSS tools (PostgreSQL and PostGIS) as its base. Also Bosnia-Herzegovina selected a FLOSS approach for their cadastral data exchange development, while the Cambodian land register database is likely to be migrated to PostgreSQL in the future. It became apparent that there are many FLOSS tools that are ready and fit to be used in cadastre and land registration and that there is a certain momentum in their adoption. During the discussions, country delegates pointed out the needs of their respective land administration systems, where FLOSS may be supportive and could play a role.

Albania:

- Updating land register rights
- Cadastral information

Nepal:

- Paper maps are of poor quality, “island maps” are NTS, and not con-joint parcels need to be surveyed

Cambodia:

- Database migration from MS Access to PostgreSQL

Samoa:

- Welcome open-source software
- Replace DOS based survey software
- Computerise land registration
- Archive for back-up
- Integrate titles and survey

Fiji:

- DOS based survey software needs modernising
- Computerise land registration
- Archive for back-up
- Integrate titles and survey

Vietnam:

- Conversion from existing formats (paper)
- Integrate planning data
- Application for data integration
- Localisation language

Kyrgyz Republic:

- Cadastral plans in digital form
- Real-time database management and archiving
- Network communications

While there are many similarities between FLOSS and commercial-off-the-shelf (COTS) software products – such as the need for local support facilities, education and training possibilities, and national language service – there are some advantages of FLOSS over COTS. The most obvious ones are: no license fees, highly motivated developers, and very flexible and scalable products. The users, however, have themselves to formulate their needs and when there is no product available in the open-source field, they have to be prepared to commission and pay for its realization. A very crucial benefit will result in so far that local know-how is being established that remains there. It seems that there are opportunities for private companies in terms of consulting, support, and education and training.

The discussion in the workshop also showed that benefits could result when big national projects declare their software developments as open-source, many others could potentially benefit. The international community in the cadastre and land registration field should be more aware of high costs of software license fees and the potential of FLOSS.

Further information and presentations can be accessed at the Otago wiki website «[http://source.otago.ac.nz/osca/FAO\\_Seminar/](http://source.otago.ac.nz/osca/FAO_Seminar/)». On that website, it is possible to make comments and suggestions concerning the project.

### **2.3 Developing modules to get recognition**

In order to get recognition as an official Open-source project, an operational shell needs to be developed. FAO therefore intends to support the building of an OSCAR FLOSS development project (Hay and Hall, 2009) and also to establish a user and developer community on the Web. This will most probably be within OSGeo, which is one of the recognized platforms for Open-source communities. This will allow a peer production development of source code for the OSCAR software that is made available for public collaboration. The product will be tested with three different real cases in FAO member countries. The outcome, a fully functional OSCAR shell with an active user community, will lower the barriers for entry level of developing countries to use IT for improving land registration systems and the security of tenure.

## **3. OPEN-SOURCE – AN FIG PERSPECTIVE**

FIG should recognize «Open-Source» as an issue that is taking place. FIG should not and does not want to promote it as the solution to all problems, but to look at it in a balanced and unbiased way and to describe it as a possible alternative.

Open-source seems to be an option for even large administrations as many examples already illustrate; and there are national cadastral organizations that either already took the decision or are seriously considering to move their IT infrastructure into Open-source. There are also many opportunities for private sector companies in Open-source, mainly in the consulting field. Quite a few have already taken up the challenge and offer it as part of their services.

## **4. OUTLOOK AND CONCLUSIONS**

Working Group 7.3 has compiled a publication for the FIG Congress in Sydney, with the main objective to provide a balanced and neutral view on the Open-source possibilities for the fields of cadastre and land registration. Open-Source is an issue that we should observe and to be involved in.

## REFERENCES

Pieper, G. (2008). Free and Open Source Software for Land Administration Systems: A Hidden Treasure? FIG-Working Week 2008, Stockholm, TS 3C – Tools for Land Administration, 14 p. <[www.fig.net/pub/fig2008/](http://www.fig.net/pub/fig2008/)>

Hay, G. and B. Hall (2009). Architecture for an Open Source Semantic Spatio-Temporal Land Administration Application. FIG-Working Week 2009, Eilat, TS 8A – Software Application in Land Administration.

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