User Interface 2000
– New standard for the new cadastral index map of Sweden

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ABSTRACT

The User Interface 2000 (UI 2000) is developed in a project and composed as a concept for interchange of geographical information between first of all Lantmäteriet (National Land Survey) and the municipalities.

The new National Cadastral Index Map (NDRK) is built up and maintained in close co-operation between Lantmäteriet and the municipalities. It will be complete before the end of the year 2003. The key tool in this process is UI 2000. There are already interesting experiences from this process. There are also hopes and plans for further use of UI 2000 in other fields.

UI 2000 is neither a format nor a program but a series of technical principles that can be used with different programs and computer systems. The interface is made up of information models, a specified transfer file format and an application for data transfer. These three components are independent of each other and each can be exchanged or individually further developed.

UI 2000 was presented during the spring 2000 and Lantmäteriet in consultation with the Swedish Association of local Authorities decided to introduce the interface as soon as possible in the upbuilding and maintenance of NDRK. The start of this is a pilot project in the city of Västerås where UI 2000 is further tested and introduced.

The use of UI 2000 within the NDRK-concept is the first big test of its capacity as an effective interface for exchange of geographic information in Sweden. If it is a success there are plans to get it accepted as a national Swedish standard by the standardisation authority.

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1. INTRODUCTION

The task of Lantmäteriet (National Land Survey)is to contribute to an efficient and sustainable use of Sweden´s real estate, land and water.

The establishing and managing of the Swedish integrated Cadastral system has been a major task for Lantmäteriet for about 30 years. The system has been in operation for about 25 years and is subject to continuous development.

The digital Cadastral Index Map is now included to the system. This is done in deep co-operation with the local authorities of Sweden. The system provides integrated information for multipurpose use in the whole Swedish society. The information is disseminated on-line, direct to the users or as value added services by information agents. Integrated information together with the national cadastral index map is accessible via Internet for the citizens.

This paper focuses on the co-operation between NLS and the local authorities where one important result is the User Interface 2000 for dataexchange between the parties.

2. NEW CONCEPT FOR THE CADASTRAL INDEX MAP

The Cadastral Index Map is part of the Real Property Register and gives the geographical representation of the property. The responsibility for building and maintaining the digital map is shared between the national government authorities and 39 municipal authorities, mainly the bigger cities of Sweden. Totally there are 290 municipalities in Sweden.

In March 2000 a new general agreement was made between Lantmäteriet and the local authorities. This agreement includes the important goal to build a National Cadastral Index Map (NDRK) covering the whole country. In NDRK information in all urban areas will be based on municipal basemaps and corresponding databases of high standards. The local authorities will receive economic revenue from sales of data.

Some characteristics of NDRK. It shall:

- be the base for all geographic databases, which present property information
- be available for organisations and the public via Internet or via certain data formats
- be updated by the source of information
- be founded on databases from the municipalities in all urban areas, including a deep co-operation with 39 of the municipalities concerning updating and maintaining of the data.
- handle objects with unique identifiers, the same as in the real property register

– receive and disseminate changes via a special interface, User Interface 2000
– be completed before the end of year 2003.

3. THE USER INTERFACE 2000 (UI 2000) IN SHORT

User Interface 2000 is a unified concept for the exchange of data between central and local cadastral organisations. The specification was done in the years 1998-2000 by a special joint project between Lantmäteriet and the local authorities. This project also did some basic testing of the interface.

UI 2000 comprises information models and description of the transfer mechanism as well as a description of how these will be managed and maintained. The interface is neither a format nor a program but is a series of technical principles that can be used with different programs and computer systems.

A basic requirement has been that UI 2000 must be able to handle all types of information shown on cadastral index maps such as division into real property units, plans, regulations, easements, ancient monuments and text. Furthermore it must be possible to modify the interface so that it can handle other types of data and be used for other activities.

Other important basic aspects that have to be taken into consideration include the way information should be depicted on the index maps – including data that is still awaiting final approval – and the requirement that, within reasonable limits, it should be possible to use UI 2000 in existing systems.

The principles on which the interface has been based have been formulated during the course of the project. Information modelling has been an important part of this work, which also has included trials in two local authorities, tests, a questionnaire, seminars and discussions with system developers and users. To guarantee the quality, the components of the interface have been tested on a planned base and they have been regularly discussed in the involved organisations.

4. THREE INDEPENDENT PARTS

UI 2000 is made up of **information models,** a specified transfer **file format** and an **application for data transfer.** These three components are independent of each other and each can be exchanged or individually further developed.

4.1 The Information Models

The information models are formal descriptions of the data that must be included in the exchange and form the core of the interface. Models have been created for real property divisions, plans, easements, ancient monuments and map text as shown on cadastral index maps. In addition, there are models for revision, quality and geometry.

A basic assumption is that the information models will remain unchanged and stable for a long time whereas techniques and format will be subject to more frequent changes.

The models contain links to the Real Property Register via common identifiers. They can handle both the transfer of complete databases or changes to individual objects and require nationally unique identifiers.

Express, which is included in the STEP (ISO 10303) standard, has been used as the modelling language (this has later been changed).

4.2 Format

Initially STEP part 21 was proposed and used as the transfer format. A later change to another format, most likely XML was foreseen (this has later taken place, see below). The information models will however continue to be the base for data transfer.

To facilitate the implementation it was proposed that a special component that can read and write transfer files using the information models should be developed. The component should be made available for all users and system suppliers. In accordance with the proposal for the interface the component should be maintained by Lantmäteriet regarding the type of information on cadastral index maps.

4.3 Application for Transfer of Data

This application handles and administers the transfer of datafiles. The application that has been proposed comprises a serverpart placed at Lantmäteriet in the city of Gävle and a client part that is run in a Web browser which is placed at the local authorities. The transfer of files is initiated from the client at the local level irrespective of whether the event is an export or import of data.

5. INTRODUCING THE USER INTERFACE 2000 FOR USE WITH NDRK

The UI 2000 was presented during the spring 2000 and Lantmäteriet in consultation with the Swedish Association of Local Authorities decided to introduce the interface as soon as possible in the upbuilding and maintenance of NDRK.

5.1 The Local Government Cadastral Authorities

Because the local authorities use several different systems it is not possible to prepare detailed specifications for the modifications that will be needed in order that they can be used with Interface 2000. The changes will have to be made by the system-developers and the users. During the project there was co-operation with suppliers of systems to the local authorities with the aim of facilitating the development of technical support for the local authorities.

Some of the general requirements concerning functions in the systems used by local authorities include:

1. The systems must be able to generate data in accordance with the interface. This means that data that is defined in the models that have been developed must be given an identity and stored in the local authorities databases.
2. As identifiers and a major part of the attribute data is stored in the real property register local systems should be integrated with the the real property register
3. The systems must be able to handle identifiers and versioning.
4. The systems must be able to log changes at the custom objects level in connection with revision

To satisfy the requirements above there will in some cases be a need for more advanced storage systems than are currently used. However, many of the 39 local authorities are (mostly of other reasons) replacing or upgrading their old technical systems. This process runs rather quickly and we believe that in about two years the overwhelming majority of these authorities will have systems that can meet the requirements of UI 2000.

5.2 The Pilot Project in Västerås

Due to the fact that NDRK is planned to be complete and running by December 2003 a new project was initiated to lead and co-ordinate the integration of the 39 municipalities into NDRK with support of UI 2000. The perhaps most important part of this project was the decision to start a pilot project in the city of Västerås (about 128.000 inhabitants) The aim is that Västerås as the first of the 39 shall use UI 2000 in daily work for the updating of NDRK.

The pilot project started in april 2001 and as planned runs until July 2001when ”sharp” updating of NDRK is planned to start. Before that extensive testing is on hand during the spring of 2002.

The work is divided into at least four stages and after each stage the results are presented for local authorities, system developers and other interested parties. In that way we can start activities in other local authorities before the work is completely done in Västerås. One way of spreading the results is by our homepage www.malbild2000.lm.se The information is until now only presented in Swedish but we plan to give some information in english during the year 2002.

Some results has already been presented and two of the most important are
1. We have decided to use UML/XML instead of Express/STEP Part 21. Even if Express/STEP Part 21 has some advantages there has been a massive opinion amongst local authorities and system developers in favour of UML/XML. We have listened to their criticism and we believe it is the right step to take even if some extra work is needed. The models for instance have to be rewritten in UML.
2. The database Lantmäteriet uses today for NDRK is not very well suited for handling data with UI 2000. Therefore an “intermediate system” that reads and administers data in the specification of UI 2000 is being specified and built using Oracle/Spatial – solutions.

Testing, including security matters, will be very intense during the spring 2002 and we are working hard to keep the timetable.

6. WHAT ABOUT THE FUTURE?

The use of UI 2000 within the NDRK is the first big test of its capacity as an effective interface for exchange of geographic information throughout the Swedish society. If we succeed, and we think we will, an interesting future will open up

- The parties, Lantmäteriet and the local authorities want UI 2000 to be accepted as a National Swedish standard by the standardisation authority
- UI 2000 will also be used for exchange of other geographical data. We think information about buildings and addresses comes first
- Other local authorities than the 39 mentioned (Sweden has about 290 local authorities) will use UI 2000 for there exchange of geographical data.
- Other users, for instance the county administrations, are anxious and will probably quite soon start using UI 2000

Nothing lasts forever but the concept of UI 2000 with three independent parts and probably rather stable information models is at least some guarantee that it's lifetime reaches several years ahead.

7. SOME CONCLUDING REMARKS

There is a certain belief that UI 2000 will contribute to better and cheaper geographical data for the users and be of great benefit for the society as a whole. However in the work together with the local authorities we have noticed two interesting positive effects which were not fully foreseen from the start.

The existense of UI 2000 has made it more easy to have positive discussions on different matters of geographic information with local authorities, system-developers and other parties. It seems as if everybody now more easily understands the benefits for all parties if geographic information can be effectively exchanged.

The existense of UI 2000 has also been beneficial for the technical development in the field of geographic information. The transition to more modern technical systems speeds up in the local level and object-oriented system development and programming are on hand in many organisations. Of course, this development also has other causes than UI 2000 but we are quite certain that UI 2000 is right "in time" in this process and is an important technical link in developing geographic information and related techniques.

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BIOGRAPHICAL NOTES

Olof Olsson who is a licensed surveyor has been working within Lantmäteriet since 1973 and many years with the planning and development of the Cadastral Index Map. Since last year he is working as a project leader for the new National Cadastral Index Map of Sweden.