SOME EXPERIENCES WITH MANAGING STANDARDS

Henri J. G. L. Aalders

Delft University of Technology
Faculty of Geodetic Engineering
The Netherlands
Katholieke Universiteit Leuven
Faculty of Engineering
Belgium

ABSTRACT

In the world of GIS interoperability standardisation has become a key issue for the transfer of GIS data. And so in many countries standards have been developed in the past decades [Moellering et all, 1992] to be used by the GIS community to enable the transfer of GIS data. Also international developments have been undertaken by ISO, CEN, IHO, Cerco, where European developments are supported strongly by the European Union and the Eurogi (an Umbrella organisation for Geographic information within Europe.
These developments mean that user now can choose to apply many different standards. Some well known to them, others have never been applied or tested. For many of them to make a right choice out of so many possibilities is difficult and may cause extreme investment in programming resources.
Besides, using a specific standard for the transfer of GIS data increase the knowledge and understanding of its working i.e. shortcomings and capabilities. And so users may require improvements of these standards after some time as well as new developments in the GIS technology may do so.

Within the Netherlands this problem has been noticed by the standardisation project group within the Ravi (Land Information Council) and has set up a program for the communication and maintenance of the standards that are used in practice. Using the existing communication channels available in the official Netherlands Normalisation Institute and consulting the users that are organised within the Ravi Platform, the need for a communication centre became apparent That was called "Geoplaza™"

This presentation will discuss the history that lead towards Geoplaza™ as well as its organisation, functions and potentials.

Keywords: Information Technology, GIS, management, Spatial Information Infrastructure, Geo Standards.

INTRODUCTION

In the Netherlands many spatial databases are available as the large scale topographic database (GBK-N), the cadastral database (LKI), the topographic basic medium base map based on the map scale 1 : 10 000 (Top10Vector), the large scale municipality maps that is available for all larger cities (GBK-G), the large scale road management database for spatial data (DTB) and the road database controlling traffic accidents, many maps for utility companies, the soils survey and geological database, many databases for physical planning, etc.
In order to use GIS successfully in different application areas, one has to define and collect the objects need for the application in an automated system (including their relationships), and choose the right tools to obtain the required end-result. This approach assumes that a good GIS design for the mentioned purpose is available to the applicant. Poor GIS-designs have proven to result in inadequate studies or are incapable of producing the desired results. Mainly this is because of badly organised data, poor data models, software with limited capabilities, underestimation of time involved in developing the database and the applications, wrong inventory of data needs, etc. On the other hand well-designed system are often under-utilised because of the complexity of the system, a lack of understanding the software capabilities or because old software and data make systems less flexible. In addition, many failures are due to inadequate organisational structures that are required in relation to the new technologies.

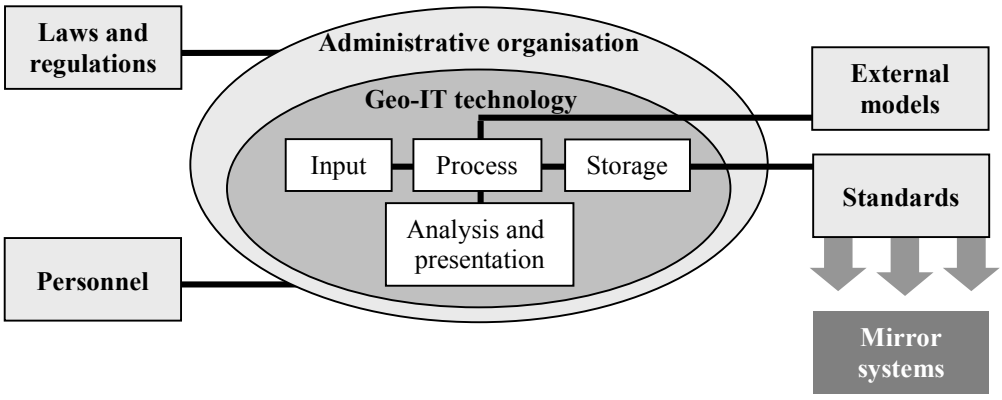

Figure 1: Actors in Geo-IT systems.

Nowadays, many GIS-applications are institutional, dealing with environmental studies, economical analysis, transportation, emergency services, mining-, utility-, governmental- and public service operations and scientific research. Often these organisations design their systems for the kind of GIS studies they provide and have their organisation in tune with the system. It appears that the success if any IT system (including GIS systems) are highly depending on this. In the design of Geo-IT systems, it becomes very clear that also attention has to be given to the financial and personnel aspects of the introduction of the system. (see figure 1).

In a country that has so much data available, it becomes necessary to develop a Spatial Information Infrastructure (SI^2). This requires providers and data users to be brought together and set agreements on policy, pricing, service and technical aspects. Here users and providers can learn form each other in the data applications for the sake of improvements the application of spatial data (see figure 2).

Apart from all kinds of regulations, users should know the availability and access to data and have the possibility to understand the data when received. Therefor standards are developed in order to assure the correct transfer and understanding of data coming from an outside source.

Organisation

Apart from the NEN (Netherlands Normalisation Institute) that performs standardisation by co-operation between interested partners, also the Ravi (Council for Land Information) promotes strongly the development and use of standards.
Within the Ravi a project group of all participating professional organisations co-operate to define and develop necessary standards in areas of applications. The proposals of these professionals are input for the NEN Commission for Geographic Information to become a full standard.

Different from other European countries the use of standards in the Netherlands (and United Kingdom) is not subject to governmental regulations. Therefor, the widely announcement to develop a certain standard is guaranteed by the NEN regulations (because it is important to involve as many potential users from the beginning of the standardisation process).

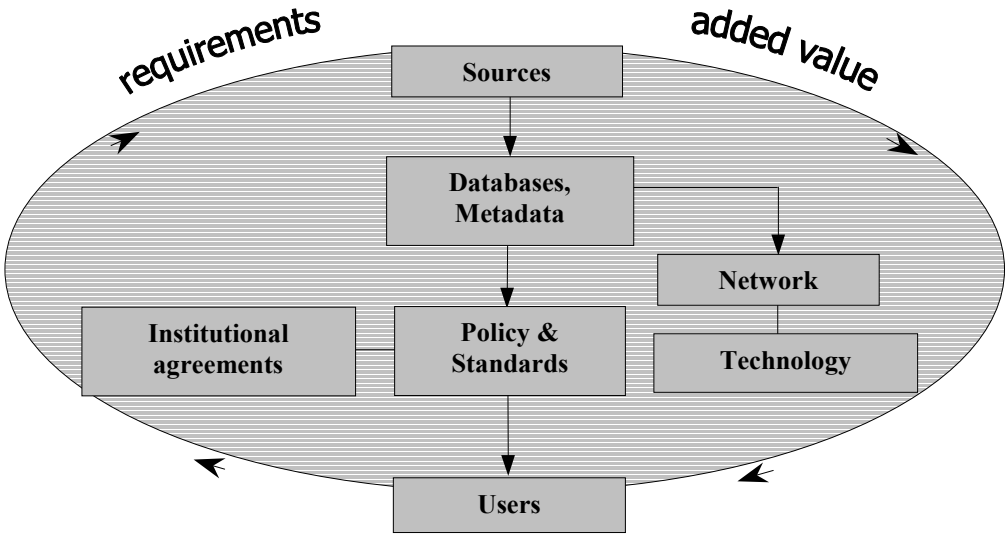

Figure 2: The organisation of a Spatial Information. Infrastructure. (SI^2).

So, the professionals within the Ravi platform and project group Standards (PGB Standards) identify and determine the necessity and method to start research for the developments of a certain standards. This research usually results in a Ravi report that is send to the NEN commission on Geographic Information. The standard NEN procedure to announce the intended issuing of a new standard is than performed but because most professionals have been involved in the development of the standard during the Ravi research this procedure is efficient finished compared to other standardisation processes.

Until now, in the Netherlands the following standards have been developed for the transfer of spatial information:

- NEN 3610. This is a standard that defines geographic objects. During its development it turned out that it would be very hard to prescribe geographic object for all kinds of application, because so many different definitions for the same object are in use by people working in respective fields of the geographic arena. So this standard define geographic objects in a generic way but also defines the structure of how the standardisation of should be done. This is because for different sectors as utility, water control, physical planning, etc. more precise standards for data definition are designed amongst the practitioners in the field. Each of them can use these sector standards for even more precise definition within their own application. In this way, the transfer of data follows the rules according to the level of application for which the transfer takes place.

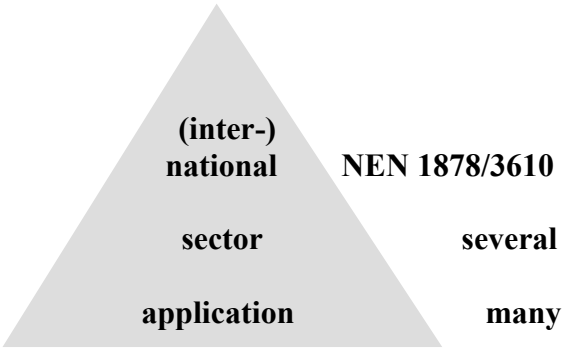

Figure 3: The organisation of standardisation in the Netherlands.

- NEN 1878. This standard is derived from the 1988 RAVI development SUF-2 and is used very frequently for all kinds of spatial applications in the Netherlands. The standard defines a format for storing object characteristics of spatial and non-spatial and graphic type. NEN 1878 has been revised and rules for application are been issued in 1998 (NPR 3611).
- NEN 3256, defining the symbols to be used on large scale maps.

Apart from the standards that are developed for the Netherlands, the NEN and the Ravi have been heavily involved in the design of the CEN standards (Comité Européenne de Normalisation) on geographic information between 1991 and 1998 (in fact the last working group meeting was held in Delft).
Due to the European development the CEN standard on Metadata is used to design the database for the Netherlands Centre for Geographic Information (NCGI). On international level, more standards are developed of which the ISO (International Standards Organisation) and CEN standards on geographic information / geo-informatics are competing in application with each other and with the existing national standards.

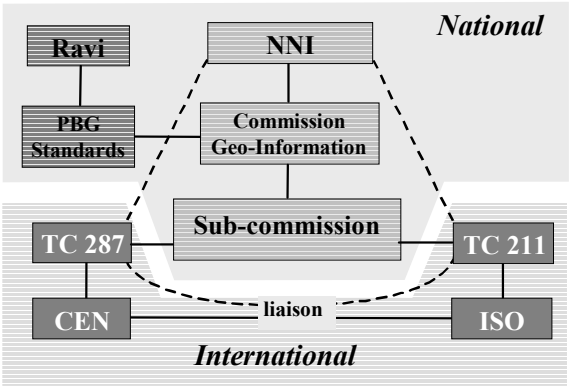

Figure 4: Standardisation of data definition at different levels.

Besides, some specific standards have been developed in the past or are presently under development as indicated in table 1.

International Institute	Standard	Remarks
CEN/TC 287	ENV 12…	Development 1991-1998
ISO/TC 211	CD191…	Development 1994- several CD's
IHO	S57 (DX90)	Hydrological maps objects only
CERCO	ETDB	Example within MEGRIN
DGWIG	Digest	Transfer between NATO members
Drive EDRM	GDF 3.0	PrEN'94. For road and traffic
OGC	OpenGIS	Communication between different systems

Table 1: International standardisation developments.

For anyone in geographic information this appears as a blurred scene and decision to choose any of the possible standards has become difficult.

Historical background

In the Netherlands, standards have a long tradition. The first developments was in 1979 when a special interest group of the Dutch Society of Cartography proposed [Aalders et al, 1980] a standard format for the transfer of spatial data (SUF).
This format only described the metric part of the spatial data. Soon after its introduction the need was felt to enhance the capabilities for data transfer enabling the transfer of non-spatial information.
This resulted in the development of a renewed version SUF-2 initiated by the Ravi in 1988 [Ravi 1988]. After the establishment of the Sub-commission on Geographic Information the SUF-2 standard was revised into SUF2.1, which was proposed as NEN standard 1878 in 1993 [NNI 1993].
In 1994 the Ravi proposed a project to design a plan for the standardisation of geographic information [Ravi, 1995] to allow providers and users to an optimal use of available data. During the project it appeared that users about required more information developed

standards and standards under development. And so, an action plan was developed for the implementation of standards together with the sector representatives from the VNG (municipalities), UvW (water management), IPO (provinces) and OON (utilities) in order to creates the conditions to implement standards accepted by Ravi members. To achieve this communications between (future) users becomes very important for the technical and organisational aspects. However, all organisations in the respective fields have more points of contact and it is difficult to reach out to the end-users of geographic information. Workshops were initiated for different sectors and finally this resulted in the sector standards for municipalities, utilities, water management, and physical planning. New initiatives will be initiated in the future when more end users will be detected that need to be supported in the implementation of standards.

Support of sectors

The effect of all the initiatives for users and others is:

- Clearly, for the present users a widening of the spectrum of data to transfers can be observed but also a growth of partners amongst which data transfer takes place. The result of this is the creation of an automated data transfer process. Data description and transfer processes need to be described more precise for this matter as well as the management of existing standards;
- For new parties also the standardisation of the transfer process will evolve. The example of the transfer between present users needs to be exposed in order to allow new users to learn the advantages and pitfalls.

Presently many spatial datasets are transferred in the Netherlands using the existing standards. To bring this in tune with the end users is difficult and solutions are offered from the development side. In the field of physical planning the solution was different. Parties involved discovered the need for a standard and the Ravi members in the field of physical planning initiated the development by defining a project. So, this solution was not offered but requested and it appears to be a much better approach. Looking for organisations to be involved in the development of the prototype, apparently the end users became very important. This makes counselling about existing standards obvious in order to tune the standard to be developed with the existing ones.

Together with the different sectors the Ravi has developed a methodology for the implementation of standards in the different sectors. Especially the object-based approach by the end user - as opposite to the earlier often used graphical approach of digital data - appeared to be a big leap forward. This allows for the development of standards in each sector in conjunction with other field of geographic information. Tuning with NEN 3610, the application rules in NPR 3611 and the rules for object-based data transfer by NEN 1878 becomes an important facet.

Standard's management

The whole scene of standardisation encompasses many aspects from development to implementation, education and communication, knowledge and application as well as general and special fields of applications. It involves:

1. **Communication**.
   All persons involved in the standardisation process have captured knowledge. When users become known with the use of standards, also question are raised about the design of databases, which standards should be included in the design and what parties should be involved in the development of the database (assuming the definitions of (spatial) objects for the database is known). The Ravi often functions as a standards information helpdesk and it may use this role for orientation about the initiation of projects requested by the field. For the realisation of such projects the market is usually incorporated. The PGB Standards of the Ravi has recently initiated a Internet side *Geoplaza™* that functions as a communication point.
   This is to support the so often requested specific counselling rather than providing only general information. The GWW (civil engineering) sector serves as an example of specific information counselling, since they use often CAD systems and appropriate standards. Research in this field has shown the overlap between the GIS and CAD standards and further attention is required to enhance the possibilities of using CAD design in a GIS environment;
2. **Standard's updates**.
   After issuing the existing standards on national level attention has gone to their implementation in different sectors. By developing the application rules NPR 3611 some errors became apparent in NEN 1878 and implemented but no other updating has been studied since. Assuming the explosive growth of the use of these standards a closer control and management of these will be required;
3. **Support**.
   In developing the NPR 3611 several sector standards were initiated to develop rules for the transfer of :
   a. pipeline data;
   b. water quantity and water quality;
   c. object classification for an object-based GBK in order to convert the digital large topographic spaghetti database into an object-based database;
   d. data for physical planning (two pilots were successfully executed to transfer physical design plans between different participating parties using their own developed converters;
4. **Harmonisation**.
   Many sectors operate in the field of geographic information. So sector standards need to be harmonised with each other using the structure in the generic standard NEN 3611. In the Netherlands, about 60 sectors in the field of geographic information have shown interest as municipality functional design for land-information object definition (GFO), as well as object-definitions for topographic objects (BOCO), water, GBK-N, utilities (RAVI/VCL), cadastre (LKI). The development of the Information model for physical planning (initiated by councils for provinces, municipalities, physical planners, the national physical planning service, city planning society) is seen as a big leap forward in the standardisation by the users.
   The land-survey service of the National Road Board has split their object-definition (BOCO) into two parts: one as an integral part of NEN 3610 and the other part as sector standard.

Harmonisation is required especially in the field of "fundamental datasets" as the GBK-N, Top10Vector and cadastral data. Many datasets are based in the data from these fundamental sets. Digital transfer is highly depending on the tuning of these datasets with the national and sector standards.

5. **International developments**.
   PBG Standards closely follows and co-operates with international standards development, which is highly appreciated and used by users. This is demonstrated by the amount of users that participated in a workshop and studied the CEN standards for commenting. The close relation of PBG Standards and the NEN Commission Geographic Information is demonstrated by this as well as the personal unification of members of both commissions.
   Although the European standards are issued now, it is the expectation that the geo-information arena is too small to support both European International and national standards and choices have to be made for one of them - presumably the ISO standards. This assumption is backed up by the Open GIS Consortium to use the ISO standards as much as appropriate. Also in the situation of the USA it is predicted that the ISO standards will be used in their national clearinghouse.
6. **Education**.
   More education in the field of GIS and GIS standards in the Netherlands is highly needed. Apart from the Delft University of Technology - Geodesy Department, the Wageningen University - GIS Department and in the post-tertiary continuous learning, no regular course are given on standards and standardisation. The need exists to enlarge the education in GIS and its standards in education programs for land-surveying, cartography, civil engineering, architect, planners, etc.
7. **Innovation**.
   With all activities ongoing in the field of standardisation for geographic information hardly any room is available for innovative initiatives. New developments in the field of the application of metadata, OpenGIS, quality and quality evaluation, graphical representation, time issues, continuous updating of datasets etc. need to be exploited and made ready for implementation. Parties interested in these aspects will have to combine their needs to ensure standards developments in this field in order to enable common understanding of data available in different datasets.

Structuring Standard's management

To increase the use of standards in the coming period the following aims should be set:

- Improve the spreading of knowledge about geo-standards;
- Increase the implementation and use of geo-standards;
- Innovation through developments required by the end-users;
- Improve the communication about geo-standards
- Better management of geo-standards and update according to needs appearing in future;
- Scan the GIS environment for new developments in the field of standardisation.
- Harmonise existing generic and specific standards.

In order to reach these aims all activities are clustered. The aim is to achieve implementation together with the Ravi platform of market institutions, the Dutch Commission for Geodesy, the NEN, CEN and ISO and the National Clearinghouse Geo-Information (NCGI) but also new partners will be looked for. It seems to be obvious to provide users with the gathered knowledge through Internet by introducing a web-site where information about GIS and standards will be available but also a discussion forum will be opened. It is planned to open the web-site in 2000.

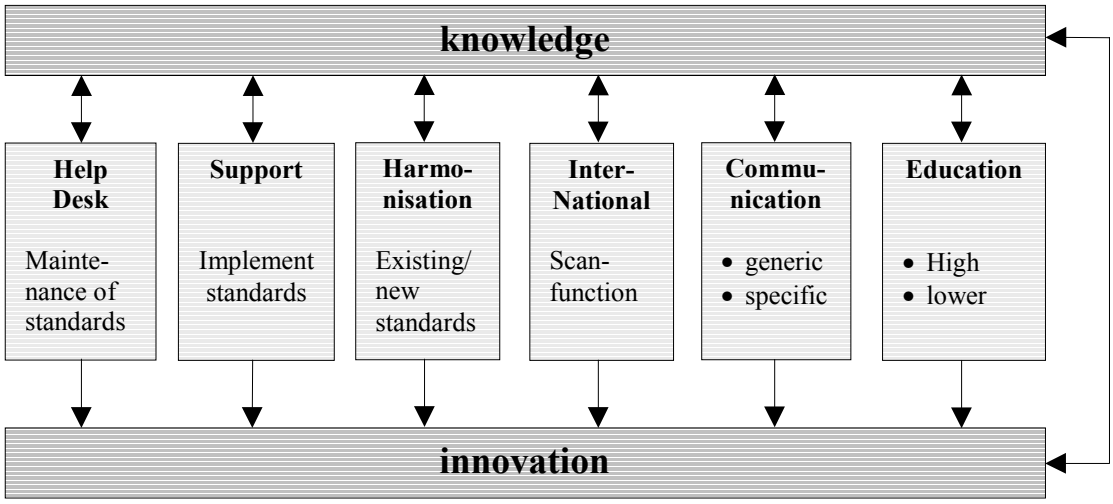

Figure 5: Clustering of activities for Standards management.

The site is also used for comments on the application of standards in different field of spatial information. Based on the information in the use of standards a structural maintenance of standards can be achieved by reviewing them biannually. Also sector standards require a periodical review and so there will be a need for a higher frequency of reviewing NEN 3610 together with sector standards.
Contemporarily the users of geo-information do not exploit the opportunities that standards offer. This will increase after more users will apply the existing standards. Assistance is anticipated to promote the use of standards in all types of fields in spatial information in all areas of users applications (including the new applications).
The experts closely will follow international developments in order to convert new developments towards the Dutch situation. One may think here of new standards from CEN, ISO and OpenGIS™. This requires both general as well as specific information towards users about the information flows between partners as well as within a specific organisation but also to users that are familiar with geo-information but are not participating yet.
Also education becomes an important issue. Existing courses in the use, implementation and characteristics on standards will be made publicly available. And, together with the existing schools at all levels, new teaching means will be developed as distance learning through Internet to be used both in the schools as well as in commercial courses and continuous professional learning. A first example of such a course is available. Specific attention will be given to the application of new technologies that became available by the new standards as the implementation of metadata and quality attributes in existing databases abd the use of this data for new applications. Research in these fields is performed in conjunction with the Sub-commission of Geo-Information models, Universities and the Ravi.

CONCLUSIONS

In general there is a common part in the contents of spatial data for many applications for which data is collected by many organisations. For a national SI^2 not only the technology (communication potentials) are inevitable but also the standards for unambiguous understanding of the data by users and providers as well as a policy on co-operation. International standards interfere with the national aspects. For efficient selection of the application of a specific standard, users need assistance from experts who, in turn, have to understand completely the user's application. Therefor a generic and specific knowledge transfer system has to be developed including a helpdesk function, communication point, specific and general courses and structural maintenance of existing standards and technology. In order to enable experts to stay expert, scanning of international developments and transformation towards national needs of these is necessary.

It appears that data sharing is not just transferring data by applying existing technology and standards.

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CO-ORDINATES

Prof. Henri J.L.G. Aalders
Delft University of Technology
Faculty of Civil Engineering and Geosciences
Department of Geodesy
Section GIS technology
Thijsseweg 11
2629 JA DELFT
The Netherlands
Tel. +31-15-278 1567
Fax +31-15-278 2745
E-mail h.j.g.l.aalders@geo.tudelft.nl
URL //www.geo.tudelft.nl/GISt/gist_e/index.htm