

Spatial Data Infrastructure as Tools in Environment and Geohazard Management. Examples from Norway

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Key words: e-Governance, Geoinformation, GSDI, Risk management, Spatial Planning

SUMMARY

Several successful web-mapping applications focusing on GI for environment, spatial planning and risk management has been developed and launched both on global, regional, national and local level. The further development gives an opportunity for better access and participating from the citizens in planning processes. The needs for environmental decision making and involvement of affected sectors and society will be more focused. Visualisation in 3D will be more daily tools for planners and citizens to view consequences of various construction proposals like landscape analysis, risk assessment, tourist information etc.

As part of municipal spatial master plans in Norway there is a demand to carry out risk and vulnerability mapping and analyses. It is a municipal task to make sure that spatial planning and building permits is carried out so it can be guaranteed that it will not create danger for people, environment and material values. It is a demand to have an overview of the risk and vulnerability in the municipality. Some guidelines are made to assist the municipalities in this work. «GIS in risk management and spatial planning». These guidelines give good examples on how to use spatial data and GIS tools in these fields.

In the paper there will be given some examples of use of spatial information and internet for dialogue with citizens in spatial planning, examples of spatial information as tools in emergency situation and crisis management. In all examples there is documented the benefit of having access to standardised and interoperable spatial data infrastructure

Spatial Data Infrastructure as Tools in Environment and Geohazard Management. Examples from Norway

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1. SPATIAL DATA INFRASTRUCTURE - NORWAY DIGITAL

Norway digital is the Norwegian government's initiative to build the national spatial data infrastructure. Norway digital is already a working co-operation and infrastructure with reference data and thematic data available, more than 600 partners and more than 100 operational web map services, geoportal and other services. Thus Norway digital is an existing implementation of the infrastructure described by the European Inspire- directive. The major concept is the building of a national geospatial infrastructure in support of eGovernment. The aim is to enhance the availability and use of quality geographic information among a broad range of users, primarily in the public sector. A broad representation of Norwegian public bodies is participating, at national level ministries and their directorates, at local and regional level most of the Norwegian Municipalities and different regional public bodies. The co-operation is based on the white paper on the National Spatial Data Infrastructure presented by the Norwegian government and accepted by the Parliament on June 18. 2003. Now there is a proposal for a new law on GEODATA to make the legal framework stronger for the partners and also to fulfil the demands from the European INSPIRE directive.

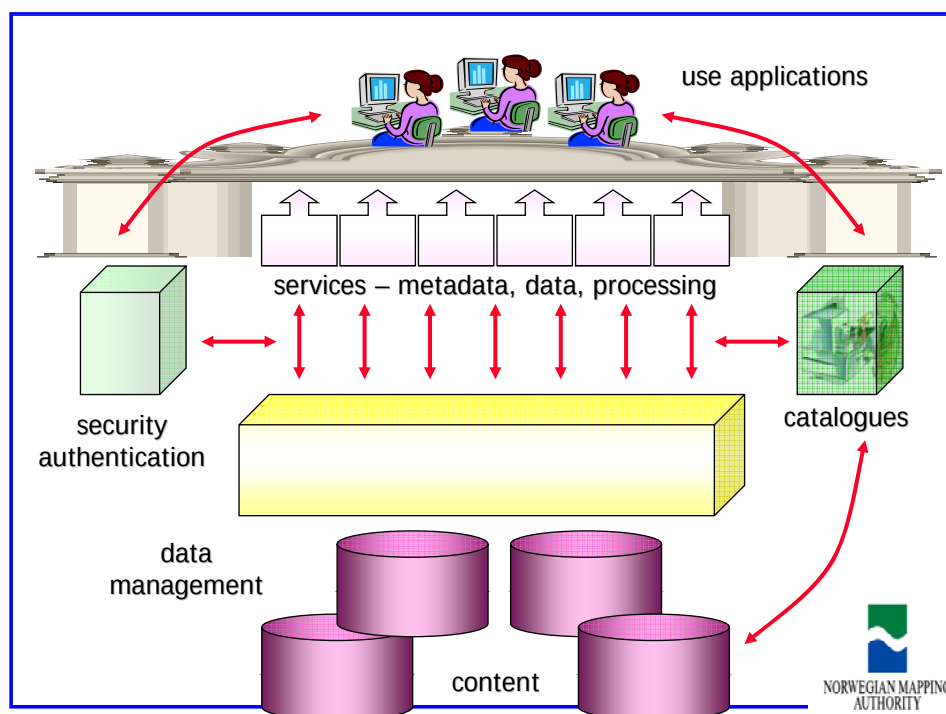
Norway has a long tradition for co-operation between public and private sector in general and between organisations in both public and private sectors. The national standard known as SOSI is a very good example of this co-operation. Within the framework of SOSI, there is nation-wide acceptance of the data structure of nearly all relevant application fields, and also a standardised method of exchanging the data. Now the framework is based on ISO standards. The current policy for the SDI development is based on three main components:

- overall agreements between the partners
- a geodata portal
- a geographic information metadata service
- a range of access services

Through Norway Digital all public producers, authorities and main national users of geographic information (maps, geodata, thematic data and property data) have established a co-ordinated and user friendly distribution service. This service makes all standardised geodata available through a core portal. The data is free of charge for internal use for all the partners in the program and the service is available on commercial basis and as a free of charge view service for the citizens. All institutions participating in Norway digital bring their own data into the infrastructure making it available to the other partners. The spatial data is divided in two main categories, reference data and thematic data. Norway digital will treat both kinds of data. Reference data include topographical data, hydrography, roads and other infrastructure, land use, buildings and cadastral information, elevation and bathymetry,

orthophoto. All data are specified in our core SOSI standard and catalogues. There is a joint funding of reference data through Norway digital, based on the so-called Geovekst model. Thematic data include a broad range of information produced by national institutions and municipalities at the local level. The themes cover aspects such as demography, risks and risk management, protected sites, biodiversity and nature values, pollution, fisheries, geology, mineral resources, agricultural and forest resources, cultural heritage and outdoor recreation facilities. The activities in Norway digital are regulated through standardised agreements and a core technological platform based on internet technology. The Norwegian mapping authority is the co-ordinator of Norway digital. The task will increase the availability of geographic information, and improve the quality and availability for all.

One of the important elements in Norway digital is co-operation. The cooperation is unique both nationally and in Europe with more than 600 partners. The red thread is to give a little and get a lot.



1.1 eNorway 2009

The Norwegian Government has set up an objective of making everyday life simpler for the citizens and securing the future welfare. ICT, used in the appropriate way, is a contribution to achieve these goals. ICT is a natural part of everyday life for most people. The Norwegian government wants to support a knowledge society where everyone can participate and where the potential of the use of information and communication technology is optimised. ICT shall support the development of public authorities to be a safe and efficient distributor of services and resources. The needs of the citizens and the private industry shall be the driving force for

the development of the eNorway services. *eNorway 2009* is about how the government want to use and realise the opportunities

The government has initiated a co-operation between representatives from governmental and municipal institutions, private enterprises, professional organisations and NGOs. With a strong and constructive commitment from the various actors, there is achieved a lot of results in relatively short time. eNorway 2009 will support the governments policy on economic growth and value for society. Good environment for research, high digital competence amongst the citizens, a high level of investments in ICT and a good ICT infrastructure are factors which contribute to get Norway in a good position in this field. Actions and projects will contribute to release value for society of IT. It is not only about technology but also about the way we communicate, work, learn and organise our public sector and about how value adding services are to be created in the Norwegian society. eNorway 2009 has three main focused areas:

- The citizens in the Norwegian digital environment.
- Innovation and growth in the private industry
- A co-ordinated and user approached public sector.

eNorway 2009 is focusing on cross sector initiatives and projects both across the sectors and between public and private sector.

Some of the goals from eNorway 2009 relevant for the GI society.

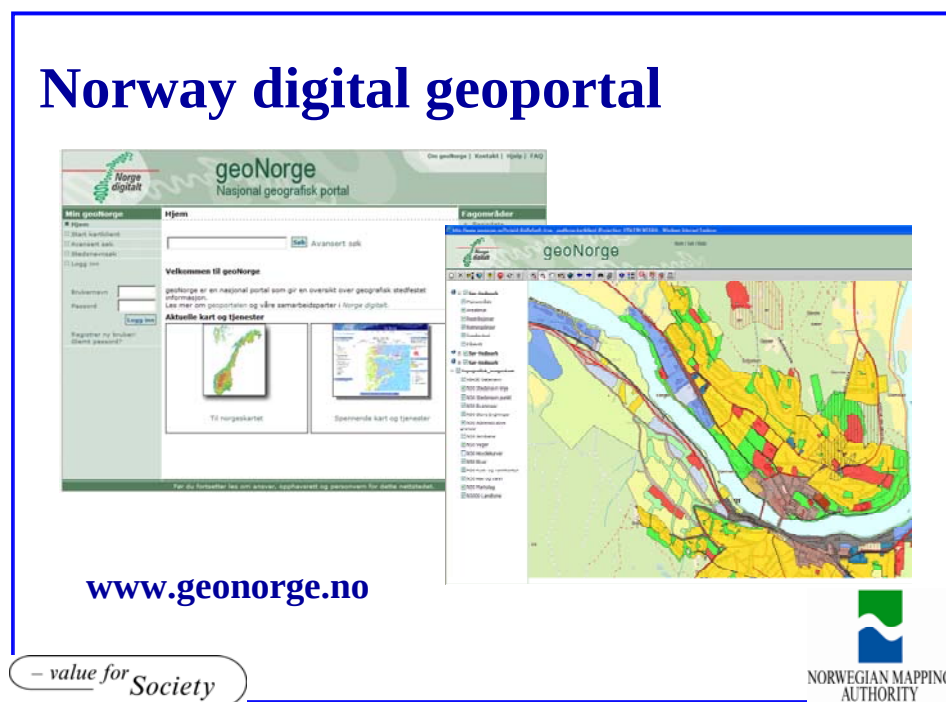
- eServices for everyone including those who does not have internet access
- All relevant interactive public services for the citizens shall be available through the citizens portal My Page
- All agreements for reuse of public data shall be assessed for adaptation to the PSI directive
- Governmental authorities within the geodata field and most of the municipalities shall be part of Norway Digital and have an update system for their own data.
- There will be modern electronic charts available for all Norwegian coastal water
- All public institutions shall use eID and eSignature for all relevant services
- All new ICT systems in public sector shall be based upon open source standards

The Ministry of Environment in co-operation with other ministries, the municipalities and Norwegian Mapping Authority are given the responsibility for the priority tasks in eNorway 2009 relevant for the Geographic Information Society

My page. As a part of the eNorway 2009 program it is a goal that all relevant interactive public services for the citizens shall be available through the citizens' portal My Page by 2009. As part of development and demonstration projects some examples is set up by use of interactive map related to "My Page" for the citizens to access information related to his own neighbourhood. My Page won a European ICT award for 2007

1.2 GeoPortal – www.geonorge.no

The main objective for the portal is to make spatial data and environmental data available and ready for use to local and regional planners, officials and politicians. The Portals shall in general serve the government, private sector and citizens with environmental GI on the Internet. The needs for environmental decision making and spatial planning will have priority. The dissemination of the information in Norway digital is based on new technologies, partly open source software and standards for Internet distribution. There is a rapidly growing interest among the partners to disseminate data as web map services.(WMS) Downloadable data are available on standard formats. Metadata is delivered together with the data. The Geoportal architecture is based on national components and on WMS, WFS, WCS web services and based on international standards (ISO and OGC). It includes both regional and local components and is used to build both a national portal (www.geonorge.no) and regional and local portals. Also some organisation/thematic specific portals are based on the same architecture. The development addresses all and any potential application field for geospatial information. It has a big variety of content, a rich set of functionality reference and thematic data and services. Much is now in daily, fully operational use such as the national portal, wms services from a large amount of agencies with national coverage, Web services and portals from local authorities. The national WMS service is based on open source software. The geoportals and gateway focus on four main topics : GI catalogue/metadata service, Web mapping, web map server clients, Downloading functionality, Information, specification, standardisation



Download functionality, access points. Many users in area planning, the environment and risk management field will need the thematic data sets for use on their own GIS applications. The

portals will be an access point making spatial data-sets available through a set of download functions. It is distributed solutions where the data will be provided directly from the various agencies own servers. The geoportals will offer the download functionality as service to other data suppliers. In this context it is a challenge to handle the differences regarding copyright and pricing policies. Today this is ranging from full cost recovery and strict licensing regimes to general free access and use. Several metadata catalogues are now running and more than 210.000 datasets with reference data and more than 50.000 datasets with thematic data are accessible through the portal. On an average there is about 200.000 downloads every day.

1.3 eKommune 2009

The municipalities in Norway have decided on a core strategy for ICT called *eKommune 2009*. This includes strategies both for surveying and spatial data, cross border cooperation, infrastructure and standardisation, integration and interoperability, ICT in local democracy and participants for the citizens. In the strategy it is stated that maps and spatial information is important both in society planning and for value adding services directed to the industry and to the citizens. Access to spatial data is essential for local government and for development of quality services. For the industry there is good potential for development of services based on geographic information. In this strategy participation and influence for the citizens is highlighted. By facilitation participation in the political decisions in the municipalities through electronic channels for dialogue between the citizens, the municipality and the politicians, the political arena is broadened and the possibilities for the citizens for real influence is increased. This will lead to better knowledge about the needs and the challenges that concerns the citizens.

An increasing number of regional GI portals are opened the last years, many in collaboration between neighbouring municipalities. The collaboration often has defined two main activities. One activity is to join forces in first time data capture/storage, maintenance and distribution of various spatial data sets. The second activity is to develop and run a common web-mapping application. Some major benefits achieved from such collaboration are

- GI catalogue/metadata service
- Shared cost through establishing a common IT/GIS infrastructure and
- Access to GI expertise by employing a project manager with long GIS experience.

Municipal experiences and opportunities. In the municipalities there are new possibilities with WMS as important condition for better access to data and better participation in municipal processes. A good example is Bärums municipality who has participated active in the geoPortal project. Bärums municipality has long experience with internet distribution of geographic information both to the public and for internal use. Bärums is an active municipality within development and use of new solutions within ICT and GIT, they have interested and demanding users within the municipality, a liberal attitude to the spread of information but they recognize sometimes conflict between the objective on free float of information and the demand for income of the same information. The chief surveyor in Bärums summarise the basic improvement with WMS as increased information access, information

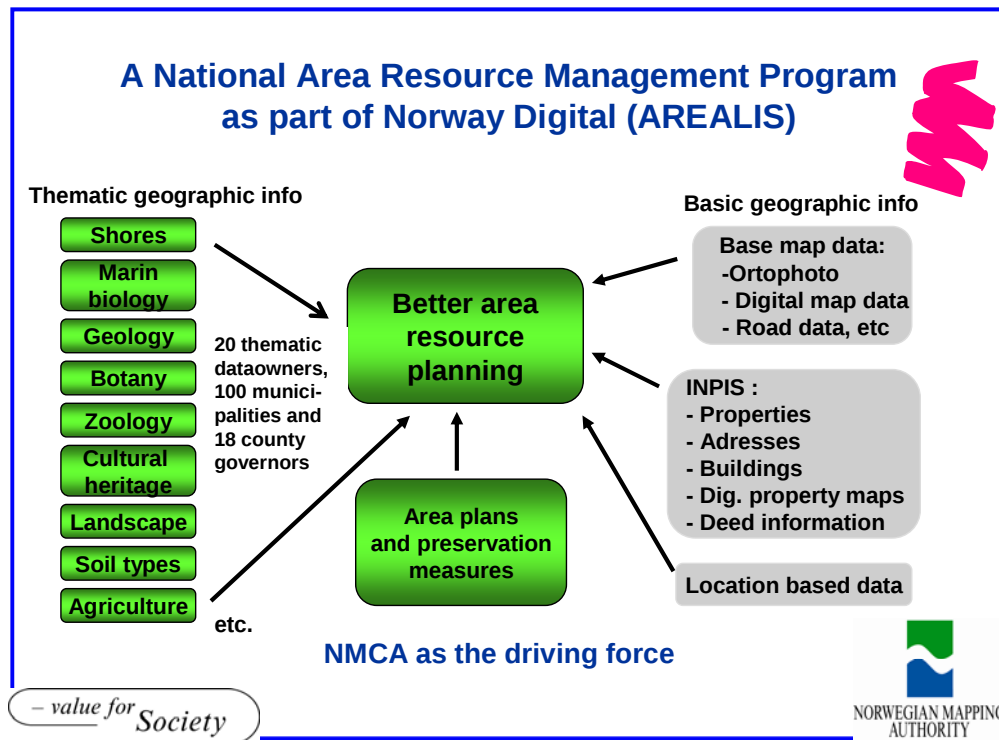
directly from the source, always updated information (or at least dated) and independent of system and organisation.

In a municipal context this means better preparation for decisions, core information basis and a more efficient distribution system compared to the traditional print and copy process. WMS gives better information exchange within the organisation and with the citizens in hearings and makes it easier to make regional (intermunicipal) map solutions – flexible for different demands. It is crucial to invest in competence and good guidance. It is also important to test the possibilities and the limits within the organisation and to choose a solution that is most suitable for your municipality if you should have in house services or buy services at a web-hotel.

2. ENVIRONMENT MANAGEMENT AND SPATIAL PLANNING

2.1 Arealis

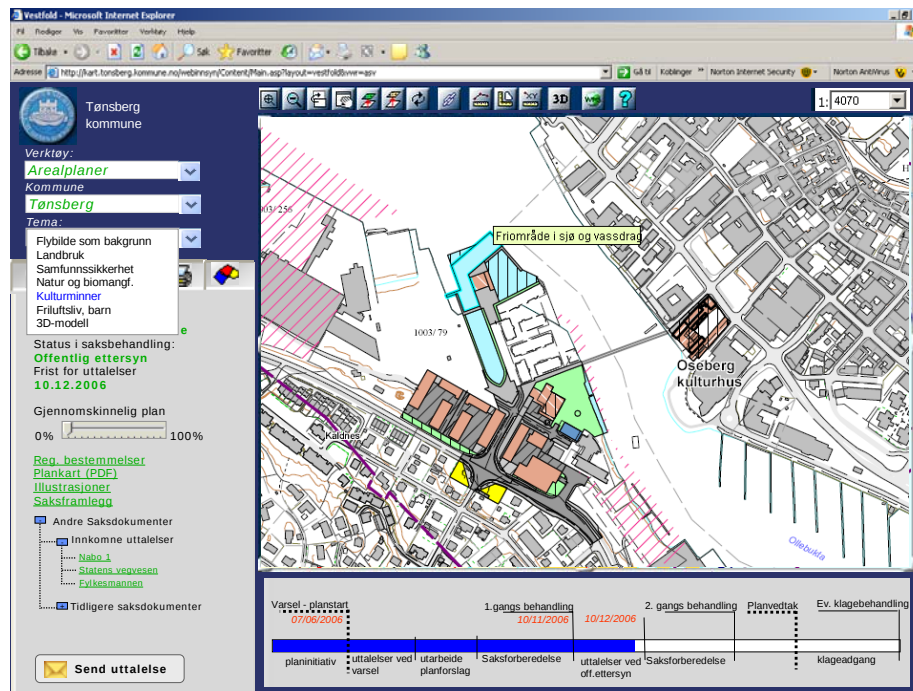
Arealis was a national project initiated by the Norwegian Ministry of the Environment in 1997. The main objective of the project was to make environmental data and land use information available at national, regional and local level and especially for planning and natural resource management. The project focused on co-operation, standardisation and extensive information activities to achieve the objective. From the very beginning the Arealis project has chosen the Internet as a strategic information channel. Arealis was a program focusing on the environment management and to make sure that there was a sustainable approach in the spatial planning and that relevant information was made available both for the planners, the politicians and the public. Arealis is now integrated in the Norway digital program.



Several successful web-mapping applications focusing on GI for environment and area planning has been launched both on national, regional and local level. The further development gives an opportunity for better access and participating from the citizens in planning processes. The needs for environmental decision making and planning will have priority. Project including 3D visualisation is also tested for planners and citizens to view consequences of various construction proposals like landscape analysis, risk assessment, tourist information etc.

2.2 Digital Planning dialogue

Digital Planning dialogue is a joint project between twelve Vestfold municipalities, Vestfold County Municipality, the County Governor of Vestfold, Vestfold University College and the Norwegian mapping authority. The background was a need for a better overview in the planning process so that the citizens, Architects, Property owners and politicians more easily can be updated and achieve status in the Planning process. The project aims to integrate existing municipal geographic information system with other relevant applications and data sources to improve current planning processes and increase citizen influence on municipal planning. The pilot is a tool for direct information flow and dialogue both for the authorities, media and for citizens at various stages in the planning process.



Some output of the project:

- More efficient executive work
- Faster processes in case handling of plans and building applications
- Strengthened information services
- Transparency in the planning process (e-democracy)
- Increased contact and more predictable processes for Land owners and other business
- Increased citizen influence on municipal planning.
- Increased accessibility of information from municipal planning
- Realise gains from ICT- investments
- Web-based handling and filing system
- Cooperation on Geodata
- Web-based GIS tools
- Participation in national important development work

2.3 Risk management

In Norway the municipalities are responsible for spatial planning and building permits. As part of the municipal spatial master plan it is now a demand that the municipality should carry out risk and vulnerability mapping and analyses. Such maps and analyses can also be required at a more detailed level before building permits can be given. It is a municipal task to make sure that spatial planning and building permits is carried out so it can be guaranteed that it will not create danger for people, environment and material values. It is a demand to have an overview of the risk and vulnerability in the municipality. Some guidelines are made to assist the municipalities in this work. «GIS in risk management and spatial planning ». These guidelines give good examples on how to use spatial data and GIS tools in these fields.

Through a good planning process the municipality make sure that new building areas are located so they are secure. It is important that risk information are easily available when the building permit are handled, so we do not locate new buildings in slide exposed areas, and that flood possibilities are taken into consideration. Many of the risk related GI data can be used for preparedness and risk management, by the risk management organisation, the fire corps, the social security management etc. There is made some checklists for the municipalities that list the most typical risk and vulnerability problems that could be present in a municipality. For all R&V item there is also an overview over relevant laws, directives and rules that put up demands for security precaution in the spatial planning, like rules for water management, noise descriptions, slide and other exposed areas, demands for security zones around industry areas. The municipality could also put out its own objectives for security in the planning like for traffic security.



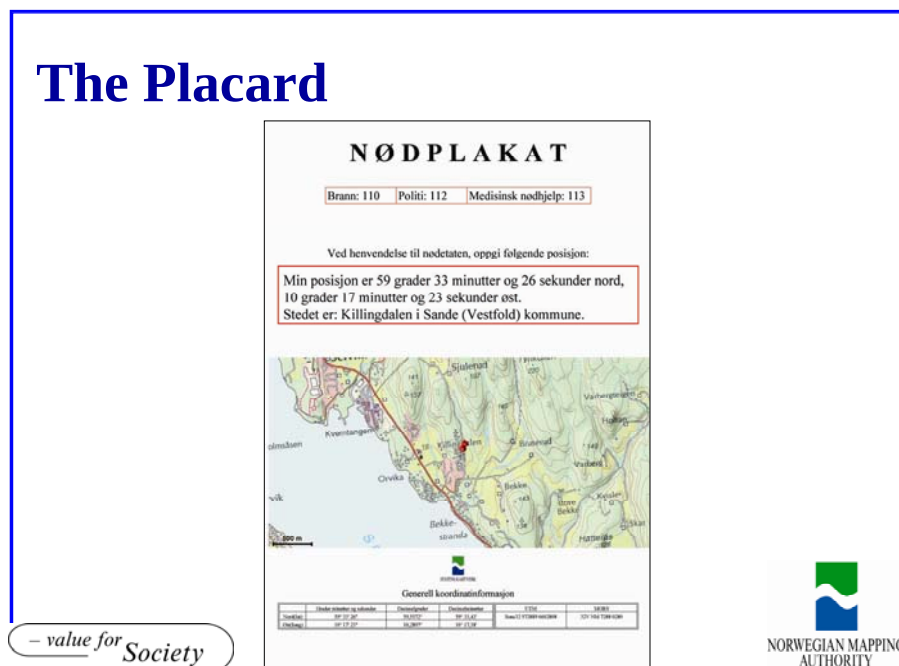
2.4 SmartRap

One example of use of spatial information and internet for emergency situation is the SmartRap system. It is a pilot program developed by the National Food Security Agency, the National Mapping and Cadastre Authority, the private companies Gecko and NorKart. The main objectives are to design and build distributed systems for use in case of emergency, such as natural or manmade disasters. The system is designed so all information is collected in real time by different Web Services and Geospatial Services directly from official databases. The system shall have the capability to produce notification lists with names and addresses inside a defined buffer zone and send warnings by SMS and voice mail directly to the people, companies or farmers inside this buffer (notification Zone). The distributed systems for use in case of Emergency consist of three different modules that communicate with each other and

with several web services in real time. This is a registration module, a map client and a notification module.

2.5 Emergency Placard

Other examples of spatial data in use for emergency is the emergency placard that gives the citizens the an easy way of knowing the coordinates at their house, cabin or other places of interest to use in case of emergency.



3 CONCLUSIONS

These examples and more not mentioned demonstrate the need of spatial information as tool in many of the day to day tasks. It is a clear need for a core framework in each country and also by authorities at local level to achieve the benefit for society of these tools. The European INSPIRE directive is one part of such a framework and the same development we find all over the world. It is important that the infrastructure for spatial information at the same time is serving the eGovernment strategies.

To achieve this there is a need for

- Commitment across sectors and authorities on a common strategic direction;
- Corporate data and information must be easily accessible and usable across agencies and by external users in the private sector and the local community;
- Responsibility for efficient management and updates of the information at each relevant authority.
- Avoid duplication of data and development effort to minimise the costs of development and support of NSDIs

- Core development and advisory forums to establish guidelines, standards, integration, logistics and user support,
- Involvement and acceptance of the private sector in adapting standards, interfaces and participating in developing and managing of relevant LIS/GIS supporting both data owners and data user
- The architecture must incorporate standard Intranet and Internet Web access mechanisms so that secure data access can be provided directly to the application, distributed spatial object, application server and metadata/query interface layers.

REFERENCES

EU ePractice website: <http://www.epractice.eu>

- Norway Digital

http://www.statkart.no/Norge_digitalt/Engelsk/About_Norway_Digital/

The ISO TC 211 web-site : www.isotc211.org

The NMA WMS client : www.geonorge.no (Norwegian)

The OGC web-site: www.opengis.org

UN portal on e-Government: <http://www.unpan.org/egovernment.asp>

BIOGRAPHICAL NOTES

Kari Strande is International Director at the Norwegian Mapping Authority. She is chair of FIG WG 3.1 task e-Government for e-Citizens. She is a local politician and engaged in promoting better tools for decisions for land management and environment. She is also working with development cooperation and spatial infrastructure projects as tool for development. She is coordinating an exchange program for young surveyors in Vietnam, Laos and Norway

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