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Published in:
Proceedings of UDMS '06

Publication date:
2006

Document Version
Publisher's PDF, also known as Version of record

[Link to publication from Aalborg University](#)

THE CITIZEN AS DATASUPPLIER IN E-GOVERNMENT

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ABSTRACT

This paper reports on an ongoing study of how to mobilise and utilize the citizen as data supplier in e-government. The role of the citizen is seen in the context of public participation, and a number of possible application areas for online tools where the citizen can serve the public administration with data are described. Existing applications where citizens acts as observers of flora and fauna are described and the limitations of these systems are pointed out. A system architecture for a prototype that is part of the project is sketched and finally the ideas of public participation and citizens as data suppliers are seen in the context of the forthcoming reform of the Danish public administration.

INTRODUCTION

Through the last decade much attention has been directed as to how the public sector can serve the citizens through digital government. The focus of this project is the opposite; how can the citizen serve the public administration by acting as a data supplier? The citizen already plays an active part in serving the public administration with data and information necessary for the administration of e.g. taxation, education and healthcare. The focus of the present study however is data and information related to environmental and property administration, planning and land management. This kind of public administration relies heavily on spatial data, and often data with a high degree of geographic and thematic detail. Such kind of data is expensive to collect and maintain, and hence one possible aspect of considering the citizen as data supplier would be one of cost effectiveness.

Another potentially interesting aspect is the citizen's inclination and opportunities to engage into participatory processes in planning and administration that results from the decentralised democracy. Public participation is an integrated part of the urban and regional planning procedure in Denmark - as in most other democratic countries. The citizen's contribution to the planning process is considered enriching and very important in the planning process, and often the public participation and joint responsibility of the planning is critical to later local acceptance of the results of the planning process.

In principle, public participation is a win-win situation, improving both process and results for the public authorities as well as the citizens. In real life, however, it is often difficult to engage the public in the participatory processes, one central reason being the effect of the

citizen's efforts which are often not perceived to be consistent with the endeavours made by the citizen. Whether real or not, this perceived lack of effect causes many citizens to choose to remain ignorant of, or not engage into participatory processes, a phenomenon known as rational ignorance *(Krek 2005)*. To overcome this barrier the perceived relationship between endeavour and effect has to be changed in such a way that the citizens are left in no doubt that their contribution makes a difference. Possible ways to achieve this can be to hand over more decision-making power to local neighbourhoods or to give the citizens enhanced options of serving as data suppliers, specifically with regards to data and information that can not otherwise be retrieved, due to e.g. cost or accessibility. However, the public authority has to give careful considerations as to how to handle the data before encouraging the citizens to supply them; clearly the data supplied by the citizens must be respected as trustworthy and be acknowledged as important if the participatory process is to be taken for granted at all. But if the contribution from the citizen is to be of any significance the quality of the supplied data has to be of a certain or at least known standard. This demand is per se a barrier for the citizen that has to be overcome by system design. If the public administration, the citizens as individuals, and groups of citizens (ngos, local community groups and the like) are to be able to exchange and share data, there must be well defined concepts for marking or declaring the data in ways that at the same time respect and acknowledge the specific value that characterises the data supplied by the citizens, and clearly distinguish them from the public administration's own data. In the public administration's data handling system the citizen supplied data has to be an integral part and not left out of administrative processes and analysis, but the contribution they make should also be identifiable based on the aforementioned declaration.

This paper presents a project that aims at identifying potential benefits, obstacles and possible solutions with an increased use of the citizen as data supplier in e-government. The project aims at building a theoretic framework, a model, for the citizen as data supplier, and bring the model into use in one or more specified application areas. The project is still in its early stages, hence this paper will primarily focus on the motivation and possible framing of the project. First the intended application areas of the project will be described. Next existing applications and initiatives with the citizen in the data supplying role will be described and an analysis of the difference between the existing applications and the ideas in this project will be brought. Finally some sketches of a possible online application based on state of the art online GI technology will be made.

SUGGESTED APPLICATION AREAS

Considering the concept "the citizen as data supplier" many different approaches can be made. In this project the authors attempt to unite three main view angles; public participation, data quality and state of the art technology. The technology that enables data supplying via websites is evolving fast, perhaps even faster than the relevant authorities can utilize them. A survey of GI-based online web sites offered by public authorities in Denmark (*Arleth and Campagna, 2005)* shows that although the level of technology utilisation is generally high, unexploited technological potential is available in state of the art technology. A central issue in the project will therefore be design and implementation of a prototype for an online data supply system. The development and design of this prototype will happen in mutual reaction with the development of the theoretic framework for the citizens as data supplier. Two application fields are at this point suggested for the implementation of the prototype; property

administration – with special focus on dwellings - and planning and administration of rural areas.

Data concerning buildings play a central role dealing with geoinformation infrastructures in Denmark as well as at the European level(e.g. INSPIRE). The Danish Register of Buildings and Dwellings (BBR) is an object oriented administrative register established in 1977 due to the purpose of providing information for statistics and taxation. In the BBR specific information concerning all buildings in Denmark are stored including unique geo-referenced addresses functioning as the primary key to Danish administrative databases. The owner is responsible that the correct areas, materials and use is registered and has to inform the public authorities if changes are made. However, the poor quality of the BBR has been of great concern for several years. Especially the definitions of areas in the BBR are not easy for layman to understand and the conflicting interest due to changes that will increase taxation is considered a general problem. At the moment several attempts are made to digitalize the various design and construction processes of the built environment as well as its interrelations with the public administration. Due to those intents increasing efficiency and data quality during the processes related to handling building permissions is considered of great importance. In this process a central aspect must be the question of how to facilitate the ability and willingness of the citizen to provide the data of interest.

The other suggested application field, the planning and administration of rural areas, stand amidst a major reform. Through the last 30 years the responsibility for managing the legislation and planning concerning rural (meaning non-urban) areas in Denmark has been appointed to the 14 counties. Urban planning and development has been handled by the municipalities. By January 1st 2007 the 270 municipalities will be merged into 98 new, bigger municipalities. The counties will cease to exist, and their present tasks will be split between the municipalities, the national administration and 5 new regional administrations. The majority of the tasks concerning the management and planning of rural areas are henceforth appointed to the municipalities. Seen in the light of decentralised democracy the case of the rural area planning makes an interesting and partly oppositely directed move; on the one hand the municipalities will become bigger, whereby the individual citizen may feel the distance between citizen and decision maker is increased. On the other hand the administrative task is moved from a higher administrative level to a more local level, whereby the distance between the decision makers and the affected citizens is significantly decreased. The scale of the area a certain plan is concerned with has much to do with the commitment and participation from the general public; the smaller the scale, the closer to the individual person's house and surroundings, the more likely they are to engage into discussions and participatory processes related to the plan. It is therefore of interest to see if the reform of the planning system results in an increased interest in planning and administration of rural areas. In a time where the conflicts between exploitation and protection of natural resources and areas becomes ever more pressing, it must be considered of great importance for the democratic process, that a broad sample of the public participates.

EXISTING APPLICATIONS AND INITIATIVES

In the area of planning and administration of rural areas a number of online applications where the citizens can supply data can be found. A survey performed in January 2006 showed that a number of counties in relation to their web-GIS had applications for reporting findings of hogweed (3), otters (1) and special medieval flora (1) (plants that were common cultivated

flora in medieval ages, some of which now are rare and only grow wild). All the applications work in the same way; a web-GIS interface can be used to zoom in to a location where the citizen has spotted e.g. hogweed, the citizen can place a marker where the weed has been observed and supply additional textual information about the observation. The experiences with the applications in the three counties (Frederiksborg, Vejle and Viborg) are fairly consistent. An initial worry that the application might be "spammed" by many false observations turned out to be groundless. Only serious submissions have been received, and the vast majority correct or very likely to be correct. The submitting citizens is asked for an email address or name, and by this way it can be seen how many citizens use the application, and how many observations each citizen has made. For more advanced observation – such as otter spillings or rare flora – the citizen can also be asked for a photo proof of the observation. The application for medieval flora registration is the least successful of the applications, most likely because this kind of registrations require a fairly high degree of botanical knowledge. But all three counties claim that the overall experience of serving the applications is positive, that valuable data is submitted by the citizen, and that the amount of information collected in this way exceed what the public authority would be able to collect within the limits of their budgets.
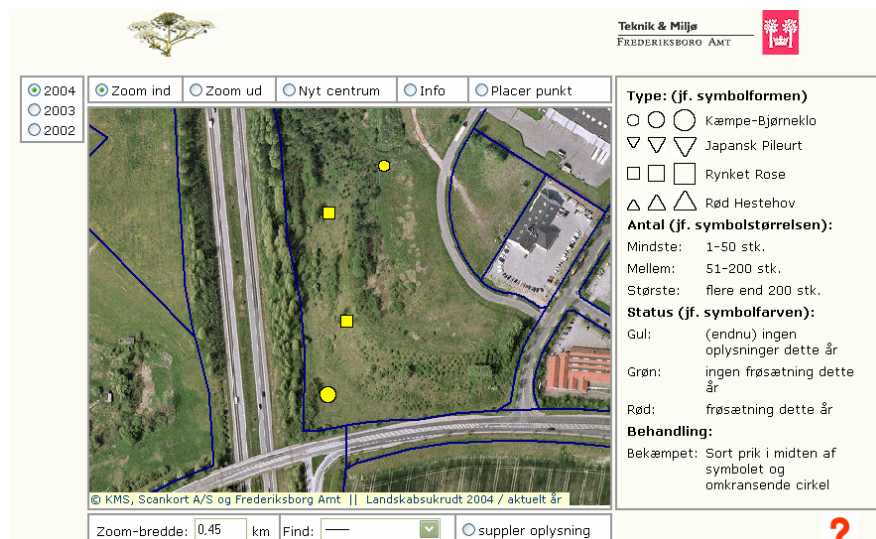

Figure 1: Online tool for registering occurrences of i.e. hogweed.
The citizens can place a marker where the weed has been observed and supply additional textual information about the observation.

In November 2005 then Danish Society for Nature Conservation (DN) (*Danmarks Naturfredningsforening, 2005)* made a call for an increased use of the public in the process of monitoring the state of the Danish flora and fauna. This monitoring is performed by NERI (National Environmental Research Institute), but DN finds their monitoring too limited. To increase the number of habitats and species that can be observed and monitored DN suggest a system where citizens can supply information about findings of relevant plants and animals. An example of such a system can be found in Sweden, where artportalen (the species portal) (www.artportalen.se) has been in use for a couple of years. This portal works much the same way as the applications presented above, only the number of species – flora and fauna – that can be made registrations of is very exhaustive. Several thousands observations are reported every month. The portal is run by the Swedish Environmental Agency, and the collected data can be used by anyone with interest in the subject. The observation is displayed in the system

(map and searchable database) immediately after it has been reported, and is subsequently verified by authorised personal in relevant organisations. The Danish Forest and Nature Agency under the Ministry of the Environment intents to establish a similar system in Denmark. The experiences and the considerations about the data quality are much like the ones made by the counties; only serious submissions are made, clear mistakes can fairly easy be spotted and eliminated by experts and the amount of observations itself make the data valuable. An important side effect that is emphasized by DN is the increased sense of ownership and responsibility of the natural resources that is imposed in the observers through their participation in the monitoring.

A conclusion on these experiences could be that it is indeed possible to involve citizens in the monitoring of environmental and natural issues, and that systems can be designed that make it easy for the citizen to submit data. The data quality can fairly easy be verified at a level that is appropriate for the intended use. What is important to stress here is that this intended uses in the above mentioned applications are not very extensive, they have clear limits. The data – e.g. the observations from the artportalen - can not be accepted as scientific proof, although obviously it performs a valuable empirical evidence, or at least indication, that is highly useful for planning scientific activities. The data is not, and can not be used for legal administration. This would demand a higher degree of systematism in the data collection, something that can not be required of a citizen that voluntarily reports observations. Most likely legal administration that might have wide ranging effects on land owners possibilities to exploit their properties will have to rely on data that has gone through a more thorough verification of the quality and correctness of the data. Hence, whereas the data from such applications as artportalen can be very useful as empirical evidence for user communities and NGO's acting as civil watch dogs, something more is required if the data is intended to actually feature in the public authorities´ legal administration systems. An important question for the current project is whether the citizen supplied data should be integrated in the legal administration in such a way, or it should remain as indicative monitoring? Even at this point public authorities base their administration on data of varying sources and quality. Metadata and data quality declarations are central to a qualified data handling, and including the citizen supplied data in the administration systems might be just another issue of thorough metadata and data quality descriptions. The project will put much emphasis on these considerations.

SUGGESTED TECHNOLOGY FOR THE PROTOTYPE

As mentioned the project aims at building a theoretic framework, a model, for the citizen as data supplier. Basically the suggested model should be general enough to encompass any situation in which the citizen serves the public administration with data, but at the same time sufficiently detailed to point out critical and problematic parts of the dataflow. Important fields of further study are, as mentioned above, the mode of exchange and the declaration of the quality of the data supplied by the citizens. Since a large number of the issues of concern relate to the actual system design of the application for citizen supplied data the project also encompass development of a prototype. Relying on open standards a prototype of a Web based Planning Support System (WPSS) *(Peng, 2003), (Campagna and Deplano, 2004)* giving options for supplying and sharing data in a variety of forms and formats will be developed and tested in one or more application areas. In this section the technologies and considerations of the system architecture are brought. The much talked about 'spatial awareness' will be taken for granted, and integrated and implemented through the appliance of open interfaces to make both geospatial data and services discoverable and accessible.

The prototype will be based on the concepts of distributed GI, which accommodate both traditional concepts like WebGIS through HTTP, Internet GIS utilizing both ex. TCP/IP and other mobile communication protocols, and Mobile GIS incorporating PDA's with built-in GPS support. Location Based Services is seen as a way of deploying the above listed technologies. The path from traditional GISystems over client/server GISystems to distributed GI services act as an important point of orientation as to aim the development of the technical solutions in the project. A prerequisite will be that the solutions are interactive, web based, distributed, dynamic, cross-platform and interoperable.

In order to keep development costs to a minimum, newly developed applications based on asynchronous JavaScript, XML and image tiling techniques[1] must be used for web based visualization at the GI nodes which are collecting and reporting information in the different scenarios. These data suppliers will be able to deliver data for non-profit use as either free or low-cost. Likewise it will be a fundamental base to make use of Open Source GI technologies, like the UMN-mapserver technology: http://mapserver.gis.umn.edu/..
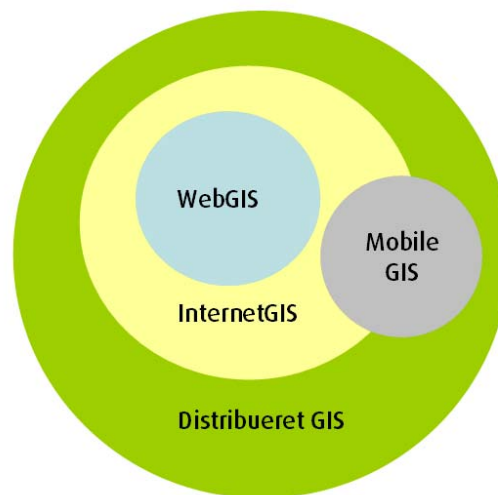

Figure 2: Concepts of distributed GI.

As an example of the use of GeoServices, an interface where a user is going to report on some specific features in space, the user could request a common GeoService for, lets say, the shortest path to the place in question.

But not only the technical interoperability is important, also the semantic interoperability is fundamental both for the success of this concrete project, but also for the possibilities for others to make use of the findings. That is why standards for distributed GIServices will be based on the Open Geospatial Consortiums industry standards, the Open Geodata Interoperability Specification (OGIS), with specifications like the Web Feature Service (WFS) specification, the Web Map Service Specification (WMS), the Web Coverage Service (WCS) Specification and the Catalogue Service (CS) specification.

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[1] http://maps.search.ch, http://maps.google.com, http://maps.a9.com, http://virtualearth.msn.com, http://earth.google.com and http://www.geofusion.com.

Web services should be based on architecture models. The Service-Oriented Architecture (SOA) is one such architecture model which purpose will be to support an application that is able to integrate the different existing computing technologies. A SOA is essentially a collection of services.

CONCLUDING REMARKS

Public participation is no trivial task, and it requires dedication and determination from all involved parties to succeed. It cannot be taken for granted that participation by groups of citizens actually leads to different plans or a more just development since the process of empowerment through participation can be undermined by the motives of the traditional power holders *(Carver, 2001)*. Threats to the participatory process may emerge from a lack of will from the planners due to a specialist's distrust in the publics' abilities to respond to the suggested plans in a qualified and relevant manner. But the most serious threat appears to be a lack of political will seen in some municipalities to perform planning and participation *(Høgh and Pedersen, 1998)*. The very assumption that the population as such actually want to be actively involved may not always prove correct, as planners that really do make an effort to involve the public in the planning process often get very little response. The reasons for this can vary; one negative explanation can be that the population do not believe their involvement will make any real difference. A more positive reason could be that the population is generally content with the planning and development performed by the authorities and have trust in their judgements. For most Danish cases a combination of these and other reasons probably explains a low commitment from the public to participation in planning processes.

To this point no investigation has proved that the presence of online GI-based facilities substantially improves the participation, although a number of professionals (such as planners and software developers) express this as their general impression. When the authors still consider it worth while, and even very important, to bring the options for participating in the planning, via online tools like the ones described in this paper, some steps further up the ladder of participation *(Arnstein, 1969)* it is very much motivated by the forthcoming reform of the public sector. It is indeed possible to imagine that in the processes of splitting, merging and rearranging the elements of the public sector, the monitoring and management of the landscape, flora and fauna will suffer from lack of attention, regularity and consistency. Although in principle the same professionals – planners, geographers, biologists etc – are to take care of the administration of the rural areas in the new public authorities as in the present ones, the same can be said about the political level. It is certainly possible that municipal politicians, who have considered the legal – and rather strict – administration of the rural areas performed by the counties as an obstacle for their plans of development, will now choose to put less emphasis on protection of the ressources when they take over the administration. The very suspicion that this might be an effect of the reform is sufficient motivation to build up applications that enables the citizens to act as wathc dog for environment and nature. The prototype of this project is thought in to this discourse. But more important it is thought as a positive means to bring the public a sense of influence and a feeling of ownership of the landscape, flora and fauna. Ultimately the hope is by this and similar attempts to empower the citizens, to reinvigorate the local democracy in a country where prosperity and stabile political conditions perhaps have made the public too sluggish with these matters.

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