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Cooperation Between Public Organizations in the Implementation of Spatial Data Infrastructures (SDI)s: A Case Study from Sweden

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Abstract. *Questions concerning cooperation are particularly relevant in complex projects where people from many organizations are involved and work together. There is a need to study and evaluate how better knowledge about cooperation can improve and make future projects more efficient. This case study is part of a research project aiming at evaluating the importance of abilities related to cooperation in the implementation of Spatial Data Infrastructure (SDI) projects. The problem at hand is that, many complex projects engage key personnel on different levels with limited experience on how to deal with questions of cooperation – both in planning and practical work. The aim of the study is to evaluate problems in cooperation using established theories and knowledge on cooperation, as well as to analyse whether problems of cooperation related to implementation specifically were a bottleneck in the studied project. Data capture is mainly based on open ended interviews. The study utilizes a framework including theories of cooperation and a model "talk – decision – action" (Brunsson, 2006). The results pointed towards problems in especially the action category. There was a lack of reciprocity between the cooperating parties, a lack of awareness about the need of daily cooperative behaviour in implementation activities and a potential risk of a free-rider problem. The most important lesson from the study is that, cooperation is a crucial component in a project of this kind, and that needed cooperation in practical implementation activities should be paid a lot of attention also in early planning activities.*

Keywords*: cadastral index map, cadastral organisations, cooperation, implementation*

Introduction and background

Cooperation is believed to be a key factor of success in many areas and has also gained a lot of attention as a subject of scientific research (see for instance Axelrod, 1984, 2000). Often cooperation is looked upon as a counterpart to *conflict. A*fter WW2 the first wave of interest was boosted by ambitions during the cold war to avoid conflict and gradually improve cooperation between nations. Cooperation in and between different types of organisations has also gained a lot of interest, see for instance Ostrom (1990). In Sweden there is nowadays in many areas complex interacting between governmental, municipal and private organizations where questions of cooperation are regarded important. This paper is focused upon the construction and operating of the national Swedish cadastral index map in cooperation between governmental, municipal and, to some extent, private organisations. The rapid technical development, especially concerning IT, has in several fields accentuated the need of coordination by means of cooperation. In this study the word cooperation is used in a general sense (following traditions from Axelrod and Ostrom) and is not defined in detail. The general development concerning literature covering questions of SDIs (Spatial Data Infrastructures) as well as cooperation is described in Olsson (2009).

In Sweden, geoinformation and the construction and operating of SDIs (Spatial Data Infrastructure) is one in this context quite typical area where policymaking, strategies and national plans show high ambitions (Nationell Geodatastrategi, 2016) but – at the same time – existing organisations and their employee´s often are not prepared for the challenges concerning effective daily cooperation internally and externally. This can, and often does, cause unforeseen problems in advanced inter-organizational projects which affect timetables, costs and outcome. Within the field of SDIs in Sweden new advanced projects are coming up aiming at nationwide accessibility, updating on a daily basis and the use of new common standards. One such typical project (National availability of the digital local plans – Towards 2021/Land Survey) suggests that all the countries detailed physical plans will be made available through a national digital access point. All information will not be stored in one place, it is a model for making constantly updated local information available. An important base for this solution is therefore development and projects within the National Board of Housing, Building and Planning (Boverket) how information in detailed plans and descriptions should be treated digitally.

In many countries there are nowadays also governmental ambitious programs aiming at digitization of a broader spectre of activities and services. They can often concern a number of different authorities and other organizations, governmental as well as municipal and private. It is becoming increasingly important that cooperation functions and evolves in a positive way in these vast and often very complex programs if these will be realized as intended. Cooperation is important on the strategy level and in the operative planning of concrete projects but also in the concrete and practical implementation activities. In this phase often people from different organisations, sometimes a little unfamiliar with the special

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demands of cooperation, have to work together close with concrete programming and other tasks.

From a Swedish perspective, the following activities are now hastily entering the scene. The strategic innovation programme Smart Built Environment is a plan that outlines how the built environment sector can contribute to Sweden's journey ´to the global forefront of the new opportunities of digitalisation. A new governmental authority for questions of digitalisation was founded in 2018 and aims at coordination and support of public digitalisation to make public administration more effective and adaptive to its purpose. The National Land Survey of Sweden is engaged in increasing standardisation of basic data and making the exchange of information in the public sector safer and more effective. One can predict that such programmes will result in a lot of projects and other activities where questions of cooperation will be relevant and even decisive in some cases. The activities will be of different nature, for instance strategic planning, formation of projects and other operative activities, but also concrete implementation activities where people from different organisations meet and work together with programming, implementation of new standards etcetera.

The aim of this research is to analyse, using established theories and knowledge, whether problems of cooperation specifically related to implementation were a bottleneck in the case project. This aim is based on an early hypothesis that too little attention is devoted to capabilities concerning cooperation in projects, especially at the practical base level. The chosen method is a qualitative case study, due to the complexity of questions of cooperation. The decision to execute the case study was inspired by Koerten (2006), who concludes that we need more knowledge about organizing, interorganizational networks and cooperative strategies. This calls for unorthodox researchers willing to use theories that focus on what goes on in people's minds rather than focusing on organizational structures (Koerten, 2006).

The project studied in this paper is a predecessor from the beginning of this century focused on a new national and digital cadastral index map of Sweden. In relation to cooperation, there are clear resemblances with new projects coming up: national, municipal and to some extent private. Many people on different organizational levels are participating. Advanced planning and development as well as more basic digitizing, and "working the floor" is included. Therefore the case project can hopefully contribute with useful experiences for new projects. In this context it can be meaningful to study an already accomplished project from the first decade of this century with some of the important ingredients that can be expected also in future activities and study it more thoroughly from the angle of cooperation.

Section 2 presents the theoretical frame and Section 3 the research method and basic facts about the case project. Section 4 presents the results, Section 5 analysis, and discussion and Section 6 conclusions and recommendations.

2 Theoretical frame

Scientific studies about cooperation are abundant, both in numbers and in terms of research areas. Research has focused on theories but also on a variety of empirical issues, such as, economy (e.g. Buckley and Casson, 2010), sociology (e.g. Kollock, 1998), management and organization (e.g. Jones and George, 1998), and biology (e.g. De Waal and Davis, 2003). Many theories about cooperation have evolved from Game Theory (e.g. O´Neill et al, 2004). Axelrod (2000) concludes that the literature on Cooperation Theory is so vast that authors can be forgiven for not being cognizant of all work related to their research topics. Theories of cooperation is also being developed in close connection with other areas including sociology, psychology and biology. Wilson and O´Brian, (2009), state that a rapid process of integration is taking place for theories of cooperation in both evolutionary biology and the human social sciences.

Considerable knowledge and many theories about cooperation exist today. An overview concerning cooperation in SDI-literature overview is presented in (Olsson, 2009). In the context of this study, however, some general knowledge and theories about cooperation are considered more useful. A number of established knowledge and theories in the field of cooperation are chosen as a frame for the interpretation of the findings. From Axelrod (1984), three aspects of cooperation are of special interest here, namely the aspects of Reciprocity, Stability and Robustness. These aspects can be used as indicators pointing at success or failure in different co operational situations. Furthermore, two of Axelrod's (1984; 2000) findings concerning cooperation between and within organizations have been chosen for this case: 1) many contacts between parties are beneficial for cooperation, and; 2) cooperation within organizations often spontaneously appears at lower levels and can seek its way upwards. The other way around is much more difficult to achieve. Theories used should be relevant for both cooperation between individuals and organizations, and that the level of experience of cooperation could vary a great deal. These aspects pointed toward the Adaptationist Theory of cooperation in groups, ATCG (Price and Johnson 2011). The ATCG theory is primarily an effort to put together scattered findings of a large number of evolution-minded researchers and to integrate these findings into a single coherent theory. From the ATCG theory has been judged especially relevant in this study the cycle of frequency-dependency for three cooperative strategies. These strategies are *free-riding, reciprocity* and *unconditional cooperation.* A risk of free-riding is often present in co-operational situations. The decision situations in the studied project could often be both hard and complex. Theories about cooperation leaning towards decision making could therefore be useful. In this case has been used A framework for analyzing institutional choice, described in Governing the commons (Ostrom 1990) and also the concept of Awareness in relation to cooperation as described by Thellufsen (Thellufsen 2008).

Ostrom (1990) states that Institutional-choice situations, both constitutional choice situations and collective choice situations affects the rules used in operational situations. Decisions made in collective choice situations *directly* affect operational situations. Decisions made in constitutional-choice

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situations *indirectly* affect operational situations. Ostroms framework is judged to be relevant and interesting in the study because the situations of conflict-cooperation described often evidently are either of the constitutional type or the collective-choice type. Referring to Thellufsen it can especially in certain situations be fruitful to use the concept of "awareness" for an analysis. Is there a lack of awareness and what can this say about the co-operational situation? Or has the level of awareness suddenly improved and how does this relate to eventual change in cooperation?

In the studied project it was judged meaningful to devote some extra interest to the implementation phase. Here the concepts of Talk, Decision and Action in organizations by Brunsson (2006) were judged useful. *Talk* includes policymaking, strategic planning, general discussions, et cetera. *Decision* is the operative level, for instance formal decisions to start new projects, budgeting, detailed planning and manning etcetera. *Action* is concrete, practical work. In the studied project a lot of technical and practical work and daily communication between working personal is categorized as *Action.* According to Brunsson (2006) there is no straight line from *Talk* to *Action.* Instead these three stages tend to live their own life. In this study, the concepts are used as a model that is believed to reveal interesting facts about cooperation within the study.

3 Research design

The study at hand is an embedded case study (Yin, 2003). The study mainly employs a qualitative approach but as there are some numeral results as well. There is resemblance also with the mixed methods approach, more specifically explorative sequential mixed methods as deifned by Cresswell (2015). The data collection is based on open ended interviews (see Yin, 2003) with a number of participants in the project, representing different levels in the project, both management and working technicians. Inspiration here was also Flick (2009). The study is based on both the central organization, National Land Survey of Sweden (hereinafter, "Lantmäteriet") and four municipal cadastral authorities (MCAs), which have relations to the studied project. The general idea was to study four carefully chosen MCAs using mainly open ended interviews with key personnel, supervisors on low level and low to high level management in all four municipalities studied and in Lantmäteriet. Interviews were completmented with a questionnaire directed primarily to technicians in the same municipalities.

3.1 Case description

In Sweden Lantmäteriet (The Swedish mapping, cadastral and land registration authority) developed plans to create a national digital cadastral index map (NCIM) in the early 1990s. The NCIM would be in a central database that could be updated on a daily basis and used broadly by many in society. This meant extensive cooperation between Lantmäteriet and the local authorities, see Målbild (2000a, 2000b. As many as 39 of the larger municipalities in Sweden (38 at the time of the study) have today their own municipal cadastral authorities (MCA) and own cadastral index maps. The MCAs have to follow national rules concerning

for instance property formation and updating the national cadastral register and the adjoining map. However, in many practical questions they have a strong tradition of independence and have earlier from time to time been in conflict with Lantmäteriet. The MCAs are also working in technical environments that in many cases differ from the one used by Lantmäteriet.

A preparatory project produced and partially tested a technical interface to enable the exchange of data between the organizations concerned (see Olsson ,2002). After that, a main project was established to fulfill the ambitions and link the municipal databases to the national one and secure updating and daily operation onward. This project was manned by Lantmäteriet and the participating municipalities, as well as external consultants. Eventually this project turned out successful (see Olsson & Papadoupoulos, 2006) but in the beginning ran into a lot of problems. The main problems related to difficulties in getting participating organizations and their people to communicate and act in accordance with the plans. Eventually the project achieved its goals, but both timetable and cost budget were heavily exceeded. A general feeling amongst the participants was that improvement in project results was strongly related to gradual improvements in cooperation in daily work (Olsson, 2008).

The process of establishing the new NCIM is above all a concern of Lantmäteriet and the 39 municipal cadastral authorities (MCA). All MCAs had to leap through all process steps listed in Appendix 1. This was done in close cooperation between the parties and most cooperation was of hands on type between technicians and other specialists in the participating organizations. The activities were organized as a joint project between Lantmäteriet and the Concerned municipalities. The practical work routines varied somewhat between the MCAs but were in general based on communication by e-mail and telephone complemented with telephone meetings and also meetings face-to-face either in Lantmäteriet in Gävle, or at the MCAs. On some occasions personnel from both organizations and the municipality's technical consultant worked together in the same office for shorter periods of time.

3.2 Data collection

The 38 municipalities/cities in Sweden that include a municipal cadastral authority responsible for carrying out cadastral works of different kinds are also responsible for updating the national property register and the adjoining cadastral index map. In a way it is meaningful to talk about the 38 municipal authorities as individuals. They differ for instance in general resources, used technical system, ambitions and technical culture. It would be relevant to cover the differences between them sufficiently and therefore select objects of a study on the basis of maximum variance. The interesting factors of selection are primarily the general resources in terms of qualified personnel and finances for needed investments. Roughly this can be estimated by comparing size (number of inhabitants) of the cities in question. Amongst all 38 municipalities in question it was estimated that at least 4 should be studied for important differences to be covered in a reasonable way. The following four municipalities were selected, see Table 1.

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Table 1. *Selected municipalities.*

Municipality	Size (population 2009)
Stockholm	XL (850,000)
Uppsala	L (198,000)
Västerås	M (137,000)
Sandviken	S (36,000)

The selection of persons to interview both at Lantmäteriet and in the municipalities was made with an ambition to find people with a direct and relatively long experience from the NCIM project (described in section 3.1), and a period of time daily engagement in the project. Selection of people to interview was also made with consideration to the concepts of Talk – Decision – Action (see Olsson, 2009 and Brunsson, 2006).

Table 2. *Number of interviewees representing different categories and organizations.*

Category	Lantmäteriet	Municipalities (in total)	Sum
Talk	1	1	2
Decision	2	2	4
Action	4	4	8
Sum	7	7	14

Altogether 14 Interviews were held during the years 2010–2012. The interviewees were informed and prepared so that interviews should be held in an open atmosphere and that they were free to comment on anything they judged important concerning implementation and outcome of the project, not only cooperation as such. The interviews were led by the author, who took notes during the interviews. The notes were transcribed and showed the interviewee in question for validation. The number of interviews with representatives of the municipalities is, as seen in Table 3, not in proportion to the size of municipalities but the number reflects practical decisions by the researcher to secure that relevant information for the study could be acquainted in all four municipalities In addition ot the interviews, 19 questionnaiers were filled in by the municipal authorities. The distribution of interviews and questionnaires is shown in Table 3.

Table 3. *Distribution of interviews and questionnaires.*

Organization	Number of interviews	Filled in questionnaires
Stockholm MCA	1	10
Uppsala MCA	1	4
Västeras MCA	3	4
Sandviken MCA	2	1
Lantmäteriet	7	–
In total	14	19

Relating to external validity (Yin, 2003) one discussed shortage in this study is that it refers to only one project from the beginning of this century in one rather small European country. This objection is of course relevant and the results can not automatically and without further consideration be used in any other project

or activity in neighbouring fields. However, at least from a Swedish perspective, the studied project was large, complex and quite typical for projects in this field engaging governmental, municipal and private organizations. It represents a type of project that probably will be more frequent in the future driven by demands from the INSPIRE initiative (Infrastructure for Spatial Information in the European Community) or similar needs.

4 Results

This section presents the results from the interviews. First, the findings are presented in relation to the Talk – Decision – Action categories by Brunsson (2006). Following that, the results are presented in relation to cooperation theories.

4.1 Talk – Decision -- Action

The comments in the interviews were classified into four categories – Cooperation, Work routines, Economy and Technical questions. Table 4 shows the four categories matched against the Brunsson (2006) categories Talk, Decision and Action.

Table 4. *Number of comments in interviews.*

Category	Cooperation	Work routines	Economy	Technical questions	Sum
Talk	8	5	2	1	16
Decision	14	13	1	1	29
Action	14	21	1	5	41
Lantmäteriet	21	25	2	3	51
Municipalities	15	14	2	4	35

In the *Talk* category (strategy level) there were two interviewees, one representing Lantmäteriet and one representing the municipalities. The interviews were quite consistent and pointed largely in the same direction. Questions of cooperation dominated and pure technical questions were quite absent. Interviews in the *Talk* category reveal a consciousness of the importance of effective implementation and that implementation can be problematic in projects of this type. However there is no detailed analysis or advice given connected to this. A degree of awareness was detected, but no direct recommendation on what should be changed.

In the *Decision* category there were four interviewees, two representing the municipalities and two representing Lantmäteriet. Many comments here were quite consistent between Lantmäteriet and the municipalities but there were also some differences. A tendency can be noticed here that Lantmäteriet and the municipalities do not have exactly the same view of the project and that the priorities in *Decision* category differ a bit. Interviews in *Decision* category are largely also in line with interviews in *Talk* category but here and there some more detailed analyses are done. Examples are recommendations to use deadlines more frequent during the implementation process and the value of meetings face-to-face.

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In the *Action* category there were eight interviewees, four representing Lantmäteriet and four representing the municipalities. Interviews in *Action* category reveal a lot of different views of what is important in this field. There were some differences between comments from Lantmäteriet and the MCAs but the differences are not significant. A number of comments illustrate the mentioned diversity Some comments are in line with comments in *Talk* and *Decision* categories but there are also a lot of other aspects pointed out in the *Action* category. Distinctive to the other categories, the comments to a greater extent refer to work routines and technical questions. Protruding examples are the need of a continuous workflow with no longer interruptions and the effectiveness when people from all parties involved work together within the same localities. Such views can of cause have their origin in time stress where there is competition from other projects. This might very well be the case but there are surprisingly no comments in interviews confirming this. Comments in the *Action* category show a great diversity but surprisingly many are pointing towards questions that must be solved in *Talk* and *Decision* phases of the project.

It is noticeable that comments on technical matters are just a few, and mainly occur in the *Action* category. One would perhaps expect a higher percentage because most of the interviewees in this category are technicians by profession. This indicates that questions of cooperation and work routines are of general high importance in the *Action* category and are in the centre of daily discussions about improvements and changes.

Other comments imply that internal cooperation routines and culture also affects the way external cooperation function. This and similar comments also imply that individuals have different abilities and attitudes towards cooperation. Some have been training cooperation at home and have a more positive attitude and some have not. These comments point clearly at the individual level – it is important in cooperation projects that participating individuals have positive attitudes, good personal abilities and adequate training in cooperation. This can be related to the frequency of "positive" and "negative" comments on cooperation as listed in Table 5. The comments in the "positive" category describe positive experiences and/or point out success factors. Meanwhile,. comments in the "negative" category describe negative experiences and/or point out problems, e.g., bottlenecks.

Table 5. *Number of "positive" and "negative" comments on cooperation in the different categories***.**

Category	"Positive" comments	"Negative" comments	Sum
Talk	11	3	14
Decision	17	12	29
Action	21	20	41
Sum	49	35	84
Lantmäteriet	29	21	50
Municipals	20	14	34
Sum	49	35	84

Positive comments dominate in general, but negative comments are increasing in frequency when we move from *Talk* to *Action* categories. Dominant positive issues can be summarized as "good daily communication". Dominant negative issues can be summarized as "misunderstandings and unexpected halts in the workflow". The issue that got most mentions was "to meet and work together often". This is however expressed in different ways by different interviewees. These comments are most frequent in the *Action* category (not *all* comments in Table 4 could be sorted this way and used in Table 5). Moving from *Talk* to *Action* we see that comments upon cooperation are diminishing in frequency but at the same time the frequency of "negative" comments is increasing. This means that in *Action* category there are relatively more circumstances and experiences pointing at shortcomings in cooperation within the studied project.

Problems in cooperation were especially pronounced in the *Action* category but a number of indications points in this direction, for instance the following. The fact that Lantmäteriet and the MCAs represent different types of organizations and are ruled in different ways was more often commented in the *Action* category. Comments in this category more often revealed problems that could be related to cooperation concerning for instance the need of a continuous workflow, the need to work more together within the same localities and comments upon individual abilities and attitudes towards cooperation. There are relatively more "negative comments" in the *Action* category, pointing at shortcomings in cooperation.

4.2 Cooperation theories

Comparisons with theories of cooperation, especially Axelrod (1984; 2000) and the ATCG theory, indicate *action* category to be potentially critical.

Reciprocity refers to the fact that there should be a reasonable balance between the efforts of the parties involved and both parties should of cause do their part of the work as agreed. Reciprocity also includes there should be a reasonable equality between the parties in terms of size and abilities. This case exhibits a lack of reciprocity between the participating parties. Lantmäteriet is considerably larger and possesses more resources and special competence than most of the single MCAs. This obviously coloured daily discussions about which party should do specified improvements of the databases and in what way. Sometimes these discussions temporarily slowed down the accomplishment of the project. This can be seen studying the comments from MCAs within the *action* category, see also Appendix 2.

One factor that can improve cooperation are meetings between the cooperating parties (Axelrod, 1984; 2000). Interviews with the *action* and *decision* categories in both Lantmäteriet and the MCAs confirms contacts could have been more frequent in daily work. Compare the following citations (and Appendix 2):

> "An important success factor was to have regular meetings face-to-face during the whole process. For different reasons this was not always s the case."

> *"To meet and work together often is very effective in projects like this one.*

Regular meetings and collaborative work activities enable constant possibilities for exchange of views and problem solving in cooperation. This

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is positive for securing and approving results as well as improving cooperation skills. In the project collaborative work periods were hard to arrange, especially under time stress and they were anticipated as time consuming. It is clear though that the value of them in the light of the importance of effective cooperation was not fully understood in the implementation of the project.

There were indications that problems were not isolated to the *Action* category only, although problems relating to cooperation in this category were quite protruding. This confirms, at least to some extent, the early suspicion about such problems. However we also see that, as stated above, that even if planning and preparations for the project (*Talk* and *Decision* categories) was done in a professional way, the complexity of the co-operational daily work and the connected risks were not foreseen and attended to (see also Appendix 2).

Discussions after preliminary evaluation often has related to the question of how the word "cooperation" is defined and used by different people. This was concretized in discussions about whether problems with timetables and budget were mainly due to shortages in cooperation *or* if local competing of available time by key personnel in the MCAs and in Lantmäteriet was a main factor. There are indications in interviews that shortages in available time slowed down the processes but these comments are not dominating the picture. Shortages in available time can be interpreted as lacking cooperation, perhaps mainly in the *Decision* category. Cooperation activities in general put more and other demands upon planning than ordinary work. Securing key personal, available time and a certain flexibility and adjustment to the other cooperating parties are essential parts of well-prepared cooperation activities.

4.3 Results from the questionnaires

The questionnaire revealed a high interest and open attitude towards cooperation internally and externally and a general good support from the local management. The only reported negative aspect was that contacts with the local management often occurred less than once a week. Many answers revealed that contacts with Lantmäteriet were quite sparse (in contradiction with the interviews), that the process in general had few problems and that contacts with the technical consultant (except in Västerås) were frequent enough. There were some differences of course between the MCAs but they were not as evident as expected. The unclear results from questionnaires could be taken as an argument that many participators in *Action* category did not realize that this situation of presumed cooperation put special demands upon working routines to be successful. With low awareness (compare section 3 and Appendix 2) of this participating individuals tended to act about the same way they acted in their ordinary work, not giving the special demands of cooperation much thought

5 Discussion

This study set out to evaluate potential roblems in cooperation and to analyse especially problems of cooperation related to implementation. The study could not reveal any significant differences between the studied four municipalities

relating to cooperation. Only a weak tendency could be observed that Västerås and Stockholm seem to be a little more communication oriented than Uppsala and Sandviken. Meanwhile, a number of comments show a difference between *Lantmäteriet and the municipalities*. Comments upon time delays and halts in the workflow are more frequent in Lantmäteriet than in the municipalities. It therefore seems as Lantmäteriet is the more eager and driving part while the municipalities are more passive, willing to fulfil agreements and obligations but not giving time-tables and daily work quite the same priority as Lantmäteriet in all situations. To balance the picture there are also a lot of similarities in the comments as the value of meeting and working together often and that it is important to have regular meetings with the third party, private technical consultants. In summary the concentration on issues of cooperation and work routines are about the same. The few comments about economy also point in the same direction – a general good economy is an important requirement for effective cooperation.

Västerås is the most "enthusiastic" of the MCAs, interviewees there see somewhat fewer problems and believe more evidently in cooperation in this field. Uppsala and Stockholm are more in balance between positive and negative comments. They are to a degree aware of the importance of cooperation but also see some clear problems. Interviewees from Lantmäteriet are generally enthusiastic and have positive attitudes towards cooperation. However some of them show limited awareness about what cooperation means in practical work situations, which is inline with Thellufsen (2008).

5.1 The Brunsson categories

The situation reffering to the Brunsson (2006) categories is in this case complex. Part of the cooperation activities in especially the *Talk* category is directed not to the individual municipalities but to their joint organisation SKL, a national organisation of local authorities in Sweden. Also, the technical consultants of the municipalities (mostly private firms), in practise important parties in the project, did not have the formal status of participating parties. Historically Lantmäteriet and the municipalities have often taken opposite positions in matters of property formation, surveying and large scale mapping (compare SOU 1969:43). When a new total organisation was introduced in 1996, a new era in the relations started. There were new needs of better cooperation, of national standards and better data exchange. This promoted a better climate of cooperation and it was possible to start projects like the one studied here. However, in spite of improvements, there were differences and historical experiences that could make practical cooperation difficult. Interestingly, these circumstances are not commented at all in interviews representing *Talk* (see Appendix 2). It is as if old disputes are all forgotten and now an era of successful cooperation is starting. Interviews with *Decision* category give the same impression with some exceptions. However, in *Action* category here and there is mentioned both differences between the organisations and references to older traditions of contradictions where Lantmäteriet more obviously wanted to rule over the municipalities in this field.

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Referring to Thellufsen (2008), one can ask whether there was a lack of "awareness" in this inter-organizational collaboration with many people involved. There are no direct comments upon this in the interviews but interviews as a whole and the previous discussion give reason to believe this can be a factor of importance and a way to describe the process in the following way:

Talk category

- A lack of awareness of eventual differences in reciprocity between participating parties
- A lack of awareness concerning specific problems of cooperation connected to implementation, for instance the risk of emerging "free-riders".

Decision category

- A lack of awareness concerning the need of more regular working-together activities between involved organizations
- A lack of awareness concerning better organized "follow-up-activities" (the need of dead-lines for instance)

Action category

- A lack of awareness concerning the need of continuous and intense working periods
- A lack of awareness concerning the adaptation of individuals to routines in a project based on cooperation

Even if *Talk* and *Decision* categories had been paid much attention in this project, interviews indicate that some of the problems in the *Action* category, referring to aspects such as staffing, individual training and work routines could have been foreseen and attended in a better way in *Talk* and *Decision* categories. This means that problems of cooperation in the studied project were not as anticipated isolated to the *Action* category only.

5.2 Cooperation theories

One might suspect that at least one reason why the project ran into trouble is connected with the fact that the parties involved in the project did not have the same degree of independence and resources. Axelrod (1984; 2000) points out that an important basic condition for effective cooperation is reciprocity. This aspect of cooperation includes a reasonable balance in terms of resources and freedom to act. In this case, there could be a lack of reciprocity. Lantmäteriet and the municipals represent different types of organisations and are ruled in different ways. There are also differences in size. Even if the municipal organizations in general are quite large, the single MCAs and supporting functions within the municipality often are considerably smaller than Lantmäteriet and do not have the same recources and technical competences as Lantmäteriet. Adding to this and leaning on historical experiences (Fredholm, 1978) Lantmäteriet is sometimes regarded more as a ruler than a cooperative part on equal grounds.

Comparisons with theories of cooperation also indicate *action* layer in this case to be potentially critical. This is especially the case when compared to Axelrod (1984; 2000) and to the ATCG theory. No evident free-riders were detected and reported in the case study which was surprising, as the planning

of the project did not include any measures to deter would-be free-riders, the practical work did not include any special monitoring of individual performance, the project group as a whole was not small and tight, and there were no extra bonuses to gain for an individual by engaging heavily in the project. All of these features are considered signals of a free-rider problem in the ATCG theory. The interviews did not, however, reveal any direct comments of problems with free-riders in the project. Many comments about work procedures and communication routines still awoke some suspicion that everyone within the project did not give it the highest personal priority. This could be kept in mind and considered more deeply in other similar studies.

"Constitutional choice" situations (as defined by Ostrom, 1990) could explain at least part of the frequent interruptions and temporary halts in the workflow, as reported in the interviews. Ostrom (1990) states that Institutional–choice situations, both constitutional choice and collective-choice situations affect the rules used in operational situations. Daily work and communication between the participants referring to the work procedur,e was followed by decisions of the collective-choice nature which directly or almost directly allowed work to proceed according to the new collective decision. However, some decisions were of institutional-choice character. Proposed solutions had to be discussed not only within the project but in contact with other parties as well. These parties could be the technical divisions of Lantmäteriet, a specific MCA or a technical consultant. In some cases, also the representatives of the steering committee of the project had to be consulted for discussion and make a formal decision and perhaps communicate it to other external parties. The mentioned institutional-choice situations might not explain all stops and halts in the workflow but evidently a number of them. This also underlines the complexity of the project and its dependence upon working cooperation procedures.

Relevant advice concerning concrete improvements were given in the interviews, and can be found in Appendix 2. The most protruding examples are the need of a continuous workflow without interruptions and the effectiveness when people from all parties involved work together within the same localities.

6 Conclusions

The results of the study indicate that problems of cooperation were an essential factor behind general problems with timetables and budget. The results also indicate that problems of cooperation in relation to the *action* category (implementation) might have been especially important. There was a lack of reciprocity in the studied project, and the frequency of meetings and collaborative work was too low. The most important lesson from the study is that cooperation is a crucial component in a project of this kind, and that cooperation in practical implementation activities should be paid a lot of attention in early planning activities. Based on this study, it can be argued that, cooperation problems could have been reduced. Most pressingly, three factors should have been paid more attention to in the planning and preparation phases. First, personal abilities in cooperation should have been valued and paid attention to when the project was staffed. All participants should

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then have had some extra training and information concerning what a project based on cooperation demands, compared to their ordinary work. Second, some type of incentive for every hour devoted to the project, and for outstanding performances should have been given to the participants. Finally, the management of the project should have engaged more regularly in monitoring the daily work, preventing eventual free-riding tendencies, and having a better understanding on arising problems.

This study has put into focus the question of cooperation in modern projects within the field of SDI. It has inspired the researcher to start new studies with a similar agenda as the one here. The complexity of the studied project and the fact that some time has passed since the project was completed also indicates that more studies are needed. Projects of interest are coming up frequently now both in Sweden and in other countries. These projects often require cooperation between organizations and individuals involved – but the requirements concerning needed practical cooperation are not always realized in advance. This can be a relevant factor to address when for instance the advanced Swedish activities concerning digitalisation are about to be implemented.

If further studies strengthen results from this one, it would be meaningful to develop recommendations concerning cooperation in national projects. A need for such recommendations arises in situations where governmental, municipal and private organisations in different combinations form projects based on cooperation. The goal may be to develop new solutions in the handling of geoinformation, for instance concerning new technique and new ways of exchanging information of national interest. Such recommendations could be constructed as a helping tool and reminder about what cooperation demands in different phases of planning and implementation.

References

Axelrod, R. (1984). The evolution of cooperation. *Basic Books, Inc, New York, N Y., USA.*

Axelrod, R. (2000) On six Advances in Cooperation Theory. School of Public Policy, University of Michigan, Ann Arbor MI 48109, USA. Prepared for a special Issue of *Analyse & Kritik* on the *Evolution of cooperation.*

Brunsson, N. (2006) The organization of Hypocrisy. Talk, Decision and Action in organizations. *Copenhagen business School press, Denmark.*

Buckley, PJ., Casson M (2010) A theory of cooperation in international business. The Multinational Enterprise Revisited (pp 41–67). *Palgrave Macmillan, London.* https://doi.org/10.1057/9780230250468_3.

Creswell, J W (2015) A concise introduction to Mixed methods Research. Department of Family medicine, University of Michigan, USA. Sage Publications, ISBN: 9781483359045.

De Waal, FBM., Davis JM. (2003) Capuchin cognitive ecology: cooperation based on projected returns – Neuropsychologia, Elsevier. https://doi.org/10.1016/S0028-3932(02)00152-5.

Flick, U. (2009) An Introduction to Qualitative Research. Edition 4. *Sage Publications, USA.*

Fredholm, A. (editor) (1978) Lantmäteriet och kartväsendet i samhällsbyggande 1928–1978. *Gävle, Sweden 1978.*

Jones, GR., George, JM (1998) The experience and evolution of trust : implications for cooperation and teamwork – Strategic management journal, 1998 – JSTOR. https://doi.org/10.2307/259293.

Koerten, H. (2006) Assessing organizational aspects of SDI. *Delft University of Technology, Delft, Netherlands.*

Kollock, P (1998) Social dilemmas: The anatomy of cooperation – Annual review of sociology, 1998 – JSTOR. https://doi.org/10.1146/annurev.soc.24.1.183.

Nationell geodatastrategi (2016), Sverige bygger en infrastruktur för geodata. *Geodatasamverkan – www.geodata.se.*

Olsson, O. (2002) User Interface 2000 – new standard for the cadastral index map of Sweden. *FIG. (International federation of surveyors) XXII International Congress, Washington D.C. USA. April 19–26 2002.*

Olsson, O., Papadoupoulos, C. (2006) Employment of the User Interface 2000 for the development of the New Cadastral Index Map of Sweden – Some Experiences. *FIG (International federation of surveyors) Regional Conference. Accra, Ghana, March 8–11, 2006.*

Olsson, O. (2009) Cooperation – a key factor for sustainable spatial data infrastructure (SDI). *SDI Convergence research, emerging trends and critical Assessment. Netherlands Geodetic commission, 48, 2009.*

O´Neill, K., Balsiger, J., Vandeveer, SD (2004) Actors, norms and impact: recent international cooperation theory and the influence of the agent – structure debate – Annu,Rev.Polit. Sci,2004- annual reviews.org. https://doi.org/10.1146/annurev.polisci.7.090803.161821.

Ostrom, E. (1990) Governing the commons. The evolution of institutions for collective action. *Cambridge University press, USA* https://doi.org/10.1017/CBO9780511807763.

Målbild 2000 (2000) Project report – a new national digital cadastral index map and a new technical interface for data exchange. Lantmäteriet and Svenska kommunförbundet. Sweden 2000.

Price, M. E., Johnson D. P (2011) The Adaptationist Theory of Cooperation in Groups: Evolutionary Predictions for Organizational Cooperation. *Evolutionary Psychology in Business Sciences. Springer Verlag Berlin Heidelberg 2011, Germany.* https://doi.org/10.1007/978-3-540-92784-6_5.

SOU 1969:43 (1969) Nytt lantmäteri, statens offentliga utredningar (national investigation and proposal concerning a new organization for surveying). Sweden 1969.

Thellufsen, C. (2008) Awareness – a tool for investigating interorganizational collaboration in land administration systems? (PhD*) Aalborg University, Denmark*.

Wilson, DS., O´Brian, DT (2009) Evolutionary theory and cooperation in everyday life. From book: Games, groups and the global good (pp 155–168). *Springer.* https://doi.org/10.1007/978-3-540-85436-4_9.

Yin, R. K. (2003) Case Study research – design and methods. *Sage Publications Inc., U.S.A*.

Appendix 1. Work procedure for the CIM

1. A written individual agreement based on the national basic agreement.
2. Joint planning and preparation activities including a broad inventory of existing municipal and governmental databases and their quality.
3. Establishing of a common informal work-plan where meetings and working procedures etc were roughly specified
4. Testing of existing databases – geometric quality, structure, completeness etcetera.
5. Improving existing databases to match the national standard in different respects. This was done in close cooperation between the parties after discussions which party was best suited to execute the improvements.
6. Developing individual new technical interfaces (based on an agreed standard) to be installed in the existing technical systems of the MCAs. This was mainly done by private consulting firms on behalf of the MCAs.
7. Installation of improved databases in the national technical system.
8. Testing of the new technical interface using improved data in a test base. This testing could lead to changes both in data and in the specifications of the interface
9. Testing of all links in the chain of the updating process under conditions similar to later official running of the system.
10. Updating of changes in data since installation of the approved database
11. Decision regarding date of official start and formalities. Establishing of support facilities etcetera.
12. Start of official running of the new NCIM.

Appendix 2. Quotations from the interviews.
The quoted comments are all translations of the original comments in Swedish, as documented in notes from the interviews.

Talk	Decision	Action
"To be successful in this type of co operational project it is important to have a pragmatic attitude and work with a long term horizon" *"It is important to start up discussions early; the starting period of the project must have sufficient time"* *"Questions of implementation are extremely important and a big challenge in this case"* *"A very relevant success factor is to solve questions of economy (costs, payments etcetera) in a clear way before starting the project – discussions about economy in later stages can be devastating"* *"The challenge in this project – not fully understood from the start – was that we both had to invent a standard and to implement it in the same project"*	*"Introduction of dead-lines for certain activities was a very effective measure to speed up the whole process" (L)* *"The project was very advanced and contained not one but a number of challenges" (MCAs)* *"An important success factor was to have regular meetings face-to-face during the whole process. For different reasons this was not always the case" (L)* *"Solving questions of economy relating to benefits, costs, compensation etcetera is very important for motivation and efficiency in the project" (M)*	*"Effective internal cooperation within an agency is important when participating in projects like this one" (M)* *"When problems occur, and they do quite frequently, it is very important to act with great flexibility" (M)* *"We should be treated as partners in cooperation – not as subcontractors" (M)* *"Introducing dead-lines for critical activities in the project was very effective for achieving results."(L)* *"Municipal personnel working with the project often in practice had a shortage of time available for the project. Available time should have been secured better in an early stage. (L)* *Working with an interested and carefully chosen pilot (in this case the city of Västeras) can be a key to success (L)* *"A generally good economy is an important success factor when participating in projects like this one" (L;M)* *"To meet and work together often is very effective in projects like this one" (L; M)* *"It is important to have regular meetings also with the third party, in this case private technical consultants"(L;M)* *"It is important that work between parties is continuous with no longer interruptions"(L,M)* *"To be successful it is most important to build good teams of people from both organizations – this should be paid much attention in the starting phase" (L,M)*

L = Lantmäteriet, M = MCAs

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