

# SECOs as a Mean to Survive? – Case Municipal ICT

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**Abstract.** Digitalization is putting pressures on municipal ICT services. Human and monetary resources are often very limited but the number of requirements for new services increases. In the country of research (Finland), local governments and their ICT managers are trying to find solutions to their constantly worsening situation. One of the solutions is to create inter-municipal ICT cooperation i.e. to build an ecosystem for the municipal ICT operations for taking care of daily ICT operations and to develop municipal ICT services further. However, due to the size of the municipals, their locations, previous cooperation etc., there are different operating models in use. The purpose of the current research is through three municipal ICT ecosystems to clarify the reasons behind the selected operating models, to find out how successful municipalities have been in cooperation and to understand whether a SECO could be a solution for municipalities. The results of the current research expose the positive opportunities for ecosystems in the municipal ICT environment.

**Keywords:** ICT ecosystem, municipal, local government, ICT cooperation, software ecosystem, SECO, business ecosystem

## 1 Introduction

In the country of research (Finland), there are 317 municipalities in total (2015) with the number of population ranging from 101 till 620715 [1]. According to the Constitution of Finland [2], municipalities are independent in their actions and decisions. This statement has reflected also at the decisions made for municipal information and communication technology (ICT). Traditionally, municipalities have chosen to develop and run their ICT activities by themselves. However, due to a tight economic situation this status is now changing [3] and municipalities are seeking new operating models for their ICT activities. One of the available solutions is ICT cooperation between nearby municipalities, in other words, a creation of an ICT ecosystem for municipalities. The ICT ecosystem is a business ecosystem [4] which includes participants from municipalities, HW and SW suppliers together with consultants and even members from the universities in some cases. The target of an ecosystem is to be able on produce better and more cost-effective ICT services for municipalities and their inhabitants. The ecosystem should be a tool for local ICT managers in their challenges. Municipalities will recognize their nearby municipalities as possible cooperation partners but the operating model is to be selected. Because the ecosystem would be a novel approach,

many issues are still open and should be decided. For example issues like joint personnel, a common data centre, joint procurement and infrastructure together with common software and jointly provided ICT services are topics which should be decided. In order to make the ecosystem work productively, municipalities need to develop work processes of new kind and a governance structure for cooperation with their nearby municipalities. There are no guidelines how to choose and implement an ecosystem for municipal ICT. This is why municipalities have used their own considerations when setting up ecosystems.

In this research, we study three municipal ICT ecosystems that are in use to support jointly involved municipalities in their ICT challenges. The purpose of our current research is to clarify the reasons behind the selected operating models and to understand the differences between the ecosystems. We also clarify the possibilities of a software ecosystem (SECO) to be a solution for the ICT challenges for municipalities. A SECO is interplay between municipalities, suppliers, consultants, and universities etc. which are working on a joint technological environment with a goal of new services [5].

In our research we also go through selected theories to clarify the reasons for cooperation and compare the core issues of the theories against the findings from our research. Our research questions are:

- R1:** What are the original goals of the municipalities for ICT cooperation?
- R2:** How do the selected theories support the targets of the municipal ICT ecosystems?
- R3:** Does the chosen operating models of the ICT ecosystems have an effect on their achievements and future plans?
- R4:** Are municipalities using SECOs a mean to survive?

Many municipalities consider ICT still as a support function but a number of municipalities have already understood that ICT can be used for more [6]. The results of our current research show that in the municipal ICT ecosystem, all cooperation models have a positive impact on the costs and efficiency of ICT activities but there are differences in the governance. Our research also shows that municipal representatives are satisfied with their ICT ecosystems.

This article is compiled as follows. After the introduction, a theoretical background is presented, followed by a walkthrough of three case studies. Then we look at the results and discuss the findings. The final part concludes the research with limitations to the current research and creates prospects for future studies.

## 2 Theoretical background

In order to better understand the reasons behind the ICT cooperation, we went through various theories. The theories which we found the most relevant for our research are the Resource Based View (RBV), Transaction Cost Economics (TCE) and Social Network Theory (SNT). RBV [7] focuses on how to optimize one's own resources and costs, TCE [8] address costs involved in cooperation and SNT [9] reveals the importance of connections and trust between people and groups. In addition, regarding

ecosystems we used Moore's definition for a business ecosystem [4] and definition by Manikas and Hansen for a software ecosystem [5].

RBV states that if an organization is unable to use its own resources in the most efficiently way, it should find new ways to succeed better. One of the ways is cooperation with other organizations. Additional requirements are that cooperation adds value to all participants and that they can't get the same advantages through other ways [7]. The key question for TCE is whether something can be produced more efficiently inside an organization (vertical integration) or outside it by other parties (market governance) [8]. According to the TCE theory, organizations should cooperate, if products or services can be done more efficiently through cooperation providing more value adds to participants [10]. SNT provides a number of factors which explain the relevance of the relations between people. In order to succeed, the cooperation needs the trust between the people and the flow of high-quality information. Information flow can take place through weak (unofficial) ties, where people are sharing information informally or through strong (official) ties, where people are sharing information formally. If the network is dense, the flow of information is better and if there is a structural hole, information is not flowing unless an alternative way for information flow will be established. [9].

According to Moore [4], organizations are part of business ecosystems when they together create new capabilities and products to satisfy customer needs. Business ecosystems also change their structures from the collection of single units to more formal models. Business ecosystems have four step development path starting from a birth stage and developing via expansion and leadership stages ending finally to a self-renewal stage.

There are many definitions for a software ecosystem [11] but in our research we follow a definition by Manikas and Hansen who defined a software ecosystem as "an interaction of a set of actors on top of a common technological platform that results in a number of software solutions or services" [5]. It is also noted that all software ecosystems belong to business ecosystems [12].

In summary, the implications for our research are that ICT cooperation between municipalities can be based on economic issues but social issues are also important. The cooperation models are different and the models may change on time. Municipalities may eventually create software ecosystems if they see added value in the long term on them.

### **3 Empirical research**

In our research, we conducted three case studies where we compared ICT cooperation between municipalities in three municipality groups i.e. municipal ICT ecosystems. Altogether 10 semi-structured interviews with the same content were organized during 2015 to collect information and comments from all municipality groups. In the ecosystem A, CIOs or equivalents from all participating organizations were interviewed while in the ecosystems B and C, the leading ICT director was interviewed. All municipality ecosystems are located in the southern part of Finland consisting of six to eight municipalities each. In all ecosystems, there is a major city and a number of

smaller municipalities. The number of inhabitants living in the studied municipality groups varies in the range of 100k - 360k inhabitants.

In our research, we clarified the reasons for the inter-municipal ICT cooperation, what benefits municipalities have received through the cooperation and their future visions about the cooperation. The main sources of information were interviews that were arranged in every municipality group during 2015. The interviews were based on semi-structural questionnaires, where the same questions were presented to every interviewee. Free-form discussions were also held as a supplement. In the ecosystems A and B, the ICT leader of the municipality group was interviewed while in the ecosystem C, ICT managers from all participated municipalities were interviewed. In the research we also used documents, presentations etc. which were made available for us.

In our research, the ecosystems have different cooperation models: one cooperation model is based on a voluntary model, where municipalities are involved in without any official commitments. The second cooperation model is based on the way in which municipalities decide on the extent of their commitments and then, in accordance with their decisions, cooperate with other municipalities. The third cooperation model contains municipalities which are fully involved in the cooperation.

## **4 Results**

Our current research consists of three case studies made in three municipal ICT ecosystems. We first clarified the reasons behind the municipal ICT cooperation and the operational status for the ecosystems. Although the studied ecosystems covered around the same number of municipalities and inhabitants, the status of the ecosystems varies greatly. A summary of the cooperation backgrounds and the operational status for the current ICT ecosystems is presented in the Table 1.

**Table 1.** Background and operational status for the current ICT ecosystems

Ecosystems	Descriptions
Ecosystem A  Reasons for cooperation	<ul style="list-style-type: none"> <li>- Main targets for cooperation are cost saving, improved procurement, knowledge sharing, development possibilities and peer discussions</li> <li>- ICT cooperation among municipalities is voluntary and no political guidance has been set.</li> <li>- In a few municipalities, ICT cooperation is involved in the municipal strategy where they have identified the need for outsourcing as strategic intent.</li> <li>- Finding a conversation partner in smaller municipalities is difficult</li> <li>- Target is to get away from the basic IT actions</li> <li>- Small municipalities have realized the benefits of being part of the ICT community led by the centre city.</li> </ul>
Operational status	<ul style="list-style-type: none"> <li>- ICT cooperation between municipalities works and is good, no real problems occurred</li> <li>- The current informal governance model is good.</li> <li>- ICT cooperation occurs through irregular, informal face-to-face meetings where current ICT activities are discussed.</li> <li>- In the meetings, common actions are decided. Decided common actions take place through various projects.</li> <li>- IM benefits most from the current ICT cooperation.</li> <li>- The main suppliers benefit from a larger customer group.</li> <li>- Costs of cooperation are mainly related to the CIO's time spent at the meetings.</li> <li>- The joint data centre saves overall costs but it has increased operating costs and improved quality.</li> </ul>
Ecosystem B  Reasons for cooperation	<ul style="list-style-type: none"> <li>- Participating municipalities have used various ways to organize their ICT cooperation in the past.</li> <li>- The reason for the ICT cooperation is that the ICT operations were very limited and municipalities were facing big problems. Specialization of ICT expertise was needed.</li> <li>- The threat analysis was organized and ICT cooperation was started.</li> <li>- Cost saving and more ICT efficiency is both important and wanted.</li> </ul>
Operational status	<ul style="list-style-type: none"> <li>- Municipalities have understood the purpose of cooperation.</li> <li>- A host municipality and a joint ICT manager was selected.</li> <li>- The current cooperation is formally organized.</li> <li>- Currently around 20 ICT people employed at different job levels.</li> <li>- Joint procurement with joint costs, less license limitations in place.</li> <li>- The cost rise factor for ICT has been at the level of inflation during the last 7-10 years and it has been stable in recent years despite municipal mergers.</li> <li>- Risk minimization is taking place.</li> <li>- Joint application, joint projects and cost sharing in place.</li> <li>- Changes in license agreements have reduced saving possibilities.</li> <li>- It is difficult to explain ICT cooperation benefits to new people.</li> </ul>

Ecosystem C	<ul style="list-style-type: none"> <li>- ICT cooperation started three years ago with the lead and initiative of the centre city.</li> <li>- The target for the ICT cooperation was to outsource common ICT services.</li> <li>- The frame municipalities joint forces to be able to discuss more evenly with the centre city.</li> <li>- Target was to save costs but efficiency was also important.</li> </ul>
Reasons for cooperation	<ul style="list-style-type: none"> <li>- ICT cooperation works well, saving a great number of costs.</li> <li>- Currently there are 21 people working in the IM for frame municipalities.</li> <li>- ICT cooperation has changed the IT work from PC support to the consultation of municipal branches.</li> <li>- The centre city and the frame municipalities have established a regional IM steering group and a separate IM steering group for the frame municipalities.</li> <li>- Regular meetings led by the joint IM director take place.</li> <li>- The ICT roadmap and the ICT experts of the centre city are available for the frame municipalities.</li> </ul>
Operational status	<ul style="list-style-type: none"> <li>- The frame municipalities have a joint IM director with no superior's responsibility and a regional coordinator.</li> <li>- Frame municipalities are paying costs for CIO, the regional coordinator and the used time of the ICT experts of the centre city.</li> <li>- No real problems, occasionally suspicions in the municipalities.</li> <li>- The frame municipalities have created a common switching core network with only one node.</li> <li>- Procurement takes place with the lead of the centre city.</li> <li>- Joint purchases and common applications in place.</li> <li>- Municipalities have their own agreements, similar on every municipality.</li> <li>- Small-scale applications are jointly agreed although the technical side of the municipalities work usually separately.</li> <li>- Every municipality gets benefits, including the centre city.</li> <li>- The frame municipalities will benefit from the ICT development of the centre city while the centre city benefits from the piloting capability of the small municipalities.</li> <li>- Locally in the municipalities there are no preferred ICT suppliers any longer although AV system administrators often still exist.</li> </ul>

According to the comments regarding the background and the operational status for the current ICT ecosystems, municipalities in all ecosystems are satisfied with their current ICT cooperation but differences exist. Findings and a comparison between differences will be concluded later in this research.

Opinions regarding to the plans of the municipal ecosystems varied greatly. There are also differences in the way, how municipalities would like to develop their ecosystems. The comments on the current ICT cooperation and visions for the future are listed in the Table 2.

**Table 2.** Comments on the current ICT cooperation and visions for the future

<b>Ecosystems</b>	<b>Comments on the current cooperation and visions for the future</b>
<p data-bbox="240 314 377 343">Ecosystem A</p> <p data-bbox="240 483 349 511">Comments</p> <p data-bbox="240 865 322 894">Visions</p>	<ul style="list-style-type: none"> <li data-bbox="404 314 1131 396">- An official status for the municipal ICT cooperation and/or more detailed guidance from the top municipal management would be useful in larger projects.</li> <li data-bbox="404 396 1131 454">- The Constitution prohibits a more detailed ICT control and guidance by the Finnish State Treasury.</li> <li data-bbox="404 454 1131 511">- ICT is not an authority issue, so ICT cannot be purchased from another municipality.</li> <li data-bbox="404 511 1131 569">- It is difficult and slow for municipalities to make joint decisions for ICT solutions.</li> <li data-bbox="404 569 1008 598">- Favouring local businesses can hinder regional development.</li> <li data-bbox="404 598 830 627">- Progress of agreed actions could be faster.</li> <li data-bbox="404 627 857 656">- Projects should be put forward more actively.</li> <li data-bbox="404 656 1131 705">- The old knowledge, skills and attitudes of current employees are creating challenges.</li> </ul> <hr/> <ul style="list-style-type: none"> <li data-bbox="404 705 761 734">- A guiding role to be created for IM.</li> <li data-bbox="404 734 1049 763">- Municipal branches should guide the ICT activities more actively.</li> <li data-bbox="404 763 1035 792">- Changes in the number of jobs and job descriptions are possible.</li> <li data-bbox="404 792 980 821">- ICT benchmarking against other regions would be needed.</li> <li data-bbox="404 821 788 850">- A shared ICT resource could be hired.</li> <li data-bbox="404 850 788 879">- More concrete projects will be needed.</li> <li data-bbox="404 879 939 908">- Infra-projects should be separated from other projects.</li> <li data-bbox="404 908 1131 956">- Common EA (Enterprise Architecture), ICT Roadmap, IDM (Identity Management) and AD (Active Directory) will be needed.</li> <li data-bbox="404 956 788 985">- An annual meeting calendar is needed.</li> <li data-bbox="404 985 1090 1014">- Floating meeting locations and responsibilities would bring variations.</li> <li data-bbox="404 1014 967 1043">- Discussion forums to be created for lower level ICT staff.</li> </ul>
<p data-bbox="240 1033 377 1062">Ecosystem B</p> <p data-bbox="240 1110 349 1139">Comments</p> <p data-bbox="240 1333 322 1362">Visions</p>	<ul style="list-style-type: none"> <li data-bbox="404 1033 1131 1062">- Currently over 300 municipalities use same systems; this makes no sense.</li> <li data-bbox="404 1062 1049 1091">- Municipalities are too autonomous and often prisoners of history.</li> <li data-bbox="404 1091 1008 1120">- Old, experienced experts are often against the transformation.</li> <li data-bbox="404 1120 830 1149">- Current ICT cooperation is personal-based.</li> <li data-bbox="404 1149 1131 1207">- ICT cooperation works as long as the original cooperation developers are involved.</li> <li data-bbox="404 1207 1022 1236">- New people bring new ideas, which may change the status quo.</li> </ul> <hr/> <ul style="list-style-type: none"> <li data-bbox="404 1236 1063 1265">- A law, a municipal union or a big structural change will be needed.</li> <li data-bbox="404 1265 1131 1323">- In the future set-up, all municipalities should participate in cooperation with money or resources.</li> <li data-bbox="404 1323 1008 1352">- A region of 50k inhabitants would be ideal for municipal ICT</li> <li data-bbox="404 1352 994 1381">- An evolutionary model for IM development will be needed.</li> <li data-bbox="404 1381 953 1410">- The regional plan should be taken gradually in practice.</li> <li data-bbox="404 1410 1131 1468">- The municipalities are again changing the way they will organize their ICT ecosystem. The future way will be regional information management.</li> </ul>

Ecosystem C	- The municipalities are bad at making strategic moves. - Scale problems with municipal branches.
Comments	- Even small municipalities have their silo organizations. - The education branch should be more strongly involved in the ICT cooperation. - Trust towards other municipalities and other ICT people is important.
Visions	- Cooperation continues as it is, ICT department is ready for changes. - A joint data centre will be purchased from the market. - Many ICT applications should be unified.

All municipality groups are positive about their ICT ecosystems even though big differences can be seen in cooperation models, joint achievements and plans for the future. A summary about the finding is presented in the following:

### **Ecosystem A**

In the ecosystem A, municipalities have been cooperating many years in the same cooperation model. Main targets for cooperation are cost saving, improved procurement, knowledge sharing, development possibilities and peer discussions. The cooperation model is free form and voluntary, where each local ICT manager decides the amount of work he invests his time and energy to the cooperation. All ICT managers in the ecosystem think that the informal governance model is good. They think that in small municipalities it is very difficult for ICT managers to find a discussion partner to share the current challenges, so discussions with their municipal ICT colleagues in the ICT ecosystem are welcome. Cooperation takes place through free-form meetings, where current ICT activities are discussed. They are following up the actions and plans of their neighbouring municipalities and agreeing with joint ICT projects. Joint projects will be carried out in separate, individual projects in which each municipality designates their participants. With this ecosystem model, they have been successful in developing their ICT infrastructure and procurement. However, in this ecosystem, some municipalities would have preferred faster implementation for projects and more projects with more impact. All municipalities think that their ecosystem works well although an official status for the ecosystem could be useful in larger projects. Municipalities in the ecosystem A have kicked off their own joint data centre. The data centre is still in the start-up phase but a few municipalities have already moved some of their municipal ICT services to the new data centre. These municipalities are satisfied with the joint data centre and see it as a base for wider cooperation. They also see a need to combine their planning efforts and applications in the future for improved effectiveness.

### **Ecosystem B**

In the ecosystem B municipalities have been cooperating many years through various operating models. The original reason for their ICT cooperation was that earlier there were not enough resources to run and develop municipal ICT services and the municipalities encountered big problems. Due to new and changing customer demands, more ICT expertise was needed. The ecosystem has created to join forces and to share knowledge, resources and applications. Their current ecosystem model is agreed on the municipal management level and it is based on a host municipality model, where one



municipality acts as a leader in all ICT activities. Now they think that they have managed well with their ICT ecosystem and each municipality has saved a lot of money. All the time the purpose of the ecosystem has been cost saving and better ICT efficiency. Procurement has been a joint activity that has led to good results. Together with all participating municipalities, the ecosystem is doing joint ICT projects whereby they have managed to keep the ICT costs stable and on the level of the inflation despite the fact that many municipal mergers have taken place. Even though the ecosystem has been agreed on the municipality management level, the continuity of it is very much dependent on the personal opinions. If there is a change in the management of a municipality or the person, who is responsible for the ICT issues of a municipality changes, there are always difficulties when explaining the benefits of the ICT ecosystem to a new person. This may create a situation that a new person will decide to end the ICT cooperation without proper understanding about the benefits of the ecosystem. The ecosystem B is also worried about the situation of municipal ICT across the country and they hope for stronger governmental participation and guidance for combining the municipal ICT. According to them, a close regional ICT cooperation with municipality size of 50k inhabitants will be the right solution.

### **Ecosystem C**

The ecosystem C consists of a centre city and 8 frame municipalities located next to the centre city. The ecosystem C has been cooperating in the current model for three years. The original purpose of the ICT cooperation for the frame municipalities was to outsource common ICT services and to be able to discuss with the centre city evenly. The current cooperation model is a centralized governance model where a joint IM director has been hired to represent all participating municipalities in the discussions and actions with the centre city. They have created a governance model with a steering group between the frame municipalities and the centre city to manage the ecosystem effectively. The joint meetings where all participating municipalities have their representatives take place regularly with the lead of the joint IM director. Both the centre city and the frame municipalities are satisfied with the arrangement of the ecosystem. In the ecosystem, the frame municipalities benefit from the size and agreements of the centre city while the centre city benefits from the ICT piloting capability of the frame municipalities. They have common procurement that is led by the centre city. Smaller municipalities will benefit from the agreements made by the centre city. They have also joint purchases for common applications. The ICT ecosystem works well although some suspicions are raised occasionally in the frame municipalities. The ecosystem C is planning to acquire a joint data centre from commercial operators. Even though they have many common applications, they see that there are still many applications to be unified.

## **5 Discussion and conclusion**

In our current research, the municipalities in their respective ICT ecosystems are satisfied with cooperation and joint achievements. However, there are differences in

the level of commitment, use of common applications and in the way, how they see the future. A summary about the visions is presented in the following:

### **Ecosystem A**

In the ecosystem A where municipalities have a voluntary cooperation model, municipalities will cooperate if they see a positive short-term impact on their individual municipality. If benefits cannot be seen, municipalities are just passively following up other municipalities' actions without any participation in joint projects. This is reflecting in the decisions and pace of joint projects making the number of joint projects fewer and the pace slower. The role of the major city is changeable and it is focusing on acting according to their own plans. The ecosystem is very dependent on personal relationships and trust. If changes in leading ICT personnel take place, cooperation may be at a hazard. Municipalities have established a joint data centre which is still in the start-up phase. However, municipalities see that in the future, more of their computer hardware and software will be moved to the common data centre and they will gradually start to combine their ICT services.

### **Ecosystem B**

In the ecosystem B, where municipalities have a host municipality model, the ICT leader in the major municipality is determined to lead the ecosystem successfully and develop their cooperation model continually. However, there are some risks regarding the managements of the municipalities. If the management of any participating municipalities change, the continuity of the ecosystem may be challenged due to difficulties in explaining the benefits of the ecosystem. There has even been such an incident in the past when a municipality decided to leave the ecosystem. Nevertheless, municipalities have already combined most of their ICT services and they are planning to wider the ICT cooperation to cover the whole region. They even see that nationwide coordination and guidance for ICT issues would be desirable in the future.

### **Ecosystem C**

In the ecosystem C where the cooperation model is based on combined resources between the frame municipalities and the centre city, the ICT cooperation is dependent on management decisions. If there is a change in the opinions and believing in the ICT cooperation, the ecosystem may be terminated. However, the ICT cooperation in the ecosystem C has been very successful and they see that even more joint applications would be needed in the common data centre in the future. With the help of the ICT ecosystem, the frame municipalities have managed to raise the level of their ICT services to the level which could be impossible without inter-municipal cooperation. At the same time, the centre city has been successful in developing new ICT services effectively.

When putting ecosystems A, B and C into Moore's evolutionary stages of a business ecosystem [4], we can see their different positions. The ecosystem A is in the "Birth" phase, where participants are starting the cooperation and trying to define their common value proposition for the future. The ecosystem B is in the "Expansion" phase, where there are trying to expand their ecosystem to cover a region-wide area. The ecosystem

C is “Leadership”, where municipalities are satisfied with their current operating model and developing it together.

The ecosystems A and B, where ICT cooperation is voluntary or based on a host municipality model, the ecosystem is very much based on trust between ICT personnel. If changes take place among the leading ICT personnel, the continuum of the cooperation can be in danger. In the ecosystem C with the centralized governance model, trust between ICT people is similar to that in the normal working environment. Personal trust has an effect on work and achievements but it does not directly have such a strong impact on the municipal cooperation. Here the importance of trust shows at the municipality management level, which can make decision for or against the continuum of the cooperation.

In our current research, we try to find out answers to four research question. Through the research questions, we try to get better understanding about the various municipal ICT ecosystems.

Our first research question (R1) addressed the original goals of the municipalities for ICT cooperation. Based on our research we found out that there are a few common reasons why local municipal ICT managers want to join forces and do cooperation with their counterparts. The main reasons which came through in all case studies with various emphasis are the following:

- They want to save on their ICT expenses
- They want to gain more results with their limited money and human resources
- They want to exchange opinions and discuss work issues with their colleagues
- They want to develop their ICT skills and knowledge

In the second research question (R2) we set to identify the alignment of the theories and the practises of municipal ICT ecosystems. In our research, we noted that original reasons for inter-municipal ICT cooperation were cost saving and better efficiency. Here practise is following the Resource Based View theory which is focusing on cost savings as well as the Transaction Cost Economics theory which is focusing on efficiency through resource optimization. In addition we noted that especially in the ecosystem A which is based on free form and voluntary cooperation, social contacts between ICT managers from various municipalities were highlighted as one of the main reasons for cooperation. Also in the ecosystem B with the host municipality model, trust between municipalities is an important success factor. These municipalities are following the Granovetter’s Social Network theory where the importance of weak tie connections i.e. unofficial and informal connections and trust between people and various people and groups is strongly highlighted.

In our third research question (R3) we targeted to find out the impact of the chosen ecosystem model to the achievements and future plans. According to our research, municipalities have different ICT needs and the ambition level of the municipality management regarding the necessary ICT services may be different. Due to these differences, the satisfaction rate for the achievements of the ICT ecosystem can vary. Here even small improvements in the ICT services may be welcome and acting as positive marks for a successful cooperation. On the other hand, if the municipality management are putting much efforts and resources in the inter-municipal ICT cooperation, the expectation level is high and even small adversities can be condemned as defeats. However, based on our research it can be seen that if the ICT ecosystem has been built on joint decisions, the ecosystem has necessary amount of resources and the

ICT governance model is formal and clear to everybody, satisfaction for the ecosystem will be good and municipalities can expect better ICT services and a good return of investment. When the ICT ecosystem is built on loose cooperation, some benefits can be expected but the ecosystem is very dependent of the individuals and the pace of changes may be slow. However, even this can be good enough for the municipalities, which are not ready for a tighter cooperation between municipalities and who do not require better ICT services.

In our fourth research question (R4) we asked about the use of SECOs as a mean to municipalities to survive with their increasing ICT challenges. Based on our current research we are able to say that municipalities will see the future of their ICT services in the form of a business ecosystem. In the ecosystem, they would have a common data centre with joint HW and SW, which would make it possible to offer better ICT services at a lower price for all inhabitants in participating municipalities. Municipalities would be purchasing most of the ICT services from suppliers in the open markets with their own ICT personnel focusing on development and supplier management. With joint ICT efforts, even small municipalities would be able to raise the level for their ICT services to the level offered by the major cities with the equal costs per capita. With current structures where small municipalities are taking care of their own ICT services, this is not possible because their purchasing power and their resources are more limited in comparison with bigger municipalities and cities. The form of the business ecosystem could even be a SECO where the municipalities would be able to use the same SW platforms with all needed systems and applications software. However, in a SECO, the ecosystem should be formed around a specific software provider [13] which in the case of municipalities is not a realistic model. This being the case, municipal ICT ecosystems will continue to be “only” business ecosystems with close cooperation between municipalities and software vendors.

## 6 Limitations of the study and future research

There are some limitations to our current research leading to new research potential. An obvious limitation is the restricted scope of the study due to the fact that it was conducted only in Finland with only three municipality groups with their various ICT ecosystems. The number of interviews could be larger. Another limitation is that interviews could also be done with people from other parts of the municipality organization i.e. outside ICT to provide a different point of view. In addition political decision-makers could be interviewed to be able to understand the political viewpoints.

There will be a lot of future research possibilities. It would be useful to extend the research also to other actors in the municipal ICT ecosystems in Finland and to organize similar researches in other countries having the similar type of public structure. Conducting research also in areas outside ICT would provide interesting views about other ecosystems.

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