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Collaboration in the making

A case study of Security Arena

Master of Science Thesis
in the Management and Economics of Innovation Programme

VIKTOR GUNNARSON
KRISTIN NORBERG OLSSON

Department of Technology Management and Economics
Division of Innovation Engineering and Management
CHALMERS UNIVERSITY OF TECHNOLOGY
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VIKTOR GUNNARSON
KRISTIN NORBERG OLSSON

Examiner: Maria Elmquist
Supervisor: Carolina Almeida Araujo de Andrade

Department of Technology Management and Economics
Division of Innovation Engineering and Management
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Viktor Gunnarson
Kristin Norberg Olsson

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Department of Technology Management and Economics
Division of Innovation Engineering and Management
Chalmers University of Technology
SE-412 96 Göteborg, Sweden
Telephone: + 46 (0)31-772 1000

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Abstract

Open innovation was first introduced as a business model but has since evolved to become an umbrella term for collaboration between actors in the innovation process. In order to understand how inter-organisational collaboration can be put into practice in a context of triple helix actors, the aim of this master thesis is threefold: first, to investigate the motivations for organisations to join a triple helix collaboration; second, to study how collaboration is enabled, and thirdly, what participants get from their participation. This is done through a case study of Security Arena, which is collaborative arrangement among actors from industry, academia and government dealing with societal security and emergency preparedness.

The study includes a review of literature on open innovation, different views on inter-organisational collaboration, forms for collaboration as well as triple helix and intellectual property management. This helps to understand the motivations for why organisations participate in collaboration, how the arena can be explained and the relations between the partner organisations and the arena. Further, the thesis contains a description on the case of Security Arena that describes the context and structure of the arena. Due to the characteristics and structure of the arena it is found to be an innovation intermediary, although similarities with open innovation arenas can be seen.

The thesis is built on empirical data that has been collected by running interviews with the partners engaged at different levels of Security Arena. The structure of the presentation of the empirical data follows the research questions and provides a basis for the analysis and discussion.

In the analysis, the motivations is found to be mainly focusing on the knowledge that the participants gain access to through the network that the arena provides, but also the new ideas that are created at the arena. When it comes to enabling collaboration, two main areas are identified: the project process and the sharing of knowledge. These areas are found to be key for the collaboration and some ideas for improvement are given. Regarding utilisation, the arena is found to be a test-bench for new ideas and technologies where the learning during projects is deemed more important than the end result.

The conclusions show that the motivations for participating in a triple helix collaboration is to gain access to a wide range of knowledge and generate new ideas. To be able to reap the benefits of a triple helix collaboration the work process as well as the openness and trust among the participants are key factors. The outcome from participation in a triple helix collaboration is both tangible and intangible, mainly related to the participants' own interest.

Keywords: *Open Innovation, Innovation Intermediary, Open Innovation Arena, Triple Helix, Collaboration, Case Study, Security Arena*

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1 Introduction

Being innovative is a competitive imperative in today's market, and as a result companies are increasingly engaging in open innovation arrangements (Chesbrough, 2003b). Open innovation began as a concept that identified the need to extend the innovation process beyond a single firm and has since its introduction been associated with a variety of different things such as open source and user co-creation (Giannopoulou et al., 2010). The rise in interest for open innovation has led to the development of a type of actors called innovation intermediaries who act as a third party facilitating innovation processes (Howells, 2006).

This master thesis will study the inter-organisational collaboration in the triple helix context at Security Arena (referred to as 'the arena'). The arena is a platform for collaboration projects amongst different partners within the areas of societal security and emergency preparedness. The arena engages actors from academia, government and industry, but there is only one employee - the program manager. The arena is commissioned by the Swedish Civil Contingencies Agency (MSB[1], referred to as 'the agency'), which also is the only governmental partner. The industry partners are Ericsson AB, Saab AB and AB Volvo while the academia partners are Chalmers University of Technology and University of Gothenburg. Both the industry and academia partners provide the human and material resources needed for the arena projects. The partner representatives are divided into a strategic steering group and an operational project management group.

The arena is located at Lindholmen Science Park (referred to as LSP) in the city of Gothenburg in Sweden. LSP hosts firms and other so-called arenas for its three focus areas:

- Intelligent Vehicles and Transport Systems
- Information and Communication Technology
- Modern media and design

The most well-known and studied arena is SAFER, an arena focusing on the field of vehicle and traffic safety. SAFER engages 25 partners from the Swedish automotive industry, academia and authorities. These partners collaborate in order to create breakthrough innovations and world-leading research (SAFER, 2013).

SAFER has been the subject of a number of studies (Elmquist et al., 2011; Ollila & Elmquist, 2011; Agogue et al., 2012; Yström et al., 2010; Aspenberg & Kumlin, 2012) regarding open innovation in general and open innovation arenas in particular. It is therefore intriguing to study another collaborative arrangement at LSP that, at least on the surface, seems very similar to SAFER. Security Arena is a good subject to study, as it is mature and has been around for approximately seven years engaging partners that partly are competitors. In contrast to SAFER it does not provide a physical place for everyday work, only meeting rooms and temporary workplaces are available. The studies of SAFER have identified a new type of actor, closely related to innovation intermediaries: open innovation arenas. These differ from innovation intermediaries as they see themselves as more than a facilitator (Ollila & Elmquist, 2011).

[1] The Swedish Civil Contingencies Agency uses its Swedish abbreviation, MSB, in both English and Swedish.

The outline of this thesis is as follows; first a theoretical framework that will guide and assist the analysis is presented. Secondly, the methodology for the study is presented and then thirdly, the case of the arena is explored. Further the empirical findings related to the research questions are presented, which then are discussed and analysed with the aid of the theoretical framework. Lastly, answers to the research questions and suggestions for future research conclude the report.

1.1 Aim and research questions

In order to understand how inter-organisational collaboration can be put into practice in a context of triple helix actors, the aim of this master thesis is threefold: first to investigate the motivations for organisations to join a triple helix collaboration, second, to study how collaboration is enabled and thirdly, what participants get from their participation.

How a collaborative arrangement is formed is influenced by the participating actors' motivations for collaboration. To gain further knowledge on how the collaboration works it is necessary to understand the underlying motives for participation. The first research question is therefore:

- *What are the motivations for academic, industrial and governmental organisations participating in a triple helix collaboration?*

The extent of the collaboration has been argued to have an important impact on open innovation and pointed out as a direction for further research (Elmquist et al., 2009). This study will complement earlier research and the second research question is:

- *How is collaboration enabled in a triple helix context?*

As the participants constitute the collaboration, they need to be satisfied and get results in order to keep collaborating. This means that the outcome is of high importance for the collaboration but also what role the arena plays for the individual actor. This gives the final research question:

- *How do participants utilise a triple helix collaboration?*

1.2 Delimitations

In this thesis the two main topics are open innovation and collaboration. In both of these fields the focus has been on inter-organisational collaboration.

The empirical data has been gathered from people engaged in the different groups at the arena. No project worker has been interviewed, other than the project management group representatives who are also engaging in the projects. This gives a limited understanding of the collaboration and communication among the partners during the project work.

2 Theoretical framework

This section will provide a theoretical framework that will be used to understand the arena, and the elements that help to create and make collaborative arrangements work. The theoretical framework starts with general literature on innovation and open innovation that sets the context of the study. It continues with closely related concepts that help understand the motivations for why organisations participate in collaboration such as the arena. Then literature on different types of collaboration is introduced that helps explain how the arena works and find what the important characteristics of the arena are. Lastly, literature that enlightens the relation between the partner organisations and the arena is reviewed.

2.1 Innovation

Since the term innovation is widely used there are also a wide variety of definitions for the term. Schumpeter (1934) described five different types of innovation: product, process, business model, supply source and ways to organise business. Innovation has later been described as the essential driving force for evolution of firms in the capitalist society (Schumpeter, 1942; Drucker, 1988).

During the 20th century, innovation has been taking place in big companies with a high level of vertical integration. These companies invested in R&D to generate new ideas that could be exploited and brought to the market. This is referred to as the model of closed innovation as it implies that generation of ideas, further development, manufacturing, marketing, distribution and service all takes place within the boundaries of a single firm. At the end of the 20th century a number of factors, such as increasing accessibility of private venture capital and growing movement and number of knowledge workers, led to some firms completely abandoning the closed innovation model in favour for open innovation, while others only partly adopted it (Chesbrough, 2003a).

2.2 Open innovation

Open innovation is built on an idea that commercialisation of knowledge should not be limited to the internal paths to market, and those paths should not be limited to only bringing internal knowledge to market. By utilising both internal as well as external knowledge, open innovation enables new ways to create value (Chesbrough, 2003b). Open innovation was originally defined as:

> *"In this new model of open innovation, firms commercialize external (as well as internal) ideas by deploying outside (as well as in-house) pathways to the market"*
> (Chesbrough, 2003b, pp.36-37)

Open innovation is described as a contrasting theory to closed innovation and Chesbrough (2003b) has outlined six principles of open and closed innovation that highlights the contrasts. These principles can be seen in Table 1 below.

Closed Innovation Principles	Open Innovation Principles
The smart people in our field work for us.	Not all of the smart people work for us so we must find and tap into the knowledge and expertise of bright individuals outside our company.
To profit from R&D, we must discover, develop and ship it ourselves.	External R&D can create significant value; internal R&D is needed to claim some portion of that value.
If we discover it ourselves, we will get it to market first.	We don't have to originate the research in order to profit from it.
If we are the first to commercialize an innovation, we will win.	Building a better business model is better than getting to market first.
If we create the most and best ideas in the industry, we will win.	If we make the best use of internal and external ideas, we will win.
We should control our intellectual property (IP) so that our competitors don't profit from our ideas.	We should profit from others' use of our IP, and we should buy others' IP whenever it advances our own business model.

Table 1 ***Contrasting principles of Closed and Open Innovation, adapted from Chesbrough*** **(Chesbrough, 2003b, p.38).**

In addition to these six principles it has also been argued that when it comes to open innovation, in contrast to traditional outsourcing of innovation capacity, partners are viewed as peers, not suppliers (Chiaromonte, 2006). Chesbrough (2003b) argued that very few firms are organised as truly open or closed, but most firms are somewhere in between.

The originality of Chesbrough's work has been questioned and it has been put forward that open innovation might simply be a repackaging of old knowledge (Trott & Hartmann, 2009). These authors further question the concept of closed innovation arguing that this term was created to be an intuitive contrast between the new and the old way of R&D. However, open innovation is a popular concept with related literature growing rapidly and a large interest from managers (Giannopoulou et al., 2010).

When introduced, the term open innovation was viewed as a business model but has since been widely applied, as shown by Giannopoulou et al. (2010) it also has been associated with concepts such as open source and user co-creation. The term has also been viewed as *"an umbrella term for collaboration between a firm and outside partners in many different parts of the innovation process"* (Elmquist et al., 2011, p.179).

2.2.1 Open strategy

Open innovation initiatives demand a new approach towards strategy for firms participating in such initiatives. Open strategy can be seen as a mixture of traditional strategy and the openness implied by the collaborative work of open innovation (Chesbrough & Appleyard, 2007). According to Giannopoulou et al. (2010) open innovation needs to be seen as a strategic choice and needs to be embedded in the overall business strategy.

Herzog (2011) states that innovation strategies need to address the balance between exploration (the development of new technologies) and exploitation. At the same time Lichtenthaler (2008) explains that technology aquisition and exploitation are becoming essential to keeping up with competition. Whether theses activities are made internally or externally can be seen as an important strategic choice (Giannopoulou et al., 2010). External technology exploitation has many benefits such as gaining access to external

technologies, learning effects, 'freedom to operate', and setting industry standards, but it also has risks such as sharing competitively important knowledge and thereby strengthening competitors (Lichtenthaler, 2008).

Taking a strategic perspective, Lichtenthaler (2008) has studied why some firms are more successful in applying open innovation when it comes to technology. In technology strategy management, technology exploitation is a vital part and it can be split up into an internal exploitation and external exploitation. Internal exploitation is the "normal" product/service business, while external exploitation is about selling technology knowledge, which is transferred to a recipient.

Open strategy aims to move focus from ownership and intellectual property to openness; it also shifts the terms for value creation and capturing. Products stemming from open innovation challenge traditional views such as the need for companies to have ownership of value creating activities and their ability to exclusion to prevent others from copying their product. Open strategy shows that great value actually can be created even though entry barriers are low. Open-oriented firms need to take a stand on different strategic issues, such as how to attract and sustain contributors, how the open invention or coordination project is led and how its agenda evolves, and how they can profit from technologies stemmed out of such initiatives (Chesbrough & Appleyard, 2007).

2.2.1.1 Problem solving perspective

One of the purposes with the arena is to improve the emergency preparedness system by fixing identified issues. Nickerson et al. (2007) proposed the Problem-Solving Perspective (PSP) for studying strategic and organisational questions. Here value creation is a process of identifying problems and thus identify opportunities to increase knowledge within the company. This approach is a contrast towards the more traditional approach of identifying opportunities to pursue. There are two ways to identify problems according to Nickerson et al. (2007) - analytical and synthetic process. The first one is a set of steps towards problem identification, which usually results in incremental innovation and smaller improvements. The second one is more explorative and helps find more novel problems and thus leads to radical innovation and more entrepreneurial opportunities. Through the PSP also larger and more systemic problems may arise as a combination of smaller problems detected.

The solving of problems identified then becomes the value capturing process. Here managers need to choose the problems that are likely to be solved and which can generate the most value to the firm (both created and captured) at a low cost. Firms compete on how effective they handle these processes, which gives higher potential in success in value capturing. Especially firms that are able to build a strong synthetic process are able to create sustainable competitive advantages, this as the processes are difficult to copy and understand (Nickerson et al., 2007).

When it comes to bringing in external ideas and collaborating with partners at the arena to capture value, the business model of the industry partners plays an important role.

2.2.2 Open business models

Scholars have not agreed on a single definition of business models, but there is a common conception that a business model is a systemic description of how firms interact with their environment in order to create and capture value (Zott et al., 2011). According to Berglund and Sandström (2013), literature on business models has focused on firm-internal issues and they give a new definition, which goes beyond a

single firm: *"a high level description of how a firm (or part of a firm) creates, delivers and appropriates value, that is centered around a focal firm, but that also transcends the boundaries of the focal firm"* (Berglund & Sandström, 2013, p.3).

Sandulli and Chesbrough (2009) are more nuanced when describing business models suggesting four different types: closed, open and partially open - buying and selling side respectively. They argue that a business model has two mechanisms: one that creates value and one that captures it. Firms with closed business models do these two within the firm. The open business models collaborate with the outside through sharing of internal resources and/or including external resources in the business model. The closed business models have limits when it comes to capturing value from unexploited resources. It is concluded that open business models are generally more value creating than the other alternatives (Sandulli & Chesbrough, 2009).

Sandulli and Chesbrough (2009) argues that a firm with a partially open business model on the buying side often lack the capability to create a resource itself. Opening the business model for opportunities brought by people and organisations outside the firm is closely related to open innovation. It is also possible to collaborate externally in testing products and with ideas made up internally. The success of this kind of business model depends the firm's absorptive capacity; how the firm is able to identify resources to create value, the ability to integrate internal and external resources and to exploit external resources. This generates a need for low uncertainty, complementarity, trust and commitment among partners. Lastly, firms with this type of business model need to overcome organisational inertia that can occur, e.g. Not-Invented-Here (NIH) syndrome[2].

Firms with a partially open business model on the selling side are firms that decide to exploit their resources outside their own business model. This generates more value per resource than with a closed business model, this through e.g. network effects and/or through complementary resources. Sandulli & Chesbrough (2009) separates the breadth and depth of an open business model and claims it is very hard to have both. The breadth regards how many actors to share resources with and the depth is how these relations should be designed. The opportunity cost for sharing resources should be taken into account; the higher the value of a resource the higher the opportunity cost and the narrower the business model. The degree of openness in such a business model also depends on the partners' capabilities to create complementary products to be sold in the ecosystem.

2.3 Views on collaboration

As stated under the section 2.2 Open innovation, the term open innovation can be viewed as an umbrella term for collaboration among actors in the innovation process. Here follows different views on collaboration around innovation that will be used to explain the structure and characteristics of the arena.

2.3.1 Innovation Networks

According to Rowley (1997, p.894) networks are *"systems of dyadic interactions, capturing the influence of multiple and interdependent relationships on organizations' behaviours"*. Networks can function as a ground for innovation as they can be a way to

[2] The not invented here syndrome means that *"The idea that a product, system, etc. that was developed somewhere else cannot be as good as one that a company, etc. develops itself"* (Cambridge University Press, 2013)

test internal knowledge and learning capabilities while at the same time offer access to external knowledge and resources not available inside a firm (Powell et al., 1996).

Nesta & Mangematin (2004) has explored innovation networks, the linkages to industry development and how the network changes over different phases. Networks consisting of different types of actors have shown to have an impact on the innovation performance of the single firm. It has been proven that firms that are actively engaged in collaborations tend to have high performance. A central position for the firm in the network and the density of the network helps improve innovation. It has been indicated that the performance of networks correlate to the individual firm performance, both positive and negative.

For firms to be successful innovators they need a diverse set of knowledge related to both the exploration and exploitation phase. The first phase is characterised by radical and rapid technical change while the second by technological consolidation and industry stabilisation around a dominant design. During the exploration phase firms focus their research on intra-organisational collaborations and alliances, as when coming to the exploitation phase they should try to reap temporary rents from the innovations. The purpose of the collaboration changes over time; in the exploration phase research hypotheses are developed and tested. Here knowledge spill over from other firms and actors tend to be beneficial and network relationships are crucial since they can be seen as gate openers to information, external knowledge and different types of goods and services. When the industry matures the competition increases and it is natural for the network to change going to the exploitation phase to focus on commercialisation, and knowledge spill over should theoretically be of less importance (Nesta & Mangematin, 2004).

Further they argue that the complexity of innovation networks is due to two aspects. The first is that firms are committed to projects based on waves of discoveries where different waves demand different sets of knowledge. Secondly, in a single wave the firm is committed to different projects within different research phases. These two aspects call for different types of collaboration and mix of actors and hence increasing network complexity. Networks are common in the exploration phase as the technological environment is very uncertain and there is little leverage to gain resources, therefore firms engage in external networks to gain access to more knowledge and capabilities without risking too much capital. The waves earlier described to be present suggest that firms need to manage collaborations within different waves of technology and manage collaborations that focus on both research and on development (Nesta & Mangematin, 2004).

Dhanasai and Parkhe (2006) focus on hub-firms that are central in the innovation network. Hub-firms have both a good reputation and authority and use this combination in a leadership role to orchestrate the network and help bring together scattered resources and capabilities within the network. This orchestration is what the hub-firm does in order to create and extract value from the innovation network.

Dhanasai and Parkhe (2006) have identified three main tasks for a hub-firm in order to increase value creation and extraction within an innovation network. The first task is to ensure knowledge mobility. This is important in order to create value within the network, learning from other firms and putting knowledge where it makes a difference. The second task is about managing innovation appropriability, i.e. making sure that firms are able to profit on their innovations. This is not as much about contracts and litigations but more about trust, interaction and joint asset ownership. In order to dare to share proprietary knowledge and information, firms need to trust the ability to

appropriate from the network. A stable network enhances the relations among the firms and improves the conditions for trust and thereby also knowledge appropriability. This is the last task of a hub-firm, to manage the dynamic network stability, i.e. allowing firms to come and go, while ensuring a non-negative growth of the network. The network needs to stay loosely coupled while still having some stability.

2.3.2 Innovation Systems

The innovation system view helps to understand the collaboration activity towards innovation. An innovation system is mainly constituted of actors and institutions related to the innovation process, but do include all aspects that influences the use, diffusion and development of innovations (Edquist, 2005).

According to Malerba (2002), sectoral systems of innovation focus on new product development and consist of different actors interacting with each other, both on the market and elsewhere. The actors in sectoral systems can be divided in to firms and non-firm organisations, where there should be heterogeneity among firms for beneficial results. The interactions among the actors can be made through communication processes, exchange, co-operation, competition and command, and results in creation, production and sale of new products.

The system includes a certain knowledge base, technologies and demands. When studying the knowledge dimension of sectors, accessibility, opportunities and cumulativeness are seen as innovation enablers. Knowledge may have different degrees of accessibility and can in this sense affect the rate of innovativeness. Knowledge may also be more or less cumulative, depending on learning processes, organisational capabilities and feedback loops from the market. Malerba (2002) also discusses two theories from Schumpeter in connection to sectoral systems of innovation; creative destruction and creative accumulation, where high cumulativeness of knowledge is correlated to the later. Demand is not seen here in a traditional way as an aggregated set of similar buyers but as heterogeneity in actors and their attributes that interacts in different ways with producers.

As an environment defines the problems firms need to solve to be innovative, the boundaries of a sectoral system should include linkages with related industries, as innovation is a collective process and does not happen in isolation. A sectoral system experiences dynamism as the industry life cycle evolves and the knowledge base can be affected by two larger changes, the evolution of a dominant design or another disruptive event (Malerba, 2002).

2.4 Forms of collaborations

In this section literature on different ways to structure collaboration, related to the innovation process is reviewed. This will be used to enlighten the relation between the partner organisations and the arena.

2.4.1 Strategic alliances

According to Gulati (1998, p.293), a strategic alliance is a *"voluntary arrangements between firms involving exchange, sharing, or co-development of products, technologies, or services"*. Even rival firms come together to form an alliance in order to gain a competitive advantage against those outside the alliance (Harrison & St. John, 1996). Dyer and Singh (1998) argue that alliances need to be idiosyncratic in order to deliver something more than a normal buyer-seller relation.

According to Schreiner et al. (2009), an strategic alliance undergoes different phases; first there is the formation phase where the decision to form an alliance and with which partner(s) is set, second there is the design phase where the framework and governance for the alliance is determined, and lastly there is the post-formation phase where the regular work in the alliance is undertaken.

Further Schreiner et al. (2009) suggest that alliance management capabilities are primarily concerning the post-formation phase since the benefits from the previous stages could not be realised with a poorly managed third stage. This is in-line with Doz (1996) who in a study of the evolutionary process of alliance found that in successful alliances the importance of the initial conditions faded as they facilitated a cycle of learning, re-evaluating and re-adjusting.

Schreiner et al. (2009) points out three management challenges in the post-formation phase: coordination, communication and social bonding. Coordination is about managing resources since there are physical, cognitive and cultural distances among the partners. Coordination includes the ability to create shared views on tasks requirements, specifying roles and responsibilities and specify work procedures. Performing insufficiently in this dimension would result in inability to perform efficiently on tasks undertaken and to benefit fully on the activities.

When it comes to communication it is important to build a shared understanding of the projects and tasks among members as well as engagement and obligations. Communication includes sharing relevant knowledge and information in a timely, accurate, and complete manner as well as having others to take part in that. Communication improves the responsiveness to changes, builds personal relations and helps assess uncertainties that arise, as well as opportunities of value creation.

Finally, the capability of social bonding facilitates establishment of norms within the alliance and attachment to the tasks to be performed and helps being proactive to needs. Social bonds also facilitate knowledge sharing among members in the alliance and signals respect to one another. This process is though time consuming and expensive in such way, but can be achieved through managerial efforts to consistently providing instrumental or expressive value (Schreiner et al., 2009).

Strategic alliances are mainly directly between organisations but collaboration among organisations can also involve a third party.

2.4.2 Innovation intermediaries

Innovation intermediaries are third party organisations that support other organisations in their innovation process. More specifically innovation intermediaries are defined as *"an organization or body that acts an agent or broker in any aspect of the innovation process between two or more parties"* (Howells, 2006, p.720). Giannopoulou et al. (2010) describes them as third parties that help inventors find a market to sell their ideas and innovators to use external knowledge. Sieg et al. (2010) adds another dimension; by identifying, accessing and transferring knowledge innovation intermediaries create value for their clients. Elmquist et al. (2011, p.178) describe innovation intermediaries as *"marketplaces for ideas, talent and technologies"*.

According to Agogue et al. (2012) intermediaries can generally be divided into two categories: brokers and network facilitators. The first category improves an existing innovation process by providing information, mediating, brokering knowledge

transactions or evaluating and setting standards. The second category is about providing user involvement, crowdsourcing[3] and increasing connectivity by creating and maintaining innovation networks.

Sieg et al. (2010) has identified three management challenges for firms reaching out to intermediaries: enlisting internal scientists to work with the innovation intermediary, selecting the right problems, and formulating problems so as to enable novel solutions. The first challenge stems from the differences in working with an intermediary compared to the internal innovation process. The managers often underestimate how time and resource consuming it is to work with innovation intermediaries as things such as formulating problems and evaluating solutions is dependent on participation of internal scientists. The next challenge is about finding problems that are suitable for external participation. Not all problems identified within a firm are suitable for sharing, as they need to be understandable to outside solvers and cannot contain trade secrets. The last challenge is about sharing problems with an external partner without influencing them with preconceptions. Working with outside solvers is supposed to bring new ideas and knowledge, therefore the problems needs to be formulated to enable novel solutions. It is hard for scientists that have worked with a problem to not include their preconceptions when describing problems for others.

As discussed in the first paragraph on innovation intermediaries, there are a wide variety of intermediaries available. Complementary to these are open innovation arenas.

2.4.3 Open innovation arenas

As shown by Ollila and Elmquist (2011), open innovation arenas are different to intermediaries in three ways:

- An open innovation arena has proprietary goals
- An open innovation arena provides a physical meeting place
- An open innovation arena sees itself as a key player in the field

The concept of open innovation arenas is not widely explored and has previously been referred to as an intermediary arena, which is defined as *"an organization that gathers competing and complementary companies within a field of expertise, and provides an arena for them to collaborate on at the same time as it negotiates their common goals"* (Elmquist et al., 2011, p.178) However, the concept of an innovation arena has evolved into an open innovation arena, which is defined as *"an actor trying to enable open innovation within a specific field of expertise, while at the same time seeing itself as a key player in the field"* (Ollila & Elmquist, 2011, p.274).

Summarising the definitions, an open innovation arena is a platform where organisations partner up as peers in a network at a provided meeting place. They collaborate around innovations by sharing and creating knowledge. The platform is focused around a particular field and has its own vision, strategy, and goals to become an important actor within that field.

[3] Crowdsourcing means to "obtain (information or input into a particular task or project) by enlisting the services of a number of people, either paid or unpaid, typically via the Internet" (Oxford Dictionaries, 2013a)).

In a longitudinal study of an open innovation arena, Ollila and Elmquist (2011) explored the managerial challenges from the perspective of the open innovation actor. Three types of challenges are identified:

- Potential competition between an open innovation arena and its partners
- Varying motives for participation among the partners
- The role of the arena

The first and last is about problems related to the interface between the open innovation arena and the partner organisations: what should be done at the arena? How is projects started at the arena? How do people working with the arena relate to it? The second type of challenges is about the variations of motivation and expectation among the organisations participating. The partners are supposed to be peers, which could be hard to accomplish if the motives and expectations varies a lot.

Chen (2008) showed that open innovation activities such as the ones at an open innovation arena are enhanced by a diversity of organisations such as a triple helix constellation.

2.5 Triple helix

The role of knowledge in society is the core of the triple helix theory. The three actors in the triple helix are: academia, industry and government. These have moved closer together as a result of social development and as a mean to achieve knowledge-based economies[4]. Earlier, academia and industry were totally separate spheres, but the steering by governments through regulations and institutions has made the two more inter-disciplinary and closer to each other. The three actors are increasingly collaborating (Etzkowitz, 2002).

Etzkowitz (2002) speaks of a new balance where the three actors in the triple helix are taking the role of each other while still being relatively independent. Examples are when universities have incubators that help bring up new firms it takes the role of industry, when government offers venture capital for starting new firms it takes the role of industry and when industry develops training and research it takes the role of academia.

The former linear innovation models of "demand pull" and "technology push" have moved to a more evolutionary model where a broader spectrum of knowledge contributes to the upcoming of new ideas. This triple helix has become a key component of innovation strategies (Etzkowitz & Leydesdorff, 1995).

Along with a variety of actors come a variety of views, which could be hard to combine. One of the more significant areas of innovation where this is important is intellectual property management.

2.6 Intellectual property management

On the road to the knowledge-based society, the importance of intellectual property management is growing as the value of intellectual property (IP) increases (Granstrand, 1999). When it comes to co-creation among partners IP management is especially important and it is suggested that collaboration should not be started without the necessary agreements signed (Giannopoulou et al., 2010). Having established the rules early improves the chance to avoid problems with appropriation (Bughin et al., 2008).

[4] According to the OECD, knowledge based economies are *"economies which are directly based on the production, distribution and use of knowledge and information"* (OECD, 1996)

This is further emphasised by Dhansai and Parkhe (2006) who brings up appropriability as one of the most important aspects of an innovation network.

Collaboration among actors that do not share the same mentality regarding intellectual property rights should be approached with precaution (Giannopoulou et al., 2010). This could for example be a firm and a university where trade secrets and academic freedom can be seen as direct opposites, which could cause problems. Further, Lichtenthaler and Ernst (2008), argues that that relations with intermediaries should be aligned with appropriability systems as transfer of knowledge, and especially technical knowledge, is difficult.

3 Methodology

Having defined the theoretical framework for the study, this chapter describes the methodology used. The chapter is structured to describe the research strategy set up, the design of the study including the processes for collecting and analysing data, and the quality the study beholds.

3.1 Research strategy

Research strategy can be divided in to two different basic clusters: qualitative and quantitative. Qualitative research emphasises words rather than quantification in the collection of data as for quantitative research. These two orientations include also other characteristics that separate the approaches. Qualitative research is based on a view that the social reality is correlated with individuals as they are creating it, a reality that is constantly shifting. It also emphasises an inductive approach where the research undertaken aims to be theory building and result in theories. Quantitative research on the other hand does not include social reality but rather envisions it as an external body. Quantitative research most often emphasise a deductive approach where theories are set up as hypotheses on beforehand and tested through the study to whether they can be confirmed or rejected. The deductive approach uses theory as a guide for the research where in the inductive approach theory is an outcome of research. (Bryman & Bell, 2011)

Deriving from the aim of this study, the qualitative approach is most applicable. The arena is impacted by the social reality, as individuals from different organisations are to cooperate and create results both for the arena and to their respective organisations.

3.2 Research design

Starting off in the qualitative research orientation, a framework for data collection and analysis needs to be chosen, the so-called research design. In business research there are mainly five design types to choose from: experimental, cross-sectional, longitudinal, case study and comparative. The experimental setting consist of two groups where one is the experimental group on which tests are performed and the other is the control group to which the results from the experimental group can be compared, hence no testing is performed on this group. The cross-sectional design aims to collect one or more data from several instances at one and the same point in time. This generates mainly quantitative data to be analysed to find correlations between variables and is hence not applicable in this case. Longitudinal, on the other hand, study one case at different points in time and is used to map changes in time in one or several variables. Case study analyses one single case thoroughly on a set level of analysis, e.g. organisation, location, person or event. Case studies are typically of qualitative nature as it gives detailed descriptions and explanations of one case. Finally there is the comparative design where equal tests are made on two or more varied cases to be able to compare and understand phenomenon. (Bryman & Bell, 2011)

The research questions set up for this study are developed to improve the understanding from the arena:

- *What are the motivations for academic, industrial and governmental organisations participating in a triple helix collaboration?*
- *How is collaboration enabled in a triple helix context?*
- *How do participants utilise a triple helix collaboration?*

It becomes evident that the chosen research design would primarily be the case study design since one organisation will be thoroughly examined. As case study is a descriptive design, the focus is on gathering data about the case from different sources to gain deeper knowledge (Bryman & Bell, 2011). Yin (2009) argues that the use of multiple data sources would generate a more accurate and convincing result and also a broader description of the studied case. The data sources used should be complementary and could consist of documents, records, interviews, observations or physical objects.

3.3 Research process

The research process set up to answer the research questions consists of a selection of methods used; this is depicted in Figure 1 and will be further explained in the following subsections.

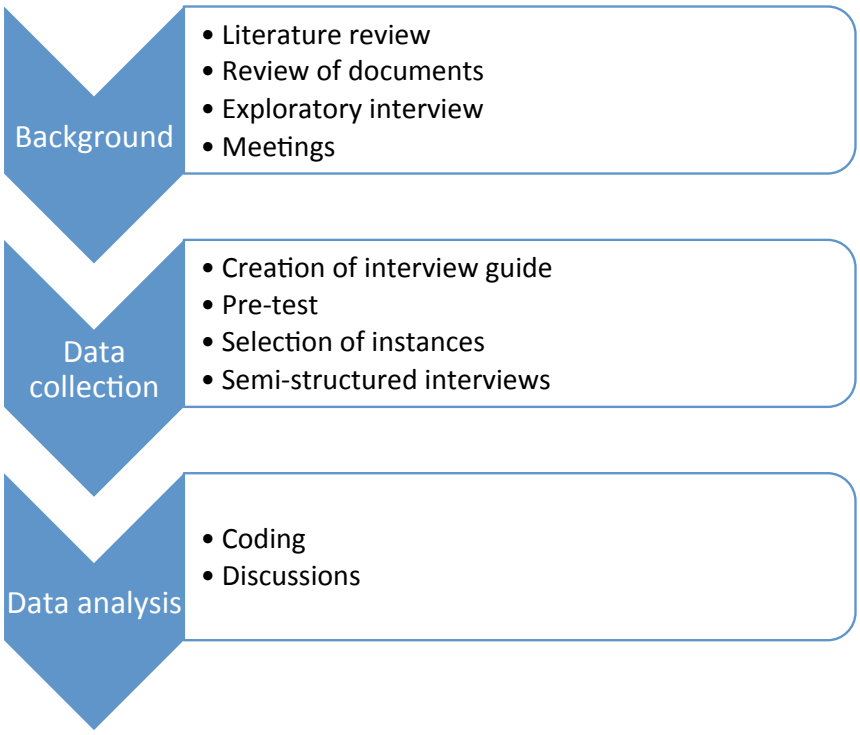

Figure 1 The research process

3.3.1 Background

The first phase of the research process, was focused on orienting in the theoretical landscape of open innovation and different types of inter-organisational collaboration, but also on understand the environment of LSP and the arena.

3.3.1.1 Review of documents

After an initial start-up meeting with the program manager, the researchers gained access to a handful of documents with different linkages to the arena: the latest signed framework agreement, three approved project proposals and forms applying for funding for each of them, and lastly and evaluation made by an external party in 2009. The access to these documents was given in confidence but helped the researchers gain knowledge about the formalisation of the arena, its history and modus operandi.

3.3.1.2 Exploratory interview

After the review of documents, one exploratory interview was performed with the program manager. The purpose was mainly to fill in the blanks about the arena, its prerequisites and undertakings. Another important aspect was to get to know the project manager a bit better and to gain a mutual understanding of each other's work. The interview was unstructured but with a few initial questions to make the meeting more informal. Using unstructured interviews helps when wanting to get the interviewee's own view on the research topic (Bryman & Bell, 2011). The interview was recorded and transcribed verbatim and used as background data for the study.

3.3.1.3 Meetings

The researchers were invited by the program manager to participate at a project start up meeting held in the middle of February. Three new projects that had been approved held their first gathering. Only one of the authors participated with the objective to understand the processes and the collaboration in the arena.

3.3.2 Data collection

After the initial exploratory phase the need of data were understood and interviews with the representatives from the partner organisations were made. The interviews were built around a framework of understanding the setting of the project better.

3.3.2.1 Selection of instances

The decision was made to try to interview people from both the steering group as well as the project management group, as the study aims to understand both the purpose and the undertakings of the arena.

As the current program manager was interviewed in the background phase is connected to all people engage in the arena today, contacts to the potential interviewees were given from him and thus so-called snowball sampling was performed. Bryman & Bell (2011) explains snowball sampling as when interviewees suggest potential future interviewees according to the subject. In this case the researchers was introduced via the current program manager to the potential interviewees through e-mail letting them know on beforehand what was coming up and introducing the subject. The e-mail opened up the opportunity for the receivers to decline the interview directly to the current program manager.

All in all the population of the study were 17 people, including both the steering group and the project management group. The initial sample was 14 people; the program manager had already been interviewed earlier and was therefore excluded since his opinions were already recorded. Two representatives from the agency were also excluded, one from the steering group and one from the project management group, due to the time frame of the study. During the interviews one of the excluded representatives from the agency was recurrently referred to as the one with most historical knowledge, and a decision was made to include all agency representatives in the study. Since the sample was almost the full population, it is considered to be representative. 15 out of 16 people accepted to be interviewed.

3.3.2.2 Creation of interview guide

Two different interview guides were developed; one specifically for the steering group and one for the project management group (both can be found in the appendix Interview guides). Some of the more general questions about the arena and motivations for

participation are the same for both groups as there was an interest to see the correlations and differences in response between them and also between organisations.

3.3.2.3 Pre-test

The interview form chosen was semi-structured to enable the interviewees to elaborate on the subjects they feel for, while still getting answers for the prepared questions. The interview guide was pre-tested although that is not considered to be of strong importance as there is flexibility in the questions asked (Bryman & Bell, 2011). The decision was to do it anyway in order to check if the questions were reasonable and perceived as expected. The two interview guides was pre-tested by the help of the former the arena program manager (just recently removed to Test Site Sweden, another arena at LSP). The interpretation of the questions given where almost in line with what was intended, wherefore only minor adjustments to increase the clarity were made. Due to only minor changes, one pre-test was considered to be enough.

3.3.2.4 Semi-structured interviews

The interviews were held in the period 1st March to 28th March (see appendix Interviews for the full schedule). The preferred language was English to prevent the researchers from translating and choosing words for quotes; the opportunity was though given to the interviewees to choose language. Seven of them were held in English and the rest in Swedish. In average an interview lasted for 45 minutes. Both researchers attended all interviews except one. The interviews were recorded, transcribed verbatim and discussed soon after they ended. The discussions included the quality of the interview and new information that came up.

3.3.3 Data analysis

After the data collection phase the research moved to generate empirical findings about the arena. After transcribing all interviews, a coding scheme was set up. Codes were created relating to the research questions and sub-codes were added to these. Using the research questions as a framework, provided helps against overload of information. During this process, the codes were at a couple of times revised since the old one was not regarded to be sufficient. The codes were created to be as universal as possible, but for the full understanding, some knowledge within the field of open innovation arenas and within this study might be needed. No listing was created defining each code, which could have become useful if following-up this study with another on a different arena or if wanting to reconstruct this study. Therefore it may give some problems with retrieval of the data analysis if wanted (Miles & Huberman, 1994).

3.4 Research quality

To determine the value of the results from this study, the research quality needs to be evaluated. The research quality is determined by the reliability and validity.

3.4.1 Reliability

The reliability of a study regards the dependability and consistency of the data. One aspect of this is whether the results are repeatable or not. Case studies do not aim at being replicable since the focus is on studying one instance thoroughly and cannot replicate other cases (Bryman & Bell, 2011). Open innovation arenas differ in themes and actors and even though the study has been well documented, the replicability is considered low due to the arena characteristics. If wanting to repeat the full study using the arena to be the focus organisation and the same interviewees, the replicability is still

considered to be low. The questions and answers in semi-structured interviews tend to shift depending on the personal qualities of the researchers, but also on the mood for both the researchers and the interviewees.

Answers in semi-structured interviews are often subjective and includes personal judgements. All answers from the interviews have been analysed together to generate a complete picture. This results in internal evaluations, which is included in the data collection, but to minimise the effect on reliability correlations between answers have been prioritised.

3.4.2 Validity

Validity is the notion to what extent the study is actually measuring what was intended. Validity can be divided into different categories such as external and internal validity. External validity measures if the results can be generalised to a greater context and internal validity measures causality in the data. (Bryman & Bell, 2011)

With the very high response rate the findings can be said to be generalizable for the whole population, which strengthens the external validity. It is also possible to generalise the findings to other organisations with the same characteristics regarding set-up, theme and type of actors. As it is though only one case being examined, one should not attempt to generalise to a wider extent as the environmental setting biases the findings.

The internal validity is considered to be strong, as the data sources have been triangulated; interviews, internal documents, an external evaluation and participation in meetings have been included in the data collection and analysis. It has been possible to create thick descriptions of the case due to the good accessibility of data. The triangulation of data sources has given a nuanced description of the arena and its operations. It has also helped build an historical overview and causality between different findings.

4 Case description of Security Arena

In this section the case of the arena will be thoroughly described, including the history, structure, scope and roles. The arena will also be put in a theoretical context.

4.1 Description of the arena

The arena is located at LSP in Gothenburg and commissioned by the agency. As seen in Figure 2, the arena engages actors from academia, government and industry.

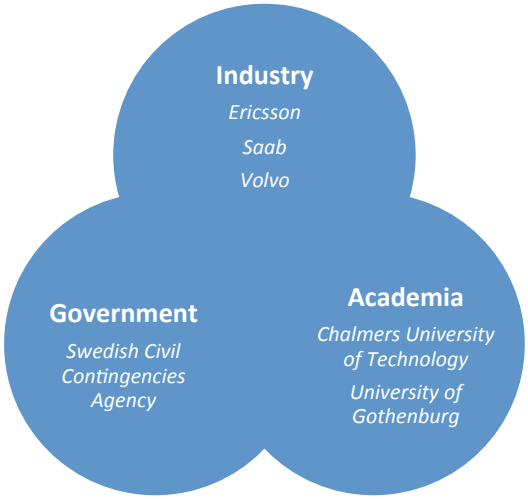

Figure 2 Security Arena and its partners.

The actors engage in joint research and development on societal security, divided into four themes:

- Transportation security
- Mobile broadband for security in society
- Surveillance and early warnings
- Methods and systems for robust and secure crisis management

The proprietary vision for the arena is "*to develop capabilities that strengthen society's security and preparedness"* (Security Arena, 2011). According to the framework agreement, the role of the arena is to be *"a national arena for research, technology development and method development as well as testing and distribution of research results in order to enhance the society's ability to prevent and handle accidents, crises and other societal critical events"*[5]. The projects at the arena are also supposed to be pushing the boundaries and generating ideas to new projects. This can be illustrated with a quote made by a person in the steering group regarding the expectations of the projects at the arena: *"Igniting a new stream of activities that might be long term to change the Swedish rules and laws or you know, to really move the position forward"*.

The arena was initiated in 2005 on two different fronts. A discussion among Chalmers University of Technology, LSP, AB Volvo and Ericsson AB in which the need to strengthen the civil security area in Sweden was pointed out. At roughly the same time, the former governmental agency Swedish Emergency Management Agency (SEMA) saw a need and got a governmental commission to strengthen the Swedish research and

[5] As translated by the authors from Swedish.

innovation environment around societal security. The two interests were met and the arena started in 2006. In 2007 Saab AB was incorporated as an industrial partner. In 2009 SEMA was incorporated with two other Swedish governmental authorities and the Swedish Civil Contingencies Agency was created, thus replacing SEMA in the organisation. In 2010, University of Gothenburg entered the arena as a result of a need to complement the arena's technology focus with softer aspects such as psychology, law and sociology. One of the steering group staff expresses *"more questions were connected to the more softer questions around security, what sort of society do we want to live in, how many cameras do we want to have everywhere and so on"*. The arena became more cross-disciplinary and this set-up of partners and disciplines is still valid today.

4.2 Structure of the arena

The structure of the arena has some resemblance to a company, with the steering group as a board, the programme manager as a managing director and the project management group as a board of directors. The employees could be symbolised by the people participating in the project, i.e. individual researchers from both academia and industry. Representatives from all partners constitute the steering group and the project management group. Depending on the needs, the projects could also have an expert group consisting of mainly external people with a specific knowledge in the field; the project leader for each project makes this decision. The structure is shown in Figure 3 below.

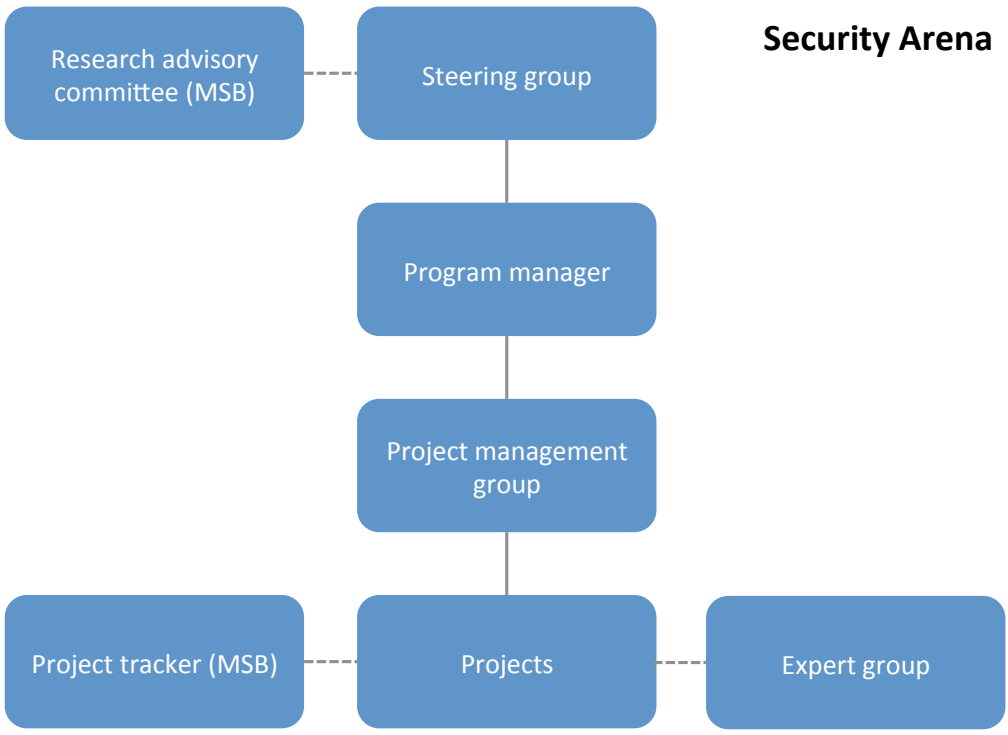

Figure 3 Organisational chart for the arena, as interpreted by the authors.

All actors in the arena are shareholders of LSP, except the agency. LSP creates a context to the arena, as there are a lot of companies and other arenas in the science park. A steering group representative describes this: *"Security Arena is not just set in a room somewhere in Gothenburg, it is sort of based in the context of a lot of other things that are either closely connected to the area of societal security or loosely connected"*. LSP employs the programme manager and supports the arena with accounting and information services.

As the arena itself is not a legal entity, agreements have to be made through LSP. There is a three-year framework agreement for the arena between the agency and LSP. The agreement regulates the organisation of the arena, project prerequisites, in-kind financing, sharing of results and project follow-up. In-kind financing[6] is an important concept in the arena; as governmental agencies are prohibited to finance product development. All industry partners participating in projects are obligated to contribute in-kind financing of at least 25 % and also make needed resources available to the arena. This is not the case for academia who receives full funding without the demand for in-kind. The agency is annually dedicating approximately 8 million SEK to the arena, of which 1,5 million SEK is allocated to hire a program manager and other administrative expenditures. The rest of the money is dedicated to funding projects as decided by the steering group. A steering group representative mentions these dedicated funding as an advantage: "*It goes quicker to get the projects going within Security Arena as the public money is already in place*". The money is routed through the arena, as the arena, not the agency, pays the partners from industry and academia for the projects where they actively participate.

In addition to the framework agreement, there are partner agreements between each industry partner and the arena. These agreements regard participation in the arena, regulating things such as participation in the steering group and the intention to participate in projects on the conditions of in-kind financing. So far, there have not been any partner agreements with the academic partners, as described by the steering group representative from academia: *"the first years it has been quite informal and there have only been basic statements and establishing decisions, regarding participation"*[7]; this is now in the works. For each project there are agreements set up among the participants and the arena. These agreements regulate things such as timetable, deliverables, and financing of the project.

4.3 Role of the arena

The projects undertaken at the arena are focused on research and development. It is mentioned by several interviewees that the projects are supposed to be close to the market and contain applied research. The projects are supposed to aim for a result that can become a product or a part of a product, as seen in Figure 4 below, but the productification is outside the boundaries of the arena.

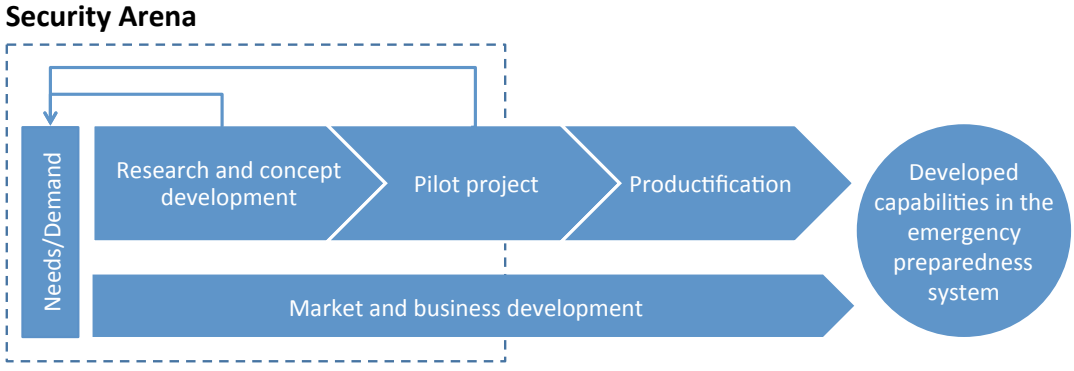

Figure 4 Scope of the arena, adapted from Security Arena (2011, p.7).

[6] In-kind financing means *"payment in goods or services as opposed to money"* (Oxford Dictionaries, 2013b).

[7] As translated by the authors from Swedish.

The interviewees also bring up other aspects of the arena. The arena should be neutral in order for the industry partners that are competitors in some aspects, to be able to work together in projects at the arena. A steering group representative talks about this reason for the arena to be neutral saying that *"if there are competitors too close, it is more difficult to do it, but forming a more neutral arena where they can actually do co-working together to rise the level of knowledge"*. The representative further elaborates on how to accomplish the neutrality among the industry partners: *"If you are working very close and if you are close to the market and close to the product development, things are getting difficult when you have competitors in the same projects. But if you raise it a level, at the system level, it may be easier"*. The arena enables this to happen by starting exploratory projects with a 2-5 year horizon.

There is also a rule decided by the steering group that all projects needs to include at least two partners in order to be eligible for funding. This is to improve collaboration and ensure neutrality by avoiding projects pushed by a single partner being run at the arena.

Another steering group representative mentions an additional benefit of neutrality by pointing out that "*the Swedish public procurement act is quite hindering when going in to this unknown areas where they don't know what they want and we don't know if it's possible to make produce or so. We needed some kind of more neutral arena to be able to discuss between industry, academia and the agencies*". As the arena itself is a non-profit organisation, not owning any intellectual property rights, it can stay neutral to all partners.

The arena is an organisation outside the partners' home businesses, with a particular function, to organise the collaboration work. One aspect brought up by the interviewees about the specific role of the arena in this collaboration is that it sometimes acts as a broker. A steering group representative from the agency stated *"They are doing a job we ourselves find difficult to accomplish, because we can not search the market for the right researchers, and we have difficulty seeing where out in the industry is the knowledge and know-how about some issues, but the arena can manage this"*[8].

4.4 Defining Security Arena

During the data collection the participants were asked to describe the arena and from that it was possible to identify some key elements among the answers such as triple helix, network, cross-disciplinary and research and development. Below follows some comments about those aspects.

The most central part of the arena is that it is a triple helix collaboration with partners from industry, academia and government and it was even referred to as unique: *"very few have industry within their collaborations […] this is a unique partnership where we have very good contacts with the industry"*[8]. Collaboration with the industry is for the agency only achieved inside the arena: *"Collaboration with academia we have several other, but we have no other arena where we work so well together with industry"*[8]. It is not only the agency that is new to collaborating with the industry. A steering group representative from academia is new to this type of collaboration: *"It has been a new and exciting experience, especially the collaboration with industrial partners that is so evident, which I have not been involved in before"*[8]. The arena is the facilitator for this triple helix collaboration, which is framed by the overall focus on societal security.

[8] As translated by the authors from Swedish.

During the interviews, one reoccurring description of the arena was that it provides a good network. The participants talk about the arena not only as a place for collaboration but how good the arena is to facilitate and promote contacts among the participating parties. One steering group representative states the following: *"You really get good networks in Security Arena, because all the players that are taking part in Security Arena have large networks. So it is a very good way for meeting different competences and different people"*. By participating in the arena you can gain access to the networks of the other actors and this provides good possibilities for positive synergies for all participants.

The work in the arena is done in projects focusing on creating new long-term abilities within the Swedish emergency preparedness system. A project management group representative from the agency clarifies; *"It's not an arena for ordering projects, but it is an arena for cooperation and collaboration in which all parties should be participating, that is extremely important!"*[9]

Summarising, the arena tries to facilitate innovation among its partner organisations. When studying the definition of an innovation intermediary as presented by Howells (2006, p.720): *"an organization or body that acts an agent or broker in any aspect of the innovation process between two or more parties"*. There are evident similarities as the arena has in several interviews been called a broker or agent, is working with innovation and involves more than two parties. However, the arena is presented as an arena under the umbrella of LSP, just like SAFER, which is the source for the concept of open innovation arenas for Ollila and Elmquist (2011). They put forward three aspects that separate arenas from intermediaries: physical meeting place, proprietary goals and seeing itself as a key player within its field. When comparing the arena to this definition, some similarities as well as discrepancies are shown. First, the arena does not provide a physical meeting place for everyday work, but only for occasional meetings. Secondly, the arena does have proprietary goals, which are specified in the annual operational plan as well as a vision. Lastly, the arena is not a key player within the field of societal security. The vision does not aim for the arena to become a key player and there have been no signs during the interviews of viewing the arena as a key player. Based on this it can be concluded that the arena is not an open innovation arena, but an innovation intermediary. The arena does however have the prerequisites for becoming an open innovation arena.

4.5 Roles at the arena

As seen in Figure 5, the arena has a steering group with representatives from academia, government, the industry partners and LSP, in total 9 persons. Each of the four R&D themes in the arena earlier mentioned has a theme leader that coordinates the different projects within the theme. These theme leaders are also the official project managers for each project started within their theme. All theme leaders are a part of the project management group together with the programme manager and three representatives from the agency, all in all 9 persons.

[9] As translated by the authors from Swedish.

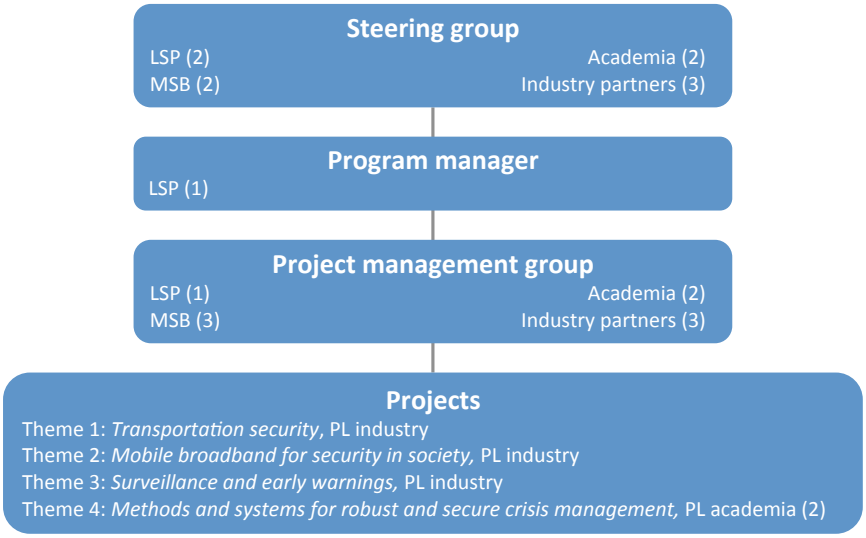

Figure 5 Division of representatives in the arena. PL = Project leader. Numbers in brackets represents the number of representatives from each type of organisation.

4.5.1 The role of the program manager

The role of the program manager is key to the arena as it is ones responsibility to be the coordinator and head of the project management group. The program manager keeps track of the projects, invoices, bookkeeping, and books meetings and makes sure the partners in the arena are performing according to plan. It has also been put forward that the program manager is to act as a broker, trying to raise interest for the different project proposals among the actors. The program manager is responsible for that project ideas are well prepared by the partners in the project management group, before they are put up for discussion and decision in the steering group.

The project manager is responsible for reporting the status and progress of the on-going projects at the arena to the steering group as well as the board of LSP. As the only person working full-time within the arena, the program manager is the one that keeps the arena alive and moving forward. More than that, the role of program manager is usually overlapped by the arena itself as showed by a quote from a steering group representative *"If we don't have a person there [at the arena], it doesn't exist"*.

4.5.2 The role of the steering group

The steering group is responsible for the long-term strategic development of the arena and identifying the directions and long-term perspectives. This includes making sure that the processes within the arena are effective and facilitates collaboration. The steering group is also monitoring the project portfolio, deciding on new projects and hires the programme manager.

4.5.3 The role of the project management group

The project management group is responsible for preparing project applications to present to the steering group. The interviewees describe the resulting project proposals as a group result, which indicates that the projects are very much co-created in the group. Except for creating ideas for new projects, the members of the project management group are also brokers for their own organisations. Their role is to find people to staff projects and some of them are also actively participating in the projects.

Project management group meetings are held in the facilities at LSP. Some representatives say that they often connect via videoconference and that the project management group usually arrange full days to work on arena matters.

All theme leaders have e-mail addresses with the domain ‘lindholmen.se’ and are obliged when presenting the arena to an external audience to use a standard presentation tool from LSP, all to show affiliation to the arena.

5 Empirical findings

This chapter aims to compile the information gathered during the data collection and the semi-structured interviews. It has been divided into three main sections structured in accordance to the research questions: motivations, collaboration, and utilisation.

5.1 Motivations

In this section the reasons for why the partners engage in the arena are described. The section is divided into sub-sections in order to distinguish the three different types of actors.

5.1.1 Motivations for companies

The most commonly mentioned motivation by industry representatives for participating at the arena mention is the network of actors available. One of the roles of the arena is to facilitate collaboration and this is closely connected to networking among the partners, as pointed out by Company A: *"The arena concept is a perfect playground for us, because there we meet a lot of good partnerships, with both industry partners and academia"*. One of the representatives from LSP highlights the same aspect by saying: *"For them I believe the most important thing is to find this room to have very open dialog and discussion with agencies and public people, but also the industrial, not competitors but colleagues, that somehow have something to do with social, civil security"*. The industry representatives talk about how the outcome of engaging in the arena goes beyond the traditional products or services. The project management group representative from Company A believes that the arena is a good way to find future add-on services related to security: *"That is how we look at […] security; as a kind of add-on service to our hard products or other kind of services that we have got"*.

Another aspect of why the companies engage in the arena, brought up by both Company A and Company C, is scanning and monitoring the area of societal security. The steering group representative from Company C says that this is *"a good way of finding out what is going on in Sweden, especially"* and the project management representative from Company A thinks that participating in the arena is a good way to *"find out what are the problems in the society"* and *"scan the research activities outside [the company]"*.

The company representatives from Company A and Company B also refer to the arena as a place for generating new ideas and bringing them into their respective organisation for further development. The steering group representative from Company A states that *"innovation is very much about trying to create new concepts and new concepts are often coming from the intersection between the different areas of competence."* and *"[we] believe that this constellation with these three big industries coming together and generating new concepts for the future is crucial"*.

During the interviews, representatives from Company A and Company B also briefly mentioned that the arena is a good supply of competence. At the arena the companies can learn about and test new technologies through the arena, but the network at the arena also provides good possibilities to identify and hire key talents.

A motive brought up in the interviews by an industry representative was to market the company as a security provider as this specific company is not believed to be well known as that. However, this was not mentioned as the main motive.

5.1.2 Motivations for academia

Academia are mainly interested in the network to *"collaborate with reality"*[10], to use the words of a representative from the agency, as it strengthens the research and improves the possibility to receive funding. Collaboration with external partners is also something highlighted by a representative from University A, who states: *"one important aspect is that we are supposed to do research work together with external partners, both in the private and public sector. So the arena has been a tool for doing that, in a sense"*. Funding is also mentioned among the motivations to engage in the arena, as can be seen in the quote from a representative from academia: *"funding is an important thing and, but also to have contacts with industry and have collaborations with industrial partners mainly and get some input from potential users of our research. Which may be industry or these other societal bodies"*. Note, though, that the stress is on the possibility to get input from users as a reason for collaborating with the other partners at the arena.

When looking further on the motivations for engaging in the arena, academia sees it as a good way to generate new ideas. The steering group representative from University A explains how the arena enhances the research projects: *"it is in these, shall we say trans-boundary processes, where the project may have a dynamic and get a multi-dimensionality that they can not otherwise get, if you only see techniques for themselves, which makes it, or if it would be social scientists from each side, but it is precisely this interdisciplinary, trans-boundary that creates this multi-dimensionality and the dynamics of the projects that we want to here at the arena"*[10]. In short, the cross-disciplinary nature of the arena enhances the projects as more angles of the same project are researched.

5.1.3 Motivations for the government

The agency constitutes the foundation for the arena's existence and on their homepage one can read: *"The task of the [agency] is to enhance and support societal capacities for preparedness for and prevention of emergencies and crises"* (MSB, 2013). The arena is a tool for the agency to achieve this according one of the project management group representatives. Through the arena, the agency can communicate the knowledge they have about where in the Swedish emergency preparedness system that there is room for improvement or where there are inabilities. This information is to be used to guide projects at the arena in order to maximise the effect of the results on the emergency preparedness system. A project management group representative from the agency describes what results they want from the arena: *"The main thing is that it is something that is requested, which provides value, which provides new abilities to either anticipate or deal with emergencies or crises"*[10]. The usability of the result is also stressed: *"Create maximum benefit and effect out in the system [...] that is in the community and out among the actors [...] find ways for research findings to reach out and actually be useful in some way"*[10].

Representatives from the agency mention the brokerage role of the arena as an important motivation. A steering group representative says: *"The arena is a great tool for us or as a means for us to find the right competences, both in industry and in academia"*[10]. It is further emphasised how projects run at the arena are enhanced by the

[10] As translated by the authors from Swedish.

arena's strength in finding the right people and competences to participate in the projects.

Another aspect is that the arena provides a greater return on the invested money as the participating industry partners provides in-kind financing. As governmental agencies are publicly funded, the representatives talk about a responsibility to use the money efficiently: *"because it is taxpayers' money and we need to make something happen, the development must go faster, we have to keep up, so this is really a very good way to create efficiency in general"*[11].

5.2 Collaboration

This section will emphasise how the collaboration in the arena is carried out. The findings have been divided into the project process and the challenges that the arena faces according to its members.

5.2.1 Process

The project process in the arena is shown in Figure 6. Below, the process will be further described and specific emphasis will be put on sharing of knowledge among arena participants.

Figure 6 The project process at the arena.

5.2.1.1 Idea generation

The process of initiating projects is considered to be dynamic as all parties within the arena are eligible to come up with new ideas for projects. One project management group representative says that it varies how a project idea is generated; members of the arena can present them, they can be generated out of discussions or presented by someone outside of the arena.

Some trends can be seen in the idea generation phase. It is mostly representatives from academia or the industry that brings up project suggestions, which is referred to by the interviewees as a bottom-up approach. An academia representative says though that it is mostly the industry that brings up new ideas under the project management meetings. Generally people tend to bring projects to the arena that needs more a collaborative research, which is more general and forward looking. A project management group representative says that they tend to propose projects that they think would be in the agency's interest.

A top-down approach is also present. This is explained as when the agency has identified needs and trends in the emergency preparedness system or some organisation has expressed a need to the agency that has been translated into a project idea for the arena. The agency then reports indications on what solutions the society needs, to the project management group. These needs can then be translated into projects by the arena. A steering group representative refers to this as the right flow of ideas into the arena: *"The answer to something, rather than the industry just suggesting that we can do this and then we made a project out of it"*. The agency has not been very clear in the past on what needs the society has. A steering group representative from the agency

[11] As translated by the authors from Swedish.

admits that they do not have the organisation fully in place to be continuously updated on societal needs.

Another explanation of a top-down approach is when the steering group propose in general terms the lack of actors or aspects in the emergency preparedness system that needs further research. A request is given to the project management group to look further into an area or field of interest and come up with a practical solution.

There has been one so-called innovation session two years ago with the aim to gather people from all organisations to come up with new ideas. This session was called "Open Arena Innovation Session" and is described by the arena as a virtual tool to create new and creative ideas in the field (Security Arena, 2011). A project management group representative explains the process where the participants were working for 48 hours with brainstorming new ideas and commenting on other ideas. These were then developed into different areas for potential projects. The ideas was later analysed, broken down and put together in new ways. According to the arena, the tool would be evaluated in 2011 to see if this could be a returning process, but another session has not taken place yet (Security Arena, 2011).

The agency plays a distinctive part in the project initiation phase as they provide the most funding for the projects. Their role is explained as to have gone from funding to purchasing. Two years ago narrow projects initiated by the researchers themselves got funded. These projects would have rather small impact on the society, but would meet the need for research. Today the agency acts as purchasers where they themselves identify and define the strategic needs in society as well as places orders to industry and academia. It has been stated that they have not been such good purchasers in the past but is now trying to change that and to be more strategic and precise in their upcoming orders. This is a shift to a new work process for the entire agency and not only the arena. A representative from the agency states that even if they do not have veto right on which projects that should be created or which direction the arena should take; they still have a very large impact on these issues. A steering group representative from the agency adds that their role should be to present problems and needs for the arena to understand and to find the right competencies to solve them.

5.2.1.2 Preparation of projects

After generating a project idea, an abstract is created and then discussed within the project management group, a process said to be rather standard. It starts with a kind of synopsis from one partner who develops it together with a few other interested parties. This group contacts other suitable actors to take part, sometimes through contacts given by the agency. One issue that is treated in this preparation phase is what kind of research is needed to make the project interesting from an academic point of view. The discussion among actors can lead to a small idea turning in to a big cross-disciplinary project. Those parties that are interested to participate in a project collaborate to create a project description and project application, including goals and specification of deliveries together with a budget for the whole project. In this part of the process, it is mainly academia and industry preparing the upcoming projects and the agency acts more as a sounding board and a broker of contacts. A project management group representative from industry explains their own evaluation of whether to participate in a project or not to be stemming from internal road maps.

Which organisations that are to be involved in a project are often formed during the project creation phase. A project is staffed with an advisory board and a project manager who has the responsibility to staff the project team and to set up the project

plan. At least 25 % of the work in a project has to be done by a second party. It is the role of the project management group representatives to find suitable competencies, resources and capabilities within the own organisation. When coming to which persons to involve in the project team, the team needs to accept persons being assigned. Sometimes a project gets funding even if the team is not complete in the sense that all team members has not been named yet.

The agency assigns project trackers to every project at the arena. The project trackers are people from the agency with competence in the area that a project focuses on. The role of the project tracker is to monitor and evaluate the project according to the different follow-up criteria and to help the project with contacts etc. When preparing the projects it is decided upon which areas the project trackers will focus and follow-up on. Project descriptions are carefully written so they will not be ambiguous and hard to follow-up on after a project has ended. The arena is flexible and the project deliverables can be adjusted when needed due to resources available in terms of people and financing, but all parties engaged in a project have to agree on this.

Project management group representatives from industry say that they discuss the arena internally with their steering group representatives. The discussions can be of strategic nature and include what projects to suggest for the steering group. The steering group representatives can advice against some projects as they will decline it and never put them into the minutes for the meeting. These internal discussions are not happening at University A according to their project management group representative. The steering group representative is though consulting the different department managements before deciding upon a project. At University B the project management group representative discuss with his colleagues in order to anchor the projects within the own organisation. The discussions include the projects as such and also who might be interested to be involved.

Within the agency, internal discussions among their representatives occur, but there has been a rather narrow circle of people involved. One representative says that they meet regularly, but that these preparatory contacts could occur more often. There are also annual discussions of more strategic nature to evaluate the operations.

To gain a broader acceptance internally at the agency a research advisory committee have been created that processes all project proposals before they are funded. This is an internal committee within the agency with several departments involved. When the project management group has finished their work, most of the time everything is set regarding the project, but it is sent to the research advisory committee for review. When the research advisory committee approves the project proposal, it is proposed to the steering group at the arena to decide upon. It is claimed that even-though the steering group makes the formal decision on which projects to start, the agency has very much influence on what research projects they want performed.

The steering group has the final decision on which projects to start and ensures that these are in line with the agreement with the agency as well as the strategic direction of the arena and LSP. Although the steering group takes the formal decisions to start the projects, a project management group representative said: *"When it finally reaches the steering group there is not much discussion, they pretty much just decide and make a ruling"*[12]. There have though been occasions when the steering group has recommitted or postponed a project proposal.

[12] As translated by the authors from Swedish.

5.2.1.3 Project work

Once a project is set up and approved, the work is divided into work packages to be accomplished by the respective participants, minimising the need to meet regularly. One project management group representative says that there are project meetings on a regular basis to integrate the different parts with each other. For example, in one project the meetings occur every second month. A representative from the agency says that when the project teams have started working, they are allowed to work more independently, without opinions from the agency. Another representative from the agency highlights the need for development of the work process to obtain more synergy effects.

The work packages are performed at the respective site, thus only the working partners get access to knowledge created in this phase. In the integration phase the respective result becomes public to the project participants. Lastly, as the agency is the owner of the final results of the project, it becomes public for society due to the principle of public access to official records. Figure 7 shows a schematic picture of how a project can be divided.

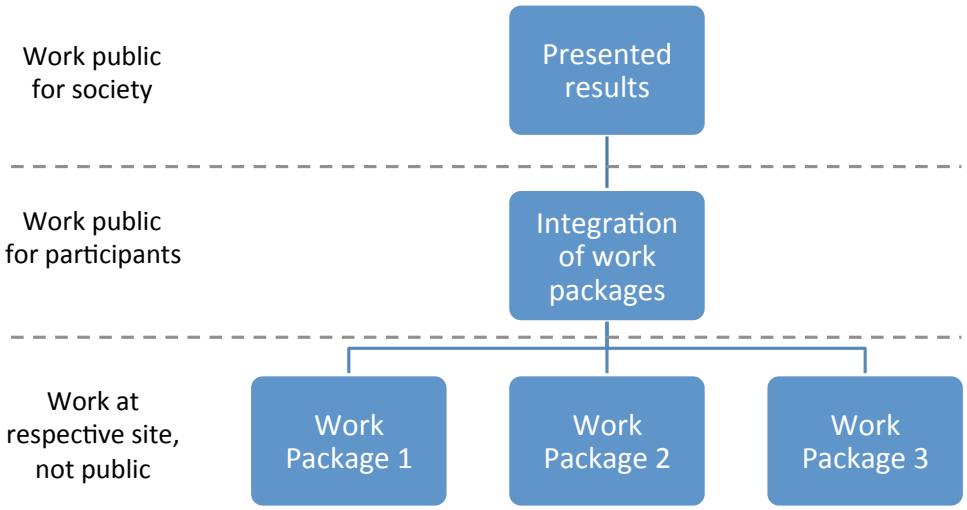

Figure 7 Division of work within a project at Security Arena.

A steering group representative from academia claims that most of the work of identifying projects is done by the industry that also does most of the problem solving in the projects. A representative from the agency describes their role in on-going projects as sharing their contacts and network as input to the projects, mainly through the project trackers. The project management group representative from Company B says that when a project is running they treat it like a regular internal project, but with a slightly larger project group. A member of the project team works in average 25 % of their total work time with a project at the arena and the intensity depends on which phase the project is in. A project management group representative from academia describes that they handle their project work as regular research.

The project work contains project meetings as well as continuous communication and interaction among the project members. Meetings can take different forms such as face-to-face meetings and telephone conferences as it is up to each project to decide the meeting forms. The interest for the facilities at LSP is not that high, although this was something that worked well before: *"Now it's mostly related to finding a room for a meeting, if it would be here or if it would be Lindholmen Science Park – it doesn't*

matter". Even the annual project presentations take place in Stockholm now instead of Gothenburg.

For the industry representatives, physical meetings have become less important, since the participants are well-connected today and phone calls or e-mail works as a substitute for actual meetings. One representative explains that since they are working as a distributed company, the employees are used to work in distributed projects and therefore the physical distance is not seen as an issue. The project management group representative says though that it is tiresome with all the travelling distributed projects include. Sometimes project issues are discussed in other forums: *"Some of it in a sense also happens through the project management group […] the process takes place on several levels in a sense"*.

5.2.1.4 Sharing of information and knowledge

When collaborating in different projects, there is a need to share information and knowledge among participants. The handling of intellectual property is regulated in the framework agreement between the arena and the agency. All results are owned by the agency but all immaterial knowledge stemmed from collaborating in the projects is free for the participants to use further in their own processes. The regulation of intellectual property rights (IPR) is something that is mentioned to be a reason for the lack of disputes. LSP stays out of the IPR discussions, as they are not aiming to profit on the arena and the responsibility is therefore put on the partners. Some projects have been subject of special IPR agreements where background information has been secured. An industry representative says that background rights are secured to some extent when entering a project: *"The open innovation paradigm is very much connected also to being good in detecting your own assets, what kind of new assets you create and how you control those assets"*.

The sharing of knowledge and information by the different parties within the arena is considered to work well. There have not been any IPR disputes in the past, but there have been occasions when lawyers from the industry partners have been forced to meet and discuss the terms for how results should be handled. An industry steering group representative says: *"We are open to collaboration but are also very professional on what to share and not"*[13]. Another industry representative claims that it is easier to protect your own properties when engaging yourself in the collaboration.

A steering group representative from academia does not think that the members of the arena are withholding information, adding that it is an open environment. One representative from the agency says that during the lifetime of the arena they have worked out ways of sharing information, but adds that this is not an issue for the agency since they are always striving for openness and accessibility of knowledge and information.

According to a steering group representative from academia, company secrets will not be disclosed in the arena since the projects are too close to the market. However, if the projects are initiated at the level of the emergency preparedness system, more information can be disclosed. A steering group representative from industry agrees to some extent, saying that you have to think about what you share or not. A representative from the agency says that the industry partners are not keen on exposing any trade secrets and that this is limiting the arena. Another agency representative is on the same track, but says that this is something that comes with the concept of the arena.

[13] As translated by the authors from Swedish.

One industry representative uses the Technology Readiness Level (TRL) scale[14] (shown in Figure 8) as a reference and means that at the lower levels, partners are more collaborative as research tends to be expensive. Actors get more protective as a technology rises in TRL. Standardisation projects are easier to collaborate on, compared to projects close to future products. An industry representative adds that if the arena would include competitors, the companies would get more sensitive on how open they could be. A steering group representative explains that as the arena is being steered by the interests of all parties, an industry partner may decline to participate in a project due to some internal strategic direction. It is though perceived that sharing of information is fostering creativity and helps the partners to get more results than when working individually, although problems arise when a project comes too close to a product.

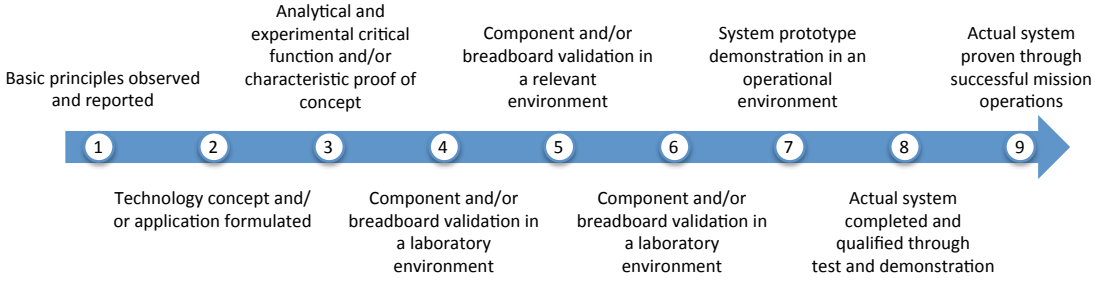

Figure 8 The Technology Readiness Level (TRL) scale adopted from The Department of Defense (2011)

The difference in objectives among the different partners in the arena becomes evident when talking about views of collaboration and knowledge sharing. A representative from academia mentions that before starting the Open Arena Innovation Session two years ago, all participants had to sign a contract regulating what one could do with the ideas coming up during the session. These types of agreements do not exist within academia and shows how the industry partners sometimes find it hard to collaborate. If the partners could be more open with their own knowledge and assets towards each other, then they could also combine their knowledge to gain more synergy effects.

This discrepancy can be explained by the fact that the industry partners have a market interest that academia and the agency lack, making them much less open to collaboration. It is not believed that a lack in sharing of knowledge has affected the projects discussed in the project management group, but rather the one that has not been discussed: *"it's rather a problem with regard to the projects that have not been conceived and designed, the ones that are automatically not thought off"*.

The steering group has explicitly asked for projects involving all three industry partners in order to foster collaboration. However, one steering group representative emphasises that this process should not be forced, that the arena needs to start from the question *"What do we want to create?"* and not from the need to collaborate more within the arena.

Within the arena, the arena high trust has been achieved, as the partners have stayed unchanged over time. One representative stresses that this is of importance when forming this specific environment: *"If you really want to formulate an open arena environment, which has an open innovation concept, that means that you have to build*

[14] The TRL scale was originally developed by NASA in the late 1980's as a tool to explain to stakeholders how mature a technology was. The tool has since been adapted and used by other organisations (NASA, 2010)

on trust between the people that are working on the arena and that also limits the project that you are initiating on the arena. You will not disclose the most secret thing you have at home". During the meetings when the door is closed, rather open discussions can occur, according to a steering group representative. This is due to the fact that the arena is a stable organisation with little turnover of people and this also ensures continuity in the arena.

5.2.1.5 Follow-up on projects

Projects are followed up upon on the steering group meetings in the form of a short presentation. All aspects of the project such as planning, set-up, budgeting and performance can be addressed during the meeting. The projects are also given indicators, red, yellow or green, depending how they are doing in relation to cost, time and quality. As will be highlighted below, the three types of partners in the arena also do internal follow-up on the projects but in different ways and make use of the results in different ways.

Follow-up within companies

Company A says that their participation in different projects at the arena is part of their internal project portfolio. This means that there is an internal follow-up process done for all projects the company is engaged in. When trying to utilise the project results the steering group representative sees some difficulties; *"Usually you have created something which is not really part of your current offering so it's a little bit tricky with, so to say the commercialisation phase […] The next step is to take it to market and then you go back to your own company and say 'Okay, we have done this port-pilot now and we should commercialise this' and then your company says 'What is this? This is not in our portfolio? It's really new things, we cannot deal with that.'"* As the commercialisation phase is not within the scope of the arena, the steering group representative suggests new types of reaching the market such as creating joint ventures.

At Company C the process is a bit different. When there is some result from a project at the arena, this is taken into the company to be processed among their customer units. This is to see if it could lead to something internally, i.e. if the company should continue to work on the results. Sometimes the customer units will initiate discussions with the end-users to find out the market readiness of the result and to see if the company is ready to make an offer with the technology. There is though no specific internal innovation process in place to put the results into and some projects from the arena may be of no use for the company. That it is, nevertheless, a natural outcome that is expected.

Within Company B, the project management group representative acts like a broker for the results and tries to find ways for them into the organisation. The representative is though self-critical towards the lack of a defined internal process. There is a need to create a process for awareness and engagement internally for initiating and participating in projects at the arena, and for following-up on performed projects. The process would help the understanding and actions on how to collaborate within a triple helix constellation as it provides great opportunities. At the same time these opportunities are easy to loose if the arena focuses on custom orders. A well-functioning process is transparent and open; there is a good dialogue so that everyone knows how and when to prepare project ideas and who to contact. The company also need to coordinate their business strategies with what is possible to gain from the arena and admits that this has so far been more of a reactive process.

Looking at the follow-up process in Company B, projects at the arena are handled internally and evaluated as a development or consultancy contract. The results are also evaluated internally within the company since the results have been created in collaboration with other parties. The evaluation would say if there was something in the results that is so interesting that it could be productified, if it needs more internal resources, if there should be a follow-up project or if they should discard taking the results further. The project management representative explains that the follow-up process in place, which is used while projects are running, includes project tracking once a month. In this process the finances are screened together with other issues that have come up through the project steering group regarding direction or resources. The project management group representative from the company is responsible to make sure that the research dimensions are fulfilled. They are however not measuring how the projects perform or the quality of the results in.

Follow-up within academia

Both universities have little overview of the possible internal project follow-up process and its measurements or quality, but relies on the individual researchers and their responsibility to follow-up their own work. The success factors for academia is the number of publications and if researchers manage to get their PhD or licentiate degree. An additional success factor is what the researchers gain from participating in different seminars, conferences, fairs and to what extent they get published.

Follow-up within government

As mentioned earlier, the agency has a so-called project tracker assigned to support and evaluate each project at the arena, from beginning to end. This person should be able to explain the need and relevance of operations undertaken to the project team. One of the steering group representatives claims that this makes the agency more adaptable towards the projects. The project tracker also helps the projects if some issues arise, as there is a continuous dialogue with the participants. One of the project management group members from the agency is coordinating these processes and the steering group representative says that this works well.

The project tracker chosen is someone that has knowledge and insights in the area of the project. The latest framework agreement specifies a number of follow-up criteria but there are also internal documents at the agency that describes the process that should be followed. The agency is obligated to make sure that everything from the projects they fund are reported, that targets are reached and work packages have been carried out. The follow-up process is constituted of a number of criteria that the project trackers or the project management for a project ought to follow-up on and report to the agency.

A steering group representative says that the arena has become more formal. As there is a constant mix of public and private resources within the arena, the increased formality helps to have full control on the finances and to handle the results stemming from the projects. A project management group representative describes the introduction of project trackers as positive since the process earlier was rather anonymous from the agency's perspective. A representative says that this new process has led to some consequences for the on-going projects in terms of changed contact persons within the agency and different types of follow-up criteria.

5.2.2 Challenges

Working in a triple helix constellation brings up different challenges that may not occur in other settings. The arena is constituted of its members and one of the main challenges

mentioned by several representatives is the importance to find projects that engage all partners. Projects started with only one industry partner and one university generate little synergy effects compared to if all partners would collaborate. Representatives have therefore suggested projects that would involve all partners but none has started yet. There are some concerns about the competition that mainly two of the industry partners are experiencing and that this could hinder full collaboration. Steering group representatives from those companies agrees on this and highlights that it is easier to work with the non-competing company. However, others mean that the time horizon and the distance to product development within the arena would make competition minor. A steering group representative says that the arena needs to stick to the plus five year horizon they have set up for projects in order to be precompetitive and that it is a mutual responsibility to keep track of this.

When initiating projects among industry partners and academia, it can sometimes be hard to give the projects relevant academic height since they cannot be too business oriented. Suggested projects have to be interesting from an academic point of view, but this has not yet been a problem. The scope of the arena is connected to the stages of research and development, which creates some challenges. One of the steering group representatives from the agency claims that there is too little focus on research and more focus on development projects. At the same time the distinction between research and development is not very clear. One project management group representative from the agency is self-critical and points at internal processes that they need to have in place for the arena to work in an optimal way. The research advisory committee tends to be better at research in comparison to development, but the arena is intended to have both as equally important.

Industry, academia and agencies have different internal working processes and time horizons. There is a need to better mix short ranged projects with those more long-term and more strategic with a broader approach. A representative from academia points out that the difference in time horizon makes it hard to involve the best researchers. The arena fund projects on an annual basis, something that is not preferred by researchers. A researcher is more likely to engage in projects where a longer research period gets funded, i.e. 3-5 years. It is also a general problem to make researchers available since they are often locked up in other long-term projects and teaching. The project management group representative has no mandate to order researchers to participate in the arena and it is hard to motivate them to engage in research projects when it is only for a couple of months and often part-time. It can therefore be hard to find someone that fits with the format that the arena provides. The search for researchers has in some cases delayed projects.

A representative from academia also sees a problem regarding the fact that the projects have been too narrow. The focus has been on technology and other aspects such as psychology, law etc. has been rather unexplored. It is a challenge to make researchers collaborate cross-disciplinary, even though there is a need for such interactivity as reality cannot be divided into the same categories as research disciplines. Some researchers may have problems embracing questions that are not within their exact field of interest. Everyone does however not agree upon this as some argues that researchers engage when they think they can create something good out of the project, regardless of who came up with the idea.

The agency has to make sure that the operations in the arena are flawless since they are object of internal audit. This has lead to the evolution of a stricter framework agreement. A steering group representative highlights that it is a fine balance between too much regulations and creativity.

Within the scope of the arena it is also important to find the right type of questions to initiate projects on. The projects need to be based on real needs in the emergency preparedness system in order to obtain benefits and synergies from the project results. An industry representative says that there is always a risk that you push projects that are prioritised internally into the arena. A success factor for the arena is to detect projects that are at the borderline of the different competences. However, this sometimes generates internal difficulties for the partners when it is time for commercialisation. A representative from the agency agrees that working on the boundary to productification is very challenging.

Over time the arena has developed to be a stable organisation and this has also lead to some stagnation as have been noted in the interviews. There is a will to expand the arena to incorporate small and medium enterprises (SMEs) as well as to increase the geographical distribution of partners from both industry and academia. Expanding the arena would generate a broader foundation and the agency would in that case be able to use the arena for a wider application area since the interest increases. When it comes to SMEs, the steering group considers it to be unlikely that these types of actors will make a long-term commitment on the same terms as the partners have today, since it would be quite costly. There is though a need to involve smaller businesses since it can make the organisation more agile. One representative from the agency do not think it will be easy to invite new partners to the arena; *"I would like to have some more companies in the arena, but it is not so easily made practically to get the others to accept it. […] It took several years and a lot of diplomatic talk for example to get Saab involved. […] to get everybody to understand and to accept and to simply find the trust"*[15].

Industry representatives has expressed wishes that the arena should, to a larger extent, have a global perspective, or at least a European perspective, and not be locked in to the Swedish borders. It is however stated in the framework agreement that the arena is supposed to be a national arena. Representatives from the agency emphasised this, as they are a national agency.

A steering group representative from academia points at the need to vitalise the thinking within the arena through engaging new members and disciplines, both from academia and industry. This could help the arena to grow from its stagnated state, something that is claimed to be of importance. However, one steering group representative is not fully convinced that there is a need for new partners: *"sometimes it's very good to have continuity and sometimes you need to get fresh brains in"*.

One steering group representative wants to see new ways to develop societal security better than the arena have been able to do in the past. Related to this, another steering group representative sees possibilities in combining different areas to create new projects across the borders of the arenas. Another representative talks about how to start a project between two of the arenas at LSP.

Finally, one steering group representative points out a big challenge for the arena and the whole Swedish emergency preparedness system: *"Many of the participants here are used to working with the defence industry […] In that context they have 10-20 years plans, they're putting up targets, how should we fight the Russians, but they have a very very long time schedule where they can hang up different research programs and activities and so on. When it comes to societal security there is no strategy, no long term plan."*

[15] As translated by the authors from Swedish.

5.3 Utilisation

Moving to how the arena is utilised by the participants, both tangible products and more tacit knowledge can be useful outcomes. Some tangible results from the arena can be found in Figure 9.

- More than 600 participants
- 70 finished projects
- 100 scientific publications
- 25 performances in media
- 50 master or bachelor theses involved
- 4 products
- Spin-offs
  - TUCAP – a technology development centre with a focus on modern communication technology to support and improve the effectiveness of ambulance alarms and pre-hospital care
  - URBSEC – Urban safety and societal security research centre
  - CISB – Innovation arena between Sweden and Brazil, São Bernando

Figure 9 Tangible results from the arena (Security Arena, 2013).

When talking about results and outcomes from the arena, the experiences among the partners differ. When it comes to industry, results from the arena are normally used for continued development and there have been products reaching the market. However, not all companies have developed products out of results from the arena. A representative from Company A says that no projects within the arena have yet led to any products within that company. There are however some concepts stemming from the arena that might become products in the future. Sometimes the results are incorporated in internal business plans and the process is continued in-house. There is also a value in learning as the project workers get new ideas, new influences and the possibility to find obstacles such as legislation that they did not know about. Another representative says that the arena helps to build the knowledge base within the civil security area, but points out that in order to obtain successful innovations you need to also take the commercialisation step to the market. The steering group representative from Company C sees the arena as a good place for proof-of-concept as the company is working on the global market: *"If we can make good solutions and good products in Sweden, they could be good references when we're going abroad"*.

When it comes to academia, a representative mentions a project that was distributed over a number of departments, which has continued to be researched in some of the departments. Some projects have led to new issues and questions to solve, which leads to new projects within the arena: *"You can gain new insights and new ideas, broadening the scope of the problem and adding new questions"*[16]. One representative explains it as working with a question or theme as foundation for a project. The upcoming of new questions can lead to the starting of a pre-study to see if a full-scale project would be interesting.

Some projects have left the arena to be continued internally at the agency. In those cases the conceptual idea has given a framework to build upon: *"A lot of the thinking has been done in the arena, and is now found in operational projects at the agency […] it leads to system changes in long term and this is much larger changes than just a result or a product"*[16]. Some projects have also generated great external interest and these

[16] As translated by the authors from Swedish.

types of projects can generate a ripple effect: *"[projects has] led to a enhanced understanding of the problem and to knowledge transfer to industrial partners and also to partners in society in general"*.

There are differences among the partners on how research results from projects are treated as the cultures and transparency differs a lot. Academia and the agency act under the principle of public access to official records, while the industry partners treat knowledge from research as secrets, in case they might want to patent. An industry representative says that the differences in objectives is not a problem since the researchers are often willing to present two different dissertations; one internal with accurate units and one public with standardised units, such actions are not regulated in any documents. A steering group representative explains that they can make a contract regulating when to write a paper, as they might need some time to realise the results and incorporate new knowledge into a product. However, this has though not yet happened in the arena. One representative from the agency highlights that it is all about trust; the parties have to give and take to prevent anyone steeling an idea. An industry representative reason in the same way, saying that there is no risk for IPR issues due to the trust among the partners. The meeting place that the arena provides facilitates a dialogue and openness regarding how the partners can use input values without infringing on each other.

Whether the result have been tangible products or intangible knowledge, the economical development of extra resources added as in-kind per invested unit of money from the agency have been positive throughout the lifetime of the arena, showed in Figure 10.

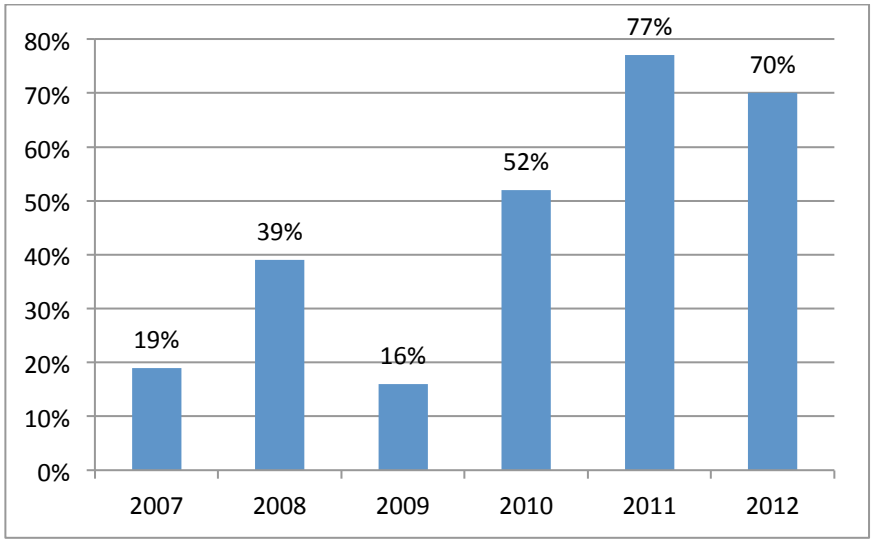

Figure 10 Economical developments - The total amount of resources in the projects in relation to the funding from the agency (Security Arena, 2013)

A representative from industry expresses concerns about not fully knowing who is the potential buyer of the projects performed. It is also pointed out that more commitment from the agency would be preferred in order to know the capability gaps in the emergency preparedness system a bit better. A steering group representative adds that the market for societal security is not well defined. After a successful project with a demonstrator there is still no clear customer and as long as this is the case, it will be hard to motivate companies to put in more efforts into the area.

6 Analysis and discussion

With a theoretical framework and data on the case of the arena some insights can be given on the motivational forces of the participating actors and the undertakings of a triple helix collaboration. This section is structured according to the research questions for the study.

6.1 Motivations

The following section will discuss the first research question:

- *What are the motivations for academic, industrial and governmental organisations participating in a triple helix collaboration?*

The empirical findings show that the network the arena provides an important motivation for participating organisations. The arena together with the organisations participating in projects is a kind of network with the arena acting as a hub-firm and a broker of projects (Dhanasai & Parkhe, 2006). As a network, the arena creates opportunities for activities that could lead to innovation through interactions and relationships among the parties; it also helps test internal knowledge and gain access to external knowledge and resources. When the participants talk about the network they are getting access to, it can be seen that it is actually the range of competences that they appreciate. Partners in the arena have realised that they cannot hold knowledge and expertise in all various areas in-house; external and internal R&D can be mixed to create and capture value. This view is well founded in the theory of open innovation. The fact that they are able to gain access to external knowledge is also a theoretical motivation for firms participating in an innovation intermediary (Howells, 2006).

Being open towards external knowledge, demands the firms to have an open business model, at least on the buying side where the firms are not able to create the resource or knowledge themselves. The industry partners in the arena open up their business models to test products and ideas. This is supported by Sandulli & Chesbrough (2009), who also argue that a firm's success depends on its ability to identify resources to capture value from, which is something that is done by the arena itself in its brokerage role. The other two success factors includes internal capabilities so the single firm can steer the outcome of its own participation in a collaboration, which in most cases in the arena has been realised by the parties.

Another important motivation for the participating organisations has shown to be that the arena is used as a way to generate new ideas and bring them into the partners' respective organisation for further development. The cross disciplinary environment brings a variety of viewpoints to the discussion. The triple helix constellation and the location within LSP help to create an open environment; the actors are open towards new ideas from outside their own organisations. The idea generation is an important part of the open innovation paradigm (Chesbrough, 2003b). The partners in the arena have realised that they cannot hold knowledge and expertise in various areas in-house, and that external and internal R&D can be mixed to create and capture value as well as a realisation about being the originator of research to be able to benefit from it.

This motivation is supported by the theory of innovation networks as discussed by Rowley (1997) and Powell (1996). The behaviour of networks differentiates between exploration and exploitation phases. The arena is focused on research and development in the exploration phase where knowledge spill over is a great benefit. According to Nesta & Mangematin (2004), successful innovators focus on intra-organisational collaborations in the exploration phase to reap the benefits in the exploitation phase.

Getting access to new knowledge can lead to the rise of new ideas internally. The motivation of generation new ideas is also justified by the arena being an innovation intermediary. An intermediary is a third party facilitating a marketplace for ideas, talent and technologies (Elmquist et al., 2011).

6.2 Collaboration

The second research question regards collaboration:

- *How is collaboration enabled in a triple helix context?*

This research question will be further explored in regards to the empirical findings in the following section. As two main areas have been identified, the process and the knowledge sharing, this section will be divided into sub-sections according to these areas.

The collaboration in the arena is transboundary regarding both the disciplines and types of organisations involved. An important undertaking for the arena is to detect projects that are at the borderline for the different actors. This has been challenging. When not all partners collaborate in a project, the full potential of the collaboration is not used. The attempts to create projects involving all partners are welcome by all parties, but there have been difficulties finding a project area that fits the scope of all companies. For the collaboration to succeed, all partners have to be able to appropriate which would help bridge the competitiveness (Dhanasai & Parkhe, 2006).

To coordinate the efforts among the members and to reach consensus in the discussions is one of the most important responsibilities of the arena. The allocation of knowledge and resources needs to function well, to work as a lubricant for the relationships. Schreiner et al. (2009) talks about three challenges in the post-formation phase of a strategic alliance, one of them is coordination. This theory supports the role of the arena: if coordination among actors is poor the ability to perform in the projects started decrease and it becomes harder to benefit from this.

6.2.1 Process

In Figure 11 shows the project life cycle been mapped together with the participation of the different partners.

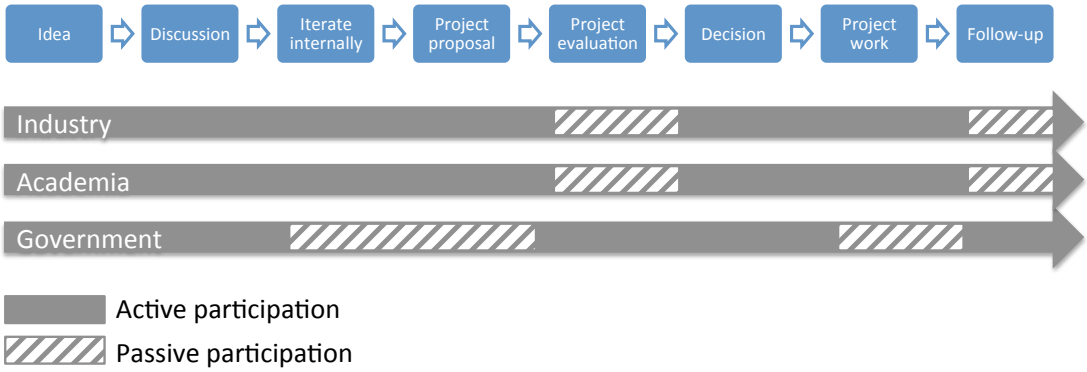

Figure 11 The project life cycle and the involvement from the different actors.

Only when all three arrows are filled, there is full collaboration. It can be seen that there are a lot of collaboration in the idea generation phase where anyone can bring project ideas and there are discussions among all partners to create project proposals. Discussions in the project management group first evaluate project ideas, to evolve to discuss which partners wants to contribute and participate in the project. The actors

iterate internally evaluating their contribution when participating in a project. This is in line with the theory the Problem-Solving Perspective where Nickerson et al. (2007) argues that managers should choose the problem most likely to be solved and the one that generate the most value to the participants. The arena should in its evaluation try to put some additional weight on how feasible it is to solve a project, as this was not shown the data collection. The figure shows how the participation from the actors differs in activity over the project phases where full collaboration does not exist after a project draft is created except for the steering group meetings.

Regarding the government, one aspect contributing to the design of Figure 11 is that the agency has moved from an active project participant to a more passive, as they no longer participate in projects. They have also introduced one additional process to the arena, the research advisory committee, to be able to evaluate projects before they are started. The drift towards a purchasing organisation in the arena is not in line with the theory on triple helix collaborations. The operation areas of triple helix actors are inter-disciplinary the notion of triple helix is connected to open innovation as it enhance the innovativeness in a collaboration. In triple helix the actor should view each other as peers (Etzkowitz, 2002). The relationship among the actors has over time developed to become less equal, as the agency is moving towards a role more focused on purchasing and not actively taking part in the project work. Even though there are disagreements regarding if the agency's role in the arena should be as a purchaser or not, it is important for the arena to be aware of this transition to not loose the benefits of triple helix. The emphasis of the agency as a purchaser shows resemblance with the notion of "demand-pull" which is stated not to have the best effect on innovation processes in triple helix (Etzkowitz & Leydesdorff, 1995). It is instead recommended that an evolutionary model should be used where ideas are generated out of knowledge. The complementarity among actors should be derived upon in this model. It should though be added that in some projects in the arena governmental actors, such as police or customs authorities, are participating, but not always.

The agency has two distinctive roles in the arena with hosting the research advisory committee and the project trackers. The process of having all funded projects pass the research advisory committee makes the decision making in the arena rather skewed: the projects are almost already accepted before reaching the formal decision from the steering group whose decision power is eroded. Ultimately the responsibility of securing the projects to include the right academic height and the right set up of follow-up criteria would lay on the program manager to strengthen the position of the arena as a network hub-firm. This could be supplemented by the agency representatives in the project management group. They could be focusing on searching for former research in the iteration step more actively than before, rather than later in the project evaluation step.

The initiative from the agency to have project trackers has shown to have a positive impact for the projects as it gives some kind of expert knowledge within the field of operations. An involvement from the agency is proven to be beneficial, the expert knowledge could therefore be considered to have been incorporated in the official project work instead of as a parallel involvement. Left would then be the follow-up task for the project trackers. Just as with the research advisory committee, this overviewing role the agency has taken could the arena be responsible for. In this set-up it seems that the project process is more important than the more tangible outcome.

6.2.2 Sharing of knowledge

The industry partners have shown not to be very keen on exposing any trade secrets in the common forums of the arena. Lichtenthaler & Ernst (2008) discuss the importance of having a system treating IPR in place before starting collaborating. The framework agreement with guidelines on what is regarded IPR and who owns it is a good starting point for the arena to manage co-creation, as claimed by Bughin et al. (2008). The competition among actors is even though said to make the industry partners more sensitive towards sharing. The theoretical framework supports this argument, as shared resources should not be competitive, it is better to focus on gaining complementarity among actors to avoid such situations. It has been clearly shown that academia and the agency are much more open to collaboration. This is justified by the literature presented by Sandulli & Chesbrough (2009) on open business models: there is an opportunity cost for sharing resources and the higher that cost the more unlikely it is for a firm to share it.

According Chesbrough & Appleyard (2007), the degree of openness in a business model is affected by whether the firm is able to create products to be sold in the ecosystem. Arena related projects have lead to four products for all firms, which has been claimed to be sufficient for the partners. The theory adds that not only firms can capture the value from collaboration but also the ecosystem. Changes in the Swedish emergency preparedness system happen though over a long period of time and it is too early to evaluate the impact from the arena on the system.

As the project work consists of dividing work into work packages and then integrating each package to a common result, the collaboration is not fully exploited. In a triple helix constellation, the parties should partially overlap and go into each other's field of expertise. When the collaboration is made on a distance with communication on a more irregular basis all the synergy effects cannot be fulfilled. This division is though not only negative. For the firms participating this is a way to both be open and closed at the same time as it gives the respective partner ownership of each individual value creating activity. During the data collection, matters about publishing papers were raised, such as specific agreement on what and when to publish. The division of work helps to limit these special agreements as trade secrets can be kept in-house to a greater extent; the firm can be very cautious on what to expose or not.

The time horizon that the arena is working on, projects to be realised on 2-5 years sight, has though proven to be a struggle. Together with the difficulties to work close to the market but not close to product this has lead to starting of projects with a scope slightly too close to market. There is generally high trust among the actors, this can be partially derived from the minimal turnover of partners, but having projects too close to market puts the trust to test. Firms having an open business model have also a need for low uncertainty, complementarity, trust and commitment among partners. If the trust is decreased the business model will be narrowed and the collaboration affected.

Schreiner et al. (2009) also mentions communication and social bonding as two management capabilities to create trust in a strategic alliance. The partners often mention that they know each other. This implies that there have been both communication and bonding within the arena as they have been able to build personal relations with each other and knows how to share knowledge. As some members feel that the industry partners withhold information the communication there are indications that the communication and social bonding in the arena being slightly insufficient. Other characteristics of communication, such as common understanding and assessment of opportunities, works fine though.

6.3 Utilisation

Finally, the empirical findings relating to the third and last research question will be discussed below. The research question is as follows:

- *How do participants utilise a triple helix collaboration?*

It has been shown that how the participants utilise the arena differs from their motivations. One of the motivations was to get new ideas. When exploring what ideas the different partners have, the actors also gain knowledge on what kind of need there is on the market, something that might be explored deeper in the arena or internally.

The participants also use the arena as a test-bench for exploring ideas by involving in common projects to share risk among partners. At the arena they can find new dimensions and knowledge that they do not inherit themselves. The various projects started in the arena have different time horizons. They vary a lot in characteristics regarding, for instance, competences needed. The diversity among partners, and also among all the organisations participating in one or several projects, contributes to diversity within the arena. This is supported by the theory of innovation networks and how they handle waves of discoveries, as discussed by Nesta & Mangematin (2004). The arena becomes responsive to the need of different actors and also to industry changes. As there is no limit on how many projects a partner can participate in at the same time, they themselves decide how much network complexity they can handle. The larger number and the more diversity of projects, the more complex situation for the project management group representative. The limited and rather small annual funding from the agency creates a manageable situation for the program manager. This is a situation beneficial for the whole arena.

It has become evident that it is not only the direct project outcomes such as a published paper or a demonstrator that is important for the participators. Competence development for the project workers is also an important outcome. The arena is being utilised as a help to improve the internal employees skills with input from other knowledge bases in the same field to gain a deeper understanding of problems. This is a typical synergy effect, as the original purpose for the workers and researchers is to fulfil what is set up for the specific project. This is though justified through theory on strategic alliances that says complementarity among actors have a positive effect on the outcome.

The arena is also used to fulfil needs from various parts of the organisations. The industry partners get a channel to see what is sellable on the market through the contacts provided by the agency. This has though been requested to be improved and to define clearer whom the customer is. Both the agency and academia representatives claim, on the other hand, that there is no other collaboration where they work so well with industry. The agency has been requested to interact with industry as well as has the research centre Urban Safety and Societal Security (URBSEC), where many representatives from academia work. The arena provides a good platform for such interactions.

In the empirical findings it is shown that the arena partners request an expansion of the arena and an increased dynamism in terms of actors. The arena is open for a diversity of firms and universities in the projects but this is not sufficient. Growing the arena to include SMEs and researchers with their base outside of Gothenburg would provide a broader foundation and the agency would be able to use the arena for a wider application area since the competence increases. Theory presented by Nesta & Mangematin (2004) supports this as the density of a network helps improve innovation. If the arena would increase the amount of partners, the innovative outcome could be

positively affected. The generation of new ideas could be improved and demands from different sectors and disciplines could build upon each other, forming creative accumulation, which also has positive impact on innovation ability. A broadening of the arena would though also call for more funding from the agency or other sources, which is something that would need to be discussed.

7 Conclusions

This study have focused on three research questions focusing on triple helix collaboration:

- *What are the motivations for academic, industrial and governmental organisations participating in a triple helix collaboration?*
- *How is collaboration enabled in a triple helix context?*
- *How do participants utilise a triple helix collaboration?*

Deriving from the empirical findings and analysis of this case study, some general conclusions can be made.

Looking at the motivations for organisations participating in the arena, two main ones were found: new knowledge and new ideas. The arena provides a network of actors related to the field of societal security that is much appreciated by the partners. Through this network, they gain access to external knowledge that is wide and different to their internal knowledge. This is also empowered by the brokerage that the arena does, helping to find the needed knowledge for projects.

The arena is also good for generating new ideas that the partners can bring back into their organisations for further development. As the arena provides access to cross-disciplinary knowledge in the open environment, ideas can be elaborated on from a number of viewpoints. The projects at the arena are exploratory, which provides good possibilities for knowledge spill over to the partners. Two motivations for participating in triple helix collaboration are therefore to get access to new knowledge and to generate new ideas for the respective partners.

When analysing the collaboration, it can be seen that the arena provides a transboundary environment as the partner organisations are from industry, academia and government; it represents a variety of disciplines. By actively pushing projects that are on the borderline for the different actors, the arena is trying to facilitate collaboration. The project process at the arena has room for improvements when it comes to collaboration, as the partners are not acting like peers during the whole process. The agency has more power in the start up process of a project and does not participate in the project work in the same way as the other partners; they only provide project trackers to monitor the progress.

Related to collaboration is how knowledge and information is shared at the arena. Projects herein should be precompetitive and exploratory, while at the same time being close to the end users. It is hard to keep this balance, which has led to some problems when it comes to knowledge sharing as the projects came too close to the market. However, high levels of trust among the partners have been seen, which is good as it increases the willingness to share. It can therefore be concluded that two important parts of a triple helix collaboration to be focused on is the work process and the openness among actors. This to be able to reap the synergies of the triple helix set up and to enhance the trust among partners.

When it comes to utilisation of the arena, it differs from the motivations. The arena is used as a test-bench for exploring ideas as they get assessed from a wider scope and the risk is shared among the partners. It is not only the direct results from the projects that are valued by the partners; competence development that helps build the internal knowledge is important and this is improved by the diversity of actors in the arena. By

participating in the arena, the industry partners also get a preview of potential markets for future products.

In the study it was also found that there is willingness among the partners to expand the arena and have more partners joining. This could improve the innovation power at the arena as the knowledge diversity increases. A triple helix collaboration can therefore be said to be utilised in ways stemming form the individual partners own interests, both tangible and intangible outcomes are of interest. A dense collaboration is appreciated.

The arena is not an open innovation arena as defined by the authors discussing this actor, but an innovation intermediary. Ollila and Elmquist (2011) put forward three arguments for what makes an open innovation arena different from an innovation intermediary: physical meeting place, proprietary goals and seeing itself as a key player within its field. The arena does not provide a physical meeting place more than for occasional meetings. The actual work in the projects connected to the arena is carried out at the participating partners' sites. When it comes to proprietary goals, the arena annually specifies goals for the arena in its yearly operational plan, and these are followed up in the annual reports. The arena also has some proprietary goals through its vision, which however does not signal it aiming for becoming a key player in the field of societal security. This gives the third and final argument: the arena is not viewed as a key player in the field of societal security. Instead, the arena is an innovation intermediary. However, this is not a negative thing as the arena can successfully promote collaboration and innovation. As any organisation, the arena can be improved in order to enhance its work and, if wanted, it can toward an open innovation arena.

8 Limitations and future research

As this study have been made on a single case, the characteristics of a case study research design implicates that the findings are subjective to the specific context of the study. This limits the possibility to generalise outside this specific context. Nonetheless a case study is perceived to be a good choice for this study due to the depth achieved through the performed interviews within the given time span. The time has also been a limitation for this study, restraining the number of interviews to perform and cases to study. With a longer time frame, the project work could have been studied more in-depth through interviews with project workers to gain a deeper understanding of the collaboration in an operational triple helix context. Studying additional cases would help verify the findings and strengthen the external validity. Due to the thick descriptions generated in this case study; the external validity is considered to be sufficient.

A suggestion for future research is to compare this case with SAFER, which has been thoroughly studied by especially researchers from Chalmers University of Technology. The common characteristics of a triple helix collaboration could help when drawing general conclusions on the research questions set up for this study. It would also be interesting to see how the differences, such as work place and number of actors, affect the collaboration.

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10 Appendices

10.1 Interviews

Here the interviews conducted during the study are listed. In the third column it is indicated what interview language and which group at the arena that the interviewee belongs to.

SG = Steering group, PMG = Project management group, PM = Program manager

Organisation	***Position***	***Date & lang.***
Lindholmen Science Park	*1) Program manager Security Arena*	*1) 2013-02-08 Swedish PM*
	2) CEO	*2) 2013-03-18 English SG*
Swedish Civil Contingencies Agency	*1) Training, Exercises & Emergency Preparedness Department / Development of Rescue Services & Emergency Management Section*	*1) 2013-03-08 Swedish PMG*
	2) Evaluation and Monitoring Department / Research Management Section	*2) 2013-03-13 Swedish PMG*
	3) Coordination and Operations Department / Coordination Section, focuses on technological issues	*3) 2013-03-19 Swedish PMG*
	4) Evaluation and Monitoring Department / Head of Research Management Section	*4) 2013-03-25 Swedish SG*
	5) Head of Training, Exercises & Emergency Preparedness Department	*5) 2013-03-27 Swedish SG*
Chalmers University of Technology	*1) Vice President, responsible of external relations*	*1) 2013-03-01 English SG*
	2) Professor in Computer Security	*2) 2013-03-11 English PMG*
University of Gothenburg	*1) Professor in Sociology*	*1) 2013-03-06 Swedish SG*
	2) Director of URBSEC	*2) 2013-03-07 English PMG*

Volvo AB	*1) Advanced Technology Research, responsible for technology strategy and innovation* *2) Advanced Technology Research / Department of Transport Solutions and Services, responsible for Connected vehicle and infrastructure*	*1) 2013-03-05 English SG* *2) 2013-03-12 English PMG*
Ericsson AB	*1) Business Unit Networks / Product Area Radio / Steering board of National Security and Public Safety (product line), responsible for finding new products and interfacing customers*	*1) 2013-03-14 English SG*
Saab AB	*1) Head of Civil Security and Traffic Management (market segment)* *2) Business developer Security and Defence Solutions (market segment)*	*1) 2013-03-27 English SG* *2) 2013-03-28 Swedish PMG*

10.2 Interview guides

The interview questions will be presented both in English and in Swedish since both languages were applied.

10.2.1 Steering group

1) Can you briefly describe your position at [organisation]?
   Kan du kortfattat beskriva din position på [organisationen]?
2) How did you, as a person, become engaged in Security Arena?
   Hur blev du involverad i Security Arena?
3) For how long have you been engaged in the arena?
   Hur länge har du varit engagerad i arenan?
4) How would you describe Security Arena?
   Hur skulle du beskriva Security Arena?
5) Why is your organisation involved in Security Arena?
   Varför är din organisation engagerad i Security Arena?
6) Can you describe your organisations' involvement in Security Arena?
   Kan du beskriva din organisations engagemang i Security Arena?
7) What general expectations do you have on Security Arena?
   Vilka generella förväntningar har ni på Security Arena?
8) What do you see as the main challenges when participating in the arena?
   Vad upplever du vara de största utmaningarna när ni deltar i Security Arena?
9) Are your organisation engaged in other types of formal collaborations?
   Är din organisation engagerad i andra typer av (formella) samarbeten?

10) What makes your organisation continue to participate in the arena?
Vad får er organisation att fortsätta att delta i arenan?

11) How do you handle sharing information/knowledge with partners?
Hur delas information och kunskap mellan partners?

12) How do you follow-up projects?
Hur följer ni upp projekt?

13) Is your organisation collaborating with other organisations in other ways than Security Arena? (Informal)
Samarbetar din organisation med andra organisationer på andra sätt än i Security Arena? (Informellt)

10.2.2 Project management group

1) Can you briefly describe your position at [organisation]?
Kan du kortfattat beskriva din position på [organisationen]?

2) How did you as a person become engaged in Security Arena?
Kan du kortfattat beskriva din position på [organisationen]?

3) For how long have you been engaged in the arena?
Hur blev du involverad i Security Arena?

4) How would you describe Security Arena?
Hur blev du involverad i Security Arena?

5) Why is your organisation involved in Security Arena?
Varför är din organisaion engagerad i Security Arena?

6) Can you describe your organisation's involvement in Security Arena?
Kan du beskriva din organisations engagemang i Security Arena?

7) What expectations do you have on projects at Security Arena?
Vilka förväntningar har ni på projekt som genomförs i Security Arena?

8) What makes you continue to participate in the arena?
Vad får er att fortsätta att delta i arenan?

9) What do you see as the main challenges when participating in the arena?
Vad upplever du vara de största utmaningarna med Security Arena?

10) Is your organisation collaborating with other organisations in other ways than Security Arena? (Informal)
Samarbetar din organisation med andra organisationer på andra sätt än i Security Arena? (Informellt)

11) Using a project as an example, can you describe how new projects are created and set-up in the arena?
Om du skulle använda ett projekt som exempel, kan du då beskriva hur nya projekt initieras och startas i arenan?

12) Can you describe the daily/weekly operations within the projects?
Kan du beskriva den dagliga/veckovisa verksamheten inom ett projekt?

13) How do you share work/knowledge with partners?
Hur delar ni arbeta och kunskap mellan partners?

14) How do you follow-up projects?
Hur följer ni upp projekt?