

Deliverable D4.3

A refined version of modular innovation model – the INNOSEC model

WP 4

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1 Executive Summary

This document gives the refined version of the INNOSEC modular innovation model for security organisations. For its development, we have taken into account many recommendations from users of the first version of the INNOSEC model to enrich it to better meet the needs of security organisations. In this deliverable the INNOSEC modular innovation model is presented in the form of a report. This will not be the final format of INNOSEC model. The final INNOSEC model will be presented as a web-site, complemented with a roadmap for implementation and a web-based tool for the assessment of security organisation's innovativeness maturity level.

The INNOSEC innovation model consists of five modules with a Guideline for the use of the model. The modules are: Innovation Strategy, Ideation, Selecting and Designing, Implementation, and People, Culture and Learning. The Innovation Strategy module deals with strategic level of innovation management and it helps a security organisation to formulate the long-term innovation direction and goals of the organisation. Ideation, Selecting and Designing, and Implementation are the process phase modules in the INNOSEC model. The Ideation module aims to present a systematic approach for identifying and introducing new innovations in the security sector. The Selecting and Designing module helps a security organisation to take immature ideas from the Ideation to refine and evaluate them, and design them so that they can be efficiently and effectively implemented. The Implementation module gives guidance to the implementation of new technology into existing security service and to the development and implementation of new security services into organisational processes. The module People, Culture and Learning aims to explain why innovation belongs to everybody, what kind of leadership and management is needed, how to develop culture of continuous innovation, and how to support organisational learning and change management.

The idea and paradigm behind the modular model is to give flexibility for the security organisations to implement INNOSEC results of innovation management and respect for current practices in general management and operation. A security organisation may choose to implement the whole model or just the modules it finds feasible for them. Nonetheless, we underline the fact that the model described here is comprehensive and generic, while its actual implementation will in most cases require some customisation and adaptation.

2 Introduction

2.1 Overview of the deliverable

The report introduces the refined version of INNOSEC modular innovation model for security organisations, and it covers the deliverable D4.3 of the INNOSEC project. In this deliverable the INNOSEC modular innovation model is presented in the form of a report. The final INNOSEC model will be presented as a web-site to be realised at the end of the INNOSEC project. At the same time the current model will be complemented by a web-based assessment tool for the innovation maturity level of security organisation.

The INNOSEC model consists of a Guideline and five modules called Innovation strategy, Ideation, Selecting and designing, Implementation, and People, culture and learning. The idea is that the Guideline will form the entrance into the innovation model. The Guidelines are described in Section 3. The modules are presented in Sections 4-8. Finally, an overview of the complementary assessment tool is given in Section 9.

The structure of each module is designed to be suitable for www-use. It may be less readable in this report format, but the figure below may help a reader to image the form of a module in www-format. The sub-chapters of this report correspond to the building blocks of the modules.

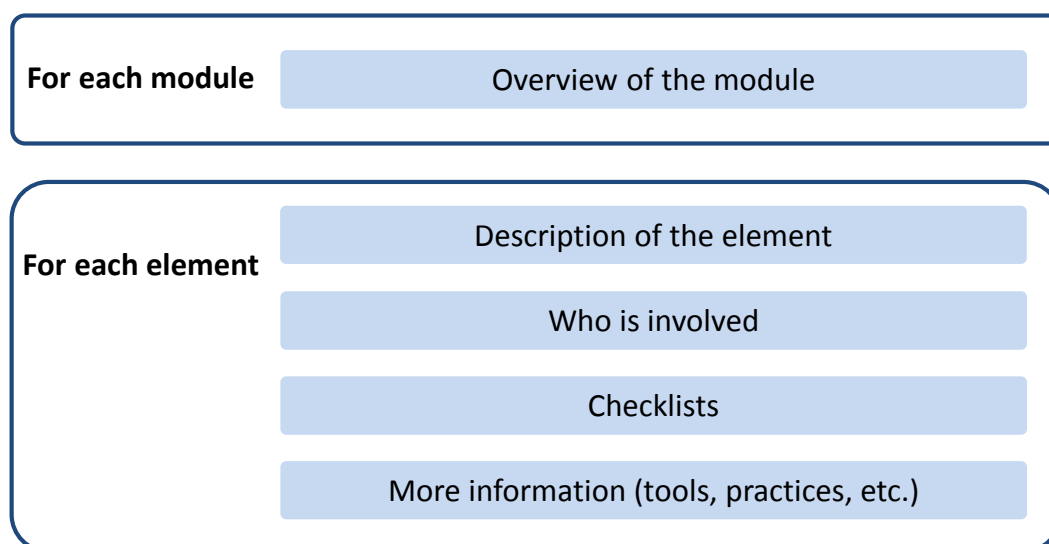


Figure 1: Structure of modules in the INNOSEC model

2.2 Refining process of the INNOSEC model and the limitations of the model

The five-module structure of the INNOSEC model has its roots in WP1 (User organisations' environment and innovation management) of the INNOSEC project. The content of the modules (and their names) have been largely developed throughout the project until D4.3. WP2 (Models of innovation and innovation management) gave a state-of-the-art review of the great variety of innovation and innovation management models available in literature and practice in different fields of business and management. Combining the understanding from WP1 and WP2, the first specification of INNOSEC model, deliverable D3.1, was developed. Early feedback from security organisations that are partners of the project, gave further guidance for the work towards the first version of the INNOSEC model, deliverable D3.2. It led to some changes in the elements of modules and methods and tools to be included in the elements. As a result some methods beyond the deliverables of WP2 were included in the model.

One of the main challenges in the development of the first version of INNOSEC model was to find a proper balance between the breadth and depth of its content. The methods and tools that were selected into the model were considered to be valuable for the security sector. In order not to be over-elaborate, however, many valuable and important tools are only briefly mentioned in the elements with a reference for more information. The feedback from the users of the first version of INNOSEC model (D3.2) suggested that we succeeded quite well in finding a good balance between the breadth and depth of the content.

Another major challenge was the style of the text. The first drafts of the modules were written by various authors having different writing styles. The styles were not harmonized for the D3.2 because we wanted to listen to viewpoints of users of INNOSEC model (i.e. people at security organisations). Based on that feedback, the styles have been harmonized in D4.3. For example, the text is not so academic and it is more security specific than in the D3.2 version of the model.

At the beginning of the project, we anticipated that the needs of private and public security organisations for innovation management would be different such that a single model could hardly satisfy both groups. The results of WP1, however, suggested that the same model can be applied both in private and in public organisations. The testing of D3.2 in a few organisations validated that assumption (for more information, see D4.2). There are only a few paragraphs in the INNOSEC model that are specific to just private or public security organisations.

The first version of the INNOSEC model was tested in selected security organisations, including those INNOSEC project partners that are security organisations, member organisations of the Advisory Board, as well as a few other security organisations. The testing produced a lot of feedback for the enrichment of the model. The feedback with recommendations were summarised in deliverable D4.1 of the project. Most of the recommendations given in D4.1 have been taken into account in this D4.3 version of INNOSEC model. These include, among others, strengthening of the bottom-up perspective throughout the model, a revision of the Innovation strategy module to be more security specific, writing of a new element for the topic "change management", and strengthening of

links between the modules. In the strengthening of the links, the results of system dynamics modelling exercise on decision making in innovation initiatives in security sector, deliverable D4.2, have been valuable.

Some recommendations we considered to be too organisation specific and elaborate to be included into the INNOSEC model. For example, one organisation called for information on procurement rules. While the issue certainly is important for the specific security organisation, and in particular public sector organisations, we left the topic as a subject in the implementation roadmap of the INNOSEC model for that particular organisation. Another example is the recommendation for the inclusion of a new module on Legislation and Finance. While recognising the relevance of the recommendation in adding security specific for the INNOSEC model, we decided not to add a new module or element on the topic into model because both legislation and finance are subjects that include so many national variations and differences that it is hard to write a good European level guide for these subjects within the context of innovation management and security. Instead, we have added sentences and short paragraphs on the topic into several elements of the model in order to underline the importance of these subjects on innovation management in security sector. More elaborated handling of these topics is a subject of customisation during the implementation roadmap for a security organisation.

3 Guidelines for the INNOSEC model

3.1 Introduction to Guidelines

The INNOSEC model consists of five building blocks, i.e. modules: Innovation strategy, Ideation, Selecting and designing, Implementation, People, culture and learning. The purpose of the Guidelines is to give an introduction to each module and explain the objectives of the module. In this way, the Guidelines help organisations identify whether the module is relevant for them, introduces the content of the modules and how to approach the module.

Not all security organisations are the same; these guidelines, while may seem generic, must therefore be approached from individual security organisations' perspectives and can be highly specific to their circumstances. This is done in conjunction with an assessment of the organisation's innovation maturity level, which helps to identify the current level of innovation maturity of the organisation and the aspects of innovation management that could be strengthened.

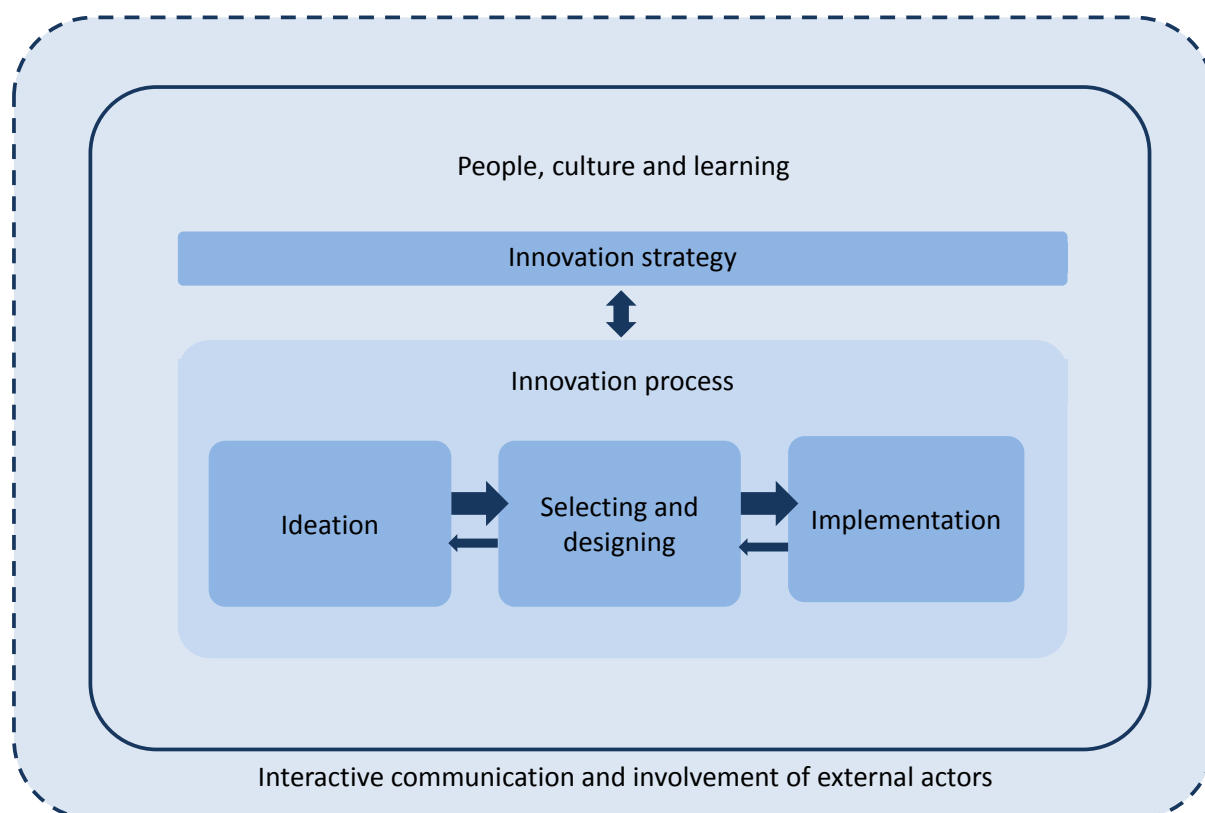


Figure 2: Modules of the INNOSEC model

3.2 Module: Innovation strategy

3.2.1 Overview of the module

An innovation strategy refers to the part of an organisation's strategy that deals with the growth of the organisation through the development of new products, services, processes or business models, i.e. innovation. It is a long-term plan of action on how to use the development of new products, services, processes or business models to achieve the organisation's objectives/ missions.

The innovation strategy is typically a part of the organisational strategy. It helps to formulate the innovation goals of the organisation and provide an overall coherence for the innovation activities of the organisation. The innovation strategy within our model consists of three elements: (i) the framework for innovation strategy; (ii) the innovation strategy process; and (iii) the innovation strategy content.

3.2.2 Guidelines for the module

This module aims to help a security organisation develop and implement an innovation strategy. Its objective is to (i) establish a long-term innovation orientation of the organisation (the innovation strategy framework); (ii) define how the strategy will be developed and implemented (innovation strategy process) and the level of involvement across the organisation, and; and (iii) specify the innovation goals and strategic choices to be taken (innovation strategy content).

An innovation strategy is important and helpful as it (a) determines the innovation goals and level of innovativeness of the organisation; (b) orientates and shapes the whole innovation process as well as individual activities; and (c) enables corporate renewal.

Element	Guiding questions	Outcome
Innovation strategy framework	<ul style="list-style-type: none"> - What are the likely trends and challenges in the external environment that have an impact on the organisation? - What are the innovation capabilities and competencies of the organisation? 	A framework which maps out the long-term innovation orientation of the organisation

Innovation strategy process	<ul style="list-style-type: none"> - Should the organisation use a top-down or bottom-up approach to develop its innovation strategy? - How can the innovation strategy be developed, implemented and monitored? 	Establish the innovation strategy-making process and responsible parties
Innovation strategy content	<ul style="list-style-type: none"> - What are the types of innovation that the organisation should pursue? - What strategies should be used to pursue those innovations? - What resources does the organisation have to pursue these innovations? 	The specific goals and strategic choices taken to enact the innovation strategy, i.e. identify the types of innovation to pursue

In order to utilise this module effectively, the security organisation should establish its level of innovation readiness and identify its innovation capabilities and competencies. This is done through the innovation maturity assessment diagnostic tool designed in conjunction with this model.

3.3 Module: Ideation

3.3.1 Overview of the module

Ideation is the first process phase module in the INNOSEC model. It consists of three elements – searching; idea generation; and idea management. It aims to present a systematic approach for identifying and introducing new innovations in the security sector through a distinct and proper search strategy incorporating market and environment monitoring to enable identification of new ideas and technologies that are relevant to the organisation (and aligned to its strategy).

3.3.2 Guidelines for the module

Element	Guiding questions	Outcome
Searching	<ul style="list-style-type: none"> - How do we bring new ideas into the organisation? - How do we monitor the market and/or changing market requirements? - How do we organise an effective search process to ensure a good variety of ideas are being accessed and considered? 	<p>Proactive monitoring of environment, the opportunities and technologies available out there that can improve the service and delivery of security</p> <p>A coherent search strategy/ routines to enable the pursuit of new innovations to the organisation. This should be linked to the overall strategy</p> <p>Identify market and environment monitoring mechanisms and practices</p>
Idea generation	<ul style="list-style-type: none"> - What do we do to generate new ideas, both from within and outside the organisation? - Are ideas being systematically generated? 	<p>Identify the range of sources of innovation for the organisation (both internal and external), and the working relationship(s) between each other.</p> <p>Establish systems and mechanisms for idea generation</p>
Idea management	<ul style="list-style-type: none"> - How are ideas that are generated captured and stored? - What processes are in place to evaluate and shortlist ideas for further development? - What processes are in place to ensure the repository of ideas are constantly refreshed and appraised for relevance and feasibility? 	<p>Establish knowledge management systems and processes/ practices/ routines</p> <p>Establish first stage assessment criteria for taking ideas forward into innovation projects</p>

3.4 Module: Selecting and designing

3.4.1 Overview of the module

Selecting and designing is a central module of the INNOSEC model which has (interactive) relationships between all the other modules of the model. The main purpose of this module is to take immature ideas from the ideation module to refine and evaluate them, and design them so that they can be efficiently and effectively implemented in the following module.

This module has three elements to support the strategic decision-making to turn ideas into solutions: Evaluation and selection, Concept development, and Experimentation.

3.4.2 Guidelines for the module

Element	Guiding questions	Outcome
Evaluation and selection	<ul style="list-style-type: none"> - What innovations (ideas and concepts) do we select? - How do we do that? And why (are we doing that/ selecting that innovation)? - What is the purpose of adopting/ implementing a particular innovation? 	<p>Selection of innovation projects to be developed and tested (and subsequently implemented) that are aligned with innovation strategy and achieving of security mission(s)</p> <p>A complementary set of innovation projects within portfolio</p>
Concept development	<ul style="list-style-type: none"> - What steps do we need to take to incorporate the selected innovation into the organisation? - Who is involved in concept development and what is their role? - Are external actors involved? 	<p>Transform idea into concrete product or service that can be implemented into organisation (after adequate testing/ experimentation)</p>
Experimentation	<ul style="list-style-type: none"> - How do we test the concept? - What is the purpose and outcome of the experimentation? 	<p>Establish the extent of testing/ piloting project parameters</p> <p>Demonstrate value of innovation to organisation to ascertain whether to progress to full implementation (i.e. achieve proof of concept) or end project</p>

3.5 Module: Implementation

3.5.1 Overview of the module

Implementation is the final stage of the innovation process. The goal of this stage is to implement new technology into existing security service, or to develop and implement new security services into organisational processes. It has four elements: Development project guideline; Technology adoption; Service development; and New service operationalization. The first element promotes the use of project management to develop the implementation process. Project management processes have been found useful in helping to manage and control development and change and is highly recommended to provide structure and guide innovation management in a systematic way. However, project management may not be suitable for all organisations; while highly recommended, it is crucial that organisations choose a process that is suitable for them. The second element is for cases where existing external technology will be adopted into existing service of security with only minor changes in the process, organisation or the actual service. The last two elements are for innovation work that targets completely new service of security or work where major changes will be done for the process, organisation or the actual service of security. There may be iterative interaction between the Implementation module and the Selecting and Designing module in some work of innovation.

3.5.2 Guidelines for the module

Element	Guiding questions	Outcome
Innovation development/ project execution guideline	<ul style="list-style-type: none"> - What is the purpose of the innovation project to be developed? - Can project management help in the implementation process? 	<p>Establish a package on how to plan and execute the project</p> <p>Establish a project implementation plan detailing work and resources required throughout the project life-cycle</p>
Technology adoption	<ul style="list-style-type: none"> - What are the key processes that need to be undertaken/ changed in order to successfully acquire and use a new technology? - How do we implement the new technology into an existing service? - How might other parts of the organisation (and 	<p>Establish any changes in routines, work processes, user training and support needed to facilitate successful adoption of the innovation</p> <p>Establish any impact on other parts of the organisation and their work practices</p>

	other users) be impacted by the technology adoption?	
Service development and New Service operationalization	<ul style="list-style-type: none"> - What are the key processes that need to be undertaken/ changed in order to successfully acquire and implement a new service innovation? - How can we develop and implement a new service? - How might other parts of the organisation (and other users) be impacted by the service development/ new service operationalization? 	<p>Establish any changes in routines, work processes, user training and support needed to facilitate the service development and/or new service operationalization</p> <p>Establish any impact on other parts of the organisation and their work practices</p>

3.6 Module: People, culture and learning

3.6.1 Overview of the module

The purpose of this module is to explain why innovation belongs to everybody, what kind of leadership and management is needed, how to develop culture of continuous innovation, and how to support organisational learning. The module has five elements to consider: Employees and innovation tasks; Leadership and management; Culture of continuous innovation; Learning; and Change management. It considers how to shape the culture of the organisation to be more innovation-oriented overall but also cuts across all the other modules.

3.6.2 Guidelines for the module

Element	Guiding questions	Outcome
Employees and innovation tasks	<ul style="list-style-type: none"> - How can all employees be involved in innovation tasks? - How can creativity and efficiency be achieved? 	<p>Innovation as a part of the daily activities of all employees</p> <p>Establish individual, team and organisational level goals, rewards and recognition for innovation ideas</p>

Leadership and management	<ul style="list-style-type: none"> - What are the leadership and structural mechanisms (if any) that currently exist to support an innovative culture in the organisation? - How can the leaders in the organisation inspire innovation? 	Outline responsibilities of management to lead and inspire innovation
Culture of continuous innovation	<ul style="list-style-type: none"> - How does the organisation currently incentivise innovation? - How can a culture of continuous innovation be fostered? 	<p>Establish the processes and mechanisms to foster and cultivate a culture of continuous innovation</p> <p>Establish key roles and flexible structures to support a culture of continuous innovation</p>
Learning	<ul style="list-style-type: none"> - Why is it important to support organisational learning, and how that should be done? - How does the organisation learn from past innovations? 	<p>Establish and enable the relevant structures and processes that enhance organisational learning at all levels</p> <p>Establish management learning tools</p>
Change management	<ul style="list-style-type: none"> - How to execute planned change? - How to support and control emerging change? - Is innovation and change effectively communicated throughout the organisation? 	Effectively execute planned change as well as support and control emergent change

3.7 Glossary

The glossary includes key terms used in the INNOSEC model. Definitions used in this glossary apply to the use of terms in the INNOSEC model.

Adaptation: The process of *modifying* a new system or process such as information technology system, management system, device, equipment or operational process to suitable and usefulness to specific needs of the specific security organisation.

Adoption: The process in which a new (technological) innovation such as information technology system, management system, device, or equipment is *acquired and put to appropriate use* within a security organisation.

Concept: A clearly written and possible visual description of the new product or service idea that includes its primary features and customer or citizen benefits, combined with a broad understanding of the technology needed.

Context scenarios: A depiction of a future world from a specific viewpoint; this is the type of scenarios being used in business planning.

Evaluation: The systematic collection and analysis of information about the characteristics and results of innovations (or programmes), to improve effectiveness, and/or inform decisions about current and future decisions.

Explicit knowledge: Knowledge is explicit when it has been or can be articulated, codified, and stored in certain media. This is in contrast to tacit knowledge (see below).

Foresight: The mapping of future alternatives and timing from the actor's point of view. It includes a variety of methods such as forecasting, backcasting, roadmapping.

Idea: An embryonic form of a new product or service; an idea is understood to be a describable new service, product, security mission or process that supports the new security service delivery.

Innovation: A new idea that is commercialized or put in practice and is significantly better than an earlier solution and improves the service of security to the citizens and customers. An innovation can also refer to the implementation of a new or significantly improved product (good or service), or process, or a new organisational method in business practices, workplace organisation or external relation. The minimum requirement for an innovation is that the product, process, marketing method or organisational method must be new (or significantly improved) to the firm.

Innovation management: Practices and institutions (both formal and informal) within an organisation that contribute to its innovation process and outcomes. The concept of innovation management encompasses an integrated approach to managing all dimensions of innovation, from innovation in products, services and business processes to

organisational and business models, through continuous monitoring, development and improvement processes.

Innovation strategy: A coherent awareness of the organisation's positioning for developing or adoption new technologies and services.

Implementation: The process of accomplishing a new or improved technology or service from a concept level into practice.

IPR: Intellectual Property Rights (or just **IP**) are exclusive rights granted by the national laws over the inventions, creations and signs, which provide for the right holders the rights to prohibit others from exploiting and using the inventions, creation, and signs.

Knowledge management: creating, capturing, storing and sharing of organisational knowledge which is embodied either in organisation's member or embedded in organisation as processes or practices.

Market research: systematic attempt to collect information about markets and customers' needs or preferences.

Mission scenarios: A specific task for a security organisation like "tsunami in the Mediterranean", "fire in a skyscraper", or "cat in a tree"; such scenarios are used for capability planning, training etc. A mission scenario can be set in today's world or in a naïvely forecasted future version of it. By researching context scenarios one may also discover novel mission scenarios, which may become important in the future. They are also sometimes called use cases or type situations.

Open Innovation: Paradigm that assumes that firms and public organisations should use external ideas as well as internal ideas, and internal and external paths to market, as the firm or organisation look to advance their new solutions; the use of external actors and knowledge to benefit the idea generation of a security organisation.

Opportunity: An identified market or public need without a clear describable idea of the actual product or the service that could fulfil the need.

Organisation culture: The collective behaviour of humans who are part of an organisation and the meanings that the people attach to their actions.

Organisational learning: processing and interpreting information both inside and outside the security organisation.

Piloting: Testing of the service concept together with the pilot customer in the new service operationalization phase.

Roadmap: A plan that matches short-term and long-term goals with specific (service and/or technology) solutions to help meet those goals.

Scenario: An internally consistent description of alternative possible futures, based upon different assumptions and interpretations of the driving forces of change.

Scenario planning refers to the identification of some significant events, the main actors and their motivations, and the possible outcomes based on these different drivers and their

impacts. Scenarios could be defined as descriptive narratives of believable alternative prognoses of a specific part of future.

Searching: Searching is a group of activities to identify what new opportunities and technologies will be available to improve the service of the organisation. Searching activities could be conducted e.g. via competitor analysis, patent database searches, by studying professional literature.

Security organisation: Organisation that is responsible for fulfilling security missions for society, or a department or group that conducts security tasks but which belongs to an organisation whose prime mission is not security specific.

State-gate model: A process model for new product and service development that divides the effort into distinct time-sequenced stages separated by management decision gates.

Tacit knowledge: Form of knowledge that is difficult to articulate in a way that is meaningful and complete. The fact that we know more than we can tell describes the tacit dimension of knowledge. This is in contrast to explicit knowledge (see above).

4 Module: Innovation strategy

4.1 Overview

The innovation strategy of an organisation formulates the long-term innovation direction and goals of the organisation, provides an overall coherence for the innovation activities of the organisation and sets out the direction for innovation execution. The innovation strategy incorporates insights about the dynamics of the market and environment in which the organisation operates in, as well as the current and future needs of its customers. It helps to determine the type of innovation the organisation plans to undertake, and guides decisions regarding the use of resources to meet innovation objectives so as to deliver value and build competitive advantage. Crucially, it sets out the overall role of innovation in relation to the organisational strategy.

The innovation strategy should be continuously checked and updated if necessary. In the INNOSEC model, the innovation strategy receives feedback from the innovation process, especially from the “people, culture and learning” module for constant renewal.

The innovation strategy orientates and shapes the whole innovation process within the organisation. All in all, an innovation strategy defines the corridor for the development of product, service, process and organisational innovations, and thus delivers also the framework and guides the idea creation and selection process (see module “Ideation”). In the INNOSEC model, the innovation strategy consists of three elements: the framework for innovation strategy, the innovation strategy process, and the innovation strategy content:

1. *The framework for innovation strategy*

The framework provides the long term orientation for the innovation activities of the organisation by identifying challenges in the environment and possible innovation-driven responses. An assessment/ analysis of the internal (and external) resources available to carry out innovation is also conducted at this stage.

2. *Innovation strategy process*

The innovation strategy process defines the process steps to formulate and control the innovation strategy. It establishes the level of involvement across the entire organisation and sets out the alignment of the innovation strategy with the organisational strategy. The strategy communication processes are also defined.

3. *Innovation strategy content*

This element is concerned with the specific innovation activities as well as the strategic choices concerning the (co-operative) development of the necessary competences. It identifies the type of innovation(s) the organisation can and will undertake; this could be product, process, service or business model innovation.

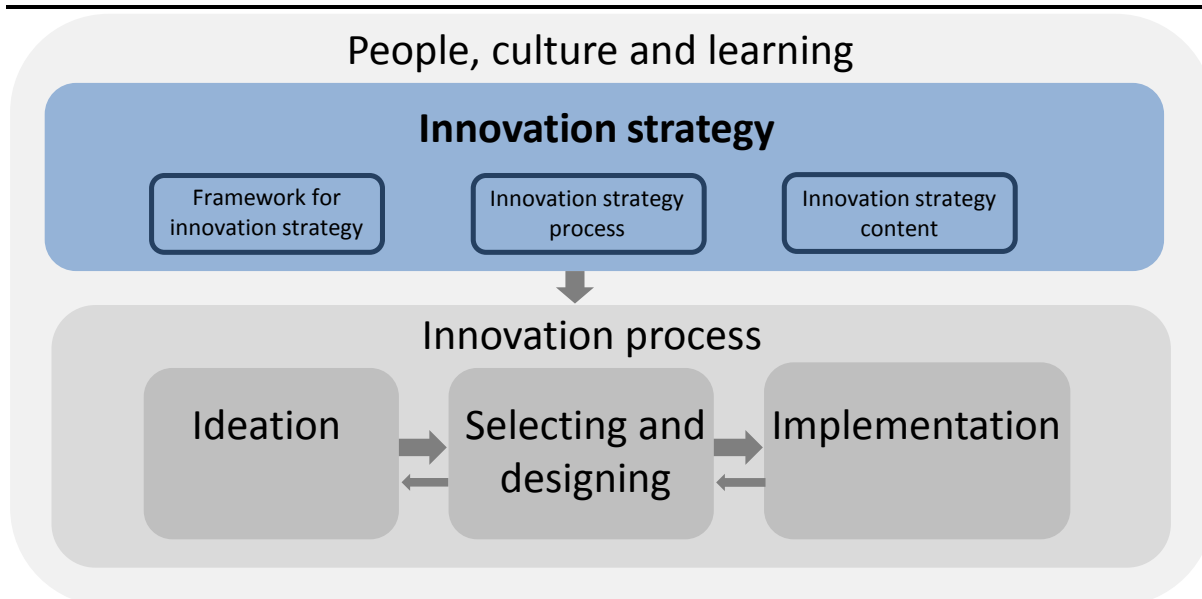


Figure 3: Innovation strategy module

4.2 Element: Framework for innovation strategy

4.2.1 Description of the element

In order to establish a long-term view which integrates internal and external aspects systematically, the framework for the innovation strategy of an organisation is established before the innovation process is started. The innovation strategy incorporates insights about the dynamics of the market and environment in which the organisation operates in, as well as the current and future needs of its customers. It helps to determine the type of innovation the organisation plans to undertake. Crucially, it sets out the overall role of innovation in relation to the organisational strategy.

Formulating and implementing an innovation strategy is an iterative process based on a broad range of information gathered. This is done through a strategic analysis usually covering the analysis and forecast of external aspects, such as e.g. the macro-framework, the industry, the clients, and the competitors of the organisation and the analysis and forecast of the organisation itself (internal aspects). It is crucial that the innovation strategy is adaptive and evolves over time, to allow for adjustments due to organisational learning, changing markets and environments.

A plethora of tools and techniques exist to help an organisation formulate their innovation strategy; here we describe a few that security organisations might find useful. For example, foresight, the mapping of future alternatives and timing from the actor's point of view, explores the long term development trends in the important environmental domains (e.g. technology, market) and aims to recognise long term future business opportunities. Scenario planning is a widely used foresight method, for instance, and could facilitate this process by developing alternative future development paths. Scenario planning refers to the

identification of some significant events, the main actors and their motivations, and the possible outcomes based on these different drivers and their impacts.

Issues to consider	Possible tools
<ul style="list-style-type: none"> - Guiding principles and long-terms goals of the organisation - Likely trends and challenges in the environment (economical, societal, technological, political, legal) that have an impact on the organisation - Main responses required to compete on the market and meeting stakeholder and customer expectations - Innovation capabilities and competencies of the organisation and its capacity to expand - Resources available to devote to innovation 	<ul style="list-style-type: none"> - PESTLE analysis - SWOT analysis - Foresight and scenario planning exercises - Market/ customer needs analysis

The precondition for any strategic development of an organisation is that the owners and shareholders deliver a scope for strategic decisions making by the management, in some specific cases or under specific governance and control structures (e.g. strictly regulated by law) there may be little leeway for the development and implementation of an innovation strategy. In general, without the commitment of the owners (shareholders), their representatives (governing body, supervisory board, etc.) and the top management (directors, etc.) the development of an innovation strategy is difficult. This is particularly an issue for some public security organisations where the mission and tasks are defined by law. Although innovation can be realised without a formal innovation strategy, a significant step towards becoming a truly innovative organisation cannot be achieved without strategy.

The scope and possibilities to define and implement an innovation strategy also depends on the organisational structure, management and governance structures of an organisation. Security organisations which are decentralised and heterogeneous (e.g. federally organised Red Cross Organisations) may not have an overall innovation strategy but realise innovations in a more bottom-up process.¹ Even though novel ideas, innovation and new technologies may be developed decentralised or locally (e.g. for a specific regions, application fields, etc.) the development of more radical innovations or adoption of new technologies may require a co-ordinated and centrally organised approach, and hence a

¹ Our case studies performed in WP 1 we found that in many of the studied security organisations innovations emerge from the needs of clients and/or from newly arising threats. They do not actively seek new innovations but have a more passive approach by waiting for needs or threats to arise. However, once a need has been identified, innovations are actively sought, e.g. by using an “exploration process”.

generic innovation strategy. Although organisations can also innovate without strategy², adopting a more explicit, formal and systemic approach will support the realisation of rather major innovations or the adoption of radical new technologies.

4.2.2 Who is involved

The design and evolution of a framework for innovation strategy is mostly directly shaped by top management. However, the process of developing the innovation strategy can also encompass a bottom-up approach and so opinions and feedback from other parts of the organisation (e.g. operational staff) might feed into the final decision. Some parts of the workforce may be involved in some specific tasks in relation to developing a framework for innovation strategy, e.g. to conduct the foresight and scenario planning, collecting market research. In addition, the innovation strategy of an organisation has to be communicated to the employees, another aspect of an innovation strategy.

4.2.3 Checklists

The following questions should be addressed when defining the innovation strategy framework:

- What is the mission of the organisation and the role of innovation to fulfil this mission?
- What are the guiding principles and long term goals of the organisation?
- What are the likely long-term development trends and challenges in the economical, societal, technological and political domain? Are any disruptions expected?
- What are the main responses required to compete on the market, serve the customers (security) needs and meet the stakeholder expectations?
- What are the basic innovation capabilities that the organisation can build upon?

4.2.4 More information (tools, practices, etc.)

For different approaches to conduct foresight, see:

- Daheim, C. and Uerz, G. (2008): Corporate Foresight in Europe: From Trend-based Logic to Open Foresight. *Technology Analysis & Strategic Management* 20, 321-336.
- Georgiou, L. et. al (2008): *The Handbook of Technology Foresight, Concepts and Practice*, PRIME Series on Research and Innovation Policy.

² The case studies of security organisations analysing the managerial practice of innovation (WP1) revealed that most of the organisations have no explicit innovation strategy. Six out of the eleven organisations had an explicit innovation strategy. Even though many of our studied organisations have no clear innovation management, some of them recognize the importance of innovations and do have strategies for specific fields (e.g. ICT).

A comprehensive overview of a large number of methods and a practical guide how to implement foresight methods can be found in:

- UNIDO Technology Foresight Manual,
https://www.unido.org/foresight/registration/dokums_raw/volume1_unido_tf_manual.pdf

To learn about different types of innovation strategy, see:

- Dodgson, M., Gann, D. and Salter, A. (2008): The Management of Technological Innovation: Strategy and Practice, Oxford University Press.

4.3 Element: Innovation strategy process

4.3.1 Description of the element

The process of developing the innovation strategy can be directed from top-down, or involve a more open and more bottom-up approach. These different modes of strategy making can be described as either more planned and rational on the one hand or more emergent and incremental on the other hand.³

The rationalist strategy developing mode can be described as the traditional top-down process which has been strongly influenced by military experience and metaphors. The process usually starts with the description and analysis of the environment (stage 1), which is followed by a determination of the course of action (stage 2), and implemented by a dedicated course of action (stage 3). This is a linear model where particularly in the first two stages only a small team is involved.

In such a traditional understanding strategy is the result of a rational choice process starting with a deep analysis of the organisation and its environment. It is assumed that managers act in a structured and rational manner and have the best knowledge and strategic abilities to derive a strategic concept and goals out of the strategic analysis process. The strategic goals are the important driver to implement strategy top-down inside an organisation and strategically control the outcomes. This rather mechanical understanding of strategic work is still the most common in managerial practice.

However, more recently a more bottom-up approach has emerged. This approach is still very goal-oriented but includes the whole organisation into the strategy development process by involving the “base” of the organisation in the responsibilities of the goal searching process. In this mode, strategy is constantly adapted in the light of new information and interpretation of the environment in an incremental fashion, often by the involvement of employees from different departments, sites and hierarchical levels.

³ This debate traces already back to the work of Mintzberg which separated between deliberate and emergent strategy.

A possible procedure of a typical incrementalist strategy (see Tidd and Bessant) is:

- i) to make deliberate steps towards the stated objectives,
- ii) measure and evaluate the steps and changes, and
- iii) adjust the objectives and decide on the next steps.

Depending on the organisational context, a Security Organisation has to specify and design its strategy process taking into account the culture, environment and history of the organisation.

To sum up, while ideas for new innovations (see also the Module Ideation) are often developed, collected and gathered in a bottom-up way, the co-ordination among the different activities, the selection of ideas, the strategic orientation for the organisational members (e.g. what and where to innovate), and the alignment with the organisational goals and mission (and sometimes with governmental policies and laws)⁴ requires a co-ordinated, formal, systematic and somewhat top-down process.

The fundamental elements of the innovation strategy process are:

1. Strategic analysis

A good innovation strategy has to understand the key features of the environment (customers, competitors, new technologies, etc.). Analysing, scanning and searching the environment for new potential targets for innovation is hence a critical task for innovation strategy development and adjustment. For Security Organisation the analysis of its environment needs also takes into account the political regulation authorities, suppliers and often citizens. While in many industries companies focus on customers or competitors, in the security sector the relevant environment may be different.

2. Strategic choice

Strategy is a selection and decision making process. The task of strategic decision making is the core task of the strategic management of innovation. A number of taxonomies exist which supports the definition of an adequate innovation strategy (see element strategy content below). The definition and development of the required resources and competencies on the one hand and the positioning of the products on the other hand are the two most fundamental strategic decisions an organisation has to make. The element innovation strategy content will deal in more depth with this task.

3. Monitoring, feedback and interaction

Formulating and implementing an innovation strategy is an iterative process and an appropriate management control system is necessary. Strategic control and monitoring is an important task and element of the innovation strategy aiming to support the implementation and flexible adaptation of the innovation strategy to changing factors.

For the strategic control of innovation a number of instruments and methods are available. Strategic control should not only monitor and evaluate but facilitate learning and that the pressure to meet milestones and deadlines enhances creative problem solving, discussion

⁴ In some cases, this restricts strategic development and the development of more proactive innovation strategies.

and coordination among project teams and across different levels of the organisation. Innovation control systems must be designed in a way that enables the adaptation to changing environmental conditions. The Balanced Scorecard is frequently suggested for designing strategic control system for innovation or R&D. These and similar models support as well the idea that a single measure is not sufficient for controlling the innovation process, particular as success factors and performance are considered as multidimensional concepts.

Thus, the entire innovation strategy process can best be described as running a "Plan-do-check-act" procedure, starting with the definition of strategic goals and plans ("Plan"), implementing of the strategy ("do"), controlling its realisation ("Check") and defining new measures of goals are not achieved and conditions have changed ("act").

4.3.2 Who is involved

Top and middle management of the organisation are necessary to make the crucial strategic process decisions. Additionally, some specific groups of the workforce and employees from middle and lower management are often involved in the innovation strategy making process and deliver new ideas for strategic renewal and new directions. Sometimes, this process is also supported by external experts. Moreover, external partners and stakeholders such as customers, citizens, and collaborative partners may be involved in the innovation strategy development process.

4.3.3 Checklists

The following questions should be addressed when defining the process for developing, implementing and controlling an innovation strategy:

- Does the organisation have an explicit and formal innovation strategy and is it aligned with the organisational strategy?
- To what extent is the innovation strategy communicated across the organisation and is it part of the culture of an organisation?
- What is the balance between the bottom-up and top-down strategy definition?
- Is the strategy process perceived as an iterative learning process in the sense of "Plan-do-check-act"?
- Are the tasks and roles of all the involved members defined across all hierarchical levels?
- What is the role of the vision and values within the strategy?
- Is the strategy interpreted as a rigid inflexible document or as lively, interactive and iterative process?
- How much engagement and resources are targeted towards implementing the strategy?
- Are responsibilities clearly defined?
- Do what extent are external partners, e.g. customers, involved in the strategy process?
- Is there a link between strategic choices and resources and budgets?

4.3.4 More information (tools, practices, etc.)

For different strategy processes see:

- Mintzberg H., et al. (1998): Strategy Safari: A Guided Tour Through The Wilds of Strategic Management: A Guided Tour Through the Wilds of Strategic Management.

For strategy process in the context of innovation see:

- Tidd, J., Bessant, B. (2009): Managing innovation: Integrating technological, market and organisational change, 4th ed. Wiley. Chichester.

For implementing an innovation strategy control system or the selection of performance indicators see for instance:

- Kaplan, R.S., Norton, D.P. (1992): The Balanced Scorecard – Measures that Drive Performance. Harvard Business Review. Vol. 70, No. 1, pp. 71-79.
- Hansen, M., Birkinshaw, J. (2007): The Innovation Value Chain, Harvard Business Review, June, 121-130.

4.4 Element: Innovation strategy content

4.4.1 Description of element

The innovation strategy content lays out the specific goals and strategic choices to be taken to enact the innovation strategy. Here, the organisation identifies the types of innovation that can help the organisation fulfil its strategy/ mission.

The main thing to consider here is: What does the organisation want to achieve from implementing innovation? This could be to:

- Develop a new product or service
- Improve operational efficiency
- Expand (or protect) market share⁵

With the innovation framework as a guiding tool, the innovation strategy content sets out to describe in detail:

- The specific innovation goals in relation to:
 - The outputs (e.g. new and/or improved products, services, processes)
 - The efficiency and resources to achieve the goals (e.g. budget, manpower, time)
- The focus and field of innovation activities, e.g. process and/or product innovation, business model innovation, etc.

⁵ This might be more relevant for private sector rather than public sector security organisations.

-
- Types of product and services offered and positioning on the market, e.g. differentiation or focus strategy
 - platforms and roadmaps to describe the relationships between the technology and product portfolio of an organisation
 - market entry strategies, e.g. first mover strategies (pioneer strategy) or follower or imitation strategy
 - make or buy strategy; whether the required resources and competencies are generated internally or acquired outside the firm⁶

The strategies and decisions at this level have also a strong impact on the innovation process and other elements; for instance, to guide the selection and design of specific criteria of a stage-gate model (see module “Selecting and designing”) or a performance measurement system, or the portfolio of services offered or projects developed. It also has impacts on the allocation of resources and, in some cases, the impact of public relations or public perception.

The field and focus of innovation activities

Apart from the different types of innovation an organisations can realize – product/service innovation, process innovation, organisational innovation – the innovation activities can be further categorized according to the level of innovativeness which ranges between incremental innovations to radical innovations. In addition, the innovation activities may also be more efficiency-driven or needs-driven.

Importantly, organisations cannot only implement or realise one type of innovation but may realise different innovations at the same time. This mix of specific innovation activities is considered an important part of an organisation’s overall innovation strategy.

Customers, users and citizens are a very important factor for economic success of security organisations. Therefore their needs and expectations influence organisations in the way they are performing their business, i.e. what type of innovation they focus on. Therefore, creating a customer-focused security organisation is one strategy which can be chosen. Optimizing and increasing the efficiency of the security processes offered or controlled by an security organisation by using new technologies (often ICT) is an important strategy of many organisations as well (*process innovations*).⁷

⁶ In times of open innovation this becomes an increasingly important issue

⁷ For example, a large police force studied in WP stressed that a national programme of police ICT in partnership with the private sector was an important strategy for them.

Product strategies

A key strategic choice is the one concerning the positioning of the products on the market, which is related to the overall strategic orientation as well. Cooper has elaborated a typology and proposes four strategic thrusts that are typically followed by companies:

The differentiated strategy: These businesses boast a technologically sophisticated and aggressive effort, a high degree of product fit and focus, and a strong market orientation. They target attractive high growth, high potential markets where competition is weaker. Resulting new products are premium priced and feature a strong differentiation and competitive advantage.

The low-budget conservative strategy: This strategy is comparable with cost leadership. It is characterized by low R&D spending, development of copycats and undifferentiated products, focused and highly synergistic new product efforts, and new products that match the business's production and technological skills and resources, fit into the business's existing product line and are aimed at familiar and existing markets.

The technology push strategy: Businesses following this strategy apply a technologically driven approach with regard to product innovation. Their products are technologically sophisticated and innovative. Problematic for this type of strategy is that the new product efforts often lack a strong market orientation, and there is little fit, synergy, or focus on the types of products and markets exploited.

Leadership or follower strategies

Porter differentiates between innovation "leadership" and "followership" as market strategies that an organisation might follow, and it is a fundamental strategic decision to be taken. With leadership strategy the organisation aims to be first on the market based on technological leadership and product innovations. Followers enter the market later by imitation and exploiting the experience from leaders.

The majority of companies within a given sector usually conduct more conservative and reactive strategies. The latter types of firms are innovative to a certain extent as well, although their innovation activities are more incremental.

Our case studies in security organisations (see INNOSEC Deliverable D1.1 & D1.2) have shown that most organisations focus on "proven" technologies, or related to a modest level of uncertainty. Only in a few cases do organisations experiment with radically new technologies. This could be observed mostly in cases where the company was intending to develop and produce the technology.

Organisational adaptation

The literature on Business Process Re-Engineering (BPR) delivers insights for the area of process innovations and other introduction of innovations which require organisational adaptation. BPR aims to analyse and design the workflows and processes within an

organisation often by using the potential of new information technologies. The aim is to improve customer service but also to reduce operational costs and hence to improve the competitiveness of firms.

In relation to BPR a number of strategic questions (GAO 1997) should be discussed relevant for security organisations, these are:

- Has the organisation assessed its mission, priorities and strategic goals?
- Has the organisation identified performance problems and set improvement goals?
- Is there a need for process innovation and organisational re-engineering?
- What is the readiness of an organisation to engage in a process innovation project?

Decisions in relation to the development of resources

The resource-based view of strategy particularly focuses on the competencies an organisation should develop in order to gain competitive advantage. They are organisation-specific resources, competencies and knowledge which deliver a significant source of competitive advantage. The capabilities of an organisation should:

- deliver a competitive advantage relative to its competitors
- deliver an advantage for the customers, users and citizens
- be specific for the organisation
- allow that there is value returned for the organisation

The resource based view can be derived by an organisational analysis. An example therefore would be a SWOT analysis which is usually applied at this stage to assess the internal resources and capabilities (Strengths and Weaknesses), and to judge the inside-out perspective (Opportunities and Threats).

Nowadays the innovation process is considered as a resource or knowledge-based process which requires the building up of resources, competencies and capabilities strategically. Crucial and different forms of resources and competencies have been classified within taxonomies which often separate between human resources or capital and organisational resources or capital.

Since innovation is viewed as the on-going pursuit and harnessing of new and unique knowledge, the individual knowledge, skills and abilities of a firm's employees – often labelled as human capital - are one important element in innovation. Agile and well trained individuals are seen as fundamental to innovation and form the basis for the creation, integration and transfer of knowledge within an organisation.

Organisational structures, processes and routines are important elements of organisational or structural capital which, for instance, enable an efficient product planning process, facilitate communication within new product development teams and provide the necessary information for product development. Accordingly, so called organisational capital is crucial for amplifying the knowledge created by individuals and incorporating it into the

organisational knowledge base. Organisational capital not only attracts talented employees, it may also facilitate knowledge creation and sharing across the organisation.

Questions concerning the development of the human capital and organisational capital which are described here from a more strategic perspective are also discussed in the module “People, Culture, and Learning”.

Customer relationship, social capital and the position within various networks is another important resource for successful launch and realise innovations.

The question about the most important sources for innovation and whether they are seen within the organisation or outside the organisation is a fundamental one and hence part of strategic decision making (“make” or “buy”). Security organisations can chose a more bottom-up approach involving many different employees and managers from different departments and hierarchical levels or can follow a more top-down approach were the top-management exploits ad hoc organisational units for a specific development. A third path might be more outside oriented involving customers and users, e.g. by organising lead user workshops or even employ a crowdsourcing strategy. These are all basic decisions and part of an innovation strategy.

IP strategy

The protection of resources and ideas may also be considered as part of an innovation strategy. In principle intellectual property, ideas and inventions can be protected against imitation by legal protection strategies, (e.g. patents, trademarks) and alternative forms for protection (e.g. secrecy, strong relationships, image, first mover advantage, fast innovation rhythm).

Apart from an individual IP strategy, sharing of IP may be a feasible strategy as well becoming more important in the last few years. Particularly, in those cases where companies are following open innovation strategies and joint development of innovations, IP protection mechanisms are limited. In addition, IPR are also relevant in the context of the the acquisition of technologies (procurement). See in the respect also the module “Selecting and Designing” and particular the element “Technology adoption”.

While some security organisations develop their own technologies and protect them by IP, others typically do not create an own IP but searches and implements external IP for its own processes (see also Module on “Ideation” in this context).

At the end, IP strategy can be defined as the rules and principles about what knowledge is important for the organisation and how it should be protected, managed and shared in order to support the business models and strategy.

4.4.2 Who is involved

Top and middle managers of the organisation are necessary to make the crucial strategic process decisions. Additionally, some specific groups of the workforce and employees from middle and lower management are often involved in the innovation strategy making process, and of course in the context of the generation of ideas inputs for the strategic development emerge which have an influence on the strategy in the medium term. Sometimes, this process is also coached by external experts.

4.4.3 Checklists

The following questions should be addressed when defining the content of an innovation strategy:

- What are the main features of the products and services offered (e.g. quicker, safer, more secure, more reliable) and how could products and services be improved?
- What is the relative position of the organisation compared to other providers or competitors concerning products and services offered in terms of quality, reliability, price, payments (if relevant), etc.
- Are the core competencies of the Security Organisation clearly identified, defined, and are the regularly developed and assessed?
- Are there rules under which conditions ideas and inventions are protected (legally) and does the organisation has an explicit IP strategy?
- What is the main sourcing strategy for adopting new technologies (make or buy): procurement, procurement and adaptation, own development, development in co-operation?

4.4.4 More information (tools, practices, etc.)

For strategic decisions in relation to positioning and market entry point, see:

- Afuah, A.N. (2003): Innovation Management: Strategies, Implementation, and Profits, 2nd edition, Oxford University Press, New York and Oxford.
- Burgelman, R. et al. (1997): Strategic Management of Technology and Innovation, Prentice-Hall.
- Cooper, R. (2001): Winning at new products. Third edition.
- Miles, R.E. & Snow, C.C. (1978). Organistical Strategy, Structure, and Process, McGraw-Hill, New York.
- Porter, M.E. (1985). Competitive Advantage: Creating and Sustaining Superior Performance, Free Press, New York.

- Tidd, J., Bessant, B. (2009): Managing innovation: Integrating technological, market and organisational change, 4th ed. Wiley. Chichester.

For the development of resources and competencies, see:

- Teece, D. (2000): Managing Intellectual Capital, Oxford.

For organisational adaptation and business process engineering, see:

- GAO United States General Accounting Office (1997): Business Process Reengineering Assessment Guide, May 1997.

For IP Management, see:

- Paasi, J. Valkokari, K. Hytönen, H., Huhtilainen, L. & Nystén-Haarala, S. (2013). Workbook for Opening Innovation: Bridging Networked Business, Intellectual Property and Contracting (Series on Technology Management, Vol. 21) London: Imperial College Press.

5 Module: Ideation

5.1 Overview

The Ideation module of the INNOSEC model aims to support the creation of successful ideas for security services. These ideas could be exploited when defining new security operations in the public sector or new security services in the private sector. In many organisations there is a lack of framework and search strategy to systematically monitor their operational environment and markets in order to identify new ideas and technologies that are relevant to the organisation (and aligned to its strategy). The Ideation module presents a systematic approach for ideating new innovations in the security sector. The module covers main challenges related to the beginning of the innovation process, also called the front end of innovation.

In the front end three sets of activities can be distinguished, which also form the elements of the Ideation module:

1. Searching
2. Idea generation
3. Idea management

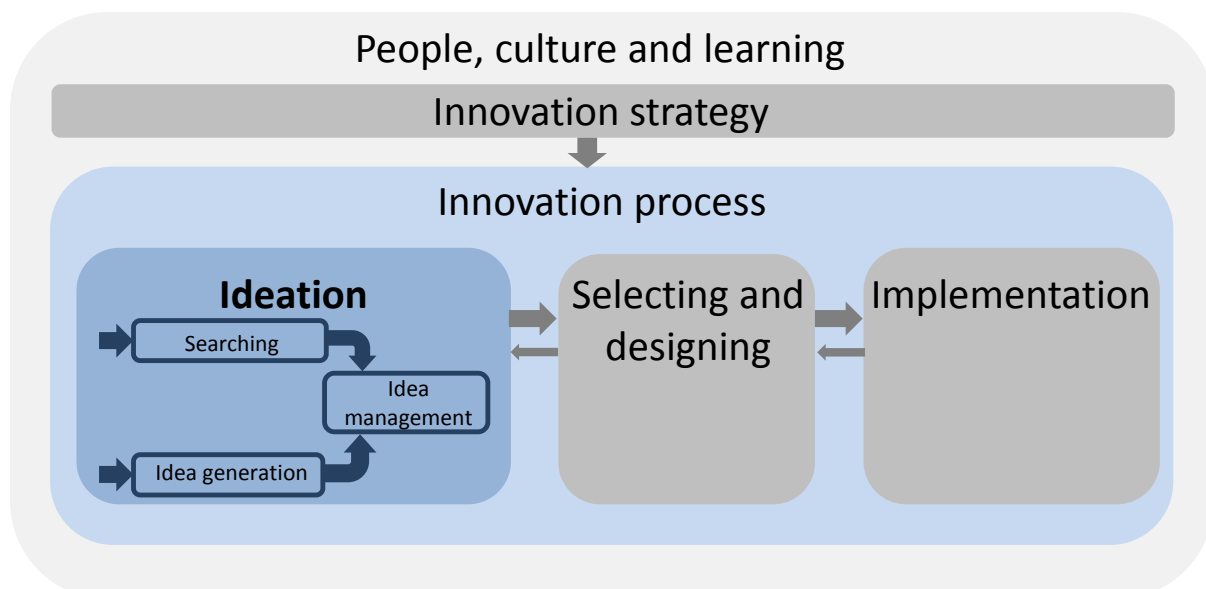


Figure 4: Ideation module

An innovation process may start from the identification of a potential need (opportunity) for new mission of security, or potential new technology to do an existing mission of security in

a better way, or an anticipated regulative and legislative need for changes in the security service. Alternatively, the process may start from an idea (or preferably many ideas) of new service of security or an idea to improve the existing service of security. The difference between an idea and an opportunity is that an idea is understood to be a describable new service, product, security mission or process, and an opportunity is understood to be an identified market or public need without a clear describable idea of the actual product or the service that could fulfil the need. After the opportunity identification or idea generation the process continues to idea management where the first selection and idea enrichment will take place. Idea management is also responsible for the storage of ideas. The front end activities are often conducted in an iterative way, and searching and idea generation may take place in parallel.

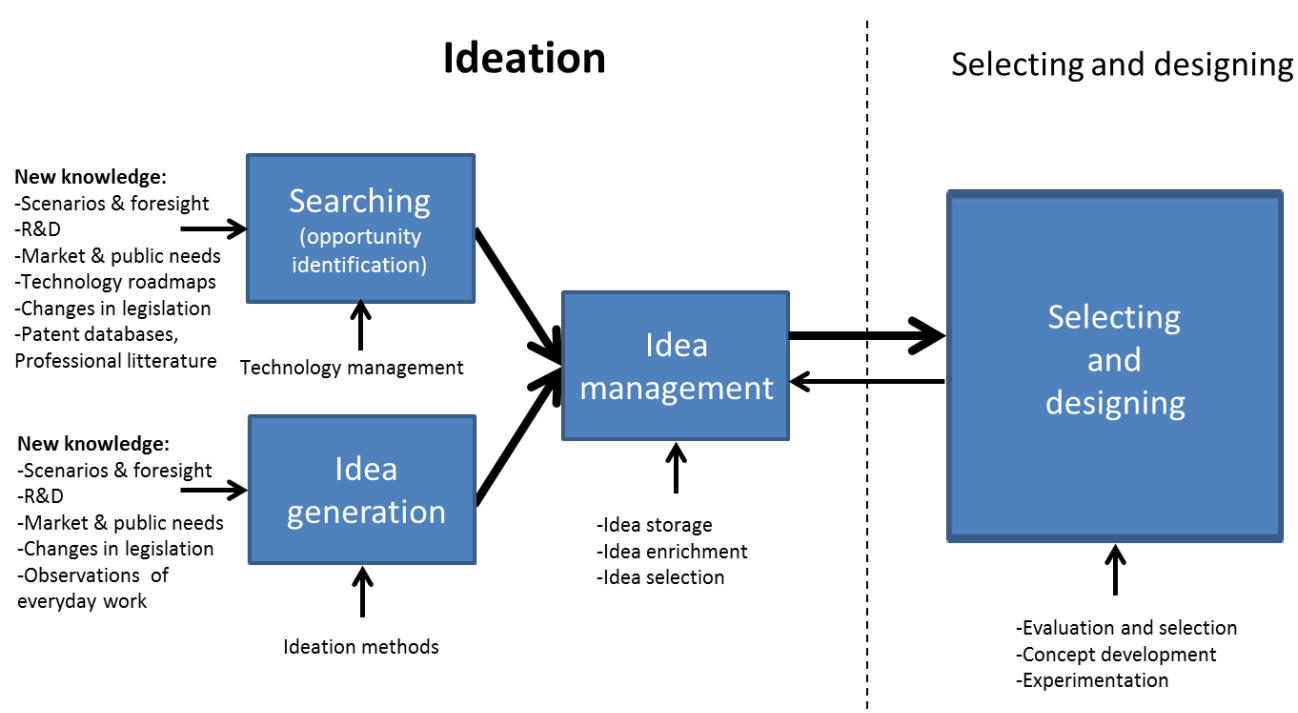


Figure 5: Process model for the front end activities of innovation, covering the elements from both the Ideation and Selecting & designing modules.

The Searching element emphasises proactive monitoring of the environment in order to identify what new opportunities and technologies will be available for the improvement of security service. It forms an interface with the module Innovation strategy, in which the strategy guides the directions for the searching and identification of new opportunities.

The Idea generation element targets to elucidate practices that are commonly used while creating new ideas. Open innovation, the use of external actors and knowledge to benefit the idea generation of a security organisation, can also be used in this stage.

The element Idea management covers several activities that are in the innovation process between searching/idea generation and concept development. The activities include the

selection of relevant ideas for enrichment, clustering of proposed ideas, storing of used as well as unused ideas, reusing of ideas, and the actual enrichment of ideas. The content of Idea management is aligned with the philosophy of modern IT tools for knowledge management.

5.2 Element: Searching

5.2.1 Description of the element

Searching refers to the identification of new opportunities and technologies that are available to improve a service of security. It covers both the aspect of improving existing services and the introduction of new services of security based on new technologies. Searching covers a variety of approaches from formal (and systematic) processes guided by organisational and innovation strategies to informal (ad-hoc type) activities driven by professional interests of experts and users in a security organisation. In this element some of the more common approaches will be reviewed, starting with formal and strategy driven search processes and ending with more informal ones. The review includes both bottom-up and top-down perspectives that are crucial for successful searching.

Scenario working

Scenario working is a central method in future research that could be used for the development of alternative scenarios of future. The future cannot be predicted - the future is not predefined - but it can be influenced through own selections and actions of an organisation. Therefore, future research and scenario working should be a part of the innovation work in security organisations, through which the organisations could be better prepared for future threats and, perhaps, be able to prevent them.

Scenarios could be defined as an internally consistent description of alternative possible futures, based upon different assumptions and interpretations of the driving forces of change. They are methodically developed in sets of three, four or more alternative future scenarios. Scenarios could be used in:

- identification of possible business opportunities / required new security services
- testing of strategy against several scenarios
- strategy enhancement based on new understanding on the requirements related to variety of possible futures
- strategy execution monitoring
- scanning change in the environment to determine if the further strategic enhancement is required

Scenario working forms a strong interface between the Ideation and Innovation strategy modules of the INNOSEC model. Scenario working has an influence also on the selection of ideas for further development (module Selecting and Designing).

Foresight

Foresight is a term for multi-science mapping of future alternatives and timing from the actor's point of view. Its aim is to bring alternative scenarios of future into the operational environment of the actor (security organisation). Foresight includes a variety of methods from which the most important are forecasting, backcasting, and roadmapping (see the description of the techniques in "More information", section 5.2.4). Strategy is sometimes operationalized through foresight techniques.

In foresight it is important to recognise areas that are critical to the operations of the organisation. The critical areas could be related to technological enhancement, changes in market and public needs, or changes in legislation and regulations in the field. In addition, foresight should define the relationship between the built scenarios and their timing, allowing an organisation to evaluate the potential of different scenarios from the organisations' point of view. Effects of the scenarios, both positive and negative, should also be identified.

Scenario working and foresight methods may not directly result in the identification of a new opportunity. More often they guide the actual searching of new technologies and opportunities or needs for the service of security. They also give valuable input for the searching.

Searching new technologies

Searching or scanning exploitable new technologies is one task inside the technology management of an organisation. In the literature it has been suggested that enterprises should consider the defining and developing of necessary structures and objectives for strategic technology management, to proactively manage impacts of technology for the competitiveness of the organisation, and for sustainable development of its socioeconomic environment. Informal searching done by individual experts of the organisation is as important as the management driven searching of new technologies. This combines both top-down and bottom-up approaches.

Technology Management includes several managerial disciplines that enable organisations to manage their technological knowledge to create and sustain competitive advantage (private security sector) and increase the cost-effectiveness of the innovation process (public security sector). There are several methods used in technology management, such as technology strategy development (role of technology in organisation), technology forecasting (identification of possible relevant technologies), technology road mapping (mapping technologies against business and market needs), technology project portfolio (what projects are under development) and technology portfolio (what technologies are in use). Technology forecasting and road mapping are mainly used in the searching of technology from outside (i.e. technology that is external for the organisation). Portfolios of technology projects and technologies are in use to support the searching of technology that exists inside of the organisation.

Methods related to the searching of new technology could include e.g. competitor and network analysis, patent database studies and other business intelligence activities. In many

cases it is no longer feasible and competitive for an organisation to do the innovation work alone. Co-operation in the searching could be conducted e.g. with suppliers, by observing customers, users, citizens, collaborating with research institutes and universities and by acquiring information (e.g. patent database studies) from consultants. The co-operation aspect will be discussed in more detail in the description of element “idea generation” under the subtitle “open innovation practices”.

The methods given above can be used both in formal and in informal searching of new technology. Informally, that is, without a formal contract or project, individual experts of organisations can do the searching of new technologies, for example, by reading professional technology journals, attending trade fairs, conferences and scientific events, joining to topical forums (physical or virtual). An important part of both formal and informal searching is to collect, evaluate and exploit the findings of the searching activities in a systematic manner.

Searching new opportunities

An opportunity here can be understood as an identified new threat, a new product or service that could be used in order to improve security, a new market for security services, or a new method of service development. Previously described scenario work and foresight methods should support also the work related to the searching of new opportunities. They offer input information to opportunity identification or describe steps related to technology development. Searching for new opportunities is very close to idea generation, and often same approaches could be exploited both in new opportunity recognition and in idea generation. Therefore, opportunity searching and idea generation activities are sometimes conducted simultaneously in iterative manner.

Methods related to the searching of new opportunities are very much the same as the methods for the searching of new technologies. Scenario working and foresight bring valuable input for the searching. Open innovation practices presented in the element “Idea generation” give another approach for searching new opportunities which can also be recommended. Some other less formal practices presented in the element “Idea generation”, such as the suggestion scheme system, could serve the searching of new opportunities as well. Independently of the method used for the searching and identification of new opportunities, the findings should be collected, evaluated and exploited in a systematic manner.

The identification of new opportunities, in itself, is not easy. People may easily become engrossed with current threats and operations such that they cannot foresee changes taking place in the environment. Even if they can, the situation may become difficult if the changes call for renewal of a mature organisation. Radical ideas, required for the renewal, rarely fit with organisations’ current strategies and may, therefore, be neglected or even rejected. It is important for the management to realise these obstacles and work actively and flexibly to overcome them.

Changes in legislation

In contrast to many other businesses, changes in legislation and other regulation have to be more deeply considered when new innovations in security sector are being pursued. Therefore the preparation of new laws and regulations forms an important source of data for new security service development. Sometimes the changes in legislation could offer business opportunities for private security companies or form must-do-development-actions for public security organisations.

5.2.2 Who is involved

Work related to scenarios and foresight is close to the strategic work that these tasks should be under the responsibility of the top management of organisation. Establishment and coordination of any system that supports the collection, evaluation and exploitation of findings related to the searching of new technologies and opportunities are under the responsibility of top management.

Personnel should promote searching by actively entering their observations to a suggestion scheme or corresponding idea collection system. These observations could accumulate from everyday work (e.g. contacts with clients, citizens etc.), reading professional and business journals, attending trade fairs, conferences and scientific events or other relevant forums, and engagement of external partners, like suppliers, sub-contractors and clients, as well as collaboration with universities and research institutes.

If technology management is perceived as an important activity, the management team of the organisation is responsible for its establishment. During the establishment operative responsibilities and roles of internal personnel in technology search are defined. The roles of external actors (partners, research institutes, users, customers etc.) should also be defined based on the specific needs related to the searching activities. In this work, the organisation should be able to evaluate the capabilities of potential partners to contribute to searching.

The input of employees (the bottom-up perspective) is very crucial for successful searching. Suggestion schemes, observations and informal searching activities (e.g. reading professional technology journals, attending trade fairs, conferences and scientific events) are essential approaches for the searching of new opportunities or technologies by employees. Complementary part of the bottom-up searching approaches is to evaluate and exploit the findings in a systematic manner, which is the responsibility of the organisation's top management. If this part fails, the employees are not motivated to give their input for searching activities which could hinder especially organisational learning. Therefore, the bottom-up approaches of searching activities have a strong interface with the module "People, culture and learning" of the INNOSEC model.

Foresight, scenario work and technology management could also be regarded as top-down activities and, if these are considered important, top management of an organisation is responsible for organising such activities.

5.2.3 Checklists

The following list of questions aims to support in establishing searching activities in an organisation.

- Has the role of technology been defined, is there a need for technology strategy?
- Is there a need to use searching tools for the identification of potential technologies?
- Is there a need to develop capabilities related to opportunity identification?
- Could a suggestion scheme or another systematic bottom-up idea collection system improve our searching activities?
- Is there a need to exploit e.g. business or market analysis in the identification of public or market needs?
- Is there a need to identify the current technologies that are being used in the organisation?
- Is there a need to identify technology development projects that are currently on-going in an organisation?
- Do we know how external partners could support our searching activities?
- Remember to always take in account the on-going changes in legislation and regulation.

5.2.4 More information (tools, practices, etc.)

Scenario working

According to Fahey and Randall scenarios have the key elements in Figure 6. Driving forces are also an essential element of scenario. In typical scenario working a group of experts with multidisciplinary background and experience develops a few alternative scenarios of the future.

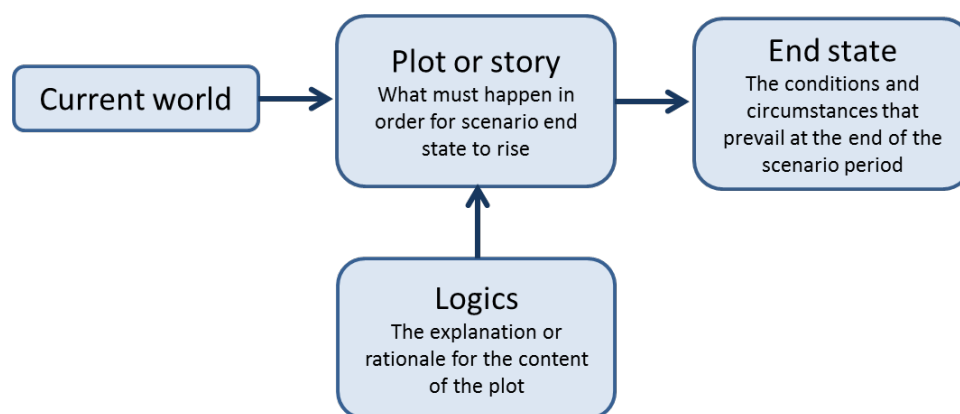


Figure 6: Key Scenario elements.

Methods that are typically used in collecting information for scenario works include e.g. PESTE analysis, filter models, and Delphi analysis. The PESTE analysis is used to identify change factors in the operational environment; the factors are divided into political, economic, social, technological and environmental factors. Sometimes legislation is included as a separate sixth factor (then one may speak about PESTEL-analysis). The filter model combines the market technology and change factors of the society into a consistent scenario path from different starting points. The Delphi analysis is a structured communication technique, originally developed as a systematic, interactive forecasting method which relies on a panel of experts.

More information on scenario working can be found in:

Fahey, L. Randall, R. M. (1998). Learning from the Future: Competitive Foresight Scenarios. John Wiley & Sons. 446 p.

Basic information concerning the PESTE analysis can be found e.g. from Wikipedia pages http://en.wikipedia.org/wiki/PEST_analysis.

Roadmapping

A roadmap is a plan that matches short-term and long-term goals with specific (service and/or technology) solutions to help meet those goals. Roadmapping is a process to develop the plan. It helps reach a consensus about a set of needs and the (security service) solutions required to satisfy those needs; it provides a mechanism to help forecast technology developments and it provides a framework to help plan and coordinate technology developments. Figure 7 represents the main elements of visionary roadmapping that is in use at VTT Technical Centre of Finland. Phaal et al have described a very similar approach in their studies.

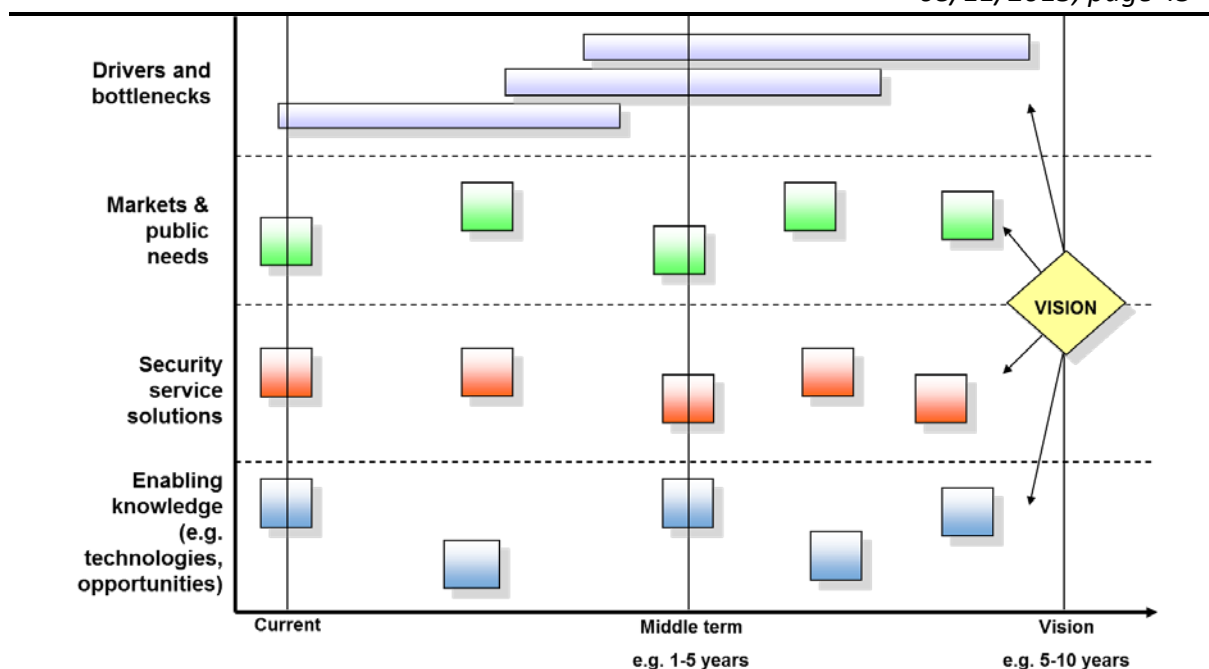


Figure 7: The elements of visionary roadmapping according to roadmapping tool in use at VTT Technical Research Centre of Finland.

More information on roadmapping (especially from the technology viewpoint) can be found e.g. from the book

Phaal, Robert, Clare JP Farrukh, and David R. Probert. "Roadmapping For Strategy And Innovation: Aligning Technology And Markets In A Dynamic World." University of Cambridge, Institute for Manufacturing, 2010. 240 p.

Other future research methods

Other original methods of future research, like forecasting and backcasting, are quite similar to road mapping. These methods have also been adapted for vision building and strategy work at organisation and industry levels. Forecasting and backcasting methods differ from each other according to the reasoning mechanism. A manager or an expert backcasts by identifying a desired future state and then by considering which of several strategies in the present is most likely to bring that state. A manager or an expert forecasts by identifying several strategies in the present and then by considering different future states that each strategy is likely to cause (from Ebert, J., Gilbert, D. & Wilson, T. (2009). Forecasting and Backcasting: Predicting the Impact of Events on the Future, Journal of consumer research, Vol. 36, available at <http://www.carlsonschool.umn.edu/assets/139480.pdf>).

Forecasting approach is presented e.g. in Wikipedia

<http://en.wikipedia.org/wiki/Forecasting>

Further information related to backcasting can be found e.g. from
http://forlearn.jrc.ec.europa.eu/guide/4_methodology/meth_backcasting.htm

Patent database studies

Patent database studies and surveys can be exploited in the search of suitable technologies that enables certain desired service of security, by helping to identify potential developing technologies and also for finding potential partners as technology providers. Patent data is easily available, is gathered from many countries, and consists of valuable technical information, thanks to the excellent classification. European Patent Office (<http://www.epo.org/index.html>) and The US Patent & Trademark Office (<http://www.uspto.gov/>) are the most exploited sources of data in this field.

Market research

Market research is a systematic attempt to collect information about markets and customers. Market research tools represent statistical and analytical methods and techniques for the identification and analysis of market needs, market size, market trends, customers and competition.

When conducting market research, two types of data could be collected: primary and secondary. Primary research data is information that comes directly from the source – i.e., customers, users, citizens. This data could be compiled by an organisation itself or specialised consultants could be assigned to gather the information via surveys, segmented focus groups and other methods. Secondary research data involves compiling of statistics, reports, studies, changes in legislation and other information from governmental and non-governmental organisations, trade associations and trade unions.

Further information related to market research could be found e.g. from the web pages, <http://managementhelp.org/marketing/market-research.htm> and http://en.wikipedia.org/wiki/Market_research

State-of-the-art information on searching activities in security organisations in general can be found on: INNOSEC D1.3 Situation report: empirical findings as basis for an innovation framework in security organisations at www.innosec-project.eu

5.3 Element: Idea generation

5.3.1 Description of the element

This element presents practices that are commonly used in the creation of ideas for new services, security missions or processes, products and solutions that aim to fulfil a market or public need. The need may be an identified real need (opportunity) for security services or a

vision of that. Here, we discuss idea generation from two perspectives: idea generation that takes place inside the organisation using its personnel, and idea generation that utilises external actors (open innovation). Some methods are then presented in the section “more information”.

Idea generation and the subsequent idea enrichment are the most creative parts in the front end stage of innovation. It is an evolutionary process. Idea generation is seldom the weakest link in organisations’ innovation process, but most ideas are typically supporting current lines of operations or business. Special actions may be needed to promote idea generation for innovations that are new to the organisation or even new to the world.

The aim of the element “Idea generation” is to support organisations to create plenty of ideas to be subsequently exploited in concept development in the module “Selecting and designing”. The first categorisation and evaluation approaches of the ideas, however, are introduced in the “Idea Management” element. The objective of this first assessment is to control the usage of resources when the actual concept development is conducted.

Ideation practices

It is widely recognised that the most important source of ideas is the employee as he or she is continuously in interaction with customers or users of the services of organisation, and knows the service content as well as the delivery process, and the needs of the customers and users. Companies that leave the idea generation to the responsibility of the board of directors are neglecting a lot of useful knowledge. The board of directors, on the other hand, may have better long-term vision on future needs of the organisation. All the viewpoints listed above are important in ideation.

Ideation may take place in specially organised sessions or spontaneously. Special ideation sessions are typically organised in order to generate ideas of solutions for an identified opportunity (which could be, for example, a recognised current or anticipated future threat that calls for new service of security). Organised ideation sessions are often facilitated by an expert who is well-versed in methods which can be used to support creativity in group sessions.

Spontaneous ideation may also create ideas for identified opportunities but it may as well create ideas of new services without a clear vision of need for the service. In the case of spontaneous ideation, it remains a task for further work within ideation to study whether there is a need for the service or not (i.e. whether there exist current or anticipated future opportunity for which the idea could be a solution). It is also important to have a system that collects ideas in order to support spontaneous ideation of personnel.

One possibility to systematically collect findings (observations, opportunities and ideas) from personnel is the establishment of a suggestion scheme system in which the personnel of an organisation could make suggestions for ways to improve existing service of security, to propose new service, or identify new threats. In such a system useful suggestions will be rewarded. Implementation of suggestion scheme system is one operational model to show how the management of organisation promotes innovativeness. Companies like Toyota have successfully implemented suggestion schemes for the staff. They have improved

product quality, reduced production costs, and enhanced employee morale. The usage of the idea management system could be one concrete way for suggestion scheme establishment (see element “Idea Management” and the module “People, culture and learning”).

In idea generation it is important to understand that there is no such thing as a bad idea, but most ideas are not realisable at a certain time frame and by the given organisation. Therefore, it is important to distinguish idea generation and idea selection (including any critics) from each other. Therefore, a storage facility is required for ideas, which enables later exploitation of created (good) ideas. This topic is further discussed in element “idea management”. Idea collection is discussed in more detail in element “idea management”.

Open innovation practices

Offerings of security services are nowadays increasingly complex. They may include several technologies—both hardware and software—accompanied by services. In many cases it is no longer feasible and competitive for an organisation to do the innovation work (or product/service development work) alone but in collaboration with external actors, which can be customers, citizens, users, suppliers, research actors, consultants, etc. When external actors are involved in innovation, one may speak about open or networked innovation.

Customers and users are increasingly more actively participating in the idea generation of completely new solutions or improvements for existing service solutions. Customer and user involvement in innovation is typically the most effective when improving existing solutions. It may be less successful when aiming at new solutions because users become easily stuck with existing services and threats such that they would not be able to think about something completely different, something that may replace present practices.

Ideas from customers, citizens and users could be collected e.g. with feedback inquiries or by organising specific ideation session, which are most often conducted with lead-customers. Some organisations have developed and implemented customer observation processes in which employees are trained to make customer observations which are then used as an input for ideation.

Suppliers are the second group that have been commonly used to support innovation. It has been found that suppliers’ early integration into the innovation process can significantly increase innovation performance in most industries. In innovation work with suppliers, security organisations should be able to define their challenges and/or opportunities rather than merely concentrate on the solution itself. In this sense innovation work could include knowledge exchange related, e.g. to future scenarios and changes in markets and legislation. This is one possible way to explain the future challenges of security organisations to suppliers and give guidance to their product development. This innovation co-operation aims to increase suppliers’ capabilities in idea generation for the solution that is needed in the creation of security services⁸.

⁸ Nonetheless, security organisations in the public sector should be mindful of EU procurement legislation when working in co-operation with suppliers.

Universities and research institutes are key players in driving science forward with their efforts in research and development. Usually these organisations are also well networked. Therefore, these organisations should be considered when open innovation practices are implemented. Furthermore, the collaboration may cover the whole innovation process, not only ideation.

In ideation the knowledge exchange between security organisations and research institutes could be related to technological development roadmaps, future scenarios, changes in market and legislation, patent data base analysis, etc. Knowledge could be used as an input data for shared brainstorming sessions. These sessions could be organised e.g. for challenge identification, opportunity search and idea generation. The co-operation could continue when identified opportunities and suggested ideas are further enriched and/or evaluated.

In a longer perspective, the co-operation between security organisations, universities and research institutes could aim for expert mobility. Increased mobility could help researchers in identifying shared needs and experts of security organisations in searching solutions for their needs. This will benefit not only the ideation but also the whole innovation process conducted in security organisations.

Independently whether open innovation practices are applied with customers, users, suppliers, universities or other research actors, it is important to pay attention to incentives of innovation for external actors. The incentives may be very different depending on origin: some actors may be happy just to be able to use the resulting new service or other solution, some would require monetary or some other business compensation, some actors could be motivated by increased reputation and reference value. It is important for the organisation to find a good balance so that all actors would be satisfied and direct their best efforts to innovation.

Networking and open innovation bring additional challenges for the management of uncertainty related to innovation development. By using open innovation, it is possible to share and lower the risk of false innovations and resource usage. On the other hand, networking increases complexity and this complexity raises new kind of risks. Therefore relationships, ideas and projects need to be managed properly when applying open and networked innovation. It is highly important to have the right key people in the network with inspired leadership and aligned incentives. Perhaps the most challenging and difficult issues relate to the intellectual property (IP) of innovation outcome.

5.3.2 Who is involved

Idea generation is a task of the whole personnel of organisation. It is a task of management to organise the innovation work so that people at different parts and levels of the organisation could take part in a desired manner. Quite commonly, the input for idea generation comes from the personnel and ideas could derive from their everyday work (e.g. contacts with clients, citizens etc.). Ideas of employees could be collected in dedicated ideation sessions or via suggestion schemes. These arrangements lie under the

responsibility of management of organisation. Specialised innovation management teams could be established to run these ideation practices.

With regards to open innovation, the top management of an organisation should make the strategic decision whether to implement open innovation practices or use only internal resources in innovation work. Roles and responsibilities of personnel and external actors should be defined case by case. Managers should also identify potential external actors to be used in idea generation and evaluate their capabilities and resources in order to recognize the most useful and reliable actors. Legal department should be involved in the preparatory phase of open innovation activities when negotiating and concluding contracts with innovation partners and to deal with procurement and IP issues (if any). In the quest for new ideas, organisations could arrange idea contests which would be intended for employees, clients, citizens, customers etc.

The use of an external actor, such as a consultant, as facilitator in ideation is quite a common practice, especially when one is aiming to create something really new and there are no in-house capabilities to support this.

Related to all ideation work, management of an organisation should decide beforehand regarding the incentives or compensations to employees for ideation as one way to keep up the motivation related to ideation work at a high level. Both monetary and non-monetary compensations such as good reputation should be considered. One example how to organise non-monetary compensation is to give quick feedback to the suggestions or presented ideas.

5.3.3 Checklists

The following list gives some advice on how the front end of innovation should be treated in practice. The purpose of this list is to improve the use of knowledge and ideas rooted inside the organisation:

- Accessible idea forum in intranet (potential forum also for suggestion schemes)
- Quickly functioning review system
- Feedback and reports of progress to the person who has presented the idea
- People responsible for the concept development should have all the ideas in use in a categorised form
- In addition to the continuous collecting of ideas, the organisation could have inner innovation contests in order to concentrate the idea generation for the use of a specific challenge or project. Also organising an innovation contests for external people is relevant option for collecting new ideas.
- A specific innovation theme day, possibly led by an external consultant, could be a useful source of new ideas
- Possibility to check if the ideas, that previously have not been used, are currently useful.

- Always take into account the on-going changes in legislation and regulation.

If external actors are being used as a resource in idea generation, the following issues should be considered:

- Appropriateness of the actor as a source of innovation
- Need for varied incentives for the external actor of innovation
- Infrastructure for capturing external knowledge and ideas
- Differential role of existing (current) and potential (future) actors, especially customers

The following set of questions aims to support the establishment of systematic idea generation activities in an organisation.

- Are ideas being systematically collected?
- If special innovation theme days for idea creation are organised, have we defined the challenge/opportunity clearly to support the ideation?
- Are we reviewing quickly and giving feedback for the generated ideas?
- Who are our idea generation partners (own employees, customers and users, research institutes, suppliers etc.)?
- Do we clearly know what we need from our innovation partners?
- Do we know the roles of our innovation partners?
- Are we using incentives (for employees, customers) in order to get ideas?
- When ideating in network, do we know what knowledge could be shared? And what knowledge has to remain confidential and kept in-house?
- Do partners have existing arrangements that would legally constrain their actions within the proposed innovation network?

5.3.4 More information (tools, practices, etc.)

Methods supporting idea generation

Several methods could be used to support the idea generation.

One commonly used method is TRIZ (the word means the theory of inventive problem solving). TRIZ presents a systematic approach for analysing challenging problems and to find superior solutions that overcome the need for any compromise. TRIZ offers a toolbox to the definition of new solutions and paths for developing new products and services. Several sources of information and consultant services related to TRIZ could be found from the

internet. The TRIZ method is presented in more detail e.g. at <http://en.wikipedia.org/wiki/TRIZ>.

Another method very suitable for security sector is the Potential Problem/ Opportunity Analysis, (PPA) that can be used as an effective method to support the opportunity identification and ideation sessions. The method can be used in organised ideation sessions and it combines the elements of opportunity (here problem) identification and idea generation. The PPA process starts with a group session for the opportunity (problem) identification, and it is followed by the first evaluation of the opportunity (or problem). The third session is for idea generation based on the results of the second session.

A. Identification of opportunities	
Phase 1	Ideas of opportunities are sought by silent brainstorming
Phase 2	Ideas are sought by silent brainstorming Keywords are applied to stimulate the search for ideas Special attention is paid to major opportunities
B. Evaluation of opportunities identified	
Phase 1	Identification of true opportunities and selection of them for evaluation
Phase 2	Identification of the contributors for the selected opportunities Ranking of key contributors and opportunities
C. Idea generation and enrichment based on the results of Step B.	
Phase 1	Ideas of are sought by silent brainstorming
Phase 2	Ideas are enriched by silent brainstorming Keywords are applied to stimulate the idea enrichment
Phase 3	Most promising ideas are selected for further evaluation

Figure 8: Steps and phases of Potential Problem / Opportunity Analysis (PPA) when applied to the opportunity identification and idea generation according to the PPA version in use at VTT Technical Research Centre of Finland

More information on the PPA method is found from the book Kepner, C.H. & B.B. Tregoe (1981) *The New Rational Manager*. Princeton: Kepner-Tregoe Inc.

More information concerning ideation methods, in general, could be found via link http://www.mycoted.com/Category:Creativity_Techniques, where techniques, like Brainstorming, Fishbone diagram, Gap analysis (and many more), used in creativity related work are being introduced.

Notes related to Suggestion Schemes

Some valuable points related to the establishment of suggestion schemes can be found at <http://www.ideaglow.com/innovation-management-blog/2013/04/6-steps-to-implement-staff-suggestion-scheme/>. Some pitfalls related to suggestion schemes are listed in <http://www.innovationexcellence.com/blog/2010/06/06/10-reasons-why-innovation-suggestion-schemes-and-idea-boxes-fail/>

Open Innovation Practices

Good practices related to open innovation are presented at the following site: http://www.iriweb.org/Public_Site/RTM/free/Good_Practices_in_Open_Innovation.aspx.

Novel examples of applying open and networked innovation in different branches of industry and service as well as guides for the implementation of open and networked innovation can be found from the books:

Paasi, J. Valkokari, K. Rantala, T., Nystén-Haarala, S. Lee, N. & Huhtilainen, L. (2013). Bazaar of Opportunities for New Business Development: Bridging Networked Innovation, Intellectual Property and Business (Series on Technology Management, Vol. 20) London: Imperial College Press.

Paasi, J. Valkokari, K. Hytönen, H., Huhtilainen, L. & Nystén-Haarala, S. (2013). Workbook for Opening Innovation: Bridging Networked Business, Intellectual Property and Contracting (Series on Technology Management, Vol. 21) London: Imperial College Press.

5.4 Element: Idea Management

5.4.1 Description of the element

The element Idea management pays special attention to tasks conducted after searching and idea generation. The tasks include storing of generated ideas and opportunities, categorization and enrichment of ideas, reviewing of ideas, selecting of ideas for further development, reusing of stored ideas. The main objective of these tasks is to further enhance the ideas to be used as a fruitful input for the concept development in the Module “Selecting and designing”. The tasks do not have to proceed in any predefined order, the process can be more or less fuzzy. However, to bring order to the fuzzy front end of innovation, the task should be formally established into the innovation process of an organisation, i.e. to establish idea management into the organisation.

In the market there are several commercial software systems available that support idea management. A link to the web page listing various software systems supporting idea management is given in “More information” of Idea Management.

Idea storage

Idea storage is important not only in collecting new ideas and opportunities. It is important also to reuse or revisit previous ideas. Most good ideas do not proceed in the innovation process. Typical reasons why good ideas do not proceed are related to resources (either personnel or economic), readiness of markets, or maturity of technology needed for the innovation. The two latter reasons means that markets are not ready for the security service that the idea is representing or at the moment there is not such technological solution available that could enable the implementation of the security service presented in the idea. Without a working idea storing systems ideas that are discarded at one moment might be neglected forever, which may mean big losses for the organisation. But with an active idea storing system, one may reuse stored ideas when the timing for further development and implementation of the stored idea is the right one.

There is a great variety of commercial software available for storing generated ideas and identified opportunities. An organisation may select the one whose user-interface and capability to long-term idea management fits best to the innovation management needs of the organisation. Whilst not essential, larger and complex security organisations might find it useful to have such a formal ideas repository to improve their knowledge management capabilities.

Idea categorization

Categorization of ideas has two main objectives. Firstly, it organises the knowledge-base (containing ideas, opportunities, etc.) in such a way that it maximises the ability to communicate over the stored knowledge. Secondly, it allows the users to quickly find specific items (certain ideas, market potentials, security threats, etc.) from the knowledge base. In the other words, the categorization of ideas should be done in order to:

- Place the content in context so that it becomes a part of the organisation knowledge
- Organise the idea content so that specific ideas could be quickly found

Organisations should collect ideas continuously. The management and post-processing of ideas could be a laborious task. Managing ideas as a portfolio makes this task easier and builds a bridge between ideation, selecting and design, and implementation. The idea management in portfolios is one way to realise the idea categorization and enrichment.

Idea enrichment

Idea enrichment is an evolutionary process where the idea may go through many iterations, changes and combinations with other ideas as it is examined and further developed. Direct contact with users, customers, internal cross-functional knowledge chain as well as

collaboration with research institutes and universities is an opportunity to enhance the idea enrichment activity.

Idea enrichment may be guided by open and transparent criteria of idea and concept selection for implementation of innovations and new technology. Through such criteria people that enrich the ideas can see what kind of ideas would have a potential for further development in the innovation process and, finally, putting in practice into the service of security.

Idea reviewing and selection

Selecting of ideas for further development is perhaps the most challenging task in the front end of innovation. Assessment processes related to idea reviewing are varying in different kind of organisations. These variations do not, however, affect significantly to the proactive nature of the evaluation results. When evaluating and selecting ideas, there is no need to use profound criteria, since there is no profound data available related to one specific idea. Some basic criteria should still be given and openly communicated to personnel involved in ideation. The basic criteria could be, for instance:

- Market potential (for private security organisations)
- Public and societal benefits (for public security organisations, improved security of the citizens)
- Value for customers and users (uniqueness of the product or service, expected approval by customers and users)
- Technical feasibility

In addition, one should never underestimate the role of intuition when selecting ideas for further development. So the first decision could be based on the experience of senior management. The role of data becomes more important in later stages of innovation process (see the module Selecting and designing).

One of the biggest challenges related to the first reviewing and selection of ideas is the fact that it must usually be done in light of very small amounts of information. In the first evaluation the idea is not yet a concept where all key aspects related to the service (or product or process) are described. Also the chosen approach and criteria to be used for the first review and selection should be as light as possible, controlling the use of resources but still producing as justified results as possible. In practice, the first evaluation should support two main objectives: what ideas should be guided to idea enrichment and/or concept development, and how much resources could be used for the further development of the idea?

If it appears in the review that the timing for further development of an idea is not proper for one reason or another, there is always a risk that a valuable idea will be lost forever. Risks related to the loss of valuable ideas in this stage, however, should be relatively low, if there is a proper idea storing system available where ideas could be stored and their potential could be re-evaluated later on.

5.4.2 Who is involved

It is the responsibility of management to organise idea management activities in a manner suitable for the organisation. In addition to describing the tasks of idea management, the management should also define the roles and responsibilities of personnel in idea management. That is, who will be responsible for the storing of ideas? Who will be responsible for the first evaluation and selection of ideas for further development? The management should also define the possible role of external actors in the different tasks of idea management.

5.4.3 Checklists

The following is a checklist of items that should be considered when an organisation is establishing an idea management system (Note, the checklist is pretty general and many aspects important for a specific security organisation may be missing – some customisation may be needed):

- Set up a web portal for managing ideas
- Define access rights to the idea management portal of organisation –restricted access or open (to use open innovation principles in idea management)
- Allow users to submit ideas and opportunities for continuous idea generation and collection
- Group ideas into categories so that the people responsible for the concept development should have all the ideas in use in a categorised form
- Enable users to vote and comment on ideas, as a part of idea enrichment
- Allow users to collaborate to flesh out ideas, as a part of idea enrichment
- Identify the most popular ideas to be used in first idea reviews
- Define open and transparent criteria for the first selection of ideas
- Select ideas for further development, selecting of most suitable ideas to be used as an input for concept development
- Keep the proposers of ideas updated on the status of idea processing, an important issue when maintaining the motivation of the idea proposers
- Reward users for their participation, an important issue when maintaining the motivation of the idea proposers
- Reserve sufficiently resources for coordination activities related to the idea management system (the resource need is often underestimated)
- Pay special attention to the launch of the system so that people are well aware of the system, and they have been trained and motivated to use the system
- Ensure that the linkages between important data sources are available (e.g. relevant patent databases, market studies, changes in legislation etc.).

An example list of criteria is presented in Table 1 against which the first review and selection of ideas for further development could be done. The list is a collection of commonly used criteria covering several branches of industry. The list is not only for the first selection of

ideas, but more broadly for the different stages of the innovation process. It may include items to which no information is available in the ideation stage of innovation. Secondly, the list is generic. Some customisation will be needed when implemented to the innovation management of a security organisation. In addition to these more or less commercial criteria, the legality issues should also be addressed when ideas are firstly evaluated when security sector is concerned.

Table 1: List of commonly used evaluation criteria for new product and service development

Evaluation class	Used criteria
Market-based	Customer acceptance
	Customer satisfaction
	Sales objectives
	Market share
	Sales in units
	Market Potential
Financial-based	Break-Even time
	Profit objectives
	IRR/ROI
	Margin
Product-based	Product/service performance
	Quality
	Product/service uniqueness
	Technical feasibility
Process-based	Stay within the budget
	Introduced in time
	Time-to-market
Intuition -based	Marketing change
	Intuition

(List of criteria presented in the table are from the source: Tzokas, N., Hultink, E. J., & Hart, S. (2004). Navigating the new product development process. *Industrial Marketing Management*, 33(7), 619-626.).

5.4.4 More information (tools, practices, etc.)

Idea management software

Several commercial idea management software are presented at <http://www.ideamanagementsystems.com/>. This page is also giving some support and tips for decision-making when choosing applicable idea management software. Note that the list given in the website is far from being complete.

Idea categorization related further information

A good power point presentation by John Lacontora and Scott Mathews over Boeing's Idea Portfolio Management process could be viewed from the web site: <http://ppmexecution.com/ppm-presentations/>.

Other valuable insights to idea classification has been studied e.g. in AIM project. See more information at <http://www.atb-bremen.de/projects/aim/>.

Idea evaluation methods

Several Idea evaluation methods are presented at http://www.creative-trainer.eu/fileadmin/template/download/module_idea_evaluation_final.pdf.

Recommended literature covering idea management

Questions related to the front end activities of innovation process are widely handled in the handbook: Belliveau Paul et al. (eds.): The PDMA ToolBook 1 for New Product Development. John Wiley Sons. 2002.

Especially the following chapters of this handbook are recommended:

- i. Koen et. al. (2002). Fuzzy Front End: Effective Methods, Tools and Techniques.
- ii. Ajamian G. M. & Koen Peter. (2002). Technology state-gate: a structured process for managing high-risk technology projects
- iii. Cooper, R. G. & al. (2002). Portfolio management: fundamental to new product success. ss. 331-364
- iv. Dunhan D.J. (2002). Risk Management: The program manager's perspective

Some other recommended textbook covering important questions of idea management is:

Ulrich Karl T. and Eppinger S.D. (2004). Product Design and development. McGraw Hill.

Osterwalder, A., & Pigneur, Y. (2010). Business model generation: A handbook for visionaries, game changers, and challengers ([Nachdr.]). Toronto: Flash Reproductions.

6 Module: Selecting and designing

6.1 Overview

Selecting and designing (S&D) is a central module of the INNOSEC innovation model, which has (interactive) relationships with all the other modules of the model. Broadly speaking the main purpose of this module is to take promising but immature ideas from the ideation module (after a shortlisting process, i.e. a selecting-type activity there!) and refining and evaluating them – in an iterative process – such that well-proven solutions can, in the end after appropriate managerial decision, be transferred to the implementation phase. Hence S&D is the module where strategic decision making related to specific innovations is prepared and progressed along the pipeline.

It is important to realise that S&D is not about selecting the winner out of a number of ready-made ideas: it should be a key quality of the iterative process that good aspects of all ideas are identified and exploited. Therefore the S&D module has three elements (as depicted below): (1) Concept development; (2) Evaluation and selection; and (3) Experimentation/ prototyping. We also consider that participants responsible for Ideation should also participate in at least the early steps of S&D to convey their tacit knowledge of their ideas and aid the second phase of the innovation process.

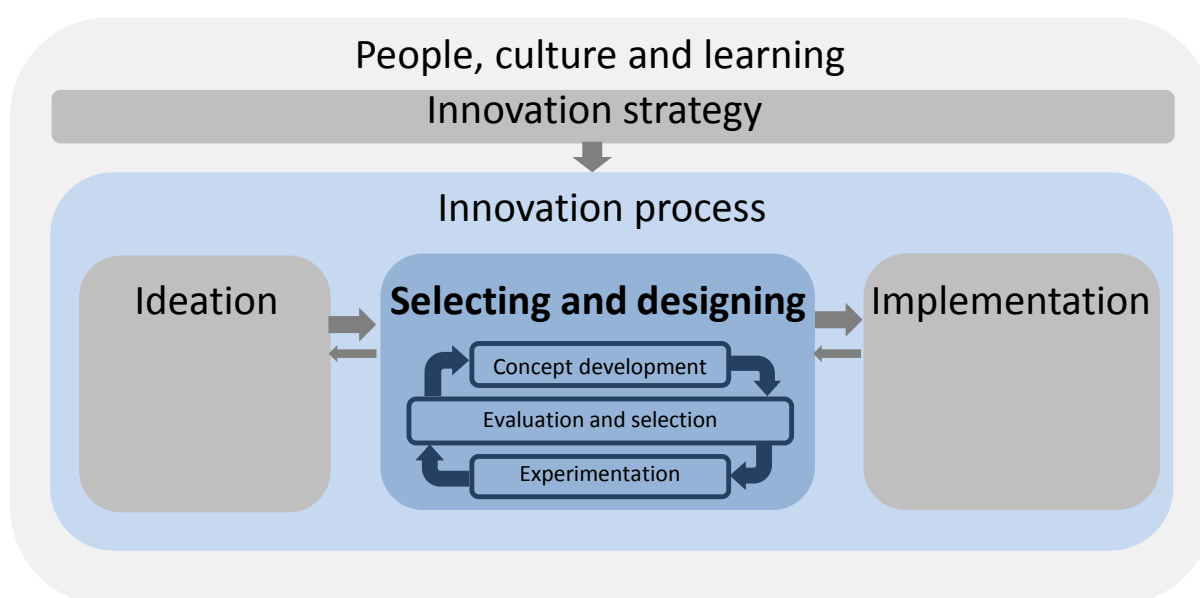


Figure 9: Selecting and designing module with its simplified process logic

It is also important to note that the development of a solution should not be seen as finished when it moves on to Implementation. This is generally true of innovation, but special features of security organisations and activities make the need to continue

innovating particularly pronounced. One such feature is that security solutions very seldom come as stand-alone plug-and-play units. Instead they need to be integrated into the systems they are intended to secure, e.g. installation of a firewall in a computer and a burglar alarm in a home are simple cases in point. Further, solutions have to be upgraded as new threats become relevant. All this means that the knowledge produced in the S&D module should be captured and transferred to Implementation – and become part of normal operations (sometimes known as Business-As-Usual). The exact form of this operationalisation depends on the exact nature of the security solution and the available resources.

Systematic exploitation of expert knowledge – including that of end-user groups – is a key aspect; information gathering by desk research is also of importance. To capture the complex mission structure typical of security services, scenarios and use cases are key tools in all steps of S&D. Approved concepts are subjected to demonstration procedures for validation. The elements of the S&D module are not to be seen as single steps in a linear process, but rather as iterative activities giving feedback to each other. The actual content of the concept development may differ depending on whether it is a question of the adoption of new technology into existing security services or development of new services. The word “designing” in the module underlines the active specification work that is done in the module for new or existing security services.

We now briefly introduce the three elements of the S&D module.

Evaluation and selection

Security is about dealing with a wide range of low probability/high impact events, including such that haven’t even happened in reality yet. This wideness of scope and gravity of consequences render it complex and laborious to demonstrate improvement across the whole range of relevant threats (or at least for no such threats an unacceptable degradation). Therefore evaluation of proposed new security solutions must take into account the full range of possible contingencies.

Concept development

Concept development refers to the phase in the innovation process where ideas are transformed into concrete solutions, whether this is a product, service or process, which can be implemented into the organisation (after adequate testing and proof of concept). One approach to achieving this is translating the *Lines of Development* (LoD) methodology from the military capability context. An important aspect is that it points to all the *non-equipment* areas necessary to consider in innovation. Also of relevance is a sequence of methodologies from the commercial context: *opportunity analysis*, defining *concept specification* and preparing an *operational model*. The latter can usefully exploit the LoD approach and constitutes a key part of the handover from S&D to Implementation.

Experimentation

Experimentation is necessary for testing, refining, and selecting concepts. It demonstrates the value of an innovation to the organisation so as to ascertain whether it is worthwhile to progress to the full implementation of an innovation, i.e. achieve proof of concept. It can also be seen as encompassing a wide range of activities with the common property – and purpose – of creating surprise. For INNOSEC, experimentation ranges from pure dry run simulations through to fully “in real life” (IRL) experiments. Furthermore, a single experiment may not be useful: it is the well-orchestrated *campaign of experiments* that is able to create new knowledge of significance for innovation. At the end of such a campaign a *demonstration* is well placed, constituting a proof of a concept developed throughout the campaign.

6.2 Element: Evaluation and selection

6.2.1 Description of the element

Security is about dealing with a wide range of low probability/high impact events, including such that haven’t even happened in reality yet. This wideness of scope and gravity of consequences render it complex and laborious to make sure that a new solution is really an improvement across the whole range of relevant threats (or at least for no such threats an unacceptable degradation). Therefore, before Implementation, a decision on evaluation of a proposed new security solution and the full range of possible contingencies must be taken into account. Evaluation and selection is about the selection of innovations that are aligned with the innovation strategy to be developed and tested (and subsequently implemented). Innovations selected to be taken forward in the S&D cycle must be complementary and related, and serve to fulfil the mission(s) and objectives of the organisation. For example, in the case of a public sector security organisation, this could be to improve the delivery of security services to its citizens.

Due to the nature of security missions as mentioned above, the only tractable approaches to such evaluation problem are those based on a set of dimensioning mission scenarios (sometimes called use cases, type situations, etc.). Hence developing, maintaining, and utilising a set of relevant scenarios is key to this element. In some cases it is also of relevance to operate with a set of broader context scenarios, portraying alternative future worlds, which may constitute modifying settings for the mission scenarios. But it is also possible, and usually the best starting point for Evaluation and selection work, to consider the mission scenarios set in today’s world or a straight-forward projection of it.

Evaluation and assessment should also exploit data from historical incidents. This topic is also discussed under Experimentation; historical incidents can be seen as “natural experiments” and provide learning opportunities for organisations.

The main component of Evaluation and selection work is an assessment of solutions against scenarios – serving as “performance criteria” plus other relevant criteria like cost, need for new regulations, etc. This is the fundamental evaluation matrix – an idea is compared against a set of criteria (and scored accordingly), and several ideas are evaluated at the same time so that the scores can be compared and the highest scoring ideas are selected for further review. Using a matrix also allows for comments from evaluators which add a qualitative dimension to the evaluation. Other methods of evaluation are cost-benefit analysis, impact analysis, value analysis, and decision trees.

Engaging experts

Evaluation and selection work should be based on expert knowledge to ensure the right decisions are taken. There might also be a problem with regard to transparency of process and hence acceptability of results. Therefore, Evaluation and selection work needs to be well documented in order to inform the other elements of S&D – as well as Implementation and perhaps other modules.

Expert workshops are a main working format for Evaluation and selection. For incremental innovations where established expertise can easily be acquired such workshops need not be ambitious and can maybe even take on the form of a few expert interviews.

However, for more major (radical) innovations it is important with extensive pre- and post-processing to fully exploit expertise knowledge. Important examples of pre-processing are preparing presentations of concepts (which can be seen as part of Concept development) and of collated Experimentation results (where it is incumbent on Evaluation and selection to do a serious pre-processing effort). One important form of pre-processing – and often also post-processing – is scenario development, further elaborated in the following section. Back-office research and interviews with individual experts must also be conducted both as workshop preparation and to sort out contentious issues raised in a workshop.

To conduct sound workshops it is important to explain to participants how their input will be used. There should be some channel for participants to comment the post-processing. Particularly if there is no follow-up workshop there should some type of web-platform for information exchange.

Workshops can be of varying size in terms of time and number of participants. If active consensus is sought, few participants and a significant period of time are generally necessary. Workshops with many participants or limited time should be aimed more at mapping out existing perspectives and confronting them with one another without striving for a consensus. This is similar to a brain-storming session. It is, however, often useful to let workshop participants prioritise by voting. This should not be voting for a single alternative (unless this is really called for by the problem situation) but some type of multi-vote exercise. Such a voting is not intended to reach a definitive result; in fact a very important type of outcome is that the minority understands that it really has to explain its position to the less insightful majority – and succeeds at that!

Web-platforms can also be used for elicitation of individual expert judgement or, if compiled results are published internally, for Delphi exercises to achieve a consensus result. Obviously an evaluation matrix could be the object of such exercises, particularly in early stage Evaluation and selection, i.e. before a lot of Experimentation results exists.

A sound Evaluation and selection work of the size we have in mind here requires engagement of a whole expert community with different roles. In particular it is important to have a small number of well recognised experts who advise the core project team.

Scenario work

Scenarios are a necessary tool for Evaluation and selection of security solutions beyond those constituting only marginal changes to security procedures. Development of a useful set of dimensioning mission scenarios requires intense and well-structured interaction with experts to reach consensus. Typically the required intensity means that workshops need to be rather long (days) with few participants.

A main consideration is the number of scenarios. The number of conceivable scenarios is very large; however, it is a practical necessity to put stringent restrictions on the cardinality of the set of dimensioning scenarios. It is then of paramount importance for transparency and legitimacy of the Evaluation and selection process that the utilised dimensioning scenarios represent the whole set of conceivable scenarios. It is also important to consider the risk for an unbalanced set of dimensioning scenarios, e.g. that certain types of threat are represented by very severe scenarios while others are represented by more nice variants. In the evaluation process this is likely to advantage solutions that are good at handling the first threat categories but have weaknesses with regard to the second.

6.2.2 Who is involved

Managers are involved in the work at least as decision makers. The role of other actors is more or less in providing information that supports the decision making.

Experts, as already elaborated, are important and involved in this element. These can be internal and/or external to the organisation. These experts act as evaluators of the ideas available to assess and select the appropriate ones to take through for further Concept development and Experimentation, and subsequently Implementation. If expert workshops are used, then capable facilitators are needed.

Stakeholders and experts need to be engaged in an appropriate and effective way. To achieve this – at least for the stakeholders – strong ownership and backing from management is needed. This is also a preparation for Implementation, should that follow. Therefore, it is of paramount importance to understand such issues and get the right people involved in the process.

It is very good to have access to good advisors and guides to the organisational setting. People near retirement or who have already retired can be useful in this regard with much knowledge but not so much vested interests (if their personality is the right one).

6.2.3 Checklists

Evaluation criteria may include:

1. Legal and ethical acceptability
2. Acceptable impact on normal operations.
 - a. For example, in mass transport system a security solution that requires many passengers be confronted and inspected (e.g. due to false positive indication for dangerous substances) is not compatible with the business logic. On the other hand, it is sometimes possible that security solutions improve operations also in other regards.

These are essentially go/no-go issues. If a clear “no” can be reached before any major resources have been invested a lot is gained. A solution rejected at this stage can still be a good idea but should in principle be sent back to Ideation for improvement with regard to the identified problems.

3. Security functionality
4. Acceptability of costs.

These two criteria constitute the main part of Evaluation & selection. Input on functionality must be provided by Experimentation, but has to be generalised from the necessarily few scenarios covered there, using available expertise. In principle a proposed innovation should be assessed across the whole range of relevant scenarios. It is also useful to work with several different solutions (which may be variations of a few basic ideas) to get an indication of most promising directions for the next step of Concept development.

Also some cost types – operational and maintenance – may require scenario-based input to be properly assessed; in addition to experience from similar systems.

Furthermore procurement and implementation costs – and perhaps costs for decommissioning at end of life – need to be assessed. There is a well-developed field of Life-Cycle Costing that can help out here.

5. Implementability including reassessment of criteria 1 and 2.

When several cycles of the above types of analysis have resulted in the identification of promising candidates for implementation this is the final criterion being activated for those.

6.2.4 More information (tools, practices, etc.)

For workshop facilitation and evaluation process management, see:

- NATO Guide for Judgement-Based Operational Analysis in Defence Decision Making, RTO-TR-087 (2012). [http://ftp.rta.nato.int/public//PubFullText/RTO/TR/RTO-TR-SAS-087///\\$\\$TR-SAS-087-ALL.pdf](http://ftp.rta.nato.int/public//PubFullText/RTO/TR/RTO-TR-SAS-087///$$TR-SAS-087-ALL.pdf) (accessed 26 April 2013)
- Pidd, M. (2009) Tools for thinking. Modelling in Management Science. Third edition. John Wiley, Chichester

For *Life Cycle Costing*, see:

- Code of Practice for Life Cycle Costing. RTO-TR-069 (2009)
[http://ftp.rta.nato.int/public//PubFullText/RTO/TR/RTO-TR-SAS-069///\\$\\$TR-SAS-069-ALL.pdf](http://ftp.rta.nato.int/public//PubFullText/RTO/TR/RTO-TR-SAS-069///$$TR-SAS-069-ALL.pdf) (accessed 26 April 2013)

Threat/mission scenario work

As explained above there exist systematic scenario development methodologies, which can contribute towards making scenario work more transparent and less open to manipulation. Such methodologies are used a lot in the German speaking countries, while scenario development in the English speaking and Nordic countries is mainly done according to the so called Intuitive Logics approach, which has its benefits in the ability to uncover alternative future world logics. In both cases the focus of researchers and practitioners is almost exclusively on context scenarios. Few exploit the benefits of the more systematic “German” approach for mission scenarios where the case for such systematic approaches ought to be at its strongest. One exception is Ritchey (2006). A recent development in the systematic scenario-building tradition is Scenario Diversity Analysis, which is a tool for finding maximally diverse sets of consistent scenarios and for benchmarking the diversity of manmade scenario sets against maximal diversity (Carlsen et al., 2013).

- Carlsen, H, Eriksson, E.A., Dreborg, K.H., Johansson, B. and Bodin, Ö. (2013) “Systematic exploration of scenario spaces for climate change research and policy” submitted for publication
- Ritchey, T. (2006) “Problem structuring using computer-aided morphological analysis” *J OpI Res Soc* **57** (7) 792-801
- Ringland, G. (2006) “Scenario Planning”, 2nd edition, John Wiley & Sons, Chichester.

6.3 Element: Concept development

6.3.1 Description of the element

The focus of the concept development phase is to transform ideas into feasible concepts for which a business case and decisions about resource allocations can be made. A concept could be based on a single idea or developed from various combinations of different ideas. The actual content of the concept development phase may differ depending on whether it is the adoption of new technology into existing security services or development of new

services altogether. The word “designing” in the name of the module (S&D) underlines the active specification work that is done in the module for new or existing security products and services. An innovation process can be initiated based on several types of situations and the actual ideas can originate from individual initiatives, political or organisational directives or as a result of formal decision processes. It is important for any organisation to be able to handle all of these types of innovation initiation processes. More complex ideas are usually formed into more developed concepts through workshops and initial experimentation, whereas less advanced ideas can be put to test by simpler and faster pathways.

Concept development is closely linked to the other two elements of S&D. Both Evaluation and selection and Experimentation are activities that, based on their results and outcome, provide basis for further rounds of idea or concept refinement. Evaluation and selection processes with initial expert analysis and scenario-based assessment delivers information for the development phase, where concepts are further matured by more in-depth analysis, additional scenario work and primary experimentation activities like simulations and prototyping.

In the next section we outline how the Lines of Development (LoD) approach from a military capability context can be utilised for civil security innovation. We also introduce a sequence of methodologies from the commercial context: opportunity analysis, defining concept specification and preparing an operational model. These features will be described below but it is important to bear in mind that they are not to be seen as individual units but rather as parts of more extensive analysis methods.

Lines of Development

Many civil security domains have similar aspects to military organisations. Therefore, approaches used in military capability management can be used for civil contexts as well. The purpose of capability management is to ensure a holistic approach, by means of balancing economy with viable use of capabilities, for an organisation to maintain and develop its total ability in a given operational setting.

The UK military uses Defence Lines of Development (DLoD) as a sort of checklist to ensure that all relevant areas, both equipment and non-equipment, are considered in the capability development. They use the mnemonic TEPID-OIL for Training, Equipment, Personnel, Infrastructure, Doctrine (and Concept), Organisation, Information and Logistics to cover all aspects of the development strategy. In a similar way, the US military uses the DOTLMPF approach (cf in Checklists and questions).

From a civil security perspective additional areas often worth consideration are Ethics and law, Interaction with the public, and Business models.

Opportunity and technology analysis

In order to estimate the potential of a given concept, you need to identify and define the opportunity for it in its proposed setting. For a profit-driven company, this may mean to evaluate the potential market and if the concept has a scalable business opportunity. For security organisations, even those in a private sector context, these are typically costs rather than profit centres, it should rather involve analysing the cost effectiveness in combination with best execution, value for money, ease of implementation and user friendliness.

An opportunity analysis involves addressing the primary questions to what problem the novel concept provides a solution and to whom. You need to explain the purpose of the concept and define the end-users and their needs. Why do they have these needs and what possible obstacles are there? For this analysis you can preferably perform expert and employer/employee interviews. Perhaps there are some potential collaborators that will facilitate acquisition of the new service or technology? Expert knowledge can be used for performing trend analyses and forecasts of the specific area and if needed, searching for new technological advancements. It is however also important to look backwards and use previous experience for future decisions.

Concept specification and enrichment

Specification and enrichment is about further exploration of the concept by gathering more detailed facts, along with initial prototyping and/or simpler modelling so as to decide on its viability. Typically, recurring cycles of concept specification/refinement and evaluation eventually end up with recommendations of the most promising concepts to be put forward for larger-scale experimentation.

During concept specification you should achieve a complete understanding of the technical or managerial requirements and the market context, as well as of all possible obstacles and risks. You need to attain a clear picture of the user needs and be able to transfer those into concept specifications. The disadvantages and benefits regarding financial and environmental aspects of the concept have to be clarified. Furthermore, it is important to identify the key areas for a given concept that need to be subjected to more extensive experimentation for successful subsequent implementation.

In order to achieve these goals, research and investigation is required to define the concept field and its actors. There might be similar alternatives already available on the market that with minor modifications can be used instead of creating the concept from scratch. Possibly, you need to perform an investigation of the intellectual property (IP) situation and find out what patents or other IP rights and new technologies or services are available within a specific field. Activities like data gathering, laboratory scale experimentation and/or computer-based modelling are performed to further explore concept design, user needs, technical requirements, risks, limitations and to provide a general understanding for the concept capabilities. Regarding economy, estimations of the total cost structure for the concept need to be performed, ranging from research and development through implementation, usage and maintenance, depending of course on the concept being a new service or technology.

For security organisations in particular, it is important to consider ethical and legal aspects that might have an impact on future usage and the public policies that regulate the organisation's actions. It is important to involve potential suppliers and intended user organisations or departments in this investigation phase in order to gain full understanding of all options and end-user needs. In this way you can calibrate your concept before the more extensive experimentation phase occurs. Substantial cost and time benefits can also be achieved by coordination of suppliers for larger systems with several components. Specified concepts should be shared with various experts and end-users for additional refinement and justification before experimentation. Based on these specification and enrichment activities, a plan should be drawn for the more comprehensive concept experimentation element. Decisions should be made for what hypothesis and strategies which need to be tested first, as well as which primary problems to overcome. Due to the iterative process of the S&D module, results from the following experimentation element provide data for additional concept refinement and also generate input values to an operational model for subsequent implementation.

Operational model/business case

If positive results are achieved during the S&D module, the outcomes are to be connected with the implementation module by creating an operational model for the concept of interest, i.e. a basic service concept. The operational model should summarise all research, analysis and experimentation carried out during the S&D process, and act as orientation for concept implementation and its subsequent evaluation. It should provide a detailed plan for how the concept should be designed, realized and successfully managed throughout different stages. This includes the identification of suitable collaborative or production partners, how to translate experimental-phase results into fully developed concepts ready for practice, how to handle obstacles that are likely to occur and suitable actions to minimize the risks that might arise with the introduction of a new system. The LoD approaches outlined above provide useful content for an operational model.

Establishing a business case or plan is one way of translating the concept into operational needs, summarising all the relevant costs and benefits of implementing the proposed concept/ solution, and setting out a plan of action for implementation regarding allocation of resources and time-scale.

6.3.2 Who is involved

The skills needed for Concept development are not so different from those of the core analytic team in Evaluation & selection. Sometimes the roles are separated as a process quality issue, but one may also see Evaluation & selection and Concept development as distinct activities animated by, at least partly, the same team.

Concept development may be carried out by a dedicated R&D team or function within the organisation if available.

The way the INNOSEC model is structured, the early phase of concept development with broad brainstorming may belong to Ideation. Therefore, concept development work tends to be in small teams engaging over long timespans.

6.3.3 Checklists

The following questions may be helpful in concept development:

- What is the level of complexity of proposed idea/innovation?
- Have all relevant areas, both equipment and non-equipment, been considered in the concept development?
- Have the concept opportunity been identified and defined for its proposed setting?
- Which are the most promising concepts to be put forward for larger-scale experimentation?
- Are there any similar alternatives already available on the market that with minor modifications can be used instead of creating the new concept from scratch?
- Have ethical and legal aspects that might have an impact on future usage been considered?
- Are there any public policies that regulate the organisation's actions?
- Have you summarised all the research, analysis and experimentation carried out during the S&D process, to act as operational model for the following concept implementation and subsequent evaluation?

6.3.4 More information (tools, practices, etc.)

At one level concept development has large similarities with scenario based evaluation as outlined above. Both are largely expert knowledge – and imagination – based crafts. Hence, both morphological analysis (MA) and scenario diversity analysis (SDA) are useful in concept development too. Preferably, combinations of different decision support methods should be used to cover all aspects of concept development. As an example, methods for quantitative analysis of scientific literature can be used in combination with methods for analysing complex systems (like MA), traditional business planning tools like SWOT-analysis and methods for multiple attribute analysis.

More general information about concept development can be found from the handbook:

- Belliveau Paul et al. (eds.): The PDMA ToolBook 1 for New Product Development. John Wiley Sons. 2002. Especially the chapter: Koen et. al. (2002). Fuzzy Front End: Effective Methods, Tools and Techniques.
- Ulrich Karl T. and Eppinger S.D. (2004). Product Design and development. McGraw Hill.

The UK MoD Lines of Development mnemonic TEPID-OIL to ascertain that concept development encompasses all relevant domains:

- Training
- Equipment
- Personnel
- Infrastructure
- Doctrine & concepts
- Organisation
- Information
- Logistics

NATO adds a final I for Interoperability.

6.4 Element: Experimentation

6.4.1 Description of the element

Experimentation is necessary for testing, refining, and selecting concepts. It demonstrates the value of an innovation to the organisation so as to ascertain whether it is worthwhile to progress to the full implementation of an innovation, i.e. achieve proof of concept. It can also be seen as encompassing a wide range of activities with the common property – and purpose – of creating surprise. Experimentation is crucial for both exploitation and exploration. For the former, it involves testing a concept, usually on a small-scale (e.g. using a prototype, piloting a new service), to refine it if necessary, and evaluate its value if it were to be further developed down the process pipeline and eventually implemented. In the latter, this involves exploring all possible options and might lead the organisation to come up with new and radical solutions. For INNOSEC, experimentation can range from pure dry run simulations through to fully “in real life” (IRL) experiments. Furthermore, a single experiment may not be useful: it is the well-orchestrated *campaign of experiments* that is able to create new knowledge of significance for innovation. At the end of such a campaign a *demonstration* is well placed, constituting a proof of a concept developed throughout the campaign.

In this model we have chosen to see Experimentation as part of the S&D module after Concept development and Evaluation and selection but an alternative could be to see the campaign of experiments as the main activities, with Concept development and Evaluation and selection as minor supportive activities. At the end of such a campaign a *demonstration* is well placed, constituting a proof of a concept developed throughout the campaign. The choice of whether to see Experimentation in the first or second way is dependent on the organisation’s overall and innovation strategy.

Exploiting the synergies from the full range of experimentation methods: from “live” to in silico experimentation

Computer simulation is one way of experimenting with different scenarios and outcomes. It allows a much faster work-pace in exploring possible combinations of conditions and can often be used in conjunction with real-world experimentation.

Robotics has three Ds for when to choose robots rather than human workers – dirty, dull and dangerous. As an adaptation of this list to the choice between computer simulation and live experimentation we would suggest difficult, dull and dangerous. Here difficult would refer to the needs of coordinating the many aspects of a system-of-system setting, and dull for the above-mentioned practical impossibility of going through the very large number of relevant combinations that is often the case in a systems-of-systems setting. The third D, dangerous, in the Experimentation context can represent danger of life and limb but also the uncontrollable and normally unacceptable knock-on effects of, say, major delays in a transport system experiment, as well as the negative psychological impacts likely to arise in passengers subjected to seemingly threatening situations. Also other ethical problems of experimentation can be counted under this D. One strand of such problems is invasion of privacy caused by various detection and identification systems. Another is the risk of panic if a real world experiment causes the public to believe that a real attack or other major incident is occurring.

At least theoretically, there is a trade-off between the additional validity from real-world over *in silico* experimentation vs. the additional cost. The result can well be a mixed strategy with some real-world experimentation to calibrate and validate models and a lot of computer simulation (cf. Checklists and questions).

Modelling & Simulation also have an important role to play in transferring results to new types of threat and to new locations.

Exploitation of historical experience

Not all phenomena are amenable to planned experimentation. Here observations from real operations are crucial and learning from past experience can be very useful. Historical incidents can be seen as “natural experiments” and provide learning opportunities for organisations.

6.4.2 Who is involved

Builders of computer models need to have the analytic skills of analysts performing Evaluation and selection in addition to the more specific computer skills. Usually the R&D team or function of an organisation is responsible for experimentation but often other skills and competences may be needed. Foresight people should also be involved as they build the scenarios for which these simulations might be based on. Risk analysts might also be involved.

If real world experimentation is utilised, it is also important to consider the ethical and legal aspects involving the public, therefore the legal function of the organisation might have input.

6.4.3 Checklists

The following questions may be helpful in experimentation:

- What constitutes a valid proof of concept for key decision-makers, including regulators?
- To what extent is it necessary to utilise real world testing, in view of costs as well as legal and ethical aspects.
- Are there external service providers who can be relied on for (parts of) experimentation?

6.4.4 More information (tools, practices, etc.)

The main issue to consider in Experimentation is the extent to which real world testing should be utilised, not only in terms of cost but also considering legal and ethical aspects.

Another issue to consider is whether there are in-house capabilities and capacity to carry out this function. Sometimes, it is worthwhile to outsource to external experts and consultants

A suite of relevant handbooks have been developed in collaboration between US DOD and NATO:

- *NATO Code of Best Practice for C2 Assessment. Revised* (2002) DOD CCRP Publications Series
- *Code of Best Practice. Experimentation* (2002) DOD CCRP Publications Series

7 Module: Implementation

7.1 Overview

Implementation is the final stage of an innovation process. The goal of this stage is to implement new technology into existing security service, or to develop and implement new security services into organisational processes. Generally, the implementation stage includes four distinct elements: development project guideline, technology adaptation, service development, and new service operationalization. Each of these is discussed in this module.

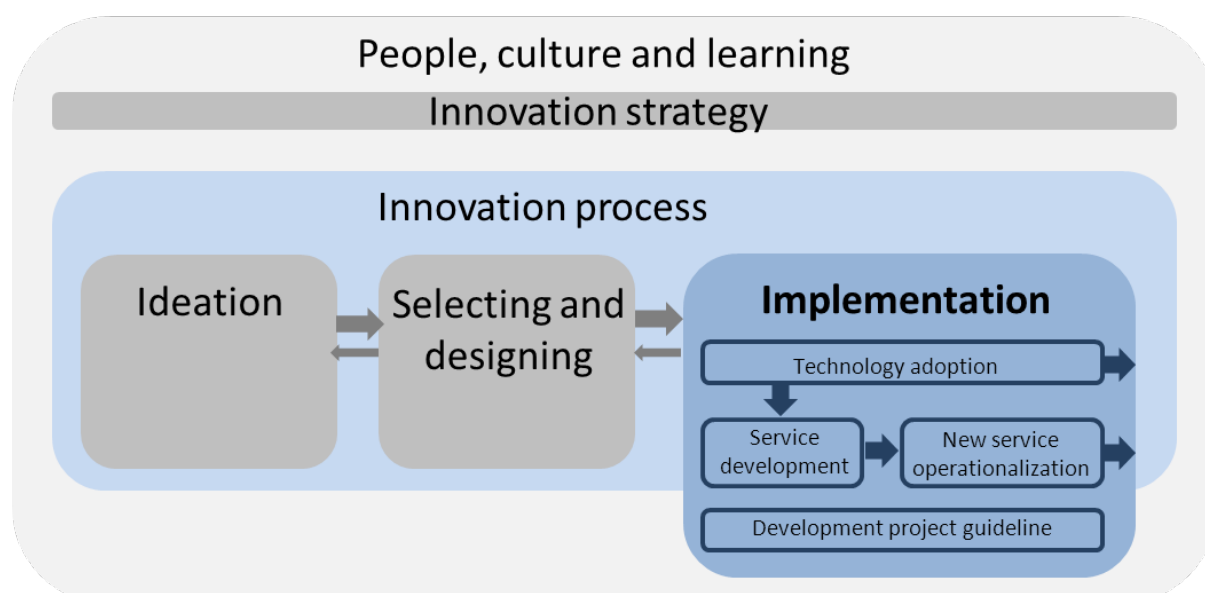


Figure 10: Implementation module

Implementation of new processes and technologies for the own use of a security organisation and implementation of new or improved services for the use its customers or other users is an essential part of innovation management practices. A project is an efficient instrument for the implementation of new technologies and practices. "Projectizing" the implementation process helps a security organisation to manage and control development and change.

In "Development project guideline" an information package on how to plan and execute projects is presented. The lifecycle of a development project is divided into initiating, planning, starting, executing, and closing. Feedback and evaluation after a development project can also support organisational learning. Advice on how to organize projects, how to share responsibilities of steering group, project team and line organisation, and how to identify needed knowledge are included. In many security organisations, practices for executing development in projects are well established and functioning. However, there are

security organisations with much less experience of development and change projects. These organisations may benefit from the element “Development project guideline”.

The objective of the "Technology adoption" element is to help security organisations to implement new technological solutions and working practices developed by another organisation, for example an equipment supplier, a software supplier, a university or a consultancy, into their own organisation. An implementation phase starts with proving the usefulness, ease of use and usage of a new solution. In most cases this proof is demonstrated by piloting the solution in a real working environment. Clear argumentation is needed in the implementation phase for employees, especially for those who find their working practices altered by the new solution. For redefining and routinizing, new working practices are important sub-processes for which there are plenty of good checklists. Finally, user training and support will ensure an efficient use of new implemented technology and working practices.

The aim of a security organisation is to execute its security mission. At a more concrete level security organisation provide services that work towards this aim. Thus, service development is a way for a security organisation to develop its processes and achieve its outcome. When improving current services and developing new ones it is useful to understand, for example, the basic characteristics of services, and the clear distinction of employees' working at the front office and the back office. Service development phases that are described in this "Service development" element are service design, service piloting and communication planning. Some concrete tools for service development, such as service blueprinting, business model canvas (for private organisations) and gap model are presented.

In the "New service operationalization" element the critical tasks, that should be executed before a new technology is fully adapted, or new services are launched, are identified. Operationalization is defined as the process in which a security organisation takes the new or improved service into production and makes it a part of their service portfolio. The service is integrated into the organisation's operational practices, IT and management systems. Both front office and back office workers know their roles and responsibilities. New service is communicated to the organisation's stakeholders, especially to potential customers. The last phase is evaluation; three approaches to evaluation work and checklists for them are presented.

7.2 Element: Development project guideline

7.2.1 Description of the element

It is helpful to view development as a series of projects, as they offer form and structure to often complex and multifaceted development work. Also, when work on development, implementation and change is organised into projects, this work can be supported with well-known project management tools and practices.

Projects are temporally limited one-time jobs that aim to create an agreed unique outcome or change. They are a common way to organise work, as they help to manage development and change, allow for clear sharing of responsibilities and make development work visible in the organisation.

The lifecycle of a project is often divided into six distinct stages: initiation, planning, start, execution of actual project work, closing, and feedback & evaluation, as shown in Figure 11. When transitioning from a stage to another, we should be able to answer the following questions:

- G0: What is the need for this project?
- G1: How will the situation change after the project? Why should we execute the project?
- G2: How should we execute the project?
- G3: In the project deliverable acceptable?
- G4: Is the project finished? Were all the tasks completed?
- G5: What did we learn from executing the project?

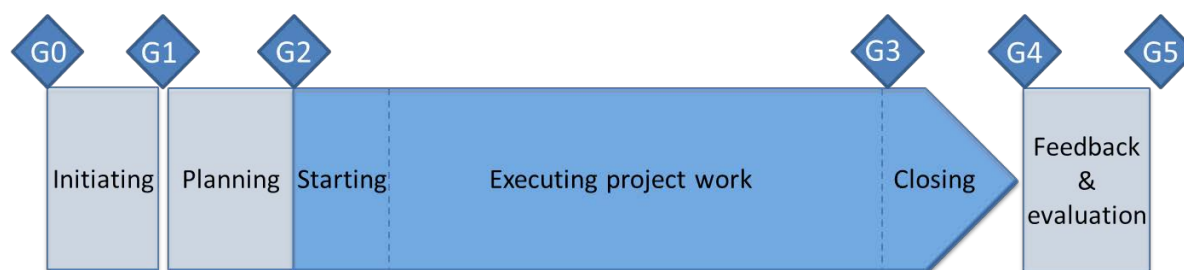


Figure 11: Project lifecycle.

Project organisation

Successful projects require organisation. Most often the project has an owner or a sponsor, who approves the project proposal, follows up project deviations, and evaluates project outcome by comparing it to the needs for which the project was originally initiated. A project should also have a steering group that approves the project plan, supports and steers project manager's work during the project, makes decisions in project decision points, and in the end of the project evaluates the project outcome or final report to the project plan. The project manager has the responsibility of project execution according to the project plan. The project manager utilizes the expertise of the project team members in executing the required project tasks.

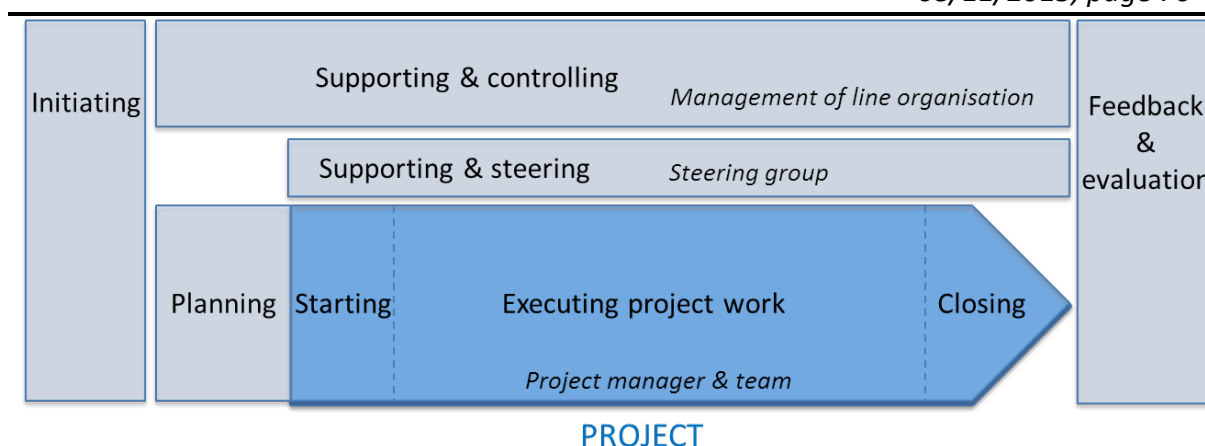


Figure 12: Project management process.

When selecting the project teams, one should aim for the most appropriate team structure. This varies with the project goals, but it is usually beneficial to have wide cross-functional participation and the right mix of people of different personality types. A high level of diversity can spark discussion on subjects that might otherwise be ignored. If new technology will be adopted, one may consider the participation of technology provider(s) and/or external consultant in the project team.

Project initiation & planning

The objective of project initiation and planning is to build a common understanding of the project between the organisation management, project management, and the project team. Both initiation and planning are processes that are taken forward through discussion, thinking and decision making. Together they reach the outcome iteratively: in initiation ideas of what is needed and project characteristics are drafted, and in planning a detailed plan of project goals, organisation and execution.

The outcome of initiation is a common understanding of what is needed between the project manager – the representative of the project team – and the project owner – the representative of the organisation. For example, the need might be related to internal development needs, customer's initiative, competitive situation, technology development, stakeholder push. The outcome of initiation is presented in project proposal, which is a document that generally contains information on the ideation and identified needs of the new project.

The outcome of planning is a common understanding of project goals, objectives, tasks, schedule, budget, and resources. This outcome is described in the project plan. Project plan is an overall plan for following up and controlling project execution. It also represents an agreement between the direct stakeholders of the project of their commitment to the project. A project plan can also be used as an information package for communication to other stakeholders.

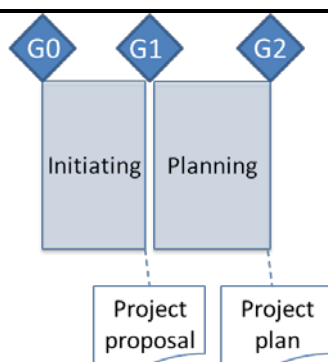


Figure 13: Documented outcome of initiating and planning phases.

When setting the goal for a new project, keeping strategic fit, inspiring vision, and clear definition of results in mind is very important. Strategic fit means that the goal of the project is aligned with the strategy of the organisation. An inspiring vision regarding, for example, the impact of the project outcome can have great motivational benefits for the project team. Moreover, the deliverables of the project that are linked to the project goals should be clearly defined.

Projects are divided to activities or tasks using the list of required results or deliverables as a starting point. A specific person or organisational unit should be assigned for each task. Also, duration and required effort is estimated for each task. These estimates are then used to comprise the project schedule by comparing the required effort to available resources during the project lifecycle. The estimates that are made at this point have a huge effect on the project outcome and the probability to stay on schedule. Thus they should be realistic and take into account possible delays and other risks that could realize during execution.

A scheduled overview of the project describes which activities or tasks are to be executed, in which order, and what are their expected results. The project schedule should also include marked milestones, predetermined points of the project execution process that are somehow important either internally to the project organisation or externally to other stakeholders. Project schedule is often presented using a Gantt diagram.

Budget is the predetermined cost constraint of the project. It is iteratively determined during initiating and planning phases of the project preparation. The budget has a communicative purpose before the starting of the project: it is the cost estimation for the project that is clearly communicated in the project proposal. Based on this estimation, the managers of organisation can decide whether to accept the proposal or not. An initial rough estimate of the required resources is later refined according to the needs that arise when detailed project task descriptions are made. Budget is often used as a cost baseline for cost control during the course of the project.

In a security organisation, it is very important to take various stakeholders into account when making the project plan. These stakeholders can be either direct or indirect. Direct stakeholders are actively involved in the project, whereas indirect stakeholders are impacted by project execution or its results, and might thus have incentives to affect them.

Stakeholder analysis should be a part of the project plan. In a stakeholder analysis, the relevant stakeholders are identified and their importance to project success is assessed. The stakeholders' objectives and requirements are also determined, as well as their motivations, interdependencies, and conflicting viewpoints.

In the project plan it should be stated how the stakeholder requirements and effects are taken into account and managed. The communication needs of the project stakeholders should also be understood, and a communication plan attached to the project plan, determining who needs to be informed of the project progress, when, and how.

Project execution

The actual project work usually starts with a kick-off. A kick-off is an event that is organized at the beginning of the project. It helps put together the team and to create a common understanding of the project goals in the project team. Also, it is a useful tool for ideation and decision-making early on in the project.

During the project execution the project manager shares the development needed between the project team. It is important to ensure the availability of the needed resources and the commitment and motivation of the project team members. The project manager is also responsible for following up the time schedule and the budget of the project.

The project manager has the main responsibilities of reporting and communicating project results to various stakeholders. Also, the project manager usually acts as the secretary of project steering group.

When it comes to project management, quality of the project outcome is often assessed based on two main criteria: by comparing to the requirements of the project plan or its revision, and its fitness of use. In new service development a good fitness of use means that the new service satisfies real customer needs, whereas in the development of operational practices or processes it means that the newly developed process supports the mission of the organisation.

Some change needs occur in almost all projects during execution. Changes in the project plan during the execution of the project can cause hassle and need for rework. It is the objective of change management minimizes the risks of such consequences to project plan changes. This usually includes minimizing the need for changes and keeping the potential negative effects of changes as low as possible through good change documentation and communication.

All change requests should be analysed and documented, but they should also be questioned. Minor changes may be approved by the project manager, but any larger changes require steering group approval. When approving change requests, a plan for the implementation of the change should be put to place. For example, small change requests in ICT projects can be easily integrated to new versions of the deliverables. The plan should take into account the reworking and general hassle the change results in.

Risk management aims at decreasing the probability and impact of negative events during the course of the project. It includes identifying risk factors, risks and their consequences.

For example, time risks will result in project delays, cost risks in budget overrun, and quality risks in unacceptable final results. It is important to analyse risks and risk factors to understand the risk, to be able to communicate it in a clear and understandable way to project stakeholders. Clear understanding of the risks and risk factors also helps in prioritising between the various risks.

Risk management also includes a plan for risk responses. For example, identified risks can be avoided by changing the initial project plan in appropriate ways, mitigated by taking actions to reduce the probability of the risk occurrence, transferred by taking measures to insure against the risks, or accepted by planning another plan that is put into effect should the risk realize. Risk response plan should also describe the reactions that are taken if any of the risks occur. Furthermore, the risks should continuously be monitored and controlled by conducting risk reporting during the course of the project.

Project closing

At the closing of the project, the deliverables – the final outcomes of the project – are finalised. The final report is written, and project results communicated to project stakeholders. Additionally, ideas for future development are gathered. If there is a need to protect intellectual property related to project results, decision for the protection (or for starting the protection process) should be made here. The cost account is closed and a closing steering group meeting is organised. In this meeting, the project is evaluated.

A separate closing meeting is often organised for the team and most important stakeholders. Though feedback and lessons learned can be discussed in this meeting, it can also serve a celebratory function. At the project closing, the whole project organisation, including project team, project manager and project steering group, is released of their obligations to work on the project.

Different kind of projects

Projects can differ in many ways, for example from the point of view of the project outcome, significance, and complexity. It is important to categorize the project at an early stage to be able to communicate its goals and resource needs effectively.

From the project outcome point of view, the project can aim at, for example, operational process development, service development, or technology adaptation. When developing operational processes, change management often has a relatively large role. In service development projects testing and piloting concepts together with customers should be emphasized. Projects that aim at technology adaptation might need a pre-study phase before project initiation to compare, for example, different technological solutions or suppliers. Also, actual technology procurement becomes an important part of such a project.

The significance of the project can be assessed by its importance to the strategy of the organisation, or by the relative size of the project compared to the size of the organisation or to other projects of the similar type. The size can be measured by the size of the project team or budget. Smaller projects do not necessarily have a steering group, but instead a

project owner from the line organisation. Very large projects, on the other hand, are often divided into subprojects. They are managed by professional project managers, who do not have a significant expert role in the project substance matters.

From the complexity point of view, the project can be categorised as increasing in complexity by its tight and critical schedule, changing or new environment, large number of external stakeholders and participants, or uniqueness of development target. Classification by complexity can be put to use in order to find the right level of administrative work, such as reporting, risk management, stakeholder management, to support project execution. Also, as the project complexity increases the need for project manager competence increases. However, it is important to keep in mind that classification by complexity does not communicate the project priority directly.

7.2.2 Who is involved

Project managers have main roles in a development project work. A project manager leads and controls the project team, and further takes care of communication process between internal and external stakeholders. Some other manager will act as an owner or a sponsor, who approves the project proposal, follows up project deviations and evaluates a project outcome with a steering committee. If the project involves with the adoption of new technology, participation of external technology experts is recommended. They can be representatives of technology providers and/or external consultants.

7.2.3 Checklists

Project manager knowledge

The following checklist can be used for project manager knowledge and skill level evaluation:

- substance knowledge – security and safety
- communication and interaction skills
- project planning and control knowledge
- project management process knowledge
- group working skills (co-operation)
- group leading skills
- networking capability
- negotiation skills
- alteration management
- information management
- information technology knowledge
- (idea) selling skills
- document management (version management)

- Reporting knowledge

Project worker knowledge

The following checklist is for project worker knowledge and skill level evaluation:

- substance knowledge – security and safety
- communication and interaction skills
- project process knowledge
- group working skills (co-operation)
- networking capability
- negotiation skills
- information technology knowledge

Project team work evaluation

The following claims and scale can be used for project team work evaluation.

1 = hardly at all
 2 = not a lot
 3 = to some extent
 4 = rather well
 5 = extremely well

- a) Objectives of my project team are clear
- b) I believe that we will reach the goal
- c) Communication works well in my project team
- d) Our project team work successfully
- e) It feels great work at my project team
- f) Climate of my project team is open and supportive
- g) New ideas are welcome
- h) I get easily help when needed
- i) I know what others are expected from me
- j) I learn new things all the time
- k) Working conditions and equipment support team work
- l) Relationship between my project team and other teams are OK
- m) Organisation management support my project team's work

Project proposal

The following checklist helps in formulation of project proposal content

- reason to initiate a project
- goal and objectives
- type of the project
 - service development
 - operational process development

- goals and main milestones
- draft time window and budget
- main stakeholders and resources
- project manager
- main risks
- limitation and connections

Project plan

The following checklist helps in formulation of project plan content

- scope
- time schedule
- resource plan
- budget
- quality plan
- communication plan
- risk management plan

Project idea in project proposal

Finding answers to the following questions can be used to improve the presentation of a project idea in a project proposal.

- What is the problem and why it is so hard?
- How the problem is solved now and by whom?
- What is the customer's/citizen's need and why it is important?
- What is the new idea?
- What is the impact of success (in an organisation/with customer and or citizen/in the environment)?
- Which are the key milestones to be achieved?
- What are the main risks?

7.2.4 More information (tools, practices, etc.)

Division of project work tasks and responsibilities

The following table (Table 2) summarizes a general division of tasks in a project by phases and responsibilities

Table 2: Division of project work tasks and responsibilities

Project phase	Project manager	Project group	Project steering group	Project owner
Project initiation and planning	<p>Ideation</p> <p>Developing and selling of an idea of a project proposal</p> <p>Project planning</p> <p>Communication of project objectives</p>	<p>Participation to ideation</p> <p>Participation to project planning</p>		<p>(Objectives)</p> <p>Approval of project proposal</p> <p>Setting up a project, project manager and project steering group</p>
Starting up a project	<p>Organising of project</p> <p>Kick-off meeting for project group</p> <p>Starting project steering group</p>	<p>Participation in kick-off meeting</p>	<p>Participation in starting steering group</p> <p>Approval of a project plan</p>	<p>Organising of project</p>
Project execution	<p>Project group management and leading</p> <ul style="list-style-type: none"> • motivation • resources • following up • controlling <p>Intermediate reporting</p> <p>Project group meeting organising</p> <p>Steering group meeting organising</p>	<p>Project work</p> <p>Task reporting</p> <p>Participation in project group meeting</p>	<p>Supporting project manager</p> <p>Steering development work</p> <p>Make decision of continuation in each decision point</p> <p>Participation in steering group meeting</p>	
Completing a project	<p>Reporting</p> <p>Communication of results</p>	<p>Participation in reporting</p>	<p>Approval of a project results in a last project steering meeting</p>	
Feedback and evaluation	<p>Post project evaluation meeting – lesson learned</p> <p>Evaluation of a project execution and results</p>	<p>Participation in evaluation of a project execution and results</p>	<p>Participation in evaluation of a project execution and results</p>	<p>Evaluation of a project execution and results</p>

Work breakdown structure (WBS)

Work breakdown structure is a tool that helps in controlling the project. WBS divides projects into controllable parts.

Phases of work breakdown structure creation are following:

1. List the main activities
2. Define the interrelations of these activities
3. Divide activities into subsequent phases. Choose the most fitting approach and remember the 100% rule – elements of lower level (tasks) must completely cover the content of higher level (work package).

Three commonly used approaches for dividing activities:

- waterfall model e.g. feasibility study, definition, design, implementation
- deliverable model - structure of functions e.g. ICT hardware, accounting system, control system
- matrix of phases and deliverables

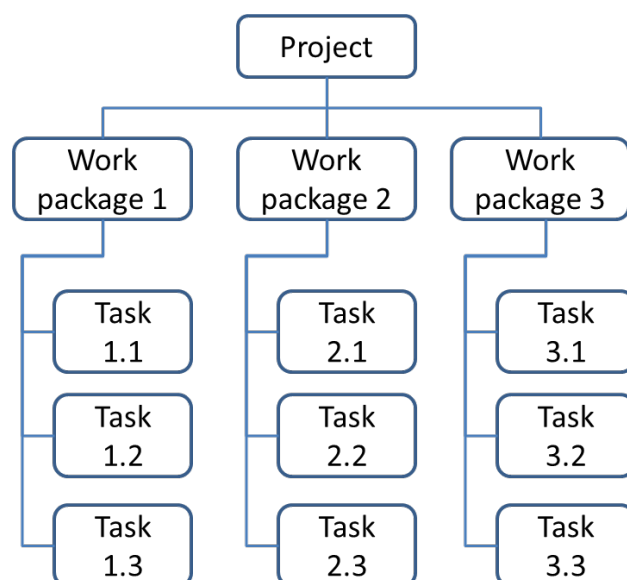


Figure 14: Dividing of activities into subsequent phases.

More information on creating a work breakdown structure (WPS) for a project can be found in project management books like “A guide to the project management body of knowledge (PMBOK guide)”. 5 ed. 2012.

The project management approach described in the INNOSEC model does not follow any individual project management methodology. Instead, the model introduces methods and

tools that are applicable to service innovation and change management projects. As additional information, the following list includes common project management methodologies. It is possible to take courses on all of these methodologies, and to receive an official project manager certificate.

PMI (Project Management Institute) standard <http://www.pmi.org/>

- guidelines for project, program and portfolio management
- “A guide to the project management body of knowledge (PMBOK guide)”. 5 ed. 2012.

IPMA (Project Management Association) best practices <http://ipma.ch/>

- project management methodology applied both public and private sector organisation
- Hermarij J. (2011) Better practices of project management. Based on IPMA competences. Van Haren Publishing
- Turner R. ed. (2008) Handbook of project management. 4. ed. Gower.

Prince2 (Projects in controlled environments) <http://www.prince2.com/>

- Process based project management best practice and standard originally developed for public organisation's large IT-project.
- Hedeman B., Seegers R. (2009) Prince2 Edition 2009: Pocket Guide. Van Haren Publishing.
- Hughes B., Cotterell M. (2009) Software project management. 5. ed. Mcgraw-Hill.,

7.3 Element: Technology adoption

7.3.1 Description of the element

Technology adoption is a process in which a new technological innovation, system, device, or equipment is acquired and put to appropriate use within an organisation (see Figure 15). The aim of such a process is to enhance the development of more efficient processes or even new security services. More concretely, at the organisational level, the adoption process usually consists of successful adoption of the innovation by employees, under the care of the managers and thanks to the inputs of some external stakeholders.

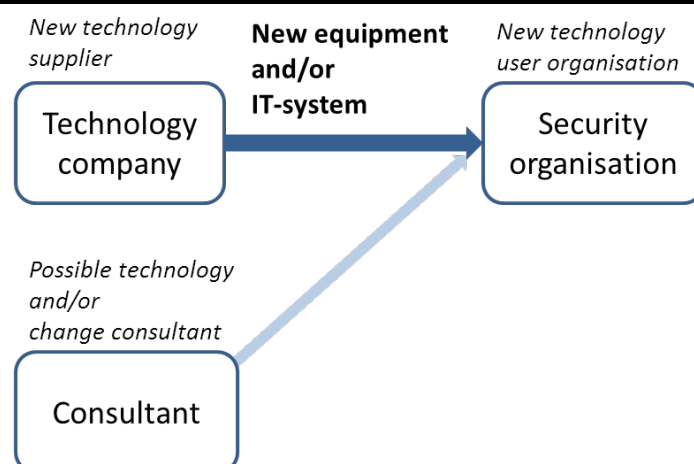


Figure 15: New technology adoption.

Success has a twofold interpretation here: firstly, it means that the innovation is adopted to satisfy the needs of security organisation, and secondly, that it has been accepted by employees. For example, the introduction of the beeper in some security organisations (like firemen associations) during the eighties can be considered a successful technology adoption. Indeed, this innovation has changed in a positive way the communication between the employees in case of emergencies. It has become indispensable, until having been replaced by some technologies more modern.

The process of technology adoption can be viewed from three distinct levels, strategic level, the level of organisational processes, and technology level, as shown in the figure below. Each of these levels brings a new perspective to the process, and help in getting a holistic picture of its progress. The process of adoption usually has two phases. First, the management decides that new technology is needed and selects the most appropriate technology for the needs of the organisation. When the new technology is made available throughout the organisation, the employees then, based on their understanding on the necessity and usability of the new technology, make the decision whether or not to adopt it in their day-to-day tasks.

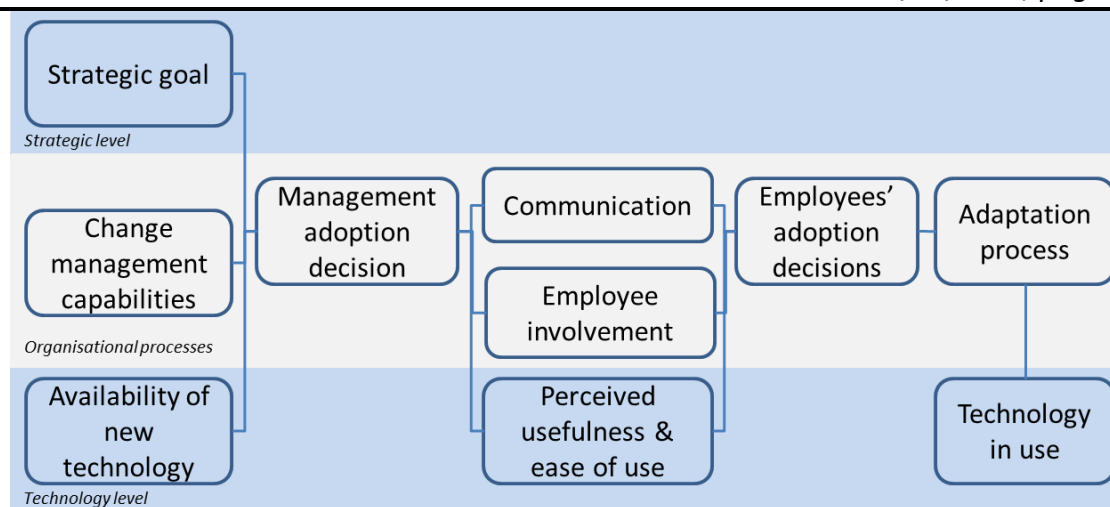


Figure 16: Two decision steps in new technology adoption.

In the following Tables 3-4, common factors of successful adoption processes are presented. The first table lists the factors that often affect the success of an adoption from the perspective of the employee. It is important for employees that they perceive the new solutions as useful and easy to use. Also, support from management and colleagues have a strong impact. The second table introduce the viewpoint of management on successful adoption processes. Management often concentrate on the level of maturity and technological fit of the new technology. They look at the ease of implementation and modularity of the technology. It is almost always easier to adopt a new technology gradually.

Table 3: Factors for successful new technology solution adoption from employee point of view.

New technology solution	<ul style="list-style-type: none"> • Perceived usefulness • Perceived ease of use
Security organisation employee (Individual end-user)	<ul style="list-style-type: none"> • Experience of capabilities to gain new knowledge and knowhow • Positive attitude toward change • Commitment to organisation's strategic goal
Security organisation	<ul style="list-style-type: none"> • Champion, superior example and support • Help and support from colleague/co-workers • Support from existing systems (e.g. salary, reward systems) • Information about new technology and its implementation process
New technology implementation process	<ul style="list-style-type: none"> • Possibilities to involve planning and implementation process • Training

Table 4: Factors for successful new technology solution adoption from manager point of view.

New technology solution	<ul style="list-style-type: none"> • Transferability <ul style="list-style-type: none"> ○ Readiness ○ communicability (documentation & user training) ○ Task-technology fit • Implementation complexity <ul style="list-style-type: none"> ○ Organisation span ○ Organisational scope • Divisibility <ul style="list-style-type: none"> ○ Modularization ○ Individualization
Security organisation	<ul style="list-style-type: none"> • Flexibility • Positive attitude toward changes • Change management capabilities • Project management practices • Resources (money, time)
Implementation process	<ul style="list-style-type: none"> • Communication schedule and practices • User involvement • Identification of possible problem before implementation • Data conversion (in case of IT-system) • Organising training • Processes, practices and systems refining

At the level of the organisation, the technology adoption process is rather delicate. The managers will have to ensure the good adoption and use of the technology by the employees. However, employees are not a uniform group; they differ in a variety of ways, including, for example, education, habits, and field of work. This is why employees will not react in the same way towards a new technology. Depending on the range of attitudes among the employees, the work of the manager can vary if difficulty.

Proving of usefulness, ease of use and usage

To prove the usefulness, ease of use and usage of a technology one needs to demonstrate that the innovation selected to be implemented fits the needs designed in the ideation module. To understand the process of demonstrating these qualities, we must briefly define them. First, usefulness refers to the utility the innovation has for a security organisation and the user, and how well it satisfies their needs. Secondly, ease of use defines to which extent the new technology can be easily adopted and put to use by an employee of a security

organisation. Thirdly, usage refers to the daily utilization of the innovation, and how it is used and implemented on a concrete level.

The demonstration of all three must fit in the project guideline and summed up in a document available for everyone. This documentation will serve as the base of the technology adoption, as it will orient the argumentation of the manager and justifies the technology choice made. Also, it can be used as the “reference” document for employees; employees can refer to the document if they have questions about the technology or its adequacy regarding the organisational need.

It is also important to provide evidence on the qualities of the innovation. To successfully do this, one should develop an argumentation highlighting the advantages of the innovation, and a clear explanation of its use (the user is able to use it without being an expert). See the checklist and questions to build the argumentation.

The following inputs from other INNOSEC modules can help in highlighting the qualities of the innovation chosen:

- Preparation work done in the phases described in Ideation and Choosing and Designing modules and also the first element, Development project guideline, of the Implementation module (definition of the needs, arguments that convinced the manager to adopt this specific innovation, etc.)
- Information gathered about implementation of similar or comparable technologies and solutions in other organisations, including lessons learned and possible improvement ideas.

The result of the argumentation phase is an instructive and educational argumentation aimed at the employee who will use the technology.

Redefining and routinizing working practices

The main objective in technology adoption should be to successfully integrate the innovation in the working practices of the organisation.

Redefining working practices means how the innovation changes these practices; routinizing signifies how the new practices are adopted as a routine by the employees. Redefining will be the part of the process centred on the current practices of the organisation: what are they, what are their advantages and drawbacks, and what in them the innovation will change. In a sense redefining is a process that defines how the working practices are enhanced by the innovation. Everyone in the organisation can be involved in redefining working practices. The aim is to collect as much ideas, remarks and experiences as possible. Based on these ideas, a precise redefinition of practices is conducted, pointing out the weaknesses and finding a way to enhance them in the respect of the values and constraints of the organisation.

After the redefinition of practices, it is necessary to routinize the new practices. This is aimed at validating these new practices. Routinizing will be led during a predefined period at the end of which the new practices could be considered as adopted. To succeed in the

process of routinisation, it is important to work with people from all organisational levels, not only the decision makers. This guarantees a higher level of acceptance of the new working practices within the organisation. It is worthwhile to emphasize that by utilizing multiple differing viewpoints in the processes of redefining and routinizing yields the best results: new working practices gain in richness and completion resulting in efficiency improvements for the whole organisation.

For the task you need information about your organisation, understanding about the style of the technology adopters and about the existing methods to teach people to learn and change. The outcome of redefining work consists of the current operating conditions of the organisation, the profile of the employees you target and the formation that can be proposed to the employees to enhance their adaptation capacity to new technologies. See the checklist and questions for executing this task.

User training and support

It is important to take care that the employees of the organisation will adopt the innovation and implement it to their daily activities. To ensure this, the organisation should readily offer user training and support for the use of the innovation.

As a phase user training and support is relatively concrete. It is so important because it is eventually in the hands of the employees whether or not the new technology or solution will bring any benefits for the organisation. Managers will have to direct and monitor this adoption and be sure that everyone who needs to is able to utilize the innovation in their work. For this aim, the help of the external stakeholders, and particularly the technology providers, will be very valuable, in so far as they will provide the guidelines to use it. The manager will act in this phase as an intermediary between the technology suppliers or consultants and the employees. With the help of the first, the manager will have to build a training (completed by a user manual) directed to the employees, clarifying to them how to use the innovation. Examples of past adoptions by other users of the considered technology, often called “success stories”, can help in this. See the checklist and questions for advice in building the training.

The output of the phase is complete and sufficient training and a user manual, aimed at all employees (with or without technological background, etc.)

7.3.2 Who is involved

Managers: At the top management level, the decision has been made, according to the process described in the INNOSEC model, to adopt an innovation within a security organisation. For the adoption to be successful, the intended innovation will have to be implemented. The objective of top management is to ensure that implementation of the new innovation is in line with organisational strategy.

Middle management is usually very active in the implementation process and act as intermediaries between the decisional and the executive levels, as well as between the experts (technology suppliers) and the new technology users (the employees). They will be the people to contact all along the technology adoption process; those collecting all the

relevant information to evaluate if the process was executed well, and if not, prepare an eventual readjustment.

Employees: The employees will adopt the new technology that the top management has decided to put into use in the organisation. They should not merely put up with this implementation; instead, they should be proactive during the process: the employees will have to adapt themselves to a new tool and it is expected that they give all the necessary feedback to the managers. Without this feedback, it is very difficult to judge the successfulness of the new technology and its implementation into organisational practices. The employees should, thus, frequently be in contact with the managers during the process of implementation.

External actors: In the context of technology adoption, relevant external actors include the technology suppliers or consultants specialized in, e.g., an IT system that is being adopted. These actors can provide the complete user guidelines/user manual for using the selected innovation in a correct way. They will be in close contact with the managers, in order to provide them all the necessary elements for the argumentation proving the usefulness, ease of use and usage of the innovation as well as the advice needed to build adequate training for the employees.

7.3.3 Checklists

The following checklist can help during technology adoption.

Building the argumentation:

- Have a clear view of the organisational needs
- Have a clear definition of the advantages of the innovation
- Explain how the innovation satisfies the needs
- Create a formal document understandable for employees on all organisational levels

Building the report for redefining and routinizing the working practices:

- Have a clear definition of the working practices of your organisation: advantages, drawbacks, strengths and weaknesses. Do not hesitate to ask for feedback from your employees, regardless of their organisational positions etc. The wider the range of employees giving feedback on the practices is, the better.
- Create a survey aimed at employees to understand their attitudes towards adopting a new technology. Prepare the survey early enough and make it simple, consisting of just a few questions. The questions should be such that the answers help you in establishing your strategy for the adoption of the innovation. Indeed, the adoption process is different if the majority of your users are sceptics or visionaries.
- Consider the point made in the elements "Learning" and "Change management".

Providing an adequate training and a user manual for the people adopting the innovation:

- Have adequate information for providing the best possible training (different success stories, different methodologies for adoption...)
- Build training that is precise, clear and easy enough to allow all relevant employees successfully adopt the innovation.

Questions to be used by the manager for building argumentation for proving the usefulness, ease of use and usage of the innovation:

Is the innovation...?	Description
Compatible	The new equipment and/or system can be adopted to the considered security organisation with its specificities
Easy to use	The new equipment and/or system is clear to use, easy to understand and to put into use; even if one is not a specialist in innovation processes
Clearly seen	The new equipment and/or system is easy to present, and concrete enough to be easily implemented
Triable	Clear and easy process: does not cost too much effort (finance & time) to implement the model
Suitable	The new solutions fits the considered organisation or issue; there is modularity and adjustability according to the special needs of the organisation
A solution to a problem	Offers a new solution. Satisfies the needs of the organisation; the model intervenes as a response to the lack of organisation/inspiration in innovation process.
Socially beneficial	The new equipment and/or system respect the cultural values and community traditions of the organisation and enhance the common work in the organisation
Economically beneficial	The price of the innovation and the costs of its adoption are acceptable considering to the benefits it brings in efficiency, cost savings or increased revenue.

Questions to be used by the manager launching a process of redefinition and routinizing of working practices:

Do the redefining and routinizing working practices have...?	Description
Employee representation	Every department and job role has been asked to provide their inputs (definition of the working practices, adaptability capacity survey)
Employee involvement	Each department and job role will be involved in the routinizing phase
Re-invention	The innovation lets the organisation reinvent itself with a new innovation process, or by highlighting new competences or new people.
Working teams	The innovation lets people who were not used to working together meet and create a new dynamic within the social organisation (informal communication, interpersonal networks, communication channels)
Management and hierarchy	The innovation helps in redefining the internal management in the organisation. Indeed, everyone is able to make proposals, regardless their place in the organisational hierarchy.
Technological experience	The manager and employees are trained into using a new technology thus gaining technological expertise.

Questions to be used by the manager for ensuring the quality of training:

Is the training...?	Description
Convenient	Convenient to the public, the organisation
Sufficient	Clear enough, understandable, complete regarding all the questions that may be asked
Accessible	Everyone can conveniently find and access this information

7.3.4 More information (tools, practices, etc.)

Basic definition of Technology Adoption:

<http://www.bridges-to-technology.com/page21.html>

Further definition of the Technology Adoption and of the different kind of users by the Chasm Institute:

<http://64.78.54.141/dnn/METHODOLOGY/MarketDevelopmentStrategyChecklist/tabid/59/Default.aspx>

Recommended practices: This link provides an example of a good practice. This report describes the successful settlement of a Technology Adoption program at the IBM society: Supporting Innovators and Early Adopters -A Technology Adoption Program Cookbook, Avi Alkalay, Chris Almond, Jennifer Bloom, Amy Chow, Felicity Peters, Rich Rogers, Christopher Wyble; Red Paper first edition December 2007:

<http://www.redbooks.ibm.com/redpapers/pdfs/redp4374.pdf>

Table 5 lists five types of innovation adopters originally introduced by Everett Rogers in his book Diffusion of innovations (2003, 1962 1.ed). In an organisational setting it might be helpful to recognize people who represent these types from the organisation when planning on adopting a new technology, equipment or system. Some people require more support and training in adopting new solutions than others.

Table 5: Categorisation of types of adopters

Innovators	The technology enthusiast looking for the state-of-the-art technology, he will always be willing for testing and adopting a new product. The “techies” are also those who can, in an organisation, get the attention of the other user by describing all the potentialities of the innovation the manager want to implement.
Early adopters	The visionaries are the ones who understand really quickly the interest of an innovation and decide to adopt it, even if it presents certain risks. Indeed, they know that this innovation will give them a competitive business advantage.
Early majority	The early and late pragmatists are the ones who see a good interest in the innovation, but they are not yet ready to adopt it. Nevertheless, once they see the solution working in “real conditions” they adopt it and have a great influence on their neighbours.
Late majority	The conservatives are less socially active and more conservative, and they delay their adoption until it has reached a strong record of accomplishment and good references from people they trust.

Laggards	Sceptics adopt the innovation once it is totally assimilated in the working practices of the organisation. They want solution to have no risk.
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7.4 Element: Service development

7.4.1 Description of the element

This element continues and refines the work that has been done in service concept development that was described in the “Selecting and designing” module. In service development, the concepts are developed into full-fledged services that can be piloted and implemented. Services are often characterized as intangible, heterogeneous, inseparable, and perishable, to distinguish them from products. These characteristics naturally affect the nature of service development itself.

It is characteristic to services that their production and consumption cannot be separated from one another. This is why the customers are often thought as co-producers of services: their presence is required for successful production and delivery. As services are produced in interactions with customer, customer insight on the production process is invaluable. This is why it is so important to involve customers in service development.

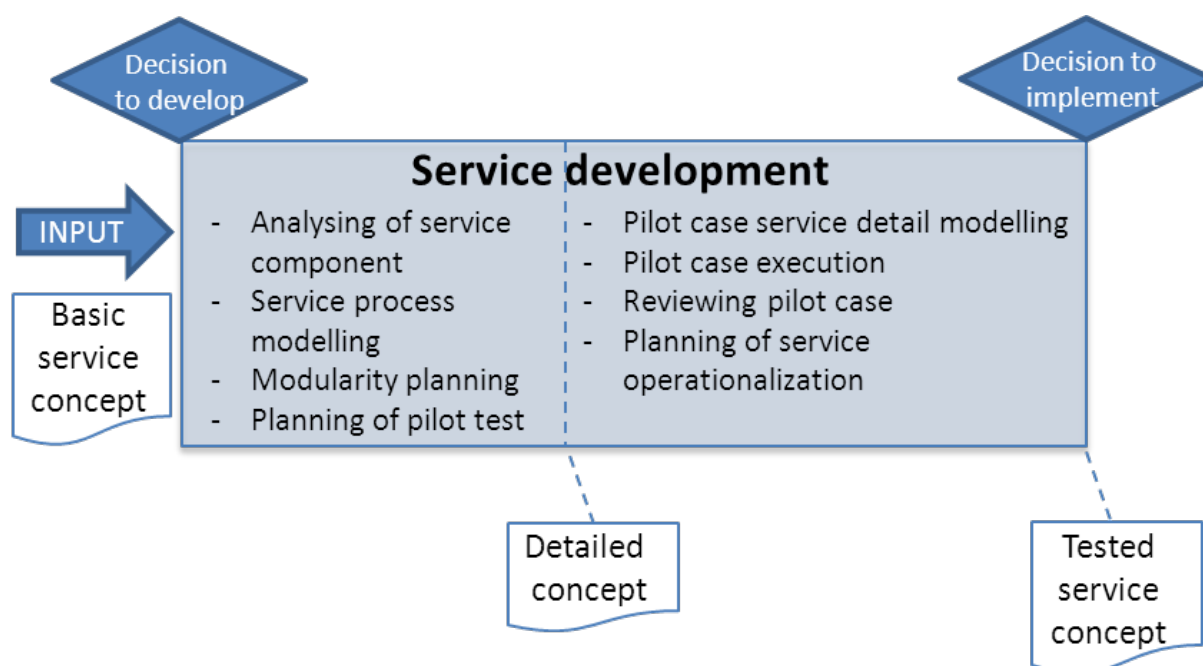


Figure 17: Service development phase.

Service concept development

In service concept development, the initial, basic service concept (i.e. the operational model of concept) is refined into a more detailed service concept that is ready for pilot testing. Service concepts are often formulated in direct interaction with pilot customers and possibly other customers as well. For example, brainstorming or feedback from concepts is often used to facilitate such interaction.

The actual service content is formulated in service concept development. The initial basic concept can at this point be refined if it is found necessary. Service content describes the service: what is provided, to whom, and how. Also, the core service, supporting services and possible value-add parts are specified. In service development the new service is also positioned against the existing service portfolio of the organisation. Is this service a completely new service? Is it a supplementary service that has clear linkages to existing services? Will the new service replace old services? At this stage, modularity should also be planned to ensure easy and efficient customization of the new service in the future.

Service process is also modelled in the service concept development phase. Tools, such as service blueprinting, can be used to describe the service process. Interaction with pilot customers and possible other customers is crucial at this point, as through the new service process, the operations of the provider and the customer are intertwined in new ways that should be brought into the open. Discussions of tasks related to the new service should be had among the front office, the back office, customer organisations, and end-users/citizens.

Service piloting

Service piloting is used to initially test a service on a smaller scale. It can be compared to prototyping that is usually conducted in product development projects. Identifying and choosing the appropriate customer for piloting can be challenging. However, as inter-organisational trust is of utmost importance, it is reasonable to start with customers with whom there is a history of successful long-term co-operation. Additionally, those are the best organisations to work with, as both of the participants will then have insight on the other's business and operations.

When the appropriate piloting partner is selected, the pilot must be planned. The pilot needs its own organisation, often consisting of members from the project organisation and the customer organisation. It can also have additional members from the organisation that are not directly involved in the project. The sharing of piloting costs should be agreed upon between the partners, and a time schedule set. Processes and practices to be used should be specified and the responsibilities for the piloting tasks assigned to pilot organisation members.

Often, the pilot requires dedicated infrastructure and systems that have to be built before the actual testing can commence. Also, staff from both organisations may need training to be able to take part in piloting. When the necessary preparations have been taken, the actual developed services can be tested in co-operation. During testing, all participating organisations and possibly other stakeholders should pay attention to the functioning of the service and its effects on their own operations. After testing, the service is evaluated and

feedback is gathered. Of interest are, for example, the benefits reached with the service, the limitations of the tested service, and needs for future development. It is important that feedback is gathered from all participants, not just own organisation.

Partner/network management

Development work is often carried out with partners or in wider network contexts. The reason for this is that the organisation does not have all the best employees and teams, does not produce all the best ideas, and cannot possibly have all the required technological knowledge. Also, it might be that the goal of the development project is not directly aligned with the core business or the mission of the organisation even though it is found relevant for the organisation. Or, alternatively, there are partners who can do the development work or selected parts of it more efficiently and cheaper than the organisation can.

It is very important to set clear rules and define understandable common targets for development work conducted with partners in a network setting. The usually identified success factors for networked development work are selecting the right partner who has the relevant competences and resources available, the required knowledge and motivation to participate.

When a technology that is new to the service providing organisation has a critical enabling role in a new service that is being developed, it is often necessary to include a representation from the organisation of the supplier of said technology into the extended project team. This enables knowledge sharing on the new technology and its utilisation, makes setting requirements and specifications for the technology easier, saves time, helps to avoid unnecessary hassle, and strengthens supplier commitment to provide functioning technology for the needs of the service

It is important to plan communication well to ensure successful knowledge transfer for the next phase, service operationalization. It is very common for a security organisation to have public organisations as major and influential stakeholders. With careful communication the commitment of these stakeholders can be reached. Also, the end-users of many new services include ordinary citizens that need to be informed of the service, and also to be involved and committed to its implementation and use.

7.4.2 Who is involved

A service development project manager with a project team has main responsibilities of execution of service development phase. Line managers and/or a project steering committee will take important go/no-go decisions in starting and ending gates, decision to develop defined basic service concept, and decision to implement tested service concept. Front line employees need to involve to a detailed concept development and also choosing process of a pilot test customer. Pilot customer's role is crucial in a pilot service execution, without their resources and contacts to end-users/citizens piloting and valuable feedback information of services is impossible to reach. In many cases, a part of development work is carried out with partners, for example an ICT development partner or equipment supplier. It

is important that, when the security service will be provided in collaboration with other actors, these actors take part also into the development of the service.

7.4.3 Checklists

The following general level checklist helps in determining task components of new service. Select relevant tasks and determine how each task is executed in the new service development.

- receive customer contact
- define customer needs
- develop a plan to satisfy customer needs
- verify the plan, and how it will help to satisfy the customer need
- prepare customers for their role by, e.g., instruction
- determine the resources are needed
- schedule and or assign resources
- coordinate with internal and/or external service partner
- gather materials, equipment and information
- prepare resources
- deliver the service (and check, help, save, support..)
- manage customer behaviour and/or role execution (customer as co-producer)
- verify or monitor successful delivery or result
- maintain or modify service delivery as needed
- respond to customer inquiries
- conclude service
- report

The checklist of new service task components has been inspired by a process map for providing service by Lance A. Bettencourt. 2010. Service innovation. "How to go from customer needs to breakthrough service". McGraw-Hill. New York.

Determination of service tasks can also be used as basic frame for service blueprinting.

The following two question lists aim at supporting gate reviews.

Decision to develop

Strategy

- Does the project support the organisation's security mission and strategic objectives?

Customer need

- Will the new service satisfy identified customer and user needs?

Feasibility

- Is the project target achievable (knowledge, financial resources)?

Opportunity

- Will the project yield new renewal opportunities to the organisation?

Decision to implement

Strategy

- Will the new service support the organisation's security mission and strategic objectives?
- Did the new service satisfy pilot customer needs?

Feasibility

- Is the new service ready for operationalization?

Opportunity

- Will the project yield new renewal opportunities to the organisation?

7.4.4 More information (tools, practices, etc.)

More about customer and citizen oriented service design. Flynn N. 2012. 6th ed. Public sector management. Sage, London.

Characteristics of services

Table 6 shows characteristics of services and suggests how to take these characteristics account in service development projects.

Table 6: Characteristics of services.

Characteristic	How it is manifested	How to take account in service development
Intangibility	Customer cannot see or test a service beforehand. Service purchase decision is complex. (private companies)	Service quality and compliance need to be considered: expectations on services should be met. Good argumentation of benefits and references/success stories. (private companies)
Customers have a crucial role in service production	Customers participate to service delivery. Customers are co-producers of service.	Customers and/or user need to be involved in service development.
Perishable	Service cannot be stored; service	There is a need to plan carefully how

	production, delivery and consumption are simultaneous. Customer/user do not differentiate service product (concept) and delivered service.	the service reaches customers/users. Service quality and compliance need to be considered: expectations on services should be met.
Heterogeneous	The output of service is varied because it is dependent on both the employees responsible for delivery and the customers/users.	Need to determine service process in detailed level – standard delivery process and train front-office employees to service delivering. Plan how to guide customers.

Service component analysis

Analysing each service component helps in outlining service components from the viewpoints of both the service provider and the customer.

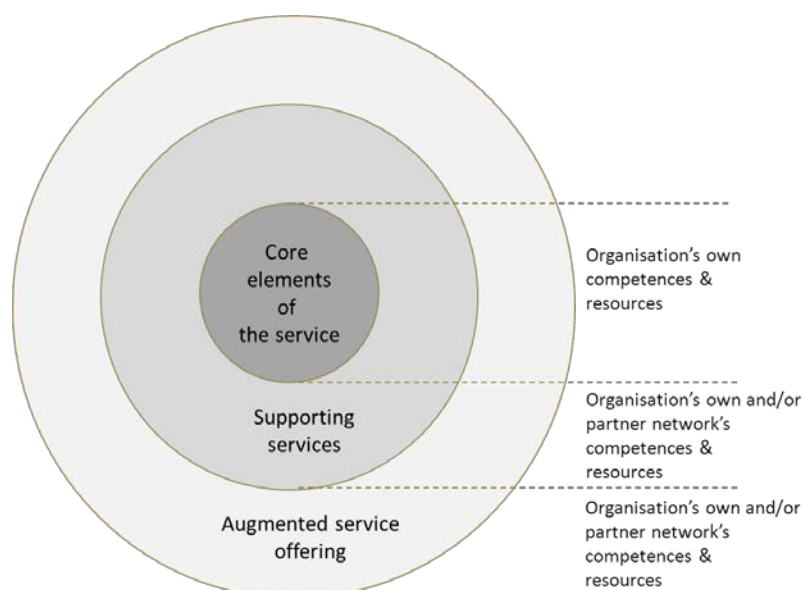


Figure 18: Analysing of service components.

Service blueprinting

Service blueprinting is a flow diagram tool used for describing the critical interactions between the customer and service provider. It is useful in service design phase in service process modelling. The objective of blueprinting is to illustrate the service delivery process from the customer's point of view and to define the customer's involvement in the delivery process. The modelling checks that all tasks in service delivery add value. With service

blueprinting critical tasks where service delivery may break down can be identified, so that contingency and recovery plans can be developed. If the service delivery process includes external actors, also their role in the process will be described by service blueprinting.

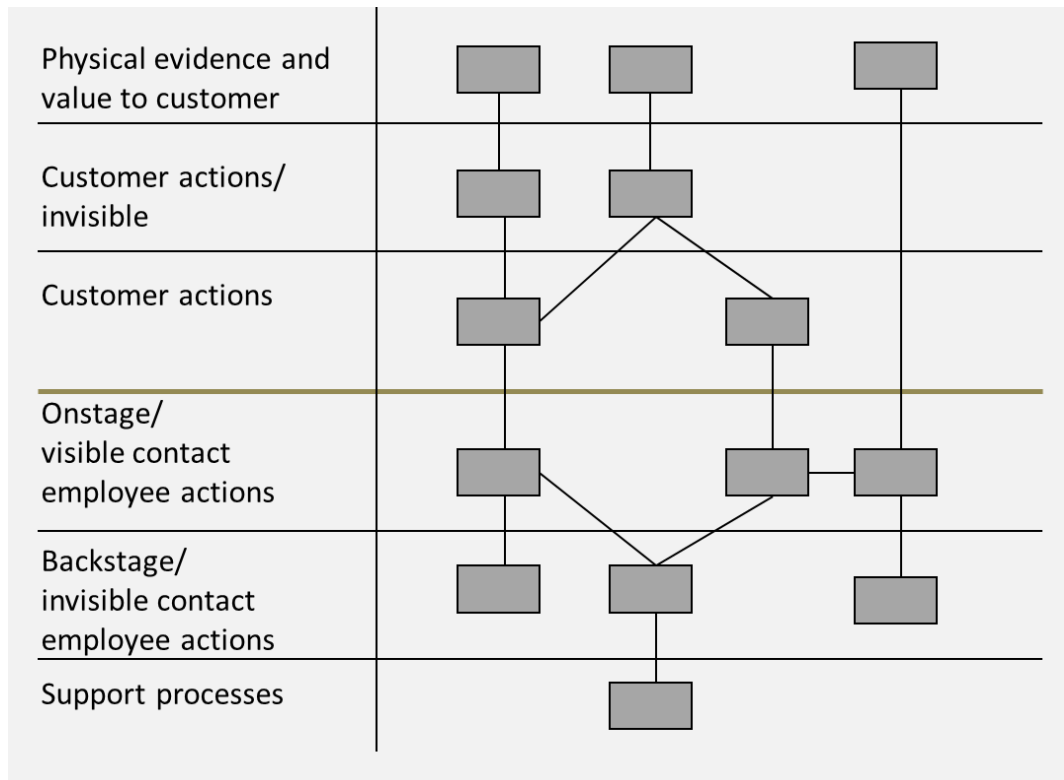


Figure 19: Service blueprinting.

Business model canvas

Business model canvas is a very popular tool for companies to design new business models. At the website <http://www.businessmodelgeneration.com/> you can find the web-tool, book and more information of the method as well as the canvas tool.

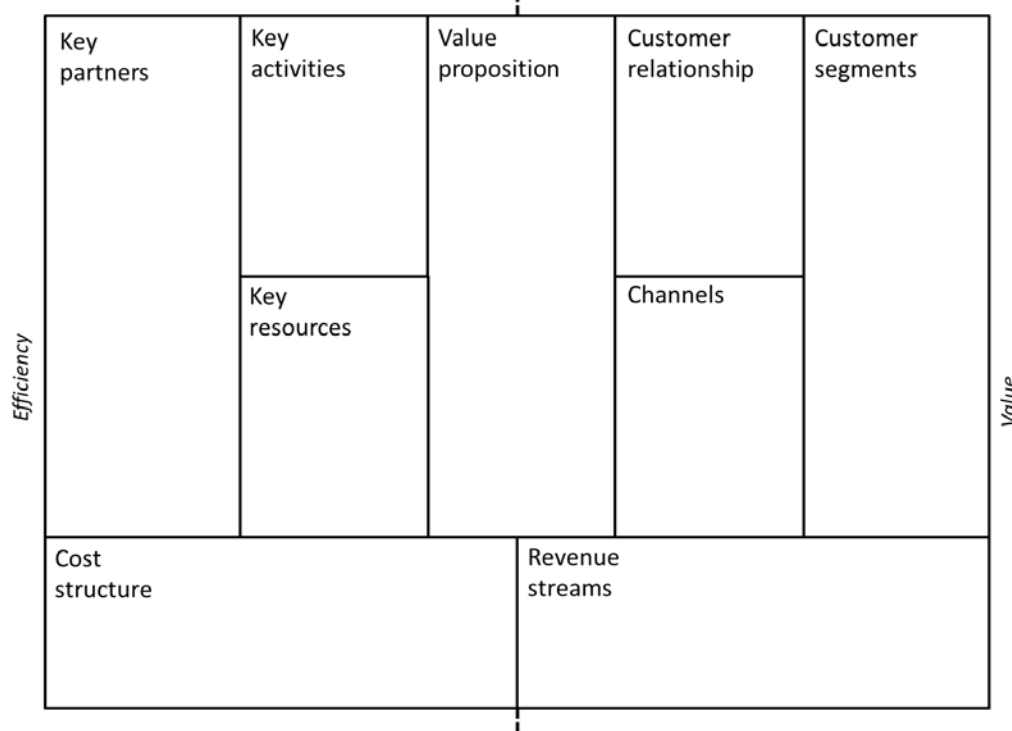


Figure 20: The business model canvas (source: Osterwalder & Pigneur, 2010, *Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers*, Wiley).

Gap model

Gap model can help to find the next service improvement targets by analysing the quality of services. The target of this diagnosing tool is to better understand customers' requirements. The gap model is based on the idea that the root causes of GAP5 are GAP1-4 (see in Figure). GAP 1-4 are the gaps that should be identified and acted upon.

GAP 1. The difference between the specifications of quality of the customer/citizen and the security organisation. In the case of citizen the specification is informal.

GAP 2. The difference between the service concept and the security organisation's own specification of service quality. E.g., the service concept designed without knowledge of organisation's capability to deliver quality or to understand of service processes.

GAP 3. The difference between organisation's service quality specification and the delivered service. This gap can be caused, e.g., by untrained staff, unclear working instructions, hurry.

GAP 4. The difference between delivered service and the image of the service that is communicated. E.g., promising more features/ faster service/ better service experience than can actually be delivered.

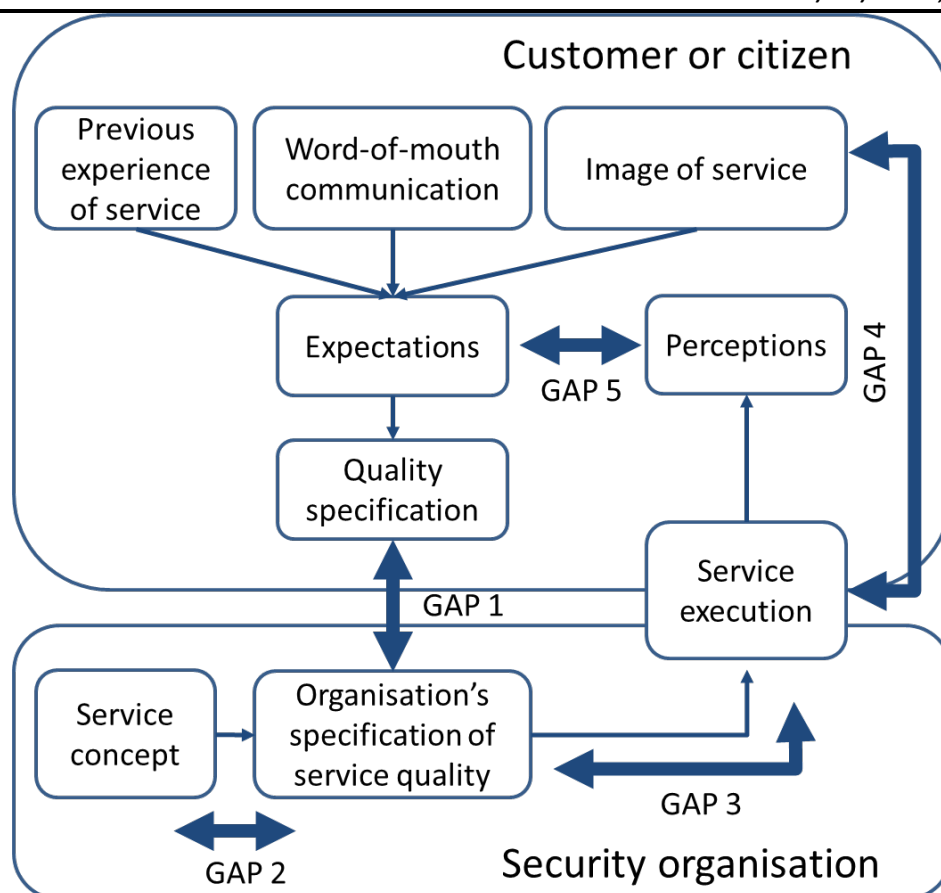


Figure 21: Gap model of service quality.

The gap model is based on works of Slack N, Chambers, Johnson B (2003) "Operations Management" 2nd ed. London. More information about the model you can found from a book: Pitman and Goffin K, Mitchell R. (2010) "Innovation management. Strategy and implementation using the pentathlon framework." 2. ed. Palgrave Macmillan.

7.5 Element: New service operationalization

7.5.1 Description of the element

Service operationalization is a process in which a new service is put into operation within an organisation. In effect, it means all the actions that need to be taken before the service is properly integrated to organisational processes, practices and systems.

"Service operationalization" element continues the work done in *"Service design"* element. In addition, methods presented in this operationalization element can be applied after the procedures presented in *"Technology adoption"* element. Whenever new technology, e.g.,

IT-system, has triggered a change process in service production or delivery, such process can be considered a service improvement.

In the service operationalization phase a new service is productised, and it is integrated to the processes, management practices and information systems of the organisation. Simultaneously, the organisation will plan the launch of the new service with internal and external communication processes. Internal communication contains discussion about roles, tasks, responsibilities and interfaces with other processes. External communication includes promoting and getting feedback from stakeholders, especially from customers or citizen.

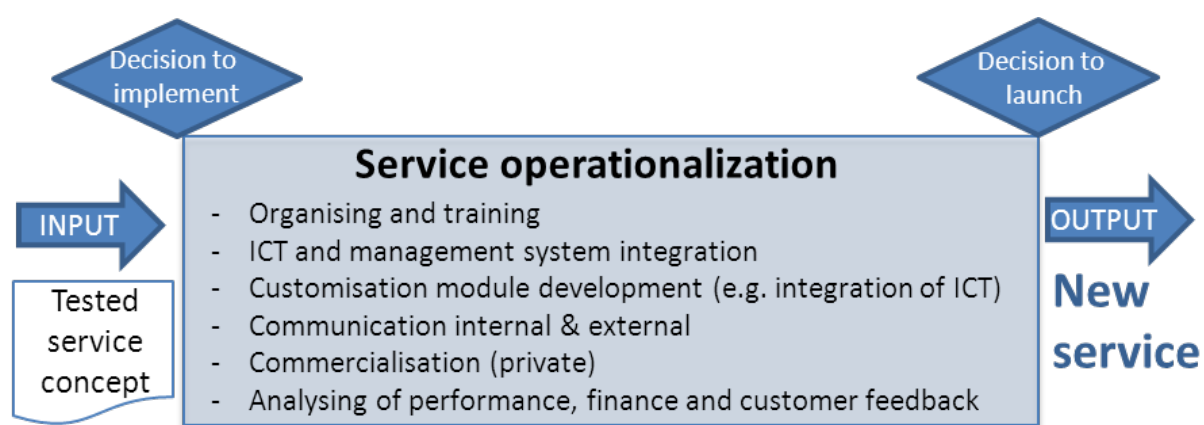


Figure 22: Service operationalization phase.

Integration

Integration of new services includes integration tasks related to organisational structures (like building new teams), to management systems (like updating the rewarding system), to refining support processes, and to making updates into information systems. Service process modelling, in which blueprinting is a widely used method, helps in identifying those processes and practises, that require special attention to ensure efficient integration. After identifying these processes the next task is to plan how they need to be changed or refined, and, of course, to execute the required changes. Institutionalising the changes, which is the last step in the integration process, means that the new refined processes and practices become part of organisation's normal every day work. An integration of management and IT systems will proceed in a similar way: identifying the required changes, executing those changes, and finally institutionalising the changes.

Preparing to launch

Productizing is one of the operationalization tasks, which prepare a new service to launch. In service development, a service being piloted is often designed to fit the pilot customer's requirements and operational environment. Thus, in a new, piloted service, there are bound to be some pilot customers specific elements. All of those elements are not relevant to other customers. There can also be some important features or elements that are missing;

elements that the pilot customer did not see as relevant. In this context, productizing is about making the new service concept adaptable for other cases and customers as well. A modular service structure is often applied to reach this goal.

Organising employee training is critical for successful service delivery. Especially the employees with whom users/citizens interact must be well trained. The service experience plays a very important role in service quality, so standardisation of front line employee's work will help produce consistent quality.

Building quality and planning for recovery are also tasks to be done in the operationalization phase. For the sake of quality assurance, services are often developed with the assumption that the service delivery will fail. The reason for failure can be, for example, variability of environmental conditions like weather, customer expectations, employees' responses, internal communication between departments, or failures in information systems. Three step approach to reduce the chance of failures is: a) assess in advance the points of customer involvement in each step of the service delivery process, b) eliminate process step that do not add value to the customer's/end user's/citizen's experience, c) identify potential operational bottlenecks and try simplify interactions, activities and policies where possible.

Communication

Both internal and external communication plays important roles during the operationalization process. It is important to identify the message receivers and their information needs. In internal communication the required level of details differs when informing and conversing with managers, back office employees, and front office employees. External communication of service benefits differs when it is directed to a customer/client, a user/citizen, a public stakeholder organisation, or media. Choosing the right mix of channels - face-to-face, internet, printed media, social media - to each audience and formulating message to fit each audience and their particular communication needs is to be done carefully. Social media differs from the other channels mentioned above in that in a social media you do not have full control over the discussion. When used wisely, social media is an effective tool for interactive communication with citizens also in the field of security. In order to minimise risks, however, the organisation must have a plan and an internal for the use of social media (see Checklists for more guidance).

The objectives of internal communication during an operationalization process are:

- to inform employees who were not involved in the service development process about the new service
- to get employees to understand the new service, and the value it can provide to the customer and users/citizens
- to find interfaces, related task etc., which have not been taken into account in the development phase to help integrate the new service to them and avoid failures

The objectives of external communication during an operationalization process are:

- to inform the customers/users about the new service so that expectations will better meet the service experience in service delivery

- to get customers/users to understand their role and responsibilities in service production and delivery

Commercialisation (private)

In this section, some additional points that are specific to commercial security organisations are presented. In other words, the following points are important in operationalization from the viewpoint of a security company. These are things that need to be taken into account in addition to those mentioned in all the other blocks in this element, which are common for both public and private organisations.

A part of launching a new service is generating awareness of it. In planning of advertising and promoting the company must take into account the expectations of the targeted customer and user segments, and the competitive situation. Also, it is important to note how well-known the earlier services of the company are. Through a detailed service description and mapping of different purchase decision criteria of potential customers and their decision makers company can deliberately reduce buyer's uncertainty and risk of buying new service.

New service opportunities can be identified by conducting test marketing. Usually, test marketing is directed towards trusted, old customers, but also customers, who will give information of sequence of new module development, e.g., IT interface building. The business model and the pricing policy of a new service can be refined utilising valuable feedback from the pilot case and test marketing. In addition, packaging strategies like combining the new service with an existing one in some customer group can be considered in this phase.

Monitoring, reviewing and auditing

Evaluation is the last phase of service development process. There are three main approaches to evaluation: monitoring, reviewing and auditing. These approaches differ in goals and perspectives on new service development and innovation. All of them are important for organisational learning on the development process. They will make a further contribution to organisation's knowledge base, in terms of understanding the innovation implementation process and the actors of processes within.

Monitoring is "real-time" evaluation examining implementation activities during the course of the service development and implementation process itself. In other words, it is evaluation through the life of development project. It provides management information on inputs and activities. Monitoring is usually carried out by the project steering group, who will react when development process deviated from the plan.

Reviewing is evaluation conducted after the launch. It is a matter of seeing how well the implementation phase has achieved the objectives set for it. The aim is evaluate, how successfully the new service and or technology have been implemented. Review can also examine which will be the next steps of improving the newly launched service. The review process should include feedback from customers/citizens. Reviewing is usually carried out together with project group and line management.

Auditing is evaluation that is done after the development project. The goal of auditing should be to attain continual improvement in innovation process and innovation management which will increase the positive outcome of the innovation projects in the future. Secondly, during auditing it is evaluated that resources have been allocated and spent properly, that tasks have been undertaken as planned and that objectives were achieved. Performance information, feedback and need for further development are all very valuable. Auditing helps an organisation to learn from mistakes and failures, in addition to the learning from successes.

7.5.2 Who is involved

Project manager's and project team's responsibilities and roles decrease during the service operationalization phase, and, simultaneously, the rest of the organisation takes more and more responsibility over the new service. Line managers and/or project steering committee will make important go/no-go decisions in starting and ending gates, regarding, e.g, whether to implement tested service concept, and whether to launch the new service. External stakeholders should also be included in discussions of launching a new service and to evaluation process.

7.5.3 Checklists

The following questions are directed to help decision making in the last gate review of service development project.

Decision to launch

Strategy

- Does the new service support the organisation's security mission and strategic objectives?
- Does the new service support the business strategy? (*private*)

Customer/citizen need

- Does the new service fulfil customer/citizen expectations?
- Have you made all the corrections which were found in pilot/test marketing?

Feasibility

- Is the new service ready to launch?
- Have both front and back office personnel been thoroughly trained?
- Is the new service integrated to management and information systems?

Market (*private*)

- Will the project reach the targeted level of market acceptance?

The following checklists contain questions that may help you in different evaluation processes.

Checklist to monitoring

- Is the project on schedule?
- Is the project on budget?
- Are there enough resources to fulfil project objectives on schedule?
- Were project tasks executed according project plan (or revised project plan)?
- Are there any factors that can hinder the project team from achieving the project objectives in time and within budget? If so, what will be corrective actions?

Checklist to reviewing new service operationalization

Process

- Is the new service fully implemented to the organisation's processes? If not, what is missing?
- Is the new service fully implemented to the information and management systems? If not, what is missing?
- Are all the needed front office employees trained?
- Are all the needed back office employees trained?
- Have the objectives of the new service been communicated to external stakeholders?
- Have the objectives of the new service been communicated to the organisation?

New service solution

- How well does the new service meet customer/user/citizen expectations?
- What kind of feedback test/pilot customers/citizen gave to the new service?
- How well did target customer identification succeed?
- What are the main customer/citizen benefits of the new service?
- Which are the next tasks to improve new solution?
- What will be the next customer/citizen group for the new service?

Checklist to auditing innovation process after development project

Strategy and mission

- Does the new service support the organisation's security mission and strategic objectives?
- Does the new service challenge organisation's current strategic objectives? How?
- Does the new service support the business strategy? (*private*)
- Does the new implemented technology support the organisation's security mission and strategic objectives? (*technology adoption case*)

Project management

- Were the project goals well defined?
- How well do development project results relate to the original plan?
- What were the major deviations from original plan?
- Was the top management committed to the project goals?
- Were the appropriate people involved in defining project goals?
- Have the appropriate people been chosen to steering group?
- How well did the steering group steer the project?
- Was the project well planned?
- Were the appropriate people involved in project planning?
- What were the key factors that impacted the schedule, resources and quality of the new service?
- Were the appropriate people involved in execution of the project?
- Were there enough resources available?
- Was the budget sufficient?
- Were any risks realise? If yes, how were the resulting issues solved?
- What kind of problems did encountered and how these have been solved?

Customer/user/citizen

- How well does the new solution meet customer/user/citizen expectations?
- How were customers/users/citizens involved in the development process?
- What are the main benefits from new solution from customer point of view?
- What are the main benefits from new solution from user/citizen point of view?

External and internal stakeholders

- Was there common understanding of project goals between organisation and politicians and civil servants? (*public*)
- How were project goals communicated to the stakeholders?
- Was the project executed in cooperation with civil servants? (*public*)
- How did cooperation go with technology provider?
- How did cooperation go with consultants?
- How did cooperation go with own organisation?

Learning

- Were new project management practices developed?
- What suggestion would you make to new project management practices in specific innovation process phase according to experience of the development project?
 - searching
 - idea generation
 - idea management

-
- evaluation and selection
 - concept development
 - experimentation and piloting
 - technology adoption
 - service development
 - service operationalization processes
 - Was the innovation process guideline modified?
 - Were new tools and methods developed and or adopted?
 - What kind of new tools and methods are needed according to experiences from the development project?
 - Were new operational practices developed?
 - What kind of new operational practices are needed according to experiences from the development project?
 - Were guidelines or new document templates developed?
 - What kind of new guidelines and documents are needed according to experiences from the development project?
 - Were new competencies achieved – at individual/team/organisation level?
 - Was new knowledge created – at individual/team/organisation level?

Opportunity

- Were new renewal opportunities to the organisation identified?
 - new services, new operational processes
 - new technologies
 - new customer/citizen segments

Impact

- How did organisation's efficiency increase as a result of the development project?
- How did organisation's future operational possibilities increase as a result of the development project and new service?
- How did the development project affect the customers or users/citizens?
- Were there any security and safety improvements (area/country/etc.) a direct result of the development project? What?
- What were the commercial benefits of the development project? (*private*)

The following checklists will assist organisations in the use of social media for communication with citizens

Social media strategy

- Have you defined the goals for the presence in social media?

-
- Have you chosen the channels where you would like to be?
 - Have you defined why you would like to be in these particular channels?

Social media practices

- Do you have a defined policy of what you can comment and what to tell in social media?
- Do you have a defined policy of what you cannot tell in social media?
- Have you defined that who can present your organisation in social media and in which role?
- Do you have policy for the use of the organisation name, brand, images, etc. in social media?
- Have you assessed the risks of social media for your organisation?
- Do you have a plan to minimise the risks?

7.5.4 More information (tools, practices, etc.)

More information about communication in a commercialisation process can be found from chapter 5 of: Maddock M. G., Uriarte L. C., Brown P. B. (2011) Brand new: solving the innovation paradox – how great brands invent and launch new products, services, and business models. Wiley: New Jersey.

A practical toolbox about planning, creation of value proposition, communication of development project's results and evaluation: Penna R. M. (2011) The Nonprofit outcomes toolbox. A Complete Guide to Program Effectiveness, Performance Measurement, and Results. Wiley.

More tools and ideas of piloting, testing and other task during operationalization phase can be found from: Kumar V. (2012) 101 design methods. A structured approach for driving innovation in your organisation. Wiley. (in Chapter 7 - Mode 7: Realize offerings)

8 Module: People, culture and learning

8.1 Overview

Innovation is primarily a question of leadership and change – how to encourage people to find a new and better way of doing – a process of learning and unlearning. The module *"People, culture and learning"* explains why innovation belongs to everybody, what kind of leadership and management is needed, how to develop culture of continuous innovation, and how to support organisational learning and change management. These are issues that lay on the back of all major process related innovation actions as well as innovation strategy work.

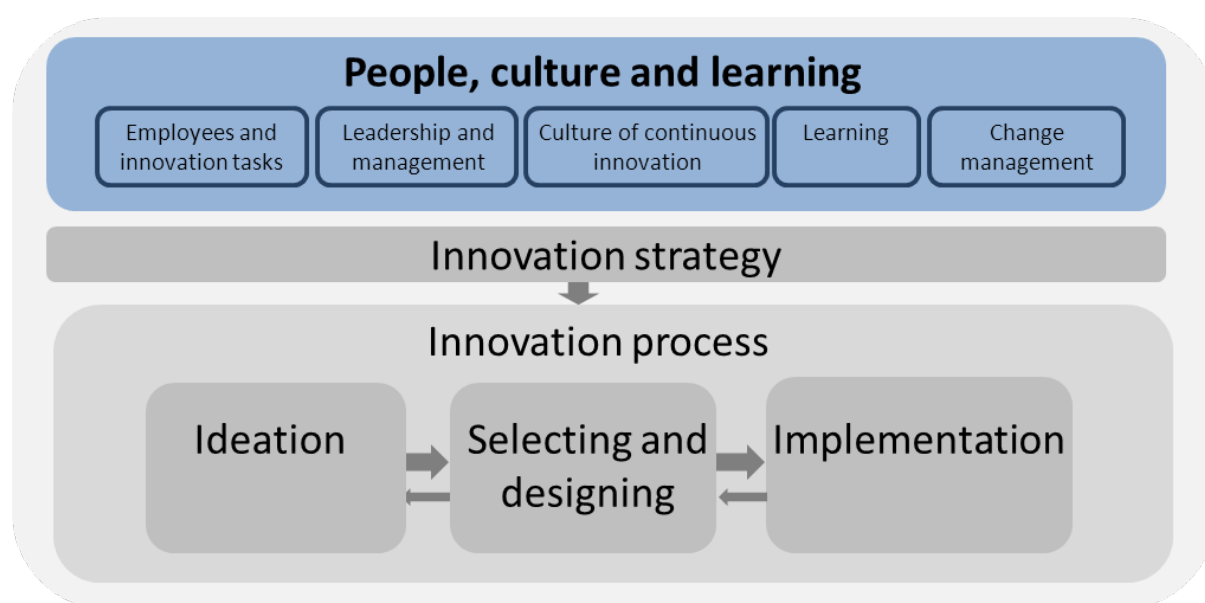


Figure 23: People, culture and learning module.

The element of *"Employees and innovation tasks"* highlights that creativity is only one part of innovation although it is highlighted in innovation discussions. One challenge of innovation management is to find the right balance between creativity and efficiency for each organisation in its operation environment to fulfil their security mission. Innovation and renewal requires employee input in the form of resources, competences and experiences. The other challenge of innovation management is to define key roles but also supportive roles of development and define each role's responsibilities. Incentive systems are often mentioned in connection with organisation's innovation management. Indeed, a well-planned incentive system can improve employees' own motivation to take part in innovation work but it also serves as a communication channel for the organisation to inform employees of the importance of innovation and the innovation strategy focus. Correct metrics and rewards make innovation manageable.

Leadership (managing people) is stressed instead of management (managing things and processes) in innovation management. The main objectives of top managers are creating an

inspiring vision, defining and adapting an innovation strategy, and linking it to innovation structures, processes and practices. Top managers need to establish and maintain an organisation culture that supports renewal and change, but also to manage relationships with external key partners and main stakeholders. In addition to discussing the need for strong leadership, the "*Leadership and management*" element presents the duties of middle management and innovation management teams, and some basic recruitment recommendations. The recommendations highlight the assessment of a job applicant's motivation, attitude toward changes, willingness to take risk, and problem solving skills in addition to the more commonly underlined substance knowledge and team work skills. The other important point in recruitment is remembering that successful innovation often stems from diversity; it seems to need different kind of people with different capabilities, knowledge and experience.

Producing just one innovation is not enough. An organisation needs to ensure its renewal and existence by innovating continuously. "*Culture of continuous innovation*" element depicts motivational factors to improving innovativeness. The main components of innovativeness, such as culture, shared vision, key roles, efficient processes, flexible structures, creative climate, and external focus are outlined. At the end of this element, team working and developing innovativeness in an organisation is shortly described.

In essence, innovating in an organisation is a process of learning and unlearning. These processes ultimately lead to change. That is why "*Learning*" element is included into the INNOSEC model. Organisational learning has to do with its members' skills, values, beliefs and practices of the organisation. It is embodied in physical artefacts like documents and organisational structures and routines. To develop organisational learning, an understanding of learning processes on individual level, team level and organisational level, and relevant boosting tools for the processes on each level, is needed.

Both innovation and organisational learning necessitate change and competences in *change management* in an organisation. For example, implementation of new processes and practices requires the planning and execution of a change process within an organisation. Changes can be planned or emergent, but all change should be managed for the optimal end results. Although these change types differ in their starting point, both can be utilised for organisational renewal. In real life, most organisational changes are actually combinations of these change types. This is why it is necessary to understand different kinds of changes that an organisation could face, and to learn, on one hand, how to plan and execute change processes, and on the other hand, how to control emergent change.

8.2 Element: Employees and innovation tasks

8.2.1 Description of the element

Seeing innovation in its wide meaning as a process of organisational renewal gives every employee a possibility to take part in innovation work. So, innovation can be a part of daily activities of all employees.

Balancing creativity and efficiency

Creativity is one part of innovativeness, but not the most important one. In organisational context efficiency is more important. Creativity without the ability to transit it into execution, value capture in private sector and efficiency in public sector, makes no sense. Conversely, execution without creativity works only in the short term because innovation and renewal are essential to the continuous existence of organisation.

In the public sector, balancing creativity and efficiency means taking into account renewal and efficient use of resources, while simultaneously keeping the benefit of governmental or regional customers and citizens in mind. In the private sector, balancing creativity and efficiency calls for simultaneous renewal and profit making in company's current operations. The most important thing is to find the right balance for the organisation which fits both its operational environment and its security mission.

At an organisational level, creativity and effectiveness are emphasised in different phases of the innovation process. In the early phases of innovation there is a need to be creative and open to new ideas. In the implementation phase, efficiency has a stronger role. Efficiency is needed to put ideas into action. Formal processes are often used after the front end of innovation.

The need to find out the right balance between creativity and efficiency is not limited to the organisational and innovation process levels. It is also important on the level of individual employees. Balancing creativity and efficiency on the individual level can be organised, for example, by defining different roles for individuals in different cross-functional development teams.

Involvement in innovation

Innovation requires resources, competences and experiences that reside in different parts and levels of organisation. Thus, all employees can have a role in innovation processes. There are key roles like a project manager, a sponsor and a champion. There are team member roles based on the expertise or position. There are roles as a representative of own function or department. A combination of team members varies depending on the question at hand. For example, the question can be idea generation, conceptualization, development, evaluation or launching. In addition to the people directly involved in the innovation project, there are a lot of people in supportive roles. These people, who are also in very important roles, are working at functions like IT and Human Resources.

When we take a closer look at involvement in the idea generation phase, we can notice that there are many other ways to take part than to suggest new ideas. Suggesting a new idea is not the only way to involve people, but it is in many cases the easiest way. Alternatively or additionally, many organisations organise different kind of idea competitions, idea generation workshops, and continuous improvement groups. Furthermore, organisations can have idea gathering databases or ideation systems (idea storages), which supports ad hoc idea generation.

In addition to presenting and collecting new ideas, idea generation phase includes other important tasks. An idea is seldom enough. It needs to be processed and enriched. Ideas are often also combined to other ideas. So, idea generation process and ideation systems should support both the development and review of ideas. One challenge in ideation systems is the feedback process. People that contribute an idea or a suggestion are often eager to have a quick response to their ideas. Furthermore, they are interested to know whether the idea will be taken forward in the innovation process. From the viewpoint of the organisation, fast evaluation of all suggested ideas need to be well organised. It is not easy to manage this, especially if there is a strong continuous flow of ideas coming in. Well-functioning idea evaluation systems need experts and managers to make go/no-go decisions based on their own expertise and experience. In the front end of innovation process, employees' involvement can also be utilised, for example, for scanning new technologies, markets, and competitive situation (*private*), and for analysing weak signals besides of idea generation, idea development and idea evaluation.

Success stories are one method of motivating the employees to participate in innovation work. Presenting success stories on innovation in internal seminars or writing about them on the intranet or similar forums sends out a message that everyone can be innovative and take part in the organisation's innovation and development work. Why it is so important to involve everyone in innovation work? Firstly, every employee is an expert in his/her own work. This presents a huge opportunity to improve organisational efficiency. Job rotation can boost this effect, because it enables an employee to combine experiences and practices learnt in both positions. Secondly, engaging the whole organisation instead of just few individuals will multiply the input data to innovation processes. Thirdly, in the implementation phase of innovation it is important to give feedback to the development team if any corrective actions and needs for refining are identified.

Definition of roles and responsibilities

As presented above, all members of organisation can take part in innovation. However, responsibilities in the innovation work needs to be defined well. Of special importance is the division of work between top and middle management, and between personnel working in organisational functions with development focus. Some of the main responsibilities of these people are listed below. Also, a description of front-line employees' roles in the innovation process is included to highlight their importance in successful innovation process.

Someone (or some team) in the top management needs to take responsibility for all innovation work done in the organisation. However, it is not necessary to call him/her as innovation manager. The main point is that a manager has this responsibility, and others in the organisation know who the person is. This manager's duty consists of a) finding out the best way of managing innovation in their own organisation, b) managing innovation work, and c) improving innovation work.

First of all, top management must be clearly and publicly committed to innovation. Only then will other managers throughout the organisation be motivated to follow the head. All the members of top management innovation team need to take part of visioning organisation's future opportunities. Allocating resources, both financial and human

resources, to innovation work is their responsibility. They should also strongly, actively and in public support innovation work and organisational learning.

Middle management and superiors have an important role in converting organisation level vision into practical goals. They allocate specific people to the innovation work and support successful execution of development projects. They are also responsible for providing employees learning possibilities like training, job rotation etc., which are important not only from the employees' point of view but to support the innovation capability of the organisation.

An innovation management team is operationally responsible for innovation work in the organisation. They organise and develop innovation structures and processes. The team also assists top management in the areas of innovation and development. Personnel employed in development work full time on developing new services and helping their organisation to adapt new technologies and processes.

People in the front line – employees with direct contact to end-users or citizens – are an important source of new innovations. They understand users' needs through direct experience, user comments and conversations. A service delivery process gives possibility to observe users' activities, to find new ideas for improving the process and for innovating new substitutive or additional services. Therefore, front line employees should have representatives in the cross-functional development team. Their knowledge about procedures and practices in old services are very valuable in innovating new services. They are familiar with users and have tacit knowledge, what the back office people in a development function do not have. In the private sector, in companies, front line people are also involved in the sales of new services.

Incentive system

Four basic elements of an individual's motivation are passion, vision, recognition and economic incentives⁹. The latter two can be supported by implementing an incentive system. Organisation's incentive systems should emphasize attitudes and behaviours that support innovation work and innovations. Organisations can also use incentive system to communicate how important innovations are to them, and that innovation and innovative thinking are desirable in the organisation.

It is important to take into account the following points when designing the incentive system:

- clear linking between goals and rewards
- transparency
- metrics and rewards that support the organisation's innovation strategy and culture

Organisational goals need to be aligned with team and individual level goals in the incentive system. The figure below shows an example of goal setting for rewarding and recognition. Rewards and recognition on the team level mainly encourage team working, which is

⁹ See Davila et al (2006) for further details.

considered a very efficient way to innovate. In the individual level linkages between employee development by learning new skills etc. and the incentive system are usually emphasised. New skills and knowledge can have positive contributions to innovation strategy. This is why individual level incentives are sometimes used.

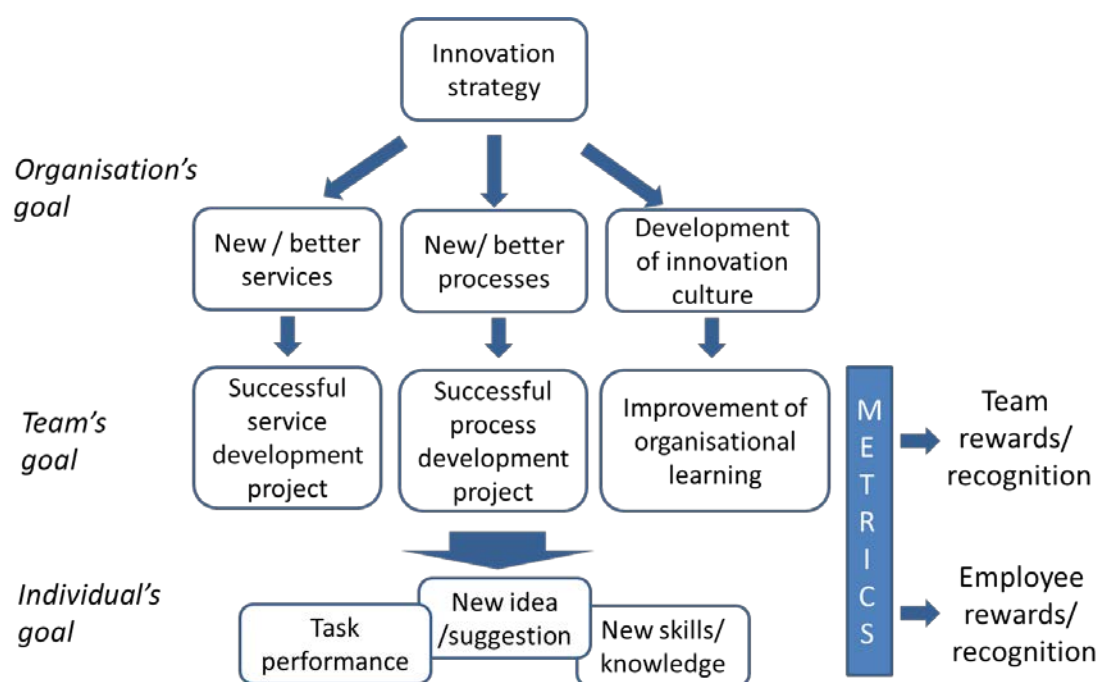


Figure 24: Example of reward and recognition.

Some examples for team level metrics are:

- the number of ideas generated
- the number of ideas implemented
- achieving of a predetermined cost saving target
- achieving predetermined specific project goals
- successful implementation of a specific process innovation

A balanced incentive system has different kinds of reward and recognition components, e.g., praise from management, peer recognition, monetary rewards, free time for personal projects, extra holidays. Especially in public organisations non-monetary rewards are important, as these organisations usually have very limited possibilities to pay out monetary rewards.

8.2.2 Who is involved

All employees should be involved in innovation tasks in one way or another.

8.2.3 Checklists

Involvement in innovation

The following claims and scale can be used for the evaluation of employees' involvement to organisation's innovation work.

- 1 = hardly at all
- 2 = not a lot
- 3 = to some extent
- 4 = rather well
- 5 = extremely well

- a) Innovation have been understood in its wide meaning as a process of organisational renewal
- b) Innovation is a concern for the whole organisation
- c) All employees knows their own roles in the innovation process(es) of the organisation
- d) Top management has clear responsibility for innovation management
- e) Employees are encouraged to come up with new ideas
- f) Employees are encouraged to share their knowledge and information
- g) Continuous personnel development is supported
- h) Employees are trained to be creative and innovative
- i) Employees are allocated to have some time resources for free innovation
- j) Cross-functional team implements projects
- k) The aim is to recruit employees with diverse training and experience
- l) Incentives for innovations are conducive to team work

In the following, tips on how to think more innovatively are listed..

- break the rules and thinking boundaries
- challenge and question assumption, beliefs, biases and current practices
- ask questions what, why, when and where
- be curious about other people's opinion and customer/citizen feedback
- discuss with other
- actively monitor change in trends and regulations to spot opportunities
- use image and intuition
- try to use also other languages than words e.g. symbols, sensory languages, feeling and visual imagery
- improvise and play
- forget expertise and experience to find creative solutions
- check assumptions
- generate alternative solutions

8.2.4 More information (tools, practices, etc.)

Textbook about innovation management in public sector including employee-driven innovation, incentives and diverse leader's roles: Bason C. (2010) Leading public sector innovation: co-creating for a better society. Policy Press.

More information can be found from:

Davila, E., Epstein, M., and Shelton, R. (2006) Making innovation work: how to manage it, measure it, and profit from it. Wharton School Pub.

Goffin K, Mitchell R. (2010) "Innovation management. Strategy and implementation using the pentathlon framework." 2. ed. Palgrave Macmillian.

The online guide/portal InnoSupport for SME companies about innovation funded with support of the EC. (Innovation guide/ 4.1.2 Creative process and creative product)

<http://www.innosupport.net/>

8.3 Element: Leadership and management

8.3.1 Description of the element

Innovation is also about good leadership and management. Leadership and management viewpoints are underlined in practical innovation management literature. This element provides a short description of strong leadership, middle management's duties, innovation management teams' roles, and general recruitment recommendations.

Strong leadership

Strong leadership, the art of managing people, is essential to achieving high performance in innovation. Top management has to clearly communicate that innovation is an integral part of everyday operations.

The main objective of top management is to create an inspiring vision that challenges the organisation to go beyond its current performance and illustrates where the organisation is headed. Also, they are responsible for defining and adapting an innovation strategy that fits the organisation, and linking it to the business/operational strategy. Furthermore, the top management is to establish and guide the evolution of organisational culture so that the organisation has the ability and courage to change. They need to guide the building of innovation structures and processes, and fight organisational resistance to change, bureaucracy and not-invented-here syndrome. The top management also has to take care that adequate resources are committed to innovation work. They are also responsible for diffusing responsibility for making innovation happen throughout the organisation, as well as managing relationships with external key partners and main stakeholders.

Middle management

It is the responsibility of middle management and superiors to support and control practical innovation work. They convert the strategy level goals to day-to-day processes that enable employees to create and extract value from innovations.

In short, middle management is responsible for encouraging employees to take part in innovation work by motivating, supporting and rewarding. They also need to determine the objectives for practical innovation work, and organise innovation work by allocating resources to development projects. On top of that, they answer for day-to-day leadership through commitment and own example.

Innovation management team

The responsibility of innovation management team is in organising and developing innovation structures and processes. They assist the top management in their innovation management duty. They make also sure that innovation is coordinated and synchronized across departments.

An innovation management team should try to find the right ways to establish and improve the innovation process, and to improve organisational structure and organisation culture to better support innovation. Other tasks of innovation management team include assessing development needs and identifying development objectives, controlling development projects and programs, managing idea generation, and leading idea and concept selection.

Recruitment recommendations

Demands of innovation work set two objectives for the recruitment process: the organisation should hire people that are multi-skilled and diverse. Interview and selection processes should assess candidates from these two viewpoints.

In addition to technical or market knowledge, a new recruits should have a wide set of other skills, like cross-functional team skills and problem solving skills. Furthermore, a new employee should have innovation capabilities, willingness to take risks, and motivation towards changes.

The organisation should strive for diversity when looking for new employees, it should not to try "cloning" itself by looking only for people that are similar to current employees. For improving its innovativeness, the organisation should try to find people with different background, education, knowledge and experience. People with different backgrounds challenge the status quo and increase diversity. Differences will contribute to create a tension which is needed in innovation.

8.3.2 Who is involved

Top management bear the main responsibility of leadership and management of the innovation work. Middle management and superiors take care of the everyday innovation work like development projects. The innovation management team assist both top and middle managers in their innovation management work.

8.3.3 Checklists

The following general level checklist helps if for managing innovation work. It can be used to identify management and leadership tasks and to determine who in the organisation is in charge of them.

- creating an inspiring vision
- linking security mission and strategy to innovation strategy
- aligning resources to innovation and development work
- organising innovation work – innovation structure
- (building and) maintaining innovation processes and practices
- (establishing and) maintaining an organisation culture that supports renewal and change
- communicating and networking with external stakeholders
- encouraging people to innovate and take risks
- steering and controlling development projects
- evaluating performance
- rewarding
- recruiting multi-skilled and diverse employees

8.3.4 More information (tools, practices, etc.)

More information about managing the work, people and recruiting in the non-profit organisation can be found from the book: Green A., Hauser J. (2012) Managing to change the world: The non-profit manager's guide to getting results. Jossey-Bass.

Practical textbook about corporate innovation management: Goffin K, Mitchell R. (2010) "Innovation management. Strategy and implementation using the pentathlon framework." 2. ed. Palgrave Macmillian.

Textbook about innovation management, technology management and new product development: Tidd, J., Bessant, B. & Pavitt, K. (2005) "Managing innovation: Integrating technological, market and organisational change", 3rd ed. Wiley. Chichester.

8.4 Element: Culture of continuous innovation

8.4.1 Description of the element

Continuous renewal needs an organisational culture that supports innovativeness. In the following we will discuss what should be considered when an organisation aims to a higher level of innovativeness. Developing a more innovative organisational culture takes a long time and is always a continuous learning process. Although there are no universal rules on

how to develop a more innovative organisation culture, there are some approaches how a transformation towards increased innovativeness can be deployed. Recognizing of some general characteristics of innovative organisations can also help in this continuous learning process.

Motivation to develop innovativeness

Innovative organisation culture does not guarantee immediate results. However, innovativeness is a characteristic that is worth working for.

In the following list there are some important effects of innovativeness presented:

- Innovativeness brings positive image to the organisation, which helps the organisation to
 - find good network partners,
 - recruit young new employees and,
 - negotiate with financiers.
- Innovativeness should be seen as resources that enable processes and practices to be more efficient or even renewing them radically.
- Innovativeness makes it possible for the organisation to utilise and adapt to results of fast technology development.

Levels of innovativeness

Innovativeness need to be viewed and developed on four levels: an organisation level, a team level, the level of individual's characteristic, and the level of task context.

Employees in innovative organisations are fairly autonomous. Failures are tolerated well because they are an inseparable part of creative process. Continuous learning of new things is strongly encouraged. Furthermore, innovativeness in the organisational level requires financial and time resources, connections within own organisation and to outside actors. Additionally, participatory decision making processes are preferred.

Team work is characteristic to innovative companies. In the team level innovativeness includes team spirit and good relationships among group members. Safety, trust, openness and learning are usually very apparent in well-functioning innovative teams.

Employees' creativity is one important factor that contributes to the innovativeness of organisation, but it is definitely not the only one. Innovativeness on an individual level includes more than just creative capacity. General skills and competences, task specific knowledge and social skills play important roles. Furthermore, openness, self-confidence, flexibility, initiative, independence from criticism, and ability to reflection are all very important characteristics of employees in innovative organisations. In an organisation where new radical ways of doing things are being sought, individuals' courage to seek new possibilities, entrepreneurial spirit and risk-taking come up as valuable characteristics.

In spite of individual characteristics, employees who consider their work challenging and rewarding are more likely to participate in innovative work than highly creative persons in

less satisfying conditions. Multidimensional and demanding tasks help employees produce new ideas and innovative solutions much more likely than simple routine tasks. It is important to bring everyday working conditions into the attention of organisational management. An organisation can improve its innovativeness by simply supporting work efficiency and wellbeing of its personnel.

Elements of innovative organisation culture

The main common characteristics of the culture of innovative organisation are presented below. They are important in establishing a culture of continuous innovation. The elements are a shared vision, flexible structures, key roles, a creative climate, efficient processes, and an external focus.

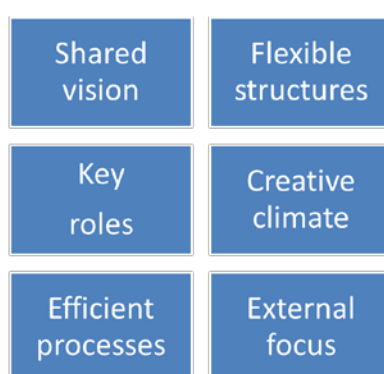


Figure 25: Elements of innovative organisation culture.

A shared vision brings the needed energy to an organisation that innovation work requires to break the status quo. The shared vision expresses what is important for the organisation and helps to minimise organisational resistance to change. Common understanding of the targeted state should be built bottom-up rather than top-down. Too often in organisations it is only the upper management that takes part in visioning work. One of middle managers' most important tasks is concretising the vision.

One of the main challenges in innovative organisations from organisation structure point of view is how to strike an appropriate balance between flexible and well formalized hierarchical structures. On one hand, innovation is mainly teamwork and a combination of different perspectives. A team structure enables flexibility and reactivity to changes in the organisational environment. On the other hand, efficient performance needs formulated and standardized processes, and in addition, in many organisations in the security sector hierarchical decision-making procedures are essential.

Some key roles in innovation work can be identified. People in these key roles promote and support innovations success during their development. Mostly they are individuals, but sometimes a group of people. The roles are mainly informal. In most cases only the role of project manager is formal.

A champion is an individual, who utilises his/her power to promote an innovation in order to ensure its success in its early stages, when new ideas meet the most difficult circumstances.

The champion believes the potential of a new idea before the organisation is convinced of it. A gatekeeper is a person, who knows where in the organisation relevant knowledge is located, and often acts as a bridge between different parts of organisation (or network). In most of cases a project team leader can have the “duties” of the champion. A sponsor is usually a senior manager, who use his/her power to support innovations. There can also be more other roles.



Figure 26: Key roles in innovation work.

A creative climate enables ideation and successful innovative work. Because communication plays a significant role in innovation, trust and openness are one of the most important building blocks of organisation's creative climate. Involvement, defined as employees' motivation and commitment to the organisation's long-term goal, vision and daily work, belongs to these building blocks, too. Sufficient free ideation time makes it possible to generate and develop new ideas outside of planned routines without time pressure. So, it is necessary to try to find some free time from daily tasks. Employees should also have some freedom to arrange their daily tasks (but taking into account that their security mission should not be threatened).

The innovative organisation's efficiency is not the opposite of creativity. They can both be used to describe successful innovation processes. Both approaches are needed. During radical changes and in the front end of new service development process, creativity will be

emphasized. However, success also requires efficient processes and routines to implement the new ideas. A service innovation process is rarely clear. Indeed, one way of making it more efficient is to find ways to make it more tangible.

Organisations' external orientation appears in the form of customer/citizen involvement to development processes, and networking with suppliers and other stakeholders. Innovation has become an open process involving networks across and between organisations. The need to be externally oriented and open is based on the assumption that not all relevant knowledge and resources can be found in one organisation.

Innovative and effective team working

Effective team working is the best way of organizing innovation work in most cases. Teams have more to offer than individuals in terms of both innovativeness in idea generation and efficiency in solution development. Innovation is about combining different perspectives and knowledge in problem solving.

Clearly defined tasks and objectives are a good starting point. Nonetheless, in the case of radical innovation, tasks are difficult to describe beforehand. In radical innovations a team needs an elevating goal, which is somehow open and challenging. Effective team leadership is needed also in innovation projects. Good balance of team roles, key roles and matching them to the individual behavioural style is very important. While an innovation work is combining different ideas, it is needed to have effective conflict resolution mechanisms within the team. The team should not need to have an outsider to solve their differences in opinions. They should trust to each other and everyone's knowledge in the team. However, an effective team utilises continuously also external knowledge.

In each innovation project the most appropriate team structure should be chosen. Cross-functional teams are able to solve customer's needs using their multi-expert knowledge and customer understanding. Cross-functional teams are widely used in product development projects. Other team forms, which are suitable for innovation work, are functional teams, autonomous teams and virtual teams. Functional teams are normally used for simple innovation projects and continuous improvement projects, e.g., 'kaizen' team work (see 'More information'). Autonomous teams with entrepreneurial project managers can be utilised in cases where new venture-like structures need to be tested. Virtual teams can utilise expertise from different organisations and locations, but in these teams responsibilities of each project partner must be especially clear defined.

Developing innovativeness of organisation

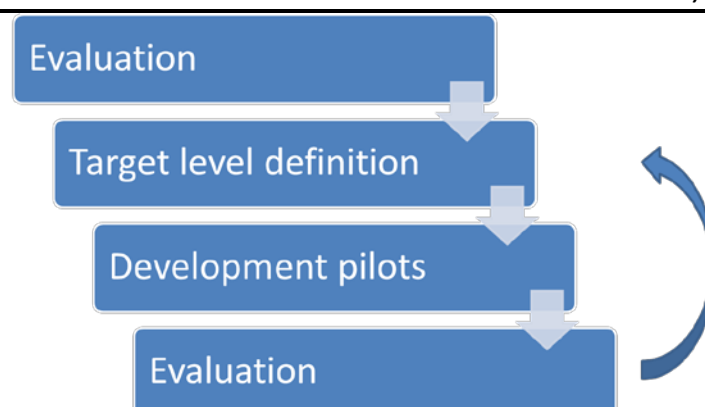


Figure 27: Development steps of innovation culture

A good starting point to develop innovativeness in an organisation is to evaluate the innovation culture of the organisation. There are many possible evaluation questionnaires for organisations to use. In many cases, e.g. in large organisations, the most suitable approach is to utilise specialised consultancy services, because consultants can use their knowledge to assess innovativeness at all levels and viewpoints. Also, consultants can be considered neutral actors that help to create an impartial evaluation.

According to the evaluation, a target level of innovativeness in all its dimensions will be defined. For development pilots it is useful to choose fast tasks so that their success stories can be used to inspire the other tasks and development project related innovation culture improvement. However, changing the innovation culture, and the organisational culture in general, is a slow transformation process. Using the above mentioned instructions the transformation will be directed into the right direction and slowly help to increase innovativeness in the organisation.

Funding of innovation work

Development and refining of services and improving working practices also require monetary resources. One may not need funding to create good ideas, but the enrichment and evaluation of ideas, and especially the development and implementation activities typically need additional funding in order to be successfully executed. These activities may be funded by sources within a security organisation, but also by external funding sources.

It is a common myth that organisations (both public and private) have very limited financial resources for innovation activities specifically in the security sector. On the contrary, the problem with the funding for innovation is common to most sectors. But what is specific for organisations in the security sector is that many organisations do not have well-functioning processes to arrange funding for the development and implementation of innovation. Or if they do have the processes, employees and managers are not used to using them. Depending on the organisation and its goals, funding can be sought from within the organisation or from external sources. For maintaining continuous innovation there is usually a need to create and support processes for both acquiring funding to the security organisation and delivering funding to development work in the security organisation.

There are a numbers of different kinds of organisations offering external funding for innovation projects in European, national and local levels. Depending on the funding organisation, it may be available for public or private security organisations, or to both. Some of the funding organisations fund the creation of new products and services, while some other may also support innovations that make organisational operation more efficient and effective. Application processes and criteria for funding decisions may vary a lot between different organisations. In any case, it is important for a security organisation searching for innovation funding to argue the motivation and goals of innovation clearly to the relevant stakeholders.

From the viewpoint of organisational culture it is important to encourage top managers to establish processes that allow employees and middle-managers to apply funding for further developing their ideas and implementing developed services. Also, it is equally important to encourage employees to actively utilize both the internal and external sources for funding of innovation and development work. Processes for applying funding for innovation must be strongly linked to the evaluation and selection activities of the organisation (see the module Selecting and designing).

Employees should see the applying of funding for innovation as a natural part of their work. As a process, the application for internal funding should be designed so that it is easy for the applicants. It may also be necessary to offer support for applying external funding to employees that have ideas worth further development. Entrepreneurial attitude may sometimes be required from employees trying to get their ideas funded. The attitude of internal entrepreneurship belongs to the culture of continuous innovation. It is important to understand that in a culture of continuous innovation, the financing of innovation work is a task that belongs both to the employees and to the managers of organisation.

8.4.2 Who is involved

All managers and employees are involved in the continuous creation of innovation culture. Top management have the best possibilities to have an impact on it. They can inspire the organisation by setting a vision, they can allocate resources to development projects and they can build a management system that supports innovativeness.

8.4.3 Checklists

Innovative organisational characteristics

The following characteristics are common for innovative organisations:

- common vision of the future of the organisation among all employees
- common values
- balancing efficiency and creativity
- common understanding of a target
- knowledge sharing is a continuous activity

- freedom and autonomy
- trust and safety
- tolerance for conflicts and chaos
- risk taking
- customer understanding
- external focus, networking
- monitoring changes as opportunities
- employees are supportive to changes
- team working
- efficient processes

Self-assessment tool for innovation management

The following list can be used for assessing innovation management practices in an organisation.

- 1 = hardly at all
2 = not a lot
3 = to some extent
4 = rather well
5 = extremely well

Innovation strategy

Innovation strategy steers organisational renewal
Innovation strategy determines innovation goals and level of innovativeness in the organisation
Innovation strategy and organisational strategy are updated continuously, in a dialectic learning process
Means for renewal are sought by identifying opportunities and needs for change simultaneously
Employees are involved in innovation strategy process

Innovation process - ideation

Opportunity identification covers both formal processes and informal activities
Foresight activities, scenario work and road mapping are conducted to outline the future
Employees are encouraged to come up with new ideas and approaches to help customers and citizens
Customers, users, citizens, research partners and suppliers are involved in ideation

Systematic practices for idea generation and enrichment, and a functioning review system
Innovation management system support idea storage, idea enrichment, idea review and reuse

Innovation process – selecting and designing

Criteria for evaluation and selection of ideas and concepts are transparent and comprehensive
Systematic concept development process
Alternative concepts are drafted to evaluation
Capacity and space for experimentation

Innovation process - implementation

Innovation implementation process is understood in the same way everywhere in the organisation
Cross-functional teams implement projects in the innovation process
Efficiency is sought through routines and practices at the implementation stage
Technology adoption is understood as an adoption and adaptation processes in the levels of strategy, organisational processes and technology
New service concepts are piloted

People and organisation

Everyone has a role in innovation processes
Flat, team based and flexible process organisation
Top managers are clearly and publicly committed to innovation
Middle managers determine objectives and allocate resources for practical innovation work
Employees with direct contact to end-users or citizens understand their role as an important source of new innovations
Incentives for innovation are conducive to teamwork
The organisation is an active member of the innovation network (including research partners, suppliers, users, customers)
Good relationship with external key partners and main stakeholders
The aim is to recruit employees with diverse training and experience

Innovation culture

Inspiring vision that challenges the organisation to go beyond its current performance
Organisation has the ability and courage to change

Unnecessary rush and routines are eliminated
Balance with creativity and efficiency on both organisational and individual level
Using success stories for motivating in innovation work
Failures are seen as learning opportunities for the organisation
Innovation capabilities are developed all the time

Organisational learning

Employees are encouraged to continuous learning and personnel development
Employees are encouraged to create and share knowledge
Information is easy to find and adapt
Overlapping and conflicting information is produced, tolerated and leveraged
Feedback and evaluation after a development project supports organisational learning
The innovation process is continuously evaluated and developed

8.4.4 More information (tools, practices, etc.)

Innovation management

Textbook about innovation management in public sector including innovation culture development, citizen involvement and diverse leader's roles: Bason C. (2010) Leading public sector innovation: co-creating for a better society. Policy Press.

Practical textbook about corporate innovation management, which is used in MBA programs: Goffin K, Mitchell R. (2010) "Innovation management. Strategy and implementation using the pentathlon framework." 2. ed. Palgrave Macmillian.

Textbook about innovation management, technology management and new product development, which is used in MBA programs and advanced undergraduate courses: Tidd, J., Bessant, B. & Pavitt, K. (2005) "Managing innovation: Integrating technological, market and organisational change", 3rd ed. Wiley. Chichester.

Online guide/portal InnoSupport for SME companies about innovation funded with support of the EC.

<http://www.innosupport.net/>

Key roles

About ten roles (anthropologist, experimenter, cross-pollinator, hurdler, collaborator, director, experience architect, set designer, caregiver, and storyteller) and how they involve to innovation work are discussed in the book: Kelley T., Littman J. (2005) The ten faces of innovation: IDEO's strategies for beating the devil's advocate & driving creativity throughout your organisation. Doubleday: New York.

Continuous improvement

Continuous improvement – *kaizen* – is an approach of constantly introducing small incremental changes in order to improve quality and efficiency. There are many books of Kaizen. The book, Dailey K.W. (2005) The kaizen pocket handbook. DW Publishing, summarizes briefly what kaizen is and how to start with kaizen.

8.5 Element: Learning

8.5.1 Description of the element

Innovation is based on learning. At the same time, innovation needs unlearning. Adapting new ways of thinking and doing is the basis of innovation. In the "Learning" element we introduce organisational learning and discuss why it is so important task to develop. Furthermore, we describe how an employee can learn and help others to learn in a security organisation.

Individual, team and organisation level learning practices

Organisations and teams learn when their individual members learn. Learning is a process, where data is converted into information that is then converted into knowledge, as is shown in a simplified way in Figure 28.

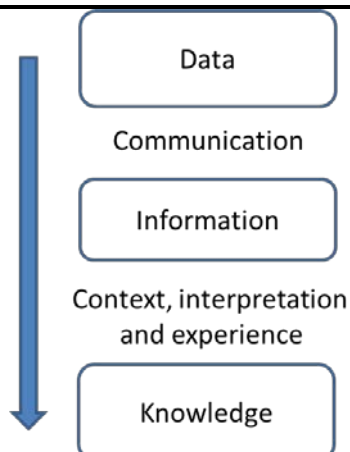


Figure 28: From data to knowledge.

Knowledge management is an organisational management system that supports the organisation in generating, sharing, applying and storing knowledge.

Organisational knowledge is embodied

- in physical artefacts: equipment, layout, databases, documents
- organisational structures: routines, standard operational procedures, roles, reward systems
- people: skills, values, beliefs, practices

To describe different learning practices, two different kinds of knowledge are defined: tacit and explicit. Figure 29 describes main features of tacit and explicit knowledge.

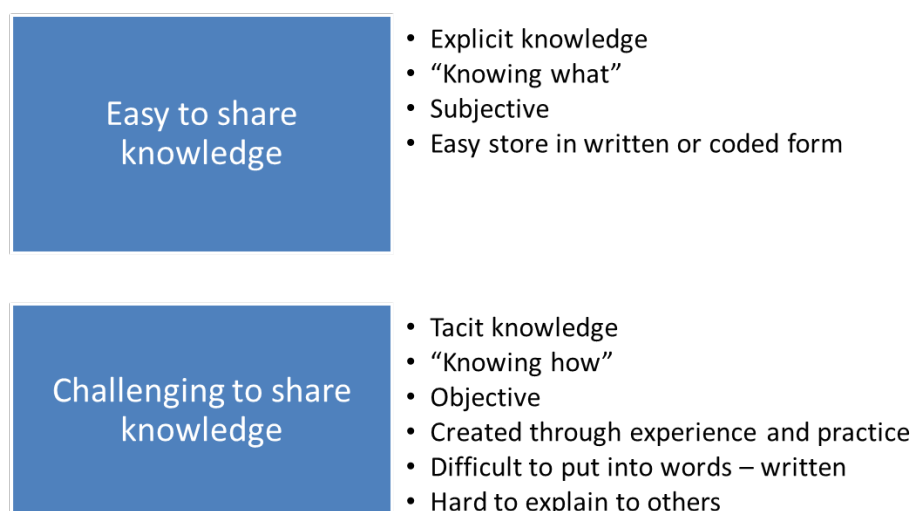


Figure 29: Explicit and tacit knowledge

Examples of individual level learning practices for "easy to share knowledge" (explicit knowledge) are training courses, manuals, process descriptions and books. To "challenging to share knowledge" (tacit knowledge) fitting ways to learn are learning by doing, job rotation and so called "tandem learning", where an expert and an apprentice are working together in order to transfer expert knowledge. Individual learning supports openness and the climate of psychological safety in the organisation. Employees need motivation to share, to create new, and to learn more.

Team learning processes include acquiring or sharing knowledge that one of the team member already possesses, generating new knowledge through collaboration and interaction, interpreting and evaluating knowledge, and integrating knowledge. Examples of team learning tools and practices are feedback, lessons learned, cross-functional development projects, and idea generation workshops. The team level learning happens when the team members are motivated to share their knowledge. Diverse teams, where the members possess different information due to their variable backgrounds, boost learning. Furthermore, the team level learning can be accelerated by having small enough team and avoiding overloading the team members with information.

The organisation level learning has two processes: integrating and institutionalizing knowledge. Relevant things in the organisational level are organisational memory, like documentation, and diverse communication channels (redundancy). Diverse communication channels are also important from innovation perspective. The most important characteristics of an organisational culture that supports learning are: open climate, autonomy, seeing failures as learning possibilities, inspiring vision, commitment, care, and trust.

Managing organisation's knowledge

Why do security organisations need to improve organisational learning? Why do they need to have knowledge management systems? The following list lists some of the benefits of knowledge management systems:

- time saving, finding needed information and knowledge fast
- avoiding double work
- avoiding loss of knowledge in cases of retiring and job changes
- good knowledge management is a way to increase motivation and commitment
- organisation needs continuous change, because its operation environment is in continuous change

To be able to utilise organisational knowledge, the organisation must filter, categorize, store and share the knowledge.

As an example of multifaceted knowledge management tasks, some tasks relating to ideation are listed below:

- analysing innovation needs
- gathering information in the organisation

- to reuse old ideas
- lessons learned in earlier projects
- gathering information outside the organisation
- information sharing
- evaluation of potential solutions
- storing new ideas and knowledge

The following table (Table 7) shows some examples of practices and tools which enhance learning in an organisation.

Practices and tools	Learning objectives
Internal meeting	- sharing information and knowledge, (creating knowledge) - converting tacit knowledge to explicit - documented form
Workshop	- sharing and creating knowledge - converting tacit knowledge to explicit - documented form
Project lesson learned (review)	- learning from success and failures - converting tacit knowledge to explicit - documented form
Job rotation	- transferring tacit knowledge to other task and contexts
Internal/ external training	- sharing information (and knowledge)
Expert group	- sharing and creating knowledge
Development group	- creating knowledge
Databases and information systems	- capturing and storing information
Intranet (discussion column, blogs, wikis)	- sharing information - building common understanding
Incentive system	- motivating through rewarding to share information
Expert catalogue	- helping to find experts (tacit knowledge)

8.5.2 Who is involved

All managers and employees are involved in organisational learning. Top management have the best possibilities to accelerate it. They can motivate others to share, create and learn more. Managers can allocate resources to development projects related to learning and training. They can also put up a knowledge management system that better supports organisational learning. An organisation can also use training suppliers and partners to enhance training activities. Also in some cases, where a separate IT system is needed to support organisational learning, information technology supplier is involved.

8.5.3 Checklists

Organisational knowledge

The following checklist is a tool to evaluate how well an organisation's knowledge management practices support organisational learning:

- employees have access to all needed information
- employees feel free to criticise existing practices and to suggest improvements
- culture of helping and guiding each other
- culture of sharing knowledge
- information is easy to find
- information is stored in a structured way
- projects are evaluated and results stored – lesson learnt are transferred
- time to share knowledge
- well-defined processes and practices
- focus on storing knowledge for later use – easy to find, easy to adapt
- means for motivating people to share knowledge – incentives, esteem, culture

Barriers of sharing knowledge

By the use of the following checklist barriers to knowledge sharing can be identified. After identification, actions towards eliminating them should be taken.

- employees do not know what information and knowledge is relevant for others
- hurry, tight schedules
- employees do not know which channels/media are suitable
- operational practices do not spur knowledge sharing
- difficulties of tacit knowledge sharing
- employees do not understand the value of the knowledge they have
- organisation is missing of common concepts
- organisation is missing on coordination
- confidentiality
- employees do not have the motivation to share
- knowledge is seen as power, sharing diffuses that power

8.5.4 More information (tools, practices, etc.)

Knowledge management

The online guide/portal InnoSupport for SME companies about innovation funded with support of the EC. (Sub chapter 10.3 Knowledge management for innovation.)

<http://www.innosupport.net/>

Knowledge conversion processes

In Figure 30, four processes of organisational knowledge conversion according to Nonaka & Takeuchi are presented. New knowledge to the organisation is created in a cycle where conversion between tacit and explicit knowledge proceeds in a spiral-like manner.

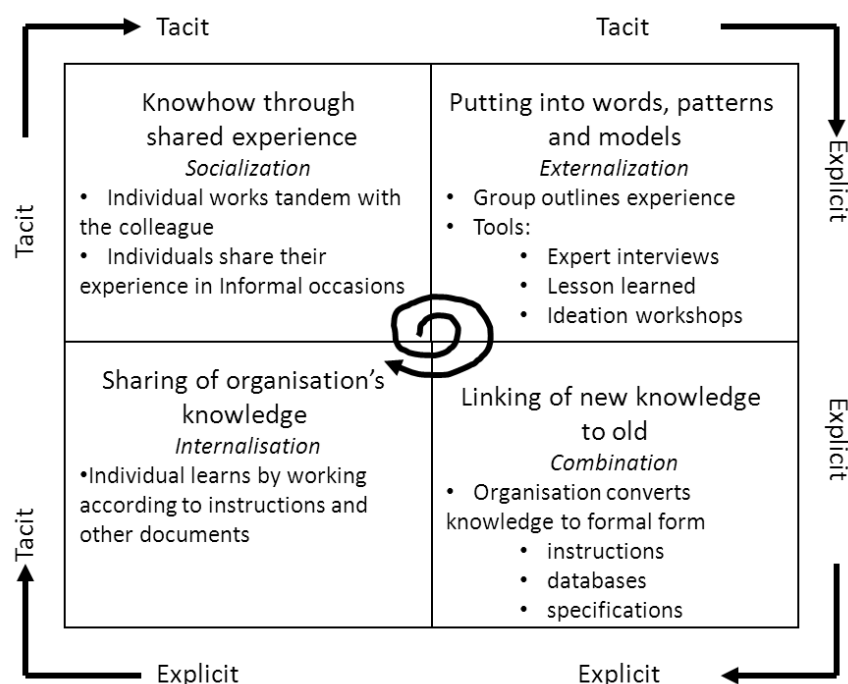


Figure 30: Organisational knowledge conversion cycle and some examples.

(source: Nonaka, I. and Takeuchi, H. (1995) *The Knowledge-Creating Company: How Japanese Companies Create the Dynamics of Innovation*. Oxford Univ. Press)

8.6 Element: Change management

8.6.1 Description of the element

Innovation requires change and change induces innovation, thus change and innovation are overlapping phenomena that are difficult to observe separately. This change management element discusses changes in organisational processes and practices, whereas the Implementation module focuses on the execution of new services.

As such, this change management element introduces a managerial view on how to execute planned change in a security organisation, and how to support and control emergent change. More general information on utilisation of project management practices can be found from the project management element in the Implementation module. Also, the Leadership and management element offers additional information and helpful advice.

Change management practices are not only important in the private sector; there are plenty of reasons why the public sector should pay close attention to them:

- resources in the public sector are often scarce, and thus public organisations increasingly strive for efficiency and cost effectiveness instead of stability; also, competition and co-operation between public and private sector service providers is becoming more common
- as previously stable operating environment becomes more and more complex, and is continuously changing, many public organisations try to learn from industrial management practices and replace their previous bureaucratic practices
- citizen and customer expectation are becoming more demanding in terms of choice and quality of services

Planned change process is used, for example, in implementing new strategy or improving organisational culture. However, not all change is planned. Emergent change can simply happen little by little, without a predetermined plan. In case of public security organisation, emergent change may come from local or national level changes in political climate or as consequences of sudden unforeseen crises related, for example, to the environment (earthquake, forest fire), health or social issues (epidemic), or human intent (terrorism, fire). Very often the realized change is a combination of both planned and emergent changes.

Planned change process



Figure 31: Planned change process

In order to minimize resistance to change, a planned change process starts with the argumentation of urgency for change (see Figure 31). The argumentation should include positive viewpoints: what new opportunities and possibilities the proposed change offers to

the personnel? It is important to emphasize the employees' viewpoint, not only that of the organisation.

The next step of a change process is creating a vision and a strategy. The importance of an inspiring vision should be taken seriously. Employees' commitment to such a vision can be strengthened, for example, by involving employees to the visioning process. Also, getting personnel to commit to a change is best achieved through participation and by clear argumentation of personnel's standpoints. Successful change processes usually create also short-term results. These can be achieved, for example, by piloting new ways of doing in a small scale. Especially in public security organisation, external commitment is crucial. Politics, civil servants and other stakeholders have power, monetary resources and vision of change objectives. Political actors often wish to see fast and cost efficient change processes.

Change projects need careful planning and, of course, they need to be provided with enough resources. Planning itself needs resources. Also internal and external communication, employee training, developing new processes and practices and testing require redeployment and redirection of resources. Programs are one option to simplify and utilise scarce resources in case, where are many change processes with coherent change objectives. Change programs achieve greater internal and external attention than separate small change projects, which will help successful execution.

Executing a change process in small incremental steps can reduce resistance and make refining of changes possible during the process itself. Development project management practices makes the change process more visible in the organisation, as well as easier to manage.

Embedding changes into the processes of a security organisation successfully requires that the new practices are incorporated into employees' daily routines. This is a process of learning and routinizing the new practices. Changing organisational practices and routines requires both unlearning old practices and learning new ones. It is the manager's responsibility to ensure that organisational processes, IT-systems, incentives, formal organisation structures, management and human resource practices support change objectives and learning.

The progress of a change process needs to be monitored and evaluated to ensure that the change objectives are met and the aimed results achieved. Data of the progress should also be collected for communication purposes (both internal and external) and to be used as evidence for stakeholders. After the change process monitoring must be continued to ensure that organisation does not lapse into old practices.

Process of emergent change

When managing change, emergent change processes also need to be paid attention to. From management point of view there are two important aspects to keep in mind: how will the organisation survive and utilise sudden unforeseen crises to its benefit, and how support and, if needed, redirect emergent changes to serve the actualisation of organisation's mission and vision. The best time to implement change is during crises and external threats since there will be minimal resistance.

Flexible organisation structure, utilisation of different learning practices and familiarity to planned change process will help. An organisation cannot be prepared for all possible crises at all times, but it can get more time to prepare to some threats through foresight activities. Further, a flexible organisation which is familiar with change survives better than a bureaucratic organisation that will paralyze when it meets crises.

A slowly changing organisational environment requires constant vigilance. Annual strategy updating process, personnel survey and other monitoring and evaluation tools can be used to identify changes in organisation culture and practices.

8.6.2 Who is involved

All managers and employees are involved, because organisational change is a multi-level and cross-organisation process. Top managers have main responsibility of change management by identifying opportunities, motivating and allocating resources for development projects and supporting emergent change by encouraging experimentation, learning and risk-taking. In many case internal change agents, guiding coalition and/or external facilitator help change execution management.

8.6.3 Checklists

The following checklist helps to find out means for reduce change resistance

- communicate objectives and urgency of change
- allocate enough time and resources to change process
- communicate of change progression
- assert and encourage widespread participation
- offer channels for ideation, feedback and criticism
- offer job security to employee
- offer retraining to employee
- execute gradual implementation
- understand employees' reasons to resist change (missing authority, old skills not valuable anymore, new or missing responsibilities, time-consuming, unpleasant, expensive..)

The following checklist helps to find argument external stakeholders.

- customers and or citizen directly benefit from new or improved services and processes
- time needed to launch new or improved service or process

- the way how new or improved service or process improve security organisations competitive position and or efficient resource utilising
- resources needed

8.6.4 More information (tools, practices, etc.)

More detailed information of planned change and Kotter's eight step models can be found from: Kotter J.P. (1996) "Leading change". Harward Business School Press. Boston.

More about implementing a change can be found in: Brown K., Osborne S. B. (2005) Managing change and innovation in public service organisations. Routledge.

More about change methods and tools can be found in: Holman P., Devane T., Cady S. editors (2007) 2. ed. The change handbook: the definitive resource to today's best methods for engaging whole system. Berrett-Koehler.

9 Overview of assessment tool

One of the exploitation objectives of the INNOSEC project is to offer a web-based support tool that will allow security organisations to easily select and implement the most appropriate modules and elements of the model according to their specific needs in innovation management. For that, an assessment tool will be developed which will complement the INNOSEC model and be available through the web-based tool. In this deliverable D4.3 an overview of the assessment tool is given.

The web-based assessment tool is based on the following dimensions:

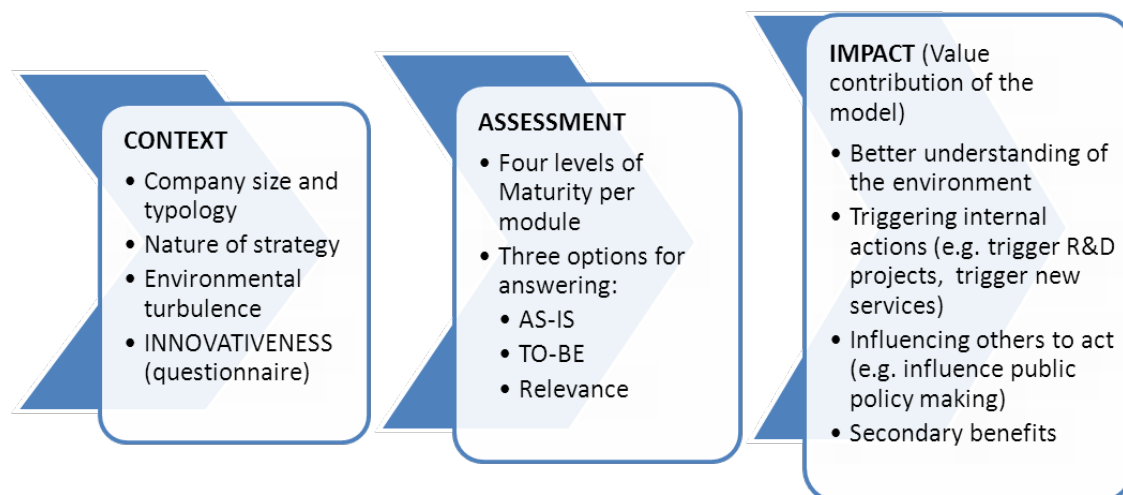


Figure 32: Proposed dimensions for the web-based tool

The first dimension will be covered by a contextual pre-assessment which, on one hand, assesses the environment of a security organisation and, on the other hand, the current responsiveness of the organisation to meet new security requirements through innovation as well as the needs to improve the innovation capability of the organisation in order to better respond to security threats. The second dimension will result in a specific assessment tool that will offer a diagnosis of the current status of the security organisation with regards to best practices in innovation management. The results of the diagnosis will guide the security organisation to choose the module(s) and its corresponding element(s) that should be undertaken at first. The third dimension will offer a checklist to be used for defining the impact of the INNOSEC model thorough the security organisation.

The implementation of innovation management practices in the security sector might be considered as a journey. The INNOSEC model is designed to accompany security organisations in that journey. The assessment tool focuses on enabling security organisations to answer the three following questions:

1. What is the starting point or 'AS-IS' level related to the application of innovation management practices according to the modules of INNOSEC model?
2. Where does the security organisation plan to evolve in the near future or 'TO – BE' level in its journey to increase its level of innovativeness?
3. Which aspects of innovation management have the most relevance for the security organisations?

The “INNOSEC-Maturity Assessment tool” proposes four levels of maturity in which a security organisation could be mapped to identify not only their current stage, but also to what next stage can they evolve in case they implement any of the modules to improve their innovativeness.

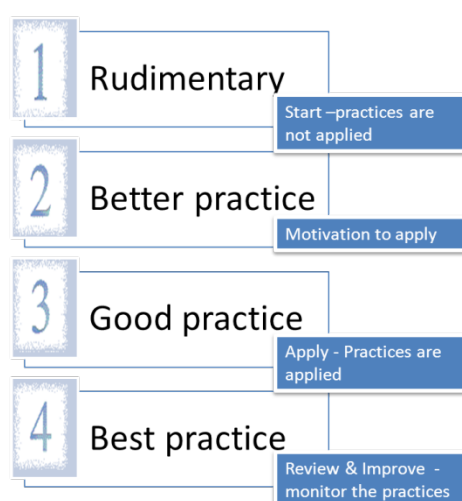


Figure 33: Proposed four maturity levels of the innovativeness maturity assessment

The “INNOSEC-Maturity Assessment tool” will be divided into five blocks which correspond to the five modules of the INNOSEC model. Based on the Guidelines of Section 3 and detailed information in each of the modules (Sections 4 to 8), a set of innovation practices has been elaborated for each of the elements of the five modules. An example is provided in Figure 34.

MODULE	ELEMENT	Level	Qualitative Innovation Best Practices
MODULE 1: INNOVATION STRATEGY	Innovation Strategy FRAMEWORK	1.1.1	Corporate Foresight is used to analyse external aspects-measuring environmental turbulence
		1.1.2	The company measures environmental turbulence in its sector
		1.1.3	The company communicates the evaluation's results of the environment and key factors using automated and standard reports
		1.1.4	The top management is fully committed to continuously improve the innovation management process
	Innovation Strategy PROCESS (Strategy Analysis, Strategy Choice and Strategic Control & Monitoring)	1.2.1	The firm has defined the Innovation Strategy (separately from the Organisational Strategy)
		1.2.2	The balance between top-down strategy and bottom-up exists
		1.2.3	Strategic control & monitoring: Is the strategy process perceived as an iterative learning process in the sense of a "Plan-do-check-act"?
		1.2.4	How much engagement and resources are targeted towards defining, implementing and monitoring innovation strategy?
		1.2.5	The company communicates: To what extent is the innovation strategy communicated and is part of the culture of an organisation? Or is it just in the brain of the top managers?
	Innovation Strategy CONTENT	1.3.1	The innovation strategic goals (implicitly or explicitly) have been defined
		1.3.2	The focus and field of innovation activities (service innovation, process innovation, organisational innovation)
		1.3.3	The Leadership or follower strategies have been defined
		1.3.4	The Innovation Strategy is aligned with internal or external capacities (make/buy)
		1.3.5	The company has defined a IP strategy (How to protect the unique and distinct resources and competencies of an organisation? Intellectual property right, complementary assets, services, etc.)

Figure 34: Example of innovation practices defined for Innovation Strategy Module on the "INNOSEC-Maturity Assessment tool"

In order to facilitate users of the assessment tool to select which of the four maturity levels better link with the provided practices in innovation management, a second level of assessment is provided as per each practice. For each practice, four statements have been described so that a user can identify in an easy way in which maturity stage the security organisation is located. Figure 35 shows an example:

Level	Qualitative Innovation Best Practices	AS-IS	TO-BE	Relevance (1 to 4)
1.1.1	Corporate Foresight is used to analyse external aspects-measuring environmental turbulence			
1	There is no use of Corporate Foresight to deeply know the environment			
2	The company is interested to learn how to use the Corporate Foresight			
3	Some service development teams have been trained to use Corporate Foresight			
4	The R&D department (and its teams) uses Corporate Foresight to make decisions			

Figure 35: Example of statements in the first innovation practice of the Innovation Strategy module

All the statements will be assessed from two points of view:

- the current maturity level (AS-IS)
- the expected or desired maturity level that a security organisation would like to achieve (TO-BE)

Besides the AS-IS and TO-BE, the user is also asked the relevance from 1 to 4 for each specific practice.

The process will result in an assessment report (INNOSEC-Maturity Assessment results report) that the security organisation can use in communicating the assessment results. The “INNOSEC-Maturity Assessment results report” will provide the security organisation with a radar diagram which graphically represents those areas that needs to be improved using the INNOSEC model. Finally, the “INNOSEC-Maturity Assessment tool” will facilitate the tracking of organisation’s progress in its journey to increase its capabilities in innovation management after the implementation of INNOSEC model or its modules by repeating the assessment exercise.