



Societal
Security
Network

VIRTUAL CENTRE OF EXCELLENCE FOR RESEARCH SUPPORT AND COORDINATION ON SOCIETAL SECURITY

D2.5 REPORT ON PRINCIPLES, METHODS AND TOOLS FOR IMPLEMENTING INTERFACES

This project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement no 313288.



Societal
Security
Network

01.01.2014
31.12.2018

info@societalsecurity.net

Coordinator:
PRIO



www.societalsecurity.net



D2.5 Report on Principles, Methods and Tools for Implementing Interfaces

Abstract: Task 2.5 identified both a list of obstacles to as well as general recommendations for successful knowledge sharing between the different sectors concerned with societal security and developed a set of tools and methods to overcome experienced difficulties in the interaction, to stimulate discussions and to improve the mutual understanding of the future SOURCE network of excellence.

Contractual delivery date: M12 +2 month

Actual delivery date: M14

Version: 1

Total Number of pages: 47

Authors: Sonja Grigoleit, Ruth Schietke, Milos Jovanovic

Contributors: Joachim Burbiel

Reviewers: J. Peter Burgess

Dissemination level: PU



Contents

Introduction.....	1
1. Knowledge Sharing – An Introduction.....	2
1.1. What is knowledge sharing?	2
1.2. Why do we need knowledge sharing?	2
1.3. What are the preconditions for knowledge sharing?	4
1.4. What are the barriers and promoters for knowledge sharing?	5
1.5. What are the lessons-learned from other disciplines regarding knowledge sharing?	7
1.6. Knowledge sharing in societal security	8
2. Catalogue of knowledge sharing tools and methods.....	10
2.1. Knowledge sharing tools	10
2.1.1. Newsletters	10
2.1.2. Media Advisories and Releases	10
2.1.3. Electronic mailing lists	11
2.1.4. Knowledge Portals.....	11
2.1.5. Knowledge Map.....	11
2.1.6. Websites	11
2.1.7. Conferences.....	11
2.1.8. Discussion Forums.....	12
2.1.9. Collaboration Tool	12
2.1.10. Communities of Practice (CoPs)	12
2.2. Workshop-based knowledge sharing methods.....	13
2.2.1. Moderated (conventional) Workshops	13
2.2.2. Workshops applying the World Café Method.....	16
2.2.3. Weighted-Bit Assessment Methods.....	19
2.2.4. “Serious Gaming” approach using the example of SETAG / DTAG	21
2.2.5. Scenario Technique	23
2.2.6. TRIZ.....	26
2.2.7. PPA.....	28
2.3. Other knowledge sharing methods.....	30
2.3.1. Direct consultations with external experts by interviews or written input	30
2.3.2. Wiki Principle.....	32
2.3.3. Crowdsourcing.....	34
3. Concluding Remarks and Outlook	36
3.1. Summary of barriers and obstacles to mutual understanding and knowledge sharing between the different sectors concerned with societal security.....	36
3.2. Summary of knowledge sharing methods.....	38
3.3. Outlook.....	41
Annex.....	42
References.....	46



Introduction

The overall objective of WP2 is to establish and support a network linking researchers, actors, agencies and institutions most concerned with societal security in Europe. The network will form the core for the future Virtual Centre of Excellence. The challenge lies in the fact that though there are many actors concerned with societal security, they are concerned in widely different ways.

The different perspectives of each security sector on societal security are accompanied for example by different technical languages, different understanding of needs and requirements, different national or cultural backgrounds, and/or different ideologies or philosophies of life. These factors influence how the different stakeholders communicate and collaborate, so that the interaction between the representatives of different stakeholders ranges from easy and smooth to sometimes problematic or even conflictual.

While task 2.4 mainly aimed at characterizing different modes of interaction of the different sectors and has identified the obstacles which could hinder a successful collaboration, task 2.5 developed a set of tools and methods to facilitate (and also improve) links and interactions between the different security sectors and their respective points of view on societal security.

To do this we have undertaken a literature research on knowledge sharing in general to learn about the general obstacles and barriers regarding the sharing of knowledge and also to learn about how to overcome these obstacles and how to set up a successful knowledge sharing network of societal security in Europe. Further, this report will describe suitable tools and methods to stimulate discussions and to create a mutual understanding for and between the different sectors of the SOURCE network.

For this report different types of data have been used: (1) literature research on knowledge sharing in general, (2) findings of D2.4, (3) results of the online questionnaire which has been developed and conducted in task 2.4, (4) literature research to gather information regarding methods and principles to induce and facilitate knowledge sharing and thus a better understanding of and between the different security sectors.

1. Knowledge Sharing – An Introduction

1.1. What is knowledge sharing?

Knowledge sharing is an activity through which knowledge is exchanged among people or organizations. [1] Davenport and Prusak have distinguished knowledge from information and information from data on the basis of a value-adding process, which transforms collected facts and figures into communicable messages and then into knowledge: [2]

- **Data** is a set of discrete, objective facts about events.
- **Information** can be described as a message, usually in the form of a document or an audible or visible communication. As with any message, it has a sender and a receiver.
- **Knowledge** consists of experience, values, contextual information and expert insight that provides a framework for evaluating and incorporating new experiences and information. It originates and is applied in the minds of knowers.

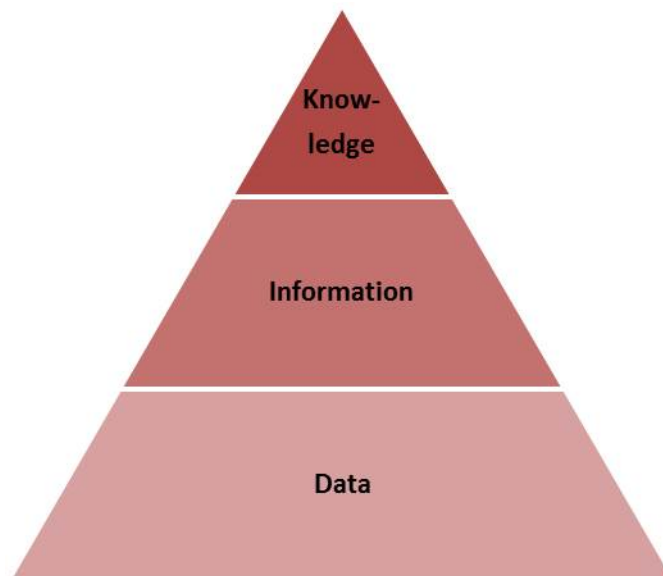


Figure 1 Data to Wisdom (Nirmala 2011)

In general, there are two types of knowledge: **tacit knowledge** and **explicit knowledge**.

Tacit knowledge is the kind of knowledge that is difficult to transfer to another person by means of writing it down or verbalizing it. For example, the ability to speak a language or knead dough requires all sorts of knowledge which is difficult or impossible to explicitly transfer to other users. Since tacit knowledge is highly individualized, the degree and facility by which it can be shared depends to a great extent on the ability and willingness of the person possessing it to convey it to others. [3–5]

Although the sharing of tacit knowledge is a great challenge, there are various activities and mechanisms which help sharing this kind of knowledge. They include conversations or workshops or the use of information technology tools such as email, groupware, instant messaging and related technologies (see chapter 2). [5]

Explicit knowledge is knowledge that has been articulated, codified and stored in certain media. It can be readily transmitted to others. The information contained in encyclopaedias and textbooks are typical examples of explicit knowledge. [5, 6]

1.2. Why do we need knowledge sharing?

The different sectors involved in the SOURCE network of excellence operate with fundamentally different understandings of security threats and societal security in general. They differ considerably in terms of their values, their means and their goals. This is because they grow out of different



“knowledge communities”, that is educational and training backgrounds, institutional foundations, different techniques and technologies, and different means for communication and dissemination of their work.

While there are many publications about the **value of knowledge sharing** in organizations and the need to share knowledge among the management and the staff in order to grow stronger and become more competitive, [5] there are relatively few publications about knowledge sharing between different sectors and types of organizations.

However, in 2006 the European Commission identified the importance of improving knowledge transfer between research institutions, the industry and civil society organisation in its broad-based **innovation strategy for the EU** as one of ten key areas for action. [7]

One of the basic models of knowledge management is the SECI model of **knowledge creation**. It can be used to explain the process of knowledge creation in organizations on the basis of knowledge transfer activities. While it has been developed for the business sector, it can also be used to understand how knowledge creation could work in broader networks including different sectors and disciplines.

The **SECI model** is based on a double spiral movement between tacit and explicit knowledge. Figure 2 shows the four modes of knowledge conversion: socialization (from individual tacit knowledge to group tacit knowledge), externalization (from tacit knowledge to explicit knowledge), combination (from separate explicit knowledge to systemic explicit knowledge), and internalization (from explicit knowledge to tacit knowledge): [5, 8]

Socialization is the process of sharing tacit knowledge of individuals. Sharing experiences is a key to understanding others’ ways of thinking and feeling.

Externalization requires the articulation of tacit knowledge and its translation into forms that can be understood by others. Dialogue supports externalization. In practice, externalization is supported by the use of metaphors and analogies.

Combination involves the conversion of explicit knowledge into more complex sets of explicit knowledge. Editing and systemizing such knowledge are the keys to this conversion mode.

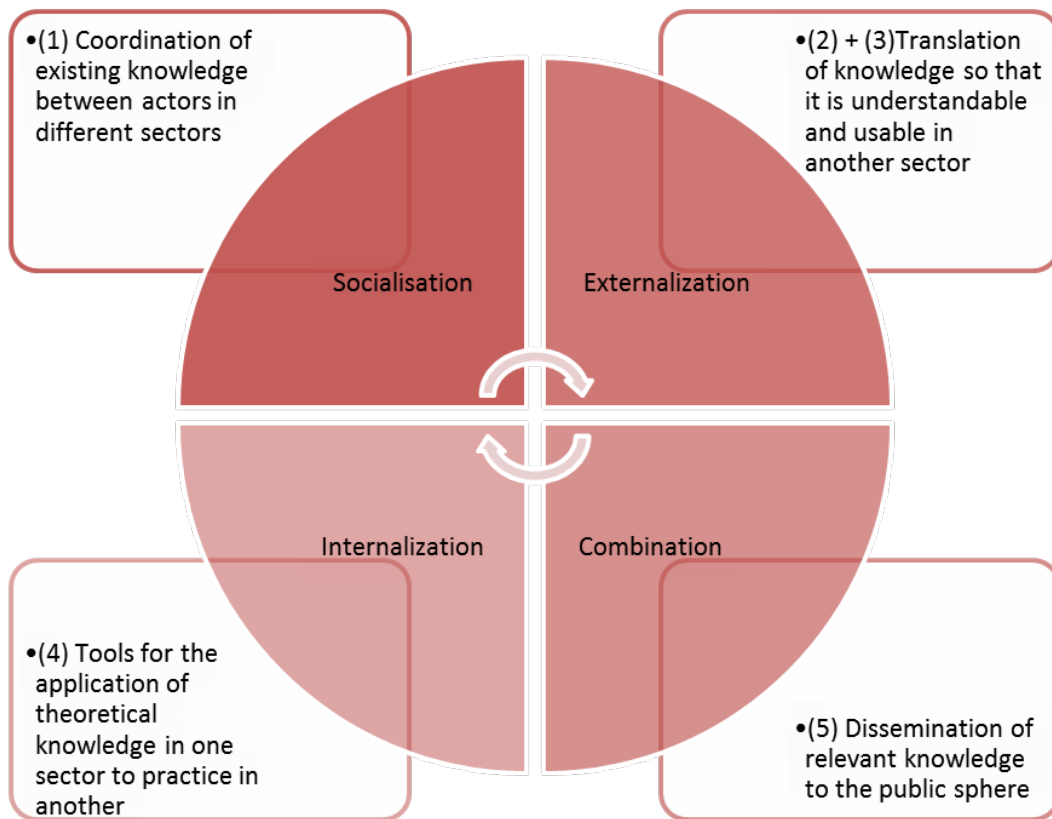


Figure 2: Organizational knowledge creation model [9] and the Five Modes of Interchange of the SOURCE project

Internalization means the conversion of newly created explicit into tacit knowledge of individuals. Learning by doing, training and exercises are important to embody explicit knowledge. Thus on the-job training (OJT), simulations or experiments are used to induce internalization of new knowledge.

Within SOURCE **Five Modes of Interchange** have been identified to describe the process of knowledge sharing with the SOURCE network:

- (1) Coordination of existing knowledge between actors in different sectors.
- (2) Translation of current knowledge from one sector to another in such a way as to make concepts, principles and empirical knowledge produced and exchanged within one sector understandable and usable in another thus ensuring integration.
- (3) Conceptualisation of practical experience and best practice in one sector such that it can be used as a basis for practical application in another.
- (4) Tools for application of theoretical knowledge in one sector to practice in another.
- (5) Dissemination of relevant knowledge and activities from one sector to those segments of the public sphere concerned with knowledge in the other.

The SECI model could be slightly modified to include the special characteristics of knowledge sharing between different security sectors. Figure 2 shows the integration of the SOURCE Five Modes of Interchange into the SECI model.

1.3. What are the preconditions for knowledge sharing?

To establish this knowledge sharing culture in the SOURCE network of excellence and to help create new knowledge in societal security, it is helpful to learn from the already established models and

processes of knowledge sharing in the business sector and to use the approved tools of **knowledge management**.

There is no universally accepted definition of knowledge management. Put very simply, knowledge - management can be seen as an application of the SECI model of knowledge creation, i.e. as the conversion of tacit knowledge into explicit knowledge, combining and sharing it with others. It is useful to consider knowledge management as having three pillars. These pillars are: management and organization, infrastructure/content management as well as people and culture. [5]

Management and organization: In organizations the most important pillar of knowledge management is the commitment of the highest level of management. Translated to the SOURCE network of excellence this would mean the commitment and dedication of the future management board of the virtual centre of excellence.

To be dealt with
in WP2.9

Infrastructure/content management: An adequate ICT infrastructure is needed in order to better create, organize, share and apply knowledge. In any knowledge management system, three principal technology infrastructures are needed. These are: firstly, the technology Infrastructure needed to organize content (e.g. taxonomy or knowledge mapping); secondly, the technology infrastructure needed to search information, once organized; and thirdly, the technology infrastructure needed to locate appropriate expertise (e.g. people finders).

To be dealt with
in WP2.8

People and culture: People and culture as an enabler of knowledge management requires three important elements. These are: the redefinition of organizational structure, the corresponding human resource practices, and a consistent organizational culture. For the SOURCE network of excellence only the last two elements are relevant. This means that the SOURCE network should take care of inviting all the relevant experts into our network and that it is also important to create a climate of trust and an environment of openness.

To be dealt with
in WP4

On the basis of these general preconditions for knowledge sharing in the network of excellence we have to identify on a more detailed level, how we could advance knowledge sharing and collaboration in the SOURCE network and how we could remove possible obstacles and barriers.

1.4. What are the barriers and promoters for knowledge sharing?

In a study about knowledge sharing among the different stakeholders involved in the health sector (researcher, policymaker, end-user) it was reported about several barriers due to the different backgrounds and work conditions. [10]

Firstly, academic **researchers** receive only few incentives from universities to participate in non-research activities beyond publishing in peer-reviewed academic journals and presenting at conferences. As knowledge sharing is often seen as something that occurs after the research is concluded, when resources may be exhausted, the knowledge sharing component is often lost.

Secondly, **policymakers** are often faced with the daunting task of sorting through a mountain of information to isolate key knowledge. Research evidence is only one source of information among many others and may conflict with policymakers' values and the current political climate.

Thirdly, **end-users** face a number of challenges that limit their participation in knowledge sharing. Often, time and resources are not available to engage in knowledge sharing. End-user may also see research evidence as contradictory with their practice experiences. Given that research evidence may be perceived as inaccessible or difficult to understand, it is not surprising that research evidence may be rejected in favour of professional experience.

In another study about knowledge sharing among scientists [11], Prescott Ensign takes up the task of understanding tacit knowledge transmission within the context of a multinational, multidivisional company. The main finding of Ensign’s research is that reputation¹ matters a great deal in knowledge sharing among scientists, with a favourable reputation of the scientist asking for information resulting in a greater likelihood that the information will be secured. The more detailed results are summarized in Table 1.

Influencing factor	Effect on knowledge sharing
Past favourable behaviour – (personal/professional relationship)	negative ²
Past favourable behaviour - (Co-work/Co-locate relationship)	negative
Duration of interaction	positive
Frequency of interaction	not significant
Predictability of behaviour	positive
Reciprocity (expectation that the recipient would give help back to the source)	positive
Obligation (imbalance of exchange)	negative
Physical distance	negative
Expertise of recipient	positive
Organizational Connection	positive
(Substantial) Contribution and Uniqueness of Sharing (knowledge cannot be obtained readily from another source)	positive
Time and Effort Required for Sharing	negative

Table 1: Summary of results of Prescott Ensigns study [11]

A study conducted by DG Research in 2006 regarding the transnational research cooperation and knowledge transfer between public research organisations and industry highlighted a number of key

¹ **Reputation** is defined as an assessment of past behaviour and the expectation of future behaviour. Past behaviour is further decomposed into the nature of the interaction between two scientists (personal/professional interactions, and co-work or co-location interactions), duration of the interaction, and frequency of interaction. Future behaviour is conceptualized as predictability in the interaction, reciprocity, and obligation (or “debt” in information exchange).

² Contrary to expectation, sharing was less among closer colleagues perhaps because of issues of competitiveness. [12]



issues that should be addressed if closer linking between research and industry should be achieved: [13, 14]

- The alignment of interests between a research organisation and a private company within a given Member State is not always straightforward due to the **different agendas and expertise** of the parties;
- Transnational collaboration is additionally hampered by three main factors: **cultural differences** (including language), **legal differences**, and **difficulties in finding partners**.
- Research organizations find it difficult to balance their researchers' desire for **open access** to research results with the need to protect them if they are to become commercially viable products.
- Although not being the sole factor, the differences between existing **legal frameworks** has a strong disincentive effect on transnational collaboration. The main research related barriers are the differences in IPR ownership regimes and joint ownership.

According to McDermott in knowledge sharing communities four key challenges must be overcome: [15]

- **The technical challenge.** Human and information systems must be designed to help community members think together, in addition to simply making information available.
- **The social challenge.** Communities must maintain enough diversity to encourage innovative thinking, yet still have common goals and interests.
- **The management challenge.** Environments that truly value knowledge sharing must be created and maintained.
- **The personal challenge.** Community members must be open to the ideas of others, be willing to share ideas, and maintain a thirst for new knowledge.

When these challenges are addressed, knowledge-sharing communities can provide opportunities for researchers, policymakers, and end-users to work together and learn from one another.

1.5. What are the lessons-learned from other disciplines regarding knowledge sharing?

The Handbook of Knowledge Sharing from the University of Alberta [10] formulated three main strategies to overcome common obstacles in knowledge sharing between different sectors:

1. Consider the audience

Knowledge sharing is a process that requires guiding the audience in a particular way of thinking. To do so requires an understanding of the problems they face, the level of detail they need, and the style of thinking they use. [15] The message must be one that is valuable to an audience based on their needs, delivered by a messenger they can trust, in a language they are comfortable with. [16]

2. Use Plain Language

If a community of people sharing knowledge spans several disciplines and contexts a common language is needed. [15] Thus, the use of plain language is highly recommended whenever possible in knowledge sharing.

3. Tell Stories



Evidence itself is not sufficient; it must be communicated in ways that make it compelling. Telling stories may be one way to present research and other forms of knowledge in a way that is appealing to diverse audiences. [16]

The Knowledge Handbook further points out six characteristics of successful partnerships in research collaborations of partners with different backgrounds: [17]

- **Cultural sensitivity.** Differences between partners are respected.
- **Trust.** The investments researchers, policymakers and end-users make to engage in a partnership are recognized; disagreements are expected; and ways to resolve conflict are established prior to disagreements.
- **Commitment.** Partners are committed to solving a problem and see research projects as single steps towards the solution.
- **Clear roles and expectations.** All parties are clear about their intentions, assumptions, and limitations at the start of the process. In particular, written partnership agreements can be helpful in ensuring clarity.
- **Partner with the organization, not the individual.** Partnerships should be between organizations rather than individuals to protect against staff turnover and to increase the likelihood that project outcomes will be used.
- **Organizational support.** Resources such as time and money may be more accessible if employers are supportive of the partnership.

1.6. Knowledge sharing in societal security

In task 2.3 of the SOURCE project a sector survey meeting has been performed to learn about how the different actors concerned with societal security interact and where obstacles in mutual understanding and consequently, in reaching a common agreement might lie.

In task 2.4 this issue was investigated further by analysing the results of an **online questionnaire** and using six different studies containing **desktop research** about the different security claims defined in D2.3 (security value, morals, social norms, cultural ideals, political priorities and economics). The results of this report are threefold.

Firstly, we were able to identify the issues and topics of societal security which are especially conflictual. We learned about the **problem-specific obstacles** the stakeholders have to overcome to reach a common security decision and identified the conflictual security aims. For more details please see D2.4. [18]

Secondly, we showed that barriers and disagreements between the different sectors do not only depend on the different professional backgrounds or the technological or specialist knowledge of the actors. The main reason for societal security actors in Europe experiencing difficulties with other sectors seems to be the feeling that they have **incompatible ideologies or philosophies of life**.

And thirdly, we demonstrated that the societal security actors experience **moral and ethical issues followed by social implications to be the most conflictual subjects** to discuss with representatives of other sectors. This also shows that the different specialised knowledge alone is not the main reason for the encountered differences. Instead, it seems that it goes to the heart of our personal moral



concepts, our ethical principles and our own priorities how societal security should look like in Europe.

The main aim of the questionnaire, which was developed and distributed in task 2.4, was to analyse the interaction of the different sectors involved in societal security and to identify obstacles and barriers in the cooperation as well as conflictual subjects in discussions. Additionally, the participants were asked to make some **suggestions how to overcome the encountered difficulties** and obstacles. This question was not answered by all participants. However, the received “free text” answers are included in the annex of this report.

The answers show that most of the participants are aware of problems existing between the different actors and their different ways of dealing with the societal security topic. Although not all of them formulated it explicitly, it seems that the main reason for the difficulties among the different security sector representatives is a lack of a common understanding regarding societal security in general and a missing mutual understanding and acceptance regarding different perceptions, perspectives, arguments and attitudes.

A minority of the participants (3 out of 25 responses) of the questionnaire seem to be pessimistic that the discrepancies between the different sectors can be overcome. These participants experience the different sectors to be in incompatible thought-worlds and see **deep-rooted discrepancies** between professional needs and perspectives. They have “no suggestion how to overcome the fundamental difficulties with ‘hardliner’”.

Most of the participants suggest having **more face-to-face meetings** between the representatives of different sectors. They state that “more dialogue is needed” and that we should “reserve time-slots for interactive-discussions and comparison of how minor and mayor aspects are perceived and understood”. It was also stated that “language is an ongoing challenge” and that we should use **plain language** and make an effort to “ensure clarity of understanding, reduce jargon, acronyms and ‘insider’ language”. It was also generally suggested to present results in “popular and easy to understand formats”.

To reduce this lack of mutual understanding it was also demanded to **educate** the representatives of the different sectors about the approaches, processes and needs of other sectors. Participants wrote that it would be “useful that the researchers recognised the processes and routines of the policy-makers and that the policy-maker understood the principles of research and the freedom of thinking”. This requires more communication and/or collaboration between the actors concerned with societal security in order to promote the dialogue between them. Knowledge should be shared to improve the understanding of each other, to make points of view comprehensible and to facilitate learning from each other.



2. Catalogue of knowledge sharing tools and methods

The questionnaire which has been developed by the SOURCE project [18] provided the consortium with new insights regarding barriers and obstacles to knowledge sharing and successful collaborations among the sectors concerned with societal security. The main obstacle is seen in the different “thought worlds” of the representatives and a lack of mutual understanding, so that many participants of the questionnaire voted for more dialogue and especially more face-to-face meetings to overcome the barriers and challenges.

Thus, the SOURCE consortium has compiled a number of tools and methods to address these obstacles using both classical tools of knowledge management (see chapter 3.1) as well as creativity methods which include an intensive interaction of the participants (see chapter 3.2).

Knowledge management handbooks provide the reader with a broad range of methods, principles and formats for the documentation of data, sharing of information and transfer of knowledge. Thus, in the following chapter a selection of tools and methods will be introduced. These examples range from the distribution of newsletters, web-based tools to communities of practice. Short descriptions will give a brief overview about the selected examples. This selection does not intend to be an exhaustive list of knowledge sharing tools, but should give a general idea which tools might be useful for the SOURCE project. In the forthcoming tasks the consortium has to verify with external stakeholders which tools could be helpful, attractive and easy-to-use for the SOURCE network.

The overview of knowledge sharing tools is followed by a chapter about creativity methods which are useful for the SOURCE network to increase mutual understanding, mediate between different “thought worlds” or opposing points of view and to share knowledge about societal security. These methods will be presented in the format of “method profiles”. These profiles give an overview of the respective method (short description, necessary equipment, number of participants, costs) as well as an assessment on the basis of our personal experience with this method. This evaluation includes the suitability of the respective method regarding e.g. knowledge sharing or the facilitation of a common understanding as well as the advantages and disadvantages of the method and last but not least the fun factor or attractiveness for the participants. In the subsequent task 2.6 of the SOURCE project these methods also have to be evaluated regarding their specific usefulness in the SOURCE network of excellence.

2.1. Knowledge sharing tools

2.1.1. Newsletters

Newsletters, typically a collection of articles on organizational activities and related topics, can be useful for raising awareness of new ideas and innovations, and also to promote knowledge-sharing activities. Newsletters can reach a broad audience, especially if available both in print and electronic versions. However, because many newsletter articles are intended to reach a broad audience, thus requiring that content be generalized and limited in length, newsletters may be unsuitable for detailed communication. [10]

2.1.2. Media Advisories and Releases

Media advisories and releases are documents sent to the media with the goal of attracting press coverage. A media advisory is a brief tip sheet designed to attract the attention of assignment editors



and the attendance of news reporters to an event. A media release is more extensive than an advisory and contains the entire news story, providing all of the information needed for media coverage. [10]

2.1.3. Electronic mailing lists

Electronic mailing lists are a special use of e-mail that facilitates the distribution of information to many users. They are typically organized around a shared interest of some sort and have a list “owner,” who is responsible for setting the guidelines around acceptable content and behaviour of subscribers.

2.1.4. Knowledge Portals

Portals can be defined as single points of access that provide easy and timely access to knowledge. Portals are frequently web-based, allowing creation of distributed documents and making it possible to search for online information. From a technical perspective, the two main features of portals are taxonomies and crawlers. Taxonomies and advanced search engines are essential elements of portals that facilitate navigation. [5]

2.1.5. Knowledge Map

Knowledge management tools deal not only with documents but also with information about living experts who provide advice and share their expertise with colleagues. The system is an efficient way of making the “localization of experts” easy and quick. [5]

2.1.6. Websites

Websites primarily put information “out there” for consumption, with greatly varying opportunities for providing feedback. However, websites have the potential to reach wider audiences than workshops and conferences as anyone interested in a particular topic or organization can access a website as long as they have a computer and an internet connection.

As the web has become a common resource people turn to when seeking for information, websites become critical to knowledge sharing. Given the sheer amount of information available online well-designed websites are necessary to keep users interested and engaged with the content. [10]

2.1.7. Conferences

Although scientific conferences have traditionally been events for researchers to present and discuss their work, an increasing number of researchers, policymakers, industry representatives and end-user are networking at conferences on areas of shared interest. As conferences often draw participants from larger geographic areas, one advantage is the opportunity to bring together individuals who would not have the chance to interact face-to-face on a day-to-day basis. Beyond the knowledge shared at conferences, opportunities for networking may support the formation or expansion of knowledge-sharing communities. Unfortunately, conferences require a huge investment of time and resources by organizers. Depending on the target audiences, costs of travel and related expenses to attend may be prohibitive. The time required for participation in a conference with duration of a full day or a number of days may be particularly for end-user and policymakers deterrent. [10]

2.1.8. Discussion Forums

Online discussion forums, also known as message boards, internet forums, and bulletin boards are web-based applications that support ongoing discussions. Discussion forums are usually focused on particular topic areas and led by forum moderators whose role is to keep discussions on topic and to censor abusive behavior. The degree to which moderators intervene and are actively involved in the day-to-day activity of a particular forum varies. [10]

2.1.9. Collaboration Tool

Collaboration resembles a large meeting space in which colleagues work together, even over long distances or at different times of day. They share opinions, calendars and projects. A collaborative environment enables people to work in secure online workspaces, in which they use e-mail, Internet web browser and desktop applications in order to share knowledge, build closer relationships and streamline work processes. Such an environment also encourages colleagues to share information in open discussion forums, thereby providing access to tacit knowledge. [5]

2.1.10. Communities of Practice (CoPs)

A community of practice is a group of people who regularly interact with one another to share and learn based on their common interests. [19] Some knowledge-sharing professionals believe that these communities are necessary for both the creation and transfer of knowledge. [20] The establishment of CoPs may help partners and collaborators overcome four barriers to knowledge sharing: [19]

- **Awareness.** CoPs increase community members' awareness of one another's knowledge.
- **Access.** CoPs provide time and space for community members to connect with one another.
- **Application.** CoPs ensure that community members share the common language and understanding necessary to share their insights.
- **Perception.** CoPs create an atmosphere where knowledge sharing among community members is respected and valued.

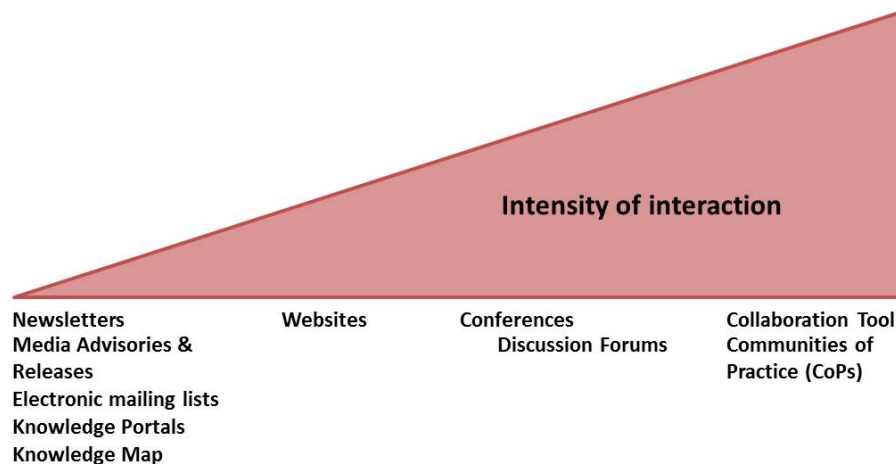


Figure 3: Overview of knowledge sharing tools in relation to the level of interaction between involved actors.

2.2. Workshop-based knowledge sharing methods

2.2.1. Moderated (conventional) Workshops









Name:	Moderated (conventional) Workshops
Origin:	n. d.
Description:	<p>A workshop is an event or special form of meeting in which a small group works intensively with a limited amount of time on one particular subject. People will meet here in order to jointly develop strategies, solve problems or want to learn from each other. The main characteristic of a workshop is the moderated cooperation towards a common goal.</p> <p>Moderation means a method to control/steer the communication in working groups, thereby guiding the participants in a cooperative and collaborative way to reach a specific goal or result. In addition to common communication structures, in which the moderator guides and influences a dialogue, moderation should facilitate the motivated and active participation of all workshop members. The aim is a for everyone comprehensible and jointly-developed result.</p> <p>While the participants specifically contribute to the workshop topic the moderator is responsible for the process of discussion, the temporal and structural course and the documentation of the results.</p> <p>Tasks of a moderator during a workshop are:</p> <ul style="list-style-type: none"> • Definition of the aim of the workshop, • Structure of the discussion (dramaturgy), • Organisational preparation, • Introduction of the topic of interest, • Control/steering of the discussion/dialogue, • Clarification of the content if ambiguities occur, • Visualisation and documentation of results <p>The specific workshop character develops when:</p> <ul style="list-style-type: none"> • A group of people takes some time beyond their usual work/daily business, to find together a solution for a specific problem, • The results have influence beyond the workshop, • The discussion is guided by a moderator (can be a external person), • (Optional) experts are involved, • Active involvement of the participants, • Visualisation of ideas and contributions, • Flexibility of workshop design in response to group dynamics <p>Dependent on the purpose one can distinguish different workshops types [21]:</p> <ul style="list-style-type: none"> • Workshop to “solve a problem” • Workshop to “solve a conflict”











	<ul style="list-style-type: none"> • Workshop to “develop a concept” • Workshop to “make a decision”
Equipment:	Projector, beamer, flipchart, moderation toolkit, pin boards, PC
Appropriate for: yes partly suitable no	<ul style="list-style-type: none"> • Networking to • Knowledge sharing • Organisation/documentation of data/knowledge • Identification of complex dependencies • Holistic assessment / Assuring completeness • Awareness rising • Facilitate communication • Facilitate common understanding to • Reality check regarding technological feasibility variable • Reality check regarding societal acceptance variable • Reality check regarding ethics and societal aspects variable • Mediate between /reconcile different world of thoughts, perspectives, philosophies to • Exchange of best practices to • Other (please specify):
	Structured process of discussion, well established processes
	Engagement of external participants often difficult due to time constraints
Minimum number of participants:	5
Maximum number of participants:	35
Effort for organizer:	Medium efforts are necessary regarding time for preparation/execution/wrap-up, technical equipment and costs.
Effort for participants:	The effort is low for in-house participants. The effort for external participants might be medium to high due to travel costs and travel time.
Fun Factor (participant (re-) motivation):	Variable
Active engagement of participants:	Yes



Dissemination effect:	Medium
Other comments:	

2.2.2. Workshops applying the World Café Method

Name:	Workshops applying the World Café Method
Origin:	http://www.theworldcafe.com/
Description:	<p>The aim of this method is „awaking & engaging collective intelligence trough conversations about questions that matter”.</p> <p>The participants sit together at small tables in a casual manner. Usually 3 to 5 people share a table, including one "table host". Each World Café session is usually designed to answer two or three questions. Questions will be answered in discussions held at each table in different rounds (2 or 3 rounds per question); the length of the rounds is about 25-30 minutes each. At the end of each round everyone at the table, except from the table host, moves to another table to further discuss the questions. The table hosts have to provide continuity to the discussions launched at each table.</p> <p>The environment at the workshop needs to be stimulating and informal so that people feel comfortable: they may drink coffee while discussing their ideas and sketch, paint and write on a large paper, the tablecloth. When all the rounds for a question have finished, a conversation guided by a moderator is started to collect the main conclusions and findings of the discussions held at the different tables in order to share them with the audience. The conclusions are summarized by the moderator in a report.</p> <p>The principles are:</p> <ul style="list-style-type: none"> • Set the context • Create a stimulating environment • Discuss questions that matter • Encourage everyone’s contribution • Connect diverse perspectives • Share new findings <p>The main factor of success of the World Café is the formulation of interesting and stimulating questions. The World Café method is well suited for stakeholder consultation as it provides exceptional scalability. It is especially useful to generate ideas and to get to a common picture, but should be used with care if concrete answers to specific questions are needed.</p>
Equipment:	Large paper suitable as tablecloth, coloured felt tip pens, flipchart, moderation toolkit, pin boards
Appropriate for:  yes  partly suitable  no	<ul style="list-style-type: none"> • Networking  • Knowledge sharing  • Organisation/documentation of data/knowledge  • Identification of complex dependencies  • Holistic assessment / Assuring completeness 

	<ul style="list-style-type: none"> • Awareness rising  • Facilitate communication  • Facilitate common understanding  • Reality check regarding technological feasibility  • Reality check regarding societal acceptance  • Reality check regarding ethics and societal aspects  • Mediate between /reconcile different world of thoughts, perspectives, philosophies  • Exchange of best practices  • Other (please specify):
	<p>The World Café method is especially useful to generate ideas and to get to a common picture.</p> <p>The method is useful to reach a consensus in the group.</p> <p>All participants have a chance to share their views and ideas, which is sometimes difficult in large “conventional” workshops.</p> <p>The World Café method is easily scalable: It can be applied to groups of 15 to 20 persons, but it can also be carried out with much larger groups.</p>
	<p>It is not straightforward to integrate data or results from other sources (e. g. other workshops, desktop research etc.)</p> <p>The composition of the group influences the direction the discussions take and fewer participants introduce a larger bias.</p>
Minimum number of participants:	12
Maximum number of participants:	2000
Effort for organizer:	Medium effort is necessary for the preparation/execution/wrap-up, for the invitation of participants, the organisation of location and technical equipment. Costs for workshop material are low.
Effort for participants :	The effort for participants is low to medium due to one day for the workshop participation and time for traveling.
Fun Factor (participant (re-) motivation):	The (re-) motivation of participant is high; the participant response is mostly very positive.
Active engagement of Participants:	Yes. The World Café method stimulates the participants to be active and to take a stand.
Dissemination effect:	High (depending on the number of participants)

**Other
Comments:**

Appropriate design and formulation of the question for a workshop is very important. The question will drive the whole workshop. It's important to create questions that both focus the topic and encourage out-of-the-box thinking. The method is especially useful for highly heterogeneous stakeholder groups.

2.2.3. Weighted-Bit Assessment Methods

Name:	Weighted-Bit Assessment Methods
Origin:	Originally developed by Fraunhofer INT for the assessment of risk associated with toxic substances. The development was supported by the German “Commission on Civil Protection of the Federal Ministry of the Interior” and the “Federal Office of Civil Protection and Disaster Assistance” (BBK).
Description:	<p>Within a Weighted-Bit Assessment Method (WBAM), a set of items is plotted against a set of yes/no-questions. This is typically done in a matrix with a value of zero corresponding to “no” and a value of one to “yes”. A selection of these values for a given item can be added to give a “score”. Individual values can be weighted by multiplying them with variable values to adapt “scores” to certain problems and/or scenarios.</p> <p>The development and use of a Weighted-Bit Assessment Table (WBAT) can be divided in three phases:</p> <ol style="list-style-type: none"> 1. Development of a set of yes/no questions: This is intellectually challenging, as finding the right set of questions is essential for the success of the WBAT. Great expertise in the subject matter is required for this. 2. Filling the table: All items to be classified have to be assessed concerning the yes/no-questions. Certain subject matter expertise is necessary for this, but less than for defining the questions. The experience gained while filling the table is usually used to refine the set of questions. 3. The filled matrix can be used to find scores for given scenarios and/or create charts by aligning several scores. This is a playful activity that can easily be performed by a group of non-experts under the technical guidance of an expert as a workshop.
Equipment:	PC (spreadsheet programme, e.g. Excel); beamer
Appropriate for: yes partly suitable no	<ul style="list-style-type: none"> • Networking • Knowledge sharing • Organisation/documentation of data/knowledge • Identification of complex dependencies • Holistic assessment / Assuring completeness • Awareness rising • Facilitate communication • Facilitate common understanding • Reality check regarding technological feasibility • Reality check regarding societal acceptance • Reality check regarding ethics and societal aspects

	<ul style="list-style-type: none"> • Mediate between /reconcile different world of thoughts, perspectives, philosophies ➔ • Exchange of best practices ➔ • Other (please specify):
	Very transparent as only addition, subtractions, and multiplications are used.
	Preparing the tables is time-consuming.
Minimum number of participants:	1
Maximum number of participants:	10 per PC
Effort for organizer:	Medium: High for preparing the method. Normal for doing the workshop in step 3.
Effort for participants:	Low: Not even physical presence is required (although beneficial).
Fun Factor (participant (re-) motivation):	Medium: Depends on the step performed.
Active engagement of participants:	Yes: Straightforward and transparent process – everybody can contribute.
Dissemination effect:	Medium: Results can be easily published as plots.
Other comments:	Multiple uses possible, depending on the phase: Phase 1: Intensive discussion among experts concerning relevant questions. Phase 2: Collection of distributed knowledge in a simple to understand format. Possibility to compare individual assessments. Phase 3: Playful assessment of complex matters with experts of various backgrounds.

2.2.4. “Serious Gaming” approach using the example of SETAG / DTAG

Name:	“Serious Gaming” approach using the example of SETAG / DTAG
Origin:	<p>The Disruptive Technology Assessment Game (DTAG) was developed in a military context by task group SAS-062 within the NATO Research and Technology Organization (RTO) framework.</p> <p>The Security Emerging Technology Assessment Game (SETAG) is based on DTAG and was adapted to a civil context within the EU FP7 Project ETCETERA (GA No. 261512).</p>
Description:	<p>Serious gaming is understood as games which do not primarily or solely serve for entertainment but mandatorily include entertaining elements. Common aspects of serious games are the aims of transferring information and equipping people with knowledge. Serious games intent to close the gap between education and practical application and exploitation of knowledge.</p> <p>Serious gaming in the field of security addresses e. g. civil protection, disaster management, the defence sector etc. with the involvement of public, private and local institutions like fire departments, police, crisis management centres and NGOs. Scenarios like natural disasters, acts of terrorism, emergency preparedness and response can be simulated by serious gaming.</p> <p>The Security Emerging Technology Assessment Game (SETAG) is based on the Disruptive Technology Assessment Game (DTAG), which was originally developed to evaluate innovative technologies and systems for defence purposes. The goal of the original game was to identify those technologies that can be “disruptive” to military operations. These technologies could rapidly change the way military operations are conducted and thus influence long-term goals and strategies.</p> <p>During the FP7 ETCETERA project, the military DTAG was modified to assess the relevance of Emerging Technologies for security purposes. In contrast to the DTAG methodology, the this modified game does not focus on the disruptiveness of technologies, but on possibilities future technologies could provide. The name was therefore changed to Security Emerging Technology Assessment Game (SETAG).</p> <p>The SETAG concept revolves around cards representing future equipment and scenarios to which these cards can be applied, pictured on a game board. The game is played by two teams of end-users. Each team has a hand of cards with descriptions of innovative technological concepts described as futuristic systems, called 'Idea of Systems' (IoS, or in the game as IoS-cards). The game board has fields that represent operational situations. As the teams act on the game board, they move from situation to situation, answering a set of predefined questions related to the use of IoS-cards in the situations encountered. The goal for each team is to optimally apply the available IoS-cards to the situations.[22]</p> <p>It is up to the teams to:</p> <ul style="list-style-type: none"> • Determine what operational challenges a situation poses to the response

	organisations <ul style="list-style-type: none"> Describe how the IoS-cards can provide a solution to these operational challenges Share their ideas with the other team and discuss alternative solutions
Equipment:	Game board, IoS-Cards
Appropriate for: yes partly suitable no	<ul style="list-style-type: none"> Networking Knowledge sharing Organisation/documentation of data/knowledge Identification of complex dependencies Holistic assessment / Assuring completeness Awareness rising Facilitate communication Facilitate common understanding Reality check regarding technological feasibility variable Reality check regarding societal acceptance variable Reality check regarding ethics and societal aspects variable Mediate between /reconcile different world of thoughts, perspectives, philosophies Exchange of best practices to Other (please specify):
	Open discussion triggers the game and allows for gathering new insights. The game combines theory and practice and is considered dynamic and entertaining to play. Possibility to feed results back into the main work stream of a project.
	The preparation of the game, especially the creation of the Idea-of-System cards, needs great effort. Adapting the serious gaming to new purposes needs great effort.
Minimum number of participants:	The SETAG was designed for a relatively small number of participants. It is to be played with two teams and each team ideally consists of 4 to 6 people. The total number of participants will therefore be somewhere around ten per session. This number of participants allows for productive plenary discussions. If the group is larger, it could be more difficult to have an interactive group discussion.
Maximum number of participants:	6 participants per group can be considered as the maximum number to allow fruitful discussions and not jeopardise possible contributions from any player.
Effort for organizer:	Serious gaming needs considerable time for preparation execution/wrap-up. The costs for the workshop are at a medium level.

Effort for participants:	The effort is at a medium to high level due to the duration of the workshop for the game and the time for traveling to the workshop venue.
Fun Factor (participant (re-) motivation):	High
Active engagement of participants:	Yes
Dissemination Effect:	High
Other comments:	The effort necessary for conducting a serious game for the first time is considerably higher than for a repetition of the same game.

2.2.5. Scenario Technique

Name:	Scenario Technique
Origin:	The scenario technique was originally developed in a military context but was adapted and further developed in economic, technological or societal settings.
Description:	<p>The scenario technique is a core tool in applied future studies. It supports the systematic identification and evaluation of future trends and uncertainties. When determining and judging the drivers of these developments, particular emphasis is placed on the interactions between them.</p> <p>Using scenarios, pictures of the future that are both plausible and intrinsically consistent can be drawn up. Scenarios involve the participants and factor in their interests, so as to translate the challenges of the future into effective, strategic actions.[23]</p> <p>In practice scenarios are based on the systematic analysis of relevant influencing factors, key factors and directions of development leading to the development of consistent alternative pictures of the future for selected topics.</p> <p>The scenario process is complex and can lead to a very broad set of results, not only including drivers and barriers of a topic (e. g. a particular technology), but also a multitude of societal perspectives. The analysis of a topic using the scenario technique does not only involve e. g. the technical feasibility of a technology, but also considers user demands and social aspects, political and framework conditions, industrial systems and infrastructures, the education and research system, and the interrelated dynamics of these elements.</p> <p>The scenario process consists of the following steps:</p> <ul style="list-style-type: none"> • Scenario preparation: <ul style="list-style-type: none"> - Determination of the objective - Definition of the field of interest • Analysis of the scenario field: <ul style="list-style-type: none"> - Investigation of influencing factors - Analysis of interconnections





	<ul style="list-style-type: none"> - Identification of key factors • Scenario prognostic: <ul style="list-style-type: none"> - Projections for the key factors related to the selected time horizon • Scenario construction: <ul style="list-style-type: none"> - Analysis of consistency - Calculation of scenarios • Scenario implications: <ul style="list-style-type: none"> - Workshop on the impact of selected scenarios • Development of strategies: <ul style="list-style-type: none"> - Workshop on the identification of necessary actions - Compilation of action options
Equipment:	PC, software for scenario development, workshop equipment like beamer, flipchart, moderation toolkit, pin boards
<p>Appropriate for:</p> <p>👤 yes 🔄 partly suitable 🚫 no</p>	<ul style="list-style-type: none"> • Networking 👤 • Knowledge sharing 👤 • Organisation/documentation of data/knowledge 🔄 • Identification of complex dependencies 👤 • Holistic assessment / Assuring completeness 👤 • Awareness rising 👤 • Facilitate communication 👤 • Facilitate common understanding 👤 • Reality check regarding technological feasibility 👤 • Reality check regarding societal acceptance 👤 • Reality check regarding ethics and societal aspects 👤 • Mediate between /reconcile different world of thoughts, perspectives, philosophies 👤 • Exchange of best practices 🚫 • Other (please specify):
	<p>A scenario process should be conducted if broad stakeholder involvement is sought and transparency is a key requirement.</p> <p>Scenario processes can be used for the assessment of broad conditions for the development of a topic of interest.</p> <p>The whole scenario process can foster the process of gathering insights about a new topic and can contribute to a common understanding.</p>
	<p>Carrying out a scenario process is a very expensive method since the process of preparing, conducting, and evaluating scenarios, expert interviews and scenario workshops is very labour-intensive. 3-4 People are needed to prepare, organise</p>

		and conduct the whole process. As the scenario process is complex, participants might find it hard to understand.
Minimum number of participants:	of	15
Maximum number of participants:	of	40
Effort for organizer:	for	The costs for workshops and workshop equipment are at a medium level. However, costs for personnel are high.
Effort for participants:	for	The effort for the participant is low, if an interview is conducted. The effort regarding the participation in a scenario workshop is at a medium to high level due to its duration and the time for traveling to the workshop venue.
Fun Factor (participant (re-) motivation):		Variable, mostly medium to high
Active Engagement of participants:	of	Yes
Dissemination effect:		High
Other comments:		<p>The process requires substantial involvement of experts from different backgrounds concerned with the topic of interest to ensure a holistic reflection of all relevant perspectives.</p> <p>A high amount of communication and discussion about the topic of interest is mandatory.</p> <p>The complexity of the process should be carefully balanced with the size of the scenario workshops involving external experts. End-users sometimes experience the scenario technique as too academic. Therefore, the overall aim of the exercise should be carefully explained to all participants.</p> <p>Execution of the scenario workshops is especially suitable for assessing one specific topic of interest (e.g. one technology) or one topic area (e. g. a technology area), as dealing with diverse topics or topic areas might overstrain participants.</p>

2.2.6. TRIZ

Name:	TRIZ (теория решения изобретательских задач or Theory of inventive problem solving)
Origin:	TRIZ was first developed by Soviet inventor and science fiction author named Genrich Altshuller and his colleagues in 1946. For more information, see e.g. [24].
Description:	TRIZ is a systematic approach to problem-solving and finding solutions without the need of compromise. There exists a toolbox of TRIZ methods which can also be used for the definition of solutions and the development of new products and services (the latter two not being of interest for the present deliverable). TRIZ assumes that problems and solutions are often repeated in the industry and research. These contradictions can be classified and used to find a creative solution to the problem. Also, TRIZ assumes that technical evolution and scientific effects and repeating patterns of these two can contribute to the solution of a problem. The TRIZ problem solving method starts with a specific problem which is generalised to form a general problem. Next, it is attempted to find a general solution to this general problem which should then lead to a specific solution. The TRIZ method can be adapted to serve as a method of knowledge sharing by using the problem solving method in connection with topics are to be discussed. Normally, this method would be used in a TRIZ workshop.
Equipment:	Visualisation tools (e.g. flipcharts)
Appropriate for: yes partly suitable no	<ul style="list-style-type: none"> • Networking • Knowledge sharing • Organisation/documentation of data/knowledge • Identification of complex dependencies • Holistic assessment / Assuring completeness • Awareness rising • Facilitate communication • Facilitate common understanding • Reality check regarding technological feasibility • Reality check regarding societal acceptance • Reality check regarding ethics and societal aspects • Mediate between /reconcile different world of thoughts, perspectives, philosophies • Exchange of best practices • Other (please specify):

	By using the formalised problem solving method, the participants of a TRIZ workshop can be lead through a clear process of knowledge sharing and problem solving.
	Since the method is highly formalised, the moderator has to be able to take into account creative solutions and fit them into the process.
Minimum number of participants:	5
Maximum number of participants:	10-15 (depending on the skills of the moderator)
Effort for organizer:	Medium (the moderator needs to prepare for the topics to be discussed)
Effort for participants:	Low (the participants only need to contribute to the different stages of the method)
Fun Factor (participant (re-) motivation):	Medium (for people unfamiliar with TRIZ, it can be interesting to use this method)
Active engagement of participants:	Yes
Dissemination effect:	Medium (depends on the paths of dissemination after each workshop)
Other comments:	There are a number of examples for how the TRIZ method can lead to problem solutions. In order to have a successful workshop, the moderator would have to be prepared very well in this specific method.

2.2.7. PPA

Name:	PPA (Potential Problem/Opportunity Analysis)
Origin:	The method was designed by [25].
Description:	PPA is a method to support the identification of opportunities and new ideas. The process starts with a session on the identification of opportunities. This is being done by silent brainstorming and the application of keywords to stimulate the search for ideas. In the second phase, the ideas and/or opportunities are identified and selected for evaluation along with the contributors for these opportunities. The key contributors and ideas are then ranked. In the final phase, the results of the second phase are taken and another session of silent brainstorming takes place. Again, keywords are applied to stimulate the enrichment of the ideas. Finally, the most promising ideas are selected for further evaluation.
Equipment:	Depending on how the method is being used flipcharts, PCs, large whiteboards can be part of a workshop.
Appropriate for: yes partly suitable no	<ul style="list-style-type: none"> • Networking • Knowledge sharing • Organisation/documentation of data/knowledge • Identification of complex dependencies • Holistic assessment / Assuring completeness • Awareness rising • Facilitate communication • Facilitate common understanding • Reality check regarding technological feasibility • Reality check regarding societal acceptance • Reality check regarding ethics and societal aspects • Mediate between /reconcile different world of thoughts, perspectives, philosophies • Exchange of best practices • Other (please specify):
	Structured way of brainstorming, which is easy to use.
	The selection of keywords can be biased and relevant ideas can be biased.
Minimum number of participants:	5



Maximum number of participants:	10-15 (depending on the skills of the moderator)
Effort for organizer:	Medium (the moderator needs to prepare for the topics to be discussed)
Effort for participants:	Low (the participants only need to contribute to the different stages of the method)
Fun Factor (participant (re-) motivation):	Medium (similar to other kinds of brainstorming methods)
Active engagement of participants:	Yes
Dissemination effect:	Medium (depends on the paths of dissemination after each workshop)
Other comments:	

2.3. Other knowledge sharing methods

2.3.1. Direct consultations with external experts by interviews or written input

Name:	Direct consultations with external experts by interviews or written input
Origin:	n. d.
Description:	<p>Direct consultations with external experts e.g. through interviews or by asking for written input can broaden and consolidate results gained by in-house desktop research.</p> <p>They require a network of experts that can be involved as required. While setting up such a network might be time-consuming, it allows high flexibility when responding to specific requests.</p> <p>Building a network of highly qualified external experts is demanding but may be a good extension of in-house expertise.</p>
Equipment:	
Appropriate for: yes partly suitable no	<ul style="list-style-type: none"> • Networking • Knowledge sharing • Organisation/documentation of data/knowledge • Identification of complex dependencies • Holistic assessment / Assuring completeness to • Awareness rising • Facilitate communication to • Facilitate common understanding • Reality check regarding technological feasibility • Reality check regarding societal acceptance • Reality check regarding ethics and societal aspects • Mediate between /reconcile different world of thoughts, perspectives, philosophies • Exchange of best practices • Other (please specify):
	High flexibility when responding to specific requests
	Time-consuming (setting up a network of experts, preparation of interview guide, travel)
Minimum number of participants:	1
Maximum	5



number of participants:	
Effort organizer:	<p>The level of effort ranges from medium to high.</p> <p>Setting up a network might be time-consuming.</p> <p>The preparation of a good interview guide is challenging and time consuming.</p> <p>Traveling time to visit the interviewees might be extensive. However, telephone interviews can be time saving alternative.</p>
Effort participants:	<p>The effort for the participant ranges from low to medium and is dependent from the kind of requested input; in comparison to provide a written report giving an interview is less time consuming.</p>
Fun Factor (participant (re-) motivation):	Medium
Active Engagement of participants:	Yes
Dissemination effect:	Medium to high (Easily transferable into a publication)
Other comments:	

2.3.2. Wiki Principle


Name:	Wiki
Origin:	The first wiki engine (“WikiWikiWeb”) was published 1995 by Ward Cunningham. Wiki systems reached great public attention through the multi-lingual online encyclopaedia Wikipedia.
Description:	A wiki engine is software that enables the creation of hypertext pages by multiple users. It usually provides an interface that enables authors with only little technical knowledge to create presentable content. The content created can usually be accessed with common web browsers.
Equipment:	Server (to host the database); PC (with connection to the database, e.g. via the internet)
Appropriate for: yes partly suitable no	<ul style="list-style-type: none"> • Networking to • Knowledge sharing • Organisation of data/knowledge • Identification of complex dependencies • Holistic assessment / Assuring completeness • Awareness rising • Facilitate communication • Facilitate common understanding • Reality check regarding technological feasibility • Reality check regarding societal acceptance • Reality check regarding ethics and societal aspects • Mediate between /reconcile different world of thoughts, perspectives, philosophies • Exchange of best practices • Other (please specify):
	Easy to use; easy to access knowledge; creating pages can be fun.
	Author motivation is key to success and sometimes hard to achieve. Some persons are reluctant to share knowledge in online systems.
Minimum number of participants:	1
Maximum number of participants:	Unlimited
Effort for organizer:	Medium: Commercial systems with good support are available. Expert knowledge is necessary to use advanced features.



Effort for participants:	Low: Common PC knowledge is sufficient. No physical presence necessary.
Fun Factor (participant (re-) motivation):	Variable: Depends on interest of participants to create web pages.
Active Engagement of participants:	Yes: It is easy to contribute.
Dissemination effect:	Variable: Content can be limited to a certain audience, but also shared freely through the internet.
Other comments:	<p>Many users may have positive associations to Wikipedia, but sometimes the concept of a wiki is wrongly limited to www.wikipedia.org only.</p> <p>Several dozen wiki engines are available, either for free or associated with licence cost.</p> <p>Wiki engines can usually be customised through add-ons and plug-ins (similar to web browsers). Through these variations they can be adapted to multiple uses.</p> <p>Wiki engines are very resilient concerning wrong use (e.g. erroneous deletion of content): Most errors can easily be corrected or “reverted”.</p>

2.3.3. Crowdsourcing

Name:	Crowdsourcing
Origin:	The term “crowdsourcing” was first coined by [26]
Description:	<p>Crowdsourcing in general, is described as being a distributed, problem-solving and production model. The latter aspect is of no interest for the present deliverable. However, the possibility to use it as a problem-solving model makes crowdsourcing a potential knowledge-sharing tool. Normally, problems are sent to a group of unknown solvers in the form of an open call for solutions. The “crowd” that works on these problems normally communicates via various online media and then selects and submits their solutions to the problem. The solution can then be used by the entity that submitted the open call in the first place and the group of users that submitted the successful solution may or may not be rewarded. A concrete model called FLIRT (Focus, Language, Incentive, Rules and Tools) has been developed which uses the principles of crowdsourcing to consider closer collaboration between a company and its customers and online customer communities. One possible advantage of crowdsourcing is the so-called “Wisdom of the crowd” which supposedly leads to better decisions and/or solutions than if only a group of experts is asked (e.g. via the workshop or world café method above) [27].</p>
Equipment:	PCs, Access to the internet
Appropriate for: yes partly suitable no	<ul style="list-style-type: none"> • Networking • Knowledge sharing • Organisation/documentation of data/knowledge • Identification of complex dependencies • Holistic assessment / Assuring completeness • Awareness rising • Facilitate communication • Facilitate common understanding • Reality check regarding technological feasibility • Reality check regarding societal acceptance • Reality check regarding ethics and societal aspects • Mediate between /reconcile different world of thoughts, perspectives, philosophies • Exchange of best practices • Other (please specify):
	By accessing a wide number of “crowds”, knowledge can be widely disseminated

	and problems can be discussed and solved.
	The method very much depends on the definition of the accessed “crowds” and the form of the problem that should be solved.
Minimum number of participants:	5
Maximum number of participants:	Unlimited
Effort for organizer:	High (selection of “crowds”, definition of feedback form, mode of using the feedback etc.)
Effort for participants:	Low (once the process has been started, the effort for the individual participant is low)
Fun Factor (participant (re-) motivation):	Medium (depends very much on the problem which is to be solved or the topic which is discussed)
Active engagement of participants:	Yes
Dissemination effect:	Medium (depends on the selection of “crowds”)
Other comments:	This method very much depends on the formulation of the problem or the topic that is to be discussed by the crowds. Also, in its modern form, it normally depends on the usage of online communities, which also need to be pre-selected. After this work has been done, the form of the feedback from these communities has to be given a certain form, so that the initiator of the crowdsourcing can actually use the proposed solutions.

3. Concluding Remarks and Outlook

This report gave a short introduction into knowledge sharing with the aim to inform the SOURCE consortium about the basic models and principles of knowledge sharing as far as relevant for the SOURCE network. The focus lay on the general preconditions for knowledge sharing, common obstacles and barriers as well as recommendation how to establish a successful knowledge sharing process.

A part from the literature about knowledge sharing in general we used the work of D2.4 and results of the online questionnaire which have not been used in the previous deliverable. The main objective of D2.4 was to describe the modes of interaction of the different sectors concerned with societal security and to detect the obstacles which could hinder a successful interaction and cooperation of all sectors to enhance societal security in Europe. Building on these findings we have analysed the “free text” suggestions and recommendations of the participants of the online questionnaire how to overcome the difficulties in the interactions between different sectors.

The following table is a summary of barriers and obstacles to mutual understanding and knowledge sharing between the different sectors concerned with societal security. In this table we have used the findings from the general literature about knowledge sharing as well as our own finding on the basis of the online questionnaire.

3.1. Summary of barriers and obstacles to mutual understanding and knowledge sharing between the different sectors concerned with societal security

Results of Questionnaire [18]	Barriers and obstacles to mutual understanding and knowledge sharing between the different sectors concerned with societal security
58%	Incompatible ideology or philosophy of life; different “thought worlds” <ul style="list-style-type: none"> The stakeholder of different sectors have sometimes contradictory security aims (e.g. regarding the proportionality, the costs and possible side-effects of a security measure)
54%	Wide discrepancies between the professional needs and requirements; lack of mutual understanding and acceptance <ul style="list-style-type: none"> A majority of the participants of the SOURCE questionnaire experience discussions with representatives of other sectors about moral, ethical and social implications of security measures as conflictual A majority of the participants of the questionnaire experience these discussions about the security value of security measures itself as conflictual
40%	Difficulties due to different organisational or bureaucratic conditions <ul style="list-style-type: none"> Only limited time and resources are available to engage in knowledge sharing Researchers receive few incentives by their universities or research institutes to present their

results in plain language outside the research community

- An imbalance of knowledge exchange has a negative effect on future knowledge sharing behaviour
- Differences between existing legal frameworks have a strong disincentive effect on transnational collaboration (i.e. intellectual property rights)
- Research organisations find it difficult to balance their researchers' desire for open access to research results with the need to protect them if they are to become commercially viable products
- Physical distance has a negative effect on knowledge sharing

38%	Difficulties to understand each other at a technical level due to different professional backgrounds
-----	--

- Research results may be perceived by policy-makers or end-user as difficult to understand or as lacking a clear conclusion

34%	Difficulties due to different time horizons (e. g. short term versus long term goals)
20%	Heated and emotional discussions; difficult to discuss issues objectively
12%	Language difficulties
12%	Difficulties due to different national or cultural backgrounds
4%	Personal dislikes; difficulties on a personal level

Table 2: Summary of barriers and obstacles to mutual understanding and knowledge sharing between the different sectors concerned with societal security

We have further compiled a list of strategies for successful knowledge sharing using both published knowledge sharing handbooks of other sectors as well as the suggestions and recommendations of the participants of the SOURCE questionnaire.

- (1) Commitment of all partners to advance the network of excellence
- (2) All parties should provide time and space for knowledge sharing and interaction; especially face-to-face meetings are highly recommended
- (3) Network members must be open to the ideas of others, be willing to share ideas, and maintain a thirst for new knowledge.
- (4) The network must maintain enough diversity to encourage innovative thinking, yet still have common goals and interests.
- (5) Use of plain language and a presentation adapted to the background and the needs of the audience
- (6) Education and training must be provided to learn about the background, approaches and needs of the other sectors
- (7) The SOURCE network has to provide for cultural sensitivity among its members
- (8) Ways to resolve conflicts are to be established prior to disagreements



- (9) Clear roles and expectations of all parties in the SOURCE network (e.g. on the basis of a Memorandum of Understanding)
- (10) The organization should be a member of the network - not the individual (to protect against staff turnover)
- (11) Capable IT tools must be implemented or designed to help the members of the network to share their knowledge (see chapter 2)

3.2. Summary of knowledge sharing methods

A summary of the most promising methods with respect to enhanced and dynamic knowledge sharing is depicted in Figure 4. It shows the main pros and cons regarding the applicability to promote knowledge exchange and mutual understanding between the different actors concerned with the multi-layered societal security issues. The last row indicates which of the knowledge sharing methods supports or advances the SOURCE Five Modes of Interchange described in chapter 2.2.

Although at a first glance none of the methods or workshop concepts is perfectly adapted to the purposes of the SOURCE network, most of them possess high potential of adaptability. The concepts are flexible and can easily be modified to match the specific objectives of SOURCE.

Although all of the methods could contribute to a larger or smaller degree to the overall aim of the SOURCE project to facilitate links between the different sectors concerned with societal security, to mediate between the different “knowledge communities” and to increase knowledge sharing, we would recommend the following knowledge sharing methods in order to explicitly support the SOURCE Five Modes of Interchange described in chapter 2.2:

For ‘(1) *Coordination of existing knowledge between actors in different sectors*’ conventional workshops, workshops applying the World Café method as well as adapted Weighted-Bit Assessment, Serious Gaming and Scenarios could be utilized. Furthermore, TRIZ and PPA could be appropriate for this purpose.

‘(2) *Translation of current knowledge from one sector to another in such a way as to make concepts, principles and empirical knowledge produced and exchanged within one sector understandable and usable in another thus ensuring integration*’ as well as ‘(3) *Conceptualisation of practical experience and best practice in one sector such that it can be used as a basis for practical application in another*’ might be promoted by workshop-based methods like Weighted-Bit Assessment, Serious Gaming and Scenarios as well as TRIZ and PPA. Furthermore, direct consultations of experts (either as interviews or as other written input) and using a Wiki Principle-based platform or Crowdsourcing could be useful.

Regarding ‘(4) *Tools for application of theoretical knowledge in one sector to practice in another*’ from the methods presented in this report mainly the process of the Scenario Technique might be most promising. TRIZ, PPA and Crowdsourcing might also be applicable. However, other methods are not explicitly excluded and might be adaptable for this purpose.

‘(5) *Dissemination of relevant knowledge and activities from one sector to those segments of the public sphere concerned with knowledge in the other*’ could be addressed by the final result of the Scenario Technique process, by the Wiki-Principle and Crowdsourcing as well as other knowledge sharing tool like e. g. newsletters etc. as briefly described in Section 3.1.



The list of methods and tools for knowledge exchange, facilitation of communication and common understanding introduced in this report is not intended to be exhaustive. There might be other additional methods, tools and principles not mentioned here, that could also address these purposes should be taken into account, too. Furthermore, hybrid forms of different concepts or methods are conceivable. Even though most of the methods and principles are flexible and can be modified according to a special focus the necessary effort for adaption needs be taken into consideration. Anyway, the choice of method is dependent from the specific purpose it should serve and it needs to be carefully selected.



Knowledge Sharing Methods										
	Workshop-based							Other		
	Conventional Workshops	World Café Method	Weighted-Bit Assessment	"Serious Gaming" (e.g. SETAG / DTAG)	Scenario Technique	TRIZ	PPA	Direct Consultations	Wiki Principle	Crowdsourcing
Data/information documentation	↻	↻	⬆	↻	↻	↻	⬆	↻	⬆	↻
Data/information organisation	↻	↻	⬆	↻	↻	↻	⬆	↻	⬆	↻
Knowledge sharing	⬆	⬆	↻	⬆	⬆	↻	↻	⬆	⬆	⬆
Exchange of best practices	↻	↻	↻	⬆	↻	⬆	⬆	↻	⬆	⬆
Networking	⬆	⬆	↻	↻	⬆	⬆	⬆	↻	↻*	⬆
Awareness rising	↻	⬆	⬆	⬆	⬆	⬆	⬆	↻	⬆	⬆
Facilitation of communication	↻	⬆	⬆	⬆	⬆	⬆	⬆	↻*	⬆	⬆
Facilitation of common understanding	↻*	⬆	⬆	⬆	⬆	⬆	⬆	↻	↻	⬆
Facilitation of collaboration	↻	⬆	↻	⬆	⬆	⬆	↻	↻	↻*	↻
Interaction of participants	↻	⬆	↻	⬆	⬆	⬆	↻	↻	↻*	↻
Fun factor	v	⬆	↻	⬆	v	↻	v	↻	v	↻
Time to invest for organizer	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆
Costs for material, equipment etc.	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆
Most related to mode of interchange	1	1	1, 2, 3	1, 2, 3, 4	1, 2, 3, 5	1, 2, 3, 4	1, 2, 3, 4	2, 3 (5)	2, 3, 5	2, 3, 4, 5

Figure 4: Overview of different methods appropriate for knowledge sharing and/or development of common understanding. Key: ⬆ yes, appropriate; ↻ partly appropriate; ↻ no, inappropriate; v variable; * up to ⬆; ⬆ high; ⬆ medium; ⬆ low; Modes of interchange: (1) Coordination of existing knowledge; (2) Translation of current knowledge; (3) Conceptualisation of practical experience; (4) Tools for application of theoretical knowledge; (5) Dissemination of relevant knowledge.

3.3. Outlook

Based on the work conducted in task 2.4 the subsequent task 2.5 identified both a list of obstacles as well as general recommendations for successful knowledge sharing between the different sectors concerned with societal security. A set of tools and methods was developed to stimulate discussions, to improve a mutual understanding and to overcome difficulties in interactions between actors with divergent thought-worlds.

These results will feed into both the assessment exercises performed in task 2.6, where several workshops will be conducted to compile the best suitable concept of knowledge sharing within SOURCE as well as into task 2.7 in order to establish a “Guidebook for Knowledge Sharing in Societal Security” which will be made available to the SOURCE consortium and later to the SOURCE Global Alliance.

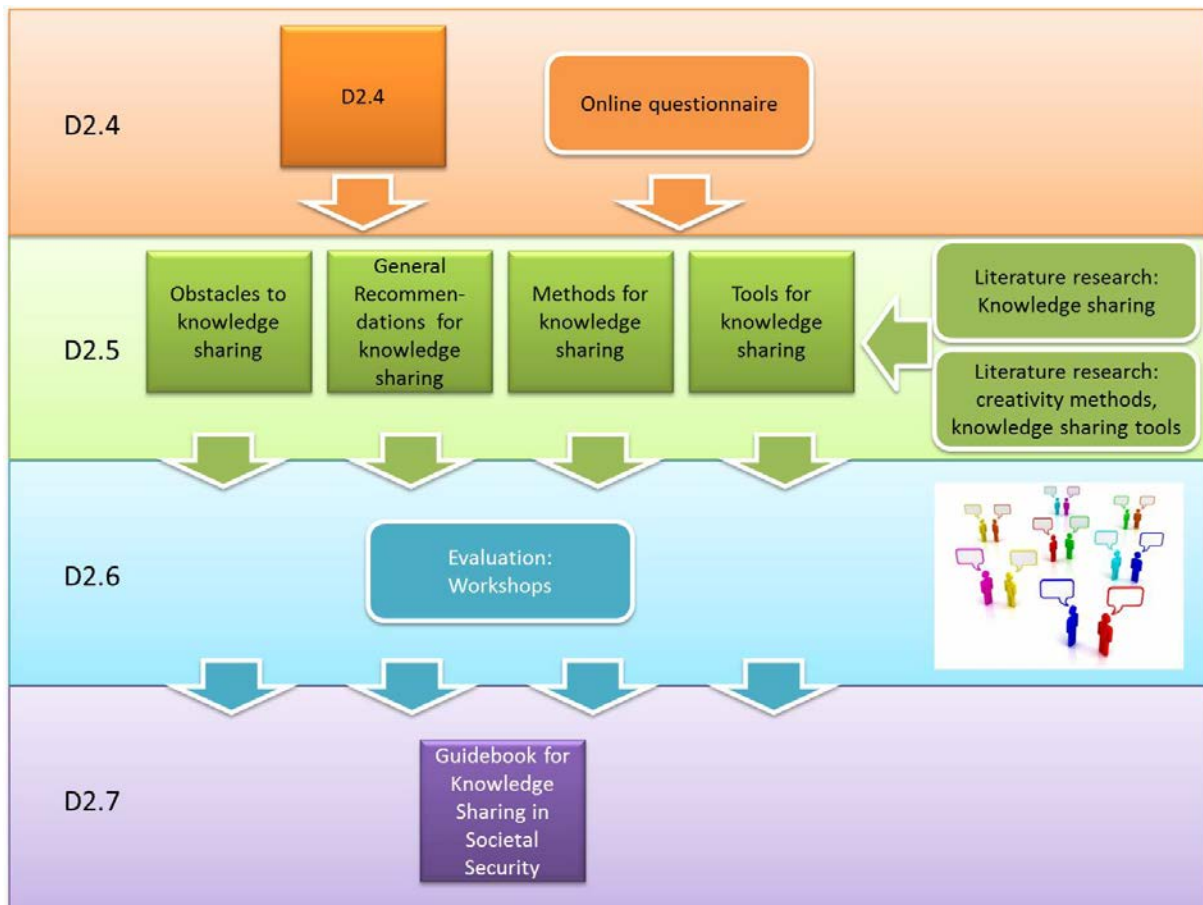


Figure 5: Data and information leading to the “Guidebook for Knowledge Sharing in Societal Security”.

Annex

Free text answers to question no. 5 of the online questionnaire: *Do you have suggestions how to overcome these difficulties?*

Sector of the participant	Most difficult interaction partner	Suggestions how to overcome these difficulties
Social and human sciences	End-user	The problem is the political constraints of the politicians and their focus on reacting to superficial short term challenges rather than dealing proactively with serious long term challenges. Solution? New politicians of a higher calibre.
Social and human sciences	Security policy maker	Governmental and European policymakers should be made to be fully transparent and open in their policy-making. They should engage with academic research and researchers and with civil society. At the moment, they are still too often too close to industry pressure groups, to the extent that they sometimes (eg with ACTA and the current EU-USA trade and data negotiations) work in secret behind doors that are closed to civil society (and indeed for too long to parliamentarians, who are only brought in towards the end), while interested (industry) people are involved in the policy-making (either overtly or covertly). This is undemocratic and leads to bad societal outcomes.
Social and human sciences	Social and human science researcher	I find that the interaction is surprisingly easy with tech people and companies, as well as CSOs. They all seem to get the importance of societal impact. It is often with other social scientists that problems arise, as they do not know how to relate to technology-oriented social sciences.
Security technology end-user	Security industry actor or technology developer	Questioning the unspoken assumptions among different partners in a project. Therefore, reserving considerable time-slots for interactive discussions and comparison of how (different) minor and major aspects are perceived and understood. Such deep discussions especially in the beginning may help disguise completely different understandings behind similar/identical words.
Security industry actor or technology developer	Civil society organisation	More frequently meetings
Social and human sciences	Security industry actor or technology developer	Discussing the key notions and concepts as used by various scientific fields, elaboration of joint understanding of the analytical components of the key notions and concepts, followed by joint understanding of the time line needed for research in different disciplines. In social sciences and humanities the process for arriving at synthesis is methodologically quite different from devising products. Much dialogue

		is needed for working together and achieving impact.
Security industry actor or technology developer	Social and human science researcher	Understanding better how the other's partners needs and ours are related will be useful to reach an understanding.
Social and human sciences	Security industry actor or technology developer	Education of all involved players to better understand each other
Social and human sciences	Security policy maker	One needs to educate policy makers while at the same time engage researchers in every day policy making.
Security technology end-user	End-user	Ensure planning is consistent with objectives and properly captured and progress tracked.
Social and human sciences	Security policy maker	As the conflicts usually arise from different views on the meaning and relevance of human rights and fundamental freedoms I have no suggestion on how to overcome this fundamental difficulty with "hardliner" security-policy makers, in particular when they aim to appease a vote bank which is not interested in human rights at all.
Social and human sciences	Security policy maker	The discussions between the policy-makers (especially in the ministries) and the researchers need to be more regular and not only implemented when new projects are to be planned. It would be useful if the researchers would recognise the processes and routines of the policy-makers (and consider them in the discussions and when delivering results in presentations and papers). On the other hand the policy-makers should understand the principles of research, the freedom of thinking and the idea, that researchers follow the concept of non-predetermination and empirical results (instead of political usefulness and desirability).
Social and human sciences	Security industry actor or technology developer	frequent interactions
Social and human sciences	End-user	Down to appropriate accountability and meaningful ethical codes. Are the end users appropriately trained to use their security tools in an ethical way? Is there a legally and enforceable remedy when things go wrong. Institutionally- is there an accountable chain of command or a culture of impunity?
Security industry actor or technology developer	Security industry actor or technology developer	Talk, talk, talk
Social and human sciences	End-user	These difficulties have been experienced with police end-users who tend to think that as long as police protocol is being followed, there are no ethical/human rights problems arising from police use



		of security technology. Communication tends to be defensive. More open-mindedness towards the aims of ethics and human rights (e.g. recognition that they might be a way for police to improve practice rather than merely a source of unreasonable obstacle to police work) would help. Face-to-face, repeated opportunities to discuss issues honestly and openly with police might help achieve better understanding.
Social and human sciences	Security industry actor or technology developer	Transparency Greater communication
Social and human sciences	Security industry actor or technology developer	Invite participants to present - in plain words - their own working assumptions, the knowledge that each sector tend to accept as the basis for further research, and in particular the knowledge related to the issues at stake. Invite participants to clarify what is problematic from their perspective. Then, compare the different approaches and visions and ask each participant if, and how, the newly acquired understanding of the other position can (or already has) influence(d) their own assessment.
Security policy maker	Civil society organisation	Improved education about how the real world functions.
Security policy maker	Social and human science researcher	To keep participating with researchers and academia in European projects, an exchange and closer relations between industry and academia.
Social and human sciences	Security industry actor or technology developer	There are no easy solutions because differences are philosophical and deep-rooted: a non-positivist critical social science perspective which emphasises the deeply political nature of security technologies at all levels and a deeply positivist or empiricist paradigm where social and political conflict and inequality are largely ignored in an instrumental obsession with techno-rational 'solutions' where social 'issues' are a spray-on at the very end, long after all the really important aspects are locked-in
Other: communications specialist and advisor	Security industry actor or technology developer	Language is an ongoing challenge and every effort should be made to ensure clarity of understanding, reducing jargon, acronyms and 'insider' language. we should be mindful that clarity of language and message is central to citizen engagement. The same commitment to simplicity and clarity should apply to processes - and we should keep practical outputs to the forefront of our mind.
Social and human sciences	Security policy maker	Increase number of contact moments; Present/publish (ongoing) research results more often in popular (easy to understand) formats
Security industry actor or technology	End-user	Face-toface meetings instead of e-mail and conference calls



developer		Clear explication what exactly is expected by when, providing templates and forms to be filled, discussions and workshops instead of written documents
Social and human sciences	Civil society organisation	Integrate civil society and NGO movements in participatory research actions.



References

1. Wikipedia (2015) Knowledge sharing. http://en.wikipedia.org/wiki/Knowledge_sharing. Accessed 19 January 2015.
2. Davenport TH, Prusak L (1998) Working Knowledge: How Organizations Manage What they Know. Boston: Harvard Business School Press.
3. Wikipedia (2014) Tacit knowledge. http://en.wikipedia.org/wiki/Tacit_knowledge. Accessed 23 January 2015.
4. Collins H (2001) Tacit Knowledge, Trust and the Q of Sapphire. *Social Studies of Science* 31(1), 71–85.
5. Uriarte, Filemon A. (Jr.) (2008) Introduction to Knowledge Management: ASEAN Foundation.
6. Wikipedia (2014) Explicit knowledge. http://en.wikipedia.org/wiki/Explicit_knowledge. Accessed 23 January 2015.
7. Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions (2006) Putting knowledge into practice: A broad-based innovation strategy for the EU: /* COM/2006/0502 final */. <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52006DC0502>. Accessed 26 January 2015.
8. Nonaka I, Reinmoeller P, Senoo D (1998) The Art of Knowledge: Systems to Capitalize on Market Knowledge. *European Management Journal* 16(6), 673–684.
9. Nonaka I, Takeuchi H (1995) The Knowledge-Creating Company: How Japanese Companies Create the Dynamics of Innovation: Oxford University Press.
10. Tsui L, Chapman SA, Schnirer L, Stewart S (2006) A Handbook on Knowledge Sharing: Strategies and Recommendations for Researchers, Policymakers, and Service Providers. Edmonton, Canada: Community-University Partnership for the Study of Children, Youth, and Families.
11. Ensign PC (2008) Knowledge Sharing among Scientists Why Reputation Matters for R&D in Multinational Firms: Palgrave Macmillan.
12. Johnson, William H. A. (2010) Knowledge Sharing Among Scientist: Why Reputation Matters for R&D in Multinational Firms, P.C. Ensign. Palgrave Macmillan, New York (2009), (220 pp., ISBN 0-230-61173-7). *Research Policy* 39(1), 187–188.
13. EUROPEAN COMMISSION (2006) Report on the outcomes of the: "Public consultation on transnational research cooperation and knowledge transfer between public research organisations and industry". http://ec.europa.eu/invest-in-research/pdf/download_en/consult_report.pdf. Accessed 22 January 2015.
14. EUROPEAN COMMISSION (2007) Improving knowledge transfer between research institutions and industry across Europe. <http://www.insme.org/files/3217/view>. Accessed 20 January 2015.
15. McDermott R (1999) Why information technology inspired but cannot deliver knowledge management. *California Management Review* 41(4), 103–117.
16. Canadian Health Services Research Foundation (2002) Knowledge transfer in health.



17. Canadian Health Services Research Foundation (2002) Productive partnerships: Report on the 2002 CHSRF annual invitational workshop. http://www.cfhi-fcass.ca/migrated/pdf/event_reports/2002_workshop_report_e.pdf. Accessed 21 January 2015.
18. Grigoleit S, Jovanovic M, Schietke, Ruth, Kliuyeva, Katsiaryna, Neumann A, Martin-Maze M, Gabrielsen Jumbert M, Garcia Canales, Juan Enrique, Herrera FJ (2014) D2.4 Overview and Analysis of Modes of Exchange between relevant Sectors: Deliverable of the SOURCE Project.
19. Lesser EL, Fontaine MA (2004) Overcoming knowledge barriers with communities of practice: Lessons learned through practical experience., in: Hildreth P. M., Kimble C. (eds.) Knowledge networks: Innovation through communities of practice Hershey, PA: Idea Group Publications., pp. 14–23: Hershey, PA: Idea Group Publications.
20. Estabrooks CA, Thompson DS, Lovely, J. J. E., Hofmeyer A (2006) A guide to knowledge translation theory. *Journal of Continuing Education in the Health Professions* 26(1), 25–36.
21. Lipp U, Will H (2008) *Das grosse Workshop-Buch: Konzeption, Inszenierung und Moderation von Klausuren, Besprechungen und Seminaren*, 8th edn. Weinheim, Basel: Beltz.
22. Besselink S, Hasberg M, Peters C, Petiet P, Pino JL, Vicente PL (2013) Report on the adapted DTA game: ETCETERA Working Document 6.1.
23. Glockner H (2012) Panning uncertainty. *Research & Results*(5).
24. Barry K, Domb E, Slocum MS TRIZ – What is TRIZ. <http://www.triz-journal.com/triz-what-is-triz/>.
25. Kepner CH, Tregoe BB (1997) *The New Rational Manager*. Princeton: Kepner-Tregoe Inc. Princeton: Kepner-Tregoe Inc.
26. Howe J (2006) The rise of crowdsourcing. *Wired* 14(6).
27. Surowiecki J (2004) *The Wisdom Of Crowds: Why The Many Are Smarter Than The Few And How Collective Wisdom Shapes Business, Economies, Societies And Nations*. London: Little, Brown.