



STOP-IT

Deliverable 2.2 (M37) **Annual technical and policy brief based on the results of each CoP**

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TITLE OF THE REPORT

D2.2: ANNUAL TECHNICAL AND POLICY BRIEF BASED ON THE RESULTS OF EACH COP

SUMMARY

This deliverable is designed as a brief overview of activities carried out in the Communities of Practice (CoPs) within the STOP-IT project, together with summarizing the feedback of the participants and facilitators, and providing recommendations for future CoP activities. It is envisaged that this brief supports the Work Package 2 (WP2) team in delivering high-quality information and support to the CoPs and their members. In developing this brief, all feedback and evaluation forms provided by the CoPs facilitators over the three years of STOP-IT have been taken into consideration, as well as feedback from the facilitators of the workshops and work meetings from the first year. Nine workshop reports and feedback from all facilitators were used in developing this brief, six from the first year, three reports for the second year, and 10 for the third year. The evaluation by both the participants and facilitators of the workshops was summarized and consolidated in order to avoid duplication of information. Each year this document will be updated with the results of next year. This will result in a complete overview of the results of all CoPs at the end of the project. Recommendations for the WP2 team were formulated as a result of the feedback and recommendations provided by participants and facilitators.

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DISSEMINATION LEVEL

- PU = Public
- PP = Restricted to other programme participants
- RE = Restricted to a group specified by the consortium.
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- CO = Confidential, only for members of the consortium



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List of Acronyms and Abbreviations

AdB	Aigües de Barcelona
BWB	Berliner Wasserbetriebe
CO	Confidential
CoP	Community of Practice
CoU	Community of Users on Secure, Safe and Resilient Society
EC	European Commission
FL	Follower
FR	Frontrunner
KPI	Key Performance Indicator
L-CoP	Local Community of Practice
PU	Public
QA	Quality Assurance
RIDB	Risk Identification Database
SAB	Security Advisory Board
TG	Thematic Groups
WP	Work Package
CSF	Critical Success Factor
SLO	Social Learning Outcomes



Deliverable 2.2 is developed as four different briefs combined into one. The document is updated every 12 months, spanning the entire duration of STOP-IT. The current brief, the third in this series, builds on the workshop reports provided by the CoP facilitators after each workshop was carried out during the first three years of the project. This practice will continue until the end of the project. Therefore, the current brief partially overlaps with the previous three. Despite the inclusion of some external stakeholders, their involvement in the local CoPs is still limited. Therefore this brief was developed as a technical brief rather than a policy brief. This remains a point of attention for the final year of the project. So far, four project CoP activities were carried out with Frontrunner and Follower utilities and one specifically targeting follower utility, while the trans-project CoP is at an increasing pace integrating the STOP-IT project into research networks dedicated to cyber-security and infrastructure protection, thus becoming more consolidated and visible. As such, the current brief aims to provide actionable advice to WP2 as well as to CoP facilitators and managers based on the workshops that were held so far, in order to ensure the success of future workshops, which also will include external stakeholders. The first steps towards the policy briefs related to the CoPs have been taken and will further be developed starting with the next and final version of deliverable 2.2, in order to provide input for the final deliverable of WP2, D2.3, which is due in M48 of the project.

The gradual development of the CoPs, from meetings to familiarize with the project and the CoP setting towards more project content meetings, is documented in this report. So far, 24 local CoPs have been held (including the technical meetings in year two), 5 project CoPs and several trans-project CoP activities were undertaken. Participants, namely CoP leaders, managers and facilitators agree that the objectives set for the CoPs were realistic and have been achieved successfully during the workshops, or as follow up activities. From March 2020 onward the CoPs have been held in a virtual format due to the COVID-19 pandemic. It is expected that more CoPs will be virtual as it is not yet clear when the pandemic is over. Therefore, in the final year it is expected to experiment more with virtual CoPs.

The suggestions, recommendations and feedback provided until M37 indicate a number of activities that were conducted between M25-M37, including the adoption of an approach to measure KPI 8, the adoption of an evaluation approach to measure both the CoP components and social learning outcomes, an update of the evaluation form, more active support to the front runners and greater interaction between work packages. The suggestions and recommendations for the following period aim at increasing the participation of external stakeholders, balancing the gender participation in workshops, reinstating the physical CoPs (if possible), offering the front runners a CoP checklist/ tips and tricks list, encouraging front runners to invite more tool developers to the meetings, focusing more on follow-up and conclusions, coming up with new ways of keeping participants engaged during virtual CoPs, and continuing to support knowledge exchange between water utilities and tool developers.

D2.2 Annual technical and policy brief based on the results of each CoP



1. Introduction

One of the goals of STOP-IT is to create and facilitate vibrant communities developed by the Frontrunner utilities of the project and research organizations, in relation to cyber security in critical water infrastructure. The Communities of Practice (CoPs) are designed to serve this purpose, and efforts were made from the beginning of STOP-IT to ensure they are operational during the project, as well as they continue to operate after the project ends in 2021. Within STOP-IT, a three three-level CoP approach is applied, (i) local level (Frontrunner water utility), (ii) project level (learning across locations and work packages) and (iii) trans-project level (transferability of knowledge and solutions to and from the project via interaction with other project/networks), see also D2.1.

The **local CoPs** are organized around the four Frontrunner utilities– Oslo VAV (Norway), Mekorot (Israel), Berliner Wasserbetriebe (Germany), and Aigües de Barcelona (Spain). Up to **M12** of STOP-IT the guideline for the set-up and management of the CoPs was elaborated (finalised in M6), and two rounds of CoP workshops already took place for Oslo and Barcelona, and one round for Berlin and Mekorot. **Between M12 and M25** two local CoPs took place; Mekorot (Israel), and Berliner Wasserbetriebe (Germany). For Aigües de Barcelona (Spain) and Oslo VAV (Norway) several dedicated technical meetings were held instead. The workshops are geared towards communication, data collection for project activities, and experience sharing with internal and external stakeholders of the Frontrunners. **Between M25 and M37** 11 L-CoPs were held. Their distribution across Frontrunner utilities is summarized below (Table 1):

Table 1: L-CoP meetings between M25 and M37.

Organizer	No. of L-CoP meetings
Oslo VAV	2
Mekorot	4
Berliner Wasserbetriebe	2
Aigües de Barcelona	3

From March 2020 and onward the CoPs were held virtually due to the COVID-19 pandemic. Monitoring how the CoPs are working towards the objectives is important in order to understand what works and what can be improved in organizing and carrying out the workshops, as well as understanding what potential follow-up activities should be encouraged. During year three of the project a new evaluation form was developed (Appendix I) to measure the three fundamental aspects of CoPs (community, practice, and domain) in relation to social learning outcomes based on the approach of Fulgenzi et al. (2020). The monitoring activity is the object of the current brief, and is based on anonymous surveys taken at the end of the workshops by the participants. In addition, during the first year of the project, the facilitators were asked to share their experiences in facilitating the workshops, feedback on the application of CoP guidelines, as well as recommendations to the WP2 team and the WPs that put forward the workshop requirements and materials. During the third year of the



project, several of the recommendations that were created in the second year were used and recommendations for following years have been formulated.

As for the **project CoPs**, we aim to identify productive interactions between the participants. We learned in the first project year that the project CoPs are evolving rather organically over a longer period of time. Between M25 and M37 one project CoPs was held; an online P-CoP during the online PSB-meeting in June 2020. Monitoring of these activities is again based on an online survey conducted at the end of the CoP and has led to recommendations for future sessions.

As for the **Trans-project CoP** we aim for cross-pollination potential with other related projects. The trans-project CoP activities are led by the project coordinator Rita Ugarelli. The activities started in the first and second year of the project and continued and further developed into year three. Some new initiatives have also been undertaken. Specifically:

- (1) Participation in the DG HOME Unit B4 'Innovation and Industry for Security' annual event including thematic panels of the Community of Users for Secure, Safe and resilient Societies (CoU).
- (2) STOP-IT joined cyber watching EU (An EU funded platform).
- (3) The establishment of the European Cluster for Securing Critical Infrastructures (ECSCI) of which STOP-IT is a member.
- (4) Collaboration with the cluster of projects funded under the H2020 digital water call 2018.
- (5) Rita Ugarelli co-organized an International Water Association (IWA) webinar (on Managing risks from digitalisation in the water sector).



2. CoP effectiveness through social learning & KPI 8

WP 2 is responsible for measuring KPI 8 (community involvement: *STOP-IT aims at awareness creation and communication between stakeholders within CoPs, target is to achieve at least 25% of identified stakeholders with effective and active participation in CoPs*). The project's description of action also assigns KPI 4, 5, and 9 to WP2, however, these KPI's do not seem to be relevant for CoPs. Most are already covered in WP 7 as can be seen in D7.2 and are suggested to be covered in WP 8 and WP 9.

Looking more closely to KPI 8, three elements need to be measured:

- Awareness creation;
- Communication between stakeholders
- Effective and active participation of 25% of the stakeholders.

In addition to measuring KPI 8, at the end of the project, WP2 has to provide a deliverable on best practices for CoPs (D2.3). By adopting a model developed in the H2020 project Nextgen by Fulgenzi et al. (2020), which measures CoP effectiveness in the three fundamental domains in terms of social learning outcomes, these three elements of KPI 8 can also be measured through the indicators used in that approach. Moreover, we can understand which factors stimulate and support an effective and efficient CoP (best practices). By looking at success factors from the literature on CoPs, we can also provide the current CoPs with suggestions for improvement. Therefore KPI 8 is measured through the critical success factors devised by (Fulgenzi et al., 2020) as it measures both KPI 8 and the performance of the CoPs.

2.1. Brief explanation of the adopted evaluation framework

According to Fulgenzi et al. (2020) a CoP effectiveness is operationalized as the achievement of three social learning outcomes (SLO); relational outcome, shared understanding and substantive outcome, and, in parallel the development of three CoP dimensions: community, domain and practice. In the literature a large set of preconditions and key elements can be found that indicate the effectiveness or successfulness of a CoP. These elements have to be taken into consideration when evaluating a CoP, in order to define strengths and weaknesses and potential for improvement.

Fulgenzi's (2020) approach for evaluating CoPs defines the development of CoPs as their increased effectiveness in stimulating and supporting the creation of knowledge (social learning), see Figure 1. Based on a literature review, Fulgenzi et al. (2020) created a list of indicators based on the preconditions for success. These indicators were clustered into six critical success factors (CSF). Each CSF is measured as the average of its indicators. The CSFs are related back to the dimensions of CoPs and social learning outcomes. Each dimension has two CSFs, one related to structural aspects and the other to epistemic ones.

D2.2 Annual technical and policy brief based on the results of each CoP



This model therefore measures the overall functioning of the CoP, which is needed for identifying best practices. KPI 8 can be measured through a selected set of indicators in Fulgenzi's (2020) model.

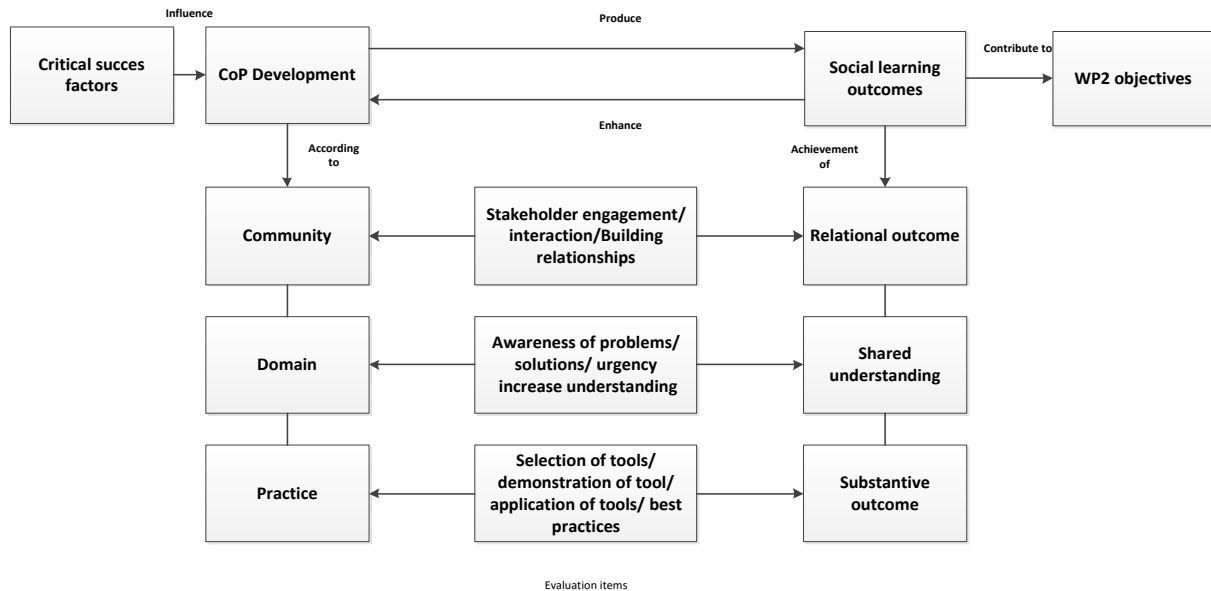


Figure 1 Framework of Fulgenzi et al. (2020)

Each evaluation item, based on KPI 8 and the CoP objectives, is thus measured by two CSFs: one is related to structural and organizational aspects, the second to epistemic and content-related ones. The indicators making up the CSFs are translated into statements that participants can rate from 1 to 5 on a Likert scale.

By adopting this framework it is possible to identify the aspects of the CoP that stimulate and support social learning outcomes, where a score above 3 is satisfactory.

2.1.1. KPI 8

KPI 8 is measured by the following evaluation items:

Communication:

- Improvement in working relationships
- Trust in others openness in communicating own opinions, concerns, interests, and goals.

Active and effective participation of relevant stakeholders:

- Opportunity for individual participation and input
- Representation of all relevant stakeholders
- Increased knowledge on the issue(s) at hand

D2.2 Annual technical and policy brief based on the results of each CoP



Awareness creation:

- Awareness of interdependencies of actions and desired outcomes
- Awareness of presence/lack of resources in the community
- Changes in own perspective
- Awareness of own role and role of others

2.2. Results of KPI 8

In this section scores of the KPI 8 indicators are presented. The effectiveness of the CoPs in general are presented in the next chapter. The scores on the vertical axis for all figures are the average score on the Likert scale from 1-5.

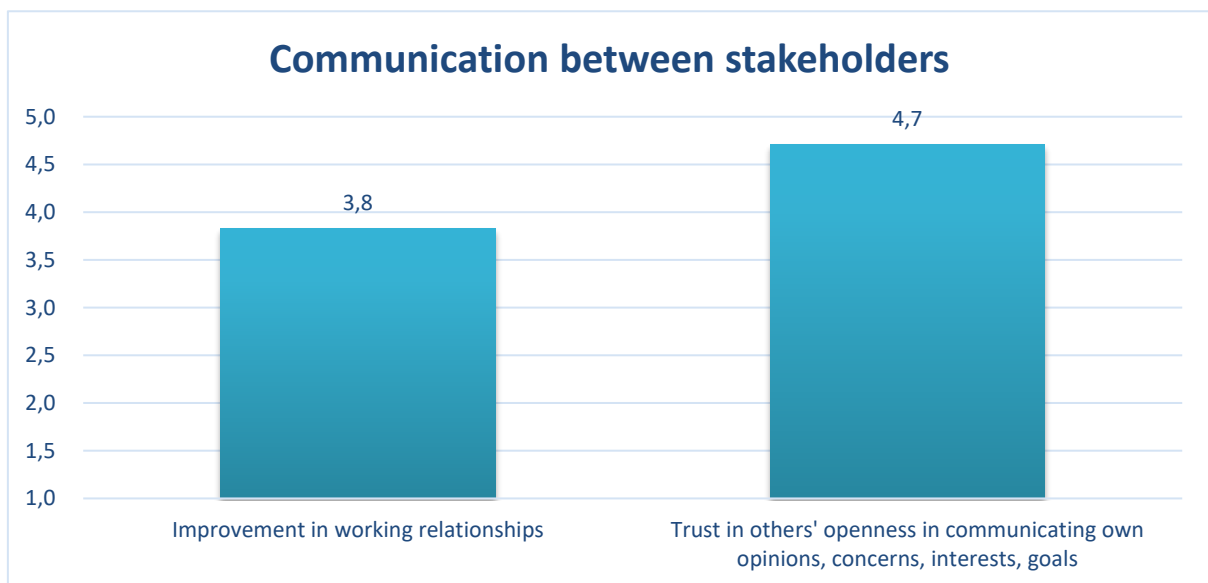


Figure 2 Communication between stakeholders in CoPs

Part of KPI 8 is to achieve communication between the stakeholders. As it can be deduced from Figure 2 there is open communication between the stakeholders. The participants believe that other participants are communicating in an open way and working relationships are continuously improved in the CoPs. Therefore, it can be said that the CoPs foster communication between the stakeholders in the project. There is room for improvement when it comes to working relationships. But this score could also be lower because the project is already in its third year and the working relationships are already established and considered sufficiently satisfactory as they are. However, this is something to keep in mind for the coming year of the project.

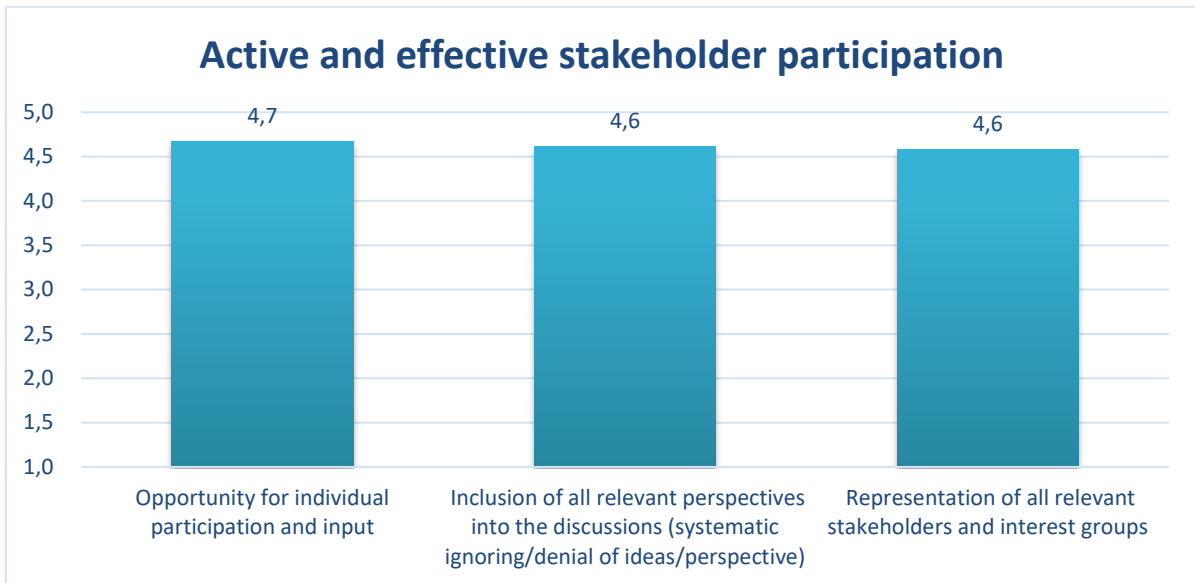


Figure 3 Active and effective participation in CoPs

KPI 8 aims for active and effective participation of 25% of the stakeholders. As shown in Figure 3, the indicator on the representation of all relevant stakeholders and interests groups scores 4.6 out of 5. This indicates that 92% of the CoP participants believes that all relevant stakeholders are represented. Accordingly, it can be concluded that the threshold of 25% is reached. The stakeholders also seem to participate in an active manner to the meetings. The participants state that there is sufficient opportunity for their individual participation and input (score 4.7 out of 5) and that the CoPs allow for the inclusion of all relevant perspectives into the discussion (score 4.6 out of 5). For the effectiveness of the participation in CoPs Figure 4 should also be taken into consideration. As it can be seen in Figure 4, participating in the CoPs led to an increase in knowledge on the issues at hand, indicating that the participation of the stakeholders was indeed effective.

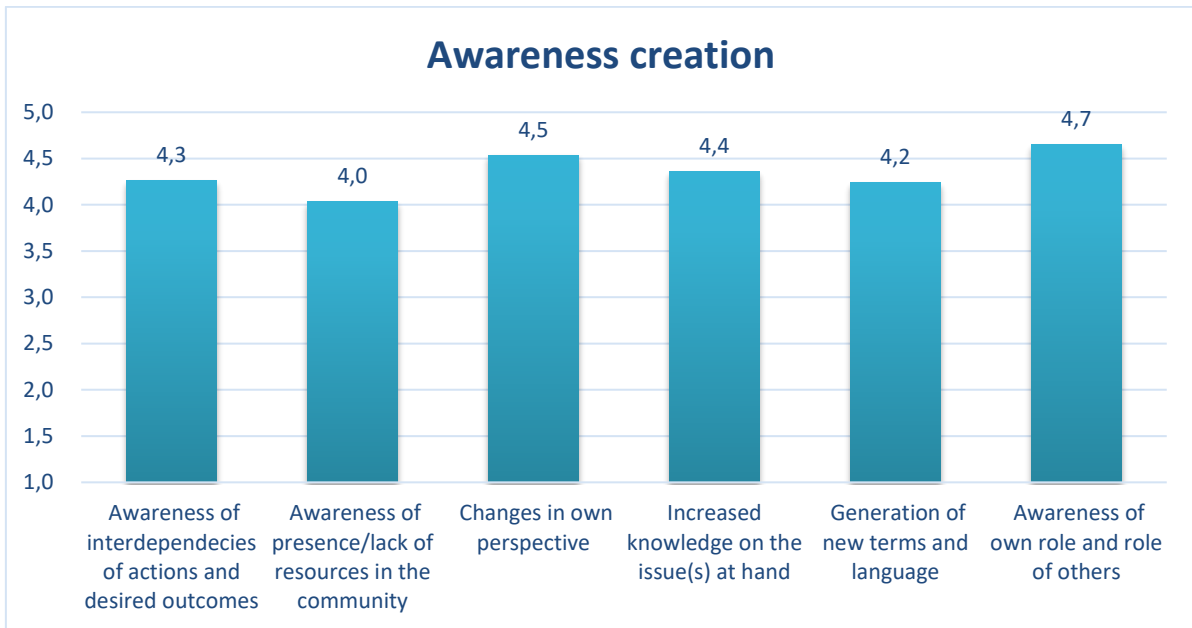


Figure 4 Awareness creation in CoPs

Lastly, KPI 8 aims at the creation of awareness. Awareness creation is measured through six indicators which can be seen in Figure 4. All indicators received a score from 4 or above, indicating that there is sufficient awareness creation. The CoPs not only enhance the awareness of the stakeholders' own role in the project and the roles of others, but also bring to light the interconnectedness of stakeholder' roles and the interdependency of stakeholders to achieve the desired outcomes of the project. Furthermore, there is increased understanding of the other stakeholders' perspective, and in relation to that, the participants learned more about the language and jargon used by participants from other organizations/WPs. Finally, the participants became also more aware of the available resources or resources lacking to handle specific cyber physical threads. This latter indicator received a score of 4, which makes it sufficient; however, there is still room for improvement.

Overall, the scores of all indicators, except the indicator on the improvement of working relationships, were 4 or above out of 5. The lowest scoring indicator has a score above 3, namely 3.8. These scores indicate that KPI 8 is sufficiently reached.



3. Local CoP activities and feedback

The CoP guidelines developed in WP2 have been revised by WP2 and are approved by the review (M18). The updated guidelines make clear the need to measure the success of the CoP activities, especially related to the local activities carried out, as these are connected to the first line of users of results stemming from STOP-IT: the Frontrunner and Follower utilities, as well as other connected local stakeholders. As part of the template provided to CoP managers and facilitators for reporting on each of the workshops, a specific section was designed to capture indicators related to outputs and outcomes of the workshops. These are envisaged to provide an overview of the direct indicators, such as number of participants and resulting follow-up actions, as well as to gauge the participants' satisfaction in relation to the activities of the CoP. During the third year of the project, the evaluation form was updated according to the evaluation method for CoPs with a focus on social learning of Fulgenzi et al (2020). In the following sections, a summary of the workshop goals, participants and their feedback, as well as feedback from the facilitator is provided. During the second and third year no feedback from the facilitators was gathered separately as they were also asked to fill in the evaluation form.

3.1. Workshop goals

A set of objectives is established before every workshop is set up. These objectives have the role of guiding the general motivation and work flow within the CoP meeting. They are established by the leader of the project activity for which the workshop is developed. For the first 2-3 workshops it was envisaged that the objectives are set up in such way that participants become comfortable with the idea of the CoPs, the STOP-IT project and its ambitions, as well as the format of the workshops and the roles of the facilitator and community manager. Also, for the first workshops it was agreed that these are carried out with internal stakeholders of the Frontrunner's organizations primarily to pilot the concept of CoPs in STOP-IT and to become aware of the level of sensitive information that is shared within the activities. However, each workshop organizer was given the freedom to choose how open the workshop should be, and invite members from external organizations to the CoP as they see fit.

Round one –year one

For the *first workshop round* (Nov 2017), the objectives were set to familiarize all the STOP-IT participants with the project, to define the scopes and goals of the CoPs and to collect and discuss the stakeholders' ideas and needs regarding the STOP-IT project.

Round two – year one

For the *second workshop round* (Feb-Mar 2018), the objectives set, were slightly different for each local-CoP. Apart from introducing CoP members to the STOP-IT project, or bringing them up to date with the developments after the first workshop, the second workshop had



the following explicit goal set as the main topic of the four local-CoP workshops carried out in February-March 2018: input to the risk identification database (RIDB) for work carried out as part of WP3, task 3.2 – Risk Identification.

Round three – year two

For the *third workshop round* (July 2018-June 2019) the objectives and set up for each local CoP were different. While some Frontrunners chose a clear local CoP (BWB, Mekorot), others opted for several separate sessions, which could be clustered as a local CoP (Oslo VAV, AdB). Being in the second year of the project, it can be assumed that the participants are now familiar with the concept of CoPs and STOP-IT itself. Therefore, the objectives of the workshops were more content orientated than in the first year. In general, the workshops were oriented towards the preparation of demonstration activities, exchanging user requirements with the tool developers, and showing the overall process of the tool development. The Frontrunners differ in their progress within the project. While some were already focusing on getting ready for demonstration, some were still at the risk identification part.

Round four – year three

The local CoPs during the *fourth workshop round* (July 2019-June 2020) were centered on the preparation for demonstration phase 2. All Frontrunners had completed the risk identification and were preparing for demonstration. The local-CoPs were focused on updates on the status of the STOP-IT tools, gathering ideas for testing of the tools, and identifying test cases. Moreover, the local-CoPs during the first half of 2020 were used to discuss and institutionalize these next steps with the frontrunners and make a timeline and planning for the actions to be taken during the remaining time of the project. The fourth round of workshops took place in the middle of the COVID-19 pandemic. Naturally, due to the travel restrictions, and social distancing, this impacted the nature of the CoPs as well. Therefore since March 2020, the local CoPs have taken place in an online format with an online evaluation provided by WP2.

So far, the feedback from participants, CoP leaders, managers and facilitators, as well as from the beneficiaries of the information shared in the workshops (WP3, 4, 5) shows that the set objectives were realistic and achieved successfully, either during the workshops, or during the follow up activities.

3.2. Participants' workshop evaluation and feedback

Round one and two –year one

The workshops set up as part of the CoP activities during the first two rounds were mostly focused on engaging internal stakeholders (from Frontrunners and research institutes), in order to collect information required by WP3, which lead to the development of CoP core groups. For the CoP workshops during these first two rounds, eighty participants attended in



total – some of these are counted twice as they attended both sessions¹. Feedback was generally positive with regards to the atmosphere, structure, openness, and collaborative opportunities. The participants appreciated the opportunity to interact with other project partners and exchange ideas. They were a little less positive with regards to the timing with which prior information about the workshop was provided, duration of the meeting (too short), participation by external stakeholders (too few), and some less interactive parts of the workshops. *Participants suggestions were to avoid long lectures, make the sessions more interactive, provide the objectives of the CoP well in advance, include more external stakeholders, and to organize more thematically oriented CoPs.*

Round three–year two

The third round of workshops focused mainly on the preparation for demonstration activities, exchanging user requirements and expectations. At the local CoPs in Berlin, Israel and Oslo a total of 41 participants was present. Since no formal CoP in Barcelona was held, there is no information on the number of participants. Evaluation during the third round of workshops is based solely on the participants' evaluation through the evaluation form and a reflection round. The reflection round also included the feedback of the facilitator. It should be noted that only at the local CoP in Berlin an evaluation was conducted. Overall, the workshop was valued positive in terms of atmosphere, exchanging ideas and discussion, getting more connected with other participants in the project, bridging the gap between tool developers and front runners, having an update on the development of the tools and for the frontrunners to provide input to the development. The less positive comments focused on the logistics of the meeting such as the location. It was also mentioned that there should be more time for discussion. *Participants suggestions were to have a more realistic planning, central location, more time for discussion on the end users' needs, and more time for the demonstration of the tools.*

Round four –year three

The fourth round of workshops was centred on the preparation for the second phase of demonstration and on identifying the next steps. In total 66 attendees participated in the L-CoPs during this period. Some are double counted as they participated in multiple sessions. The CoPs during the third year of the project were evaluated systematically, based on the social learning outcomes and CoP domains which are at the centre of a successful CoP, namely community involvement, domain and shared understanding and practice, and substantive outcomes.

¹ Aigües de Barcelona and Oslo VAV had both two workshops each, while BWB and Mekorot held one each, combining the first and second set of objectives

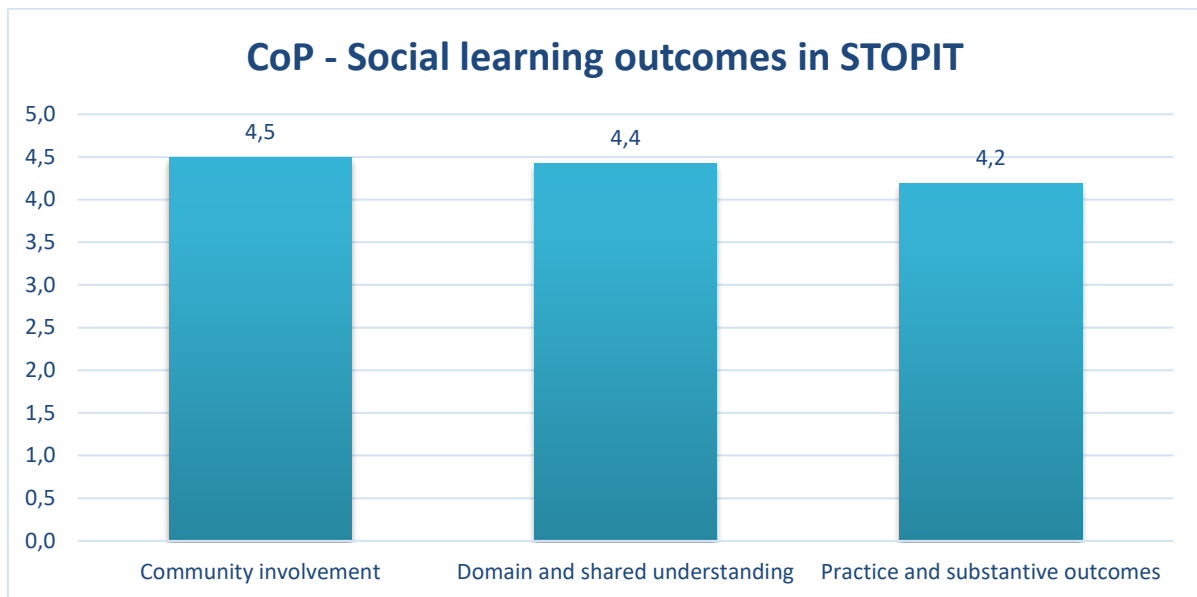


Figure 5 Social learning outcomes CoPs.

As shown in figure 5, all three domains received a score higher than 4 on a scale from 1-5. Therefore it can be concluded that the CoPs were functioning well.

The open ended questions confirmed this result. The open ended questions showed that the participants valued the CoPs for again the opportunity to interact, exchange ideas and learn from each other (community involvement and shared understanding), but also for their practical contribution to the project such as identifying the follow-up steps, bottle necks, and the information needed for the implementation of the tools (practice and substantial outcomes). Moreover their efficiency and discussions were highly appreciated. The least positive points mentioned were related to the progress of the tools and that some were developed without specific knowledge on the water service industry. While this has little to do with the CoP approach, the last point shows the importance of organising CoPs in the early phases of the project.

The shift to online CoPs gave the opportunity to experiment and learn from online CoPs. The online CoPs were appreciated for their focus, efficiency and not needing to travel. However, the participants missed the elements which they usually value most: the personal contact, small talks for news, creative ideas; furthermore, the online meetings are more prone for misunderstandings.

While the participants understand that online CoPs are currently the only feasible option, they recommended to hold future CoPs in a face-to-face session as much as possible. Moreover, they prefer more live demonstration of tools, more tool developers participating in the workshops, and to work together with the technology providers to test the tools. Other suggestions were more organisational: having a more focused agenda and making the objectives of the meeting more clear beforehand.

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All three years of CoPs evaluation show that the meetings are valued for being a platform where the different participants of the project can come together, share their knowledge and experiences, and better understand each other. The CoPs thus help to **bridge the gap between the end users of the tools and the tool developers**. They do **form a community, have a shared domain** and the meetings are more **focussed on the implementation** (practice). The shift to online meetings illustrated the sense of community that the face-to-face CoPs bring. Despite the overall positive score of the CoPs, there is room for improvement. *The participants suggested to focus more on the implementation of the tools and include both tool developers and frontrunners. If possible the workshops should be held on site and allow plenty of room for discussion and interaction. Time management remains an issue, it is necessary to strike a good balance. Lastly, while there have been some external stakeholders participating in CoPs, this remains a point of attention for the last year of the project.*

3.3. Local CoP facilitators feedback

As the local CoP development is performed in coordination with the research institutes active in the project and in collaboration with the Frontrunners, it was important to gauge the perception that the facilitators have on the workshops performed so far. As such, the local CoP facilitators were asked to respond to the following questions, related to the set-up, management of the local CoPs, as well as the support offered from WP2:

1. How would you describe the facilitator experience overall? What have you gained/learned from this activity?
2. Are there/have there been follow up actions decided with CoP members so far?
3. Have the guidelines elaborated by WP2 through D2.1 provided you with the tools and knowledge you felt were required to facilitate the workshops?
4. What are your recommendations for:
 - a. The WP2 team – elaborators of the CoP methodology in STOP-IT?
 - b. The other WPs representatives that develop the workshop subject, materials and ideas?
5. What are your suggestions for improvement overall?

Primarily, all facilitators noted that the CoP approach has been a positive experience so far with direct learning outcomes for them, as well as for the participants. The first two workshops were mainly designed (aside for setting up the CoP) for Frontrunners to provide inputs for the work carried out in WP3, specifically in tasks 3.1 and 3.2., and as such, there has been less room for developing social learning and characteristics associated with the CoP approach. However, there is an overall beneficial sentiment that the facilitators are building their own role within the STOP-IT CoPs through their approach to the application of the concept, their role as the project tasks “translator” to actions, and through ensuring that attention is given to the goals, values and social learning between stakeholders. Follow up actions, including additional meetings and telephone-conferences, are being organized by the communities.



Facilitators reported that the guidelines prepared in WP2 for the design, set-up and management of the CoPs have been beneficial in forming a theoretical basis before the CoPs became operation. In practice, the CoP meetings took their own direction and started taking their own identity. This is a consequence of a deliberate choice made in the development of the guidelines, namely the CoPs were given flexibility in choosing the methods to use in the meetings, such as the order in which they approach the subjects, flexibility to adapt to local culture and work conditions, to the Frontrunners primary interests, etc. Not all questionnaires, templates and recommendations were used as prescribed, which indicates that the facilitators are using their own best knowledge to lead the workshops. While this is in principle a good development for the CoPs so far, attention should be given to how much the workshops are straying from the overall direction of the project and, if needed, support should be provided from WP2 to correct any undesired deviations.

One particular point of attention raised by the facilitators, also seen in the participants' feedback, is that guidelines, suggestions, materials, and requests from work package leaders should be made available to both the facilitators and the CoP members more in advance compared to how this has been done so far. As noted by the facilitators, the local CoPs are now established but the immediate future of these CoPs is in the hands of the WPs that provide them with content. *The facilitators suggest to clearly mark the future workshops on a 6-12 months basis, so that a calendar of events can be established. This will enhance the capabilities for the CoPs to collaborate (between locations, as well as between local-project-trans-project). Another suggestion is to have CoP members provide information in advance of the workshops, and then summarize, compare and discuss during the workshops, rather than asking for the information to be shared as part of the discussions. This feedback around proper communication and information sharing relates to the "what's in it for us?" question to which the CoP members should have a clear answer formulated for themselves.*



4. Project CoP activities and feedback

Project CoPs are designed to exchange experiences on the applicable outcomes of STOP-IT with project partners by promoting a multi-stakeholder approach to water system protection (see also D2.1). Up to M37, project CoPs have been launched on different levels:

- i. on Task- and Work Package (WP) level, within the Scientific Technical Committee (STC), the Project Advisory Board (PAB) and
- ii. as a project CoP of STOP-IT operators in order to connect Frontrunners, Followers and other WPs and
- iii. as a project CoP specifically targeting Followers as part of the training sessions by WP8

CoPs on project level are not considered in this report as these CoPs consist mainly of project working groups and meetings and interactions, which will be described in corresponding WP deliverables and technical reports (in M18, M36, M48).

This chapter summarizes and reflects on the different kinds of project CoPs.

4.1. Project CoP connecting Frontrunners, Followers and WPs

In order to connect Frontrunners (FR) and Followers (FL) beyond project activities and tasks and to enhance exchange of knowledge and experiences, it was decided to provide a CoP for FR and FL water utilities. So far, three project CoPs of this kind were organized. A first meeting took place within the expanded local CoP workshop at Berliner Wasserbetriebe (Workshop on IT-Security on 12.-13.03.2018). At the meeting three (out of four) Frontrunner utilities and three (out of four) Follower utilities were attending.

The objective of this first water utility meeting was to bring together FRs, FLs, research institutions and technology providers in order to:

- Provide a framework for knowledge exchange between utilities
- Achieve a common understanding of upcoming tasks and tools developed
- Exchange experiences and ideas
- Discuss and define needs and expectations

A second workshop connecting Frontrunners, Followers and tool developers was held at the first PSB meeting in Barcelona (19.06.2018). At this meeting all water utilities participating in STOP-It were present as well as representatives from the research institutes and other parties involved in the STOP-It project. The CoP had the following objectives:

- To enable communication between FRs, FLs, research organisations and further project partners about existing risk management procedures.
- To provide feedback for FRs and FLs to their existing risk management concepts.

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- To develop common agreements about do's and don'ts in risk management processes.
- To create the possibility to give input and expectations for future local CoP designs.

At the second PSB meeting in Athens, the third project CoP connecting Frontrunners, Followers and tool developers was held (19.06.2019). The CoP shifted its focus from risk management towards technical understanding of the tools, preparation for demonstration activities and created opportunity to exchange expectations and feedback between water utilities and tool developers. Objectives were:

- To ensure all Frontrunners and Followers have a profound understanding of the tools developed in STOP-IT (WP4, WP5 and WP6).
- Planning of the tool demonstrations with focus on open questions, technical requirements, participants, timeframes, demonstrated scenarios, key performance indicators and evaluation methods.
- For Frontrunners to provide feedback and recommendations to the tool developers.
- To enhance the involvement of water utilities into the tool development process for a higher degree of customization of the technologies.

The fourth Project CoP was meant to be held at the PSB meeting in Berlin. Unfortunately, due to the COVID-19 pandemic, the PSB shifted to an online meeting and so did the P-CoP. The project CoP had the following goals:

- To update all the project participants of the progress, limitations and action plans of the front runners.
- To create shared understanding on the progress and next steps for testing of the tools.

As it can be seen, the project CoPs have developed over the past three years of the project. While the first one was mainly set to up a framework for knowledge exchange, create common ground and shared expectations between all the parties involved, gradually the CoPs aim shifted towards knowledge exchange on the content of the project. First on risk management, but as the project tools and modules developed, the emphasis of the CoPs shifted towards preparation for demonstration, and finally to the preparing the frontrunners and technology providers to test the tools. The exchange of knowledge between the various participants remains an objective. Based on the feedback by the participants the goals set are realistic and have been met.

4.1.1. Participants' workshop evaluation and feedback

Similar to the local CoPs, the project CoPs were evaluated by the participants through the evaluation form and the updated evaluation form, measuring the main components of CoPs from the third year on.

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The overall feedback on the first project CoP meeting connecting FRs, FLs and WPs was very positive and the participating (and also other) partners from water utilities were indicating interest on further meetings. This led to the provision of such a session within the annual project meetings in Barcelona (2018) Athens (2019), and one was planned for Berlin (2020) as well.

The project CoP in Barcelona was viewed overall positive. The participants mentioned their intention to keep the communication with the other partners, and keep the momentum and understanding that was generated during the session going. In Athens the participants were very positive in general about the project CoP too.

The participants of the P-CoPs specifically mentioned their appreciation of the opportunity to have face-to-face discussions, getting to know each other, having a collaborative and productive atmosphere and gain better understanding of the tools. The participants also expressed the need to bridge the gap between the worlds of water utilities and the research institutes/technology providers.

Less positive aspects were that the duration of the workshop day was too long, but the sessions were too short, there were too few technology providers present, overview of how the tools interact was missing, and overall some questions were left unanswered in regard to the tools. Overall, the followers should be more included. There were also some logistic issues as the lack of climate control and difficulty in finding one's way to the locations.

Some concrete suggestions for future P-CoPs were more precise announcements of the discussion topics, using the world café method for future P-CoPs, and organizing specific sessions around the tools for both followers and frontrunners.

The P-CoP in year three was held in an online format. Therefore the results are presented separately. Just as in the online L-CoPs, the format was appreciated for being fast, productive, focused and the only option during the current situation. The meeting itself was valued for being able to catch up, and for providing a clear plan for the future. Again the lack of face-to-face interaction and having no possibility to have informal small talk led to less team feeling.

Suggestions for future CoPs would, therefore, be to hold the meetings as much as possible face-to-face and, if there is a need to have virtual CoPs, to try to experiment with interactive tools to keep the participants engaged such as Mentimeter (tool). One participant did mention that this format would be suitable for an update every three months to keep everyone in the project up to date.



4.2. Project CoP for Followers

In order to transfer the applicable outcomes of STOP-IT to the Follower water utilities, the first project CoP meeting targeting the Followers was held on day two and three of the PSB meeting in Athens (19.-20.06.2019). All Follower water utilities were represented. This project CoP had the following objective:

- To train the FLs –according to the classification of Deliverable 8.1
- To check MS13 for the first round of training activities delivered
- Use the feedback to improve the training materials for profile 1

During the session, the presentation, training material and a video explaining the added value for the decision makers was presented. This gave the Followers the opportunity to provide feedback on the materials and also to express their challenges and need for training material.

Overall, based on the feedback the goals of the session seem to have been realistic and met.

4.2.1. Participants' workshop evaluation and feedback

Overall the participants evaluated the first project CoP focusing on the Followers as positive.

Only the most interesting parts of the training session were mentioned:

- To get an overview and general information.
- To see the progress of the work that has been done by SINTEF and ICCS.
- To have a face to face meeting.
- The opportunity to talk to each other.

The only suggestion for improvement was to:

- Make an overview of the status of where the different Followers are in the process also in cooperation with the Frontrunners.

During the third year of the project another P-CoP for followers was planned together with WP 8. Due to the COVID-19 pandemic, this CoP has been postponed until October 2020.



5. Trans-project CoP activities and feedback

Trans-project CoPs make the outer layer of CoPs in STOP-IT, and are associated with the lowest confidentiality level. They are designed to establish the interaction with other international networks, initiatives/projects or research communities dealing with critical infrastructure, enabling knowledge exchange and methodological exchange. And to encourage the dialogue for the pre-establishment of certification mechanisms by facilitating the debate and expert elicitation and consultation across borders between different critical infrastructures (D2.1). The trans-project CoPs, the activity is led by STOP-IT coordinator Rita Ugarelli.

5.1. Trans-project CoP activity during the first year (May 2017-May 2018)

During the first year, collaborations have been established with relevant communities: the ICT4Water cluster (www.ict4water.eu), the "Community of Users on Secure, Safe and Resilient Societies" (CoU) (www.securityresearch-cou.eu/about), the FP7 project SCOUT (www.scout-project.eu) and the Net4Society (www.net4society.eu). During the second year of the project, STOP-IT partners contributed to the physical and cyber safety in critical water infrastructure workshop by the NATO science for peace and security program, and STOP-IT partners participated in the joint kick-off of the Digital Water projects (12-06-2019) by EASME. Furthermore, Rita Ugarelli is now formally engaged to collaborate with the ERNCIP-water group.

The ICT4water cluster aims at safe, sufficient, valued and "smart" water for EU citizens by stimulating the development of innovative water management products and services, based on Information and Communication technologies and enabling greater cooperation among researchers, industry, water regulators, operators and users across the EU. The cluster comprises 20 ongoing H2020 projects, including STOP-IT and 13 concluded projects.

The collaborative activities established are:

- Contribution to the ICT4water newsletter by STOP-IT (WP9)
- Participation to the ICT4Water cluster events (e.g. the EIP Water conference in Porto in September 2017 and the combined events of ICT4Water cluster and the WssTP working group on ICT and Water)
- STOP-IT was presented by Rita Ugarelli (SINTEF) within an ICT4Water dedicated session at the coming 13th International Conference on Hydroinformatics (HIC 2018). (www.hic2018.org/) in June 2018. STOP-IT is member of the ICT4Water Cluster and actively involved in the implementation of their ACTION PLAN.
- Rafael Giménez (CET), Gustavo Gonzalez (ATOS), Rita Ugarelli (SINTEF), are the leaders of the action "Cybersecurity"

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- Christos Makropoulos (KWR) is the leader of the action "Actor Awareness - Water & Digital"
- Andreas Hein, Fabian Vollmer and Achim Mälzer (IWW) presented STOP-IT at BSI, Germany to connect the expert group for the water sector to the project. BSI is the German Federal Office for Information Security.
- Strong presence of STOP-IT partners at the ICT4Water annual event – June 2019 (SINTEF, KWR, CET, and EUT). At this event it was confirmed that STOP-IT is still the only project dealing with cybersecurity in the water sector. Ways to collaborate have been discussed.

The "Community of Users on Secure, Safe and Resilient Societies" (CoU) has been launched in January 2014 and has since developed to become an efficient platform of exchanges among different actors of different branches of security and crisis management. The CoU has developed a thematic programme for 2018, among which a dedicated theme focuses on water safety and security (Theme 2).

The collaborative activities established are:

- On the 8th of March 2018, Rita Ugarelli (SINTEF) participated to the "Science to Science" round-table on Theme 2, to present the project on behalf of the STOP-IT consortium
- The CoU will create an expert team on cyber security and Rita Ugarelli expressed the availability to join on behalf of the consortium. The expert team will also interact with NATO on selected topics.
- At the 7th of June 2018 Rita Ugarelli (SINTEF) attended the 11th CoU Theme 12 "Urban CIP", led by DG HOME with European Reference Network for Critical Infrastructure Protection (ERNICIP). The event focused on urban critical infrastructures:
 - FP7 and H2020 Projects (see list below) for the "science to science" panel.
 - Involvement of policy DGs and MS in the "policy to policy" panel.
 - Bringing scientists, policy-makers and industry/SMEs together around crisis management at city level and CIP in the "policy to research & innovation" panel with involvement of stakeholders.
 - Involvement of practitioners in the "Interactions with practitioners" panel.
 - Projects of relevance to the theme: SMR, RESOLUTE, IMPACT, CARISMAND, CUIDAR, SMART-RESILIENCE, DARWIN, ATENA, DEFEND, STOP-IT, SAURON, GAMMA, SUCCESS

The SCOUT project is based on the use of multiple innovative and low impact technologies for the protection of space control ground stations and the satellite links against physical and cyber-attacks. STOP-IT was presented at the final workshop of SCOUT by Juan Caubet (EURECAT) the 15th of March 2018 within the AFCEA conference "Protection of critical infrastructures: the SCOUT workshop" devoted to the thematic topic of protection of critical infrastructure. No short term follow up items are foreseen in relation to the SCOUT project,

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but according to Juan Caubet there is high potential for collaboration with the other projects presented at the workshop.

STOP-IT has been invited to events organised by ERNCIP (<https://erncip-project.jrc.ec.europa.eu/>) and to contribute to their activities. ERNCIP (European Reference Network for Critical Infrastructure Protection) is an EC platform, which is formed by different Thematic Groups (TG). Aigües de Barcelona (AdB), Frontrunner of STOP-IT, is involved in one of those TG (Chemical and Biological Risks to drinking water). Since M12, Rita Ugarelli is formally engaged to collaborate with the ERNCIP – water group. ERNCIP- water group is about the release the draft guidelines for a water security plan and is looking for STOP-IT water utilities, interested to provide feedback.

5.2. Trans-project CoP activity during the second year (May 2018-May 2019)

In October 2018, STOP-IT partners (ICCS, Bergen, Oslo, and SINTEF) contributed to the CYBERWATER 2018 Physical and Cyber Safety in Critical Water Infrastructure workshop organized by the NATO science for peace and security program. The workshop brought together experts from 12 NATO countries and 6 partner countries, envisaging to formulate “Best practices” based on recommendations and conclusions for policy and practices. An important result from the event was a call for papers for ASCE J. Environ. Eng. Special Collection "Physical and cyber safety in critical water infrastructure". Christos Makropoulos and Rita Ugarelli are involved as co-authors. At the PSB meeting in Athens the attendees were asked to also submit papers for the next issue.

Lastly, STOP-IT partners SINTEF, KWR, Eurecat participated in the joint kick-off of the digital water projects on 12.06.2019, which was organized by EASME. This resulted in establishing valuable connections with the newest H2020 projects in digital water.

5.3. Trans-project CoP activity during the third year (May 2019-May 2020)

During the third year of STOP-IT, the trans-project activities have built upon the connections established in the previous years:

ICT4Water Cluster: the ICT4Water cluster, after publishing the Action Plan (<https://www.ict4water.eu/wp-content/uploads/2019/04/ict4wateractionplan2018.pdf>), has created action groups to implement the plan. The Action Plan 2018-2030 focuses on implementation of actions related to interoperability and standardization, data sharing, smart water, cyber-security, actors' awareness, policy and business models. For each of these actions an expert team was created. STOP-IT partners (CET, ATOS and SINTEF) are co-leading the action group on cyber-security. As such, STOP-IT is actively involved in the ICT4Water initiatives, with monthly meetings, contribute to the Connected Digital Single



Market and the Resilient Energy Union objectives by promoting energy efficient and safe smart ICT technologies in the water sector. The action group includes only two H2020 projects: STOP-IT and aqua3S. The actions under development are: strengthen the collaboration with the European Cyber Security Organisation (ECSO) to examine the possibility of some joint dissemination actions, and the preparation of a whitepaper on Cybersecurity in the water industry.

CoU - INFRA Scoping Group: participation to the DG HOME Unit B4 'Innovation and Industry for Security' annual event including thematic panels of the Community of Users for Secure, Safe and resilient Societies (CoU) (17th September 2019). Rita Ugarelli attended and presented the STOP-IT project. This format was a key source of exchange and discussion with the Commission to define future security research priorities and to facilitate contacts between H2020 projects and policy makers. On each session a number of projects funded by the Commission were invited to join the panels (moderated by Commission officials) and to present the work. More information on the CoU can be found here: <https://www.securityresearch-cou.eu/>.

An immediate outcome of this experience was to join and include STOP-IT in the <https://www.cyberwatching.eu/>. The Cyberwatching.eu project uses a number of underpinning information sources to visualize the state of the art of projects as a means to maintain oversight of the larger European Cybersecurity research landscape. The radar maps projects by research themes. Improved color-coding makes it possible to understand the project lifecycle status and Market and Technology Readiness Levels and an evaluation of its performance compared to other projects in the same sector. Further details such as start/end date, the budget, funding call, funding scheme are also included. A later but relevant outcome of the event was the establishment of the ECSI cluster.

CoU - INFRA Scoping Group: the participation to the CoU event in September 2019, resulted in the agreement of collaboration between H2020 projects coordinators attending the event. We have established the European Cluster for Securing Critical Infrastructures (ECSCI - <https://www.finsec-project.eu/#comp-k38hag4h>), including the following projects:

- FINSEC (<https://www.finsec-project.eu>)
- ANASTACIA (<http://www.anastacia-h2020.eu/>)
- DEFENDER (<https://defender-project.eu/>)
- InfraStress (<https://www.infrastress.eu/>)
- RESISTO (<http://www.resistoproject.eu/>)
- SAFECARE (<https://www.safecare-project.eu/>)
- SATIE (<http://satie-h2020.eu>)
- SecureGas (<https://www.securegas-project.eu/>)
- SPHINX (<https://sphinx-project.eu/>)
- STOP-IT (<https://stop-it-project.eu/>)

The cluster has successfully proposed and will organize an international workshop on Cyber-Physical Security for Critical Infrastructures Protection (CPS4CIP) 2020 in conjunction with ESORICS (<https://www.surrey.ac.uk/esorics-2020>). The CPS4CIP workshop will take one full



day on September 18th 2020 in Guildford, United Kingdom. Rita Ugarelli (SINTEF) and Christos Makropoulos (KWR) will contribute as Project Committee Chairs.

An internal workshop of the cluster is under preparation and will possibly take place in June 2020. The original plan was to organize a face-to-face workshop, and a back-to-back to the event annual event of CoU-INFRA 2020 in March 2020, but both events were cancelled due to the corona virus outbreak.

Collaboration with the cluster of projects funded under the H2020 digital water call 2018: through the dialogue established with the five projects aqua3S, Digital Water Cities, Fire4Water, SCORE and NAIADES, Rita Ugarelli has proposed to make available results of STOP-IT, which are public and which could help the "younger" projects to build from our results. This resulted in the decision to connect STOP-IT colleagues (of EURECAT) to contribute to the working group about risk management ontology within the task force "FIWARE and ontology". The potential collaboration on the risk management ontologies is not yet defined, and a possible evolution of the dialogue will be to create a new working group related to FIWARE in the ICT4Water cluster, as platform to exchange between projects on a bigger scale.

Additional during the third year of project, as activity which is in between WP2 and 9, Rita Ugarelli co-organized an International Water Association (IWA) webinar (<https://mailchi.mp/iwa-network/post-webinar-managing-risks-digital-water>) on "Managing risks from digitalisation in the water sector", which took place on 1 April 2020. This webinar is part of a series from the IWA Digital Water Programme. Rita Ugarelli and Christos Makropoulos (KWR) contributed to the webinar as panellists.

Lastly, STOP-IT is connected to the IMG-S. The IMG-S is an informal and European wide network of experts in the security domain, connecting academia (UNIV and RTO), industry (SMEs and large) and end-users.

At M37 of the project, the trans-project activities continue making STOP-IT visible in the most relevant networks/communities at EU level related to safety, security and CIP. The T-CoP activities in the first two years have laid the groundwork for the T-CoP activities in the third year. STOP-IT is presented at various events on cyber security which made it possible to establish the European Cluster for Securing Critical Infrastructures (ECSCI) through which several EU project on cyber security for critical infrastructures are connected and several workshops are planned. Therefore, it can be concluded that during the course of the project, STOP-IT has become more visible and has increasingly contributed to relevant network/communities at the EU-level.



6. Critical review of CoP workshops

Summarizing the feedback and indicators provided by both, the CoP participants and facilitators, creates a basis for improvement of the future operation and knowledge gathering/sharing within the CoPs. The following subchapters are primarily directed towards local and project CoPs. For trans-project CoPs there are currently no particular recommendations for improvement, as most activities are developing on longer time frames and in connection to other projects and initiatives.

6.1. Lessons learned in year one

The CoP guidelines were designed to support the CoP facilitators and managers in the setting up, starting and managing the activities carried out in the workshops. These guidelines were not set up as hard prescriptions, and each CoP had flexibility in how to carry out the initial activities. In the guidelines it was suggested that the first CoP workshop should start with an introduction to the CoP concept, leading the participants through the different aspects that the activities will cover. In practice, for some of the CoPs it was found that introducing and discussing the different CoP aspects gradually, in relation to the specific tasks required, was more efficient than discussing the concept of CoP and its operation itself.

In the guidelines the importance of the roles of facilitators of the CoPs were clearly recognized: “The CoP facilitator is designated from the related research institute and supports the CoP manager. The facilitator should be an ‘independent expert’, who is given the authority to lead, to impose clear rules and roles, and who can generate an environment of trust.” In practice, this aspect was proven, as the facilitator has the important role to keep Frontrunner utilities engaged, to collect their needs for corresponding tasks and project activities and vice versa.

As the CoPs take shape through the development of workshops and connected activities, social learning takes place between the members of the CoP. So far, and time available for development of social learning and characteristics associated with the CoP format. However, as the CoPs develop as part of the STOP-IT project, including external stakeholders (not only members of the organizations represented in STOP-IT), social learning will most likely take shape through the stakeholder interactions with the project.

Sets of questionnaires, materials, and templates are provided to the CoP facilitators and managers, as well references to the CoP guidelines, prior to the workshops being organized. To this point, the facilitators reported that it would have been excessive to use all questionnaires, templates and recommendations exactly as provided; instead, the facilitators had the freedom to tailor the approach and use only materials that were needed in the workshops.

The CoP activities in the first project year were focused on (1) setting up the CoPs and (2) providing information required for WP3 of STOP-IT – namely, the identification of risks for the

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Frontrunner utilities systems. Up to now, FRs were mostly asked to provide information, but it is envisaged that as the CoPs advance and coalesce by attracting more members, STOP-IT will also need to focus on showing the benefits in terms of "what is in it for us" to the members.

The distinction between local and project CoPs is blurry in practice; however, this is not perceived as a problem. Instead, while allowing for flexibility for the organic development of project CoPs, efforts are made to be inclusive in the approach, especially for the STOP-IT utilities.

During the first year the lessons learned led to the formulation of the list of recommendations below. It builds on the consolidation of participation indicators, feedback from members of the CoP, as well as feedback from facilitators. The recommendations provide actionable information, mostly dedicated to the WP2 team, while facilitators and managers should be informed about the actions taken by the WP2 team on the basis of the following recommendations.

1. Efforts should be made to balance the gender representation in the workshops
2. The CoP guidelines may be more appropriate for formal meeting formats. They should be considered and applied for the annual meeting, when a dedicated session for utilities is programmed as a project CoP
3. Material and information should be provided earlier by WPs or task leaders responsible for the workshop (i.e. info material, graphics, suggested moderation techniques etc.), graphics are already prepared to clarify the STOP-IT project and approach to participants
4. Dates for CoP events/meetings should ideally be set for the upcoming 6-12 months in advance in a calendar of activities
5. Ensure that attention is given to the goals, values and social learning between stakeholders
6. Ensure and enhance experience sharing between the local CoPs, as well as with project and trans-project CoPs
7. Involving more/external stakeholders is relevant for experience sharing, user requirements, technology development, testing experiences, and the building of contact networks
8. Focus on experience sharing in the coming project year and, to the extent possible, expand beyond the local situation and connect FRs
9. Try keep the meetings lively by avoiding long lectures and the filling of Excel files/questionnaires during meetings. These activities should be carried out before or after the actual meeting, while the meeting should be reserved for discussing results and summaries of these activities
10. Try placing more emphasis on what the input/feedback will be used for to show what the next steps will be (envisaged characteristics of RIDB, capabilities of the solutions, etc.), provide some visions, knowledge that will be inspiring and show the participants 'what's in this for me'



11. Explore the provision of a toolbox of moderation techniques (in case there is no suggestion from the WPs or task leaders who are responsible for workshops content). This could be for instance a short presentation showing 3-5 useful moderation techniques, such as world café, visioning etc., which could support the discussions

12. Implement a more illustrative overview of outcomes and storylines, identifying the stage of the project in relation to project activities, what results are envisaged to be obtained through the information requested, what are the future steps to be taken

6.2. Lessons adopted in year two

Of the twelve recommendations mentioned in the list in the previous subchapter, four points were implemented within the CoPs in the second year. The first point, organising a project CoP at the annual meeting has been implemented. Moreover, the preferred working method mentioned in the participants evaluation, the world café method, has been used. The second implemented recommendation is the provision of materials and information earlier. The agenda and instructions for CoP preparations have been sent to the participants a few weeks in advance. The instructions for the project CoP in Athens were sent several times in draft versions and the final version 1.5 weeks in advance. The agenda for the local CoP in Berlin was also provided a few weeks in advance of the workshop. The third implementation refers to more information sharing between local CoPs. Based on this recommendation a “living document” was created where the main results of the local CoPs will be published continuously. This living document can only be accessed by project partners and has the goal to make knowledge exchange between the Frontrunners easier. The fourth used recommendation was the toolbox of moderation techniques. During the second year of the project a toolbox of moderation techniques was developed by WP2 containing eight moderation techniques. The techniques are clustered, based on the situation in which they are suitable and explained to the extent that hosts should be able to adopt these techniques by reading the toolbox. The toolbox has been shared on the Innovation Platform (the internal platform of the STOP-IT project), and is thus accessible by all project partners.

Other recommendations refer to more ongoing processes which should be paid attention to during the entire duration of the project. This holds true for the suggestion to make effort to balance the gender representation in workshops. For the formal local CoPs in year two (Berlin and Israel) it is possible to provide a percentage for the amount of women present. For the local CoP in Mekorot (Israel), this was 22.2% and for BWB (Germany) this was 31.6%. For the project CoP the percentage of women present was 33.3%. Ideally this percentage would be close to 50% and to achieve this remains an ongoing process, which should be communicated to the water utilities as WP2 has only limited influence in this.

The suggestions to ensure that attention is given to the goals, values and social learning between stakeholders and trying to keep meetings lively by avoiding long lectures and filling in excel files is also a point that should be kept in mind continuously during the project. While the CoPs during the second year allowed for a sufficient amount of discussion, some



participants mentioned that the presentations were still too long. Therefore, this remains an ongoing process.

The same can be said for the next two suggestions: involving more/external stakeholders for experience sharing and building contact networks. This remains an open issue, but requires a good balance with the confidentiality requirements of the L-CoPs, which have the highest level of confidentiality. This makes it a challenge to involve more external stakeholders. While during the second year of the project there have been more project CoPs and more trans-project CoPs activities and BSI expressed their wish to participate in a local CoP, the focus needs to lie on building networks and sharing experiences with a broader range of stakeholders.

Finally, some recommendations are not solely meant for WP2 and collaboration with other WP's are necessary. The suggestion to implement a more illustrative overview of outcomes and storylines, identifying the stage of the project in relation to project activities, what results are envisaged to be obtained through the information requested, what are the future steps to be taken, the request to show what is done with the recommendations of the users and what are the next steps within the project. While all of this could certainly be done in the CoPs, input from other work packages is needed.

6.3. Lessons learned in year two

The work of WP2 in the second year of the project mainly consisted of implementing the recommendations made in the previous year, as described in the previous sub-chapter, and supporting new local and project CoPs. Based on the observation and evaluation of these workshops, lessons can be learned.

One of the positive aspects of the project CoP held in Barcelona was that the participants were very positive about the concept of CoPs and said to be very motivated to continue CoPs in the following year. In practice however, little initiative was taken. Two formal local CoPs were held and the other companies organized several separate workshops. It is the responsibility of the Frontrunners to organize local CoPs as is written in D2.1: "The meeting topics will be decided by the CoP managers in collaboration with WP or task leaders and *support from WP2* as part of the preparatory work for the meetings." WP2 could also more proactively offer their support, however WP2 is dependent on Frontrunners to communicate this with WP2. Examples of this more proactive support could be to make an annual schedule to indicate periods where FRs should organise CoPs. This requires closer contact with the Frontrunners as they decide on meeting topics. This should be done for local CoPs, as well as for project CoPs.

During the first year several forms such as the evaluation form and templates for minutes and workshop were designed in WP2 and made available on the Innovation Platform. D2.1 states that at each CoP a person should be appointed to take the minutes and write workshop reports as these minutes and reports are crucial for other work packages within the STOP-it project. However, only for the CoPs where a member from WP2 was present, an evaluation was conducted and a report was written. Therefore, it can be concluded that it is not enough

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just to make these forms available, but WP2 should actively promote these forms and stress their importance to the CoP coordinator. Again, this requires input and information of the Frontrunners in regard to organizing local CoPs.

Another lesson learned during the second year relating to the monitoring of the CoPs was brought to our attention during the review of D2.1 and D2.2. Here it was mentioned by the reviewers that KPI's are missing. During the third year of the project, the KPI's for CoPs were developed based on a literature study conducted within KWR for the Nextgen project.

Most of the feedback received from the participants in the workshops relates to practical issues, such as the centrality of the venue, the directions of the venue, dietary needs, and working climate control systems. The CoPs seem to function well in bringing various stakeholders together and exchanging explicit and tacit knowledge.

The recommendations list from year one, combined with the lessons learned in year two, results in the following list of recommendations for future workshops:

1. Keep making efforts to balance the gender representation in the workshops
2. Set up an CoP events/meetings schedule for the upcoming 6-12 months in advance in a calendar of activities
3. Keep ensuring that attention is given to the goals, values and social learning between stakeholders
4. Keep involving more/external stakeholders for experience sharing, user requirements, technology development, testing experiences, and the building of contact networks
5. Keep trying to keep the meetings lively by avoiding long lectures
6. Try to create a better connection with the other WPs that develop tools to implement the suggestions made in the previous year, such as presenting a graphic overview of their progress and next steps during the CoPs
7. Creating a CoP schedule for the upcoming years
8. Actively offer the evaluation, minutes and workshop report template and stress the importance for the monitoring of CoPs to the workshop hosts, alternatively be present at the workshops
9. Provide a checklist with practicalities for organizing a CoP to the Frontrunners
10. Design KPI's for CoPs
11. Design a new evaluation form based on the new KPI's

6.4. Lessons adopted in year 3

Most of the recommendations from year two have been addressed in the third year of the project. Starting with the effort to balance the gender representation in the workshops, the workshop report now monitors the gender balance per CoP. There have been two CoPs with a gender balance with both 50% men and women. Unfortunately the gender balance of the L-CoPs in general is 67% male and 33% female. While this issue has been addressed, it remains a point of attention for the final year of the project.



During the third year, WP 2 has been actively offering its support and reminding the front runners to organise L-CoPs. This has resulted in an increase of L-CoPs in the third year and better documentation of the L-Cops. WP 2 has also been more closely connected to other work packages such as WP8 for organising P-CoPs for the followers.

The update of the evaluation form for the CoPs addressed several recommendations. First, it was designed to measure KPI 8. Second, updating the evaluation form itself was a recommendation from last year. Lastly, the new evaluation approach focusses on social learning in CoPs, a topic for which more attention was recommended.

The CoPs during the third year have also become livelier with less long lectures. The received feedback does not mention the lack of interaction or long presentations.

What has not been adopted from the recommendation of year two is a yearly planning of the CoPs. This was recommended because of the small number of L-CoPs in the previous year. However, in the third year, the number of L-CoPs has increased. The reminders, and the actively offering of support for organising the CoPs has led to an increase of L-CoPs. Therefore the approach to organise CoPs on need base, seemed sufficient. In relation to that, during the online L-CoPs the frontrunners and technology providers made a planning for the remaining activities for the last phase of the project.

Lastly, the involvement of external stakeholders remains an issue. While some CoPs have included parties such as Water Europe, Kraft Cern, Norsk Vann, and NTNU, this involvement remains limited and should have more priority in the final year of the project.



6.5. Lessons learned year 3

During year three of the project, WP 2 has focused on the continuous improvement of the CoPs in STOP-IT. Based on the implementation and evaluation of the CoPs in year three, some lessons can be learned for future CoPs.

Most issues from year two have been addressed, however the gender balance and involvement of external stakeholders in the CoP remains an issue. During year three some progress has been made, but further action should be taken during the final year of the project. As WP 2 role is to simply supporting the organisation of CoPs, its influence is limited. However, when reminding partners to organize CoPs, WP 2 could also mention to keep the gender balance of the workshops in mind. Concerning the inclusion of external stakeholders, WP 2 could offer the frontrunners to jointly design a plan to involve more external stakeholders.

Based on the evaluation of the P-CoPs and L-CoPs on their dimensions and social learning outcomes, the CoPs seem to be functioning quite well. The three CoP dimensions and social learning outcomes are measured through six critical success factors. The community and relational outcomes are measured through indicators on organisational aspects and atmosphere. The domain and shared understanding is measured through stakeholder inclusion and representation, and convergence towards a shared perspective. Lastly, the practice and substantive outcomes are measured through indicators on the identification of opportunities and challenges, and generation of knowledge.

While the CoPs score on the general three components quite well, there is room for improvement. Therefore it may be worthwhile to look into detail at the specific indicators, combined with the received written feedback, to see what can be improved. The scores of the indicators presented on the vertical axis is the average score on the Likert scale from 1-5.

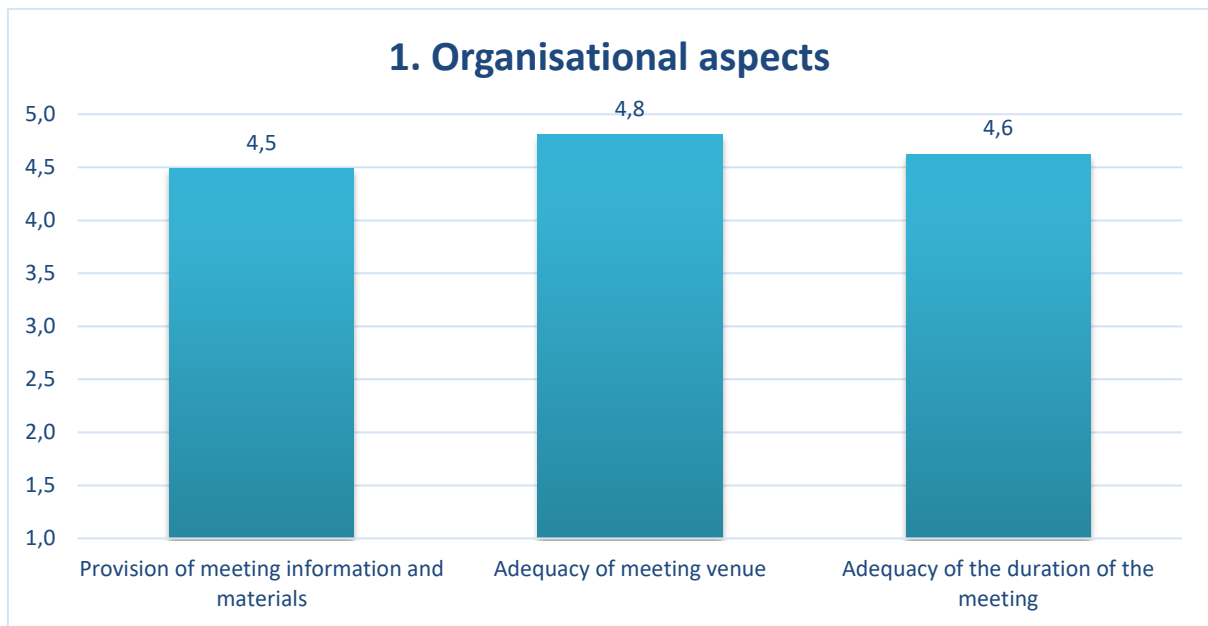


Figure 6 Organizational aspects of CoPs

Figure 6 shows that the participants are content with the venues of the meetings. But improvement is possible when it comes to the provision of meeting information and materials. This is in line with the written feedback. WP 2 could follow-up on the recommendation of last year to provide a check list for CoPs, including when to send out the meetings documents. The duration of the meeting scores also well. However, from the written feedback it seems that some workshops are still too long or too short. Therefore this remains a point of attention.

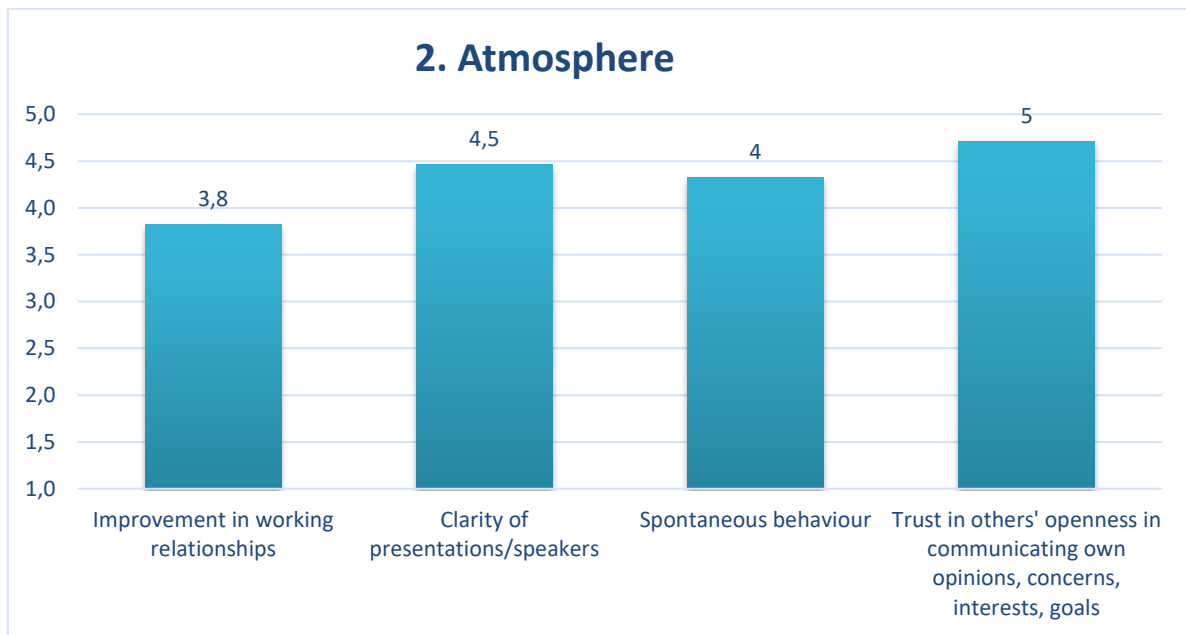


Figure 7 atmosphere CoPs

In general the participants are satisfied with the atmosphere during the CoPs. The participants are communicating openly and the presentations and speakers are clear. The working relationships could be further improved. This could be done, as suggested, by including more technology providers in the CoPs and have them work closely together with the frontrunners to prepare the testing of the tools. The “lower” score on spontaneous behaviour could be caused by the switch to online CoPs. The written feedback showed that the online meetings did not allow for small talk and informal discussions which usually lead to new creative ideas and better connection between the participants. Therefore it is advised to have as much face-to-face CoPs as possible.

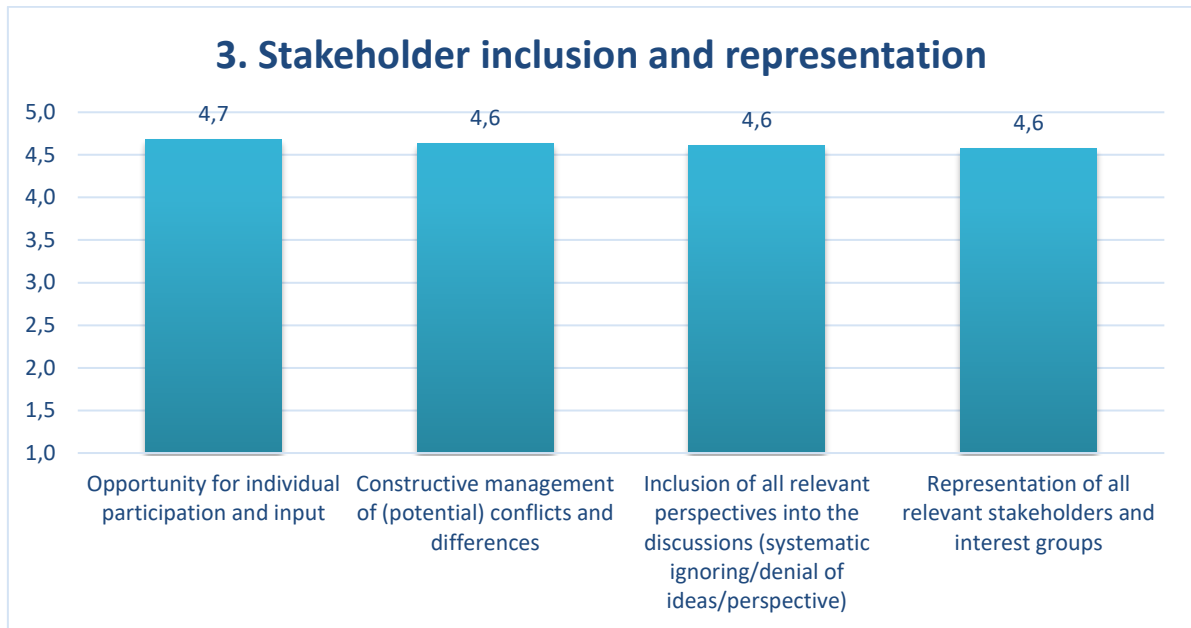


Figure 8 Stakeholder inclusion and representation

Figure 8 shows that the participants are confident that the relevant stakeholders are included in the CoPs. The score could be improved by inviting more tool developers to the CoPs and perhaps also external stakeholders. The figure also shows that there is enough opportunity for everyone to participate, differences are solved in a constructive manner, and all ideas are welcome. This shows that the CoPs are inclusive and constructive.

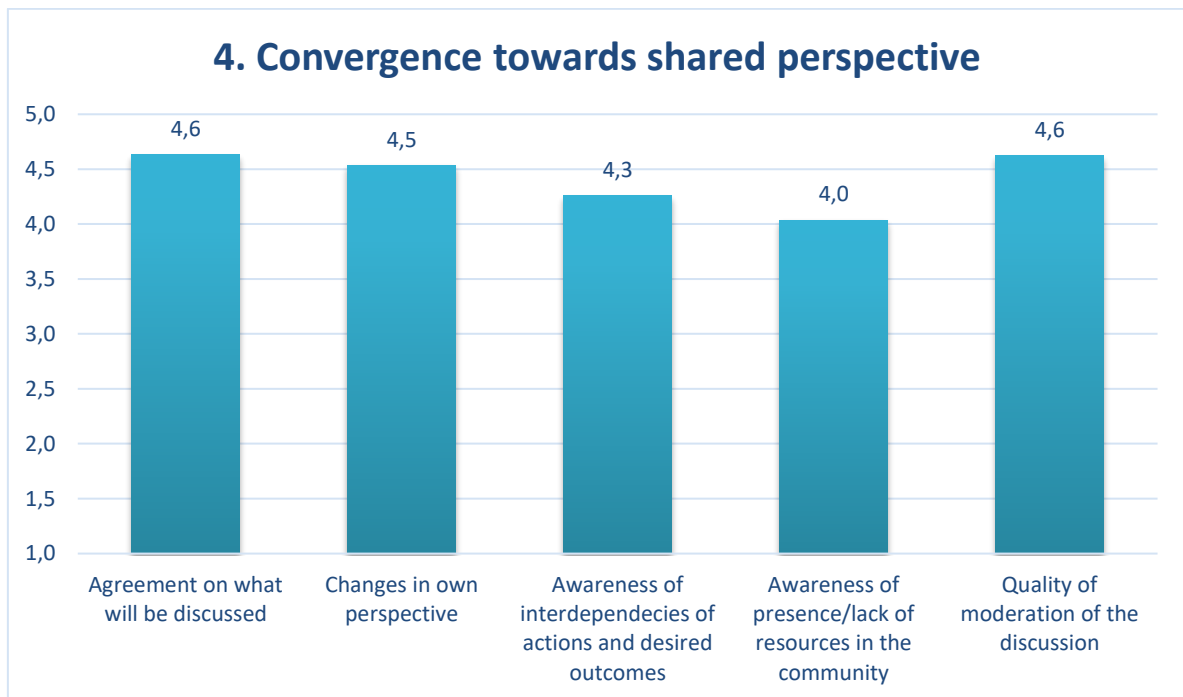


Figure 9 Convergence towards a shared perspective

Figure 9 shows that the CoPs are working quite well in the convergence towards a shared perspective. Awareness on the presence and lack of resources to tackle cyber physical security issues could be improved as well as the awareness of interdependencies. For future CoPs it could be a good idea that while preparing for testing the tools, a small stakeholder analysis could be made (e.g. who do you need for this?). The same could be done for the actual resources. Starting at the desired outcome and back casting until present time could be a way to do this. A first attempt has already made in the online CoP sessions.

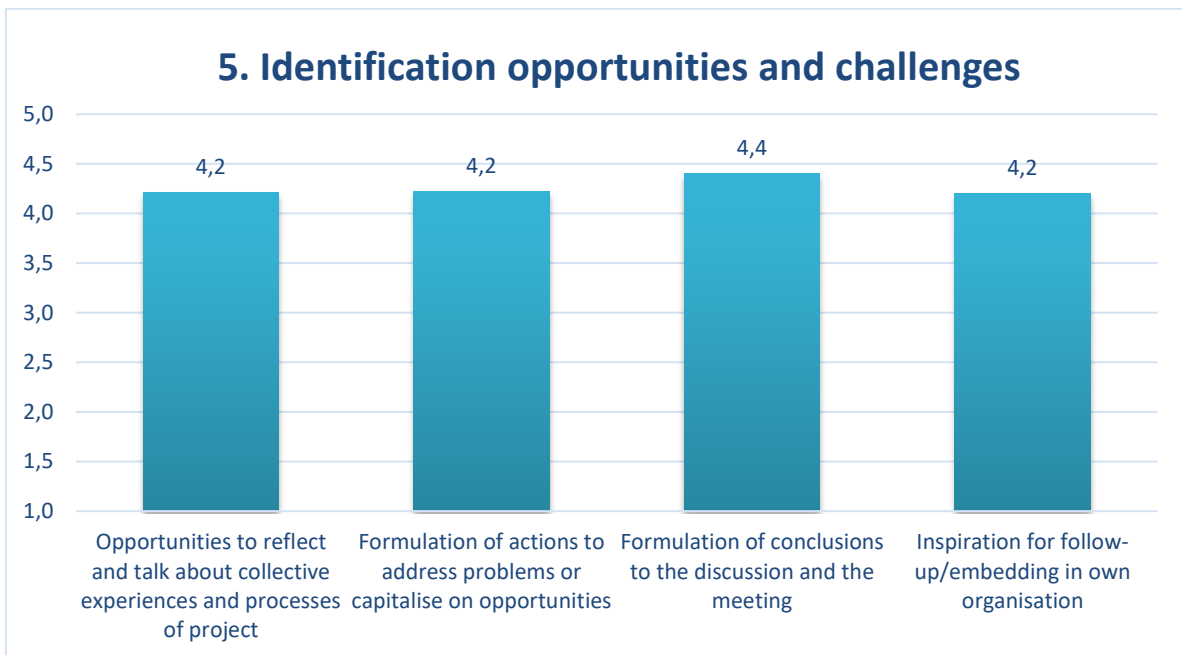


Figure 10 identification of opportunities and challenges

Figure 10 shows that the identification of opportunities and challenges goes quite well. Yet, there could be more focus in the CoPs on concrete actions and follow-up. This goes well together with the back casting approach. At the end of the CoPs there should be time reserved for formulating conclusions and follow-up steps. This is also something that WP 2 could advise to the frontrunners.

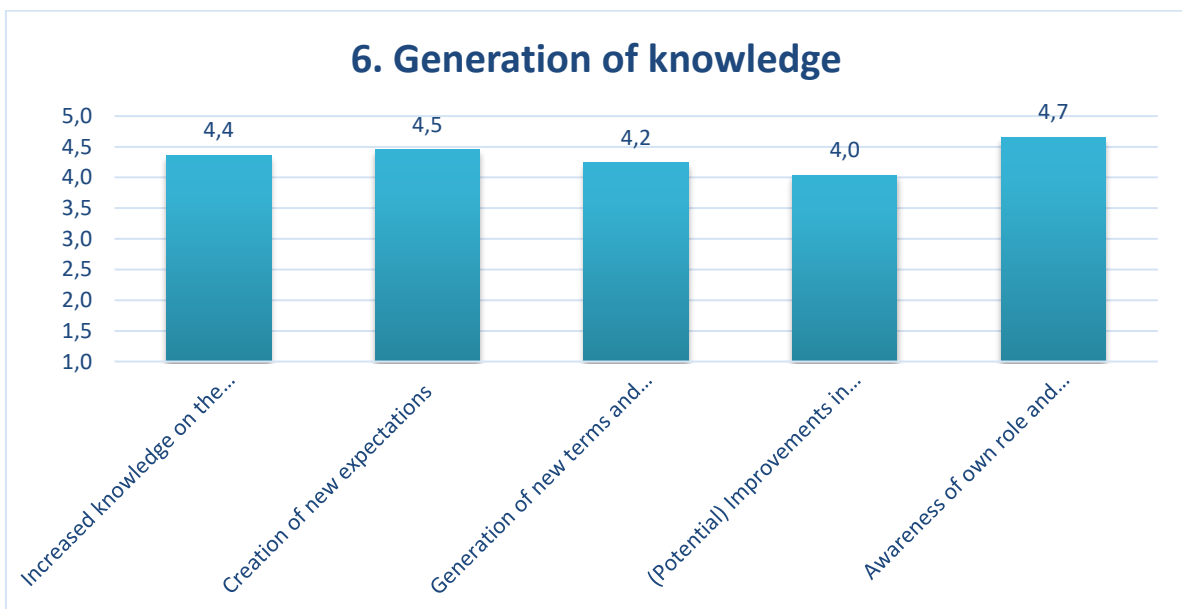


Figure 11 Generation of knowledge



Also the generation of knowledge through CoPs is sufficient. The identification of potential improvements for the participants' organisation could be improved. This coincides with the formulation of conclusions and follow-up steps. As a form of moderation, the participants could be asked to come formulate take home messages for their organisation. Better understanding of new terms and language used by others outside the participants' own organisation and work package could be improved through more interaction with different stakeholders. However, being in year three of the project this "lower" score could also be explained by the fact that the participants already know each other and their terminology quite well.

6.6. Recommendations for future workshops

We are now entering the last phase of the project. Therefore it is important to focus on maximizing the impact of the CoPs. Hence several of the recommendations for the last year of the project are along these lines. These include:

- Remind frontrunners actively to keep the gender balance of CoPs in mind.
- Offer frontrunners to design a plan to involve more external stakeholders.
- Include more tool developers in the CoPs.
- Organize the CoPs as much as possible face to face.
- If the CoPs have to be online, experiment with interactive tools such as mentimeter, mural etc.
- WP 2 could provide a tips and tricks sheet for the frontrunners including:
 - When to send out preparatory documentation;
 - Topics that the participators of previous CoPs mentioned for future CoPs;
 - Suggestions for interactive tools;
 - Asking the participants to formulate take home messages;
 - Reminding the front runners to schedule time to formulate conclusions and follow-up steps.
- Making a detailed plan from now on until the end of the program through a back casting method in combination with a small stakeholder analysis.
- Having live demonstrations of the tools (suggestion for WP7).



References

Fulgenzi, A., Brouwer, S., Baker, K., & Frijns, J. (2020). Communities of practice at the center of circular water solutions. *Wiley Interdisciplinary Reviews: Water*, e21450.



COP EVALUATION FORM

Place: _____ Date: _____

It was a pleasure to have you in this meeting. We would like to know your opinion, so that we can improve future events and meet your expectations. Thank you for your collaboration!

Name (optional): _____

Organization (optional): _____

Please rate the extent to which you agree with each of the following statements: (1=strongly disagree; 2=disagree 3=neutral; 4=agree; 5=strongly agree; N.A=not applicable)

1. Meeting logistics and stakeholder engagement	
1.1 I received the information about the meeting and materials well in advance	
1.2 The venue was adequate for the purpose of the meeting	
1.3 The meeting had the right duration in time	
1.4 The presentations and speakers were clear and understandable	
1.5 During the meeting I improved or made new connections for my professional network	
1.6 During the meeting, my behavior was spontaneous and unfiltered	
1.7 I believe others were communicating openly with me	
Comments: (optional)	

2. Awareness and increased understanding	
2.1 I believe that all relevant stakeholders were present at the meeting	
2.2 I agreed with the items listed on the agenda	
2.3 I had sufficient opportunities to provide input to the discussion	
2.4 Most ideas/perspectives were included and respected during the discussion	
2.5 Differences and (potential) conflicts among us were addressed in a constructive manner	
2.6 The way the discussion was facilitated and moderated supported the meeting objectives	
2.7 I have a better understanding of the perspective of the stakeholders (i.e. end users, tool developers)	



2.8 I believe that actions and objectives of the stakeholders are interconnected (i.e. end users, tool developers)	
2.9 I know which resources are available and which are still lacking to handle specific cyber and or physical threats	
Comments: <i>(optional)</i>	

3. Outcomes and conclusions

3.1 There was enough time to reflect on our collective experience and functioning as a group	
3.2 I have a better understanding of the language/ terminology used by the participants outside my organization/ work package	
3.3 Participating in the meeting increased my knowledge on the solutions/ needs of the end users	
3.4 I am aware of my own role in the project and how each of us can contribute to the projects goals	
3.5 I believe that clear conclusions were formulated at the end of the meeting	
3.6 I believe that clear actions were formulated to improve solutions. For example solutions for cyber physical threats	
3.7 After participating to the meeting I identified (potential) improvements for my organization/ work package	
3.8 The meeting inspired me to take follow-up actions in my own organization/ work package	
3.9 My expectations on the outcomes of the meeting were met	
Comments: <i>(optional)</i>	

Pros and cons of the local CoP

In your opinion, what were the most positive and less positive aspects of the meeting?

Most positive:

Less positive:

Suggestions for improvement

What suggestions for improvement do you have for future meetings?



Thank you!

Please give this questionnaire back to the workshop organizer before leaving.



Annex II Overview of Local and Project CoPs

This annex provides an overview of both the local and project CoPs that have taken place within the STOP-IT project

Project CoPs

Type of CoP	Date	Location	Organizer
P-CoP	12/13-03-2018	Berlin	BWB
P-CoP	19-06-2018	Barcelona	CET/AB
P-CoP	19-06-2019	Athens	ICCS/KWR/IWW/SINTE F
P-CoP	20-06-2019	Athens	WP8/WP2
P-CoP	10-06-2020	Online	SINTEF/KWR

Type of CoP	Date	Location	Organizer
L-CoP	November 2017	Oslo	Oslo VAV
L-CoP	November 2017	Barcelona	AdB
L-CoP	November 2017	Berlin	BWB
L-CoP	November 2017	Israel	Mekorot
L-CoP	27-02-2018	Barcelona	AdB
L-CoP	07-03-2018	Oslo	Oslo VAV
L-CoP	July 2018- June 2019	Barcelona	AdB
L-CoP	11-02-2019	Oslo	Oslo VAV
L-CoP	11-03-2019	Israel	Mekorot
L-CoP	01-04-2019	Oslo	Oslo VAV
L-CoP	03-05-2019	Oslo	Oslo VAV
L-CoP	15-05-2019	Berlin	BWB
L-CoP	12-09-2019	Oslo	Oslo VAV
L-CoP	10-11-2019	Israel	Mekorot
L-CoP	13-11-2019	Israel	Mekorot
L-CoP	27-01-2020	Oslo	Oslo VAV
L-CoP	27-01-2020	Barcelona	AdB

D2.2 Annual technical and policy brief based on the results of each CoP



L-CoP	12-02-2020	Berlin	BWB
L-CoP	27-04-2020	Online	Mekorot
L-CoP	05-05-2020	Online	BWB
L-CoP	06-05-2020	Online	Mekorot
L-CoP	10-05-2020	Online	AdB
L-CoP	02-06-2020	Online	AdB



STOP-IT



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