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About IMPETUS

IMPETUS (Intelligent Management of Processes, Ethics and Technology for Urban Safety) is a Horizon 2020 Research and Innovation project that provides city authorities with new means to improve the security of public spaces in smart cities, and so help protect citizens. It delivers an advanced, technology-based solution that helps operational personnel, based on data gathered from multiple sources, to work closely with each other and with state-of-the art tools to detect threats and make well-informed decisions about how to deal with them.
IMPETUS provides a solution that brings together:

- *Technology*: leverage the power of Internet of Things, Artificial Intelligence and Big Data to provide powerful tools that help operational personnel manage physical and cyber security in smart cities.
- *Ethics*: Balance potentially conflicting needs to collect, transform and share large amounts of data with the imperative of ensuring protection of data privacy and respect for other ethical concerns - all in the context of ensuring benefits to society.
- *Processes*: Define the steps that operational personnel must take, and the assessments they need to make, for effective decision making and coordination - fully aligned with their individual context and the powerful support offered by the technology.

Technological results are complemented by a set of *practitioner's guides* providing guidelines, documentation and training materials in the areas of operations, ethical/legal issues and cybersecurity.
IMPETUS places great emphasis on taking full and proper account of ethical and legal issues. This is reflected in the way project work is carried out, the nature of the project's results and the restrictions imposed on their use, and the inclusion of external advisors on these issues in project management.
The cities of Oslo (Norway) and Padova (Italy) have been selected as the site of practical trials of the IMPETUS solution during the project lifetime, but the longer-term goal is to achieve adoption much more widely.
The work is carried out by a consortium of 17 partners from 11 different EU Member States and Associated Countries. It brings together 5 research institutions, 7 specialist industrial and SME companies, 3 NGOs and 2 local government authorities (the trial sites). The consortium is complemented by the Community of Safe and Secure Cities (COSSEC) – a group established by the project to provide feedback on the IMPETUS solution as it is being developed and tested.
The project started in September 2020 with a planned duration of 30 months.

For more information

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Executive Summary

External collaboration has been critically important to the IMPETUS project. During the design and implementation of its tools and platform, external collaborators have provided important feedback, expanding the range of perspectives beyond those of the end-user cities of Oslo and Padova. Collaboration with a wider range of people interested in IMPETUS technologies and applications increased awareness of IMPETUS and increased the field of potential future adopters of its solutions. Additional collaborations with other smart city projects and initiatives resulted in beneficial information sharing, the opportunity to coordinate scheduling and participation in events of mutual interest, and the adoption of a previously developed Snap4City software platform for use as a framework for IMPETUS tools. Finally, the IMPETUS Acceptance Pilots and Live Exercises could not have taken place without extensive collaboration and support from emergency managers and responders in Oslo and Padova.

IMPETUS had a "twin" project (a project that responded to the same call for proposals) called S4AllCites. There was fruitful co-operation between the two projects, especially in the closing stages of the projects.

IMPETUS's primary mechanism for external collaboration was The Community of Safe and Secure Cities (COSSEC), whose members were not part of the IMPETUS consortium, but who represented organizations and individuals interested in the application of smart city technologies to public safety. COSSEC members were recruited from the time of the project proposal onward, offering them the opportunity to understand and influence new smart city technologies that could benefit their cities. Recruiting COSSEC members turned out to be a challenge. However, ultimately representatives from 47 organizations, 17 cities, 5 citizen groups, and 14 European Union countries joined COSSEC. Members included city authorities, emergency agencies, researchers and technology developers, and citizen organizations.

Following the first IMPETUS Project Review, an External Cooperation Working Group was established to support COSSEC recruiting and seek collaborations with related projects and initiatives. This resulted in a series of fruitful workshops with UrbSecurity, a European Union initiative to improve safety and security in urban environments, and a successful collaboration with the Secu4All project in co-organizing a joint conference that acted as a final dissemination event for IMPETUS.

Initial COSSEC activities included three webinars addressing the three pillars of the IMPETUS project: ***technology***, ***ethics***, and ***operations***. These webinars served to familiarize COSSEC members with IMPETUS and initiate a two-way dialog, surfacing priorities, issues, and opportunities for clarification. They also were a source of new ideas, including software tool from the Snap4City program that was adopted for use in the IMPETUS platform.

COSSEC members then participated in several key IMPETUS events: the Padova Acceptance Pilot, an IMPETUS Plenary Meeting, and the Live Exercises in Oslo and Padova. These provided an opportunity for COSSEC members to see IMPETUS demonstrated, gain deeper knowledge of the tools and platform, and provide feedback on what they saw. COSSEC members also actively participated in the IMPETUS Dissemination Event.

COSSEC feedback on early events helped shape the organization of later events. COSSEC feedback from demonstrations of the IMPETUS tools and platform showed clear recognition of the potential for IMPETUS technologies to benefit cities by improving coordination and situational awareness during city emergencies. COSSEC members also had numerous suggestions for further evolution of

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the IMPETUS tools and platform, and for additional information that might be collected to support cities in assessing how IMPETUS could best be used to address their particular priorities and operational environments.

Reflecting on COSSEC, we conclude that this approach to external collaboration has high potential, limited only by its success in recruiting members willing to donate their time to project activities. While in principle this approach can engage a wide range of perspectives and a large community of potential advocates and adopters, in practice some of the best candidates for membership are very busy and difficult to enlist. In spite of these limitations, we believe COSSEC, together with our other collaboration activities, made valuable and essential contributions to IMPETUS.

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List of Abbreviations

Table 1: List of Abbreviations

Abbreviation	Explanation
AI	Artificial intelligence
AP	Acceptance Pilot
APN	Action Plan Network
COSSEC	Community of Safe and Secure Cities
CPTN	Counter Terrorism Preparedness Network
FASTER	First responder Advanced technologies for Safe and efficienT Emergency Response
IMPETUS	Intelligent Management of Processes, Ethics and Technology for Urban Safety
ISP	Institute for Security Policies
LiveEx	Live Exercise
MIM	Minimum Interoperability Mechanism
ML	Machine learning
NHRI	Norwegian Human Rights Institute
OASC	Open and Agile Smart Cities
Snap4City	Scalable Smart Analytic Application Builder for Sentient Cities
SOC	Security Operations Center
SURE	Smart Urban Security and Event Resilience

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1 About this deliverable

1.1 Intended readership/users

This document describes activities undertaken by the IMPETUS project to initiate and carry out external collaboration. It describes the approach used to enlist external collaborators, the collaboration activities carried out, and an assessment of how these activities impacted IMPETUS.

We expect this document will provide a useful reference for project participants, collaborators, and reviewers. We particularly hope it will be informative for participants in other projects requiring external collaboration, providing a case study on the particular approach used by IMPETUS.

IMPETUS external collaboration produced insights representing a variety of perspectives on the objectives and issues associated with applying smart city technologies to public safety. We expect this information to be helpful to cities and technology providers as they navigate the path from technical potential to practical application.

1.2 Why would I want to read this deliverable?

Projects such as IMPETUS are often proposed and planned to incorporate external collaboration. External collaboration can greatly expand the pool of stakeholders providing input to a project, and also expand the awareness of project results and improve the chances of these results being used after project completion.

Although external collaboration is very appealing goal, it can be challenging to implement. The best collaborators are often busy people without a direct stake in the project. Readers who wish to address this practical challenge can benefit from this description of the IMPETUS experience as an informative case study.

As the IMPETUS team worked to configure advanced technologies into useful tools for smart cities, the IMPETUS external collaborators provided an outside view of what made the technology useful or not. This is again a case study, this time about applying advanced technology. In this the reader may find useful insights into the general transition from research to application, and more specifically the application of technology to smart city applications.

1.3 Structure

Section 2 of this document reviews IMPETUS objectives for external collaboration. Section 3 describes the IMPETUS approach to external collaboration, the Community of Safe and Secure Cities (COSSEC) and related activities. Section 4 summarizes the contributions made to IMPETUS by external collaboration, including feedback from COSSEC on IMPETUS. Section 5 concludes with an assessment of how external collaboration benefitted IMPETUS, and a reflection on the effectiveness of the IMPETUS approach to external collaboration.

1.4 Other deliverables that may be of interest

There are a number of IMPETUS deliverables that would allow a reader to delve further into the IMPETUS program, to better understand the context within which external collaboration took place. Each of these deliverables is available to the public from the IMPETUS website.

More details on the IMPETUS tools can be found in D3.4 *Tool development final report*. External collaborators participated in pilots and exercises, and details of these activities can be found in D7.2

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Acceptance pilot report, D7.3 *Report on the use of technical platform in pilots*, and D7.4 *Report on the use of frameworks*.

IMPETUS communication and dissemination, in which external collaborators played a role, are described in D8.3 *Communication and dissemination report 2*. Collaborations related to market dissemination are described in D8.4 *Ecosystem report*.

1.5 Synergy with other projects/initiatives

An important goal of IMPETUS external collaboration was to connect with other projects and initiatives with shared interests. These connections are described in the Sections below.

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2 IMPETUS External Collaboration Objectives

There were three primary objectives driving IMPETUS external collaboration:

- **Enhancing the effectiveness of the IMPETUS user-centered design process** – User-centered design requires the close involvement of the ultimate users of IMPETUS throughout the development process. The IMPETUS project team includes participants from Oslo and Padova specifically for this purpose, and they have been an excellent source of user requirements, evaluations, and other feedback. However, in planning the project it was recognized that there was an opportunity to expand interactions with a broader range of people interested in smart city security, by establishing regular two-way communications with individuals and organizations outside of the project

- **Establishing dissemination channels and promoting the exploitation of IMPETUS results** – a primary objective of projects such as IMPETUS is to spread knowledge of project results throughout relevant communities and to maximize the adoption of project results. External collaboration can greatly increase the number of potential adopters of IMPETUS technologies, by expanding the number of stakeholders who understand and have contributed to project results

- **Realizing the mutual benefits of coordination and information sharing with related projects and ongoing activities –** there are a number of ongoing projects and forums addressing issues related to smart city security. Sharing results and other information can be of mutual benefit to IMPETUS and these other activities, for instance by helping to clarify project scope and value added, and by building on lessons learned.

In the next Section we describe the IMPETUS approach to external collaboration.

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3 The IMPETUS Approach to External Collaboration

This section describes the IMPETUS approach to external collaboration, whose primary mechanism was the Community of Safe and Secure Cities (COSSEC), a group of smart city safety stakeholders from outside the project team.

Two other external collaboration mechanisms were employed by IMPETUS: an External Cooperation Working Group within the IMPETUS project, and teams of local collaborators in Oslo and Padova to support IMPETUS demonstrations and exercises in those cities.

3.1 COSSEC

COSSEC was established to extend involvement in the IMPETUS project to stakeholders beyond the project consortium. This was expected to provide access to a wider pool of knowledge and experience to help, guide and assess the project's work, to allow the project to understand and take into account requirements and constraints from the wider community, and to create "ambassadors" who would help disseminate project results and potentially become early adopters.

COSSEC members were sought from organizations with an interest in the objectives, technologies, and results addressed by IMPETUS. The benefits offered to potential members were the opportunities to make connections and share information in a community with shared interests, and to keep up to date with and influence advances in smart city security.

COSSEC members were recruited from several types of organization:

- **City authorities, emergency agencies or other type of organisation that may in the longer-term wish to adopt IMPETUS results:** these members could influence project direction and design aspects to help ensure that the results more closely match the member's needs. They would gain access to demonstrations of results as they were developed, and so would be able to form a deep understanding of IMPETUS capabilities. Finally, they would have the opportunity to act as "first adopters" with close follow-up and support

- **Public organisations/authorities (at the city level or nationally):** these members could form a detailed understanding of the potential role of IMPETUS in addressing policy issues and influence the project's direction to maximise policy impact. They could also ensure that IMPETUS properly takes account of legal, ethical, practical, or political considerations that might otherwise prevent them from being able to benefit from project results

- **Researchers in other projects / technology developers:** these members could find oopportunities for fruitful cooperation with IMPETUS (or other COSSEC members) during and after IMPETUS, through the exchange of ideas/results/experiences

- **Citizen organisations, ethical and gender experts:** these members could have opportunities to influence technological development and associated processes to move them in the direction needed to address important non-technical concerns.

The IMPETUS Description of Action (DoA) set the following goals for COSSEC membership:

- At least 40 members,
- from at least 10 cities,
- including at least 5 citizen groups,

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- from at least 10 EU countries.

An initial group of organizations expressed interest in COSSEC at the time of the IMPETUS proposal, and recruiting members for COSSEC was a continuing process throughout the project. IMPETUS partners nominated and solicited members, and members were recruited at collaboration meetings arranged with related projects and other interested organizations. Ultimately, COSSEC membership included members from

- 47 organizations
- 17 cities
- 5 citizen groups
- 14 EU countries.

COSSEC member organizations are listed in APPENDIX A.

COSSEC activities are described in Section 4.

3.2 External Cooperation Working Group

Based on recommendations from the first IMPETUS Project Review, in May 2022 an External Cooperation Working Group was established, with members drawn from the IMPETUS consortium. The purpose of this group was to:

- Identify external organisations/projects/individuals (including but not limited to COSSEC) with whom to cooperate
- Prioritize and select opportunities for external cooperation
- Promote rich engagement of external collaborators with IMPETUS partners and activities.

The working group was instrumental in arranging COSSEC webinars, meetings with police and other stakeholders, collaborative sessions during pilots and exercises, and joint meetings with other projects. The working group was especially instrumental in preparation for the Live Exercises in Oslo and Padova, in order to create opportunities to bring in additional perspectives from external guests and fill gaps (e.g., human rights experts joining for the Padova exercise). These activities are described in Section 4.

3.3 Engagement of Local Stakeholders

The IMPETUS project used Acceptance Pilots (APs) and Live Exercises (LiveExs) to assess and refine its platform and tools. These key milestones were accomplished in the cities of Oslo and Padova with the help and participation of numerous local emergency managers and responders. These people were instrumental in providing the operational framework and role players essential to the APs and LiveExs.

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4 IMPETUS External Collaboration Activities

This Section describes:

- COSSEC activities, familiarization webinars followed by participation in IMPETUS demonstrations and exercises,
- Collaborative workshops, in which COSSEC and IMPETUS members worked with personnel from the UrbSecurity European Union initiative, and
- The conference entitled "*The future of urban security: Urban planning and the adoption of advanced technological solutions*", an event jointly organised with the Secu4all project, and acting as the final dissemination event of IMPETUS.

4.1 COSSEC – IMPETUS Webinars

Three two-hour webinars were held to engage COSSEC members with IMPETUS project participants to discuss the three main pillars of IMPETUS: ***technology***, ***ethics***, and ***operations***. The following sections summarize these meetings. Detailed notes from these webinars are presented in Appendix B.

4.1.1 Use of Advanced IT for the Protection of Public Spaces, May 4, 2021

The purpose of this meeting was to address the first pillar of IMPETUS: technology. Participants shared approaches taken by several projects using advanced IT to support public safety: IMPETUS, Smart Urban Security and Event Resilience (SURE), Scalable Smart Analytic Application Builder for Sentient Cities (Snap4City), and Open and Agile Smart Cities (OASC). Presentations were made by members of the IMPETUS team, and by COSSEC members who were participating in the other projects.

A discussion following the project presentations identified common challenges across the projects, including integrating new technology with existing systems, recognizing threats without violating privacy, moving technology from research to reliable operations, and acclimating security staff, the public, and other stakeholders to new technologies.

The consensus of the participants was that the webinar was a useful exchange of information. A particularly tangible result of the meeting was that IMPETUS, after some investigation, decided to adopt the tool presented by Snap4City as the software solution on which the IMPETUS platform would be built, rather than developing its own from scratch.

Participants noted that it would be desirable in future webinars to devote more time to discussion of particular issues of interest. It was suggested that this might be accomplished by webinar attendees submitting questions in advance of the meeting, after the agenda is published.

See Appendix B for detailed notes from this webinar.

4.1.2 Ethical and Legal Issues with the Use of Smart Cities Technologies for Public Protection, June 16, 2021

This meeting addressed the second IMPETUS pillar: ethics. The agenda included a presentation of the results of an IMPETUS survey on public understanding and concerns about use of smart city technologies for public safety, and two presentations by COSSEC members, one on a European perspective on protecting privacy in the face of increasing data collection, and the second on ethical issues associated with the use of AI and machine learning technologies.

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Following a suggestion from the previous COSSEC webinar, attendees submitted questions in advance concerning ethical issues associated with the use of smart city technologies. Discussion of these questions was interspersed with the presentations.

See Appendix B for detailed notes from this webinar.

4.1.3 Influence of technology on operations and operational concepts in IMPETUS, March 30, 2022

This meeting addressed the third IMPETUS pillar: process. The meeting was structured to get feedback from COSSEC members on how IMPETUS was approaching development of operational concepts, the definition of user profiles, conduct of the Acceptance Pilots, and operator training.

COSSEC members emphasized several opportunities and challenges. It was clear to them that IMPETUS could provide unprecedented access to information and situational understanding, resulting in a common, more complete picture shared among the various participants in public safety operations. However, to realize this potential, they noted that a common 'language' must be found that is understood by all stakeholders, some of whom today work with different terminology within different frameworks. Also, although a unified system helps coordination, not everyone needs access to everything. To avoid frustration and inefficiency, individual user interfaces should be tailored to their specific interests. And finally, any system must support enforcement of rules and procedures, yet retain the ability to step beyond these constraints when the situation demands it.

See Appendix B for detailed notes from this webinar.

4.2 UrbSecurity Collaborative Workshops

The UrbSecurity initiative was identified by the External Cooperation Working Group as an opportunity for useful external collaboration. UrbSecurity is an Action Plan Network (APN) associated with URBACT Territorial Cooperation Programme, co-sponsored by the European Regional Development Fund, the 28 Member States, Norway, and Switzerland. Its goal is to improve safety and security in urban environments through spatial design and better use of public spaces.

The UrbSecurity APN is led by the city of Leiria, Portugal in partnership with 8 other cities/regions: Madrid, Spain; Parma, Italy; Longford, Ireland; Mechelen, Belgium; Pella, Greece; Michalovce, Slovakia; and the regions of Szabolcs 05 Association of Municipalities, Hungary; and Romagna Faentina, Italy.

IMPETUS and COSSEC participated in three collaborative workshops with UrbSecurity. These workshops are described below.

4.2.1 IMPETUS- URBSECURITY Virtual Cooperation Meeting, October 6, 2021

The goal of this meeting was to familiarize the group with both projects, get to know the individuals involved and their respective activities, explore collaboration, and identify and fix conflicts in event dates. In addition, IMPETUS had a goal to recruit COSSEC members.

SINTEF presented an overview of IMPETUS and representatives from UrbSecurity summarized their program. This was followed by a discussion of opportunities for collaboration. It was decided that IMPETUS members would attend the two planned UrbSecurity meetings described below, and that members of the UrbSecurity APN would join COSSEC.

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4.2.2 UrbSecurity Action Planning Network Transnational Meeting 7, January 20, 2022

After the first cooperation meeting, IMPETUS representatives from TIEMS and SINTEF attended the virtual URBACT UrbSecurity APN Transnational Meeting 7, in Pella, Greece. Twenty-one experts attended from UrbSecurity.

After a welcome from Pella's authorities, who presenting a video on the history of Pella, the Lead Expert from UrbSecurity, provided an overview of UrbSecurity, introduced the UrbSecurity partners, and explained the cooperation with IMPETUS to the UrbSecurity audience. IMPETUS next provided an overview of the project and a detailed description of the IMPETUS tool, Firearm Detection. The presentations were followed by a long discussion with several UrbSecurity partners on issues associated with smart city technologies.

In the afternoon, the former Director of the Hellenic Police HQ Cybercrime Division, gave a presentation "Surveillance and data protection", emphasizing the importance of privacy and data protection in this age of pervasive use of digital technologies, especially for urban security. He emphasized that this very challenging topic should be discussed with citizens, even as young as school age children.

Next was a presentation by a researcher in spatial planning at the University of Coimbra: "Urban planning using serious gaming". The presenter introduced the audience to the world of gaming and invited all participants to answer a questionnaire about it.

The attendees concluded that the meeting was very fruitful for all participants, and all of them wished the collaboration to continue.

4.2.3 URBACT UrbSEcurity Action Planning Network Transnational Meeting 8, May 31 – June 1, 2022

IMPETUS participated in a second UrbSecurity APN Transnational Meeting, held in Parma, Italy. This face-to-face meeting offered further opportunities for collaboration and COSSEC recruiting. The meeting was attended by about 40 experts from UrbSecurity APN, and two representatives from IMPETUS.

This meeting was deemed very useful. It was apparent that the APN is a rich source of user perspective of the sort valuable to COSSEC's objectives.

4.3 COSSEC Participation in key IMPETUS Events

A primary goal of COSSEC was to engage its members in IMPETUS development, to benefit from their feedback and to win them over as advocates for the future use of IMPETUS solutions. To this end, COSSEC members were invited to IMPETUS events and encouraged to participate and provide feedback.

COSSEC members participated in the IMPETUS events shown the following table.

Table 2: COSSEC participation in IMPETUS events

Event	Dates	Attending COSSEC Organizations
Padova Acceptance Pilot	1-3 Dec 2021	Padova Red Cross, Padove Logione Carabinieri, Questura of Padova, FASTER
IMPETUS Plenary Meeting	5-7 Apr 2022	Snap4City, Counter Terrorism Preparedness Network (CTPN)

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Oslo Live Exercise	18 Aug 2022	Dutch Institute for Safe and Secure Spaces (DISSS, University of Groningen, S4AllCities, UrbSecurity City of Leira, and CTPN
Padova Live Exercise	13 Oct 2022	Cittadinanzattiva Italy; Questura of Padova; Local Carabinieri, fire-fighters, civil protection volunteers; Faenza City Council, other city police representatives, CPTN, DISSS, Privacy International UK, REACT Italy
Joint conference organised with Secu4All project – acting as final dissemination event for IMPETUS	30-31 Jan 2023	Setubal Municipality, Municipality of Faenza, CPTN, Norwegian Human Rights Institute, Oslo Politidistrikt, Legione Carabinieri di Padova, REACT Italy, Romagna Faentina, Univ. Florence, Univ. Groningen, Valencia Local Police [1]

COSSEC members were prepared for their participation in these events through the previously described webinars on the three IMPETUS pillars, and by information packets prepared for them summarizing the IMPETUS tools and platform. At the events themselves, presentations and demonstrations further informed COSSEC members to ensure they understood what they were seeing, allowing them to give considered feedback.

After participating in these events, COSSEC members generally found themselves impressed by the goals of IMPETUS, and by the organization of the project and of the various events they attended. They saw great promise in the technologies demonstrated by IMPETUS, and they saw that users were enthusiastic about the system. Their feedback also recognized a variety of the challenges IMPETUS will face in becoming fully operational.

COSSEC feedback from their participation in IMPETUS events is summarized in Section 5.

4.4 Co-operation with "twin" H2020 project, S4AllCities

The S4Allcities project https://www.s4allcities.eu/ is an H2020 project that responded to the same call for proposals as IMPETUS. The objectives and overall approach of S4AllCities are very similar to those of IMPETUS – so much so that that we consider ourselves "twin" projects. Both projects started on the same date and ran in parallel; S4AllCities ended in December 2022, just two months before the end of IMPETUS.

For approximately the first half of each project, collaboration was low-key, with some informal meetings between the management teams of both to compare notes and exchange experiences.

As the projects reached their conclusion there was much closer collaboration:

- As a COSSEC member, S4AllCities took part in one of the two concluding live exercises in IMPETUS (Oslo, August 2023). S4AllCities offered detailed feedback on the organisation of the event as well as technical and other feedback about the applicability of the technology applied in the exercise. The feedback was partially based on experiences in S4AllCities but also on simple observation of the event. S4AllCities also learned lessons from the event for their own final exercise concerning event organisation and printed materials for tool descriptions.

[1] This list just shows the COSSEC members represented at the event. In addition, there were about 20 participants from Secu4All, mostly representatives of different municipalities.

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- IMPETUS was an active participant in the S4AllCities final live exercise and final dissemination event in Bilbao, October 2022. IMPETUS was able to contribute views and suggestions at these events, and to learn more about technical approaches used in S4AllCities.
- S4AllCities participated actively in the joint conference arranged by IMPETUS towards the end of the project (see section 4.5), having the role of panelist in a key session on city requirements and experiences.
- In December 2022, both projects established a working group to integrate the lessons learned in the projects about ethical issues and cybersecurity and to document these in two white papers. *At the time of writing this working group is active and making progress on the papers.*
- In the closing stages of IMPETUS, the two projects co-operated closely to create an overview of the tools and other key results produced in both projects, classifying them into groups & sub-groups, identifying areas of overlap as well as unique contributions of each project. We consider that this can provide a useful overview for potential adopters of the types of technology developed in the projects. It can also be a useful input to any work on further development or integration of any of the results from either project.

4.5 Conference jointly organised with Secu4All project, January 30-31, 2023

This event was organized by IMPETUS in collaboration with the Secu4All project and held in Rotterdam. There were 67 participants, including 12 COSSEC members and representatives from the EU projects IMPETUS, Secu4All, SURE, Snap4City, PRoTECT, and S4AllCities. Its title was "*The future of urban security: Urban planning and the adoption of advanced technological solutions*", and it acted as the final dissemination event for IMPETUS.

The event was organized around the theme of *improving safety in public spaces in urban environments.* Attendees included project participants from IMPETUS, Secu4All, and other related projects, together with stakeholders from municipalities, law enforcement, and policy making.

The object of the meeting was to share results, experiences, and perspectives, and to establish relationships and understandings that will advance the effective use of advanced technologies to improve public safety.

The event included a field visit demonstrating the tools and measures used by the city of Rotterdam to ensure public safety, informal networking sessions, and a series of panel discussions to explore the successes, challenges, and best ways forward in adopting new technologies to improve safety in urban public places.

The meeting was organized to maximize the sharing of perspectives and the potential for future collaboration. Each of three panels had members selected to represent multiple perspectives, and open discussion with the audience was encouraged. In addition, multiple opportunities for informal networking were provided around meals, a reception, and exhibits.

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5 Contributions of External Collaboration to IMPETUS

5.1 Feedback to IMPETUS Development

The collaboration webinars and workshops described above provided plenty of opportunity for informal feedback to IMPETUS from external collaborators. While it is difficult to fully assess the impact of this feedback, it provided a rich source of ideas for consideration by IMPETUS developers as they refined their approach.

More formal feedback was solicited from COSSEC members after their participation in the IMPETUS Acceptance Pilots, Plenary Meeting, and Live Exercises. We summarize this feedback below, organized according to four validation categories identified by IMPETUS:

- The Usability of the IMPETUS software integration platform and its tools
- The Applicability of the IMPETUS ethical framework
- The Impact of the IMPETUS Operational Framework
- The Effectiveness of the IMPETUS cyber security framework.

We also include a fourth “other” category, covering feedback on the organization of the events, etc.

5.1.1 Usability of IMPETUS Platform Tools

- COSSEC members noted that responders seemed to be very happy to have the enhanced information and communications provided by IMPETUS during the exercises. They pointed out that it would be useful to use the Practitioners Guides to capture the responder’s experience with these improvements and their recommendations for best practices in their use
- COSSEC members recognized that consolidating information on a single platform brought with it the challenge of information overload, and the need to work with users to ensure the design effectively filters and prioritizes alerts, and specializes them to the interests of particular users. With limited familiarity and experience with IMPETUS, it was difficult for COSSEC members to judge the degree to which further refinements in this regard might be necessary
- They noted that the versatility of the IMPETUS framework would allow future incorporation of additional tools, for example risk/vulnerability assessment and citizen communications
- It was suggested that further testing of IMPETUS could provide valuable assessments of the effectiveness of individual tools, which would be useful for cities planning to use IMPETUS technologies. COSSEC members also noted the importance of further testing to determine whether together or separately IMPETUS tools might lead to unintended consequences
- It was noted that each IMPETUS tool appears to work best in certain limited operational situations. For example, the Bacteria Detector device is effective when it can be pre-installed in rooms where it is desirable to monitor for biological threats; the Firearm Detector works when firearm threats manifest as guns in plain sight. It would be good to identify the effective operational range of individual IMPETUS tools, and offer users the flexibility to select the tools most relevant to their operational needs
- Concerns were raised about whether information generated by the Workload Monitoring System might be considered sensitive personal information
- As experience with IMPETUS tools is accumulated, it will be important to estimate the probability of false positives or false negatives, and provide this information to operators so they can take it into account as they interpret alarms
- It was suggested that in the escape route simulations used by the Evacuation Optimiser, account be taken of the specific location of the threat, e.g., a shooter or bomb explosion

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- It was suggested that the Social Media Detector may not be able to detect messages on applications such as WhatsApp and Signal, which lack the necessary 'back door'. If this is the case, operators need to be aware of which parts of the social media ecosystem they can see, and which parts are invisible to them
- Consideration should be given to further integration of the IMPETUS tools, for example passing location coordinates from the Weapon Detection to the Evacuation Optimiser
- Cities adopting IMPETUS would need to get a clear idea of (1) what historical data they would need to collect to train, optimise, and calibrate IMPETUS tools, and (2) what real-time data feeds they would have to set up to support IMPETUS
- COSSEC members hoped the Practitioners Guides would be helpful in better understanding how IMPETUS tools would be used in practice.

5.1.2 Applicability of the Ethical Framework

- COSSEC members suggested that in addition to the ethical safeguards built into the IMPETUS system, operational safeguards would need to be put into place to provide oversight to counter ethical breeches due to intentional or unintentional operator action
- It was suggested that the Firearm Detector and any use of AI to assess "normal" behavior or "normal" clothing be audited for bias, as these could flag minorities as suspicious
- Concern was raised that private companies might resist having their code audited for adherence to privacy and ethical standards.

5.1.3 Impact on Operations

COSSEC members noted that IMPETUS clearly has the potential to have very favorable impacts on city operations to ensure public safety. They pointed out the importance of answering the following questions as more experience is gained with the system:

- Do the IMPETUS tools and platform risk delaying decisions while data is being analyzed?
- Does IMPETUS risk diluting responsibility or creating issues during an inquiry?
- Does the use of IMPETUS actually increase the speed of coordination and response?
- What is the range of public safety threats for which IMPETUS is effective, and are these threats prevalent enough to justify the system cost?

5.1.4 Effectiveness of Cyber Operations

No additional feedback was received specifically related to cyber security.

5.1.5 Other Feedback

COSSEC members provided additional feedback related to the conduct of the Acceptance Pilots and Live Exercises. Much of this feedback applies to earlier IMPETUS events, which resulted in these issues being fixed in later events. The early feedback is recorded here, as useful considerations for readers who may be planning such events.

- Attendees appreciated that the events were well organized, schedules adhered to, and held in high-quality venues. Events ran smoothly in spite of technical problems
- Communications challenges were noted in the events. Attendees heard acronyms they did not understand, demonstrations were sometimes difficult to understand by those external to the

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project, and there was a need to better accommodate the different ‘languages’ spoken by different types of end users

- During the exercise, attendees gained understanding of the tools, but some found it difficult to see how the tools were used and applied in practice
- Some confusion was noted with respect to the term “validation” as used in connection with the IMPETUS events. “Validation” typically describes the final testing of a fully operational system, which does not apply to IMPETUS. It was suggested that a better understanding by COSSEC members of the IMPETUS validation objectives would have been helpful in setting expectations.

5.2 Contributions to IMPETUS Dissemination and Exploitation

IMPETUS external collaboration activities, particularly COSSEC and the IMPETUS Dissemination Event, strongly contributed to disseminating information about IMPETUS, by exposing the project to a variety of cities and smart city stakeholders. The in-depth participation by COSSEC members (APPENDIX A) greatly expanded the network of people and organizations knowledgeable of IMPETUS, and the IMPETUS Dissemination Event opened opportunities for future exploitation of IMPETUS results.

While it is difficult to predict the future exploitation of IMPETUS technologies, there is no doubt that the intense interactions fostered by the project, between smart cities and technologists, have advanced the practical application of smart city technology to public safety. Cities participating in IMPETUS and COSSEC are now better equipped to assess how to use smart city technologies, and technology developers are better aware of how to refine their products in the direction of city needs.

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6 Conclusions

External collaboration was undertaken by the IMPETUS project to enhance the design of its tools and platform, establish dissemination channels, promote exploitation, and share knowledge with other programs and initiatives. The project's primary means of external collaboration, COSSEC, succeeded in eventually recruiting 47 member organizations from 17 EU countries. A subset of these members was active in three IMPETUS-COSSEC webinars; three collaborative workshops with the UrbSecurity Action Plan Network (representing a multi-national group of 9 cities); and IMPETUS Acceptance Pilots, Live Exercises, Plenary Meeting, and Dissemination Event. An External Cooperation Working Group was established after the first IMPETUS project review, and it was instrumental in establishing connections with other projects and recruiting COSSEC members.

6.1 How External Collaboration Has Benefitted IMPETUS

COSSEC and the other external collaboration measures provided access to a wide range of stakeholders, experts in technologies and operations associated with smart city protection. This collaboration allowed these experts to learn details of the project so they could provide both informal interactive feedback and the more formal feedback summarized in Section 5 above.

During the project, external collaboration activities gave IMPETUS project personnel the opportunity to try out their ideas on a new audience, forcing them to clarify their objectives and communications. Questions and presentations from external collaborators helped anticipate potential issues and stimulate new approaches. A high-impact example of this was the adoption of the Snap4City project's software tool as the basis for the IMPETUS platform. Specific COSSEC feedback from early project events influenced the structuring of later events.

Much of the COSSEC feedback from IMPETUS events informs post-project work, identifying steps needed to be taken to further refine and validate IMPETUS technology, as well as important information needed by cities to make decisions regarding deployment of IMPETUS.

External collaboration meetings allowed a variety of smart city programs and initiatives to become aware of IMPETUS. This provided opportunities for mutual information sharing, and it was a good way to find additional COSSEC members. These contacts also supported IMPETUS dissemination and enhanced the chances for exploitation of IMPETUS results.

6.2 Effectiveness of COSSEC for External Collaboration

The COSSEC approach to external collaboration has great potential. It can greatly expand stakeholder input to a project, as well as cultivate a large field of potential post-project adopters. However, the degree to which this approach succeeds depends on convincing people not part of the project team to donate their time and attention to project participation.

For IMPETUS we found the recruiting process challenging. Ideal COSSEC members were busy with their primary jobs, and many were already committed to external activities that exhausted any free time. While it was easy to articulate the value of IMPETUS and make what seemed like a compelling case for joining COSSEC, in practice personal connection was more persuasive than abstract argument in recruiting members.

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Although eventually we were able to get a fair number of people to put their name on the COSSEC list, only a few were able to make substantial contributions. However, the contributions of these few have been valuable.

Another challenge we encountered with COSSEC was finding the best way to put its members in a position to provide informed feedback. In spite of significant efforts to inform COSSEC members through webinars, exhibits, etc., it was difficult for some members to understand what they were seeing at pilots and live events. Perhaps a more effective alternative might have been to arrange special COSSEC demonstrations, rather than immerse them in the exercises.

The type of approach to external collaboration exemplified by COSSEC has strengths and weaknesses compared to a more traditional, formal review process such as an "External Review Board" or "Advisory Board". These are summarized in the table below. The COSSEC style has the greater potential for deep impact – but a greater risk in execution that the potential may not be realized.

Table 3. Comparison of COSSEC-style and Advisory Board style in terms of potential impact on project direction

Factors	Type of collaboration	
	Open-ended, dynamic (such as COSSEC)	**Formalized Advisory Board**
Reviewers/collaborators	Potentially large number, broad expertise, adaptable to project needs.	Limited number, typically selected once and for all at project initiation.
Commitment	Highly variable; level of participation depends on the situation of the member and can vary from almost nothing to deep collaboration.	Members generally commit to a defined level of participation.
Process	Evolves during project according to member availability; feedback may come too late. Flexible.	Tied to project schedule and deliverables; response to review can be planned. Rigid.
Potential project impact	Could be very high or very low, depending on recruitment success, member commitment and timing.	A useful level of impact is almost guaranteed – but unlikely to be major in nature.

In IMPETUS we felt that the COSSEC style suited the project needs very well and was mostly successful. We feel that a traditional "Advisory Board" would have had considerably less impact on the project.

6.3 Continuing COSSEC After IMPETUS Completion

The IMPETUS project plan envisioned COSSEC continuing after project completion, moving forward with the application of IMPETUS technologies to smart city safety. We do not expect that to happen. We can see two ways COSSEC might have continued, and it does not appear that conditions favor either.

One version of a continuing COSSEC would be appropriate if the IMPETUS technologies were sufficiently mature for COSSEC to become something like an IMPETUS users' group, helping members tailor IMPETUS to their own environments, or to continue to build upon the technologies developed by the project. IMPETUS has made extremely valuable contributions to the application of

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technology to smart city safety; however, IMPETUS has not produced (and was not intended to produce) a one-size-fits-all, single package as an operational product.

What IMPETUS has produced is a wealth of knowledge concerning the application of technology to urban safety. And beyond that, it established, partly through COSSEC, a network of stakeholders who worked together on this application. There is much work left to do in this area, and COSSEC could become a continuing forum to address this area.

However, the COSSEC activity has made it clear that there are already established fora concerned with applications of technology to urban safety. Some have been valuable collaborators during IMPETUS, and some of them have supplied COSSEC members. While there are some unique aspects to the composition of COSSEC, it is not clear that there is a role for another general forum in this area. Rather than a continuing COSSEC, the best IMPETUS legacy would be to ensure the project's results inform these existing fora as they move forward.

In informal discussions with the Efus organisation during the event organised with Secu4All (see section 4.5) potential involvement of some COSSEC members in Efus (e.g., in technical committees related to adoption of technology) was discussed. *At the time of writing no conclusions have been reached about this, but the idea will be further explored.*

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7 APPENDIX A: COSSEC Members

Organization	Country	Website
University of Stirling	UK	https://www.stir.ac.uk
H2020 S4AllCities	EU	https://www.s4allcities.eu/
H2020 FASTER	EU	https://www.faster-project.eu/
SIGMA Consulting	Italy	https://www.sigmaconsulting.it/it/home/
H2020 CONCORDIA	EU	https://www.concordia-h2020.eu/
City of Rijeka	Croatia	https://www.rijeka.hr/en/?noredirect=en_GB
H2020 CyberSec4Europe	EU	https://cybersec4europe.eu/
University of Murcia	Spain	https://ants.inf.um.es/en
University of Porto	Portugal	https://sigarra.up.pt/fcup/en/
Padova Red Cross	Italy	https://cri.it/
UIA initiative SURE Project City of Tampere	Finland	https://www.uia-initiative.eu/en/uia-cities/tampere
H2020 ENSURESEC	EU	https://www.ensuresec.eu/
Italian Data Protection Authority	Italy	https://www.gpdp.it/web/garante-privacy-en/home_en
Brown University	USA	https://www.brown.edu/brown-research
Open & Agile Smart Cities International	Brussels	https://oascities.org/
H2020 RED-Alert	EU	https://redalertproject.eu/
University of Nebraska at Omaha	USA	https://www.unomaha.edu/college-of-information-science-and-technology/about
UIA initiative PIRAEUS	Greece	https://www.uia-initiative.eu/en/uia-cities/piraeus
Jaipur Smart City Ltd	India	https://smartnet.niua.org/users/jaipur-smart-city-limited
Legione Carabinieri di Padova	Italy	http://www.carabinieri.it/
Questura di Padova	Italy	https://questure.poliziadistato.it/padova
UrbSecurity, an Urbact APN	EU	https://urbact.eu/urbsecurity-action-plan-network-planning-safer-cities
Municipality of Pella	Greece	https://www.giannitsa.gr/
Counter Terrorism Preparedness Network	UK	https://www.london.gov.uk/what-we-do/fire-and-resilience/counter-terrorism-preparedness-network-ctpn

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University of Groningen	Netherlands	https://www.rug.nl/research/
Municipality of Mechelen	Belgium	https://www.mechelen.be
Municipality of Leiria	Portugal	https://www.visiteleiria.pt/en/home/
Municipality of Longford	Ireland	https://www.longfordcoco.ie
Municipality of Michalovce	Slovakia	https://www.michalovce.sk
University of Salford	UK	https://www.salford.ac.uk
Dutch Institute for Safe and Secure Spaces	Netherlands	https://www.disss.eu/
EU Joint Research Centre Ispra	Italy	https://joint-research-centre.ec.europa.eu/jrc-sites-across-europe/jrc-ispra-italy_en
Snap4Cities Initiative	Italy	https://www.snap4city.org
Cities Union Romagna Faentina	Italy	https://www.romagnafaentina.it
Comune di Parma	Italy	https://www.comune.parma.it/notizie/news/categoria/PROGETTI+EUROPEI.aspx
City of Madrid	Spain	https://www.fomentoterritorial.com/
Community of Szabolcs 05	Hungary	https://www.interregeurope.eu/
ISSEL - Aristotle University of Thessaloniki	Greece	https://issel.ee.auth.gr/en/13-2/
Cittadinanzattiva	Italy	https://www.cittadinanzattiva.it
Privacy International	UK	https://www.privacyinternational.org
REACT – The Integrity Company	Italy	https://www.re-act.it
Municipality of Faenza and Unione della Romagna Faentina	Italy	https://www.comune.faenza.ra.it
Oslo Politidistrikt	Norway	https://www.politet.no
Valencia Local Police	Spain	https://www.policialocalvalencia.es
Setubal Municipality	Portugal	https://www.mun-setubal.pt
Directora de Serveis de Prevencio	Spain	https://www.baercelona.cat
Norwegian Human Rights Institute	Norway	https://www.nhri.no/en/

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8 APPENDIX B Detailed Notes from COSSEC Webinars

Three webinars were held to discuss the three main areas of IMPETUS: ***technology***, ***operations***, and ***ethics***. This Appendix provides detailed notes from these webinars.

8.1 Use of Advanced IT for the Protection of Public Spaces, May 4, 2021

The purpose of this meeting was to discuss challenges and approaches associated with technical solutions to the protection of public places, sharing the perspectives from IMPETUS, as well as from several COSSEC members. The meeting was attended by representatives from IMPETUS and several COSSEC members. The meeting lasted two hours and was attended by an average of 38 people.

The meeting was opened by the COSSEC Chair, who introduced the meeting and presented an overview of COSSEC. He presented several issues to be addressed at this meeting:

- The capabilities and limits of advanced security technologies (e.g., artificial intelligence, data analytics, facial recognition)
- Social acceptance of today's security technologies
- Integrating multiple technologies and their portability
- Targeting the right user for technical solutions
- Developing requirements to ensure interoperability.

SINTEF followed this introduction with an overview of the IMPETUS program. The program was characterized as exploring the technical, ethical, and process dimensions associated with the application of advanced technologies to city security. IMPETUS is developing a suite of tools to prepare for and deal with emergencies, that will be demonstrated in Oslo, Norway and Padova, Italy.

Next was a presentation of the Smart Urban Security and Event Resilience (SURE) program by a representative from the city of Tampere, Finland. SURE is a program focusing on managing large crowd concentration and event-related urban security. While their solutions draw on advanced technologies, their approach emphasizes creating a sense of security in event participants. They are testing their solutions in Tampere.

A COSSEC member from the University of Florence next presented an overview of the Scalable Smart Analytic Application Builder for Sentient Cities (Snap4City) program. This work has created a tool that can integrate multiple smart city applications and provide user interfaces to support smart city operations. The presentation suggested consideration of the Snap4City tool for use in the IMPETUS platform, which was later adopted for IMPETUS.

Next, a representative from Open and Agile Smart Cities (OASC), a non-profit organization based in Belgium, presented their work to develop Minimum Interoperability Mechanisms (MIMs), standards to allow interoperability between systems in cities and communities. This can play a large role in smart city evolution, as various projects develop tools and other systems whose value can be greatly enhanced if they can interoperate with each other, and better yet, communicate with other communities.

After these presentations of different approaches to applications of advanced IT, SINTEF facilitated a discussion around the most challenging aspects of this topic, including COSSEC members plus IMPETUS partners Insikintelligence, Cinedit, and City of Oslo. From the perspective of technology

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development, issues discussed included the challenge of combining new and existing technologies, designing for the appropriate user, and how recognize threatening people without facial recognition (e.g., terrorists dressed as policemen). From the perspective of moving technology into operations, issues discussed included identifying the key challenges in moving from research to implementation, making it easier for staff to adjust to new technology, and how to resolve discomfort with security technology by involving the public and other stakeholders.

At the end of the meeting, it was concluded that there had been much valuable information exchanged within the limited two-hour format, and that the meeting was a success in that respect. However, it was noted that the presentation-driven agenda resulted in spending much time devoted to people presenting their work, rather than discussing common issues. It was thought that future meetings might be more fruitful if specific issues were identified and studied ahead of the meeting, leaving more time for discussion.

8.2 Ethical and Legal Issues with the Use of Smart Cities Technologies for Public Protection, June 16, 2021

The purpose of this meeting was to discuss ethical and legal issues associated with the deployment of smart city technologies for public protection. The meeting was attended by a set of invited COSSEC members and a large number for IMPETUS partners. There was an average of 40 attendees, and the meeting lasted a bit over two hours.

The meeting was introduced by the COSSEC Chair, who reviewed the agenda and the COSSEC concept and membership.

The next presentation was by IMPETUS partner ISP, who represented the results of a “Survey on the Use of Smart Technologies in Detecting Security Threats in Public Places”. The purpose of the survey was to assess several citizen populations about their knowledge of smart city technologies, their opinions of it, and to what extent they were worried about unethical use of this technology. Citizens from five cities were surveyed: Oslo, Padova, Madrid, Zagreb, and Bucharest. Knowledge of smart city technologies was varied across the cities; for example, 49.3% in Oslo and only 17.4% in Padova responded that “I’ve never heard about it!”. Across all cities, 11% of the respondents felt either “unsafe” or “very unsafe”; however, in Bucharest, it was 31%. The presenter welcomed people outside of IMPETUS to take the survey.

The next presentation was by a COSSEC member, an expert in personal data protection, on Ethical Issues, Personal Data protection, and possible misuse of personal data: a European perspective. The presenter reviewed privacy and data protection risks associated with the increasing collection and use of digital data, and the harm that can potentially come from increasing reliance on artificial intelligence (AI). He next reviewed European legal frameworks to insure ethical AI and data privacy.

Next, A COSSEC member from the University of Nebraska at Omaha, USA discussed “Ethical Issues of perceived fairness in Machine Learning (ML)”. He introduced the concepts of bias and fairness, and how bias can be unintentionally introduced into ML systems through the nature of the data used to train the systems, or by limitations in the system’s architecture. He suggested five ethical principles for AI and ML systems: transparency, justice and fairness, non-malfeasance, responsibility, and privacy.

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Following a recommendation from the previous COSSEC webinar, attendees had been asked to submit questions for discussion in advance. Discussion of these questions was interspersed with the discussions around the presentations. Here are the previously submitted questions:

- When mentioning implanted sensor chips that may monitor substances (such as dopamine, serotonin, oxytocin, endorphins) to know the state of mind and body of people, in what cases is this the practice? Why would people what to implant these sensor chips?
- Can you name a few examples of AI apps that support human behavior in terms of developing opinions and judgment and enabling decision and actions?
- Can you explain what information asymmetry is and how is it affecting privacy and data
- protection?
- What exactly are AI and ML? What is their relation?
- Could you name a couple of bad / good practice examples related to disrespect of the
- principles stated under AI ethic and data protection challenges?
- Can you name a few examples of algorithmic bias in the case of public security?
- Clarify the concepts of bias and fairness with the use of advanced IT solutions for the protection of public spaces.
- Can bias and fairness affect the analysis of Community Social Networks?
- Are there, or should be, metrics with regards to bias and fairness analysis of population data (e.g. Norwegian vs. Italians)?
- What about the need for the protection of public spaces vs. EU regulations (GDPR, proposal for the use of AI).
- Investigate the critical issues related to the protection of personal data in the automatic detection of the temperature that is made for the current Covid-19 emergency in public places, airports, shopping centers, etc. What are the current measures to protect personal data, or is there any indication at European level that these measures are expected in the near future?

8.3 Influence of technology on operations and operational concepts in IMPETUS, March 30, 2022

The purpose of this meeting was to address the third pillar supporting the IMPETUS project: *processes*: delivering a solution to support the cognitive processes of sensemaking, decision making and coordination, fully aligned with the needs of multiple city stakeholders (e.g., police, first responders, cities) and complemented by deployment guidelines. The meeting was attended by a set of invited COSSEC members and a number of IMPETUS partners. COSSEC members attending were from University of Groningen, H2020 FASTER project, H2020 S4AllCities, SURE project, Snap4City Initiative, and the URBSECURITY Initiative.

The meeting was introduced by the COSSEC Chair. He posed three basic questions relating to processes, to be addressed at the meeting:

1. What capabilities of the IMPETUS tools and platform will be available to support the Acceptance Pilots and Live Exercises?
2. What are the target scenarios for use in the Acceptance Pilots and Live Exercises?
3. What are the open problems, challenges, and possibilities associated with the Acceptance Pilots and Live Exercises?

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SINTEF presented an overview of the IMPETUS project and technologies. The presentation addressed the need to consider various user profiles in designing and evaluating IMPETUS:

- SOC operator
- SOC supervisor
- IT security specialist
- IT supervisor
- Intelligence planning specialist
- IT technical administrator.

The City of Padova presented results from the IMPETUS Acceptance Pilots. They first presented a comprehensive overview of how the APs were operated in Oslo (Nov. 4,5,6, 2021) and Padova (Dec 1,2,3 2021), and the results and feedback that was obtained. Both APs identified teambuilding as an important outcome. In Oslo, it was the first opportunity for operators to evaluate the IMPETUS tools. Operators were enthusiastic about the tools, and developers gained a better understanding of the operator perspective. This valuable feedback was used to prepare for the Padova AP, which was able to go deeper into feedback on specific tools. It was emphasized from an operator perspective, IMPETUS must provide added value in terms of real-time "passive" alarms, more complete information, and better coordination between those called to intervene.

Next SINTEF and the City of Oslo presented how IMPETUS had characterized concepts of operations for the development of its tools and platform. They started with the basic Security Operations Center (SOC) process of information collection, analysis, response activation, and evaluation/correction of response. As IMPETUS provides improved information to increase situational awareness and decision support tools, SOC operators must be trained to work in-the-loop with the platform and adapt operational procedures to account for new information pathways. This will also result in changes in communications patterns, requiring a common operating language to ensure interoperability. Ultimately, IMPETUS should improve resilience to events that threaten public safety, and the presenters discussed this in the context of a resilience framework that entails prediction and preparation, rules and procedures, and a capacity to move beyond the rules in an appropriate way when needed. The value of training in worse-case scenarios was also stressed.

Next, attendees discussed operational concepts and questions raised by the previous presentations. There was general agreement on the need to support data and information sharing among the users with various profiles. It was expected that different user categories could use the same tools, but with customized user interfaces enabled by the IMPETUS tool integration platform.

After a break, TIEMS led a presentation and discussion of the draft target scenarios to be used in the IMPETUS Live Exercises. The scenarios involve anticipating and dealing with demonstrations protesting new social restrictions due to COVID-19. In Oslo, the scenario would involve four user profiles working in parallel: SOC Operator, SOC Supervisor, Cyber Operator, and Analyst.

A discussion of how best to define scenarios for live exercises followed, with COSSEC members S4AllCities noting that they will use a scenario with distributed attacks in different cities, and the City of Tampere noting that the SURE platform has been designed to address event security for Nokia Arena events.

SINTEF and the COSSEC Chair summarized and adjourned the meeting.

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