AHEAD
Toward sustainable foresight capabilities for increased civil security

D2.2 –Foresight Methodology

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1 Executive Summary

The purpose of this document is to report the foresight method prototype developed for the AHEAD Horizon Europe project. The European Union has advanced projects on civil security through Horizon Europe, including AHEAD "Toward Sustainable Foresight Capabilities for Increased Civil Security." This project involves the development of a capability-based foresight framework, made for and by civil security agencies to better anticipate technology evolutions and the contextual elements (e.g., legal, ethical, societal, economic) that further impact the future of civil security. After an introduction to the application of foresight methods, this deliverable underlines the reasons why some methods were deemed appropriate to the specific context of EU civil security and how they were adapted.

The exercise of developing complex social and technological scenarios about the future is a difficult task. After all, it is difficult to disconnect individuals from present-focused knowledge and thought patterns. It was therefore decided to deploy a specific foresight-game to facilitate thinking about the future in the specific domain of civil security. The tested prototype foresight method combines a serious game with a canvas system for the purpose of aiding law enforcement agencies in anticipating future threats and capabilities needed to maintain European civil security. Considering key dimensions of civil security, the proposed foresight method involves future scenarios and workshops to explore technology uses, criminal opportunities and police capabilities. It begins with selecting a civil security topic, followed by developing scenarios through expert panels tasked with exploring the possible futures and relevant technologies. In the workshop, foresight participants are asked to consider criminal typology, motivations, and access to a technology. To help LEAs prepare to combat new threats, participants are to compare the threat and its repercussions with the LEAs' missions and review the LEAs' capacity to carry out these missions effectively to combat the new threat. Police missions have been carefully considered and are divided into four categories: prevent, protect, investigate, and enforce. Capabilities is measured based on POSTEDFIT (i.e., People, Organisation, Sustainment, Training, Equipment, Doctrine, Facilities, Information and Technology) to enable law enforcement agencies to assess the impact of future threats on their missions and organisations. The final canvas is shown in Figure 3.

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List of Acronyms

Abbreviation / Acronym	Description
CCG	Collectible Card Game
DoDAF	Department of Defence Architecture Framework
EA	Entreprise Architecture
EU	European Union
IT	Information Technology
JRC	Joint Research Centre
LEA	Law Enforcement Agency
POSTEDFIT	People, Organisation, Sustainment, Training, Equipment, Doctrine, Facilities, Information and Technology
SES	Scenario Exploration System
STEEPLE	Social, technological, economic, environmental, political, legal factors

2 Introduction

Upholding civil security is an imperative responsibility for law enforcement agencies (LEAs). Civil security refers to the safety of individuals and nations, maintained through political, economic, social, and environmental stability (Rothschild, 1995). The state of civil security in Europe is marked by concerns for Cluster 3 areas of crime and terrorism, border management, disaster and infrastructure resiliency, and cybersecurity. These civil security concerns are likely to be exacerbated by emerging technologies, such as artificial intelligence (AI), quantum technology, and big data analytics (Clapp, 2022). Law enforcement agencies must prepare for rapidly changing technologies and evolving civil security concerns. Preparing for an uncertain and unpredictable future requires robust methods that can help individuals and institutions to see beyond current issues. Foresight methods may provide robust frameworks that support individuals and institutions to better prepare for future challenges (Dreyer & Stang, 2013). Foresight is the systematic assessment of potential future outcomes, particularly regarding changing trends in science and technology, and often with consideration for public policy implications (Miles, 2010).

The EU Horizon Europe project, AHEAD, seeks to develop a foresight framework specific to the civil security domain to pre-empt potential disruptions in civil security posed by technology and anticipate the operational future of policing. In this report, we describe a foresight prototype specific to the field of civil security tested in the AHEAD project and, building on feedback from experts attending the AHEAD workshops, reflect on the efficacy of the framework as designed for a civil security foresight. Foresight methods are useful proactive tools that can be adapted for pre-empting evolving civil security concerns. Within the specific context of European civil security, foresight methods can help law enforcement agencies determine possible threats, assess their own capabilities, and inform the development of threat response policies. During the first four months of the project, a prototype foresight method was tested for applications specific to the civil security domain. This prototype combines a serious game with a canvas system for the purpose of aiding law enforcement agencies in engaging with the methodology. The game involves workshops to explore technology uses, criminal opportunities and police capabilities through different scenarios.

3 Tested Foresight Prototype

A prototype foresight method was tested, which combines a serious game with a canvas system for the purpose of making the methodology appropriate for the civil security domain while aiding law enforcement agencies in engaging with the methodology. The proposed foresight method involves workshops to tackle technology uses but also criminal opportunities and police capabilities through various scenarios. In recent years, the integration of serious games and card games, such as collectible card games (CCGs), into foresight systems has gained significant attention in research and practical applications. These games are not merely sources of entertainment; they play crucial roles in enhancing learning, strategic thinking, and decision-making processes across various domains. Testing of the prototype involved assessing the game's applicability in LEA contexts.

3.1 Rationale for using Foresight Games

Card games, including Collectible Card Games (CCGs), have been recognized for their unique contributions to foresight systems. They assist in studying system analysis and design, providing high levels of motivation, and serving as effective educational tools (Chang et al., 2008). These games promote strategic thinking and offer a practical approach to learning software engineering principles (Estell, 2005). Additionally, card games like Conveyance Go have been effective in enhancing students' scientific knowledge, particularly in transport and energy subjects (Liu & Chen, 2013). Despite these benefits, the games also have limitations. Technical challenges in game prototypes, like the Robot Memory Game, highlight the need for further development before wider application (Sandoval et al., 2021). Moreover, the limited foresight in players can be a significant challenge, necessitating the development of more sophisticated algorithms and strategies to model decision-making processes more accurately (Liu & Zhu, 2017). Hence, card games and serious games have a great deal of potential in foresight systems, supporting the domains of strategy, education, and policymaking. The potential benefits informed our decision to use this technology as the foundation for our framework.

The use of serious games in the context of foresight exercise among the structure of European Union is not new. In 2020, the publication "A Game for All Seasons: Lessons and Learnings from the JRC's Scenario Exploration System" by Laurent Bontoux and colleagues (Bontoux et al., 2020) focused on the European Commission Joint Research Centre's (JRC) Scenario Exploration System (SES). The SES is a foresight gaming system for applying futures thinking to policymaking. It was originally designed for EU policymakers to engage in systemic thinking with long-term perspectives and explore alternative futures on various issues and themes. The SES was conceived following a 2012 request for a long-term foresight study on "eco-industries", aimed at envisioning a sustainable transition in Europe. This led to the consideration of serious gaming techniques, seen as increasingly popular and effective in the broader futures space. The SES is thus rooted in the tradition of "serious games", which are designed with explicit educational purposes rather than for entertainment. The SES process involves participants, referred to as "scenario explorers," representing different stakeholder groups. They undertake actions across three "time horizons" to achieve long-term objectives, guided by scenarios that create contexts with a mix of certainty and unpredictability. Participants

develop their roles, set objectives, and take actions using limited resources, with a "public voice" judging and scoring these actions. This interaction aims to simulate responses connected to various issues of interest, fostering strategic and systemic thinking.

Rather than providing entertainment, serious games serve a specific goal, proving to be quite beneficial for strategic planning and foresight. Research has demonstrated that they produce captivating experiences that, as demonstrated by circular economy planning, not only boost participant interaction but also produce fresh perspectives about potential futures (Dufva et al., 2016). Additionally, serious games like WeShareIt have been crucial in helping policymakers become more capable, particularly in terms of anticipating catastrophes brought on by climate change (Onencan et al., 2016). Educational games like Plan-It Commander are specifically made to help children with attention-deficit hyperactivity disorder employ beneficial behavioral strategies (Bul et al., 2015).

The SES has many notable strengths. In particular, the gaming system helps participants imagine the ramifications of future situations for themselves and the subjects they care about, according to preliminary demonstrations and testing with varied groups. With the same scenarios, it was able to hold the attention of a diverse group of people and facilitate discussion on a wide range of subjects. Additionally, it has been demonstrated that the SES may foster a lively dialogue that is essential for foresight without requiring participants to defend their present goals. The SES has been successfully applied in a variety of settings, leading to its modification for a range of problems and requirements, including nutrition and food safety. These modifications demonstrated that the tool is adaptable and able to meet various needs. The SES has garnered recognition for its adaptability, versatility, and capacity to involve a wide range of individuals and themes. It has demonstrated consistency and reproducibility in its applications and the ability to foster good and productive dialogue environments. The SES yields a range of results from scenario investigations, including specific concepts, general cognitive exercises, and introspection on intricate problems. Being a flexible tool, it may be customized to meet the demands of different stakeholders and themes. For example, it can be changed to accommodate different roles, scenarios, or contextual variables. The SES also successfully encourages participants to engage in strategic thinking impacted by scenario limits and restricted resources. This is especially true in policy-oriented exercises when participants are encouraged to analyze strategically and holistically. Due to the many strengths of the SES, it may be an efficient methodological base for a new foresight framework on LEA civil security capabilities. Yet, testing by LEAs involved in the AHEAD project raised concerns about the complexity of the game. Thus, the SES was used as an input to develop and inform the proposed framework.

Although serious games are an effective method of engaging users, participants may struggle to grasp the relevance and real-world applications of the game. This issue was of specific concern under AHEAD. Thus, to ensure that LEAs could relate to real-life situations, we integrated the canvas concepts developed by Osterwalder to enable greater big-picture perspectives by participants combined with strategic considerations. Osterwalder states the contribution of the canvas is to facilitate innovation, help with the strategic evolution of the organization, and translate strategic evolutions into services and products corresponding to the needs of the market (Osterwalder, 2004; Osterwalder et al., 2011; Osterwalder et al., 2014). Indeed, canvases provide an integrative and strategic framework that is indispensable for contemporary organizations seeking innovation, strategic development, and adaptability in response to evolving demands.

In the dynamic landscape of LEAs, where the evolution of technology continuously opens new avenues for criminal activities, the integration of Collectible Card Games (CCGs) with collective intelligence canvases emerges as a promising foresight tool. This approach is justified by the unique ability of CCGs to foster strategic thinking and decision-making, as observed in their educational applications (Chang et al., 2008), and in enhancing scientific knowledge in specific domains (Liu & Chen, 2013). The interactive and engaging nature of CCGs can be leveraged to simulate complex criminal scenarios, encouraging LEAs to explore and understand the multifaceted impacts of technological advancements in criminal behavior.

Additionally, CCG frameworks can benefit from the addition of collective intelligence canvases, such to those found in startup ecosystems, which can enhance the foresight exercises. These canvases allow for the gathering of many viewpoints and knowledge, which is essential for understanding the quickly changing technological environment. They were therefore considered as appropriate in the AHEAD context, LEAs being able to develop a more comprehensive and proactive picture of possible criminal activity by fusing the structured, insight-driven methodology of intelligence canvases with the strategic and cooperative components of CCGs. This combination also proves helpful with planning preventative actions as well as creating thorough policies and training curricula that are suited for upcoming difficulties. Thus, creating a system that combines CCGs with collective intelligence canvases was deemed a fresh and practical approach for law enforcement agencies to remain competitive in a time when technology advancements are constantly changing the nature of crime.

3.2 Methodology

3.2.1 User Opportunities

Whatever the method used to generate the scenarios to be explored, the resulting scenario generation must include the following elements:

- The driving force that guides the future towards a plausible outcome.
- The description of the people impacted by this future: their typology, age range, and socioeconomic category.
- The tasks they will be willing/able to perform in this future (these may be professional or personal tasks, or a mixture of the two).
- The list of emerging technologies that will enable the users concerned to carry out the tasks they want to perform in this hypothetical future.

In line with the Canvas methodology, these elements are grouped into four boxes on the foresight board: Context, User (i.e., potential victim) type, Key triggers for users, and Users opportunity.

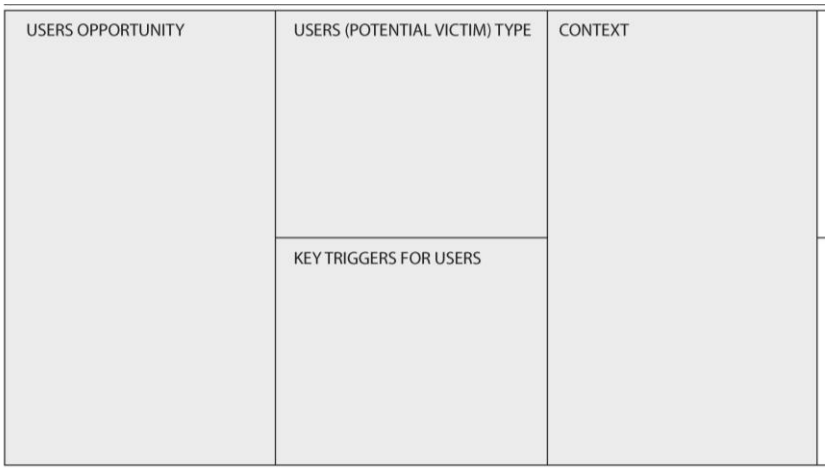

Figure 1: Canvas describing the user opportunities in a certain context for typical users.

3.2.2 Crime Opportunities

To make the foresight method completely relevant to the civil security domain, the primary objective was defined as the identification of the potential crimes encouraged by these new uses. Therefore, we added boxes relating to this specific issue to the initial framework that may be filled out in a collaborative activity or workshop between experts in areas related to technology, law enforcement, and civil security. By considering that a crime opportunity is based on a criminal typology, a motivation and access to a technology (these last two parameters are triggers that encourage the realisation of the criminal opportunity), three new boxes (as shown on Figure 2) were added to the original framework to reinforce its appropriateness to the LEA context: Criminal Types, Key triggers for criminals, and Crime opportunity.

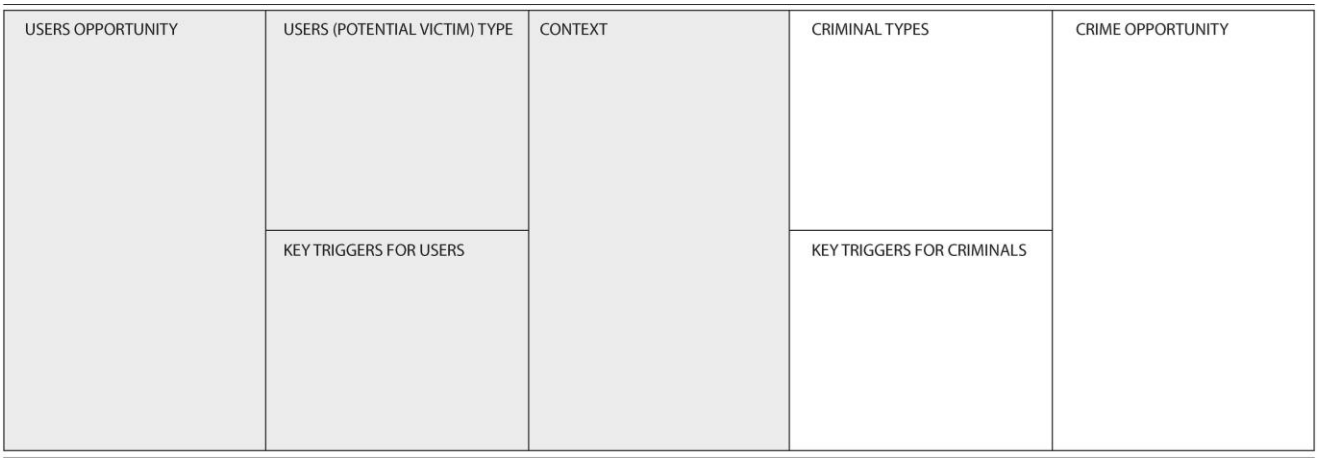

Figure 2: Crime opportunity canvas

3.2.3 Police Missions

Another aim of the framework is to help LEAs reflect on their capability needs when facing and combating new threats. This involves (1) comparing the threat and its repercussions with the LEAs' missions, and (2) reviewing the various components of the LEAs' capacity to carry out these missions effectively with a view to combating the new threat. To do so, LEAs from the consortium

were asked about key police missions and this survey resulted in the distinction of four categories:

- Prevent.
- Protect.
- Investigate.
- Enforce.

It is interesting to note that, depending on the police organization in a specific country, some of the missions can be merged: for example, Prevent & Protect may be the same mission. However, AHEAD aiming to propose a generic framework that can serve all the European LEAs, we maintain the more nuanced four-part breakdown.

3.2.4 Police Capability

Capabilities refer to the well-known concept of Entreprise Architecture (EA), which is crucial for organizing and managing complex structures within organizations. Two significant frameworks in this domain are The Open Group Architecture Framework (TOGAF) and the Department of Defence Architecture Framework (DoDAF). These frameworks assist in aligning various aspects of an organization, ensuring that its information technology (IT) strategy is consistent with its business goals. TOGAF is widely recognized for its comprehensive approach to designing, planning, implementing, and governing an enterprise information architecture. DoDAF is specifically tailored for defence projects but has been applied in other areas due to its structured approach to architecture design. Research shows that combining the strengths of both frameworks can be highly effective. For instance, Tao et al. (2017) illustrate how a tailored enterprise application architecture framework can support service-oriented architecture and cloud computing by extending the mapping between TOGAF and DoDAF models (Tao et al., 2017). Similarly, Delgado-Quintero et al. (2017) present a mathematical approach using a model-checking technique to analyze capabilities in enterprise architectures using both frameworks, enabling quantitative verification of operational models' achievement of enterprise capabilities.

Implementing these frameworks can enhance strategic alignment and increase organizational productivity. Yet, challenges include the need for tailored solutions for different organizational sizes and types, and the necessity of incorporating elements such as guidelines to increase the frameworks' effectiveness. TOGAF applies mainly to companies and their IT capabilities and is not suitable for our practice framework. However, these frameworks have been extensively reviewed for their value in capability development. The consensus is that the key to effective architecture management is an appropriate taxonomy for the development of architecture products, and strict adherence to it. This taxonomy aims to ensure a common lexicon that explicitly describes concepts, capabilities, and systems, while reducing ambiguity and interpretation problems. In the above-mentioned cases, this taxonomy remains complex and mainly IT-oriented, and is therefore far removed from LEAs' considerations. This is why we have preferred another, more concrete approach.

POSTEDFIT was proposed by Oosthuizen et al. (2008) for a military context (South African Department of Defence). It does not focus on IT, but rather all the components of an organization, including People, Organisation, Sustainment, Training, Equipment, Doctrine, Facilities, Information and Technology (Delgado-Quintero et al., 2017). It is therefore generic enough and was considered appropriate to fit the needs of European LEAs. For LEAs that already have their

own capability framework (e.g., Sweden) it is quite possible to substitute the existing framework for the one currently proposed. Our decision to use POSTEDFIT is justified by its simplicity, consisting of only nine components, and its ubiquity of use. Integrated into our framework, it will enable LEAs to assess the impact of future threats on their missions and organisations. By comparing the evolution of their missions with the initial state of their organisation, the LEAs will not only have an overview of their readiness but also a vision of the components they will need to support in the future in order to be able to adapt. Based on these considerations, two new zones were added to the canvas, enabling it to prompt LEAs' forward-thinking when it comes to their capabilities impacted missions and impacted capability components. The final canvas is shown in Figure 3.

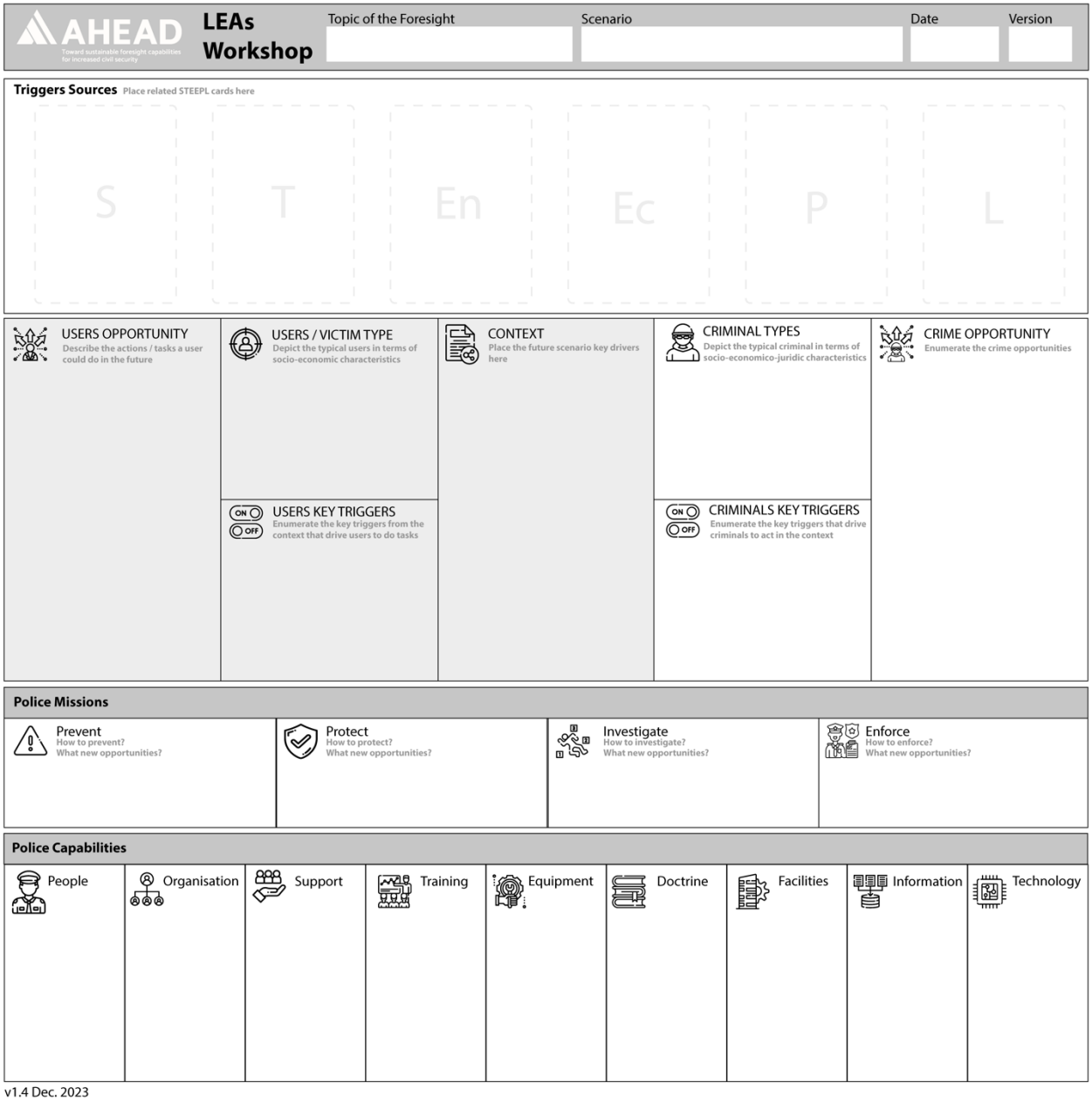

Figure 3: The proposed Canvas that acts as game board for the session.

***Note**: the upper part of the canvas has an extra area that is a placeholder for the STEEPL cards that will be used by the attendees during the session.*

4 Conclusions

Maintaining the safety of individuals and nations is a difficult, but imperative task for law enforcement agencies and civil security practitioners. The task requires robust and adaptable methods. Reviewing existing foresight methods, the EU Horizon Europe project, AHEAD, has identified those frameworks whose adaptation was considered both feasible and relevant to develop a capability-based foresight framework for LEAs. This framework which is the first of its type, relies on a foresight game, and prompts forward-thinking about future uses, potential future crimes, and their impact on the missions of LEAs. It has been tested during AHEAD's first foresight exercise on online presence and proved useful to prompt consideration about crime and capabilities in a specific civil security context. The next foresight exercises will provide opportunities to assess the prototype in the context of other security concerns and to further improve the prototype. Further testing will be conducted on the framework to define the proper conditions for efficacy in the civil security context. Research exists on the evaluation of foresight methods (e.g., Georghiou, & Keenan, 2006); however, foresight evaluation is often neglected by foresight programs. Thus, the next foresight cycles will focus on examining the influence of various conditions on the efficacy of the framework, such as the diversity of experts involved, the role of the facilitators, and the integration of megatrends, weak signals, and quantitative methods.

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