COPRA AVIATION SECURITY RESEARCH ROADMAP

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Abstract

The EU funded project COPRA (Comprehensive European Approach to the Protection of Civil Aviation) developed a roadmap for future research activities, which could lead to a more resilient, flexible and comprehensive approach. Tackling 70 existing and potential threats to aviation (security) identified during the COPRA project, the research roadmap supports the drafting of national and European research agendas that intend to create the knowledge and the technologies to ensure secure aviation in the years to come. This paper presents the overall approach of COPRA and the resulting roadmap.

Keywords: aviation security, research agenda, roadmap.

INTRODUCTION

Security has become a major factor in civil and commercial aviation. In recent decades, the number of threats to aviation security has grown significantly. This has led to even more security regulations as the threats evolved. Thereby, security procedures have become exceedingly complex, time consuming and invasive to passenger privacy. At the same time, passenger and cargo traffic are expected to double in the next 15 years. It is clear that the current complex security system cannot be adapted to such growth. It has already and will increasingly become a major market restraint.

Therefore, the project COPRA (Comprehensive European Approach to the Protection of Civil Aviation) was initiated under the Seventh Framework Programme of the European Commission to develop requirements and recommendations for future research activities, which should lead to a more resilient, flexible and comprehensive approach. To that aim, COPRA brought together a well-balanced consortium of research organisations, industry players and major air transport providers with a wide range of European stakeholders who contributed in expert workshops.

The goal of the COPRA Aviation Security Research Roadmap is to provide the European Commission and the member states with clear guidelines for future R&D activities responding to operational and economic market needs while being attentive of the acceptance by citizens.

COPRA APPROACH

Within the COPRA-project several separate interconnected work packages have been carried out. The intermediate research results of all of these work packages were checked, extended and/or further elaborated on in workshops with expert groups before finalizing the work package and proceeding with the project. Finally, each one of the work packages contributed to the roadmap in its own way, by providing (background) content for one of its layers.

First the current state of affairs was explored, by identifying stakeholders and their requirements on aviation security, the state of the art of aviation security and the current legal framework (WP1). Subsequently, current, emerging and new threats to airports, aircraft and auxiliary infrastructures were identified [1] (WP2). Next, both measures and security concepts were compiled which could counter these threats (WP3) and the security concepts were assessed and prioritized based on security benefit, costs, impact on the aviation system and public acceptance and constraints (WP4). Finally, everything came together in the COPRA Aviation Security Research Roadmap (WP5).

ROADMAP STRUCTURE

Technology roadmapping has been one of the most widely used and appreciated methodologies for innovation management planning in the last 15 years. Developing technology roadmaps supports organizations to make solidly based decisions on future R&D areas that need to be addressed in order to be prepared for future challenges and ambitions.

Although there are many ways to create and present a roadmap, the overall framework of a roadmap is always based upon a layered structure that can also be recognized in the COPRA roadmap. Fig. 1 shows the general outline as applied for COPRA.

A roadmap looks at the topic of interest from different ‘viewpoints’ or ‘perspectives’; these perspectives are generally called ‘roadmap layers’. There can be many perspectives, depending on the level of detail of the roadmap, but the three main perspectives are always:

- Strategic perspective

  In this layer the ‘WHY-question’ for innovation is answered. What are the strategic considerations for innovation? Items described in this layer can be based upon the internal strategic goals and ambitions of an organisation, but also on external factors such as drivers, trends, threats etc. For the COPRA roadmap this layer contains the drivers and trends in future aviation that are most relevant for future innovations in aviation security systems.

- Functional perspective

  This second layer describes WHAT should be done or developed to reach, tackle or be prepared for the items that were described in the strategic layer. In general, this can be either products, capabilities or concepts. Although some specific aviation security concepts were identified in COPRA, it was decided not to recommend specific concepts in this layer, but to give more general recommendations and goals for future aviation security concepts.

- Resources perspective

  The third layer describes the HOW, i.e. the technologies and other resources that are necessary to be able to develop the products, capabilities and/or concepts described in the functional layer. In the COPRA Aviation Security Research Roadmap, this layer gives recommendations for future research and development. This is the actual research agenda that the consortium recommends and that will contribute to and address the current and future challenges in aviation security.

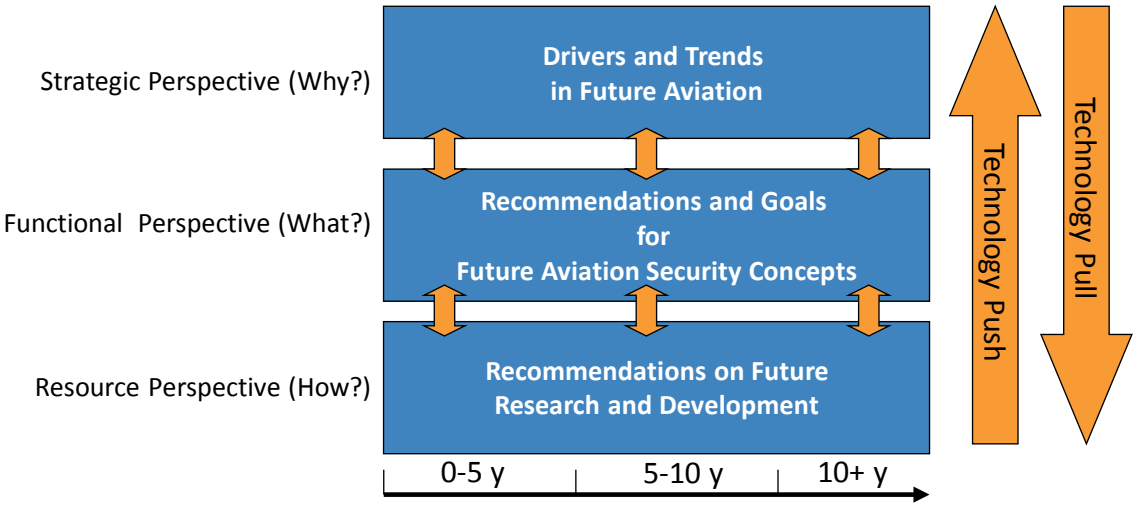

Fig.1 General outline of the COPRA roadmap

Because a roadmap is a plan, it has a timeframe. For the COPRA roadmap a three-window timeframe was used: A short term timeframe with a horizon of 5 years, a mid-term timeframe with a horizon between 5 and 10 years and a long term timeframe with an horizon of 10 years plus. However, this three-window timeframe was not used for all three layers of the roadmap: The trends and drivers have no time dimensions and the recommendations for future research and development are plotted only on the short term (0-5 years) and mid/long term (5+ years) timeframe.

A very important aspect in a roadmap process is that both technology push and technology pull forces are addressed. Especially in defining the elements of the functional and the technological layers, not only technologies that are needed for the functions should be defined (top down), but also functions that derive from new technological possibilities should be considered (bottom up).

COPRA RESULTS

COPRA inventoried stakeholder requirements, the state of the art and current legal framework; collected current, emerging and new threats to airports, aircraft and auxiliary infrastructures; compiled security measures and security concepts to counter these threats; and assessed and prioritized the security concepts based on security benefit, costs, impact on the aviation system and public acceptance and constraints. Based on all this work, the research roadmap was created consisting of the previously mentioned three layers:

- Drivers and Trends in Future Aviation

  Developed by considering demographic, economic, social-cultural, technological, environmental and political factors (DESTEP), a total of 13 drivers and trends are considered most important in determining the shape of aviation security in the upcoming 15 years by the consortium and experts.

- Recommendations and Goals for Future Aviation Security Concepts

  Clustered into four headlines (Resilient, Comprehensive, Comfortable and Safe, Affordable and Efficient), a total of 23 recommendations and goals for Future Aviation Security Concepts have been compiled; eight for the short term (0-5 years), ten for the mid-term (5-10 years) and five for the long-term (10+ years).

- Recommendations on Future Research and Development

  Based on the previous two layers and the previous work packages, a total of 33 recommendations on Future Research and Development have been compiled; 21 for the short term (0-5 years) and twelve for the mid- to long-term (5+ years). The recommendations include research topics to tackle specific emerging threats, as well as recommendations for research towards a more resilient, comprehensive, comfortable and safe as well as affordable and efficient aviation security system.

The roadmap is depicted in Fig. 2. The third layer contains detailed recommendations for a European Research Agenda for Aviation Security. Tackling 70 existing and potential threats to aviation (security) identified during the COPRA project, the research roadmap supports the drafting of national and European research agendas that intend to create the knowledge and the technologies to ensure secure aviation in the years to come. More detailed information on the content of the roadmap may be found in the final deliverable [2].

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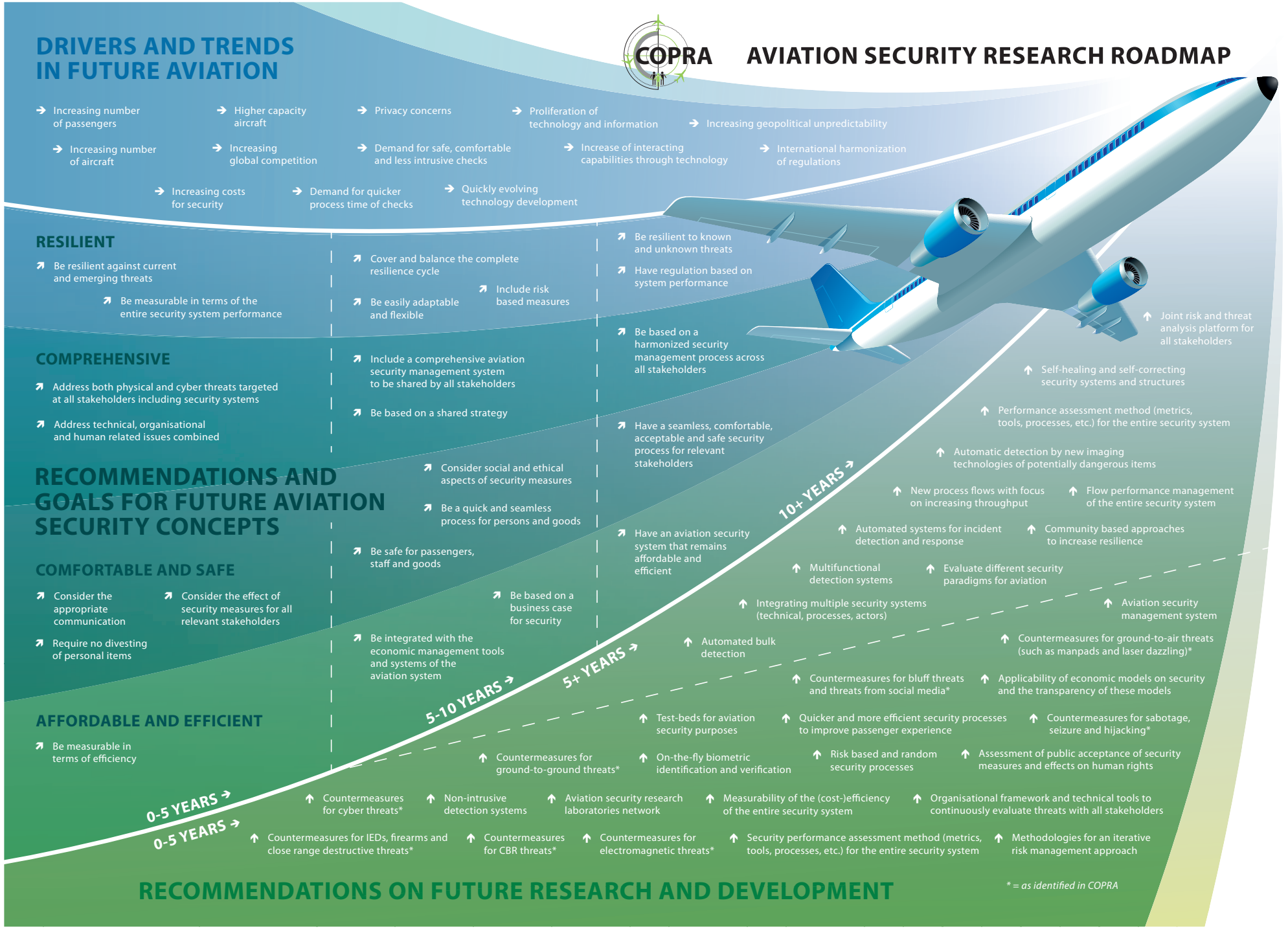

Fig 2. COPRA Aviation Security Research Roadmap