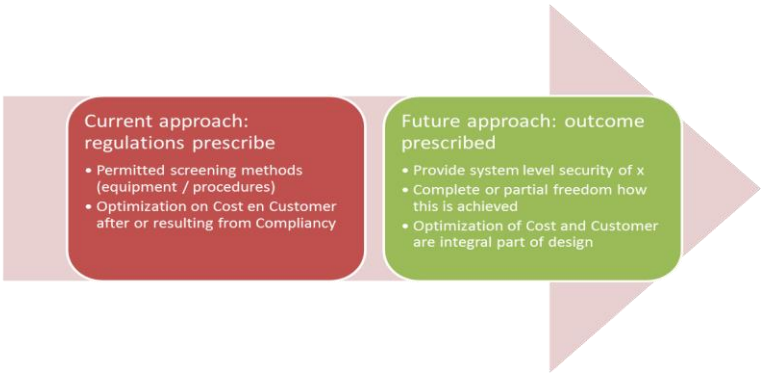
Publishable summary

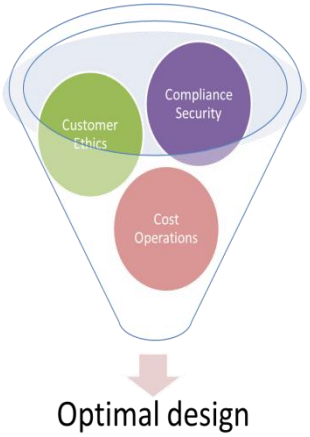
Description of the project context and objectives

Numerous measures and new regulations in civil aviation security have been introduced after terrorist attacks in the last 25 years at member states scale and, since 9/11, at EU scale. But can the current system with its ever increasing number and complexity of security regulations be sustained much longer? Concerns have been raised that the current regime inhibits technological innovation and the ability to adapt and respond to changes in threat perception.

The current EU regulatory framework (EC300/2008, EC185) focuses mainly on the types of equipment that are allowed to be used and their detection performance as components in isolation, rather than defining the required security performance of the overall checkpoint system. Because test and evaluation methods developed to date only aim at comparing performance against requirements on this 'component' level, it is unclear what overall security performance current checkpoints actually deliver. The sector needs a **paradigm shift** to address performance at the system level, and from separate consideration of security and operational impact, to a holistic approach from the design phase onwards, adequately supported by system level evaluation methods.



The aim of the XP-DITE (Accelerated Checkpoint Design Integration Test and Evaluation) project is to develop, demonstrate and validate a comprehensive, passenger-centred, system-level approach to the design and evaluation of airport security checkpoints. This will allow airports, checkpoint designers and regulators to incorporate a wide range of requirements and to evaluate checkpoint performance against system-level security, cost, throughput, passenger satisfaction and ethical factors. This will help ensure robust and controllable security performance, whilst providing freedom for airport operators to design checkpoints with innovative technologies and procedures.



Whereas XP-DITE is not building the ultimate checkpoint of the future, the project is building the tools that might enable it. XP-DITE will develop a suite of design tools and evaluation methods to implement the XP-DITE approach, which will be validated through trials at two European airports: Schiphol Airport, The Netherlands, and Shannon Airport, Ireland. Throughout the project, the XP-DITE team will work closely with airport operators, regulators and other stakeholders, both to gather requirements and to disseminate the results of the work so that the European and international security community can benefit from it.

Work performed and main results of the second period

Design

Two major outputs of XP-DITE are the airport checkpoint design process (ADP) and the airport checkpoint design tool (ADT).

The guide for the design process (ADP) has two parts: WHAT needs to be done when designing a checkpoint and HOW should it be done and which methods should be used. The first part is delivered early in period 2, and the second has been under review at the end of period 2. The latter part is continuously updated based on the activities in designing the proof-of-concept designs that XP-DITE has been made.

The development of the design tool (ADT) has been started in period 2 with setting the requirements. Based on these requirements a software design of the ADT has been released. This software design formed the basis of the first version of the ADT. The first version has all basic functionality needed to design an airport checkpoint, including a repository with characteristics of relevant components and concepts, and a connection to the Shared Evaluation Platform (SEP) for the performance calculation.

Performance calculation

Another major output of XP-DITE is the Shared Evaluation Platform that determines the performance of a design on system level in the performance areas Customer, Cost, and Security & Compliance.

The aim is to predict the performance of ACPs on system level by model calculations based on component performance. To this end the component repository (database which is part of the ADT) holds characteristics in the three performance areas (Customer, Cost, and Security & Compliance) of all components to be used in ACPs, including detection equipment. The repository includes commercially available equipment (approved through ECAC CEP), as well as detector prototypes developed in XP-DITE (the performance of which was assessed through testing within the project), and other components rated (the performance of which was evaluated through subject matter experts sessions).

All performance indicators in the three performance areas have been prioritized. Those which can be calculated analytically or by simulation will be described in D4.3 shortly after the end of the second period. For others a model may have to be developed on the basis of empirical measurements (e.g. questionnaires to passengers), which will be done in the third period.

Proofs-of-concept

The ADT has been used, together with expert knowledge within the consortium, to design two airport checkpoints that will be used to validate the concept of the system level approach in XP-DITE. One airport checkpoint design will focus on using new technologies and new concepts (Schiphol) and will operate off-line and the other airport checkpoint design aims at compliance with current regulations (Shannon) and will operate online. Both designs will be finalized shortly after the end of the second period.

The designs will be used to validate elements of the XP-DITE concept. Evaluation of performance in all performance areas will be empirically assessed at system level, for which a suite of methods in the empirical shared evaluation platform is developed. Some methods and tests in the performance area

Security & Compliance will be executed in dedicated laboratories and all other tests will be done at the actual checkpoint locations on the airport. The planning of all activities, from integration of components into a checkpoint at laboratories and airports to the validation activities, has been done in period 2. A second round of detailed planning will be necessary when the latest status is available with respect to the designs, the availability of the labs, airports and components.

Technology developments

The four threat detection components that are developed within XP-DITE (multiview X-ray component, vapour detection component, particle detection component, stand-off passive mm-wave person anomaly detection component) have been further developed in period 2. This entailed final optimizations and adaptions of the components to get them ready for performance assessment, the integration in the trial checkpoints, the system level testing and the proof-of-concept exercises at the airports. Also the vapour detection and particle detection components were integrated into one transport belt cabinet that must be connected to the output of a (commercial) X-ray screening component.

Ethics

The research ethical work consisted in the development of a project baseline for informed consent. This baseline was applied to all research activities in the period that involved volunteers.

During the second period the applicability and compatibility of the ethical evaluation and design framework was ensured in different contexts. In particular input was needed for the component repository, the design activities regarding the proof-of-concept checkpoints and for the implementation in the computational part of the Shared Evaluation Platform. The questionnaires that will be used as part of the empirical part of the Shared Evaluation Platform were amended to include those aspects defined in the ethical evaluation framework. Furthermore, a concept for validation for the ethical framework was developed.

The second periodic ethical report is drafted which is currently reviewed by the Ethical Advisory Board.

Dissemination

The second annual XP-DITE stakeholder meeting took place on March 12, 2015 in Paris, alongside the Passenger Terminal Expo exhibition and conference. The latest plans and results from the project were discussed with the EU project officer and a broad range of stakeholders. Several stakeholders also presented relevant initiatives in their organisations.

In the second period, there have been a total of eight conference presentations and posters from XP-DITE. In addition to public dissemination at conferences, much of the focus of XP-DITE dissemination has been through focused interaction with stakeholder groups such as the regulatory community and airport operators. At least six formal meeting and presentations have been held.

The development of a set of XP-DITE white papers was initiated in order to strengthen a shared vision on a number of important overarching topics. The white papers will be used to show thought leadership in the aviation security world and to describe the key concepts of the needed paradigm shift. The following white papers are (almost) finalized: System level security, Consistency in detection performance, Modelling the

threat to an airport checkpoint (Modus Operandi), Airport checkpoint concepts, High level validation strategy, Airport checkpoint flexibility, and IP and confidentiality of XP-DITE results.

Expected final results, impact and use

Final results

There is a growing understanding among European and national regulators, operators and industry that a change in the approach to aviation security checkpoints is required. The Airport Checkpoints (ACPs) in the future should deliver sufficient but more flexible security, and further minimize negative effects including cost and hassle, so as to ensure a more positive passenger experience at the same time. To achieve this we deliver an approach at ACP system level, support more quantifiable design of ACPs which enables explicit balancing of requirements, and support regulatory and operational control of overall performance.

It is the ambition of XP-DITE to pave the way for the design and operation of such future passenger-centred airport checkpoints by delivering:

1. A comprehensive set of system-level requirements and metrics for security, operation and aspects related to perception.
2. An ethical framework in view of human rights issues associated with some security technologies and procedures with appropriate attention for 'privacy by design'.
3. A design tool for integrated airport checkpoints.
4. A Shared Evaluation Platform (SEP) for testing and evaluating of integrated ACPs and its subsystems on all performance aspects.
5. Two proof-of-concept integrated ACPs at Schiphol and Shannon airport.
6. Recommendations for integrated-level security regulations and recommendations for using results in other security checkpoints (e.g. mass transportation).

Use

In the first instance, the project results will be exploited by regulators, airports and other stakeholders who will have the opportunity to assess the effectiveness of the XP-DITE approach. This has a significant value in itself. On the longer term it is the intention that the design process developed within the project will be mainly used by airport security infrastructure designers. The evaluation tools developed within the project are foreseen to be used mainly by regulatory bodies and auditors. Layered access rights ensure compliant handing of classified data. The innovative security system components developed during the project are all expected to be sufficiently mature by the end of the project that they can be built into the project proof of concept checkpoints and subsequently further developed and exploited as commercial products if viable, either by the partners which developed them, or by licensing to other security system manufacturers.
The next step after XP-DITE could include enriching the design repository with reliably assessed data from operational checkpoints, producing actual checkpoint designs and updates, tuning of methods and extending the reach of the products developed.

Impact

XP-DITE results are intended to have positive impact on stakeholders in the regulatory community, aviation security related industry, and the air traveling public.

For the **airport security provider, operator and checkpoint designer**, XP-DITE will provide a set of tools that will enable aviation security checkpoints to be designed and evaluated, both on paper and in the field, with all aspects of performance addressed. As such the XP-DITE tools should stimulate the use of innovative procedures and new technologies in checkpoints, and allow airports to optimise checkpoint designs to the individual needs of their business.

The XP-DITE tools will allow **regulators** to carry out 'what if' experiments to explore the impact of potential changes to regulations such as EC185 on whole checkpoint performance, and to value the implications of new approaches and technologies developed by industry. The tools should also allow designing regulatory context of checkpoints which enables easier and quicker response new and changing threats. Finally XP-DITE will provide reliable methods to assess security performance of whole checkpoints, rather than just detection equipment, in order to build a conformity scheme based on actual levels of security.

XP-DITE results will facilitate the introduction of new technologies and innovative products for **aviation security equipment manufacturers** and provide incentives for even higher levels of performance, by providing insights on the relation between characteristics of products and the overall performance of the checkpoint, in all performance areas.

XP-DITE should result in higher satisfaction of the air **travelling public** with the security process through fewer delays and improved convenience at the airport, whilst at least ensuring compliant security levels during their flights.

Website
www.xp-dite.eu

Partners

TNO – Netherlands Organisation for Applied Scientific Research
(Coordinator)
The Netherlands

Alfa Imaging
Spain
Alfa Imaging has been a partner until October 2015

Cascade Technologies
United Kingdom

Center for Adaptive Security Research and Applications (CASRA)
Switzerland
CASRA is a partner since July 2014

FOI – Swedish Defence Research Agency
Sweden

Iconal Technology
United Kingdom

ID Partners
France

Fraunhofer Gesellschaft
Germany

ISDEFE – Ingeniera de Sistemas para la Defensa de Espana
Spain
Isdefe has been a partner until February 2014

The Manchester Airport Group
United Kingdom
Manchester Airport Group has been a partner until April 2014

Morpho
France

Amsterdam Airport Schiphol
The Netherlands

Shannon Airport Authority Ltd
Ireland
Shannon Airport is a partner since April 2015

Smiths Detection
Germany

University of Freiburg
Germany