XP-DITE : Outcome-focused, system-level approaches for checkpoints

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MIKE
16 miles 62 today
Happy Birthday!
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XP-DITE: Accelerated Checkpoint Design Integration Test and Evaluation

EU FP7 Security Research Project
2012 - 2017
Total Cost: 14.6M Euro

Overview

- Topic Area:
  - **Aviation security checkpoints**
- Problem addressed:

  Checkpoints are inflexible, one size fits all

  Dont always work as well as they could
- How solved:
  - **Certify systems not components**
  - **Design for system level security**
  - **Checkpoint design and evaluation tools**
- So what:
  - **Provides outcome-focused, result-oriented regulation**
  - **More consistent security performance**
  - **Flexibility for airports**

The problem

Regulatory framework focuses on types of equipment allowed to be used and their detection performance as components in isolation

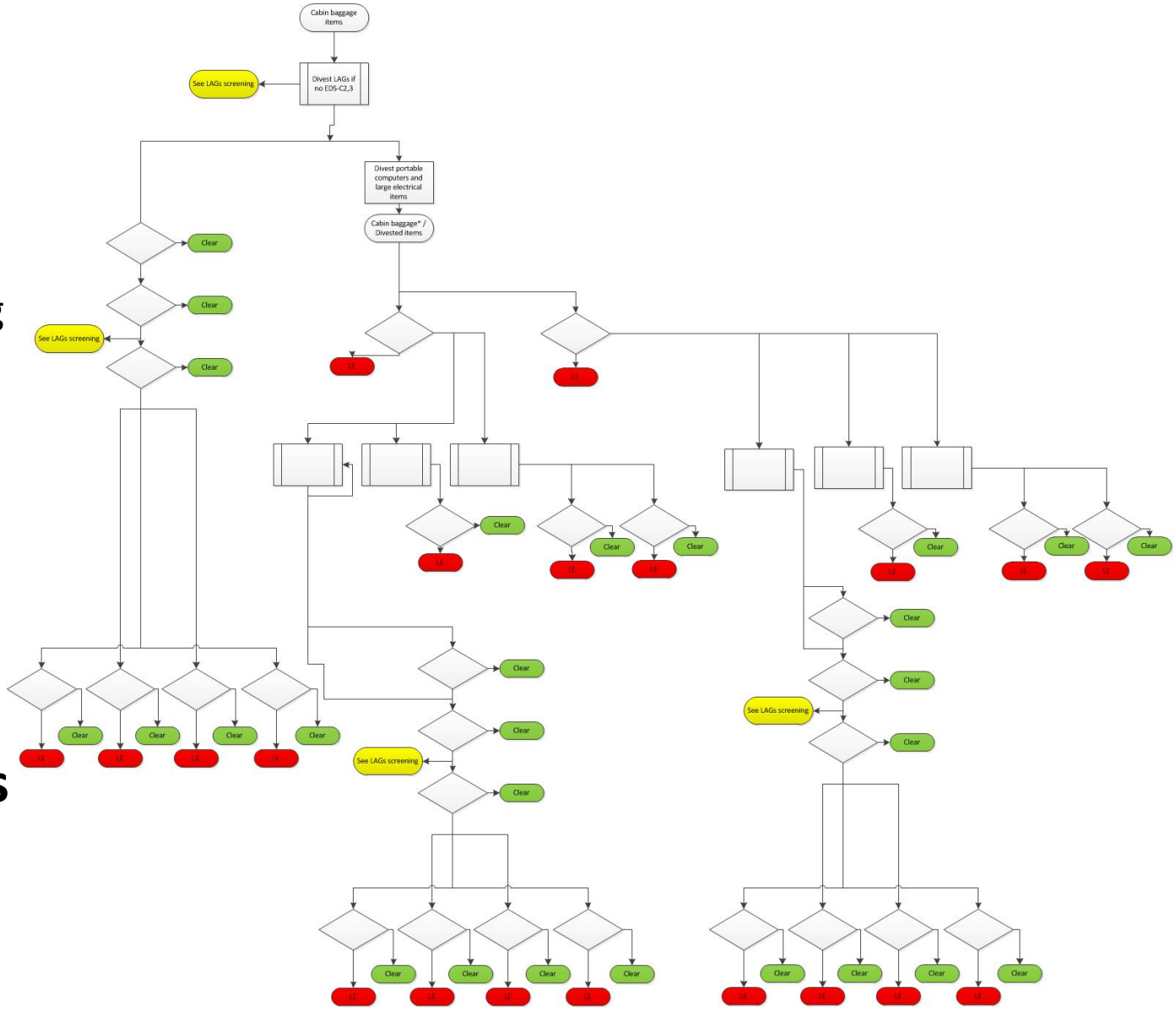
Complex rules define checkpoint processes

Consequences:

- Overall security performance of the system is not really known
- Lack of flexibility. Hard for airports to adapt checkpoints to meet their individual needs
- Technology innovation is inhibited

Current regulations – prescriptive and complex

- **Cabin Bag Screening Example**
  - Branches show options
  - Paths show screening process leading to clear/not clear
- **Further flowcharts for**
  - **LAGS**
  - **People**
  - **Non-passengers**



Outcome-focused regulation

- Current Approach
  - Design largely prescribed
    - Permitted screening methods
      - Equipment types e.g. WTMD (approved equipment e.g Manufacturer xx, version y) *EC300, EC185, approved lists*
      - Procedures (e.g. divesting, alarm resolution…) *EC185, EC Decisions, More Stringent Measures in individual Member States*
- Outcome-focused (system-level, performance based….)
  - Outcome prescribed
    - Provide security level = x
    - Complete, or partial, freedom how this is achieved

XP-DITE enables this paradigm shift

Move from equipment based regulations to

- **Outcome-focused**
- **Performance-based**

Regulation

enabling

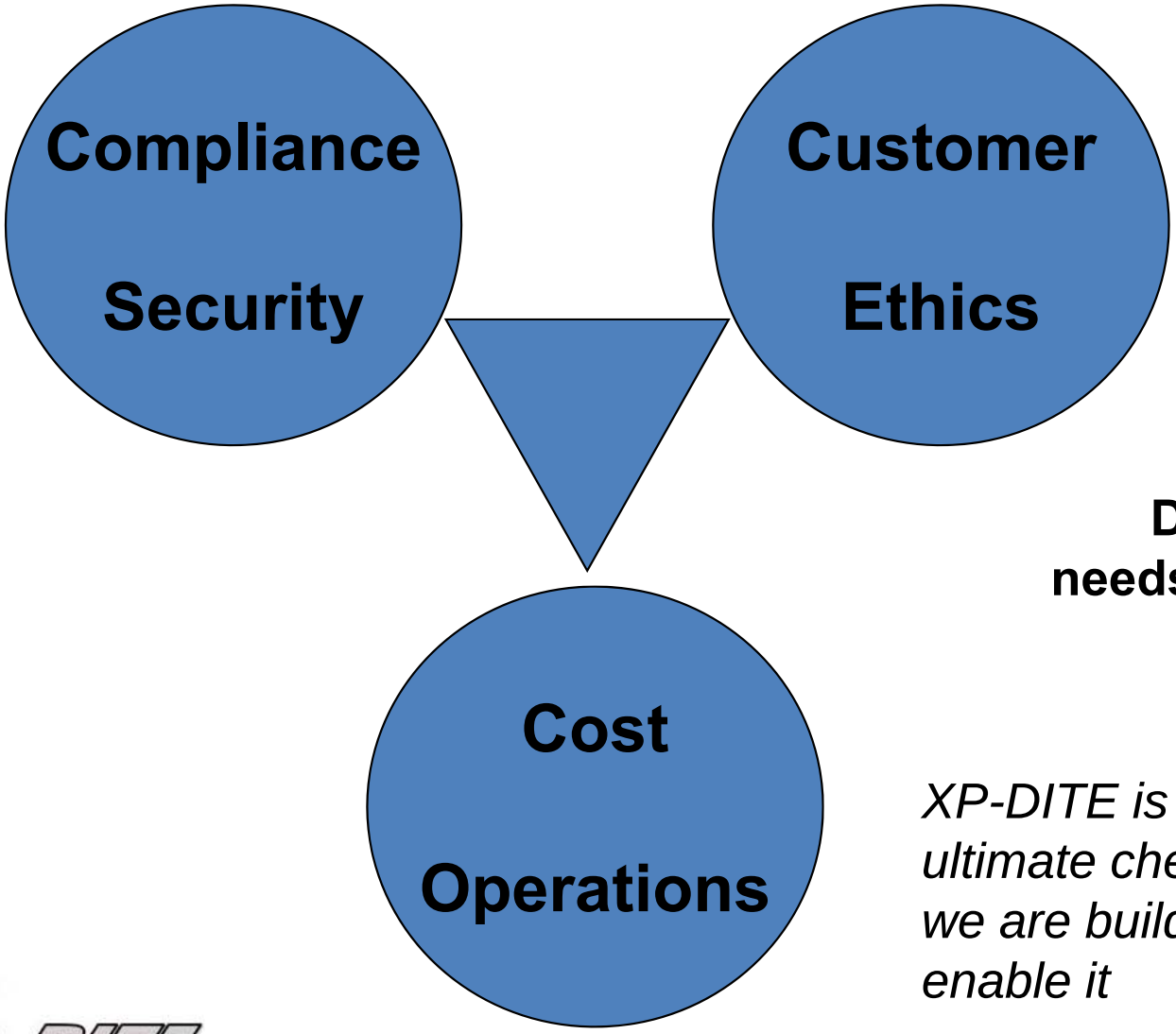
- **Risk-based**
- **Proportionate**

} **Security**

- **Flexibility for airports**
- **Technology innovation**
- **Happier passengers**

Performance Areas

Security is only one Performance Area



Design and Evaluation needs to balance requirements in all three areas

XP-DITE is not building the ultimate checkpoint of the future – we are building the tools that might enable it

What is system level security?

- Overall probability of detecting a threat : Pd=x
- But……..

What is system level security?

- Overall probability of detecting a threat : Pd=x
- But……..What threat?
  - **Pd averaged over all types of threat?**
    - Guns – large, medium, small, disguised, dismantled, plastic….
    - Knives – large, medium, small
    - Explosives – military, commercial, HME, solid, liquid, powder…
      - » Devices (explosive + detonator + power source…)
  - **Weighted by likelihood of occurrence?**
  - **Weighted according to impact of each threat?**
  - **Pd of all threat sizes or Pd set of minimum threshold threat types & masses?**
  - **Average Pd *or* threshold minimum Pd on each threat type (avoid ‘holes’)?**

What is system level security?

- Overall probability of detecting a threat : Pd=x
- No single answer to what the threat is – regulators and others must decide
- XP-DITE has developed a flexible approach – and has made some specific choices in the tools to be validated in the proof-of-concept checkpoints

MO approach (Modus Operandi)

Modus Operandi (MO) Approach

Break the threat down into individual components:

MO = **Threat object (gun, knife, explosive A….)**
+ Vector (bag, person….)
+ Concealment (location, clothing, bag type….)

$$P_d = \sum w_i P_d (MO_i)$$

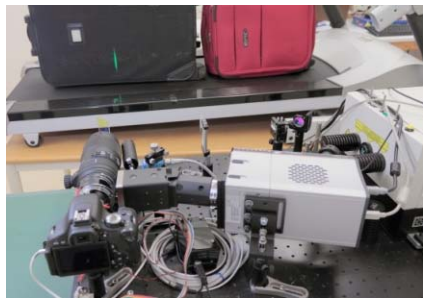
$$\{MO_i , w_i\}$$

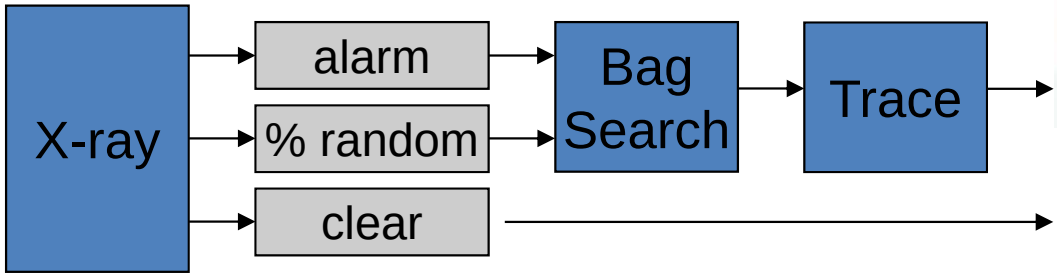
chosen by regulator

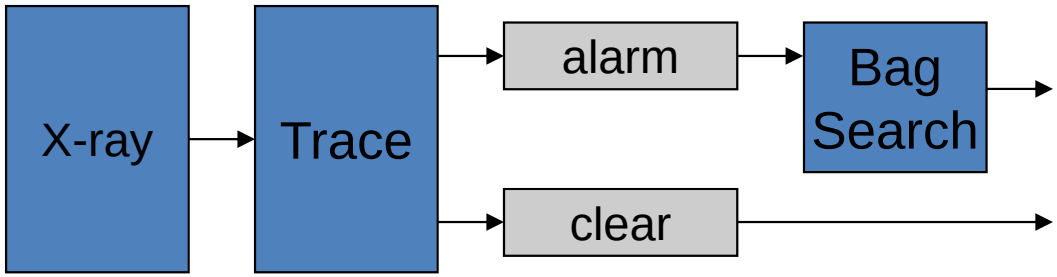
based on threat

Example XP-DITE concept

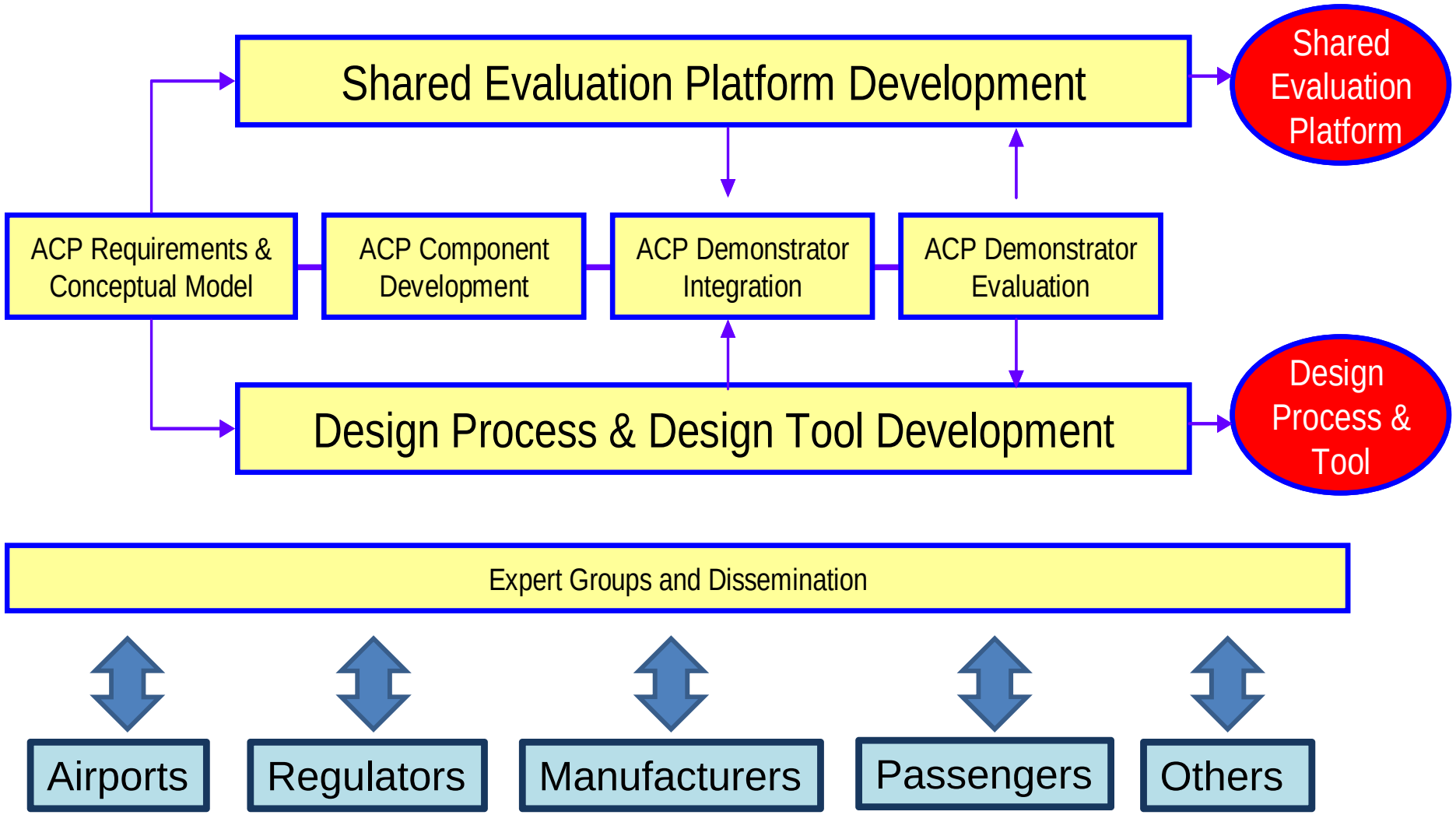
- Replace X-ray + random manual search + random manual trace
- By X-ray + automatic vapour & particle trace on every bag



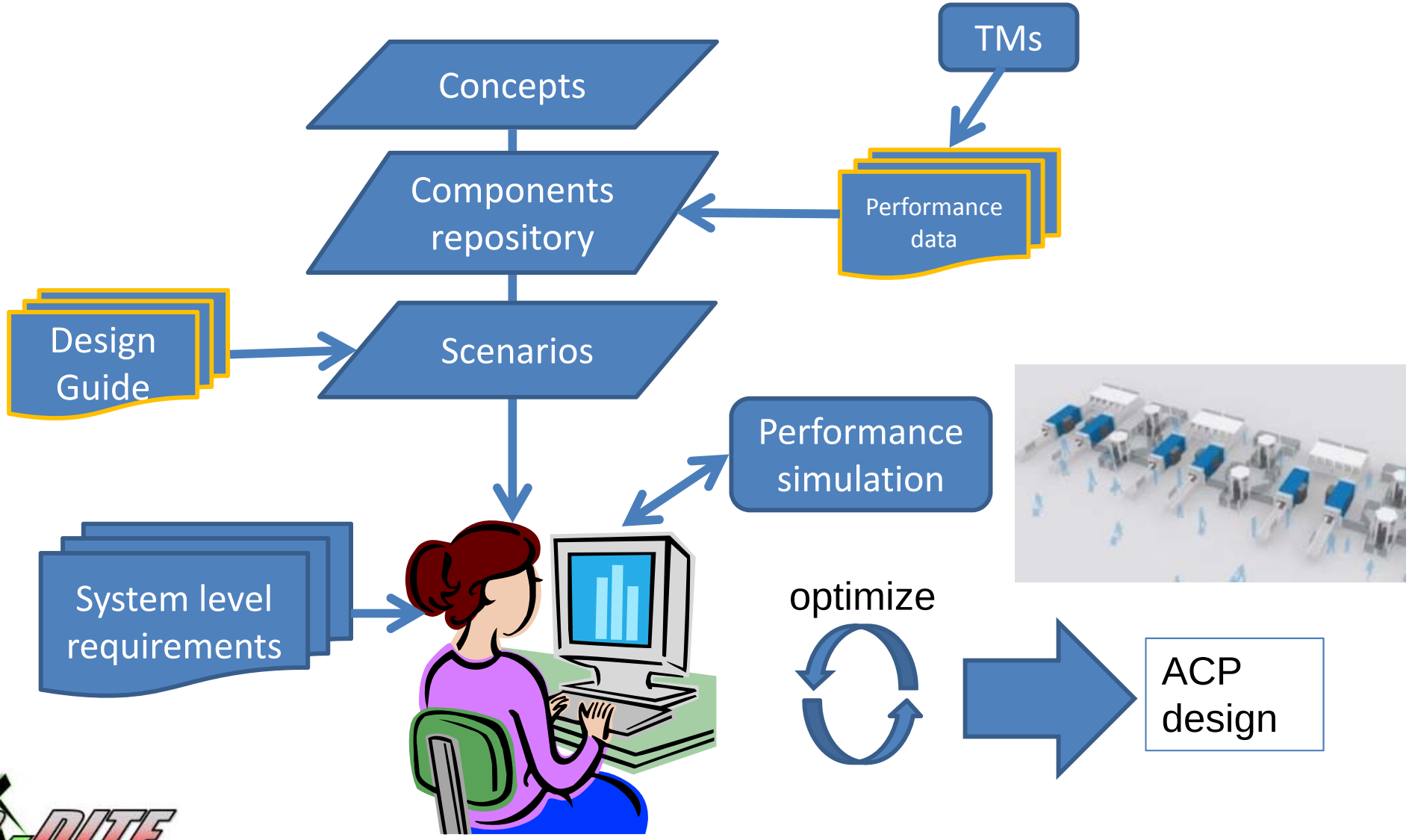




XP-DITE Project structure

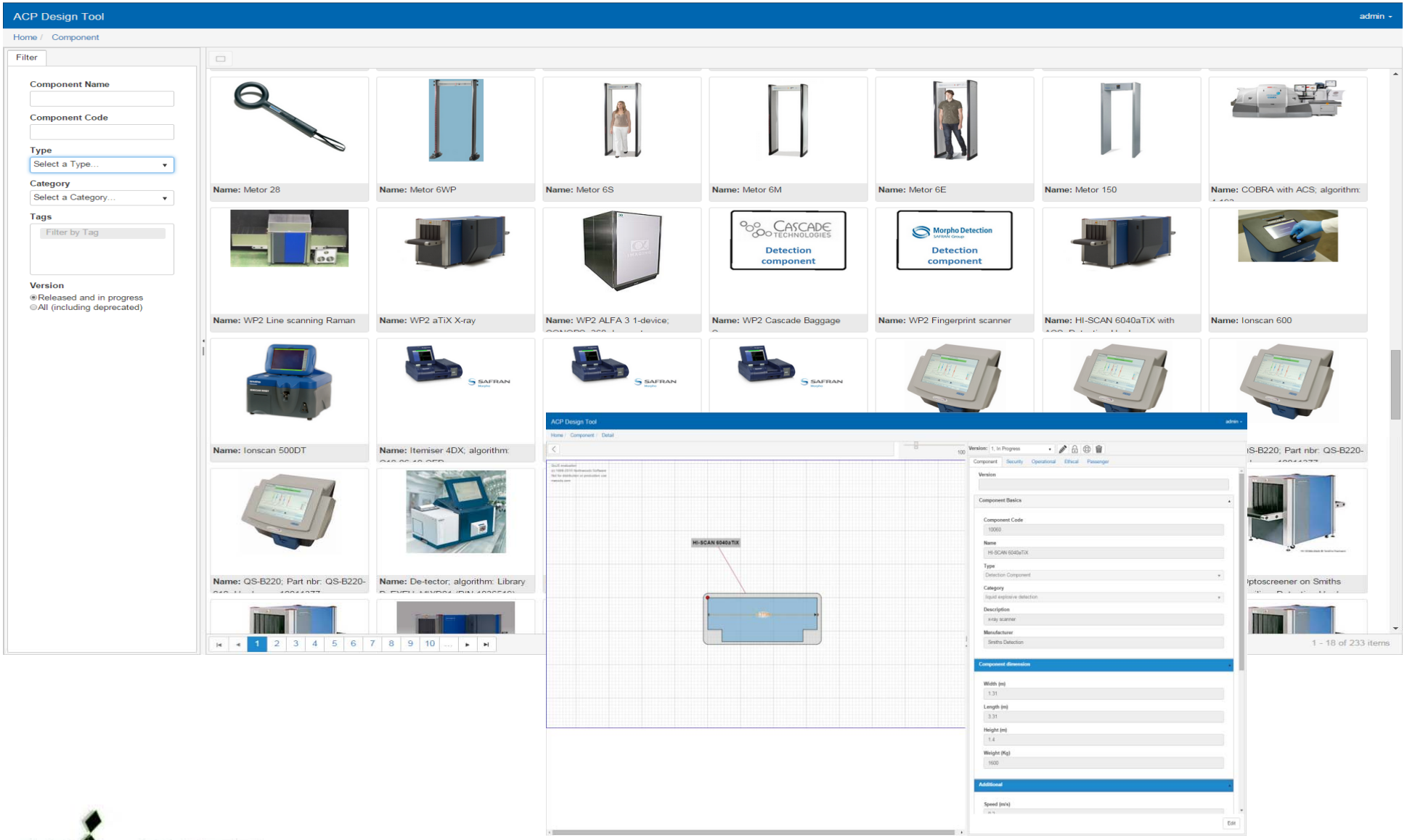


Design tool


TMs
Concepts
Components repository
Performance data
Design Guide
Scenarios
Performance simulation
System level requirements
optimize
ACP design

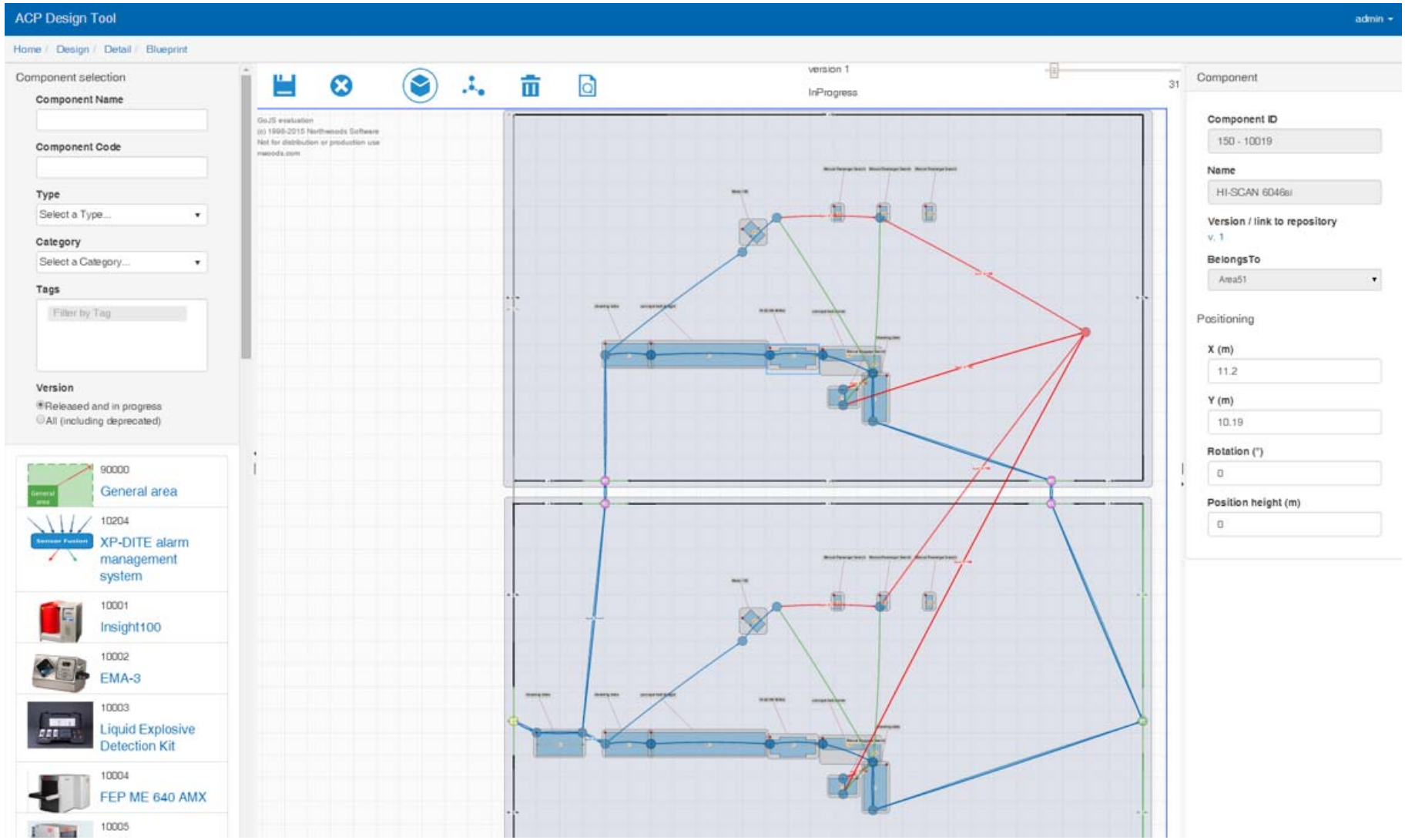
Design tool – Repository

Design tool – Repository



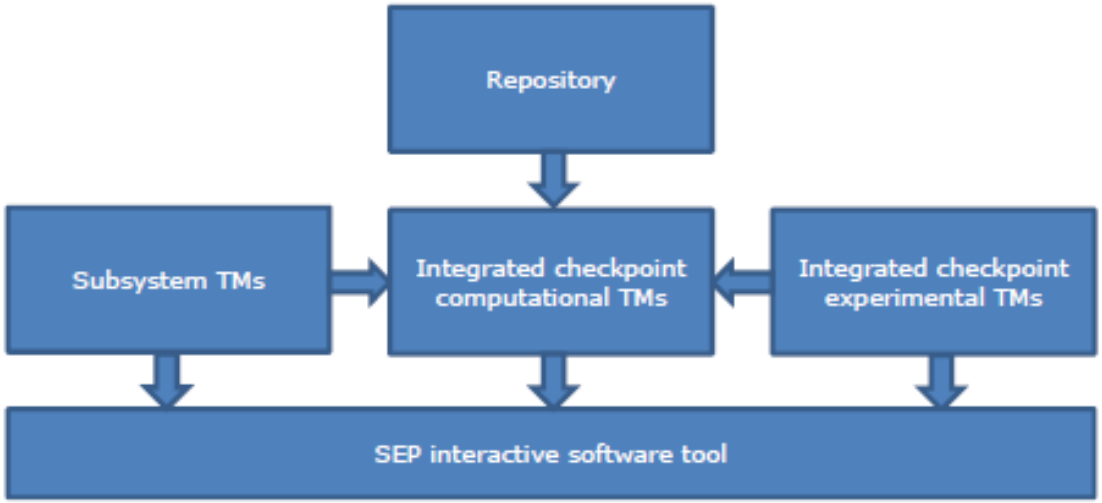
Note:equipment makes and models shown are purely illustrative

Design tool – User Interface

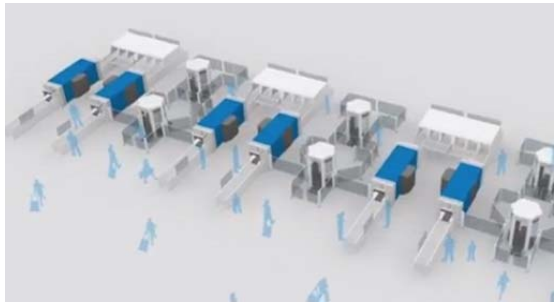


Shared evaluation platform

- Calculates system performance from component data
- Performance Indicators
  - Security & Compliance
    - Detection performance (MO based)
    - Unpredictability
  - Customer Service
    - Perceived waiting time
    - Peak waiting time
    - Divesting/revesting hassle
    - Privacy
  - Operations
    - Throughput
    - Staff numbers
    - Floor space
    - Cost
- Test methods for components
- Empirical checkpoint evaluation methods



Field testing and evaluation

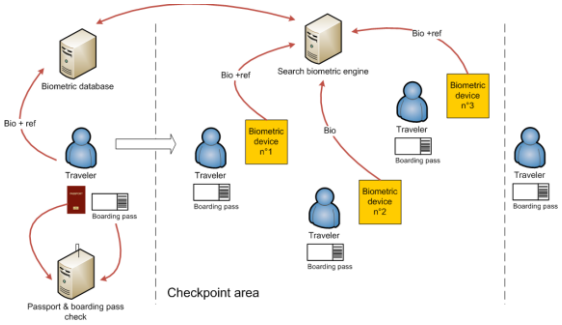


- Validation of system-level concept
- Validation of XP-DITE tools

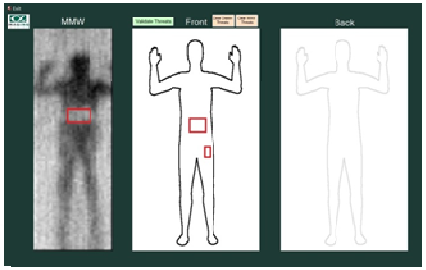
- Paper designs & evaluations
- Proof-of-principle checkpoints
  - Field trial in Shannon Airport
    - US Pre Clearance
  - Technology Demonstrator evaluated in test-bed and at equipment test labs (TNO, ICT)

Innovative component development

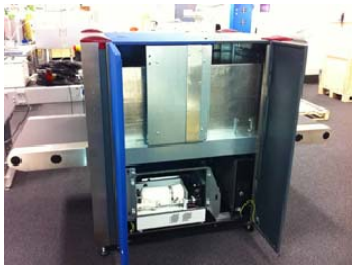
Biometric local tracking

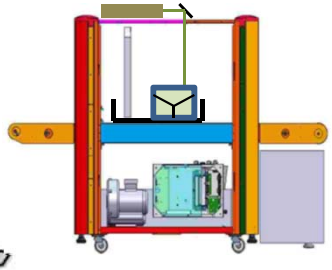


Stand-off passive mm-wave passenger screening

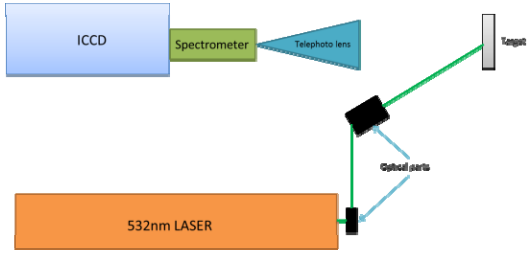


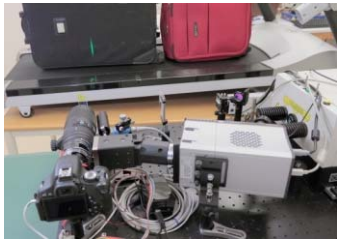
Vapour detection by QCL IR spectroscopy



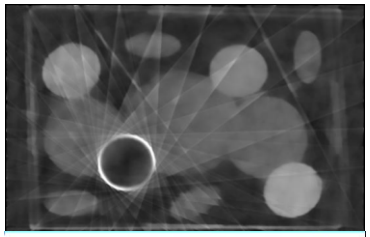


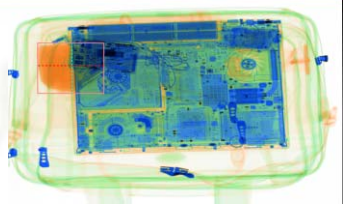
Trace particle detection by Raman spectroscopic imaging





X-ray scanning hand luggage multiple capabilities

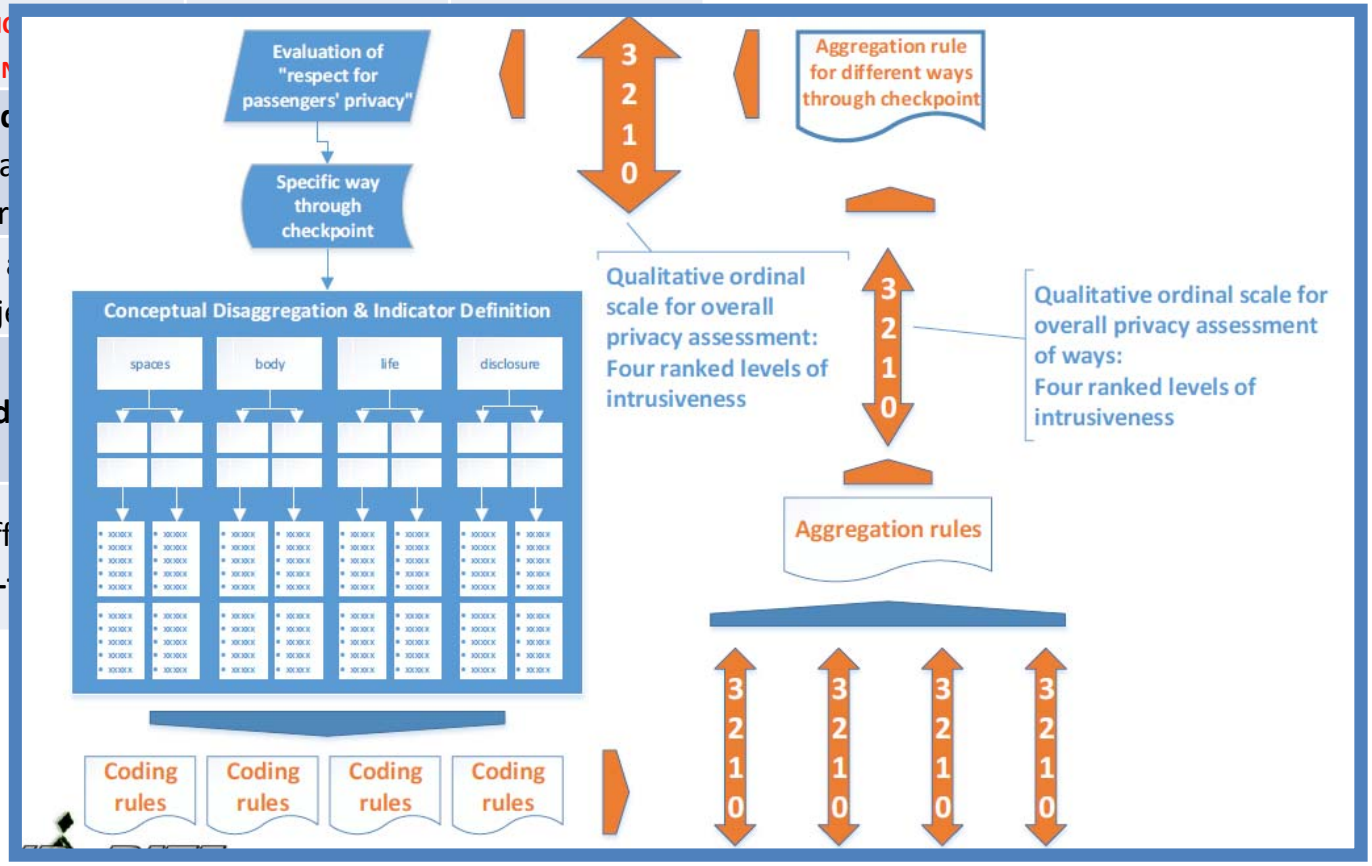




Ethical evaluation

Guiding principle	Respect for individual dignity and integrity in ACP screening processes			
Focus	Individual		Society	
Aspect	INTRUSIVENESS PRIVACY	ERROR/DISCRIMINATION DIVERSI…	RESTRICTIVENESS ACCEPTABILITY	CHILLING EFFECT ACCEPTANCE
Ethical risks as system-level attributes	Intrusion into **spatial privacy**	**limited** sta… scr…		
	Intrusion into **bodily privacy**	**false** … rej…		
	Intrusion into **private life**	**false d…**		
	Disclosure of Information to others	aff… **non-**…		

Identification of ethical, legal and societal aspects (ELSA)



XP-DITE Outcomes

- **Airport operators and checkpoint designers**
  - Checkpoint design and evaluation tools - on paper and in the field
  - Enable use of innovative procedures and technologies
  - Optimise checkpoints to individual business needs
  - Provide evidence to regulators of security level achieved
- **Regulators**
  - Explore system-level approaches to security performance evaluation
  - Carry out 'what-if' experiments on potential new regulations and impact of new technologies
  - Enable checkpoints that can be more easily adapted to new threats
- **Equipment Manufacturers**
  - Facilitate introduction of new technologies
- **Passengers**
  - Fewer delays & improved convenience whilst ensuring they are kept safe

Thank You

www.xp-dite.eu

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