Project: **Multi-View and 3D CT for ACBS* and HBS****
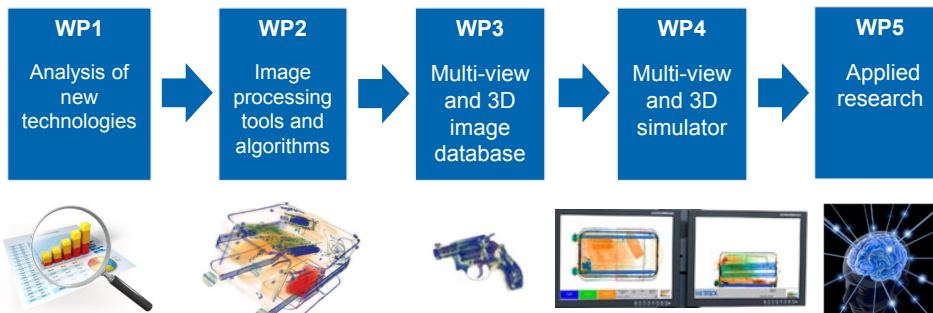
*ACBS : advanced cabin baggage screening
**HBS : hold baggage screening

Empa

CASRA

Introduction

This project constitutes one of the 5 work packages (WP) whose global goal is to increase the effectiveness of airport cabin and hold baggage screening in the suppression of illicit objects in Swiss aviation. The development of existing structures and processes at security checkpoints with X-ray equipment is scoped, in the light of the technological change towards multi-view and 3D CT technology. Additionally, analysis and scientific studies evaluating the human-machine interaction and demands on human factors are carried out. It is a 4 year collaborative project between Empa and CASRA, initiated in 2015 and funded by the Federal Office of Civil Aviation.

WP1 Analysis of new technologies	**WP2** Image processing tools and algorithms	**WP3** Multi-view and 3D image database	**WP4** Multi-view and 3D simulator	**WP5** Applied research

Aims

- Create a database of 3D models of threat items and baggage
- Simulate multi-view and 3D scanners baggage scanners
- Images used for screener training and to perform scientific studies

Methodology

- Recording of at least 100 threat objects and 20 suitcases in 3D
- Material assignment methods to create realistic 3D models
- Projector running on GPU that can merge an arbitrary number of objects
- 3D reconstruction to create merged 3D image data
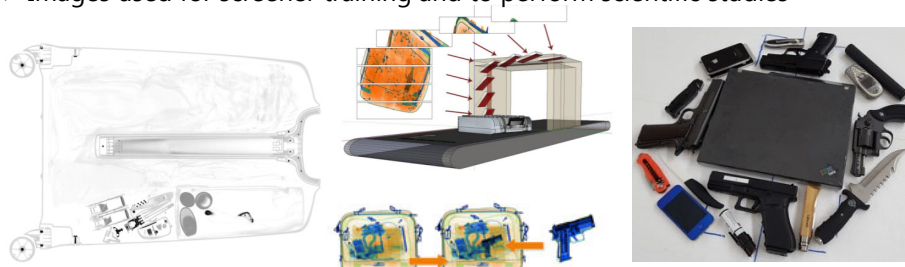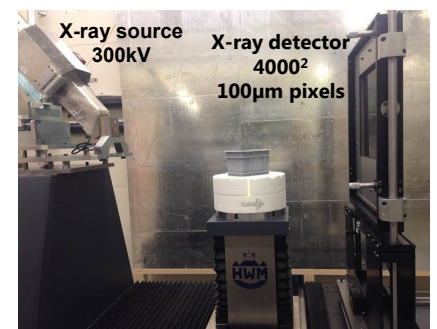

System 1: HECT

Used to scan large items and empty suitcases

- 2D fan beam high-energy linear accelerator (4-6MeV)
- Line detector (slow ~ 5 h/bag)
- Detector pixel size = 0.4mm
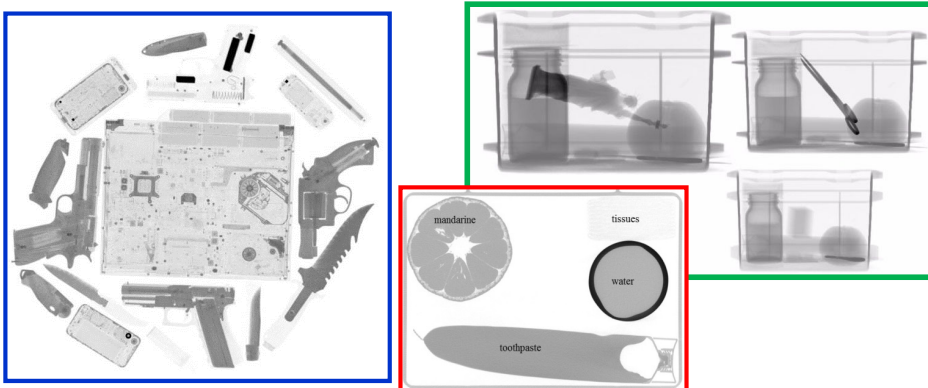- Max object diameter = 80cm

System 2: µDETECT

Used to scan licit and illicit baggage contents items

- 3D cone beam up to 300kV
- High resolution (10µm)
- Max object diameter = 30cm
- Max object weight = 50kg

X-ray source 300kV

X-ray detector 4000^2 100µm pixels

Outlook

- Improve material assignments with dual-energy CTs
- Establish contacts to other device manufacturers and airports for continuous expansion of the image database
- Future international aviation standards are expected to require 3D CT baggage screening

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