Australian
BORDER FORCE

Operational Challenges with Automated Threat Detection - Australian Perspective

Ash Bell, Assistant Secretary, Customs and Border Modernisation
ashley.bell@abf.gov.au
Boston, July 2023

Australian context

- The ABF is leading a **Trade Modernisation** program under a whole of Australian Government **Simplified Trade System** agenda to strengthen our strategic national asset – the Australian border.
- Automated threat detection in cargo is a key part of our trade modernisation agenda.

Australia's challenge: Where do we invest our efforts to realise our vision?

Vision: Streamlined, accurate, secure and scalable cargo inspection at the border

Problem: Where do we invest our automated threat detection development efforts? 2D, 3D? Container x-ray, cabinet x-ray, pallet x-ray? Vendor specific, vendor agnostic?

Methods: Who do we collaborate with? Vendors, non-vendor AI specialists, academia? Do we develop in-house capability?

How have we sought to answer this challenge?

Through:

- research and international experience
- exploratory work including proofs of technology
- working with others including our biosecurity agency and international partners

What did our research and international experience tell us?

Advice from Australia's science and technology agency indicated:

- Likely 2D high energy x-ray imaging will remain dominant for sea cargo
- Likely 3D / Computed Tomography (CT) x-ray could meet the future operational needs of both customs and biosecurity agencies
- Likely CT will be available for ULD size air cargo within 5 years
- AI offers the **greatest potential** for 3D images as provided in x-ray CT scanning.
- A significant ongoing **dedicated effort** will be required to develop automated threat detection over an expected 7 – 10 year timeframe.

What did we learn from our exploratory work?

- The results from the completed ATD proofs of concept show promise, however, the ABF is still at a very early stage in understanding and exploring the technology.
- Working with vendors and close co-operation with international counterparts will be required.
- Further trials and evaluations are needed to inform the ABF's decision on the best technology approach.

What did we learn from our 2D – 3D comparative exercise?

The comparative exercise involved the use of 60 test parcels and 12 x-ray analysts of varying experience to test effectiveness of 2D and 3D x-ray to detect border threats. Algorithms were not used.

Preliminary findings:

- False positive rate was the same for 2D and 3D
- accuracy differed based on size of package:
  - 2D better for small and medium packages
  - 3D better for larger packages
- 3D manipulation tools were more advanced and complex

What did we learn from Australia's biosecurity agency?

Australia's biosecurity agency has made significant progress:

a. **3D algorithm development** with Rapiscan and New Zealand's bio-security agency
b. 3D algorithms completed - **meat, seafood, fruit and vegetables**;
c. 3D algorithms under development - lizards, snakes, ivory, rhino horn, turtle shell and tortoise shell
d. **Trialled 2D X-ray** algorithms partnering with Rapiscan and Smiths to inform future 2D hardware and software strategy

Questions for you!

- What is your advice to the ABF – **where should we invest our resources and effort?**
  - Your advice on **partnering arrangements** – should we seek to have a range of partners depending on the technology?
  - Is the **machine agnostic** approach mature?
  - 2D and 3D – do you agree with Australia's science agency, that **3D has more potential** for automated threat detection? Will 3D be dominant?

Thank you!