



WORLD CUSTOMS ORGANIZATION  
ORGANISATION MONDIALE DES DOUANES



Douane  
Belastingdienst



Port of  
Rotterdam

# Technical Experts Group Unified File Format Development Program

March 14, 2018

Prepared by WCO Technical Experts Group



Rapiscan



Leidos



AS&E



L3



Nuctech



Smiths Detection



# UFF

How can a global standard for scanning / NII be beneficial to Customs and Industry ?

Chris Hogg Joris Groeneveld



## Who are we ?

- A vendor and user partnership formed under the auspices of the WCO as a Technical Working group.
- The Major vendors are Rapiscan AS&E, SMITHS Detection, L3 Communications and Nuctech.
- World Customs Members participating in the Technical Expert Group.
- Co-Chair Mr.Joris Groeneveld Dutch Customs



## What is UFF ?

- NII Unified File Format a common format for transmission of x-ray images and associated data.



- NII Equipment is widely used by customs authorities to inspect cargo for
  - Security and Revenue Protection
    - Weapons, Drugs, Money, Explosives, WMD's
    - Protect and collect revenue on dutiable goods miss declaration, under-declaration.
  - NII Facilitates trade by being **None Intrusive** and **relative quick**
  - Efficient use of NII reduces the barrier to frictionless trade when compared with manual inspections, which cost **time** and risks **damage**



PORTAL



Eagle P60



Sentry Portal



Z Portal for Trucks



Z Portal for Cars



Sentry + Z Portal



CarView

MOBILE



Eagle M25



Eagle M60



ZBV Line

GANTRY



Eagle G60



OmniView Gantry



OmniView ZBx

RAIL



TRAILER



AIR CARGO



HANDHELD





Douane  
Belastingdienst





Competitive tendering and unique functionality means Dutch customs has a wide range of NII equipment.

This brings challenges:

- Each vendor has their own operating method
- Unique Software and dedicated Workstations
- Images stay on the machine
  
- Inefficient use of staff
- Lower Throughput
- Potentially longer clearance times





## What were the initial problem to solve

- View and manipulate the X-ray image from multiple vendors on a common workstation via a high fidelity common format
  - Reduces training
  - Better utilisation of operators
- Dutch customs approach was to add a cross vendor compatibility clause into a competitive tender for NII equipment.
- L3 won ... and asked for all file formats ... the meeting did not go smoothly



## What was the resistance when first asked ?

- First vendor in may have a technical advantage / lock out
- The request for information was not bi-lateral
- Reverse engineering formats is an ethically gray area depending on location.
- Reverse engineering is fragile.
- Transfer of knowledge about key functionality was a perceived risk
- At this time Rapiscan offered to bi-laterally share information via TIFF.



## What Changed ?

- The Vendors started to develop complex integration and aggregation platforms for their own equipment and in doing so started to realise there is merit in integrating third party systems.
- Rapiscan have a number of national scanning systems in Mexico, Puerto Rico and Albania which involve transmission of data across the country to regional inspection centres. Rapiscan and other vendors have done trans-national image transfer.
- The realisation that images needed to get off the machines to web enabled viewers, tablets, the advantages for training.
- The UFF effort was created in 2016 bringing all the vendors formally to the table.



### Puerto Rico Port Authority

- Full turnkey integrated non-intrusive solution
- 5 scanning sites
- All inspection is done on the scanning site
- Single-source solution for cargo screening equipment, staffing, personnel training, and maintenance
- Meets 100% screening mandate with 12x operational efficiency



### Mexico Customs Authority

- Full turnkey integrated non-intrusive solution
- 25 scanning sites
- All image analysis performed remotely on our proprietary nationwide network
- Proprietary training and CertScan operational software
- Site design, build, operations, maintenance, staffing, training, and image analysis all done by S2 Global



### Government of Albania

- Full turnkey integrated non-intrusive solution
- 4 scanning sites
- Multiple checkpoint inspection operation with remote image analysis
- Training and operational software
- Site design, build, operations, maintenance, staffing, training, and image analysis all done by S2 Global



## The Challenges

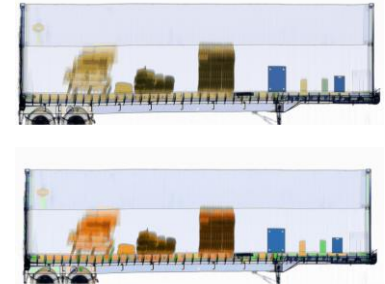
- We are all competitors. -
- This is a self funded effort.
- Any standard is potentially going to generate changes in existing software systems and that has a high cost.
- Risk of Technical bleed over

- We like to solve problems
- We believe it will be a great benefit to our customers +
- We have a high level of technical competency within the group



## Requirements

- No loss of fidelity in the X-ray image
- Preservation of key information such as Material type
- Attachment of LPR, OCR data
- Attachment of Trade data required for evaluation of images
- Record of inspection results and comments
- Compact as possible file size for transmission
- Single file for ease of handling
- Modern Web based API for interconnectivity



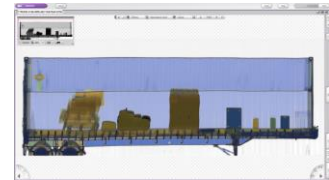
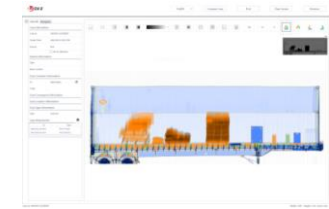
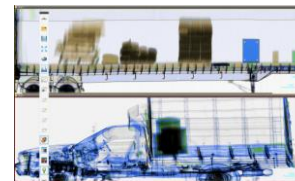


# Driving the Solution

- WCO TEG Meetings to regularly report on Progress
- A series of pilots to apply the acid test to the solution
- Vendor competition

Browse Datasets

1. Select NII Supplier
2. Select a Dataset





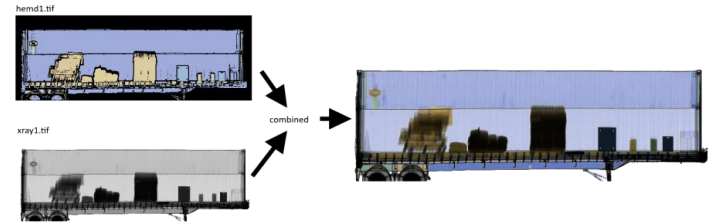
## What are the potential advantages to the AEO members ?

- More efficient utilisation of customs staff and equipment on a single site, within a whole region, or country e.g. east coast / west coast USA.
- Improved training of customs staff by sharing images between locations and countries.
- Possibilities for “scan before shipping” concepts allow containers to be inspected while on the water or in transit on the train networks when scanned at origin ports.
- Possibility for x-ray use in trans-shipment confirmation scanning at one or both borders.
- Possibility for port or AEO members to fund scanning equipment and provide images to customs authorities to reduce clearance times.





- The Near Future
  - To complete and release UFF 2.0
  - Increase the set of supported vendors
  - To release as a formal standard
  - To mandate in tenders
- The Future
  - Support for an open algorithm model allowing for deep learning based threat classification systems to be supported via the format.
  - There may be scope for machines <1MeV Palette scanners which could start to provide functionality into other market areas. Support for AWB is already

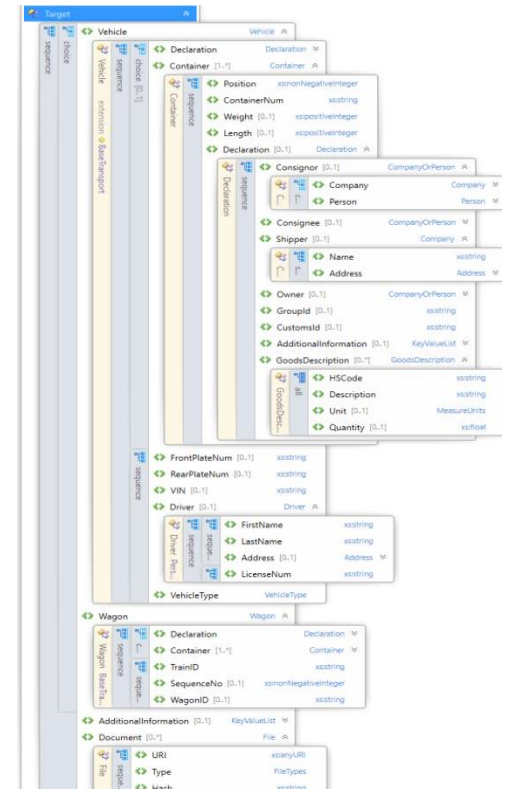




- Technical Comments
- Use of industry standard formats wherever possible - off the shelf not DIY
- Keep data human readable as much as possible
  - Images should be readable where possible in standard packages.
  - Data should be in a well formatted but human readable form – XML.
  - Keep everything as compact as possible, size = slower transfers and more cost
  - The best engineering solutions tend to be self evident however you must respect that you may have to compromise to move forward.
  - A file format is not a mechanism to move data you need a WEB.API as well.
  - You need to take care that any model is scalable from 1 system at 30 per hour to 50 systems at 150 per hour.
  - Start thinking of cyber security as soon as possible.



- Technical Comments
- Trade data is a complex problem to model
  - Everyone wants a field
  - The mapping between an X-ray and a declaration may be
    - 1:1
    - 1:N One declaration many containers
    - N:1 Many declarations to one container (LCL)
  - XML has been chosen to allow
    - Extensibility
    - Transformation to a viewable format XSLT
    - Searchable - XPATH





# QUESTIONS ?