

ATRs with Analog Outputs - Developing and Test

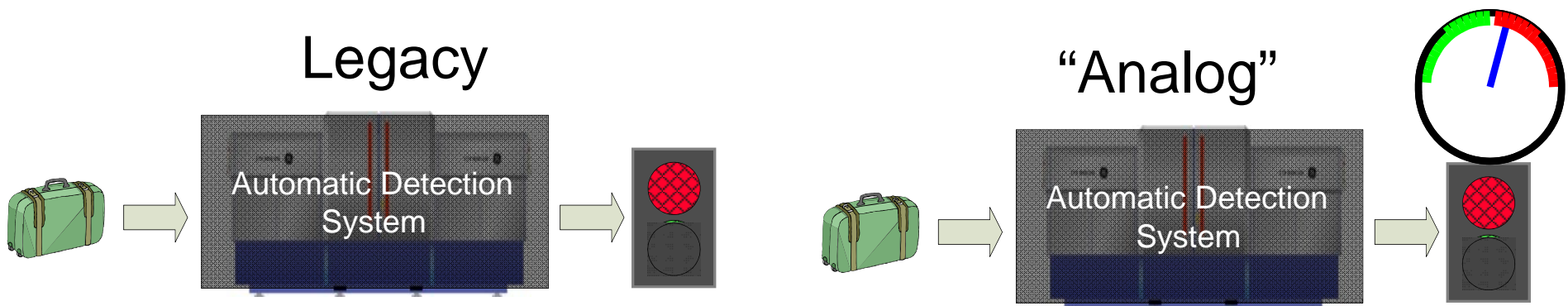
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ADSA13 Workshop

October 29th, 2015

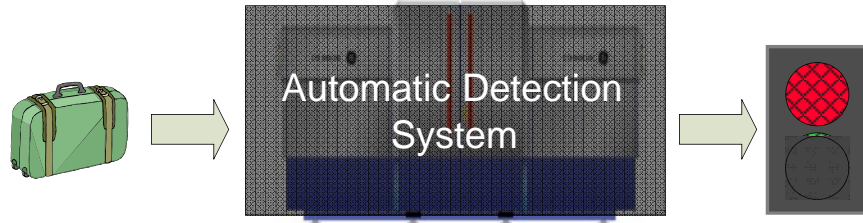
WHAT IS IT? WHY DO I CARE?

- Traditional ATRs: binary alarm/clear decision
- Pre-set, certified operating points
- Limited flexibility for fusing with other systems or within risk-based screening
- “Analog outputs”: something continuous...
- Challenges:
 - specifying requirements of systems that need to be fused,
 - testing, deployment, maintenance

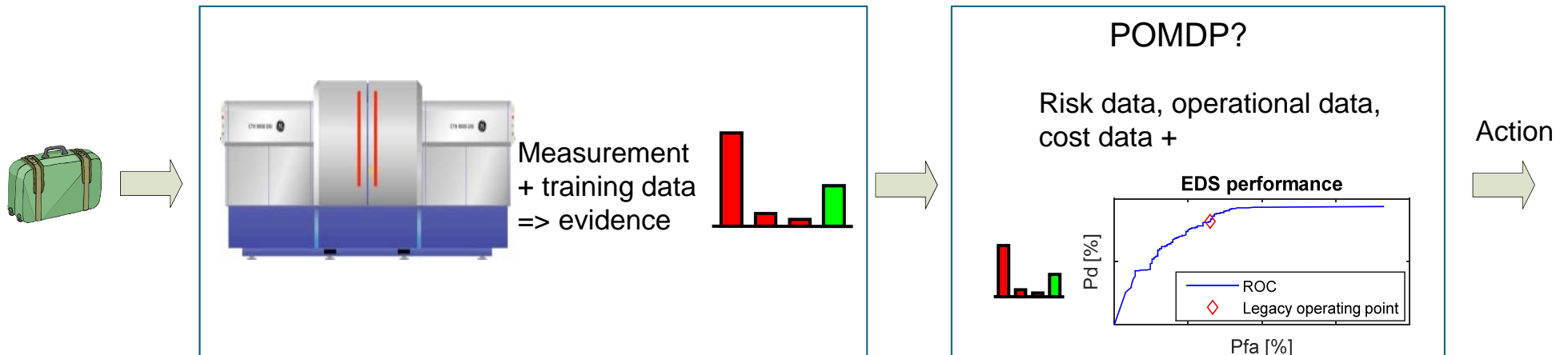


A MORE TRANSPARENT, EVIDENCE-BASED DETECTION SYSTEM

Legacy



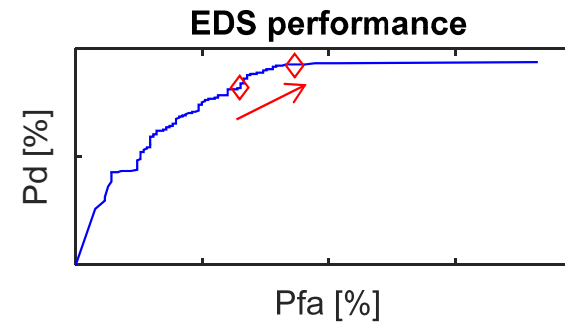
Future?



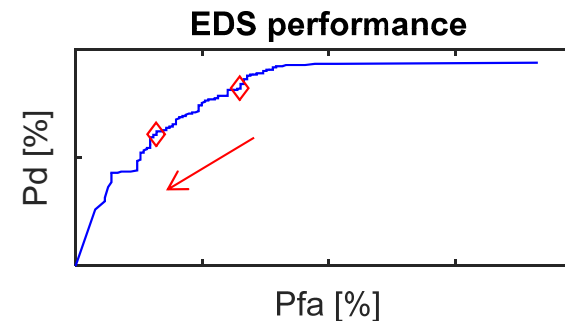
EXAMPLES / SCENARIOS

→ Depending on the prior beliefs (outside of ATR), one could effectively select different operating points on the ATR ROC

Case 1): Passenger is selectee + threat alert level high
-> Move up on the ATR ROC curve



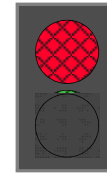
Case 2): Pre-check passenger, threat level moderate
-> Move down the ATR ROC curve



The analog output allows extracting higher performance from an ATR when the context is changing (from information sources outside of ATR)

THE ROC CURVES...

- Seems great.. How do we get our hands on these ROC curves?
- The EDS certification and procurement protocol does not require ROC
 - EDS must issue alarm/clear decision on bags
- So... there are no ROC established for legacy systems (at least not necessarily)
- Can we build these curves? Yes
- Is there more than one way to do so? Yes
- How do we test and verify these? Probably best to make it part of the TSL test process



MAKING AND TESTING ROC

→ ATR developer would have to:

- Provide a single parameter that links to a ROC provided
- Can be done with various approaches, typically involving likelihood functions for each threat material
- Would have to also spend more time optimizing performance in low Pfa or high Pd range (away from legacy operating point)

→ Regulator (TSL):

- During system testing, more emphasis would be placed on characterization
- Scanning the normal threat and false alarm data sets, regulator would collect the “single parameter”, which is the key into the ROC curve
- Regulator can thus:
 - Validate ROC provided by ATR developer
 - Revise this ROC based on gov't data
- “Certify” the ROC, including the key parameter

EXAMPLE ROC

