# Evolution and New Potential of RPMs in Security Screening

## U.S. DOE NNSA Office of Nuclear Smuggling Detection and Deterrence

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# Radiation Portal Monitors (RPMs)

# Modernizing Legacy Systems

## EML Algorithm - What is it?

- Using machine learning to push legacy systems closer to the state-of-the-art.
- Recognizes scans of innocent radiation sources.
- Trained on data from over 300 thousand scans.

## What are the benefits?

- Fewer alarms from innocent radiation – 50% - 90% reduction at most sites.
- Runs on legacy RPMs.
- Alarms are more meaningful when they do occur.

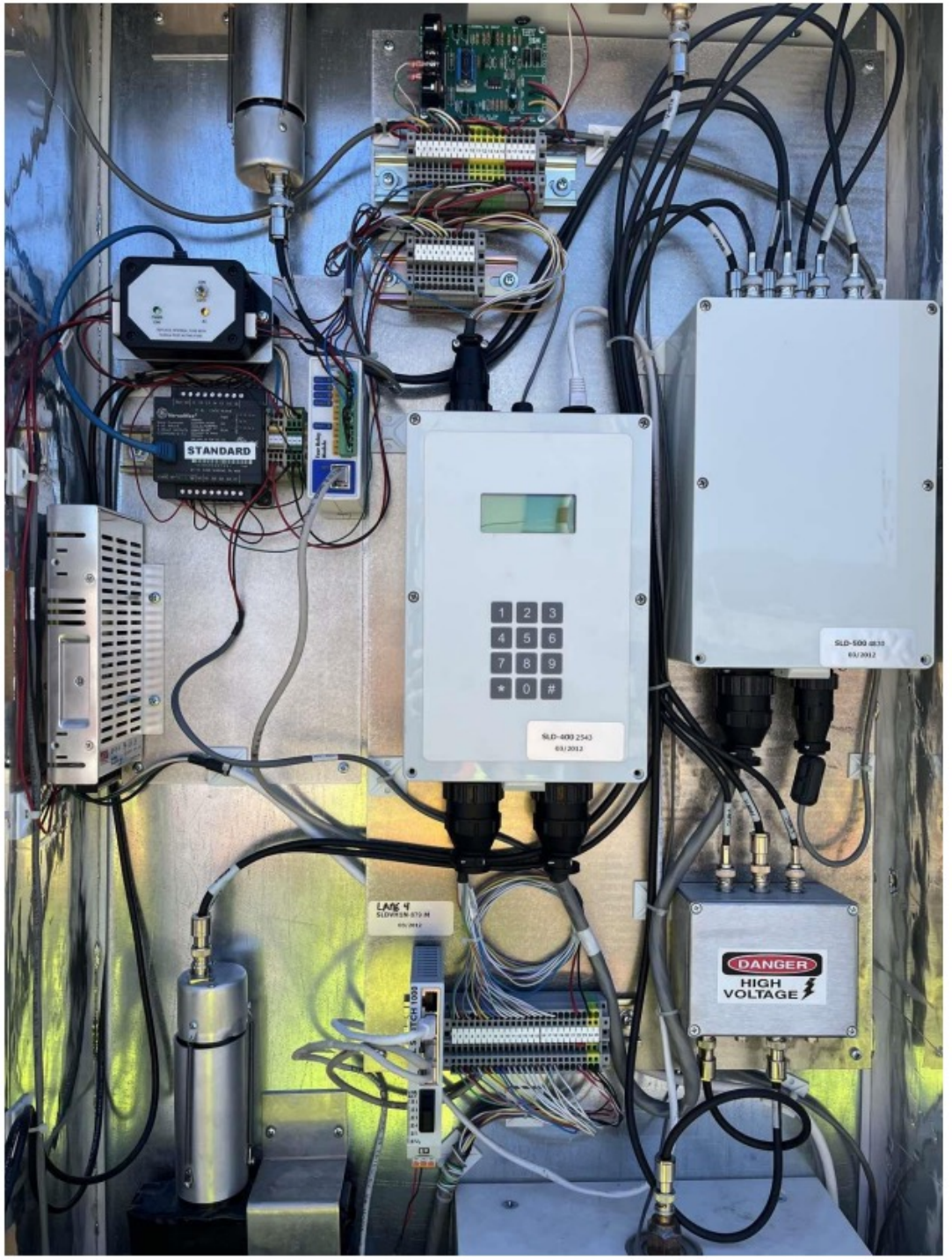
# EML Success Stories

## Operations improvements:

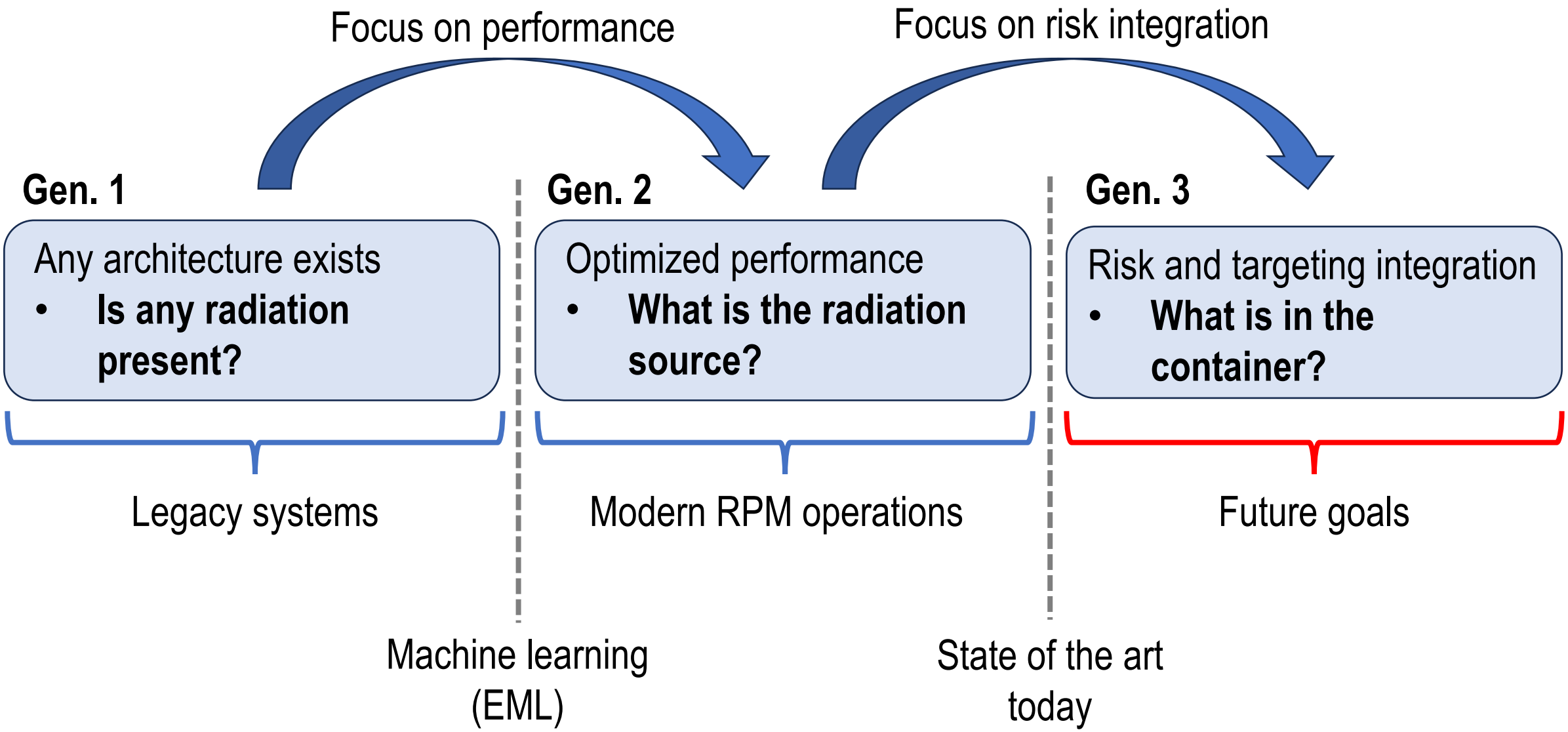
- 91% fewer alarms per day
- Agency was able to reduce RPM staff from three officers to one

## Partner and Regional-led Installs:

- NSDD provides a few new RPM parts and the software
- Partners and local/regional maintenance providers can self-upgrade
- Cost effective upgrade route

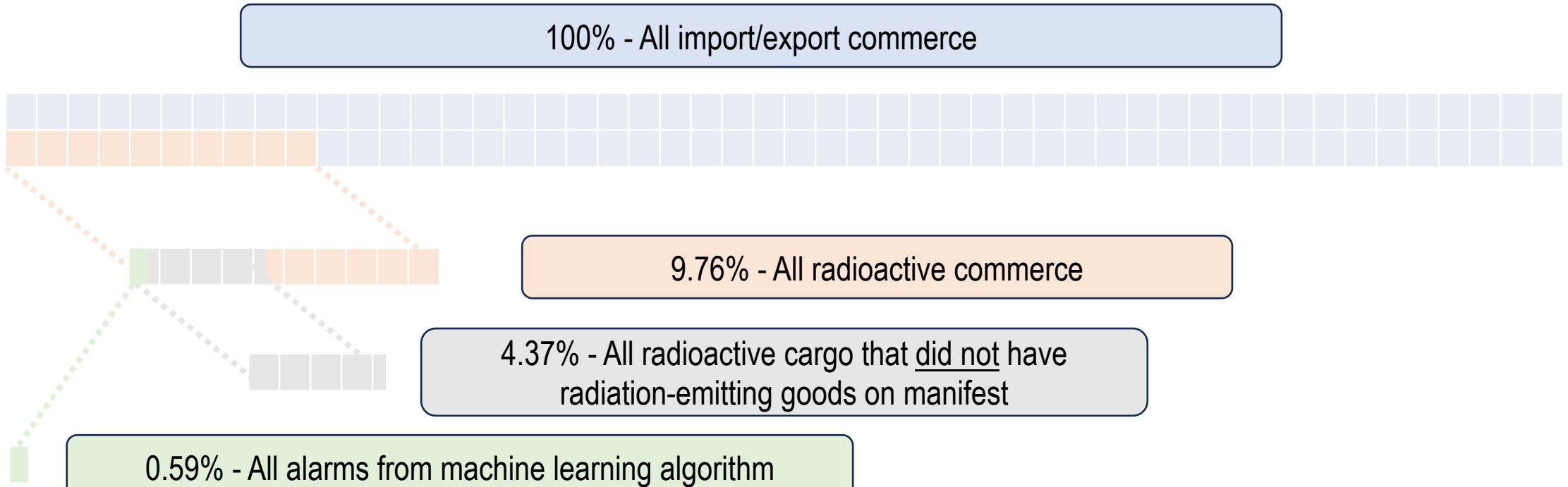


# RPM Technical Evolution



# Future Operational Concepts

# Case Study: RPMs on Conventional Smuggling Detection



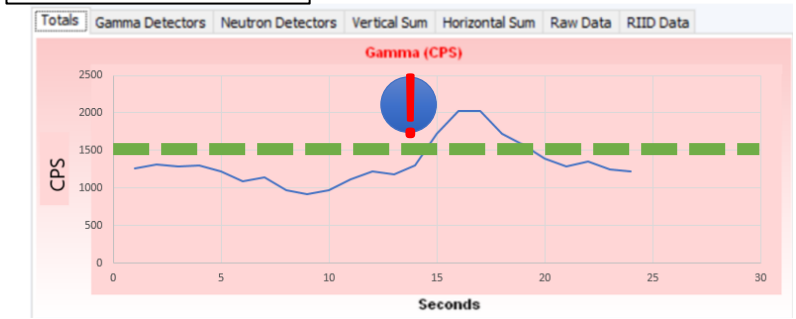

Transnational organized crime is big business […] equivalent of close to 7 per cent of the world's exports of merchandise.

- United Nations Office on Drugs and Crime

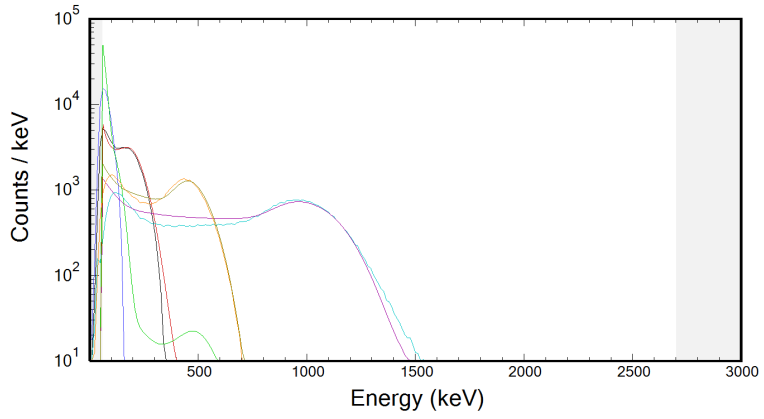
# Imagining the Future

## 1 Measurements by radiation detection systems:

Radiation levels




Spectral signatures




## 2 Data fusion with information systems and other sensors:

Inputs:

- Targeting risk indicators
- HS code - commodity
- Radiation signatures
- NII scans
- Other measurements and sensors:
  - Weight
  - OCR/VIS

## 3 Algorithms and output:

Are there risks from:

- Misdeclaration of commodities?
- Conventional smuggling?
- Narcotics?
- Agriculture quarantine and inspection?
- Nuclear or radiological threats?

# Building New Screening Architecture

- RPMs have conventionally been a standalone platform.
- Future operational concepts require fusing RPMs with other databases, software, and algorithms.
- Platforms must aggregate data streams:
  - What you know - sensor systems
  - What you are told - commerce and risk management systems

# Procurement Considerations

- RPMs and NII are significant investments for a state.

- Modern security screening systems must meet several requirements:
  1. Performance – is the design basis threat met?
  2. Operation – does functionality suit the agency use cases?
  3. Sustainability – is the system maintainable?
  4. Cybersecurity – is data secure from external access?

- Building requirements for a radiation detection system is hard
  - NSDD offers partnership and expertise in designing system requirements.
  - Perspective moving rad/nuc screening from standalone to integrated

# Summary

- A new focus on how radiation sensors fit into modern seaport operations:
  - Integration with risk profiling, or ‘targeting’, systems.
  - Synch with customs and commerce data.

- In the market for a new NII or RPM system? Be forward leaning in the choices you make.

- When leveraged properly, radiation sensors can enable a wider potential to detect and counter conventional smuggling.



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