

# OPTRO 2024 EPIC ROUNDTABLE PHOTONICS IN DEFENCE

ADVANCED IMAGING AND SENSING TECHNOLOGIES FOR  
DETECTION, RECOGNITION AND IDENTIFICATION (DRI)

## DRI Challenges for Missile Systems

**Chris Greenway**

MBDA Missile Systems

EO Seekers & Sensors (UK) – Dept. Head

# MBDA Missile Systems

[www.mbda-systems.com](http://www.mbda-systems.com)

ABOUT US

SOLUTIONS AND SERVICES

INNOVATION

CAREERS

NEWSROOM

## Overview

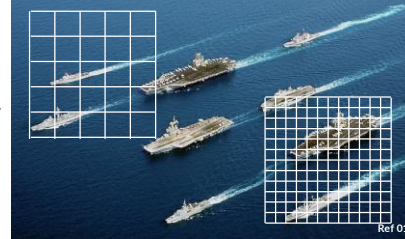
- MBDA – who we are
- Classic DRI Challenges
- DRI Opportunities for the Future



# Classic DRI Challenges

- DRI (Det, Rec, ID) originates from US studies
  - > How accurately military personnel can 'acquire' targets?
- Johnson Criteria widely used, often at 50% probability
  - Other Criteria (e.g. NIIRS) available ...
- Image Quality is the key driver
  - More Pixels i.e. better spatial resolution
  - More Photons i.e. better signal/noise
- Impact on Design Choices
  - Bigger Optics
  - Better (more sensitive) Detectors
  - Lower Noise System

>> More expensive, more complex system



Det = 1 line pairs (2 pixels)  
 Rec = 4 line pairs  
 ID = 6+ ...

@10km, 10deg FoV ~ 1.7km extent

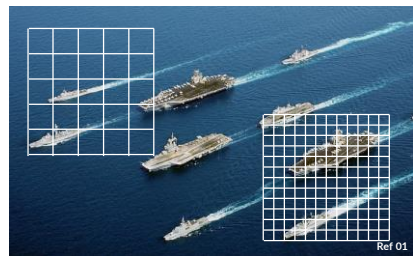
640pixels ~ 2.5m/pixel

Rec = 4pairs = 8pixels

Min Feature Size > 20m

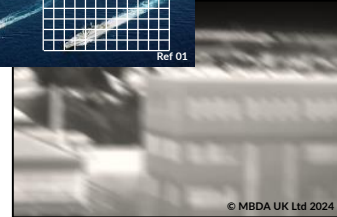


# DRI Opportunities for the Future



- Computational Imaging for Improved Performance

- Super Resolution, and multiple apertures
- Digital Processing (Focussing, Filtering)



- DRI no longer restricted to passive imaging, at traditional wavelengths

- Use of LADAR (and imaging RADAR) – 3D ‘DRI’ metrics needed
- ‘Multi-Sensor’ data fusion – utilise the best attributes from each sensor

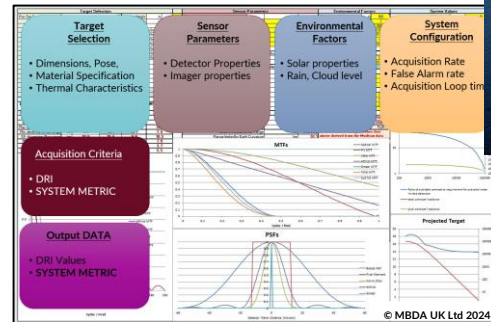


- ‘AI’ for Improving Target Acquisition

- The role of Deep Learning & CNN to support ‘Operator in the Loop’
- Autonomous systems ... needs to be robust ... but not necessarily image based

- Tools for Predicting DRI

- More representative of the system
- Wider range of technologies and environments



# Closing Remarks

- MBDA
  - European Missiles Systems Company
  - Overall missile performance strongly linked to 'DRI' ability
- Classic improvements in DRI lead to more complex and costly designs ... not practical in the constraints of a missile system
- Next generation seeker designs need to leverage more innovative solutions
  - Computational imaging design
  - 'AI' target acquisition techniques
  - Multi-Sensor Configurations
- And understand how DRI metrics can evolve to meet these new approaches
  - *This allows us - as a European photonics community - to explore a broader range of technologies and techniques in order to deliver the future defence capability*



**End of Presentation**

*Thank you for your attention*

Ref : 12210308484

# OPTRO 2024 EPIC ROUNDTABLE PHOTONICS IN DEFENCE

ADVANCED IMAGING AND SENSING TECHNOLOGIES FOR  
DETECTION, RECOGNITION AND IDENTIFICATION (DRI)

## DRI Challenges for Missile Systems

[chris.greenway@mbda-systems.com](mailto:chris.greenway@mbda-systems.com)