



SEAS DTC

Systems Engineering for Autonomous Systems
Defence Technology Centre

An Overview of the SEAS DTC



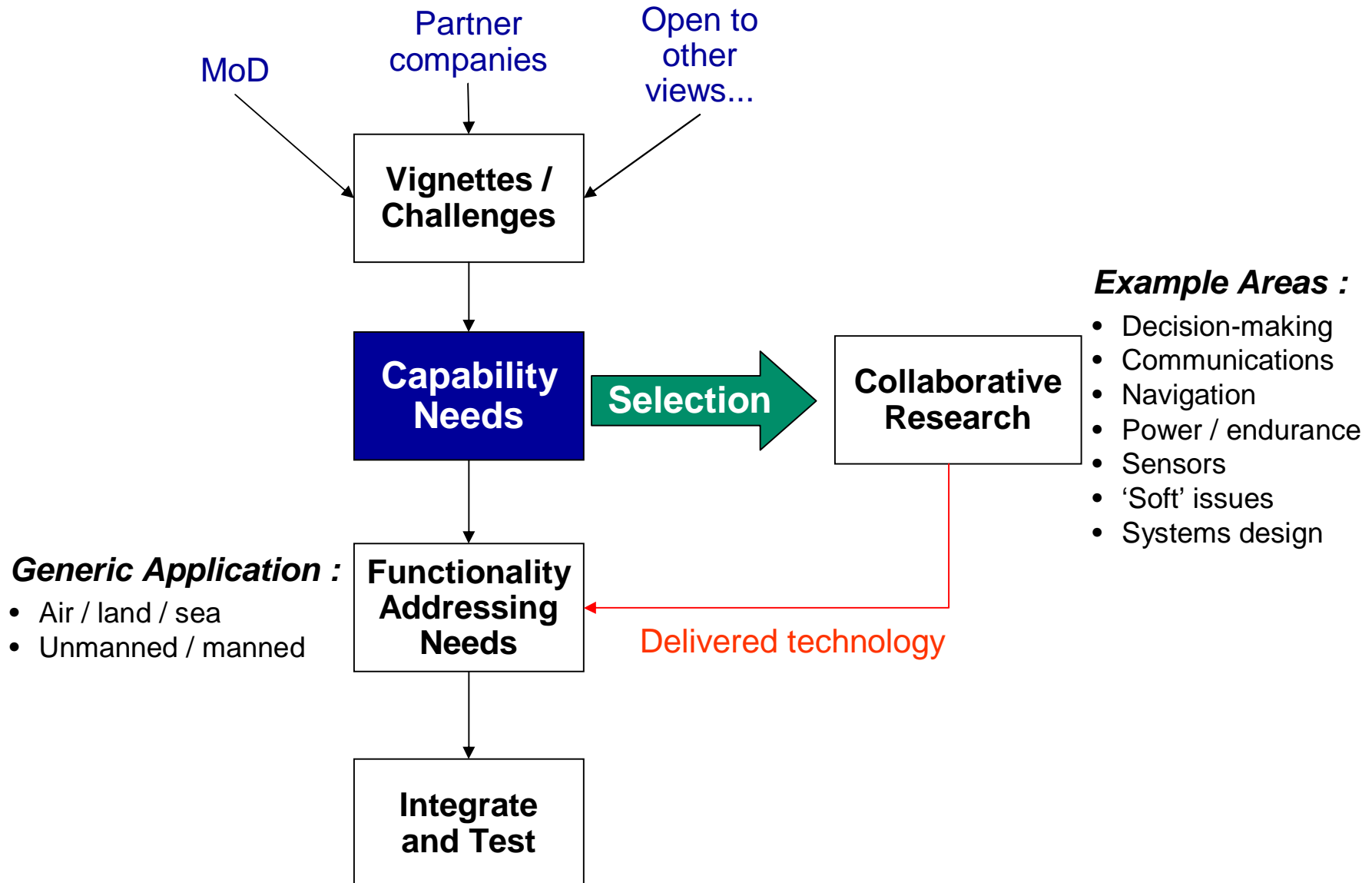
Agenda

- **A Systems Approach to Meeting Capability Needs**
- **Examples of Contribution of SEAS DTC Work to Military Capability**
- **Exploitation Model**

Agenda

- **A Systems Approach to Meeting Capability Needs**
- **Examples of Contribution of SEAS DTC Work to Military Capability**
- **Exploitation Model**

Introduction : A Systems Approach to Meeting Capability Needs



Agenda

- A Systems Approach to Meeting Capability Needs
- **Examples of Contribution of SEAS DTC Work to Military Capability**
- Exploitation Model

SEAS DTC

Combined air / land reconnaissance



Capability Drivers

Ability to detect changes (route proving)

Ability to provide own surveillance

Increased detection rate

Enhanced situational awareness

Increased navigational accuracy

Increased endurance

Improved human / machine interaction / trust

Benefits

Reduced risk to humans

Reduced cost of manpower or other resources

Greater operational tempo

Increased probability of mission success

Reduction in training / skill demands

SEAS DTC

Contributing Technology

Phase correlation

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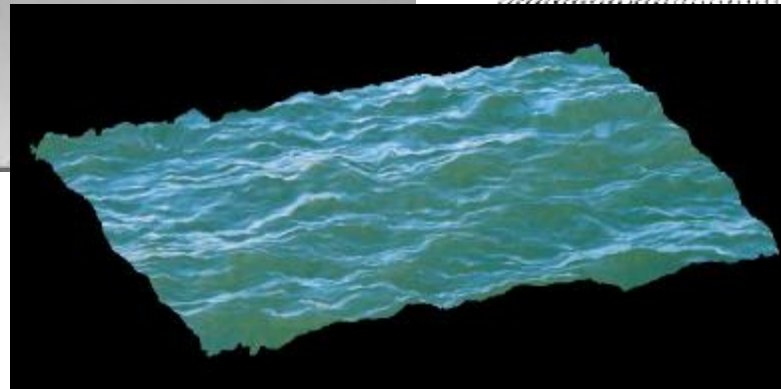
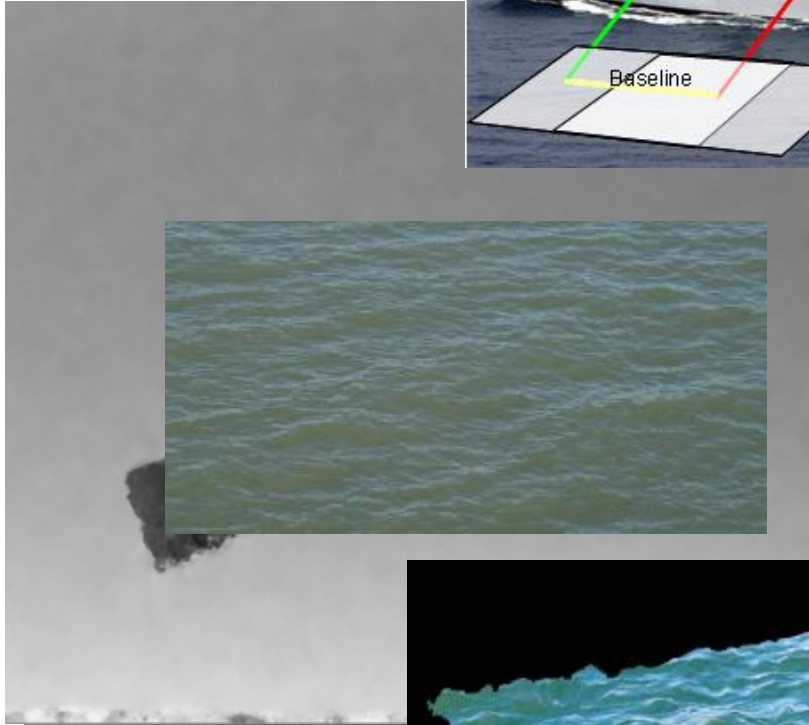
Greater operational tempo

Increased probability of mission success

Reduction in training / skill demands



Phase Correlation: *Imperial College*



SEAS DTC

Contributing Technology

Intimate control

Assured computing

Capability Drivers

Ability to detect changes (route proving)

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Enhanced situational awareness

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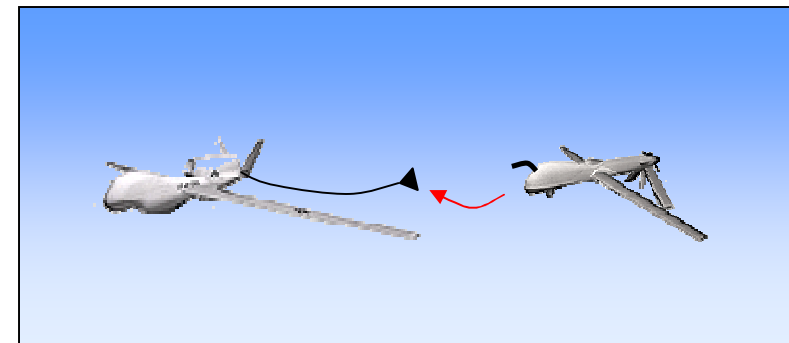
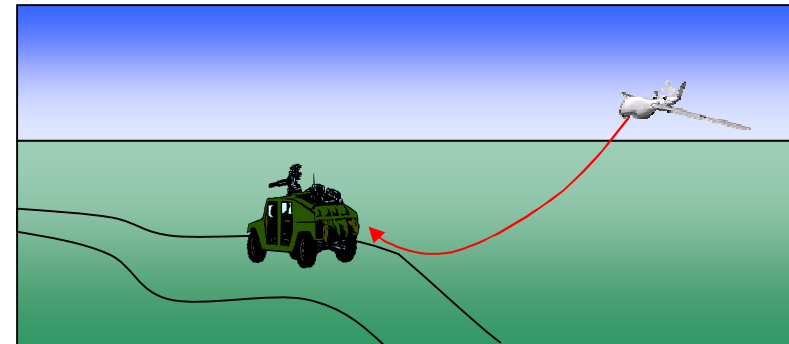
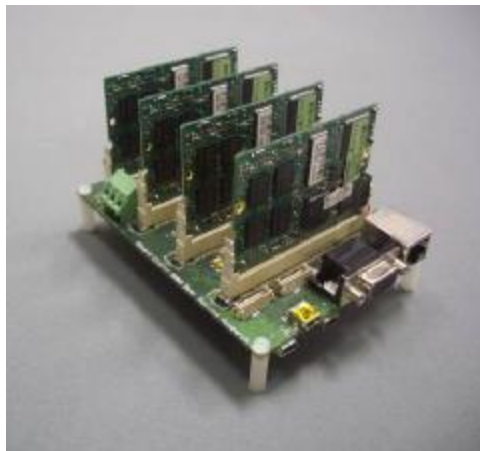
Greater operational tempo

Increased probability of mission success

Reduction in training / skill demands



Intimate Control : *Roke, MBDA, Bristol University, Blue Bear*
Assured Computing : *Heriot-Watt University, St Andrews University*



SEAS DTC

Contributing Technology

Object recognition and tracking

Capability Drivers

Ability to detect changes (route proving)

Ability to provide own surveillance

Increased detection rate

Enhanced situational awareness

Increased navigational accuracy

Increased endurance

Improved human / machine interaction / trust

Benefits

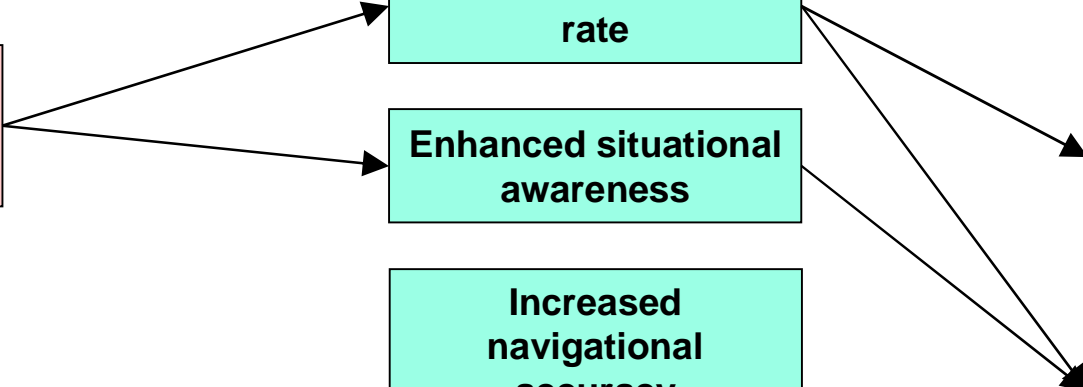
Reduced risk to humans

Reduced cost of manpower or other resources

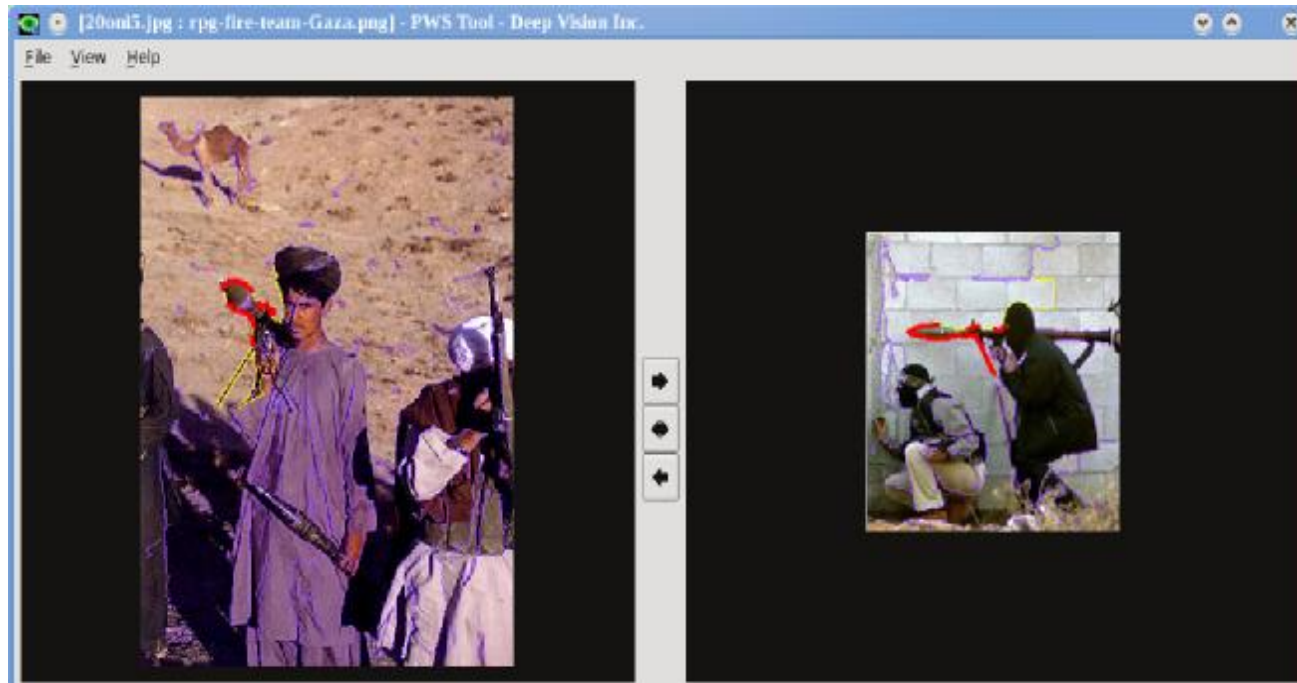
Greater operational tempo

Increased probability of mission success

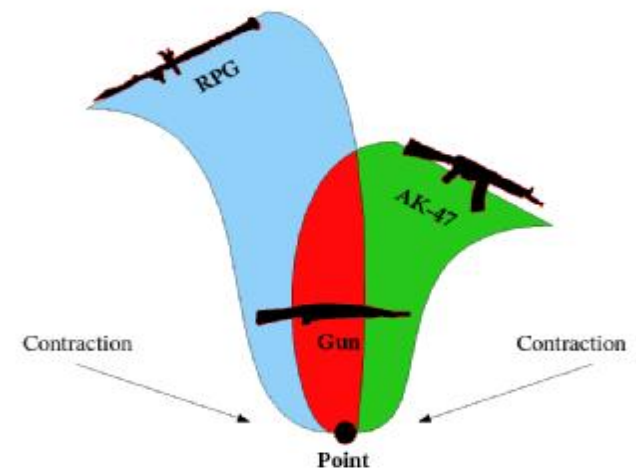
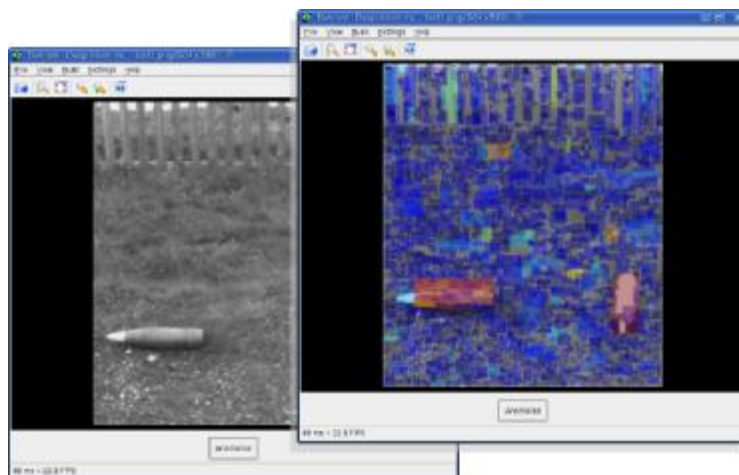
Reduction in training / skill demands



Object Recognition and Tracking : *Deep Vision*



***Needs less than
1/30th second
computation
- 1 frame!***



SEAS DTC

Contributing Technology

Localisation and mapping

Capability Drivers

Ability to detect changes (route proving)

Ability to provide own surveillance

Increased detection rate

Enhanced situational awareness

Increased navigational accuracy

Increased endurance

Improved human / machine interaction / trust

Benefits

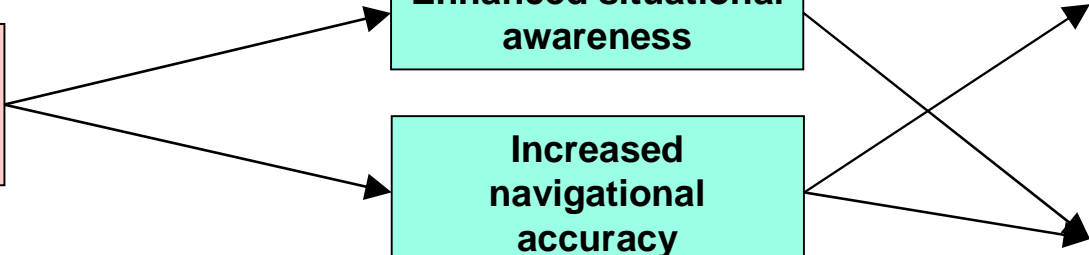
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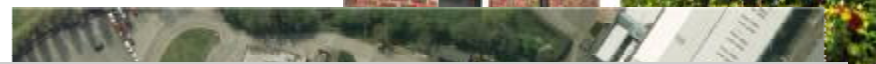
Greater operational tempo

Increased probability of mission success

Reduction in training / skill demands



Localisation and Mapping : *Oxford University*



Detected Loop Closure

GPS Location (X, Y, Z):
5706653.548177, 528909.490877, 74.071243

Current Image



Recognised Image



SEAS DTC

Contributing Technology

Terrain assessment

Capability Drivers

Ability to detect changes (route proving)

Ability to provide own surveillance

Increased detection rate

Enhanced situational awareness

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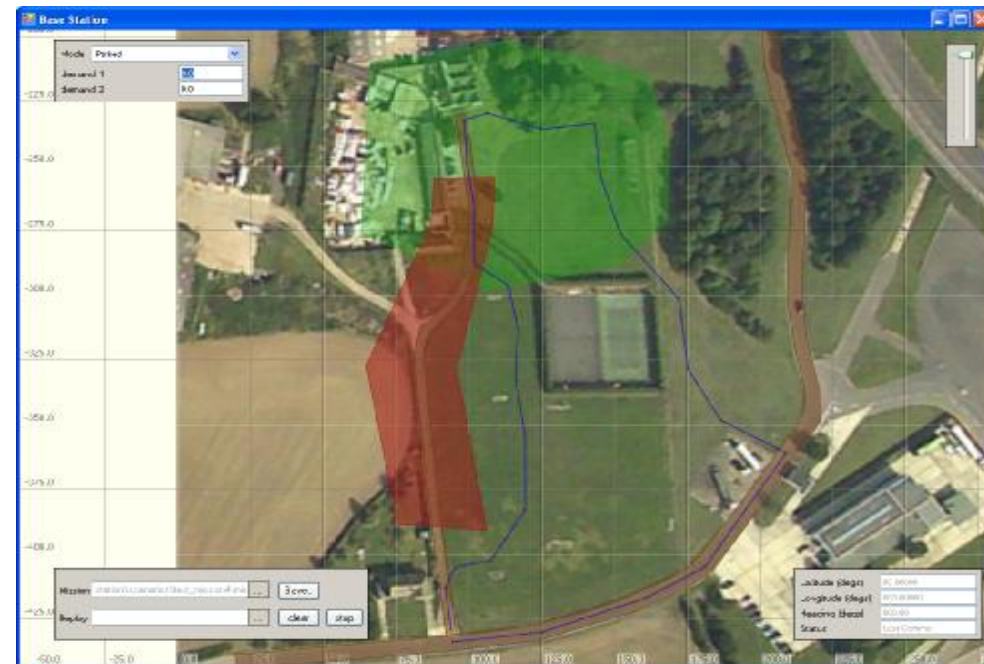
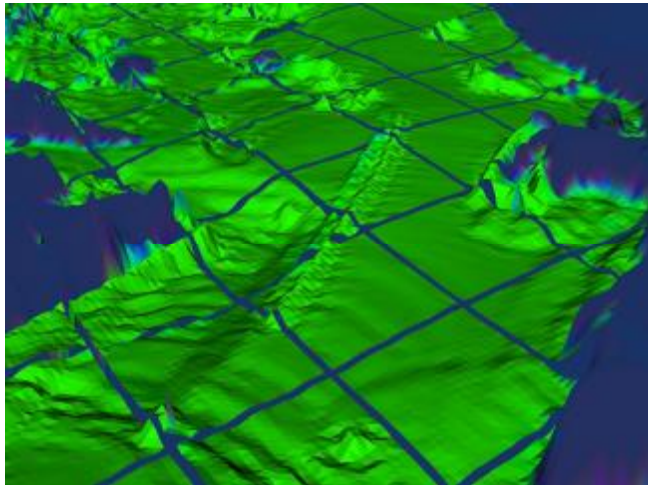
Greater operational tempo

Increased probability of mission success

Reduction in training / skill demands



Terrain Assessment : *BAE Systems Advanced Technology Centre / MIRA*

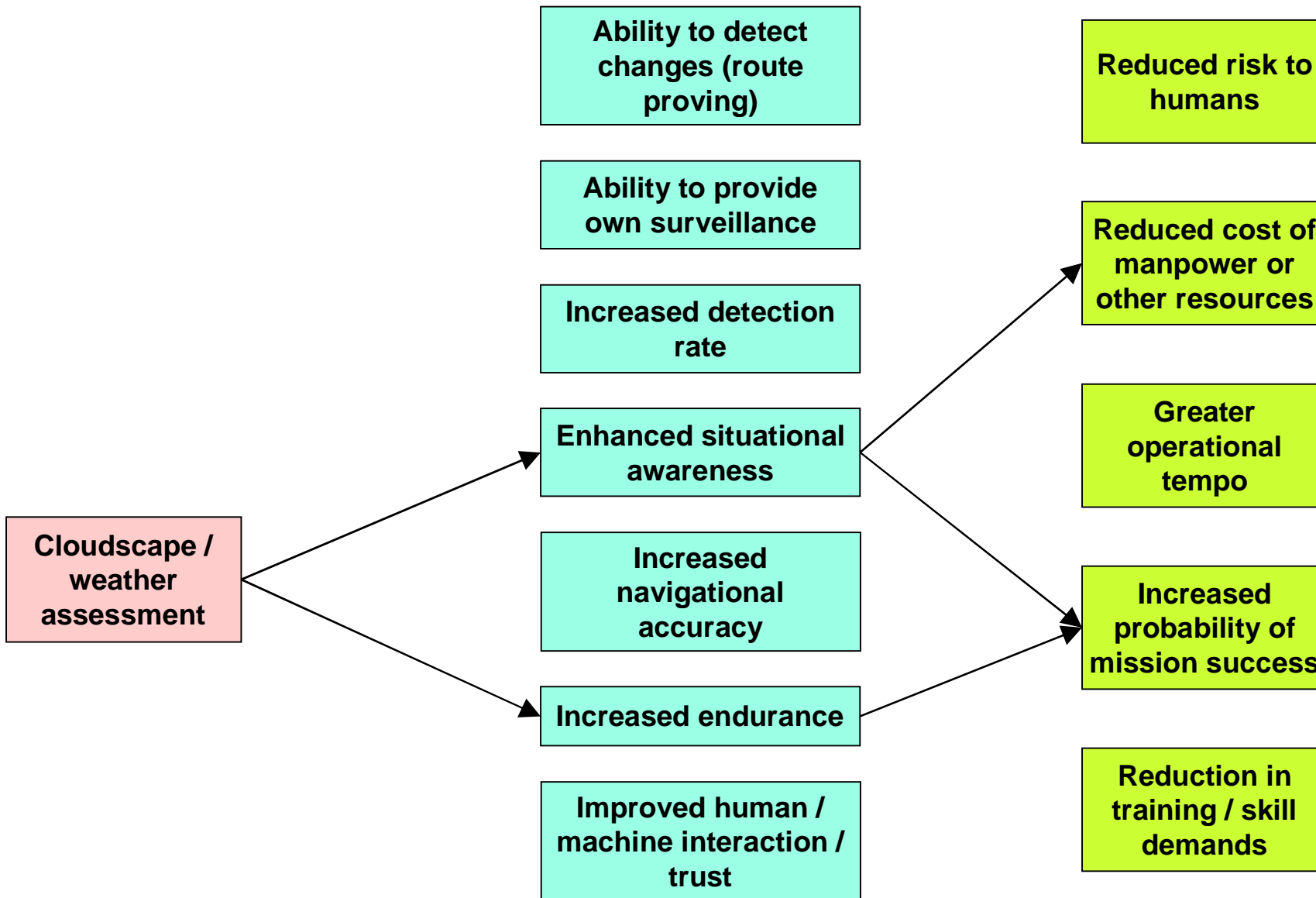


SEAS DTC

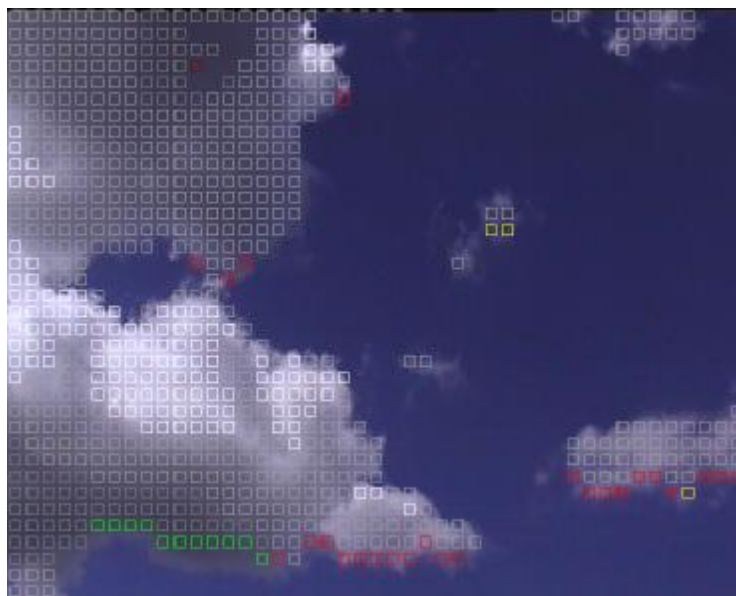
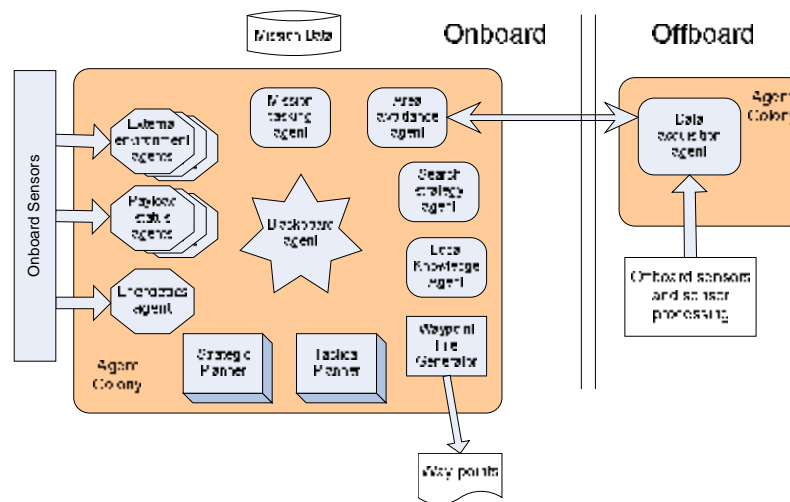
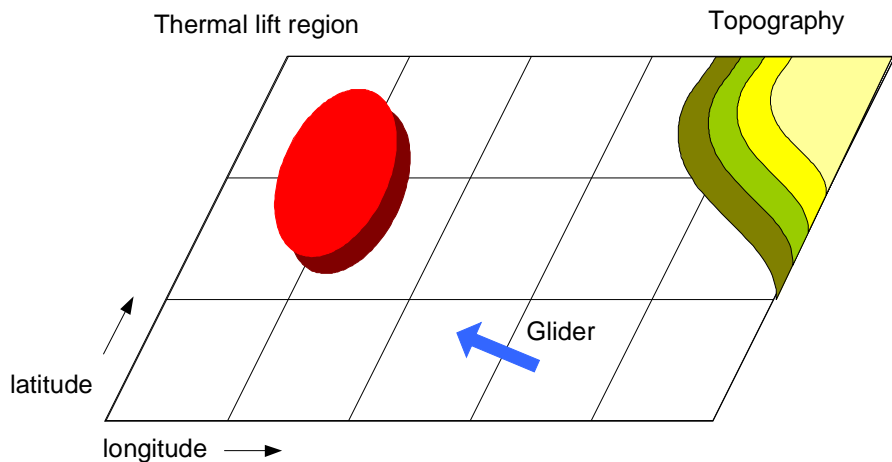
Contributing Technology

Capability Drivers

Benefits



Cloudscape / Weather Assessment : MBDA, Roke, Met Office



SEAS DTC

Contributing Technology

Trusted reasoning engine

Capability Drivers

Ability to detect changes (route proving)

Ability to provide own surveillance

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Enhanced situational awareness

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Increased endurance

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Benefits

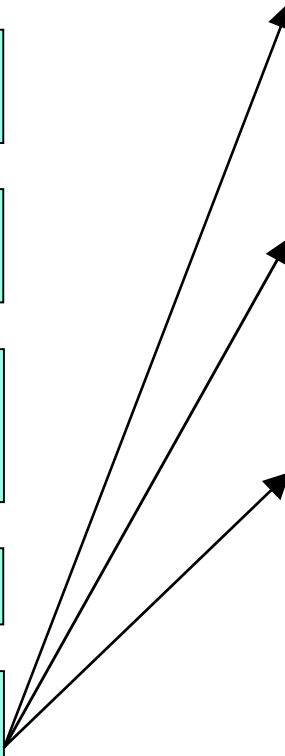
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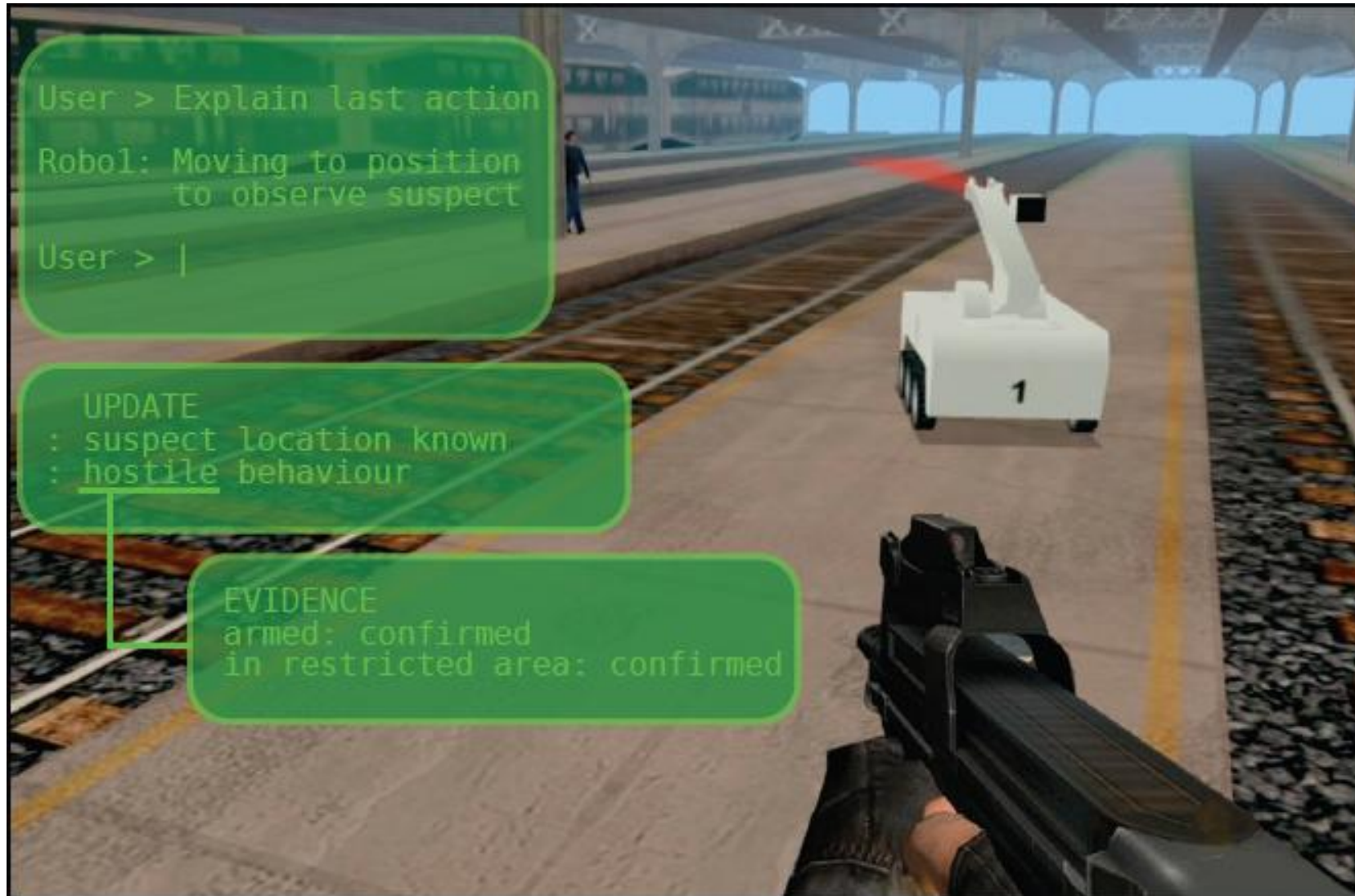
Greater operational tempo

Increased probability of mission success

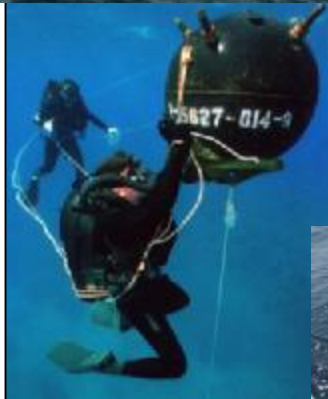
Reduction in training / skill demands



Trusted Reasoning Engine : *ThinkTank Maths*



Mine Countermeasures



Capability Drivers

Improved search efficiency

Increased robustness to intermittent comms

Remote monitoring

Improved covertness

Benefits

Reduced risk to humans

Reduced cost of manpower or other resources

Greater operational tempo

Increased probability of mission success

Reduction in training / skill demands

SEAS DTC

Contributing Technology

Collaborative
planning / plan
repair

Capability Drivers

Improved search
efficiency

Increased robustness
to intermittent
comms

Remote monitoring

Improved covertness

Benefits

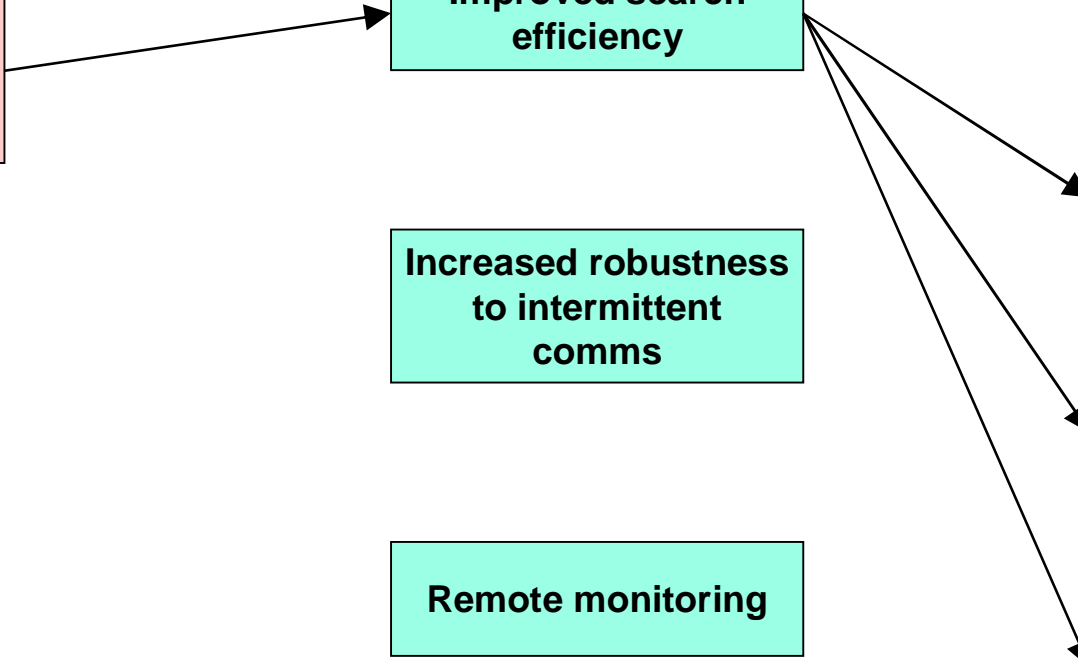
Reduced risk to
humans

Reduced cost of
manpower or
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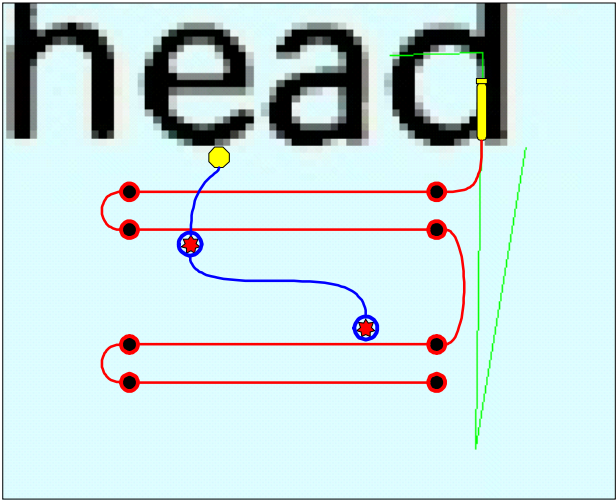
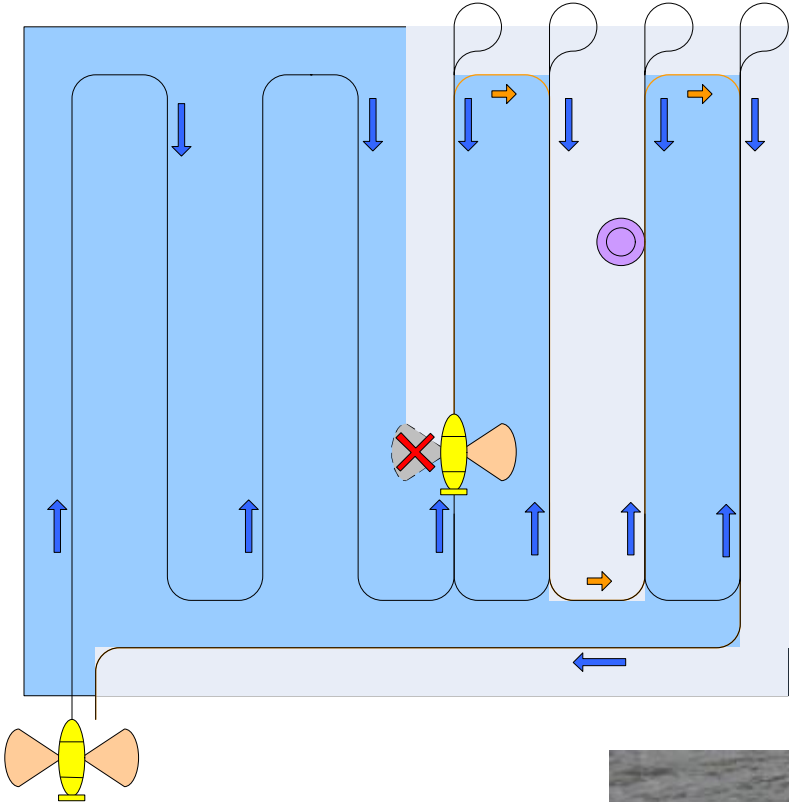
Greater
operational
tempo

Increased
probability of
mission success

Reduction in
training / skill
demands



Collaborative Planning / Plan Repair : *Heriot-Watt University*



SEAS DTC

Contributing Technology

Capability Drivers

Benefits

Comms through water into air

Improved search efficiency

Increased robustness to intermittent comms

Remote monitoring

Improved covertness

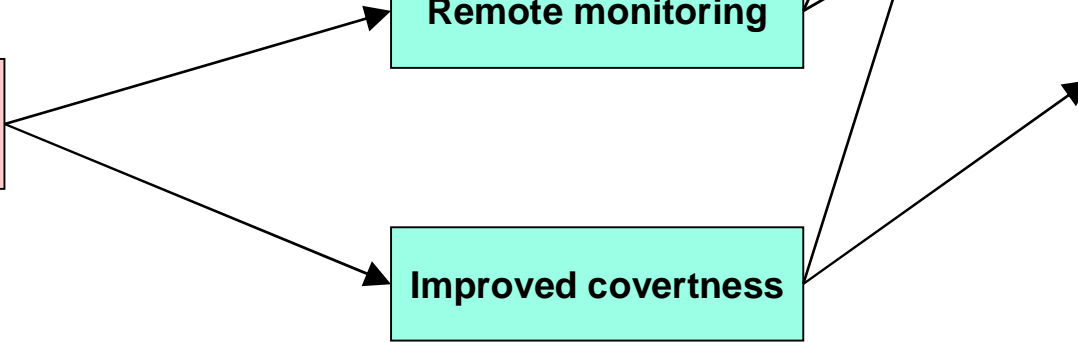
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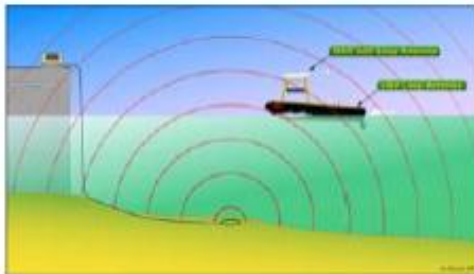
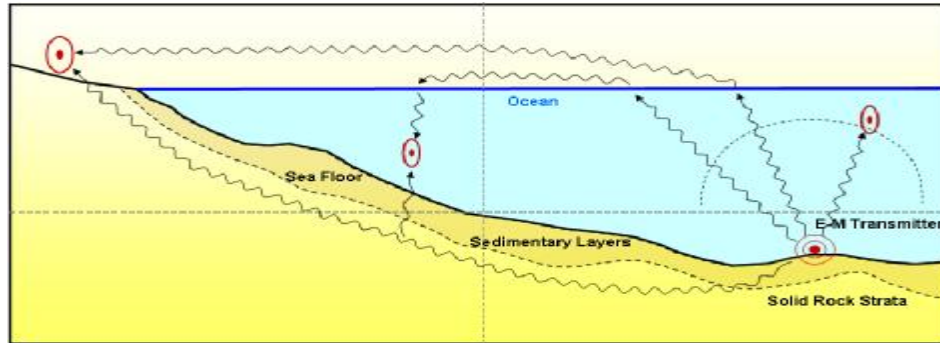
Greater operational tempo

Increased probability of mission success

Reduction in training / skill demands



Comms through Water into Air : *Wireless Fibre Systems*



DSEi demonstration 2007

**Underwater to UAV trial
March 2008**

Urban Surveillance



Capability Drivers

Improved covertness

Enhanced situational awareness

More robust and efficient communications

Benefits

Reduced risk to humans

Reduced cost of manpower or other resources

Greater operational tempo

Increased probability of mission success

Reduction in training / skill demands

SEAS DTC

Contributing Technology

Analysis of video
of crowded
scenes

Capability Drivers

Improved covertness

Enhanced situational
awareness

More robust and
efficient
communications

Benefits

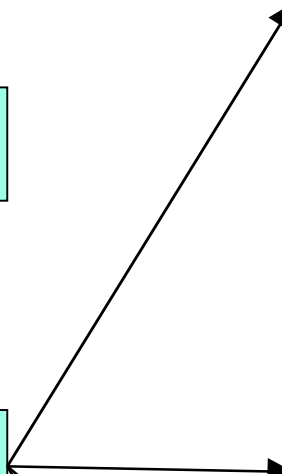
Reduced risk to
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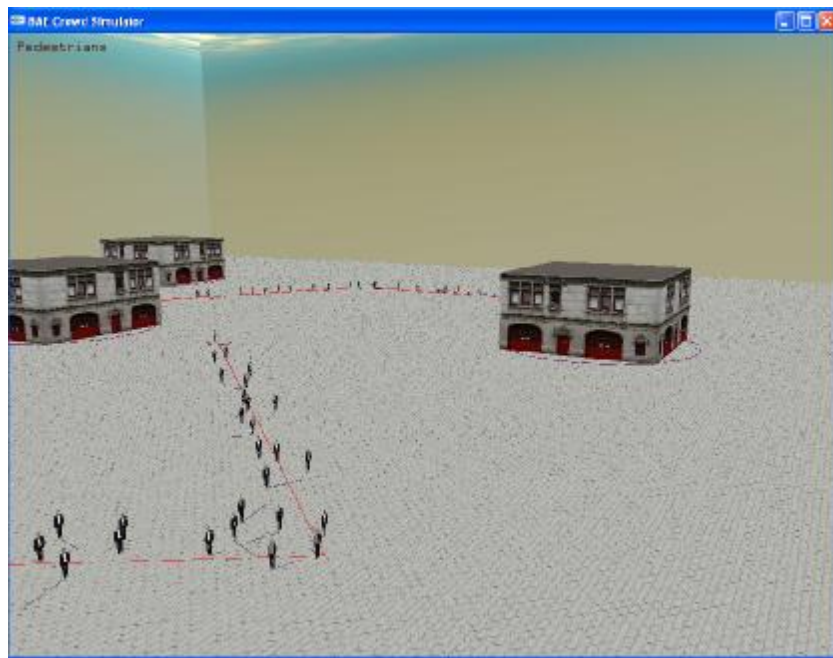
Greater
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Analysis of Video of Crowded Scenes :
BAE Systems Advanced Technology Centre

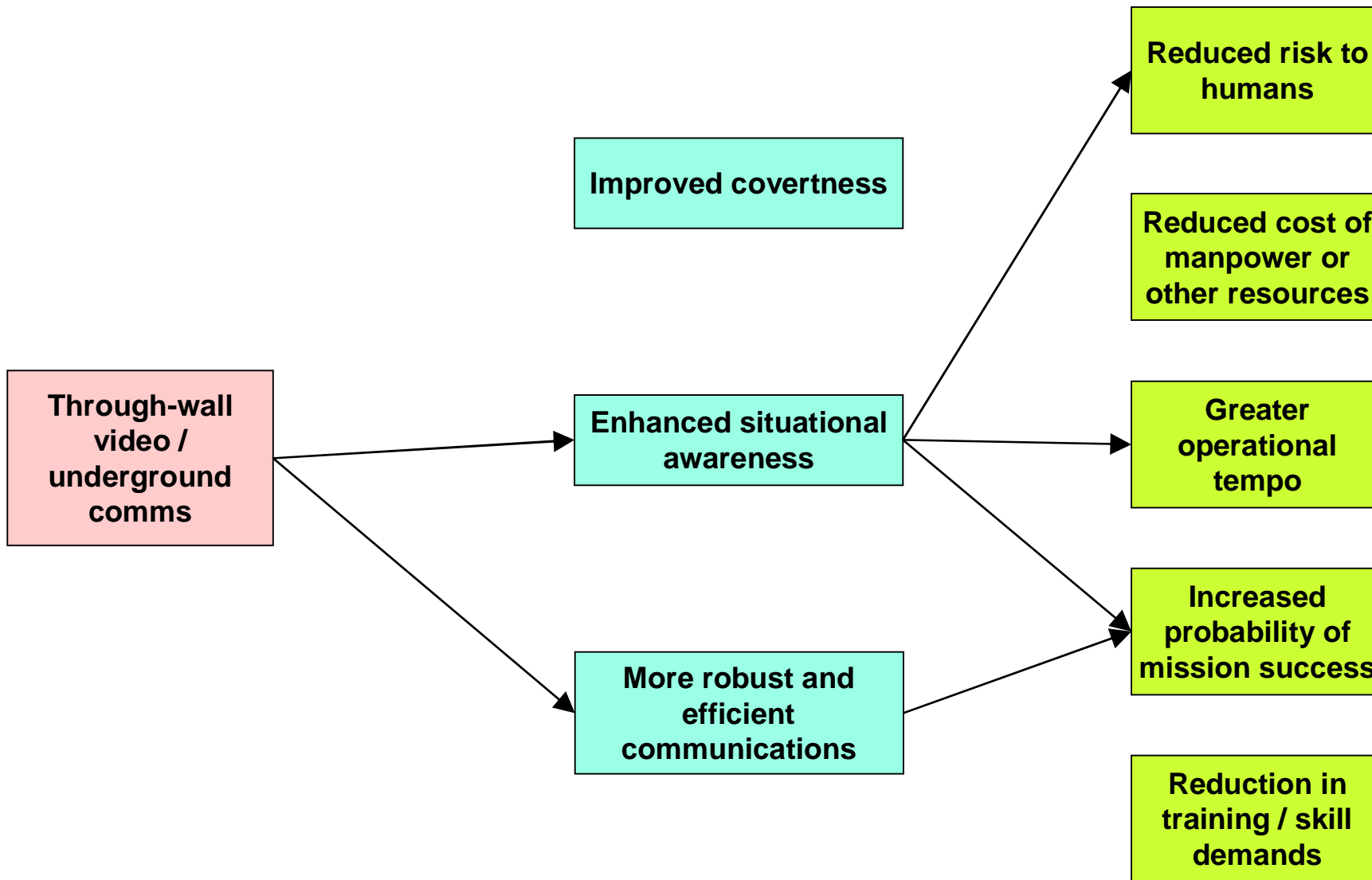


SEAS DTC

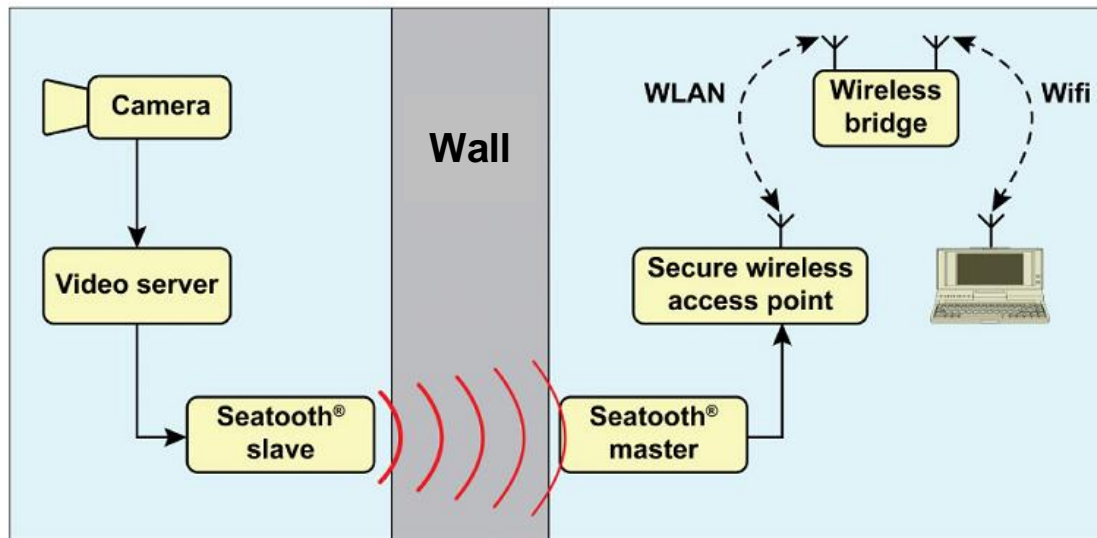
Contributing Technology

Capability Drivers

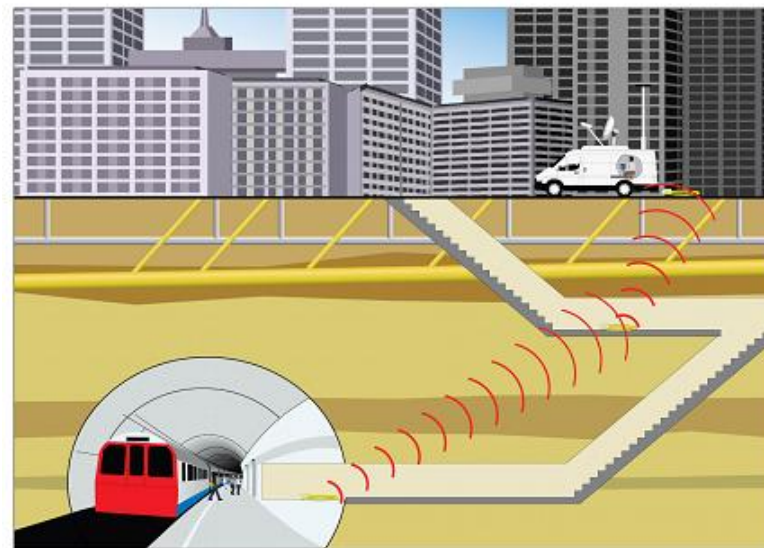
Benefits



Through-wall Video / Underground Comms : *Wireless Fibre Systems*



Tests in Glasgow underground.



SEAS DTC

Contributing Technology

Capability Drivers

Benefits

Efficient bandwidth utilisation

Improved covertness

Enhanced situational awareness

More robust and efficient communications

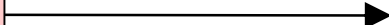
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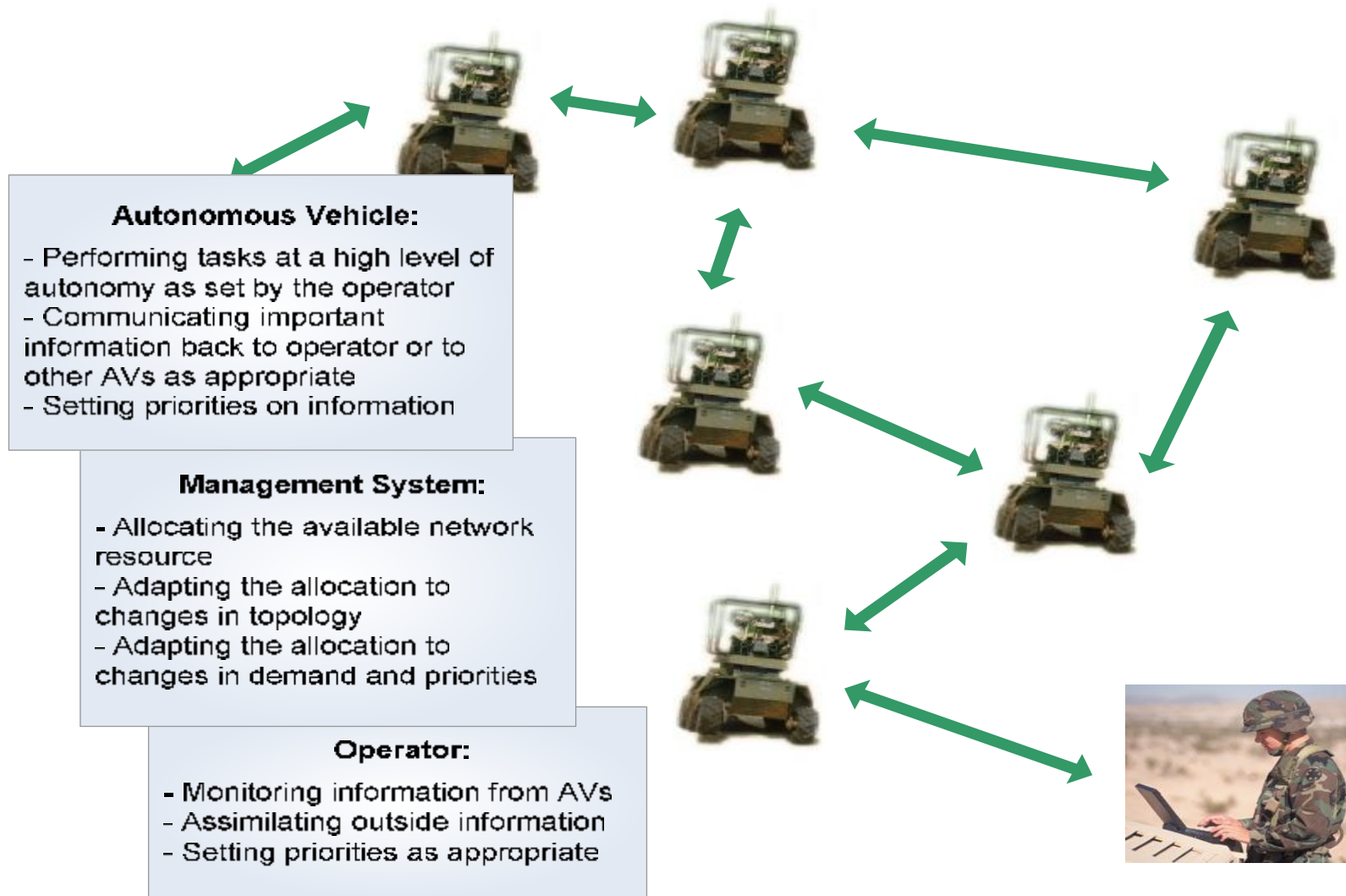
Greater operational tempo

Increased probability of mission success

Reduction in training / skill demands



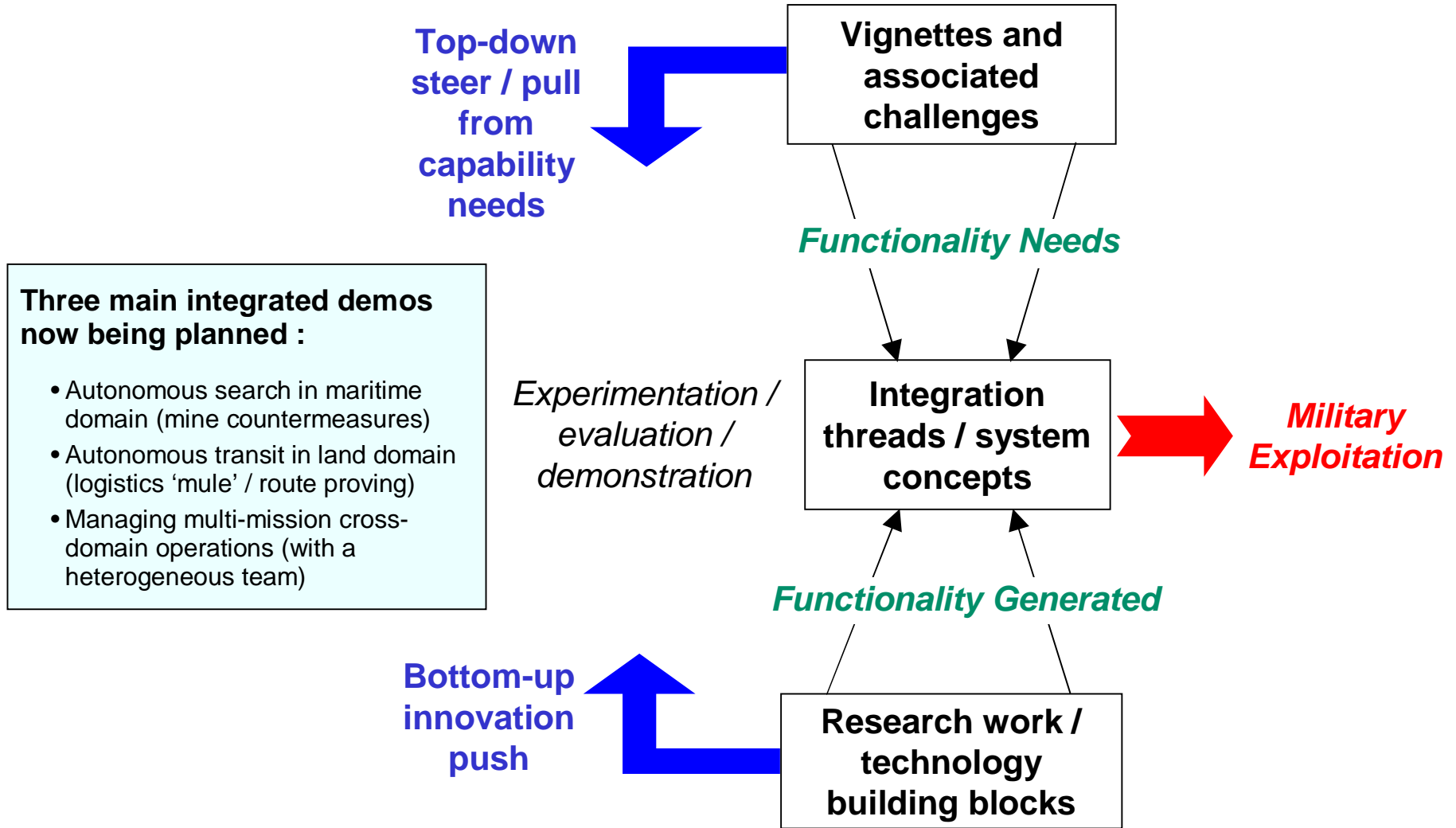
Efficient Bandwidth Utilisation : *BAE Systems Advanced Technology Centre*



Agenda

- A Systems Approach to Meeting Capability Needs
- Examples of Contribution of SEAS DTC Work to Military Capability
- **Exploitation Model**

Exploitation Model



Next Conference Sessions

- **Following an introduction next to the EMRS DTC, there will be a 5 minute break for SEAS delegates, followed immediately by the first SEAS DTC conference plenary session in this auditorium**
- **For EMRS delegates, paper sessions will start at 11:00 in the Sidlaw and Fintry rooms**



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www.seasdtc.com

