



CHALLENGES OF AI-DRIVEN VEHICLES

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Where Are the Challenges of Autonomous Vehicles?

Technical

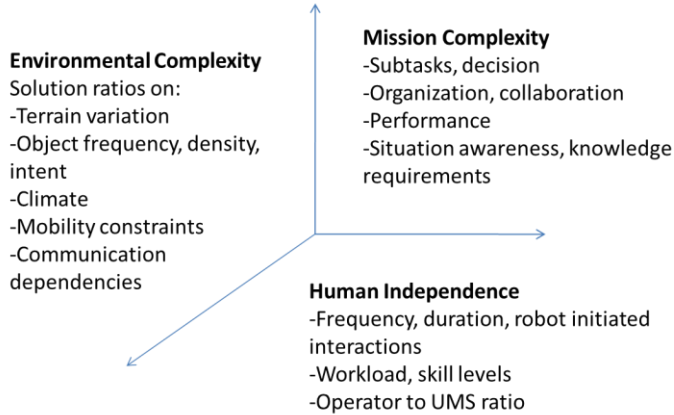
Regulatory

Personnel

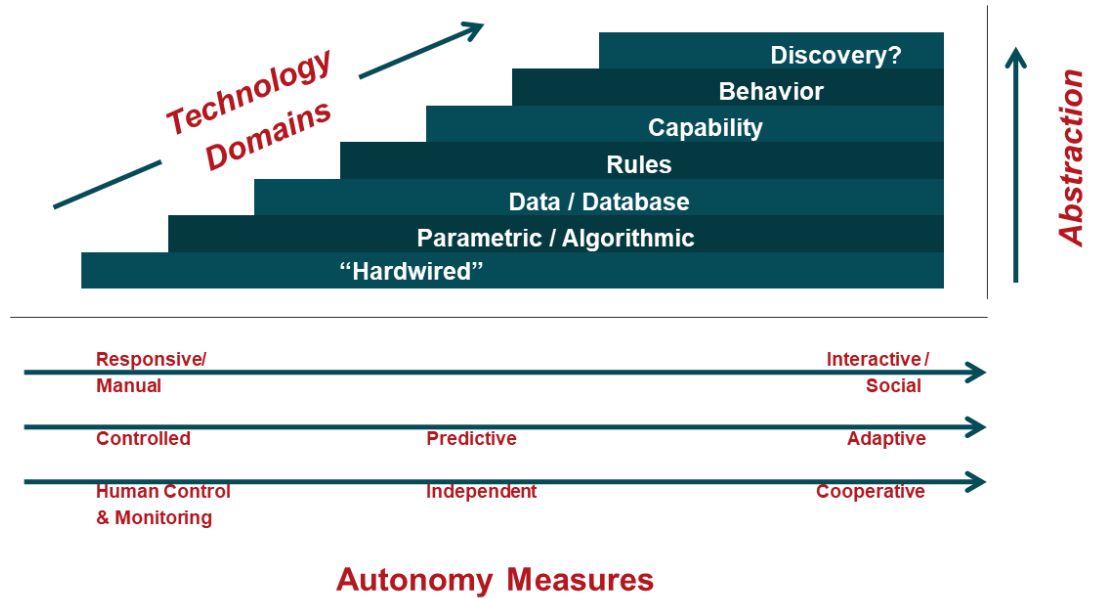
Perception

What is Autonomy?

Autonomy Levels for Unmanned Systems (ALFUS)



<https://www.nist.gov/sites/default/files/documents/el/isd/ks/ALFUS-BG.pdf>



Autonomy and AI

RC-Type Vehicle

LOA 1
Execute Preplanned Mission

LOA 0
Remotely Piloted Vehicle

Adaptive Vehicle

LOA 3
Robust Response to Real Time Faults / Events

LOA 2
Changeable Mission

LOA 4
Fault / Event Adaptive Vehicle

Multi-/Cooperative Vehicle

LOA 5
Real Time Multi-Vehicle Coordination

LOA 6
Real Time Multi-Vehicle Cooperation

Mission Aware/Engaged

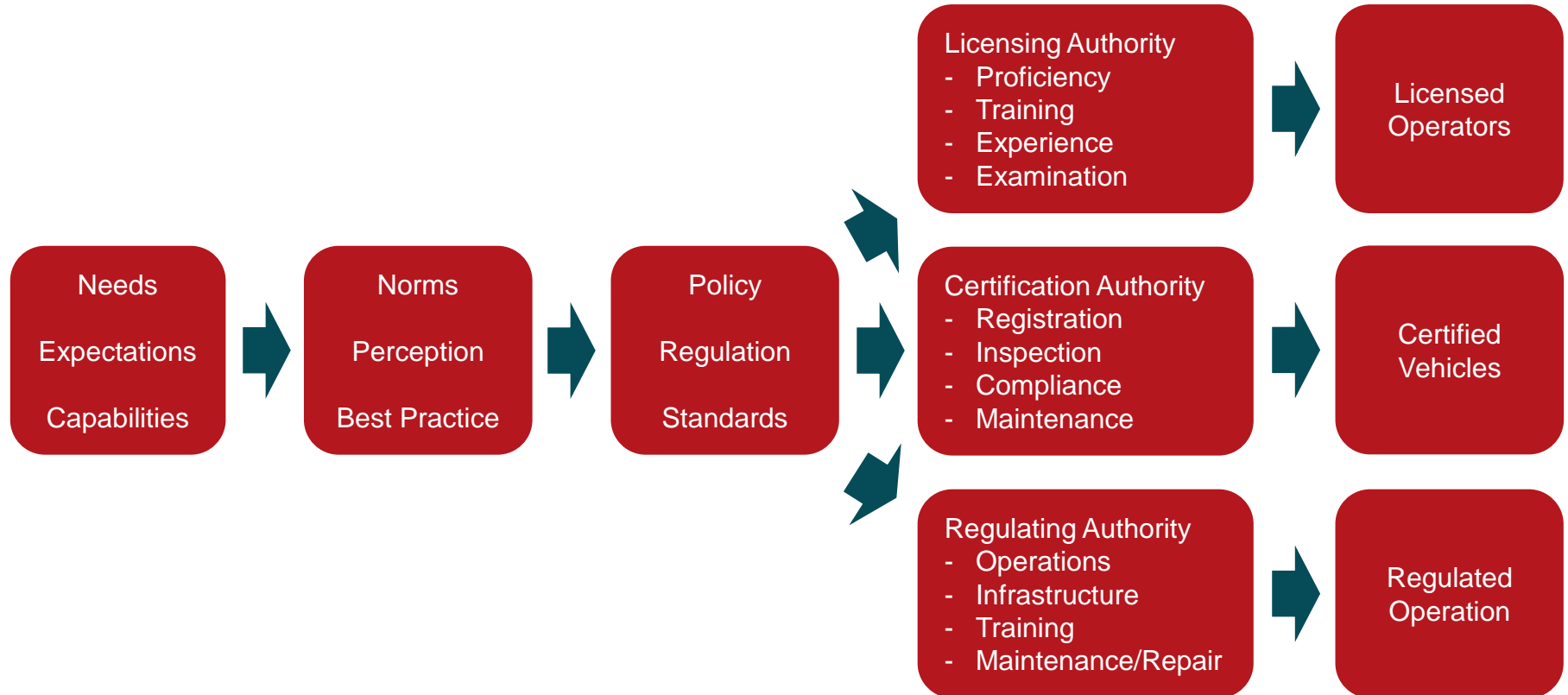
LOA 7
Battlespace Knowledge

LOA 9
Battlespace Swarm Cognizance

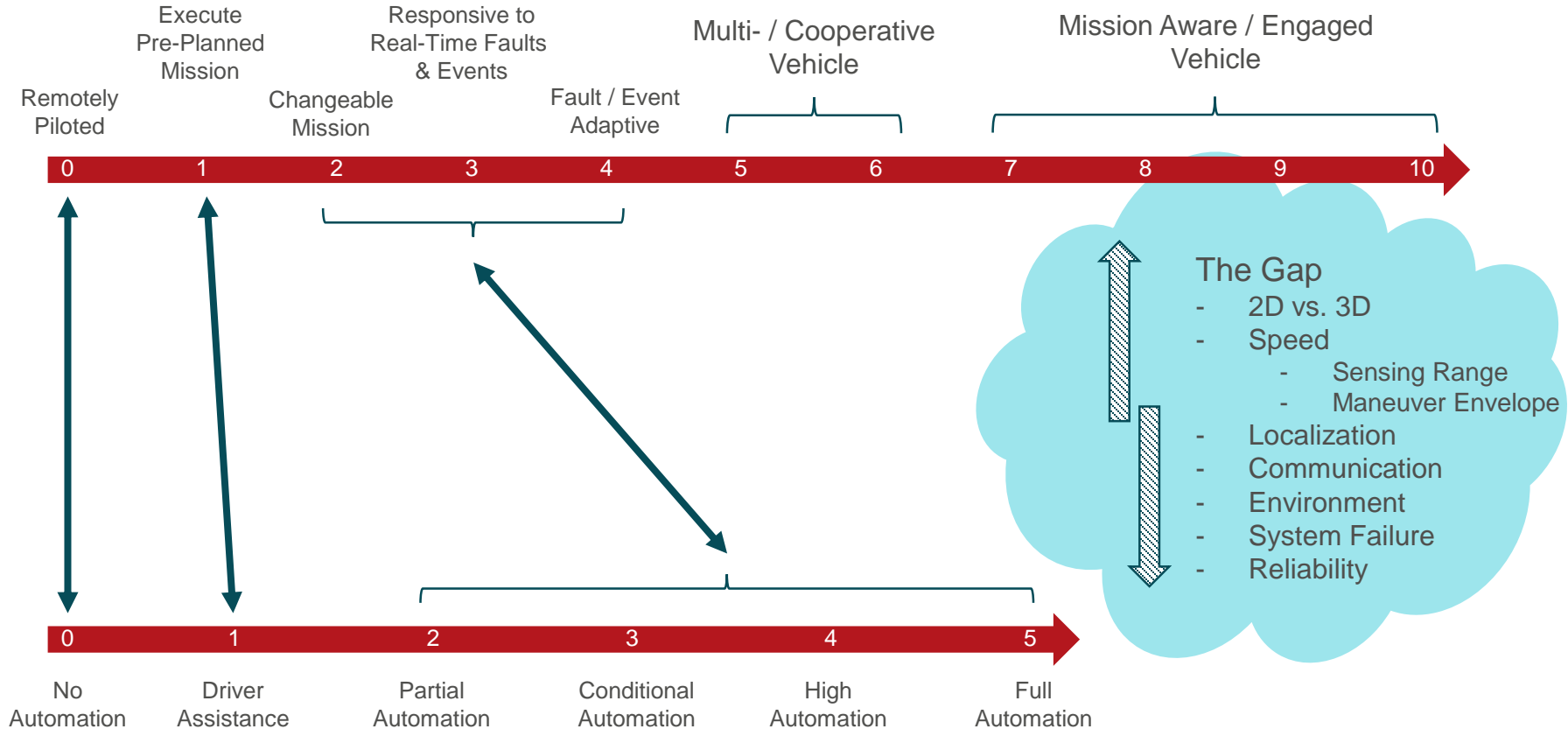
LOA 8
Battlespace Cognizance

LOA 10
Fully Autonomous

Generic (and simplified) Licensing and Certification Flow



Controls & Autonomy – Key Differences Between Air and Ground



Complexities of a Heterogeneous Control Environment



Three Cases:

- ➡ - All Human-Driven Vehicles
- ➡ - All Autonomy-Driven Vehicles
- ➡ - Mixed Human and Autonomy Driven Vehicles

Unique Gaps to Bridge

Our current state ...

- We treat machines differently than we treat people
- Machines have no stake in any outcome
- Non-deterministic without accountability is uncomfortable

What we strive for ...

- Reliability
- Explainability
- Perception and Intent
- Forensics

Take-Aways

- **De-Mystify and Generalize Artificial Intelligence**
- **Continue to mature sensing and decision-making approaches**
- **Re-examine certification and licensing requirements**
- **Re-think human and machine roles in existing and new use cases**

THANK YOU