

# Multi-Vehicle (m:N) Working Group

**NUMBER:XPO22-WG02**

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# M:N Vision Must Include Whole Ecosystem

- Considerations for M:N Must Include the Aircraft, Operational Procedures, and Airspace Management
- Moving Towards Automation/Autonomy
  - New Capabilities Require Evaluation of Technical Readiness, Regulatory Readiness, and Changing Role of the Human
  - Automation Integration and Maturation Strategy: Demonstrate New Capabilities in 1:1 Before M:N Ops Acceptance
  - Changing Roles Must be Based on Demonstrated Resilient, Proficient Technology Supported by Data
  - Changing Human Centric Airspace Management Must Be in R&D Planning and Evolution





# M:N Working Group Discussion Points

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- Operational Approval for M:N Should Focus on a Task-based, Functional-Based Demonstration of Mature Capability
- Automation Design & Human Factors Aspects of Managing M:N – Not Just for “Normal” Ops, but For Contingency/Emergency
- Lessons Learned from Swarm Fleets of SUAS or UAS in Upper Class E May Not Apply to M:N in Other Classes of Airspace
- Level of Involvement from ATC Required by Procedure/Airspace Must Be Taken Into Consideration – Not Just Whether M:N is Desirable, Technically Feasible But Is There a Viable Regulatory Path?
- Designated Separator – Person Held Responsible for Maintaining Separation – Rule Change Required if This is Redefined or Automated
- NASA/FAA/Industry Partnerships Key to Data Collection and Acceptance



# Backup Slides



# Notional Automation Capability Maturity Model

## Capability

New ability, expertise, or proficiency

## Functions/ Services

Task, role, and/or system effects which enable a *Capability*

## Technology/ Human

Equipment including HW/SW which provide *Functions/ Services*

Human contributions to provide *functions/ services*

## Data/ Knowledge

Information sources used by *Technology* and/or *Humans*

*Human* knowledge

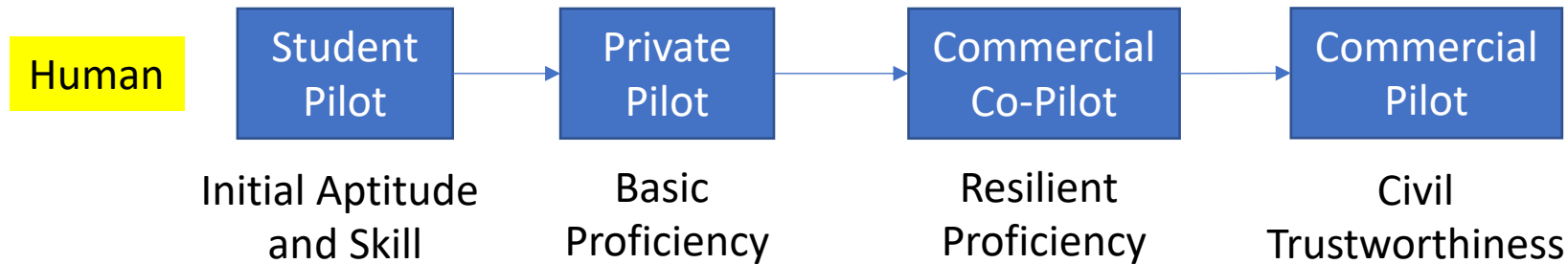
Must assess maturity, integrity, reliability, availability, etc. of data sources & technology to implement an intended function in support of a new capability

# Building-in Robust Safety Assurance

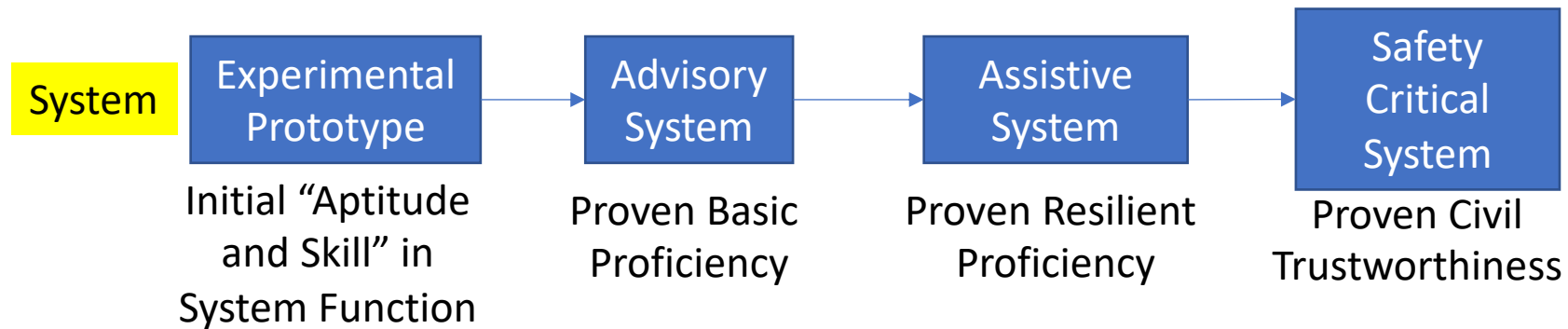


- Compare Risk-based, Model Based Automation Development to Pilot/Crew Development Process
- How Do We Build In Proficiency, Robust Function?

Scenario-based Training With Instructor + Repetition + With Expected Outcomes/Behavior



Simulation & Flight Test to Demonstrate Readiness for Intended Use, Type of Operation, Task Criticality



Must Work-up to Resilient/Robust Assurance in Automation Designs

# Automation Example – Technology Maturation

