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LAVOSAR Industry Workshop

WP1 Standardisation and Business Case

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EDA Brussels, 25 June 2013

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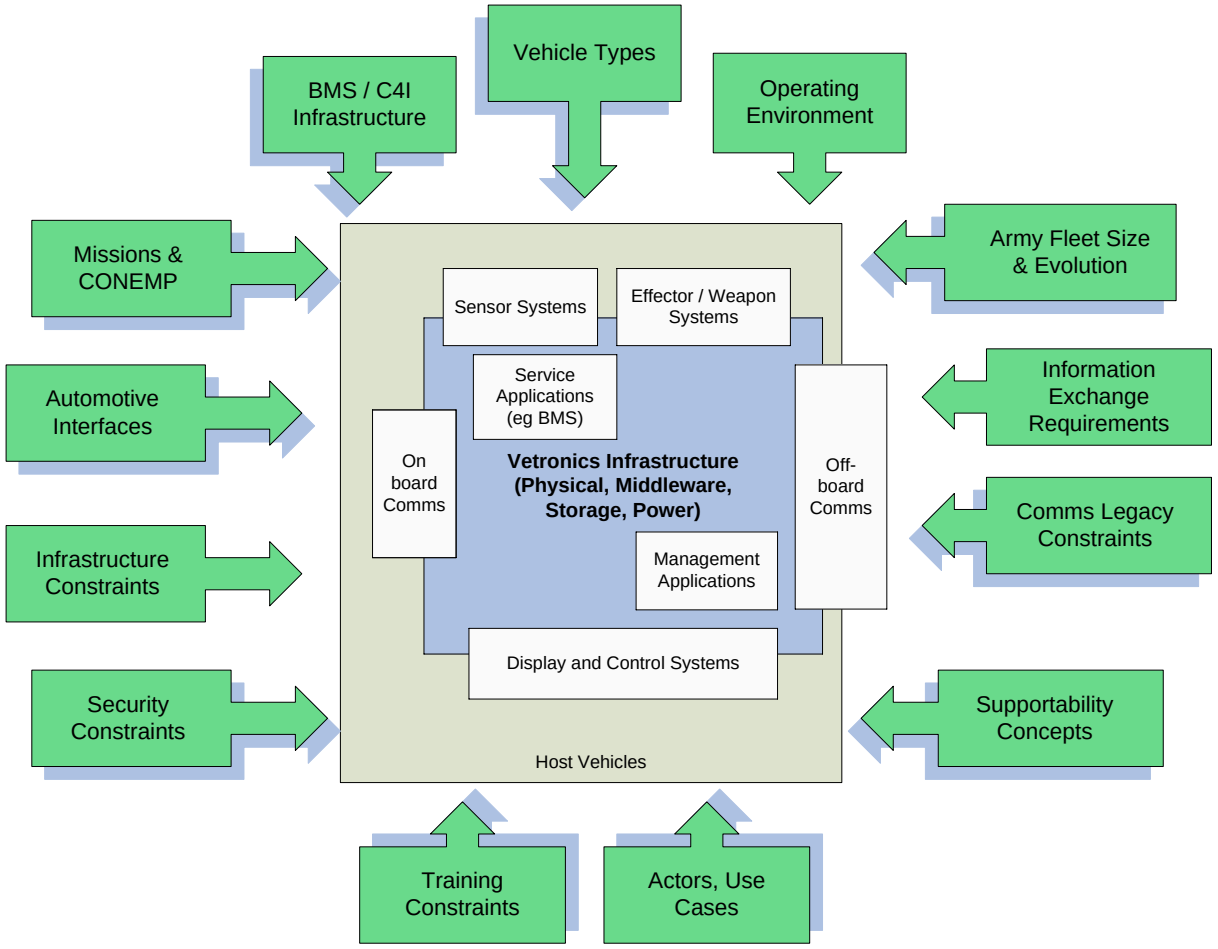
Work Package 1 (complete)

- Candidate Standards
- Normative Framework
- Business Case



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Which Vehicle Types?

- EDA Future Land Systems Expert Group identified opportunities

Vehicle Type	Short Term Prospect	Long Term Prospect (>5 years)
Combat Contact Vehicle	Some Legacy Upgrade	Tactical Differences
Combat Multi-Role Vehicle	Opportunity for Collaboration	Opportunity for Collaboration
Combat Support Vehicle	Specialist Mission Systems	Specialist Mission Systems
Logistics Vehicles	Vehicle Competition Preferred	Vehicle Competition Preferred
Unmanned Vehicles	Immature Concepts	Opportunity for Collaboration

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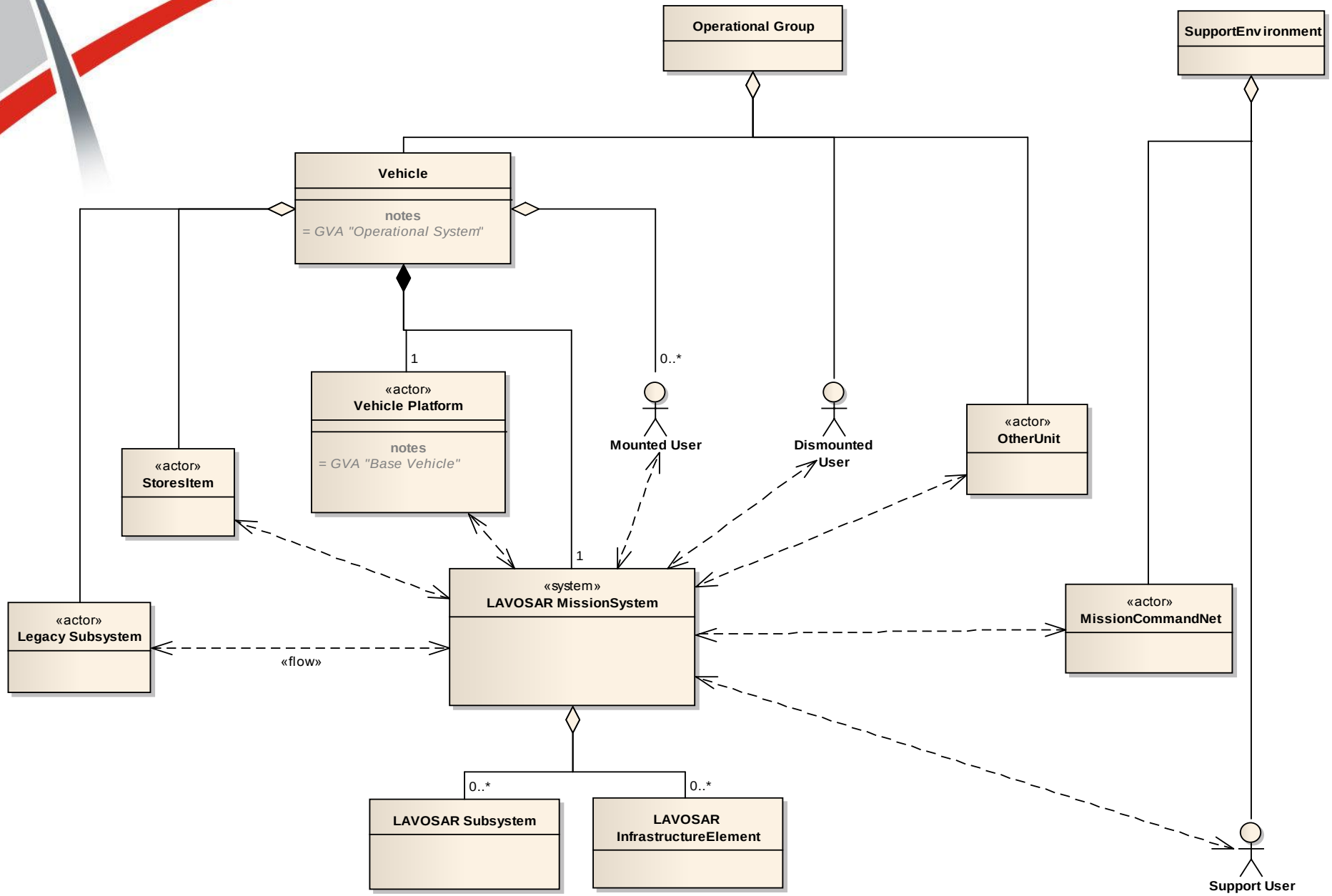
Mission System Context



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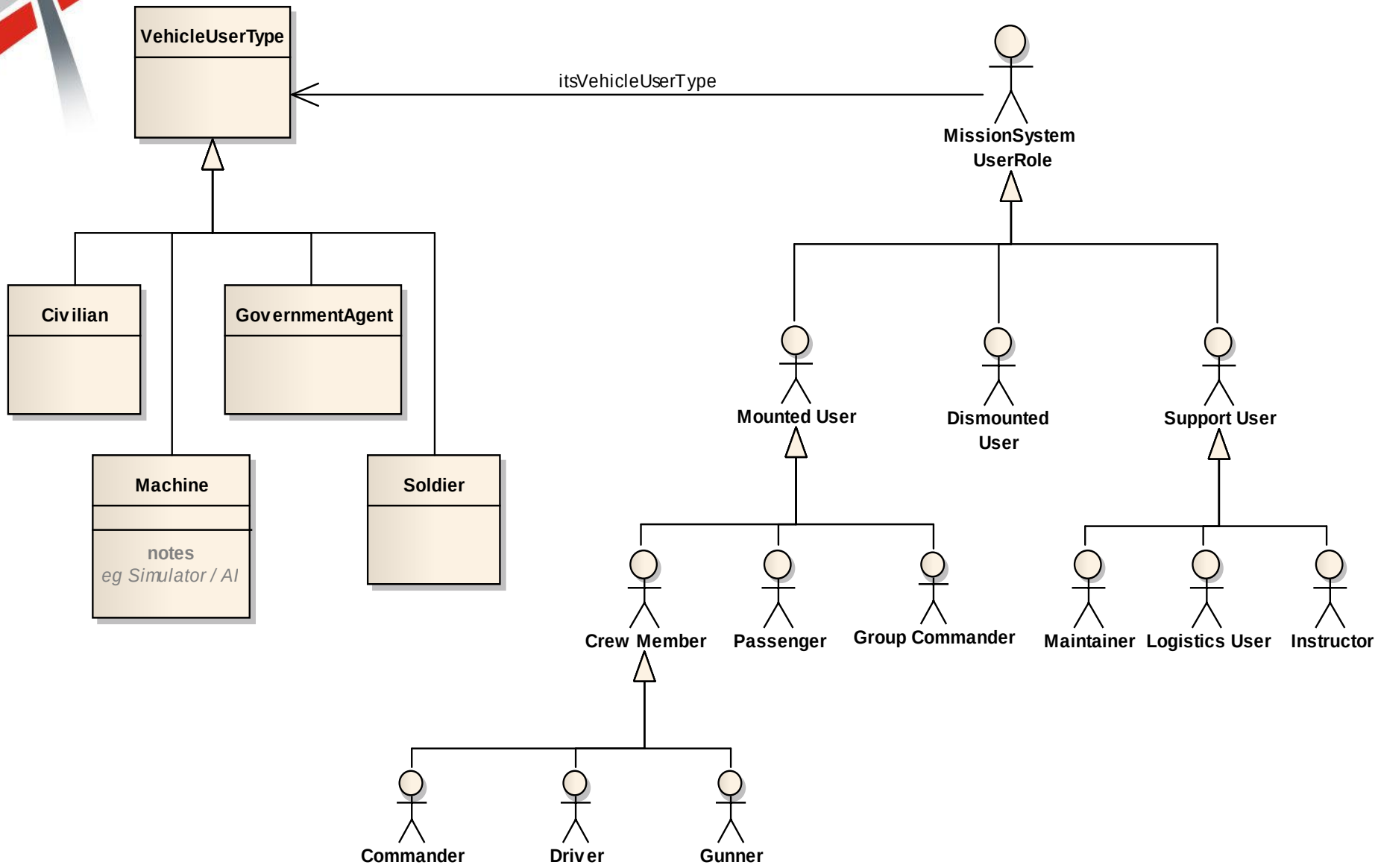
Mission System Users



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Standards

- Aim of identifying small set of precise standards to bound the architecture
- Previous lists of standards (CEN 10) - insufficient focus
- Nominations were invited for Mission System electronic architecture standards. Additional request to vehicle providers, remains open.
- Nominations received based on best practice within the team.
- Loosely grouped into categories, tabulated, reviewed and developed.
- Some “Guidance” standards are included. Aim to compress list to most architecturally relevant.

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Candidate Standards (highlights)

- Crewstation
  - Human Machine Interface - UK GVA Def Stan 23-09
  - Detailed guidance from Def Stan 00-250, MIL STD 1472
- Physical Infrastructure
  - Ethernet IEEE 802…
  - 28 Vdc – STANAG 2601 + Def Stan 61-5
  - Including connectors – Def Stan 23-09
- Data Infrastructure
  - Middleware - Data Distribution Service (DDS)
  - On-board Video RTP/SNMP (STANAG 4697 / Def Stan 00-82)
  - Off-board Video STANAG 4609
- Data Model
  - On-board - GVA Data Model
  - Off-board - NATO STANAG 5525 – MIP (JC3IEDM)

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Applicable Standards Discussion

- Input invited on

  - Safety infrastructure
  - Security infrastructure
  - Software defined radio, secure comms
  - Separation of software and hardware
  - Extensibility of middleware
  - 28 Vdc vs Higher voltage, and over what time

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Normative Framework

- Government Questionnaire
- Mission System Features
- Use Cases
- Identify major system elements

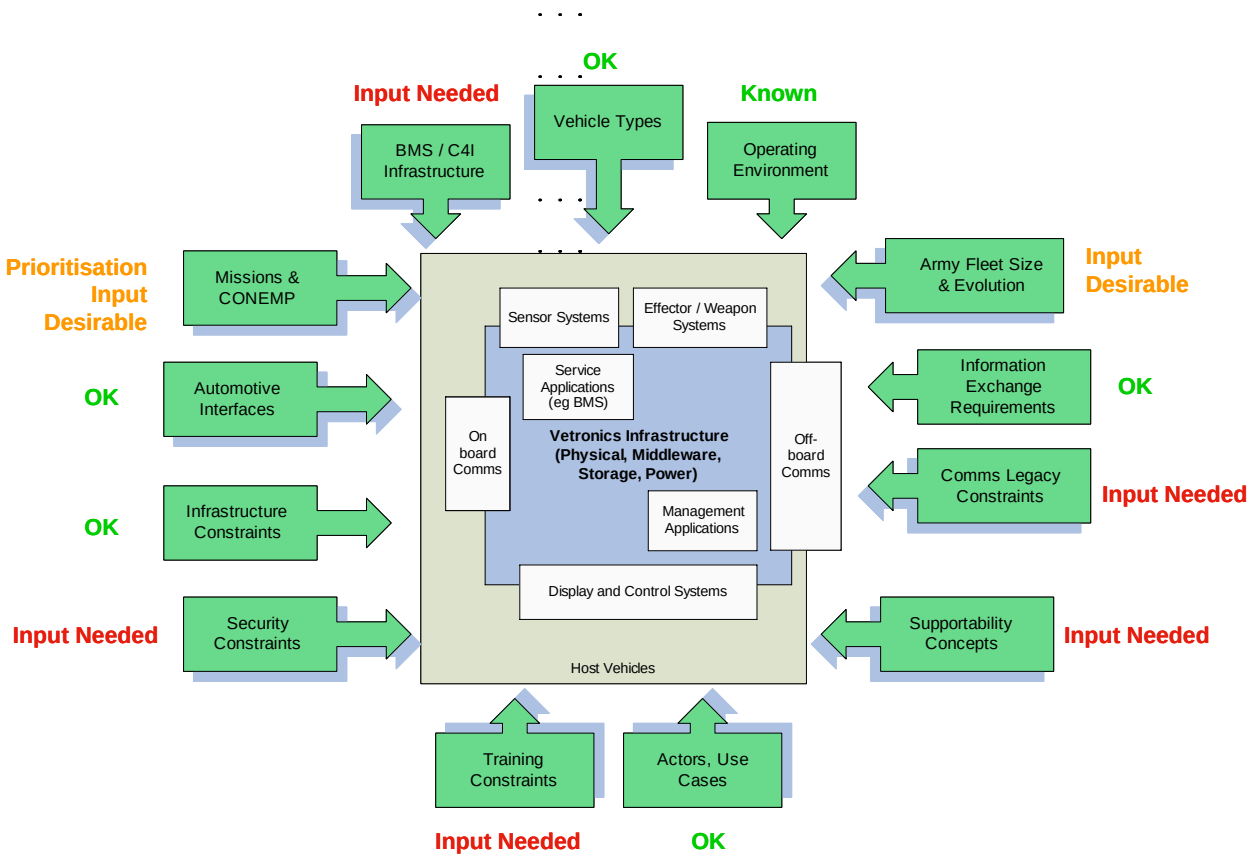
Government Stakeholder Questionnaire

LAVOSAR Study:
Vehicle Mission System Stakeholder Data Input

EDA Participating Member Country: | Date: dd mm 2013

	Vehicle Type				
General Characteristics	**MBT**	**IFV**	**Recce**	**APC**	**Truck**
Number of land vehicles with Mission System expected to be upgraded or procured up until 2023					
Anticipated Year of Initial Operating Capability					
Anticipated Year of Full Operating Capability					
Mission System acquisition / procurement concept					
Support Concept					
Training Concept					
Mission System Features					
User Interface					
Single, intuitive multi-function standard HMI display per crew station					
Flexible operator role (eg gnr, cmdr) assignment to any crew station					
Onboard Crew Communication Voice intercom					
Crew aids for collaboration / on board (Text, Graphics, Cues, Alerts)					
Head-out operation of mission system					
Crew aids for collaboration / task share between vehicles in own troop					
Other (please specify)					
Sensors					
Optical Sensors (any band) - Close Indirect Vision (driver or 360deg)					
Optical Sensors (any band) - Reconnaissance, Surveillance					
Optical Sensors (any band) - Target Acquisition and Aiming (inc LRF)					
Navigation - Own vehicle geo location measurement / GPS)					
Acoustic (eg Sniper) Detection Sensors					
Meteorological Sensors					
CBRN Sensors					
Other (please specify)					
Effectors					
Modular Weapon Subsystems (self-defence, direct or indirect fire)					
Optical Effector (eg Laser Designator, pointer)					
Acoustic (eg Public Address, countermeasures etc)					
ECM effectors					
Defensive Aids Launch (eg obscurant, smoke)					
Other (please specify)					
Applications (Operational, Training, Maintenance)					
RSTA Automated Information Development (detect, track, recognise)					
Fire Control Computation Aids					
Precision Target Geo-Location					
Navigation (Digital Maps)					
Blue Force Tracking (awareness of own force locations)					
Battlefield Information Management					
HUMS, diagnostics, prognostics information development					
Power Management					
Integrated Electronic Test & Maintenance Manuals					
Battlefield scenario simulation & training					
Other (please specify)					
Mission System Infrastructure					
HF/VHF Voice					
Data Radio					
Off-board Personal Role Radio (to dismount troop)					
SATCOM					
Mass Storage of Mission data (audio, video, location etc)					
Multiple Independent Layers of (information) Security on board vehicle					
Ability to add / remove elements / re-role mission system in Theatre					
Other (please specify)					
Number of users per vehicle operating Mission System simultaneously					
User Security Access Control to Mission System					

Information & Power Exchange Requirements	Voice	LS Data	HS Data	Power	Voice	LS Data	HS Data	Power	Voice	LS Data	HS Data	Power	Voice	LS Data	HS Data	Power	Voice	LS Data	HS Data	Power
Own Vehicle - Dismounted Soldier																				
Own Vehicle - Troop Vehicle																				
Own Vehicle - Command Network																				
Own Vehicle - Maintainer																				
Own Vehicle - Training Equipment / Training Environment																				
Own Vehicle - Dismounted Equipment																				
Own Vehicle - UAV/UGV (eg video downlink)																				
Own Vehicle - Internet																				
Own Vehicle - Removable Storage Media																				
Own Vehicle - Key material																				
Other (please specify)																				
Fixed Legacy Interface Types																				



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Mission System Feature Priorities

- Based upon average response, top five functions for the Combat Multi Role platform:
  - HF/VHF Voice Communication
  - Navigation (Digital maps)
  - Battle Management
  - Blue Force Tracking
  - Data Radio
- Expected government priority - concerning Battle information related

- Of remaining features, the following were rated important
  - Crew Voice Intercom
  - Close Indirect Vision
  - Defensive Aids Launch
  - Precision Target Location
  - Off-board Personal Radio
- These concern Local situational awareness

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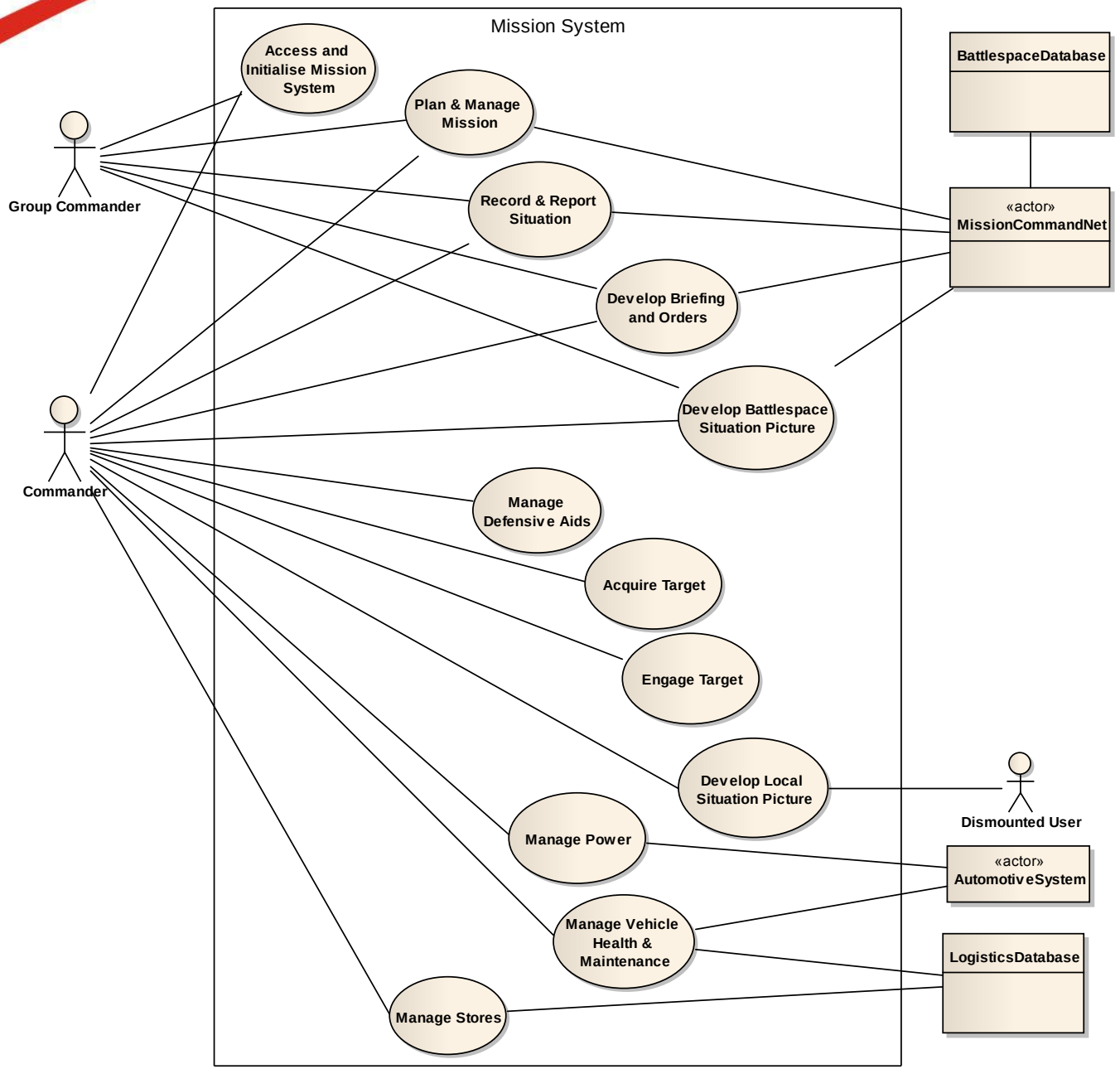
Use Cases - Command



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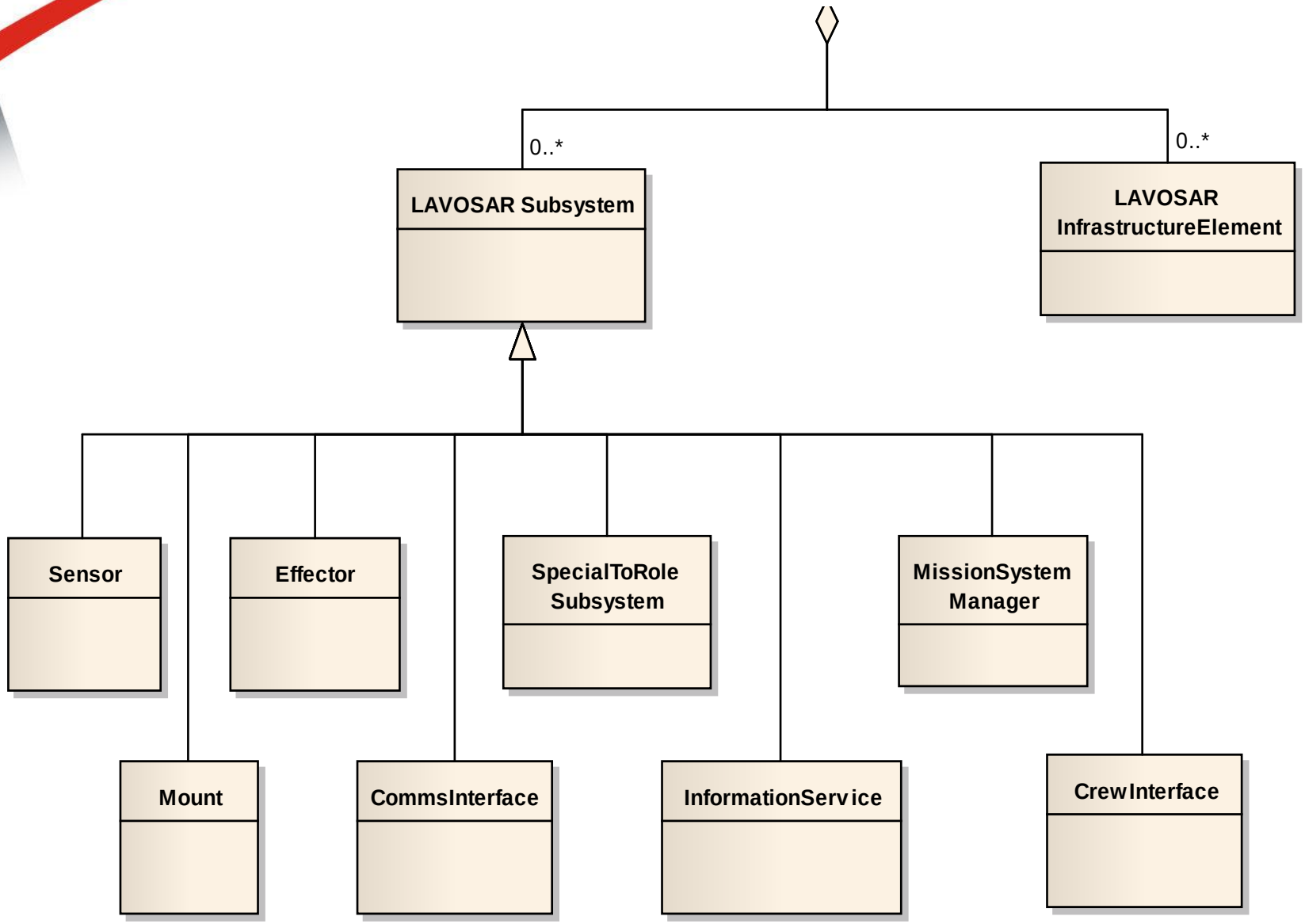
Mission System - Composition



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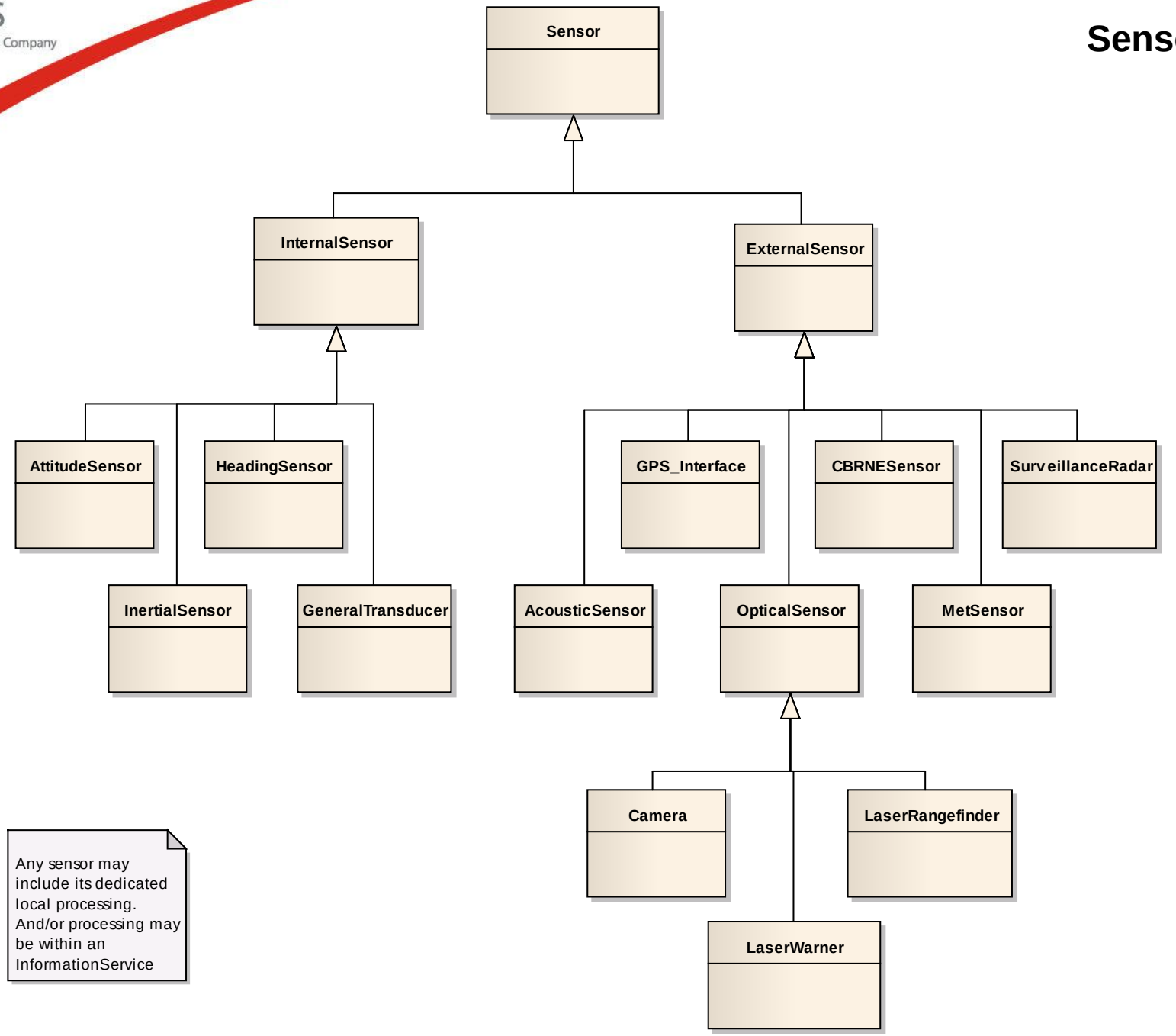
Sensor



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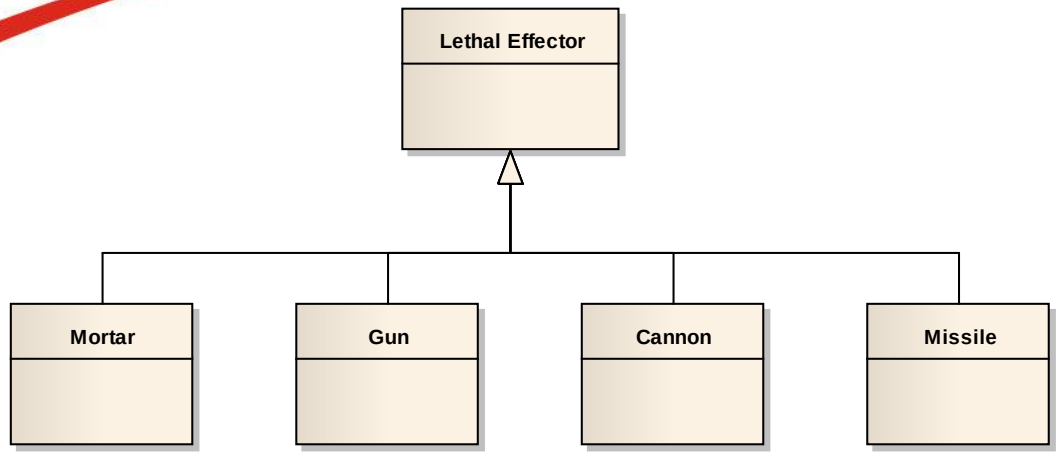
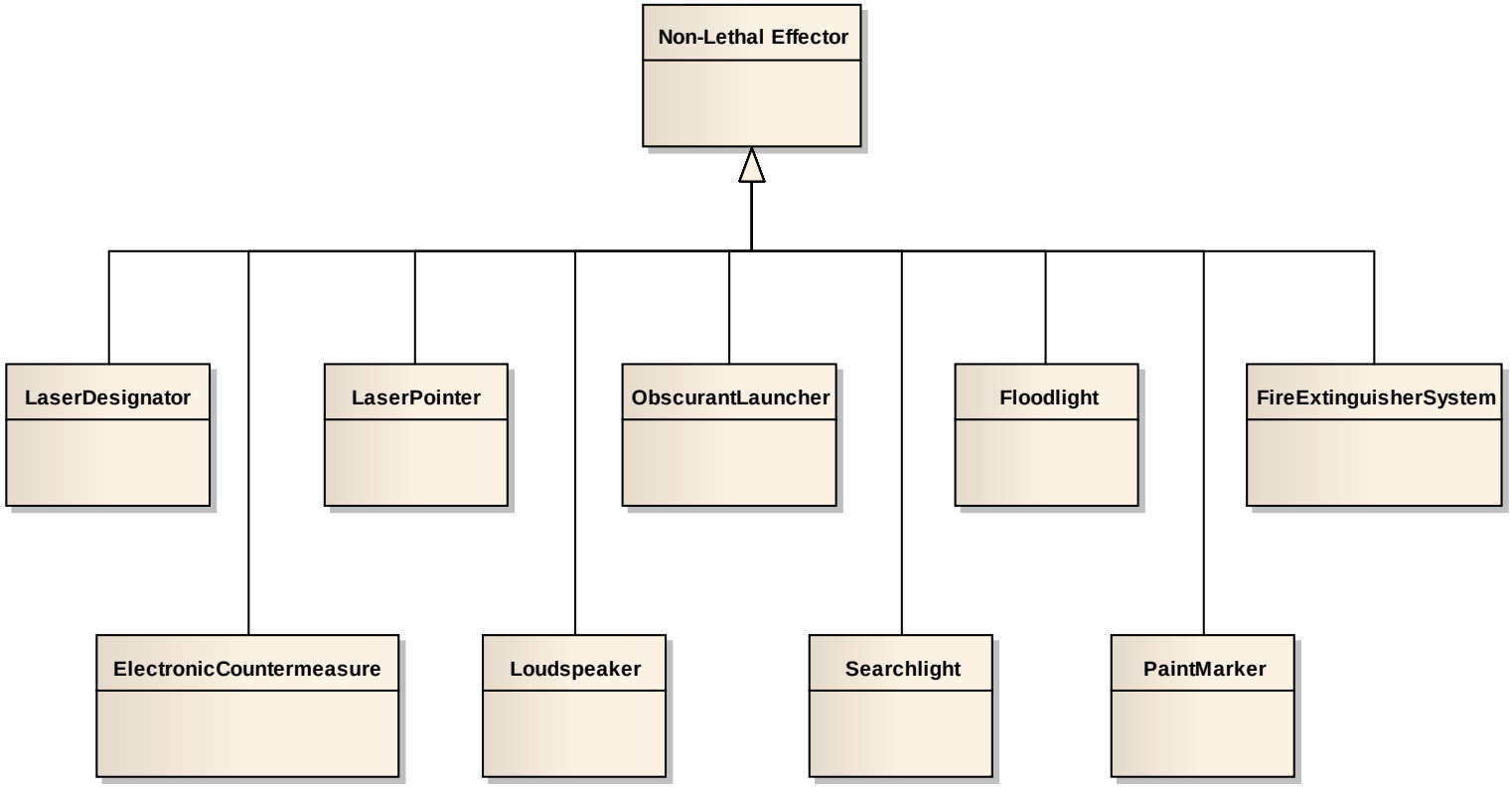
Effector





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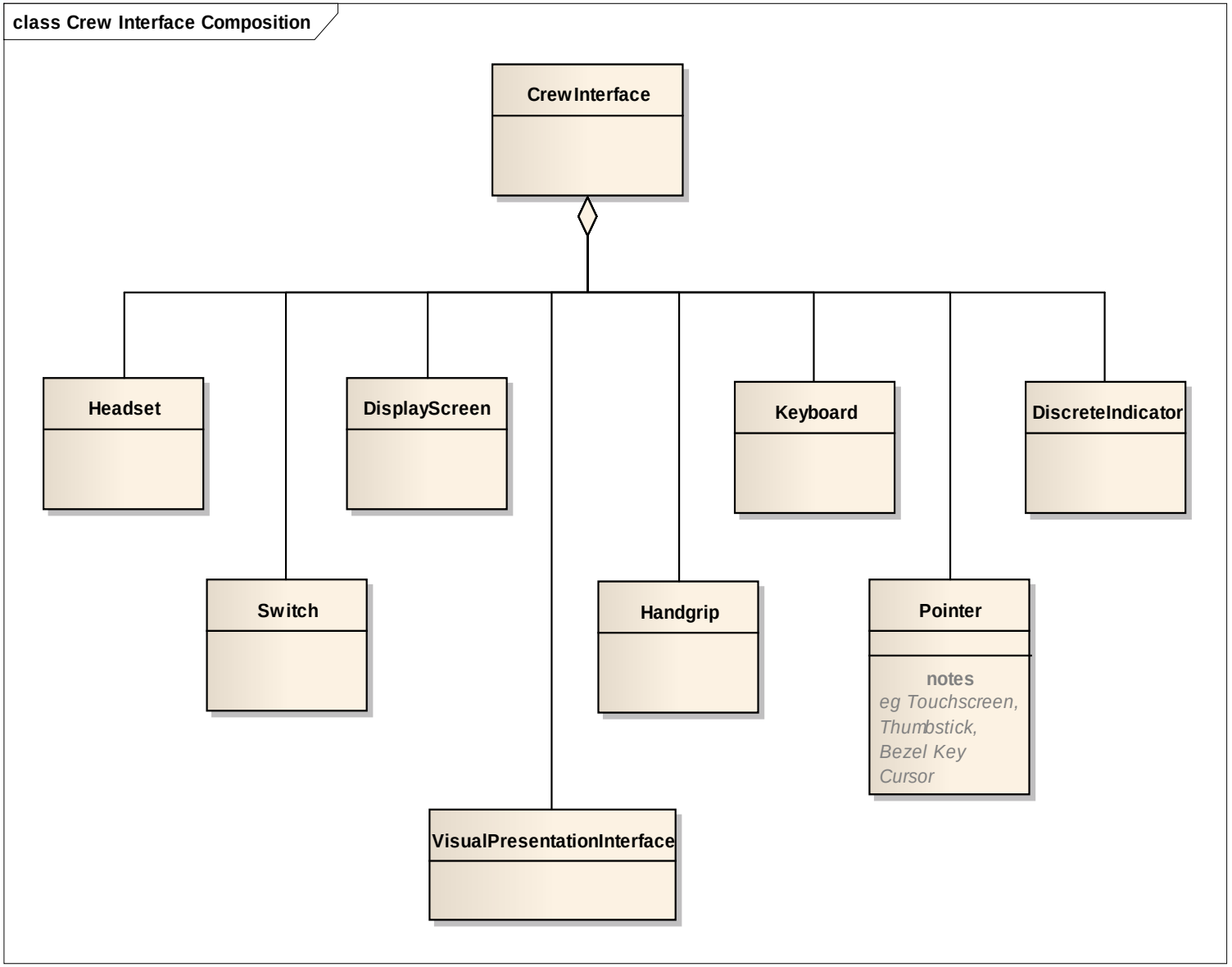
Crew Interface



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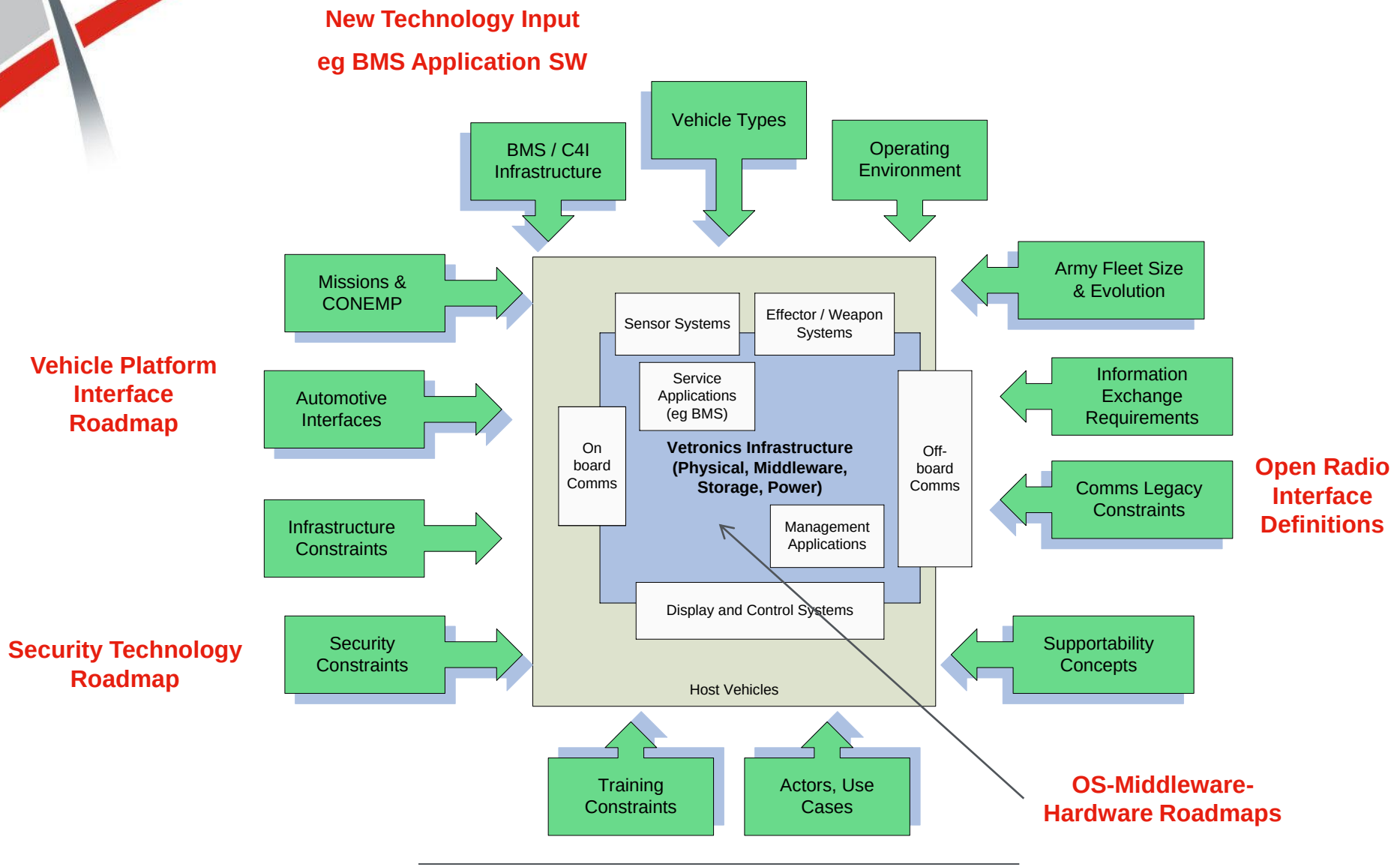
Normative Framework – Discuss



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Business Case - Background

- Evolving operational threats.
- Frequent variation in theatre of operation and mission requirements.
- Shrinking procurement, fewer developments of new vehicles.
-
- Procurement of generic base vehicle platforms without a full concept of use for the mission systems they may ultimately carry.
- Buyer aversion to the single source prime “vehicle provider is mission system integrator” approach.
- Increasing vetronics sophistication - Mission system integration skills needed
- Buyer expectation of a COTS-like ‘plug-and-play’ continuous technology progression with all associated benefits. (vs market volume)
-
- Increasing software capability expected and possible … giving operational improvements (with associated complexity and risk).

- Government recognition of above, leading to accelerated initiatives in standardisation.

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Business Case - Perspectives

- “Tier 0” Government and Military
  - User
  - Procurement Agency
- “Tier 1” Industry Prime Contractor and Mission System Integrator
  - (inc C4I Network Technical Authority)
- “Tier 2” Industrial Supply Base.

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Business Case - Benefits

- "Tier 0" Government and Military
  - User
    - Reduced Workload
    - Improved task effectiveness
    - Modular flexibility
    - Training simplified
    - Maintainability
  - Procurement Agency (eg fleet 5000 vehicles)
    - *Specification simplification*
    - *Initial Acquisition (~10% potential saving)*
    - *Support*
    - *Training*
    - *Whole life – potential saving initial estimate ~25%*

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Business Case - Benefits

- "Tier 1" Industry Prime and Mission System Integrator
  - Initial Specification effort reduced
  - Maintain architecture cost reduced
  - Acquire Infrastructure and subsystems – from Tier 2 reductions
  - Integrate, Test, Certify, Deliver – Risk reduction
  - COTS infrastructure support base (eg test equipment)

- "Tier 2" Supply Base
  - Develop Infrastructure saving (roadmap, open standards)
  - Manufacture of Infrastructure - scale
  - Develop subsystem – software/hardware reuse, tool reuse

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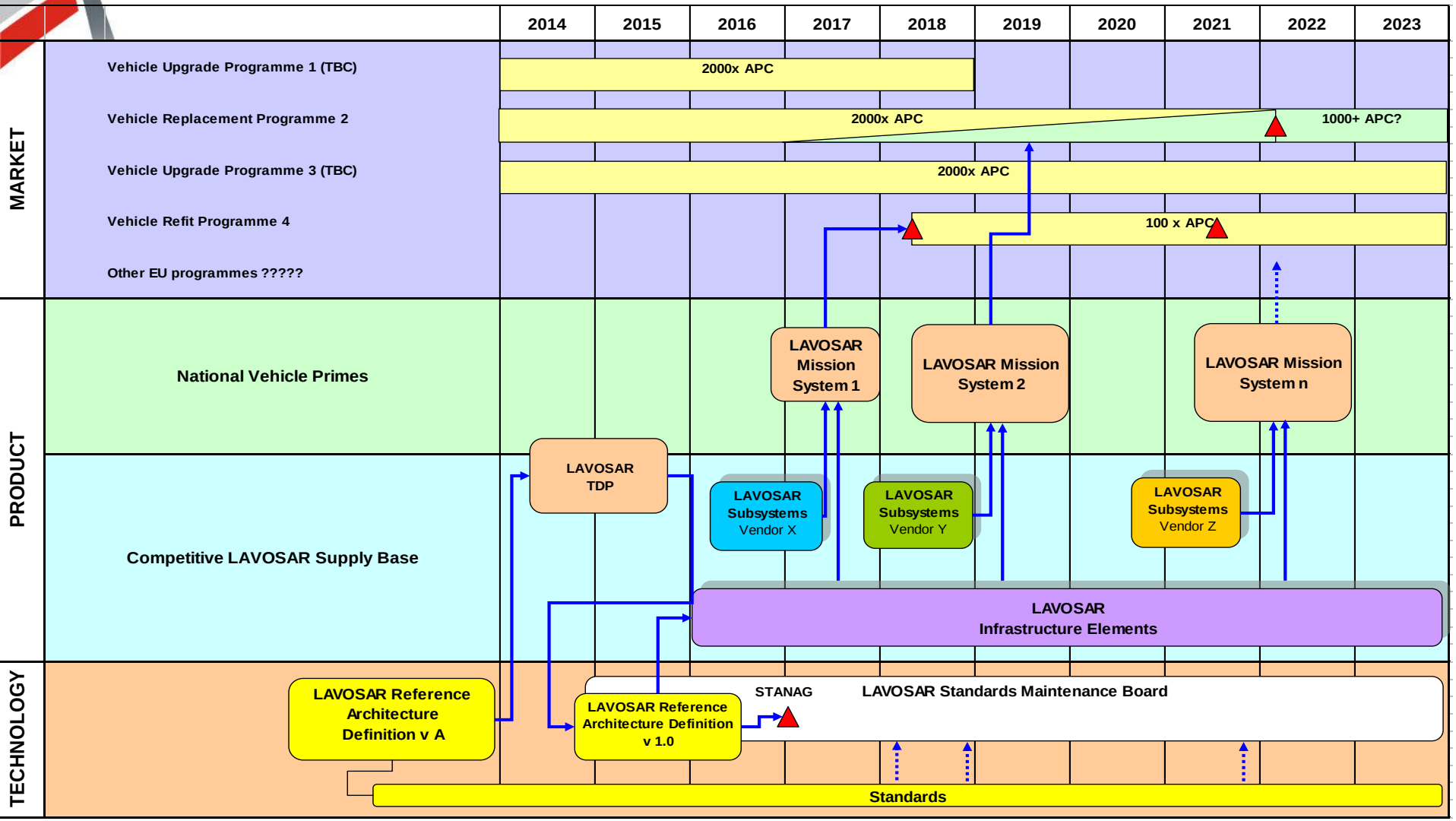
Outline Roadmap



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Business Case – Discussion

- Work should continue to quantify
  - Fleet sizes
  - Acquisition model
  - Capability introduction schedules
  - Software cost model

- Comments invited on assumptions:

  - Funded EU body maintains LAVOSAR Reference Architecture Definition..
  - EU free-market procurement policy for LAVOSAR Subsystems.
  - Vehicle Prime organisations continue, as design authorities, to underwrite the installed performance. (not Tier 0 “plug and play”)
  - Scope for Tier 1 Mission System Integrator v Vehicle Provider

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END

Thank you

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