



Algorithm & Simulation Directorate



Raytheon
Missiles & Defense

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Released 8/2022
RMD-20135

Agenda

- How the Algorithm & Simulation (A&S) Directorate fits into Engineering
- The individual disciplines within A&S
- How you fit into A&S: The matrix organizational structure
- Q&A

The Algorithm & Simulation (A&S) Directorate

Raytheon Missiles & Defense: By the Numbers

Raytheon Missiles & Defense brings customers the industry's most advanced end-to-end solutions, delivering the advantage of one innovative partner to detect, track and defeat threats.

**We are here
to create a
safer future**



\$16B
annual revenue



30
states



30K
employees



28
countries

Global headquarters: Tucson, Arizona



Raytheon Missiles & Defense provides the industry's most advanced end-to-end solutions to detect, track and engage threats

What we do



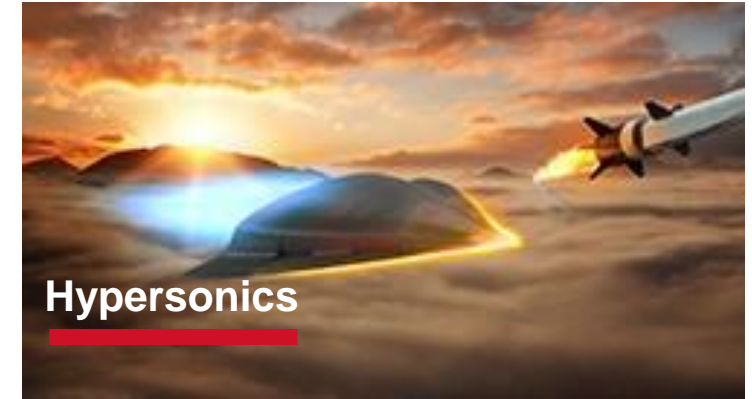
Air Power

Achieving air dominance depends on what aircraft carry and the technology that powers them.



Counter-UAS

Defending against drones requires a range of systems, including sensors and effectors.



Hypersonics

Facing global threats of the future requires hypersonic weapons that travel at incredible speeds.



Land Warfare & Air Defense

Overpowering adversaries requires equipping ground forces with integrated, proven precision weapons and more.



Strategic Missile Defense

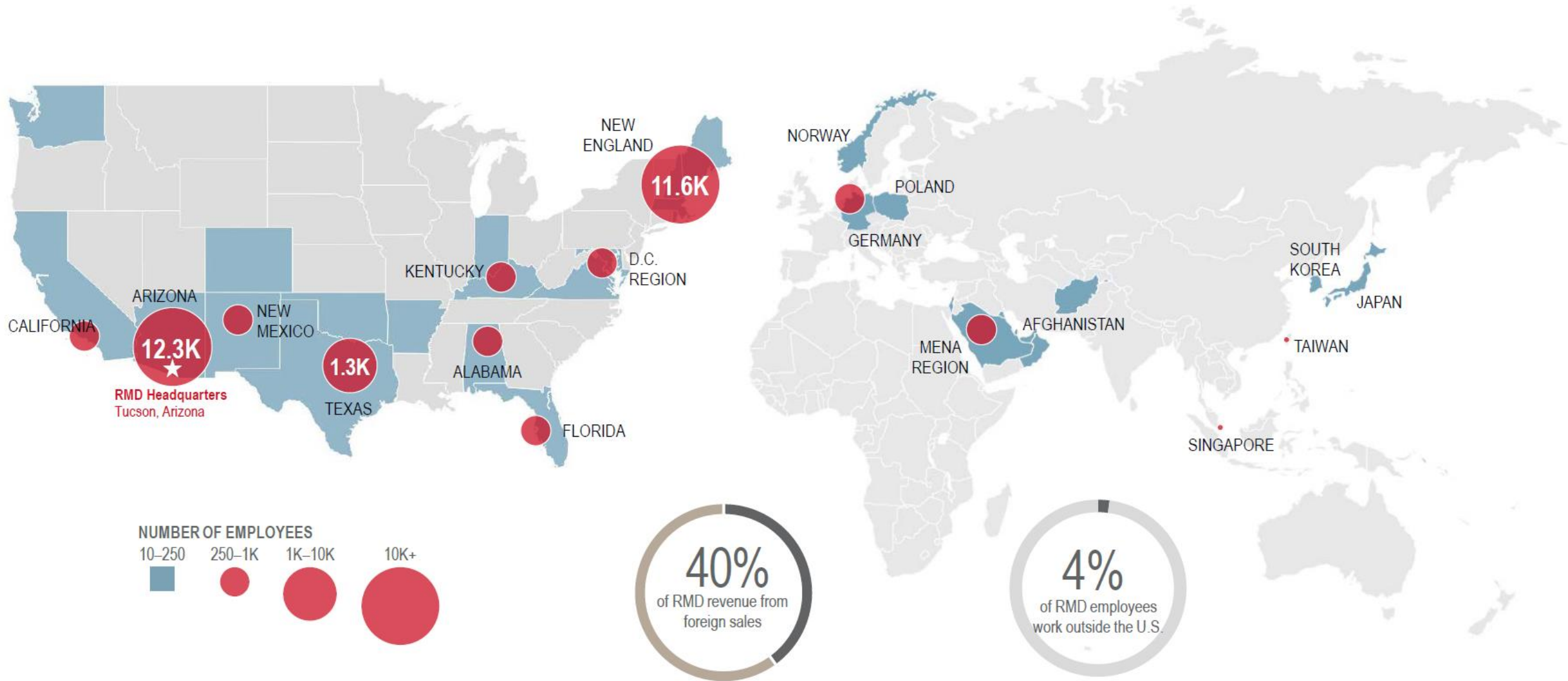
Making the world a safer place requires technologies that see farther, process data faster and precisely guide interceptors to targets.



Naval Power

Maintaining freedom of the seas calls for innovative sensors, command and control and precision weapons.

Raytheon Missiles & Defense: Major Locations



Raytheon Missiles & Defense: Engineering

Cross Product Team

Define overall system solutions and integrate subsystems and products to deliver comprehensive layered-defense capabilities, with 5 focus areas:

- Algorithm & Simulation
- System Design & Architecture
- Systems Modeling & Architecture
- Systems Integration & Test
- Whole Life Engineering

Integrated Product Team

Design, implement, and test software and hardware subsystems and products

- Electrical Products
- Mechanical Products
- Software Products

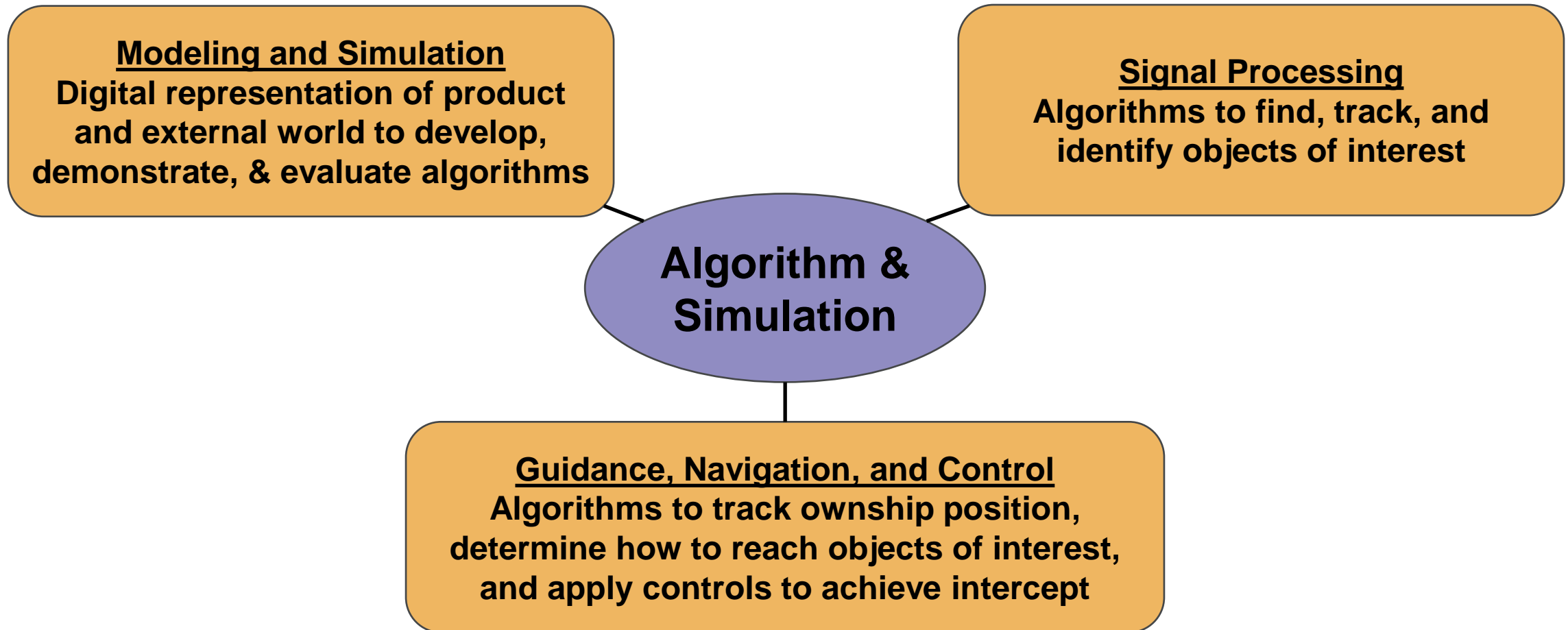
Engineering Execution

Support engineering efficiency, operations, and services

- Configuration & Data Management
- Engineering Excellence
- Modular Technologies
- Technology & Strategic Partnerships

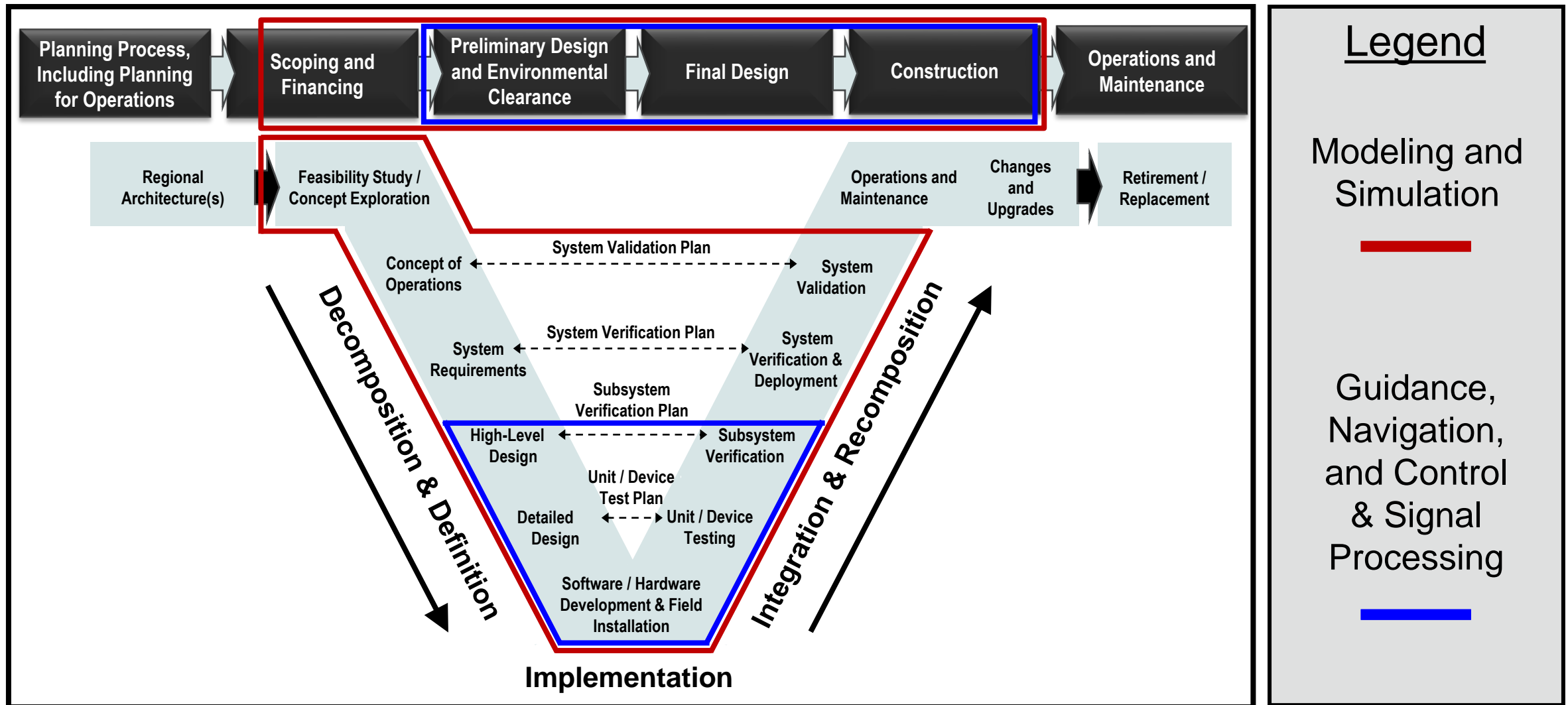
RMD Engineering has three focus areas

Engineering: Algorithm & Simulation Directorate



A&S's vision is to be our customer's first choice for product solutions through world-class people, leading-edge technology, and capability they have confidence in.

The Systems Engineering “V” Chart Ties Things Together

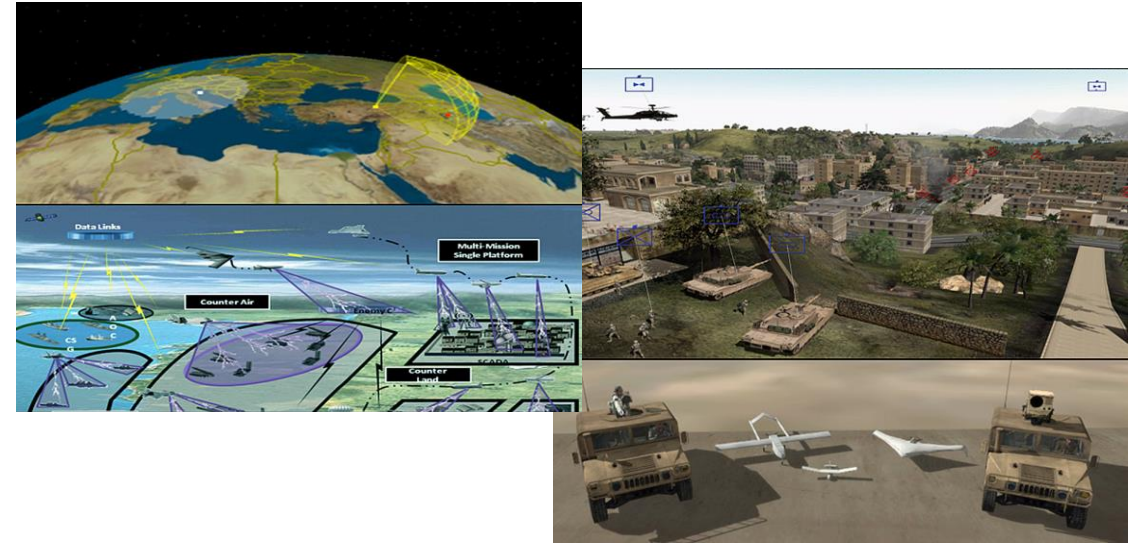


Individual Disciplines

Modeling and Simulation (M&S)

Responsibilities

- Integrated flight simulations
- Animation & visualization
- Computer-in-loop test environments
- Mission level analysis & concept development
- Detailed performance analysis
- Component modeling and Interoperability
- Scene generation and sensor modeling
- Pre- and Post-flight analysis



A&S Context

- Provide simulation environment to host and demonstrate performance of algorithms
- System performance assessment/analysis
- Analysis and verification of Concept of Operations and system design

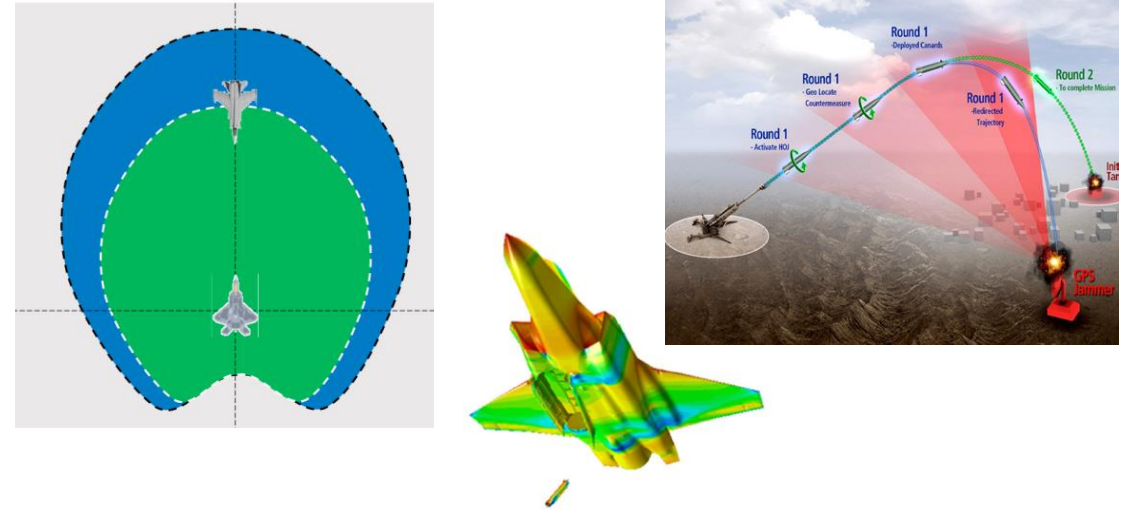
Typical Background

- Degrees in Computer Science, Applied Math, Physics, Statistics, Operations Research, Engineering disciplines, ...
- Software Skills in C/C++, Matlab, Python, Linux, Fortran, Java, Perl, Distributed Computing, ...

Guidance, Navigation, and Control (GNC)

Responsibilities

- Guidance, target tracking, target state estimate
- Navigation, trajectory optimization
- Control actuation system algorithm design and hardware integration, autopilot
- Aerodynamic design and analysis, computational fluid dynamics, wind tunnel testing, flight sciences
- Autonomy



A&S Context

- Receive & process target track information from Signal Processing
- Provide algorithms for flight software and simulations
- Gather and analyze telemetry data to assess algorithms and validate simulation
- Establish hardware errors & confidence levels

Typical Background

- Degrees in Aerospace Engineering, Electrical Engineering, Mechanical Engineering, Physics, Math, ...
- Software Skills in C/C++, Matlab, Python, Linux, ...

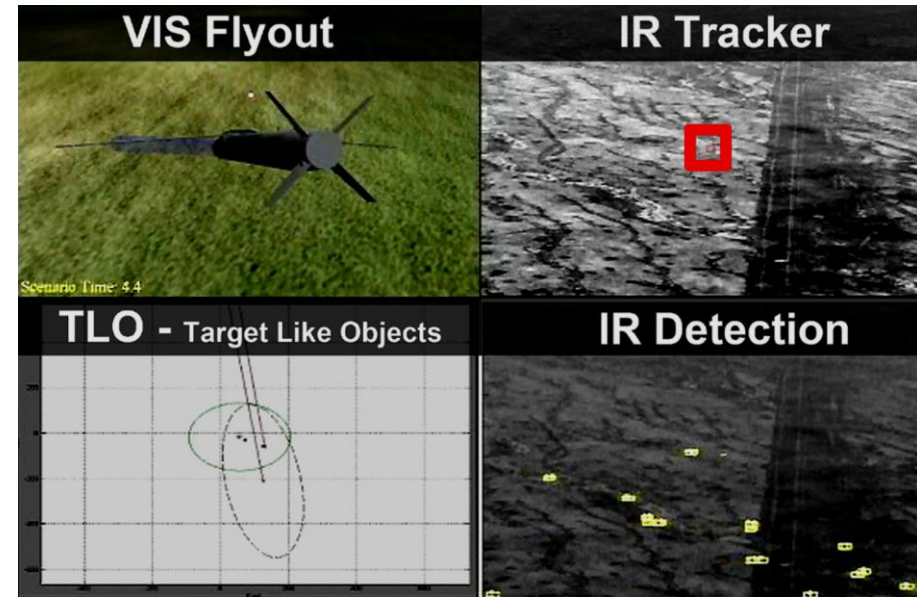
Signal Processing (SP)

Responsibilities

- Work with radar frequency (RF), visible electro-optic (EO), and infrared (IR) sensor data
- Convert raw sensor data into usable data, including calibration and de-noising
- Design and develop algorithms for fusion, object detection, tracking, classification, countermeasure rejection, & terminal aimpoint
- Apply Machine Learning

A&S Context

- Provide target track information to Guidance, Navigation, and Control
- Provide algorithms for flight software and simulations
- Gather and analyze telemetry data to assess algorithms and validate simulation

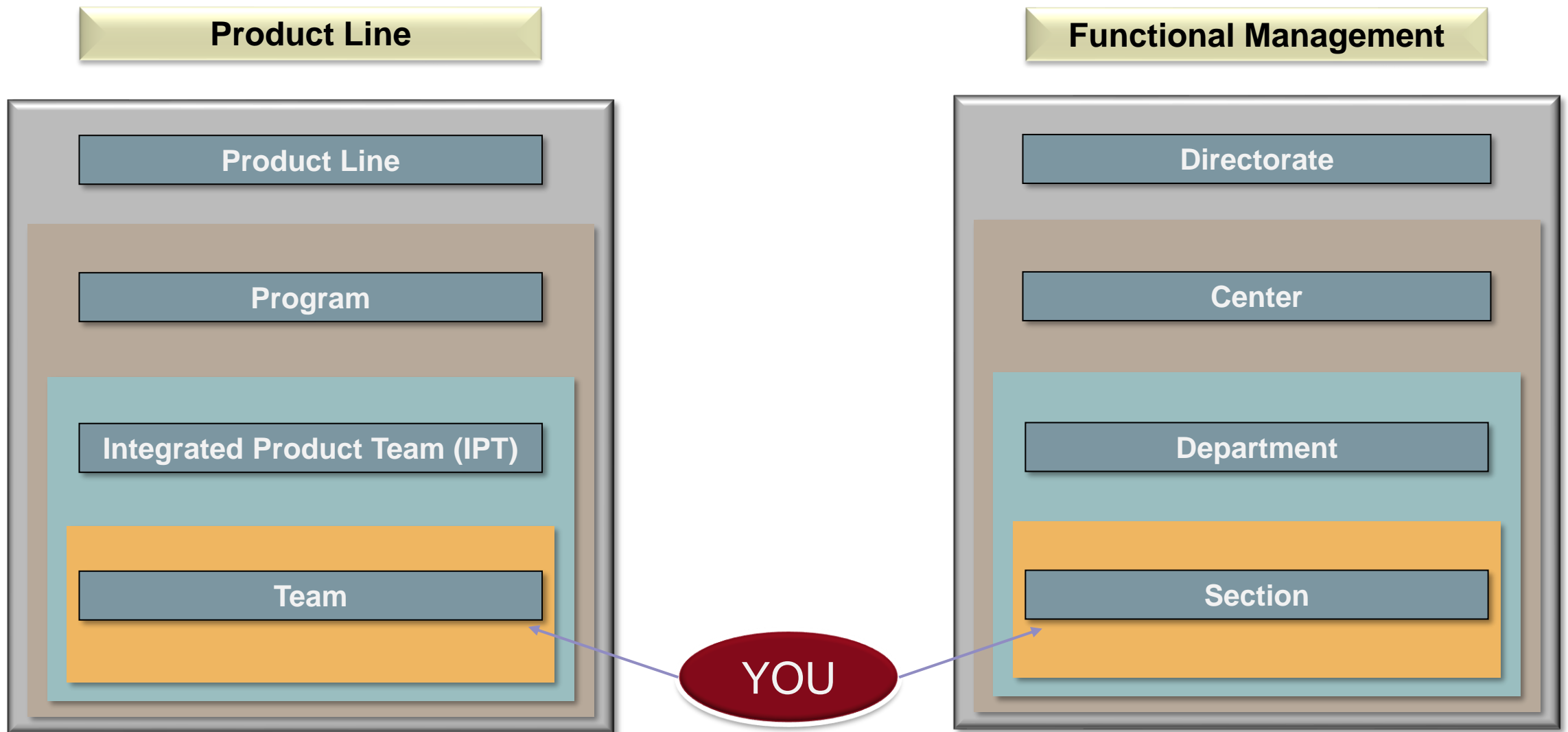


Typical Background

- Degrees in Electrical Engineering, Computer Engineering, Applied Math, Computer Science, Physics, ...
- Software Skills in C/C++, Matlab, Python, Linux, ...

Matrix Organizational Structure

Product and Functional Structures



Responsibility Comparison

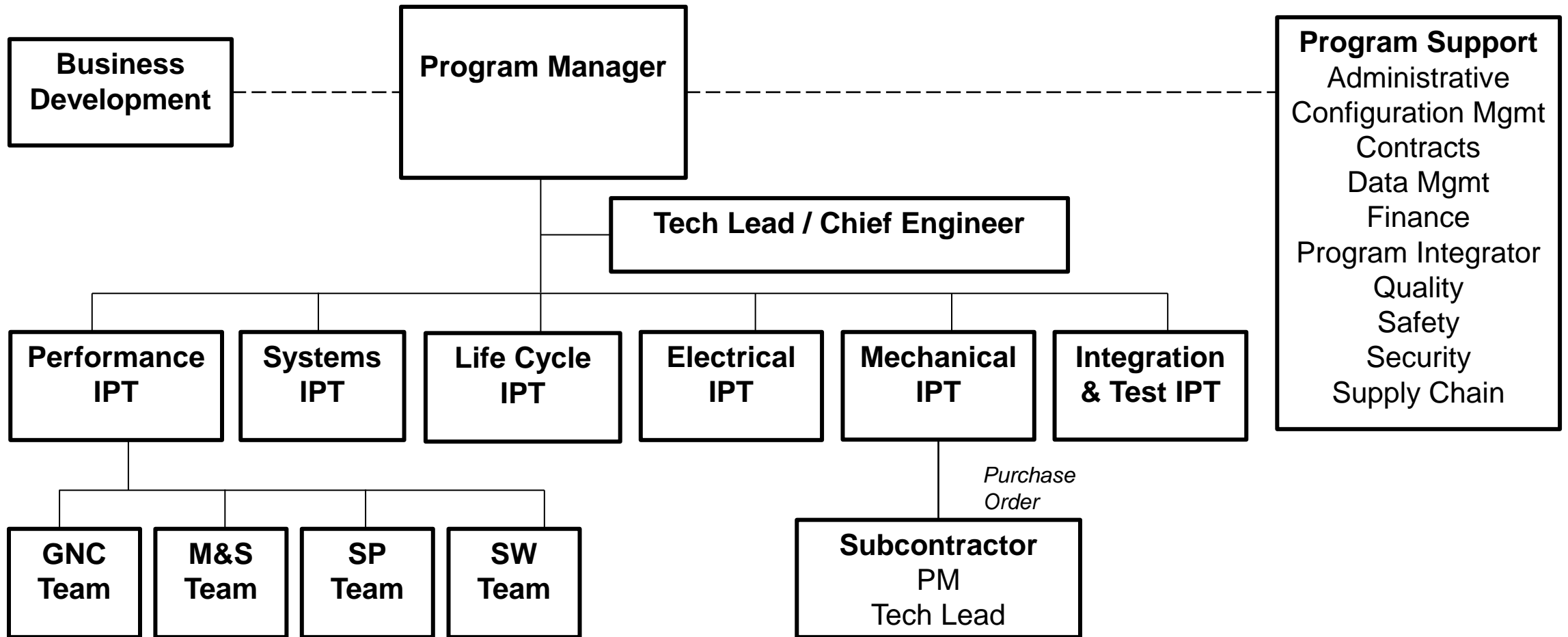
Product Line

- Day-to-Day Tasking
- Charge Numbers
- Customer Interface
- Program Schedule
- Financial Reporting
- Capturing New Business
- Risks & Opportunities Management

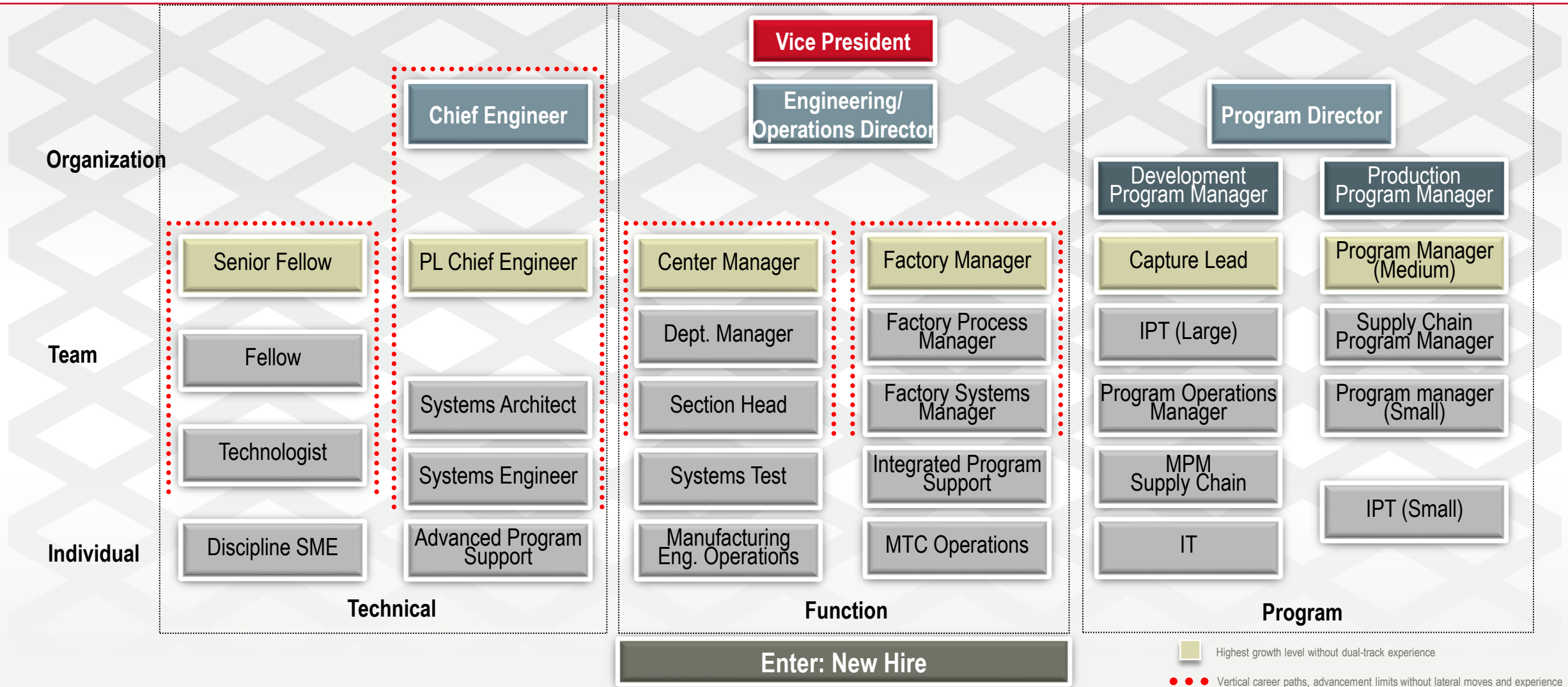
Functional Management

- Provide Staffing to Programs
- Career Development
- Performance Development
- Timecard Approval
- Travel Approval
- Digital Technology Assets
- Talent Recruitment

Example Program Organization Chart



Technical / Leadership “Lattice” for Career Growth



Security Clearance

- A&S engineering & science positions typically require a security clearance
- Raytheon Missiles & Defense does not make the clearance decision
 - The DoD Defense Counterintelligence & Security Agency conducts the background investigation, and the DoD Consolidated Adjudications Facility determines eligibility for a Personnel Clearance
 - <https://www.state.gov/m/ds/clearances>
- How long does it take to get a security clearance?
 - According to state.gov, the time it takes for each case will vary depending on the person's specific circumstances

Questions?