Lockheed Martin Transformation

You may not recognize us

September 28, 2023

LOCKHEED MARTIN

Agenda

- Digital Transformation
- AI4SE - CJADC2
- SE4AI - LAIC
  - AI Factory
  - Data Fabric
- AI Ethics at LM
- Bringing it all together

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Mission-Driven Transformation

Platforms/People

Systems of Systems

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Lockheed Martin People

110,000
Employees

58,000
Scientists and Engineers

375+
Facilities Worldwide

Operating in over
54
Countries with
7,800
Employees

Mission-Driven Transformation

Across our business, we're **transforming with urgency** to deliver the **21st Century Security capabilities** our customers need to stay ahead of rapidly-evolving threats.

We're embracing **disruptive innovation** in our processes, technology and tools to drive **speed, agility, and data-driven insights** for our customers.

Lockheed Martin Business Transformation

Case For Bold Transformation vs. Incremental Change

- Changing Customer Needs & Expectations
- Evolving Competitive Landscape
- Better Enablement of OneLM Vision

"Re-Engineer Business Processes & Re-Engine the Company"

Desired Transformational Business Outcomes

- Speed
- Agility
- Insights
- Competitiveness

"Empowering our People to Connect, Collaborate, and Innovate with Speed and Agility"

Monuments

- Compliance
- Security
- LM Core Values

Standards

- Enterprise Reference Architecture/ Guardrails
- Return to Core If Not, Why Not
- No/Low Customization
- Industry Standards

North Stars

- Model-Based Enterprise
- Operating Models
- Interoperability
- Commonality
- Data as a Strategic Enterprise Asset
- Stakeholder Experience

Execution and Governance

Value Streams

- Concept to Product
- Design to Sustain
- Acquire to Retire
- Plan to Perform
- Record to Report
- Order to Cash incl. Opportunity
- Relationship to Retention
- Plan to Stock
- Issue to Complete
- Procure to Pay
- Hire to Retire

Empowered Agile Value Stream Product Teams
Process, Data, and Systems

Led by Enterprise Functional Process and Product Owners

Supported By Functional SME's, IT Product Owners, Business/IT/Data Architects, Risk/Compliance, Business Process Optimization, Change Management

Critical Success Factors

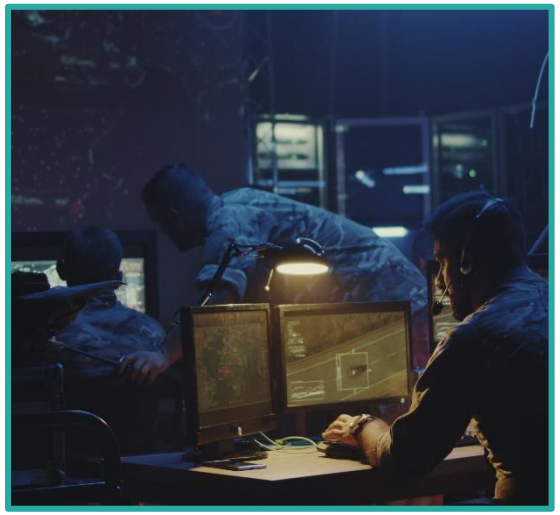
- Customer First
- Conviction
- Commitment
- Change
- Communication
- Consistency
- Courage
- Course Correction
- Compromise

"Process First"

Business Process Re-Engineering, Systems Modernization, and Change Management

"Persona-Based User Centric Design"

Transformational Business Outcomes



Speed:

Accelerate program timelines to deliver new capabilities from the factory to the field faster than ever

Agility:

Respond to rapidly-changing customer needs and stay ahead of a dynamic technology landscape

Insights:

Build a data-centric enterprise that collects, integrates and analyzes information for strategic advantage

Competitiveness:

Drive efficiency and customer mission value through innovation, competitive pricing and streamlined processes

North Stars for Transformation

Model-Based Enterprise: We're adopting a model-first mindset into how we generate, analyze, and share data as we collectively build and utilize integrated models across the enterprise

Commonality: We're driving greater commonality across Business Areas and Functions with standard processes, applications and performance measures to drive business/revenue growth and margin expansion

Operating Models: We're expanding available operating models to meet shifting customer need for increased agility, affordability, spiral development, disaggregation, and the application of commercial technologies

Data as a Strategic Asset: We're defining data domains, access, governance, security and analytics to support the real-time delivery of interoperable data and insights for decision-making

Interoperability: We're enabling greater visibility of people, materials, capacity, and costs, for all value streams and programs, to simplify the exchange of talent and resources across Business Areas and Functions

Stakeholder Experience: We're creating a tailored experience across employees, suppliers, partners, and customers to simplify information access while improving both quality and timeliness of interactions

A holistic approach to Transformation that will empower employees, streamline processes, and take One LM to the next level.

Factory & Product Build Simulations in Parallel with Product Design

Factory Simulation

Enhanced Automated Capacity and Utilization Analysis For Factory Optimization

Build Simulation

Iterative Manufacturing and Design Loop To Improve Design and Accelerate Learning Curve

AR Training

Digitally Simulated Mfg Environment Increases Preparedness of Factory Staff

Virtual Build Before You Build

Engineering for the End-to-End Lifecycle

Design for Maintainability

Visual and Analytical Models to Assess Maintainability Impacts with System Design for Lifecycle Affordability

Sustainment Simulation

3D Technology to Represent Sustainment Data and Immediately Interpret the Results to Minimize System Downtime

Global Sustainment At The Edge

Automation and Technologies at Warfighter Locations of Need to Deliver the Intended System Effects

Digitally Integrated From the Factory to the Field

LM JADC2 Approach

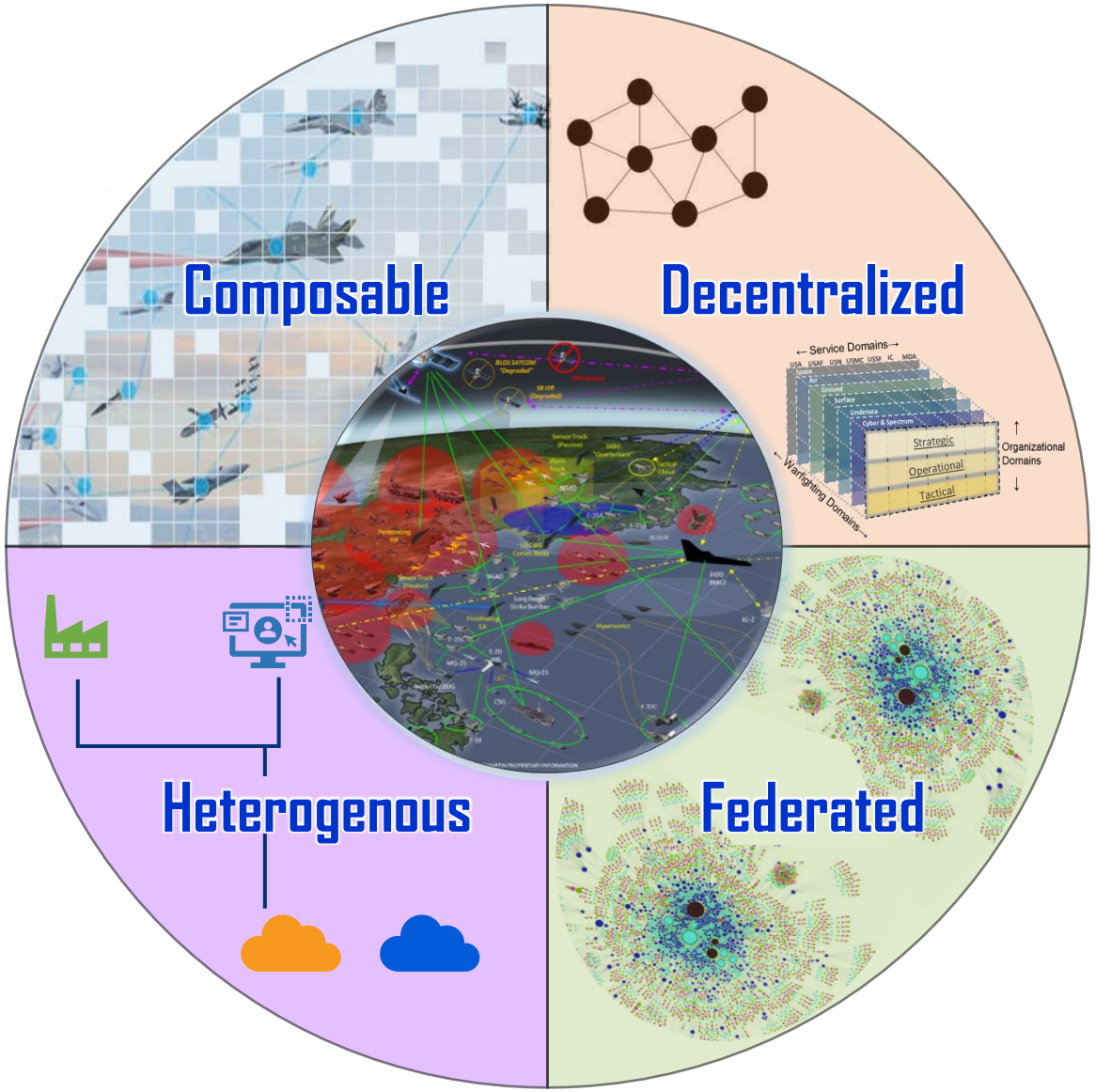
CJADC2 Tenets

Software

Monolithic

Command & Control

Centralized



Digital Infrastructure

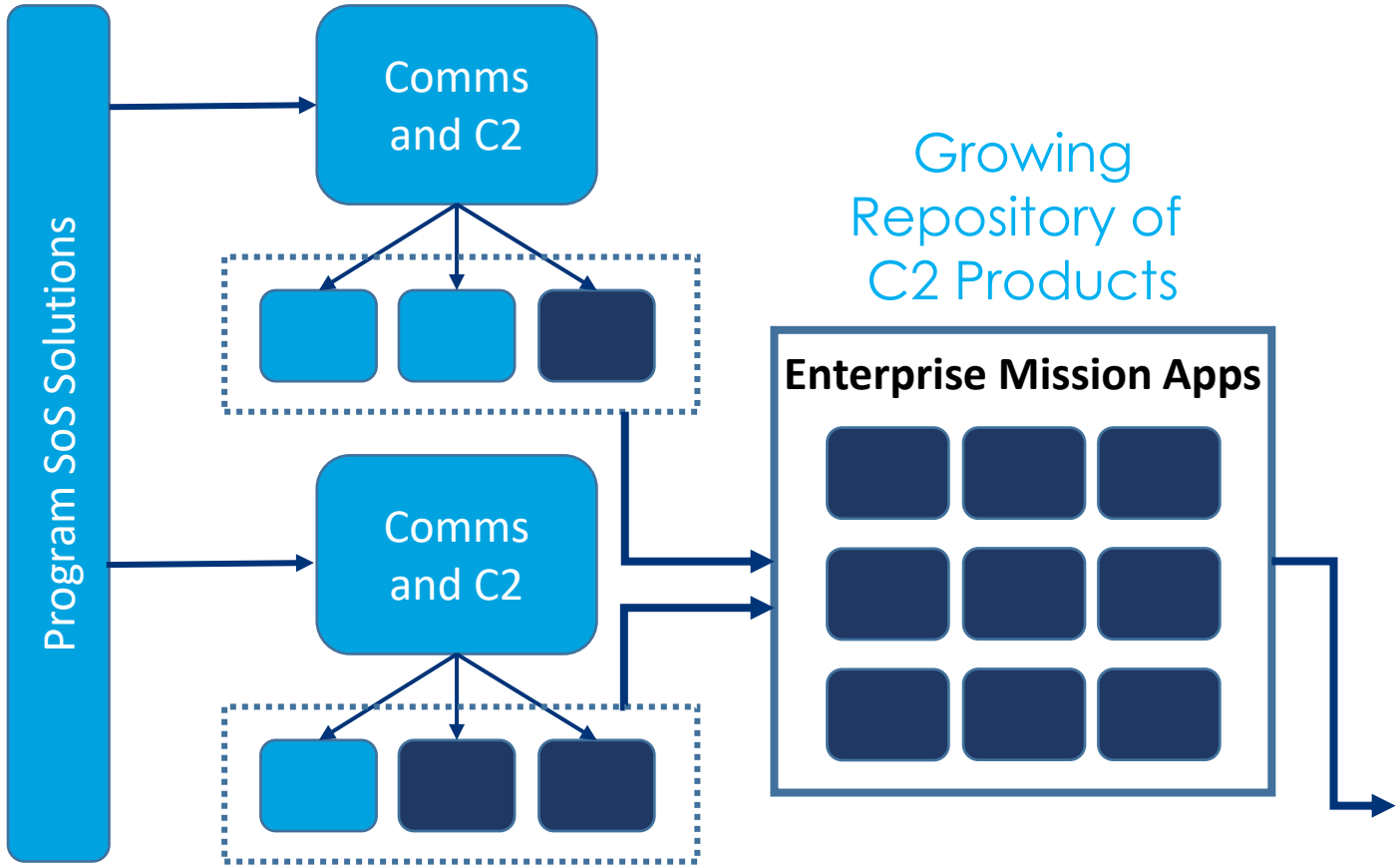
Homogenous

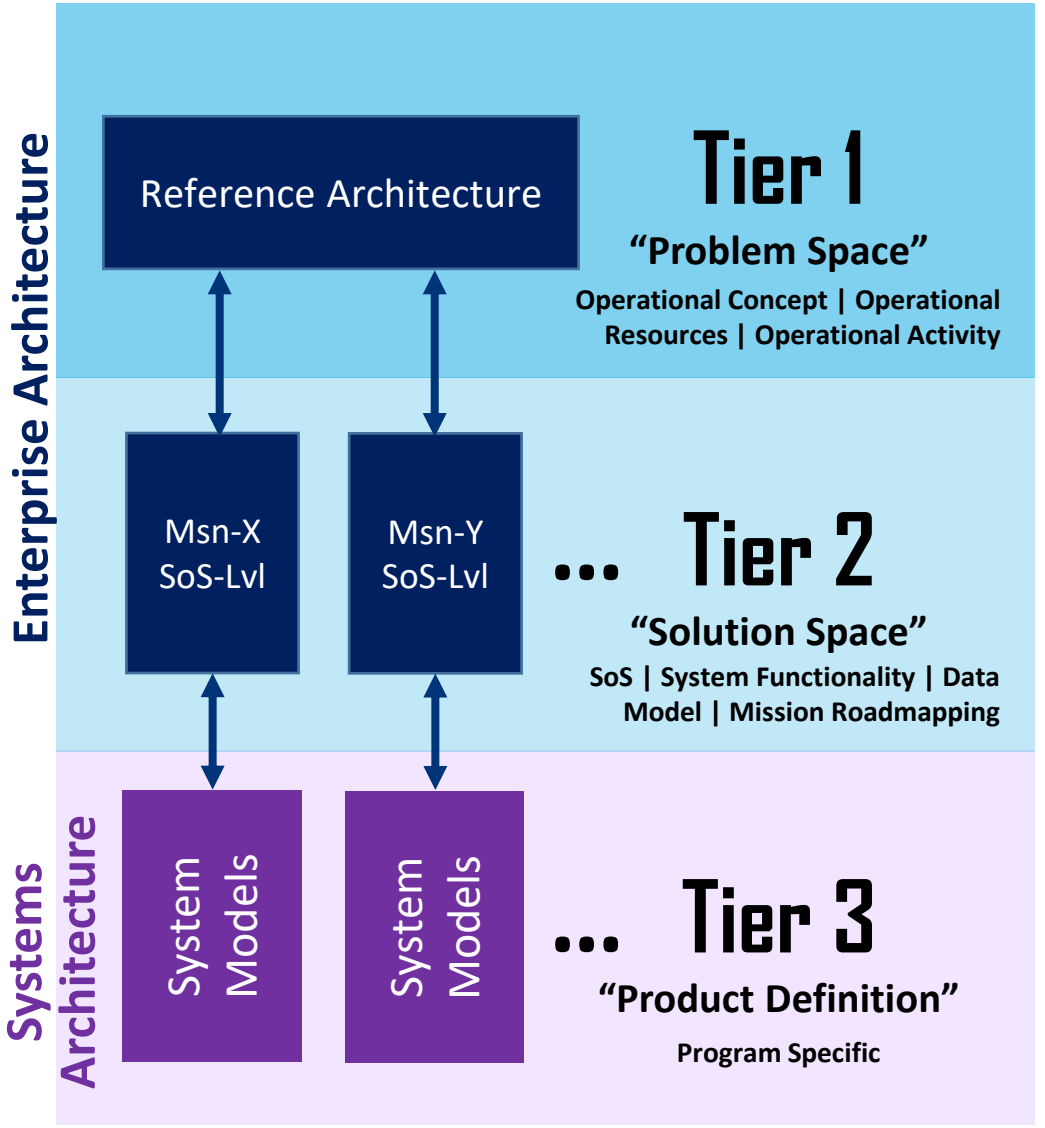
Data Fabric

Common

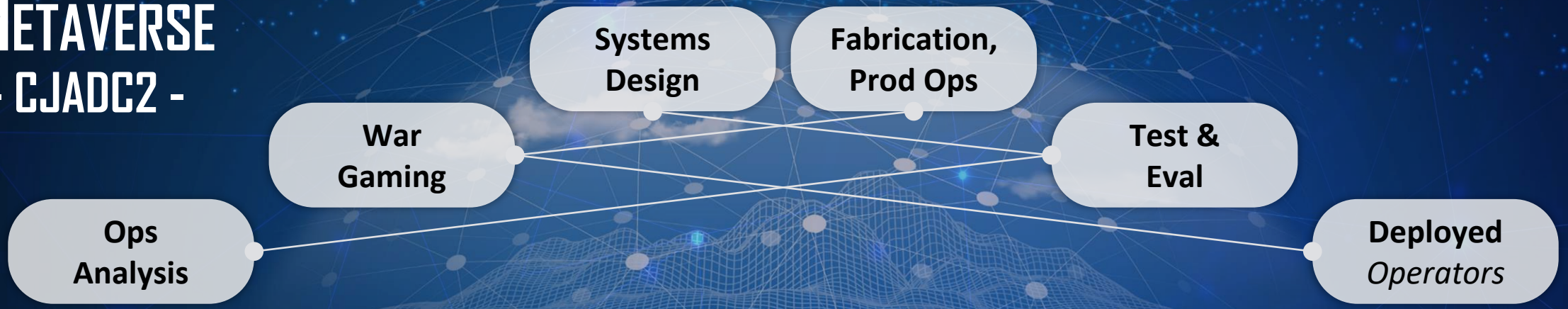
CJADC2 MBSE Reference Architecture

Operations Analysis | Functional Analysis | Cost Analysis





METAVERSE
- CJADC2 -



– Visualizations –

Real-Time Immersion - Human Machine Interface (HMI)

– Digital Thread –

Simulations - Digital Twin

– Data Fabric –

Data Interconnected Throughout Lifecycle

Artificial Intelligence

LAIC

Lockheed Martin Artificial Intelligence Center

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Lockheed Martin AI Center Overview

Rapidly deliver value across the enterprise through the ethical deployment of AI/ML

LAIC

Build Foundations • Enhance Innovation • Accelerate Transition

Talent
Tools
Technology

Partnerships
Processes
Strategy

AI Integration

Program Transition, Mission Management, 21CS Roadmapping

- Cognitive Baseline
- Industry Integration
- Defense Integration

AI Innovations

CRAD, Rapid Prototyping Mission Applications, Emerging Mission Capabilities

- Computer Vision
- Cognitive Signals
- Intelligent Agents
- AI Mesh

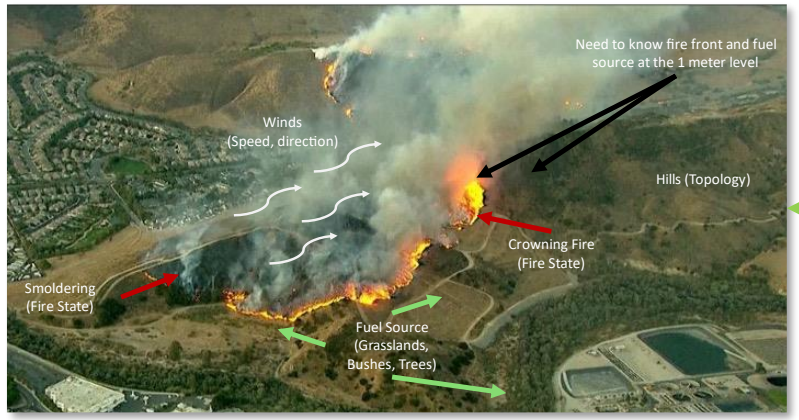
AI Foundations

Infrastructure, Tools, Consultation, Training, Production Operations R&D

- AI Factory
- FORCE
- Aimlabs / Consulting

Cognitive Mission Manager for Wildland Fire Suppression

Develop and demonstrate an AI-enabled mission manager to support wildland fire suppression via Cognitive Multi-Agent Planning and Asset Coordination

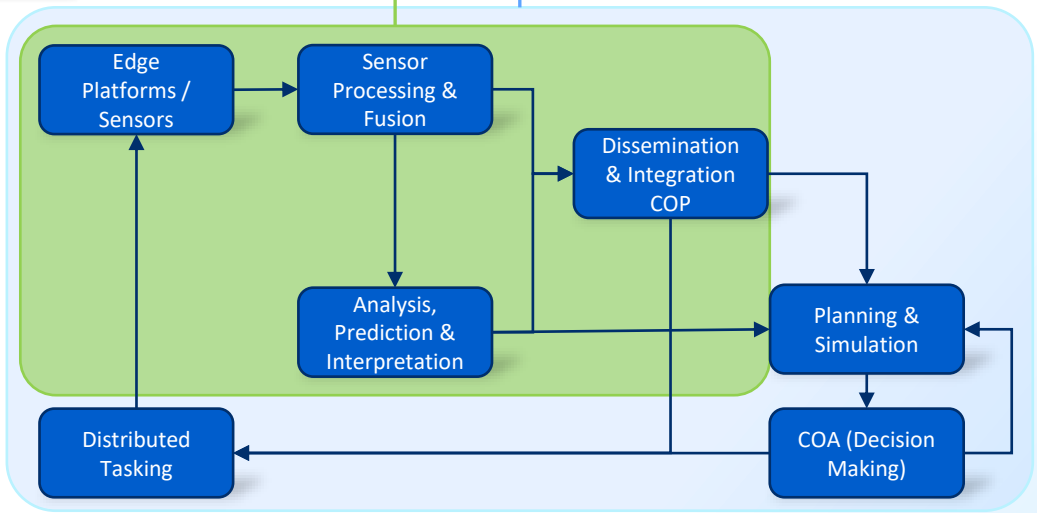


Fire Behavior Prediction:

- Sensor data is fused to predict the behavior of a wildland fire (direction and rate of spread) to inform distribution of situational awareness and courses of action
- Sensor data includes: Fire state classification, Wind/Weather, topography & adjacent fuel sources

Multi-Agent Planning & Orchestration

- Multi-Agent, multi-domain planning and asset coordination for strategic and tactical decision making for fire suppression
- Distributes situational awareness and decision aids to incident command teams, air support, and various ground crews
- Interprets commander's intent
- Distributed tasking managed centrally or at the edge



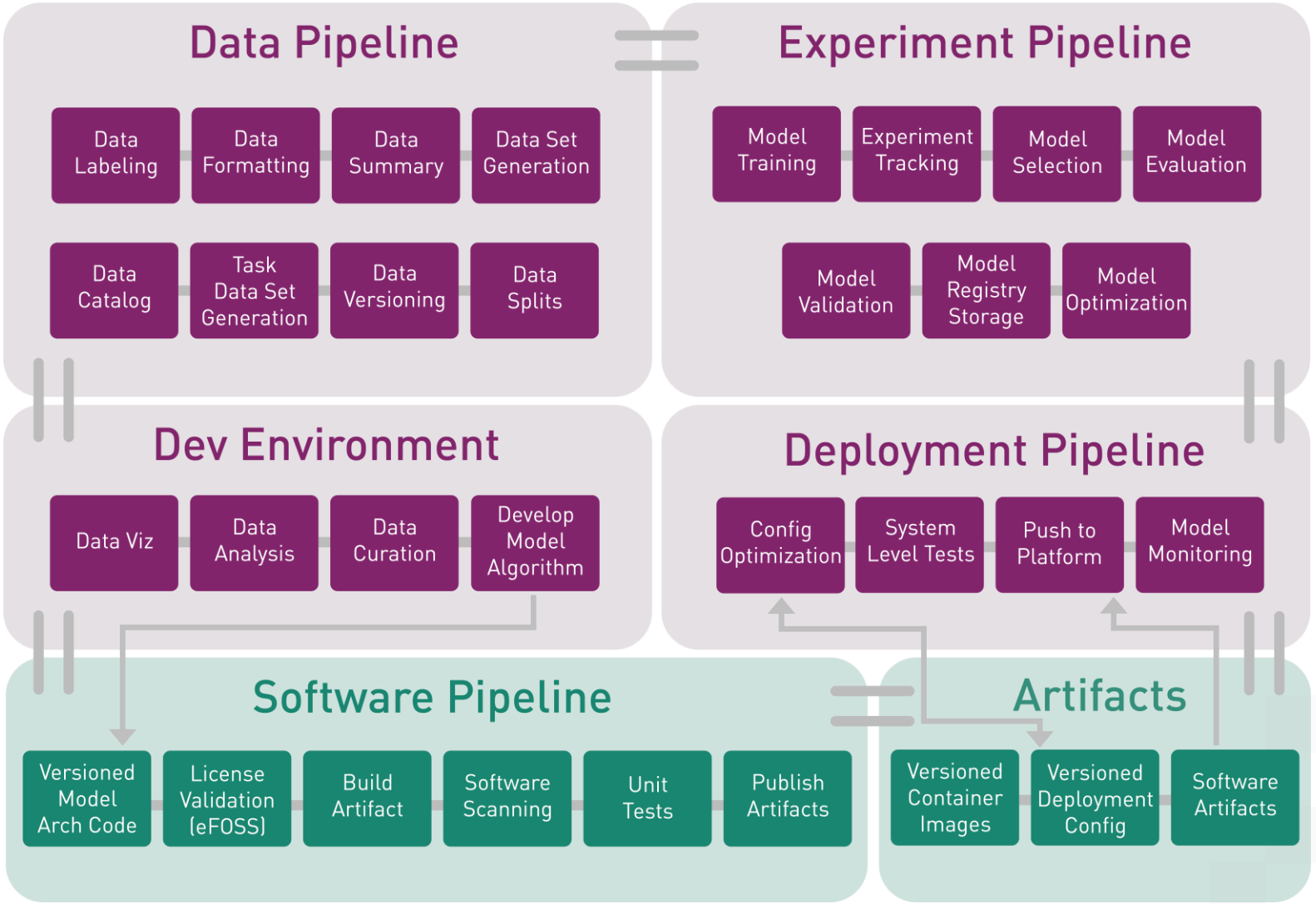
Reference Architecture for Mission Management

CMM Deployed at the LM Center for Innovation (Lighthouse)

ADP-AI AND AUTONOMY

INVERTING THE MAN-MACHINE RATIO

AI Factory and Software Factory



- Developed ML algorithms feed into the larger software system
- AI Factory is focused exclusively on the machine learning lifecycle using DevSecOps principles
- AI Factory and Software Factory work jointly to build and deploy ML-based systems into production software

Production Ready Software

- Applying InnerSource patterns, based on the best practices of the Open Source community, helps us as an enterprise to derive maximum value from the capabilities we develop and to ensure that we're employing the entirety of Lockheed Martin's talent base to make our software and systems as high-quality, maintainable, and extensible as possible.

- By developing high-quality software using open standards and modern development techniques, we ensure that we can deliver trustworthy AI-enabled software to the warfighter at the speed of relevance.

- MLOps is at the core of how we think about deploying AI-enabled systems to achieve [trustworthiness/justified confidence], explainability, security, and the ability to continuously update our systems in the field.

- We employ DevSecOps/DevStar and MLOps best practices along with the DoD Ethical AI Principles to develop trustworthy and secure AI-enabled, software-defined systems for our customers.

How Do Teams Engage at LM

AI Foundations

Aimlabs

An enterprise-wide AI and Machine Learning Community of Practice
https://aimlabs.us.lmco.com

Aimlabs Consulting

Provides support staff, prototype/MVP capabilities, and extended project consulting for a variety of AI/ML needs

https://aimlabs.us.lmco.com/consulting

Dev Advocates

Creates momentum and drives adoption of MLOps and DataOps solutions through interactions within Lockheed Martin's developer community

AI Summit

A family of internal events focused on Artificial Intelligence and Machine Learning for practitioners, leaders, and other interested employees from across the enterprise
https://aimlabs-dev.us.lmco.com/summits

Outreach

Website

https://factory.ai.us.lmco.com

Slack Communities

#ai-factory – Community home for AI Factory
#aif-early-adopters – Joint development

Blogs and Tutorials

https://docs.us.lmco.com/pages/viewrecentblogposts.action?key=aifactory

AI FACTORY

Implementing Ethical AI Principles…
How to get Started

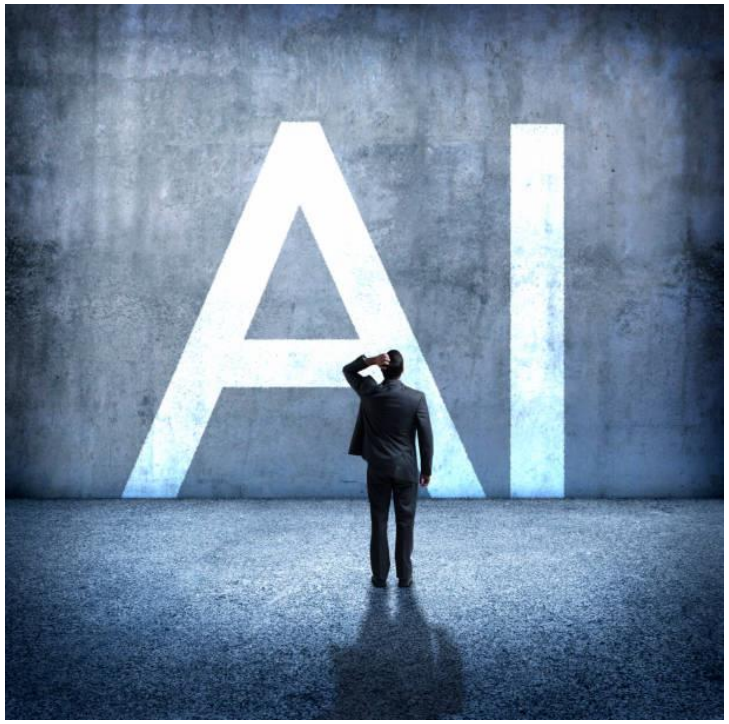
AI Benefits and Risks

Benefits

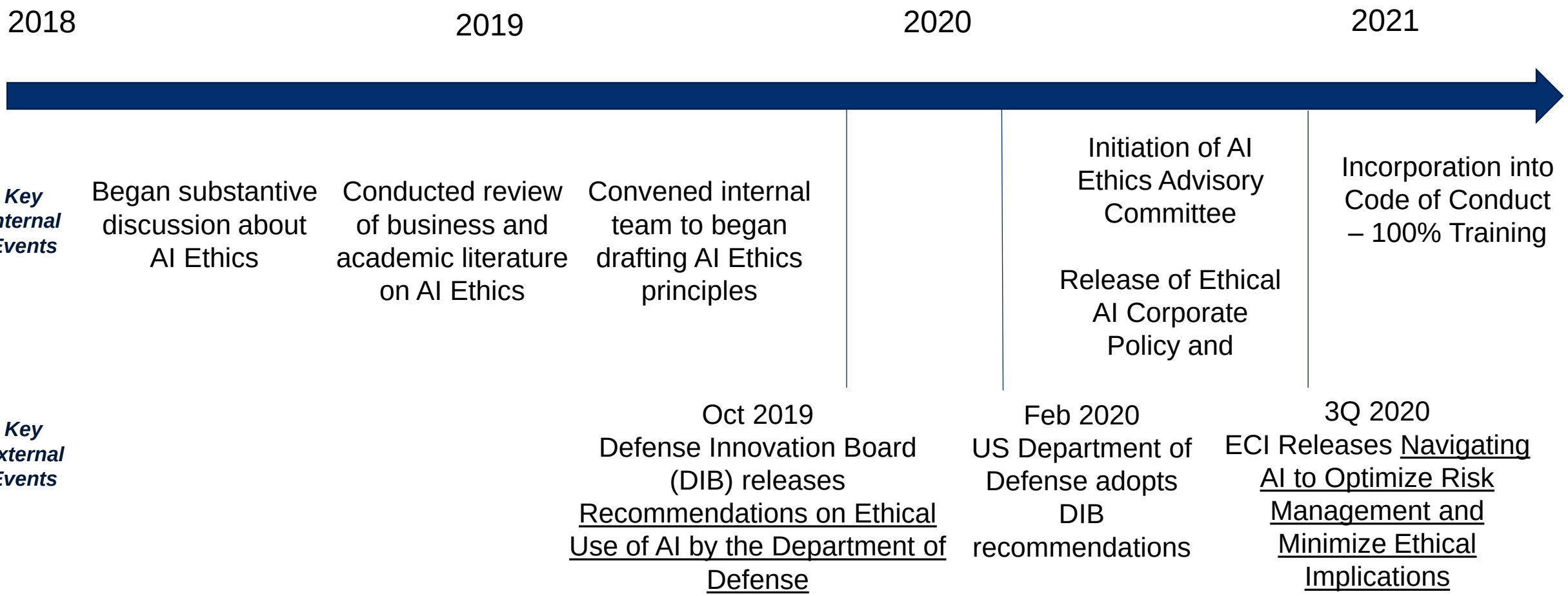
- Optimize internal business processes and systems
  - Gain insights from data repositories
  - Improve productivity & workflow
  - Enhance research & development capabilities
- Improve delivered product & service performance
  - Provide more capable products & services to our customer
  - Reduce development & operational costs

Risks

- Bias
- Transparency & Trust
- Privacy & Security



Our AI Ethics Journey



DoD Ethical Principles for AI

Responsible

DoD personnel will exercise appropriate levels of judgment and care, while remaining responsible for the development, deployment, and use of AI capabilities.

Governable

The Department will design and engineer AI capabilities to fulfill their intended functions while possessing the ability to detect and avoid unintended consequences, and the ability to disengage or deactivate deployed systems that demonstrate unintended behavior.

Equitable

The Department will take deliberate steps to minimize unintended bias in AI capabilities.

Reliable

The Department's AI capabilities will have explicit, well-defined uses, and the safety, security, and effectiveness of such capabilities will be subject to testing and assurance within those defined uses across their entire life-cycles.

Traceable

The Department's AI capabilities will be developed and deployed such that relevant personnel possess an appropriate understanding of the technology, development processes, and operational methods applicable to AI capabilities, including with transparent and auditable methodologies, data sources, and design procedure and documentation.

Incorporation into Our Code of Conduct

We Use Artificial Intelligence Responsibly

WE SET THE STANDARD

We are committed to pursuing the benefits of Artificial Intelligence (AI) while ensuring procurement, development and our internal use are in accordance with our values.

Why It Matters

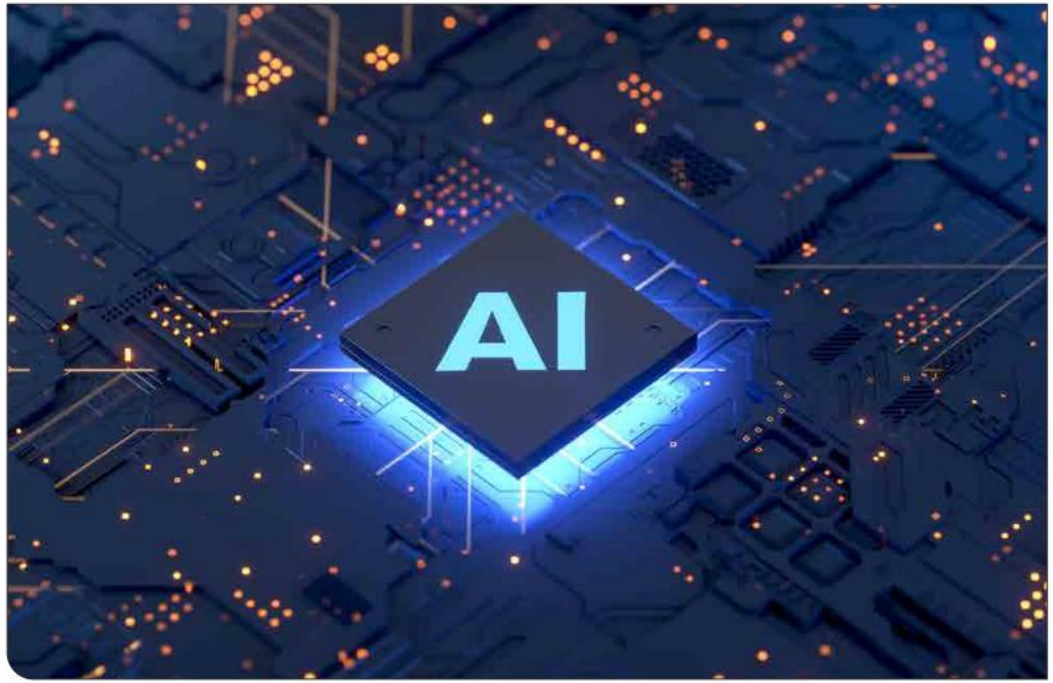
- We recognize that AI holds tremendous potential benefits for our customers and our operations, and we intend to be an industry leader in this revolutionary technology.
- Access to tremendously valuable data and high-performance computing has unleashed unprecedented opportunities in AI that are changing the way companies operate in all industry sectors.
- We understand that, as a rapidly evolving discipline, there may be risks that must be considered and addressed in the design and implementation of AI systems.

What to Watch Out For

- If you are involved in the development, procurement, deployment or internal use of AI systems, ensure you are familiar with the principles and concepts outlined in *CPS-022, Ethical Development and Use of Artificial Intelligence.*

Key Policies

- CPS-022 Ethical Development and Use of Artificial Intelligence



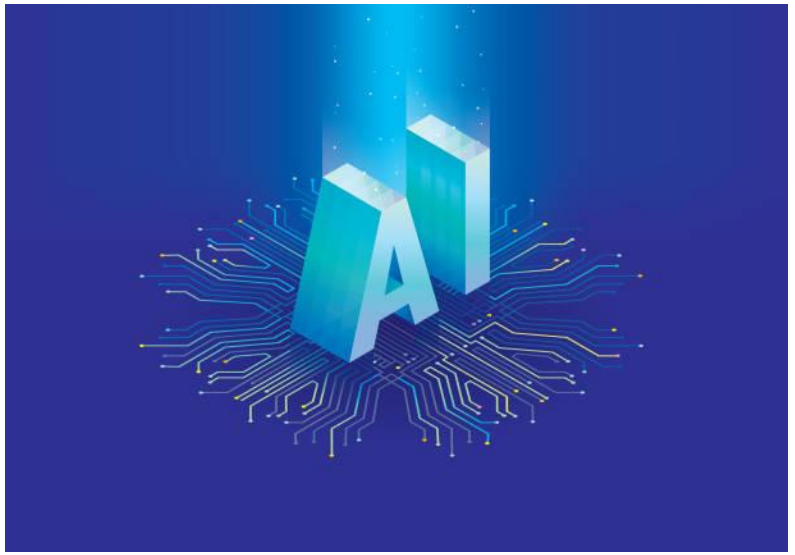
Did you know?

Lockheed Martin was one of the first defense leaders to align with the U.S. Department of Defense guidance on the Ethical Use of Artificial Intelligence.

Artificial Intelligence Ethics Advisory Committee

Identify, Inform, Coordinate, Collaborate, Adjudicate

The mission of the Artificial Intelligence Ethics Advisory Committee is to catalyze Lockheed Martin's vision for the operationalization of the AI Ethics Principles as documented in Corporate Policy through increased business area and functional collaboration on the development of foundational guidance artifacts and frameworks that support the ethical development of AI systems.

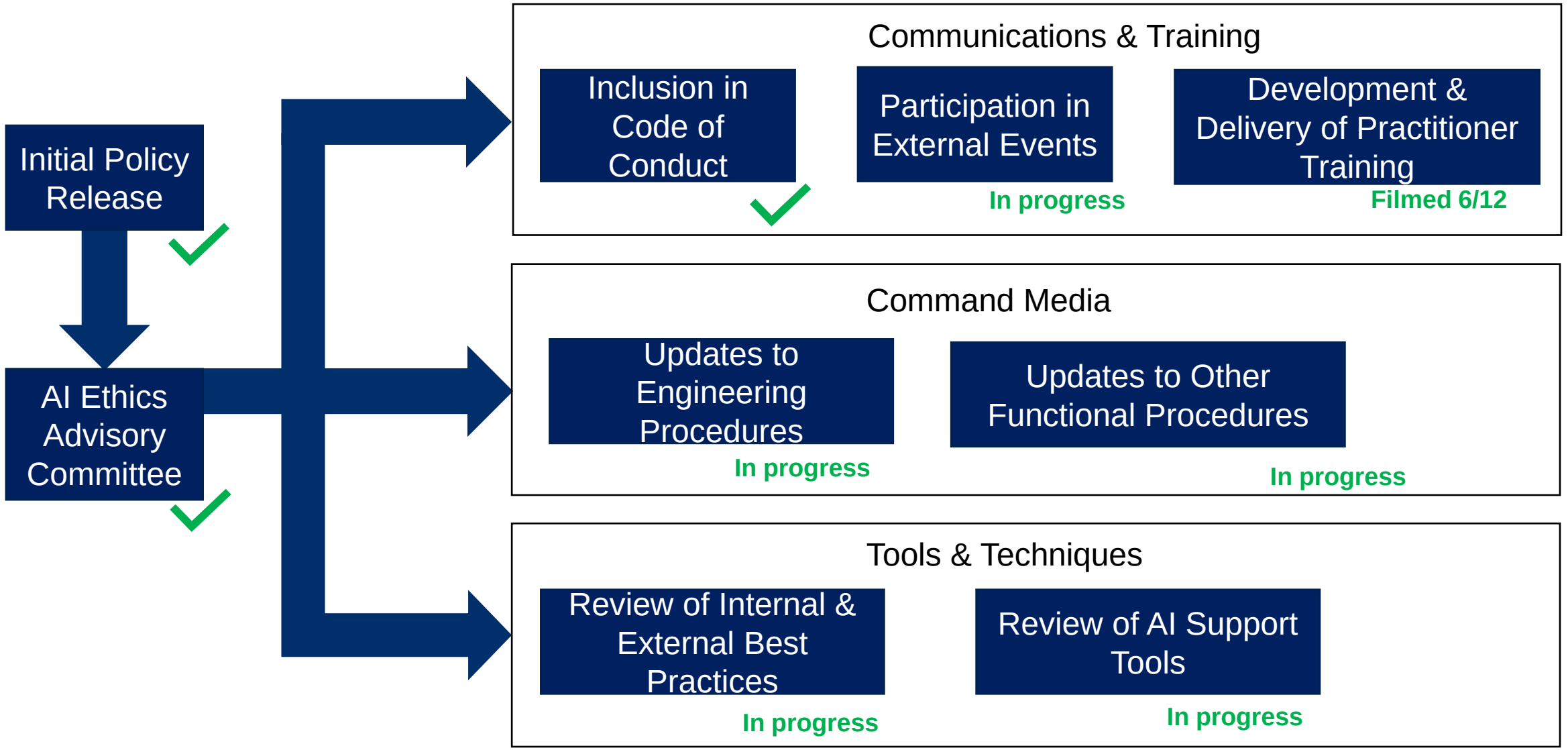


The committee is co-chaired by the Engineering and Ethics representatives

The committee consists of members of all functions and each business area, including:

- Legal
- Human Resources
- Communications

AI Ethics Guidance Roll-Out

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