Why Do We Have an Edge Computing Challenge in the DoD? -or-

Computing at the Edge; Painting it Green

NOVEMBER 30, 2022

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Carnegie Mellon University Software Engineering Institute

CMU SEI is a DoD R&D Federally Funded Research and Development Center





Established in 1984 at Carnegie Mellon University

Charged to improve the state of the practice of software engineering and cybersecurity

Added AI Engineering in 2018

Collaborates with CMU and broadly in academia, government, and industry

Capable of conducting both fundamental research and classified work

Offices in Pittsburgh and DC, with locations near customer facilities in MA, TX, and CA

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Our Expertise: Assure Secure, Affordable, Rapidly Delivered, and Innovative Software

Bring Capabilities that make new missions possible or improve the likelihood of success of existing ones

Be Trustworthy in construction, correct in implementation, and resilient in the face of operational uncertainties

Be Timely so that the cadence of fielding is responsive to and anticipatory of the operational tempo of the warfighter

Be Affordable such that the cost of acquisition and operations, despite increased capability, is reduced and predictable











Need: Increased Capabilities Beyond Those in Commercial Technology

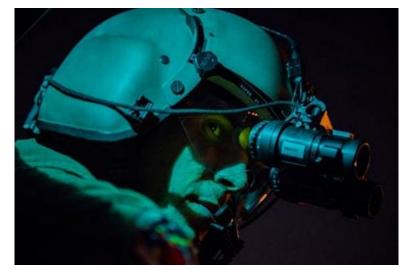








Need: Development and Delivery Matched to Operational Tempo







Need: Robust and Resilient Solutions







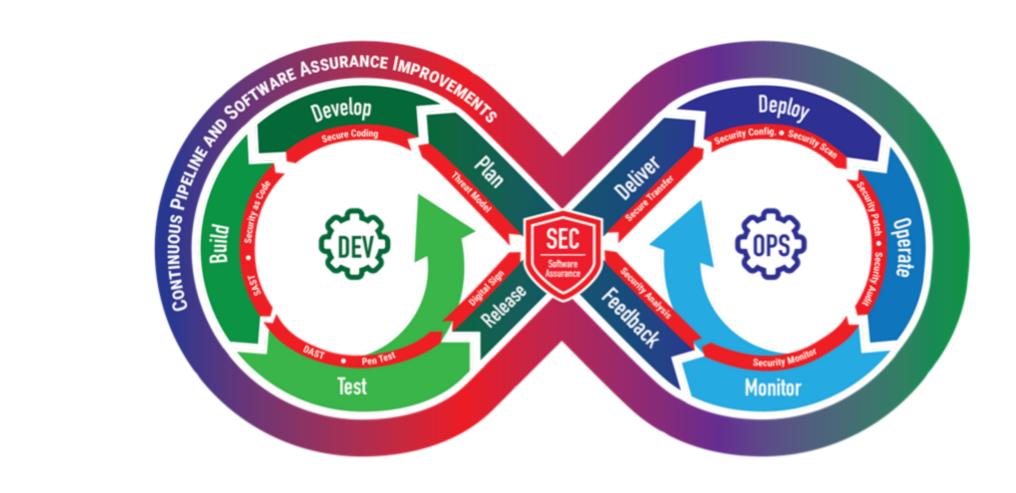




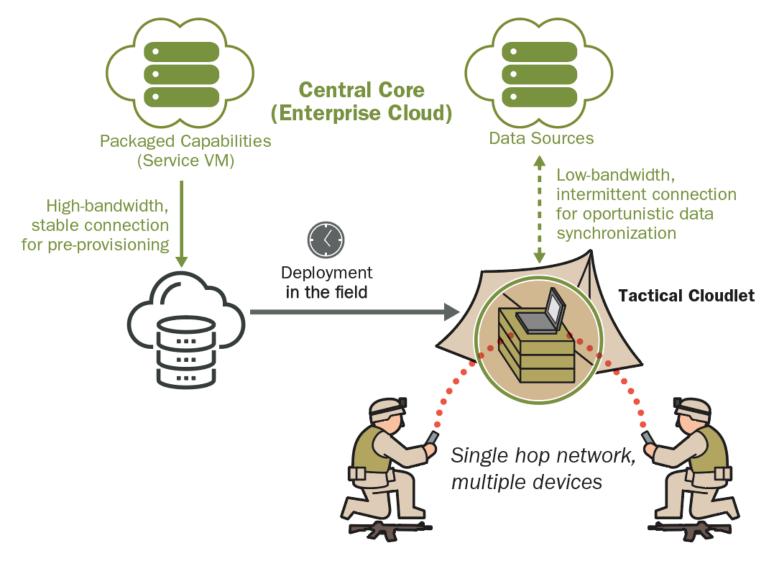
"The threats the U.S. faces change rapidly, and DoD's ability to adapt and respond is now determined by its ability to develop and deploy software to the field."

Software Acquisition & Practices Study

Deploy Rapidly and Flexibly and Extend DevSecOps Infrastructure to the Field

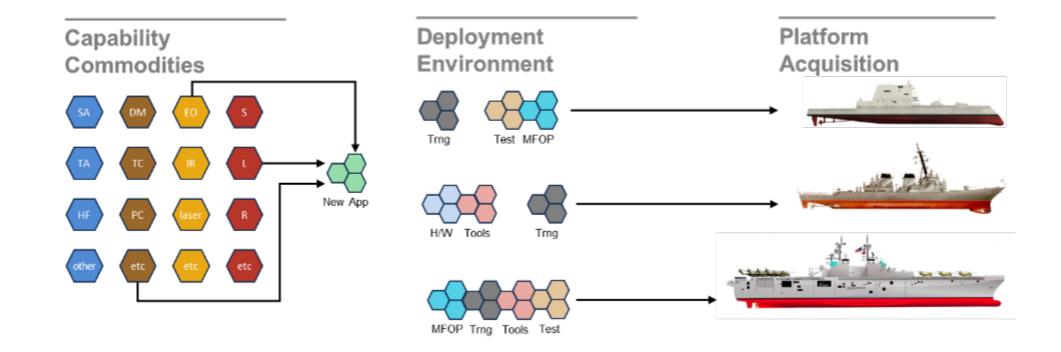


Improve Capability at the Edge in Near Real Time



Opt for Modular Over Bespoke Design





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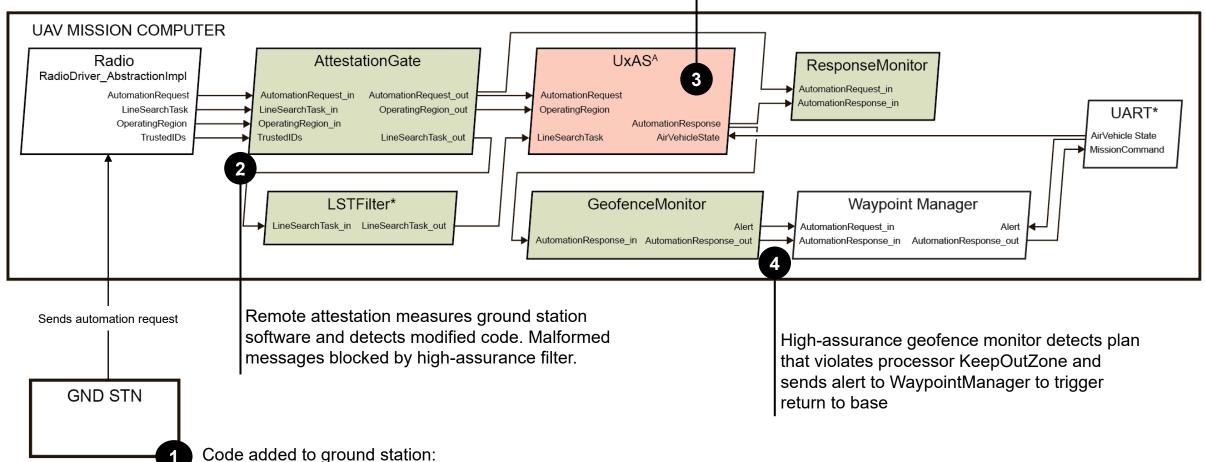
Pay Attention to Architecture Seams

Software to generate malicious requests

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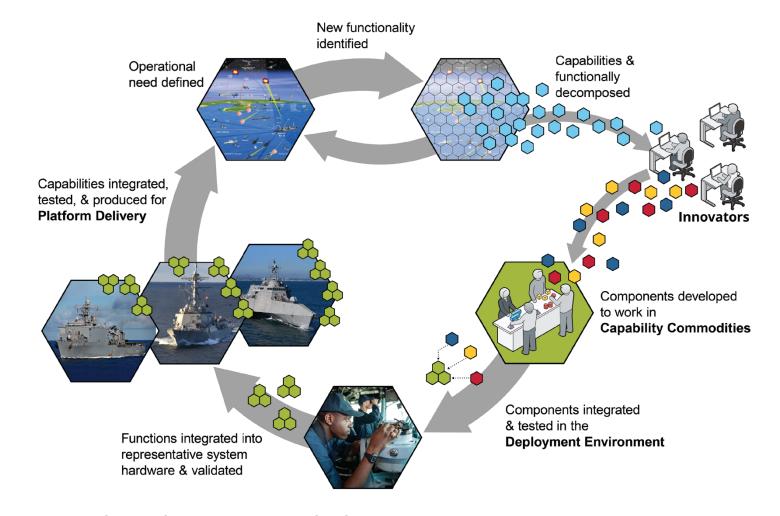
Trojans added to UxAS PlanBuilderService, replacing AutomationResponse with plan that violates KeepOutZone

Autonomous Mission Planner



Source: Cyber Assured Systems Engineering with AADL, 2022 AADL User Days

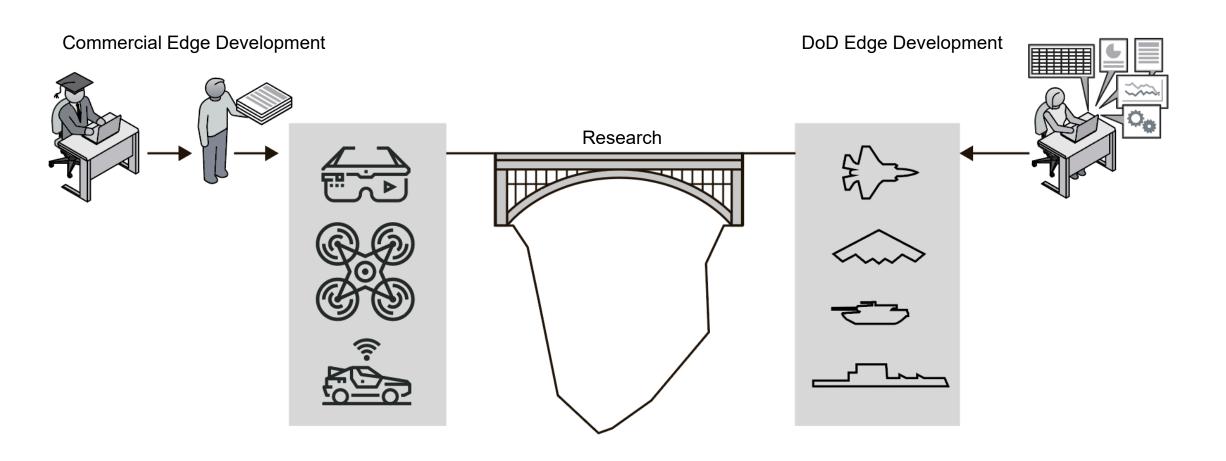
Move Research into Deployment, with Operational Feedback



Virtuous Cycle of Rapid Feedback for Capability Integration and Deployment

Paint it Green: DoD Software Acquisition for the Edge





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