Accelerating DoW Space-based Acquisition Through the Implementation of Agile, DevSecOps and Digital Engineering Processes

Michael D. Orosz[1], Lt Col John M. Turner[2], Lt Col Trevor M. Johnson[2], Brian Duffy[1] and Craig Charlton[1]

[1]USC Information Sciences Institute
310-486-2150
mdorosz@isi.edu

[2]United States Space Force
310-653-2547
John.turner.66@spaceforce.mil

6 May 2026

SYSTEMS ENGINEERING RESEARCH CENTER

UNITED STATES SPACE FORCE

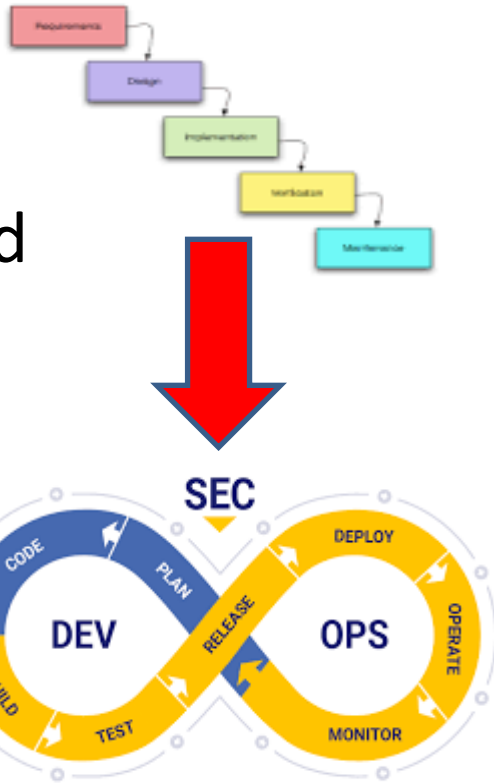
SPACE SYSTEMS COMMAND

U.S. Space Force Satellite Communications & Positioning, Navigation, and Timing (SATCOM and PNT) Program Office

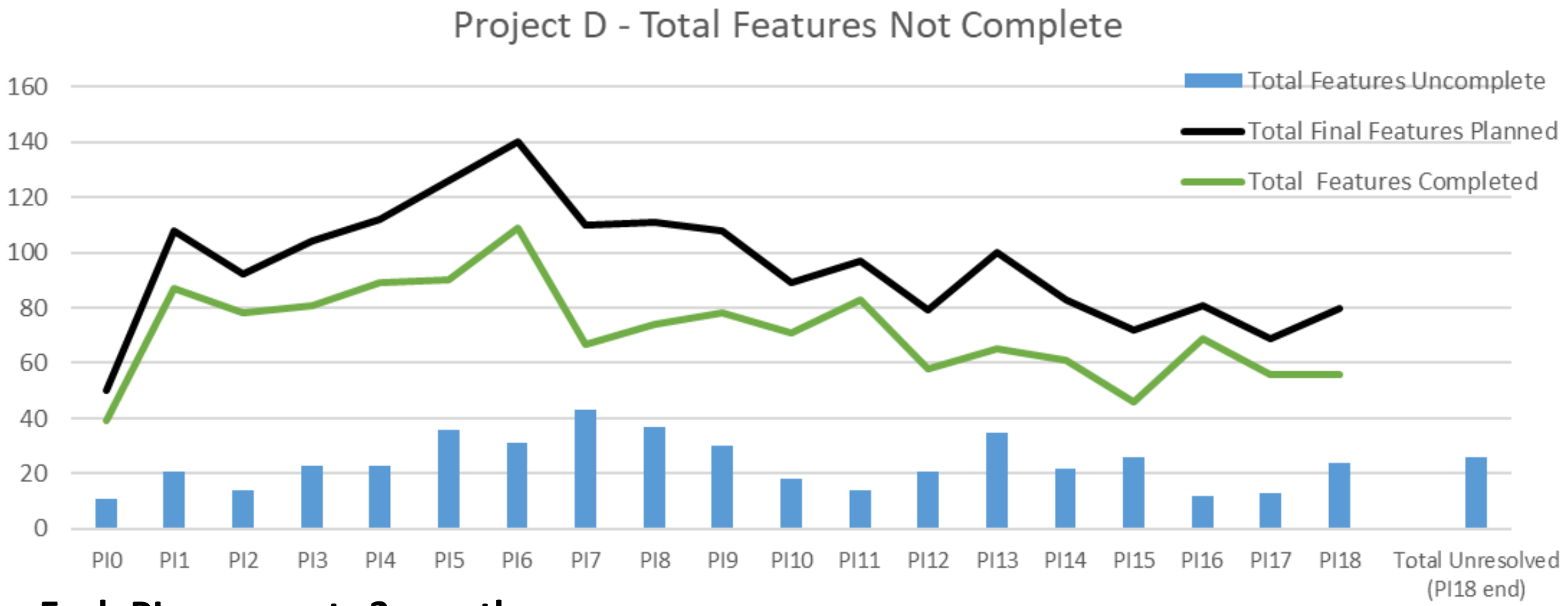
Overall Project Objectives

- **Improve DoW competitiveness**: Specifically - improve existing DoW space-based software acquisition pathway – *but generalize as needed for other domains*

- **Goals**:
  - —Determine the mission engineering methods, analysis, and metrics to transition from traditional DoD 5000 waterfall development environments to agile/DevSecOps processes
  - —Includes integration of emerging technologies and related education for the future workforce.

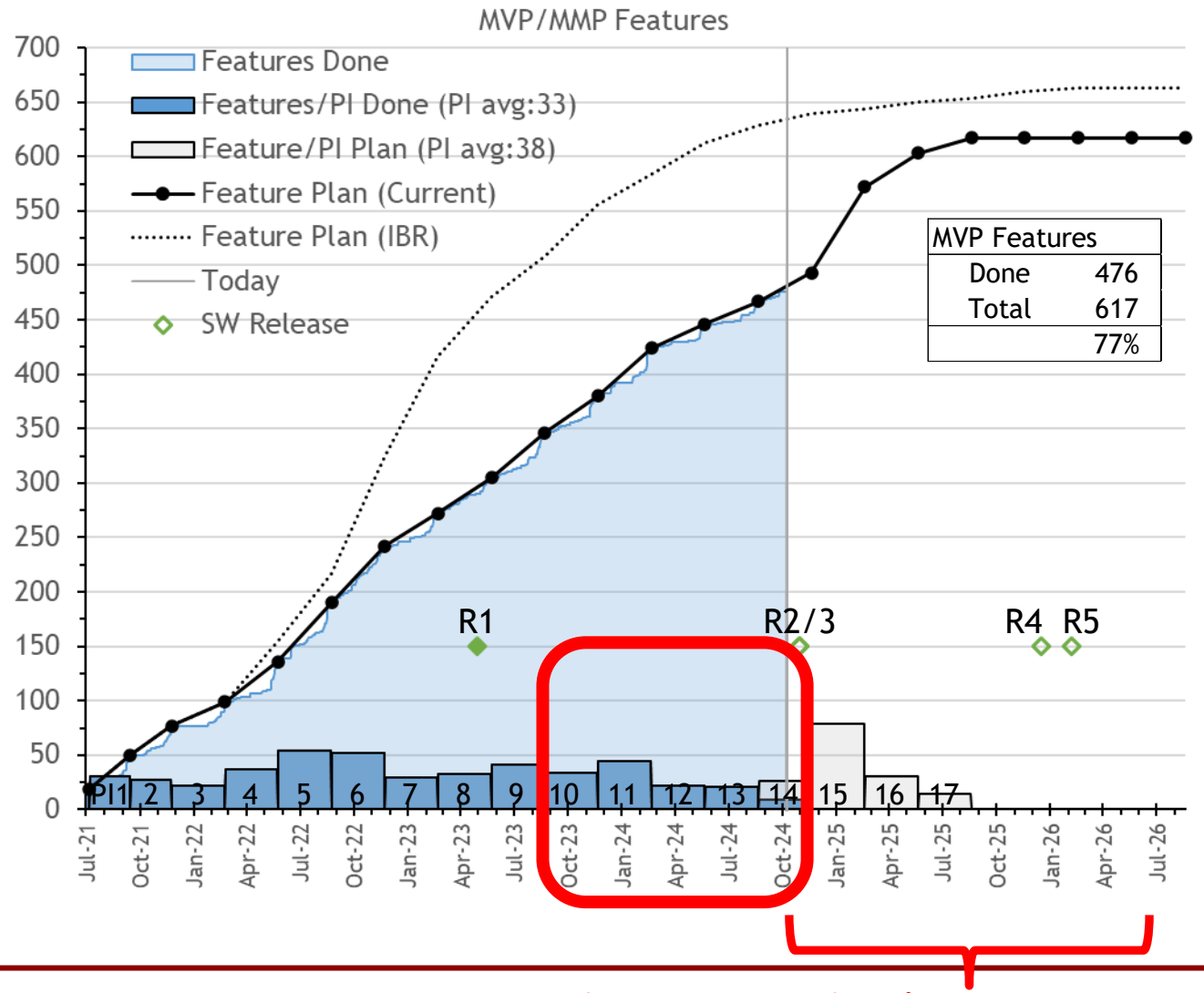


Features Slipping from PI to PI



- **Each PI represents 3 months**
- **A feature represents work that can be accomplished in 3 months**

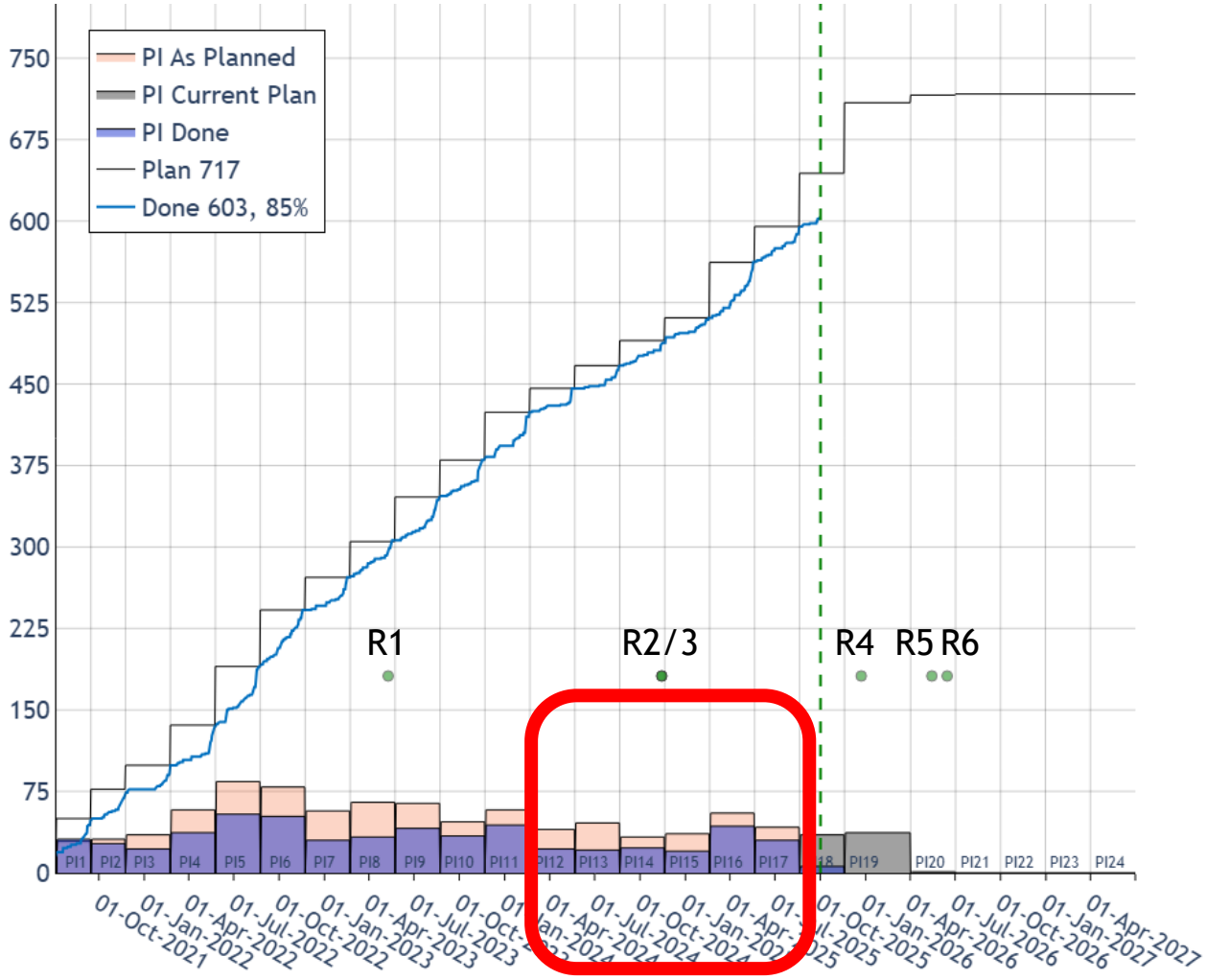
Bow Waves in Agile – Year Ago

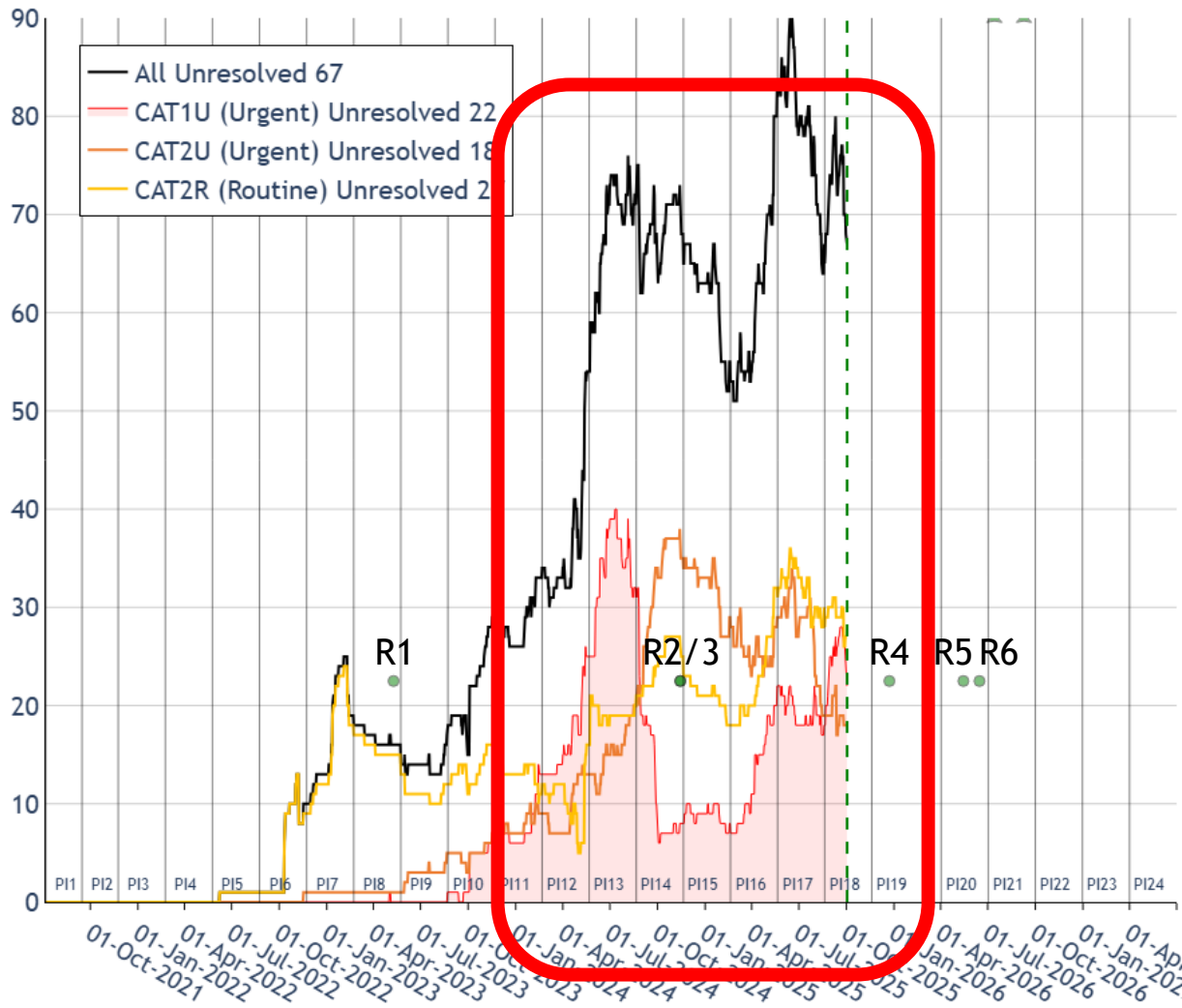


R1-R5 are MVPs

A bow wave and we're running out of runway!

Bow Waves in Agile



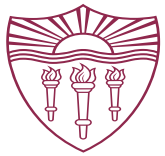


"Bugs" discovered during testing

The bow wave was addressed via schedule extension…for now

R1-R5 are MVPs

Some Reasons for the Building of a Bow Wave



- Blockages
  - Lack of resources (software license issues, external dependencies, test facilities etc.)
- Competition for workforce
  - In many cases, team members work multiple projects and can be “pulled” depending on project priorities (new hires = expensive learning curve)
- Underestimating code complexity
  - Some of this can be attributed to “discovery”
  - Can also be attributed to a lack of understanding of the system requirements
- **Bugs & DRs due to delayed integration and testing of the system**
  - The high priority bugs & DRs consume workforce effort and crowd out mission features which become delayed.

More Reasons for the Bow Waves

- Project D is an update to existing baseline program (Project E) that itself is evolving.
  - Project E was developed primarily via **waterfall** with the major integration and **testing** events left to the **end of the program**.
  - **Merging of baseline** changes into Project D is manageable, but **time-consuming** and does add complexity to the program.
  - Another major challenge is the demand Project "E" has on the Project D **work force**. Project D's workforce is frequently **"pulled" to support Project E**.
- Delayed horizontal I&T
  - As already noted, unit testing (i.e., vertical I&T) occurs early and often, however, **multi-unit (i.e., multi-CI) I&T is pushed to near the next major MVP/MMP** (i.e., major milestone).
  - This **results in intersystem bugs/DRs**, often **high priority CAT1U** bugs that **have to be addressed**, until late in the development cycle, often **at the expense** of software **development**.

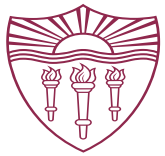
Recommendations/Observations

1. **Upfront engineering**: Perform some upfront engineering to help populate the project backlog, map features with compliance requirements, ***identify end-to-end test cases***, and to identify dependencies as early as possible in the program.
2. **Not all staff skillsets are equal**: The amount and diversity of talent needs to be constant, so they can be moved/re-arranged to react to the changing needs (be agile) of the program.
3. **Near operational test environments**: Establish (early in the program) a near operational environment and high-fidelity simulators (for horizontal I&T)…**put this before system development starts in terms of priority…need to start I&T (at all levels) as soon as possible. Black box portions of the environment if necessary.**
4. **Sprint Margins**: Plan margin into the sprints to handle unexpected events such as new technology insertion and/or unexpectedly complex stories (**Agile 101**).
5. **Licensing and other IP issues**: get licensing, IP, accreditation, certification and other programmatic issues resolved early.

Recommendations/Observations (Cont.)

6. **Training:** Need for on-board and continuous training to ensure team members (both the contractor and acquisition team) are on the same page
7. **Costing Challenges**: For projects that are costed using "T-shirt sizes, costing needs to be segmented into development, integration and testing, and bug (problem) work-off. Also need sufficient number of T-shirt sizes to cover smallest to largest work packages
8. **Custom tools**: Be prepared to customize performance tracking tools
   - Applies to all teams…government and development contractor
   - Issues:
     - Software incompatibilities
     - Foreign ownership of tools
     - Access challenges (e.g., VPN, security concerns, etc.)
     - EVM lags actuals – sometimes by months.

Thoughts on MOSA



- Prime contractors and the government want to establish and maintain a modular open-systems approach (MOSA)
  - Reduce vendor lock
  - Improve sustainability and evolution
- Challenge:
  - Refactoring is overtaken by high priority events such as pending milestones, high priority bug/discrepancy work-off, evolving requirements among many others
- The result:
  - Slipped schedules and brittle systems.
- Possible Solution:
  - Need to emphasis (e.g., high priority) modularity throughout lifecycle of the system. Possibly put into contracting.

Thank You

Mike Orosz
mdorosz@isi.edu
michael.orosz.ctr@spaceforce.mil
310-486-2150