

Vignette 2 – F22: DevOps on a Hardware Platform

Craig Ulsh and Maj Zachary McCarty

The F-22A Raptor program recognized a need for greater speed and agility and took action. In mid-2017, the F-22 Program Office realized the F-22A Raptor modernization efforts were not delivering at a speed that would keep pace with emerging threats. Program leadership secured the expertise of the Air Force Digital Service (AFDS). A joint team assessed the program and captured a series of observations and recommendations. The overarching assessment was:

The Air Force must move faster, accept a greater amount of risk, and commit to radical change with how the F-22A modernization effort is managed and technology is implemented. Competitors are moving faster, and blaming poor vendor performance will not help the F-22A Raptor remain the dominant air superiority platform.

The F-22A Program Office realized that change was needed. The F-22 acquisition process, steeped in the traditional DoDI 5000 model, was slow and cumbersome, with initial retrofits taking at least 6 years to deliver. The program recognized the following symptoms:

- Requirements were static and rigidly defined.
- Capability was delivered in large, monolithic releases.
- Change was avoided and treated as a deviation from well-guarded baselines.
- The development team placed too much focus on intensive documentation.
- Separate programs with separate contracts drove inefficiencies and conflicting interests.
- Insufficient automation for incremental testing resulted in marathon test events. More specifically, the team identified a number of issues that are common among weapon systems:

Development practices. Development processes were matched to the traditional acquisition process. Large feature sets, multiple baselines, highly manual developer testing tools, and limited focus on continuous software infrastructure upgrades contributed to the slow capability delivery cycle. The team made several specific recommendations under the overarching recommendation for the software development teams to adopt modern software practices.

Planning. Several inefficiencies were identified in the planning process including lack of metrics for estimation of effort, inability to prioritize, and inefficient use of developer time. Again, the team proposed that the program adopt modern agile software processes.

Organization. Organizational gaps included poor collaboration across teams, lack of incentives for engineering talent, and competing priorities across multiple vendors.

Contracts. The single most significant observation is the failure to prioritize.

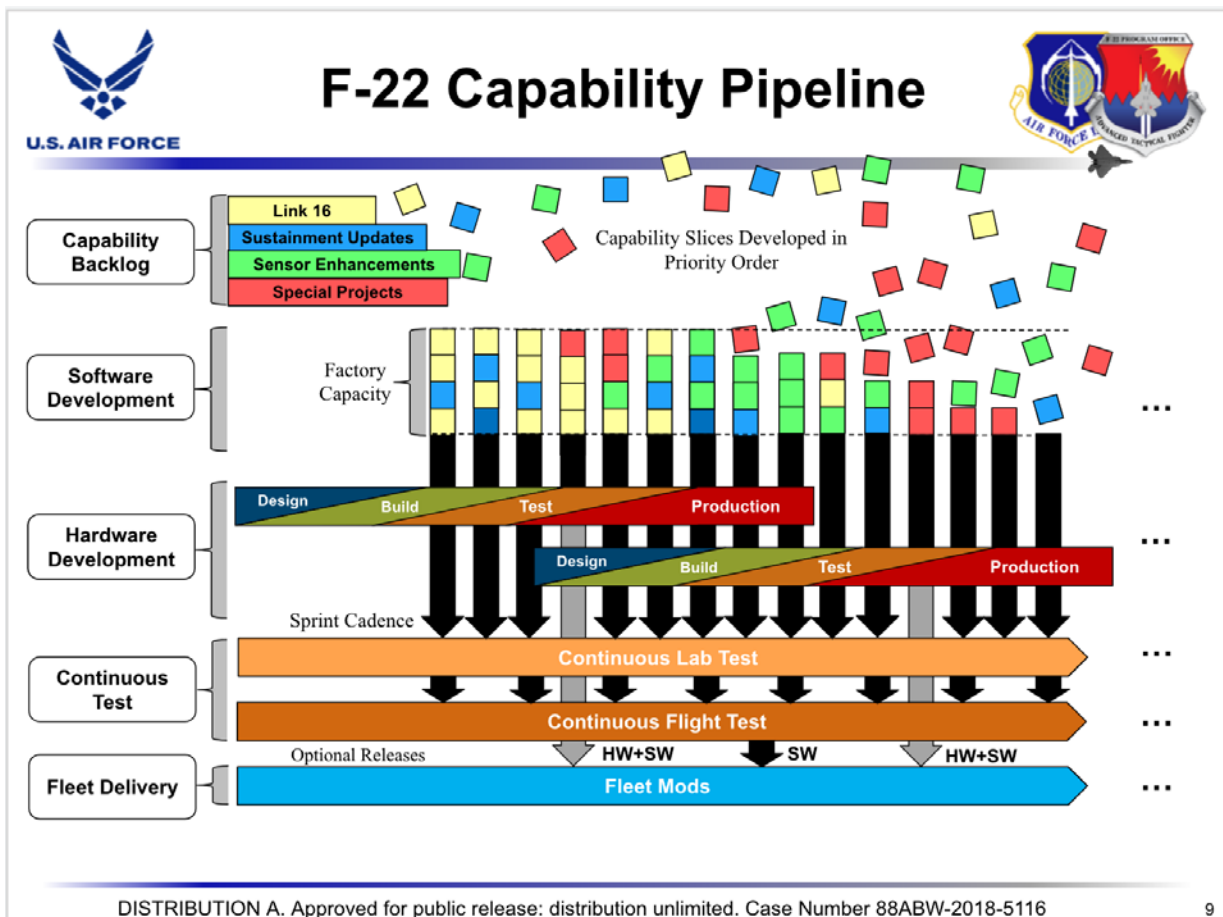
In November 2017, the F-22 Program Office took several steps to accelerate the F-22A modernization efforts. In response to outdated development practices, the program office restructured TACLink 16 and TACMAN programs into a single agile development stream. To properly match the contractor effort with a new development approach, a “level of effort” for prime

development labor was adopted. To address some of the planning concerns, steps were taken to adjust program alignments and authorities.

The F-22A Raptor program has made positive steps in adopting a more modern approach to both hardware and software acquisition. Perhaps the best example is a new contract structure that allows for quick reaction to emerging requirements and changing user priorities while incentivizing a long-time incumbent contractor for continuous improvement. The Program Office has learned lessons during the transition to more agile approaches, including:

- Culture change has been the biggest hurdle.
- The program must recognize and accept that things will go wrong.
- Security controls limit flexibility and communication.

The program is on the right track with a sound plan to accelerate delivery. But the program office also noted, in the immortal words of Mike Tyson, “Everyone has a plan until they get punched in the face.”



Slide image received for briefing from F22A Raptor Program Office.