

How to Deliver Real Capability to the Fleet in 24 months or less: A Move towards Holistic Agile Development

By Project Longhorn Team **

The Project Longhorn Team, comprised of members from Naval Undersea Warfare Center Keyport Division, Naval Surface Warfare Center Philadelphia Division, and Department of Energy partners at Sandia National Laboratories, was recognized with the SECNAV Innovation Award in the Innovation Catalyst category for its achievements in mitigating a serious cyber threat to the United States Fleet. The team delivered pioneering capability in a significantly abbreviated time frame, eradicating the identified threat. The success of the team stems from the innovative approach of leveraging cutting-edge technology employed by the best performers across disparate technology and organizational boundaries, which has culminated with providing significant positive benefits to the Department of the Navy and Department of Defense.

Cyber security and cyber threats are a chief concern for the United States, and particularly for the Department of Defense (DoD). The Department of the Navy (DON) recognizes these real threats to the Fleet; the Project Longhorn Team plays a vital role in identifying and understanding these threats. With the understanding that the standard approach to doing business would be ineffective when a significant cyber threat was identified, the Project Longhorn Team benchmarked then partnered with best-of-breed technology providers both inside and outside of the DON, employing proven cutting-edge product development strategies and applying it to the Navy Research and Development Establishment (NR&DE). This was an agile, fast, high return on investment solution that harnessed the best and brightest minds, focused resources, and targeted intelligence. All team members were involved in critical decision making and performed as true catalysts leading to accelerated development times and a superior end product.

In less than two years from white board concept to functional deployed capability, Project Longhorn delivered critical capability to the Fleet as a direct result of the team's dedicated efforts, which addressed a major cyber threat that started with a \$25K investment in Naval Innovative Science and Engineering (NISE) funding. The most innovative aspect of this effort was how that capability was architected and delivered.

Are you part of an agile effort that can deliver much needed capability in 24 months or less?

How do you know if you are part of or have an agile development effort? Take the quiz! Ask yourself these questions- and score yourself at the end. For every “YES”, give yourself the corresponding points listed at the end of each question, sum them up as you go, and keep track of the total:

1. Is there an end user on your team? (20pts)
2. Can you make unilateral decisions about major architectural, engineering, or strategy parameters, within a cycle time that does not impact/delay forward progress (hours to days)? (30pts)
3. Is your primary focus Cost and Schedule vice Cost, Schedule AND Performance? (see note*) (5pts)
4. Are you (i.e. your technology or capability you are developing) directly connected to a “Kill Chain”- either your’s or the adversaries? (10pts)
5. Are you solving an immediate or near term threat? (5pts)
6. Do you have funding operatives/decision makers, who can “pull the trigger” on funding, integrated onto your team? (10pts)
7. Are you building on incremental successes or capabilities you develop iteratively, such that if funding were to be suspended mid-project, you still would have delivered critical capability to the end user/Fleet? (to answer yes, you must have iterative developments that easily fit within a 24 month total span- i.e. 3 months, 6 months, 12 months- not 18 or 20 months) (20pts)
8. Do you have a clear funding path? (such as an Asymmetric Use-Case Based funding model) (10pts)
9. Are you leveraging Best of Breed (World Class) technology and expertise- not just Navy Labs/technology/subject matter experts? (20pts)
10. Is your team comprised of people from 3 or more distinct and different organizations who all have “skin in the game”, i.e., need to have this problem solved too? (20pts)
11. Are you developing aspirin (your final solution) to solve a major headache/migraine or are you trying to sell vitamins? (people will pay for an aspirin, but are less likely to spend scarce dollars on vitamins) (10pts)
12. Can the principals who architect/design/develop the technology make cross-cutting policy decisions? That is to say what is the degree of separation between Executive and Creative/Developmental functions- it must be 1 or less. (20pts)

*Note: The average time to deliver new capability to the Fleet is 84 months, while the iPhone was delivered in 24. By focusing on delivering an 80% solution and building upon that capability iteratively- i.e., focusing on cost and schedule, leads to new capability faster for less cost. Apple didn’t start out with the soon to be announced iPhone 7; it has gotten progressively better over time. Can you imagine if we had built a requirements document in 2005 (the first iPhone was released June 29, 2007 minus 24 month development cycle) and proposed to roll out the iPhone 7 (or our first iPhone product) in 2016?

How did you do?

Category I (170 or more points): Congratulations, you are part of an agile effort that can deliver much needed capability in 24 months or less.

Category II (130-169 pts): You are on the right track, but you need to resolve your shortcomings quickly.

Category III (65-129 pts): Don't expect any rave reviews from the warfighters you are supporting.

Category IV (<64 pts): Congratulations, you have given victory to the adversary- game over, try again next time.

By the way, if you answered "NO" to questions #'s 2, 7, and 12 (all three) but got points on the other questions; you are automatically relegated to Category IV.

How did Project Longhorn do it?

After the identification of a significant cyber threat to Fleet assets, leveraging an existing Technical Exchange Forum at Johns Hopkins University Applied Research Laboratory, Keith Archbold, a former Navy CAPT /Pilot and Silicon Valley technology executive, benchmarked organizational capabilities and technologies within academia, industry, and government. This effort eventually led to a partnership with Sandia National Laboratories and various organizations within Naval Sea Systems Command, Space and Naval Warfare Systems Command, and Fleet Cyber Command, leveraging the most creative scientists, engineers, and Flag Officers we could find.

The Project built upon critical capabilities provided by David Reid, John Mulder, Mitch McCrory, Alex Roesler, Lon Dawson, Phil Turner, and Allan Weidenheimer; who also each took a leadership role during various aspects of the project- ranging from building the team, driving execution, engagement with Flag leadership, architecting solutions, funding strategies, imagining "the art of the possible", adversarial assessment, and more...

Robert Alvey, Jeremy Hyland, and Gary Herbert had critical roles ensuring everyone was "on the same page", understanding "what" needed to be done in terms of the environment, and the making the reality of the end user come alive on the team. This was not your typical team, each member with a wide range of different skill sets and who could access a ready network of resources to better inform the problem identification and the solution space.

The team employed a "loosely coupled" development strategy that maximized widespread collaboration among the best and brightest performers and technology providers; an iterative design approach that built upon incremental capability gains; and liberal experimentation that integrated hand-on Flag level involvement, as well as prototyping that quickly eliminated failed

solution paths and allowed key decision makers to bring their breadth of knowledge and understanding of the threat environment into the process early on. In typical “waterfall” development processes (which this was not), we tend to “infantilize” the input of top level decision makers by presenting overly complex solutions significantly past the critical architecture phase, which cannot be easily changed or revectored so late in the process. The original “whiteboard solution approach” used in Project Longhorn could have been easily understood, as Albert Einstein professed, “by my grandmother”.

Ultimately, the unprecedented collaboration at both the working and Flag levels between DON and DOE laboratories, Industry, Program Executive Offices, and other government agencies, despite a lean funding profile, mitigated a major National Security threat. The benefits of this model have resulted in positive value to the DON and the Fleet; however it can be further leveraged beyond this particular capability and be used as a model and institutionalized to solve other critical issues faced by the Navy.

This is a success story that illustrates how cutting-edge product development strategies employed by firms within Silicon Valley startups and the venture capital community- effectively "injected" into the NR&DE, can revolutionize the development and delivery of targeted Fleet capability while ensuring National Security goals keep pace with an ever changing and improving adversary.

Key Components of Project Longhorn

This capability would not exist today if any one of the following components was missing or if they were not tied together in an effective yet simple strategy (it was actually much simpler than it sounds below):

- A "loosely coupled" versus a "monolithic" development architecture.
- Best of breed technology benchmarked across academia, industry, and government.
- Diverse skill sets in key technology areas, operational contexts, and the Intelligence Community collaboration.
- A project that was built around motivated individuals who were trusted to get the job done and had adequate support to respond to change- rather than strict adherence to a plan. This aspect was especially critical in an environment where the adversary never sits still.
- Iterative and agile engineering development processes that build upon incrementally achieved capabilities. One major capability was delivered after only 5 months-including hardware, software, and integration into complex systems.

- A strong commitment to agile software development practices (within the overall agile effort) that leveraged teams not individuals, leadership and decision making spread across the team at different times, and a culture of asking questions and not giving orders.
- A "not afraid to fail" development environment focused on massive upfront experimentation and prototyping vice excessive documentation.
- Integrating key Flag and SES-level decision makers in the early architecture and experimentation/prototyping phases.
- The ability to accept and tolerate out-of-the-box approaches and potential solutions.
- A strong tie to the operational context and focus on understanding the real underlying problem versus rushing to a solution- i.e., 95% of the time spent on problem identification and 5% on solution development; rather than the inverse, which is generally the norm, leading to the wrong solution or the same failed solutions over and over again.
- Technology development unconstrained by organizational boundaries.
- A strong focus on collaborating with the customer verses static or rigid contracts- this kept the team focused on what the ultimate value of the product should be- because it DOES change and is rarely captured well up front.

The efforts of each member of the team, both individually and as a collective, resulted in an innovative solution to a critical issue which can be replicated across the Fleet and DOD as a whole. Many of these practices are already commonplace in Silicon Valley-type high tech development environments and were simply adopted by the principals in this effort.

**** =The opinions expressed here are solely those of the author(s), and do not necessarily reflect those of the Department of the Navy, Department of Defense or the United States government.**