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(This section must be signed)

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Thank you for participating,

Gregory Hamilton
President
Aviation Week Network

Acknowledged, agreed, and submitted by

Paulette M Petersen

Nominee's Signature

24 May 2022
Date

Nominee's Name (please print): Paulette M. Petersen

Title (please print): Director, Value Stream Management, Air Combat Test and Training Solutions

Company (please print): Collins Aerospace

NOMINATION FORM

Name of Program: Tactical Combat Training System Increment II (TCTS II)

Name of Program Leader: Paulette M. Petersen

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Postal Address: 400 Collins Road NE, Cedar Rapids IA, 52498

☒ Customer Approved

- Date: 20 May 2022
- Customer Contact (name/title/organization/phone): Lindsey Frisco, Strategic Communications Specialist, PMA-205, lindsey.a.frisco.ctr@us.navy.mil and Amie Blade, Public Affairs Officer, PEO Commercial Services, 757.651.1124

☒ Supplier Approved (if named in this nomination form)

- Date: 26Apr2022
- Supplier Contact (name/title/organization/phone): Dave Hammond, Site Vice President, Leonardo DRS, 850.302.3971
- Date: 11May2022
- Supplier Contact (name/title/organization/phone): Tom “Mach” Schnell, Captain Jim “Max” Gross Chair and Director, Operator Performance Laboratory (OPL), 319 631 4445

PLEASE REFER TO PROGRAM EXCELLENCE DIRECTIONS
AS YOU COMPLETE THIS FORM.

EXECUTIVE SUMMARY: Make the Case for Excellence *(Value: 10 pts)*

What is the vision for this program/project? What unique characteristics and properties qualify this program for consideration?

(12 pt. Times New Roman) LIMIT YOUR NARRATIVE TO THIS PAGE.

The vision of the U.S. Navy Tactical Combat Training System Increment II (TCTS II) is to enable pilots to *train like they fight.* The legacy air combat training system, TCTS I, has several areas for improvement that limit aircrew training, including a closed, proprietary structure. TCTS II, developed by Collins Aerospace and Leonardo DRS, solves these challenges with a secure, mature, and open systems architecture. It is an encrypted, multiple independent level security (MILS) system that safeguards tactics, techniques and procedures during live air combat training. This security architecture enables 4th- and 5th-generation platform interoperability and a common training system for the U.S. and its coalition partners. TCTS II is also among the first system-of-systems to comply with the Future Airborne Capability Environment (FACE™) open standards architecture, enabling rapid system upgrades to meet emerging training needs.

TCTS II is a complex system-of-systems that incorporates advanced datalinks, encryption, networking and processing to connect over 100 participants in large-scale air combat training scenarios. It manages a "gameboard" of all threats, weapons, and players– in real-time with high precision and reliability. TCTS II enables the blending of live, virtual, and constructive (LVC) entities to provide unmatched operational realism with battlefield complexity and threat density to challenge our most advanced aircraft.

In 2019, TCTS II had just completed Critical Design Review (CDR) and began full-scale development toward the Navy's Milestone C, which marks completion of the initial engineering phase and formally transitions the system into production. During this time, program staffing was ramping to a peak of 160 personnel. The engineering team tripled in size with an increase of hiring, onboarding and training. The Navy had recently accelerated Milestone C by six months to speed TCTS II capability to the fleet. The aggressive staffing ramp up, high system complexity, and schedule acceleration added cost and schedule risk to our ability to meet this key milestone. Then in 2020, the team suffered two challenges in quick succession: the global COVID-19 pandemic and a devastating natural disaster in the team's central location of Cedar Rapids, Iowa.

To meet these challenges, the team transformed our culture and approach to execution with our customer. Our culture shifted to one of extreme ownership, transparency and commitment through facilitated training and modeling from leaders. We enacted the "Big 3" metrics to track our commitments, become more predictable, and embrace a continuous improvement mindset. We adopted innovative approaches to mitigate our risks including changing to an agile delivery schedule, digitizing our test and development environment, and enacting a joint customer battle rhythm to control change and cost. Through this transformation the team achieved predictable performance as reflected in the stability of our metrics, cost, and deliveries. In March 2021 TCTS II completed Milestone C on-time and is currently in low-rate production. In May 2021, TCTS II went on to complete its first operational flight test at the Advanced Naval Training Exercise where the Navy said its results "accelerated fleet LVC capabilities by 2 years".

We are nominating TCTS II for Program Excellence in the Supplier System Design and Development category to share how our team achieved this remarkable feat in spite of significant challenges. Through our transformation we delivered on our key milestones and built significant trust with our customer that will benefit the program long into the future. Ultimately, we sped critical air combat training capability to our warfighters so they can protect democracy across the globe more effectively and safely.

Do not exceed 10 pages in responding to the following four descriptions; allocate these 10 pages as you deem appropriate, but it is important that you respond to all four sections. DO NOT REMOVE THE GUIDANCE PROVIDED FOR EACH SECTION.

VALUE CREATION *(*Value: 15 pts*)*
Please respond to the following prompt:

- Clearly define the value of this program/project to your customer
- Clearly define the value of this program/project for the corporation
- Clearly define the value of this program/project to members of your team
- Clearly define the contribution of this program/project to the greater good (society, security, etc.)

(12 pt. Times New Roman)

The value of TCTS II to our customer

Our customer is the U.S. Navy's PMA-205. They have been tasked with providing solutions that enable the U.S. Navy to modernize their aviation training ranges and systems. PMA-205 awarded the TCTS II program to Collins Aerospace to develop the next generation training system so our aircrews can *train like they fight*. This requires a system that can represent today's complex battlespace and keep pace with an ever-changing landscape of weapons and threats for tomorrow's fight. For instance, the capabilities of new 5th generation platforms, like the F-22 and F-35, push the limits of existing training systems to produce realistic threat scenarios.

Today's battlespace is multi-domain and complex. Training for it must incorporate 5th- and 4th-generation fighters, Command and Control (C2) platforms and aircraft from partner nations. Security classification differences between these platforms provide a significant challenge for these blended training scenarios. The security infrastructure of today's training system prevents this interoperability.

TCTS II is architected to enable next-generation air combat training capabilities that are secure, mature, and open. It addresses the areas for improvement in the legacy air combat training system, TCTS I, while providing scalability for the future fight. It provides National Security Administration (NSA) Certified Type 1 encryption that supports Multiple Independent Levels of Security (MILS) enabling interoperability between 4th- and 5th- generation platforms. This security infrastructure enables realistic live training while still protecting the tactics, techniques, and procedures that give our warfighters tactical advantage. To ensure TCTS II can adapt to future training needs, it provides a Future Airborne Capability Environment (FACE™) open standards architecture along with a third-party toolkit and government data rights. This allows the government and other vendors to rapidly integrate and deploy new advanced TCTS II training capabilities.

TCTS II provides an immersive, high-fidelity training environment that seamlessly blends live participants and synthetic threat systems, commonly referred to as Live Virtual Constructive (LVC) enabled training. The goal of LVC-enabled training is to increase the effectiveness and density of training for every flight hour. In May 2021, TCTS II conducted its first LVC demonstration in an operational environment at the Advanced Naval Technology Exercise (ANTX)-21. This showcased many firsts in naval aviation training including simultaneously connecting two live F/A-18 aircraft, an operational Navy war ship, a manned F/A-18 simulator, and constructive threats all interacting via the Navy's Continuous Training Environment (NCTE). This high-end, complex "fight" was monitored live across the globe by Navy commanders while TCTS II proved its multi-domain integrated warfighting training capability. The demonstration results will be used to further determine how TCTS II and LVC will be implemented effectively and efficiently in naval aviation training. The Navy stated the early success of TCTS II at ANTX-21 "accelerated fleet LVC capabilities by 2 years".

While the current contract is with the U.S. Navy, the U.S. Air Force has signed a letter of intent to utilize TCTS II as its next-generation air combat training system (known as P6). This opportunity will triple the number of TCTS II fielded systems and will save the DoD hundreds of millions of dollars by aligning the USAF and U.S. Navy to a common training solution. As stated by program officials, "The Navy, Marine Corps and Air Force all identified a critical need for a common, encrypted and multiple-level security range training system, and PMA-205 will be delivering TCTS II to meet those requirements on schedule".

The value of TCTS II for Collins Aerospace

The TCTS II program provides Collins Aerospace the opportunity to build on our strengths in aerospace communications, navigation, and networking to provide innovative, mature solutions for the air combat test and training market. In 2010, Collins was awarded the Common Range Integrated Instrumentation System (CRIIS) program for modernizing Army, Navy, and Air Force test ranges. CRIIS' modular, secure, and open architecture for test ranges served as the foundation for our approach to a next-generation training system. We built on that foundation by infusing LVC technology that we developed in our flight simulators business and from research performed by our advanced technology organization.

TCTS II provides significant growth potential to serve the operational test community and our international partners. Collins is actively developing capabilities with the DoD to realize their vision of a common solution for *both* test and training missions. As prime on TCTS II and CRIIS, Collins is well positioned to converge technologies across these systems and make them interoperable so test and training ranges can expand the limits of what they do. TCTS II will also serve as a global solution for our allied international partners.

TCTS II provides Collins strategic value in the business experience we gain as a Tier 1 integrator to the Navy, pushing frontiers on open systems, and developing best practices in project management. As longstanding members of the FACE™ consortium, Collins was well positioned to take the first large-scale system-of-systems solution through FACE™ conformance and validation testing. The experience gained in developing this open system architecture will benefit future programs and has demonstrated our industry leadership in this arena. TCTS II presented many unique execution challenges which we overcame by applying our Collins Management System (CMS) and Trusted Agile framework, as described in later sections. The lessons learned executing TCTS II will prove invaluable to the future of test and training, and to project teams across our enterprise.

The value of TCTS II to the members of our team

The most fulfilling projects are those that provide technical challenges for our team members and a sense of larger purpose and mission. TCTS II has offered this experience to a large cross-functional organization consisting of over 160 people, nine agile scrum teams, and over multiple sites. TCTS II integrates a diverse set of technology in datalinks, encryption, networking, and processing which allows our engineers to gain experience in multiple domains. The scale of the program combined with our Integrated Project Team (IPT) approach provides many opportunities for team members to learn new disciplines and progress their career all while supporting TCTS II. Additionally, many team members are veterans or have family currently serving which makes what we do even more impactful and fulfilling.

Our organizations had to grow rapidly to staff TCTS II. We hired and onboarded many new engineers to PMA-205 as well as to Collins, including more than 30 recent college graduates. This diverse mix of early career talent were put in demanding roles and performed in a dynamic, fast paced environment. They were given stretch roles as cost account managers, flight test engineers, scrum masters, and product owners. They were put in front of our customer at major reviews and during high-stakes integration and

test events. With mentorship and guidance, they grew to meet these challenges, and after three years of intense execution, have matured into leaders and engineers that will lead PMA-205 and Collins Aerospace into the future.

The value of TCTS II to the greater good

Air combat proficiency is crucial to maintaining air superiority for the U.S. and our coalition forces. The ability to control the skies is essential in protecting democratic freedoms and for stabilizing global power. TCTS II increases pilot proficiency with training that provides unmatched operational realism, in a secure environment, whenever and wherever its needed. TCTS II's open systems architecture allows our warfighters to quickly adapt their training to meet new emerging threats and missions, whether on range or forward deployed. The flexibility, scalability, and realism of the system gives our warfighters the tactical advantage to perform their missions effectively and return home safely.

METRICS (Value: 15 pts)

Please respond to the following prompt:

- What are your predictive metrics?
- How did you perform against these metrics?
- How do your predictive metrics drive action toward program excellence? Please provide examples.

(12 pt. Times Roman)

What are the predictive metrics on TCTS II

TCTS II employs many metrics to track quality, schedule, and cost performance including what we call the "Big 3" metrics: S-Curves, Current Execution Index (CEI), and staffing burn. These metrics measure progress daily or weekly allowing us to predict performance against the plans we set each month. They help our team visualize if we are on track and quickly recognize when recovery plans are needed.

S-Curves are a task burndown chart created by each scrum team every sprint. As show in Figure 1, it consists of a plan line projecting task closure over time, plotted against the daily total of closed tasks (in green). All S-Curves are combined into a program-level S-Curve and distributed across the entire program every day. The S-Curves allow the scrum teams and program leadership to quickly assess sprint progress and is a powerful indicator on where course corrections may be needed.

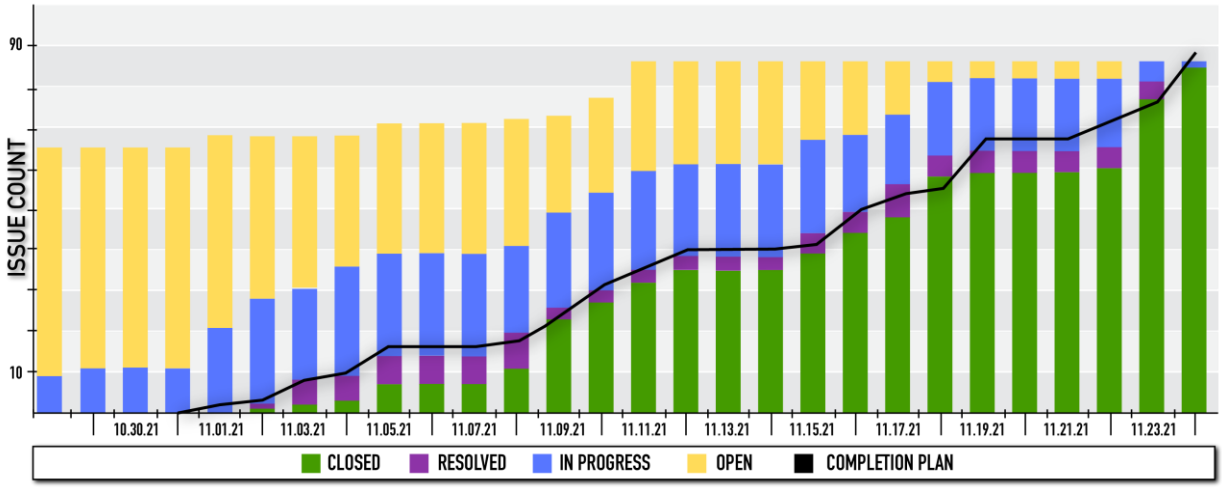

Figure 1 Sprint S-Curve Metric Example from November month Sprint

CEI, another "Big 3" metric, measures how accurately our program team forecasts the tasks they can achieve in each month. It is a percentage of the actual completed tasks over all tasks forecast to complete

in that month. Each week the team reviews progress on CEI tasks. This drives proactive conversations around where we have risk and what actions are needed to meet our forecast commitments. At month end, we use CEI to identify lessons learned that will improve our forecasting and execution in future months.

The final "Big 3" metric, staffing burn, measures weekly staffing actuals against the staffing plan set for the month. Cost Account Managers (CAMs) set the monthly staffing plan with their Estimate to Complete (ETC) and schedule forecast. Each week actual staffing data is trended to predict performance against their plans. Variances are flagged when a CAM is burning "hotter" or "colder" than plan and their explanation may reveal emerging cost challenges, schedule risks and the actions needed to mitigate them.

How TCTS II has performed against these metrics

The following charts show a six-month trend of our performance on the "Big 3" metrics, starting with sprint plan completion. Our threshold expectation for sprint plan completion as measured by the S-Curve is 95%, with an objective of 97%. Our average sprint plan performance exceeds the threshold, illustrating how we've become predictable in meeting the sprint plans we set (See Figure 2).

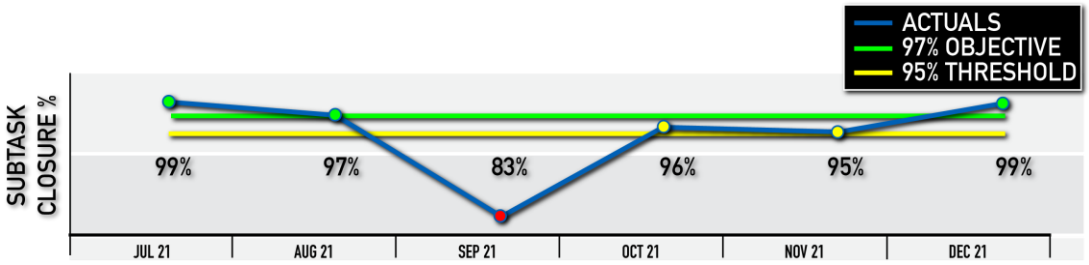

Figure 2 Total Sprint Task Completion Trend

CEI performance has consistently met or exceeded expectations against a target of 75% tasks completed as forecast each month (See Figure 2). This trend indicates our team is paying attention to their schedule tasks and can accurately forecast their near-term plans, accounting for dependencies and uncertainty.

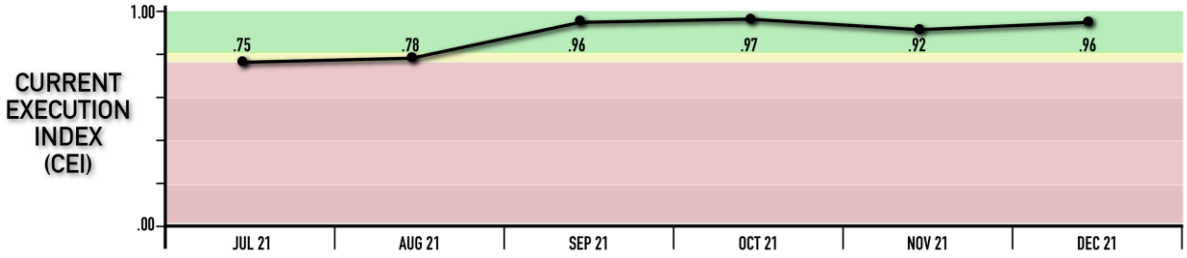

Figure 2 CEI Performance Trend

Finally, staffing actuals have averaged within 10% of staffing plans each month (See Figure 3). This demonstrates the team's ability to estimate the cost of their work and their capacity to spend in the month. Accuracy on staffing execution is directly correlated to improved stability in our cost performance.

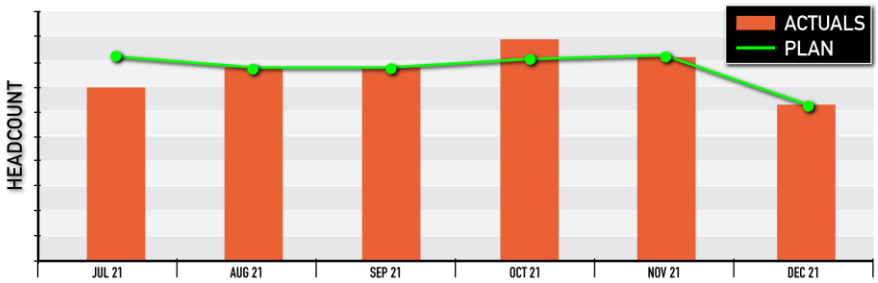

Figure 3 Staffing Performance Trend

How predictive metrics used for TCTS II drive action toward program excellence

Our definition of excellence is consistently meeting the commitments we make. It's doing what we say we are going to do and being predictable. By holding our team accountable to the "Big 3" metrics, among other metrics, we have become more predictable. It has reinforced in the team that our commitments matter, large and small. And because they matter it demands we create detailed, achievable plans and proactively address emerging issues during execution. It has nurtured a culture of extreme ownership where teams not only own their tasks but seek to make *all* teams successful in achieving the mission.

Our metrics have helped us embrace a learning culture where we learn from the mistakes we make and capitalize on our successes. When we fall short of our commitments, we conduct a Root Cause Corrective Action (RCCA) to identify the contributors and actions we need to take to improve. It is this continuous improvement mindset coupled with high standards that has enabled the TCTS II team to deliver on their promises, build trust, and achieve excellence.

The stability in our cost forecast is just one example of how the continued application of our predictive metrics have led us toward excellence. We track our cost forecast as our most-likely Estimate At Complete (EAC). This is a measure of our EAC forecast inclusive of factored risk and opportunities. Excellence is keeping our most-likely EAC stable against a fixed set of scope. Throughout 2021, TCTS II enjoyed remarkable stability in our cost forecast. Minimizing surprises helps our customer plan for the future and allows our team to better anticipate staffing needs. At a recent TCTS II program management review, our customer highlighted this stability and praised the team that made it happen. Our predictable performance has improved the morale of our team, built customer trust, and is leading to future business.

DEALING WITH PROGRAM COMPLEXITY (VOLATILITY, UNCERTAINTY, COMPLEXITY, AMBIGUITY, OR VUCA) *(*Value: 25 pts*)*

Please respond to the following prompts:

- *10 pts:* Describe areas of VUCA faced by your program and why.
- *15 pts:* Explain how your team responded to these challenges.

(12 pt. Times Roman)

Describe areas of VUCA faced by TCTS II and why

The largest complexity for the TCTS II team has been the breadth of expertise and collaboration required to support each of the different technologies used in this system-of-systems. Figure 4 illustrates the complexity of TCTS II: many "pod" subsystems in the air, forming a complex RF network with ground subsystems, interfacing with external range systems, all through layers of security and encryption to deliver reliable, precise data for live, virtual, and constructive entities. Each of these subsystems are systems within themselves– like the pod. Inside its AIM-9 missile form factor is a set of electronics (radios, amplifiers, processors, power supplies, etc.) that must perform under the harshest of airborne

environments while severely constrained on size, weight, and power. Developing, integrating and qualifying TCTS II across all systems, stakeholders, and platforms is an enormous undertaking.

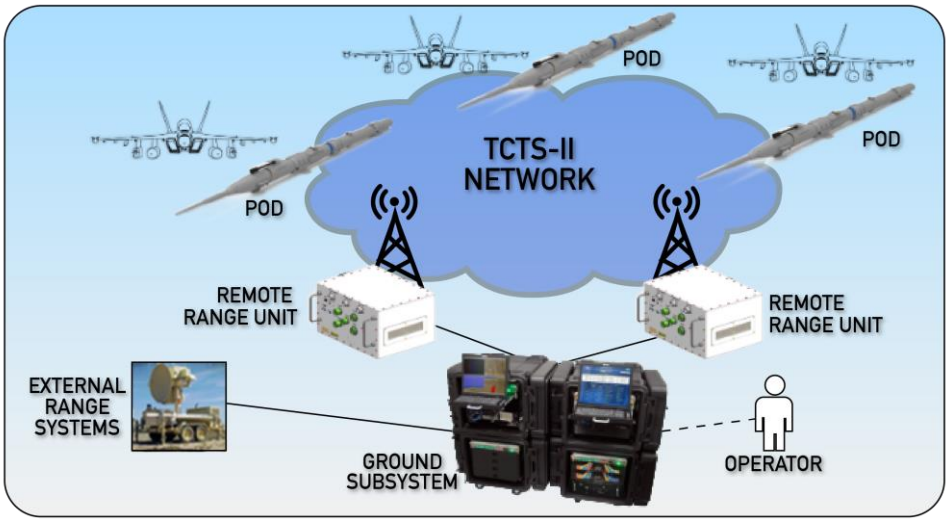

Figure 4 TCTS II System Complexity

Prior to the COVID-19 global pandemic, we benefited from colocation, in person technical interchange, and lab demonstrations to get feedback from our customer and internal stakeholders. Just as we entered the integration and test phase, the pandemic struck and disrupted this battle rhythm. We had to find a new way of working that balanced those integrating on-site in our labs and those providing support remotely. Our development team implemented agile methodologies to make the details of our plans more visible, manage dependencies, and increase the flow of communication across all stakeholders.

Not even six months into the pandemic and less than eight weeks before our first major test event, a devastating derecho storm struck Cedar Rapids, Iowa, the home of our TCTS II development labs and where over 100 of our team members reside and work. It was an "inland" hurricane with winds gusting up to 140 mph for over an hour. It caused damage to nearly every home and left people without power for over a week. Our buildings ran on generator power to keep development going as our employees came on-site to work, charge their phones, and enjoy some air conditioning.

How the team responded to these challenges

The development complexity of TCTS II coupled with unprecedented external headwinds created cost and schedule challenges on our path to Milestone C. Our team responded with strategies to address these risks including adopting an incremental delivery schedule to maintain schedule on key test events, utilizing a virtual test environment and digital simulations to reduce hardware dependencies, and adopting a Joint Change Control Board (JCCB) with our customer to control costs. These strategies are further detailed in the following section.

To maintain morale, the leadership team made it a priority to celebrate the wins and to be present on-site with our support. The path to Milestone C was long and demanding. We broke down the plan into smaller objectives such as completing the next sprint and making the next incremental software delivery. The team showed incredible resilience through long nights, weekends, and traveling weeks on-end to the various ranges and test facilities. We celebrated each of these wins with pizza, food trucks, ice cream parties – whatever it took. Every other week we crowned one team member the "People's Champ" as voted by peers for going above and beyond. We celebrated bigger wins with executive leadership giving

public recognition and handing out cash rewards and swag. With each win the momentum built and so did our team's pride in what we were accomplishing despite the odds.

While the team appreciated the food and gifts, they also desired leadership to be present "in the trenches" and to share in the hardships of the team. Our management team transitioned to working fully on-site during the pandemic so we could respond quickly to issues and better sense the pulse of the team. Managers were present for each extended shift and weekend to keep the team fed and encouraged. This shared sacrifice kept us united and determined as we scratched and clawed our way to success.

ORGANIZATIONAL BEST PRACTICES AND TEAM LEADERSHIP *(*Value: 35 pts*)*
Please respond to the following prompts

- *15 pts:* Describe the innovative tools and systems used by your team
- *10 pts:* Define how you developed, led and managed people
- *10 pts:* How did you leverage skills and technologies of your suppliers?

(12 pt. Times Roman)

Innovative tools and systems used by TCTS II

The TCTS II team initiated an enhanced joint customer battle rhythm focused on change control and cost management. At the heart of this battle rhythm is the Joint Change Control Board (JCCB) process. All program changes that impact cost are brought forward with an operational impact, scope plan, and comprehensive life cycle cost to enable our customer to make data-driven, informed decisions. Prior to JCCB, a Change Planning Conference (CPC) meeting is held with a smaller team of Collins and customer leadership to jointly triage and prepare the work packages to be reviewed at JCCB. This process has advanced the team's awareness of upstream and downstream impacts of changes, eliminated surprises, and stabilized the program's cost performance.

The changes approved by JCCB then proceed to detailed design and are gated by an Increment Design Review (IDR) prior to development. The IDR details the scope and design of each new feature and models the end result to the system. This process establishes a technical baseline with all stakeholders and gains customer concurrence before proceeding to build and test.

Additionally, the TCTS II program holds weekly Program Management Reviews (PMR) with a focus on cost and schedule performance. During these PMRs the team reviews a multitude of metrics including staffing levels and the health of critical paths in the schedule. This weekly review promotes transparency, collaboration, and reinforces our "One Team" culture between Collins and our customer.

We overhauled our risk management process to achieve stability in our cost forecast. We drove ownership and accountability down to each CAM and increased the frequency of our cadence with program leadership. We instilled a "risk hunter" culture. If one voiced a worry, concern, or unknown, it was answered with "Do we have a risk for that?" We educated CAMs on "most likely" EAC – their EAC forecast inclusive of their factored risk profile. We set expectations this most-likely EAC was their commitment and how proactive risk management was a crucial component to achieving stability in their forecast. With renewed focus and understanding, we identified uncertainty in our plans much sooner and gave ourselves time to mitigate risks and enhance opportunities to reduce program cost and schedule.

We adopted an agile development and delivery model to further reduce risk. Prior to the integration and test phase, our delivery schedule was a classic waterfall development: one major test event and software delivery to capstone years of design and development. When we entered system level integration we

collaborated with the Navy on an agile approach to incrementally deliver system maturity to maintain schedule. This incremental approach enabled the higher-level test program to proceed and burn down risk, rather than finding these risks later when the entire system was "ready".

We implemented a framework called "Trusted Agile". This framework is an execution "recipe" that was honed over years of Collins development on similar defense programs like TCTS II. We immediately embraced three tenets to support our path to Milestone C: achievable increment plans, sprint subtask burndown charts, and the "integration" sprint. We believe the most important factor in delivering our builds on-time is an achievable plan. To that end we place a large emphasis on our increment planning events. Our approach is to continue planning until *each team* can commit to their plan. That means establishing belief in their plan: getting into the details, dependencies, using past actuals, and accounting for risk and historical rework. Each team is required to present their plans to the entire program and show data for "why" it's achievable. This approach reinforces ownership and accountability at the team level, establishes buy-in, and motivates strong follow through on their commitments. See Figure 5 for a typical increment plan presented by a scrum team to the program.

	1.1	1.2	1.5	1.INTEG	TOTALS
WORKING DAYS	20	20	20	20	
TEAM VELOCITY	10	10	5	10	
PLANNED STORY POINTS	5	7	4	2	
PLANNED GROWTH	3	3	1	3	36%
TEAM LOADING	80.00%	100.00%	100.00%	50.00%	
				AVERAGE INCREMENT LOADING	80.00%
				HISTORICAL GROWTH	23%
				PLANNED vs HISTORICAL GROWTH DELTA	12.71%

Figure 5 Data-Driven Increment Plan

The next tenet enacted was sprint subtask burndown. Each increment has four sprints with each sprint being four weeks in duration. Prior to a sprint, each scrum team breaks down their work into small tasks and creates a plan for when those tasks will complete over the sprint. These plans are represented in a burndown chart called an "S-Curve". As shared in the metrics section, the S-Curves are distributed *daily* across the entire program. If a team falls behind, we dive in and take immediate actions to recover.

The third tenet we embraced from Trusted Agile was the integration sprint. The first three sprints of the increment are for developing the increment's features. The fourth sprint, dubbed the "integration sprint", is dedicated to system-level integration, test, and bug fixes. This sprint gives the systems team a baseline configuration where they can focus on finalizing the increment build. The software teams reserve capacity in this sprint to fix bugs while working ahead on the next build.

Beyond project management, the TCTS II development team leveraged digitalization of work to reduce technical risk and development cycle time. We created a virtual test environment to emulate dataflows within the hardware of the pod subsystem. The software development teams employed this virtual environment to test interfaces and functionality without hardware-in-the-loop. This approach allowed progress before real hardware was available and mitigated impacts from hardware delays that mounted from supply chain shortages associated with the COVID-19 pandemic. We also employed simulation of complex system elements such as virtual airborne participants. To create these simulations, we reused homegrown tools and incorporated our COREsim product line from our flight simulators business unit. The virtual airborne participants reduced the required quantity of hardware assets, enabled robustness testing of adverse RF network conditions, and easily generated a max load scenario of over 100 entities.

By continuously testing, the team can identify defects early and prevent more costly discovery downstream when the system is exercised at scale on the ranges.

How TCTS II developed, led, and managed people

At the start of 2020 TCTS II faced a number of common program challenges on our path to achieving Milestone C. Our situation became even more difficult when the global pandemic hit, impacting staffing, supply chain, and our ability to collaborate. We needed a ladder to climb towards excellence.

The first rung on that ladder was strengthening our team culture and leadership around commitment, transparency, ownership, and accountability. The TCTS II team needed to reinforce trust with the Navy by being an organization that set achievable plans and met them, consistently. We needed to be predictable. Embracing this culture started with targeted coaching and training for those in leadership roles. We held a two-day virtual "offsite" where we conducted interactive training on project excellence. We discussed the meaning of commitment and ownership, shared our best practices for project management, and simulated a real program where these values and methods were applied in a team-based setting.

The second rung on our ladder to excellence was optimizing the organizational structure to provide more focus on our critical paths to Milestone C. We were spreading our project leaders thin over many areas, covering the same meetings, and solving problems by committee. To focus our efforts, we assigned a dedicated program manager and engineering lead to each critical path. Our mantra was "divide and conquer". We empowered each leadership team with a clear mission and authority to execute. This approach increased the speed of decision making and enabled a deeper dive on our risk areas.

The third rung on the ladder was establishing a harmonious battle rhythm. The leadership team managed the "divide and conquer" approach with a daily stand-up where we all came together to status a list of critical issues. As an ode to our Navy customer, we described these issues as "gators circling the boat". The gators closest to the boat became the priority. One-by-one we methodically addressed these issues and became "gator slayers". This became a fun rallying cry for the program and an effective analogy to communicate our situation to leadership and the customer.

Figure 6 Priority Scheme for Handling Critical Issues

How TCTS II leveraged skills and technologies of suppliers

TCTS II partnered with the University of Iowa's Operator Performance Laboratory (OPL) to conduct flight testing for system integration and as risk reduction prior to the Navy's F/A-18 flight test events. In

July of 2020, TCTS II completed its inaugural flight on a highly instrumented L-29 jet aircraft at the OPL. Additional flights were conducted at the OPL in November 2020. By partnering with OPL and its fleet of instrumented test aircraft, Collins was able to find problems early in the development cycle, well before gaining approval to flight test on the F/A-18. The Collins and OPL teams embraced an agile approach with rapid iterations of finding issues, fixing them on-site, and getting right back in the air. This approach reduced months from our schedule and mitigated the risk of finding issues during the more costly and time-critical Navy flight tests.

The Collins team also partnered with Leonardo DRS Airborne & Intelligence Systems (DRS) for their experience in the training market. DRS scope includes integration with weapons simulations, pod integration, and pod production. DRS used their historical data to maximize qualification by analysis for the TCTS II pod and leveraged established relationships with various test houses for us to construct a cost-efficient testing plan. When faced with supply chain delays, we established an integrated pod build plan that allowed DRS to make progress with each part Collins made ready. This tight coupling between our build plans helped mitigate schedule risk and hold to our customer commitments. DRS also collaborated closely with the Collins engineering team during weapons integration. They traveled to Collins' labs to verify weapons functionality and joined our team for formal testing at our customer's facilities. This collaboration between engineering teams allowed us to debug and fix issues real time, saving cost and schedule.