

NOMINATION FORM

Name of Program: US Army Gray Eagle Performance-Based Logistics

Name of Program Leader: TJ Nagle

Phone Number: 858-879-5390

Email: tj.nagle@ga-asi.com

Postal Address: 14200 Kirkham Way, Poway, California 92064

- Customer Approved
 - o Date: 6/23/2020
 - o Contact (name/title/organization/phone): LTC David Benjamin, Project Manager, PdM EUAS, 256-313-4655
- Supplier Approved (if named in this nomination form)
 - o Date: _____
 - o Contact (name/title/organization/phone): _____

CATEGORY ENTERED

Refer to definitions in the document "2020 Program Excellence Directions." You must choose one category that most accurately reflects the work described in this application. **The Evaluation Team reserves the right to move this program to a different category if your program better fits a different category.**

Check one

- Special Projects
- OEM/Prime Contractor Systems Design and Development
- OEM/Prime Contractor Production
- OEM/Prime Contractor Sustainment

Point Distribution

Executive Summary: Make the Case for Excellence (15 pts)		
Metrics 10 pts Predictive Metrics (10)	Program Volatility/ Uncertainty/Complexity/ Ambiguity 25 pts Describe overall VUCA (10) Cite examples of team response (15)	Organizational Best Practices & Team Leadership 40 pts Innovative Tools and Systems (15) Unique Innovative Processes for People Development/Knowledge Transfer (15) Unique Practices for Customer Engagement (10)
Value Creation (10 pts)		

Abstract

In 150 words or less, why is this program excellent in terms of execution?

General Atomics Aeronautical Systems, Inc. (GA-ASI) Army Gray Eagle Unmanned Aircraft System (UAS) Performance-Based Logistics Sustainment

GA-ASI’s Gray Eagle UAS is the Army commanders’ weapon system of choice to provide 24/7 responsive, armed, aerial surveillance and attack capability, cohesively teamed with manned systems and Soldiers in the field. With over 100,000 Gray Eagle flight hours annually, GA-ASI works closely with the Army Endurance UAS Project Office through its **Performance-Based Logistics (PBL) program** to maximize the UAS’s operational readiness to ensure mission success when and where it is needed. From January 2017 to December 2019, GA-ASI was instrumental in the superb readiness of the Gray Eagle fleet, leading initiatives and techniques that improved its Mission Capable (MC) rate 15 percentage points, from 82% to 97%, and ultimately completing the year with a 99% single month MC rate for December 2019.

Mission Capable Rate Improvement

Gray Eagle Readiness Rates CY17 - CY19			
Readiness Metric	2017	2018	2019
Mission Capable (MC)	82%	95%	97%
Evaluation: Green = Level 1 (85-100%); Amber = Level 2 (75-84%); Red = Level 3 (60%-74%); Black = Level 4 (< 60%)			

GA-ASI achieved this level of readiness through its innovative management and execution of the PBL program, providing the most flexible and cost-effective sustainment solution to the Warfighter.

Purpose

Provide a 150-word description of the purpose of this program, spelling out all acronyms and correct acronyms

The Army Gray Eagle PBL program directly supports the operations and sustainment of over 200 Gray Eagle aircraft systems worldwide. PBL is a full-service logistics program providing on-site Field Support Representatives (FSR) at both stateside and overseas combat locations, supply chain management for spares and consumables from the factory to the warehouse to the field, depot overhaul and on-site urgent repair of assets, and 24/7 reach-back engineering support to respond to Soldier needs. There are currently 18 home station and 11 overseas deployed Gray Eagle locations supported by the Army PBL contract. The size, complexity, and scope of the Gray Eagle system required a different approach than previously used in order to meet the challenges of this valuable Warfighter asset that is always in high demand. The PBL program was initiated to ensure the Gray Eagle is always mission ready and available when called upon during operations.



Gray Eagle Unmanned Aircraft

Executive Summary: Make the Case for Excellence (Value: 15 pts)

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

Vision

The Gray Eagle UAS program has been an important element of US Army aviation since its initial fielding in 2009. Since then, the Gray Eagle program has grown in size and complexity with evolving and austere deployed locations, growing number of fleet aircraft, and always improving system capabilities through field upgrades to meet Warfighter needs. Inside of this global Army UAS “ecosystem,” GA-ASI and the US Army Project Office team work every day to provide operational units a turn-key, lethal, reliable, cost effective asset – a system that a Warfighter can rely upon to be there when needed at a moment’s notice. This is why the PBL program was put in place and what our ultimate goals are focused on.

GA-ASI and the Army Project Office’s program vision is to keep the focus on what matters – agile, cost effective support to Soldiers in the field. That vision emanates into program and contracting approaches such as focused and operational relevant performance metrics, use of multi-year and innovative contracts and subcontracts, fixed-price sustainment where feasible, bundled services, and shared parts and expertise pools that contribute to keeping products affordable to operate, and making it easier for the Army to predict and budget for their programs.

To support this vision, GA-ASI set about leveraging cross-organizational expertise to provide the best services and the best price. GA-ASI provides round-the-clock service for multiple UAS customers that equates to supporting 69 GA-ASI aircraft airborne around the world every second of every day. Faced with this daunting responsibility, GA-ASI leadership took action. A central organization called Product Life Cycle Sustainment (PLCS) was created through consolidation of several engineering functions. GA-ASI is able to capitalize on common knowledge, experience, and economy of scale to bring best service to the customer. Ultimately, PLCS addresses cost over the Life Cycle, putting our vision into practice.

Uniqueness

What unique characteristics and properties qualify this program for consideration?

The PBL program is unique in the breadth of services provided in a very complex environment around the world with program agility to respond to operational needs. To be successful in a cost-effective manner, the program must have innovative practices, processes, and tools that constantly evolve to deal with situations and environments not envisioned at the inception of the program contract. The GA-ASI PBL team has thrived in this environment by focusing on data, customer collaboration, sound decision-making, and thorough processes to be more effective and efficient.

Complex Operating Environment: The Army Gray Eagle system is uniquely challenging in many ways –geographically, organizationally, and in magnitude. The Gray Eagle fleet serves multiple operational customers to include three (3) geographic combatant commanders, one (1) functional combatant command, one (1) Army command, and one (1) Army Direct Reporting Unit. In total, there are 16 units operating in 29 locations around the world. These units are never standing still, whether it’s the ever-evolving nature of operational missions, or new world-wide deployments and locations that must be responded to quickly. GA-ASI is responsible for shifting assets, Field Support teams, supply chain elements, and reach back support structure to support these moves. Additionally, customer funding is an ever-changing dynamic, sometimes creating last-minute opportunities for training at various locations and adding new demand on the PBL program.

In addition to those challenges, the Gray Eagle system is a complex evolving fleet of aircraft with several configurations or “blocks” operating that drive different needs in terms of spare parts, on-site service

expertise, and reach back engineering support. In order to continually upgrade the capability of the system, GA-ASI seamlessly handles multiple field upgrade efforts, including planning upgrade kits and spare parts, updating technical manuals, releasing maintenance service bulletins, and adapting the supply chain for sustainment of these new configurations. This complexity is multiplied as our team executes these upgrades during the high operations tempo of Gray Eagle units in the field. Across the system, Gray Eagle aircraft are flying at a rate of over 250 hours per day! Planning and executing upgrade programs on this fast-moving train is a challenge GA-ASI readily accepts.

Breadth of PBL Services: The breadth of services GA-ASI provides under the PBL program is truly “soup to nuts” for the Gray Eagle system and our customer. At the very core of PBL is the ***Supply Chain Management*** function that ensures the right part is in the right place at the right time to keep operations running. GA-ASI manages the central warehousing and shipment of Gray Eagle parts and spares around the world and is continually monitoring usage via on-site, near-real-time inventory systems. GA-ASI field support personnel directly track shipments to ensure timely and cost effective re-supply. Lastly, timely execution of depot actions to return components to operational status as part of standard overhaul or repairs is a vital part of the supply chain service to minimize spares volume and costs.

If supply chain is at the core of PBL program services, ***Product Support Management*** is the heart of our efforts. GA-ASI is proud of the quality of our direct support to the Soldier in the field through our highly experienced Field Support Representatives (FSRs) with 24/7 reach back to our stateside team. Our FSR work force typically has over 300 people embedded with units around the world. GA-ASI has a tremendous amount of expertise serving as direct back up to Army support personnel and providing full-maintenance action recommendations to maximize aircraft availability. As a result of the maintenance initiatives for Gray Eagle aircraft, the US Army has achieved system availability rates greater than 95% the past two (2) years, 15% above the goal. This achievement really starts with the training provided that introduces Soldiers to Gray Eagle at the beginning and is there for them through the maturation of the product.

Product support relies on a strong backbone of experiences engineers within the company that are part of PBL’s ***Sustaining Engineering*** services. These services include ensuring accurate and timely instructions to the Soldiers through developing, releasing, and maintaining technical manuals, driving closure for bulletins related to critical safety items, quality escape containment, modified operational or inspection criteria, configuration changes, and many other engineering-related subjects. GA-ASI examines data from anomalies, failures, and mishaps for timely customer-oriented communication of analysis and engineering recommendations. The company’s combination of engineering disciplines, broad technical backgrounds, and access to detailed engineering and failure history data ensures that emerging issues are quickly resolved. These services are provided 24 hours a day, 365 days a year, to maximize system availability and to ensure Gray Eagle maintains one of the lowest mishap rates of any military aircraft and highest availability rates of any fielded system.

Unique Approach to Program Success: GA-ASI provides full-spectrum service in this very challenging operational environment by relying on strong management practices with a focus on data driven actions, innovative tools and practices to be more effective, and creating program agility to respond to customer needs.

Data and information is key to GA-ASI’s approach to the PBL contract. As a performance-based contract, the Gray Eagle PBL program is highly focused on data across the spectrum of operations from the field, through the supply chain, to the bottom line through Earned Value Management (EVM). Contract incentives are driven by performance in improving the Reliability, Availability, and Maintainability (RAM) of the system. GA-ASI has excelled at achieving these metrics which has resulted in the Gray Eagle System achieving a lifetime operational readiness rate of over 90%. Specific contract metrics are

tracked and scored on a quarterly basis and have the flexibility to be pivoted to new measures under joint agreement with the customer during the contract period to areas in need of improvement or key operational importance. Beyond the customer's metrics, GA-ASI uses data internally to determine trends, report status to senior management, and resolve issues. Innovative tools like our "PM dashboard" provide quick look on EVM performance with deep dive capability to key factors for action.

GA-ASI's commitment to providing the most flexible and cost-effective sustainment solution requires the use of *innovative practices, processes, and tools*, which has made the PBL program the model for sustainment programs at GA-ASI. For example, GA-ASI implemented Radio-Frequency Identification (RFID) technology using a "Tower Inventory System" in our warehouse that has improved the efficiency and accuracy of inventory tracking to save customer costs. Also, in 2019 the Army PBL sustainment team adopted the OPUS sparing model to optimize spares and reduce overall system costs. Applying OPUS resulted in an efficient reduction of excess parts being ordered. For additional efficiencies, GA-ASI also focuses on reshaping processes to adapt to operational needs. In collaboration with the customer, GA-ASI took the existing standard Failure Reporting Analysis and Corrective Action System (FRACAS) process, which focused on a finite list of components set at contract award, and flexed the process during the contract period to allow shifting investigations to new component failures and relax efforts on parts that have shown stability. This has facilitated better use of resources and funds to address any other emerging issues affecting operations.

The agility to adapt services to meet the evolving operational environment demands is crucial to long-term success. This is not a trivial task given the size and complexity of the PBL program. A trailblazing contracting approach has been implemented for scalable and rapidly deployable field support personnel to turn an urgent Field Commander need into an operational capability. An expedited FSR support process of pricing and providing FSRs by "week of effort" has resulted in a capability to quickly turn field change requests into executable contract modifications to support emerging US Army requirements. The challenge extended to our subcontracting processes with our partners who also provide FSRs. This quick reaction contracting approach could not have been implemented without the tight collaboration between GA-ASI and the Army Project Office.

GA-ASI's ability to be agile and effective on PBL programs is largely due to the Integrated Product Team (IPT) reorganization put in place in 2017 and structured around the Army Gray Eagle product. The IPT structure not only brought together dedicated personnel from supporting functional departments into a centralized work space, but more importantly fostered comradery through a team-building atmosphere emanating from the Army IPT Vice President and his leadership team.

These successes signify the importance and shared commitment of GA-ASI and the Army. Our company has striven to build a relationship with the Army Project Office that fosters a *unique customer collaboration* to deal with the ever-changing environments and requirements. In an unprecedented effort, GA-ASI and the Army Project Office team conducted a system-wide "road trip," performing a site-by-site review of sparing levels. Learning from this pain-staking work, the team restructured the sparing levels to centralized parts at the company warehouse to save costs. The overall effort resulted in significant cost savings in system-wide inventory. Collaboration extends to many aspects of operations; for instance, planning complex field upgrades to ensure the Gray Eagle units are ready and it is planned with the least impact to operations. Collaboration starts at the top with senior leadership from our company and the Army Project Office. Our singular focus is to work hard every day to provide operational units a turn-key, lethal, reliable, cost effective asset – a system that a Warfighter can rely on every day and every hour to support the mission.

VALUE CREATION (Value: 10 pts)

Please respond to the following prompt:

- *Clearly define the value of this program/project for the corporation beyond profit and revenue*
- *Clearly define the value of this program/project to your customer*
- *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.)*

Company Value

Results are the ultimate measure of success of any company product. Great results translate to greater demand for the product. The Gray Eagle Program's operational performance has won GA-ASI more delivery orders, and it has earned a reputation for responsiveness and effectiveness through reliability and capability. The rest of the aerospace industry has noticed. Industry partners have sought-out GA-ASI, not only to bring their products to bear, but to team with us to make the overall system better, as great logistics support is just as important as operational results. Our PBL practices and processes have influenced our industry partners, with positive effects on their business models as well. More partners continue to mirror and implement the best practices of the PBL program in their everyday operations. The value of the PBL program has gone beyond just GA-ASI.

Internally, our PBL program has focused on metric measurement and tracking as a key best practice from the beginning. Metrics have enabled GA-ASI to continually adapt and improve our sustainment processes, as well as develop new ones. Our PBL approach has produced these important outcomes while supporting the dynamic and complex environment in which our Army Customer operates. As a result, our PBL program's flexibility, scalability, and adaptability have made it the preferred model for other GA-ASI programs, DoD services, and international customers. Customer satisfaction, due in large part to our sustainment excellence, has enabled GA-ASI to grow, improve products, and invest in our future.

Success in the PBL program has resulted in growth in PBL revenue. Revenue growth is allowing GA-ASI to invest in the Gray Eagle platform through the use of Internal Research and Development (IRAD), focusing on additional automation, payload, and detection capabilities. Maintaining relevance of the Gray Eagle system is critically important to the Company and continues to drive future production buys of the aircraft.

Customer Value

GA-ASI has been able to provide our Army Customer with an affordable, highly-combat capable, and effective system. While the Army stays focused on maintaining superb combat capabilities, our focus is on providing those capabilities as affordably as possible and remaining that way over the full life cycle of the system. Having a record of outstanding safety, reliability, availability, and maintainability is essential to achieving this goal. GA-ASI is providing improvements by greatly increasing endurance/on-station time enabling longer mission duration, broadening the number of potentially available operating bases; incorporating significantly greater reliability, maintainability, and flight safety; and increasing payload and weapons capacity with provisions for even further growth capabilities. PBL revenue reinvestment into IRAD funding is being used to improve aircraft automation and sensors, showing the Army Customer ways to solve problems posed by future conflicts. Our PBL support infrastructure must continue to improve with the platform if the Army is going to have continued success.

Addressing those future threats requires a team effort. This team includes GA-ASI, the Army, and other industry partners. We maintain an exceptional rapport with our customer using frequent team meetings to maintain continuously open dialogue and show a willingness to identify capabilities other companies possess that can help solve future operational problems. Our IRAD efforts have integrated several capabilities from other companies. These efforts have provided tremendous value to the customer and

shown them true options to solve operational problems, not just briefings, but with real data from flight testing and demonstrations.

Team Value

The Army PBL program is aligned with GA-ASI's perspective that employees must have a solid understanding of the company's vision, mission, core values, and strategic objectives. PBL team members are developing unique skills and experiences not available on other programs. Managers are given complete authority to manage the cost, schedule, and budget within their contract responsibilities, pushing down decision-making to the lowest level providing the best response and most effective outcomes. Our managers extend their responsibilities down to team members to create shared ownership of the results. The PBL approach and processes have been used throughout our company, which has resulted in a highly-trained, highly-skilled, and highly-efficient workforce.

Greater Good

National Security is a broad undertaking, involving hundreds of techniques, ideas and approaches. In the end, it comes down to action and achieving real results. The PBL program has made a positive difference in the lives of people, increasing pride of ownership from the hard work invested, saving lives on the battlefield, and in humanitarian support helping people recover from disasters and hardships because the Gray Eagle was there when called.

METRICS (Value: 10 pts)

Please respond to the following prompt:

- How do your predictive metrics drive action toward program excellence?

Metrics

The PBL program is structured to provide performance-based life cycle product support, where outcomes are acquired through performance-based metrics that deliver Warfighter needs and incentivize product support providers to reduce costs through innovation. The program's key performance metric is to provide a Gray Eagle system Mission Capable (MC) rate above 85%. An MC rate involves many factors beyond the functionality of the mission associated systems, mainly maintenance and supply factors. To achieve higher MC rates, the Non-Mission Capable Supply (NMCS) times and Non-Mission Capable Maintenance (NMCM) times must be reduced. These times involve many factors having to do with parts supply and maintenance events, such as: repair turnaround time (time required to complete a repair of a failed part, measured in how many days from induction into the repair facility to return of part into service); the time from failure to conduct a root cause analysis to determine failure cause; logistics response time (time in mean days that elapses from the date a customer establishes a requisition to the date the customer receives the material that was ordered); and others.

Ultimately, these metrics are designed to ensure the maximum use of spare parts in the active supply chain. By doing this, the total parts required to keep the supply chain flowing in a way to not disrupt unit operations and cause maintenance or supply down time is optimized. There are more metrics at lower levels designed to measure supply chain responses to field needs and requirements. There are even inventory and delivery accuracy measures, such as FRACAS Response Time (FRT), to ensure reliability of the system, and Depot Mean Down Time (DMDT) and COLTS Error Rate (CER) for inventory accuracy that assesses the extent to which the parts delivered to the customer correspond to the parts that were ordered. Achieving the overall MC rate is complex and comprehensive. Our PBL approach monitors, measures, and identifies all of these factors and incorporates them into contract metrics to hold us accountable for our work.

Using the data from our performance measures has also resulted in many process improvements that have led to increased operational readiness rates and reduced costs. One example is in the DMDT metric. The turnaround time for critical repairs was identified as an area of concern. Subcontractor repairs were taking up to 30 days processing through the GA-ASI depot prior to being sent to the vendor for repair. An analysis of the overall repair time found that the total time could be reduced by direct-shipping repair items from the field to GA-ASI's designated repair facility. We developed the Direct Repair Shipment (DRS) process enabling field sites to return major subcontractor parts directly to the subcontractor facility. This decreases transportation time and costs, decreases DMDT, increases effectivity and productivity, ultimately increasing site readiness. We integrated the DRS process into our contractual agreements with set guidelines and metrics. Once the repair has been completed at the vendor, quality checked, , and part shipped back to the Inventory Control Point (ICP), it is stocked and available to fill incoming requisitions. ***The implementation of DRS resulted in a decrease of overall total repair turn time by 40%.***

To improve accountability, the Army PBL program leverages a Program Management Plan that consists of tracking, analyzing, and acting upon numerous metrics capturing program execution and technical performance effectiveness through business, financial, and technical measures. At the heart of program execution metrics is a mature Earned Value Management System (EVMS), providing industry standard Cost Performance Indices (CPI), Schedule Performance Indices (SPI), Estimate at Completion (EAC), and To Complete Performance Indices (TCPI). The program analyzes the CPI and SPI data monthly, reviewing both the Inception to Date (ITD) and the Current Month (CM) in combination with monthly EAC and TCPI data to be able to identify both long-term and recent performance, as well as predict future performance goals to ensure successful program execution. Although the use of EVMS is not typical in performance-based contracts, GA-ASI and the Army Customer have developed a tailored, formal EVMS methodology, which has yielded a great deal of valuable data. The PBL sustainment program has benefited directly from EVMS techniques and metrics, showing indicators of risks and opportunities that assist with program decisions and direction.

Internal Metrics

The GA-ASI Program Management (PM) Dashboard is used to display relevant programmatic data to facilitate consistent evaluation and communication of program performance. The PM Dashboard displays program performance metrics, resource demand versus availability at both the program and enterprise level, risk management data, and flight operations information. Program performance is monitored and communicated through monthly Program Review meetings with executive management and the customer.

The Army PBL program provides ratings in several categories based on defined criteria, including but not limited to Cost, Schedule, Technical, Quality, and Customer Satisfaction. The category rating data are loaded into the PM Dashboard to enable quick assessment of program data for GA-ASI's entire program portfolio at all levels of the company. Our PBL program organization has dedicated program planning and control professionals to maintain continuous visibility and importance of this data, influencing other GA-ASI sustainment programs to follow the same planning, monitoring, and reporting regimen.

The PBL FSR Manning Tracker is another internal dashboard that provides a rapid health assessment for the contract. With 300 FSRs assigned to 26 locations around the world, anomalies were difficult to identify in a timely

Program Management Dashboard

Evaluation Category	Last	Current
Resources (Staffing, Facilities, etc.)	Green	Green
Requirements/Systems Engineering	Green	Green
Customer Satisfaction/Communications	Green	Green
Contract Management	Green	Green
Schedule Performance	Green	Green
Cost Performance	Yellow	Green
Fee Performance	Green	Green
Subcontract Management	Green	Green
Software or Hardware Development	Green	Green
Product Support (Log, Spares, TOs, Training)	Green	Green
Manufacturing, Integration, and Production Test	Green	Green
Flight Integration and Test	Green	Green
Quality	Green	Green
Unbilled/Cash Flow	Green	Green
Overall Rating	Green	Green

manner. In May 2019, the Field Operations team modified a dashboard product to pull in existing reports and create a basic stoplight metric that evaluated staffing levels at each site.

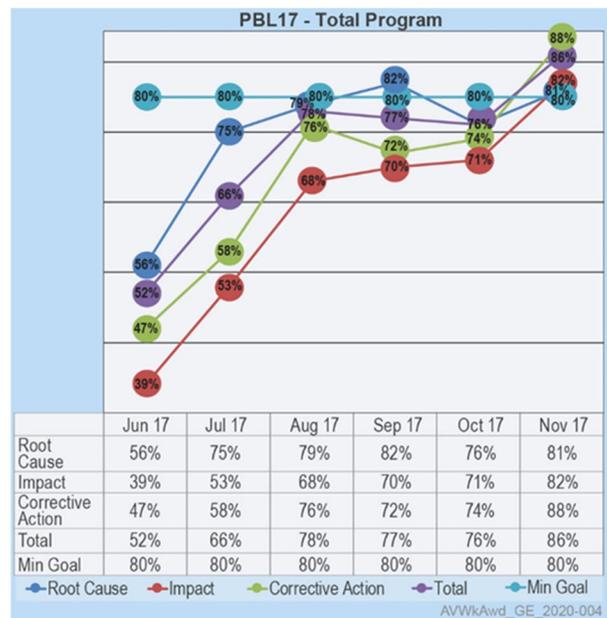
The backbone of this report is having accurate numbers for authorized FSRs. Attachment 0012 to the contract establishes a baseline FSR plan for each site. Once these numbers have been established, the Field Operations team uses the Field Support Request Form (FSRF) and associated process to document contractual changes as a result of unique unit training requirements and, more importantly, developing operational needs of the combatant commanders. The FSRF feeds into the FSR Map that provides forecasting information to GA-ASI and its business partners on the PBL contract. This allows management to make informed decisions on staffing requirements to support the 300 positions around the world. Daily personnel reports automatically feed into the PBL FSR Manning Tracking and compare actual personnel

PBL FSR Tracking

OCONUS Sites	Total OH	Total Auth	O/H	Auth	O/H	Auth	O/H	Auth	O/H	Auth	O/H	Auth	O/H	Auth	O/H	Auth	O/H	Auth
Site 1	14	14	1	1	5	5	2	2	1	1	0	0	2	2	1	1	2	2
Site 2	15	14	1	1	5	5	2	2	1	1	0	0	2	2	2	1	2	2
Site 3	13	14	1	1	5	5	1	2	1	1	0	0	2	2	1	1	2	2
Site 4	2	2	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0	0
Site 11	12	12	1	1	4	4	4	4	1	1	2	2	0	0	0	0	0	0
OCONUS Total:	140	144	9	10	48	50	23	24	10	10	2	2	19	20	9	8	20	20
HOME UNITS	Total OH	Total Auth	O/H	Auth	O/H	Auth	O/H	Auth	O/H	Auth	O/H	Auth	O/H	Auth	O/H	Auth	O/H	Auth
Unit 1	10	11	1	1	3	3	2	2	1	1	0	0	1	2	1	1	1	1
Unit 2	8	7	1	1	1	1	1	1	1	1	0	0	1	1	2	1	1	1
Unit 3	10	10	1	1	2	2	2	2	1	1	0	0	1	1	1	1	2	2
Unit 18	7	7	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1
CONUS Total:	151	149	12	12	35	35	29	29	15	15	0	0	22	24	14	13	24	21
Total:	292	293	99.7%															
			Manning Levels															
			No Issues					Over					Under					

on site with the authorized numbers pulled from the FSR Map. The dashboard formats matching numbers in green, shortages in yellow, and overages in red. Although it's a simple concept, the *modified dashboard reduced the FSR mismatch rate from 10% in May 2019 down to 1% to close out calendar year 2019.*

Another internal metric that drove improvement for the Army PBL program was a variance analysis scoring metric, tracked monthly. On a monthly basis, each Variance Analysis Reporting (VAR) is measured against pre-established scoring criteria to quantify VAR quality. GA-ASI recognizes VAR quality is predicated on technical relevance to the schedule and cost drivers. Quantification of schedule and cost impacts, with technical root cause, is needed to understand the problem and how the corrective action will contain or resolve program impacts. VAR scoring criteria is comprised of four areas: Requirements, Root Cause, Impact, and Corrective Action. The Requirement area scores the accuracy of the VAR breach threshold. The Root Cause area identifies the reason for each Element of Cost (EOC) impacted in the VAR and scores the quality analysis and quantification of each impacted EOC. The Impact area determines the impact to the critical path and other Control Accounts (CAs) and scores the quality of timing impacts, recovery timelines, and



Six Month VAR Process Improvement Trend

estimate-at-completion (EAC) reasonableness. The Corrective Action area ensures that the Latest Revision Estimate (LRE) or Comprehensive EAC (CEAC) is addressed and scores the quality of the recovery and risk plan analyses.

The implementation of the VAR scoring in the Army PBL program has enabled CA Managers (CAMs) to objectively determine the cause of the variance in question and its impact to the CA, related activities, and milestones. The CAM then develops and identifies the necessary corrective action. Within a span of five (5) months of monitoring these criteria, *the Army PBL program total VAR scores improved by 34% and surpassed the acceptable internal threshold score of 80%*. This metric is essential to the success of the Army PBL

program because it not only contributes to identifying root causes and developing concrete corrective actions, but it also assists in effectively communicating and informing the Army Customer on the contract performance.

VAR Scoring Checklist

Type	Area	Outline	Score	Description
00_Req	00_Requirements	01	N/A	SV Breach Accurate
00_Req	00_Requirements	02	Y	CV Breach Accurate
00_Req	00_Requirements	03	Y	VAC Breach Accurate
02_CV	01_Root_Cause	12	Y	EOC
02_CV	01_Root_Cause	13	Y	Price Usage Rate (\$)
02_CV	01_Root_Cause	14	Y	Resource Rate/Mix Details
02_CV	01_Root_Cause	15	Y	Price Usage Hr
02_CV	01_Root_Cause	16	Y	Resource Rate Hr
02_CV	01_Root_Cause	20	N/A	Is CV due to MATL and/or ODC?
02_CV	01_Root_Cause	21	N/A	Identify drivers of MATL/ODC Var
02_CV	01_Root_Cause	22	N/A	MATL/ODC due to timing?
02_CV	02_Impact	17	Y	Labor usage due to timing?
02_CV	02_Impact	18	N/A	How much will be corrected if timing?
02_CV	02_Impact	23	N/A	MATL/ODC corrected due to timing?
02_CV	02_Impact	24	N/A	How much of MATL/ODC will not be corrected?
02_CV	02_Impact	26	Y	Why can VAR not be corrected in future?
02_CV	03_Corrective_Action	19	Y	How/When will Labor CV be corrected?
02_CV	03_Corrective_Action	25	N/A	How/When will MATL/ODC CV be corrected?
02_CV	03_Corrective_Action	32	Y	Has LRE been updated?
02_CV	03_Corrective_Action	33	Y	When will LRE be updated?
02_CV	03_Corrective_Action	34	N	Risk Plan Updated?

Achieving Success

All metrics to measure the successes of the GA-ASI Army Program teams are recognized in many ways, but one to mention in particular is the traditional October (12 months after induction period) “dying off of repairs” for the PBL Contract. While the turnaround time of a repair is an important metric of the program, the completion of repairs marks a significant milestone, and recognition is celebrated with the ceremonial cake representing a successful completion and end of a project. The result has turned into a focus on repair completion that has resulted in year-to-year improvement of the contracts repair completion rate. The PBL program goal is completion of all repairs 12 months after induction period ends.



Repair Completion Trophy Case

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

Please respond to the following prompts:

- 10 pts: Describe overall VUCA faced by your project/program.
- 15 pts: Cite specific example(s) and how your team responded.

Addressing Volatility/Uncertainty/Complexity/Ambiguity

Like many aerospace programs, Gray Eagle has encountered its fair share of Volatility, Uncertainty, Complexity, and Ambiguity (VUCA). Program leadership has recognized and overcome numerous challenges, with the understanding that their jobs exist to recognize and overcome symptom effects of VUCA. Our team views VUCA in these terms:

Volatility: The RPAS industry has been one of the most change-induced and rapid-growth environments in the aerospace industry; **Uncertainty:** Predicting the future requirements for long lead sustainment material; **Complexity:** Technical advancement and system complexity continues throughout the life cycle and current sustainment effort; **Ambiguity:** Regardless of product reliability and prior service history, RPAS system technology will continually be assessed by numerous agencies with various levels of ambiguity associated with the new or unknown.

The Gray Eagle system is currently operating in 18 home station and 11 overseas locations supporting 16 different units. The operational tempo (OPTEMPO) for each unit varies, and there are often competing and short-notice events requiring Gray Eagle unit support. In some cases, there is little notice of upcoming support needs, requiring creative ways to provide rapid response to support unit operations.

Key Reliability Improvements to Minimize Volatility

Attempting to manage a program impacted by volatility is a challenge no organization wants to face. There are events that are completely out of your control. To some extent, the Gray Eagle's success creates its own problems because users have such confidence in it that they use it in ways never intended and in environments never anticipated. With such pounding, reliability becomes an overarching issue. In order to calm the volatility, our team returns to sound practices and focuses on the data. Monitoring Reliability metrics is key to staying well grounded. Such metrics are Mean Time Between System Abort (MTBSA) for Ground Control Equipment (GCE), Mean Time Between Essential Function Failure (MTBEFF) for GCE, MTBEFF for Aircraft (AC), and FRT, which have led to better reliability and reduced costs. Some examples of how we used metrics to improve reliability and reduce volatility are:

K16 Replacement Turbo Development: High-cycle fatigue was identified as the primary turbocharger failure mode initiating at the leading edge of the turbine wheel. GA-ASI used the advanced technology of Non-Intrusive Stress Measurement System (NSMS) testing to measure blade dynamic behavior and excitation drivers to confirm cause and develop mitigating measure to prevent high-cycle fatigue. Through fielding of the Borg-Warner K16 turbocharger and a software patch, GA-ASI successfully addressed this failure mode and dramatically improved the reliability of the propulsion system.

Gearbox Reduced Oil Pressure: Reduced gearbox oil pressure results in loss of propeller pitch control, propeller over-speed, and loss of thrust. Two (2) mishaps with the Gray Eagle aircraft were directly related to reduced gearbox oil pressure. GA-ASI identified Foreign Object Damage (FOD) as the most probable cause of reduced oil pressure while examining six (6) gearboxes with improper regulator settings as a contributing factor. As a result of this, GA-ASI improved their 100-hour engine inspections with more robust leak detection, addressed regulator pressure settings and gearbox cleanliness through shop instructions and production test procedures, and provided a bulletin to the field to provide procedures that allowed for better recognition of a developing issue.

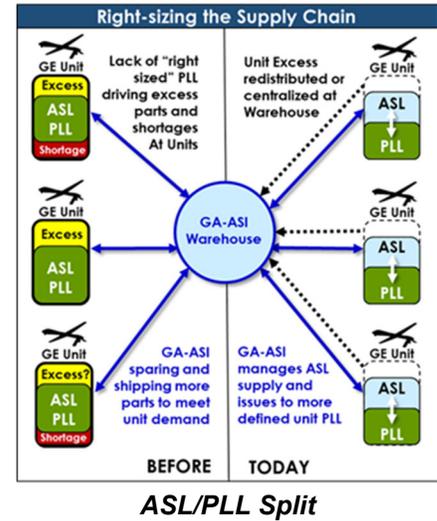
Aircraft Performance Monitoring (APM): The goal of APM is to significantly increase time between user alert of an anomaly and a critical-failure event of aircraft hardware. APM leverages fleet-wide Gray Eagle flight log data and Machine Learning (ML) to create models that predict nominal hardware performance. When integrated, APM compares real time aircraft sensor data (e.g. gearbox oil pressure) to predicted "nominal" values to evaluate hardware health. A deviation in data beyond pre-defined thresholds

triggers an APM anomaly alert. In one example, an anomaly detected during the initial 30 minutes of a mission was indicative of a low-pressure alert hours later in that mission. As a result, operational adjustments were made and put into motion. The mission was completed and a valuable asset was saved.

Uncertainty of Where Needs Arise

Gaining a grasp of uncertainty was exemplified in 2019 with a worldwide effort to realign the spares at all unit locations through the development of standardized Prescribed Load Lists (PLL) and Authorized Stock Levels (ASL). The Army Product Manager – Medium Altitude Endurance (PdM-MAE) Office began an initiative to realign the responsibility of the management of each Gray Eagle UAS company’s PLL and ASL to the respective operational unit. The effort consisted of 100% across-the-board inventories of each unit’s current spares package. The PBL program team provided “boots on ground” support investigating all facets of these efforts. After intensive analysis of each respective unit’s spares usage demand, the spares packages were divided into a PLL and an ASL, which were new at that time. The packages were tailored to the individual unit to support their individual flying-hour programs. This flexibility enabled individual units the ability to identify equipment that it

deemed critical to accomplish its forecasted missions. Equipment identified as excess was meticulously accounted for and returned to the Army Warehouse in Poway, California, to be re-inducted into the greater supply system. On average, each company’s realignment consisted of the categorizing and retro-shipping of over 1,500 line items of spares, with an average value over \$3M. The project as a whole significantly reduced the fielded units’ logistical burden for upcoming rotations and deployments and streamlined each home station logistical footprint. It has also significantly reduced the amount of storage space required within squadron facilities (e.g. an entire ASL is now stored within two (2) ISU-90 containers versus a 1,500 square foot storage room, approximately 75% reduction of footprint). In addition to the logistical support benefits, the restructuring has also been successful in identifying and reducing the amount of obsolete parts throughout the fleet. *The Gray Eagle spares ASL/PLL realignment has significantly reduced the burden on the Army’s supply chain, enabled “true” supply/demand analysis through the usage of the Aircraft Notebook (ACN) reordering process, and resulted in an overall cost avoidance of over \$20M to the program through returning available spare parts into the active supply chain.*



Complexity of the Gray Eagle System

In 2018, a new version of the Gray Eagle was fielded. The conversion was not a simple modification kit. Although the new version shares significant commonality, the fuselage, tails, engine, landing gear, propulsion and fuel system, avionics and wings have new and modified designs. GA-ASI applied considerable lessons learned to these modifications, having originally modified the MQ-1 Predator to the Gray Eagle. The new aircraft provided increased performance, but it also included better reliability.



Gray Eagle Extended Range

The challenge for the PBL program was in sustaining two (2) variants simultaneously. The modifications were designed as a system-level effort based on the number of subsystems compared to the baseline. To reduce system complexity, a key design focus was to maximize hardware and software commonality between the two (2) variants. For maintenance technicians,

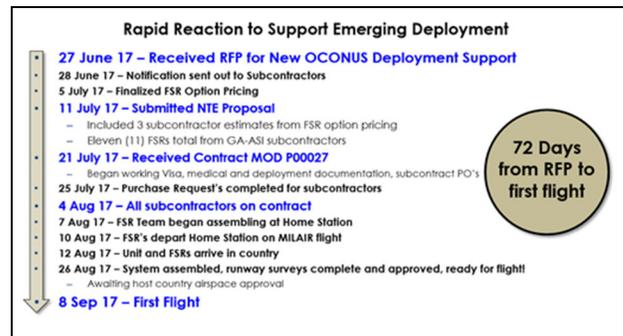
maximizing commonality improved maintainability. For operators, maximizing commonality resulted in increased operational effectiveness. Both variants share the same operational software, making it possible to fly both from the same Ground Control Station (GCS). As performance and complexity increased, the sustainment picture remained fairly constant by tying engineering and logistics together throughout the upgrade process.

Ambiguity of Future Operations

The Army Gray Eagle system supports three geographic combatant commanders, one (1) functional combatant command, one (1) Army command, and one (1) Army Direct Reporting Unit. In total, there are 16 units equipped operating in 29 locations around the world with different priorities. In addition to these locations, units frequently conduct training exercises and support DoD and international exercises at additional locations worldwide. These exercises create a constant ebb and flow for demand on FSRs that provide depot-level maintenance support at these units.

From 2017 through 2019, there were over 50 additional events requiring adjustments to the baseline plan, and all of them were supported. To address this ambiguity in FSR demand, GA-ASI PBL program managers worked with the Human Resources department to create a flex program for personnel on the Gray Eagle team. This program provided unique opportunities for personnel to deploy in support of the contract, but return home without a burden to the contract, creating an unprecedented surge capability. When unexpected staffing requirements were added, the program's pool of personnel could adapt and fill these new staffing requirements quickly. Likewise, when a mission was unexpectedly cancelled, necessitating a reduction in FSR requirements, the flex program could absorb those changes without affecting the contract.

GA-ASI's efforts to address and prepare for unit operational ambiguity were key enablers to take a deployment direction to first flight in 72 days.



Rapid Response FSR Support

ORGANIZATIONAL BEST PRACTICES AND TEAM LEADERSHIP (Value: 40 pts)

Please respond to the following prompts:

- 15 pts: In executing the program, what unique and innovative practices, tools and systems frame your program and help you achieve program excellence?
- 15 pts: What unique and innovative processes and practices are you using to develop people and transfer knowledge and how do you know they are working?
- 10 pts: What unique practices are you using to engage customers and how do you know?

Program Unique and Innovative Processes

GA-ASI has taken steps within the contractual boundaries of the PBL program to develop program-unique and innovative processes to take advantage of inherent strengths while ensuring Gray Eagle success.

Flex Failure Reporting, Analysis, and Corrective Action System (Flex FRACAS) Process: The standard PBL FRACAS process had historically been controlled by a fixed list of FRACAS items and rigidly enforced repetitive review of hardware with well-understood failure modes and known root causes, and limited the ability to investigate new/emerging failure trends on off-list hardware. The Flex FRACAS process leverages reliability data to direct unscheduled returns through one of three investigative paths: Full FRACAS, FRACAS Lite, or Track and Trend. New/emerging failure modes that meet certain qualifying criteria (identified through mishaps, mission scrubs, reliability, or cost of repair/replacement) are routed to Full FRACAS, in which exhaustive investigative efforts are applied to determine root cause

and corrective action. In those cases in which root cause is well understood, the FRACAS Lite process utilizes a set of simple yet targeted data-collection steps that quickly confirm the instances of known failure modes during normal Depot processing. This expedites hardware back into the supply chain without engineering involvement, saving time and ensuring availability. For all other returns, the Track and Trend process monitors the flow of hardware and informs the periodic re-evaluation of hardware to ensure proper routing within Flex FRACAS. The goal of the Flex FRACAS process is to increase the return on investment in FRACAS by directing resources away from items with well-understood failure modes to focus on emerging failure trends to increase the potential for reliability improvement and long-term cost savings.

Focused Responsiveness. One tenet of the PBL program has been rapid contracting. Most understand this as it applies to delivering products, but not necessarily people. GA-ASI has developed a ***“Fixed Price FSR Week”*** contract structure with our major subcontractors that uses an IDIQ approach to provide negotiated rates for emerging requirements that can be executed without going through the process of a full proposal. In 2017, this effort paid off with the deployment to support operations OCONUS. The possible deployment was first discussed in June. As the discussions progressed, it became apparent the unit would need a full complement of 11 FSRs from the contractor team. The newly created contracting approach enabled the plan to be put together in 14 days. The Army Customer then issued a contract modification for support less than 30 days from the beginning of the process. The GA-ASI FSR Team then quickly began preparing operational procedures, working visas, and country clearances for the upcoming operations. The FSR Team began assembling at the unit home station and departed to the operational site, where – shortly after – unit and FSRs arrived in country. After receipt of equipment, the system was completely assembled, runway surveys completed and approved, and the unit was ready for flight, awaiting host country airspace approval. The First Flight in support of the operation was completed within 72 days of the initial requirement being communicated. This process is considered a company best practice.

Rapidly deploying maintenance and support personnel is one thing; keeping up with this dynamic for pilots and operators is another. GA-ASI responded by developing a ***“Non-Traditional Aircrew Training” program***. UAS often require training programs beyond the scope of those of traditional airmen due to system complexity and the varying levels of automation in a relatively young and unstandardized industry. In this regard, GA-ASI is uniquely positioned to offer initial qualification on its platforms, and has done so for hundreds of its own crewmembers to date. In addition to training company flight crews, GA-ASI has provided training to over 2,000 UAS pilots and operators at every Army installation operating Gray Eagle variants worldwide. Unlike other large UAS platforms, the Gray Eagle system is operated by these “non-traditional” flight crew, i.e., personnel who are not certified manned pilots and operators. This paradigm shift in flight crew qualifications poses an obvious and unique set of challenges for the company’s training department. Together, GA-ASI and the Army have demonstrated the ability to safely operate large UAS around the globe with non-traditional flight crew through incorporation of curricula focused on automation management and a highly-effective Automated Takeoff and Landing system.

The PBL program delivers analyses, support personnel and crew in the here and now, but it also keeps an eye on the future. The PBL team has an obligation to “optimize total system availability while minimizing cost and logistics footprint.” For the past three years, Army PBL has engaged in an inter-departmental effort to use ***industry standard forecasting and an analytics software supportability model*** called Opus to forecast and optimize spares procurement. The Opus Suite is a Monte Carlo algorithmic-based deterministic model that has enabled Army PBL to perform automated sensitivity analysis, reducing sustainment costs while preserving system operational readiness. The customer’s response to the forecasting effort and dramatic cost avoidance has been well received. Since 2018, Opus procurement

modeling and simulation has sustained system availability above Army operational readiness standards while reducing the Army Customer’s spares acquisition costs by approximately \$14M.

Tracking spares and knowing exactly what you have is critical to modeling what you need. GA-ASI has implemented an **RFID system** solution to automating and optimizing the Catalog Ordering Logistics Tracking System (COLTS) database and Gray Eagle supply chain system. The proprietary Tower Inventory System (TIS) provided by GA-ASI subcontractor T&W Operations is unique among competing RFID-based technologies in that it consists of a mobile 24-foot RFID scanning tower, RFID scanning “guns,” and TIS/COLTS Application Program Interface (API) software. The mobile TIS traverses the 105,000 square feet of Army warehouse space, digitally capturing the more than 76,000 inventory items via individual RFID inventory tags and subsequently transfers the data to the COLTS database. **The TIS has consistently achieved 100% accuracy in the Army warehouse over the previous nine (9) monthly inventories while reducing manpower and time for each inventory event, from eight (8) weeks under the manual system to approximately 12 hours using the TIS.** Economically, the TIS is a self-amortizing project – a byproduct of improved inventory accuracy is realized through greater property accountability which has resulted in cost avoidance and savings exceeding the cost of the system. The TIS is fully operational in the Army warehouse and will be fully fielded at all Army Gray Eagle CONUS sites by the end of this year. Success in the COLTS/Gray Eagle supply chain led to full implementation of the TIS at Red River Army Depot and Redstone Arsenal storage sites in support of GA-ASI fielding of equipment to newly activated Gray Eagle units. The TIS system was conceived, developed, tested, and validated in the GA-ASI/Gray Eagle Army warehouse.

Personnel Unique and Innovative Processes

The GA-ASI Army Program Office established an Integrated Product Team (IPT) structure focused on the Gray Eagle product in 2017 that merged several functional areas into one cooperative group. Members of GA-ASI Contracts, Subcontracts, Pricing, Engineering, and Finance all merged under the operational control of the Army Programs Vice President. Overall communication, timeliness, and productivity was immediately increased and was recognized by the Gray Eagle customer. The IPT structure also fosters comradery and cooperation through focused **team-building** events. A “year in review” presentation by IPT managers for the 200+ members highlighted successes and individual achievements amongst co-workers and a follow-on social event bolstered a sense of team cohesiveness that made IPT members proud to be part of the Gray Eagle team. IPT leadership is consistently eyeful of extraordinary efforts, and when they occur reward the individuals with Spot Awards in front of their peers and supervisors.

Within the IPT, there is a **Program Management Rotation Program** that creates unique opportunities for program management and engineering professionals to experience and participate in other areas of the overall Army PBL program, including production, flight test and development, and IRAD efforts. This rotation program has greatly enhanced the entire IPT structure by developing leaders with an understanding of every area involved in Gray Eagle development, from conception to end user/Warfighter support. The IPT has since become a model for other organizations within GA-ASI.

GA-ASI believes employees must have a solid understanding of the company’s vision, mission, core values, and strategic objectives. In support of this



Sharing Knowledge and Building Strong Teams

perspective, executive management hosts monthly cross-functional forums, attended by over 125 senior leaders, to create a shared understanding of the operating environment and alignment on key company and strategic activities. The fast-paced PBL program is enabled by the culture set through this process and benefits from the organizational adaptability and decentralized decision-making it fosters.

Engaging the Customer

GA-ASI is dedicated to achieving excellent customer satisfaction and serving its customers through innovation and value creation. On the PBL program, the Army Customer is involved on a daily basis and is a big part of the quarterly Logistics Management Reviews (LMR). LMRs bring senior logistics managers and subject matter experts together to work through and refine the overall Life Cycle Support Plan. Cooperative and positive relationships with the Army Customer fostered open communication with regard to customer satisfaction and concerns. Using various program review meetings, PBL leadership continually communicated program challenges, progress, and help needed using cost, schedule, and quality metrics. Due to this continuous communication across all stakeholders, cost, schedule, and technical performance were closely controlled.

In Huntsville, Alabama, GA-ASI has staffed a high-performing team of Army logistic experts that expands and further enhances a sustainment program management presence, providing direct and timely engagement with the customer program office and fostering in-person communications with Army functional support management teams. The Huntsville office provides a top-notch meeting facility hosting over 2,000 customer visits every year, supporting formal and informal cross-functional teams at all levels, and focusing on executive level engagements that enable open communication and rapid issue resolution between respective program and contracting offices.



Army Gray Eagle Team