WHITE PAPER

How RG Modernized Air Force Depot Maintenance Operations

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RG's longest-standing customer relationship is with the US Air Force. The company was founded to provide program management solutions to the Air Force, Defense agencies, and the broader Federal Government. This purpose drove both the development of leading program management practices and the creation of specialized tools and methodologies which have provided innovation, modernization, and transformation to the Air Force over the past three decades and led to the development of the latest Cloud-ready solutions.

In 1983 RG began work on a prototype for a project management support system (PMSS) for the Air Force Logistics Command (now the Air Force Materiel Command, or AFMC) to provide consistent, traceable, and flexible planning and scheduling capabilities at Wright-Patterson Air Force Base (AFB) and across the three Air Logistics Centers (now Air Logistics Complexes) at Oklahoma City, Ogden, and Warner-Robins.

Text BoxWhile RG was supporting the PMSS prototype, the company was also investing in developing robust and capable commercial software tools to support program managers by enabling enterprise wide planning and tracking of activities. This software, named BETA, provided some innovative capabilities including automated network analysis and reporting of task and activity status as well as the ability to be configured to support program management across multiple industries and customers.

In 1985 RG was awarded a competitive contract to continue development of PMSS for AFLC. In 1987, BETA was renamed to Control and Analysis Tool (CAT[®]) and it rapidly gained wide use among DoD and commercial customers. CAT[®] was incorporated into PMSS and Air Force usage of PMSS was extended beyond information management programs to the support the first of many major weapon systems, the F/FB/EF-111 series of aircraft.

Over the next decade as use of PMSS spread steadily across the Air Force maintenance enterprise. RG continued to win competitive recompetes to support PMSS and continued the modernization and enhancement of PMSS. The release of CAT II[®] in 1994 delivered further enhanced enterprise program planning and control capabilities to the Air Force PMSS user community and others.



Figure 1: RG commercial software product releases.

In 1998, RG released Jaguar[®], a commercial software platform encompassing RG's proven scheduling engine and algorithms in a modernized architecture including support for web-based development and interfaces, an Oracle relational database system (RDBMS), and an improved application programming interface (API). The replacement of the outmoded file system and 4GL scripting language with modern database and web-based development tools enabled the power of the core scheduling engine to be readily integrated with other enterprise business systems using standard programming tools.

Text BoxIn 2000 the Air Force selected RG to redesign PMSS as part of the G097 Programmed Depot Maintenance Scheduling System (PDMSS) on the Jaguar® platform. PDMSS is the Air Force system of record for maintenance operations, responsible for the management of planning, scheduling, and execution of aircraft programmed depot maintenance (PDM) across the Air Logistics Complexes (ALCs).

The modernized PDMSS facilitates planning, tracking, scheduling, execution, and performance measurement activities for programmed/un-programmed depot maintenance workload and is the repository for all master operations (work documents) and the network schedule.

In 2015 RG's suite of enterprise planning and

JFAST[™] Core Capabilities

Complex Schedule Management

- Up to 50,000,000+ Activities & Constraints
- Critical-Path / Critical-Chain Analysis
- Resource Loaded Scheduling
- Self-Healing Schedules (Insert/Delete)
- Logic Loop Avoidance
- Parent-Child Constraint Inheritance
- Flow-Step Support

High Speed Computation

Complex Schedule Management

- Locations, Facilities, Tools, & Items
- People & Skills
- Consumable & Renewable Resource
 Types
- Multiple Calendars & Shifts

Customizable Charting & Reporting

• Supports Gantt, PERT, & Fever Charts

control tools were consolidated under the Jaguar Family of Advanced Scheduling Tools™ (JFAST™), recognizing the Jaguar® product as the premier offering. Development continues to deliver enhancements both to the core commercial software product and to the Air Force specific capabilities of PDMSS.

After assisting the Air Force migrate the entire PDMSS system to a new application server in 2017, RG began working on a roadmap for PDMSS' cloud migration. The Air Force's interest in cloud services aligns with other RG customers and coincides with the development of Lynx[™], the latest tool of the JFAST[™] commercial software platform.

Delivering On-site Expertise to Maximize Value to the Air Force

Since inception, RG has worked with the Air Force providing uninterrupted support, maintenance, and modernization of both PMSS and its successor PDMSS. To this day, RG continues to support PDMSS with sustainment, new release testing, upgrade implementation, and training and mentoring of Air Force personnel and contractors.

RG's work at Ogden ALC (OO-ALC) began in 1993 and continues to the present day. The core work at OO-ALC is maintaining, developing, and implementing enhancements to PDMSS and providing program management oversight and technical expertise for their PDMSS Web, a PDMSS-complementary application, including the inclusion of Major Work Requests (MWR) and Aircraft Enterprise System (AES) interfaces.

At Wright-Patterson Air Force Base (WPAFB), the Project Management Office for all MRO Air Force operations, RG's on-site work began in 1997 and continues through the present. RG provides PDMSS code sustainment and enhancement of the complete development lifecycle (requirements gathering, analysis, design, development, release, systems and database management). RG also tests, prepares, and maintains the full suite of applications, as well as performing baseline PDMSS sustainment for all ALCs.

RG provided on-site work at Warner Robins ALC (WR-ALC) from 1993 until 2016 including the development of applications interfacing directly and indirectly with PDMSS. These included ROCIT (Role Oriented Consolidated Information Tool) which provided dashboards and queries of PDMSS and other Air Force business systems to show information tailored to specific operational roles, and a Maintenance Work Request (MWR) application which allowed users to add and track unplanned work in PDMSS. Each of these applications pulled information directly from the system of record – PDMSS and did not require additional manual data entry or additional contractor support.

Continuing the Modernization of PDMSS

While PDMSS has undergone previous upgrades and enhancements, the entire web front-end was built on Sybase EA Server which in 2017 had reached the end of its functional life and was within two years of being fully deprecated by the software manufacturer. To address this, the Air Force sought a means to replace the PDMSS web application server to extend the life of the system and avoid a potential break in service due to unsupported software in the stack. To minimize the risks of change control, the user experience needed to be as close to identical to the existing system as possible.

In September 2017, RG was awarded a modification to its current PDMSS Sustainment contract to upgrade the PDMSS system. RG offered a low-risk solution to the Air Force as the original implementer and ongoing sustainer of PDMSS, was responsible for the entire PDMSS technology stack and supplier of the core Jaguar[®] software.

Text BoxOriginally, the PDMSS EAServer End of Life project was planned to follow a traditional waterfall approach to delivery. RG recommended taking a more Agile approach within the overall project delivery framework which would significantly reduce risks for the Air Force. While the Air Force was not prepared at the time to adopt a fully Agile approach for project delivery, they allowed RG to implement a three-phased schedule of delivery and government Component Validation & Integration (CV&I) testing rather than the original request for one large development phase followed by a single CV&I phase. This allowed for any complications to be identified early and mitigations taken, reducing the risk of major issues affecting the project deadlines.

The key to adopting this approach was the active engagement of Air Force leadership, enabling constructive discussion about the proposed approach and ensured alignment between Air Force and RG objectives.

Instead of the originally intended PDMSS modernization delivery concept of a single large team with separate developers and testers, RG set up two Agile Scrum teams, each containing developers and testers who worked together to plan and prioritize work in 2-week sprints. Due to their expertise with the existing system, members of the PDMSS sustainment team were available as subject matter experts representing the end users and the sustainment team leader acted as product owner (PO) to aid in prioritization, working with the Scrum Master to structure the backlog.

Later, the team segmented into four smaller Agile "pods" which included two or three developers and one tester. Each pod was assigned one PDMSS feature set, increasing focus while also developing expertise amongst team members. The pods each had individual goals while encouraging integration of teams through collaboration and shared learning. Their efforts resulted in the delivery of over 1000 completed screens in 18 months, showcasing the effectiveness of Agile practices within a systems modernization effort.



Figure 2: RG software developers in a Kanban planning session

PDMSS Adopts Agile Practices for Enhancement and Modernization

In early 2020 RG was awarded the most recent PDMSS contract.. In this current PDMSS Maintenance, Sustainment, and Development contract with the Air Force, RG provides continued sustainment and support of PDMSS using Agile software development best practices which provides flexibility and scalability with controlled cost profile. RG continues to prepare PDMSS for cloud-migration and the adoption of DevSecOps for the consistent and efficient delivery of quality releases into production (see figure 3).

Text BoxRG's expert team has worked collaboratively with the Air Force for years to establish system requirements, advise on functional priorities, and assist with the Air Force's shift to an Agile sustainment approach. This collaborative development approach provides the Air Force with improved visibility and control over development activities through the inclusion of designated Air Force personnel into the process. At present, RG's team provides continuity in this work while lending an unsurpassable depth of knowledge and understanding of PDMSS, associated systems, and business processes.

RG's PDMSS Sustainment Core Team responds to ongoing sustainment requirements while providing an improved capacity to address the backlog of change requests and keep pace with changing technology to slow and reverse the accumulation of technical debt for PDMSS development. RG additionally provides optional "surge" personnel in the form of pods for use in addressing future requirements which exceed the capacity of the core team.

The RG team works closely with the Air Force program to identify and harness innovative ideas and approaches to further streamline and improve system sustainment. System sustainment support is integrated into the Agile development approach, allowing for consistent innovation, faster turn-around to meet user needs, and the flexible deployment of upgrades while maintaining the previous version of the system. The support model and pod construct enable RG to continue to explore enhancement with the Air Force to improve delivery and address future needs.



Figure 3: RG's Agile development approach with the US Air Force

The Power of the Analyst

As the PDMSS program continued to deliver sophisticated features to the users at the ALCs, the demand grew for the system to house progressively more data and expand in its capabilities. From the beginning, RG was consistent in developing a stronger, more complex and sophisticated system.

During the period of initial development, RG analysts, having had the necessary experience and expertise in developing and maintaining PDMSS, were the primary users of the application. These analysts performed scheduling, project management, and report-building duties across the ALCs. Through training, coaching, and continuous collaboration with the Air Force, RG assisted in assimilating the Air Force into becoming thorough practitioners of PDMSS. As modernization continues today, RG continues to support the Air Force in this manner.

With the release of Lynx[™] and the move towards the Cloud, defining streamlined workflows and driving adoption across the user community will be supported by new, easier-to-use interfaces for systems administration and management, and flexible tools to manage tailoring the system to suit the specific needs of users.

Supporting these user communities with business analysis, coaching, and best practices on how to achieve the maximum value from PDMSS will be critical to the continued realization of productivity and efficiency benefits across the Air Force maintenance enterprise.

The Future of PDMSS

In 2017 RG began the development of Lynx[™], the next generation of JFAST[™] commercial software based on a modern microservices architecture to enable either on-premises installation or deployment as a Cloud-native application. The steady shift of the Department of Defense and Air Force toward Cloud computing required a redesign of the software architecture to embrace current standards for development, usability, and integration, including comprehensive APIs for integration at the data, application, and user interface tiers.

RG's Value to the Air Force	
Expertise	Breadth and depth of expert-level knowledge about the system components and techniques, as well as the logistics and collateral business processes across PDMSS and general Depot Maintenance
Innovation	Continuing to help lead the Air Force in shifting sustainment to an Agile model and leveraging our Pod-based staffing model for easy staff adjustments for scope changes or a more aggressive approach to reducing the backlog
Collaboration	Active collaboration with Air Force and program leadership to discuss and explore enhancements and help decide on established priorities
Agile Best Practices	Proven commitment to using Agile best practices for development and sustainment, enabling the program to be more flexible and responsive in delivering capabilities for Airmen as needs evolve

In parallel with Lynx[™] product development, RG began working closely with the Air Force to plot a roadmap for eventual Cloud migration of PDMSS, identifying opportunities and consideration for usability, data migration, systems integration, and cost. As with the earlier Jaguar[®] transition, the move to the Cloud is an opportunity to revisit and redesign workflows and practices to take advantage of advances in technology and capability.

The roadmap under development will assist the Air Force to transition to the new PDMSS platform with a minimal disruption to their daily operations by engaging their user communities in a process of continuous modernization, releasing new features and capabilities which have in part been designed by the users themselves. In embracing a fully Agile approach to systems delivery, AFMC is enabling the continued enhancement of PDMSS and its benefits to the Air Force maintenance enterprise well into the future.

About Robbins-Gioia

Robbins-Gioia partners with clients to test and refine every solution to meet their exact needs. We take pride in tackling complex management challenges with fresh and innovative insights and in transforming our clients' vision into reality.

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