extensive use of design margin verified in M&S and testing at margin conditions. Operational testers will rely extensively on DT data, thereby reducing the OT requirements without sacrificing confidence in their assessment.

Commonality

The Army recognizes that high precision-guided munitions development costs, when balanced against fiscal realities, require additional emphasis on affordability. To make Excalibur more affordable, the Army and Navy have established a process to objectively examine cooperation and commonality issues among their precision-guided munitions programs. An Army-Navy-OSD Executive Steering Committee and associated IPT are coordinating the development and production of these programs. Initiatives include opportunities to leverage research and development investments, foster competition through economies of scale and review potential component and system commonality areas.

Technical Representatives at Contractor Facilities

Given Excalibur's technical and programmatic complexity, the PM decided it was important that key technical representatives be physically located at the prime contractor's facility in Tucson, AZ, to coordinate, then execute, a disciplined systems development process. In addition, specific responsibilities of Defense Contract Management Agency (DCMA) representatives are clearly outlined in an approved Memorandum of Agreement that is updated as necessary. These representatives will participate in daily meetings and activities throughout program development and execution. DCMA Tucson issued a Letter of Delegation to DCMA Northern Europe to provide operations oversight of the major subcontractor, Bofors Defence, Karlskoga, Sweden.

The Excalibur guided projectile program is a key element of U.S. Army transformation to a strategically deployable, logistically supportable and highly lethal force. These 155mm artillery projectiles will allow the U.S. Army cannon artillery units to dominate future battlefields at extended ranges in support of the lighter Interim and Future Forces now being equipped and deployed. Excalibur features include low cost-per-kill, increased survivability, extended range, fire-and-forget GPS/INS and a modular design strategy that means the same guidance and tail sections can be used for different warhead options.

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Applying Six Sigma to Excalibur Reduces PALT

Faith Harder

In late 2000, the Army merged the 155mm XM982 Excalibur and the joint U.S./Sweden Trajectory Correctable Munitions (TCM) program into a single cooperative program to develop a precision-guided, extended-range projectile. The biggest challenge was to cut the development cycle from 24 months to less than 1 year to meet the expectations of COL Nathaniel H. Sledge Jr., the Project Manager for Combat Ammunition Systems (PM CAS). PM CAS is a Six Sigma organization, so it was natural that team members Faith Harder, the PM's Acquisition Analyst; Scott Cawood, International Project Engineer; and Cynthia Schoner, Contracting Officer; use this approach. The Six Sigma methodology's fundamental objective is implementing a measurement-based strategy that focuses on process improvement and variation reduction through the Six Sigma improvement project application. The objective was to achieve a 50-percent reduction in the Procurement Administrative Lead Time (PALT) and award an Excalibur contract modification that would effectively merge the U.S. and Swedish extended-range projectile programs. The process team used its Six-Sigma tool kit to accomplish the mission, including cause-and-effect analysis, failure mode and effects analysis and house of quality to identify and prioritize issues and define improvement processes. Level I and II

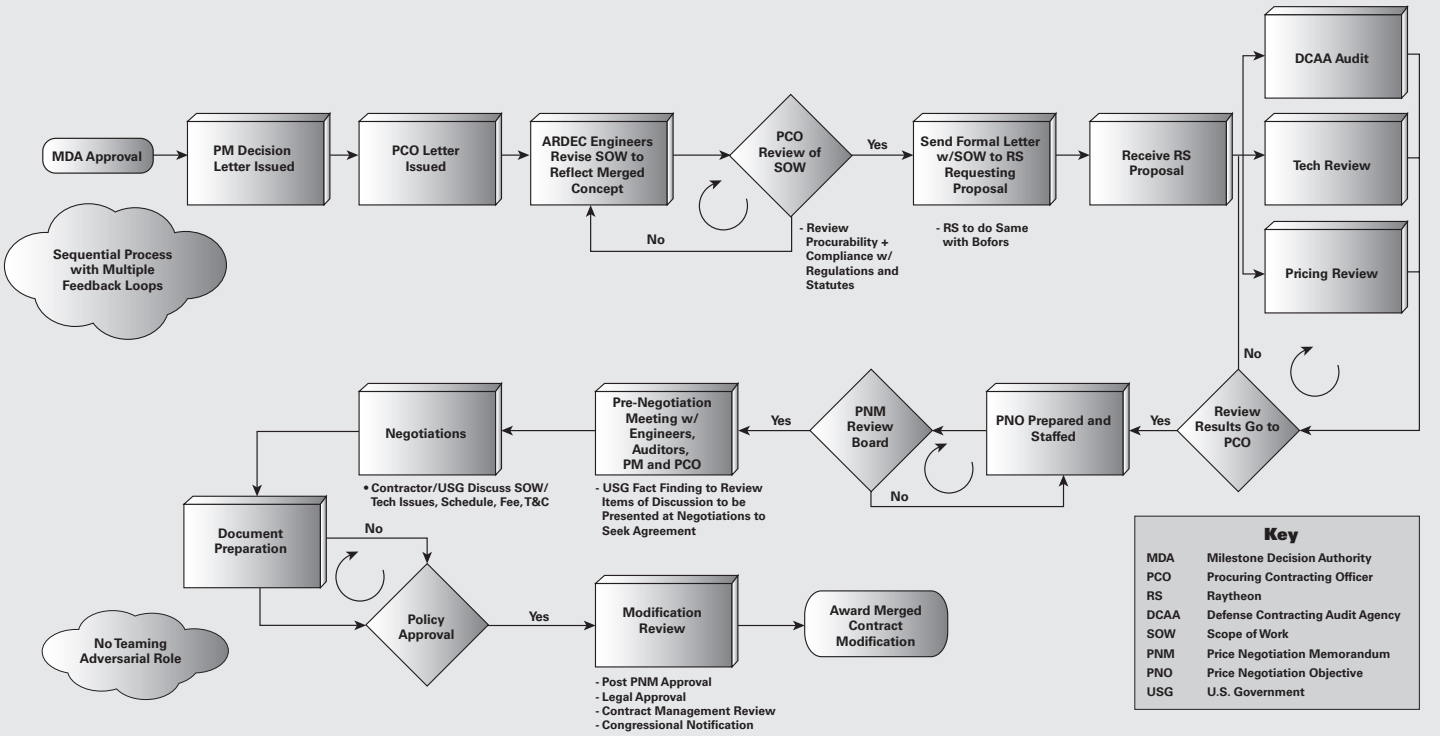

Figure 1. Traditional Contract Approach

process maps showed what was required to accelerate the procurement process. Gantt charts were created to establish the baseline and track the team's progress.

To fully appreciate the process "reengineering" approach undertaken, review the time-consuming, sequential contract approach in Figure 1. Then compare it to the much-improved PALT Process Map in Figure 2 below. This more streamlined approach allowed the team to work issues concurrently and in real time, resulting in significant cost and time savings.

On Dec. 11, 2002, the U.S. Army and the Kingdom of Sweden signed a Memorandum of Agreement for cooperative Excalibur projectile development. The merged Excalibur and TCM programs contract was awarded Dec. 17, 2002, for $238 million and a 63-month period of performance. Team members also streamlined the international documentation cycle from 24 to 12 months and reduced PALT by 50 percent, earning recognition under the U.S. Army Tank-automotive Command's Army Research, Development and Engineering Center's Value Engineering Program where it was credited with cost avoidance of approximately $9 million. We are proud to say the team met its goal.

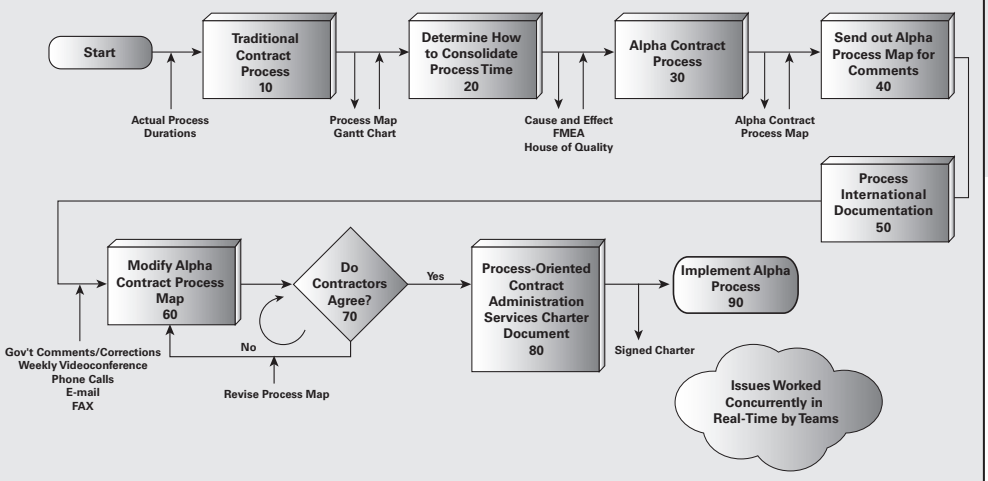

Figure 2. Improved PALT Process Map

FAITH HARDER is the Acquisition Planning Team Leader for PM CAS. She received her Six Sigma Green Belt Certification from VSE Corp. and public service administration certification from Fairleigh Dickinson University, where she is pursuing her B.A. in public service administration.