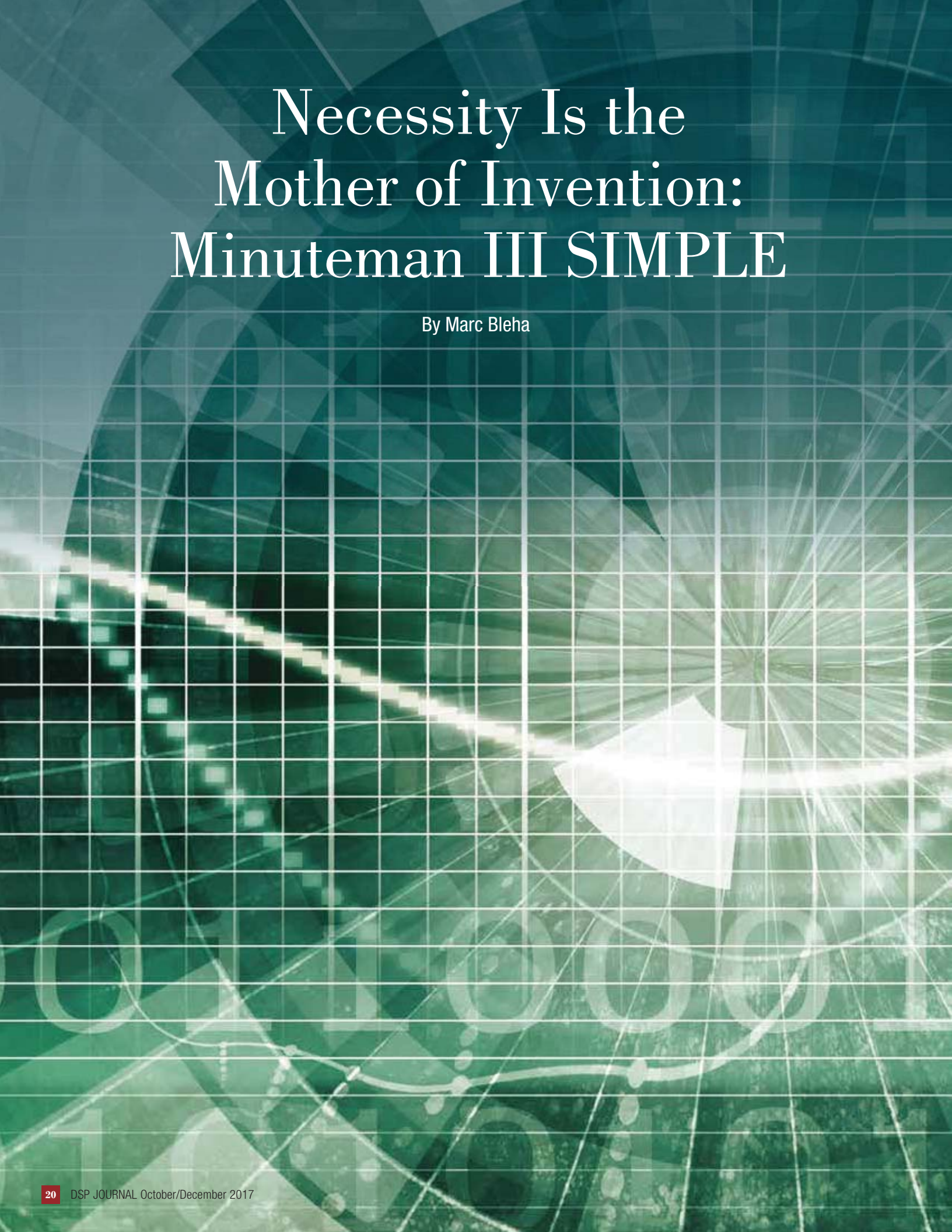
Necessity Is the Mother of Invention: Minuteman III SIMPLE

By Marc Bleha



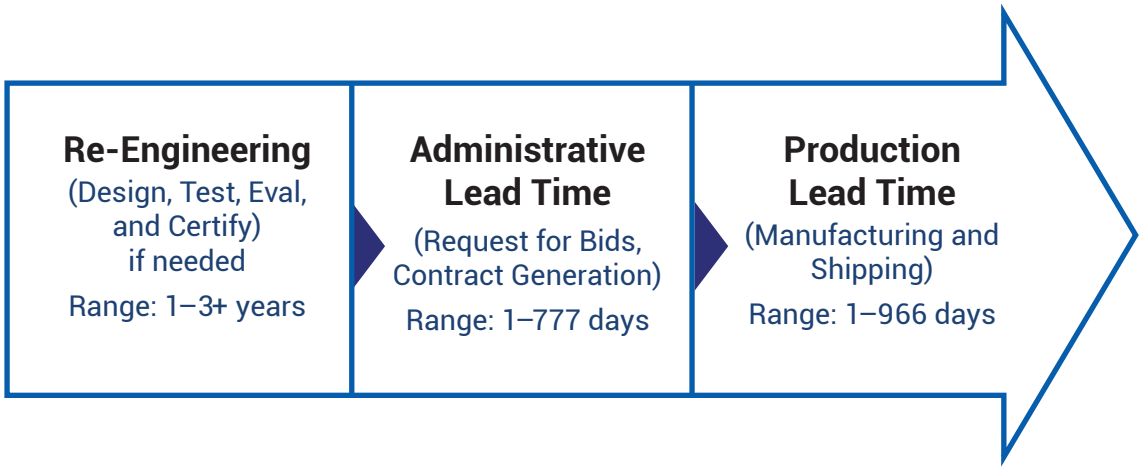
Last year, I was honored to receive the Department of Defense Diminishing Manufacturing Sources and Material Shortages (DMSMS) Individual Award for a networked database system named SIMPLE (Stock Inventory Maintenance Production Logistics Enterprise) that manages a 50,000+ line item inventory, which crosslinks and analyzes multiple data sources to identify "supportable at risk" components for the Minuteman III weapon system. With the modern computer age, industry and government have multiple information system platforms and hundreds of logistical decision support systems that have the capability of tracking inventory levels, locations, shipments, and even their subcomponents. So why is there a lagged response to DMSMS issues? Is the lag due to inability to forecast demand and changes in the commercial and governmental sectors, the lack of accurate consumption and production data, economic changes, or geopolitical climate change driving policy? From a data system perspective, is it possibly that too much data exists, or worse, incomplete data, which creates noise in the decision support systems that needs to be filtered out when compiling an effective sight picture? In many cases, "Yes"!

Imagine that you just bought the sweetest '65 Mustang convertible. Chrome rims, white leather seats with a matching white convertible top, and a beautiful cherry red paint job that looks like liquid glass. Under the hood is this clean, original, 289-cubic-inch 4.7L V-8 married up to an original four-speed manual transmission. Everything on this car is stock—almost as if it came out of a time capsule. You trailer it home (too nervous to drive it), and as it gets unloaded, the ramps shift and the car falls a short distance and catches the edge of the ramp and dents in the rocker under the car door. After a few choice words, maybe a tear or two, you inspect the damage. Luckily the door opens up and you inspect in, around, and under the panel. You Google the car panel to find the part number (remember, everything is on Google) and proceed to start looking for a matching part. The problem is that you want to maintain that original status, so knock-offs are out of the question—the search becomes a little more difficult. If you can't find the original part on a shelf somewhere, who can manufacture that part using the exact same material, shaped to the exact same specifications and then also painted to the exact same color of your sweet little ride? Then, if you find the specific part among the online world of warehouses, how can you verify authenticity? Are you going to want a sample tested? To add to the dilemma, you also need to find a garage or at least a mechanic or artisan, in this case who is skilled enough to remove the damaged part and install the new one. And on top of all that, you will also want the artisan to strip, repair, and paint the broken part to the engineer's requirements from the 1960s. Always need a spare, right? And I forgot cost, how much would that be again?

Sound strange? With the age of our weapon systems, the requirement to maintain engineering baselines, the challenges faced with counterfeit parts, and the required overhaul cycles to ensure the nation's investments operate as designed when needed—the Mustang parable is not too far from the truth. Compound that with a weapon system that needs near 100 percent functional capability 24 hours a day, 7 days a week, 365 days a year. You now have the Minuteman III intercontinental ballistic missile system. Phenomenal engineering feats were accomplished to build this national strategic deterrent, which was only supposed to be in service for 10 years, yet decade after decade the system's life was extended with very few system modifications. Walking into a current launch facility or launch control center is akin to walking into an interactive museum representative of the 1960s and '70s.

Now, let's multiply these issues with the lifetime buys of parts from contractors that went out of business decades ago, which are now depleted or depleting, the lack of component technical data rights, the lack of materials to build to original specification, and when you can actually find a manufacturer, what the cost is for a low-rate production run (hint, it is usually very high). To further muddy the waters, parts are acquired and managed by either the Defense Logistics Agency or the Air Force Materiel Command. In addition, the Minuteman III depot-repairable components are overhauled at the Ogden Air Logistics Complex and funneled back into the Air Force supply system based on demand and the availability of carcasses. Therefore, there are multiple additional information technology systems driving just-in-time buys, pushing carcasses in for repair based on repair cycle times plus logistic travel times, and maintaining inventory accountability and shifting inventory locations. Some systems even include historical acquisition and production lead times. (See Figure 1.)

Figure 1. Lead Time



What does SIMPLE do? SIMPLE takes all of these data exported from each independent system and combines the information to provide a logistical supply health and risk assessment for more than 50,000 parts for the Minuteman III weapon system. The system identifies critical current shortages based on the demand for immediate supply chain action, short-term high-priority

part actions, and long-term future planning requirements. In addition, if the part is having or will have DMSMS challenges, it is identified to the program manager as a possible candidate for reengineering or reverse engineering to baseline. The key to understanding is that just because a part is available for the next 6 months or even 2 years, the acquisition and production lead times may exceed that based on past history acquisition or future DMSMS constraints.

So SIMPLE goes one step further than just predicting a stock-out date, it also backs out to ensure that lead-time requirements are identified and met as well. In addition, if production lead times are extremely high as seen in Figure 2, the identified trend is that the part or subcomponents of the part may be experiencing early signs of DMSMS constraints, which would add another lead-time consideration—engineering. Based on current data available, government engineering solutions are a minimum of 1 year, averaging over 2 years for an approved and tested design package to approach industry with. Based on data from SIMPLE, and if the part required an engineering solution or upgrade, the part could take up to 5 years before it would be on the shelf. The average administrative acquisition lead time for DLA was 80 days plus contractor production, which averaged 140 days as seen in Figure 2 and Figure 3. Extended administrative lead times represented DMSMS constraints: vendor availability and willingness to bid on work, the lack of profitability, and possible material shortages. Additionally, SIMPLE calculates depot production rates and identifies lagging production lines and future stock-out or excess production impacts early, providing leadership the capability to readjust workloads. Finally, the system generates a multitude of reports from a 30,000-foot view of inventory health to detailed component and subcomponent viability.

But all of this analysis is completely dependent on the data accuracy from all agencies influencing the source data management systems. While I built SIMPLE to be an independent, standalone system, hundreds if not thousands of individuals directly affect the outputs provided to senior leaders and decision makers on the status and wholistic vision of the supply chain health for the Minuteman III weapon system. In the future, the Hill Air Force Base ICBM Systems Directorate Weapon System Supply Chain Management branch will lead the effort to analyze, improve, and

Figure 2. DLA Production Lead Times by Product (2016)

Figure 3. DLA Administrative Lead Times by Product (2016)

develop the accuracy of SIMPLE. Two future projects include incorporating AVCOM data (a DMSMS tracking system) and a web analysis presented at the last DMSMS conference from the University of Washington to identify reengineering projects at a system, subsystem, line replaceable unit, or subcomponent level for the most cost-effective return on investment. While SIMPLE has enabled leaders to act early enough to head off critical stock outages in some areas, coming into the inventory management and analysis game late with this model forces many supply agencies and program managers supporting the weapon system to decide what is necessary and where to assume risk. Government funding is not infinite and using the tool while continuing to validate the data generated is a key step to long-term planned sustainment of the supply chain. Necessity was the mother of this invention.

About the Author

Captain Marc P. Bleha is the Pacific Regional Support Center Detachment 1 commander at Wake Island Airfield, responsible for supporting all island operations including 400 aircraft annually as well as multiple exercises and Missile Defense Agency supported test and evaluation operations. Before that, he was a logistics readiness officer assigned to the U.S. Air Force (USAF) Logistics Career Broadening Program (LCBP) at Hill Air Force Base, Utah. LCBP is a USAF headquarters sponsored 2-year Air Force Materiel Command broadening program that specializes in acquisition logistics, life-cycle sustainment, and wholesale logistics support. Officers competitively selected by respective career field developmental teams gain valuable knowledge and experience in managing the acquisition and sustainment aspects of the Air Force logistics system through rotational assignments in various functional areas in the Air Force Sustainment Center, the Air Force Life Cycle Management Center, or a Defense Logistics Agency Inventory Control Point. His rotations included the 309th Electronics Maintenance Group assisting with depot-level maintenance management for the F-35, F-22, F16, F-15, C-17, MQ-1, and MQ-9 weapons platforms; the Air Force Nuclear Weapon Center System Directorate as the Weapon System Supply Chain Management Branch chief; and the 414 Supply Chain Management Squadron Programmed Depot maintenance integrator for the Minuteman III weapon system. Additional assignments include base-level deployment and distributions flight commander and fuels flight commander at Hill Air Force Base and air terminal operations flight commander and Air Mobility Operations Wing executive officer at Ramstein Air Base, Germany. Captain Bleha also deployed as the Class III combat advisor to the Afghan Nation Army while assigned to the Combined Security Transition Command–Afghanistan under International Security Assistance Force.