Visualizing the Last Tactical Mile

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In the 19th century, Charles Joseph Minard charted a flow map of Napoleon's disastrous Russian campaign from 1812-1813. The chart beautifully incorporated data, design, and storytelling— thus set the standard for military data visualization. The Army has always set forth to integrate data visualization, providing commanders another way to see their formations and the operational environment. Today, the Army has embraced data more than ever, fostering data management visualization to make better decisions. But is the logistician today prepared to manage big data analytics? Are they trained on how to visualize data to better serve decisions makers? How does the force produce technically-savvy, data driven logisticians?

Logisticians may not think of themselves as data stewards, data visualizers, or data managers, but now more than ever, it has become essential to embrace big data analytics in order to become better operational logisticians and manage logistics requirements for the future. Data visualization is powerful—but also challenging. At the Southern European Task Force-Africa (SETAF-AF), taking on this challenge was essential to help visualize the last tactical mile, and better serve our warfighter.

Serving at the SETAF-AF as the 'Army in Africa' within U.S. Africa Command's (USAFRICOM) area of responsibility (AOR) presents unique challenges and problem sets. Time and distance—a logistician's two greatest constraints—are major challenges within USAFRICOM's AOR. The operational environment is dispersed, volatile, and expeditionary. The African theater requirement places low demand on the joint logistics enterprise; however, the nature of the mission yields higher risk and is critical to achieving national objectives. The logistician operating within USAFRICOM does so as an economic force, meaning, they must continually find ways to achieve the mission

without bringing in large sustainment footprints or infrastructure. Reliance on our partners, commercial vendors, and host nations are critical to fulfilling logistics. However, operations in this manner can create an information blind spot.

The defense transportation system and defense supply chain is a disciplined, well-oiled machine. These systems also incorporate technology that allows the enterprise to track and monitor supplies. However, when operating outside of that network to support intra-theater logistics (through contracting, acquisition cross-service agreements, inter-service agreements, and transportation tender programs), collecting housing, analyzing, and visualizing sustainment data becomes challenging. The component must rely upon multiple sources for information, numerous stove-pipe data spreadsheets, and good old-fashioned telephone & email reporting to continuously flow materiel and supplies into the AOR.

SETAF-AF supplies, delivers, and services USAFRICOM customers superbly. However, to gain efficiencies and become more responsive, data collection and analysis are critical to continual process improvement. Without a last tactical mile data program, an organization will find itself reactionary vs. anticipatory.

Six-Step Data Management Program

The SETAF-AF G4 has tremendous capability to deliver supplies and services on the Africa continent; however, there wasn't a process to capture and visualize sustainment data. Common to other operational and tactical units, this challenge is not new, nor is the solution revolutionary. Harnessing multiple data elements into one location is a core principle to enterprise resource planning and data architecture, but the execution is the challenge. This is especially challenging within a DOD operational level environment where multiple units and agencies operate from the commander's intent to achieve mission success.

See graphic "Data Driven Execution Plan"

To begin improvement, SETAF-AF G4 began a supporting objective to "Programmatically Set the Theater"—and created a data management project. SETAF-AF G4 understood that commanders needed to see the strategic to tactical environment better in-order-to be prepared for no-notice crisis response or shifts in national objectives requiring flexible sustainment and distribution. The data management project developed a 'Data-Driven Execution Plan', a simplistic framework to capture, house, analyze, and visualize logistics and sustainment data. The plan includes the following:

- Leadership Defines Objectives.
- Subject Matter Expert Identifies Supporting Data.
- Store Excel sheets within SharePoint, using a list.
- Build ArcGIS or Analytical Dashboard.
- Update Information Regularly.
- Leadership Measures Progress via Dashboards.

The challenge at the tactical and operational level is that units are often constrained on what software or hardware they can utilize to collect, house, and visualize data. This is a reason why staffs often rely on Excel. This is not a bad thing—rather, it is an example of a low-cost, readily available tool that most staff officers are familiar with. However, organizing that data into common formats that allow for exporting and visualizing becomes the real challenge. When using other low-cost, readily available data analytical tools, data must be formatted in an exportable format such as 'comma separated value' or CSV. When formatted header row data and standardized column data becomes the method that an organization captures data, visualization using products such as: Microsoft Business Intelligence, Tableau, or ArcGIS can easily be incorporated to conduct analytics. If your organization adopts these methods, a readily available cloud-based warehouse may also be used. The simplest and readily available tool is SharePoint and the software's 'list' application. It's not cutting edge, but the simplicity of

the tool, coupled with its' availability, allows the software to be adopted by operational and tactical level units all over the globe.

ArcGIS and the COVID-19 Pandemic

In 2019, a devastating novel coronavirus (COVID-19) took hold of our society. At the time, SETAF-AF was experimenting with an Esri web-based software called ArcGIS and had built nominal common operating dashboards on the software's web-based platform. At this time, the 'John Hopkins COVID-19 Dashboard' increasingly gained notoriety, as it visualized COVID-19 infections. Soon, organizations were asking how to incorporate dashboards such as this one into their day-to-day operations.

See Graphic "John Hopkins dashboard"

Thankfully, SETAF-AF was already working with partners to expedite data visualization and planned to achieve a web-based common operating picture. It wasn't easy and continues to present challenges to ensure sustainable and repeatable processes. Fast-forward two years after embarking on this project, SETAF-AF G4 and the greater command have a fully functioning common operating picture on the ArcGIS platform. The result has allowed commanders to see the operational environment and their formations better and with more analysis.

The benefits far outweigh the cost, but one must recognize that last tactical mile common operating pictures come with challenges. Behavior change is by far the single most challenging hurdle to overcome. The DOD is a PowerPoint friendly environment, which can stifle organizing information within a data analytics compatible manner. Depicting common operating pictures using unstandardized sketches within PowerPoint is something staff officers have been indoctrinated with since their basic course. PowerPoint is quick and easy to learn. Organizing data and using data analysis tools require extra steps and strict formatting; however, once those steps are taken, one can

employ concept of operations and sustainment briefings to the next level of presentation and decision making.

Best Practices

After achieving common operating picture success at SETAF-AF, other commands seek lessons learned and best practices to adopt data visualizations within their organizations. The following are best practices, advice, and recommendations to help leverage data and data visualization within your unit:

1. Don't wait to begin measuring your data. The quicker a data plan is formulated and implemented, the sooner your organization will collect data to measure and visualize. It doesn't happen overnight—but before long, your unit will amass enough data over time to better understand, shape, and influence decision making.

2. Adopt a simple data management plan that your team can understand and follow. SETAF-AF G4 found success in our Six Step Data Management Program. Ask yourself, "How will you communicate to your customers, units, and staff members the task of managing, analyzing, and visualizing data?"

3. Read, follow, and implement the DOD Data Strategy and the eight guiding principles:

   - Data is a Strategic Asset. DOD data is a high-interest commodity and must be leveraged in a way that brings both immediate and lasting military advantage.

   - Collective Data Stewardship. DOD must assign data stewards, data custodians, and a set of functional data managers to achieve accountability throughout the entire data lifecycle.

   - Data Ethics. DOD must put ethics at the forefront of all thought and actions related to how data is collected, used, and stored.

   - Data Collection. DOD must enable the electronic collection of data at the point of creation and maintain the pedigree of that data at all times.

- Enterprise-Wide Data Access and Availability. DOD data must be made available for all authorized individuals and non-person entities through appropriate mechanisms.
- Data for Artificial Intelligence Training. Data sets for A.I. training and algorithmic models will increasingly become the DOD's most valuable digital assets. We must create a framework for managing them across the data lifecycle that provides protected visibility and responsible brokerage.
- Data Fit for Purpose. DOD must carefully consider any ethical concerns in data collection, sharing, use, rapid data integration as well as minimization of any sources of unintended bias.
- Design for Compliance. DOD must implement IT solutions that provide an opportunity to fully automate the information management lifecycle, properly secure data, and maintain end-to-end records management.

4. Choose a readily available cloud environment, for example, SharePoint or OneDrive to warehouse data and allow your unit members access.

5. Use simple data formats that can be imported amongst multiple data visualization tools such as ArcGIS, Microsoft BI, Excel, Tableau, Vantage, and/or any common operating picture mapping software. Once the data is in CSV format, it can be imported or exported into a number of systems keeping up with changing technologies, or amongst various commands.

6. Document as you go. Develop standard operating procedures and How-To guides to help your staff replicate and carry-on data gains & quick wins.

7. Take advantage of training. Across the Army, more and more data analytics courses are offered to Soldiers and civilians to create a culture of technically-savvy logisticians. Rigorous and rewarding training is available to Sustainers, such as: the Financial Management Advanced Business Analytics Course and TS410 SAP Business Consultant Program (at the University of South Carolina); the Army Logistics University Data Analytics Course, ITIL4 Foundation and Development Course, Agile Certification, and Esri ArcGIS courses to name a few.

8. Leverage existing enterprise databases to extract AOR and formation specific data. Often, the data is out there—but it's either not readily accessible or presented in a manner that tells a story. Be familiar with tools such as Integrated Data Environment/Global Transportation, Integrated Mission Support for Surface Deployment and Distribution Cargo, Global Combat Support System-Army, General Fund Enterprise Business Systems, etc. Contact and coordinate with data owners to find out potential solutions that may improve sustainment across all stakeholders. Know who on your staff has access and determine what information element you need to visualize. Extract those raw data files and incorporate them into your visualization tools.

Conclusion

Becoming a technically-savvy data driven logistician is our new reality. Commanders must be able to see their logistics data in ways that allow them to make the best tactical, operational, and strategic decisions to win. Our responsibility is to gain the knowledge that will enable better data analytics and visualization to envision the last tactical mile. The problem set is timeless, but today we have technological advantages to see our problem.