Technical Data Management-Catalyst

A look into the future of Marine Corps IT development and procurement

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Marine Corps information technology applications tend to be outdated and difficult to use, and the DOD procurement process to replace them has been notoriously slow and unresponsive to user input. Recent logistics software acquisition, however, shows this may no longer be the case. The Marine Corps is undergoing a massive digital transformation effort to improve data validity and availability, user experience, and—perhaps most importantly—procurement practices. The Technical Data Management-Catalyst (TDM-Catalyst) application, which is the first logistics information technology (LOG-IT) capability to be fielded since the Deputy Commandant for Installations and Logistics (DC I&L) created a separate LOG-IT branch (the branch is abbreviated as LPI), serves as an example of what Marines can expect in replacement for legacy programs. TDM-Catalyst is a cloud-hosted application that replaces four legacy systems and automatically ingests and validates data on every repair part and end item configuration in the Marine Corps inventory, enabling global logistics awareness.[1] Notably, it provides clean data to other downstream systems and users in support of logistics planning, operations, and lifecycle management activities across the Marine Corps through a user-friendly, intuitive platform. Additionally, it is one of the first Marine Corps programs to adopt the Agile software development methodology, reducing its procurement cycle from the standard multi-year process where product visions at the outset seldom meet the required capability at delivery (e.g., Global Combat Support System-Marine Corps) to an eighteen-month process from idea to deployment with continuous collaboration between the customer and developers to ensure the finished product meets Marine Corps needs. With TDM-Catalyst, Marines no longer have to adapt their mission to fit the tools they receive; rather, they can modify their tools during development and after fielding to better support the mission.

Background

TDM-Catalyst began as a Technical Data Pilot study led by I&L and the Logistics Portfolio Manager (LPfM) from October 2017 to January 2018 to inform future technology adoption and product development strategy for the enterprise's cataloging and provisioning systems.[2] Both processes were selected for review since they are central to nearly all supply and maintenance transactions and susceptible to poor data. The pilot concluded by delivering a functioning application over a secure, schema-agnostic noSQL database that simplified user interaction, eliminated gaps in automated activities, and incorporated robust validations to ensure data cleanliness. The Technical Data Pilot demonstrated to DC I&L that using modern business practices (including Agile and DEVSECOPs)[3] and technologies could replace the legacy systems with a superior application relatively quickly and led DC I&L to endorse TDM-Catalyst.

TDM-Catalyst aimed to resolve several problems with legacy cataloging and provisioning systems. First, there were too many cataloging systems, each one requiring extensive manual data entry, a multitude of swivel chair processes, and offline transactions with a complete lack of system data validations. For the

Marine Corps to introduce a new National Stock Number (NSN) into the supply system, users had to update up to twelve systems. Unsurprisingly, keystroke errors and stove-piped platforms were persistent threats to data accuracy. Second, the simple act of obtaining a new NSN was too slow, often taking between six to eight months to complete a catalog action request (CAR) for Primary End Item (PEI) NSNs. Third, the systems made finding data difficult and confusing. The user interfaces (that is, what the user sees on the screen) were not intuitive and required users to know system-specific codes and shorthand that impaired research for anyone without extensive training. Fourth, the difficulty of updating or using the systems led many Marines to use "workarounds" to bypass them entirely. Fifth, there was no trend analysis to inform the maintenance cycle.

The most pernicious problem caused by the inefficiencies of the legacy systems was poor data quality. Inaccurate, and sometimes inaccessible, data led to slower delivery times, more frequent re-orders, longer equipment deadline periods, and obsolete or improper inventory levels. Provisioning and cataloging are essential to readiness. The legacy systems were not able to provide the data integrity required by the fleet.

Vision for TDM-Catalyst Production and Procurement

To solve the problems with legacy systems, the developers and users had to collaborate to create a system to reduce touchpoints and safeguard data. The team working on TDM-Catalyst wanted to avoid the pitfalls of past LOG-IT procurement where development took several years. The process was unresponsive to customer input and in-stride modifications, and the results failed to meet the needs of the organization. The vision for TDM-Catalyst consisted of three parts.

1. Make a cloud-based data platform that is responsive to users' needs and allows users to build low-code/no-code applications.
2. Build the platform so the acquisition logistics and product cataloging community could streamline (and largely automate) the provisioning and cataloging process, improve data quality and visibility, and transform the user experience.
3. Plan future projects to rapidly integrate logically grouped legacy functions and design features to automate new business process segments quickly.

Bottom line: the vision was to provide users an easy-to-use system to generate and access clean data on an automated platform that was developed and fielded quickly. But how?

The DOD procurement process is often criticized for its rigidity and its slow, expensive timeline for obtaining everything from weapons systems to individual equipment.[4] Yet, TDM-Catalyst was developed in just eighteen months from cradle to deployment as a minimally viable product (MVP). As an MVP, TDM-Catalyst will be refined continuously based on customer input as long as it remains in service. A development and procurement process quickly provided the Marine Corps a product that will adapt to the users' needs throughout its lifecycle. In short, the Marine Corps got both the product it wanted and what it paid for. TDM-Catalyst avoided several common pitfalls of the standard procurement pro-

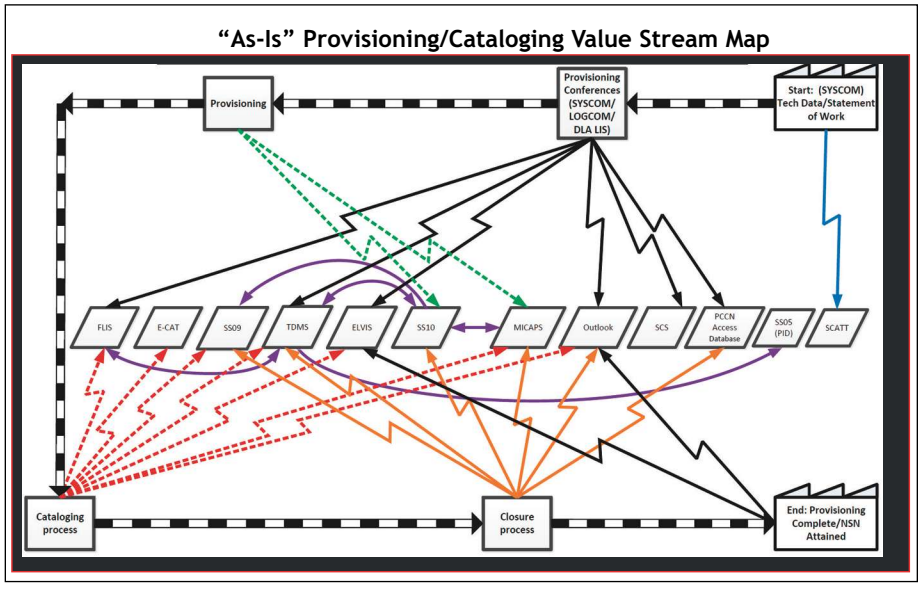

Figure 1. *(Figure provided by the PMW230 Program Office [MARCORSYSCOM].)*

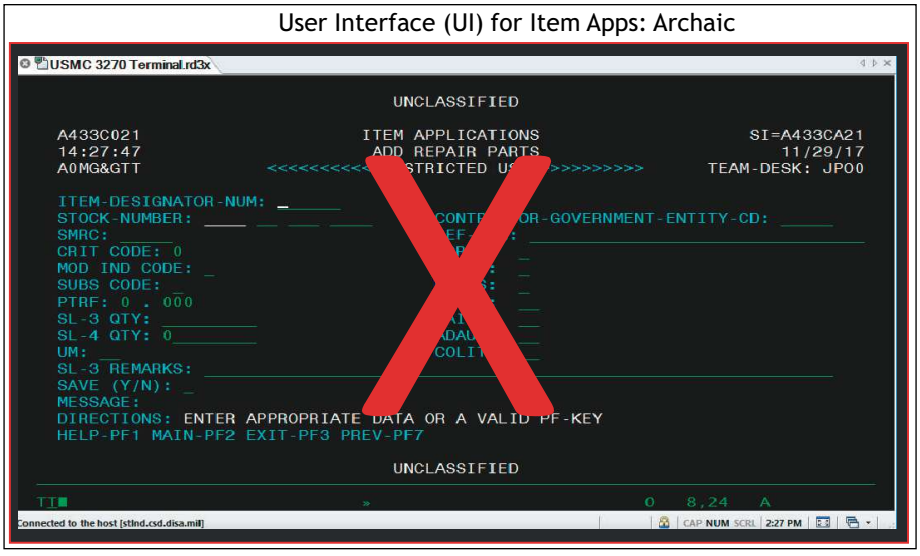

Figure 2. *(Figure provided by the PMW230 Program Office [MARCORSYSCOM].)*

cess by using the Agile development methodology. Agile is common in the commercial software industry, but it has application to military software (and perhaps hardware and weapons systems) as well.

To understand Agile development, it is helpful to compare it with standard product development. Standard product development is "plan focused," in which customers provide a set of requirements for a product (often in a Statement of Work or Performance of Work Statement) and the manufacturers or service providers prepare a delivery plan (or "waterfall") to develop a product they think will meet the consumer's needs. With a Waterfall delivery model, customers are stuck with the plan developed up front and risk receiving the "wrong thing" that fails to meet their requirements, is something users hate to operate, or both. Waterfall projects are rigid, lengthy, and prone to costly re-works and, at times, abandonment.

Agile, on the other hand, is "value focused" rather than "plan focused" and provides flexibility to adjust product features based on new information or customer requirements, ensuring delivery of the highest priority items based on resources and time available. Value is delivered in time boxes commonly referred to as "sprints," with the result of each sprint being a potentially shippable product. Sprints are normally two to four weeks long. This incremental approach reduces risk and cost during development Refinement does not end with the release of the MVP; sprints continue so developers can incorporate prioritized enhancements to the product after it has been fielded to ensure the product better meets users' requirements. This ongoing refinement of the product is called a Continuous Delivery Pipeline.

Agile development is *collaborative* between program managers, portfolio managers, consumers, and developers. During TDM-Catalyst development, there were nearly daily meetings between Marine Corps key players (LPI and Marine Corps Systems Command and software developers to confirm priorities and test the software to ensure it performed the tasks required by each sprint. Product defects were found early and fixed prior to moving to subsequent tasks. In industry, this type of collaboration for software is also known as DevOps, as it involves partnership between development and operations teams.[5] In the military, the term used is DevSecOps as security personnel are involved in the process to ensure software is compliant with DOD security protocols.[6]

Agile development is *iterative* as products are developed in sprints where groups of tasks (called "stories") or groups of stories (called "epics") are accomplished in short sprints. The sprints accomplish prioritized, achievable tasks—ensuring the product can meet specified consumer requirements. Finally, Agile is *flexible* as it allows customers to eliminate, modify, or create new requirements as the product is being developed and used. Agile is highly supportive of continuous exploration: new ideas to improve any aspect of an application design or process can be rapidly generated, tested, and then evaluated for adoption, refinement, or abandonment as a routine aspect of product development.

The Result: What TDM-Catalyst Provides to Our Marines

- *Elimination of CAR Table of Organization/Equipment Change Requests.* In the past, completing validation on NSNs for (PEIs took an average of six to eight months and required transactions with three separate agencies (DC CD&I, MARCORSYSCOM, and Logistics Command). TDM-Catalyst has a fully automated interface

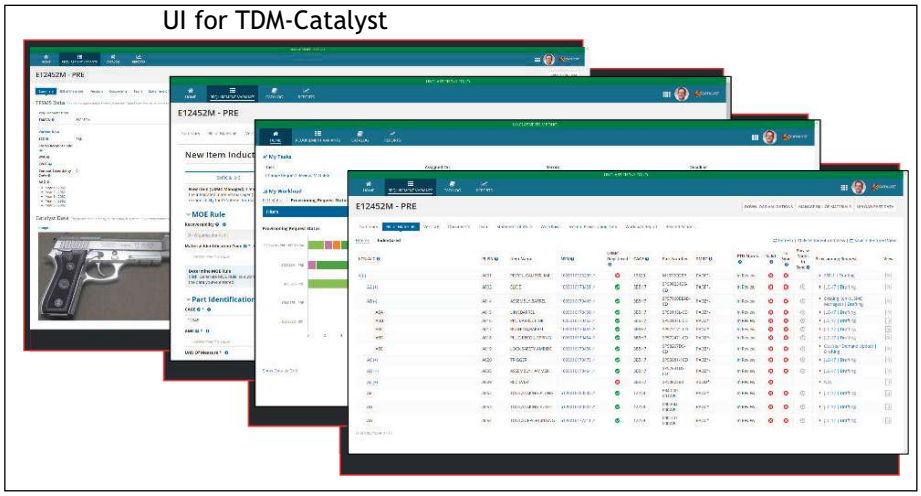

Figure 3. *(Figure provided by the PMW230 Program Office [MARCORSYSCOM].)*

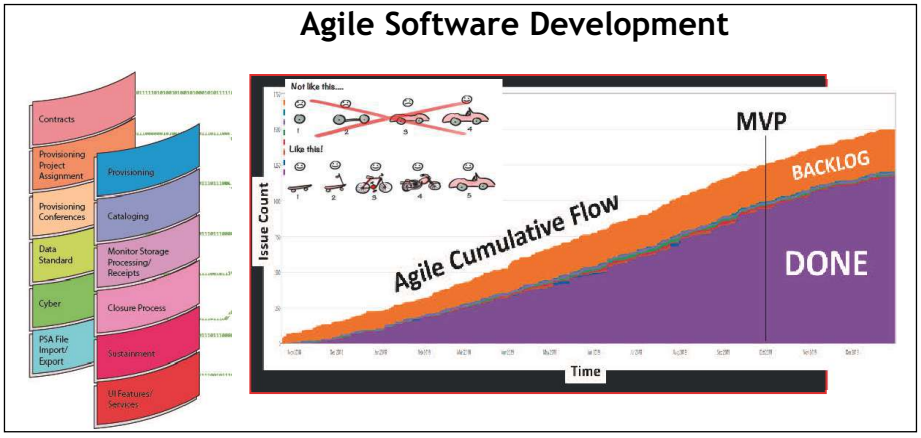

Figure 4. *(Figure provided by the PMW230 Program Office ([MARCORSYSCOM].)*

that reduces transaction time to one–two days and eliminates CAR Table of Organization/Equipment Change Requests and swivel chair actions between catalogers and other agencies.

• *Automated manufacturer data ingestion and NSN prescreening*. Legacy systems required manual input of all manufacturer data for NSNs, which led to a high rate of "keystroke error" and other data problems. For example, an LVS-R has approximately 15,000 NSN parts that required manual entry and lookups. TDM-Catalyst automatically updates and validates NSN data through continuous monitoring against the Federal Catalog in the Federal Logistics Information System.

• *In-application training and help desk*. Users can access training classes and "how to" videos from within the site if they are unfamiliar with conducting transactions. If after viewing short step-by-step videos users have additional questions, they can access a helpdesk between 0700–1630 EST Monday–Friday. This eliminates the need for MLGs and MEFs to staff training centers to offer Catalyst courses, since the system is meant to be intuitive and includes built-in video training for each type of transaction.

• *Data safeguards*. The system prevents user-generated data flaws by requiring end-item validation for any manually input information.

• *Visibility of parts and bill of materials management*. Past systems offered no "drill down" capability to find, associate, and transact on parts contained in a PEI product configuration. Additionally, parts data was only available down to one level of indenture (or level of complexity), as parent-child relationships were not visible. In TDM-Catalyst, all PEI NSNs are visible in one place and show parent-child relationships for parts within an end item (e.g., number of bolts in a SECREP, quantity and location of every bolt in a product configuration).

• *Trend analysis*. TDM-Catalyst provides continuous trend analysis on NSN usage and demand signals across the enterprise, which has implications throughout the supply chain including inventory and distribution planning.

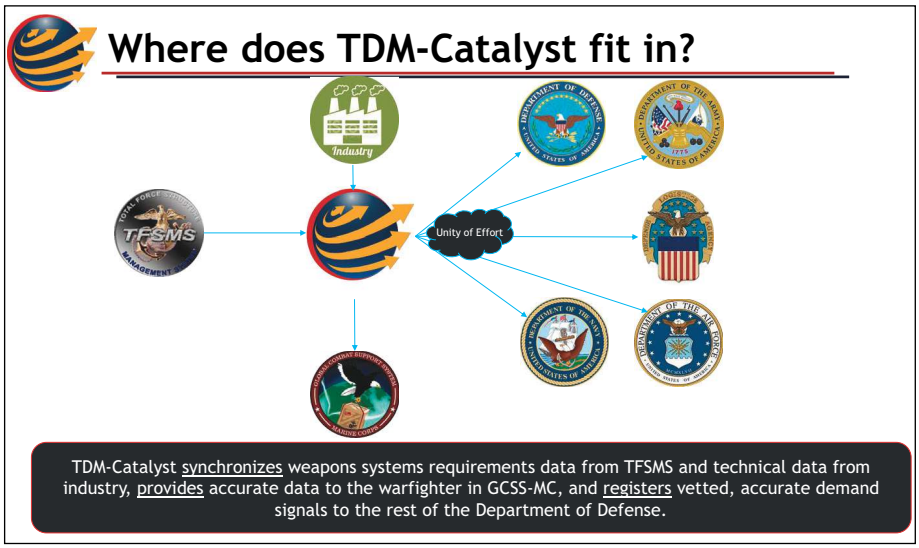

Figure 5. *(Figure provided by the PMW230 Program Office [MARCORSYSCOM].)*

Conclusion

The TDM-Catalyst application provides a glimpse into the automation, data validity, and logistics transparency Marines should expect from future LOG-IT systems. Clean, accurate data is automatically updated and validated ensuring the warfighter always gets the right part at the right time. More importantly, they should expect a more responsive procurement system—one that is faster and delivers a better product. The Agile methodology allows for continuous customer feedback during development, and these iterative improvements will continue in two-week sprints throughout the product's lifecycle to ensure that it continues to meet the needs of its users. Future LOG-IT software, including other applications under the TDM Program, are being developed using the Agile methodology—ensuring the developers and the customers are collaborating to make an MVP that meets the enterprise's needs and users actually enjoy operating. Agile almost certainly has procurement applications beyond software, but that is a topic for another article.

Notes

1. TDM-Catalyst, as a cataloging and provisioning application, replaces the legacy TDMS, MICAPS, Item Apps, and Provisioning software.

2. Cataloging may be defined as "the process whereby each item of supply is named, assigned a Federal Supply Class, described to identify characteristics, and ultimately assigned an NSN [by Defense Logistics Agency-Logistics Information Service]." Headquarters Marine Corps, *MCO 4410.29 Assignment of the Marine Corps Stock Numbers (MCSN) and Criteria Determining the Registration of National Stock Numbers (NSN),* (Washington, DC: December 2012). Provisioning may be defined as "the identification, selection, and acquisition of initial support items required for maintenance." Headquarters Marine Corps, *MCO 4400.79 Provisioning Policy*, (Washington, DC: May 2007).

3. DevOps is a software development and delivery method involving frequent collaboration between developers and operations teams. DevSecOps is a similar concept where security teams ensure software is compliant with industry or government security protocols throughout the entire development process. Staff, "What is DevSecOps?," *Red Hat*, (n.d.), available at https://www.redhat.com.

4. See Alex Haber, "Attacking the Root of the Problem in DOD Acquisition," *The Hill*, (January 2015), available at https://thehill.com, and Marcus Weisgerber, "Slow and Steady is Losing the Defense Acquisition Race," *Government Executive*, (n.d.), available at https://www.govexec.com.

5. "What is DevSecOps?"

6. Ibid.