

## CASE STUDY



# Streamlining Logistics With Data Modernization



**US Marine Corps**  
Technical Data Modernization –  
Catalyst Project

**Industry**  
Public Sector

**Solution**  
IT Modernization – Logistics

## The Challenge

TDM-Catalyst is a major Logistics IT modernization effort for the United States Marine Corps (USMC). The USMC handles a great deal of materiel (military materials and equipment) that is critical to their mission. This materiel includes weapons, vehicles, radios, tools, and numerous other components as well as subcomponents of equipment and supplies. The catalogs of information needed to manage and administrate that materiel (including parts for repair and replacement) is the subject of the TDM-Catalyst project.

The legacy applications involved in this modernization effort were four separate catalog and procurement enterprise information systems. The applications performed finding and accessing inventory in catalogs and logistics provisioning information. Those catalogs also held information about the equipment item configurations used by Marine Corps personnel, who provision parts and equipment for the warfighter.

These legacy systems were examples of the condition of many Defense IT systems in use today. They were notoriously slow and unresponsive by today's standards, had no coordination or exchange of information and therefore accuracy suffered. These systems used mainframe and mid-tier computing infrastructure technology from 20-30 years ago. Users had to access four different workstations and transmit document files using email without data validation or verification to complete a workflow. There was excessive manual data entry risking human error and costing a huge man hour expense. For example, when adding an item with a National Stock Number (NSN), users had to update 12 different systems. Execution and approval of this process often took six to eight months. There were frequent errors, out-of-date information, and duplicate orders, identifying a truly broken aged process.

The new TDM-Catalyst system now completes this workflow in less than 48 hours, often in as little as 24. TDM-Catalyst is a true improvement and enhancement to the mission.

**“Initially we started as a catalog transaction operation, the backbone of operations, but the future implementation is to do trend analysis for weapons systems where we can perform proper adjustments for logistics AND engineering for just-in-time supply. We want to order the right part at the right time in the right configuration. We want to predict how much equipment is needed at a location to support the operation. The backbone of the data we are putting into the system is going to be used downstream.”**

John Estep,  
TDM-Catalyst project owner

## Approaching the Challenge

Information Technology modernization is a goal for the Deputy Commandant for Installations and Logistics (DC I&L). They created the Logistics Information Technology (Log-IT) branch of the Logistics Command to improve mission operations using current Information Technology resources like cloud computing and web browser user-interfaces. The TDM-Catalyst modernization project establishes global logistics awareness and operations competency unlike any previous system.

The goals of TDM-Catalyst are to transform Log-IT:

1. Streamline and automate the catalog and provisioning processes.
2. Establish a cloud-based data platform that has full accreditation for DOD use.
3. Provide a user-friendly, intuitive web-based user interface by using a low-code development platform.
4. Ingest catalog data from the various sources using a modern multi-model/NoSQL data platform.
5. Improve Data *quality*; Clean and master the data for TDM-Catalyst and other downstream user requirements.
6. Continuously manage change in the data structure.
7. Follow Agile development practices.
8. Enable future modernization projects with reusable accredited technology.
9. Ensure Data is reusable and process continues to improve.
10. Manage, meet and excel at the Logistics mission.

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## Providing the Answer: Technology Evaluation and Operational Change

The procurement process to acquire materiel has hindered many efforts in the DOD. Rigid process with lengthy acquisition cycles have been the status quo. This is also a problem for acquiring the compute resources and software technologies for improvements. The TDM-Catalyst project, at its inception, was facing a circumstance where using the on-premises USMC owned datacenter was the only way forward. This would require very long timelines for approval to acquire resources, high costs of procurement, and unwieldy policy and process for accreditation. As the planning and preliminary work was underway, the Marine Corps established MCBOS (Marine Corps Business Operations Support Systems) to enable procurement and accreditation of Cloud computing services from Amazon Web Services (AWS) in conjunction with the Naval Information Warfare Center-Atlantic (NIWC-Lant).

The preliminary work involved a Technical Data Pilot (TDP) project using Agile development practices and trial of the MarkLogic Data Hub technology and Ap-pian’s low-code development platform. It was determined to be an ideal environment and worked great in the initial pilot!

**“...trying to quickly get the data to where it needed to be, ...was a snap. I mean, it was astonishing how quickly we were able to react to any changes. We did that on literally a daily basis.”**

John Estep,  
TDM-Catalyst project owner

In the TDP, the TDM-Catalyst team found that this modern technology was able to overcome the distinct limitations of relational databases, namely the difficulty to ingest disparate data schemas and formats, and the problem to create usable data from undefined sources.

Eric Bower (Technical Lead) said, “We had to effectively build a Rosetta Stone on the backend.” The ability to speak in different languages, in terms of data, enabled rapid synchronization of business processes and data structures. Bower added, “We needed immense flexibility as we went through development to harmonize all of the data from a wide range of sources and pedigrees ... And we didn’t want to get stuck rebuilding schemas because we had no clue what everything was going to look like going into it.” The MarkLogic multi-model Data Hub “made perfect sense.”

The team took on the task to achieve full accreditation and DOD Authority to Operate (ATO) for the TDM-Catalyst system on AWS. This was the first USMC Program to achieve this milestone and the first USMC cloud-based application. The MarkLogic and Appian software platforms and the TDM-Catalyst application itself are entirely hosted on AWS and approved. The accreditation can be reused by other DOD entities. Others who wish to use the same technology can do so with their own Cloud environment.

It is certain the TDM-Catalyst effort will have to adjust and change along the way and throughout the program lifecycle. MarkLogic enables Agile development and fast modifications to the data without disruption in the operation. For DevSecOps, MarkLogic is the perfect answer. It tracks the changes to data maintaining provenance and lineage to ensure change is as expected and traceable.

The team had a vision to enable modernization for future IT projects, as well. The team designed and implemented the system with other use-cases in mind. TDM-Catalyst was architected and built within MCBOS and USMC requirements that can be applied to other data modernization projects using DevSecOps processes.

Agile software development practices are central to the TDM-Catalyst modernization. They required the involvement of subject-matter-experts to act as stakeholders throughout the process. By using short-term goals and milestones called “sprints”, they detected errors and design flaws early and fixed them before they cascaded into deeper problems. Small collaborative teams accomplished work goals quickly without excessive rework and stayed the course with each sprint delivery.

As the development concluded, the project team had to contend with the problem of organizational and cultural change of some twenty years. People were used to working with the legacy systems and had developed work-arounds to get the job done, in spite of the broken systems. TDM-Catalyst delivered a new way of working and needed to get people to accept change and understand the accelerated rate at which they could now work. Once they overcame the barrier to change, people found the new system to be superior in every way, and they appreciate their new ability to get more done in less time.

**“What we’ve got now is an interface to present all of our product configuration data, other logistics product data and catalog information to any Marine Corps user that needs access to it. And that includes Marines in the Operational Forces, Headquarters Marine Corps, Systems Command, Logistics Command and other stakeholders – really anywhere, as that single authoritative and extensible product information backbone for the Marine Corps.”**

Eric Bower, Technical Lead

## Results

TDM-Catalyst went live in production operation on March 1, 2021. It replaced the four separate legacy systems (3 mainframe and 1 middle tier application). The Marine Corps will be able to decommission and shut down all of these legacy systems. With elimination of those systems, the Marine Corps will recover costs to operate, maintain and sustain them, and reduce risk. Personnel will be assigned to other tasks currently in backlog — saving time, materiel and manpower.

Users now have one application to accomplish the various tasks that spanned four legacy systems. The new system exceeds expectations with users. Feedback is outstanding! The new system drastically shortens the time to locate materiel with accurate information. The workflow processes eliminate extra steps and make the work much more efficient. The reliability of the data is so much better that the user community is growing. Provisioning of parts and equipment takes far less time. The system automatically updates inventory data from the Federal Logistics Information System (FLIS). This enables the readiness of Marine Corps forces for mission operations and substantially enhances the ability to execute. The TDM-Catalyst system dramatically improves data quality, with elimination of manual errors and implementation of automatic data validation. It enables trend analysis for planning and demand signals used by the DOD. As value data is continuously collected, the USMC validates its investment.

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## Next Steps

The next phase of this program is underway with the implementation of the Publications System (Pubs). Equipment documents, manuals, configuration documents, and other published materials are migrating to the same platform. Pubs will serve over 10,000 users across the Marine Corps enterprise. Following that application deployment, other needs will be prioritized and modernized using these technology platforms in a continuous modernization effort.

*IT Modernization is now a reality for the US Marine Corps.*

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## About MarkLogic

MarkLogic helps customers create value from complex data faster. Our platform ingests data from any source, creating and refining metadata to support powerful models. Customers use these models for deep search and query, building enterprise applications and bringing unique insights to analytics and machine learning.