Fighting with Live Data

XVIII Airborne Corps' Experience with Its Operational Data Teams

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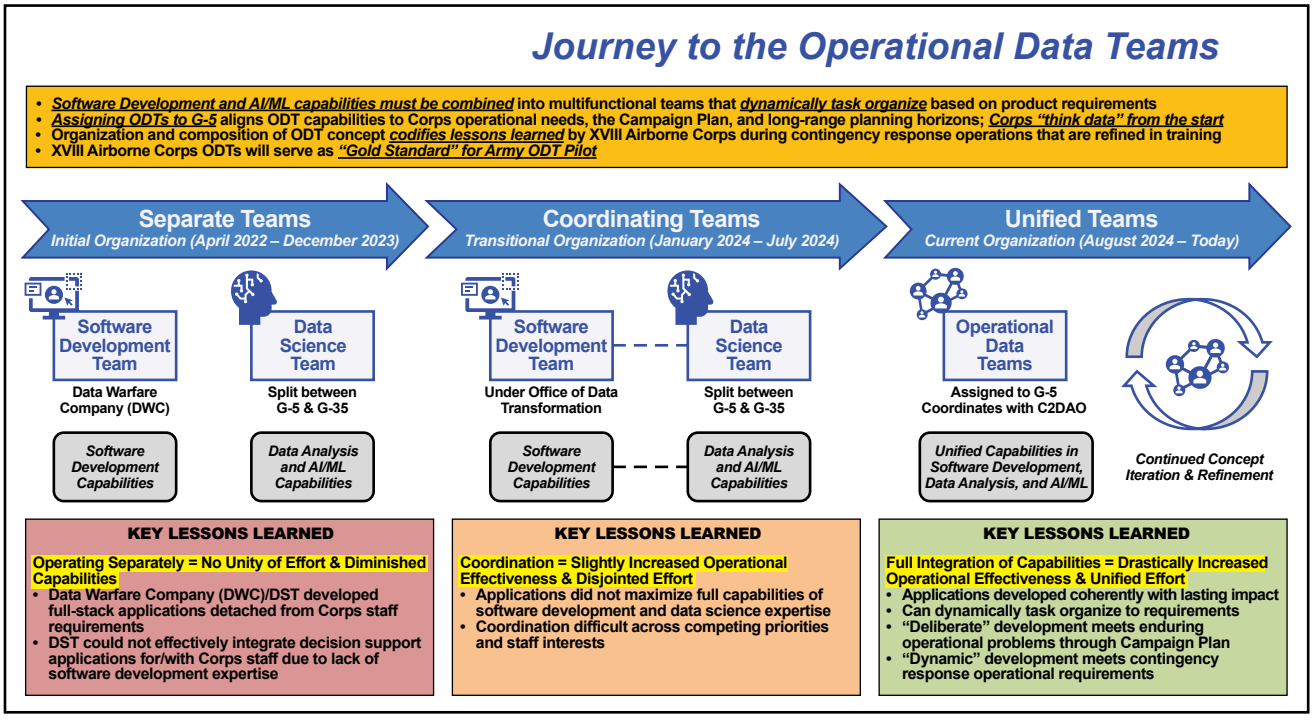
Victory in modern warfare requires commanders to make better decisions faster than their adversaries. The news drives this home every day, whether it be from Ukraine, the Red Sea, Gaza, Iraq, or Syria. We exist in an age where accelerated data and platform development are integral to our warfighting capabilities. Achieving Combined Joint All-Domain Command and Control (CJADC2)—the Department of War's (DOW) current mission command approach for achieving decision dominance—requires adapting new technologies and synchronizing systems to provide, exploit, and visualize the right data rapidly.[1] Critical to enabling CJADC2 is the ability to manipulate and utilize a variety of data sources to develop tools that support the commander's data-driven decision cycle.[2] The importance of this effort only grows as DOW establishes a foundation upon which to build future artificial intelligence/machine learning tools.

Even given this imperative, the Army has struggled with how best to leverage access to live datasets; new and emerging data-centric platforms; and a growing talent base of officers, warrant officers, noncommissioned officers, and soldiers to solve its most challenging operational problems. Current efforts associated with "transformation in contact" and the Army transformation initiative will not just rely on the integration of new technologies and data streams but will ultimately require a data-centric foundation to enable true continuous transformation.[3] Understanding how best to build an enduring data-development capability within our formations while sustaining the unique manpower and skills required to employ this capability will remain one of the Army's chief concerns over the next decade.

The XVIII Airborne Corps (XVIII ABC) began wrestling with this challenge in 2022. This article outlines the Corps' approach to this problem—the operational data team (ODT). ODTs, as constructed within the XVIII ABC, provide commanders with an organic capability to develop and adapt the data-centric tools that help achieve realized CJADC2 while integrating critical new data sources. They enable commanders to use extant data sources to better see themselves in space and time and improve decision-making at an accelerated pace. The Corps pioneered the ODT concept and continues to collaborate across the Army data



(Figure by authors)

Figure 1. Journey to the Operational Data Teams

enterprise to shape the evolution of ODT organization and employment. XVIII ABC's experience with ODTs provides a starting point for other Army units to establish their own ODTs and avoid the mistakes the Corps made early in the formation process.

XVIII Airborne Corps' Operational Data Team Journey

XVIII ABC has experimented with different ODT organization structures and operational employment concepts during the past several years. That journey is summarized in three different phases as depicted in figure 1: the initial Data Warfare Company concept; distribution of software development and data analysis capabilities across Corps headquarters staff sections; and consolidation of those capabilities into ODTs under the Corps G-5 (strategy, plans, and policy).

Initial organization: Data Warfare Company. The XVIII ABC commander saw an operational demand to expand the Corps' innovation culture and officially activated the Data Warfare Company (DWC) on 1 June 2022.[4] The DWC had its own unit identification code and command team and reported directly to the Corps' chief innovation officer, an Army colonel. The DWC was initially staffed with a small number of military graduates of the Joint Special Operations Command Global Analytics Platform, and Galvanize-trained software development and product management contractors supplemented them by providing cybersecurity/risk management framework expertise to facilitate regulatory Authority to Operate accreditation of DWC developed capabilities.[5]

DWC development efforts focused almost exclusively on everyday business-related requirements but could focus on urgent operational mission requirements as the need arose. As a separate company, the DWC enjoyed some autonomy and mission focus. Company administrative and logistics responsibilities, however, taxed the two-man company headquarters. Further, the eventual elimination of the Corps chief innovation officer position (an unauthorized billet) reduced the unit's ability to advocate for direction among the Corps leadership and staff. Finally, the DWC lacked organic data-science expertise, as the Corps' organic data-scientist-qualified operations research/systems analysts were assigned outside of the DWC. The DWC proved to be an unsustainable model, and the Corps looked to experiment with another approach.

Transitional organization: Distributed among multiple Corps staff sections. Next, Corps leaders decided to transition DWC personnel from an independent company and distribute them among different Corps headquarters staff sections. The software developers became the Data Activities Team within the Corps' Knowledge Management Office. The data scientists remained split between the G-5 and G-35 (future operations). The cloud engineers and cybersecurity/risk management framework specialists were assigned to the G-6 (command, control, communications, computers, and cyber) staff, whom the Corps commanding general (CG) directed to assume all responsibility for cloud operations and system security accreditations.

During this phase, military software developers and product managers arrived from the Army Software Factory (ASWF) and data scientists and data engineers arrived from the Artificial Intelligence Integration Center training program.[6] Software developers and data scientists began to work more closely together on operational mission capabilities, but their interaction with Corps staff sections was limited and stove-piped within areas of assignment. This model lacked the full staff integration necessary to leverage the capabilities of these teams.

Current organization: Operational data teams in Corps G-5. After struggling with scaling the impacts of the Data Activities Team across the Corps, Corps leaders reconsidered where the software developers and data scientists should reside within the Corps staff. The decision was made to organize them into a separate entity—the ODT—and assign them to the Corps G-5 (G-6 maintained cloud platform engineers and the cybersecurity specialists). This accomplished multiple tasks. First, the move aligned and synchronized ODTs' development efforts with the Corps' long-term planning activities and its cycle of internally and externally driven exercises. ODT development efforts now focused on operational mission capability requirements aligned with the Corps' formally designated operational problems within its campaign plan (CAMPLAN). Second, it facilitated better interaction across the Corps' staff sections and with subordinate organizations. Based on these several organizational iterations, XVIII ABC decided that the optimal near-term organizational structure for its ODTs is within the Corps G-5.

XVIII Airborne Corps' Vision of an ODT Structure

The Corps ODT is a deployable and responsive team that enables commanders to fight with live data. They are organic, multifunctional teams with a range of skills that allow them to solve emerging operational problems at the speed of need. The team dynamically task-organizes based on operational requirements. Their required skills include roles determined by industry best practices and associated with

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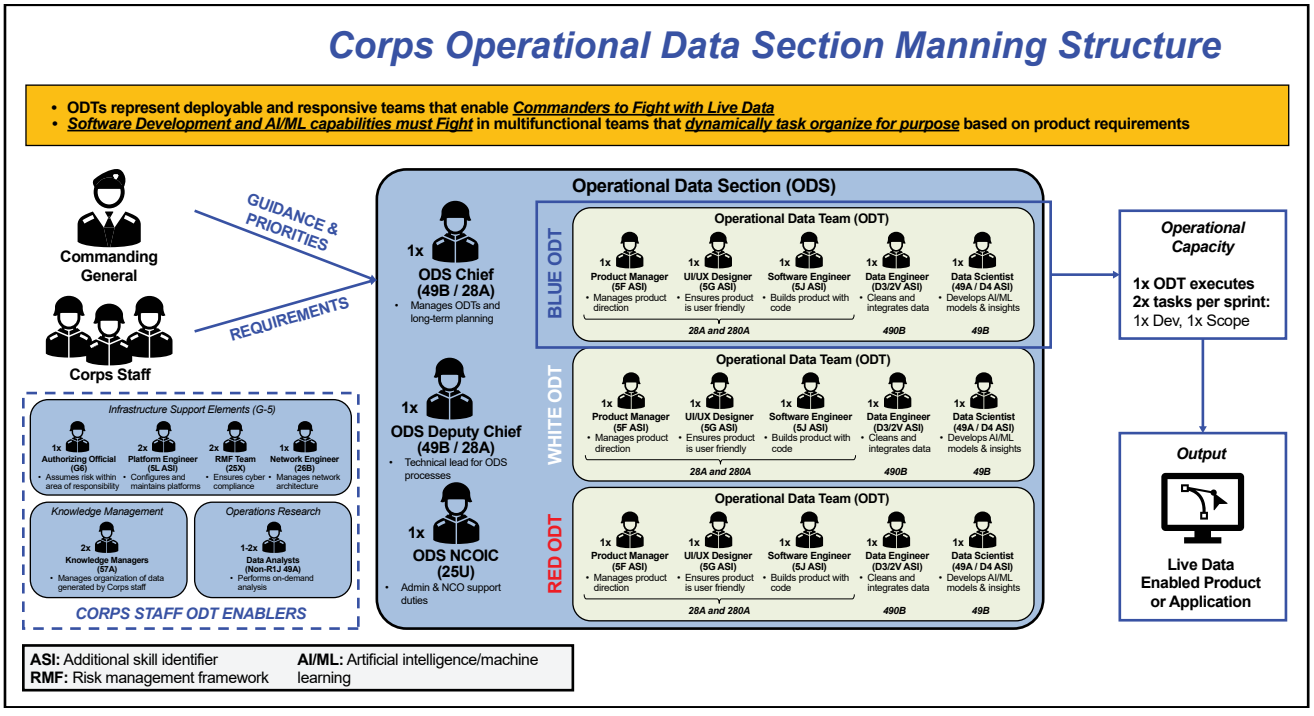

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Figure 2. Concept of ODT Manning Structure and Capabilities

product management, user experience design, software development, data science, and artificial intelligence/machine learning domains. To this end, XVIII ABC recommends the ODT manning structure depicted in figure 2. It represents a final operational capability toward which the Corps is working.

XVIII ABC has collaborated with the Mission Command Center of Excellence in its effort to determine the echeloned employment of ODTs and to develop an ODT concept of operations. Figure 3 depicts the current XVIII ABC ODT echelon concept. Experimentation with this concept is part of the Army's transformation-in-contact 2.0 initiative.

Integration of ODT Product Cycles with Corps Long-Term Planning and Exercise Cycles

Optimizing ODT finite resources—personnel, finding, and time—requires the strict alignment of the ODTs' efforts against the corps' most important operational demands. Prioritization was key: there will always be more data-centric operational problems than time to solve them. To enable the prioritization of myriad emerging demands, the G-5 and the ODT developed a governance process that aligned all activities against the Corps' CAMPLAN and attendant critical operational problems. The G-5 and ODT hosted a series of working groups with the Corps staff to develop potential technical innovation objectives (TIO) intended to solve identified operational problems. The ODT, along with the G-5 and the Corps' chief technology officer (an Army-sponsored highly qualified expert), reviewed the draft list of TIOs to assess their operational value alongside their development feasibility. Assessment results generated a proposed prioritization of TIOs for the ODT during its next product development cycle, known as a program increment (PI). Development cycles run for about twelve weeks but align within the Corps exercise cycle. Each PI culminates with a Corps exercise in which products in development can be tested with warfighting function product owners or new TIOs can be scoped.

After the ODT develops its initial TIO priorities for its next PI, the Corps deputy CG confirms the validity of the priorities. The ODT then develops a draft TIO implementation plan to be executed during the following PI development cycle. The implementation plans include what activities each ODT will do to

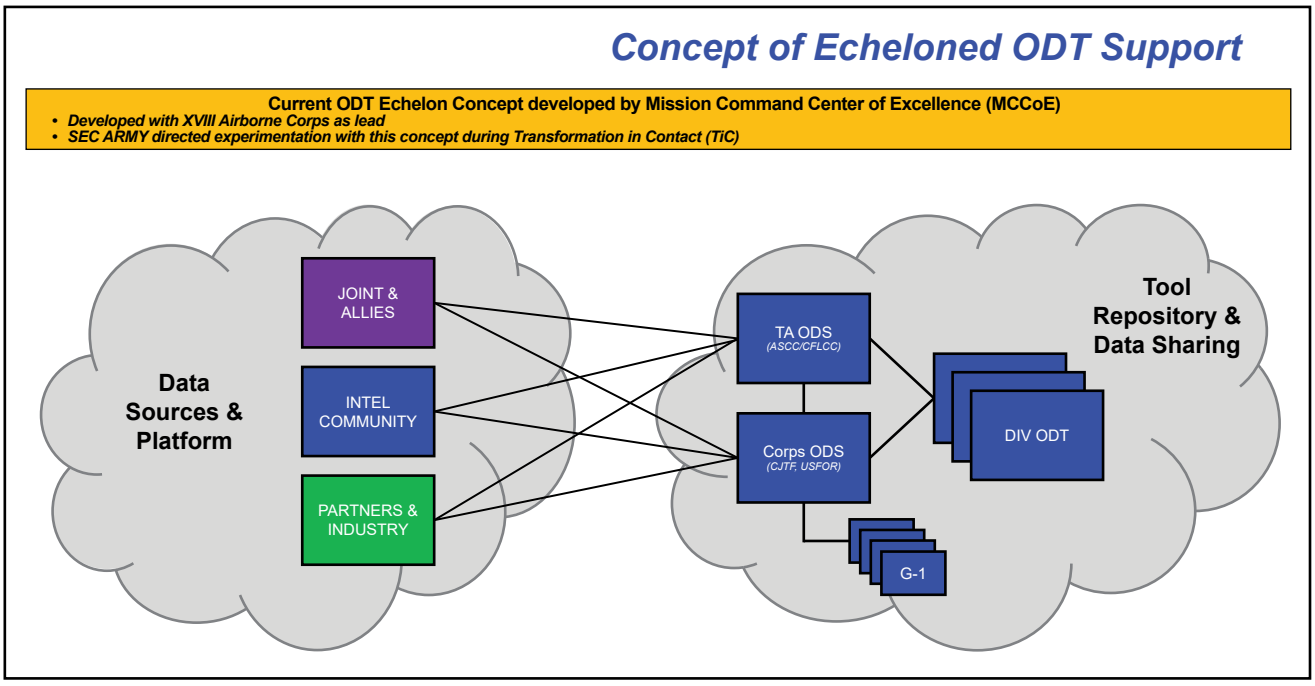

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Figure 3. Concept of Echeloned ODT Support

fulfill operational software development or data science requirements. The ODTs present their implementation plans and recommended efforts to the CG, who then approves the way ahead for the PI and its inclusion in a corresponding exercise/experiment. The CG retains the authority to determine what falls above or below the ODTs effort "cut line" and to make decisions to dynamically retask ODT development efforts.

XVIII Airborne Corps' ODTs Problem-Solution Development Process

The XVIII ABC ODTs address complex challenges through a rigorous problem-solution development methodology directly informed by industry best practices and training from the ASWF. This approach prioritizes understanding and solving problems—rather than implementing preconceived solutions—and is tailored to the specific complexity of each challenge, usually stemming from the Corps CAMPLAN and/or selected operation plans. The process begins with a staff element articulating a problem, not a desired solution, and progresses through a series of phases punctuated by key decision points (invest, divest, pivot) to ensure efficient resource allocation and maximize impact.

Figure 4 depicts how an ODT tackles Corps problems, and figure 5 depicts a notional PI cycle.

The methodology emphasizes thorough investigation and validation at each stage. Initial scoping focuses on understanding the operational problem, identifying stakeholders, assessing overall feasibility, and answering critical questions around goals, team responsibilities, user needs, pain points, technical feasibility, and potential risks. This is followed by deeper problem validation, framing potential solutions, and developing a minimum viable product (MVP) for testing. Throughout, an ODT prioritizes user feedback and iterative refinement, ensuring the final product directly addresses the identified need.

During exercises/experiments, an ODT's involvement is aligned with a given solution's maturity, shown in figure 6. If a product is in the scoping phase, the team focuses on user research to further refine the problem definition. For MVPs, exercises provide valuable opportunities for real-world assessment, bug fixing, and minor adjustments based on user feedback. Solutions in the discovery, framing, or development phases are generally held stable during exercises, allowing the ODT to focus on gathering data and validating assumptions for future iterations. This approach ensures that each ODT delivers impactful, user-centered solutions that directly

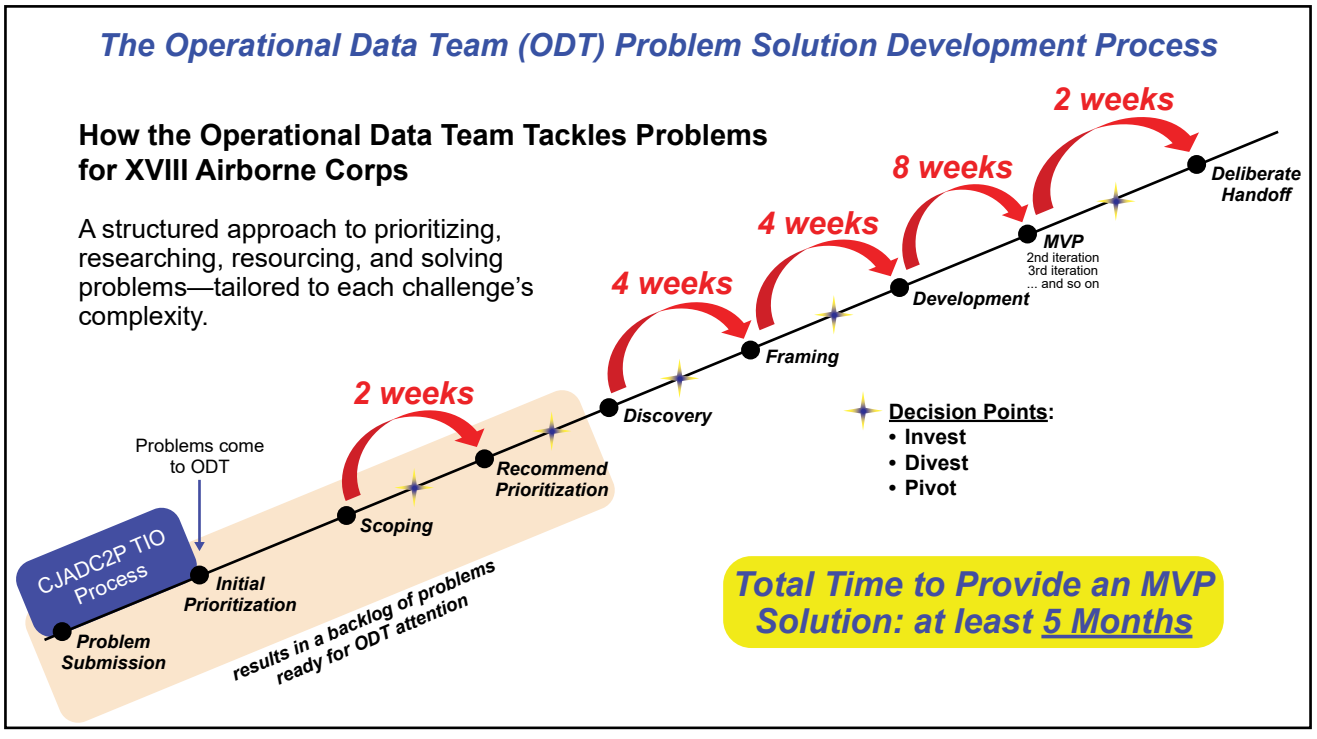

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Figure 4. How an ODT Tackles Problems for XVIII Airborne Corps

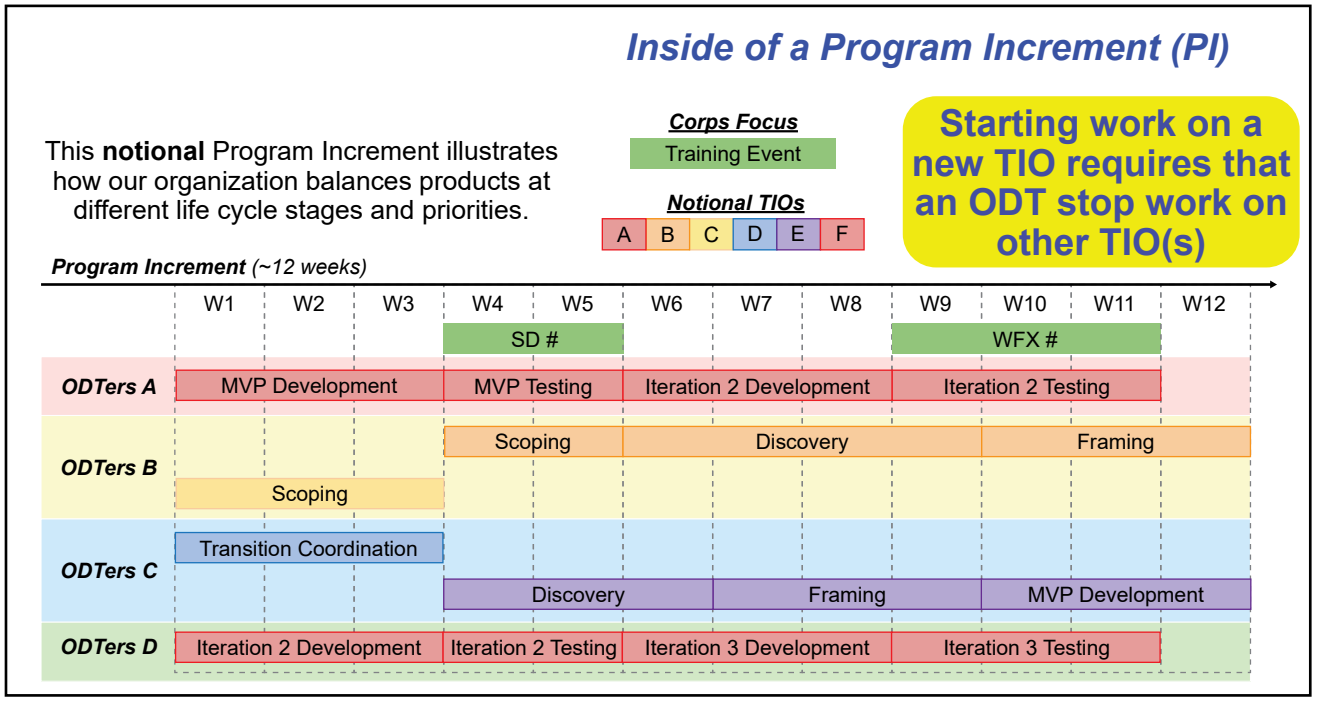

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Figure 5. A Notional Program Increment Cycle

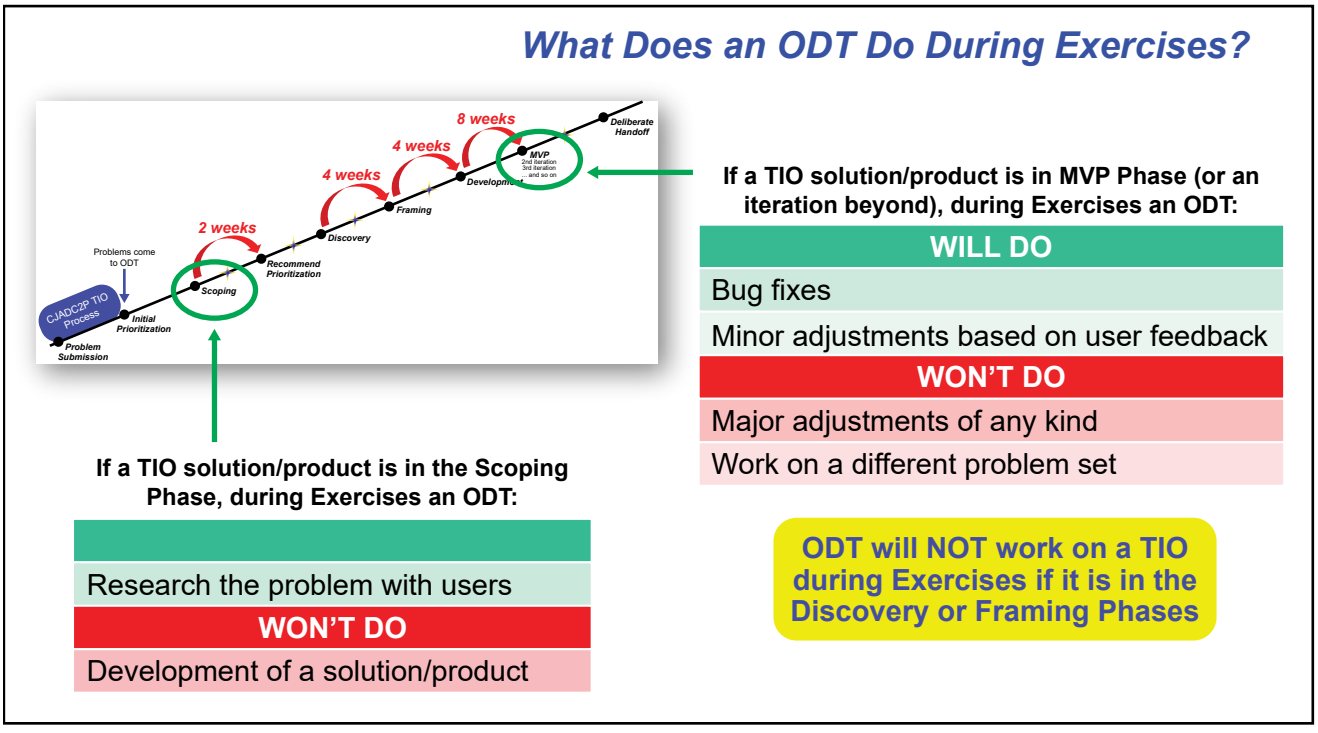

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Figure 6. What an ODT Does during Corps Exercises

support the Corps' operational objectives. Results of the ODT's activities during exercises/experiments become inputs for the next ODT TIO prioritization and development cycle.

An Example ODT Effort: Battle Damage Assessment Visualization

In today's fast-paced operational environment, timely and accurate intelligence is paramount. Recognizing the need for a more dynamic understanding of battlefield effects, the XVIII ABC ODT responded to a critical need from the Corps commander: a tool to visualize the attrition of a potential enemy's integrated fires complex in real-time. The commander's intent was clear—automatically visualize operational risks and opportunities based on real-time data. A crucial element of this capability was integrating it within the existing Corps targeting processes and leveraging the targeting data already present within the system. Working closely with the Corps G-2 (intelligence) section and industry partners, the ODT delivered a prototype in three months, an MVP in six months, and a full handoff to an Army enterprise-level program of record in just nine months.

Battle damage assessment (BDA) visualization provides commanders with both the statistical data and the crucial context needed to make informed decisions. The system answers two critical questions simultaneously: Where are there operational risks? and Where are there operational opportunities? Rather than simply knowing the number of enemy radars destroyed, commanders can now see the spatial impact of those strikes on the battlefield and in an enemy's formation, enabling them to anticipate enemy reactions and proactively adjust their plans. Beyond this automated assessment, the tool also allows analysts to visualize the underlying data in tailorable charts and graphs, allowing analysts to create custom views for their command. Critically, the system ties together intelligence reporting with targeting data, creating a historical record of BDA. This allows for longitudinal analysis, identifying trends and informing future targeting decisions. This enhanced situational awareness fosters synchronization and coordination across the battlefield, ultimately allowing friendly forces to gain the initiative. The ODT's success hinged on close interaction with other staff elements, breaking down traditional silos and fostering a collaborative environment.

This innovative solution is already gaining traction across the Army. The tool has been used in four exercises with the XVIII ABC, 101st Air Assault Division, and the 82nd Airborne Division. Following a successful handoff to the Army Intelligence Data Platform, managed by the U.S. Army Intelligence and Security Command, the BDA visualization capability is looking to be adopted by commands like U.S. Army Europe and Africa and III Armored Corps. The BDA portfolio integrates data objects, workflows, and visualizations to deliver a comprehensive intelligence picture. This rapid development and successful implementation demonstrate the potential of data-driven decision-making and the critical role of dedicated ODTs in providing commanders with the tools they need to win on the modern battlefield.

Lessons Learned

XVIII ABC's experience has highlighted key lessons learned about the use of ODTs:

- A properly staffed and employed ODT provides rapid solutions to priority operational problems. An example of this point was the collaborative effort by the ODT, the Corps G-2 staff, the U.S. Army Intelligence and Security Command, and the Army Intelligence Data Platform on BDA visualization that delivered a prototype in three months, an MVP in six months, and a full handoff to a program of record in nine months. The Army recognizes the ODT concept as a critical component of decision optimization, where an ODT serves as the action arm of decision optimization for commanders to achieve decision dominance at echelons above brigade.[7]
- It is important to educate the Corps CG and staff about the agile process an ODT uses to scope problems and develop solutions. It follows industry's best practices, and the ASWF trains its students to use it. Using the process helps ensure that
  - ODT efforts address the right problems and develop good solutions, and do so in the fastest realistic time;
  - commanders and staff have realistic expectations about an ODT's capacity to work on multiple operational problems; and
  - commanders and staff understand their responsibilities in collaborating with an ODT. Their active participation is essential to defining the right problems to solve and developing the best solutions to them.
- ODT product development efforts should be integrated into a command's long-term planning processes and exercise cycles. Doing so enables the ODT to gain an understanding of the range of operational problems and to better recommend which ones it can help solve.
- An ODT requires a priorities governance policy signed by the CG to ensure that ODT efforts stay focused on CG approved priorities. XVIII ABC's early experience without a governance policy was that too many customers requested ODT resources at the same time. With no adjudication process to prioritize their efforts, ODT resources became overextended on unrealistic timelines.
- An ODT requires personnel experienced in all the skill sets that enable rapid solution innovation for emerging problems at the pace of need. Further, given the rapid change of relevant technologies, ODTs require contractors to supplement military personnel to provide capabilities that those personnel have not acquired.
- Some challenges require help from higher-level organizations. For example, current Army-wide manpower constraints may not allow an ODT force structure that XVIII ABC experience indicates is required. Commands experimenting with ODTs should document those challenges for higher headquarters' support.

Summary

XVIII ABC's experience with leveraging ODTs to solve its challenging operational problems has greatly increased the ability of the CG to make better decisions. The concept has proven mission critical to the operational success of the Corps headquarters. After several years of experimenting with them, the Corps has organized its singular ODT into two ODTs within an Operational Data Section in the Corps G-5 to align and synchronize their efforts with the Corps' long-term planning activities and its cycle of exercises. Key factors contributing to the Corps' success with its ODT include its combination of agile software development and data science related skill sets, a priorities governance process, a rigorous problem-solution development methodology informed by industry best practices and the Army Software

Factory, and active collaboration between the ODT and the Corps staff and other stakeholders. XVIII ABC's experience informs the evolution of ODT organization and employment across the Army enterprise. ■

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Notes

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