Driving Future Change

With Army Research, Collaboration and Prototyping

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The Mission Command Battle Lab (MCBL) works regularly with a variety of organizations pushing the technological envelope within the mission command warfighting function (WfF). This paper shares the MCBL's experience with the Army Regulation (AR) 5-5 study process and with using the study results while collaborating with other organizations to provide tangible benefits to the Army.

The MCBL, through collaboration and partnering with key organizations, helped drive the rapid development of a functioning prototype based on the study results. The resulting prototype provided a tangible, functioning mission command tool while facilitating experimentation and continued research. The Deputy Assistant Secretary of the Army for Research and Technology characterized these activities best in a 2014 presentation: "We will focus on maturing technology, reducing program risk, developing prototypes that can be used to better define requirements and conducting

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experimentation with soldiers to refine new operational concepts." The MCBL and its partners epitomize this statement, and this article documents only one critically important MCBL Science and Technology (S&T) activity.

The MCBL partnered with a number of organizations to move from an AR 5-5 study proposal to a working prototype in under 3 years. In the following paragraphs, we provide a quick overview of the study, including its preparation and sponsorship, while emphasizing the value of collaboration and the payoff from working across organizational boundaries.

In Fiscal Year (FY) 2013, the MCBL worked hand-in-hand with the Department of the Army (DA) Staff to formulate an AR 5-5 study focused on meeting the needs of Army commanders. Even in the study formulation phase, the critical importance of communicating and collaborating with the DA Staff cannot be overemphasized. After the MCBL exposed the draft study proposal to key deputy chief of staff (DCS) DA staff members, Michael Eixenberger (then the deputy director, Department of the Army Military Operations, LandWarNet/Mission Command [DAMO LM] Directorate) quickly recognized the value of a commander's toolkit and assumed an active sponsorship role. The DAMO LM team helped to ensure the message resonated with the AR 5-5 study scoring committee during the approval process.

The approved AR 5-5 study was titled the *Commander's Toolkit: System Inputs, Visualizations, and Impact on Leader Development* and was executed during the summer and fall of 2013. It hypothesized that there is no mission command system designed and developed for the commander. In working toward proving or disproving this hypothesis, the MCBL leveraged an existing contractual relationship between the U.S. Army Training and Doctrine Command (TRADOC) and the MITRE Corporation to bring MITRE onto the study team. MITRE formulated a comprehensive research protocol that included procedures and questions, while the MCBL provided oversight and coordinated for access to the serving Army commanders. In the early research phases, the MCBL team did not know that the study, with unfaltering support from the Communications-Electronics Research, Development and Engineering Center (CERDEC), would provide Army commanders with a working prototype in less than 3 years.

The team validated the study hypothesis through the comments and feedback from 13 brigade commanders serving at the time. Army commanders are the underserved members of the mission command team. The final report was published in December 2013 and highlighted the complexity of the commander's mission command environment. The research also identified a number of core needs within the following five broad themes:

- Information Operations and Knowledge Management
- Commander's Information Requirements and Decision Support Tools

- Next-Generation Mission Command (specifically using mobile technologies)
- Interpersonal Communications
- User Interaction with Mission Command (MC) Systems

Within those themes, the research provided broad guidance to ensure commanders receive the mission command functionality that they require. The guidance for the capability highlighted the need to:

- Focus on providing an intuitive and streamlined interface to deliver the commander the information he needs when he needs it.
- Leverage touch-screen gestures and future-looking modalities to best serve the commander.
- Provide functionality identified in commander interviews, including elements of Running Estimate, Common Operational Picture (COP), Combat Power Assessment, and Decision Support Matrix to create a "TOC [Tactical Operations Center] in a Pocket" for commanders on the move.
- Include alerts for Commander's Critical Information Requirements (CCIRs) and decision points, audio/video communication as well as a zoomable map with layers and onscreen drawing.

The study findings were embraced immediately by systems developers and user representatives across the Army. The CERDEC Command, Power, and Integration (CP&I) Directorate was one of those organizations. Its then-director, John Willison, recognized the value of the research and moved quickly to posture his organization to leverage the study findings. And the CP&I team established the Tactical

Army analysts examine the Commander's Toolkit shared workspace functionality during the User Jury with the 1st Infantry Division at Fort Riley, Kansas. They tested this function for assemblying multiple mobile tablets to expand collaboration space.
Mission Command Battle Lab's photos.

Computing Environment (TCE) program as the organization for constructing a prototype Commander's Toolkit. The TCE program is CP&I's alternative approach to the traditional model for transitioning S&T developments to the acquisition community. Instead of developing a complete system for transition to an Army product/program manager, the TCE program established a vehicle for researching, prototyping and experimenting with developing technologies that can be modularly transitioned to the acquisition community.

In January 2014, the MCBL and CERDEC CP&I also established a collaborative body to ensure both operational and technical (systems development) presence and oversight. The joint team was stood up rapidly, creating the programmatic structure to ensure adequate communications and collaboration. Through distributed collaboration (weekly teleconferences) and quarterly face-to-face sessions, the joint team was able to ensure that the brigade commanders' needs highlighted in the FY 2013 study were accounted for.

The lead TCE developers worked tirelessly over January 2014 to March 2015, while also working closely with the MCBL to bring the Commander's Toolkit prototype to life by using the TCE software. The development team focused on ensuring the functionality required and the needs of the commanders were present in the Commander's Toolkit prototype. The photo above shows the shared workspace functionality, or "extend" function, where, for example, multiple tablets can be arranged to expand the space in which commanders can collaborate with subordinate commanders and staff members.

On April 13, 2015, after a number of iterative builds and demonstrations with the Mission Command Center of Excellence (MCCoE) and the MCBL, the TCE project demonstrated a working Commander's Toolkit prototype to the MCBL, the TRADOC Capability Manager (TCM) for MC, and a member of the First Infantry Division (1ID). The prototype was met with overwhelming acceptance. COL John R. Cook, TCM MC/CP, said that he wanted to get the Commander's Toolkit into the

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The Communications-Electronics Research, Development and Engineering Center's Tactical Computing Environment and the Mission Command Battle Lab team members observe the soldiers' use of the Commander's Toolkit collaboration functionality between small tablets and a larger display during the User Jury with the 1st Infantry Division at Fort Riley, Kansas.

hands of Army/1ID leaders as soon as possible. He added that the collaboration space and functionality "are precisely what commanders need." LTC Chuck Slagle, 1ID Deputy G3, reinforced the need for the Commander's Toolkit and coordinated and hosted a broader demonstration and user jury with key 1ID leaders on June 20–July 1, 2015.

The user jury was jointly planned and coordinated between the 1ID, the MCBL, CERDEC CP&I and the TCM Mission Command and Command Posts (MC/CP). The event was a welcome culmination to several months of collaboration, systems development, demonstrations and research.

The 1st Infantry Division provided soldiers with tactical deployment and leadership experience to participate in the 1½-day user jury. Ten operationally relevant vignettes were constructed to gather feedback from soldiers about the Commander's Toolkit prototype, core functionality and interface design. Analysts from the Army S&T and MC user communities participated, including MCBL, Army Research Laboratory (ARL), CERDEC and the TCM MC/CP. The results overwhelmingly supported the expanded use of mobile collaborative applications for Army commanders and leaders and their staffs. The user jury validated the prototype core functionality and interface design but also identified key refinements needed prior to participating in continued experimentation and assessment.

While at Fort Riley with the 1ID, one soldier stated that the Commander's Toolkit, or a Leader's Toolkit, should be available to all leaders,. Slagle described an environment where leaders from squad through corps could have a Commander's Toolkit tailored to their specific needs. Other user jury participants said that increased functionality could prove hugely beneficial in addressing the myriad tasks required of young leaders. One example was provided of digital range cards for squad leaders and platoon sergeants. As the group discussed these leader capabilities, the idea of a capability to integrate multiple range cards from multiple perimeters into a base defense plan was generated.

The Commander's Toolkit grew from a study proposal to a functioning prototype for hands-on user feedback in 2½ short years. In an environment with shrinking resources where systems development spans 10-plus years, this effort highlights the value of close collaboration and a unified effort to provide soldiers with improved capabilities. It also is an example of the value of the Army's TRADOC Battle Labs and Defense Labs working together to inform technology development cycles earlier and drive S&T innovation to better meet soldiers' needs. The prototype provides added value through its use in continued research, experimentation and development of mission command systems interfaces. Its transition path is yet to be determined, but it has already provided immeasurable value to the Army and helps the collaborative team (MCCoE/MCBL, CERDEC, 1ID, ARL and TCM MC/CP) fulfill the Army's S&T mission as stated by the deputy assistant secretary of the army for research and technology: "The Army's S&T mission is to foster discovery, innovation, demonstration and transition of knowledge and materiel solutions that enable future force capabilities and/or enhance current force systems. The Army counts on the S&T Enterprise to be seers of the future—to make informed investments now, ensuring our success for the future."

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