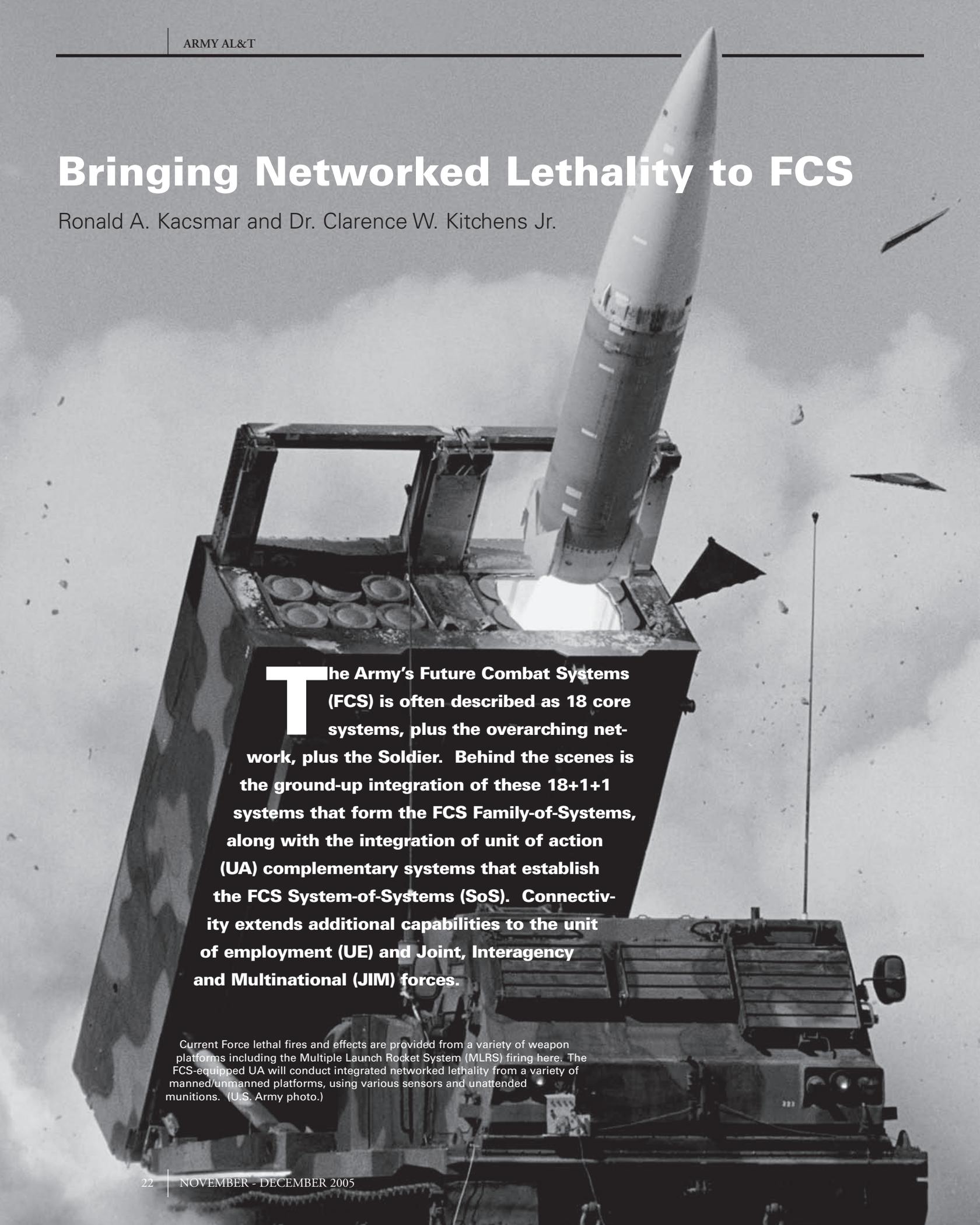


Bringing Networked Lethality to FCS

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The Army's Future Combat Systems (FCS) is often described as 18 core systems, plus the overarching network, plus the Soldier. Behind the scenes is the ground-up integration of these 18+1+1 systems that form the FCS Family-of-Systems, along with the integration of unit of action (UA) complementary systems that establish the FCS System-of-Systems (SoS). Connectivity extends additional capabilities to the unit of employment (UE) and Joint, Interagency and Multinational (JIM) forces.

Current Force lethal fires and effects are provided from a variety of weapon platforms including the Multiple Launch Rocket System (MLRS) firing here. The FCS-equipped UA will conduct integrated networked lethality from a variety of manned/unmanned platforms, using various sensors and unattended munitions. (U.S. Army photo.)

These integrated components will enable numerous advanced capabilities that will make the UA a modular fighting force like none other. The ability to conduct integrated Networked Lethality (NWL) — more broadly known as Networked Fires and Effects (NF&E) — will provide the most decisive advantage for the UA/UE. When integrated with some of the core capabilities and processes, the FCS NF&E will empower a highly effective NF&E-enabled fighting force.

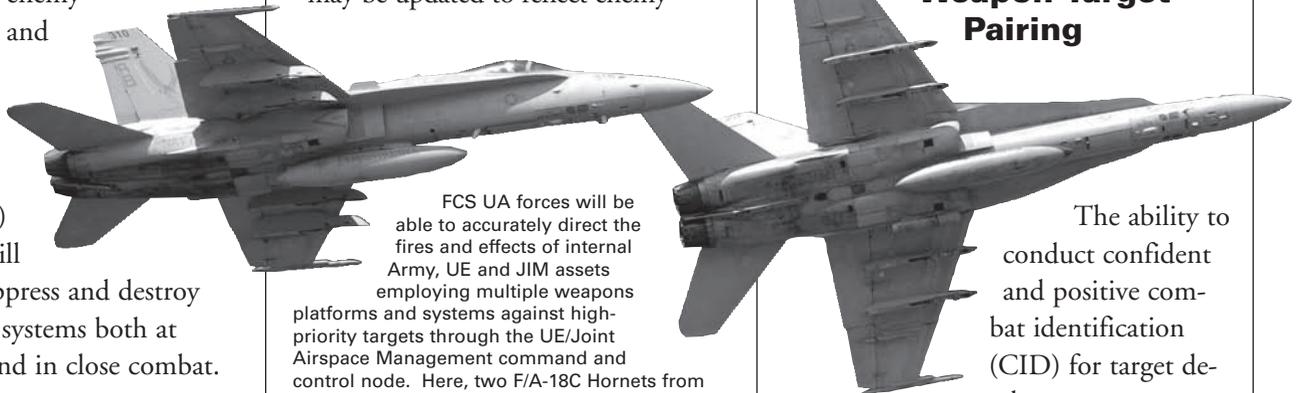
NF&E will be the FCS UA's ability to rapidly leverage and employ UA, UE and JIM sensor and effects assets — through battle command services — to detect and engage enemy targets with lethal and nonlethal fires. line-of-sight (LOS), beyond-LOS (BLOS) and non-LOS (NLOS) fires and effects will be available to suppress and destroy enemy forces and systems both at extended ranges and in close combat.

The FCS NF&E is augmented by the UA's ability to conduct cooperative engagements — such as BLOS, point-and-shoot and avenge kill — through rapidly establishing dynamic sensor-shooter linkages for delivery of precision effects. NF&E cannot be attributed to a single system, but is instantiated by the dynamic and cooperative interaction of these capabilities across the entire UA, UE and JIM forces. Fundamental to their interaction and effectiveness are FCS networked communications and intelligence, surveillance and reconnaissance (ISR) data fusion.

Fires and Effects (F&E) Planning and Preparation

Prior to battle, combatant commanders create their attack guidance (AG)

plans delineating target priorities, associated attack methods, desired effects on target and timeliness of target attack, in addition to allocating appropriate targets to the UE and JIM forces. Commanders can perform this through the F&E Planner of the Battle Command Planning and Preparation Services (PPS), which also provides decision-making services for generating weapon-target pairings and decider-sensor-shooter linkages. The AG and associated tools will permit coherent and precise management of targeting information to provide accurate and predictive effects that are responsive, timely and meet the battlefield commander's needs. Throughout the battle, the AG may be updated to reflect enemy



FCS UA forces will be able to accurately direct the fires and effects of internal Army, UE and JIM assets employing multiple weapons platforms and systems against high-priority targets through the UE/Joint Airspace Management command and control node. Here, two F/A-18C Hornets from Strike Fighter Squadron 136 perform a carrier break maneuver during a tactical air power demonstration Sept. 17, 2005, over Naval Air Station Oceana, Virginia Beach, VA. (U.S. Navy photo by PH2 Daniel J. McLain.)

attrition, effector status and other evolving battle elements. Also during planning and preparation, the UA will use the PPS for integrated live, virtual and constructive training, and conducting mission rehearsals to optimize attack tactics. Additional planning services contributing to NF&E include the sensor planner, maneuver planner, terrain analyzer, ground space planner and airspace planner.

Sensors and Target Processing

FCS platforms will be equipped with various sensor packages that will be

configured and tailored prior to mission execution to best meet commanders' needs for addressing expected threat, terrain, weather and environmental conditions. Targeting data for deployment of effects by the UA can originate from UA, UE or JIM forces. Target processing will be conducted per AG directives and the predefined rules governed by the levels of automation, which control the degree to which a service may make a decision on behalf of a user. Levels of automation include manual, management by consent, management by exception and fully automated modes.

CID, BFT and Weapon-Target Pairing

The ability to conduct confident and positive combat identification (CID) for target development — supported by robust Blue Force Tracking (BFT) to maintain accurate and timely situational awareness — will reduce battlefield areas of uncertainty and thus enable the UA to move rapidly and act decisively. The CID will provide for real-time identification of friendly, threat, noncombatant and neutral forces. The FCS-equipped UA will achieve CID through integrated situational understanding (SU) and battlespace object processes such as detection, classification, recognition and ID. Positive ID of friendly forces will be achieved by UA, UE and JIM forces equipped with compatible and interoperable CID systems.

Additionally, as the Battle Command Mission Execution services process



The FCS-equipped UA will achieve enhanced combined-arms effectiveness across the full spectrum of conflict, day or night, and in all weather, climate and terrain conditions. Here, SGT Shaimon J. Lee (right) passes SPC Earl R. McFee a round for the M109A6 Howitzer during combat operations near Fallujah, Iraq, Nov. 6, 2004. (U.S. Army photo by SFC Johancharles Van Boers.)

targets per the priorities and weapon-target pairings defined in the AG, Blue Force SU will rapidly and accurately select the most appropriate battlefield effector within the required target proximity for completing the fire mission. Sensor-to-shooter linkages will also use Blue Force SU to determine the optimal sensor to link with an effector platform.

Clearance of Fires

UA clearance of ground and airspace for delivery of effects — in close coordination with the Joint Airspace Control Authority's designated UE/Joint Airspace Management command and control node — will enable, rather than restrict, fires execution. SU will be developed as a result of:

- Continuous BFT and CID processes.
- Cooperation with advanced fire control for the refinement of tactical and technical fire direction.
- Information dissemination via the Common Operating Picture.

The result will be the acceleration of clearance of fires, thus empowering rapid engagement of high payoff, most dangerous and time-sensitive targets.

Sensor-to-Shooter Linkages

Sensor-to-shooter linkages permit near-real-time sensor data to be fed directly from a sensor platform to the firing platform operator to permit clearance of fires and BLOS engagement of targets. The FCS network and battle command system provide a capability to establish sensor-to-shooter links, maintain them as long as they are needed to conduct the assigned mission and then terminate them when they are no longer needed, releasing the sensor platform to conduct other missions.

Lethal and Nonlethal Effects

FCS-equipped UAs will employ overmatching lethal and nonlethal F&E in a complementary manner — lethal effects combined with nonlethal effects — to achieve enhanced combined-arms effectiveness across the full spectrum of conflict, day and night, and in all weather and terrain. These UA forces

will be able to accurately direct F&E internally, or from supporting UE forces and JIM, assets employing weapons platforms and systems, such as the High Mobility Artillery Rocket System, MLRS, F/A-18 Hornet, Mk84 Joint Direct Attack Munition, Naval surface ships firing 5-inch guns and the Tomahawk Land Attack Missile, among many others.



FCS-equipped UAs will employ overmatching lethal capabilities to full-spectrum, combined-arms dominance on future battlefields. Here, an artist's rendition depicts the NLOS Cannon. A demonstrator version of this system is now being tested at Yuma Proving Ground, AZ. (U.S. Army image.)

Lethal effects within the FCS-equipped UA will be provided by Soldiers and weapons platforms such as the Mounted Combat System (MCS), NLOS-Mortar, NLOS-Cannon and Armed Robotic Vehicle-Assault (ARV-A), as well as unattended munitions such as the NLOS-Launch System and the Intelligent Munitions System. Nonlethal effects will be delivered by various means, including Soldiers, LOS, BLOS and NLOS fires and unattended munition systems.

Total time from contact to fire mission generation, to target engagement and defeat will be drastically reduced, permitting FCS-equipped forces to cooperatively engage targets with tactical, operational and strategic level assets in seconds instead of minutes or hours. Every authorized platform and Soldier will have the capability to direct fires from any shooter available to the UA.

Each platform will also be able to take advantage of all available sensors to literally see around corners and achieve lethal and/or nonlethal F&E from BLOS. This will enhance the UA's capability to decisively attack high payoff and most dangerous targets from beyond the range of the enemy's weapon systems, significantly increasing force survivability. The BLOS platform operator, serving as the sensor, shooter and decider, will make the decision to fire based on the rules of engagement, collateral damage considerations and CID enabled by real-time video imagery of the enemy target and its immediate surroundings. Imagery will be provided to the platform operator through the network and battle command system from a sensor that has been placed in a position to serve as

“virtual eyes-on-target.” The MCS and the ARV-A will be able to deliver BLOS fires when teamed with appropriate sensor platforms.

Battle Damage Assessment (BDA)

The BDA process provides a timely and accurate estimate of damage resulting from the application of lethal and/or nonlethal military action against a threat force. The FCS battle command system's ability to dynamically synchronize ISR, fires and maneuver, and to dynamically conduct sensor taskings, will significantly enhance the BDA process, making it more efficient. By combining overlapping/layered sensor coverage with automated processing and reporting, BDA will be developed and distributed faster with more accurate results.

During a mission, emerging BDA results are compared with predetermined measures of effectiveness to determine if additional attacks are needed and, if so, the target is recommended for reattack and the reengagement process is initiated. When nonlethal effects are employed, BDA will consider a different set of factors — including changes in human behavior or shifts in social attitudes — in assessing mission success.

Other Supporting Capabilities and Services

Supplemental to the core capabilities described here, other NF&E supporting capabilities and services are being developed that include advanced survivability and reliability initiatives.

Additionally, the Performance-Based Logistics approach adopted by FCS will enable real-time system status data to be collected by the Platform Soldier-Mission Readiness System and then fed to the Logistics Decision Support System within the Forward Support Battalion. Status of critical provisions — such

as ammunition, fuel and water — will be continuously monitored and used to support predictive analysis that will ensure resupply occurs well in advance of the need.

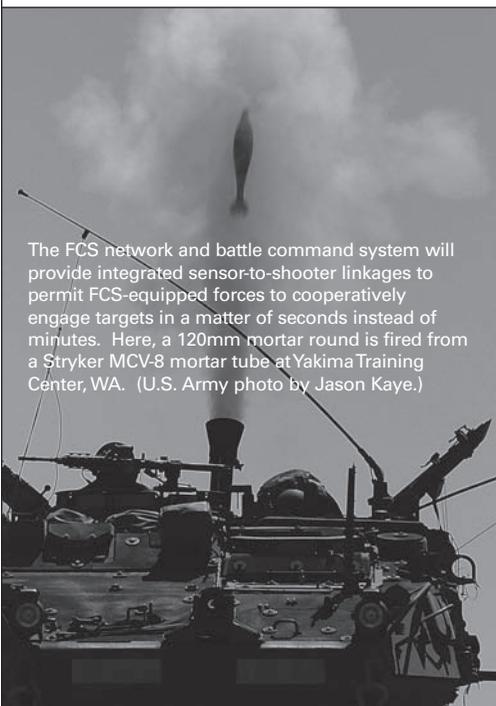
In summary, FCS-equipped UA forces will be able to deliver highly effective NF&E and:

- Develop battlefield situations out of contact.
- Engage the enemy in unexpected and highly effective ways.
- Maneuver with speed and agility to positions of advantage.
- Engage enemies beyond the range of their weapons systems.
- Destroy their forces with enhanced fires at the time and place of the commander's choosing.

Each individual capability described in this article provides a significant warfighting advantage. However, when integrated as a complete SoS, they provide an operational capability far greater than the sum of their parts. NF&E will be the embodiment and realization of the UA's quality of firsts paradigm: “See first, understand first, act first and finish decisively.”

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The FCS network and battle command system will provide integrated sensor-to-shooter linkages to permit FCS-equipped forces to cooperatively engage targets in a matter of seconds instead of minutes. Here, a 120mm mortar round is fired from a Stryker MCV-8 mortar tube at Yakima Training Center, WA. (U.S. Army photo by Jason Kaye.)