



## Faster Information Sharing Gives Edge to Warfighters

**In June 1995, Air Force Captain Scott O’Grady was patrolling the no-fly zone over Bosnia in his F-16C Viper aircraft. Suddenly, his plane was knocked out of the sky by a Serbian surface-to-air (SAM) missile. He ejected safely and survived for six days eating leaves, grass, and ants before being rescued by U.S. Marines. Our military learned the enemy was anticipating our actions faster than we thought and moving their SAMs faster than we could knock them out.**

In today’s warfighting scenarios, command and control includes the ability to react faster than the enemy by getting inside his OODA loop—the recurring cycle of “observe, orient, decide, and act.” By going through this cycle quickly, observing and reacting to unfolding events more rapidly than an opponent, the U.S. military can get inside the opponent’s decision cycle to gain the advantage. This is achieved, in part, with intelligence, surveillance, and reconnaissance (ISR) assets, including unmanned aircraft systems (UASs) and manned aircraft. They range from small unmanned Scan Eagles to larger unmanned Predators and Reapers, and from the manned C-12 Huron to the full-sized manned Joint Surveillance Target Attack Radar Systems aircraft (better known as Joint STARS).

For combat operations, ISR allows a level of planning, analysis, and targeting support never seen before in the history of warfare. ISR is so critical to our military that Secretary of Defense Robert M. Gates established a task force last year to ensure the Department of Defense is doing everything possible to provide ISR assets to support warfighters. In his Defense Budget Recommendations issued in April 2009, Sec. Gates increased ISR support by \$2 billion.

### Information Sharing is Critical

The DoD is deploying more ISR assets to cover as much ground as possible and encouraging interoperability on data links between the services. MITRE’s Enterprise Systems Engineering Capstone initiative focuses on improving the command and control of ISR assets and the cross-boundary information sharing necessary to enable this.

“One of our projects in the Capstone initiative strives for improved command and control of ISR, or iC2ISR,” says MITRE project leader Ray Modeen, who serves as the director of integration for the 350th Electronic Systems Wing at Hanscom Air Force Base, Mass. “It’s a force multiplier for ISR assets. The concept not only involves sharing information across traditional service boundaries, but also sharing ISR assets.” Working with Modeen are team members Eric Koerner, director of integration for the 551st Electronic Systems Wing, and Carole Mahoney, associate department head, Information and Computing Technology Division. Other team members include Bruce Czulada, associate department head, Space, Intelligence, and Information Operations Division, and Tim Kehoe, principal software systems engineer. Czulada and Kehoe also support the 350th Electronic Systems Wing. The iC2ISR team has access to MITRE’s broad range of expertise found in our DoD Command, Control, Communications, and Intelligence (C3I) Federally Funded Research and Development Center.

### Listening to Customers

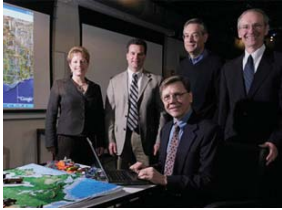
The team members began their work by listening to the customer’s problems. “We brought in about 30 people for our first brainstorming session,” recounts Modeen. “These were government, military, or civilians who actually worked at operational sites that included an Air Operations Center, a Joint STARS aircraft, and an Airborne Warning and Control System [AWACS] aircraft. We didn’t show them any technology.

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Effectively using intelligence, surveillance, and reconnaissance (ISR) assets such as the Global Hawk is critical for maintaining military superiority.

Improving command and control of ISR is a force multiplier for ISR assets.



The iC2ISR project team members, from left, are Carole Mahoney, Eric Koerner, Tim Kehoe, and Bruce Czulada. Seated: Ray Modeen.

“MITRE is taking an enterprise approach to interoperability and information sharing among many systems.”

We simply asked them how they worked and the problems they encountered.”

The team found three major challenges to efficient ISR operations:

1. Stove-piped operations where one service doesn't share information with another service, or organizations within the same service that don't share internally.
2. Maintaining shared “situational awareness” of ISR assets and their sensors, and how they're being used to satisfy collection requests in near-real-time.
3. Dynamically re-tasking, or changing missions, of ISR assets such as unmanned aircraft while in mid-flight.

“We're not focusing on a single system that's going to solve everybody's problems,” says Koerner. “We're focused on the underlying data and making it available to more users. The Mission Planning System, for example, is used for planning routes for several types of military aircraft. Today, that information is stove-piped—the units that plan the routes for their aircraft don't share that information with other units. We want to pull that data together and relate it to other information about those assets such as their missions, collection requirements, and current locations that will be provided to ISR managers and other users.

“We're borrowing from a process previously proposed by the Joint Mission Planning System program. We're suggesting putting information about routes for aircraft in a mission planning data storage warehouse where anybody can get at it. So, if I have an ISR task I want to accomplish, and a new target pops up, I can access the planned routes of all the ISR aircraft in the area at any given time.”

### Enterprise Approach to Interoperability

Mahoney says, “MITRE is taking an enterprise approach to interoperability and information sharing among many systems. We are bringing various capabilities together. We're identifying the information-sharing standards to enable interoperability among those capabilities and helping to evolve those standards where appropriate. We're also identifying capability gaps as opportunities for advanced prototyping and identifying requirements that we can transition to programs of record.”

Another aspect of improving command and control of ISR is speeding up communication loops. An example is a request from a soldier for an image of a potential target. The request moves up the Army's chain of command, over to the Air Force, and back down to the UAS operator. The team is working to shorten such cycles.

One problem the team discovered was the absence of feedback in requests for an ISR asset. “For example, if a soldier on the ground requests ISR support for an aerial photo, that request may eventually work its way up to the Air Operations Center,” Mahoney says. “We need to improve the feedback to show the original requester that the request was received and provide insight into the status of how and when that request may be fulfilled.”

### Accessing MITRE Expertise and Tools

After getting input from the ISR users and identifying the challenges, the team drew on a variety of MITRE engineers for help. Their expertise included simulation scenarios, weather, air operation centers, integration, and other areas. The team used MITRE's Agile Capability Mashup Environment (ACME) lab to quickly combine, or mash up, separate technologies into experimental solutions. (See “ACME and REACT Speed Up Prototyping.”)

How has the concept of improving command and control of ISR been accepted by the stakeholders? “Our project received positive reaction from the beginning,” says Modeen. “Interest has been very high from the kick-off with our Air Force ESC sponsors last fall to a recent ESC briefing with industry vendors and integrators. We've also received valuable input from MITRE's Air Force Advisory Board.

“Our next steps will be a demonstration of a dynamic ISR manager, which allows an operator to quickly move a UAS, or other type of sensor, to snap a picture of a new target. We'll also demonstrate an electronic folder that shows targets, which replaces collecting information on paper.”

—by David A. Van Cleave

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