



# THE CONNECTIVITY CHALLENGE

—  
A NEW REVOLUTION  
IN MILITARY AFFAIRS



**A new “revolution in military affairs” is driving land force transformations worldwide. Like the precision guidance revolution of the 1970’s, today’s digital revolution demands new ways of thinking, equipping and operating modern armies.**

In the 1970’s, Army General Donn Starry saw the precision guidance revolution take shape in the Arab-Israeli conflict. Surveying the outcome of the conflict, he explained the revolution that was already underway:

*“On the modern battlefield, anything that can be seen, can be hit – and anything that can be hit, can be killed.”*

—  
General Donn Starry, 1974

GEN Starry’s straightforward observation drove the Army’s transformation to Air-Land Battle and re-shaped Army acquisition, force development and training.

Today, the outlines of a new revolution are emerging, driven this time by a confluence of three digital technologies – ubiquitous full-spectrum sensing, 5G networks, and artificial intelligence. These technologies invite an update of General Starry’s insight, to guide future Army modernization:

*“In the modern battlespace, anything that can be known will be known, and anything that is known can be acted upon.”*

Just as the precision guidance revolution re-shaped army requirements for doctrine and materiel development, the digital revolution is poised to re-shape how modern armies collect, manage and act on information. Gaining military advantages from the digital revolution is the “Connectivity Challenge” facing commanders and Ministries of Defense.

## THREE TECHNOLOGIES ARE DRIVING THE REVOLUTION

In the 2020's, armies are racing to incorporate three related technologies into the materiel base, and the most successful armies are likely to be those that can weave these technologies into an integrated military decision-making capability. Sensors, 5G and AI are the drivers of the digital revolution.

### Ubiquitous Sensors

#### Anything That Can Be Known...

Army leaders at every level can now expect real-time, full-spectrum information from arrays of advanced sensors on satellites, piloted and non-piloted aircraft, ground vehicles and individual soldiers. Darkness, smoke, topography and distance are no longer barriers to situational awareness, and sensor-generated information can support decision-making with high-resolution video, audio or other digital information streams. General Starry's environment, with cavalry scouts carrying binoculars and small tactical radars, has been replaced by full-spectrum, unblinking sensors. This new fact leads to a huge torrent of available information, pouring over commanders in a continuous wave. How will all this information reach commanders in time to be useful? The second revolutionary technology solves this problem.

### 5G Networks

#### Connecting Commanders to Knowledge

As the volume of sensor-generated information increases, military 5G networks bring the immense bandwidth, high transmission speeds and low latency necessary to link vast sensor networks to the commanders who need to act on sensor-generated information. The analog, FM-voice radio networks of the precision guidance revolution are being replaced by secure 5G technology capable of moving any amount of information to any point on a military network instantaneously and continuously.

Current efforts by the Services to build common operating pictures and shared situational awareness point to the revolutionary potential of 5G networks. Joint, all domain air defense has always been a difficult challenge because the

Army and Air Force have different sets of sensors generating huge volumes of data. Moving this vast amount of situational information to the right interceptor requires the kind of speed and bandwidth available on the highest-speed military networks.

But when unlimited amounts of information are available instantly, anywhere in the battlespace – how will commanders and staffs discern between essential information and chaff? How can insights from multiple sources be synthesized in time to shape decisions and create military advantages? The third revolutionary technology will solve this challenge.

### Artificial Intelligence

#### Anything Known Can Be Acted Upon

Huge volumes of data arriving from multiple sources, in diverse forms and contexts, could simply wash over commanders and staffs and never produce actionable insights. The tasks of synthesizing data, identifying decision points, and generating options are the domain of artificial intelligence (AI) applications – the third technology of the new revolution in military affairs.

The Army's efforts to enable joint fires by empowering Army and Air Force platforms and shooters through ground-based sensing networks are ripe for AI-based solutions operating on high-speed, low latency 5G networks. As the Services develop their approach to Joint All-Domain Command and Control (JADC2), artificial intelligence applications will help filter flows of data and create insights from continuous flows of information.

## THE CONNECTIVITY CHALLENGE: GAINING MILITARY ADVANTAGES FROM THE DIGITAL REVOLUTION

Just as the precision guidance revolution required commanders to think about the battlefield in new ways, the digital revolution and the rise of ubiquitous sensors, high-speed networks and artificial intelligence demand new ways of thinking about equipping and operating land forces. The armies that succeed in adopting three innovation practices seem most likely to realize the greatest advantage from the 21st century digital revolution in military affairs.

## **Innovation Practice 1**

### **Optimize Decision Processes, Not Individual Devices**

In the precision guidance revolution, a single new capability drove changes in materiel and doctrine. Optimizing individual anti-armor and other precision-strike weapons, and aligning doctrine with better weapons, created real military advantages.

The digital revolution is not that simple. Because the source of advantage in the digital revolution comes from accelerated decision cycles, the old approach of optimizing individual devices may just waste money and capability. Optimizing sensors without improving the networks that carry sensor data means that information flows are bottlenecked. Optimizing the speed and bandwidth of networks without providing analytics and decision support means that users are overwhelmed with data they are unable to act upon.

In the digital revolution, Army innovators need a comprehensive view of end-to-end decision processes. Money and time – always in short supply – need to focus on optimizing decision processes rather than the individual devices and systems that enable the processes. Real military advantages come from digital technology only when technology improves in the speed and quality of decision-making. Finding the bottlenecks and barriers, and creating solutions that accelerate the decision process, is the new burden for innovators in the digital revolution.

## **Innovation Practice 2**

### **Design The Soldier Experience**

As new digital devices, screens and power supplies proliferate, Army innovators will need to keep a close eye on the soldier experience. Unlimited amounts of data moving across tactical networks at 5G speeds can overwhelm soldiers in both physical and cognitive dimensions.

Soldiers are already carrying too much equipment. A 2017 Government Accountability Office report identified individual Marine loads of 90 to 159 pounds, with an average of 117 pounds, and Army soldier loads of 96 to 140 pounds, with an average of 119 pounds. Adding “just one more” small digital device could prove to be the microchip that breaks the soldier’s back.

The cognitive burden is increasing as well. Multiple screens, alarms, digital feeds and other information sources may appear useful in isolation, but designers will need to ask new kinds of questions about the potential for information overload. The soldier experience should enable each user – shooters, staffs and commanders – to process only the information needed to make timely, accurate decisions. In the digital revolution, Army innovators may find that “less is more”, and that user experience design becomes decisive.

Simply adding “more gear” will be counterproductive in the digital revolution – innovators will need to address the impact of new devices on the physical and cognitive experience of every user.

## **Innovation Practice 3**

### **Make Small Bets As Fast As Possible**

Moore’s Law – the observation that processing capability doubles every two years – now shapes the Army’s innovation environment. As sensor capability, network speeds and throughput, and artificial intelligence capabilities demonstrate Moore’s Law in the military digital revolution, old acquisition and fielding practices that took years or decades have become irrelevant – even dangerous.

Big bets on systems with long lifecycles cannot possibly keep up with the speed of technical innovation on every dimension of digital technology. A recent Stanford study found that the time to train an artificial intelligence network to recognize images dropped from three hours in 2017 to about 88 seconds in 2019 – a capability doubling time of less than four months, far outpacing Moore’s Law. Military innovation cycles have never coped with this kind of speed, but the digital revolution demands materiel development and acquisition practices that can do so.

The practical answer may be that the Army will constantly be making small bets on marginal improvements in sensors, networks and AI – innovating and fielding at the speed of technology, rather than the speed of acquisition bureaucracies. Not easy, but essential to capture the military benefits of digital technology.

**In the digital revolution – anything that can be known will be known, and anything that is known can be acted upon.**





# REIMAGINING CONNECTIVITY, TOGETHER.

—  
WE MAKE SOLDIER  
MODERNIZATION  
EASY.

## FISCHER CONNECTORS IS THE ARMY'S PARTNER FOR WINNING THE CONNECTIVITY CHALLENGE

Making the power and data connections that enable digital transformation is the core skill of Fischer Connectors. From simple, reliable connectors and cables designed to meet Nett Warrior standards, to tactical hubs that minimize the soldier's physical burden, to advanced microelectronic solutions that optimize the performance of digital devices on military networks, Fischer Connectors provides real solutions to the "Connectivity Challenge" facing today's commanders.

Fischer Connectors has the **innovation skills** to capture the military advantages of digital technology, the **agility** to work on accelerated Army timelines, and the rigorous **attention to detail** in design and manufacturing to meet the most stringent Army requirements.

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