

# Interoperability: Saving Lives and Money

**Submitted to: President Donald J. Trump**

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The President  
The White House  
Washington, D.C. 20500

Dear Mr. President:

Being able to exchange and trust information is critical to the security of our nation and the quality of life of all Americans. Each year, the public and private sectors invest billions in network technology, but a third of that money ends up being wasted. This is because their various computer systems are incapable of communicating with each other – and then they must spend even more to make those systems interoperate.

I'm sure you are receiving many proposals on how to save money and make the government work more efficiently. The nonprofit Network Centric Operations Industry Consortium is offering our expertise to assist your administration in developing the strategies that will ensure widespread interoperability, which will help reduce cost, increase capability, improve performance, and save lives.

NCOIC was founded in 2004 by business leaders who understand all markets require interoperable solutions. The contributors to the attached paper by NCOIC are senior leaders from the government, DoD and health care. All of us have worked on solving interoperability issues for decades.

As a result of our efforts with Fortune 100 companies and government agencies such as the Federal Aviation Administration and National Geospatial-Intelligence Agency, NCOIC has developed approaches for creating interoperable environments – and also for helping different teams communicate with each other as they prepare for interoperability.

Ours is not an expensive methodology. It requires that government and government contractors understand requirements and verify interoperability before purchase. With leadership provided by the government, this can be imbedded in the technology development and procurement plans of thousands of companies and agencies in a range of markets.

Interoperability is not a fleeting concept. In this age of information and interdependence, it is foundational to our well-being and success. NCOIC is anxious to help you in providing focus to government agencies and incentivizing industry to achieve widespread interoperability so we can save money and improve efficiency in countless ways.

Sincerely,

Lt. Gen. Harry D. Raduege, Jr. (USAF, Ret)  
Chief Executive Officer

# Interoperability: Saving Lives and Money

## Introduction

Each year, our military, government and private industry spend billions and billions of dollars on information technology, but more than 30% of the money goes just to getting data shared between computer systems. These are unnecessary expenditures that also waste time, delay action, and have many negative effects on key sectors such as defense, security and healthcare – and on our society. Instead, by using an approach known as *cross-domain interoperability*, we can significantly reduce costs and speed up the exchange of vital information.

Cross-domain interoperability refers to the ability to move data seamlessly within and between agencies, organizations, businesses, industries and countries. This allows partners to share information and resources, promotes collaboration, improves decision-making, and leads to greater organizational success. For example, in the case of a disaster, crisis or humanitarian mission, cross-domain interoperability allows multi-national responders using different technologies to communicate quickly and save precious time and lives.

The benefits of sharing resources are well understood, as it reduces duplication, creates efficiencies, and increases productivity for each partner. This cross-domain, sharing philosophy is the foundation of the game-changing Internet of Things (IoT), which has already created millions of new capabilities for users around the world.

Despite good intentions, organizations in both the public and private sectors have not positioned themselves to take advantage of the tremendous potential of cross-domain interoperability. More than \$180 billion is spent each year to enable defense and security IT products and services to operate together – a high price tag for a “patch.” Our government acquisition strategies need to change to reflect an interoperable approach, so that each new purchase meets technological requirements, saves time and money, and supports user readiness and performance from day one.

## Costly Re-work and Waste

Government agencies and non-governmental

organizations operate using their own processes, which too often result in negative consequences. Examples of proprietary processes that created the need for product modifications and costly equipment integration are the F-22, F-35 and E-8C Joint STARS platforms. Each system was built by the U.S. Air Force without interoperability in mind. Two of the most advanced fighter aircraft with integrated sensors were not designed to work together. The Joint STARS downlink had to be redesigned to support existing military systems. In each case, if the need for cross-domain interoperability had been built into the process, greater capability would have been achieved and future integration costs eliminated.

The healthcare marketplace offers another example of the lack of cross-domain approaches. When service members move from active to veteran status, their health data requires a completely separate and non-interoperable healthcare IT system. The practice of two separate healthcare systems defies common logic, impacts lives, and is very expensive. Experts estimate that creating greater interoperability could reduce healthcare spending by \$30 billion, a significant offset of rising costs.

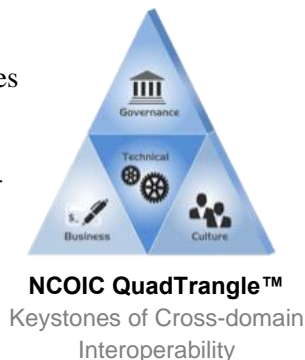
## Interoperability Implementation

Historically, technology has been viewed as the primary enabler of interoperability – and making a technical change is considered the quickest path to achieving an interoperable solution. But as is typically the case, a single technical solution fails completely or falls significantly short of the objective, primarily because it has become obsolete by the time it is implemented. Experience has shown that it is actually non-technical issues that present the biggest hurdles in implementing interoperability.

Of course, technology is foundational in the thought process, but it is not a hard-and-fast fixed requirement -- this is a basic flaw in many current practices. Organizations should be addressing four interrelated keystones to create a cross-domain interoperable environment: *technology, governance, business value and culture*.

When they have been properly included in the planning and programming process, these four keystones enable lasting interoperability. Technology has the greatest number of variables and is the easiest to modify. Culture is the most difficult and least flexible of the keystones – studies in organizational dynamics have shown it takes 10 years to effectively change a culture. Governance and business value vary based on government and market shifts.

Balancing the four keystones ensures successful cross-domain solutions. Neutral processes are also critical -- and are the only way to get rival factions or organizations with non-compatible elements to work together.



### ***NCOIC Expertise and Proven Approach***

The nonprofit Network Centric Operations Industry Consortium (NCOIC) has developed a proven framework and approach for evaluating these challenges and implementing cross-domain interoperability.

Founded in 2004, NCOIC is a global industry and government organization that by law cannot market the products and services of its members -- the only thing NCOIC is allowed to market is the interoperability of products and services.

Thanks to its industry representation, NCOIC has excellent information regarding the defense and security marketplaces. NCOIC experts have served in leadership roles on the U2, Airborne Warning and Control System (AWACS), RC-135V/W Rivet Joint, and other programs. They have similar stories of cost factors that could have been alleviated using interoperability-friendly practices.

NCOIC long ago determined that new integration costs for upgrading platforms were at least 30% of the entire program lifecycle cost. When presented with these findings, Boeing and Lockheed executives thought the numbers appeared low, as did leaders from the U.S. Defense Information Systems and the NATO Military Committee. They know from their experience that failing to include interoperability requirements in the original design

of a system will increase the lifecycle cost. Retrofitting always costs more than when a capability is included in the original manufacturing process -- that is common knowledge in industry and government, but is often considered “part of doing business.”

The NCOIC approach to implementing cross-domain interoperability uses industry and its competitive nature to create checks and balances, ensure impartiality and enhance business value. NCOIC’s process can be embedded in 18 months and organizations can expect returns to lower integration costs across the effected domains up to 30% in two to five years.

### ***Recommendation***

Industry must be incentivized to make interoperable IT products and services -- requiring this in the acquisition system will provide the necessary encouragement. Using the neutral and impartial NCOIC approach that crosses agencies and markets, government cannot only incentivize businesses, but improve their profitability. Dealing with challenges in government and agency cultures will be harder. But given the new administration’s goal of business value and government efficiency, the NCOIC team looks forward to success.

Cross-domain interoperability -- the seamless flow of trusted information between systems to where it’s needed most -- is NCOIC’s sole focus. We believe we now have a rare opportunity to ensure that interoperability is mandated in government acquisition and operations, resulting in significant savings of time, money and lives. NCOIC has proven methods of achieving interoperability efficiencies and would be pleased to help with this opportunity at a critical time in our nation’s history.

**For Information, Contact:  
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# Background Information

NCOIC FACT SHEET

## Contributor Profiles



### ***Gen. (Ret) Harald Kujat***

*Chairman, NCOIC Advisory Council  
Former Chief of Staff, German Armed Forces  
Former Chairman, NATO Military Committee*

Gen. Harald Kujat currently serves as Chairman of the Advisory Council of the Network Centric Operations Industry Consortium and works with international leaders from the private and public sectors to address complex interoperability issues that affect global interdependence.

Gen. Kujat retired from active service in the German Air Force in June 2005 after having served as Chief of Defence of Germany from 2000 to 2002 and as Chairman of the NATO Military Committee from 2002 to 2005.

As chairman of the senior military authority of NATO, which is composed of the Chiefs of Defence of its 26 member-countries, Gen. Kujat led the military transformation of NATO, managed the development of new strategic concepts and plans, provided guidance to NATO's Strategic Commanders, and advised the North Atlantic Council of ministers and heads of states and governments. He chaired meetings of the Chiefs of Staffs of the Euro-Atlantic Partnership Council of 46 countries, the NATO-Russia Military Council, and the NATO-Ukraine Committee.

Gen. Kujat has held a number of high-ranking national and international assignments throughout his distinguished career. He was:

- Director, IFOR Coordination Centre (ICC), Supreme Headquarters Allied Powers Europe (SHAPE); Mons, Belgium, 1996,
- Assistant Director Plans & Policy and Deputy Director, International Military Staff (IMS), NATO Headquarters; Brussels, Belgium, 1996-1998,
- Director, Policy and Advisory Staff, Ministry of Defence; Berlin, Germany, 1998-2002.

Gen. Kujat is an ancien of the German Armed Forces General Staff Academy and an ancien and honorary ancien of the NATO Defence College. He is the author of several books and articles on security policy and military strategy.

Gen. Kujat has been awarded the Commanders's Cross of Merit of the Federal Republic of Germany, the Commanders Cross of the Ordre National de la Legion d'Honneur of the French Republic, the Legion of Merit of the United States of America, the NATO Meritorious Service Medal, and the highest honors and awards of many other nations.





***Lt. Gen. Harry D. Raduege, Jr. (USAF, Ret)***

*Chairman, Deloitte Center for Cyber Innovation  
Senior Advisor and Managing Director, Cyber Risk Services, Deloitte & Touche LLP  
CEO, Network Centric Operations Industry Consortium*

At Deloitte & Touche, Lt. Gen. Harry Raduege works globally with clients across government and industry in reducing risk to their business and mission operations due to cyberattacks and other unauthorized intrusions.

Gen. Raduege retired after serving 35 years in the U.S. military. He worked in the areas of technology, including telecommunications, space, information, and network operations. He served more than 17 years in joint duty assignments and was a four-time Federal activity CIO. In his last position, he led Department of Defense net-centric operations as the Director of the Defense Information Systems Agency. In that role, he directed planning, engineering, and implementation of interoperable communications and intelligence systems, serving the needs of the President, Secretary of Defense, Joint Chiefs of Staff, combatant commanders, and the Military Services. Notably, he led efforts to restore communications to the Pentagon following the 9/11 terrorist attacks, upgraded Presidential communications, and led the successful expansion of the Department's Global Information Grid through a \$1 billion transformational communications program.

Gen. Raduege was also appointed by the Secretary of Defense as Commander of the Joint Task Force for Global Network Operations and Deputy Commander for Global Network Operations and Defense for the U.S. Strategic Command. In these roles, he was the first commander assigned responsibility for directing the operation and defense of the Global Information Grid to assure timely and secure net-centric capabilities across the entire Department. He also served as Manager of the National Communications System and led the nation's efforts to prioritize the restoration of telecommunications throughout New York City and the Pentagon following the 9/11 terrorist attacks.

Prior to these assignments, Raduege directed command and control systems for North American Aerospace Defense Command, U.S. Space Command, and Air Force Space Command. He also served as Chief Information Officer for all three commands, was architect for computer network defense and attack capabilities established within the Department of Defense, and was national spokesman for the Department during the successful Year 2000 computer roll-over efforts.

Gen. Raduege directed command and control communications and was the Chief Information Officer for the U.S. Central Command for three years, which included managing relocation efforts required after the terrorist bombing of Khobar Towers in the Kingdom of Saudi Arabia. Earlier, he served as the first commander of the Air Force C4 Agency and was the Joint Chiefs of Staff architect for all satellite communications supporting more than 500,000 deployed military members during the Gulf War in 1991. He was inducted into the U.S. Air Force Cyberspace Hall of Fame in May 2011 and received the Lifetime Achievement Award in Cybersecurity from The America's Future Series in 2014.

Gen. Raduege serves as Chief Executive Officer of the Network Centric Operations Industry Consortium, an international not-for-profit organization with more than 50 members and advisors in 12 countries who represent businesses, government agencies and organizations that work together to advance global, cross-domain interoperability.



***Thomas A. Cellucci PhD, MBA***

*Chairman and CEO, Bravatek Solutions, Inc.  
Member, NCOIC Board of Directors*

Dr. Thomas Cellucci is an accomplished serial entrepreneur, seasoned senior executive and board member who possesses extensive corporate and venture capital experience across a number of worldwide industries.

Dr. Cellucci served as the first Chief Commercialization Officer at the U.S. Department of Homeland Security and the White House, working directly for Presidents George W. Bush and Barack Obama. While there, he expanded the role of public-private partnerships within government and increased opportunities for cooperative research and development activities. He was responsible for initiatives that identified evaluated and commercialized technology with the goal of rapidly developing and deploying products and services that meet the specific operational requirements of DHS operating components, first responders and critical infrastructure/key resources owners and operators.

Dr. Cellucci's outreach with both the private and public sectors to establish and foster mutually-beneficial working relationships that facilitate cost-effective and efficient product, service and technology development efforts was viewed as a goal for all federal agencies. At DHS, he published eight books on the development of operational requirements and innovative public-private partnerships as well as articles and other resources that facilitate communication both across government and between the public and private sectors.

Dr. Cellucci also served as Director of the Office of Public-Private Partnerships and was responsible for the effective integration of the Long Range Broad Agency Announcement procurement process, Office of SAFETY Act Implementation, Small Business Innovation Research Office, and Commercialization Office. In addition, he was asked to serve as the Director of the Research & Development Partnerships Group to integrate and leverage the more than \$9 billion in DHS assets and the expertise of 1,400 team members through the group's investments in national labs, universities, international partners, special programs and the private sector and government interagency partners to deliver solutions for the Homeland Security Enterprise.

Dr. Cellucci has authored or co-authored more than 24 books and 192 articles on requirements development, commercialization, nanotechnology, laser physics, photonics, environmental disturbance control, MEMS test and measurement, and mistake-proofing processes. He co-authored ANSI Standard Z136.5 "The Safe Use of Lasers in Educational Institutions." He was a pioneer in advancing the field of nanotechnology in American science, engineering and manufacturing and instrumental in progressing the nanotechnology agenda through his bi-partisan work with Presidents Bill Clinton and George W. Bush and many leaders in the U.S. Senate. His contributions made possible the National Nanotechnology Initiative signed by President Bush in 2004 that added over \$3.9 billion to the federal budget specific to advancing nanotechnology. He was also active in discovering and fostering strategic partnerships that brought nanotechnology into a wide array of consumer products.

In 1999, he founded the successful management-consulting firm, Cellucci Associates, Inc., and profitably growing firms has become his trademark. In addition, he regularly interacts with high-ranking members of the U.S. government and serves as keynote speaker at both business and technical events around the world. Dr. Cellucci is the first-ever U.S. Federal Government representative to the Council on Competitiveness, a prestigious group of thought leaders in business and academia focused on ensuring America's global competitiveness in technology, innovation, education and industry. He has also held the rank of Professor or Lecturer at institutions like Princeton University, University of Pennsylvania and Camden Community College.

Dr. Cellucci earned a PhD in Physical Chemistry from the University of Pennsylvania (1984), an MBA from Rutgers University (1991), and a BS in Chemistry from Fordham University (1980).





***Dr. Douglas E. Rosendale, DO, FACOS, FACS***

*CEO, CAIRN-corporation LLC  
Member, NCOIC Board of Directors*

Dr. Doug Rosendale recently transitioned from federal service with the Department of Veterans Affairs to become a clinical informatics entrepreneur. His new start-up venture, CAIRN-corporation LLC, is focused on healthcare transformation, leveraging health information technology for new models of care, and striving for a healthy-living ecosystem.

As a physician and trained informatics specialist, Dr. Rosendale provides enterprise architecture services with a focus on clinical informatics. His consulting supports Fortune 500 firms as well as small innovative companies entering the health IT marketplace. He works to leverage mobile technology, analytics, telehealth, remote/virtual health, predictive modeling and higher levels of computational science, so a smarter and healthier world can be attained. He promotes standards to achieve interoperability and believes innovation and economic drivers should not be constrained by proprietary closed systems.

Dr. Rosendale has experience working in many levels of the Federal government, including the White House, Department of Defense, National Institute of Standards and Technology, Department of Homeland Security, Department of Health and Human Services, and other agencies. He is familiar with the political, operational and policy dynamics of this complicated domain and also has experience with private health organizations.

Most recently, Dr. Rosendale was Senior Physician Advisor (Clinical Informatics) for the Veterans Health Administration's Office of Health Information. He was a member of the affiliate faculty for the Harvard Decision Systems Group Informatics program and is now on the affiliate faculty at the University of California San Diego Medical Informatics program. He also co-chaired the intra-governmental Health IT Innovation / Interoperability Development Environments (HITIDE) sub-group for health IT innovation test-beds, under the White House Office of Science and Technology and Policy and the National Coordination Office for networking IT research and development. He was part of the VA/DoD senior coordination group that established the Interagency Program Office. He also co-established and directed the Clinical Informatics and Requirements Division, focused on the interagency electronic health records and the Virtual Lifetime Electronic Record. His efforts were focused on better Health Information Exchange models between the VA (with over 200 hospitals and thousands of outpatient clinics) and its private sector partners, as well as developing a platform for fully integrated electronic health records.

Dr. Rosendale's health IT background spans many aspects of quality, performance and outcomes reporting, including being a member of the Surgical Quality Alliance, the Ambulatory Quality Alliance, and the Secretary of Health and Human Services Value Exchanges program. He is currently Executive Director of the Western Slope Study Group, focused on patient-reported quality health outcome measurement. He was on the executive board for the original VA National Surgical Quality Improvement Program. In addition, he was on the Technical Expert Panel for Clinical Decision Support, overseeing the Agency for Health Research and Quality pilot programs at Harvard and Yale Universities.

Dr. Rosendale was the Chair of the Surgery Discipline and on the Board of Governors for the American College of Osteopathic Surgeons. He was the Chief of Surgery for the Grand Junction VA Medical Center. He is a Fellow of the American College of Osteopathic Surgeons and the American College of Surgeons.

Dr. Rosendale has been widely published in national journals and presented on clinical informatics topics at numerous national venues.