Interoperability:
Saving Lives and Money

Submitted to: President Donald J. Trump

By Contributors:

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March 6, 2017

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

Dear Mr. President:

More than $180B dollars is spent each year attempting to make defense and security products and services work together more effectively. This equals the defense and security markets for the Department of Defense and the European Union. And this does not take into account costs to make products interoperable in the health and first responder marketplace.

Attacking interoperability issues will save the U.S Government billions of dollars each year. More importantly, the lives saved, not quantifiable, will increase dramatically.

Most organizations and agencies see making a technical change as 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.

What is paramount to address is not only the technical but the governance, business objectives and the culture when diverse organizations are trying to collaborate. In this paper, we provide several examples of how important it is to work the culture and other non-technical issues and that making interoperability a requirement up front in the acquisition system will save billions of dollars and lives.

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 and we are all members of the Network Centric Operations Industry Consortium, a global non-profit industry and customer organization with a sole charter to foster interoperability of products and services.

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.

We would like to work with you on making interoperability a requirement in the acquisition system and to help you in providing focus to government agencies and incentivizing industry to achieve widespread interoperability so we can save money and lives.

Sincerely,

Chief Executive Officer
Interoperability: Saving Lives and Money

Introduction
Over $180 billion is spent each year to enable defense and security products/services to operate together. Each year, our military, government and private industry spend billions and billions of dollars on systems with high technology, but more than 30% of the money goes to integrating systems ensuring data is shared. These unnecessary expenditures waste time, delay action, and have negative effects on key sectors such as defense, security, healthcare and on our society, as a whole. 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. 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.

This cross-domain 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 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 products and services to operate together – a high price tag for a “patch.”

The NCOIC is designed to work on interoperability tools and processes. The global members and the Advisory Council (customer base) represent the following 2014 markets—$600B per year: Aerospace & Defense, Transportation, Security, NATO and Australian Defense.

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.

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 cross-domain interoperability had been built into the process, greater capability would have been achieved and future integration costs eliminated.

Interoperability as an Upfront Requirement
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 creating a cross-domain interoperable capability included in the original manufacturing process -- common knowledge in industry and government, but is often considered “part of doing business.”

Healthcare Marketplace
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. It is also recognized that interoperable information systems can unlock the power of artificial intelligence and cognitive medical approaches to more effective and efficient treatment modalities as well as achieving a “Value” based, vs. “Volume” based healthcare industry.

**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 a single technical solution is never practical -- 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.

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**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.

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.

**Recommendation**

We believe that 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.

Industry must be incentivized to make interoperable products and services -- requiring this in the acquisition system will provide the necessary encouragement.

NCOIC’s impartial 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.

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.

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.

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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 Commander’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.
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 Chairman of the Deloitte Center for Cyber Innovation; as a Senior Advisor and Managing Director of Deloitte Advisory, Cyber Risk Services, Deloitte & Touche LLP; as a Senior Counselor of The Cohen Group; and 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.
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.
Background Information

NCOIC Fact Sheet

NCOIC Value Paper

Interoperability Verification in NATO Acquisition Processes
NCOIC Products and Services
Reflect All Aspects of Interoperability

Proven Toolkit for Building Interoperable Systems Across Multiple Marketplaces
- Open tools, processes, frameworks and other technical resources valued at $100 million
- Helps developers explore customer needs, propose re-usable designs and test effectively
- Can result in lower costs, faster implementation, increased capability and reduced risk

Interoperability Contract Services
- Voice of Industry Reviews: unique business and academic perspectives from NCOIC members – their
  comments on a proposed solution can be pivotal to product neutrality
- Interoperability Roadmaps: implementation plans detailing the path from the current to the future environment, including both
  technical and non-technical considerations
- Acquisition Strategy: framework and guidelines to ensure systems being purchased can be successfully implemented, have a long
  lifecycle, and enable the organization to buy and add capability without being delayed by technology, regulations or other factors
- Online Test and Evaluation: validate interoperability concepts and capabilities in a safe environment

MERLIN Interoperability Environment for Demonstration, Testing and Evaluation
- Development and implementation environment that enables government agencies and other NCOIC customers to take a proven
  and governed approach to creating an unclassified but secure trust federation
- Customer can utilize a persistent cloud-based infrastructure to implement applications, verify interoperability, conduct exercises,
  evaluate potential solutions and create a lasting capability for ongoing operations or special needs
- Includes a process that creates the customer's unique governance documentation, establishes an IT infrastructure, verifies
  interoperability needs that enable application integration, and produces an exercise environment to provide reports for validation
- Has benefit for a range of markets, domains and needs, such as disaster response, humanitarian assistance, health care, security,
  defense, financial services and utilities
- MERLIN events give large and small companies a platform of federated clouds where they can demonstrate the interoperability
  of their products, services and concepts

Interoperability Verification
- Process designed for the acquisition cycle to evaluate and certify the interoperability of products and services offered to large and complex organizations
- Identifies the minimum interoperability threshold, how well a technology meets organizational requirements, and whether it can be implemented and used effectively
- Enables products and services to “plug and play” within an organization's networking environment
- Examines evidence of technical interoperability based on the normal testing vendors use to build products and services and system-of-system solutions
- Helps in quickly moving products and services from integration to implementation
- Offers customers increased flexibility and capability while reducing costs and acquisition risk
- Gives vendors access to more markets and enables them to offer capabilities without increasing the customer's overhead, thereby
  enhancing their own value

NCOIC does what other organizations can't, thanks to its robust legal environment, proven products and services, experience in implementing net-centric operations, and valuable input from experts in a range of industries and disciplines.

Join NCOIC today!

www.ncoic.org
NCOIC is an international, nonprofit consortium that develops concepts, tools and processes for building interoperable systems across markets, industries and national borders.

The consortium offers an open, legal environment that enables government and business to work together without conflict of interest as they address challenging global interoperability issues. NCOIC is also unique because it has a proven approach that includes all aspects of cross-domain interoperability: the technical foundation as well as cultural, regulatory and financial considerations. This approach reduces time to market for products and services, giving customers new capability more quickly.

An organization can become a member of NCOIC and test new ideas and solutions in a neutral environment as well as interact with global leaders, experts and decision-makers. Regular demonstration events enable NCOIC members to integrate their products and services into an interoperable environment, using concepts and frameworks proven to significantly reduce engineering integration time and cost. In addition, organizations can contract directly with NCOIC for interoperability services.

NCOIC Members and Customers Tackle Tough Interoperability Issues
- Advisory Council of international leaders provides insight on interoperability issues, needs and procurement trends in their countries
- Members collaborate across domains and nations to take on issues and concepts as well as develop technical tools and processes
- Interoperability projects, evaluations and demonstrations assess the capability of products and services and give government agencies access to cross-industry ideas
- Federal Aviation Administration, NATO Communications and Information Agency, National Geospatial-Intelligence Agency, Australian Dept. of Defence and others have improved operations based on NCOIC expertise

NCOIC is Vendor-neutral and Maintains a Legal, Non-competitive Environment
- Enables true dialog without compromising national or organizational interests
- Complies with the National Cooperative Research and Production Act (NCRPA) that allows potential competitors to share information and ideas
- Meets U.S. Office of Management and Budget (OMB) A119 directive
- Activities based on open standards and commercial off-the-shelf products, with no barriers to international participation

NCOIC Benefits Governments, Organizations and Businesses of All Sizes
- Interact with senior executives, technical innovators and thought-leaders from government, military and industry
- Get exposure to new ideas, trends, products and services from companies of all sizes
- Identify new market and sales opportunities in the public and private sectors
- Work with potential customers, partners and suppliers
- Validate concepts and capabilities in a legal non-competitive environment
- Participate in demonstrations, evaluations, projects and technical teams

The world's recognized and sought-after thought leader, catalyst and partner for effective network centric operations and interoperability
NCOIC VALUE

The cornerstones of the Network Centric Operations Industry Consortium’s value to its members and customers are:

- The participation of, and access to, government and industry leaders
- A legal and neutral environment that follows OMB A119 philosophy and directives
- Its unique focus on the implementation of interoperability, which includes an industry review
- Its intellectual capital: proven products and services that enable interoperable systems, with the ability to get on contract quickly.

Expertise and Uniqueness

NCOIC Advisory Council
The international Advisory Council consists of senior government leaders and strategists with expertise in cross-domain interoperability. Members of the Advisory Council provide insight on interoperability issues, specific needs and procurement trends. They enhance the consortium’s knowledge of customer requirements, provide access to key thought leaders, and create reach into the NCO community. The NCOIC Advisory Council is unique among consortia for the breadth and depth of its membership. This team of senior government officials represents the United States, Canada, Europe, Australia and NATO.

Legal Environment
NCOIC offers a legal and informal venue where members and government customers can overcome many of the business, political and national barriers that inhibit collaboration. To provide a framework for this global collaboration, NCOIC uses a set of carefully crafted processes and procedures that meet the intent of the U.S. Office of Management and Budget (OMB) A119 directive. OMB A119 allows and directs U.S. agencies to solicit industry comments about the development and use of standards.

NCOIC was formed in accordance with the National Cooperative Research and Production Act. Through the years, the consortium has remained in compliance and each quarter fulfills the rigorous filing and reporting requirements. This gives NCOIC a unique organizational standing in the research and development arena.

NCOIC’s neutral working environment enables an open and ongoing dialog without conflict-of-interest and ITAR issues. Its allows technical and business teams to discuss and explore interoperability concepts and approaches as well as develop technical tools and processes for use within different markets and domains. By creating and fostering an open environment, NCOIC helps its members and customers share knowledge and address challenges so that, individually and collectively, they can operate more effectively.

Implementation Philosophy
The NCOIC QuadTriangle™ underscores the consortium’s philosophy to developing and implementing successful interoperable systems. NCOIC experts understand the technical issues involved in implementing interoperable systems — and they are experienced in identifying and addressing the non-technical factors that must also be considered: business value, governance and culture.

Collectively, the applicable laws, regulations, industry practices, organizational culture, objectives, budgets and resources have a far greater impact than the technology in creating and
maintaining a trusted and reliable environment. This unique implementation philosophy is reflected in NCOIC products and services.

**Voice of Industry Review**
With each project, NCOIC provides a Voice of Industry review that enables all consortium members to comment on the contract deliverable. These comments are integrated into a document that is presented along with the final report. The review allows the customer to view all industry inputs — positive and negative — regarding the proposed solution. These candid reviews, which can be pivotal to product neutrality, are not utilized by any other for-profit or non-profit organization.

**Products and Services**

**Technical Resources**
NCOIC offers a broad range of technical products that are publically available for use by business, government and non-governmental organizations. Valued conservatively at more than $100 million, these cross-domain interoperability resources help developers explore customer needs, propose reusable designs and test them more effectively. This results in lower engineering costs, quicker program implementation, increased capability and reduced risk.

The NCOIC Technical Council, its Work Groups and Integrated Product Teams develop the consortium’s resources — including tools, processes, procedures, frameworks, patterns and other technical artifacts — and revise them to stay up to date.

**Interoperability Services**
NCOIC offers a growing range of services to assist its customers in meeting their goals for interoperability. These include:

- An online interoperability incubation and test environment for use in demonstrating and proving technical concepts and solutions, known as the Rapid Response Incubator
- An Interoperability Implementation Evaluation of the “technical capability” and “implementation complexity” of a proposed system, resulting in an overall interoperability valuation that customers can use in their decision making
- The development of an implementation plan or interoperability roadmap that details the pathway from the current (as-is) to the future (to-be) environment and includes both technical and non-technical considerations
- The development of an acquisition strategy that ensures systems being purchased can be successfully implemented and will have a long lifecycle — so the organization can buy a capability and add capability, without it being dead-ended by technology, regulations or other factors
- The development, management and evaluation of Requests for Proposals for interoperable systems and products
- Concept development analyses or position papers that describe the capabilities interoperability can achieve, along with a description of interoperability tools
- Education contracts to provide training and assistance with implementing and using the consortium’s processes, frameworks and tools.
Markets & Customers

Expanding Market Focus
The consortium initially focused on the interoperability needs of the Department of Defense. Over the past few years, interest has expanded to include the interoperability needs of the international defense community, healthcare, crisis response, and first responder communities of interest.

The consortium has achieved a unique presence as there have been, and continue to be, barriers to competitors seeking market entry. NCOIC’s achievements — its 12-year experience in a not-for-profit environment, remaining ITAR free and maintaining independent neutrality (OMB A119) — are noteworthy and position the consortium for future success.

Customers
NCOIC is a catalyst for its customers -- its products and services help improve their technical environments and ability to meet mission and organizational goals. Past customers of NCOIC include the NATO Communication and Information Agency, Federal Aviation Administration, National Geospatial-Intelligence Agency and Royal Australian Air Force.

Operational Strengths

Ethics and Customer Satisfaction
NCOIC adheres to the ethical standards reflected in OMB A119 and other government documents, and it complies with the contracting requirements of customer organizations like NATO. All NCOIC resources and services have been developed for, and used by, its customers -- and the U.S. General Services Administration has conducted performance evaluations based on customer surveys of each of its contract projects and given an “outstanding” rating to the consortium’s product delivery and quality.

Governance and Oversight
NCOIC has carefully crafted and put in place not-for-profit governance policies, procedures and processes designed to maintain its neutrality while addressing all aspects of its operations. This documentation is available to consortium members and customers. The organizational design was also developed to help ensure neutrality and ethical behavior.

NCOIC Leaders and Experts
The NOCIC Board of Directors, comprised of respected leaders from industry and academia, provides strategic direction and guidance on operational and financial activities for the consortium. Daily operations are managed by an Executive Staff of technical and business experts. These individuals reflect a diverse range of background and experience in military, government and industry environments. The consortium has prepared detailed job descriptions and hired qualified individuals to perform the range of responsibilities required to maintain and grow the organization. In addition, for any project, NCOIC can draw from the personnel of its members and affiliates to create a team of scientists, engineers, technical and other appropriate personnel, all under the direction of the consortium’s Executive Staff.

Fiscal Responsibility
Since its founding in 2004, NCOIC has a track record of financial responsibility. The non-for-profit consortium generates revenue through membership dues and contract activities. It makes no capital investment and must maintain a positive cash balance. As a virtual organization, NCOIC keeps
overhead to a minimum by contracting for facilities and resources as needed for each project. Its policies and its accounting firm require that two executives are involved in all financial transactions.

NCOIC board members, advisors and key customers are involved in the development of business plans and contract processes to help ensure they are fair, balanced and open. In addition, contract development is extremely fast so NCOIC can get to the needed work of demonstrating concepts, developing acquisition strategies and performing product evaluation.
Interoperability Verification in NATO Acquisition Processes

Col. Tip Slater (Ret)
NCOIC Chief Financial Officer

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Once Upon a Time…

No, it’s not a fairy tale

Requirement for success…
NCOIC Vision

The world’s recognized and sought after thought leader, catalyst and partner for effective network-centric operations and interoperability
Interoperability Vision

• Products and services rapidly integrated
• Capabilities multiplied by interrelationships
• NGOs, nations and industry all able to participate
• Increased market opportunity
NCOIC & Interoperability Verification

• NCIA requested NCOIC look at a verification process to
  • Enable products and services to plug and play
  • Move products and services to an implementation phase versus an integration phase
  • Provide the NATO agencies and nations more flexibility and capability
  • Impact the acquisition cycle

• Guidelines
  • Provide a framework for greater industry involvement
  • Shift technical definitions from NATO to industry
  • Use industry as market indicators for technology growth and direction
Starts with Interoperability Minimums

- NCIA (NATO) / NCOIC
  - Defining environment
  - Defining the minimums
- Achieving Interoperability
  - Culture
  - Governance
  - Business Value
  - Technology
- NATO / NCIA / Industry
  - Adding capabilities
- Approach: Keep it Simple
  - Know your environment
  - Achieve your minimums
  - Add capability

Defining Interoperability

Identifying the Minimums

Creating the Capabilities

Implementation Approach
Culture

- Cultural practices have the greatest influence and are hardest to change
- NATO / NCIA builds process to handle cross-culture issues

Objectives:
- Reduce Risk
- Accelerate Schedule
- Lower Cost

Move assessment up front vs post purchase

Accelerating Procurement, Implementation and Validation
Governance

- Technology change must fit within the laws, treaties and regulations
- Standards and policies of the affected domains and nations must be addressed
- Governance documents exist
Business Value

**Industry Goals**
- Lock in customers
- Fewer competitors

**Customer Goals**
- Get new products
- More competitors
Business Value

• Producers Create Interoperability Walls
  • Locks in customers
  • New products requires integration €’s
  • Cost to upgrade cheaper within product family

• Creates Integration Costs
  • 30% of lifecycle
  • Defense and security
  • $180 billion (2011 Study)
Business Value

• Time and money
• Integration cost

Typical market activity for last 50 years

Example: U2 Platform
- Capability $-
- Integration $-
$180 Billion

Market Requiring Interoperability is not Unique
More Revenue in Upgrade Lifecycle than in Initial Program
Other Examples

• JTRS (failed)
  • Bite off more than you can chew
  • Mixed technologies - wave form and network
  • Different technology paces
  • Ignored market

• ADA (failed)
  • No market value
  • Government unique

• Internet (success)
  • Driven by market dynamics
  • Market driven standards

• WiFi (success)
  • Industry working together common set
  • Market driven standards
Business Value

• Cross-domain Opportunity
  • Shift €€ from integration to capability
  • Capability = products and services
  • Increases customers and industries
  • Increases market access

“Plug and Play” Products and Services in a Global Market
Provide Far More Sales Opportunities
Technical

• NATO agencies have covered
  • Governance
  • Culture

• Business value
  • Exists but require interoperability walls to be diminished

• Technical needs a new focus
  • The Interoperability Verification is an open ended conversation
Technical

• Initial verification process
  • Basic MLI (Minimum Level of Interoperability)
• Future expanded levels covered
Technical

NATO functionality Requirements: Architecture Building Blocks

**Industry**
- Components & Services

**NISP**
- Interoperability Standards & Profiles

**NATO**
- FMN Implementation

NATO / NCIA IV Value Assessment

**NCOIC**
- Interoperability Verification Results

**NCIA**

Marketplace Expanded with More Qualified Vendors
Acquisition Risk Reduced with NCOIC IV Process and Certificate
Technical

- Initial verification effort will look at product development process

V-model of the systems engineering process.\[^{1}\]

Taking advantage of what is already being done

1. Clarus Concept of Operations, Publication No. FHWA-JPO-05-072, Federal Highway Administration (FHWA), 2005
Requirement for Success

Roadmap
Acquisition Strategy
Test and Evaluate

NCOIC QuadTriangle™
Cross-Domain Interoperability Dimensions
Summary

• IV a verification process that determines interoperability risk
• Establishing an environment where industry leads the effort
• Create a positive environment for
  • Customers
  • Industry
  • All others
NCOIC Executive Operations Committee

Executive Operations Committee

- Harry Radeuge: Chief Executive Officer
- Tip Slater: Chief Financial Officer
- Pat Ryan: Chief Technical Officer
- Karen Mowrey: Treasurer
- Carl Schwab: Executive Director
- John Fairfield: Secretary

Contracts

- Tip Slater: Chief Financial Officer
- Pat Ryan: Chief Technical Officer
- Carl Schwab: Executive Director
NCOIC IV Activities

Contracts

Tip Slater  
Chief Financial Officer

Pat Ryan  
Chief Technical Officer

Carl Schwab  
Executive Director

Charter  
Governance
BOD  
Advisory Committee
MOA

Interoperability Verified

Technical Director

Ed Barger

Mark Bowler  
IV Tech Team Lead

Kenneth Cureton  
Tech Council Chair

Membership  
Technical Process
Development
Advisory Council: Interim
June 2016

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- Dr. Paul Kaminski, Advisory Council Chair Emeritus and former Undersecretary of Defense for Acquisition, Technology and Logistics, United States
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