Interoperability Verification

The Need for Interoperability Verification

In 2015, the general manager of the NATO Communications and Information Agency requested that the Network Centric Operations Industry Consortium (NCOIC) provide recommendations for improving the interoperability of systems before they are acquired and used in the Federated Mission Networking (FMN) initiative. The Allied Command Transformation (ACT), in its role as the NATO requirements organization, also began requesting pre-acquisition interoperability evaluation in 2016.

As a result, NCOIC recommended an information-exchange and knowledge-sharing process that would quickly and easily identify barriers to interoperability required to meet evolving operational needs as well as a methodology to quickly visualize those barriers in order to reveal "what is blocking forward progress." This process also provides and shares guidance for items needing improvement in order to meet operational requirements and identifies risks if defined guidance is not followed. It is well known that interoperability issues in federated systems are typically getting worse with time, not better!

The recommended Interoperability Verification (IV) process recognizes that following industry standards and NATO STANdardization AGreements (STANAGs) is absolutely necessary. However, such standards evolve far slower than operational needs, so meeting standards is often not sufficient in meeting rapidly-evolving operational needs. Consequently, operations typically employ ad hoc activities in overcoming crippling interoperability problems that invariably occur.

The NCOIC IV process improves this issue through information exchange and knowledge sharing that:
1. Identifies Key Interoperability Barriers that must be resolved in order to achieve a minimum level of interoperability -- things blocking systems from successfully integrating into the desired environment. Such things are typically "pain points" regarding governance, culture, business and technical issues. The IV process also identifies Key Interoperability Enablers that could be leveraged for further improvement.
2. Provides an industry-neutral method to assess the existing interoperability properties or qualities of products, services and networks in systems for operational use. This method is publicly available and can be used by industry, any nation or the NATO enterprise.
3. Compares those interoperability properties to the characteristics required to successfully integrate any product, service or network into the environment supporting a particular operational activity or community of interest (e.g. military missions, first responders or health providers). The IV process does not test the universal interoperability of products, services or networks; it exchanges and shares knowledge on what has been tested and experienced.
4. Enables procuring agencies (e.g. NATO enterprise or nations) during vendor bid evaluations to reduce the risk of acquiring products and/or services that cost less to acquire but more to integrate and use.

5. Enables system integrators for FMN or national systems to assess the risk of integrating a new element into their networks or systems, and thus greatly speed up the integration process.
6. Provides a common basis and a neutral forum for feedback to industry regarding interoperability issues.
7. Enables a provider of a product, service or network to assess the opportunity for addressing a particular market; the assessment can be re-applied until the product, service or network changes significantly through new versions, major updates, etc.

NCOIC recommends that NATO use the IV process in acquisitions, in FMN groups during capability planning and integration, and in providing feedback from operational users regarding interoperability effectiveness. NCOIC also recommends a pilot program to demonstrate value of the IV process and how quickly the process can be used by NATO, nations and global industry.

Why is Interoperability So Hard to Achieve?

As the NCOIC QuadTrangle™ illustrates, the solution to an interoperability problem is usually more than technical and includes culture, since different cultures are often the biggest barrier in working together. Interoperability solutions must also fit within laws and policies and must make business sense for both the customer and provider.

NCOIC QuadTrangle™
Cross-Domain Interoperability Keystones

Frankly, governance, culture and business issues in federated networks may be more significant in creating interoperability obstacles than technology. Therefore, the emphasis should be on net-enablement of the entire ecosystem cross-domain solution, not just the product/service technologies employed in individual networks and specific mission operations.

Even from a technical perspective, specification of industry and government standards is necessary for vendors in developing hardware and software products and services, but too often not sufficient to guarantee interoperability across dissimilar vendor products and services. Almost all standards can be "interpreted" and implemented in slightly different ways. Therefore, industry needs further guidance on how to implement standards in order to increase interoperability across vendor product lines and among different vendors.

Interoperability issues often result in vendor products/services that are lowest-cost to procure but more expensive to integrate in terms of integration and testing time and effort.

NCOIC has developed patterns, frameworks and tools to measure and improve interoperability since 2004. NCOIC introduced the IV process for developing interoperability guidance for vendors and to generate vendor interoperability risk assessments.

Who Benefits from Interoperability Verification?

Benefits to **ACQUISITION**
- Acquirers can use industry-neutral IV assessments in vendor bid evaluations
- Nations can perform their own IV assessments to reduce the risk of acquiring products/services that cost less to acquire but more to integrate and use.

Benefits to **INTEGRATORS**
- Gives insight into potential integration risks of using available products/services in order to greatly speed up system integration (e.g. FMN CIAV process).
- Provides a common basis and forum for feedback to industry regarding interoperability issues.

Benefits to **USERS**
- Offers insight into potential interoperability limitations in using integrated products/services.
- Provides a common basis and forum for feedback to acquirers, integrators and industry regarding interoperability issues.

Benefits to **INDUSTRY**
- Businesses can perform their own IV assessments of the interoperability of their products, services and networks using this common, validated process and thus increase sales by demonstrating proof of interoperability across product lines and family-of-systems to promote broader/global market opportunities.
- Offers potential to increase sales by demonstrating interoperability improvements over legacy systems.
- Provides a common basis and forum for feedback from governments regarding interoperability issues.

Summary of IV Process Benefits

A key benefit of the IV process is to reduce risk to governments of procuring products and services with interoperability issues, especially in understanding of Key Interoperability Barriers and Enablers and their usefulness. This process also will speed up systems integration by understanding interoperability risks of procured products/services and help to accelerate field integration by understanding common levels of interoperability for dynamic entry/exit of family of systems/system of systems (FoS/SoS) participants. The IV process will provide business value to industry for wider global sales of products/services with assessed interoperability.

In addition, the IV process provides a common basis and forum for feedback to industry regarding interoperability issues. It provides governments with industry feedback regarding current and future standards, especially for new/emerging technologies. It also provides industry with government feedback regarding future interoperability needs.

NCOIC intends to demonstrate the value of the IV process to the FMN initiative, to nations and to industry. Obviously, the IV process and any proof-of-concept program must perform within legal boundaries and organizational constraints.

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