NCOIC™’s Network Centric Analysis Tool (NCAT™) Overview & Tutorial Demonstration

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Chair – NCA Content WG

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NCOIC-NCAT Overview 20101025
Net-Enabled Future

Stove-piped Systems, Point-to-Point Networks
Vision

Industry working together with our customers to provide a network centric environment where all classes of information systems interoperate by integrating existing and emerging open standards into a common evolving global framework that employs a common set of principles and processes.

Mission

Our mission is to facilitate the global realization of Network Centric Operations. We seek to enable interoperability across the spectrum of joint, interagency, intergovernmental, and multinational industrial and commercial operations. NCOIC is global, with membership open to those who wish to apply the vast potential of network centric technology to the operational challenges faced by our nations and their citizens.
Network Centric Operations Industry Consortium
NCOIC is a Unique Organization

NCOIC exists to facilitate the global realization of Network Centric Operations/Net Enabled Capability. We seek to enable interoperability across joint, interagency, intergovernmental, and multinational industrial and commercial operations.

- Global Organization
- Voice of industry
- Cadre of technical experts
- Dedicated to interoperability
- Advisory Council of senior advisors who help prioritize our work in a non-competitive environment

*In the photo:* BrigGen Dieter Dammjacob (DEU AF)-J3 NATO Supreme Headquarters, Allied Powers Europe; Lt.Col. Danut Tiganus-CIS Directorate, EU Military Staff; Dr. Tom Buckman-NC3A Chief Architect; Gen Harald Kujat,-German AF (Ret.) former Chief of Staff of German Armed Forces & head of NATO Military Committee, Marcel Staicu-European Defense Agency NEC Project Officer.
NCOIC Members

- 80+ Member Organizations including leading IT and Aerospace & Defense companies, government organizations, non-governmental organizations and academic institutions
- Members from 18 Countries
- Advisors from 26 key stakeholders from Australia, EDA, France, Germany, Italy, NATO, The Netherlands, Sweden, UK and US

Technical Council

Working Group collaboration

Executive and Advisory Council joint meeting

Terry Morgan honors outgoing Advisory Council Chair, Keith Hall
Collaboration

- NCOIC facilitates interoperability by collaboration
  - Member organizations & Advisory Council
  - Our member’s customers
  - Agencies of global governments
  - Other NCO stakeholders

- Collaboration occurs through
  - Invited Review of developing documents & architectures
  - Joint demonstrations and white papers
  - Joint and hosted forums, symposia and workshops
  - Joint technical development with stakeholders
  - LOI, LOA, MOU, CRADA and other agreements

NCOIC provides guidance for network centric standards and their patterns of use.
Global Stakeholders

“The Australian Department of Defence is a keen supporter of NCOIC, its principles and tools. We aim to apply NCOIC’s products to our acquisition process to better define interoperability requirements and improve through-life systems integration prospects.” John McGarry, Australian Air Commodore.

"We have used NCOIC’s NCAT tool to assess levels of interoperability during NATO Response Force exercises. Our Centre of Excellence found the tool to be very useful in establishing the level of interoperability." Commander Fred van Ettinger, Section Head of the Multi National Command and Control Centre of Excellence.

“NCOIC has four characteristics which make it unique. The organization is solely dedicated to network-centric operations and interoperability; its membership stimulates discussions about global interoperability; it serves as a ‘vendor neutral’ forum, and it has a cadre of industry’s top technical experts who are available to do its work.” Jack Zavin, U.S. Office of the Assistant Secretary of Defense, Networks and Information Integration.
**Relationships**

- **Government**
  - Australia Defence Organization (ADO)
  - Eurocontrol
  - European Defence Agency
  - NATO
    - ACT
    - NC3A
    - NCSA
  - Netherlands Command & Control Centre of Excellence
  - Sweden Civil Aviation Authority (LFV)
  - Sweden Defence Materiel Administration (FMV)
  - US Defense Information Systems Agency (DISA)
  - US Department of Homeland Security (DHS)
  - US Federal Aviation Administration (FAA)
  - US Joint Forces Command (JFCOM)
  - US NAVAIR
  - US SPAWAR
  - OSD(NII)

- **Organizational**
  - Australia Defence Information & Electronic Systems Association (ADIESA)
  - NATO Industry Advisory Group (NIAG)
  - OASIS
  - World Wide Consortium for the Grid (W2COG)

*2008 IDGA Award: Outstanding Contribution to the Advancement of Network Centric Warfare*
NCOIC Key Deliverables
Addressing Inter-Agency, Cross-Industry NCO Gaps

- **Systems, Capabilities, Operations, Programs, & Enterprises (SCOPE) Model**
  - Characterization of commercial, civil, and government requirements for interoperable systems

- **NCOIC Interoperability Framework™ (NIF) and Net Centric Patterns**
  - Recommendations for open standards and their patterns of use to obtain interoperable systems

- **Building Blocks**
  - Catalog of COTS & GOTS open standards based products compliant with NIF recommendations

- **Network Centric Analysis Tool™ (NCAT)**
  - Netcentric analysis of system architectures, including System-of-Systems and Federation of Systems architectures

- **NCOIC Lexicon**
  - A glossary of terms and definitions that lay the foundation for meaningful discussions. Provides a common language for the disparity of ideas concerning key terms, including "NCO."

- **Systems Engineering best practices and processes**
  - These best practices and processes include tools, process and maturity models, modeling techniques, and collaborative environments for NCOIC integration.

These products, combined with NCOIC member expertise in NCO/NEC, measure netcentric capabilities, requirements, gaps and provide recommendations for interoperability.
Sustained Effort to Make NCOIC Products Part of Procurement Process

**Overarching Goal:** NCOIC deliverables are adopted, utilized and required by customer agencies

<table>
<thead>
<tr>
<th>Advise</th>
<th>Participate</th>
<th>Adopt</th>
<th>Require</th>
</tr>
</thead>
</table>

- **All Advisory Council Members**
  - NATO
    - C3 IPT
    - NCA FT
  - DISA (US)
    - CRADA
    - OSWG
    - NCAT
  - OSD-NII (US)
    - NCAT
    - OSWG
    - Cybersecurity
  - FAA/JPDO (US)
    - Aviation IPT
    - Net-Centric Attributes
    - (NextGen/NEO)
    - Net-Centric Attributes

- **US Defense Science Board**
  - USAF SPACECOM
  - NCAT
  - FAA/Eurocontrol
    - SCOPE/NCAT/Patterns
  - FAA OTA
  - US DoD
    - Net-Centric Attributes
  - Australian DoD
    - SCOPE/NCAT
    - Patterns/BBs

NCOIC is Pursuing Plans to Further Increase Influence in Future Procurements
NCOIC Terms

• Network-Centric:
  – Related to systems and patterns of behavior that are influenced significantly or enabled by current and emergent networks and network technologies. Often these center around IP-based internetworking, but the term is sometimes used to include any type of enabling network.

• Network-Centric Operations (NCO):
  – An information superiority-enabled concept of operations that generates increased combat power by networking sensors, decision makers, and shooters to achieve shared awareness, increased speed of command, higher tempo of operations, greater lethality, increased survivability and a greater degree of self-synchronization.

Net-Centricity Requires Interoperability
NCOIC & Interoperability

• **(DOD/NATO)** The ability of systems, units, or forces to provide services to, and accept services from other systems, units, or forces and to use the services so exchanged to enable them to operate effectively together. (Joint Pub 1-02)

• **(DOD only)** The condition achieved among communications-electronics systems or items of communications-electronics equipment when information or services can be exchanged directly and satisfactorily between them and/or their users. The degree of interoperability should be defined when referring to specific cases. (Joint Pub 1-02)

• **(NATO)** The ability to operate in synergy in the execution of assigned tasks. (AAP-6 [2005])

• **(IEEE)** … the ability of two or more systems or components to exchange information and to **use the information that has been exchanged**

• **(Wikipedia)** Interoperability is connecting people, data and diverse systems. The term can be defined in a technical way or in a broad way, taking into account social, political and organizational factors.
NCOIC Assists Customers in obtaining interoperable solutions

CUSTOMER GOALS → MISSIONS TO ACHIEVE GOALS → MISSION NEEDS → SOLUTIONS TO NEEDS (EXISTING AND FUTURE) → RESULTING CAPABILITIES & SERVICES

NCO Initiatives Database

SCOPE Model

NCOIC Interoperability Framework (NIF™)

The Network Centric Analysis Tool (NCAT™) provides an assessment of reaching interoperability goals

Typical Process Steps to Solutions:
1. Analysis of Alternatives
2. Requirements Derivation
3. Requirements Validation
4. Design Synthesis
5. DESIGN VERIFICATION
6. Deployment
7. Support
8. Upgrade or Disposal

Supports Layered Quality of Service

Network Centric Analysis Tool (NCAT™)

Building Blocks (BB)

Test & Evaluation of solutions & results
Network Centric Analysis Tool (NCAT™)
• The NCAT is an assessment tool to...
  – Provide a metric based approach to evaluating and measuring a system architecture’s “fitness” for operating in a net centric environment

• NCAT focuses on areas of criteria, categories, compliance, and recommendations
  – Measures how well a target aligns with the areas of compliance
    • Criteria and metrics to measure their “goodness” are identified
  – Criteria can be grouped together into common categories (e.g. Information Assurance)
  – Criteria can be tailored to meet specific needs
Network Centric Analysis Tool [NCAT™]

Purpose

• **NCAT Supports**
  – Assessing compliance with specific architecture guidelines & ref models
  – Selection of appropriate architectures
  – Comparison between similar entities
  – Implementation of SCOPE analyses

• **NCAT Use Cases**
  – Internal Program performs self-assessment
  – Product Evaluation Engineer ranks similar products based on scoring results
  – Project/program Manager monitors progress comparing planned and achieved behaviors
  – Lead Systems Integrator (LSI) verifies Network Centricity compliance
  – Acquisition Authority selects system/products based on assessment results

*Provides confidence that a system can operate in a network centric environment*
Who is using NCAT™?

- Network Centric Operations Industry Consortium (NCOIC™)
  - Net Enabled Emergency Response (NEER) IPT
  - Sense & Respond Logistics (S&RL) IPT
  - Member companies for new business
- Member companies supporting FAA NextGen
- North Atlantic Treaty Organization (NATO)
- USAF Space Command (via Northrop Grumman)
  - Performing 100+ assessments
- Interest being shown by members of the Australian Department of Defence, DISA and FAA
NCAT Highlights

- Questionnaire-based
- Tailorable Q&As by Program
- Collaborative & Web-enabled
- SQL-driven - Supports MS SQL, IBM DB2 and Oracle database servers
- Excel-to-XML data import & export
- Leverages web services for easy integration with third-party reporting applications
- Supports NCOIC SCOPE model

Step 1 – Set Goals/Expectations
Step 2 – Perform Assessment
Step 3 – Perform Analysis
NCAT Terms

- **User attributes** = Roles + Programs
- **Program** (associated with a Survey)
  - Identifies the entity to be assessed
  - Partitions data between programs for privacy
- **Categories**
  - Groups of Questions & Answers
- **Profile** (has a Top Level Category)
  - A tailored set of Questions and Responses grouped by Categories
- **Survey** = Program + (Assess1+Assess2+Assess x)
  - Sets Planned Values
  - Associated with Profile & Program
  - Survey - Aggregation of multiple assessments sharing common Profile for a single program
- **Assessment** = User + Survey
  - Associated with User and Survey
  - Assessment is a single instance – one assessor, one set of questions
- **Reports**
  - Single Assessment or Survey Report with multiple Assessments
  - Compares Planned vs Achieved
  - Export to Excel /other External Analysis Tools
## NCAT User Roles

<table>
<thead>
<tr>
<th>Role</th>
<th>System Administrator</th>
<th>Content Definer</th>
<th>Program Configuration Manager</th>
<th>Assessor</th>
<th>Guest</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Explanation</strong></td>
<td>Has technical skills. Has knowledge about Reports and data to import/export.</td>
<td>Defines database content used for surveys and assessments</td>
<td>Administers programs and the surveys within these programs</td>
<td>Performs assessments for specific programs</td>
<td>May receive some general information about what NCAT does - not clearly specified</td>
</tr>
<tr>
<td><strong>Associated with Program</strong></td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td><strong>NCAT Rights</strong></td>
<td>Can create/edit/delete every NCAT entity such as Users, Programs, Profiles, and Surveys, etc. Can upload or delete Report templates. Can import/export every NCAT entity. Perform assessments. View Reports.</td>
<td>Create/modify/delete Classifications, Questions and Answers. C/m/d Programs and Surveys. Upload or delete Report templates. Perform assessments. View Reports.</td>
<td>Modify/delete ONLY Programs, where the user is assigned with this Role to. Modify/delete Surveys where the user is assigned to the corresponding Program. Perform Assessments for Surveys, where the user is assigned to the corresponding Program. View Reports for those Assessments.</td>
<td>Perform Assessments for Surveys, where the user is assigned to the corresponding Program. View Reports for those Assessments.</td>
<td>No specific rights</td>
</tr>
</tbody>
</table>
Begin with the Goal clearly in mind!
NCAT Demonstration
NCAT - Engine Features

- **System**
  - Split between tool and content

- **Technology**
  - Web based **Generic Features**
    - 2 versions using common database structure

- **Access via Web**

- **Stand-alone on Desktop**
  - Database backed

- **Functionality**
  - Taxonomy based evaluation
  - Multiple users, programs, schemes, profiles, and assessments
  - Response directed assessment
  - Program dependent weights, scales, and priorities
  - Progress tracking (planned, achieved, time series, snapshot)
  - Comparative (systems and phases) analysis
  - Extensive dynamic reporting – compliance, non-compliance, summary, detailed, various formats (tables and graphs)

- **Interfaces**
  - Import/export XML data
NCAT - Development Background

• **Spiral One**
  – Based on: “Modular Open System Approach – Program Assessment and Rating Tool – DoD (AT&L/DS) - Joint Systems Task Force
  – EXCEL Spreadsheet evaluation via NII Net Centric Checklist

• **Spiral Two**
  – A web based tool
    • Capable of handling multiple sets of criteria
    • Provide extensive reporting
    • Oriented towards design and implementation communities as well as the acquisition community

• **Spiral Three**
  – NCAT content extended to cover all aspects of interoperability:
    • NCOIC SCOPE model
    • NATO Maturity Levels
    • DoD / NATO Net-Ready Key Performance & Interoperability Parameters (NR-KPPs / KIPs)
    • Other customer evaluation criteria
NCAT V3 Enhancements

UI Enhancements
• Sortable tables (each column can be sorted) used in the overview pages, to include Profiles, Programs, Users
• New text fields for editing pages offering better value validation, automatic sizing and calendar widgets
• Improved assessment editing and performance
  – split plane for dragging a border between left/right area of screen
  – using dynamic trees for displaying and modifying categorization
  – popup window for showing contextual information
• Progress bars/wait icons when generating a report
• Value descriptions of question as small popup window

Assessment Enhancements
• Comment fields for each Answer
• Ability to include new attribute for question (example Answer) and displaying it where needed using turn on/off button
• Branching questions using an overview tree for displaying the different branches in editing mode
• Implementing agent for transferring old database content to new database schema

Usability Enhancements
• Excel-to-XML data import/export
• Supports MS SQL, IBM DB2 and Oracle database servers
• Leverages web services for easy integration with third-party reporting applications

Additional Enhancements
• Option to add a keyword list to Profiles and setting a corresponding filter in the Profile view
• Encrypting saved passwords
• Server binds to all available IP-addresses when starting application within enterprise network
Scenario 1: Product Evaluation Engineer Ranks Products

- Product evaluation engineer runs NCAT on multiple products with a common set of criteria. He produces a comparative report. He then ranks the products based on NCAT scores. Selection of the products guided by the NCAT scores depends on other factors.

Scenario 2: Project/program manager Monitors Progress

- The manager prepares a common set of criteria; runs NCAT at various phases of the project/Program. A comparison of the results shows the progress.

Scenario 3: LSI verifies/assesses compliance

- An LSI engineer/manager, before integrating the vendor products runs NCAT to assure interoperability and integration.

Scenario 4: Quality Check Engineer identifies root causes of failure

- Quality Engineer runs NCAT to determine if the system meets the set criteria. Root causes report is produced to identify and rectify possible failures.
NCAT Scenarios (cont’d)

Scenario 5: Acquire System
• System to be acquired is evaluated with a common set of criteria, which has a minimum level of acceptability. While identifying failure areas, NCAT gives a measure of acceptance/confidence.

Scenario 6: Architect identifies standards
• An engineer in charge of designing a net-centric system or its components creates an architecture with various views (i.e., SVs), that support a Technical View. He then evaluates it using NCAT and produces a guidance report. The report provides recommended applicable standards to improve the component’s Net Centric characteristics.

Scenario 7: Assess system maturity
• A company developing a net-centric system assesses it against a maturity model that defines several levels of net-centric compliance. When compared to customer needs, this gives input to the development plans.
NCAT™ - Methodology

- NCAT™ focuses on compliance assessment using pre-defined questions and multiple choice responses
  - Identifies criteria and metrics to measure “goodness”
  - Measures how well a target aligns with the areas of compliance
  - Groups criteria into common categories like Information Assurance (IA)
- First – define standard against which to measure compliance
- Compliance Level determined by Assessor selecting using multiple choice responses with weighted scores to standard questions
- Assessments structured by an administrator who crafts the questions and planned target results for the specific case.
- Profiles developed by selecting applicable subsets of the available questions or creating new questions and responses
- Assessment Results (individual or series) reported
- Data Privacy maintained and not openly visible

Asking the right people the right questions
## What are we measuring?

### Network Centric Attributes and Behaviors

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internet &amp; World Wide Web Like</td>
<td>Adapting Internet &amp; World Wide Web constructs &amp; standards with enhancements for mobility, surety, and military unique features (e.g. precedence, preemption).</td>
</tr>
<tr>
<td>Secure &amp; available information transport</td>
<td>Encryption initially for core transport backbone; goal is edge to edge; hardened against denial of service.</td>
</tr>
<tr>
<td>Information Protection &amp; Surety (built-in trust)</td>
<td>Producer/Publisher marks the info/data for classification and handling; and provides provisions for assuring authenticity, integrity, and non-repudiation.</td>
</tr>
<tr>
<td>Post in parallel</td>
<td>Producer/Publisher make info/data visible and accessible without delay so that users get info/data when and how needed (e.g. raw, analyzed, archived).</td>
</tr>
<tr>
<td>Smart pull (vice smart push)</td>
<td>Users can find and pull directly, subscribe or use value added services (e.g. discovery). User Defined Operational Picture v Common Operational Picture.</td>
</tr>
<tr>
<td>Information/Data centric</td>
<td>Data separate from applications and services. Minimize need for special or proprietary software.</td>
</tr>
<tr>
<td>Shared Applications &amp; Services</td>
<td>Users can pull multiple applications to access same data or choose same apps when they need to collaborate. Applications on “desktop” or as a service.</td>
</tr>
<tr>
<td>Trusted &amp; Tailored Access</td>
<td>Access to the information transport, info/data, applications &amp; services linked to user’s role, identity &amp; technical capability.</td>
</tr>
<tr>
<td>Quality of service</td>
<td>Tailored for information form: voice, still imagery, video/moving imagery, data, and collaboration.</td>
</tr>
</tbody>
</table>
Net-Centric Implementation Framework

Part 1: Overview

Part 2: ASD (NII) Checklist Guidance

Part 3: Migration Guidance

Part 4: Node Design Guidance

Part 5: Developers Guidance

Part 6: Acquisition Guidance
• Data Tenets – Data/Application Team
  – Make Data Visible
  – Make Data Accessible
  – Make Data Understandable
  – Make Data Trustable
  – Make Data Interoperable
  – Provide Data Management
  – Be Responsive to User Needs
Net-Centric Tenets

- Information Assurance/Security Tenets – IA Team
  - Net-centric IA posture & Ops Continuity
  - ID management, authentication, privileges
  - Mediate Security Assertions
  - Cross-Security Domains Exchange
  - Encryption
  - Employ Wireless Technologies
  - Others – Integrity, Confidentiality, Intrusion detection & reporting, Audits, Policy Compliance, Certification and Accreditation (C&A)
Service Tenets – Enterprise Services Team
  – Service Oriented Architecture (SOA)
  – Open Architecture
  – Scalability
  – Availability
  – Accommodate Heterogeneity
  – Decentralized Ops & Management
  – Enterprise Service Management (ESM)
Net-Centric Tenets

- Transport Tenets – Transport Team
  - IPv6
  - Packet Switched Infrastructure
  - Layering and Modularity
  - Concurrent Transport of Info Flows
  - Differentiated QoS Management
  - Network / Inter-network Connectivity
  - RF Acquisition
  - Joint Net-Centric Capabilities
  - Ops & Management of Transport & Services
# Net-Centric Tenets

<table>
<thead>
<tr>
<th>Data Tenets – Data/Application Team</th>
<th>Service Tenets – Enterprise Services Team</th>
</tr>
</thead>
<tbody>
<tr>
<td>Make Data Visible</td>
<td>Service Oriented Architecture (SOA)</td>
</tr>
<tr>
<td>Make Data Accessible</td>
<td>Open Architecture</td>
</tr>
<tr>
<td>Make Data Understandable</td>
<td>Scalability</td>
</tr>
<tr>
<td>Make Data Trustable</td>
<td>Availability</td>
</tr>
<tr>
<td>Make Data Interoperable</td>
<td>Accommodate Heterogeneity</td>
</tr>
<tr>
<td>Provide Data Management</td>
<td>Concurrent Transport of Info Flows</td>
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<tr>
<td>Be Responsive to User Needs</td>
<td>Differentiated QoS Management</td>
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<tr>
<th>Information Assurance/Security Tenets – IA Team</th>
<th>Transport Tenets – Transport Team</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net-centric IA posture &amp; Ops Continuity</td>
<td>IPv6</td>
</tr>
<tr>
<td>ID management, authentication, privileges</td>
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<td>Layering and Modularity</td>
</tr>
<tr>
<td>Cross-Security Domains Exchange</td>
<td>Concurrent Transport of Info Flows</td>
</tr>
<tr>
<td>Encryption and HAIPE</td>
<td>Differentiated QoS Management</td>
</tr>
<tr>
<td>Employ Wireless Technologies</td>
<td>Network / Inter-network Connectivity</td>
</tr>
<tr>
<td>Others – Integrity, Confidentiality, Intrusion</td>
<td>RF Acquisition</td>
</tr>
<tr>
<td>detection &amp; reporting, Audits, Policy</td>
<td>Joint Net-Centric Capabilities</td>
</tr>
<tr>
<td>Compliance, C&amp;A</td>
<td>Ops &amp; Management of Transport &amp; Services</td>
</tr>
</tbody>
</table>

**Put together make up the majority of the questions**
NCAT Survey Steps

- **Step 1 – Set Goals/Expectations**
  - Administrator creates a Profile to be used for a specific assessment
    - A Profile - selection of questions applicable to a Program
    - Administrator may adjust scores and weights at this stage
  - Administrator creates a Program that has a fixed set of Assessors using “Profiles”
  - Administrator creates a Survey from the profile
  - Administrator sets threshold levels (called planned values) for each question with inputs from the team of stakeholders

- **Step 2 – Perform Assessment**
  - Assessor(s) answer Profile questions in the survey for the artifacts being assessed.

- **Step 3 – Perform Analysis**
  - Analysts generate reports on the results
    - Assessment Report includes a comparison between the planned values and the actual assessed values for an individual assessment.
    - Summary Report aggregates and scores the responses of all individual assessments for the program.
### NCAT™ - Measurement Method

<table>
<thead>
<tr>
<th>Technologies</th>
<th>Verification/Certification</th>
<th>Use of Standards</th>
<th>Governance Procedures</th>
<th>NON COMPLIANCE</th>
<th>LOW COMPLIANCE</th>
<th>PARTIAL COMPLIANCE</th>
<th>SOME COMPLIANCE, NOT ALL</th>
<th>MOSTLY COMPLIANT</th>
<th>FULL COMPLIANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not Implemented</td>
<td>NONE</td>
<td>A Few</td>
<td>NONE</td>
<td>0 %</td>
<td>20%</td>
<td>40%</td>
<td>60%</td>
<td>80%</td>
<td>100%</td>
</tr>
<tr>
<td>Some Elements</td>
<td>Little or NONE</td>
<td>A Few More</td>
<td>Some Identified</td>
<td>Most</td>
<td>Most</td>
<td>Most</td>
<td>Mostly Identified</td>
<td>Most</td>
<td>ALL</td>
</tr>
<tr>
<td>Over half</td>
<td>Little or NONE</td>
<td></td>
<td>Some Identified</td>
<td></td>
<td></td>
<td>Most</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Most</td>
<td></td>
<td>Some Identified</td>
<td>Identified</td>
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<tr>
<td>ALL</td>
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</tbody>
</table>

NCAT uses a gradient scale
NCAT Assessment Reports

- NCAT Assessment Reports in 3 Formats
  - PDF, HTML, MS Word
NCAT Assessments and Scores

NCAT Tool Provides Overall Assessment and Scores for each Evaluation Criterion

**Score Summary**

- 25 Total Questions
- Max possible score = 25 x 100 point per question = 2500
- Planned 38.4%
- Achieved 76%
- Does not have to approach max, just meet or exceed planned

<table>
<thead>
<tr>
<th>Section</th>
<th>Service Oriented Architecture</th>
<th>Open Architecture</th>
<th>Scalability</th>
<th>Availability</th>
<th>Heterogeneity Accommodation</th>
<th>Enterprise Service Management</th>
<th>Combined Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Questions Applicable</td>
<td>2</td>
<td>7</td>
<td>5</td>
<td>5</td>
<td>2</td>
<td>4</td>
<td>25</td>
</tr>
<tr>
<td>Total Questions Not Applicable</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Max Score</td>
<td>200</td>
<td>700</td>
<td>500</td>
<td>500</td>
<td>200</td>
<td>400</td>
<td>2500</td>
</tr>
<tr>
<td>Planned</td>
<td>160</td>
<td>660</td>
<td>160</td>
<td>325</td>
<td>100</td>
<td>325</td>
<td>960</td>
</tr>
<tr>
<td>Achieved</td>
<td>160</td>
<td>660</td>
<td>160</td>
<td>325</td>
<td>100</td>
<td>325</td>
<td>960</td>
</tr>
<tr>
<td>Score</td>
<td>60.00%</td>
<td>94.29%</td>
<td>60.00%</td>
<td>65.00%</td>
<td>50.00%</td>
<td>64.25%</td>
<td>76.00%</td>
</tr>
<tr>
<td>Normalized</td>
<td>35.00%</td>
<td>40.00%</td>
<td>32.00%</td>
<td>60.00%</td>
<td>36.00%</td>
<td>42.50%</td>
<td>38.40%</td>
</tr>
</tbody>
</table>
CONTENT2.11 SPIDER VECTOR SURVEY

- **as planned**
- **achieved**
- **max**
NCAT Provides Simple Content Import Using Excel

- Enable Macros in Excel
- Follow Instructions on Worksheet 1
NCAT - Engine Features

- **System**
  - Split between tool and content
- **Technology**
  - Web based Generic Features
  - 2 versions using common data base structure
- **Access via Web**
- **Stand-alone on Desktop**
  - Database backed
- **Functionality**
  - Taxonomy based evaluation
  - Multiple users, programs, schemes, profiles, and assessments
  - Response directed assessment
  - Program dependent weights, scales, and priorities
  - Progress tracking (planned, achieved, time series, snapshot)
  - Comparative (systems and phases) analysis
  - Extensive dynamic reporting – compliance, non-compliance, summary, detailed, various formats (tables and graphs)
- **Interfaces**
  - Import/export XML data
NCAT™ Download Link

- Download link for NCAT and related Material
  - http://ncoic.cachefly.net/Java/java.zip
Network Centric Operations Industry Consortium eLearning Modules

- Network Centric Assessment Tool (NCAT™) Overview
- https://www.ncoic.org/technology/activities/education/elearning/
- Network Centric Operations: The Fundamentals
- The Role of NCOIC Deliverables
- Systems, Capabilities, Operations, Programs, and Enterprises (SCOPE) Model Overview
- NCOIC Interoperability Framework (NIF™) and NCOIC Patterns Overview
- Building Blocks Database Overview
- Export Compliance Overview

On Line Training Materials
• NCOIC is developing a family of Network Centric Tools for understanding net-centricity and interoperability
• NCOIC provides NCAT to interested stakeholders
• NCAT can be tailored for:
  – Program specific profiles of selected questions
  – comparison of planned vs actual assessments
  – Privacy of program-specific results
• NCOIC requests feedback in return for using NCOIC products.
  – Feedback will be used to improve future versions only.
  – Your feedback will not be shared openly.
Net-Enabled Future

Stove-piped Systems, Point-to-Point Networks

nCOIC™
NCAT
Tutorial
Reference
In order to better understand NCAT, the following provides a short tutorial on a small subset of the NCAT questions.

- The subset is entitled “Services” which has 25 questions

The user will download the Java Zip files and install the NCAT program.

The user will log in as the “ncat_administrator” & do the following:

- setup a new User Account for “John Q Services” (username “Services”,
- create a new Program called “Services Program”,
- create a new Profile called “Services Profile”,
- create a new Survey called “Services Survey”,
- set Planned Values, log out

The user will log in a second time as “Services”:

- perform the assessment answering 25 questions
- Run some reports and examine them
Unzip the files on the host machine

- Double Click on the .exe file to install
- Automatically places files in `C:\NCAT_RTL`
- Go to `C:\NCAT_RTL` to start NCAT
Start NCAT – Derby Database

1. Double Click on 1-Start_Apache_Derby_DB.bat

Wait for the command box to report “started and ready to accept..”
Start NCAT - JBoss

2. Double Click on 2-Start_JBoss.bat
   Wait for “Started in xx s”
Bring up web browser using “http://localhost:8080/ncat/”
Login as “ncat_administrator” using password “ncat”
Examine NCAT™ overview (HOME)

• We will inspect each
  – Users
  – Programs
  – Categories…
  – Profiles
  – Surveys (set planned)
  – Assessments
  – References
  – Guidelines

• Then we will:
  – Perform an assessment
  – Generate Reports
  – Analyze Results

• Click on “Users”

User attributes = Roles + Programs
Program (associated with a Survey)
- Identifies the entity to be assessed
- Partitions data between programs for privacy

Categories
- groups of Questions and Responses

Profile (has a Top Level Category)
- A tailored set of Questions and Responses grouped by Categories

Survey = Program + (Assess1+Assess2+Assess x)
- sets Planned Values
- Associated with Profile & Program
- Survey - aggregation of multiple assessments sharing a common Profile for a single program

Assessment = User + Survey
- Associated with User and Survey
- Assessment is a single instance – one assessor, one set of questions

Reports
- Single Assessment or Survey Report with multiple Assessments
- Compares Planned vs Actual
- Export to Excel or other External Analysis Tools
- Import / Export Data
• We need a Naming Convention to create each definition and know it is the right one for us
  – User named “Services, John Q.”
  – Program “Services Program”
  – “Services” Category already exists
  – Profile “Services Profile”
  – Survey “Services Survey” (set planned values as admin)
  – Assessment – Note you can “View and delete”
  – Reference “Services Reference”
  – Guideline “Services Guideline”

• Then we will:
  – Logout as “ncat_administrator” and login as “Services”
  – Perform an assessment of the “Services Program”
  – Generate Reports on Single Assessment
  – Analyze Results
Setup User

- Pick “Services” Naming Convention first
- Fill in mandatory fields
- Have not set up Program yet so cannot assign role/program relationship
- Make sure you check the “Account is active” box.
- Save
- Come back later to add Program
- Click on “Home”
Confirm User “Services” is created

- Confirm on Users screen.
- Then Click on “Home” link. Then Click on “Programs” link.
Setup Program

- Follow the “Services” Naming Convention
- Click on New Program to create a new “Services Program”
Fill in “Services Program” details

- Name it “Services Program”
- Fill in Mandatory Fields
- Skip References for now
- Note no Surveys are filled in
- Click on “Program is active”
- Click on “Save”
- Click on “Home”
Associate Program with User

- From “Home” Click on “Users”
- On the “Services” row, Click on Edit under “Actions”
Associate Program with User

- Click on “Role” pull down
  - Select “Assessor”
- Click on “in_Program” pull down
  - Select “Services Program”
  - Click on “Add”
Associate Program with User

- Observe update to “Roles in Programs” concatenates “Assessor” – “Services Program”
- Click “Save” returns to “User” list
- Click “Home”
Since “Services” Category was already available, we will create a new Profile next.

Click on “Profiles”
Setup New Profile

- Actions include “modify assigned C/Q/A*” (discussed later)
  - C/Q/A = Categories, Questions, Answers
- Click on “New Profile”
Create New “Services Profile”

- Name new profile “Services Profile”
- Fill Mandatory Fields
- Click on pull down for “Assign Top Level Category”
- Click on “Profile is active”
- Click on “Save” takes us back to “Profiles” page
Confirm new “Services Profile”

• Confirm creation of new “Services Profile”
• Click on “Home”
Setup New Survey

- Observe Actions include “set planned values*” (discuss later)
- Click on “New Survey”
Create New "Services Survey"

- Name it “Services Survey”
- Fill Mandatory & Optional Fields
- Click on pull down for “Profile” and select “Services Profile”
- Click on pull down for “Program” and select “Services Program”
- Click on “Survey is active”
- Click on “Save” takes us back to “Surveys” page

<table>
<thead>
<tr>
<th>Field</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Survey name</td>
<td>Services Survey</td>
</tr>
<tr>
<td>Description</td>
<td>Description of Services Survey.</td>
</tr>
<tr>
<td>Start date (mm/dd/yyyy)</td>
<td>08/04/2008</td>
</tr>
<tr>
<td>End date (mm/dd/yyyy)</td>
<td>12/31/2008</td>
</tr>
<tr>
<td>Leader</td>
<td>Bill Swanson</td>
</tr>
<tr>
<td>Milestone</td>
<td>Complete Milestone A</td>
</tr>
<tr>
<td>Purpose</td>
<td>Demonstrate NCAT</td>
</tr>
<tr>
<td>Profile</td>
<td>Services Profile</td>
</tr>
<tr>
<td>Program</td>
<td>Services Program</td>
</tr>
<tr>
<td>Survey is active</td>
<td>✓</td>
</tr>
</tbody>
</table>

* - Fields are mandatory
Confirm new “Services Survey”

- Confirm creation of new “Services Survey”
- Click on “Services Survey” Actions “set planned values”
- Can only be set by “ncat_administrator”
Setting “Planned Values”

- Observe Services has six sub-categories which are labeled alphabetically.
- Letter A is “Service Oriented Architecture” which has 2 questions.
- Q1 of SOA is shown below.
- Pick 2nd choice “The System uses some services through ….” – The planned value
- Click “next question”
Category A: Service Oriented Architecture

Question A2 (2): To what extent are system capabilities implemented as service components that are accessed through a common Enterprise Service Bus (ESB)?

YOU ARE EDITING PLANNED VALUES!

- No Enterprise Service Bus is used by the system.
- Proprietary middleware provides some of the basic services of an ESB. No specific procedures are in place to ensure uniform compliance.
- An ESB is implemented internally that can provide basic services to the platform. Some standards are utilized in the implementation.
- An ESB is implemented using widely used open standards that provide all the net-centric core services as well as critical event processing, security services and autonomous capabilities. Most of the system’s functionality is implemented as services.
- An open standard based COTS ESB that can mediate dynamic requests and match QoS requests with appropriate SLAs in non-real time, near real time and real time and interact with other ESBs deployed on the net-centric environment. The ESB is verified and certified to provide these capabilities. Uniform adoption is assured by comprehensive governance processes.
Category B: Open Architecture

1 (7) indicates Q1 of 7 questions in this category

Question B1 (7): Is the system architecture based on loosely-coupled interactions, enabling the internal components to map to well-defined external interfaces?

YOU ARE EDITING PLANNED VALUES!

- The system is tightly integrated and not modular.
- The system is constructed of well defined modules with well defined interfaces, but the interfaces are proprietary or specific to the program.
- The system is constructed of well defined modules with well defined interfaces. Interfaces are based on widely used open standards and consistent with the program or platform.
- The system is constructed of well defined modules with well defined interfaces. Interfaces are based on widely used open standards and consistent with the COI.
- The system is constructed using invoked dynamically discovered services or through choreography of services (or both). Services implemented by this system are deployed and dynamically discoverable on the net-centric environment and accessed using net-centric core services for discovery, mediation, messaging, and connectivity.
Category B: Open Architecture

Question B2 (7): Is Web access implemented by the program built using Web Foundational standards: Hypertext Transfer Protocol (HTTP), Hypertext Mark up Language (HTML), File Transfer Protocol (FTP), User Datagram Protocol (UDP), Transport Control Protocol (TCP), Internet Protocol (IP), Simple Mail Transfer Protocol (SMTP), Multi-purpose Internet Mail Extensions (MIME), Uniform Resource Locator (URL), and Unicode universal character set?

- Web Access is not implemented by this system.
- This system utilizes some, but not all of the listed standards.
- This system implements and uses Web Access using most or all of the listed standards in their current form. The standards used have been verified to work together.

YOU ARE EDITING PLANNED VALUES!
Category B: Open Architecture

Question B3 (7): Are Web services and web access implemented by the program built using Web Emerging Standards or Best Practices: HTTP State Management Mechanism, MIME Encapsulation of Aggregate Documents such as HTML (MHTML), Web Distributed Authoring and Versioning (Web-DAV)?

YOU ARE EDITING PLANNED VALUES!

- Web Access is not implemented in this system.
- This system utilizes distributed components but not web services.
- This system utilizes some, but not all of the listed standards.
- This system implements and uses Web Services using most or all of the listed standards.
- This system utilizes Web Services standards and also utilizes Grid computing standards.
Category B: Open Architecture

Question B4 (7): Are Web services and web access implemented by the program built using XML Foundational Standards: XML Namespaces, Extensible Style Language Transformations (XSLT), Extensible Style Language (XSL), XML Path Language (XPath), Cascading Style Sheets (CSS)?

YOU ARE EDITING PLANNED VALUES!

- Neither Web Access nor Services is implemented in this system.
- This system utilizes distributed components but not web services.
- This system utilizes some, but not all of the listed standards.
- This system implements and uses Web Services using most or all of the listed standards.
- This system utilizes Web Services standards and also utilizes Grid computing standards.
Category B: Open Architecture

Question B5 (7): Are Web services implemented by the program built using Representational State Transfer (REST), Simple Object Access Protocol (SOAP), Web Services Description Language (WSDL), Universal Description, Discovery, and Integration (UDDI)?

YOU ARE EDITING PLANNED VALUES!

- Web Services are not implemented in this system.
- This system utilizes distributed components but not web services.
- This system utilizes some, but not all of the listed standards.
- This system implements and uses Web Services using most or all of the listed standards.
- This system utilizes Web Services standards and also utilizes Grid computing standards.
Category B: Open Architecture

Question B6 (7): Are Web services products compliant with WS-Security Profile?

YOU ARE EDITING PLANNED VALUES!

- Web Services are not implemented in this system.
- Web services that are used are implemented with proprietary interfaces.
- Web services use products that are compliant, but configurations are not verified.
- Yes, fully compliant and verified.
Category B: Open Architecture

Question B7 (7): Are Web services products compliant with the Web Services Interoperability (WS-I) Basic Profile?

- Web Services are not implemented in this system.
- Web services that are used are implemented with proprietary interfaces.
- Web services use products that are compliant, but configurations are not verified.
- Yes, fully compliant and verified.

YOU ARE EDITING PLANNED VALUES!
Category C: Scalability

Question C1 (5): How many consumers of services deployed by this system are expected?

YOU ARE EDITING PLANNED VALUES!

- Web Services are not implemented in this system.
- Unknown/estimated.
- Empirical evidence shows that the system can support the expected number of consumers.
- The system has been formally tested to meet the service level as defined in the specifications and is capable of scaling to meet excess demand.
- The system includes automatic detection of increased usage and will automatically increase capacity without human intervention.
Question C2 (5): How many service invocations of services deployed by this system per hour (or per some appropriate unit of time) are expected?

- Web Services are not implemented in this system.
- Unknown/estimated.
- Empirical evidence shows that the system can support the expected number of service invocations.
- The system has been formally tested to meet the service level as defined in the specifications and is capable of scaling to meet excess demand.
- The system includes automatic detection of increased service load and will automatically increase capacity without human intervention.
Category C: Scalability

Question C3 (5): On what assumptions or empirical tests are the above mentioned estimates based?

- Web Services are not implemented in this system.
- Unknown/estimated.
- Past usage history.
- Surveys and agreements have been executed to provide best estimates.
- Hardware and software facilities are in place to scale automatically to meet usage and load requirements.
Category C: Scalability

Question C4 (5): What performance analysis has been done to understand or predict the ability of the service to handle number of end-user consumers?

- Web Services are not implemented in this system.
- Unknown/estimated.
- Empirical evidence shows that the system can support the expected number of consumers.
- The system has been formally tested to meet the service level as defined in the specifications and is capable of scaling to meet excess demand.
- Hardware and software facilities are in place to scale automatically to meet usage and load requirements.

YOU ARE EDITING PLANNED VALUES!
Category C: Scalability

Question C5 (5): What performance analysis has been done to understand or predict the ability of the service to handle the expected number of calling services?

YOU ARE EDITING PLANNED VALUES!

- Web Services are not implemented in this system.
- Unknown/estimated.
- Empirical evidence shows that the system can support the expected number of service demands.
- The system has been formally tested to meet the service level as defined in the specifications and is capable of scaling to meet excess demand.
- Hardware and software facilities are in place to scale automatically to meet usage and load requirements.
Category D: Availability

Question D1 (5): Does the program have a continuity of operations plan?

YOU ARE EDITING PLANNED VALUES!

- No plan is in place.
- Basic plan allows for MTBF and MTB recovery. No testing plan is in place.
- Basic plan allows for MTBF and MTB recovery. Testing plan is in place and exercised regularly.
- A continuity plan is in place to assure minimal MTBR including regular backups and testing.
- A fault tolerant continuity of operations plan is in place and it is exercised on a regular basis with contingency operations also verified.
Category D: Availability

Question D2 (5): What is the plan for providing service during routine maintenance (hardware and software)?

- No plan is in place.
- Scheduled outages.
- Scheduled outages. Regular backups and test of backups is done.
- Backup systems are used to carry load while prime system is maintained. Synchronization is manual and requires man in the loop.
- Backup systems are used to carry load while prime system is maintained, synchronization is automatic.

YOU ARE EDITING PLANNED VALUES!
Category D: Availability

Question D3 (5): What is the plan for providing service during catastrophic failures (e.g. massive outages of the power grid, physical destruction of the hosting facility)?

- No plan is in place.
- Offsite backup and archives. Secondary site has been identified to reconfigure and restart. MTBR > 1 day.
- Offsite backup and archives. Secondary site has been identified to reconfigure and restart. MTBR less than 1 day.
- Distributed facilities are able to pick up load with some degradation of performance.
- Completely redundant hardened site with automatic failover. No disruption of service. Failover is regularly tested and calibrated.
Category D: Availability

Question D4 (5): Does the continuity of operations plan include procedures for finding, housing, and supporting the technical support staff during an emergency action?

YOU ARE EDITING PLANNED VALUES!

- No plan is in place.
- Support plans include shelter in place.
- Support plans include shelter in place or personal evacuation.
- Evacuation plans are in place, but service would be disrupted during an emergency action.
- Yes, Emergency support or evacuation procedures are in place and tested on a regular basis.
Category D: Availability

Question D5 (5): What percent of threat scenarios have been identified and validated for application to your design?

- No threat scenarios have been considered in the planning.
- Approximately 25 percent of threat scenarios have been considered in the planning.
- Approximately 50 percent of threat scenarios have been considered in the planning.
- Approximately 75 percent of threat scenarios have been considered in the planning.
- A robust set of threat scenarios has been considered in the planning.

YOU ARE EDITING PLANNED VALUES!
Category E: Heterogeneity Accommodation

Question E1 (2): How do you describe in which way the system will support bandwidth variability and universal utility on the battlefield independent of bandwidth constraints?

YOU ARE EDITING PLANNED VALUES!

- Only will support High Bandwidth wired LAN connection.
- Multiple versions will be available for low to high bandwidth environments.
- The service has logic that will sense bandwidth availability but cannot adapt and will, thus only notify user of constraints and potential latency issues.
- The service will adapt to bandwidth conditions.
- The will service adapt to delivering end-to-end capabilities over a broad range of bandwidths (from low bit-rate tactical communications to multi-gigabit backbone service), environments (fixed and wireless), and end-user devices (e.g., PDAs, laptops, workstations, mainframes).
Category E: Heterogeneity Accommodation

Question E2 (2): Does the system support delivery of capabilities to thin or browser-based clients, especially those that provide adaptability to a variety of disadvantaged edge environments for end-users?

- The program can only support Client server environments.
- The program requires high bandwidth to support thin or browser-based clients via servlets or portlets.
- The program may support low bandwidth to thin or browser-based clients via servlets or portlets.
- The program does support low bandwidth to thin or browser-based clients via servlets or portlets.
- The program will support delivery of capabilities to thin or browser-based clients, especially those that provide adaptability to a variety of disadvantaged edge environments for end-users.
Category F: Enterprise Service Management

Question F1 (4): Does the service provide instrumentation to enable the service provider to determine the current operational state and performance level of the service?

YOU ARE EDITING PLANNED VALUES!

- The service does not provide instrumentation to enable the service provider to determine the current operational state and performance level of the service.
- The service does provide instrumentation to partially enable the service provider to determine the current operational state and performance level of the service.
- Scalability, configuration, diagnosing, healing and error logging and recovery require an operator, and operator is assisted by a comprehensive set of instrumentation and tools. Logging of errors is automatic.
- Comprehensive system support and network monitoring provides operator with online configuration and error diagnosing and recovery. Logging is uniform across the domain.
- Automatic and dynamic scalability, self-configuration, self-healing, self-diagnosing, and uniform error logging and recovery are enabled across the net-centric environment.
Category F: Enterprise Service Management

Question F2 (4): How do you describe the nature of the service management information made available to consumers and providers of the net-centric environment such as the Global Information Grid?

YOU ARE EDITING PLANNED VALUES!

- No service management information function will be made available to consumers or provider of the service.
- Service level agreements are included in the description of the service, but are not available for runtime use.
- Limited service management information, not including performance metrics and problem/outage status information, will be made available to consumers or providers of the service.
- Service management information, including performance metrics and problem/outage status information, will be made available to consumers and providers of the service.
- SLAs are part of the service descriptor and are based on open standards. The QoS is dynamically available and can be used to match requestors’ required SLAs with a provider’s QoS. These services are dynamically discoverable and accessed using net-centric core services for discovery, mediation, messaging, and connectivity.
Category F: Enterprise Service Management

Question F3 (4): To what extent are protocols and standards being used to collect and disseminate service management information?

- No service Management function is provided.
- Limited QoS information is available at runtime. It is available only through proprietary interfaces and APIs. SLA is described with program specific formats.
- SLAs are defined with open standard formats and are dynamically discoverable. Mechanisms are available to provide runtime QoS of deployed services using open standards.
- If service Management function is provided, standards used to collect and disseminate service management information, and in what format will it be made available (e.g., SNMP, XML, CIM).
- SLAs are part of the service descriptor and are based on open standards. The QoS is dynamically available and can be used to match requestors’ required SLAs with a provider’s QoS. These services are dynamically discoverable and accessed using net-centric core services for discovery, mediation, messaging, and connectivity.

YOU ARE EDITING PLANNED VALUES!
Category F: Enterprise Service Management

Question F4 (4): Has this program provided completed examples of all Service Level Agreements negotiated by this provider with others?

- No Service Level Agreements (SLA) has been or will be negotiated by this service provider with others.
- Some SLAs have been negotiated and provided for other service providers.
- SLAs have been negotiated and provided with other service providers with which it will interoperate.
- A complete list of completed examples of all Service Level Agreements (SLA) negotiated by this service provider with all other service providers and consumers with which it will interoperate has been provided.
- SLAs have been negotiated with all other providers and consumers and are automatically enforced by the infrastructure - the ESB.
End Assessment Returns you to the Summary

- Click “Back” takes you to “Home”
- Note the Assessment is not complete, just the setting of the Planned Values
• Click on “Assessments”
• Observe if any assessments are visible for “Services”
No Assessments visible for Services

- “Services Assessment” has not been created at this time
- Click on “Home”
See if any “References” are defined

- Click on “References”
- Observe if any references are visible
Setup “References”

- Click on “References”. Currently empty.
- If “Services Reference” is not present, click on “New Reference” to create it
Create new “Services Reference”

- Name new item “Services Reference”
- Add a link to “google” and click “Save”
Confirm new “Services Reference”

- Observe new “Services Reference” is created with the link to Google
- Click “back” or “Home” to return “Home”

<table>
<thead>
<tr>
<th>Reference Text</th>
<th>Link</th>
<th>Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Services Reference</td>
<td>[edit] [delete]</td>
<td><a href="http://www.google.com/">http://www.google.com/</a></td>
</tr>
</tbody>
</table>
See if any “Guidances” are defined

- Click on “Guidances”
- Observe if any “Guidances” are visible
Setup new “Guidance”

- If “Services Guidance” is not present, click on “[New Guidance] to create it.
Setup “Guidances”

- Create “Services Guidance”, add Text
- Use the “Reference” pull down to select available “Services Reference”
- Click “Save” to return to “Guidances”. Confirm “Services Guidance”.

![Guidance Setup Screen]

* - Fields are mandatory
Confirm “Services Guidance”

- Confirm new Guidance successfully created.
- Click “back” or “Home” to return to “Home” screen.
Back to “Home”, Go to “Profiles”

- Click on “Profiles”

### NCAT Overview

**Users**
Create, edit and delete users

**Programs**
Create, edit, delete a program

**Categories, Questions and Answers**
Create, edit, delete a category; create, edit, delete questions and answers

**Profiles**
Create, edit, delete profiles which are based on copies of categories containing questions and answers. The content editor may tailor categories, questions and answers of a profile.

**Surveys**
Create, edit, delete a surveys by assigning a profile to a program

**Assessments**
View and delete assessments

**References**
Create, edit and delete references

**Guidances**
Create, edit and delete guidances

#### Perform Assessment for Survey:

<table>
<thead>
<tr>
<th>Survey</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>System Short List Vector Test Survey</td>
<td>System Short List Vector Test</td>
</tr>
<tr>
<td>NCAT SPIDER Vector Survey</td>
<td>-</td>
</tr>
<tr>
<td>System Vector Test Survey</td>
<td>-</td>
</tr>
<tr>
<td>CONTENT2.11 SPIDER VECTOR SURVEY</td>
<td>This survey is to establish the SPIDER VECTORS.</td>
</tr>
<tr>
<td>Data SPIDER Survey</td>
<td>Data SPIDER SURVEY Description.</td>
</tr>
<tr>
<td>services Survey</td>
<td>Description of Services Survey.</td>
</tr>
</tbody>
</table>

#### Generate Report from Report Template:

<table>
<thead>
<tr>
<th>Template</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>NCAT Report Assessment</td>
<td>-</td>
</tr>
<tr>
<td>NCAT Report Survey</td>
<td>-</td>
</tr>
<tr>
<td>Excel NCAT Report Basic V2.0</td>
<td>-</td>
</tr>
</tbody>
</table>

**Report Templates**
Upload, delete report templates

**Import Data**
Import NCAT entities from data file

**Export Data**
Export all NCAT entities to data file
Go back to “Services Profile” to link References

- Click on “Services Profile” Actions “modify assigned C/Q/A”
Go to 1st Category and 1st question

- Click on 1st category “Service Oriented Architecture”
Navigate to Question needing reference

- Both questions in “Service Oriented Architecture” are visible
- Click on Actions “Edit” for top Question
Question Expanded to show attributes

- Observe question structure
  - Text
  - Description
    - Must fill with something
  - Weight
  - Reference
    - Pull down to select “Services Reference”
- Answers
- Active box
- Click “Save”
Confirm Results of adding Reference

- Taken back to Higher Level
- Observe new Green Ref tag
- Click on Edit again
Add Guidance to Answers

- Guidance is not visible until an answer is selected using “edit”
- Guidance aids Assessor in selecting a particular response
Filling in Answer Guidance & Reference

- Observe Answers can have both Guidance and Reference
- Use pull downs for each to select and resave

<table>
<thead>
<tr>
<th>Answer text* (max. 1000 characters):</th>
<th>Many of the systems functions are implemented and deployed as services in a local repository.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Explanation* (max. 2000 characters):</td>
<td></td>
</tr>
<tr>
<td>Scale value*:</td>
<td>60</td>
</tr>
<tr>
<td>Guidance:</td>
<td>-- no guidance --</td>
</tr>
<tr>
<td>Reference:</td>
<td>-- no reference --</td>
</tr>
<tr>
<td>Answer is active</td>
<td>✅</td>
</tr>
<tr>
<td>Created:</td>
<td>ToXML script version 2008-02-20 (2008-07-09 16:19:23.0)</td>
</tr>
<tr>
<td>Changed:</td>
<td>()</td>
</tr>
</tbody>
</table>

* - Fields are mandatory
Filling in Answer Guidance & Reference

- Observe Answers can have both Guidance and Reference
- Use pull downs for each to select and resave

<table>
<thead>
<tr>
<th>Answer text* (max. 1000 characters):</th>
<th>Many of the systems functions are implemented and deployed as services in a local repository.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Explanation* (max. 2000 characters):</td>
<td>-</td>
</tr>
<tr>
<td>Scale value*:</td>
<td>50</td>
</tr>
</tbody>
</table>
| Guidance: | Services Guidance
Guidance text: Expects selection criteria for specific Questions and |
| Reference: | Services Reference
Reference link: http://www.google.com/ |
| Answer is active | ✔ |
| Created: | ToXML script version 2008-02-20 (2008-07-08 16:19:23.0) |

* - Fields are mandatory

Save | Cancel
Confirm Results

- Observe References for the Question and the [Ref] and [Guid] for an answer.
- Click “Save” and return to “Profile” list.
- Click “Home” to start “Assessment”

### Questions of selected category "Service Oriented Architecture"

Home > Categories > Questions of selected category > Edit question

<table>
<thead>
<tr>
<th>Question text* (max. 1000 characters):</th>
<th>To what extent are system capabilities implemented as service components that are published and discoverable through open standards?</th>
</tr>
</thead>
</table>

| Description (max. 2000 characters): | |
|-------------------------------------||

<table>
<thead>
<tr>
<th>Weight*:</th>
<th>1</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Reference:</th>
<th>Services Reference Reference link: <a href="http://www.google.com/">http://www.google.com/</a></th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Answers:</th>
<th>[Add answer]</th>
</tr>
</thead>
<tbody>
<tr>
<td>The functionality of the system is not implemented with service components.</td>
<td>0 [down] [edit] [delete]</td>
</tr>
<tr>
<td>The system uses some services through Web Services or Rest.</td>
<td>30 [up] [down] [edit] [delete]</td>
</tr>
<tr>
<td>Many of the system's functions are implemented and deployed as services in a local repository. [Ref] [Guid]</td>
<td>60 [up] [down] [edit] [delete]</td>
</tr>
<tr>
<td>The system's functions are deployed and registered in a repository that is accessible for all members of a CCI who can use them.</td>
<td>80 [up] [down] [edit] [delete]</td>
</tr>
<tr>
<td>System functionality is implemented by choreographing service invocations dynamically in a workflow that satisfies the mission goal.</td>
<td>100 [up] [down] [edit] [delete]</td>
</tr>
</tbody>
</table>

- Question is active: ✔
- Created: ToXML script version 2008-02-20 (2008-07-08 16:19:23.0)

* - Fields are mandatory

Save Cancel
Log out as Admin, Log in as “Services”

- Click on Logout to logout as the ncat_administrator
- Prepare to log back in as the Assessor “John Q Services” with a username “Services” and password “ncat”

<table>
<thead>
<tr>
<th>NCAT™ overview</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Users</strong></td>
</tr>
<tr>
<td><strong>Programs</strong></td>
</tr>
<tr>
<td><strong>Categories, Questions and Answers</strong></td>
</tr>
<tr>
<td><strong>Profiles</strong></td>
</tr>
<tr>
<td><strong>Surveys</strong></td>
</tr>
<tr>
<td><strong>Assessments</strong></td>
</tr>
<tr>
<td><strong>References</strong></td>
</tr>
<tr>
<td><strong>Guidances</strong></td>
</tr>
</tbody>
</table>

| Perform Assessment for Survey: | System Short List Vector Test Survey | System Short List Vector Test |
| | NCAT SPIDER Vector Survey | - |
| | System Vector Test Survey | - |
| | CONTENT2.11 SPIDER VECTOR SURVEY | This survey is to establish the SPIDER VECTORS. |
| | Data SPIDER Survey | Data SPIDER SURVEY Description. |
| | Services Survey | Description of Services Survey. |

| Generate Report from Report Template | NCAT Report Assessment |
| | NCAT Report Survey |
| | Excel NCAT Report Basic V2.0 |

| Report Templates | Upload, delete report templates |

| Import Data | Import NCAT entities from data file |
| Export Data | Export all NCAT entities to data file |
The user will download the Java Zip files and install the NCAT program

The user will log in as the “ncat_administrator” & do the following:

– setup a new User Account for “John Q Services” (username “Services”),
– create a new Program called “Services Program”,
– create a new Profile called “Services Profile”,
– create a new Survey called “Services Survey”,
– set Planned Values, log out

The user will:
– log in a second time as “Services”,
– perform the assessment answering 25 questions
– Run some reports and examine them
Log out as Admin, Log in as “Services”

- Login as “Services” (password = ncat)
- Perform Assessment for “Services Survey”
- Confirm User: “Services” in a Role of “Assessor”
- Note significantly cleaner “Home” screen showing only what this user is setup to accomplish
- Click on “Perform Assessment” for “Services Survey”
Start Assessment

- Click on “Start Assessment”
Observe 1st question

- Observe
  - reference and guidance boxes show up
  - a comments /notes box is visible
- Answer question
- Click on next question
- Repeat until all 25 questions are answered
Assessment Ends & returns to “Home”

- End of Assessment returns Assessor to NCAT Overview
- End of Assessment by User: “Services”
- It is possible to have multiple Assessors (not covered in this tutorial)
- Click on “NCAT Report Assessment”
The user will download the Java Zip files and install the NCAT program.

The user will log in as the “ncat_administrator” & do the following:

- setup a new User Account for “John Q Services” (username “Services”)
- create a new Program called “Services Program”
- create a new Profile called “Services Profile”
- create a new Survey called “Services Survey”
- set Planned Values, log out

The user will:

- log in a second time as “Services”
- perform the assessment answering 25 questions
- Run some reports and examine them
Choose Report Type

- Choose “Services Survey” Assessment performed by username “Services”
- Observe there are three Export Types: PDF, HTML, Word
- Choose Export Type, for this exercise click on “(Word)”
### Assessment Information

**Program Information**

- **Program Name:** Services Program
- **Program Purpose:** -
- **Lead Organization:** NCAT Functional Team

**Program Manager's Information**

- **Name:**
- **Email Address:**
- **Telephone Number:**
- **Office Code/Symbol:**

**Note:** not filled in since “Program Configuration Manager” role was not Established.

**NCAT Assessment Information**

- **Completion Date:** 07/15/2008

**Lead Assessor's Information**

- **Name:** Services
- **Email Address:** John_Q_Services@Raytheon.com
- **Telephone Number:** (972) 123-4567
- **Role in Program:** Assessor
- **General Role:**

---

*Assessment Report showing all Information for the specified Assessment*
Finding and Using the Legend

- **The Legend is on the very last page of the report.**
- **Legend explains the color code for reading the assessment results**
  - Black means “not selected”
  - Red means “Planned or Expected Value” set by ncat_administrator
  - Blue means “achieved value” selected by the user “Services”
  - Green means the “achieved value” set by the Assessor matches the “Planned or Expected Value” set by the ncat_administrator

<table>
<thead>
<tr>
<th>Legend</th>
<th>First Category Element</th>
</tr>
</thead>
<tbody>
<tr>
<td>B Root Category</td>
<td>First Category Element</td>
</tr>
<tr>
<td><strong>B_1 Sub Category</strong></td>
<td>Subordinated Category Element</td>
</tr>
<tr>
<td><strong>Question</strong></td>
<td>Question element</td>
</tr>
<tr>
<td><strong>Answer</strong></td>
<td>Answer from survey</td>
</tr>
<tr>
<td><strong>Selected Answer</strong></td>
<td>Answer selected by Assessor</td>
</tr>
<tr>
<td><strong>Planned Answer</strong></td>
<td>Expected Answer</td>
</tr>
<tr>
<td><strong>Planned and Selected Answer</strong></td>
<td>Selected Answer corresponds to expected Answer</td>
</tr>
</tbody>
</table>
**A1**

**Service**

To what extent are system capabilities implemented as service components that are published and discoverable through open standards?

The functionality of the system is not implemented as service components. The system uses some services through web services or mess.

May of the system's functions are implemented and deployed as services in a local repository.

The system's functions are deployed and registered in a repository that members of a COI can use.

System functionality is implemented by choreographing service invocations dynamically in a method that satisfies the business goal.

Use Comment box to log objective evidence or rationale for answers.

**Comment**

**A2**

**Service**

To what extent are system capabilities implemented as service components that are accessed through a common on Enterprise Service Bus (ESB)?

No Enterprise Service Bus is used by the system.

Proprietary middleware provides some of the basic services of an ESB. No specific procedures are in place to ensure formal compliance.

An ESB is implemented internally that can provide basic services to the platform. Some standards are utilized in the implementation.

An ESB is implemented using widely used open standards that provide all the necessary core services as well as critical event processing, security services and autonomic capabilities. Most of the system's functionality is implemented as services.

An open standard based COTS ESB that can mediate dynamic requests and match CoS requests with appropriate SLAs in real-time, near real-time and real-time and interact with other ESB deployed on the network environment. The ESB is certified and certified to provide these capabilities. The adoption is driven by comprehensive governance processes.

**Comment**

**B1**

**Open Architecture**

Is the system architecture based on loosely-coupled interactions, enabling the internal components to adapt to changing requirements?

The system is tightly integrated and not modular.

The system is constructed of well-defined modules with well-defined interfaces, but the interfaces are proprietary or specific to the program.

The system is constructed of well-defined modules with well-defined interfaces. Interfaces are based on widely used open standards and consistent with the program or platform.

The system is constructed of well-defined modules with well-defined interfaces. Interfaces are based on widely used open standards and consistent with the COI.

The system is constructed using loosely coupled dynamically discovered services or through choreography of services (or both). Services implemented by this system are deployed and dynamically discoverable on the network environment and accessed using network-centric core services for discovery, mediation, messaging, and connectivity.

**Legend**

- **B Root Category**: FirstCategory element
- **B_1 sub Category**: Subordinated Category element
- **Question**: Question element
- **Answer**: Answer from survey
- **Selected Answer**: Answer selected by Assessor
- **Planned Answer**: Expected Answer
- **Planned and selected Answer**: Selected Answer corresponds to the expected Answer
Scalability

C1 How many consumers of services deployed by this system are expected?

Web Services are not implemented in this system.

Unknown estimated.

Empirical evidence shows that the system can support the expected number of consumers.

The system has been formally tested to meet the service level as defined in the specifications and is capable of scaling to meet service demand.

Hardware and software facilities are in place to scale automatically to meet usage and load requirements.

C2 How many service invocations of services deployed by this system per hour (or per some appropriate unit of time) are expected?

Web Services are not implemented in this system.

Unknown estimated.

Empirical evidence shows that the system can support the expected number of service invocations.

The system has been formally tested to meet the service level as defined in the specifications and is capable of scaling to meet service demand.

Hardware and software facilities are in place to scale automatically to meet usage and load requirements.

Availability

D1 How many service invocations of services deployed by this system per hour are expected?

Web Services are not implemented in this system.

Unknown estimated.

Empirical evidence shows that the system can support the expected number of service invocations.

The system has been formally tested to meet the service level as defined in the specifications and is capable of scaling to meet service demand.

Hardware and software facilities are in place to scale automatically to meet usage and load requirements.
Achieved matches Planned
Achieved matches Planned
Has this program provided complete examples of all Service Level Agreements negotiated by this provider with others?

No Service Level Agreements (SLAs) have been or will be negotiated by this service provider with others.

Some SLAs have been negotiated and provided for other service providers.

SLAs have been negotiated and provided with other service providers with which it will interoperate.

A complete list of completed examples of all Service Level Agreements (SLAs) negotiated by this service provider with all other service providers and consumers with which it will interoperate has been provided.

SLAs have been negotiated with all other providers and consumers and are automatically enforced by the infrastructure – the ESB.

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>B Root Category</td>
</tr>
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</tr>
<tr>
<td>Answer</td>
</tr>
<tr>
<td>Selected Answer</td>
</tr>
<tr>
<td>Planned Answer</td>
</tr>
<tr>
<td>Planned and selected Answer</td>
</tr>
</tbody>
</table>

To what extent are performance and service levels agreed on?

No service level agreements are included in the description of the service, but are not available for routine use.

Limited service management information, not including performance metrics and problem/condition status information, will be made available to customers or providers of the service.

Service management information, including performance metrics and problem/condition status information, will be made available to customers and providers of the service.

SLAs are part of the service descriptor and are based on open standards. The QoS is dynamically available and can be used to match requestors' required SLAs with a provider's QoS. These services are dynamically discoverable and accessible using network core services for discovery, mediation, messaging, and connectivity.

When do you expect service to be disrupted or unavailable?

No service management information is provided.

Limited QoS information is available at runtime. It is only available through proprietary interfaces and APIs. SLAs are described with program-specific formats.

SLAs are defined with open standards and are dynamically discoverable. Mechanisms are available to provide run-time view of deployed services using open standards.

If service management function is provided, standards used to collect and disseminate service management information, and in what format will it be made available (e.g., SMTP, XML, CIM)?

SLAs are part of the service descriptor and are based on open standards. The QoS is dynamically available and can be used to match requestors' required SLAs with a provider's QoS. These services are dynamically discoverable and accessible using network core services for discovery, mediation, messaging, and connectivity.
## Score Summary

- **25 Total Questions**
- **Max possible score = 25 x 100 point per question = 2500**
- **Planned 38.4%**
- **Achieved 76%**
- **Observe –**
  - Does not have to approach max, just meet or exceed planned

<table>
<thead>
<tr>
<th>Section</th>
<th>Total Questions Applicable</th>
<th>Total Questions Not Applicable</th>
<th>Max Score</th>
<th>Score</th>
<th>Normalized</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service Oriented Architecture</td>
<td>2</td>
<td>0</td>
<td>200</td>
<td>160</td>
<td>80.00 %</td>
</tr>
<tr>
<td>Open Architecture</td>
<td>7</td>
<td>0</td>
<td>700</td>
<td>660</td>
<td>94.29 %</td>
</tr>
<tr>
<td>Scalability</td>
<td>5</td>
<td>0</td>
<td>500</td>
<td>300</td>
<td>60.00 %</td>
</tr>
<tr>
<td>Availability</td>
<td>5</td>
<td>0</td>
<td>500</td>
<td>325</td>
<td>65.00 %</td>
</tr>
<tr>
<td>Heterogeneity/ Accommodation</td>
<td>2</td>
<td>0</td>
<td>200</td>
<td>130</td>
<td>65.00 %</td>
</tr>
<tr>
<td>Enterprise Service Management</td>
<td>4</td>
<td>0</td>
<td>400</td>
<td>325</td>
<td>81.25 %</td>
</tr>
<tr>
<td>Combined Rating</td>
<td>25</td>
<td>0</td>
<td>2500</td>
<td>1900</td>
<td>76.00 %</td>
</tr>
</tbody>
</table>