



# **Geospatial Intelligence Interoperability Through Standards**

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**15 May 2002**

## NIMA Vision and Mission Statements

- **National Imagery and Mapping Agency**
  - Vision: *“Know the Earth... Show the Way”*
  - Mission: provide timely, relevant, and accurate Geospatial Intelligence in support of national security

<http://www.nima.mil/general/25jan02.html>

## Definitions

- **Geospatial Intelligence**
  - is the analysis and visual representation of security-related activities on the Earth
- **The National System for Geospatial Intelligence (NSGI)**
  - is the integration of technology, policies, capabilities, and doctrine necessary to conduct Geospatial Intelligence in a multi-intelligence environment

## NIMA Mission Structure

- **NOW,**
  - respond to analysis and production demands – in what is recognized as a perpetual state of crisis
- **NEXT,**
  - champion and complete a complex set of major investments, to move to the NEXT level of the NSGI
- **AFTER-NEXT**
  - drive toward future technical trends and applying them to operational needs, inserting technology rapidly, and providing relevant Geospatial Intelligence, services, and solutions

## NIMA Strategic Intent

- Provide geospatial intelligence in all its forms, from whatever source – imagery, imagery intelligence, and geospatial data and information – to ensure knowledge foundation for planning, decision, and action.
- Provide easy access to geospatial intelligence databases for all stakeholders
- Create tailored, customer-specific geospatial intelligence, analytic services, and solutions
- Acquire what is available commercially, validate and extend/produce only what cannot be obtained from publicly available sources

Content Standards and Interoperability Division  
Mission Statement

**[NIMA] Lead the identification, selection, development and adoption of imagery, imagery intelligence, and geospatial standards for the National System for Geospatial Intelligence (NSGI).**

## Standards Definitions

- **Open/Consensus Standards:**
  - A document, established by consensus and approved by an accredited standards development organization, that provides, for common and repeated use, rules, guidelines, or characteristics for activities or their results, aimed at the achievement of the optimum degree of order and consistency in a given context. [IEEE P1003.0]
  - The process [of standardization] of developing and agreeing (by consensus or decision) uniform engineering criteria for products, processes, practices, and methods [DoD 4120.3-M]

## Standards Definitions

- **Technical Standards:**
  - As used in this subsection, the term "technical standards" means performance-based or design-specific technical specifications and related management system practices. [PL 104-113]
- **De facto/Proprietary Industry Standards:**
  - A standard [or commercial practice] that has been informally adopted, often because a particular vendor was first to market with a product that became widely adopted. [OpenGIS Guide]

## NIMA Now

- **Products and services based on traditional Military Standards and Specifications**
  - **Foundation Feature Data (FFD)**
  - **Mission Specific Data Sets (MSDS) (land-based, aeronautical, hydrographic information, ...)**
- **Formats predominantly Government (NITF, VPF)**
- **Metadata limited, database or library level**
- **Software: Government off-the-shelf (GOTS), and to a lesser extent, Commercial off-the-shelf (COTS)**
- **Large overhead to maintain and update (documentation, prototype, systems, ...)**

## NIMA Next

- **Build an imagery, imagery intelligence, and geospatial data environment**
  - Create an integrated information libraries
  - Instill practices which provide for fusible data
  - Acquire and access data through federated production among geographically dispersed producers
- **Implement Data Content Standard development**
- **Influence Industry/Academia/Government Standards**
  - Adopt ISO and National Standard profiles in Data Content Standards
  - Ensure Open GIS Consortium (OGC) standards support appropriate Data Content Standards
  - Participate in OGC development of Standards based Commercial off-the-shelf (SCOTS) through interoperability prototypes and joint demonstrations

## NIMA Next (continued)

- **Procure OGC compliant Standards-based COTS (SCOTS)**
- **Adopt and advance ISO Standards**
  - **TC211 Metadata, Spatial Schema, etc**
  - **Sub-committee 29 Compression**
  - **Sub-committee 24 Graphics**
- **Expand application of SCOTS supported Data Content Standards**
- **Establish standard compliance testing**
- **Share costs by applying commercial solutions**

## NIMA After-Next (objective stage)

- **Enterprise Data Environment**
  - capture and maintain authoritative representation of features and attributes (Geospatial)
  - new sensors and exploitation capabilities (Imagery Intel)
  - track changes over time (i.e construction phases of a facility) (support animation)
  - seamless geospatial and intelligence data (fully integrated)
  - metadata “rich”
    - catalogue, discovery and retrieval, and exploitation
  - user profiles
  - Web based services
- **Data Content Standards are needed as mechanisms for interoperability**

**NIMA After-Next**  
(objective stage) (con't)

- **Focus on Research, Development, Acquisition, and Rapid Insertion**
- **Adopt ISO and market driven SCOTS**
- **Require pre-acquisition conformance testing against defined standards**
- **Utilize SCOTS software**

## Standards Community's [re]focus for Coalition Partners

- **Vision**
  - “Setting the STANDARD for Coalition Operations”
- **Mission**
  - Support interoperability of geospatial intelligence for Allied and Coalition Forces, Civil Defense, and Homeland Security
- **Strategic Objectives**
  - Influence, adopt, and profile ISO Standards
  - Influence and adopt OGC Standards and other market standards
  - Invest in advanced technology for the rapid development and exploitation of geospatial intelligence
  - Broaden and diversify membership

Standards Bodies – *How we do this.....*

- **Non-Government**

- Object Management Group (OMG)
- Open GIS Consortium (OGC)
- ISO TC/211 Geographic information/Geomatics
- ISO/IEC SC29, Coding of Audio, Picture, Multimedia and Hypermedia Information
- ISO/IEC SC 24, Computer Graphics and Image Processing
- ISO/IEC 13818 (MPEG)

Standards Bodies – *How we do this.....*

- **Non-Government (cont'd)**
  - International Hydrographic Organization (IHO)
  - International Maritime Organization (IMO)
  - Society of Motion Pictures and Television Engineers
  - International Television Union
  - International Broadcast Union
  - ANSI (L.1, H.3, H.8)

Standards Bodies – *How we do this.....*

- **Government Bodies**
  - NATO InterService Geographic Working Group
  - Digital Geographic Information Working Group
  - NATO Air Forces Armaments Group, Air Group IV
  - ABCA Armies, Engineering WG
  - Federal Geographic Data Committee
- **DISA, OSD, and associated DoD and IC committees**

Standards Community's [re]focus... *time for change*  
Work Agenda for Coalition Partners

- Determine common interoperability requirements for geospatial intelligence
- Develop conceptual and logical geospatial intelligence data models in concert with the user community and other standards' bodies
- Provide a functional layer of expertise between ISO base Standards and application developers, e. g. OGC
- Influence and adopt open market standards
  - ISO Base Standards, OGC, SEDRIS...
  - Profile ISO Base Standards
  - Define Application Schemas

Standards Community's [re]focus... *time for change*  
Work Agenda for Coalition Partners

- **Establish a model-based (UML) and staff sufficient data model expertise**
- **Adopt and drive extensions to neutral exchange formats such as XML, GML, and SVG**
- **Establish Registers:**
  - **rapid review and adoption of data elements**
  - **reduced overhead and maintenance**
  - **authoritative referencing across Standards bodies**
    - **and subsequent cooperative maintenance agreements**

**NIMA and Coalition partners' refocus  
Work Agenda for Coalition Partners**

- Define conformance and conformance testing**
  - Develop rigorous test suites**
  - Identify test facilities available for conformance testing**
    - E.g., Joint Interoperability Test Commands**
    - Other National Assessets**
- Participate in prototypes and demonstrations**
  - CRADAs with international industry**
  - Partnerships with Nations**

NIMA After-Next (definition)

– The After Next is....

a state of constant evolution which embraces components of the Now and Next. The end result is the optimum achievement of single or multiple goals, as originally defined. (As the “temporal components” of the Now and Next change, so does the After-Next)

Standards are ... ***“Shrink Wrapped!!!!”***

# Backup Slides

## Interoperability(definition)

- **Problem: Geospatial data production systems must be both syntactically and semantically interoperable to achieve information interoperability.**
- **- syntactically interoperable - two systems are syntactically interoperable if they use the same structure for information that flows in the systems and is processed by the systems.**
  - **Example: A geospatial data model that conforms to ISO TC211 models would achieve syntactic interoperability across the geospatial community.**
- **- semantically interoperable - two systems are semantically interoperable if they have a common understanding of semantics of the information that flows in the systems and is processed by the systems.**
  - **Example: A geospatial data model that addresses specific implementation issues, such as FACC profile mappings, would be semantic interoperability between those communities that use the same implementation criteria.**

## Data Content (definition slide 1)

- **Data Content**
  - **The complete set of rigorously modeled geospatial data which achieves syntactic or semantic interoperability.**
- **Data Content Standard (DCSTD)**
  - **An adoption or profile of an ISO base standard, which achieves syntactic interoperability of geospatial intelligence. A DCSTD is modeled base and may incorporate aspects from one or more ISO base standards, e.g. 19107 (Spatial Schema), 19127 (Geodetic Codes and Parameters)**

## Data Content (definition slide 2)

- **Data Content Specification (DCSpec)**
  - **An instantiation of a Data Content Standard which defines a set of criteria for a select community, thereby making the data semantically interoperable within the limits of the community. This may include the adoption of a unique coding system for feature and attribute content. A DCSpec shall not specify format.**
- **Application Interface Control Document (AICD)**
  - **A document that precisely defines how the data set is specifically formatted.**