The NATO Codification System as the Foundation of the ECCMA Open Technical Dictionary

Overview

• History and basics of the NATO Codification System (NCS)
• The use and benefits of NCS data
• Case studies
• How the NCS laid the foundation for the ECCMA Open Technical Dictionary (eOTD)
• Video: The importance of using the right name!
What Is the Purpose of Codification?

- To establish a common supply language throughout all logistic operations
- Language independence: All aspects of the item identification and description can be stored and exchanged in an encoded format
- To enable interoperability
- To optimize resource management by minimizing duplication in inventories

**Cataloging = Codification**

Prince Maurits of Nassau-Orange

Simon Stevin
Dutch Scientist
Operational efficiency
Strict stock management

France
1710
King
Louis XIV

Year 1945
January the 18th

President ROOSEVELT:

“I request that procedures be examined to improve goods management for the efficient pursuit of war as well as for business in peacetime.”
Creation of NATO Alliance

- Political cooperation…
  - Language problem!

- Military cooperation…
  - Language problem!
  - Language of logistics also a major problem
  - Each nation and even, each Armed Forces had some type of codification system

1953'S LONDON Meeting

Federal cataloguing becomes NATO codification
The NATO Codification System

• A set of rules and regulations that enable 26 NATO countries and 28 non-NATO nations to exchange logistic information about 16 million items of supply

• A flexible distributed information system that can be tailored to national requirements

To facilitate logistic (co-)operation by using a uniform and common system for:

- Identification
- Classification
- Stock Numbering

of items of supply
Before Codification

I need a washer

Jeg har brug for en skive

Very difficult to work together!

Very difficult to support each other!

Interoperability almost impossible!

Something needed to be done!

After Codification

NCS Principles

One Item of Supply

One NATO Stock Number

5306-00-019-1802

I need a shim

Un disque s.v.p.
The NATO Codification System

- Assignment of a uniform Item Name to an item of supply

- Use of a uniform system of classification of items of supply (STANAG 3150)

- Use of a uniform system of identification of items of supply (STANAG 3151)
NATO Allied Committee 135 Mission

- Provide a forum for discussion on policy matters concerning the NCS
- Review the progress in the implementation and application of the NCS
- Establish common regulations and procedures for NATO Codification

Organization
What Is a NATO Stock Number?

- NATO Stock Numbers represent item of supply concepts rather than an items of production
- An item of supply concept represents a cluster of characteristics related to form, fit, and function
- Many items of production may fit a single item of supply concept

NATO Stock Number (NSN)

MANUFACTURERS IDENTIFICATION SYSTEM
DUNLOP 11-00-20SPTGM
GOODYEAR TIRE CO 11-00-20SRLER
GOODYEAR FRANCE 11-00-20UNISRL
CUP SNC 1100R20GSRT4-16PR

USERS CODIFICATION SYSTEM
NAVY
ARMY
AIR FORCE
OTHER COUNTRIES

2610-14-3224604
Single Stock Number
Total Item Record (TIR)

- NSN
- Item Identification Data
- Freight Data
- I & S Data
- Management Data
- Characteristics Data
- NATO Commercial & Government Entity Data
- Item Names
- Groups & Classes
- Item Identification Data

NSNs and the Item of Supply Concept

<table>
<thead>
<tr>
<th>NSN/NSN</th>
<th>INC</th>
<th>AIN-MUN AIN</th>
<th>TILC</th>
<th>EADD/060</th>
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<td></td>
</tr>
</tbody>
</table>

1. Item Identification Data
2. Manufacturers’ Part Numbers (References)
3. Users
NCS Statistics

• Approximately 16 million NATO Stock Numbers have been assigned
• Approximately 7 million by the U.S. and 9 million by the other NATO countries
• Approximately 30 million reference numbers have been registered on these NSNs
• Approximately 1.5 million manufacturers and other organizations are registered
• These NSNs contain more than 31 million user registrations

The Scope of the NCS

• More than 47,000 structured and defined Item Names
• More than 27,000 properties to describe items
• More than 150,000 property values to discriminate one item from another
NSNs Are Assigned to Spare Parts

A-10
32,254 NSNs

M1A1  21,415 NSNs

HUMMV  14,655 NSNs

What Is Codified?

- Everything needed by soldiers, sailors, airmen, and marines
- Everything needed by all sectors of government, including, office supplies, parts for space vehicles, toiletries, computer equipment, and fuels
NATO Codification System

Users

Navy
Air Force
Marines
Army
National Agencies

DEPOTS
Other NATO/FMS
Private Industry

What is it?
How long to keep?
Price?
Characteristics?
How to handle?
Who uses it?
How to order?
How to store?
What is it?
How long to keep?
Price?

ANSWER = The NSN and associated data
Q: ACQUISITION
What is the part number of known items?
"Which NATO supply class?"
"Who manufactures this item?"
"What should we call this?"
"Is it already stock listed?"

A: CATALOGING
• NATO Stock Number (NSN) records provide:
  -- past sources of procurement
  -- identification of the item
  -- cost of the item
  -- record of key logistics decisions
• NSN is key to other procurement information

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Q: SUPPLY MANAGEMENT
"What's the last recorded price?"
What is the unit of issue?
Can another item be substituted?
What is the acquisition advice code??

A: CATALOGING
• Records initial logistics support decisions
• Records changes to those decisions throughout life cycle
• Provides means to notify all users of changes
• Offers flexibility
• Is a single, comprehensive source of information needed to manage items
**MAINTENANCE**

"What is it?"

What is the CAGE?

**CATALOGING**

- Takes the “wrench turner” from repair manual to the supply system
- Provides information on alternate sources, substitutable parts, interchangeability, and so forth
- Shows who manages the spares, how they’re managed, how much they cost, unit of issue, and so forth

**STORAGE & DISTRIBUTION**

**CATALOGING**

- Indicates hazardous material content, precious metals content, physical security requirements, other characteristics
- Is flexible to meet national requirements for storage & distribution

Q: What is the NSN so I can order it?

A: What is the part number?

Q: What is the CAGE?

A: What is the part number?
**Q:** DISPOSAL

"What is it?" How can I identify this item?

What is the unit of issue?

Should it be demilitarized?

**A:** CATALOGING

- Helps identify unknown items.
- Provides Demilitarization information
- Provides information about hazardous material
- Helps ensure environmentally sound disposal
- Provides storage information

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**Benefits of the NATO Codification System**

**BEFORE**

More Inventory + Multiple Procurements + No Visibility of Assets Across Services = Wasted Resources

- Standard Data Elements
- Item of Supply Concept
- Single Manager

**AFTER**

Less Inventory + Consolidated Buys + Sharing Of Assets = More Effective Force
Operational Advantages of NATO Codification

- Interoperability
- Stock control
- Reduction of distribution networks
- Prompt satisfaction of user needs
- Facilitates technical dialogue
- Easily accessible data
- Standardization of material
- Knowledge of resources
- Accurate description of items
- Common language
- Computerization

Economic Advantages of NATO Codification

- Savings realized on production of new items
- Use of already identified components
- Consolidation of orders
  - Diversity of suppliers
- Widespread knowledge of existing material
- Reduction of spare parts
- Limitation on range of equipment
- Stock reduction
- Elimination of duplicates
- Inventory transfer options
- Accurate identification of items
- Adaptable to technological changes
Benefits of the NCS

- **Operational**
- **Economic**
- **Flexibility**
- **Interoperability**

Relations With Industry  Environment

Benefits: United Kingdom Study

Of the 200,000 new items offered to the UK NCB for Codification each year, approximately 50% are already codified and have been allocated a NSN.
### Item Entry Control

- Prevents unnecessary inventory growth and item duplication. Items managed by NSNs instead of manufacturers part numbers
- Savings in warehousing and item management fees (supply bases managed by contractors, charge $150/line item/yr)
- About 25% of new items detected with existing NSNs each year (5-7,000 items or savings of >$750K/yr)

### OEM Part Number Breakout

- Seek out true manufacturers and their part numbers
- Promotes competitive bidding during procurement, leading to lower prices. OEM prices can be 30% lower than prime contractors prices
Pre-Provisioning Screening

- Items procurement intends to purchase screened against existing inventory for dead/surplus stocks to be released.

- Comparison of last purchase price to help negotiate for better pricing. Recent aircraft project, high value items >US$10K per item screened against NSN file. Difference >US$4M (for 156 items) between contractor & NSN prices.

Can Surplus Stocks Be Released?
What is the Last Purchase Price?
Singapore Study: The NCS Adds Value to Supply Chain Management

- Million Dollar Project Award - International Exposition of Innovation and Quality Circles 2005

Case Study: Codification In Bosnia Peacekeeping

- Logistics operations under UN deficient because of a lack of a common technical language
- Many unneeded spare parts delivered under perilous conditions
- NATO forces found NCS of great benefit after NATO takeover
An international non-profit membership association of industry and government master data managers and their application or service providers

Our Mission

To increase the quality and lower the cost of descriptions through developing and promoting the implementation of International Standards for Master Data Quality

Aims and Objectives

• DLIS and AC/135 undertook the partnership with ECCMA and involvement with ISO for the following reasons:
  – To automate the codification process
  – To improve the quality and availability of data
  – To help align the NCS with international standards
  – To increase cooperation with industry
“There is and always has been a philosophical gulf between the application of cataloging for military purposes and ... for commercial. ...commercial practices are not precise enough to support cost-effective military inventory management and military cataloging is far too detailed and costly for commercial purposes. ...ECCMA offers a way to bridge the gulf” - Mr. Alan Williams, Assistant Deputy Minister, Canadian Department of National Defence

The ECCMA Open Technical Dictionary

- The ECCMA Open Technical Dictionary (eOTD) is an open technical dictionary of cataloging concepts used to create unambiguous language independent descriptions of individuals, organizations, locations, goods and services
- The ECCMA Open Technical Dictionary (eOTD) is based on the NATO Codification System (NCS) with a more modern database architecture oriented toward the commercial world
Common Terminology = Common Mapping

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</table>

Machine Bolt; Product Number: 3225020037; Nominal thread diameter: 1.0 inches; Width across flats: 1.450 inches; Width across corners: 1.653 inches; Head height: 0.591 inches; Count per pack: 10; Pack price: $0.80 (M-Bolt;NTD1.0”;WAF1.45”;CPP10)
NCS – eOTD – ISO 22745

Master Data
NSN
eOTD-r-xml
ISO 22745-40

is coded using concepts in
conforms to the constraints in
Identification Scheme
ACodP-1
ISO 22745-13

Identification Guide
FIIG
eOTD-i-xml
ISO 22745-38

Dictionary
H6+MRD
eOTD-xm1
ISO 22745-18

Terminology Mapping

- Public domain concept identifiers
- Free identifier resolution to underlying terminology (web services)
- Hyperlink to source standards
- Multilingual
- Multiple terms, definitions and images linked to single concept identifier
Transformation Through Automation

Before

• lack of clarity on data requirements
• disparate data format
• disparate data content
• disparate metadata
• potentially subjective human judgment
• operate as an additional process

After

• application processable data requirement statements
• consistently mapped metadata
• standard characteristic data exchange format

impact: faster, better, cheaper

ISO 22745: eOTD as International Standard

• Fundamentals of ISO Standard 22745:
  – Embodies eOTD metadata into international standard
  – Creates a standard data requirements statement (Identification Guide)
  – Creates a standard request for characteristic data that can be processed by manufacture’s applications (PDM, ERP)
  – Creates a standard characteristic data exchange format
  – Describes how characteristic data can be tagged in STEP design files (ISO 10303)
ISO 22745: Automation of Cataloging

• Mapping Catalog Data from Source Data

- features (e.g., thread characteristics including:
  - length (65 mm)
  - form (ISO M)
  - class (6G)
  - diameter (20 mm)

• Create data one time and use throughout life cycle

- definition of the property from the Implementation Guide

- thread class is found by browsing through the feature tree

- data entry field
NATO Cataloging at Source Project

As Is

Vendor → CAD/CAE/CAM PDM ERP → Data

Data → NCS → NCB

Cataloging Application → Structured Data

Documents → Graphics

To Be

Faster - Better - Cheaper

Vendor → eOTD enabled Cataloguing Application

Internet → eOTD-q.xml → Data requirements in application processable format (ISO 22745-30)

Data in ISO 8000 compliant format (ISO 22745-40)

Internet → eOTD-r.xml → eOTD enabled PDM or ERP
Rendering of ERP Long and Short Descriptions

Original Supplier Catalog Description

P/N 1234EF: 400KW 6 POLE 525VOLT FRAME HGF355E: FT MOUNTED RPM 988 SF1,0 CODE G:IP65:INS F:IL/IN 6.6:DUTY SI: NR.88695 11 00:AMB 40DEGREE C:DELTA T 80DEG: COS 0.86:COOLING IC 411:ALT1000M

Original ERP Short Description

ELECTRIC MOTOR

Standardized ERP PO Description

MOTOR, ELECTRIC: POWER RATING 400 KW, ELECTRICAL RATING 525 V, FRAME HGF355E, FOOT MOUNTING, SPEED 988 RPM, INSULATION CLASS F, 6 POLES, SERVICE FACTOR 1.0 CODE G, ENCLOSURE IP65, MNFR P/N: 1234EF MNFR: WEG, FFT: IL/IN 6.6: DUTY SI: NR.88695 11 00:AMB 40 DEGREE C:DELTA T 80DEG: COS 0.86:COOLING IC 411:ALT 1000M

Rendering of ERP Long and Short Descriptions

ISO 8000: A Standard for Master Data Quality

• Fundamentals of ISO Standard 8000:
  – Set standards and a certification process for master data quality
  – Encompasses master data quality but can easily be extended into all types of data quality
  – Defines different areas of data quality
    • Provenance
    • Traceability
    • Currency
    • Completeness
Benefits of ISO 8000

• Providing faster access to better quality characteristic data
  – Faster NSN assignment
  – More complete records
  – Better search resolution
  – Fewer duplicates
  – Fewer item reduction studies
• Benefits
  – Higher customer satisfaction
  – Savings in design and life cycle costs
  – Reduced acquisition lead time
  – Increased supportability and safety of systems and equipment

YOUR POINTING AT IT WON'T HELP - THE COMPUTER RECORDS SHOWS NONE IN STOCK.
What is the cost of bad data quality?
In this case $125,000,000
The price of a Mars Climate Orbiter!

<table>
<thead>
<tr>
<th>Mars Orbit Insertion Burn</th>
<th>M/D/Y HH:MM:SS PDT (Earth Receive Time, 10 min, 49 sec. Delay)</th>
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International Organization for Standardization

- 156 National standard organization members (one per country)
  (AFNOR, ANSI, BIS, BSI CNIS, DIN, PKN ..........)
- 192 Technical Committees
  - 3 000 Technical bodies
  - 50 000 domain experts
- Central Secretariat in Geneva
  - 150 staff
- ISO TC 184 Industrial automation systems and integration
  - ISO TC184 SC4 Industrial data (STEP)
    - ISO 22745 (open technical dictionaries and their application to Master Data)
    - ISO 8000 (Data Quality)
ISO TC 184/SC 4 voting members

- Australia, SAI Standards Australia International, Ltd
- Austria, ÖNORM Österreichisches Normungsinstitut
- Brazil, ABNT Associação Brasileira de Normas Técnicas
- Bulgaria, BSI State Agency for Standardization and Metrology
- China, SAC Standardization Administration of China
- Czech Republic, ČSN Czech Standards Institute
- France, AFNOR Association française de normalisation
- Germany, DIN Deutsches Institut für Normung
- Italy, UNI Italian National Standards Body
- Japan, JISC Japanese Industrial Standards Committee
- Korea, KS T Korean Agency for Technology and Standards
- Netherlands, NEN Nederlands Normalisatie-instituut
- Norway, SNI Standards Norway
- Portugal, IPQ Instituto Português da Qualidade
- Russia, GOST Federal Agency on TechnicalRegulating and Metrology
- South Africa, NASREC South African Bureau of Standards
- Spain, AENOR Asociación Española de Normalización y Certificación
- Sweden, SIS Swedish Standards Institute
- Switzerland, SNV Swiss Association for Standardization
- United Kingdom, BSI British Standards Institution
- United States, ANSI American National Standards Institute

Justification for ISO 22745/8000

- Item reduction studies (identification of duplicates)
  - Save up to 15% of total inventory cost
- Better sourcing and contracting
  - Save up to 20%
- Substitution and interoperability
  - Part standardization during design and manufacture
    - Increases equipment availability
    - Can be mission critical
Codification: the Center of eCommerce

- Online catalogs are a critical success factor for eCommerce initiatives
- An electronic representation of goods and services: facilitates global buy/sell activities

The eOTD is a foundation for design collaboration and industry standards.

ISO 22745 and the eOTD are the foundational enablers for the breakthrough our industry needs in the next generation of direct, accurate, and effective collaboration across the supply chain at meaningful and granular levels of data exchange never before imagined.

Alton Sanders
Senior Manager,
IDS Engineering Standards Control Function
PW Knowledge and Reuse Management (KARMA)
“Boeing currently buys 200 different kinds of safety glasses and 80 different shades of white paper. The defense and commercial aircraft divisions each negotiate for their own aluminum and titanium. Why can’t we buy two or three kinds of safety glasses? Why can’t we have standard part numbers that go across the enterprise?”

One Common Anglo Number

Standardised Long Description:

Standardised Short Description:
Tire Pneumatic: Loader 25' 445mm 0.95 2*

The Value

masterpiece

sparesFinder

Catalog Compose: Cleansing Productivity Tool

Stock Code Catalogue Data Sheet

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Value</th>
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<td>NULL</td>
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<tr>
<td>OPERATED</td>
<td>HANDLEOVER</td>
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<tr>
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<td>ENDM</td>
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<tr>
<td>TIGHT</td>
<td>BALL &amp; SEAT</td>
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Generate New Descriptions

A Vision Realized

• The NATO Codification System is the foundation of an international standard for creating standard descriptions

• The eOTD is an open standard for encoding Master Data through the life cycle of a product – from design through disposal
Vision of the Future

- Logisticians will manage information more than material
- NCS data is the foundation for logistics information
- Benefits will grow

Vision for the Future

What is impossible to do right now, but, if you could do it, would fundamentally change your business?

1990 Joel Arthur Barker

- Cataloging at source (vendor supplied data)
  - Common metadata
    - an end to data mapping
  - Requirement specifications
    - an end to incomplete data
  - Data provenance
    - an end to inaccurate information
- Lowers the cost of cataloging and increases long term data reliability!