

NATO INTERNATIONAL STAFF - DEFENCE INVESTMENT DIVISION

**ALLIED
UNIQUE
IDENTIFICATION
OF ITEMS
PUBLICATION**

**AUIDP-1
(Edition 1)**

**NATO GUIDANCE ON
UNIQUE IDENTIFICATION
(UID) OF ITEMS**

**AUIDP-1
Edition 1**

JULY 2010

**NATO GUIDANCE ON UNIQUE
IDENTIFICATION (UID) OF ITEMS**

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(Edition 1)**

July 2010

NORTH ATLANTIC TREATY ORGANIZATION
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Director, NATO Standardization Agency

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PREFACE

1. In response to a task from the NATO Life Cycle Management Group (LCMG) / AC/327, Working Group 5 developed this document as NATO guidance for unique identification (UID) of items (note: as used in this document “UID” should be considered synonymous with “UID of Items”).
2. AUIDP-1 defines the general approach for UID within a System Life Cycle Management (SLCM) framework and provides guidance on the application and implementation of methods for UID, i.e.:
 - item identification within the AAP-48 defined SLCM processes,
 - identifying, marking, and registering items using Unique Item Identifiers (UII),
 - the complementary relationship with NATO Codification,
 - enabling improvements to asset visibility, data exchange, and multinational logistics operations,
 - sample implementation details in Annexes providing contract language, registry content, and case studies.
3. To realize the benefits of UID, relevant NATO policy and guidance documents need to define the implementation of UID within each process, therefore process owners should utilize the AUIDP-1 as a reference when establishing or modifying these documents to implement UID. For example, if UID is critical to configuration management, the Allied Configuration Management Publications (ACMPs) will need to define the specific application of UID within configuration management processes and procedures.
4. Implementation of UID within operational systems and processes should also provide similar benefits within aspects of operations and Operation Logistics Chain Management (OLCM).
5. Specific nations, agencies or acquisition programs may develop program-specific UID implementation plans that define the applicability of UID within their area of responsibility.
6. Industrial partners will need to consider the impacts and can leverage the benefits where NATO, national, agency and acquisition programs adopt UID; or without such adoption if industry business process improvements support implementation. These impacts and benefits are very similar to those described throughout this guide.
7. AUIDP-1 should be read in conjunction with AAP-48, *NATO System Life Cycle Stages and Processes*, ISO 15288 *Systems Engineering – System Life Cycle Processes*, and Standardization Agreement (STANAG) 2290, *Unique Identification of Items*, and other references cited throughout this document.
8. Consideration is given to NATO data exchange standards.
9. Access to and requirement for UID data will be based upon the functional role of each user.

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- Annex 3: UID of Items Application within System Life Cycle Stages and Processes
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1. INTRODUCTION

This publication provides guidelines for implementing Unique Identification (UID) of Items concepts, specifically:

- What items are to be uniquely identified
- How to mark items
- How to manage the data related to marked items
- How to exploit the assured data delivered by the capability of UID

This publication supports NATO decision makers in consideration of UID as a means to improve upon life cycle processes and operations. These processes include, but are not limited to codification, configuration management, sustainment, asset tracking, inventory and supply chain management, and analysis of the effectiveness within the System Of Interest (SOI).

This publication can be used by NATO, NATO agencies, nations or programs to adapt Standardization Agreements (STANAG) or publications to incorporate UID within functional areas, or as support in development of UID implementation plans. These implementation plans provide detailed information regarding the methodology for selecting which items are to be uniquely identified with UID, and how Information Systems (IS) and business processes will leverage UID. Figure 1-1 shows the relationship of AUIDP-1 to other NATO agreements, publications, and implementation plans. Annex 1 provides a template for implementation plans.

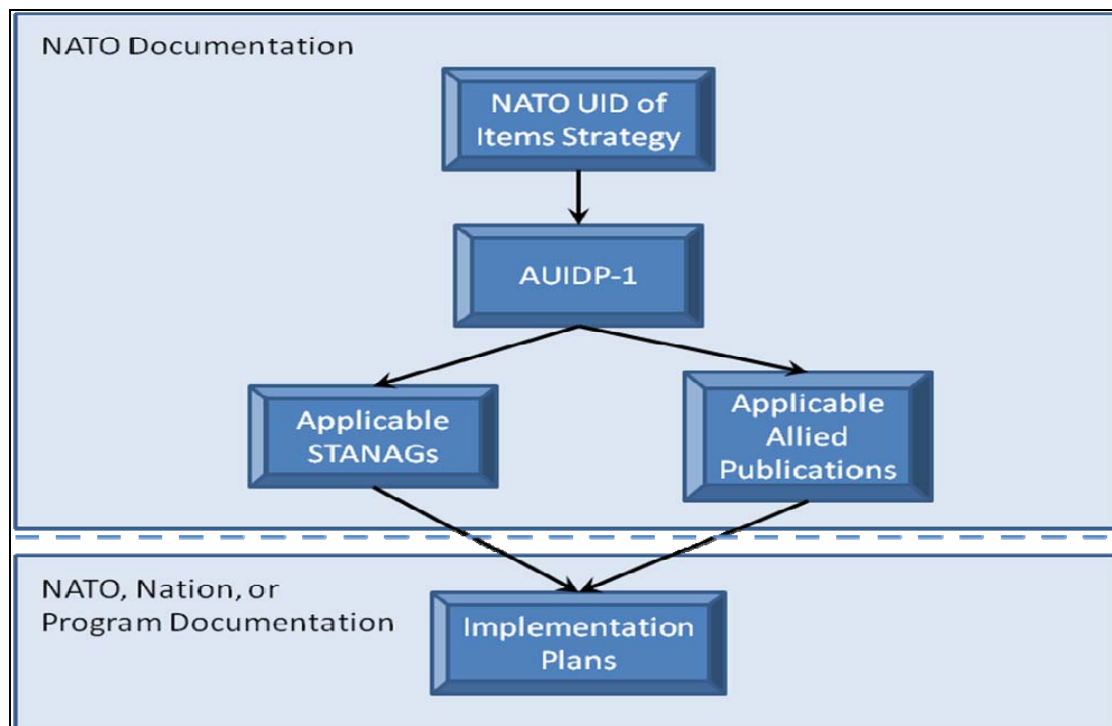


Figure 1-1: AUIDP-1 Relationship in Development of Related Documentation

Additionally, this publication identifies the common use of UID and establishes a set of standards within IS and processes to improve item traceability and data sharing in

support of System Life Cycle Management (SLCM)¹. Examples of UID case studies, contractual language and registry structure are provided in the Annexes.

1.1. Purpose

To achieve the above stated goal, this publication:

- Explains the concept of UID
- Identifies roles and responsibilities for UID
- Provides guidance on which items are to be uniquely identified
- Provides guidance on how to mark items in accordance with STANAG 2290 “UID of items” to establish a population of compliant items
- Illustrates improvements in data quality achieved through automatic data capture and data exchange
- Provides guidance on how to establish and maintain UID registries
- Provides guidance on how to use and exchange UID related data to assure the availability of timely and accurate information
- Identifies potential benefits through application of UID to deliver more effective systems life cycle management
- Provides a potential implementation path for national consideration to adopt and exploit UID
- Provides a framework for industrial partner use when planning their own implementation whether in response to a requirement or self-motivated adoption.

1.2. Applicability

This publication is applicable to NATO bodies and agencies, nations and industry, in their roles as system or item acquirer, supplier, through life manager, custodian, sustainment provider, or operator for all life stages described within AAP-48.

This publication applies to:

- NATO-owned systems
- Employment of national UID assets provided in support of a NATO operation
- Employment of national UID assets within the framework of a NATO multinational programme

The extent of implementation of UID within a SOI depends on:

- The SOI's scope and complexity
- Operational or special requirements for item level traceability
- The planned or existing capabilities for marking, Automatic Identification and Data Capture (AIDC) in through-life processes, and common utilization of the system by nations adopting UID

¹ See CM(2005)0108: NATO Policy for Systems Life Cycle Management

All enterprises implementing UID should establish the necessary policies and contractual arrangements (see Annex 4).

This publication is part of the conceptual framework defined by AAP-48 establishing UID as an enabler for operations, logistics and SLCM. Within SLCM, this publication can be considered within the “Framework Document (enablers)”, as shown in Figure 1-2¹.

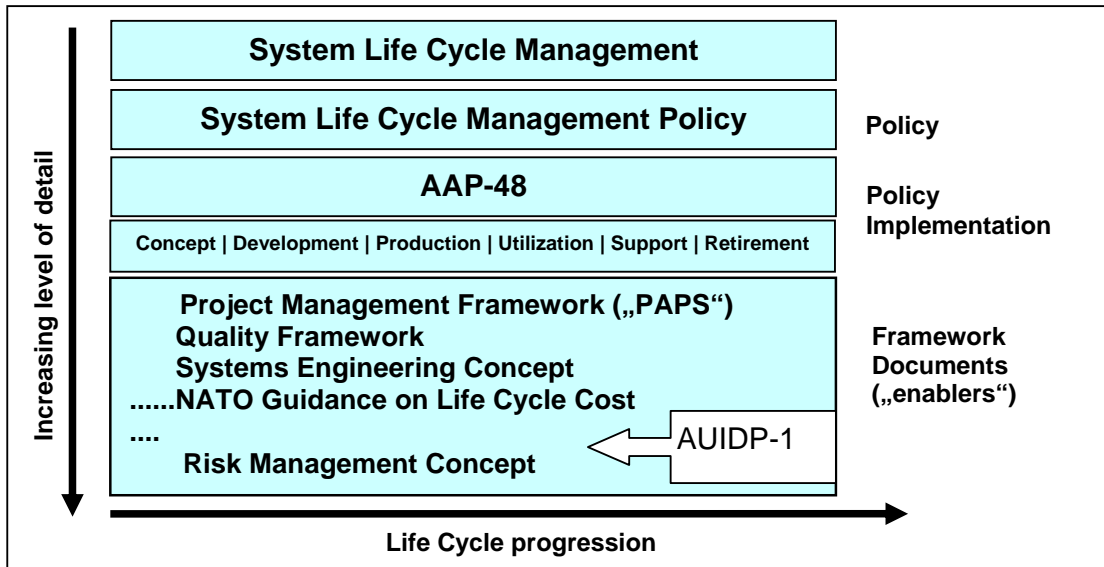


Figure 1-2: Adapted SLCM framework from AAP-48

1.3. UID of Items Concept

UID is a common standard and a set of business rules for identifying *serially managed equipment* and *items of supply*. UID standardizes the method for assigning serialized reference numbers, called Unique Item Identifiers (UII) for these discrete items. UII assignment ensures global uniqueness within ISO/IEC 15459 applications ensures quality data capture through the use of a machine-readable, two-dimensional ECC 200 data matrix² symbol with the encoded UII information, and establishes a common data key (i.e., the UII) for each information system to collect, manage, and share information related to that serialized item. UID marking requirements and construction of UII and are fully described in STANAG 2290. Any implementing organization can incorporate UID marking on items by complying with STANAG 2290.

UID does not replace the NATO Codification System (NCS), which is in widespread use throughout all NATO nations (including Partnership for Peace (PfP) nations) and is supported and used by industry. NCS will continue to be the basis of stock identification where the same items of supply are given a unique NATO Stock Number (NSN). Further information on the relationship between UID and the NCS is provided in section 2.4 of this publication.

¹ AAP-48 NATO System Life Cycle Stages and Processes

² STANAG 2290 provides details on the ECC 200 Data Matrix Symbol and encoded data

In general, terms, UID provides the same baseline benefits of any method of serialization in terms of tracking:

- Ownership/custodian and location,
- Collecting utilization and maintenance/repair history
- Identifying applicability of a warranty against an asset
- Performing configuration management

Beyond these baseline benefits, UID:

- Incorporates machine-readable information on each item in a common data format
- Simplifies data entry through AIDC therefore improving data quality
- Uses UII as the common data key for uniquely identified items, having the potential to improve interoperability between IS regardless of functional domains (e.g. engineering, maintenance, distribution, asset management, acquisition, financial management), by utilizing UID within data exchange standards.

As a standards-based identification system, UID is designed to support operational and SLCM decisions by enabling NATO, NATO nations, PfP nations, and industry to improve data sharing, data retrieval and data quality related to serialized items.

UID can and should be used in life cycle processes that benefit from serialized management of items, but must be integrated into the processes and supporting IS to capitalize upon these benefits. Policy, process, procedure and IS changes may be required to achieve maximum benefits from UID implementation. Benefits are based on the degree of process improvement that results from the changes. These improvements range from automating current manual processes to organization-wide process re-engineering. Figure 1-3 shows that to improve SLCM capabilities through UID, an organization must first establish a machine-readable marking capability and then exploit AIDC.

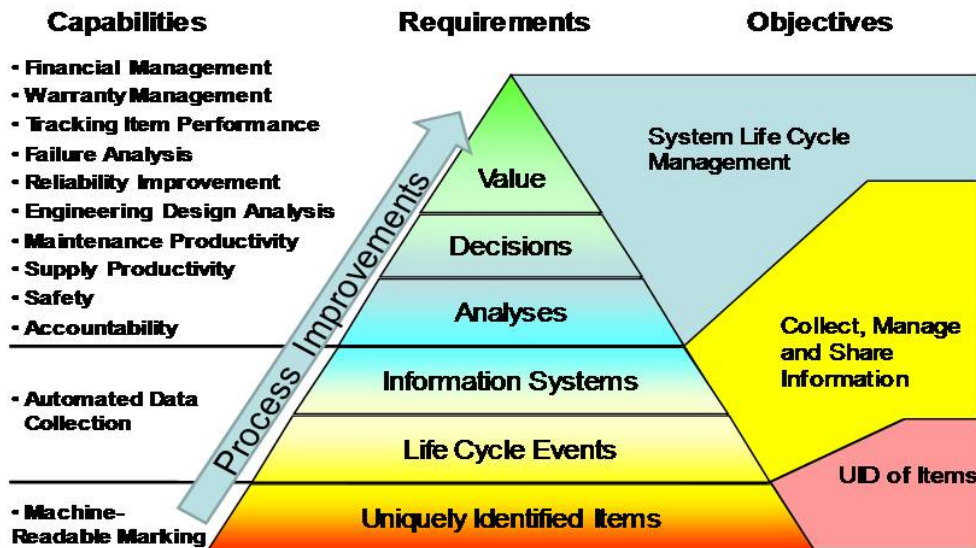


Figure 1-3: System Life Cycle Management Implementation Hierarchy

2. ITEM MANAGEMENT

2.1. Challenges

In an environment as diverse and complex as NATO, maintaining oversight of items within inventory across multiple global operations, exercises, maintenance facilities, storage depots, and during transit is a daunting task. In addition to knowing where an item is, other useful information is often needed; for example:

- What is its status and residual potential?
- Who is the custodian of this item?
- What configuration is it in?
- What is its repair and maintenance history?

Information systems play a key role in identifying, tracking and attributing relevant information about items throughout their lives. To have timely and accurate information about items in inventory, IS need to be capable of discerning individual items within an inventory. A significant challenge to effective item life cycle management is the lack of interoperability among existing IS. Therefore, for items requiring UID, it is necessary to facilitate data sharing between IS, and to access the item-level information using a UII as a common data key.

2.2. Differentiating Items

Unique identification provides the opportunity to differentiate an individual item from all others. UID provides a common means to track characteristics of individual items beyond what is common to items within the same NSN. Examples of this are:

current and past custodian, usage since last scheduled inspection, age, condition, configuration, and location.

UID provides not only a method of serialization that ensures global uniqueness, but also the UII data element format for a standard means of identifying items in each IS to facilitate data sharing. Additionally, critical to differentiating items throughout the inventory is accurately identifying them during each transaction.

2.3. Serialized Management

UID provides a standardized means for serialized item management within NATO, and with NATO partners, replacing and improving upon previous (non-standardized) means of serialization often using other data elements relating to an item, or numbers with no relationship to the item. Similar to legacy methods, it builds upon the foundation of common information available about items through reference of their NSN and manufacturer part number provided through the NCS. Examples of when NATO has responsibility for serialized item management are listed in section 2.5.2.

2.4. UID and NATO Codification

The NCS was introduced in the mid 1950's as the basis of Materiel Identification for all military forces within NATO. Under the NCS, all equipment components and spare parts are uniformly named, described, classified and assigned a unique 13-digit NSN.

2.4.1. Aim of NCS

The principle aims of the NCS programme are twofold:

- To facilitate interoperability between NATO and coalition forces by enabling identification of materiel by a common stock number thereby facilitating the demand and exchange of equipment independent of national languages
- To achieve cost efficiencies, the use of NSN facilitates elimination of duplicate stock holdings of the same item held under different stock numbers or categories, particularly during multinational operations

2.4.2. NCS Applicability

The NCS is operated by all NATO nations as well as a further 30 Partner nations around the world. These nations operate the procedures and processes of the NCS and contribute to the common NATO Codification Database – the NATO Master Catalogue of References for Logistics (NMCRL), which contains details of some 16 Million NSN as well as some 33 Million Part-Numbers and details on 1.7 Million manufacturers and suppliers.

2.4.3. NCS Basics

The NCS describes items that satisfy specific user requirements and nominates these as *Items of Supply*. Many manufacturers around the world produce functionally identical items and allocate their own description and part numbers known as *Items of Production*. The NCS examines these Items of Production and where it can be demonstrated by examination of their characteristics that they are satisfying the same user requirements, they are designated as an *Item of Supply*. Whenever

possible, an international normal standard specification should be assigned to the NSN.

The basic principle of the NCS is that one Item of Supply is given one NSN. However, the NCS has no function to identify Items of Supply by serial number. Where this requirement exists, it is done on a national basis using national methods for identifying and controlling individually serialized items.

2.4.4. Complementary Role of UID to NCS

The UID concept therefore operates at a different and complementary level from the NCS in terms of materiel identification. However wherever possible and practicable, it is intended that NCS and UID should operate in tandem and that each should add value to the other by providing the Programme managers, engineers, logisticians and other users with complete information on equipment and materiel. Subject to refinement and trial, it is anticipated that the two systems will operate in harmony to benefit programme managers and others. For example:

- Identify the complete capability of an Item of Supply through use of the NSN by accessing the NMCRL
- Identify the complete item history for UII marked items

NSN is used to identify the capability, supplier information, and stock levels, but the UII can be used when there is a need to understand the configuration, age, warranty, maintenance history, operational usage, and location of individual assets.

Figure 2-1 depicts a scenario where a replacement part is needed during a NATO operation. This figure defines a conceptual decision approach using both UII and codification data to source a replacement UID managed part from national, multinational, or company (supplier) stocks where specific attributes may be needed (e.g. more than 500 remaining hours before scheduled removal.) These attributes are associated with individual UII within national Logistics IS, and nations that manage by UII are flagged within the NATO Total Item Record (NTIR).

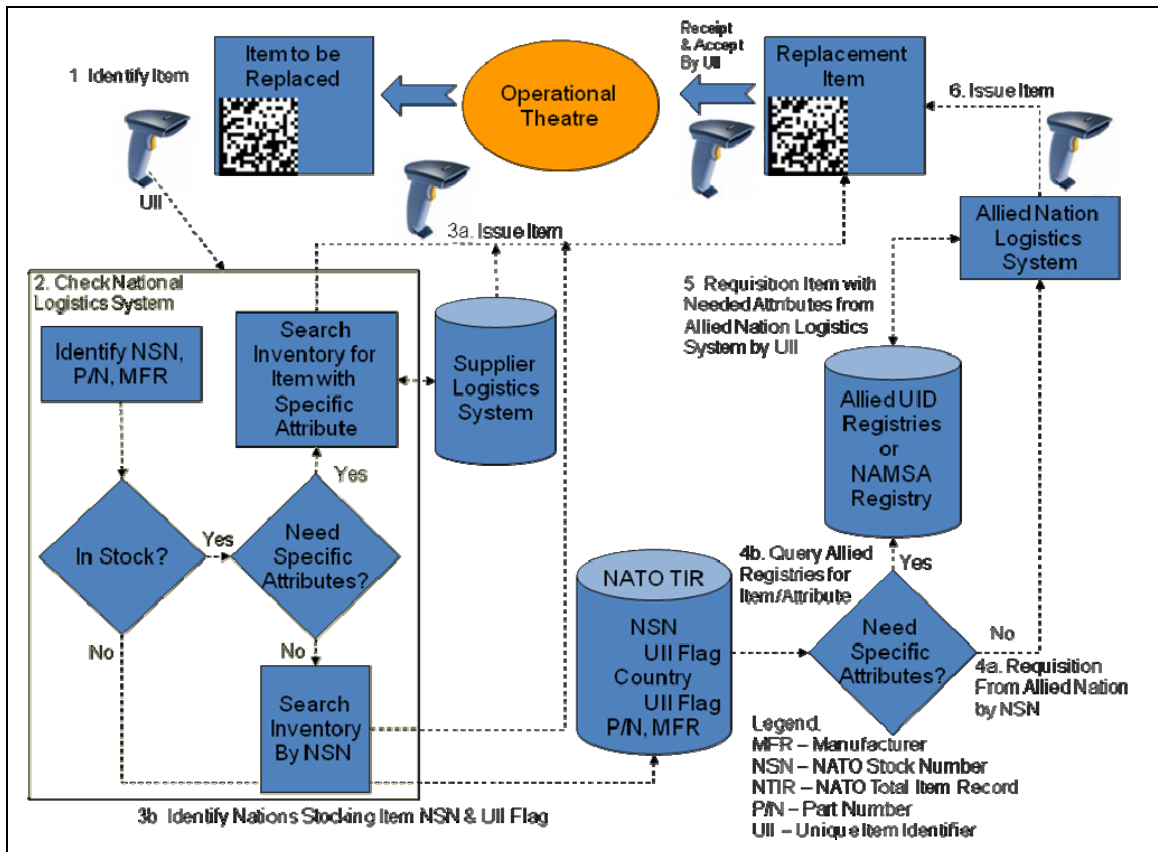


Figure 2-1. UID and Codification Supporting Logistics – Part Needed Scenario

In another example, a national Light Armoured Vehicle project uses both UID and NSN within its *Sense and Respond Logistics* environment. On-board sensors collect usage data, which are associated with the related UII. When a repair part is needed, the fault code, troubleshooting tasks, and usage history associated with the failed part are associated with the UII within the maintenance management IS to improve the ability to tailor the overhaul of the repair item, identify if it is under warranty, or if it requires modification. Since the replacement part must only be a form, fit, and function replacement, it is processed within the material management IS using the NSN that is applicable to the parent SOI under repair.

NSN has primacy as the basic standard for all nations to define an Item of Supply. The information associated with a UII is specific to the serialized item. Even Items of Supply that are managed by UII will still utilize NSN and NATO reference (i.e., NCAGE and Part Number) as common data keys for searching in NMCRL.

2.4.5. UID Enhancing, Not Replacing NCS Capability

It should be clear that UID will not replace NSN, or any other element of the NCS. While UID enables enhanced visibility of the history and traceability of an Item of Supply, the ability to reference all common characteristics is done through association with NSN and NATO reference related NMCRL data. This provides tremendous efficiency over association of these attributes to each UII, and maintains

the commonality of the NCS for items for which UID is not applicable. Figure 2-2 shows an example of item management using both UID and NSN.

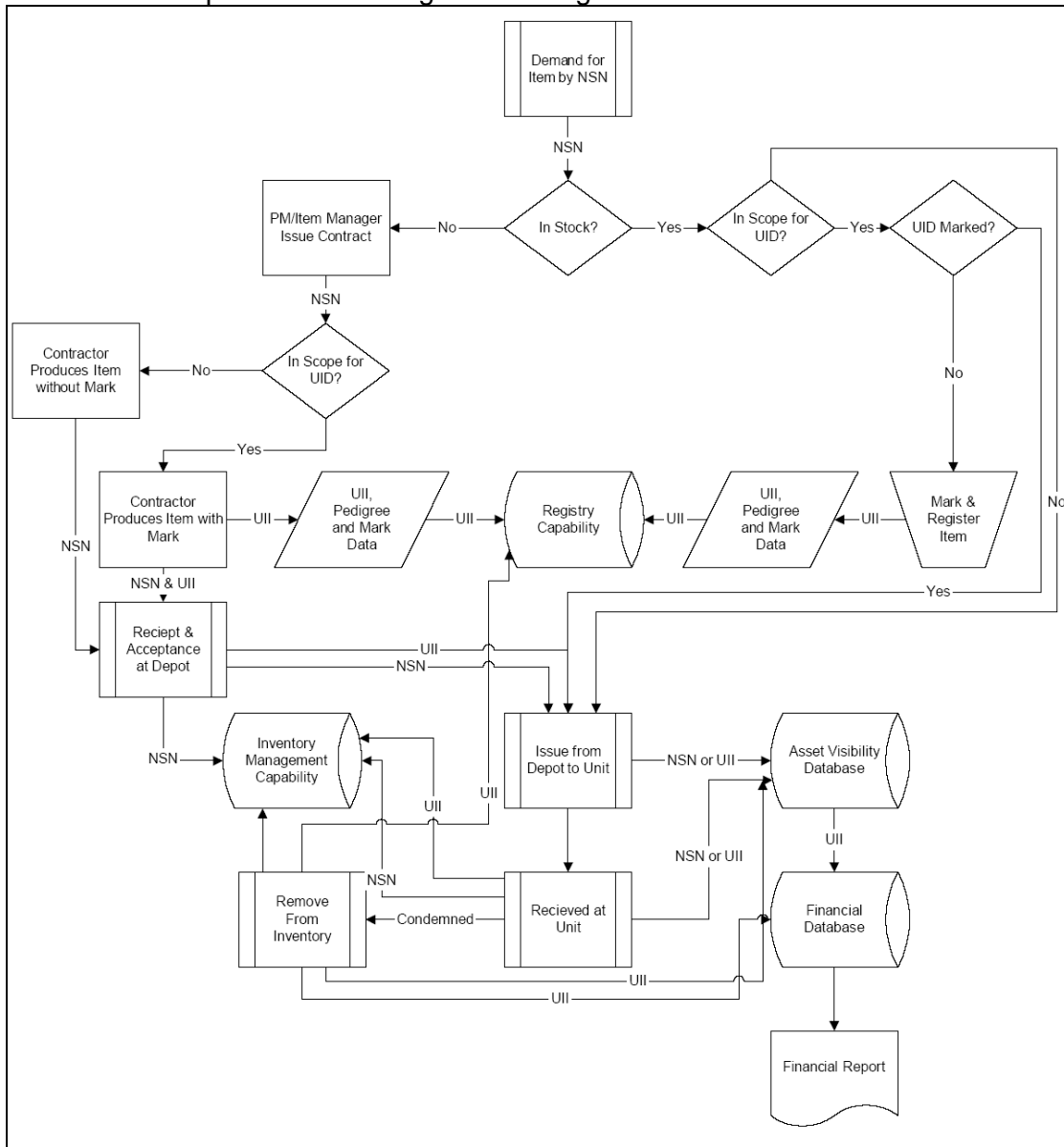


Figure 2-2. Item management using both NSN and UII

2.5. Item Selection Considerations

NATO and nations have an inherent responsibility to identify and track individual items under numerous policy and procedural requirements. A logical starting point for the adoption of UID is serial number tracked items, small arms, and other controlled inventory items.

2.5.1. NATO Unique Considerations

NATO operates, maintains, stores and transports both NATO owned and national owned items. When NATO determines to mark items either owned by NATO or in NATO custody there may be a justification for marking similar national assets. Additional benefits can be derived by uniquely identifying items in NATO custody that

are not owned by NATO (particularly if the owning nation already uses UID) and for NATO items that are in use by nations. The owner of the item (if other than NATO) must be consulted prior to application of UID and then provided the UII and marking information.

2.5.2. Items to be Uniquely Identified

Items to be uniquely identified are to be determined by nations, or for NATO commonly funded items, by NATO programme managers, applicable NATO agencies or bodies. A general recommendation is to establish a critical mass of items for enabling IS and processes to exploit benefits from UID. The following categories of items are considered an initial baseline for identifying with UII:

- Configuration Items (CI)
- Repairable items
- Currently serially managed items
- Controlled Items
- Items requiring certification, calibration, or confirmation of disposal
- Items required by statute or policy
- Items with a significant value or cost
- Items constructed, at least partly, by separately identifiable UID components
- Items identified as being mission critical, and assigned a RIC at the NSN level
- Items subject to one or more forms of through-life measurement
- Life limited components
- Government Furnished Equipment in contractor possession

If Items are uniquely identified with a UII for the purpose of identification during temporary custody or use in an operation or exercise, they are still permanently assigned that UII, and must be marked in a manner that will endure within the intended environment.

2.5.3. Depth of Implementation within an SOI

The use of UII to uniquely identify items that are components of an SOI provides the same benefits of UII on the SOI itself. In addition to the considerations in section 2.5.2, the decision of which components of a system for UID should therefore be in accordance with the maintenance plan of the SOI.

2.5.4. Marking Items

2.5.4.1. New Acquisitions

Items being procured are the best and most cost effective candidates for adopting UID. They will have the greatest amount of their life cycle to return on the investment, and decisions such as marking method and location are made by the manufacturer or by the engineering design authority if not the manufacturer. This enables UID execution during production and prior to delivery. Recommended language to include in contracts for requiring UID is included in Annex 4 of this publication.

2.5.4.2. Items in Operational Use and Inventory

Items that meet the recommendations of section 2.5.2 of this publication, and were not delivered from the manufacturer with compliant UID markings are also candidates for UID. Since some items remain within the inventory for decades, and process improvements enabled by UID may provide for enhanced inventory management, tracking, or accountability of items, it is still important to consider these legacy items in the inventory. It will take years to both implement process improvements using UID, infrastructure improvements and incorporate marks on items; therefore it is recommended that programme managers consider SOI retirement plans before implementing UID.

In addition to the recommendations of section 2.5.2, special considerations should include:

- Whether newly acquired items of the same design are being delivered with UII marks (hence, design activity is complete)
- Capabilities within commercial or organic repair facilities for affecting STANAG 2290 compliant marks
- What marking methods are applicable to the item, and if this further limits the opportunities for affecting the mark
- If the item is repairable; If so, how often it is accessed or undergoes repair
- How large the population of items is within the inventory and whether they are marked
- What the expected cost of marking will be
- If there are current information gaps that could be mitigated through application of UII to the inventory

2.5.5. Calculating Return on Investment for UID on an SOI

One consideration of implementing UID is its impact upon Life Cycle Cost. Refer to ALCCP-1, *NATO Guidance on Life Cycle Costs* for specific guidance on performing a Life Cycle Cost Estimate. General categories and considerations for cost estimation are provided to quantify costs and benefits associated with UID implementation:

Costs:

- Determining the depth of implementation within the SOI
- Determining marking method and location (including engineering analyses)
- Equipment, labour or contract cost for marking items
- Process changes implementation
- Acquisition or modification of IS to use UII and AIDC
- Acquisition, fielding, and sustainment cost of AIDC readers
- Communications infrastructure capacity and compatibility improvements

Benefits:

- Data entry and data cleansing labour saved using AIDC
- Inventory, maintenance, and logistics labour saved using AIDC
- Reduction in number of lost inventory items
- Improved configuration management
- Improved item visibility and accountability

- Accurate information on characteristics and their distribution (i.e. failure rates) over items of supply
- Improved item traceability through life, and its support to SLCM decisions

Of note, if UID is planned to be utilized across the board for selected items within a site, process (depot, overhaul contact, etc.), or operation, return on investment may not be the driving factor in the decision to implement.

3. INCORPORATING UID ON SOI OR ITEMS

The basic requirements for adopting UID on a system or item are to:

- Physically mark the item with data matrix with the encoded UII information
- Register the item in the appropriate registry
- Ensure that appropriate IS utilize UII to identify and exchange data about serially managed items.

3.1. Marking Items and Ensuring Unique Identification

STANAG 2290 provides information on how to develop a standardized structure and content for UII to be used by NATO and nations, and provides guidance for the physical marking and content of the machine-readable Data Matrix symbol applied directly to each item or data plate/label and packaging. STANAG 2290 provides details on:

- Construction of Unique Item Identifier
- Marking of Items with a Unique Item Identifier

3.1.1. Using Existing Processes for Marking Construct Determination

Each organization physically marking items should be assigning UII based upon STANAG 2290 and internal rules that ensure global uniqueness. Suppliers or producers will generally determine which construct and encoding semantics are used in marking newly produced items. They should consider business processes, and specific circumstances when determining the UII construct that is applicable to the equipment being marked. If a supplier has an established serialization scheme in place that meets the requirements of STANAG 2290, such as the Vehicle Identification Number (VIN) number for automobiles, it should be the scheme of choice for UID identification.

Suppliers should not be required to accommodate a customer request for a specific UII construct. All UID enabled AIDC, IS and processes must be capable of accepting all STANAG 2290 defined UII constructs and UII equivalents, therefore customer directed constructs both raise manufacturing costs and provide no benefit.

3.1.2. Marking New Procurements

Requiring STANAG 2290 compliant marking is simplest during the development stage of the life cycle. In the case of newly designed items, the requirements can be built into engineering documentation and processes in the design process where the cost is negligible. For procurement of existing items, the complexity of the implementation may vary depending on the marking approach used and the capability of the provider to make modest changes to existing markings on the item. For example, adding the data matrix symbol to an existing data plate or label typically does not affect form, fit or function, and is considered a minor engineering

change. For procurement of items designed previously, negotiation with the supplier should include discussion on the business value to the provider of their ability to use UII in their processes, and what data can be shared from NATO usage and field maintenance.

Manufacturers should consider where within the production process marking will occur. Organizations shall identify any manufacturing processes after marking that may affect the readability or adherence of the mark or label. Where items are received without marks, a process by which items can be marked must be in place to mark the item and ensure that associated data is captured and placed into the appropriate registry.

3.1.3. Marking Existing Inventory

Plans for marking legacy items in accordance with the marking method specified by the design authority must balance costs and benefits:

- The resources needed for equipment, training and material to generate and register the marks in the registry at each location
- The timeline by which equipment marking is desired to be completed
- The accessibility of the items to be marked while in operations, storage or transit
- Benefits such as those described in section 4 of this publication

It is not feasible to remove most items from service, and disassemble them solely for marking and registration of the desired components. Often, it is unreasonable to remove items in storage or transit from packaging for marking purposes. To overcome these challenges, two strategies are provided below. These strategies are not mutually exclusive, and a combination of them may be optimal.

3.1.3.1. Using Existing Events for Legacy Marking

Opportunities to mark and register existing inventory items occur at events such as maintenance, modification, or item receipt. Using these opportunities to mark items minimizes the impact to cost and operations. The number of events required to complete the marking depends upon the frequency and duration of opportunities for marking within the planned marking timeline.

3.1.3.2. Using Seek and Apply Strategies for Legacy Marking

A second strategy to consider is to *seek and apply* marks and to register in an active marking campaign. This strategy generally is best applied to either small populations of items in a geographically close space, or when site-wide marking activity is planned (e.g. within a warehouse.)

3.1.4. Renewal of UII Markings

All system maintenance planning efforts should include maintenance of the UID mark to ensure the machine, and where applicable, human readability of the UID markings. Supply, maintenance, repair or overhaul procedures should be reviewed for non-intrusive opportunities to verify the integrity of the mark, and provide a process to renew the mark with the original encoded data. This is applicable when the original mark is missing, but known, or when the quality of the mark is compromised.

3.1.5. Marking Within Support Contracts

All maintenance, overhaul, and modification contracts are appropriate opportunities for applying and registering newly marked items or renewing marks on previously marked items, and should include requirements within the contract. This approach is applicable to both legacy items to be initially marked, and for renewal of marks. Annex 4 of this publication provides marking language for inclusion in contracts. This language can also be tailored to require marking within support contracts.

3.1.6. Marking Method Selection

There are several methods available to mark items with the UID compliant data matrix symbol. The item shall be marked in such a manner that lifetime sustainability of the mark can be guaranteed (i.e. dot-peen, laser-etch, metal plate). That is the marking must last for the expected lifetime of the item. This will naturally differ from item to item based upon usage patterns. Acceptable marking methods are the decision of the design authority. Additionally, considerations should be given to matching the marking method and the planned AIDC technology.

3.1.6.1. Marking Methods during Procurement

During procurement, marking method is generally the decision of the design authority and the application of UII will normally not directly require a change to any modern marking methods already in use. However, the least intrusive and most cost effective marking method that meets the permanency requirements should be utilized. Selection of which method should consider that the mark should withstand the intended environment (salt fog, temperature, fluids, vibration, etc.) of the item throughout its life, and that the mark cannot affect the form, fit, function, or interfaces with associated parts or items. Consideration should also be given to readability of the mark, accessibility of the mark while installed on a system, organizations may consider adopting a standard marking method that meets the minimum requirements of all items to be marked, as this may provide economies of scale, and minimize equipment and training requirements for unique equipment or processes across product lines.

3.1.6.2. Marking Methods for Existing Inventory

Similar to identifying the marking method for procurements, selection of the marking method needs to consider the operating environment, physical form, fit or function, of the item, but additionally should identify and consider common marking methods with new acquisitions, if the item is still in production. Additional considerations for marking existing inventory are environments in which the mark will be applied (depot, field, etc.) and what special facilities, training, or equipment may be necessary, based upon each marking method.

3.1.7. Affecting changes to Technical Documentation

Placement, format and marking method must be illustrated in the required technical documentation, to support the specific UID requirements of the system.” Design authorities can standardize data label design to reduce technical documentation costs. Refer to STANAG 4457¹ for engineering documentation requirements.

¹ STANAG 4457: Engineering Documentation in Multinational Joint Projects - AEDP-1

3.2. Registration and Update of Item Records

Each item marked must have an item record initiated within the appropriate registry. The appropriate registry is the owning nation's registry, or the NATO registry for NATO common funded items. At a minimum, this record will include the data elements identified in Annex 6. While this represents the minimum data required for UII assignment and interoperability with other IS, additional data elements may be required to support intended business processes. Annex 7 is an example of a UID registry layout (e.g., NAMSA) which includes the UII related data elements. Processes must ensure that as item attributes change, (UII itself will not change), the corresponding data elements the registry's item record are updated.

4. EXPECTED BENEFITS

This section describes expected benefits from the application of UID within life cycle processes. This is not a complete list, but represents logical areas to target improvement. Annex 3 provides a list of proposed areas for UID applicability within system life cycle states and processes.

The UII can be used to identify opportunities to improve processes or item performance. To do so, data must be captured during life cycle events, related to the item's UII, and available to programme managers, engineers, logisticians, users, etc. for respective analysis and action.

Process and IS adaptations are required to capture and exploit UII within related life cycle processes. A thorough process review should be undertaken to ensure that existing processes are enhanced to accommodate UID. The full benefits of adopting UID are realised once data is collected, related and shared.

4.1. Improved Data Quality and Data Entry Labour Reduction Using AIDC

AIDC (scanning the data matrix symbol) should be used whenever possible for identifying items, and initiating item-related transactions in lieu of manual data entry or paper-based processes. AIDC increases data quality and reduces data entry time. For example, data collected from a use case¹ for UID enabled data collection showed an 86.1 percent improvement in time to identify items using readers over manual entry of UII. This same study identified a reduction in data entry errors from 11 percent in manual data entry to zero using AIDC.

Once items are marked and AIDC implemented, business area impacts are achieved. Figure 4-1 provides examples of business area impacts. This figure represents the results of a 2003 study performed by ATKearney on behalf of UCCNet, a supply chain management and e-commerce standards organization. The purpose of the study was to determine the business benefits of AIDC.

¹ U.S. Marine Corps Prepositioning Program - Norway (MCPN) IUID Product Life Cycle Support (PLCS) Pilot Program: Final Report. Lockheed Martin Corporation, April 2008

| Business Area Affected | Business Impact |
|--|--------------------------------|
| Merchandising and Sales time handling data | 5% reduction |
| Customer service time dealing with purchase orders | 5+% reduction |
| Finance time reconciling invoices | 5-10% reduction |
| Inventory | .5-1% reduction |
| Out-of-stocks | 1+% reduction |
| Logistics costs | 1+% reduction |
| Warehouse and direct store delivery | 1000's of hours saved |
| Speed to market | 2 weeks less time on new items |
| Shelf tag and scan errors | 1000's of hours saved |
| Data Cleansing | \$4 saved for every \$1 spent |

Figure 4-1. Business Impacts of AIDC Utilization

4.2. Item Related Data Exchange

Once UID is commonly applied for identification of an item throughout its life, and UID enabled IS are collecting and storing related data, *information resource management*¹ can be enabled. IS can then use the UII as the common data key to discover authoritative data in other UID enabled IS. Use of authoritative data from its source IS in a *capture once, store once, use many times* paradigm throughout relevant NATO IS improves information management efficiency. This ensures that the most current data is used in planning and decision-making. For example, access to data in a codification system by relating a UII to its NSN and NATO reference is possible through cross-reference data in the authoritative registry.

The means by which these IS exchange this data should also be standardized to ensure that the data formats are compatible and the data exchange semantics and structure are compatible. This ensures the attributes are useable and identified within the correct context.

UID enabled IS can perform Electronic Data Interchange (EDI) of item-related data using one of two methods: point-to-point IS interface or data exchange using a Service Oriented Architecture (SOA) by using neutral data exchange methods such as STANAG 4661

By formulating, agreeing, implementing and maintaining standards for equipment and procedures used throughout NATO, a significant contribution is made to the cohesion of the Alliance and to the effectiveness of its defence structure.

- *The NATO Handbook*

¹ AAP-48 has details on Information Resource Management.

(which references ISO 10303 AP 239 [PLCS] data exchange standard).¹

Use of neutral data exchanges improves system level interoperability, further enables network centric operations, and reduces the cost and complexity of replacing IS through eliminating tailored IS interfaces for data sharing. These neutral data exchanges enable association of data from UIIs to their common NSN.

4.3. Design and Engineering

UID provides the key to life cycle data, which enables access for engineers to a wealth of empirical data collected during operations and maintenance of SOI. This data can be compared with planning data used in concept design and system development. Variances in system design performance between planned and actual can be used to make design improvements to improve reliability or maintainability. The engineering process can then continue iterations for system improvement even after the SOI is in the *Utilization* or *Support* stages, and for the following generations of systems.

4.4. Configuration Management

Use of UII facilitates configuration management functions of identification, audits, control and status accounting as defined in STANAG 4159, STANAG 4427, and Nederlands Normalisatie-instituut (NEN) ISO 1007. UII enables management of differing configurations within a part number or type/model designator, and can be utilized to perform configuration status accounting of equipment configuration state and history. Likewise, management of items using UII offers a standard means to track and plan pending configuration changes against individual items.

Use of UID enabled configuration management within maintenance and supply chain management IS, which typically use NSN as a data key, improves the ability to identify and order parts compatible with the exact configuration of the item.

Configuration management using UID applies UIIs to the product Work Breakdown Structure (WBS). The WBS provides the hierarchical structure of the equipment end item (parent) and all of its subordinate assemblies, components (children). The basic equipment WBS will define each approved configuration of the parent, and which part numbers are authorized to be installed in each element of the WBS to perform the required function. This approach provides the configuration description of an item by the configuration of the installed children. Extension of UID into this concept allows a historical record of each UID item within configuration management IS to allow for tracking of configuration history, current configuration, and pending configuration changes.

Implementation of UID within configuration management will likely provide further benefits, which will be demonstrated by configuration management experts.

¹ STANAG 4661 provides a single format to be used for any IS for a specific transaction. The ISO 10303 standard used in STANAG 4661 has additional protocols such as AP 233 for Systems Engineering that are interoperable with PLCS.

4.5. Operational Deployment / Redeployment

Use of the UII to identify and relate deploying items to the operational unit offers a standardized means of linking an item to unit schedule or location changes. This improves the ability for NATO to ensure units receive their correct equipment during *Receipt, Staging and Onward Integration* of forces¹. Additionally, it can be used to ensure that equipment priority for movement is aligned with that of the owning or intended using unit, therefore improving the effectiveness of strategic mobility assets during a deployment. Figure 4-2 shows the potential use of UID within the data capture and sharing during the planning and execution phases of a NATO deployment.

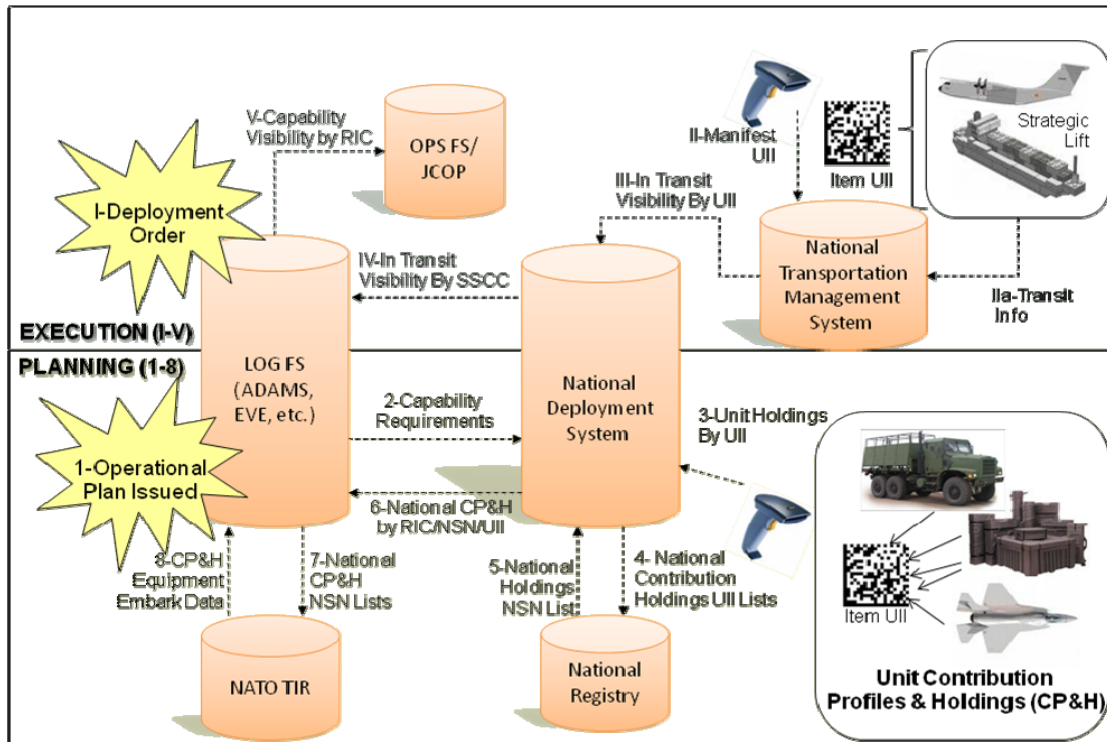


Figure 4-2. UID Supporting Operations/OLCM – Deployment Scenario

4.6. Asset Tracking

Although tracking consignments in transit will use codes such as the Serial Shipping Container Code (SSCC), the relationship of these codes to the UUI of each item included within the consignment provides item level in-transit visibility. Should any significant life cycle event occur while in transit, such as loss or damage, it will be captured in the item’s historical record. Additionally, the receiving unit can utilize the UUI for visibility into item specific, configuration-specific, or NSN related data on the incoming item.

¹ AAP-51: NATO Asset Tracking “To-Be” Business Process Model

4.7. Asset Visibility

With the linkage of NATO's UID enabled inventory management and asset tracking IS, programme managers, engineers and logisticians can have visibility of the location and status of the uniquely identified inventory items in NATO custody. Extension of this through data sharing with nations and contracted commercial service providers continues this level of visibility for items in NATO custody for complete global visibility.

Timely and accurate logistic asset information is required to provide for efficient management and co-ordination of support to NATO forces. Visibility of logistic resources and capabilities is essential for NATO and nations to manage logistic support in the most effective manner.

- STANAG 2184

4.8. Warranty Management

To realize benefits from UID in warranty management, contract and logistics data must be linked using the UII data element. This linkage simplifies identification of items under warranty, to ensure that if repair is required, the value of the warranty is maximized.

Additionally, warranties can now be designed for item-level attributes that are captured in logistics IS. For example, an engine warranted against failure for 30,000 km driven when installed on a vehicle, vice warranted for 12 months after contract delivery. Since distance travelled can be attributed to each engine UII, a clear use history is available to identify the item as being warranted or not. This is possible due to linking of the item specific usage data in the Logistics IS, and the warranty data in the acquisition IS.

4.9. Multinational Logistics

Use of UII and UID enabled IS provides insight into item characteristics beyond NSN that can improve the ability of NATO to perform multinational logistics operations while fully respecting the national interests for their national equipment in the custody of NATO. Through NATO use of UID and standardized data exchange, nations can have improved visibility to the stocks and capabilities within NATO multinational logistics activities. An example application of UID providing value is within the NATO Logistics Stock Exchange (NLSE¹), minimizing unnecessary redundant logistics capabilities by nations. A UID enabled NLSE will improve item level traceability, could reduce the redundant stock deployed for an operation, and improve visibility to existing contributed stock.

4.10. Maintenance Management

A UID enabled maintenance program should maximize the use of AIDC to identify items during servicing, maintenance, and repair procedures. This ensures that the activity is appropriate within the unit maintenance schedule, for the configuration of the item, and enables the maintenance management IS to accurately capture the activity in the item's historical record. This information can be utilized in assessing

¹ NLSE information is available at http://www.namsa.nato.int/info_sys/nlse_e.htm

the status of the item, in identifying failure trend on the item, or during a safety or incident investigation. Use of UII within maintenance processes supports AAP-48 requirements to:

- Monitor the system's capability to deliver service and record problems for analysis
- Maintain a history of problem reports, corrective actions and trends to inform operations and maintenance personnel, and other projects that are creating or utilizing similar system elements

Use of UID enabled data exchange between levels of maintenance, including contracted commercial maintenance, can provide insight to the maintenance facility into fault codes identified and repair tasks performed at lower levels of maintenance. It can also provide accurate usage information that has been attributed to the item (even when installed in a higher-level assembly) that can be used in deciding the depth of repair needed (repair vs. overhaul) or condemnation for economical reasons. Conversely, data gathered during maintenance operations can be used to identify reliability or maintainability issues that may require a change to Integrated Logistics Support (ILS) plans, or redesign of an item. Additionally, capturing the actual scope of work performed at a maintenance level or shop can help identify needed changes in labour, or for pricing of future maintenance contracts.

4.11. In Service Reliability and Maintainability (R&M)

UID enabled IS support efficient collection and relation of data for Failure Reporting and Corrective Action System (FRACAS) and Root Cause Analysis (RCA) of failures¹. Item-level data collected using UII from operations, maintenance, sustainment, and the logistics chain supports RCA statistical analyses and assessment of factors that led to the failure. Once root cause is determined, having the wealth of UID related data allows for precise determination of "which specific item requires which specific action".

UID enabled data collection and sharing is important to a through life Reliability Centred Maintenance (RCM) programme. Through UID enabled data collection, analysis of the conditions and actual faults found during operations can be better understood. This knowledge can be used in further iterations of Logistics Support Analysis (LSA); updating maintenance plans based updated RCM. These follow-on RCM analyses can yield extension, contraction or removal of scheduled maintenance tasks based upon the improved data. This ability to align scheduled maintenance task intervals with the reality of the failure modes that they aim to prevent will improve safety, reduce unnecessary maintenance, and reduce the risk of secondary damage caused during failure of an item.

Implementation of UID within Reliability and Maintainability (R&M) will likely provide further benefits, which will be demonstrated by R&M experts.

4.12. Safety Management

Ensuring safe operation of equipment requires attention to a diverse set of details. The operators and maintainers must have trust in the information within an item

¹ ARMP-6, Allied Reliability and Maintainability Publication: Guidance for Managing In-Service R&M

record, or the item may be subject to limitations or even termination of use. The inherent ability in the adoption of UID to accurately collect, attribute and store data related to item life cycle events can be utilized to improve safety management. The assured availability of all significant activity related to an item is improved through the visibility that is afforded by the standardized use of UII for identification and UID enabled data exchange across IS, whether the item has been in the custody of NATO, nations, or a commercial entity. This improved visibility of data reduces the risk of employing unsafe items, including counterfeit items in operations and weapon systems, as well as the risk of limiting use of safe items due to lack of historical information.

The greater potential for collecting and discovering data about individual items and populations of items also improves the ability to perform a root cause analysis of failures, to identify with a greater degree of accuracy other items within the same NSN that are at risk of the same failure. This is possible using UII to relate failed items with a common attribute such as lot, batch, or environmental exposure. This not only improves the speed at which a safety issue can be resolved, but it also reduces the operational impact of a safety investigation through limiting the population of items that are unavailable for service during the investigation.

4.13. Budget and Financial Management

Having accurate traceability of a system or item through each life cycle stage and significant event provides the ability to capture and allocate cost. Due to the ability to collect and share data using UII as the common data key, cost can be collected and shared from production, testing, operations, maintenance, storage, and disposal. Financial management IS can link contract payments to deliveries of specific UII from production, overhaul, or modification if required within the contract.

4.14. Industry

Industry should consider the benefits described throughout Section 4 to optimize internal business processes including manufacturing work in process and management of subcontractors.

4.15. Benefit Summary

Once items are marked, life cycle data is being collected using AIDC, IS are UID enabled, and able to seamlessly share item data, a new capability is borne to trace individual items through life. This provides visibility to managers into location, status, age, and historical events to make reasoned decisions about the item, or the entire inventory of similar items.

5. ROLES AND RESPONSIBILITIES FOR UID

This section provides recommended activity and standards for organizations and nations implementing UID. Annex 5 provides more recommendations for organizations within NATO.

5.1. NATO and Nations

Thresholds for selecting which items are to be uniquely identified must be identified by NATO and nations adopting UID as well as where their registry capability is going

to be performed, and how they will ensure that their national IS are capable of the minimum functions defined in section 6.

NAMSA will host the NATO registry for NATO commonly funded items. Detailed capabilities for the NAMSA registry within the NAMSA Enterprise Resource Planning (ERP) system are defined in the OLCM NAMSA Basic Document¹. A nation may choose to utilize the data elements in Annex 6 or Annex 7 as a model for development of a national registry.

5.2. National Processes

STANAG 2290 must be followed by Nations adopting UID. Additionally these nations are encouraged to identify registry capabilities, and develop national policies that define the level of incorporation of UID marking for new equipment, and within existing inventory. This policy should also identify standard contracting clauses for initial UID marking and registering, as well as for logistics, repair and overhaul services. Nations also must ensure that a plan is executed to modify IS to allow for relation of UII to discrete items, and enable updates to associated data within related registries. Nations should review and re-engineer processes as needed to maximize the value of adopting UID, but at a minimum consider incorporating AIDC within the logistics chain to improve data quality, and support UID enabled functions.

5.3. National input to NATO Codification System

Nations will provide the list of NSN for items that a nation has decided will be uniquely identified using UID for use within the NCS. This will support a data flag within NMCRL identifying which NSN are being nationally managed UII.

5.4. UID Participating Nations during NATO Operations

Nations that have adopted UID should prioritize marking and UII related data transfer capability to equipment that will be used in a NATO environment.

5.5. NATO Industry Advisory Group (NIAG)

NIAG should continue to advocate for commercial adoption of UID to expand the depth of UID enabled IS throughout defence and other supporting industries, therefore improving data exchange interoperability with NATO and UID participating nations. NIAG can work with defence industrial partners to develop and disseminate streamlined approaches to technical documentation changes for incorporating UID. NIAG can also share industry experience and commercial best practices with NATO on use of UID in process improvements and data exchange.

NIAG can also work with industry on develop and disseminate marking processes, standards, and technologies that improve the durability, readability, and range of surfaces that can accept UID markings. NIAG should also promote internal adoption of UID across commercial entities as the industry standard for unique identification and item marking. This will reduce the overall cost of maintaining duplicate standards for serialization, improving competitiveness for winning new contracts, and enabling proliferation of the standard as a means to reduce barriers of communication between business units, customers and suppliers.

¹ OLCM UID NAMSA Basic Documents. v. 2.0, , 29 April 2008

6. INFORMATION SYSTEM IMPACT

6.1. NATO Information Systems Impact

Impact to NATO and national IS of UID is dependent upon the processes that are utilized in serial management of items. An enterprise approach should be undertaken to ensure that item level data integrity is maintained from the point of capture with IS to the various points of need throughout NATO and nations. Functional data repositories within logistics, engineering, financial management should be reviewed for requirements or benefits of UID compliance.

At a minimum, registry functionality must exist for each UII to be registered. To use the UID data to improve serial management of items, each IS that is used in serially managing data for UID items must share information using the UII as the relational data key.

Additionally, UID capable imaging devices will need to be employed at points in the organization for AIDC to capture UID related events within IS. Scanning of the data matrix symbols requires a camera-based imaging device. These devices can also read linear bar codes. Laser scanners typically used to read linear barcodes cannot read data matrix symbols. When choosing the device, consider the marking methods to be scanned. Typically, Direct Part Marks require more capable imaging device.

6.2. UID Registry

6.2.1. Registry Functional Requirements

UID registries must ensure a single global instance of a UII. Additionally, they must relate the registered UII to its pedigree data (at a minimum) to establish an authoritative record for the existence and identification information for each registered item. The registry must accept and respond to queries about individual items, and return information on the existence (at a minimum) of the item within the registry, and essential pedigree data elements.

6.2.2. Relationship to National and Supplier Registries

Since equipment transfers between NATO, supplier and national ownership and custodianship over its life, it is imperative that registries are capable of sharing records of individual UII, and noting which registry is actively managing the status of the item. Additionally, since registries must ensure that newly assigned UII are not already in use, there must be processes in place to ensure that no only one item is registered to the same UII in different registries.

6.2.3. Registry Data Elements

To provide basic registry functions, and identify items in both UID and legacy terminology, each registry must have a minimum set of common data elements. The draft minimum required set of data elements is listed in Annex 6.

6.3. NATO and National Data Repositories

Each IS that locally stores or shares attributes related to a UII is a repository. Repositories may or may not perform registry functions in addition to collecting, storing and relating non-registry required attributes to an item. It is necessary that each attribute exchanged between information systems related to UII have an identified system that is the authoritative source for that data element. Identification of an authoritative source (e.g., the owning nation's registry) is critical for data exchange and enabled by implementation of UID.

The UII should be a common data key for item traceability in all computational functions including inventory acceptance, item accountability, storage, issue, receipt, valuation, health, maintenance, and disposal.

Since repositories will use the UII as this data element within its structure, data sharing across IS are vastly improved, regardless of whether it is a financial management, engineering, or inventory management IS. This also reduces the overall data redundancy that leads to conflicting information about the status of a unique item.

6.4. Minimum IS Requirements for UII Enabled Data Repositories

To ensure correct use of the UII and associated data across all IS, there are several business rules that must be adhered to by each IS:

- Once the UII is derived, it must not be deconstructed to determine the original elements.
- Activities that collect data about an item should be capable of associating the data with the UII.
- An IS should be capable of using the UII or the combination of its component data elements to retrieve the data record associated with the item represented by the UII.
- IS must be capable of accepting, reading and processing UIIs in Construct #1, Construct #2 and STANAG 2290 identified UII equivalents.
- IS utilization (storage, recall and use) of specific UII data is strongly recommended.

6.5. Initial population of UII data

For items which NATO has a need to manage, the vendor or nation will transmit item identification data. These data will be used to register items in the NATO registry. Nation owned items should be registered in the NATO registry only if they are committed to a NATO operation or to NATO stocks. Otherwise, inclusion of these items in the NATO registry is at the discretion of the nation.

Annex 1: Unique Identification of Items Implementation Plan

AUIDP-1 Provides a sample template UID Implementation plan for programs or organizations implementing UID. This template contains a general format, and text such as “XXX” or “...” should be replaced by actual text in the program’s or organization’s actual plan. Additionally, Attachments I and II should be completed and represent the abbreviations, acronyms and definitions for terminology used in each plan. The template is as follows:

UID of Items Implementation Plan for XXX.

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Attachment I. Abbreviations and Acronyms

Attachment II. Definitions

1. Scope

1.1 Introduction

This XXX Unique Identification (UID) of Items Implementation Plan has been prepared to support the development and deployment of the XXX platforms.

This plan describes how to apply and document use of the latest methodology for UID of Items.

1.2 System Overview

This system will implement UID of Items in the following incremental way:

Table 1.2-1. Increment Definition

| Increment | Functionality |
|------------------|----------------------|
| 1 | |
| 2 | |
| 3 | |

1.3 Document Overview

The purpose of this plan is to apply UID of Items to the XXX. The XXX UID of Items Implementation Team will implement, as early as feasible, and foresee automatic identification technology needs that thoughtful planning must address to promote reliable item identification, tracking, traceability, and surveillance through the application of STANAG 2290 compliant marking. This Plan is intended to define a fully-compliant strategy that: (1) emphasizes opportunities to utilize automatic item identification infrastructure, (2) achieves favorable outcomes by identifying the timely application of logistics resources to meet schedule and satisfy milestone requirements over the system's operational life-cycle.

Electronic data interchange is critical to this plan and XXX documentation will reflect this in....

1.4 Relationship to Other Plans

2. Applicable Documents

The following documents are referenced in and/or applicable to this document. The latest revision of the document applies unless otherwise stated.

2.1 Government Documents

2.2 Contractor Documents

2.3 Other Documents

- a. STANAG 2290 NATO Unique Identification of Items
- b. ANSI MH10.8.2 Data Identifier and Application Identifier Standard
- c. ISO/IEC 15418 Information Technology - Automatic Identification and Data Capture Techniques - Bar Code Symbology Specification - Code 128
- d. ISO/IEC 15434 Information Technology – Syntax for High Capacity Automatic Data Capture (ADC) Media
- e. ISO/IEC 15459-4 Information Technology - Unique Identification of Items

3. Terminology Requirements

The planned installation of XXX platforms will utilize UID of Items terminology and acronyms as necessary and essential within the context of the plan. Appropriate explanations are provided for acronyms and abbreviations in Attachment I. Abbreviations and Acronyms. Attachment II, Definitions contains an explanation for terms associated with the implementation of UID of Items and procedures as well as relevant system terminology.

4. Item Unique Identification Requirements

4.1 Item Life-Cycle Accountability Requirements

This Plan sets forth the item life-cycle accountability objectives of Enterprise level acquisition authority and total life-cycle system support responsibility for XXX. This plan will fully implement the current NATO AUIDP-1 to identify XXX deliverable system equipment and repairable items. Guidance and definitions contained in AUIDP-1 will be utilized, together with program and contract requirements.

4.1.1 Working Group Duties and Responsibilities

A functioning cadre composed of cognizant government individuals and contractor personnel, henceforth referred to as the UID of Items Implementation Team, will collaborate on matters related to the application of UID of Items. The Chairman will direct the team, set its agenda, convene its meetings (and teleconference calls) or delegate that duty. Whenever UID of Items technical issues arise, the Chairman will look to the Team members for solutions that promote safe, secure, and reliable item identification, tracking, traceability, and surveillance throughout the XXX life cycle. Among its initial responsibilities, the Implementation Team will collectively determine the proper mean(s) for achieving item identification objectives and plan for early implementation system-wide. The team will also recommend what read capabilities the AIT infrastructure should be technically capable of attaining, to satisfy the aforementioned objectives.

4.2 Item Acquisition Cost and Valuation

Comprehensive system accountability and transaction records will be established and maintained (suitable for audit purposes) for all XXX items (defined as property, and equipment) required.

A notional Bill of Material (BOM) was used to aid UID of Items planning and to construct the tables shown in this Plan. Tables a through d, list components of the system, and whether UID of Items is or is not required.

Any UII assigned to XXX items delivered under the contract and maintained in a registry will capture its monetary value derived from its acquisition cost. The basis for valuation of XXX property and equipment will be the acquisition cost of items, that is, the contractor's estimated cost at the time the item is delivered under the terms of cost type contracts.

4.3 Serially Managed Items

The decision to designate certain XXX UID of Items qualifying system hardware as serial managed items will be made, by the Implementation Team, early in the system development process to promote the use of the UIIs for total life-cycle system support.

Only the STANAG 2290 recognized UII constructs are accepted and only STANAG 2290 commercial identifier equivalents are desired or required.

4.4 Unique Identification of Items

This plan promotes the NATO goal to manage uniquely identified items using international standards and commercial item markings to the maximum extent possible and resist imposing unique NATO requirements. Reliance on unique item identification markings will contribute to the integration of item data across both the NATO Information Systems (IS) and private industry ISs to improve data quality and global interoperability and advance the rationalization of systems and infrastructure.

4.5 System Items Candidates

The major XXX subassemblies, components, and parts form a complete integrated system. UID of Items marking requirements will flow to subcontractors responsible for developing subassemblies, components, and parts. This ensures all UID of Items candidates, including spares purchased directly from vendors or through the prime contractor are UID of Items qualified spare items (subassemblies, components, and parts) having been marked appropriately with the XXX UII data elements and the delivery of registry data submission.

System components and identification of which are UID of Items qualifying items are listed in the table below

Table 123. List of XXX components

| No. | Item Name/Nomenclature Type Designation | Part Number/Manufacturer | CAGE | National Stock Number | Qty | UID of Items Required (Y/N) | Unit Cost |
|-----|---|--------------------------|------|-----------------------|-----|-----------------------------|-----------|
| 1 | | | | | | | |

| | | | | | | | |
|---|--|--|--|--|--|--|--|
| 2 | | | | | | | |
| 3 | | | | | | | |

4.6 UID of Items and RFID Metrics

This section is devoted to defining metrics associated with the XXX UID of Items implementation process. Development of standard metrics will include the assignment of responsibilities, collection, analysis, and reporting tasking, and the anticipated contribution of data to the overall metrics process in accordance with the provisions of the XXX Increments

4.6.1 Collection

The means of collecting data, sufficient to initiate standard metrics development, will

4.6.1.1 Total Number of UID of Items/RFID Qualified Items

The approach is to manage assets at the lowest level and it is anticipated, at a minimum, all Line Replaceable Units (LRUs) will require a UII.

4.6.1.3 Percent of Items Assigned an UII and Reported to the Registry

As set forth in table 123 X%.....

4.6.1.6 Percent of New Contracts Including the UID of Items Clause

All XXX contracts will be new procurements, and as such, will contain the appropriate UID of Items Contract Clause.

4.6.1.8 Percent of Existing Contracts Modified for UID of Items Requirements

4.6.2 Analysis

The methods for analyzing lifecycle data are many and varied across the functional areas and the lifecycle. Specific analyses are.....

4.6.3 Reporting

The methods for reporting data, sufficient to support UID of Items Standard Metrics development, will proceed as an iterative process.

4.7 UID of Items Budget

This section is devoted to defining the budget associated with the XXX UID of Items where those costs are over and above the expected marking costs and/or infrastructure costs. The methods of budgeting sufficient to support UID of Items standard metrics development will proceed as an iterative process.

4.8 UID of Items Schedule

This section is devoted to defining the scheduling associated with the XXX UID of Items implementation process. The methods of scheduling resources sufficient to support UID of Items standard metrics development will proceed as an iterative process.

4.9 Registry Actions and Responsibilities

This section is devoted to defining the registry actions associated with the XXX UID of Items implementation process. *(Development of this section will include the assignment of responsibilities, process driven tasking, and the anticipated contribution to the registration process).*

4.10 Automated Information System (AIS)

This section is devoted to defining the Automated Information System (AIS) associated with the UID of Items implementation process. *(Development of this section will include the assignment of responsibilities, information entry tasking, and the anticipated contribution to the AIS process).*

4.11 Legacy Items

This section is devoted to defining the issues associated with the XXX UID of Items implementation process and legacy items. *(Development of this section will include the assignment of responsibilities, a process to identification outstanding issues with legacy items).*

5. Item Identification Marking Requirements

UID of Items marking requirements set forth in STANAG 2290, call for the application of an identification plate, identification band, identification tag, or identification label securely fastened to military property. This provision of the plan ensures XXX UID of Items qualifying items, not subject to STANAG 2290 are adequately marked and contain the requisite data content to satisfy both free text and Machine Readable Information (MRI) applications, and mandates item identification markings for XXX UID of Items qualifying items.

6. Packing and Storage Identification

6.1 Unit Pack Design and Exterior Marking

Unique LRU preservation and packaging requirements will be identified to ensure planned UID of Items that keeps pace with the XXX hardware system engineering process.

6.2 Handling and Storage System Requirements

Unique LRU handling and storage requirements will be identified to ensure UID of Items implementation keeps pace with the XXX hardware system engineering process. Each LRU and its physical attributes will be studied to derive preliminary unit pack specifications and recommend appropriate UID of Items marking location(s).

7. Unit Pack Identification for Shipment and Transport

Each packaged LRU and its proposed unit pack will be studied to derive preliminary mode of transport requirements, container design limitations and specifications, together with appropriate locations for exterior UID of Items marking(s).

8. Logistics Support Analysis Record (LSAR)

8.1 LSAR Data Element and Table Development

Data elements used to describe each XXX UID of Items qualifying subassembly, component, or part embedded within an item and the parent that contains the embedded subassembly, component, or part. Among the data elements of interest to the requiring activity are those used to distinguish items as serially managed, mission essential, or controlled inventory requiring a UII.

8.2 LSAR Report Capability

Data element information will be recorded to relate to the minimum information content for XXX markings, whether machine-readable or free text, suitable for constructing the LSA 040 Components of End Item (COEI) List, also referred to as an Authorized List Item Report. In addition, other LSAR ad hoc reports (as discussed in paragraph 9.3) can be useful when implementing UID of Items

8.3 LSAR Ad Hoc Report Capability

LSAR ad hoc reports can be of use when implementing UID of Items. These output reports are derived from the content of LSAR XD, XE, and XF Tables and are entitled: (1) System or End Item Serial Number Report, (2) LCN to Serial Number Useable On Code Report, and (3) LCN to System End Item Useable On Code Report.

9. List of Cognizant Individuals

The organizational structure and membership of the Implementation Team are shown in Figure 2.

10. UID of Items Implementation Process

The UID of Items implementation Process is depicted in Figure 3.

UID of Items Implementation Process Chart

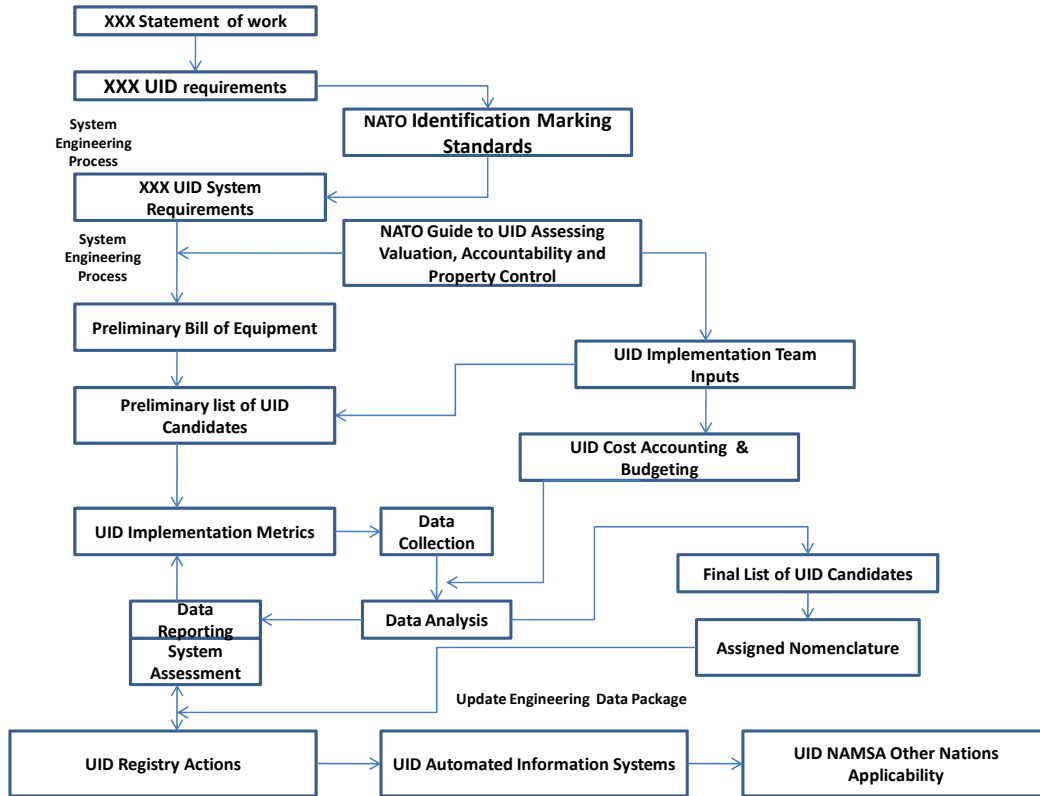


Figure 3

Attachment I. Abbreviations and Acronyms

Attachment II. Definitions

Annex 2: UID of Items Case Studies

1. NAMSA 2006 UID Experiment: STEADFAST JAGUAR (SFJR) UID Experiment

1.1. Background

As part of experimentation within SFJR 2006, a task was included to determine the capability to leverage UID to improve item-level In-Transit Visibility (ITV), and the interoperability between UID and Radio-Frequency Identification (RFID).

1.2. Purpose of UID in Experiment

To test the utility and technology involved in application of UID and RFID to provide ITV of items within a consignment. The experiment also developed a prototype for a NATO UID Registry for registering and attributing data to UII.

1.3. Recommendations/Conclusions

Formal recommendation was to develop and standardize a UID registry, integrated with NATO databases to provide/improve real time ITV, Total Asset Visibility (TAV), and inventory information of UID items in support of operations. In addition to the recommendation, the experiment showed UID could benefit NATO in the following areas, noting that UID must be integrated into business processes or introduced as part of a process reengineering effort:

- Item visibility regardless of platform or “owner”
- Lower item management costs
- Item data necessary for top-level logistics and engineering analysis
- Accurate sources for property and equipment valuation and accountability
- Improved access to historical data for use during systems design and throughout the life of an item
- Better item intelligence for warfighters for operational planning
- Reduced workforce burden through increased productivity and efficiency
- Improved inventory accuracy

1.4 Source Document

DRS Technical Services, Inc. “*Report of Experiments for Headquarters, Supreme Allied Commander Transformation, North Atlantic Treaty Organization In support of Exercise STEADFAST JAGUAR 2006.*” October 2006,

2. NAMSA 2007 UID Experiment

2.1. Background

This experiment started the development of the NAMSA registry within their SAP system with the creation of the required additional fields. Additionally, the implementation and the testing of automatic population functions and of the UID data reports needed for the printing of the UID Unit Pack labels. In parallel, all the UID documentation was collected in a specific directory and documents were developed describing the NAMSA SAP UID project, the business processes involved, the SAP registry, the related SAP transactions and the UID Marking procedure.

2.2. Purpose of UID in Experiment

The experiment was designed to build upon the 2006 experiment baseline to identify benefits and further integrate UID into NAMSAs internal processes and with external suppliers or customers.

2.3 Recommendations/Conclusions

The experiment allowed formalized documentation of detailed requirements for UID within the NAMSAs registry as well as item and unit pack marking standards and procedures. The following list identifies the scenarios executed and issues identified during the experiment:

Scenarios:

- Movement of UID items within NAMSAs stocks
- New NATO asset received from contractor
- Delivery of NATO UID assets to a contractor
- Stock transfer of NATO owned UID items

Issues Identified:

- Need for ability to identify UID items within Advance Shipping Notification, similar to US DoD Wide Area Workflow (WAWF)

2.4 Source Document

Operations Logistics Chain Management (OLCM) UID NAMSAs Basic Documents, version 2.0. 28 April 2008

3. NAMSAs 2008 UID Experiment

3.1. Background

This experiment was designed to support development of improved data exchange between NAMSAs SAP and supported nations, and to relate consignment tracking to UII contained in each consignment.

3.2. Purpose of UID in Experiment

There were two work packages in this experiment:

- The first work package consisted in simulating the procurement from a supplier of an item UID managed by populating the NAMSAs UID registry with supplier UID data and showing the verification and receiving processes into NAMSAs stocks.
- The second work package consisted in delivering an item with UII data to a consignee and in ensuring the visibility of the UII in NALES (OLCM decision-making support tool, developed by NC3A) and consignee AIS using SSCC.

3.3. Recommendations/Conclusions

Results of this experiment were not available for inclusion in this publication.

3.4 Source Document

N/A

4. NAMSAs 2009 UID of Items Experiment

4.1 Background

This experiment was built upon previous UID experiments within NAMSA to support OLCM and a greater capability for UID based item management within NATO and with NATO nations.

4.2 Purpose of UID in Experiment

The purpose of this experiment was to test the capability for NAMSA UID registry to interact UII related information with national or vendor registries and IS, and to show how UID leverages/provides incremental benefits to codification in certain circumstances.

This is done via exercising five work packages designed for validating concepts for data sharing between NAMSA, NCS, vendors and nations:

- The first and the second work packages consist of testing the NAMSA UID registry function without/with preliminary information (Advanced Shipment Notification) and with interaction with other UID registries and with the NACOMS database.
- The third work package is designed to enable UII to be used as part of an electronic, transferable item record, enabled through a PLCS compliant data exchange.
- The fourth work package consists in simulating a customer requirement for a specific UII item by showing UII level visibility into NAMSA stock and in requisitioning a part by UII that has specific characteristics (e.g. remaining shelf life).
- The fifth work package is a real-life test case using UID marked PATRIOT items.

4.3 Recommendations/Conclusions

Results of this experiment were not available for inclusion in this publication.

4.4 Source Document

N/A

5. UID of Items in Operational Logistics: AIDC from US Marine Corps Prepositioning Program-Norway pilot

5.1 Background

United States Marine Corps (USMC), Lockheed Martin, and the Norwegian Defence Logistics Organization teamed in this project to validate two concepts: First, to simulate a Programme Manager's *seek and apply* strategy for legacy UID marking and registration. Secondly, item UII data was translated between U.S. DoD registry format and ISO Standard 10303 AP 239, using a DEX and translators developed for the pilot. Specifically, this UID of Items integration project capitalized on the Marine Corps Prepositioning Program-Norway (MCPN) to apply UID marks to 41 USMC Medium Tactical Vehicle Replacement (MTVR) end items, plus their installed

engines and transmissions. Application of UID data labels was performed on the MTRV in their storage environment of about 50% relative humidity and 10 Degrees Celsius using a range of adhesives.

5.2. Purpose of UID in Experiment

The marking experiment focused on the ability to mark legacy items in an environment outside a maintenance depot. Although a storage site was used, the same application could be performed at an operational site or supply depot with no maintenance capability. The data transfer project using UID and PLCS was to prove the interoperability of UID data exchange using both ISO and US DoD protocols.

5.3 Recommendations/Conclusions

- Problems associated with commercially available adhesives inability to stick to Chemical Agent Resistant Coating (CARC) paint on MTRV (and common to other equipment)
 - A new 'peel and stick' pressure sensitive adhesive was developed by Avery Dennison, a commercial partner in the project that bonded and cured to CARC, even in MCPP-N environmental conditions
- The project team successfully demonstrated that UID data could be shared into the PLCS-enabled communities, and later converted back as files that could update the US DoD UID registry
- The first known USMC "in field" UID marking and data submission to the DoD UID Registry
- The team completed greater than 50% of the UID DEX development for eventual submission to OASIS, the standards organization which developed PLCS
- The team collected AIDC versus manual data entry metrics:
 - 86.1% improvement in time to identify items using AIDC over manual entry
 - Reduction in data entry errors from 11% for manual data entry to 0% using AIDC

5.4 Source Documents

Byrne, Mark. *"Marine Corps Prepositioning Program-Norway: Item Unique Identification and Product Life Cycle Support."* Available at: http://www.acq.osd.mil/dpap/pdi/uid/training.html#success_stories

Lockheed Martin Corporation. *"Marine Corps Prepositioning Program - Norway (MCPP-N) IUID Product Life Cycle Support (PLCS) Pilot Program: Final Report."* April 2008

6. UID in Item Management: US Navy Explosives Ordnance Disposal Technical Division (NAVEODTECHDIV)

6.1 Background

US Navy project to integrate UID into Joint Service EOD business processes. Aim was to use UID enabled data collection and sharing to improve tracking of failures, availability, and logistics chain activity within a Performance Based Logistics (PBL) environment. Anticipated benefits were improvements in Just In Time sparring, product reliability/availability, and asset accountability/visibility.

6.2. Purpose of UID in Project

Data collected against items serially managed by UID is shared between field maintenance units, supply chain activities, depot level maintenance facility, and the In-Service Engineering Activity (ISEA). This is done to maintain an accurate picture of the equipment status and history, and provides a rich data model for accurate reliability, spares modeling. These data are available to all stakeholders to analyze and adjust stock levels/locations, business processes, and equipment or software design (where needed) to improve item availability, reliability, and reduce cost.

6.3 Recommendation/Conclusions

Using UID for serialized item management of equipment and repairable items, NAVEODTECHDIV was able to create an environment that fused usage, maintenance, supply chain and configuration data. This information is then accessible to support decisions and business processes from fleet maintenance activities, to contractor repair depot, to in-service engineering and programme management. From this single environment, the supply chain, maintenance, and PBL contracts can be managed at the item level.

- Operations, maintenance, and failure data is available to identify and perform root cause analysis on systemic problems affecting cost, readiness or efficiency within the program
- Item-level data fidelity allowed for tailoring of spare parts and other support for each element of the using community based upon their actual uses in different services, operations, or training environments
- Once problems were identified, accurate item-level accounting and parent-child relationships supported rapid development of plans for correction based upon real time location and status

During a 12-month period of using UID in these processes, NAVEODTECHDIV was able to affect the following on the Man Transportable Robotic System (MTRS):

- Improve system level reliability by over 85% (620 hours to 1170 hours MTBF)
- Improve Operational Availability by 3%
- Lean out spares inventories to match PBL response time, about half of what standard spares model would require
 - Rapidly able to respond to drop in demand due to increases in reliability
- Identify, resolve, and replace unqualified part within 30 days of installed failure
- Business case shows reduction in labor from scanning data vice manual entry saves 1 Man year equivalent of labor annually between Operations, Maintenance and Engineering
 - Labor savings alone provided a Return on Investment for cost of marking within 3 years

6.4 Source Document

Decker, Jerry. "NAVEODTECHDIV IUID Implementation." Presented at April 2009 UID Forum, Denver, CO, USA

7. UID in Physical Inventory: U.S. Joint Robotics Repair Facility Example

7.1 Background

The Joint Robot Repair Fielding (JRRF) provides in-theater support for U.S. Joint Service Theater Provided Equipment (TPE) ground robots. With a turnaround time of four hours or less to return a repaired robot to supported units, use of UID data marked on each robot in machine-readable format is a key step towards achieving sense and responds logistics.

7.2. Purpose of UID in Experiment

This *real world* project incorporated UID into supply chain and maintenance management processes to improve repair part availability, configuration management, and repair turnaround time.

7.3 Recommendation/Conclusions

- During the period of measured activity, 64 Explosive Ordnance Disposal (EOD) robots were rebuilt from destroyed condition for a cost savings of approximately \$3.2M.
- The operational rate on all supported platforms has never been below 100% since April 2005.
- Having UID data marked on items in machine-readable format as well as connected to active asset data in IS results in:
 - Zero “lost” data due to human error
 - Shorter repair-cycle time as a result of UID “scan in and scan out”
 - More fidelity of data tracked in IS due to UID decision process
 - Routine logistics processes streamlined with UID and hand scanner
 - Configuration management integrated with all supply chain actions
 - Shipping, Receiving, Maintenance, and Transportation tied to UID
- As a result of creating data that is more accessible, more accurate, and actively used to manage EOD robots throughout their complete life cycle, UID and supply chain integration saves the time, money, and ultimately lives on the battlefield
- JRRF recognizes that UID without IS integration provides no value
 - IS must capture UID data and then use it intelligently to support the mission

7.4 Source Document

Varian, Paul. “*Joint Robot Repair Fielding Supply Chain Management through Item Unique Identification and Catalog Ordering Logistic Tracking System.*” Available at: http://www.acq.osd.mil/dpap/pdi/uid/training.html#success_stories

8. UID within Unit Processes: U.S. Army Example

8.1 Background

U.S. Army unit utilized UID and personnel ID Common Access Cards (CAC) to manage Aviation Life Support Equipment (ALSE), tools, and Organizational Clothing and Individual Equipment (OCIE).

8.2. Purpose of UID in Experiment

Utilize UID marked and registered items and CAC cards to automate and tailor OCIE stocks within the organization. Personnel equipment authorisations and characteristics (sizes) were entered in IS with equipment records. Scanning of UID and CAC allowed automated tracking of issuance and return of items, and identified

individuals that were custodians of items. This reduced the effort in locating missing tools for safety of flight purposes, and improved the ability to tailor on-hand stock to the unit personnel.

8.3 Recommendations/Conclusions

- General results found were:
 - Improved accountability through automated issue and tracking
 - Automated calibration tracking and scheduling of individual items
 - CAC interface improved accountability, and reduced time for issue and receipt
- Specific metrics collected show:
 - Equipment turn-in time was reduced by over 100 hours In ALSE and OCIE shops over a 12 month period
 - Reporting capability reduced ALSE technician effort by 20 fold
 - Inventory analysis completed reduced from 1 week to 30 minutes
 - Hand receipt automation reduced issuance delay from greater than 1 week to zero
 - Similar modules have avoided 310 hours using UID and AIDC
- Automation and linking of personnel and equipment records supports a *Digitally Integrated Maintenance Environment*
- Not all components need an Air Worthiness Release (safety approval) before being marked
 - Components should be evaluated and pass the common-sense test before requesting additional approval steps
- Centralized location for marking equipment is ideal
- Avoid direct part marking where possible
- Work with Original Equipment Manufacturers (OEMs) on data plate format and placement
- Limited, successful demonstration of AIDC uses are effective in obtaining user buy-in to the process

8.4 Source Documents

Cox, Jimmy. "TF160 Special Operations Aviation Regiment (SOAR): Unique Identification Policy Office Integration Project." Available at: http://www.acq.osd.mil/dpap/pdi/uid/training.html#success_stories

Kime, Jeffrey. "Technology Applications Program Office (TAPO) Item Unique Identification (IUID) Program." Presented at June 2008 UID Forum, Sacramento, CA, USA

9. U.S. Navy Step-by-Step Process of UID of Items Implementation

9.1 Background

U.S. Navy organization documented each step in implementation of UID within facility and processes. Facility implemented item marking, data capture and registry data sharing capabilities.

9.2. Purpose of UID in Project

To document the steps, considerations, costs and benefits when implementing UID as a service towards Navy compliance, as well as for internal process improvements.

9.3 Recommendations/Conclusions

- Develop holistic plan for UID through understanding of its use within the organization mission, current and future processes and systems (both hardware and software)
- Document decisions during implementation
- Tailor the equipment and processes to suit the implementing organization's mission, facilities, and items to be uniquely identified
- The project identified a \$25-\$43 unit cost savings per label for in-house production with UID data over acquiring non-UID labels from vendor
- Migration from linear bar code to UID Data Matrix improved reliability, captured more data per scan
- Facility used data capture during the project to:
 - Link UII to inventory and configuration management system to better capture life cycle transaction history of all material
 - Capture all registry data fields for current and future advanced search capabilities

9.4 Source Document

Sann, Brian and Atencio, Rick. *Step-by-Step Process of UID Implementation, Network Integration Engineering Facility*. April 2009 Presentation to UID Forum in Denver, CO, USA.

10. UID in Physical Inventory: U.S. Navy Standard Missile Example

10.1 Background

Naval Surface Warfare Center (NSWC), Corona Division implemented a project to integrate UID within an Advanced Maintenance Information System (AMIS) to perform Serialized Item Management (SIM). The first major component of this project was the application of UID technology to legacy and new production hardware. The second was integrating the UID into an existing reliability-centered, parts-tracking IS. The UIDs were registered in the US DoD's UID Registry and the established comprehensive maintenance tracking system was modified to track hardware based on UID. Once UID integration was completed, the system transitioned to become the AMIS.

10.2 Purpose of UID in Experiment

- Establishing safety-approved UID marking and reading procedures for energetic assets (missile components)
- Incorporating UID marking procedures within the maintenance cycles
- Capturing UID marks throughout the movement and deployment cycle
- Defining UID requirements across modifications, upgrades, and different vendor requirements
- Validating that the UID mark would withstand the STANDARD Missile environmental conditions

10.3 Recommendations/Conclusions

- High quality marks are not necessarily expensive to produce
- Reading and verifying poor quality marks requires an expensive reader/verifier
- The software used to read or verify is the most critical aspect of a quality reader/verifier
- Program Office complications can be the most intractable problems to overcome
- Costs associated with UID marking vary; while some surfaces require little attention, some require intensive intervention, especially on legacy hardware
- Not only does SIM help Corona to track a missile through its entire lifecycle, it also allows Corona to track all the components that have been associated with that missile at one time or another
 - The missile block type or components may change over time, but the unique identification number will not change, and therefore, will allow for complete traceability
 - This gives Corona the added capability to track the histories of all the components and to distinguish among items that may have duplicate serial and part numbers
- Additional benefits of UID enabled SIM:
 - Inventory and availability analysis: SIM provides a basis to compute surge capability
 - Focused recall: SIM allows identification and rework of affected hardware in the event a faulty or bad lot is discovered
 - Costs are kept low because accurate asset management is maintained
 - Response time for the fleet is optimized with timely analysis
 - Reliability analysis: SIM provides data necessary for advanced statistical modeling
- In the long term, having the ability to consistently locate, control, and evaluate assets, the DoD will be able to make more informed decisions on the joint strategic and tactical missions
- UID will establish a common interface across all organizational boundaries.

10.4 Source Document

MacDougall, Craig. *“Naval Surface Warfare Center, Corona Division: STANDARD Missile Marking and Serialized Item Management.”* Available at: http://www.acq.osd.mil/dpap/pdi/uid/training.html#success_stories

Annex 3: UID of Items Application within System Life Cycle Stages and Processes

1. Introduction

Application of UID is dependent on the stage the SOI is in when the UII is assigned and applied. Additionally, utility of UID can vary with the life cycle stage of the related SOI. This chapter will discuss the potential advantage and means to exploit UID in each life cycle stage.

Per the AAP-48, the Life Cycle of a SOI is divided into the following six stages:

1. Concept
2. Development
3. Production
4. Utilization
5. Support
6. Retirement

Intuitively, the earlier the stage at which UID is planned or integrated in the SOI, the lower the investment cost, and the greater the benefits that can be derived over the system life cycle. Similarly, the greater utilization of UID within integrated Enterprise or national processes and IS, the more benefits are derived from the resources expended in initial marking and registering.

2. Acquisition Process

Source selection, past performance in leveraging UID in internal processes, and delivery of complete UII records are all part of the acquisition processes.

3. Concept Stage

During the Concept stage, requirements are being analyzed for development of potential system-based solutions.

3.1. UII Application

- Since there are no physical assets at this stage, there is no practical application of UII this early on the new system

3.2. UID Benefits to the Programme or System

- Leverage UID enhanced data collection from like/similar systems for concept trade studies, and assessing technology robustness

3.3. UID Considerations during Phase

- Develop an initial UID plan for a Programme during this stage to maximize the benefits that UID can provide over the remaining life cycle stages
- Consider the logistics support strategy for potential systems or processes, and the applicability of UID

4. Development Stage

During the Development stage, concepts are being transformed into designs, and refined into a weapon system inclusive of the supporting infrastructure, logistics

support concept, personnel, and technical data needed to operate and maintain the system through the remaining life cycle stages.

4.1. UII Application

- Test articles should be given UII to associate all configuration, special limitations, and performance achieved against to determine effectiveness of design against specifications

4.2. UID Benefits to the Programme or System

- Leverage UID to collect and share test data between system developer and NATO customer
- Early components delivered to support qualification and test may qualify for future NSN assignment and inclusion in active inventory if their design does not change during test and acceptance
- Enhances the ability to maintain configuration status of each pre-production component
- UID mark degradation due to poor marking locations or suboptimal marking methods can be discovered and changed prior to final production drawing acceptance

4.3. UID Considerations during Phase

- UID marking processes, drawings, and data capture accessibility are consistent between production, assembly, as well as utilization and support stages.
- Consider NATO and national IS that will be utilized during operations and support of the system for ability to leverage UID

5. Production Stage

The Production Stage is where the defined system transforms from a design state to a fielded state, where the articles and processes are tested against design performance requirements to ensure the weapon system, as delivered, meets the original mission requirements.

5.1. UII Application

- UII tracked with parent/child relationships during assembly for the “as-built” configuration

5.2. UID Benefits to the Programme or System

- Production data, including out of tolerances, deviations or waivers are collected which may provide valuable root cause information during future life cycle stages

5.3. UID Considerations during Phase

- Contract Clauses for UID
- Subcontractor compliance
- Leveraging UID and AIDC in fielding and acceptance processes
- Testing UID compliance during system evaluation and acceptance
- Modification of IS to accept UID and associated attributable data to support SLCM of SOI

6. Utilization Stage

The Utilization Stage is where the SOI is operated within the reality of operational and training environments. Operational data can be collected to support the actual environment and utilization of items, and compared to the assumptions during the development stage. Significant differences may require updates to planning factors for spare parts provisioning, maintenance and overhaul schedules, and budgets.

6.1. UII Application

- Collection of usage cycles (hours, kilometres, shots fired, sorties, pressurization, etc.) and attribution of this data to individual SOI through relating this metadata to the UII in operational IS
- Tracking of expended life of items against their expected service life to determine valuation, or to plan overhaul or replacement programmes
- Use of AIDC in support of Inventory management, maintenance or supply transactions to reduce time and manual data entry errors
- Use in relation to identifying items during maintenance or modification activity to maintain configuration management and configuration status accounting

6.2 UID Benefits to the Programme or System

- Asset Visibility through deployment and employment in an operational or training area
- Use of AIDC during item inventories improves the accuracy and speed of identifying items within IS for reporting for accountability or treaty purposes

6.3. UID Considerations during Phase

- Ensuring that processes that can employ AIDC are facilitated as such
- IS must be capable of relating UII through information exchanges to ensure that command and control decisions are exploiting system availability and future planned unavailability information resident in logistics IS

7. Support stage

The Support stage is the employment of the support concept defined in the Development stage. This is a collection of all of the supply, maintenance, and sustainment activity that enables the continued operation of the SOI. This is historically the longest stage of a system life cycle, and where most of the resources are applied or consumed.

7.1. UII Application

- Identifying applicability of guarantees or warranties for an SOI
- Leveraging item configuration to identify applicability of replacement parts
- Leveraging item configuration to tailor maintenance and repair activity on an SOI (tailoring maintenance cycles for discrete SOI)
- Tracing potential recall or safety items in-service from a bad production lot or from an out of tolerance repair process
- Reducing likelihood of counterfeit or condemned items being introduced into the supply system or operating equipment
- Identification of repeatedly failing individual items, to allow for overhaul or condemnation

7.2. UID Benefits to the Programme or System

- Improves capability of identifying SOI that require excessive maintenance per unit of operation as good candidates for overhaul or disposal
- Enhances the ability to identify SOI components that may benefit from a change in support concept (level of maintenance), source of maintenance
- Enhances serialized item management capabilities for improved data quality and attribution for use in trend analyses, predictive modelling
- Provides a means for attribution of modification or life extension resources to equipment values for depreciation and financial reporting
- AIDC enhances speed and accuracy of data capture to automate processes and forms used in accountability, maintenance and sustainment
- Enables tailored Depot overhaul, based upon the specific usage history, maintenance history, and failure mode

7.3. UID Considerations during Phase

- Collection and transmission of needed of maintenance and supply data is supportable by IS bandwidth, security protocols
- Applications and processes are designed to exploit the data that is captured from maintenance, supply, operations, and acquisition

8. Retirement Stage

This stage consists mainly of disposal process. Many decisions need to be made that relate to the transfer of material with military application to another military, for use in the civilian sector, long-term storage in museums or for scrap.

8.1. UII Application

- Identifying items that contain Hazardous Materials (HAZMAT)
- Identifying whether items have been demilitarized
- Identifying items that have classified material loaded

8.2. UID Benefits to the Programme or System

- Enables Identifying parts from SOI being decommissioned that may be in need within the remaining fleet, for similar systems in service, or with value to external customers
- Improves ability to determine the remaining value or useful life
- Enables identification of demilitarization procedures for the specific configuration of item to be retired
- Supports identification of when export controls are required or completed against specific items
- Enables ensuring demilitarized or disposed items do not re-enter the inventory

8.3. UID Considerations during Phase

- Ensure that data related to UII that is needed for archival and historical record purposes are maintained as programme sunsets

Annex 4: Recommended UID of Items Contract Clauses

The following paragraphs are inserted from Dutch national UID of Items Policy, and are provided as representative language that may be used within NATO or national item acquisition contracts to levy requirements for UID of items marked by contractors.

UID-CLAUSE

UID-CLAUSE

Ref 1: MIL-STD-130N (DOD Standard Practice Identification Marking of US Military Property).

Ref 2: STANAG 2290 ED1 (Unique Identification of Items).

Ref 3: ISO/IEC International Standard 15418, Information Technology – EAN/UCC Application Identifiers and Fact Data Identifiers and Maintenance.

Ref 4: ISO/IEC International Standard 15434 Information Technology – Transfer Syntax for High Capacity Automatic Data Capture Media.

Ref. 5: ISO/IEC International Standard 15459- Information Technology - Procedural requirements to maintain a non-significant, unique identifier for item management applications, and outlines the obligations of the Registration Authority and Issuing Agencies.

Introduction

The Ministry of Defence has issued the policy that all items acquired from this date that meet pre-determined criteria shall be equipped with Unique Identification (UID).

UID is the allocation of a unique number to an individual item using a standard procedure which is globally accepted. UID makes it possible to store and exchange data on an item's usage and maintenance history using national and international systems. UID can be used in the logistics chain to track and trace materiel more effectively. Implementing UID-marking will lead to the optimisation of the logistical footprint.

Definitions

As used in this clause:

“Data Identifier” is a specified character (or string of characters) that defines the general category or intended use of the data that follows (more detailed contained within Ref 1).

“Data Matrix” (ECC 200 symbol) is a two-dimensional matrix consisting of black and white "cells" or modules arranged in either a square or rectangular pattern (as conveyed in the example shown alongside this text). Concerning UID-marking; the information stored in the Data Matrix is the UII.



“Data qualifier” is a specified character (or string of characters) that immediately precedes a data field that defines the general category or intended use of the data that follows. (more detailed contained within Ref 1).

“Enterprise identifier” (EID) is an activity identifier code assigned to the entity that is responsible for assigning the unique identifier to an item. Usage note: Enterprise identifier codes are uniquely assigned by one of the following registration (or controlling) authorities which shall have an ISO assigned IAC and comply with ISO/IEC 15459-2.

“Issuing agency code” (IAC) is that assigned by the Registration Authority for ISO/IEC 15459-2,

Registration Procedures. The current Registration Authority of ISO/IEC 15459-2 is NEN –

Nederlands Normalisatie-instituut. The IAC represents the registration authority that issued the EID (e.g., Dun and Bradstreet, GS1). (see ISO/IEC 15459-2).

The IAC can be derived from the data qualifier for the enterprise identifier and does not need to be marked on the item.

“Item” means a single hardware article or a single unit formed by a grouping of subassemblies, components, or constituent parts (more detailed contained within Ref 1).

“Human Readable Information” (HRI) is information intended to be conveyed to a person. HRI in lieu of machine-readable information is commonly referred to as text. In this clause the HRI application is associated with data matrix.

“Machine-readable Information” is information subsumed in a pattern of bars, squares, dots, or other specific shapes, interpretable through the use of equipment specifically designed for that purpose. The patterns may be applied for interpretation by digital imaging, infrared, ultra-violet, or other interpretable reading capabilities.

“Serialization within the EID” occurs when each item is assigned a serial number that is unique among all the items identified under the EID and is never used again. The enterprise is responsible for ensuring unique serialization within the EID. The serial number which shall be unique within the EID is a combination of numbers and or letters assigned by the enterprise (i.e., a manufacturer or vendor) to an item that provides for the differentiation of that item from any other like or unlike item and is never used again within the EID.

“Serialization within the part number” occurs when each item of a particular part number is assigned a unique serial number within the original part number assignment. The enterprise is responsible for ensuring unique serialization within the original part number. The original part number is a combination of numbers and or letters assigned by the enterprise (i.e., a manufacturer or vendor) at asset creation to a class of items with the same form, fit, function, and interface. The serial number within the part number is a combination of numbers and or letters assigned by the enterprise (i.e., a manufacturer or vendor) to an item that provides for the differentiation of that item from any other like item.

“Unique item identifier” (UII) is a globally unique and unambiguous identifier that distinguish an item from all other like and unlike items. The UII is a concatenated value that is derived from a UII data set of data elements.

“Unique Identification” (UID) is a system of establishing unique identifiers to assets and other entities distinguishing it from other like and unlike entities by means of a dedicated 2 dimensional data matrix.

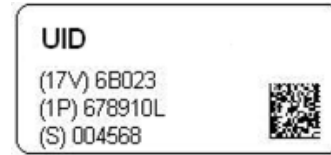
Requirements

1. The Contractor shall provide a UID-marking for the following items:
< Based on criteria's defined in the "UID national policy paper", program managers/system engineers determine which items should be mark with a UII.>

2. The Contractor shall mark items (as mentioned at point 1) with UID-marking according to the methods specified in STANAG 2290 ED1. In any case the UID-marking shall comply with the regulations as stated in this clause.

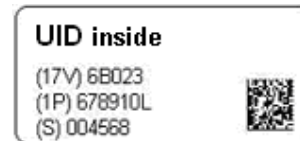
3. The UID-mark (as demonstrated in the example besides) shall contain:

- a. A data matrix symbol (This contains the UII data);
- b. The HRI contains:
 - The text: "UID";
 - The data elements contained within the UII. These elements; should be depicted separately (under one another) and the; identifier, according to the chosen standard, should be depicted in parenthesis preceding the data elements again;
- c. Exception: Where space is insufficient the HRI may be omitted.



4. The item shall be marked in such a manner that life time sustainability of the mark can be guaranteed (i.e. dot-peen, laser-etch, metal plate). That is the marking must last for the expected lifetime of the item. This will naturally differ from item to item based upon usage patterns.

5. The Contractor must apply A replicated UID label (named UID inside) to the outside of any package of uniquely identified materiel where the UID data matrix is not easily machine-readable through the packaging material. The UII and its component data elements are to be replicated in this label (as demonstrated in the example besides). This marking may be placed using a paper label.



6. For each item which conforms with paragraph (1) and that is eligible for the UID marking; the contractor shall, in addition to the information provided as specified elsewhere in the contract, report at time of delivery the following:

- a. UII;
- b. IAC;
- c. EID;
- d. Part Number;
- e. Serial number;

7. The Contractor shall submit the information required by paragraph 6 of this clause in electronic format using XML standard and according to the functional specifications (format) as conveyed in paragraph 8 of this cause.

8. Functional specification in XML for UID marking

The XML file should be comply with the format as shown below

Header

- Message : Fixed 'UID'

Detail

- UII : Unique Item Identification
- IAC : Issuing Agency Code
- EID : Enterprise identifier
- PARTNUMBER : Part Number
- SERNR : Serial Number

DTD (Technical specification)

```
<?xml version='1.0' encoding='UTF-8' ?>
<!--Generated by XML Authority-->
<!ELEMENT Message (ROWSET)>
<!ELEMENT ROWSET (ROW)>
<!ELEMENT ROW (UII,IAC,EID,PARTNUMBER,SERNR)>
<!ELEMENT UII (#PCDATA)>
```



```
<!ELEMENT IAC (#PCDATA)>  
<!ELEMENT EID (#PCDATA)>  
<!ELEMENT PARTNUMBER (#PCDATA)>  
<!ELEMENT SERNR (#PCDATA)>
```

Example:

```
<?xml version="1.0" encoding='UTF-8' ?>  
<UID>  
<ROWSET>  
<ROW>  
  <UII>0625SUN123456789MH803123OPF100200300400AP</UII>  
  <IAC>UN</IAC>  
  <EID>123456789</EID>  
  <PARTNUMBER>F00100200300400AP</PARTNUMBER>  
  <SERNR>MH80312</SERNR>  
</ROW>  
<ROW>  
  <UII>0625SUN123456789MH803123OPF100200300500AP</UII>  
  <IAC>UN</IAC>  
  <EID>123456789</EID>  
  <PARTNUMBER>F00100200300500AP</PARTNUMBER>  
  <SERNR>MH80312</SERNR>  
</ROW>  
</UID>
```

9. This information should be send to the address below via e-mail to:

9. Additional requirements:
< *DOD may determine additional requirements based on item related limitations such as nature of use, maintenance procedures, position of the UID mark etc..*>
- a. _____
b. _____

(End of clause)

The following paragraphs are draft Canadian contract clauses inserted from the Defence Administrative Orders and Directives (DAOD) 3010-1, "Management of Unique Identification and Standardized Marking of Materiel." They are provided as representative language that may be used within NATO or national item acquisition contracts to levy requirements for UID of items marked by contractors.

Unique Identification (UID) clauses:

- i. **Unique Identifier.** The Contractor shall generate unique identifiers (UIIs) in accordance with this DAOD 3010-1 "Unique Identification and Standardization of Marking of Materiel" and "NATO STANAG 2290 "Unique Identification of Items (Edition 1) for items selected by the Department of National Defence (DND), including _____ (*DND CF to insert list of materiel/items if known at time of contract award*).
- ii. **UII Mark.** The contractor shall affix the assigned UII to each respective item in accordance with this DAOD 3010-1 "Unique Identification and Standardization of Marking of Materiel" and "NATO STANAG 2290 "Unique Identification of Items (Edition 1)" prior to materiel acceptance by DND or the CF. These marking shall be applied and positioned in accordance with both the DND standard D-02-002-001/SG-001, *Canadian Forces Standard for Identification and Marking of Canadian Military Property* and the Canadian Forces Technical Order (CFTO), C-02-006-002/AG-000 "Information Markings on Canadian Forces Equipment" in effect at the date of contract award and shall be of such quality as to remain machine readable for the expected life of the item.
- vii. Identification Data Exchange clause:
Identification Data Set. The contractor shall make available electronically the following data elements;
 - EID,
 - UII,
 - Original Part Number and Current Part Number,
 - Original and Current Batch/Lot Number,
 - Serial Number,
 - Contract Line Number,
 - Item Description,
 - NSN or Permanent Stock Control Number (PSCN),
 - Ship-to Location and Shipping Date,
 - Unit of Purchase and Price per Unit of Purchase,
 - Weight, Volume, Height, Depth and Width.
- viii. Labelling For Shipment And Storage clauses;
Packing Labelling. In addition to the required interior and exterior package markings the Contractor must ensure also, that, the following data is included in the package label, _____ (*DND to insert applicable data elements: specification number, manufacturer's name, drawing number, batch/lot number, qualification number, cure date of rubber components, data required by the contract or by the commodity specification, date of manufacture, date of repair or overhaul, name of repair or overhaul contractor, UIIs and modification status*).

The Contractor must apply and position these data elements in accordance with DND specification D-LM-008-002/SF-001 "Marking for Shipment and Storage".

The Contractor must apply the NSN (or PSCN), the original part number, the serial number, the lot/batch number and the contract number to the package using a GS1-128 linear barcode. These data elements must also be replicated in human readable form under the barcode.

The Contractor must apply the UII(s), in a machine readable form, to the outside of any package of uniquely identified materiel where the UID data matrix is not easily machine-readable through the packaging material. The UII and its component data elements are to be replicated in a PDF 417 barcode in accordance with DAOD 3010-1 "Unique Identification and Standardization of Marking of Materiel and STANAG 2290 (Edition 1).

In addition to the above stated label requirements and if necessary, additional management data elements may be included in the PDF 417 barcode attached to the shipping/storage label.

(End of clause)

The following paragraphs are inserted from U.S. Defense Federal Acquisition Regulation Supplement (DFARS). They are provided as representative language that may be used or tailored for use within NATO or national item acquisition contracts to levy requirements for UID marking on the contractor

252.211-7003 Item Identification and Valuation.

As prescribed in 211.274-5(a), use the following clause:

ITEM IDENTIFICATION AND VALUATION

(a) *Definitions.* As used in this clause—

“Automatic identification device” means a device, such as a reader or interrogator, used to retrieve data encoded on machine-readable media.

“Concatenated unique item identifier” means—

(1) For items that are serialized within the enterprise identifier, the linking together of the unique identifier data elements in order of the issuing agency code, enterprise identifier, and unique serial number within the enterprise identifier; or

(2) For items that are serialized within the original part, lot, or batch number, the linking together of the unique identifier data elements in order of the issuing agency code; enterprise identifier; original part, lot, or batch number; and serial number within the original part, lot, or batch number.

“Data qualifier” means a specified character (or string of characters) that immediately precedes a data field that defines the general category or intended use of the data that follows.

“DoD recognized unique identification equivalent” means a unique identification method that is in commercial use and has been recognized by DoD. All DoD recognized unique identification equivalents are listed at http://www.acq.osd.mil/dpap/pdi/uid/iuid_equivalents.html.

“DoD item unique identification” means a system of marking items delivered to DoD with unique item identifiers that have machine-readable data elements to distinguish an item from all other like and unlike items. For items that are serialized within the enterprise identifier, the unique item identifier shall include the data elements of the enterprise identifier and a unique serial number. For items that are serialized within the part, lot, or batch number within the enterprise identifier, the unique item identifier shall include the data elements of the enterprise identifier; the original part, lot, or batch number; and the serial number.

“Enterprise” means the entity (e.g., a manufacturer or vendor) responsible for assigning unique item identifiers to items.

“Enterprise identifier” means a code that is uniquely assigned to an enterprise by an issuing agency.

“Government’s unit acquisition cost” means—

(1) For fixed-price type line, subline, or exhibit line items, the unit price identified in the contract at the time of delivery;

(2) For cost-type or undefinitized line, subline, or exhibit line items, the

Contractor's estimated fully burdened unit cost to the Government at the time of delivery;
and

(3) For items produced under a time-and-materials contract, the Contractor's estimated fully burdened unit cost to the Government at the time of delivery.

"Issuing agency" means an organization responsible for assigning a non-repeatable identifier to an enterprise (i.e., Dun & Bradstreet's Data Universal Numbering System (DUNS) Number, GS1 Company Prefix, or Defense Logistics Information System (DLIS) Commercial and Government Entity (CAGE) Code).

"Issuing agency code" means a code that designates the registration (or controlling) authority for the enterprise identifier.

"Item" means a single hardware article or a single unit formed by a grouping of subassemblies, components, or constituent parts.

"Lot or batch number" means an identifying number assigned by the enterprise to a designated group of items, usually referred to as either a lot or a batch, all of which were manufactured under identical conditions.

"Machine-readable" means an automatic identification technology media, such as bar codes, contact memory buttons, radio frequency identification, or optical memory cards.

"Original part number" means a combination of numbers or letters assigned by the enterprise at item creation to a class of items with the same form, fit, function, and interface.

"Parent item" means the item assembly, intermediate component, or subassembly that has an embedded item with a unique item identifier or DoD recognized unique identification equivalent.

"Serial number within the enterprise identifier" means a combination of numbers, letters, or symbols assigned by the enterprise to an item that provides for the differentiation of that item from any other like and unlike item and is never used again within the enterprise.

"Serial number within the part, lot, or batch number" means a combination of numbers or letters assigned by the enterprise to an item that provides for the differentiation of that item from any other like item within a part, lot, or batch number assignment.

"Serialization within the enterprise identifier" means each item produced is assigned a serial number that is unique among all the tangible items produced by the enterprise and is never used again. The enterprise is responsible for ensuring unique serialization within the enterprise identifier.

"Serialization within the part, lot, or batch number" means each item of a particular part, lot, or batch number is assigned a unique serial number within that part, lot, or batch number assignment. The enterprise is responsible for ensuring unique serialization within the part, lot, or batch number within the enterprise identifier.

"Unique item identifier" means a set of data elements marked on items that is globally unique and unambiguous. The term includes a concatenated unique item identifier or a DoD recognized unique identification equivalent.

“Unique item identifier type” means a designator to indicate which method of uniquely identifying a part has been used. The current list of accepted unique item identifier types is maintained at http://www.acq.osd.mil/dpap/pdi/uid/uii_types.html.

(b) The Contractor shall deliver all items under a contract line, sub line, or exhibit line item.

(c) *Unique item identifier.*

(1) The Contractor shall provide a unique item identifier for the following:

(i) All delivered items for which the Government’s unit acquisition cost is \$5,000 or more.

(ii) The following items for which the Government’s unit acquisition cost is less than \$5,000:

| Contract Line, Subline, or Exhibit Line Item Number | Item Description |
|---|------------------|
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |

(iii) Subassemblies, components, and parts embedded within delivered items as specified in Attachment Number ____.

(2) The unique item identifier and the component data elements of the DoD item unique identification shall not change over the life of the item.

(3) *Data syntax and semantics of unique item identifiers.* The Contractor shall ensure that—

(i) The encoded data elements (except issuing agency code) of the unique item identifier are marked on the item using one of the following three types of data qualifiers, as determined by the Contractor:

(A) Application Identifiers (AIs) (Format Indicator 05 of ISO/IEC International Standard 15434), in accordance with ISO/IEC International Standard 15418, Information Technology – EAN/UCC Application Identifiers and Fact Data Identifiers and Maintenance and ANSI MH 10.8.2 Data Identifier and Application Identifier Standard.

(B) Data Identifiers (DIs) (Format Indicator 06 of ISO/IEC International Standard 15434), in accordance with ISO/IEC International Standard 15418, Information Technology – EAN/UCC Application Identifiers and Fact Data Identifiers and Maintenance and ANSI MH 10.8.2 Data Identifier and Application Identifier Standard.

(C) Text Element Identifiers (TEIs) (Format Indicator 12 of ISO/IEC International Standard 15434), in accordance with the Air Transport Association Common Support Data Dictionary; and

(ii) The encoded data elements of the unique item identifier conform to the transfer structure, syntax, and coding of messages and data formats specified for Format Indicators 05, 06, and 12 in ISO/IEC International Standard 15434, Information Technology – Transfer Syntax for High Capacity Automatic Data Capture Media.

(4) *Unique item identifier.*

(i) The Contractor shall—

(A) Determine whether to—

- (1) Serialize within the enterprise identifier;
- (2) Serialize within the part, lot, or batch number; or
- (3) Use a DoD recognized unique identification equivalent; and

(B) Place the data elements of the unique item identifier (enterprise identifier; serial number; DoD recognized unique identification equivalent; and for serialization within the part, lot, or batch number only: original part, lot, or batch number) on items requiring marking by paragraph (c)(1) of this clause, based on the criteria provided in the version of MIL-STD-130, Identification Marking of U.S. Military Property, cited in the contract Schedule.

(ii) The issuing agency code—

- (A) Shall not be placed on the item; and
- (B) Shall be derived from the data qualifier for the enterprise identifier.

(d) For each item that requires item unique identification under paragraph (c)(1)(i) or (ii) of this clause, in addition to the information provided as part of the Material Inspection and Receiving Report specified elsewhere in this contract, the Contractor shall report at the time of delivery, either as part of, or associated with, the Material Inspection and Receiving Report, the following information:

- (1) Unique item identifier.
- (2) Unique item identifier type.
- (3) Issuing agency code (if concatenated unique item identifier is used).
- (4) Enterprise identifier (if concatenated unique item identifier is used).
- (5) Original part number (if there is serialization within the original part number).
- (6) Lot or batch number (if there is serialization within the lot or batch number).
- (7) Current part number (optional and only if not the same as the original part number).
- (8) Current part number effective date (optional and only if current part number is used).
- (9) Serial number (if concatenated unique item identifier is used).
- (10) Government's unit acquisition cost.
- (11) Unit of measure.

(e) For embedded subassemblies, components, and parts that require DoD item unique identification under paragraph (c)(1)(iii) of this clause, the Contractor shall report as part of, or associated with, the Material Inspection and Receiving Report specified

elsewhere in this contract, the following information:

(1) Unique item identifier of the parent item under paragraph (c)(1) of this clause that contains the embedded subassembly, component, or part.

(2) Unique item identifier of the embedded subassembly, component, or part.

(3) Unique item identifier type.**

(4) Issuing agency code (if concatenated unique item identifier is used).**

(5) Enterprise identifier (if concatenated unique item identifier is used).**

(6) Original part number (if there is serialization within the original part number).**

(7) Lot or batch number (if there is serialization within the lot or batch number).**

(8) Current part number (optional and only if not the same as the original part number).**

(9) Current part number effective date (optional and only if current part number is used).**

(10) Serial number (if concatenated unique item identifier is used).**

(11) Description.

** Once per item.

(f) The Contractor shall submit the information required by paragraphs (d) and (e) of this clause in accordance with the data submission procedures at http://www.acq.osd.mil/dpap/pdi/uid/data_submission_information.html.

(g) *Subcontracts*. If the Contractor acquires by subcontract, any item(s) for which item identification is required in accordance with paragraph (c)(1) of this clause, the Contractor shall include this clause, including this paragraph (g), in the applicable subcontract(s).

(End of clause)

ALTERNATE I (AUG 2008)

As prescribed in 211.274-5(a)(4), delete paragraphs (c), (d), (e), (f), and (g) of the basic clause, and add the following paragraphs (c) and (d) to the basic clause:

(c) For each item delivered under a contract line, subline, or exhibit line item under paragraph (b) of this clause, in addition to the information provided as part of the Material Inspection and Receiving Report specified elsewhere in this contract, the Contractor shall report the Government's unit acquisition cost.

(d) The Contractor shall submit the information required by paragraph (c) of this clause in accordance with the data submission procedures at http://www.acq.osd.mil/dpap/pdi/uid/data_submission_information.html.

(End of alternate U.S. clause)

Annex 5: Recommended UID of Items Roles & Responsibilities for NATO Organizations

NATO should:

- Develop and maintain a UID registry capability for commonly funded NATO assets
- Establish and maintain a UID registry capability which is to be available for nations to use in lieu of a national registry
- Establish and maintain a registry capability which will host data on items that are committed by member nations to NATO operations, to include which nation owns each item
- Provide the capacity for these registries to interoperate with the NATO codification system

UID impacts and benefits NATO commands and organizations differently, depending on their role within SLCM, operations, and OLCM. Recommended considerations and roles are provided below for select organizations within NATO for implementation of UID.

Allied Command Transformation (ACT)

ACT shall include UID as an enabler of future capabilities of NATO forces, specifically within the implementation of Operational Logistics Chain Management (OLCM). UID should be tested and utilized within annual experimentation programmes, specifically within the NATO Training and Exercise Programme (NTEP) where possible.

NATO Consultation, Command and Control Agency (NC3A)

NC3 should include UID standards and potential capabilities within all relevant NC3A Production Segment plans. IS investment decisions should include the ability to accept and share UII related data for relevant IS, and the ability for AIDC readers to populate UII data fields.

NATO Programme Management Organizations and Agencies

Programme management organizations should review their SOI to identify the applicability of UID to their programme. Considerations for applicability are identified in section 2 of this publication. Programme managers should also review and update all relevant processes and IS under their purview where opportunities exist for improvement using UID. Programme managers interested in marking their systems should refer to section 3 of this publication for identifying appropriate methods and means for implementation.

NAMSA

As with NATO in general, NAMSA processes and IS that handle item level data to manage UII marked items, must meet the minimum compliance requirements of STANAG 2290. Additionally, these AIS should strive to be compliant with the optional compliance requirements defined in STANAG 2290. This is true not only for NATO commonly funded items, but also for national items with UII that are in NAMSA custody. This capability will enable data collection and sharing between NATO, Nations and industry adopting UID.

As NAMSA is the primary agency having direct transactions of items with Nations and industry partners, NAMSA should develop and maintain UID-enabled standard data exchange formats using AP 239 PLCS DEX for standard supply and maintenance transactions plus operational life cycle data sharing. NAMSA should utilize these standard data exchange formats for all NATO and external UID transactions, upon preliminary agreement with NATO partners.

The Group of National Directors on Codification (AC/135)

AC/135 and subordinate groups should ensure that they include references to UID in related documents to ensure that clear guidance is available to identify the unique and complementary capabilities of Codification and UID. AC/135 will provide the capability to identify within the NCS, which Nations are managing any individual NSN using UII.

Life Cycle Management Group (AC/327)

AC/327 is responsible for UID incorporation into SLCM processes and policy, including the management and approval of changes to this publication. UII provide a common definition of unique items throughout all stages and process of the life cycle, and across all functional areas of management. Because of this, AC/327 can promote use of UID and ISO 10303 standards within SOI design and SLCM processes to enable through-life information interoperability.

Military Committee Land Standardization Board Asset Tracking Working Group (LSB MC ASTWG)

The LSB MC ASTWG should ensure that sufficient capabilities exist within asset tracking data exchanges and IS to include the UII for each item identified with a UII within a consignment.

Annex 6: Recommended Registry Data Elements with Descriptions

| <u>Field Name</u> | <u>Format</u> | <u>Min/Max</u> | <u>Code</u> | <u>Description</u> |
|---------------------------|---------------|----------------|-------------|--|
| Ull | AN | 1/78 | M | The Unique Identifier that ensures uniqueness of all items listed in the registry. |
| Item type | A | 3/3 | M | Flag that identifies the item as an end item or an embedded item. Values : END – End Item / EMB – Embedded Item (in relation with Parent Ull) |
| Population Type | A | 3/3 | M | Flag that identifies the population an item belongs to. Values: NEW – Newly purchased item / LEG – NAMSA owned item in NAMSA stock / NFP – NAMSA owned item in the custody of a contractor |
| Compliant Mark Flag | A | 1/1 | M | Flag that states whether the Ull is marked on the item in compliance with UID of Items Policy. Values: Y – Marked in compliance / N – Not marked in compliance |
| Ull Type | AN | 3/10 | M | Designator to indicate which method has been used to uniquely identify an item. Values: UID1 - UID Construct 1 / UID2 - UID Construct 2 / VIN - Vehicle Identification Number / GRAI - Global Returnable Asset Identifier / GIAI - Global Individual Asset Identifier / ESN - Electronic Serial Number / OTHER - For Ulls without an assigned Ull Type |
| Issuing Agency Code (IAC) | AN | 1/3 | C | Designator to indicate which code was used in the Enterprise Identifier. Required if Ull Type is UID1 or UID2. Values: D – CAGE / LB - ANSI T1.220 / LD – DoDAAC / LH – EHIBCC / UN – DUNS / 0, 1, 2, 3, 4, 5, 6, 7, 8 or 9 - GS1 Company Prefix |

| <u>Field Name</u> | <u>Format</u> | <u>Min/ Max</u> | <u>Code</u> | <u>Description</u> |
|-------------------------------|---------------|---------------------|-------------|---|
| Enterprise Identifier | AN | 1/13 | C | Code identifying the Enterprise that assigned the item with the UID data elements. If UII Type is UID1 or UID2, this is the same Enterprise Identifier that was used in the construct. Required if UII Type is UID1 or UID2. |
| Batch/Lot | AN | 1/20 | C | The batch/lot identification of the item if applicable. Required if the UII Type is UID2 and the Lot/Batch was used within the UII. |
| Original Part Number | AN | 1/32 | C | The Enterprise assigned Part Number corresponding to the assigned UII. Required if the UII Type is UID2 and the Part Number was used within the UII. |
| Serial Number | AN | 1/30 | C | The Enterprise assigned Serial Number corresponding to the assigned UII. The serial number may be within the Enterprise or within the Original Part/Batch/Lot Number. Required if UII Type is UID1 or UID2. |
| Description | AN | 1/250 | M | Description of the item - NATO Approved Item Name and additional data when available. |
| Procurement Instrument Number | AN | 13/25 | C | Contract number under which the item was procured. This is a unique identifier for the contract, purchase order, BOA, Basic Agreement, or BPA and includes the delivery order, task order, and call number as appropriate. Required from Vendors for new procurement; not required when reporting legacy or embedded items. |

| <u>Field Name</u> | <u>Format</u> | <u>Min/ Max</u> | <u>Code</u> | <u>Description</u> |
|---|---------------|---------------------|-------------|---|
| Procurement Prime Contractor Identifier | AN N0 | 5/5 9/9 | C | The 9-digit DUNS or 5-character CAGE of the contractor that is responsible for reporting all UIIs of the delivered items to the Government. Required from Vendors for new procurement; not required when reporting legacy or embedded items. |
| Procurement Line Item | AN | 1/8 | C | The purchase contract line item. Required from Vendors for new procurement; not required when reporting legacy or embedded items. |
| Acquisition Cost | R | 2/18 | C | Unit Price as defined in the procurement contract or as defined at delivery by the contractor. Required from Vendors for new procurement; not required when reporting legacy or embedded items. |
| Foreign Currency Code | AN | 3/3 | C | International Organization of Standardization code from ISO 4217 representing the currency unit of Acquisition Cost. Will default to "USD" if Acquisition Cost is provided and Foreign Currency Code is not. |
| Unit of Measure | AN | 2/2 | C | Unit of Measure associated with the Acquisition Cost of the item. Required from Vendors for new procurement; not required when reporting legacy or embedded items. (For list of codes, see ASC X12 Standards Element 355.) |
| Current Part Number | AN | 1/32 | O | Used only if the item's current part number is different from the Original Part Number. Must be provided if Current Part Number Effective Date is provided. |
| Current Part Number Effective Date | DT | 10/10 | C | The date the item was modified or changed to the current part number from a previous part number. Must be provided if Current Part Number is provided. |

| <u>Field Name</u> | <u>Format</u> | <u>Min/Max</u> | <u>Code</u> | <u>Description</u> |
|-------------------------|---------------|----------------|-------------|---|
| Manufacturer IAC | AN | 1/3 | O | Designator to indicate which code was used in the Manufacturer Identifier. Required if Manufacturer Identifier is provided. Values: see IAC (field 6) |
| Manufacturer Identifier | AN | 1/13 | C | Code identifying the Manufacturer that produced the item if different from the Enterprise Identifier. (field 7) |
| Parent Ull | AN | 1/78 | O | The Ull of the next higher Ull'd item that this item is embedded in. |
| NIIN | NO | 9/9 | C | NATO Item Identification Number Must be filled as soon the Item is codified in the NATO Codification System |
| CAGE/ NCAGE | AN | 5/5 | C | NATO code identifying the Enterprise that assigned the item with the UID data elements Must be filled as soon the Enterprise is codified in the NATO Codification System |

“Format” Column Code Definitions:

A Alphabetic characters only (a-z, A-Z)

AN Alphanumeric characters (a-z, A-Z, 0-9)

DT Date in the format CCYY-MM-DD (i.e. 2005-07-15).

NO Numeric; no special characters such as dollar sign or cents ('\$' or '¢'); if decimal point ('.'), v is number of digits to the right; if no decimal point v is replaced with '0' (zero).

R Real numbers only; floating decimal point allowed ('. '); no dollar sign ('\$').

“Code” Column Definitions:

C Conditional; depends on value or appearance of other elements or national guidance.

I Not used when sending data to the UID Registry.

M Mandatory; must always be provided.

O Optional; may or may not be provided.

Annex 7: NAMSA Item Record and UID of Items Registry Data Elements

| | |
|--|---|
| Equipment number | Stock Check for Serial Numbers |
| Date on which the record was created | Division |
| Name of Person who Created the Object | Configuration Control Data |
| Date of Last Change | Date of Last Goods Movement |
| Name of person who changed object | Unique Identifier |
| Equipment category | Item type |
| Type of Technical Object | Population type |
| Inventory number | Compliant Mark flag |
| Size/dimension | UII Type |
| Weight of object | Issuing Agency Code |
| Unit of weight | Enterprise Identifier |
| Date on which the warranty ends | Original part number |
| Guarantee date | Batch/Lot |
| Equipment replacement value | Base Unit of Measure |
| Country of manufacture | Current Part Number Date |
| Manufacturer drawing number | Manufacturer IAC |
| Manufacturer serial number | Parent UII |
| Manufacturer model number | Marking action |
| Year of construction | Bagged or tagged Code |
| Month of construction | Mark contents |
| First delivery date of the equipment | Mark effective date |
| Start-up Date of the Technical Object | Marker IAC |
| Serial number | Marker Identifier |
| Warranty date for Sales and Distribution | Medium Code |
| Object number | Mark Value |
| Referenced Configuration | Mark Method |
| Configurable Material | Mark grade |
| Material Number | UID chain |
| Serial number | Manufacturer part number |
| Plant | Procurement Instrument Number |
| Storage Location | Procurement Prime Contractor Identifier |
| Batch Number | Procurement Line Item |
| Customer to Whom Serial Number was Delivered | Acquisition cost |
| Maintenance plan | Foreign Currency Code |
| Measuring Point | NIIN |
| Revision Level | Cage code |
| Master warranty number | Innate Serialized Data Mark |
| Serial data when maintaining equipment | Innate Serialized Data Mark Contents |
| Configuration supported | Innate Marking Enterprise |
| Sales equipment | Innate Marking IAC |



- Standard Serially Managed Item Record Data Elements



- UID Registry Data Elements

Annex 8: List of Acronyms and Abbreviations

| ACRONYM | DESCRIPTION |
|----------------|---|
| AC | Allied Committee |
| AIDC | Automatic Identification and Data Capture |
| AP | Application Protocol |
| ASN | Advance Shipping Notification |
| ASTWG | Asset Tracking Working Group |
| DEX | Data Exchange |
| EDI | Electronic Data Interchange |
| ERP | Enterprise Resource Planning |
| FMECA | Failure Mode, Effects and Criticality Analysis |
| FRACAS | Failure Reporting and Corrective Action System |
| ILS | Integrated Logistics Support |
| IS | Information System |
| ISO | International Organization for Standards |
| LSB | Land Standardization Board |
| MC | Military Committee |
| NAMSA | NATO Maintenance and Supply Agency |
| NC3 | NATO Consultation, Command and Control |
| NCS | NATO Codification System |
| NIAG | NATO Industry Advisory Group |
| NLSE | NATO Logistics Stock Exchange |
| NMCRL | NATO Master Catalogue of References for Logistics |
| NSN | NATO Stock Number |
| NTEP | NATO Training and Exercise Programme |
| OLCM | Operational Logistics Chain Management |
| ORBAT | Order of Battle |
| PfP | Partnership for Peace |
| PLCS | Product Life Cycle Support |
| RCA | Root Cause Analysis |
| RCM | Reliability Centred Maintenance |
| RIC | Reportable Item Code |
| SCM | Supply Chain Management |
| SLCM | System Life Cycle Management |
| SOI | System Of Interest |
| SSCC | SERIAL Shipping Container Code |
| STANAG | Standardization Agreement |
| UID | Unique Identification |
| UII | Uniquely Identified Item |
| VIN | Vehicle Identification Number |
| WBS | Work Breakdown Structure |

Annex 9: List of Reference Documents

| REFERENCE | TITLE |
|-------------------------|---|
| AAP-48 | NATO System Life Cycle Stages and Processes |
| ALCCP-1 | Guidance on Life Cycle Costs |
| CM(2005)0108 | NATO Policy for Systems Life Cycle Management |
| ISO 10303 (with AP 239) | Industrial Automation Systems And Integration – Product Data Representation And Exchange – Part 239: Application Protocol: Product Life Cycle Support |
| ISO 15288 | Systems Engineering – System Life Cycle Processes |
| ISO/IEC 15459 | Information technology - Unique identifiers |
| ISO 9001 | Quality Management Systems |
| STANAG 2290 | Unique Identification of Items |
| STANAG 4159 | NATO Materiel Configuration Management Policy And Procedures For Multinational Joint Projects |
| STANAG 4427 | Introduction Of Allied Configuration Management Publications (ACMP) |
| STANAG 4661 | Product Life Cycle Support (PLCS) |

Annex 10: List of Terms and Definitions

Automatic Identification and Data Capture (AIDC): The methods of automatically identifying objects, collecting data about them, and entering that data directly into computer systems (i.e. without human involvement).

Data Repository: One or more databases or information systems that collect, store, and associate data (including metadata) about items.

Imaging Device: an AIDC device that recognizes, captures and interprets encoded data through use of an image, vice scanning with a laser.

Items of Supply: an Item of Production, which a responsible supply management authority has determined as being, required to meet a specific logistics requirement. Within the limits set by the concept, an Item of Supply may be:

- A single Item of Production with a single NATO Stock Number
- Two or more interchangeable Items of Production from one or several manufacturers all with a single NATO Stock Number.

Legacy item: item delivered from the supplier without being having been UID marked or registered.

Life Cycle: the period extending from inception of development activities, based on an identified need or objective, through to decommissioning and disposal of the asset/system.

Pedigree Data: sufficient data elements to identify a uniquely identified item from any other like and unlike item, plus acquisition contract information.

Process: set of interrelated or interacting activities which transforms inputs into outputs.

Registry: a function within a repository that is designated as a “UID registry” that relates uniquely identified items’ pedigree data to their individual UII and mark information.

Serially Managed: items that are not only serially identified, but where at least one organization requires tracking of attributes of each item. Items that are assigned serial numbers at production, but managed throughout life as a pool of items (e.g. by NSN) are *not* serially managed.

System life cycle: the evolution with time of a system-of-interest from conception to retirement.

System of interest (SOI): the system whose life cycle is under consideration in the context of a project or programme.

Unique Identification (UID): A system of establishing unique identifiers to assets and other entities distinguishing it from other like and unlike entities.

Unique Item Identifier (UII): A set of data elements marked on an item that is globally unique and unambiguous and uniquely identifies one item from all other like and unlike items. *Usage note: UII may refer to the concatenated data string that contains the UII set of data elements. UII may also refer to the machine-readable mark that contains the UII set of data elements.*