

## CODIFICATION AS AN INSTRUMENT STREAMLINING INTEROPERABILITY AND THE LOGISTIC CHAIN

*This paper presents the significance of codification applied to streamline interoperability; and, subsequently the logistic chain. The development of information systems and their capabilities, and, on the other hand, a demand for codification and specialized knowledge of military defence products, at the beginning of the 21<sup>st</sup> century, led to the emergence of the concept of the so called 'smart codification'.*

### 1. Introduction

In its original form, *interoperability* means *the ability to operate in synergy in the execution of assigned tasks* and can be interpreted as “an ability to act in synergy in joint performance of assigned mission”<sup>1</sup>. The way to achieve interoperability within NATO is, first of all, standardization.

*Standardization*<sup>2</sup> within NATO is the process of elaboration and implementation of concepts, doctrines, procedures and projects in order to achieve the highest level of compatibility, mutual exchangeability and uniformity in conducting warfare, management and leadership, and operation and maintenance of armament and materiel<sup>3</sup>.

With reference to military defence products, standardization (normalization) means conducting such analyses which ensure<sup>4</sup> function ability and utility, conformity (compatibility), exchangeability, secure usage, and limitation of (redundant) diversity.

The objective of normalization is application of unified standards in industrial production concerning dimensions and materials applied. The following phases of normalization of military defence products can be distinguished:

- Classification, or grouping according to similarity, features characteristic of a product,
- Unification, or making uniform construction or dimension features of machine parts in order to ensure exchangeability,
- Classification into types - in order to simplify production and lower the costs, and facilitate operation and maintenance.

### 2. Codification

In standardization, a tremendous role is played by codification, which is also the tool streamlining production and the consumer logistics chain at both national and multinational level.

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<sup>1</sup> Cf. J. Maj, “The Significance of Interoperability in Standardization In the Context of Present and Future Challenges”. The Proceedings of VI National Conference on the “Problems of Ensuring Quality and Codification in the Aspect of Integration with NATO and EU”, Warszawa 2006, p. 14.

<sup>2</sup> *Standardization* (unification), English term used in NATO the Polish equivalent of which is *normalizacja* as defined in Normalization Act (Dz. U. 1993, Nr 55 poz. 251).

<sup>3</sup> *MC 319. Policy and Principles of NATO*, Ministry of National Defence, Warszawa 1998.

<sup>4</sup> <http://pl.wikipedia.org/wiki/normalizacja>.

NATO countries permanently purchase, store, and use millions of commodities, in particular, numerous items of military equipment. Permanent extension of the items of equipment is a result of the introduction of the new, hi-tech armament and constant modernization of that already in use. NATO logisticians undertook actions in order to: streamline supplies and production, limit doubling of supplies, simplify administration, lower the cost of acquisition of the product system. As a result of those activities, the countries of the Alliance created *NATO Codification System* (NCS), which is a common and unified system of NATO member states used for identification, classification, and management of supplies items<sup>5</sup>.

Basic documents which regulate implementation and functioning of NCS are as follows:

- *The Allies' Codification Publication No 1* (AcodP – 1), known as *NATO Codification Manual*,
- NATO STANDARDIZATION AGREEMENT - STANAG 3150 – concerning *Uniform System of Supply Classification*,
- NATO STANDARDIZATION AGREEMENT - STANAG 3151 – concerning *Uniform System of Item Identification*,
- NATO STANDARDIZATION AGREEMENT - STANAG 4177 – concerning *Uniform System of Data Acquisition*,
- NATO STANDARDIZATION AGREEMENT - STANAG 4199 – concerning *Uniform System of Exchange of Materiel Management Data*,
- NATO STANDARDIZATION AGREEMENT - STANAG 4438 – concerning *Uniform System of Dissemination of Data Associated with NATO Stock Number*.

The principal objectives of NATO Codification System include<sup>6</sup>:

- Ensuring interoperability between member-states participating in the system (both at home and abroad),
- Liquidation of duplicates of supplies,
- Immediate finding of exchangeable items of supplies,
- Ensuring sufficient information which allow to maintain appropriate level of supplies necessary to perform a task by a military detachment.
- Facilitation of identification, management, and classification,
- Facilitation of cooperation and mutual support for national armed forces (the army, the air force, and the navy),
- Facilitation of cooperation and mutual support for the armed forces of any member-state,
- Facilitation for NATO's armed forces to cooperate with and support the armed forces of member-states,
- Creation of conditions for effective use of resources within one theatre of operations regardless of its national, NATO, or international character,
- Minimization of logistic costs.

In order to achieve the above goals, for each item, NCS applies: unified name of the product under a unified nomenclature system, a unified classification system, a unified identification system, and a unified NATO stock number under a unified NATO system for

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<sup>5</sup> Cf. *Introduction to NATO Codification System*, Ministry of National Defence, Military Centre for Normalization, Quality Assurance, and Codification. Warszawa, 2002. p. 7.

<sup>6</sup> [www.nato.int/codification z 03.01.2007 r. http://www.nato.int/structur /AC/135/ncs\\_ guide/english/ e\\_index.htm](http://www.nato.int/codification/z_03.01.2007_r_http://www.nato.int/structur/AC/135/ncs_guide/english/e_index.htm).

store number designations. This permits: providing exact data on all items of supplies included in the system both during the war and in peacetime, and ensuring immediate access to data, and ensuring a common language of supplies intelligible to all parties.

In NATO, NCS plays a leading role in the concept of interoperability; therefore, it is applied in numerous areas of logistics<sup>7</sup>.

1. In the process of acquisition of armament and military equipment (AaME) the codification system responds to the questions posed by a buyer: who manufactures the requested item of supplies, does the item offered by the manufacturer meet the requirements, do limitation occur in the process of supplies, is a given item of supplies used at home or by another NATO country. Moreover, the codification system also provides: the list of manufacturers offering the full items of supplies, a detailed description of the items of supplies including all data connected with physical, quality, and/or functional characteristics (the descriptions must be comparable regardless of their origin and must be based on the standard language of description of the items of supplies), and, finally, access to information on the terms of purchase in order to promote competition between products.
2. In material resources management, logisticians applying NCS manage their resources according to the kind and application (deployment) regardless of the origin of the item of supplies, store the items of supplies under appropriate conditions ensuring their operational readiness, and provide the customer with the required item of AaME on time and with the use of the most appropriate means of transport, distribute and redistribute to various users the required equipment in line with detailed demands and resources available. Therefore, NCS: identifies the item of supplies meeting the same requirements, using unique number, regardless of the reference system used by the manufacturer, it can determine the requirements connected with the way of packaging, storing conditions, and estimated period of storage, it defines the users of the specified items and/or determines the transportation requirements that should be met in the process of supplies of AaME.
3. NCS facilitates maintaining of the technical reliability of AaME (products). The personnel responsible for the said reliability needs answers to the following questions: what spare parts will have to be purchased and where they should be shipped, what are the repair-overhaul capabilities bearing in mind the resources available in a given place, and if the required spare parts are available anywhere under the national or NATO system. Within this area the codification system provides: information on the relationships between all parts of the system, their elements and sub-components, lists of registered national and international participants as well as information on possible exchangeability between particular items in order to make maximum use of the possessed resources.
4. Codification streamlines getting rid of surplus, redundant items of supplies, and facilitates elimination of faulty items. Getting rid of items of supplies can be connected with their uselessness (i.e. expired life-time, replacement of basic equipment) or their technical state (repairs impossible). If getting rid of the useless equipment becomes a necessity, in order to reduce the costs of storage, the following issues become significant: elimination of only such items which cannot be re-used (by another user), retrieving the components or substances which can be re-cycled, and, in this way, they may ensure savings, and ensuring environmental protection during the process of utilization of redundant equipment and materials. Within this area, the codification system includes information which, identifies the potential users of equipment surplus, determine both the properties of sub-units and selected elements of a given item of supplies, and the criteria of their

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<sup>7</sup> *NATO Codification System*, The DNA of Modern Logistics, p. 6.

retrieval, indicate the procedures of disposal of materials of dangerous substances or those that contaminate the natural environment.

### 3. "Smart" Codification

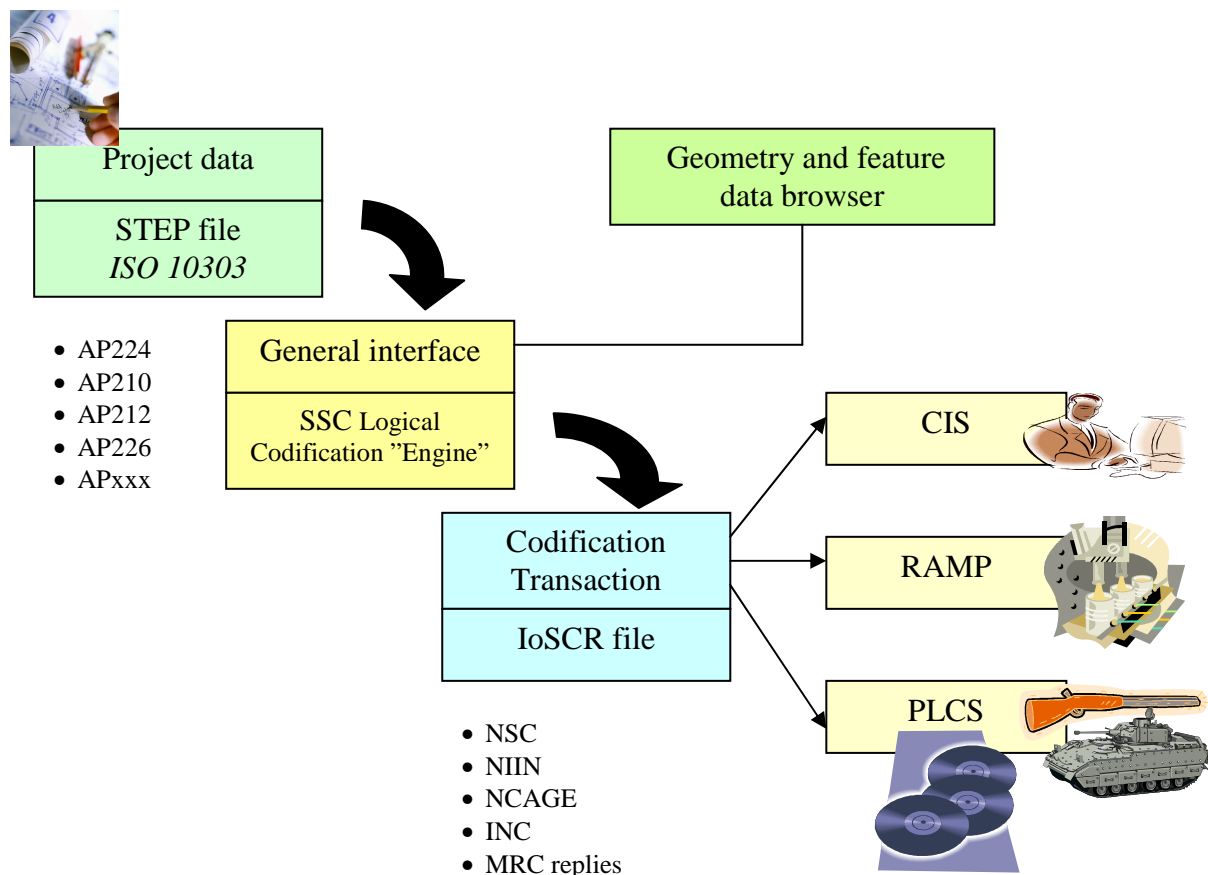
The development of information systems and their capabilities, and, on the other hand, a demand for codification and specialized knowledge of defence products, at the beginning of the 21<sup>st</sup> century, led to the emergence of the concept of the so called 'Smart Codification'. It is assumed that basic data will "flow" automatically into codification information system (CIS) of NCS from the electronic system of the manufacturer/supplier.

Such a process of data transfer is termed 'source codification'. The Source Codification Method uses the standard of ISO 10303 – STEP (Standard for the Exchange of Product Model Data) within the transfer of codification data from the design electronic documentation to the Codification Information System.

This permits indication of codification data in an electronic form in the design phase by engineers possessing the most extensive knowledge of the product. In this way, the need for the latter interpretation of data and their manual "copying" by a codifier is eliminated. After the indication and "interception" of data at the source, they are converted to the format used in eOTD dictionary, as a tool serving for their import into NCS in the National Codification Bureau (NCB). The operation and the range of applications of the Smart STEP tool is illustrated by Diagram 1.

Diagram 1

Smart STEP Codification (SSC) operation and application scheme



Designations:

- AP – Attached Protocol
- INC – Item Name Code
- IoSCR – Item of Supplies Code Record
- CIS – Codification Information System
- MRC – Main Requirements Catalogue
- NCAGE – NATO Commercial and Government Entity
- NIIN – NATO Item Identification Number
- NSC – NATO Supplies Class
- PLCS – Product Life Cycle Support
- RAMP – the system of Rapid Access to Manufactured Parts

Reference: M. Dalkowski, *Wpływ globalizacji produkcji i źródeł dostaw na kodyfikację wyrobów obronnych w ramach dostaw na rynki NATO i UE*, materiały VI Krajowej Konferencji „Problematyka zapewnienia jakości i kodyfikacji w aspekcie integracji z NATO i Unia Europejską”, Warszawa 2006, s. 57.

‘Smart’ codification is more precise and cheaper, and allows for an integration of computer systems and data through the use of the standards in this branch of science, and work and experience of industrial engineers. Making use of standard data and their analysis significantly improve the process of codification of defence products.

#### 4. Effects

The advantages resulting from the use of NATO codification system can be demonstrated within the following areas<sup>8</sup>.

Operational advantages:

- NCS contributes significantly to standardization of equipment and materiel; therefore, it supports raising the level of interoperability, because spare parts can be used in numerous armament systems.
- The amount of knowledge on means and resources available at national and NATO level permits:
  - rationalization of stock resources management through the mutual availability of possessed spare parts and service workshops,
  - distribution of minimal-need amount of spare parts during warfare,
  - mutual supplies for different arms and services,
  - access to the supplies support of other countries.
- An exact description of the item allows the user to identify effectively the item meeting particular requirements and to retrieve the readiness of equipment without delay.
- The standardized form of communication simplifies significantly the “technical” dialogue between users.
- The application of computer technologies allows for recording, processing, storing, and sending of identification data and effective management through the use of common, available databases.

Economic advantages:

1. The database allows the designers and design-team leaders to browse the base in search of the parts which were included into the supplies system and can be used instead of introducing the new ones. Such practice allows for a reduction of a diversity of items that

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<sup>8</sup> A Szymonik, *Logistyka jako system racjonalnego pozyskiwani wyrobów obronnych*, AON, Warszawa 2007, s. 116.

- have to be managed and a reduction of costs connected with tests and experiments, identification, storage and other activities connected with supplies. Approximately 50% of the items among the components used at the design stage have already been codified.
2. The knowledge pertaining to the spare parts used in the armed forces allows the agencies making acquisitions to:
    - Avoid unnecessary purchases for a particular user when another user has a stock surplus,
    - Combine the orders of several users to achieve the most convenient price while purchasing a larger number of items,
    - Have access to a number of sources of potential supplies; and, in his way to generate considerable savings through promoting competition between suppliers,
    - Register the costs of supplies, which facilitates budget monitoring and management.
  3. The system contributes significantly to the standardization of a broad range of equipment performing identical functions, thus reducing the number of spare parts necessary to manage each of the armament systems.
  4. The elimination of duplicates reduces the level of stock resources and simultaneously brings savings in storage space, storehouse service equipment and personnel.

## References

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