NATO C3 CLASSIFICATION TAXONOMY

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In modern times, the description of an organizational structure within its strategic, economical, technical, and operational environment is a daunting task. Performing that task in an alliance governed by 28 individual nations, with the purpose of capturing the requirements for communications and information systems in support of improved information sharing and decision making, that's a real challenge. The North Atlantic Treaty Organisation (NATO) is that organisation, and the subject of discussion is its structure of Consultation, Command and Control (C3).

Transformation

The recognition of the need to transform the NATO alliance is based upon Information Age principles and to pursue a course towards NATO Network Enabled Capabilities (NNEC) has dramatically changed the level of ambition in the field of C3 after the Prague Summit of 2002. It has also changed the command structure of the Alliance: the operational headquarters were grouped under one single strategic command, and the transformation of NATO's military capability was assigned to a new strategic command. The Allied Command Transformation (ACT) provides the conceptual framework for the conduct of future combined joint operations, and the capabilities they need.

The C3 capability of NATO is supported by several common-funded programs, a large number of more or less correlated information systems, and a whole range of standards, procedures and directives. The C4ISR Division of ACT has a rich program of work aimed at transforming this capability.

In order to understand the C3 needs and requirements, ACT needed to identify the elements of the C3 structure and their relationships, and arrange them into a classification. This arrangement is known as taxonomy. It helps to understand the underlying fabric, and find opportunities for cost saving, and for a faster and smarter development of future solutions.

Mapping the Enterprise

The NNEC Feasibility Study of 2005 proved that the future communications and information systems (CIS) environment for NATO must adapt a Service Oriented Architecture (SOA), and that obviously has consequences for the C3 structure. This study presented a Technical Services Framework, with a hierarchical arrangement of technical services in four horizontal classifications (in a way comparable with the OSI seven-layer model), plus two vertical groups: Information Assurance (IA) and Service Management & Control (SMC).

The Technical Services Framework was used as the basis for a reductionist description of the complex C3 structure. Soon it was recognized that this was not sufficient for a full representation, and that the result would not provide the desired level of granularity, nor give correct attention to relevance, priority and completeness of services. Acknowledging too that this description would deliver the source data for architectural views of the C3 areas of interest, as well the requirements for the development and implementation of future C3 capabilities, it became evident that a taxonomy should have a broader and deeper scope.

In an analogy to geospatial referencing, this new C3 Classification Taxonomy aims to 'chart' the NATO C3 'landscape'. This activity is referred to as 'enterprise mapping'. Its purpose is to capture concepts from various communities of interest, and map them for item classification, integration and harmonization.

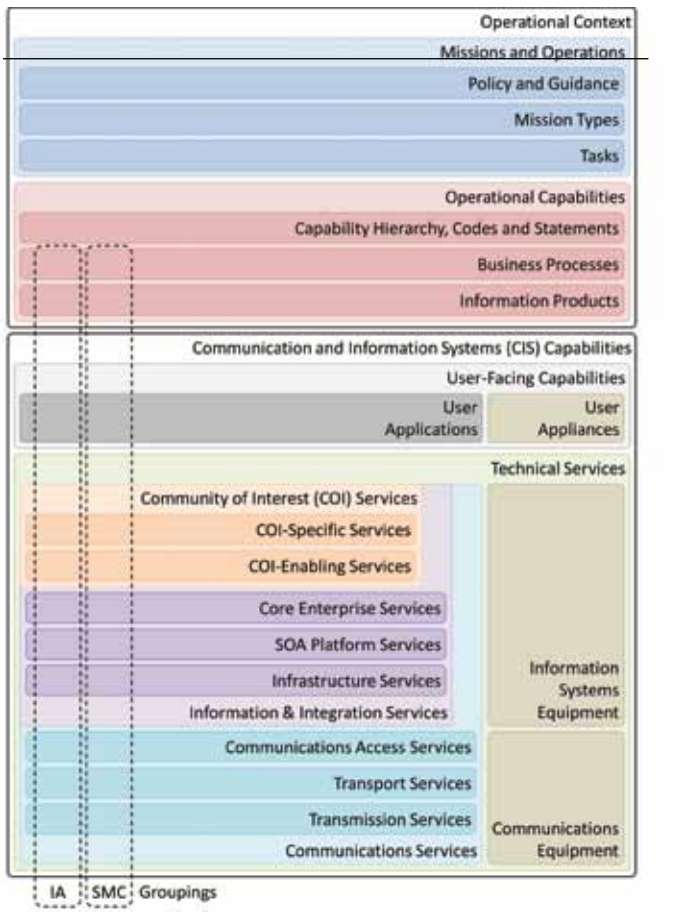

Figure 1 - C3 Classification Taxonomy, level 0

Operational Context

The requirements for future C3 capabilities are obviously not purely technical in nature. A framework for CIS services would only address the back-end technology solutions, and would not give any resolution about quality and quantity of services required for a particular mission. Therefore the C3 Classification Taxonomy starts with an 'Operational Context'. The Operational Context describes the environment in which CIS capabilities are defined and used. It connects the strategic concept and political guidance of the Alliance through the NATO Defense Planning Process (NDPP) to the traditional CIS architecture and design constructs.

The Alliance's political and military ambitions, the overarching guidance and policies, its Level of Ambition, and the so-called Mission-to-Task Decomposition (MTD) are categorized under 'Missions and Operations'. Then the needed capabilities are catalogued, operational (business) processes addressed, and relevant information products incorporated under 'Operational Capabilities'.

All this information provides the organizational perspective in which the CIS technology solutions will be deployed in order to achieve success in NATO's future missions. Being all part of the taxonomy might fuel the idea that there is causality in the different layers, and that the classification constitutes a certain hierarchy of data from top to bottom, and eventually into the technical domain. This is not the case here. The layers are chosen as a comfortable grouping of datasets. There are relations between different datasets, and between layers, without a hierarchical notion. Amongst other things, this means that the different datasets can link directly to all layers of the technical framework, not necessarily top-down from layer to layer.

CIS Capabilities

With the operational context set, it is opportune to link it to a technical framework of applications, services, and equipment. These 'CIS Capabilities' span two significant categories: the 'User-Facing Capabilities' and the 'Technical Services'. The relationship between these categories, and the separate layers within them, could then be regarded as a hierarchical structure, from application down to physical layer.

User-Facing Capabilities provide an end user with 'User Applications.' These Applications are computer software components designed to help a user perform singular or multiple related tasks (Apps!). They run on 'User Appliances' and provide the logical interface between human and automated activities. Applications are stable and relatively unchanging over time, whereas the services used to implement them will change over time, based on technologies and changing business needs.

Technical Services provide the foundation for NNEC. (This part of the taxonomy is often referred to as the original Technical Services Framework of the NNEC Feasibility Study, in spite of the difference in service classifications.) They provide a set of related software and hardware functionalities that can be used for different purposes, with the policies that should control their usage. They are to be implemented in a federated model that allows NATO and the Nations to jointly provide a robust and secure platform on top of which the User-Facing Capabilities can run. Their requirements are derived from operational needs expressed by the collection of required applications.

EM Wiki

As the C3 Classification Taxonomy evolved and expanded, the growing complexities of the datasets stipulated the development of a tool to record and process all the datasets and produce tangible outputs. So by the end of 2010 ACT's Technology and Human Factors (THF) Branch built a web-based platform on the basis of a wiki (similar to the software running Wikipedia), and modified this wiki to support the taxonomy with graphic rendering, electronic forms, and semantic integration. This so-called 'Enterprise Mapping (EM) Wiki' is accessible via the Internet on a protected website.

The datasets in the wiki are either derived from designated and certified sources, or captured by contribution of subject matter

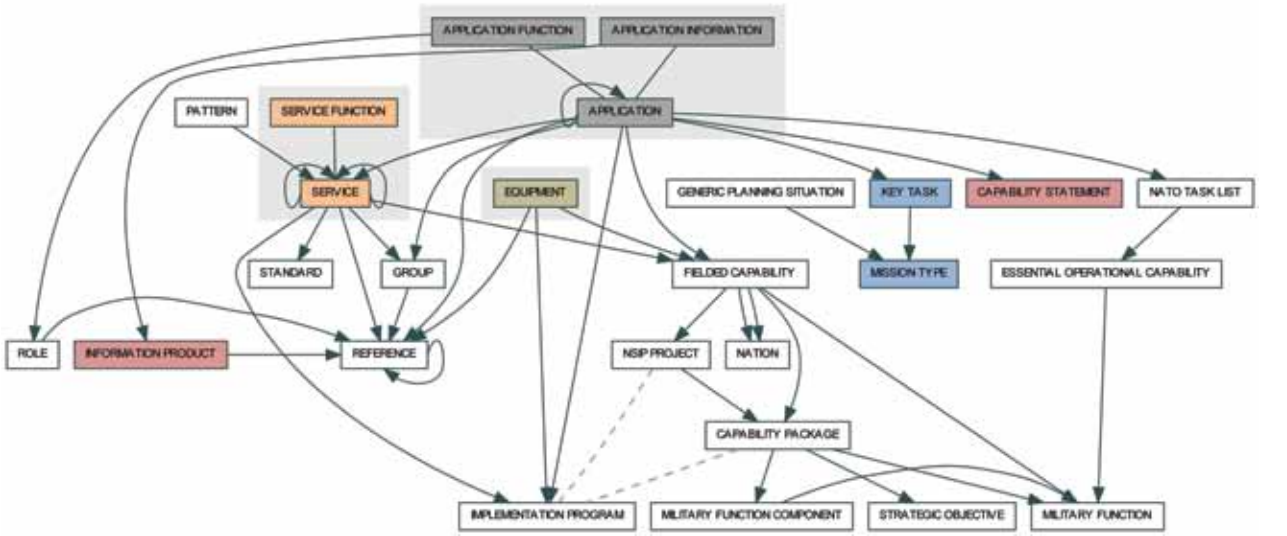

Figure 2 - A relationship chart for Enterprise Mapping

experts, architects and other stakeholders. This means that some datasets are static, some are updated on a regular basis, and others are continuously evolving and expanding. Most notably, this is the case with the definition of applications and services. Gathering all that data and providing timely and relevant content to the wiki is the most important – and most difficult – task. ACT receives support in these efforts from architects and engineers of the NATO C3 Agency (NC3A).

The effectiveness of the wiki as a collaborative platform depends on a couple of characteristics. The most important one is that all users can edit – and therefore contribute – the content in a simple editor. That simplicity was challenged by the increasing complexity of the evolving datasets, and the 'spaghetti diagram' of internal relationships. So to contain this complexity for the main contributors, the THF Branch has created manuals, online forms and an automated reporting mechanism for posters, charts and reports. For instance, contributions to the applications dataset are supported by self-explanatory forms, and requirement definitions for applications in one certain community of interest are automatically featured in a single document.

At certain intervals the data in the EM Wiki is baselined, i.e. captured and stored for a certain version at a certain date and time. Typically, baselines are generated to develop Reference Architectures (RAs) for a subset of the wiki (like a certain community of interest, or a certain classification in the taxonomy). The architectural views in these RAs are developed in compliance with the NATO Architectural Framework (NAF). The data in these views are identical to those in the baselined wiki dataset.

The software for the EM Wiki is available as open source, and the local modifications were needed to define the separate datasets, to create templates, forms and categories, and to generate the automated outputs. There is no considerable constraint in re-using the em wiki as a whole, or for selected parts. In fact, ACT stimulates the re-use of this resource, as it helps partners further evolve and collaborate, and improve interoperability.

The EM Wiki has proven to be a flexible and effective tool for the mapping of the C3 Classification Taxonomy, and it has therefore enabled ACT to capture the requirements for significant portions of the C3 structure of the NATO Alliance, and making sure that the common funds are well-spent on future C3 capabilities that will establish and maintain a service-oriented architecture, and improve interoperability and information sharing.

Status

Recently, ACT has proposed to the NATO C3 Board (NC3B) that the C3 Classification Taxonomy might be used as the reference for not only the development of Reference Architecture - with the appropriate level of detail in applications and service descriptions, and requirements definitions – but also for the Overarching Architecture (less granularity for the NC3B) and eventually Target Architectures (more granularity for the NC3A). If approved, this would mean that the whole NATO C3 landscape would be charted and captured in the same way, and stored in a single repository. This would certainly enhance the coordination between these architectures, synchronize various activities and projects, and improve interoperability and information sharing. At the same occasion, ACT also proposed to eliminate the NAF in favour of The Open Group Architecture Framework (TOGAF), which will bring the Enterprise Architecture efforts of the NATO Alliance closer to industry standards.

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Washington's Cherry Blossoms Celebrate 100 Years

Spring in metropolitan Washingtonian, DC, is heralded each year with clouds of pale pink cherry blossoms across the region, most famously around the Tidal Basin, where the Jefferson Memorial holds court. The annual blossoming is celebrated each year with the National Cherry Blossom Festival, which brings hundreds of thousands of visitors from around the country and the world to participate in the many cultural festivities that are featured during the five-week event, from March 20 to April 27, 2012.

Washington received over 3,000 cherry trees from the city of Tokyo, Japan, as a token of the growing friendship between Japan and the United States over 100 years ago. This year's Festival marks the 100th anniversary of the official planting of the first two cherry trees, which was held on March 27, 1912. Most of the remaining trees were later planted around the area that we now refer to as the Tidal Basin.

Each year about mid- to late-February, locals begin the "cherry blossom watch" and begin their prognostications about when the blossoms will actually come out and then reach their peak color. Extremes in winter weather always raise concerns about them blooming "too early" or "too late," since the ideal is that they show themselves sometime during the Festival itself. The official "bloom watch" begins around the first of March. The National Cherry Blossom Festival offers many activities, including kite building and flying, fireworks on the waterfront, painting and other art, workshops and lectures. The iconic Cherry Blossom Parade will be held on April 14.