Case Study on Mapping of Defense Information Infrastructure (DII) Common Operating Environment (COE) Segments to DoD Technical Reference Model (TRM) Services

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Purpose and Objective of the Case Study

The Defense Information Infrastructure (DII) Common Operating Environment (COE) is an infrastructure for building interoperable systems across user applications using a set of guidelines, standards and specifications implemented through a collection of reusable components or segments. In the DII COE Integration and Runtime Specification (I&RTS), a segment is defined as a collection of one or more software and/or data units most conveniently managed as a unit of functionality. Building a target system includes combining COE components with mission-specific software.

The mapping document categorizes the DII COE segments into the service areas defined in the DoD TRM. Each COE segment is mapped into a DOD TRM service based on the segment's functionality as determined from DII COE and COTS documents. Although the DOD TRM provides for both a services and an interfaces view, at this time the mapping contains only the services view.

Rationale

In the DII COE documentation, a conceptual correspondence already existed between the DOD TRM and the DII COE, illustrated in figures showing the DII COE services and architecture. As a logical follow-on to the notional mapping already in the DII COE documentation, a finer granularity of mapping was developed of the DII COE segments to the services defined in the DOD TRM. The mapping provides a common foundation for viewing diverse components from a conceptual perspective, and helps to understand the roles of the various COE segments. It can be used not only to contrast DII COE with other system architectures but also to provide a basis for correlating interoperablility areas between the DII COE and other system architectures.

Description

The COE segments referenced in the mapping were derived from the DII COE 3.4 Build Lists. The purpose of each segment in the build list was identified, and based on the segment's purpose, it was mapped to a DOD TRM service. The software version description document and the DII COE Integration and Runtime Specification (I&RTS) document were used to obtain a segment's function. If a software version description document was unavailable for a segment and the I&RTS provided no descriptive information, the World Wide Web was searched for information related to the segment.

The mapping document contains a listing of the DOD TRM service areas, each followed by the descriptions from Section 4.4 of the DOD TRM. Below each DOD TRM service are the COE segments mapped to that service. With each segment is a description of the segment, with the source for the description identified. The host platform(s) on which each segment is available are also listed.

Results/Findings

Most of the DII COE segments were easily mapped to a single DOD TRM service area, but some of the segments could be categorized into more than one service area. To minimize ambiguity, the primary purpose of the segment was identified and used to categorize it into a single DOD TRM service area.

For example, the DocViewer segment allows users to view documents installed locally or documents loaded on any document server. This segment was mapped to DoD TRM 4.4.1.2.1 Multimedia.

Similarly, the Application Framework segment is a client to the Joint Mapping Toolkit – Visualization segment that provides a framework for application segments that share a common tactical display. The DII Motif Style Segment tailors and extends basic Motif features in accordance with Version 3.0 of the DII COE User Interface Specification. Both of these segments were mapped to DoD TRM 4.4.2.1.2 User Interface Services.

As another example, the Object Request Broker is an intermediary that coordinates and manages the requests between clients and servers. This segment was mapped to DoD TRM 4.4.2.4.4 Distributed Computing Services.

There were some segments that did not appear to map directly to an existing service area. For each of those segments, a decision was made to map the segment into the DOD TRM service area that seemed most closely related to the purpose of the segment. The segments where this tailoring of the model was required included the Software Development Kits (SDK), the Alerts, and the data segments.

The SDKs provide examples and libraries that a developer can utilize to develop or expand the function of a COE segment. Each SDK was categorized into one of the DOD TRM service areas based on the functionality developed by utilizing the SDKs. For instance, the Universal Communications Processor (UCP) SDK provides the development libraries, including scripts, data, and sample sources, for third party UCP developers to build client applications for the UCP engines. Since the UCP mapped to the DoD TRM 4.4.2.1.6 Communication Services, the UCP SDK was also mapped to that service area.

The Alerts segment provides a generic mechanism for the sending and receiving of alert messages between processes. It provides applications with the ability to register specific events which will generate visual/audio/log alerts to the operator during the operation of the system. This segment was mapped to the DoD TRM 4.4.2.2.9 Extended Operating Services, since the description of the services in that service area was closest to the functionality of the alerts.

The data segments can be classified into account groups, templates, and data used by runtime software. They don't provide any functionality by themselves, but rather provide a mechanism for creating or modifying the runtime environment. The account groups, which provide samples for accessing and customizing the user interface, were mapped to the User Interface Services. The templates provide examples of how to customize the behavior of a parent segment and were mapped to the same DOD TRM service area as the parent segment. The data segments were

mapped to the same DOD TRM service area as the segment that utilized the data at runtime. For example, the MIL-STD-2525 Symbology data segment, which contains Computer Graphics Metafiles (CGM) and a menu hierarchy that allow the construction of MIL-STD-2525A icons, was mapped to DoD TRM 4.4.1.2.1 Multimedia.

Conclusions

The DOD TRM is very useful in gaining a better understanding of the roles and functions of the DII COE segments. Moreover, the mapping process also provides useful feedback on the DOD TRM itself. The mapping provided valuable insight into the tailoring process, and may even provide input in possible future updates of the DOD TRM.

References

Defense Information Infrastructure (DII) Common Operating Environment (COE) Integration and Runtime Specification (I&RTS), Version 3.1, Defense Information Systems Agency, 1 October 1998

Department of Defense Technical Reference Model (DoD TRM) Version 1.1 Coordination Draft, Defense Information Systems Agency, 15 July 1999

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