Information Paper

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Subj: MESSSAGE TEXT FORMAT XML SCHEMA REFACTORING PROJECT

1. Background. United States Message Text Format (USMTF) is governed by MIL STD 6040B and defines a slash delimited shorthand that is used for official communication. NATO MTF is defined by the Allied Data Publication 3 (ADatP3) and remains aligned with USMTF. Since 2008 these standards have been defined using Extensible Markup Language (XML) Schemas which support both slash delimited and XML message formatting. Each standard provides over 300 messages which have been developed and maintained by service and national level operational sponsors over the past 20 years.  The messages and their content provide an authoritative lexical, ontological, and operational reference model for information exchange requirements across the spectrum of modern warfare.

2. Issues

a. Format. Slash delimited MTF messages have been criticized as being less effective than unrestricted formats used by modern tools such as email and word processors. Nevertheless MTF messages remain in effect for official communication across the DOD.

b. Efficiency. XML MTF instances are significantly larger with the addition of XML tags, which causes significant issues when they are delivered unmodified over tactical networks.

c. Interoperability. Implementation of different versions of the standards in systems cause interoperability problems which are difficult to mitigate.

3. Recommended Solutions. Software implementation principles include the improtance of "separation of presentation and data." MTF Standards can be better implemented if this principle is applied toward user interface, transmission, and version harmonization.

a. Format. The requirement for shorthand notation in order to convey complex information with sufficient accuracy and detail remains intact, but the presentation of this information can be improved using XML technologies. Implementation and user interface improvements can be employed to make messages more readable, and to allow message content to populate modern tools such as email, documents, map displays, dashboards, diagrams and reports. This will be better facilitated by refactoring the XML Schemas that are used to define the messages so that they are aligned with mainstream design principles.

b. Efficiency. If message delivery is addressed as a type of presentation then the information can be transmitted using optimized compressed and binary formats without loss of data. Efficient XML Interchange (EXI) is a mature open standard for using XML Schema definitions for lossless delivery of XML content using optimized binary encoding and compression.  MTF standards are well positioned to leverage this technology, but specific efforts must be taken to improve XML Schema formats and publish best practices for implementation.

c. Interoperability. Data required by specific versions of messages can be recognized in other versions using generic presentation mechanisms which allow fields from any standard to be recognized. This will require the application of information provided in XML Schema from all standards. The design patterns required for the adaptable use of MTF fields are represented in the US National Information Exchange Model (NIEM), which has been identified as a best practices target for XML standards in the DOD.  NIEM alignment and compliance will improve interoperability between different versions of MTF standards, and facilitate compatibility with other information exchange standards.

4. Current Efforts

a. XML Standard Refactoring

(1) Among US DOD Services the Marine Corps has recommended conformance with the NIEM standard as a path toward effective implementation of USMTF and other standards. Based on a prototype effort which successfully converted the XML Schema to NIEM conformant naming and design rules, this position was ratified by the USMTF configuration management board in September 2014. The same effort was successfully applied to NATO Schema and the proposal to adopt US refactoring efforts is under consideration with a high likelihood of adoption.

(2) Administrative changes to the standard are required in order to remove naming conflicts and other issues in order to re-factor XML Schema for increased functionality. These changes are being incorporated into the conversion processes as they are approved.

(3) A collaborative development environment has been established on DoD servers in order to efficiently execute significant changes to the MIL STD, as well as to develop and provide reference implementations and best practices. Implementation efforts serve to justify changes as well as to prevent redundant work and facilitate the use of the NATO and USMTF standards in current systems.

(4) Agile development processes are being employed in order to achieve specific objectives as well as to incorporate software unit testing procedures into the configuration management and reference implementation products. Unit tests allow automated testing and verification of all messages and related software when any changes are applied to XML Schema, XML transformations or source code.

5. Objectives

a. The current goal is to achieve full refactoring of the USMTF XML Schema, along with ratification of all required changes by January of 2015. This is an aggressive plan given the complexity of the work and the need to achieve approval from service sponsors for all changes to the messages. All changes impact the way the standard is implemented using XML, and not the core content.

b. Parallel implementation and verification will also be conducted for the NATO MTF standard. Reference implementations of improved implementation, display and delivery capabilities will be demonstrated at Combined exercises and presented at NATO meetings as complete products. Efforts are underway to establish a collaborative development environment on NATO servers to encourage participation by other nations.

c. The way in which these objectives are addressed is intended to promote the requirement for modern software development procedures and XML proficiency at the standards level as well as at the implementation level. Services and agencies that are responsible for maintaining Joint and Combined interoperability will be encouraged to establish and maintain centers of excellence that will guide the maintenance of standards and enforce responsible implementation in systems.

6. Conclusion. The proposed design changes to MTF can be applied to other message standards and will enable harmonization and integration of information exchange requirements without dependence on specific message sets or versions. The ontologies contained in military message formats represent baseline data points that can be leveraged by data mining, expert systems, artificial intelligence, and other processes which can be employed by Intelligence, Command and Control and Tactical systems in order to increase situational awareness and combat effectiveness.