Model Driven Data Interoperability (MDMI)

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Some of the problem

• The current messaging environment inhibits change
  ▪ Legacy software to is expensive to change (remember Y2K)
    • Can’t take advantage of new message formats and technology
    • Can’t respond fast enough to market changes
  ▪ Too dependant on least-common-denominator definitions
    • Message variants squeezed into restrictive syntax and semantics

• Conversion of message information not standardized
  ▪ Ever app or EAI solution coded separately, no standard for conversion
  ▪ Versioning is costly and slow

• STP still out of reach
  ▪ Semantic meaning of fields between message not consistent
  ▪ No standardized mechanism to move information between standards
  ▪ Information integrity not maintained throughout a transaction
Objectives for MDMI

• Be UML-compliant
  ▪ A well structured modeling paradigm (as opposed to XML)

• Express standard as open and public UML profiles
  ▪ However, message definitions and conversion “content” can be proprietary, semi-private or public.

• Make it easily for Financial Services standards bodies
  ▪ Separate syntax from semantics – be wire format independent
  ▪ Provide for model (semantic) level compliance

• Enable enterprises and vendors to implement industry standard data conversions applications
What is the MDMI standard

- Models the conversion of “message elements” instead of messages
  - Describes how to take elements out of a message or insert it into a message
- Separates syntax and semantics
  - Localizes the complexity of overloaded legacy messages
  - Allows for semantic level mapping
- Message elements mapped to a central domain data dictionary
  - Standards bodies or enterprises need only map to business elements
  - Hub and spoke model creates a linear set of transformations
- Robust creation of domain data dictionaries
  - Dictionary comprised of truly reusable business elements
  - Semantic distance maintained
    - Synonyms and near-synonyms in a separate “thesaurus”
- Maps can be created using industry standard tools
  - Based on UML models
So what are MDMI benefits

- Allows standards bodies to automate versioning
  - Supports version map injection
- Provides a viable pathway to new wire formats like XML
- Defines a real world process to incrementally build a domain data dictionary
  - Based as much on existing messages as on industry modeling
  - New well-structured business elements easy to add
- Delivers on the ISO 200022 promise of effective, but flexible re-usability
  - Entities can create whole new message formats from business elements
- Creates a mechanism for federating domains through standard dictionaries
- Reduces cost and improve quality for financial institutions
  - Internal data can be easily mapped to inter-enterprise message standards
High Level view of MDMI Design Process

Step 1 – Removing Syntax

Documentation for Existing Message Formats (e.g. VISA TC05) → Create Message Model → Message Element Set → Syntactic Translation Model

Step 2 – Mapping Semantics

Message Elements → Create Semantic Maps → Semantic Map

Domain Business Elements
Process to remove syntax

- Modeling done by Technical Professionals
  - No (or minor) domain knowledge necessary
  - Except for specifying Business Rules and associations
A Description of the Message Element Set

• Definition of the Message Element Set
  - A set of classes representing the smallest semantic elements in a message
  - Independent of any type of message syntax or physical format representation

• The MDMI Profile for Message Elements
  - Class description
  - Business Rules associated with a Message Element
  - Datatype rules

• Message Element relationship model
  - Directed model of the context of each Message Element
Example of Message Elements (from MT103)
Message Relationship Model

• Providing the message context for a Message element
• Modeling still done by technical professionals
  - Only minor domain knowledge necessary
A Description of Message Syntactic Model

• Definition of Message Syntactic Model
  ▪ UML Model of the syntax of a message
    • Should works for any type of existing message format, e.g., EDI, TCxx, XML, etc

• Contains LeafSyntaxTranslator for each Message Element
  ▪ Provides information necessary to insert or extract a Message element value
  ▪ Key attributes include Location and Format
Message Syntactic Model

dcl CM4PMS_MSM

import MessageSyntaxModel

+ name: String
+ messageSyntaxModel
  1
  validNode
+ node: 1 *

MessageElement

+ name: String
+ datatype: Datatype
+ description: String [0, 1]
+ multipleInstantiation: Boolean = False
+ position: String
+ positionExpressionLanguage: String
+ messageModelName: String

+ messageElement: 1
  validLSTTOfMessageElement

SetChoice

+ constraint: String
+ constraintExpressionLanguage: String

LeafSyntaxTranslator

+ format: String
+ formatExpressionLanguage: String

Set

+ node: Node [2, *]
+ isUnique: Boolean = False
+ isOrdered: Boolean = False
Process to Create Semantic Map

- Modeling done by content-aware professional
  - E.g., Business Analyst who understands Domain

INPUT

- Message Elements
- Domain Business Analyst
- Domain Business Elements From Domain Data Dictionary

OUTPUT

- Semantic Mapping using UML tool
- MDMI Profile for Semantic Mapping
- Semantic map of Message Elements and associated Business Elements
A Description of the Message Semantic Map

• Map of Message Elements to Business Elements in a Domain Dictionary
  • E.g., Business Elements derived from the attributes of UNIFI business components

• Semantic Mapping constraints
  ▪ Defines allowed association between Message Elements and Business Elements
  ▪ **Key - Allowed mappings provide boundary to determine whether new Domain Semantic Element is required.**
Importance of Semantic Mapping

- Semantic mapping failure implies new Business Element
- Business Elements for domain dictionary can be discovered
  - Through formal modeling (ISO 20022)
  - Through reverse-engineering of existing messages
  - Through submission by User’s driven by market needs
- Semantic mapping constraints identify synonyms and near synonyms
  - Support well-structured data dictionary
  - Provide semantic distance between Business Elements
- Semantic mapping can be used federated domain dictionaries
  - E.G., Wholesale banking domain linked to Insurance domain
  - Will increase quality across multi-step transactions
Message Element Semantic Map
• MDMI artifacts can be “injected” by standards bodies
• Enterprises can efficiently map conversions of internal message and data formats
• A vendor can use the MDMI standard to create industry standard message data conversion applications
Using Semantic Mapping for well-structure Data Dictionaries
Proposed UNIFI Data Dictionary

- OMG’s Finance Domain Task Force has been working closely with members of the TC68 –WG4
The Whole Data Dictionary Shebang

- Domain Model Catalogues
- Synonyms and Near Synonyms
- Qualified Business Elements
- Basic Elements

Slide 21
Process to Add to Domain Dictionary

**INPUT**
- Formal Domain Modeling
- Reverse Engineering
- Element Submission

**OUTPUT**
- Domain Business Analyst
- Semantic Mapping using UML tool

MDMI Profile for Semantic Mapping

Dictionary
Federating or linking Data Dictionaries

• Enterprise Domain to Industry Domain federation
• Industry Domain to Industry Domain federation
• Entire STP movement of data can be automated
The (potentially) glorious future of MDMI

- Choice of appropriate wire format based on need
- Creation of dynamic message formats based on business elements
- Can be a framework for lossless conversions
- Introduction of an indirect reference standard will improve security
In summary

- This standard can reduce costs
  - Injection reduce costs of conversions
- Increase quality
  - Standards bodies focus on domain they know best
- Improve STP
  - Through integral movement of data
  - Automated movement of data across federated domains
- Provide market flexibility
  - Focus on truly reusable components
  - Create well structured domain dictionaries
  - Allow for the incremental growth of dictionaries based on market need.
How can you help

• Much practical work is needed to fill out the standard
  ▪ The devil is always in the details

• A successful proof-of-concept will result in a major standards body implementing the standard
  ▪ That will start a snowball rolling down the mountain

• So participate with the MDMI consortium and help lead the way to this promised land
  ▪ Founding members – FireStar, SWIFT, HSBC