**The Federal Health Information Model - A White Paper**

**Executive Summary**

Several Government entities, to include State government agencies, whose missions include providing, funding, or regulating healthcare, are actively building enterprise Information Models to foster interoperability, consistency, and efficiency within their jurisdictions. It is recommended that these Information Modeling efforts be coordinated to form a Federal Health Information Model (FHIM). It is further recommended that a project be chartered under the Federal Health Architecture program to provide managerial direction and support for the FHIM.

**Business Case and Context**

Federal Agencies are directed to produce a Data Reference Model (DRM) as part of the Federal Enterprise Architecture. Notwithstanding this direction, agencies need an understanding of the data that is the lifeblood of their organization, and would need some sort of model whether it is mandated or not.

The need for such models is particularly important as government organizations embrace Service Oriented Architecture (SOA), which has become the state of the art in Information Technology. It is well understood that SOA implementation is impossible without a set of commonly understood and agreed-upon information models. While SOA is a technology solution, it has potentially dramatic effects on business strategy and business operations as it enables organizations to adapt quickly to changes in their environment.

In addition, as agencies periodically undertake initiatives to modernize their operations, the use of Business Process modeling has become prevalent. The tools to automate business process modeling and the processes by which the modeling occurs have become mature and are in widespread use. Business process modeling is a key component to Business Architecture, which is itself a prerequisite to the adoption of a corresponding Enterprise Architecture. During the course of producing business process models, information items are identified. These information items must correspond to the enterprise Information Model. In other words, the business process modeling both informs and relies on information modeling. A key point here is that both efforts require traceability to its counterpart. In other words, it is important to know that a piece of information is used in process x and y, but not z. Similarly, it is important to know upon which pieces of information a business process depends.

In addition, it is important for a large enterprise to have a clear understanding of what the authoritative sources are and who the business owners are for its data. Similarly, for each data element, the rules, rights, and responsibilities for data maintenance (i.e., Create, Read, Update, and Delete) should be centrally maintained. An information modeling effort can identify and document this information.

In recognition of these benefits, several information modeling efforts exist throughout the federal and state governments. Some are enterprise-wide, while others might be project specific or cover a specific subset of the agency. As several agencies are involved in healthcare (i.e., the provision, funding, or regulation of healthcare - to include research and medications), there are currently multiple information modeling efforts in the healthcare “space”.

In order to minimize duplicate efforts and conserve scare modeling talent, it is recommended that a centralized modeling effort be established whereby existing modeling efforts at the agency or department level can collaborate to refine their models individually and to form consensus on a set of more universal models.

It is worth noting that one of the main benefits of information modeling is the promotion of semantic interoperability between agency systems. However, it is sub-optimal for each agency to generate their own models; while this promotes interoperability among the disparate systems within the agency, it does not necessarily guarantee interoperability with systems of other agencies.

Such a centralized modeling effort is consistent with the goals of Federal Enterprise Architecture (FEA). In the FEA, there is a concept of a “Segment Architecture” – architectures that are concerned with a particular segment of the enterprise. These Segment Architectures together form the overall Enterprise Architecture to which they must also conform. The typical scope of a Segment Architecture has not been clearly defined, hence many agencies have based their Segment Architecture on their own “lines of business”, however, the ideal of Segment Architecture concept is that they can and should run across agencies. Hence “Healthcare” can and should be a standalone Segment. Each Segment Architecture consists of the entire architecture “stack” in miniature; in other words, each contains its own Business, Strategy, Information, and Application Architectures. Therefore it is fully consistent with the FEA that the Healthcare Segment (i.e., the Federal Health Architecture) has a complete, stand-alone Information Architecture, which encompasses all of healthcare information across all federal agencies.

**High-Level Vision and Principal Collaborators**

It is not suggested that the FHIM project create new modeling content. Rather, the FHIM would serve as a forum at which the various agency modeling efforts can present and “harmonize” their models. The value of and the need for the “harmonization” function cannot be over emphasized. The FHIM effort must balance the conflicting requirements of maintaining relevant perspectives while at the same time providing the common basis necessary to promote interoperability among the agencies and with external trading partners (e.g., the NHIN). As the mission of each agency is different, their perspectives on “common concepts” such as “patient” are by definition different. It is unreasonable to think that a one-size-fits-all model dictated from above can meet each agency’s requirements equally. There will, therefore, be differences between agency models. Nevertheless, a common vocabulary must exist to support the sharing of data, which itself is a prerequisite to enable workflows that cross agency boundaries (such as a Veteran receiving care at DoD, VA, IHS, and a commercial trading partner such as Kaiser Permanente; or a cancer research project in VA involving an experimental drug which must coordinate with FDA and NCI).

In order to coordinate agency efforts, the FHIM project would need to establish model style guidelines, provide some kind of guidance on common tooling, maintain a repository where artifacts can be located and retrieved, maintain a collaborative environment (e.g., wiki, discussion forum) to foster discussion, and hold regular harmonization sessions where overlapping models are vetted. It is therefore likely that the FHIM project will need to employ a small team of senior modelers and information architects, or perhaps these personnel would be “detailed” from the member agencies.

It is further recommended that the FHIM be created incrementally, rather than in some sort of “big bang” approach. It will be very difficult to attempt to harmonize all existing models at once. Therefore, it is suggested that the FHIM begin with a small set of large, mature models. Once these would be harmonized, other models are examined, iteratively maturing the FHIM model as needed. With each iteration, the number of changes to the FHIM required should diminish, eventually resulting in a model that not only represents the needs of US governments, but likely those of the industry as a whole.

While modeling efforts exist in several agencies already, some modeling efforts are limited to a particular function or “domain”, while others are integral to the agency’s enterprise architecture efforts. It is therefore suggested the FHIM begin with the extant enterprise models, such as those that exist in VHA (VHA Health Information Model), DOD MHS, and NCI (caBRIDG). As others are identified, they will be incrementally addressed. In other words, it is suggested that the FHIM program be initially be comprised of VHA, DOD, and NCI. This suggestion is not to exclude other agencies, but to pursue a manageable expansion strategy.

It is recommended that the FHIM program be formally chartered with a minimum of these three agencies as principle signatories. It is recommended that these three agencies begin immediate dialog to establish the charter and initial program plan.

**Value Proposition**

The history of Healthcare IT is such that it has developed in “silos”, thus causing interoperability difficulties. Most healthcare organizations deploy a mixture of homegrown and products from various vendors which were never designed to talk to each other. While other industries have overcome such history, the sheer breadth and complexity of healthcare has made it difficult to coalesce on a single set of standards. This is now changing due to a number of factors which, taken together, are providing the necessary catalysts to bring semantic interoperability to reality. Among these factors are HITSP, the NHIN efforts, international collaboration on structure (HL7) and medical terminology (IHTSDO [SNOMED] and LOINC). In addition, ARRA has placed new urgency behind some of these existent efforts.

In the meantime, government agencies are pursuing architectural initiatives in order to better use information technology to provide a better value to citizens. Information Architecture in general and Information Modeling in particular are key aspects of these efforts.

As the industry in general is coalescing, the Federal Health community must also. The end result of these efforts will be seamless interoperability between partners, enabling workflow to cross organizational boundaries; eventually providing higher quality care to the public with more efficiency than is possible today.

Several important initiatives complement the proposed FHIM such as NCI’s caBIG, the USHIK metadata registry work, and various VA-DoD interoperability/exchange initiatives. The notion that the information lifecycle is not necessarily limited to a single agency and that commonalities exist between the agencies can augment individual efforts. The use of high-level healthcare and health information exchange scenarios can support and inform modeling efforts across agencies. The FHIM effort will enable true semantic interoperability between disparate federal systems through common concepts and ontologies, thus realizing true collaboration across federal agency efforts.