



Model Driven Solutions
Where Business Meets Technology

Federation Engine™



A technology and strategy for enabling the enterprise and government through information sharing, federation, and analytics, leveraging business-focused semantics

The modern enterprise is digitally enabled, collaborative and agile. Essential to these key performance indicators is the ability to ingest, analyze, leverage and share information internally and externally. The federation engine technology and federated data as a service™ provide the foundation for *enabling the enterprise to solve the data problem with business-focused semantic models.*

THE DATA PROBLEM

Data and data processing have been key to the efficiency of processes and departments and enterprise goals. Applications that enable core business functions and decision making are each individually effective and have been essential to increased productivity and enabling new capabilities. What has been less effective, and quite costly, is the integration of information, processes, and services throughout and outside the enterprise. The very practices and technologies that have allowed systems and data be locally effective have impaired their value as enterprise and community assets.

The typical enterprise is faced with thousands of integrations across redundant and often ill-defined applications, services, and data resources. Data is only understood locally, not in the context of the business, enterprise or industry. As new regulations or opportunities arise, capabilities are added tactically, which only makes the web of integrations and dependencies worse. The system of systems that powers the enterprise becomes less and less agile while becoming more costly. There is limited visibility of processes, services, and information across the enterprise and across systems and databases. Leveraging new technologies becomes prohibitive.

What started as enablers have become liabilities. We can do better; we must do better. We can take a major step in solving the data problem.

THINK GLOBALLY, ACT LOCALLY

Solutions that solve local problems are essential, the applications and databases that serve a department or process need to reflect the priorities, viewpoints, and realities of their stakeholders and environment. This need to act locally has been seen as a barrier to other priorities: to enable the enterprise, to federate, analyze and share globally, to collaborate.

These local priorities and viewpoints are usually intertwined with the technologies used for specific systems based on the terms and concepts needed locally and tactically, to solve the problem of the day. Of course, different “local”

solutions use different technologies and different terms and structures for their own needs. Of course these forces will create the tower of Babel we have today!

There have been efforts to think globally; data dictionaries, industry standards, metadata management, data warehouses, SOA and now “data lakes” have been a few of the magic bullets – each seeming to fall short, each seeming to create yet another stovepipe instead of providing a path to solving the real problem. More local solutions will not solve the global problem.

We need a better way to think globally and act locally.

THE SEMANTIC SOLUTION

Local solutions, commercial data, and open sources have given us lots of data, much of that data structured, but structured for the local solution. The same information, the same facts, are represented in different ways in different technologies – their definitions and hierarchies dis-integrated across local solutions. What is missing is the understanding of what this data means regarding the enterprise, the industry, and the stakeholders. This meaning is semantics. Semantics means meaning. Business meaning is the only possible “pivot point” between all the local and divergent data resources, messages, and applications. Currently, what something means is far too tied up with how it is represented and implemented. Semantics grounds data with meaning, not technology.

Establishing business meaning is not new, there have been data dictionaries, enterprise data models, industry standards and other efforts. These are a good start but suffer from some problems: Many are still “data” focused, they do not capture true business meaning. Others efforts define concepts but lack a connection to the data; they are not actionable. Excellent definitions are necessary, but not sufficient to solve the data problem. A semantic model is needed. FIBO, the Financial Industry Business Ontology provides such a semantics model, one that we can make actionable by connecting it to data.

To be actionable; semantics must be modeled and connected to models of the data, these models are ontologies which leverage generations of theoretical and

practical development. We must understand how data represents business concepts and how that can be used to federate, integrate, translate, share and analyze data and applications. Actionable semantics requires an engine that understands both the data and the semantics and can transform that understanding into capabilities.

THE FEDERATION ENGINE™

The MDS Federation Engine turns semantic models into enterprise capabilities. Reference models of business semantics are used as the “pivot point” between data repositories, vocabularies, and technologies. The data is connected using mapping models that describe how patterns of data represent business concepts.

Based on the semantic reference models and mappings, data can be federated for analytics, referenced for new and legacy needs and transformed for sharing in the structure of choice to meet the requirements of business partners and industry standards. The same data and the same models can be used for multiple needs and technologies. For example, you don’t have to “model for big data,” you model business semantics and can derive schema for big data or meaning from big data. Once mapped to the semantic reference models, the work is done to map to all other mapped data formats.

The federation engine isn’t just about models; it is also about technology and infrastructure. Data federation can be supported using various technologies including SQL, Big Data, XML, OWL, Linked Data (RDF), Graph Databases, Spreadsheets, JSON, Blockchain, and proprietary formats. Schema can be ingested, related and shared based on multiple standards including UML (Unified Modeling Language) and the OWL (Web Ontology Language). The federation engine is technology independent while being technology aware. It is based on and also driving standards, including [OMG-SMIF](#) (Semantic Modeling for Information Federation).

DERIVING CAPABILITIES FROM SEMANTIC MODELS ENABLES:

- Precise definition of business semantics that is intuitive for stakeholders and can be processed by machine logic
- Integration of information from multiple sources – schema, UML models, ontologies, and dictionaries.
- Federation of data from multiple disparate sources and technologies into unified enterprise knowledge defined by business semantics.
- Query and analytics across diverse sources to enhance stakeholder knowledge and decision making
- Export of information and reporting in the format and vocabulary of the user, or as required by regulation and external standards
- Logical reference data that can be used by new and legacy applications
- Integration with proven enterprise infrastructure by provisioning solutions into the enterprise technology of choice without technology lock-in
- Forward engineering of semantic models plus design decisions to data schema
- Support for capturing the results of unstructured text analysis
- Support for regulatory compliance and business rules

CAN I USE THIS CAPABILITY NOW?

The federation engine is the result of years of development and enterprise projects. This capability is being refined into an open source product and federated data as a service offering. The open source is not ready for public release yet, but is anticipated within the year and will then evolve to realize the federation engine vision. While not yet public, this capability can be applied to specific enterprise needs today. Please contact MDS to see how we can help solve your data problem.

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