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SEMANTICS AND ONTOLOGY – THE FUTURE OF DATA AGGREGATION

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Abstract

The quest for futuristic solutions and models that bring positive changes in Data Management has always been to transform sourcing, distribution and managing the golden copy of data. Unlike sourcing, chaffing and maintaining data at every stage of the trade lifecycle, the data in itself is transforming into a platform with centralized data management principles. This article explains the application and benefits of using semantic technology combined with ontological structures allowing semantic requests to source business-driven data.

Challenges of Financial Data Management

Financial Data Management has become more important and complex over the years due to the following reasons:

Increased regulatory compliance: The 2008 financial crisis has led to tighter regulatory norms and more stringent compliance and reporting requirements. This meant better financial performance and financial data management.

Increased Cost: When firms are operating in a low returns model, managing data is proving to be more cost intensive and inefficient.

Timeliness and Efficiency: From the perspective of consumers, it is of utmost important to receive data from the aggregators and deliver it internally in time to enable optimized batch processes. Given the dependencies on batch processing timelines, it has become even more important to deliver data with high quality and minimal human interventions. Refer to Figure 1 for what consumers are looking for.

> " There is much more focus in the market on improving data quality overall due to regulatory, risk management, and business pressures. Timeliness and accuracy of data are both of primary importance in a market where financial and reputational damage can be caused by inaccurate reporting to regulators and clients. Getting the right framework in place to measure data quality and to ensure the taxonomies are consistent across an organization is therefore very important. "
>
> **Virginie O'Shea**
> Senior Analyst, Securities and Investments
> Aite Group
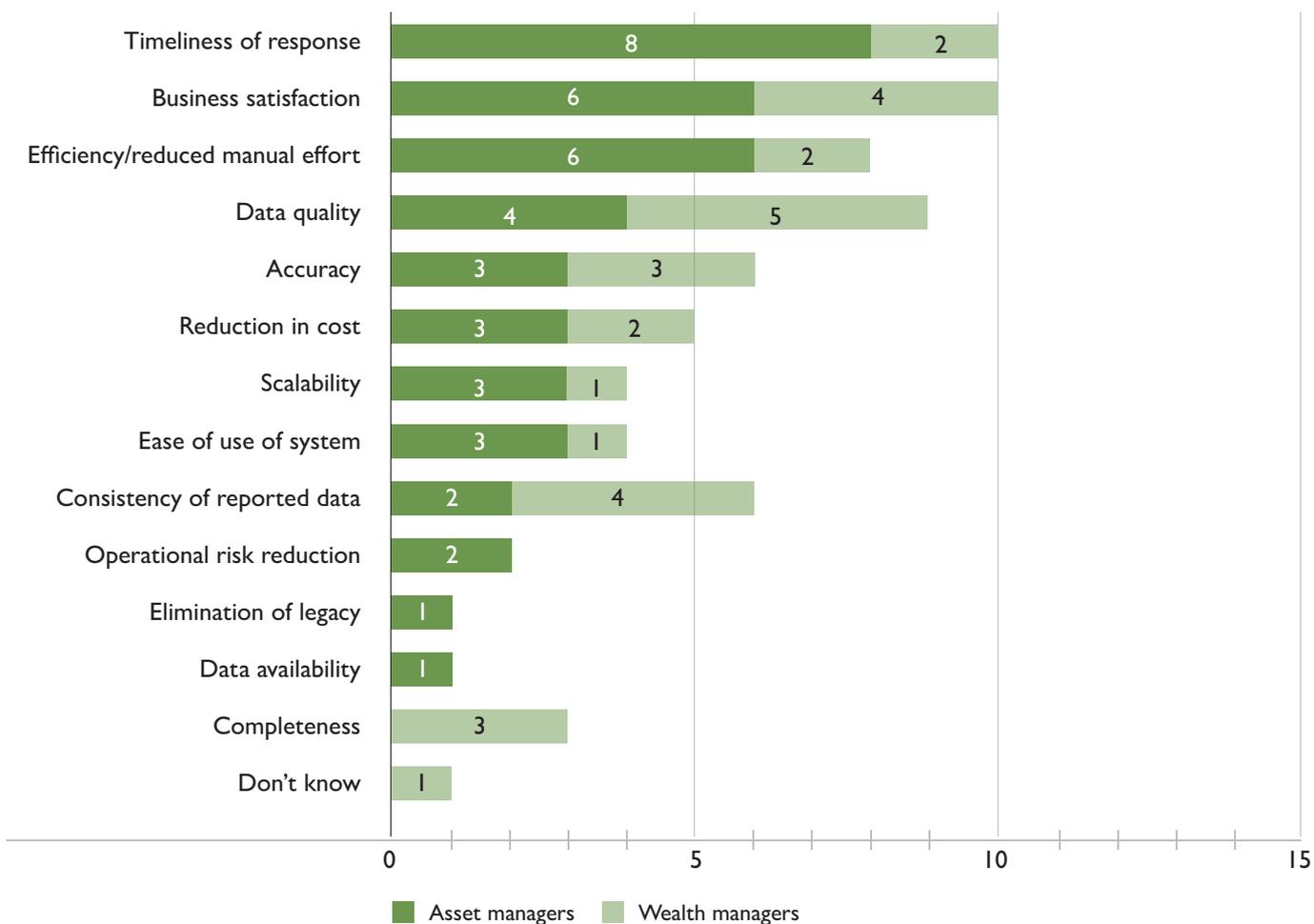
Source: Aite Group survey of 26 asset managers, 2013

Figure 1: Results of survey asking respondents the criteria used to measure success of a data management implementation (Source: Aite Group, 2013)

Redundant data: Financial Data Management is done in independent silos by organizations, which results in higher costs, further aggravated by redundant data subscriptions and more technology platforms to cleanse and manage data.

Duplication of efforts: Same data is maintained separately by the front-office, middle-office and back-office teams, because their usage varies. This leads to added complexity and duplication of efforts.

Lack of single golden source: Firms have to source data from multiple vendors for various asset classes. There is no universal standard, leading to many data vendors and firms using proprietary standards to identify and to enrich their data.

Ever-changing technology and skills: Technology is changing at a rapid pace and so is the demand for specific skillsets. Firms pay a premium in this catch-up game and end up focusing on non-core businesses to remain competitive.

Semantics and Ontology

Semantic technologies are meaning-centered that include tools for auto-recognition of topics, concepts, information, extraction, and categorization. Semantic technology provides an abstraction layer above existing layers to enable bridging and interconnection of data and processes. At the same time, they provide level of depth that is far more intelligent, capable, relevant, and responsive interaction than with information technologies alone.

Semantic technology when combined with the Ontological representation of data enables machines as well as people to understand, share, and reason data and its file content during execution time. Figure 2 explains the ontological structures of Basic Financial Instruments concepts like stock exchange market, trading day, and analysis.
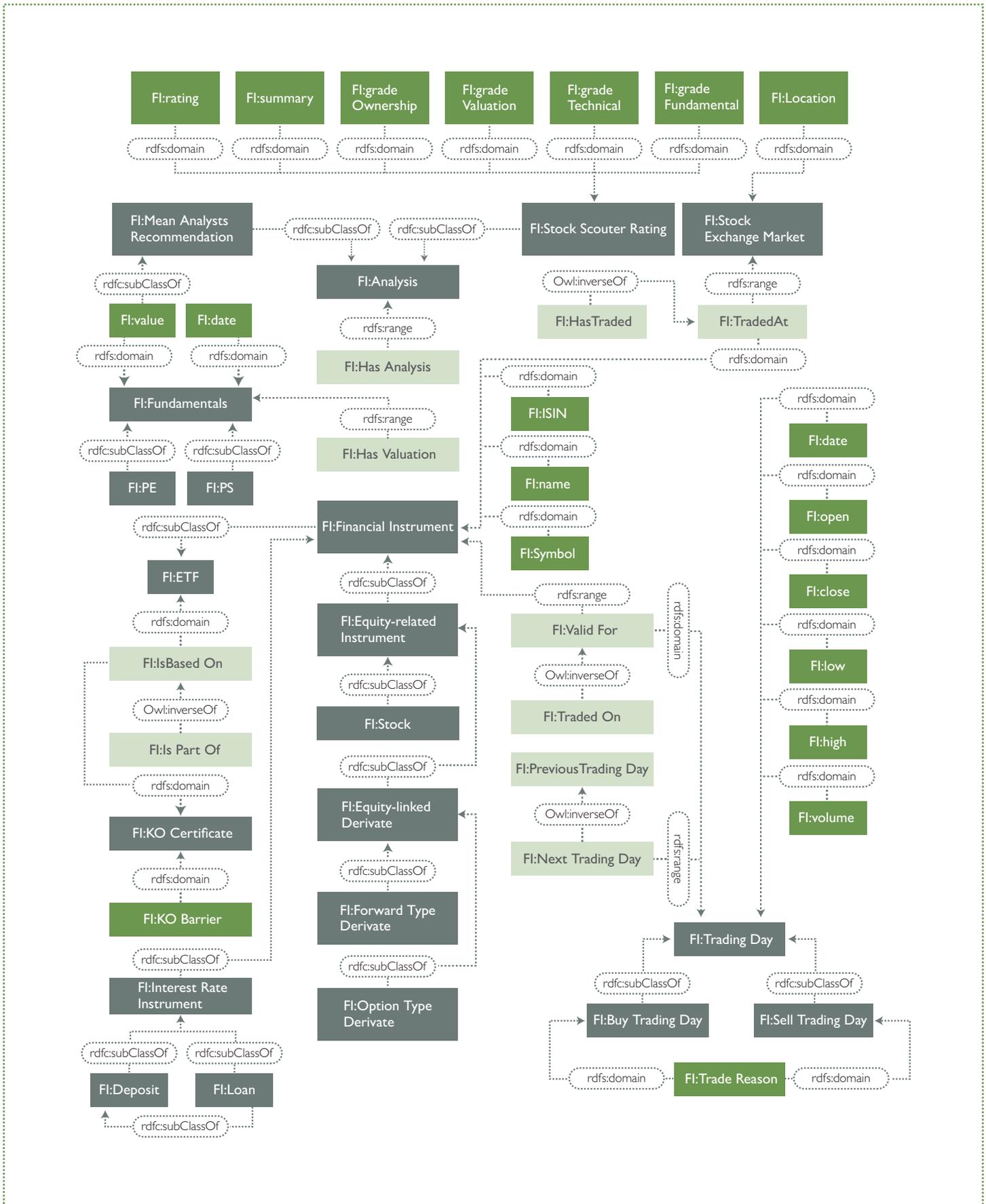
Figure 2: Ontological structures of Basic Financial Instruments concepts like stock exchange market, trading day, and analysis

Source: Employing Semantic Web technologies in financial instruments trading by Dejan Lavbic and Marko Bajec

Application of Semantics and Ontology to Financial Data Management

Application of Semantics technology has been limited to academic purposes barring a couple of exceptions. With respect to financial data, the use of Semantics and Ontology will bring considerable changes to the industry:

- Shift towards a consumer-centric data consumption model

- Organizing data based on Ontological structure with a Semantic language layer

- Consumers shall pay for the data that they consume

- Data consumers can focus on sourcing credible data rather than ascertaining data credibility in house

The role of semantic integration defines a wrapper around data sources and establishes dynamic links between Ontology entities (e.g. classes, properties,, etc.) and the data sources. This is best explained with an example where an asset manager is interested in sourcing data for "Bonds with yield greater than 7% in APAC". There are two aspects involved here:

- First, the semantic engine has to decode the business language, identify data elements and the relational factors.

- Second, based on the data elements and relational factors, the underlying small case. Thus, semantic engine should be able to traverse through the ontological structures to get the related bonds that satisfy the conditions as depicted in Figure 3.
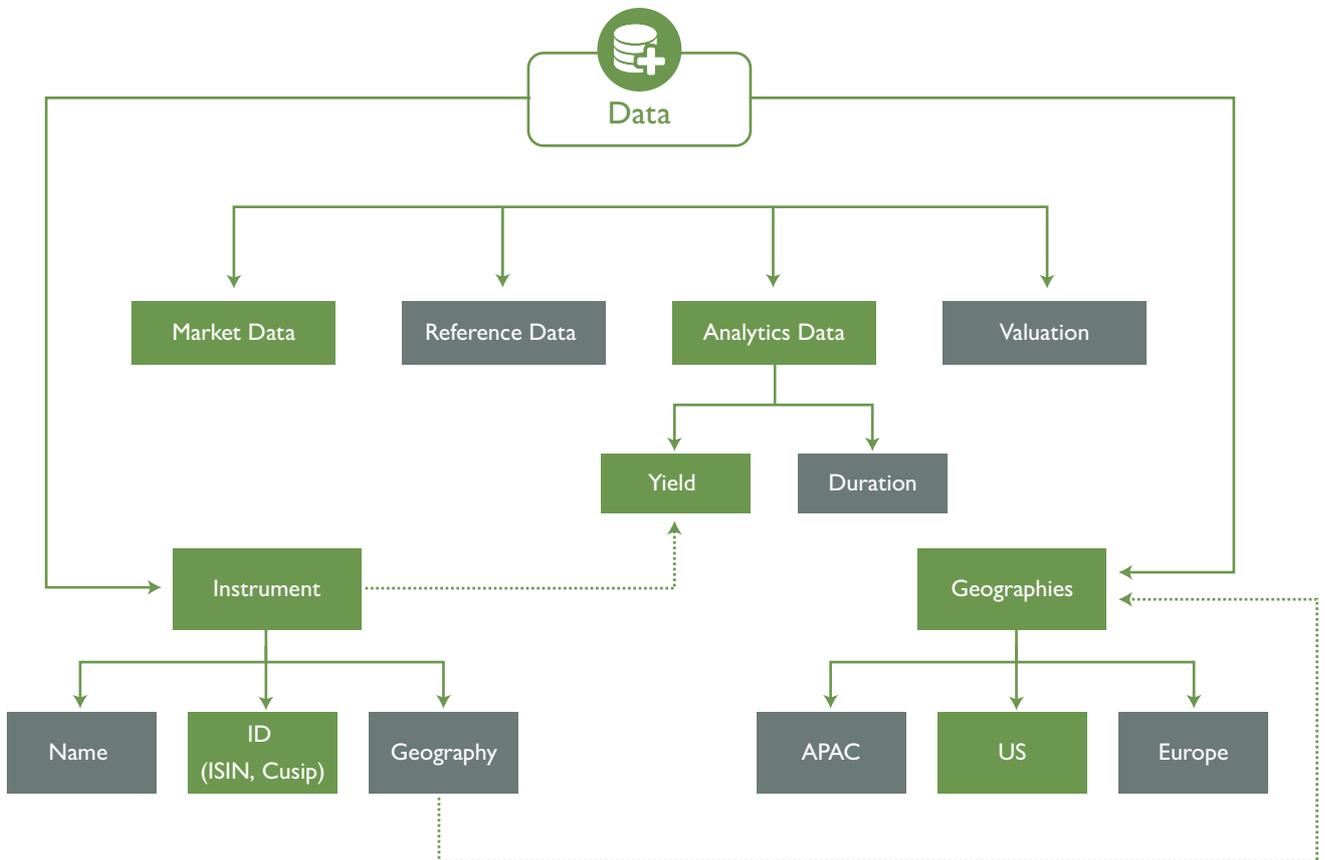

Figure 3: Ontological representation for a subset of data for getting yield rates for a specific category of fixed income security

The Future Operating and Pricing Models

Financial Institutions are forever reshaping their operating models and processes to bring in more data credibility and reduce the total cost of data-centric operations and ownership. The application of Semantic technology can enable operating models and cost of sourcing to significantly change.

Operating Model

Traditionally, the data was sourced from multiple vendors/aggregators based on the quality and the prioritizing needs of the data. However, the future operating model as depicted in Figure 4 fundamentally relies on the following principles:

a) Aggregators provide data based on semantic language

b) Data credibility is maintained and managed by the data aggregators

c) Target model fundamentally shifts the golden source of data residing in consumer's firm to the data aggregator's firm

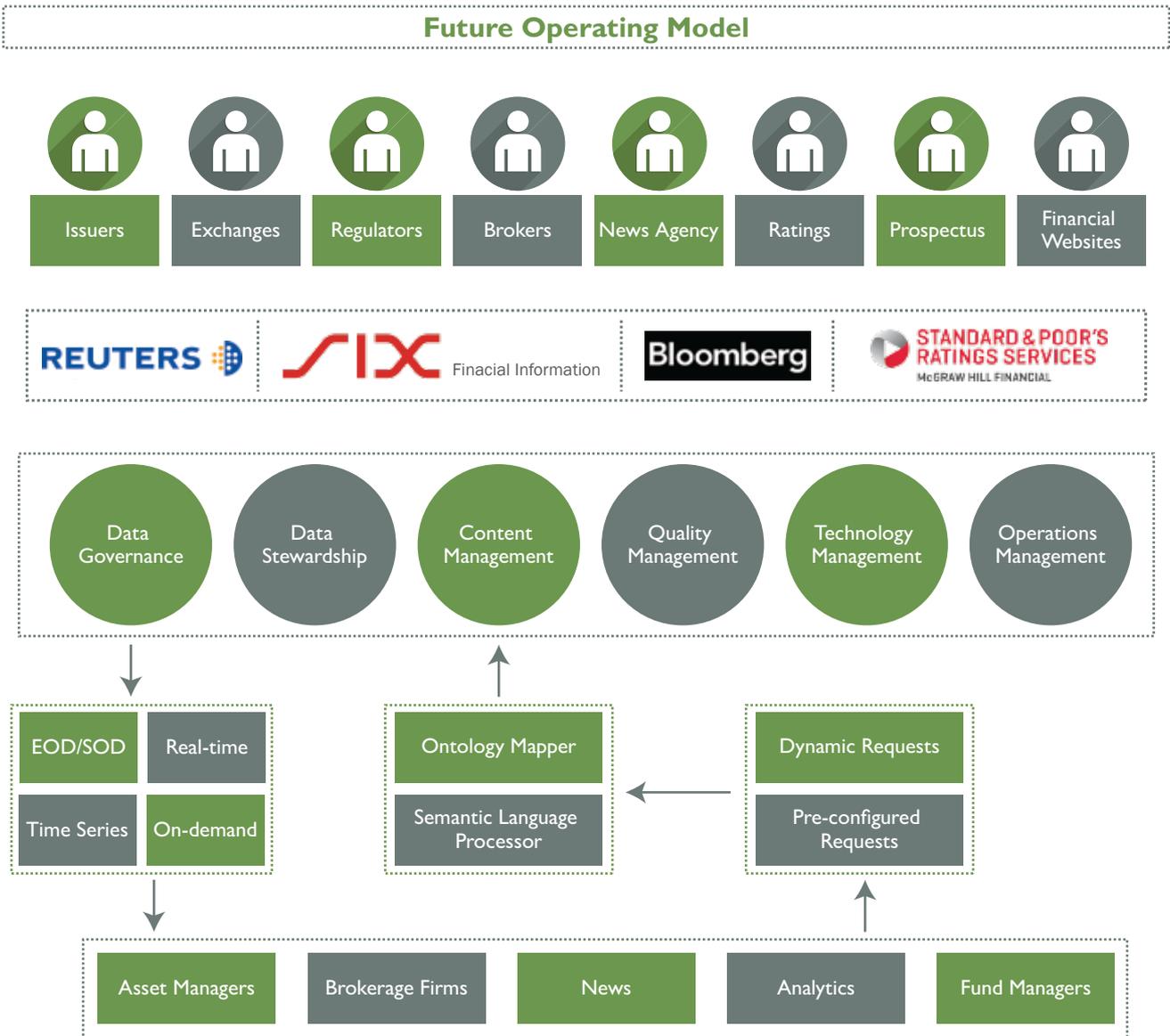d) This model aggregates the data from various sources that meet the needs of the data consumers

Figure 4: Target Operating Model

Pricing Model

Invariable pressure on the data aggregators to provide better credibility and lower costs to consumers shift the focus from providing huge volume of data to the more relevant and meaningful data that satisfies the firm's business.

Given better options, Financial Institutions can pay for the data that they actually consume in their business rather than the entire offering. Figure 5 below depicts data consumption usage against various asset classes and data characteristics.
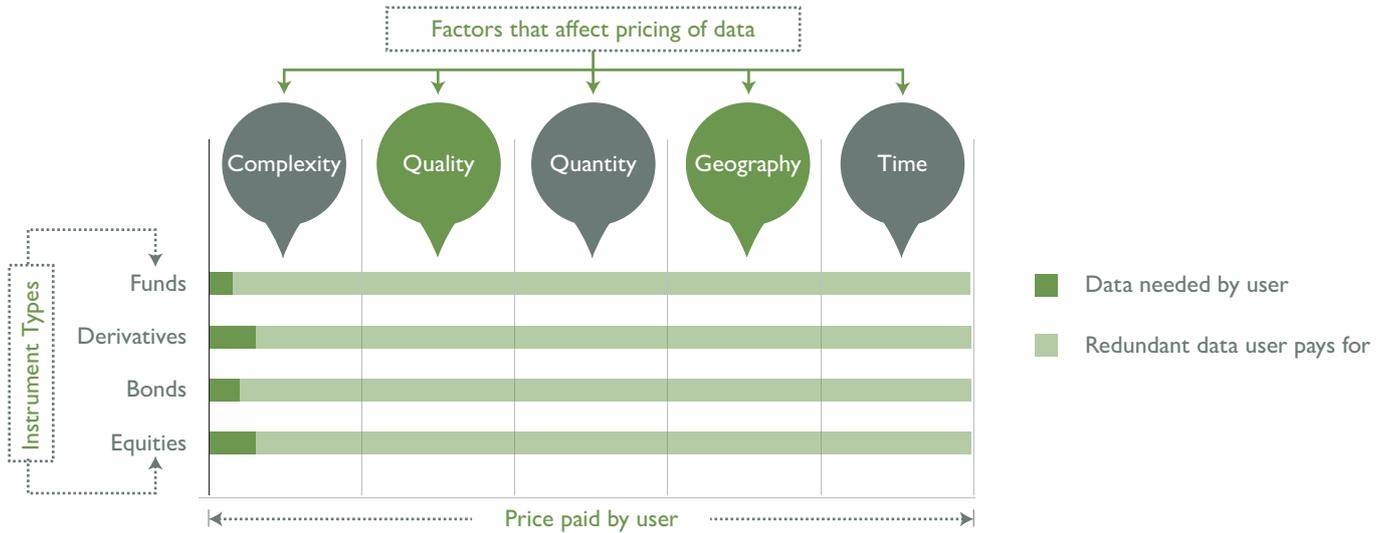
Figure 5: Data pricing using Traditional Model

The proposed Semantics and Ontology-based model would price data based on various parameters such as type of instrument, instrument attributes, geography, complexity of sourcing data, quality of data, and time delay factor. This model helps Financial Institutions to move from a uniform pricing to a pay-as-you-go model.

Figure 6 represents the various dimensions such as asset classes, type of instrument and other factors (quality, complexity, etc.) for pricing and the semantic usage of data sourcing.
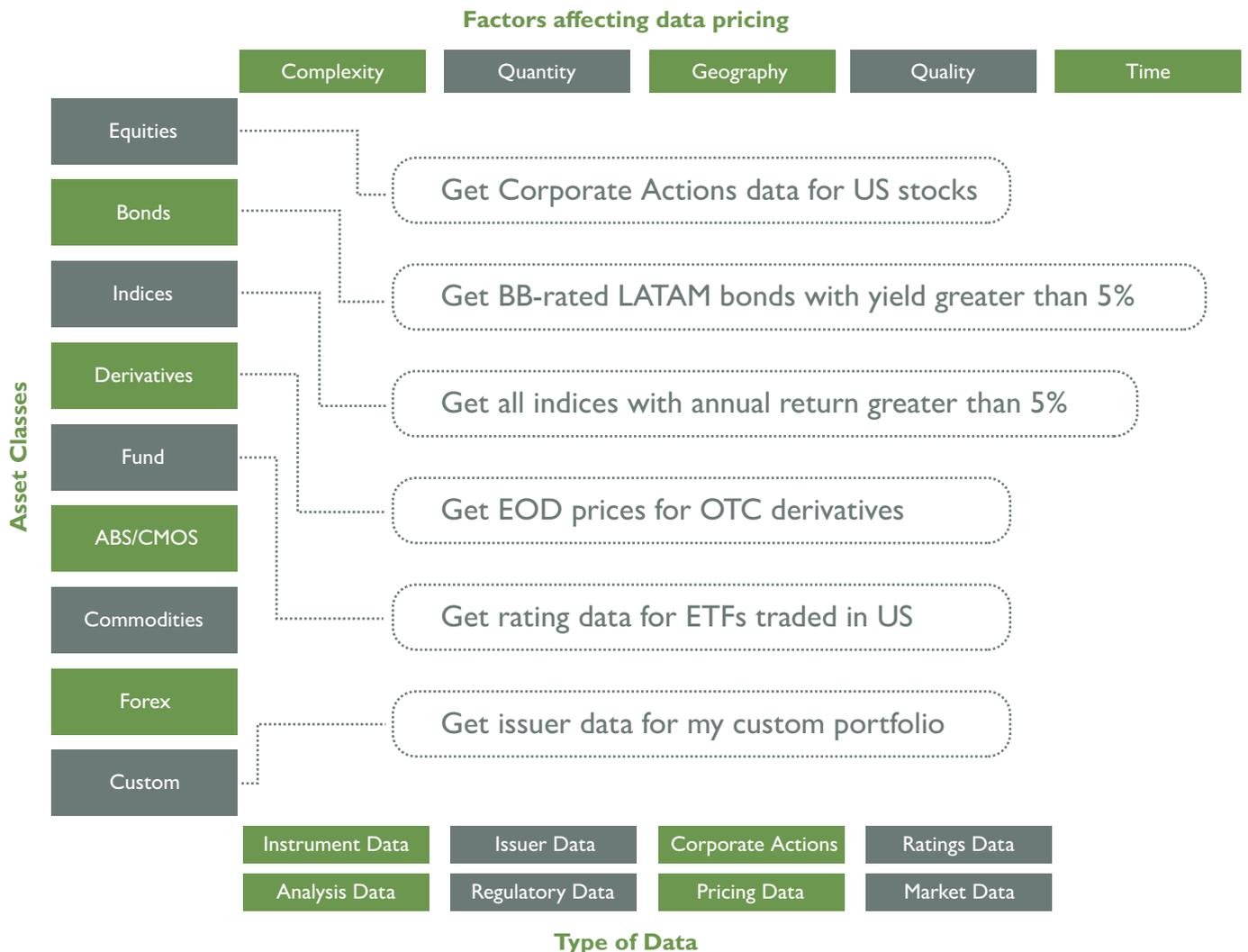

Figure 6: Data pricing using the Proposed Model

Conclusion

Acquiring data from multiple sources, integrating with the existing systems and processes, and ascertaining data quality has always been a challenge. Although in a nascent stage, the advent of Semantics and Ontology has been transforming with the development of cognitive technology and tools. The application of these technologies in the financial services industry is certainly a revolution that would only succeed with the changes to the underlying data organization and management.

With the increasing thrust on operations improvement and reducing cost of ownership, this technology would be adapted slowly but with great caution and care. To reap the benefits of this shift in data management, it is imperative that this initiative and implementation should come from the data aggregators. Without the initiative from the data aggregators, this technology would remain forever un-incubated. This change would eventually happen as the consumers see a huge potential in terms of outsourcing the management and maintenance of "Golden Source of Data" outside the firm's environment to benefit from the economies of scale.

References

- Employing Semantic Web technologies in financial instruments trading by Dejan Lavbic and Marko Bajec

- Compliance and competitiveness – A report from the Economist Intelligence Unit

- Reference Data Acquisition Challenges: Getting it Right From the Start by Aite Group

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