

Chapter 10

Linked Data Driven Information Systems as an Enabler for Integrating Financial Data

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ABSTRACT

With increased dependence on efficient use and inclusion of diverse corporate and Web based data sources for business information analysis, financial information providers will increasingly need agile information integration capabilities. Linked Data is a set of technologies and best practices that provide such a level of agility for information integration, access, and use. Current approaches struggle to cope with multiple data sources inclusion in near real-time, and have looked to Semantic Web technologies for assistance with infrastructure access, and dealing with multiple data formats and their vocabularies. This chapter discusses the challenges of financial data integration, provides the component architecture of Web enabled financial data integration and outlines the emergence of a financial ecosystem, based upon existing Web standards usage. Introductions to Semantic Web technologies are given, and the chapter supports this with insight and discussion gathered from multiple financial services use case implementations. Finally, best practice for integrating Web data based on the Linked Data principles and emergent areas are described.

INTRODUCTION

Consumers of financial information vary from personal investors looking for investment opportunity, business executives seeking competitive advantage over their competition, to government

regulators investigating corporate fraud. While the particular analysis performed by each of these information consumers will vary, they invariably have to source, consider and evaluate information from multiple resources such as the US Security and Exchange Commission (SEC) filings, corporate press releases, market press coverage, third

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party information providers, expert commentary and specialist communities of interest. Failing to consider information from alternate or complementary data resources brings the risk of lacking adequate insight for investment decisions or, of making an uninformed judgement call. Recent economic events have begun to bring sharp focus on the activities and actions of financial markets, institutions and not least regulatory authorities. Enhanced scrutiny will bring increased regulation (Economist, 2009) and information transparency (Wired, 2009), further increasing the burden on investors, analysts and investigators.

The last five years has also seen a growing number of Open Government transparency initiatives to make such public sector information available. Notable economic and financial Boxes are EuroStat (<http://epp.eurostat.ec.europa.eu/portal/page/portal/eurostat/home/>), data.gov.uk, sec.org, data.gov, recovery.org, the World Bank (<http://data.worldbank.org/data-catalog>) and IMF (<http://www.imf.org>). Intended to freely provide public sector information, statistics data and economic indicators for transparency purposes, this raw government data is also being “crunched” by companies looking to inform their own business function, those of their stakeholders or as opportunity for new service provision (IDG, 2009). The EU Public Sector Information directive has previously mandated that data sets produced and collected by the public sector containing legal, financial, and economic data be made available to explicitly target innovative use of the data. The resulting catalogues represent the largest source of raw information in Europe available for re-use and integration into new products and services targeting an estimated twenty seven billion euro market (EC, 2006). The sources represent rich repository sources of business related data, competitor data, market watch data and government spend; their data catalogues are freely available online for uptake and analysis by the financial community.

Consolidating similar and related information into a single view remains hugely problematic.

Originally the realm of data warehousing, data-related issues of format, duplication and differing schema definitions remain (e.g., different jurisdictions can have different understandings of the same accounting terms). Across multiple sources the problem remains the classical data integration problem, where a common interoperable data abstraction is necessary. However Open Data is published in formats such as CSV, PDF, XML or text making integration and reuse costly, acting in effect as a barrier to entry. Extracting information from individual filings and structured sources is relatively straight forward where a machine readable format is available e.g. data encoded in the eXtensible Business Reporting Language (XBRL, <http://xbrl.org/>).

Semantic Web technologies provide powerful integration capabilities based upon a standard representational format. Linked Data represents best practice for exposing, sharing, and connecting pieces of data, information, and knowledge on the web based upon those standards. Used to publish semi-structured and structured data on the web, and as a means to provide more tightly interlinked datasets for enhanced search and querying, its adoption and use represents an opportunity to achieve standard access and inter-operability between and among financial data sets both for data consumption and publishing.

The chapter focuses on the use of Semantic Web technology, in particular using Linked Data principles, as an enabler for financial data integration that spans the enterprise firewall to include web-based financial content as part of financial data ecosystem.

Introduction introduces the case study fundamentals and challenges associated with financial data integration.

Overview of Semantic Web Technologies provides an introduction into the fundamental principles and building blocks of Semantic Web technology, namely global Universal Resource Identifiers (URIs), the Resource Description Framework (RDF) and its conceptual data model,

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