A Transaction-Oriented Architecture for Enterprise Systems

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ABSTRACT

Many enterprises risk business transactions based on information systems that are incomplete or misleading, given that 80-85% of all corporate information remains outside of their processing scope. It highlights that the bulk of information is too unstructured for these systems to process, but must be taken into account if those systems are to provide effective support. Computer technology nonetheless continues to become more and more predominant, illustrated by SAP A.G. recognising that 65-70% of the world’s transactions are run using their technology. Using SAP as an illustrative case study, and by bringing in the benefits of technologies such as Service-Oriented Architecture (SOA), Business Process Management (BPM), Enterprise Architecture Frameworks (EA) and Conceptual Structures, a practical roadmap is identified to a Transaction-Oriented Architecture (TOA) that is predicated on the Transaction Concept. This concept builds upon the Resources-Events-Agents (REA) modelling pattern that is close to business reality. Enterprise systems can thus better incorporate that missing 80-85% of hitherto too-unstructured information thereby allowing enterprise systems vendors such as SAP, their competitors, customers, suppliers and partners to do an ever better job with the world’s transactions.

Keywords: Business Process Management/Modelling (BPM), Combining and Unifying Business Intelligence with Semantic Technologies (CUBIST), Conceptual Structures, Enterprise Architecture (EA), Process-Oriented Architecture (POA), Resources-Events-Agents (REA), SAP A.G., Semiotic Ladder, Service-Oriented Architecture (SOA), Transaction-Oriented Architecture (TOA), Transaction Concept (TC)

INTRODUCTION

Many enterprises risk business transactions based on information systems that are incomplete or misleading, augmenting the claim that 80-85% of all corporate information remains outside of the processing scope of such systems (Seidman, 2004; Polovina & Andrews, 2011). Essentially, the bulk of information is too unstructured for these systems to process, but must be taken into account if those systems are to provide effective support. However, as these enterprise systems become more and more predominant the issue becomes increasingly acute. Indeed SAP as a significant vendor of enterprise systems have noted that 65-70% of the...
world’s transactions involve SAP systems; thus to maintain this share and the responsibilities it brings they “have to do a good job” (Forbes LLC, 2011). Enterprise systems are being expected to align more and more with the essence of the enterprise and through the productivity of computers lever this knowledge about itself and become more successful.

**APPROACHES**

Accordingly there has been a substantial push to Service-Oriented Architecture (SOA) and an eco-system that in SAP’s case is epitomised by the Enterprise Services Workplace (ESW) (SAP A.G., 2012). Allied to these approaches is the integration of Business Intelligence (BI), particularly in handing the proliferation of data (Economist, 2010) and in conjunction with novel database querying tools such as Hadoop Impala (Cloudera, Inc., 2013). In SAP’s case, there has been the emergence of the High-Performance Analytic Appliance (SAP HANA) architecture (Word, 2013; SAP A.G., 2013). A continuation of BI is to apply semantic technologies that structure unstructured data. These information extraction technologies take knowledge management a stage further by discovering knowledge hitherto hidden in that data, thereby capturing much more of that elusive 80-85% of corporate information. The Combining and Unifying BI with Semantic Technologies project (CUBIST) is an exemplar of extracting meaning from structured and unstructured data to discover knowledge (CUBIST project, 2013).

**Service-Oriented Architecture (SOA)**

SOA recognises the limitations of existing enterprise applications that have been built along the lines of large functional silos such as Enterprise Resource Planning (ERP), Customer Relationship Management (CRM), Supplier Relationship Management (SRM), Financials, or even for specific industries (the so-called ‘verticals’ applications) such as Oil and Gas, Healthcare, Banking, Telecommunications or Public Sector.

Whilst all these applications reflect actual applications rather than a technology seeking an application (e.g. Database Systems), the semantics (or ‘meaning’) of business activity are at a much lower granular level than those applications imply. Rather, like object-oriented approaches, business activity is made up of a number of service components, namely ‘business objects’ that can be orchestrated into business processes according to the business requirements. With intermediate levels of orchestration of these objects into process components that in turn can become part of deployment units, enterprise applications are individually configured in a way that better aligns with the given business need. Standardisation is achieved at the component rather than the application level, thus taking advantage of reusability. Agility is achieved by re-orchestrating or enabling new components in direct response to changing business needs. To allow flexible orchestration and re-orchestration, the service interfaces of each business object are also defined according to a standardised governance process. Even the data of each business object are built according to Global Data Types (GDTs).

All in all, SOA provides an operational architecture that makes component based software development become realistic for enterprise systems. SOA development distinguishes itself from object-orientation to the extent that each component is centred on providing a *service*; in our case a composite element of business semantics that *adds value* to the enterprise application. The technical nature of each component is encapsulated by its business meaning, thus can be directly applied by Business Process Management (BPM) and its associated Business Process Modelling (whose acronym is also BPM) to orchestrate business processes.

**Enterprise Services Workplace (ESW)**

To operationalise SOA (i.e. to make it possible) many vendors and their partners and customers...
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