Towards devising an Architectural Framework for Enterprise Operating Systems

Sérgio Guerreiro¹, Steven J.H. van Kervel² and Eduard Babkin³

¹Universidade Lusófona de Humanidades e Tecnologias, Escola de Comunicação, Artes, Arquitetura e Tecnologias da Informação, Campo Grande, 376, 1749-024, Lisbon, Portugal;
²Formetis BV, Hemelrijk 12 C, 5281PS Boxtel, Netherlands;
³National Research University Higher School of Economics, B.Pechorskaya 25/12, Nizhny Novgorod, 03155, Russia; sergio.guerreiro@ulusofona.pt, steven.van.kervel@formetis.nl, eababkin@hse.ru (ICSoft 2013, Reykjavík, Iceland)

Problem Definition

Problem manifestation: Unmanageable complexity in IT system design that results in bad engineering: functional mismatch e.g. bad business-IT alignment; unmanageable use of resources and lack of support for evolving enterprises. Caused by fundamental drawbacks in current theory and (best) practice of architecture for information systems:
1. do not take into account human-centric foundations of enterprises for which the information systems are produced;
2. they insufficiently use generic and reusable formal methods and application of engineering sciences (e.g., clear distinction between function-construction perspectives, support design- and life-cycles; cf. Enterprise Engineering);
3. do not take into account imminent stratification of abstraction levels of information systems (global scope of enterprise).

Methodology

Goal: Devise a framework, modeling methodology and executing software engine - the Enterprise Operating System (EOS):
1. Capture and control all phenomena that occur in operation of the organizational business transactions, with model compliance;
2. Provide all information systems (financial, logistic, production etc) all factual data about the operation of the enterprise;
Means: Apply principles of Enterprise Engineering (eg. DEMO, Enterprise Ontology, DEMO processor, etc.);
Verification: (i) DEMO methodology, (ii) argumentation and (iii) professional case studies.

Results

1. Enterprise Operating System (EOS) conceptual model

2. EOS with Adaptive Case Management Systems casus

- Dutch semi-public company that delivers energy and utility services, for citizens;
- Involves complex tailor-made contracts for each citizen;
- The contract should comply with external legal regulations, internal business policies, conditions & procedures.

- 1. DEMO model of the enterprise;
- 2. Fine-grained DEMO models;
- 3. DEMO model simulation and validation (DEMO processor);
- 4. Runtime execution of models in full production (MDE) on EOS;
- 5. Easy, low cost implementation of the ACMS document system;
- 6. High degree of customer satisfaction in full production.

Conclusions

- EOS controls and monitors all atomic elementary communication and production acts and facts that are observable, in order to assess the “world of phenomena” occurring in the organization, against the predefined fine-grained enterprise models that are consensual agreed between the stakeholders (for Compliance and Risk control in GRC);
- The framework satisfies the C4-ness quality criteria and follows precisely the discipline of Enterprise Engineering;
- First casus in production supports claim of elimination of ambiguity, absence of anomalies, constructs overload and constructs excess;
- with strong reduction of complexity; elimination of programming (MDE); optimal business-IT alignment and low cost implementation.

Future Research

- More empirical case studies, especially in the Governance, Risk and Compliance (GRC), COBIT and ITIL domains with third parties (you)?;
- Extend the framework for the systematic engineering of information systems (financial, logistic, production control etc) for the enterprise;
- Investigate extensions for full observation of business transactions operation: operational control and real time audits (GRC, COBIT).