

Process Based Enterprise Architecture Building

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Abstract

"The complexity and diversity of enterprise systems, the growth of middleware and the drive for the next level of efficiency and productivity, both within and across organizational boundaries, mandates "process thinking". But unlike re-engineering, today's processes must be directly executable and evolve incrementally, with minimal impact on business operations allowing an optimal change management" [5]

Keywords: Enterprise Agility, Enabling Process Managed Enterprise, business processes and IT alignment, business processes streamlining, Enterprise Architecture Flexibility, BPM, BPMS, Enterprise Application Integration

1. Summary

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2. Introduction

The aim of this paper is to describe an operational step to build a process-based architecture while trying to

capitalize on the experiences on the one hand and to underline specificities and the critical points related to such construction on the other hand. We examine both the principles of Process Based Architecture building and the progressive step of implementation.

This paper is also an incentive to engage early in a step of construction of Process Based Architecture taking into account multitude of possibility of tackling this subject. Indeed, each project that requires an evolution of the Enterprise Architecture is a good opportunity to initialize thought of Process Based Architecture building.

3. Enabling Process Managed Enterprise

3.1. Enterprise agility

Enterprise agility is one of major requirements for "Vision and Strategy" and business process alignment; it's the ability to respond quickly to rapidly changing market and business requirements.

BPM provides enhanced business agility, control and accountability. It will streamline internal and external business process [1].

3.2. Enterprise transformation project

To achieving enhanced business agility goal, BPM provides support to Enterprise transformation project and offer the capability to carry out this project using process transformation operations like add a new activity, redefine logical sequence of group of activities, automate and integrate tasks including workflow and add a new data flow exchange with customer or supplier etc.

Enterprise agility means capability to execute process transformation operations with a minimum impact on IS "Information System" and TI "Technical Infrastructure".

4. Process Based Enterprise Architecture building

This objective can be reached by building a Process-Based Enterprise Architecture allowing easy process

transformation operations manipulation and “*Enabling Process Managed Enterprise*” [5]. It will define, enable and manage the exchange of business information through a global process view including employees, customers, partners, applications and databases.

The Process Based Enterprise Architecture of which we underline is not business process reengineering, enterprise applications integration, workflow management or another packaged applications. It's the synthesis and extension of all these technologies and techniques into a unified Architecture. This unified Architecture becomes a new foundation upon which the enterprise is built [1]. This architecture provides comprehensive Process Management and Integration capabilities.

With BPM approach all business and IT people speak a common language and have a common objectives. But Process Based Enterprise Architecture must be designed, according to agility requirements, with a main objective: “*Implement Process Transformation Operations and allow decoupling between Process Transformation Operations and IT transformation operations*”.

Here under, we present design principles and applicability of Process Based Enterprise Architecture.

5. Process Based Architecture Framework Design Principles

5.1. Translate business needs into technical requirements

The main objectives for “business area architectures” are:

- Create alignment between business processes and IT
- Design infrastructure and application in order to support and monitor the KPI (Key Performance Indicators) of Business Process.
- Build architecture for performance: develop applications, data, and technology architectures that meet the performance requirements of the business processes.

Process Based architecture framework streamlines internal and external business processes, eliminates redundancies and increases automation, providing end-to-end process visibility, control and accountability.

Process Based Architecture is built with architecture framework which will be designed to meet business needs and to translate business needs into technical requirements as:

- **Flexibility:** in order to allow easy implementation of new functionalities or business process reconfiguration, the different components of the

architecture will be de-coupled as far as possible. Architecture flexibility allows [4]:

- Business objects modifications (Data parameters)
 - Logical sequence of application processing
 - New business functions implementation and new applications integration without architecture redesign
- **Consistency** of data and processes will be ensured through appropriate integration, where applications are exposed at varying degrees of granularity through connectors and adapters.
 - **Scalability:** a true middleware approach will enable application services, data transformation services and process services to scale in line with customers needs, at all levels of granularity.
 - **Compliance** with IT standards: Process Based Architecture is based on preferred technologies, open standards and well-defined interfaces, allowing optimizing time of delivery of complex systems. The Center focuses on large-scale applications, providing industrial strength solutions that support end-to-end transactional processes across a heterogeneous IT landscape. It embraces relevant open and de facto standards, such as J2EE, BPML, WSDL, SOAP, XML as well as industry standards such as STP, TMF, CPFR and SCOR*. Nevertheless, legacy applications will be taken into consideration; a Process Based Architecture framework provides

* STP: (Straight through processing) replacing the traditional phone and fax confirmations with a completely automated loop, from pre-trade communication and deal capture through to clearing and settlement. The industry has much to do to achieve STP. Hard-hit by the current downturn, financial institutions must adopt new XML standards that are replacing legacy communication protocols, while seamlessly integrating core trading processes with supporting systems such as accounting and risk management. New software systems must be capable of adapting to future developments in still-emerging messaging and data standards.

TMF's (Technology Management Forum) Compendium of Uniquely Effective Programs Are Specifically Targeted at Technology and E-Business Companies. They Are Designed to Enhance Company Value, Accelerate Time-to-Market and Enable Attractive Liquidity Events.

The mission of the CPFR (Collaborative Planning, Forecasting, and Replenishment) [2] Committee is to develop business guidelines and roadmaps for various collaborative scenarios, which include upstream suppliers, suppliers of finished goods and retailers, which integrate demand and supply planning and execution.

SCOR®: The Supply-Chain Operations Reference-model has been developed by the Supply-Chain Council to describe the business activities associated with all phases of satisfying a customer's demand. The Model itself contains several sections and is organized around the five primary management processes of PLAN, SOURCE, MAKE, DELIVER, and RETURN. By describing supply chains using these process building blocks, the Model can be used to describe supply chains that are very simple or very complex using a common set of definitions. As a result, disparate industries can be linked to describe the depth and breadth of virtually any supply chain. The Model has been able to successfully describe and provide a basis for supply chain improvement for global projects as well as site-specific projects

integration of legacy applications and allow their easy evolving without architecture redesign: when legacy application is changed only adapter allowing legacy application integration must be changed. This propriety is inherited directly from EAI approach. In addition, with Process Based Architecture framework the integration of the new standards can be progressive and selective: only proven standards, having received a large adhesion (e.g. XML), are used in the critical applications.

5.2 Conceptual model of Process Based Architecture Framework

Process Based Architecture framework encompasses several layers covering Technical infrastructure until process vision through functional and applications layers. The schema here under summarize different conceptual layers to take into consideration while design Process Based architecture framework:

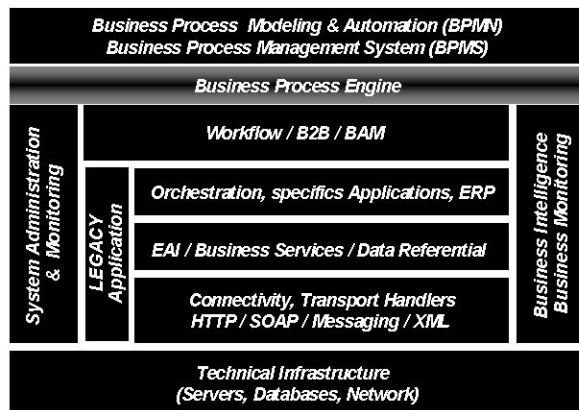


Fig.1

Emerging standards for Business Process Modeling Language (BPML) created, developed, published, maintained and promoted by Business Process Management Initiative (BPMI.org) bring Process Management to existing and future IT investments [2].

The BPMS layer represents a top maturity level implementation of Process Based Architecture framework. Indeed, with this layer, process has own material representation separated from applications platform. Business Process layer and process layer are extremely decoupled and all automated or human workflows are integrated on Process execution platform.

But it's not necessary to implement all Enterprise Business process on BPMS platform. The best process candidate to be implemented on BPMS solution is that the process having several executions scenarios. The best execution scenario is determined on instance t by business event. The couple (Event, t) is processes execution parameter.

BPMS platform allow integration and execution of legacy applications, but applications designed with preferred technologies (Cf. §5.1) can be naturally integrated in BPMS platform.

Compliance with IT standards and decoupling of IT layers and business process layers bring positive impact in flexibility and increase Enterprise Agility.

Finally, the complete Process Based Architecture framework incorporate:

- Process Engine allowing Process materialized platform: Modeling, Monitoring, integration and Executing
- Application Integration Platform as EAI, orchestration engine of Web-Services and Enterprise Business Services Directory
- Data Enterprise Common Referential
- Connectivity platform allowing Data and Messages exchanges taken in charge legacy applications
- Business intelligence engine to support business activity monitoring enabling process performance reporting and analytics [2].

6. Process Based Architecture Framework Applicability

The main objective to implement Process Based Architecture is maximizing Enterprise Agility allowing Business Process and Enterprise Vision & strategy alignment.

The positive impact of Process Based Architecture is increasing flexibility of Enterprise Architecture at several level of granularity of Process, Applications and Technical Infrastructure.

Implement BPMS can conceal flexibility problem but is not enough to obtain real flexibility. Attention must be turned to business decomposition model and to Application integration rules.

6.1. Business Process Decomposition model

The decomposition of business processes into business and infrastructure services and the definition of their dependencies provide a solid basis for enterprise information and application architecture. This decomposition aimed to create independence of Enterprise Business Areas. Each Business Areas have his proper business context and have his own evolving road map. Process Based Architecture building must take this decomposition into account to increase IT flexibility and Business Process Agility. The decomposition of business processes into services independently from technology, resulting services are technology-independent [6].

When implementing a service and applications, we would recommend considering Data exchanges between business areas as external exchanges and use standard business exchange or standard XML schema (if exist). We would recommend also don't use Direct Data access to implement business rules between different Business Areas and restrict possibly using this integration mode only inside Business Area. Some literatures speak about "Urbanization" approach by reference to cities map when we use avenue to circulation inside city and highway circulation between different cities [4].

In this level of architecture building, the re-use philosophy doesn't to have priority. The priority is to Enterprise Agility and Business areas and business services independent-technology. Re-use philosophy doesn't to be applied between deployed business and technical services of different Business Areas.

See book of Richard Pawson "Expressive Systems" [3] we read: *"The message is that re-use is good result, but a poor objective"*.

6.2. Progressive step to building and deployment of Process Based Architecture

Process Based Architecture building and deployment is a background process witch can be accomplished with progressive step.

Following list of main task witch can be executed independently:

- Process Modeling & Automation specifications definition
- Process Engine automation
- Business Process Decomposition Model
- Business Process Performance Model
- Business Process and IT alignment strategy
- Strategy of business Service implementation and integration
- Strategy of Enterprise Application Integration
- Internal & External exchange platform design an implementation
- Functional and Applications map
- Technical Infrastructure map

These tasks contribute directly on architecture building and represent a good opportunity to initialize thought of Process Based Architecture building.

6.3. Performance model is an axe major of building Process Based Architecture

Process Based Architecture building must founded on a global step of engineering of performances, which must be maintained continuously. This step must be led on two levels: The level of Business Activity Monitoring by implementing Key Performance Indicators (KPI) and the level of technical performances indicators covering applications, databases, components and services and technical infrastructure: networks, servers, storage...

A function Drill down must be implemented on the level of the major KPI to allow tracking and detailed analysis of issues origin: technical, human, internal, external, chronic, accidental... Some methods such as SIX SIGMA make it possible to give a good approach of Process Performances analysis and to specify rule of KPI monitoring.

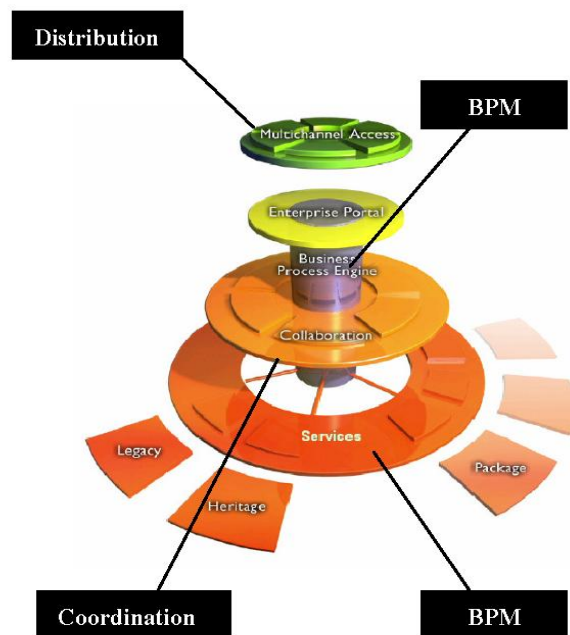
7. CSC e^{4SM} Process Based Architecture Framework

CSC Computer Sciences Corporation, has developed Process Based Architecture Framework called **CSC e^{4SM}** Allowing using best of practices. (See www.csc.com)

The positive impact of CSC e4 is to enable change through the combination of legacy systems, new best of breed components and process technology. CSC e4 accelerates the renewal of IT architecture, of project delivery and of integration across business unit boundaries, while lowering cost of ownership. In all cases CSC e4 is deployed to solve a specific business problem against a specific return on investment. The design principles provide confidence that subsequent process change will not require significant new investment, for all types of organizations.

CSC e^{4SM} Main advantages and benefits include:

- Reduced total cost of process ownership and infrastructure ownership
- Reduced process design-to-production time and cost, reducing process cycle times
- Increased automation and process customisation levels
- Encompass existing and future applications



CSC e^{4SM} framework provides comprehensive Process Management and Integration capabilities

Fig.2

CSC e^{4SM} Is based on flowing layers [2]:

- **Distribution:** interact with the enterprise through different channels such as browsers, PDAs and mobile phones. This enables the employee to utilise the channel most suited to their work, or the consumer the device of greatest convenience. CSC e⁴ enables the process designer to take advantage of the different features and benefits of any channel. This layer manages the physical connection managers, ensures authentication, security and eligibility of the channel source and user role against enterprise entitlements and access control lists. CSC e^{4SM} transforms requests from the channels to a channel neutral, enterprise format for processing by the process interaction manager, through the portal interface. Users interact with the end-to-end process and manage tasks associated with the process, optionally supported by workflow management technology. Responses are translated back to the specific channel format.
- The **co-ordination** layer manages the web services and application integration requirements of the enterprise. It marshals requests for business services to the correct application component interface and ensures responses occur in context of the overall process design. This layer provides services for on-the-fly industry data and application format conversion between process participants, together with process and systems monitoring and management of both the enterprise applications and CSC e^{4SM} elements. Middleware technology is used

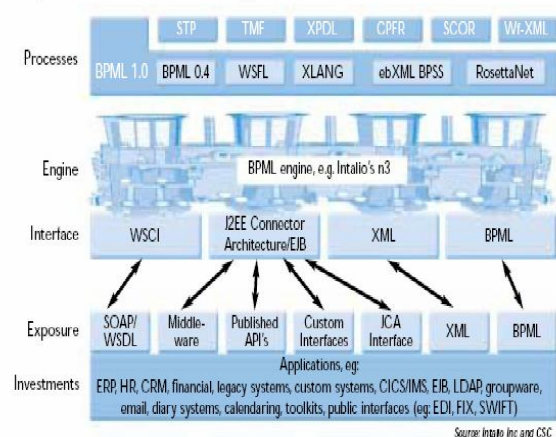
to deliver all service requests and to connect applications.

- **Business Process Management:** The process manager allows business architects to describe an end-to-end business process, or an interface to a business process of a partner, using services available in the business service directory and/or reusable process patterns in the process repository. It allows process decision logic to be based on process data captured during the process or returned from interactions with enterprise applications. The process design tool allows rapid deployment of new and changed business processes once all participants have been registered with CSC e^{4SM}. Process design patterns can be reused as sub-processes within larger processes. The process manager allows the definition of synchronous, asynchronous and parallel steps within a process, including the business level definition of transactions or compensating activities.
- **Service:** The service layer consists of the business interfaces of the enterprise applications known to the CSC e^{4SM} environment. Each application within the service layer exposes itself to CSC e^{4SM} using connectors, adapters and process projectors, as required. CSC e^{4SM} defines standards for such connectivity, enabling rapid and simple integration with other applications within the enterprise.

8. Zero code development with Intalio|n3 platform

The most compelling attribute of the Intalio|n³ BPMS platform is its ability to support the development of executable business processes without having to write code. This is called Zero Code Development. (See www.intalio.com).

The Fig.3 represent a Intalio BPMS platform in banking architecture example:



Source: Intalio Inc and CSC

Fig.3

8. Business Cases

8.1. Banking Business Cases

A leading French insurer used CSC e^{4SM} to transform its policy administration process supporting 600,000 policies. The company created a Web-based portal for administering new business and processing policies for 30 products, which shifted 80% of servicing activities from the company's home office to its 3,500 agents and substantially reduced core processing costs.

Business Process Modelling with Corporate Modeller of the Casewise company helping to achieve Basel II compliance: It requires that banks thoroughly address operational (organisation and IT) risks and develop internal solutions

8.1. CSC e^{4SM} and RFID

Intelligence must be distributed to the edges of the supply chain

- To filter and convert raw data into relevant information.
- Automate data capture in real time;
- Minimize data flow to the enterprise;
- Create real-time event notification;
- Supports networking, which enhances decision support;
- Enables decisions based on information from multiple enterprise systems.
- Software must manage a variety of collection technologies: bar code scanners, RFID readers, remote sensors, control system actuators.
- There must be business intelligence and processing at the data collection point : As data is collected, business rules have to be able to provide alerts and notifications.
- Software infrastructure must be an open architecture: Built on Web-services, Capable of integration with existing systems, Providing for rapid applications development and easy customization.

9. References

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