# Value Configuration Design – an Evolution in Adequate Business Process Design

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**Abstract.** Process breadth and depth completeness is an important factor for evaluating process design adequacy. Current process design strategies and toolsets poorly support the breadth and depth of business process logic resulting in incomplete business process designs. A framework that integrates the process, activity and resource viewpoints is proposed to address this inadequacy. This integrated viewpoint results from refocusing business process design practice from the traditional individual process silos towards integrated enterprise-wide *process network* design. Labeled as *Value Configuration Design*, enterprise-wide process design is the next evolution towards adequate business process design. .

**Keywords**: business process design, adequate process design, value configuration design. .

## 1 Introduction

This paper discusses the issue of design adequacy in the context of enterprise-wide business process design. Process design and management is a core part of our industry-practice-based process innovation research program, which stems from our research group's industry experiences.

Traditionally business process design and design adequacy tend to address a specific business process in isolation. A business process is defined simplistically as a flow of predictable activities that are performed by multiple resources to achieve a business outcome.

Porter[1] introduced the concept of the value chain as a series of activities (both primary and support) that add value in contributing to the delivery of customer requirements. The value chain concept was later extended by Stabell and Fjeldstad[2] into value configuration, *defined as a network of value chains*. Value configuration denotes the fact that in practice, an enterprise commonly networks with several partners and suppliers in servicing its customers.

The value configuration models the enterprise-wide business process as a *network* of inter-dependent core processes. Designing individual core business processes in isola-

tion, without the enterprise-wide view, can lead to a sub-optimal process design when aggregated into the total value network.

Value configuration design requires a *process engineering methodology* which ensures the resultant value configuration will deliver the customer value (requirements) in line with the business strategy. Our research aims to develop the methodology, which will serve as a practical process innovation tool for process managers.

This paper describes part of our progress towards that goal and focuses on the issue of design adequacy. It discusses the criteria for design adequacy and defines the concept of *process (breadth and depth) completeness* as a measure of design adequacy. A framework is also proposed to address completeness in the context of value configuration design.

## 2 Requirements for a Process Engineering Methodology

A process engineering methodology must (a) allow process designs to be validated to meet both the business strategic and operational requirements, and (b) define the systematic steps for designing each core process (strategic or unique and commodity) to not only meet the specific customer value propositions articulated by the strategic intent, but also be agile for ongoing changes due to the changing business environment. From the strategic viewpoint, the methodology must validate the alignment of the process design to the strategic intent (or value discipline): operational excellence, customer intimacy or product leadership that the enterprise stands for, as well as any mandatory regulatory compliance (such as Sarbanes Oxley) requirements [Kaplan & Norton 3]. From the operational viewpoint, the methodology addresses the process design's *functional and performance requirements*, reflecting the stakeholders and, most importantly, the customers' requirements.

This paper focuses solely on process design adequacy from the operational viewpoint of our methodology. Future papers will describe the complete process engineering methodology in detail.

## 3 Criteria for Process Design Adequacy

The criteria used for evaluating software quality are a useful starting point as criteria for evaluating business process design adequacy. Many variations of software quality criteria exist. However a common thread is the division of requirements into functional and non functional. [Wikipedia 4].

Analogously, we define process design adequacy from two dimensions: *'functional'* – referring to process completeness; and *'performance'* referring to other quality aspects: understandability, conciseness, portability, consistency, maintainability, testability, usability, reliability, structuredness, efficiency and security. Design adequacy

is defined as the *minimum* set of process functional and performance requirements that meet the stakeholders (particularly the customers) requirements. For the purpose of this paper, we focus specifically on the completeness (functional) dimension of business process design as the means for measuring and implementing adequate process design.

## 4 The Completeness Dimension of Business Process Design

We define business process design completeness as having two variables:

1. The minimum *scope of* the total suite of *business processes* within the value configuration of an organization that is considered mandatory by the stakeholders. This includes both primary and support processes.
2. Within each selected (core) business process, the minimum *scope of activities* that must be designed as part of executing instances of a business process to meet mandatory stakeholder requirements.

The second variable (core process design) is the more complex part of evaluating process design completeness and is expanded in the next sections.

## 5 Breadth / Depth Complexity Matrix Concept

Soanes [5] introduced the concept of the breadth / depth complexity matrix to describe the inadequacy of (or lack of completeness in) individual business process designs.

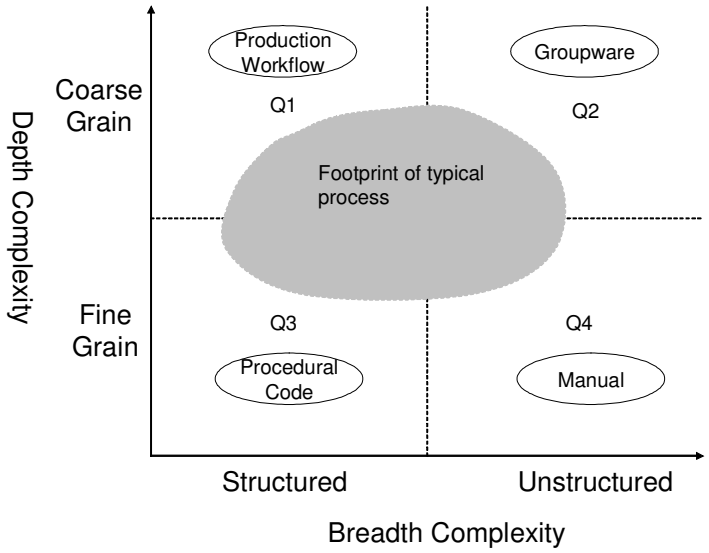


**Fig. 1.** Process Breadth / Depth Complexity Matrix

Breadth complexity is defined as the range of activity types within a business process ranging from highly structured systemic to unstructured ad-hoc activities.

Depth complexity is defined as the abstraction levels of process logic within a business process ranging from very coarse process logic (e.g. work passing from one resource to the next) to very granular process logic (e.g. navigation between fields on a data capture screen).

Soanes proposed that the footprint of typical processes crosses multiple breadth / depth quadrants of the above matrix. To illustrate the mapping, a simple real world business process example was used that has a footprint that includes aspects of all quadrants. This ranged from coarse-grain depth level, highly structured routing between human resources (Q1); coarse-grain depth level, unstructured interactions occurring within an email system (Q2); fine-grain depth level, highly structured flow of functions and screens embedded as procedural code in the transaction system (Q3); and fine-grain unstructured (Q4) process knowledge that is manually implemented.

Soanes concluded that existing process design strategies and toolsets tend to specialise in one quadrant of the matrix. Given individual processes can span multiple breadth/depth segments, this specialisation strategy can result in multiple process design strategies and toolsets being used within the one process. This means a significant percentage of business activities performed have been excluded from the scope of the business process design and are thus not controlled and tracked by the BPMS implementing the business process designs. It results in inefficient and ineffective business operations – an undesirable outcome of inadequate (core) process design.

## 6 Process Design Framework to Facilitate Completeness

We propose the following framework (Figure 2) as a practical method for modeling the process breadth and depth complexities:

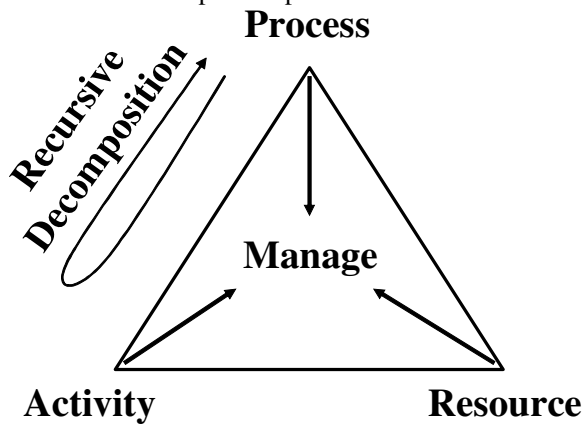


**Fig. 2.** Process / Activity / Resource / Management (PARM) framework.

The Process / Activity / Resource / Management (PARM) framework defines four viewpoints of business processing that need to be integrated and managed as part of the design considerations (in response to *stakeholder requirements*) for each core business process:

- The Process viewpoint focuses on the controlling, guiding and restricting of the flow of activities performed for specific process instances. Its measurable objective is to meet the *customer's* end to end service delivery expectations.
- The Activity viewpoint focuses on the facilitation of an environment to manage human activity with the recognition that human resources will prioritise their own execution of multiple activities across multiple processes simultaneously based upon their own individual work practices. The execution sequence is not deterministic – contrary to conventional process design which assumes that activities will be executed deterministically as prescribed by the design. Its measurable objective is to provide the most effective (both productivity and quality) environment for the completion of all work across all processes – reflecting the *process (knowledge) worker's* cognitive decision making behaviour which is unstructured.
- The Resource viewpoint forecasts, plans, schedules and assigns resources to activities. Its measurable objective is to maximize the utilization and therefore the efficiency of the total resource pool. This viewpoint captures the *process (resource) manager's* requirements.
- The Management viewpoint integrates the process, activity and resource viewpoints through balancing the tension between service, cost and quality expectations. It reflects the requirements of the *business owner* of the process.

Breadth complexity requirement is modeled by the alignment and integration of the process, activity and resource viewpoints, with the "breadth" being accentuated by the activity viewpoint which explicitly models both structured and unstructured behaviours.

The recursive decomposition of the framework parameters (an activity at one level of abstraction can be decomposed as a process at the next lower level of abstraction), enables breadth complexity to be managed at multiple levels of depth complexity.

The assignment of a resource to perform an activity on a process instance creates the link between the process and activity viewpoints. This assignment can be an active resource management strategy based upon optimising a pool of resources (more applicable to production workers), or can be a passive resource management strategy based upon individual resources prioritising their own assignments (more applicable to knowledge workers).

Process design completeness is achieved through a consistent and integrated approach to modeling and managing the process, activity and resource viewpoints.

The management viewpoint integrates the process design into the business strategy. Decomposition of the business strategy into measurable objectives provides the pa-

rameters for balancing the tension between the process viewpoint objectives (service), activity viewpoint objectives (effectiveness) and resource viewpoint objectives (utilisation).

Traditional process design strategies and BPMS toolsets are inadequate as they tend to focus only on the process viewpoint and seldom include the activity and resource viewpoints. Activities are an essential part of process design strategies. However the existing prescriptive toolsets cannot model the non-deterministic less structured activities.

Furthermore, there is poor support for the resource viewpoint. Most BPMS tools will support simulation as a means of identifying the optimisation of resource allocation. However as Reijers and van der Aalst [6] highlight, a simulation model typically focuses on a single process while the people involved distribute their time over multiple processes.

## 7 PARM Framework Implementation

A new process engineering methodology (and associated BPM tool) is required that supports a process designer using the PARM framework to ensure adequate value configuration design. It is a core part of our on-going research program at UTS. Its detailed solution, however, is outside the scope of this paper which aims to address practical design issues and introduce the new integrated concepts. Below we highlight some existing initiatives that address various aspects of the PARM framework requirements.

van der Aalst et al [7] describes case handling workflow as "a new paradigm for supporting flexible and knowledge intensive business processes." Case handling workflow is characterised by defining what can be done to achieve a business goal with the knowledge worker actively deciding how to reach that goal.

Process mining's goal is to reverse engineer a process model from activity event logs. van der Aalst et al [8] proposes that to allow for operational flexibility, workers should be allowed to deviate from the pre-specified process design (they use the term "workflow"). Process mining is then proposed as a means of providing a feedback loop that monitors actual deviations to adapt the process design to changing circumstances and detect imperfections in the design.

Many parties (eg Enix [9]) are proposing the integration of BPM and the business rules approach (as advocated by Ross [10]) as a key future development in addressing unstructured exceptions within structured process flows.

Case handling, process mining and the business rules approach integration with BPM, are examples of attempting to address breadth / depth complexity by extending the process viewpoint.

Activity theory is the basis of a number of initiatives that focus on the activity viewpoint. Activity theory is defined by Adams et al [11] as “a powerful and clarifying descriptive tool focusing on understanding human activity and work practices…”

Adams et al leverages activity theory principles to propose the concept of worklets as “a repertoire of self-contained sub-processes that can be applied in a variety of situations depending on the context of the particular work instance.”

Human Centred Work System Design is an initiative by NASA to define processes for the Mars mission based upon activity theory principles. Sierhuis and Clancey [12] state “the notion of a human-centered work system is one based on work practice, i.e. what people actually do, as opposed to a machine-centered approach that tends to focus on the flow of products and work through a work system often ignoring the way people in the organisation prefer to work. ”.

Harrison-Broninski [13] has introduced the concept of Human Interaction Management (HIM). He states that “current mainstream techniques and tools for work support…deal only with "mechanistic" business processes. HIM extends this to include support for "human-driven" processes focused on human creativity and collaboration”.

Within the BPM domain, best practice for resource management is the simulation approach. It is recognised that there is a need to address the resource viewpoint within BPM as per Russell et al’s [14] definition of the resource patterns associated with BPM. Apart from the progress commercial vendors have achieved with resource optimisation (e.g. SAP in the enterprise resource planning domain), there are interesting developments in many diverse areas such as Grid computing [Buyya 15] that could be applicable to the BPM domain.

It is envisaged that our evolving process engineering methodology will be developed from an integration and adaptation of existing initiatives and best practices to achieve the multiple viewpoints of the PARM framework.

## 8 Conclusion

It is proposed that process breadth and depth completeness is a major evaluation criterion of adequate process design. Completeness is restricted by the current process design strategies in their inability to address the breadth and depth of business process logic.

The PARM framework is proposed to overcome these limitations. It allows business process owners to holistically manage and integrate the process, activity and resource viewpoints in line with stakeholder requirements.

This in turn requires moving beyond the traditional approach of designing and managing individual business processes in isolation towards an integrated view of process, activity and resource. This integrated view is labeled "value configuration design", in reference to the broader goal of configuring the total value network of multiple processes consisting of overlapping and independent activities with resources multitasking across multiple activities simultaneously.

The future work is to fully develop a total process engineering methodology and BPM tool that incorporates a value configuration design architecture, modeling approach and implementation requirements. This will most likely be an integration and extension of a number of existing initiatives that are already attempting to address the breadth / depth complexity challenge.

## References


1 Michael E. Porter. Competitive Advantage 1985.
2 Stabell and Fjeldstad. Configuring value for competitive advantage. On chains, shops and networks. Strategic Management Journal 1998 Volume 19 Number 5 pages 413-417.
3 Kaplan and Norton. The Strategy Focused Organization. September 2000.
4 Software Quality Factors at http://en.wikipedia.org/wiki/Software_quality
5 Michael G. Soanes. Process Design Strategies to Address Breadth and Depth Complexity. 4th International Conference, BPM 2006. September 2006.
6 H.Reijers, W.Van Der Aalst. The effectiveness of workflow management systems: Predictions and lessons learned - - International Journal of Information Management, 2005.
7 W.M.P. van der Aalst, M. Weske, and D. Grunbauer. Case Handling: A New Paradigm for Business Process Support. Data and Knowledge Engineering, 53(2):129—162, 2005.
8 van der Aalst, W. M. P.; van Dongena, B. F.; Herbst, J.; Marustera, L.; Schimm, G.; Weijters, A. J. M. M. Workflow mining: A survey of issues and approaches. Data & Knowledge Engineering, Volume 47, Issue 2 , November 2003, pages 237-267. Elsevier.
9 Enix Consulting Limited. Business Rules are from Mars and Processes from Venus at www.enix.co.uk.
10 Ronald G. Ross. Principles of the Business Rules Approach. 2003.
11 Michael Adams, David Edmond and Arthur H. M. ter Hofstede, 'The Application of Activity Theory to Dynamic Workflow Adaptation Issues', In The Seventh Pacific Asia Conference on Information Systems (PACIS-2003), July 2003, Adelaide, Australia, p 1836 - 1852.
12 M. Sierhuis and W. J. Clancey, Modeling and Simulating Work Practice: A human-centered method for work systems design, IEEE Intelligent Systems, vol. Volume 17(5), 2002.
13 Harrison – Broninski. Human Interactions – the heart and soul of business process management. 2005.
14 Nick Russell, Wil M.P. van der Aalst, Arthur H.M. ter Hofstede, and David Edmond, Workflow Resource Patterns: Identification, Representation and Tool Support, Proceedings of the 17th Conference on Advanced Information Systems Engineering (CAiSE'05) , volume 3520 of Lecture Notes in Computer Science, pages 216-232. Springer-Verlag, Berlin, 2005.
15 D.P. Spooner, J. Cao, S. A. Jarvis, L. He, and G. R. Nudd. Performance-aware Workflow Management for Grid Computing. The Computer Journal, Oxford University Press, London, UK, 2004.