Adequateness -
a Holistic Inquiry into
Business Process Design

Rainer Schmidt

Department of Computer Science
University of Applied Sciences
Beethovenstraße 1
73430 Aalen
Germany
+49 178 180 4116
Rainer.Schmidt@htw-aalen.de

Abstract: Adequate design of business processes takes into consideration not only classical requirements such as functionality but also requirements such as conformance to rules and laws. Adequate design differentiates classes of requirements, which vary in the means to achieve them and the ways to measure them. Especially, the reuse of reference process models and best practices, which have already proven to be adequate, is an important means for achieving adequateness.

1. Introduction

The design and support of business processes has traditionally concentrated on single requirements such as functionality, flexibility and reliability. However, in practice it became more and more obvious that a holistic view is necessary to consider the requirements which have to be fulfilled by a process. This holistic view is provided by the concept of adequate process design (1). Adequate process design means that a process will have the ability to fulfil its stakeholders' expectations (1). Therefore, this paper will suggest a definition of the term adequate design in the second section. The third section of this paper compares the means for achieving an adequate design of business processes. It will show that methods for reuse play an important role for achieving an adequate design. Finally a summary and conclusion are given in section 4.
2. What is adequate design?

For a long time, only the requirements of the organization implementing a business process have been considered for deciding whether a business process is adequate or not. However, there are a multitude of other stakeholders that the business process attempts to satisfy. For example, the customers for whom the process is executed, the employees and suppliers participating in the execution of the process, the people who may be directly or indirectly affected by the process (such as investors) and the society or public as a whole. The organization may be interested in executing the business process efficiently. The customer may expect that a product or service is provided to him. The employees may expect that workloads are not exceeded. Finally investors may require that accounting standards are fulfilled to get a clear view of the financial situation of the enterprise. As a result of these disparate needs, regulators often step-in to impose some rules that all parties more or less agree on (e.g. Sarbanes-Oxley). These examples show that adequateness is a relative property. A process cannot be adequate on its own, but only in relation to requirements defined by the stakeholders.

2.1 How many requirements have to be fulfilled?

Although all stakeholders strive to have all their requirements fulfilled, in reality there will be some requirements which are fulfilled and some which are not. Therefore it has to be pondered whether a definition of the term adequateness which requires that all requirements of all stakeholders are fulfilled provides much value, because there will –probably- never be such a process. On the other hand, a definition of the term adequateness allowing the partial fulfillment of requirements may stir up discussion because nearly all processes fulfil some requirements. Thus adequateness would be decided on the degree of fulfilment of the requirements. However this implies the question, which degree is the right one. Furthermore, the measurement of the degree of fulfilment is also not clearly defined.

The immediate following question is whether adequateness has to be considered as a binary property or not. If adequateness is not considered as a binary property, then there is no need for clear cut criteria between adequateness and non-adequateness. Thus, adequateness can be expressed as the ration between fulfilled and non-fulfilled requirements. Conversely, if adequateness is regarded as a binary property, clear criteria must be identified. One solution is to differentiate the requirements of the stakeholders between those that must be fulfilled in every case and those that are less important. Thus, there are requirements that are crucial for a stakeholder and some that are not. The stakeholders will consider a process as adequate if their crucial requirements are fulfilled. Adequateness is achieved if all crucial requirements of all stakeholders are fulfilled. If a process is not adequate, crucial requirements of at least one stakeholder are not fulfilled. In such a case, and it has to be expected,
the stakeholder will reject further cooperation. For example, suppliers may leave a supply chain because they do not receive adequate revenues for their products.

2.2 What classes of adequateness can be differentiated?

To clarify the nature of the term adequateness, four basic classes of requirements can be differentiated by examining the outcome of the process, the execution of the process, the design of the process and conformance with global valid rules as shown in figure 1. Functional requirements relate to the outcome of the process, i.e. the product or service provided by the process. Quality of service requirements refer to the execution of the process. During design, requirements such as flexibility, reusability apply. Conformance requirements may relate both to the outcome, the process itself and its design. They are of a more abstract nature. Beyond these basic classes, a number of additional classes may exist; however, this is subject of further research.

![Fig. 1: Classes of adequateness](image)

2.2.1 Functional adequateness

Functional adequateness of a process means that the main "goal" of the process is achieved. Often, this outcome is the providing of one or many products or services. Therefore, a process is regarded as functionally adequate if it provides the products or services it has been designed for. The decision about functional adequateness often has to be performed manually because the abstract specifications of the products and services have to be compared with the real products and services provided by the process. The semantic gap between specifications and process outcome is very large; therefore functional adequateness is difficult to measure.
2.2.2 Quality of service

Often, the provision of a service or product is subject to quality requirements such as reliability, performance, cost etc. For example, a product has to be produced within a certain time after receipt of order. Such requirements which do not describe the outcome of the process directly but the qualities of its provision are called quality of service requirements, also known as Non Functional Requirements (NFR). The decision whether the quality of service requirements are fulfilled or not is done by defining metrics, measuring them and comparing them to the margins defined by the stakeholders.

2.2.3 Quality of design

Quality of design requirements constrain the manner a process is designed. They demand that the process has properties such as flexibility, reusability etc. To fulfil them, the use of design methods or approaches is necessary. For example, a modular approach can improve the flexibility of a process. Furthermore, syntactic requirements contain rules for the description of the business processes. For example, they postulate that to each activity a role needs to be associated, which is responsible for the activity.

Quality of design requirements can rarely be measured a priori. For example, reusability can only be measured if reuse has already taken place. This means that the fulfilment of design requirements can be measured mostly, retrospectively, by looking back at the result of the design.

2.2.3 Conformance

Conformance requirements demand the conformity of the process with rules, laws, standards etc. Thus the stakeholders are often the public, the government but also investors, banks etc. Examples for conformance requirements are the conformity with Sarbanes Oxley Act (SOX) (3), ISO 9000 / 9001 (4) and ISO 20000 (4). SOX defines accounting standards for enterprises which shall assure proper information of investors and the public. ISO 9000 / 9001 define a quality management system for organisations. ISO 20000 defines requirements for IT-service processes which assure, that the IT-services provided achieve a certain level of quality.

3. What are the means for the adequate design of business processes?

There are different means for the adequate design of business processes. They vary depending on the class of adequateness addressed.
3.1 Functional requirements

To design a process adequate to functional requirements, classical means already known from software engineering can be used. For example, requirements engineering can be used to gather the requirements to be fulfilled by the business process. Nevertheless, the fulfillment of functional requirements cannot be done by a general automatic procedure, instead human invention and design is required. This problem is comparable to the automatic generation of program code, a problem which has not been solved yet.

A common way to reduce the effort to fulfill the functional (and other) requirements is the use of process reference models. Process reference models represent knowledge about the adequate design of a process for a certain context or domain. The reference model is used as a template for the individual process. Nevertheless, the reference model approach has been criticized for being too restrictive: If all enterprises use exactly the same process model, how can they differentiate amongst themselves? A possible solution for this problem is generic process models. In contrast to a classical reference model, it does not specify every detail of the process but allows each enterprise to introduce individual specializations without sacrificing the compatibility between different enterprises.

3.2 Quality of service

Due to the fact, that the fulfillment of many requirements concerning the quality of service cannot be associated with a single task or operation, it is necessary to employ special means to assure that they are met. Such means are, for example, simulation and process-controlling. In the area of service processes, the so-called service level management plays an important role in the achievement of expected service levels. Furthermore reference and generic models can be used. For example SCOR contains patterns for fulfilling quality of service requirements.

3.3 Quality of design requirements

For the fulfillment of quality of design requirements, which highly overlap with those of classical software engineering, classical software engineering means can be applied, such as, modularity, separation of concerns etc. Nevertheless there are also approaches which are specific for the design of business processes. Syntactic requirements can easily be met by using an appropriate business process modeling tool, which enforces that only syntactically valid structures are created.
3.4 Conformance requirements

It is difficult to design a process adequately to conformance requirements. Often, so-called best practices are used. Best practices are small fragments or patterns of processes that represent knowledge about the means to fulfill one or several requirements for adequateness. They can be used in different contexts or domains. In contrast to reference models, best practices do not provide the template for a complete process but only a small part of it.

4. Conclusion and Outlook

The adequate design of business processes means that a business process is designed in a holistic way. However, it is difficult to decide which are the crucial requirements that must be fulfilled. The requirements can be differentiated into functional, quality of service, quality of design and conformance requirements. Functional requirements describe the outcome of the process, i.e. a product or a service. Quality of service requirements define the conditions that have to be met when the product or service is provided, for example reliability, reaction time etc. Reference and generic models are often used as means to achieve an adequate design with a minimum of effort. Quality of design requirements constrain the way a process is designed. Conformance requirements often reflect laws or other rules with broad validity. Best practices are a common means for fulfilling conformance requirements.

Although reference models and best practices are both important means for reuse, they highly differ in their capabilities. Whereas reference models are mostly highly formalized, best practices often lack formal foundations. Therefore it is difficult to compare two “best practices” and to know which of them really the best one is.

Further work and research on the adequate design of business processes should address the following topics. First, the criteria for an adequate design should be formalized. This is necessary to develop detailed methods for the adequate design of business processes. Particularly, procedures are necessary to decide whether a requirement is crucial or not. Second, structures for the proper representation of best practices should be developed. Using them, the comparison, storage and retrieval of best practices will be possible.

Acknowledgements

I would like to thank Gil Regev for many fruitful discussions.
References


