

## Flexibility in Service Processes

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**Abstract:** Service processes are a special type of business processes playing an increasingly important role in modern economies. They require new forms of flexibility not found in ordinary business processes. They are at the same time processes and products. They therefore have to be flexibly adaptable to the customer's requirements while being offered at a competitive price. Service processes have allow a high degree of interaction with external participants such as the customer and subcontractors. Furthermore external resources have to be flexibly integrated. Finally, service processes not only must produce a defined process output but they also have to provide a defined potential to provide the process output.

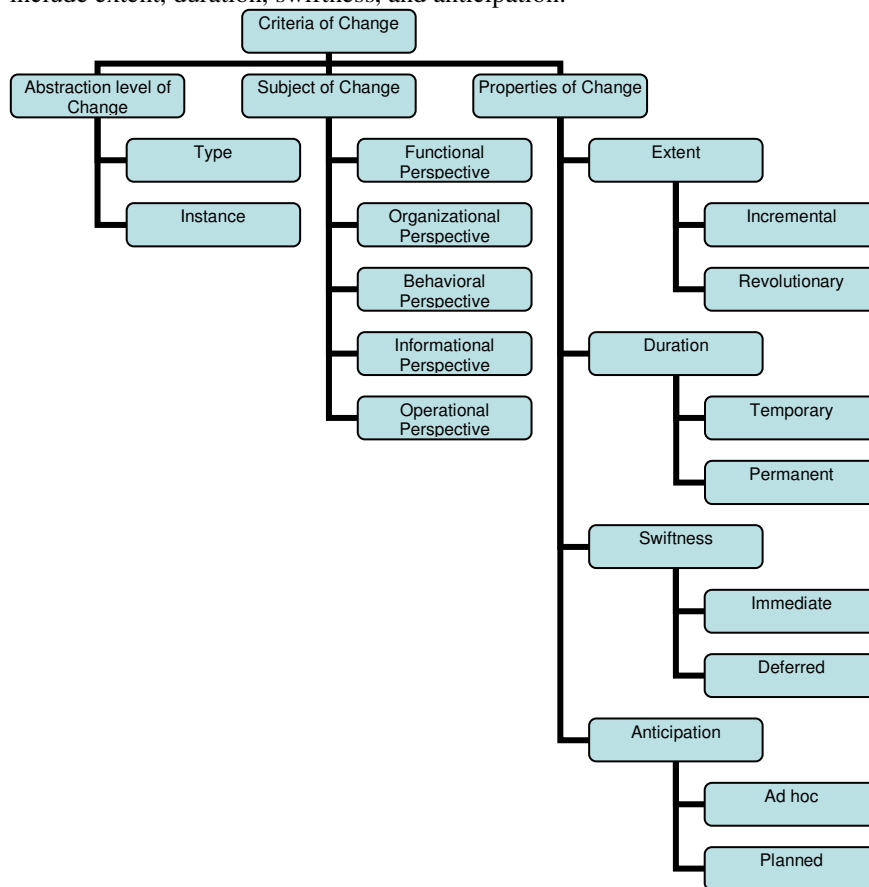
### 1 Introduction

Service processes are a special type of business processes playing an increasingly important role in modern economies. Traditional production-oriented industries are declining and replaced by service providing enterprises. One example is the area of information technology, where hardware and software is provided by a few large enterprises and supplemented by a multitude of services. Different providers combine low level services such as network and server administration, database tuning etc. to deliver high level services to customers. Therefore, service processes are progressively crossing organizational boundaries. Service processes must be very flexibly adaptable to the customer's requirements. These requirements are more quickly changing than in traditional business processes, where material products are created. The customer does not "see" a physical product and therefore often expects, that all changes can be implemented immediately.

This paper will analyze which special kinds of flexibility are necessary for supporting service processes. It will proceed as follows. In section 2, the notion of flexibility is defined and clarified. In section 3, the properties of service processes are analyzed. The characteristics of service processes, when compared to ordinary business processes, are used to identify the special flexibility requirement in section 4. Related work is covered in section 5. A conclusion and outlook on further work is given in section 6.

## 2 Flexibility

Flexibility [ReSS06], [Bide05], [ReWe05], [Soff05] is the capability to implement changes of the requirements in the business process model and instances by changing only those parts of the business process model and instances that reflect the change. Flexibility appears in a multitude of notions as shown in the taxonomy of [ReSS06]. This taxonomy classifies flexibility with respect to the types of changes it enables. The taxonomy presented in Fig. 1 uses three orthogonal dimensions: the abstraction level of the change, the subject of change, and the properties of the change, that include extent, duration, swiftness, and anticipation.



**Fig. 1: Notions of change [ReSS06]**

To describe the subjects of change more formally, so called perspectives are used. Perspectives are disjoint sets of model elements, that describe independently evolvable parts of the process. For example, the organizational structure of a service processes can be changed completely whereas the operational perspective remains unchanged. Different approaches for defining perspectives are compared in [BKRR03]. Standard business processes and service processes contain five basic

perspectives [Schm05]: The functional perspective describes what the process has to do; particularly it defines the process goal. The operational perspective describes activities executed during the process. The control perspective defines, when and under which preconditions activities are performed. In the informational perspective the information that shall be exchanged between activities is defined. The organizational perspective describes who participates in which roles in the process.

### 3 Service processes

To clarify the characteristics of service processes, a case study is used that is based on the ITIL [ITSMF] module incident management / service desk , see Fig. 2.

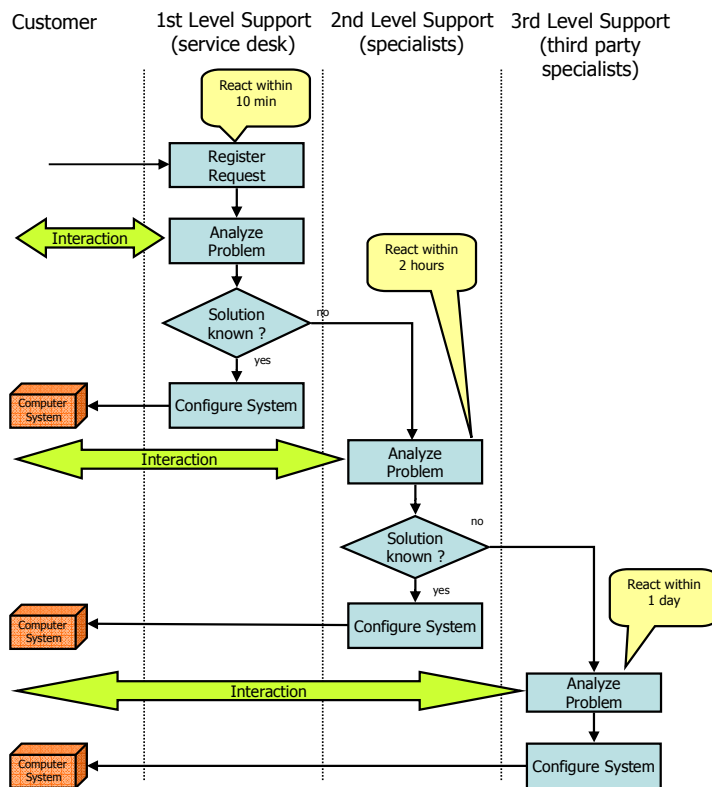


Fig. 2: Three level service support

The service process is a three level IT-support for users of a computer system. The IT-support process is operated by a service provider in the customer’s building. The three level user support is composed of a service desk at level 1, a team of specialists at level 2 and third-party specialists at level 3. All support levels interact with the user to analyze the problem and they access the user’s computer system to configure it. Furthermore, each level has a defined reaction time for user requests. The service desk at level 1 is the primary point of contact for the user. All problems and requests

are collected by the service desk. The service desk has to react to incidents within 10 minutes. Many incidents can be solved by the service desk, in this case the service desks configures the computer system directly. If an incident cannot be solved by the service desk, it is forwarded to the second level support. Thus the specialists are not bothered with problems below their qualification such as resetting forgotten passwords. The second level support has to react within two hours. But there are also problems that cannot be solved by the second level support. These problems are forwarded to external service providers specialists who are the third level support. They have to react within one day.

### 4 Service Processes and Flexibility

Service processes have a kind of double identity, because they are also products offered to the customer. Therefore, on one hand, they have to be very flexible, to adapt the provided services to the customer’s requirements. A process has to be provided, that is individually tailored to the customer’s requirements. However, individually tailored processes are unique and therefore offer no possibility of reuse of parts of the process. Thus the efficiency of an individually tailored process is low. On the other hand, the providing of services must be done efficiently, because there is a strong competition of service providers on the market. This requires a highly standardized process. This process can be executed efficiently, because there are reuse and economies of scale. However, standardization also implies that individual customer requirements cannot be taken into account. Thus, there is a conflict between flexibility and the capability to economically execute service processes.

Service processes have many properties in common with ordinary business processes. Therefore, the subjects of change defined in Fig. 1 can also be found in service processes. To clarify this, the subjects of change defined in the taxonomy have been applied to the example process in Fig. 3. The result is shown in Fig. 3

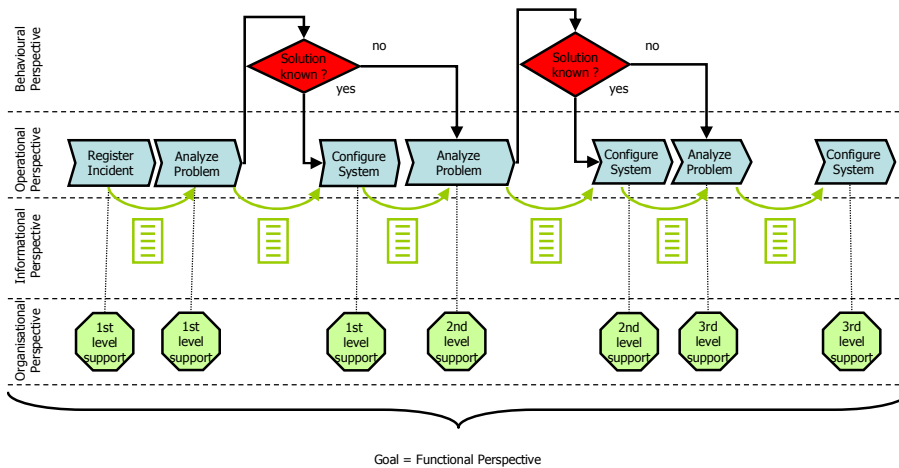


Fig. 3: (Basic) subjects of change in service process

However, there are important differences between service processes and common business processes, that require, that the notion of flexibility has to be extended for service processes. These differences have been discussed extensively in the area of service engineering [BuSc06], [BöJK03], [KIWe01], [WeKI04], [WeKI03]. First, service processes show a high degree of division of labor, requiring many interactions between the service provider, the customer and third party service providers. Second, service processes extensively use external resources both from the customer and third party service providers, that have to be appropriately obtained, integrated and administered. Third, not only the execution but also the potential to execute the service process is important to the customer.

These properties of service processes require, that the subjects of change for business processes described in [ReSS06] have to be extended. This will be done by introducing three new perspectives: the interaction, the resource and the service level perspective.

#### **4.1 Interaction perspective**

A characteristic of service processes is their high degree of division of labor with a high involvement of external participants. In traditional production processes the customer is only interested in the outcome of the process but not the process itself. In service processes, there are many interactions between the service provider, the customer and third party service providers. Both need to be integrated during the whole process, not only at the beginning and the end of the process: In the example above, the customer has to be asked for further details about the incident report. Advice is sought from the third level support. In the example of there are problem solving interactions between all levels of support and the customer. As service processes contain many interactions, it is necessary to provide flexibility in changing and integrating new interactions into the process. Interactions need to be adapted to changed customer requirements and new interactions have to be integrated due to new customer requirements. To achieve this, a new perspective has to be created when defining the metamodel for service processes. This perspective is called interaction perspective.

#### **4.2 Resource perspective**

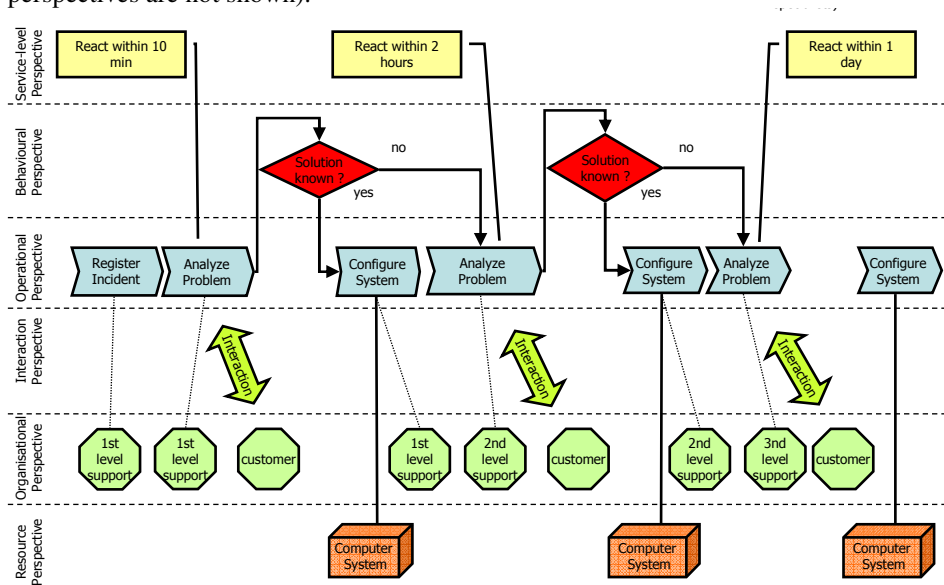
Service processes differ from traditional business processes also because they extensively use external resources both from the customer and third party service providers. Resources have to be appropriately obtained, integrated and administered [ZdHe05]. The computer system in Fig. 2 is such a resource. For example, before the customer's computer system can be configured, one has to have administrative privileges. Finally customer resources have to be given back at the end of the service provision. To properly represent changes in the resource perspective, it must be simple to add, change and remove resources.

#### **4.3 Service level perspective**

Not only the execution but also the potential to execute the service process is important to the customer. In the example above, it is important for the customer that

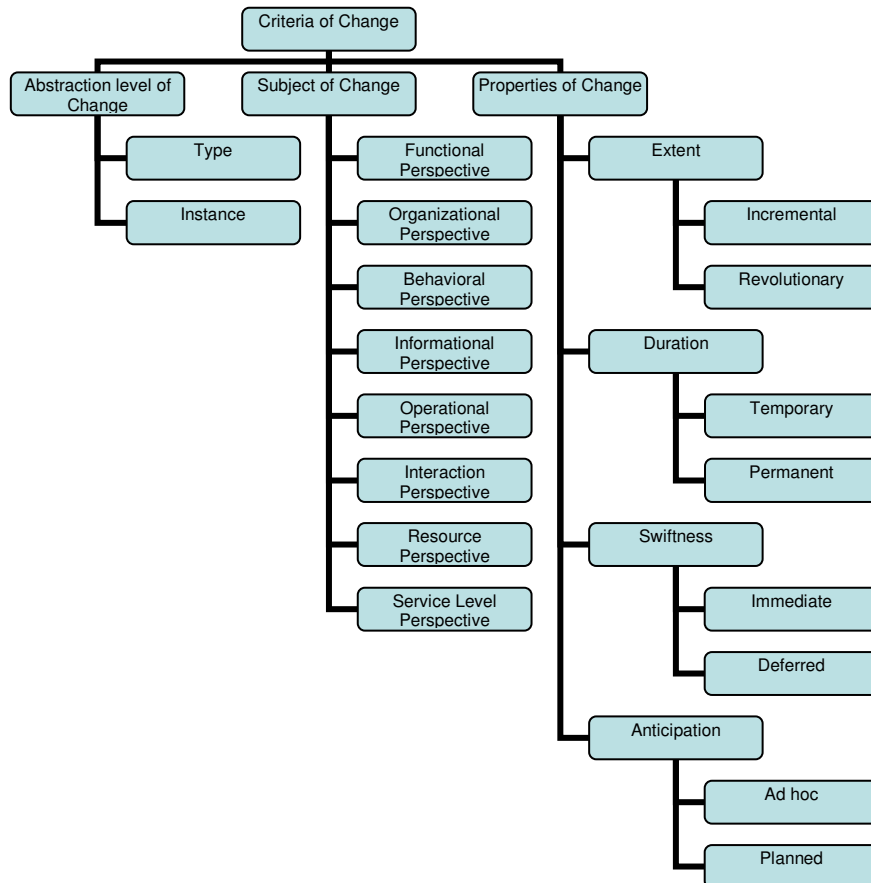
his staff may call the service desk and get a reaction within a predefined reaction time. Therefore service providers have to make available a predefined potential to perform a service process. This potential is measured as service level. In the example above, a service level defines the maximum reaction time. To reach a certain service level as defined in a service level agreement, resources have to be kept ready, as services cannot be stored as material products. In the example, one has to keep ready properly trained staff available in the service desk, regardless of whether there are calls or not. The service level perspective is needed to define the potential to perform activities. It describes the rights and duties for the customer and the service provider, the service performance indicators (SPIs), the measurement of the service performance indicators and change procedures. Service levels agreements have to be easily adaptable to changing business requirements.

Applying these considerations to the case study, we get the representation as shown in Fig. 4 . Here the service process is split up into perspectives and perspective elements, to show the additional subjects of change found in service processes. Each perspective is shown as separate layer. (Not all perspectives are shown for the clarity of the drawing. The informational and the functional perspectives are not shown).



**Fig. 4: Additional perspectives for service processes**

Based on the considerations above, the taxonomy defined in [ReSS06] can be extended for service processes. It is shown in Fig. 5.



**Fig. 5: Extended subjects of change for service processes**

## 5 Related work

A first approach to capture the special properties of service process is presented in ServiceFlow [KlWe01], [WeKl04], [WeKl03]. It describes how to model service processes and how to execute them. However, the approach covers the details of the interaction perspective, but not further perspectives such as the service level or the resource perspective. The need, that resources have to be appropriately obtained, integrated and administered is identified in [ZdHe05]. In [BöJK03] a modularization approach for services in the information technology business is proposed. It is based on a conceptual model of IT-services that contains integration and system services comparable to the interaction and the resource perspective. The approach is further developed in [BWFK04]. It models interactions and resources explicitly, but in a very inflexible way. For example, only system elements can be provided by external roles but not services. First ideas how to integrate (software) services across enterprises are

found in the CrossFlow project [CROS]. It developed concepts to support the creation of virtual enterprises by outsourcing services to other enterprises. The outsourcing is based on contracts that specify the services to be provided. CrossFlow provides an architecture to make and enact these contracts. A virtual market provides mechanisms for matching service requests and offers. Furthermore the configuration of the enactment infrastructure and service monitoring and control is provided.

## 6 Conclusions

Service processes have special properties: They show a high degree of interaction with external participants such as the customer and subcontractors. Another difference to standard business processes is the integration of external resources, for example the customer's computer system into the process. Finally, service processes not only have to produce a defined process output but they have also to provide a defined potential to provide the process output called service level. These properties elicit new kinds of flexibility necessary to properly support service processes. Furthermore, there is a conflict between the need for flexibility of service processes and the product nature of service processes. It can be reduced by using component-oriented approaches.

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