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Value Creation by Process-Oriented Project Management

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ABSTRACT

The start of a design process based on value creation requires a different approach and new models. The aim of this study is to provide insight into how a design process based on value creation can be initiated. The intended result of the study is the design of a collaboration model that can serve as a starting point for making process agreements. The significance of this collaboration model lies in the current processes of change in the building sector. These processes require new, innovative forms of collaboration.

Keywords: Value Creation, Process Control, Process Management, Project Management, Plan Development

1. INTRODUCTION

Approaching the design process from the perspective of process control polarises the stakeholders, which end up working in parallel to one another in a mono disciplinary fashion. The stakeholders are judged based on their ability to deliver a unique product of a certain quality. Parties from different disciplines share documents but fail to communicate about them. As a result, coordinating the various disciplines is a demanding task.

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Initiating a design process based on value creation requires a different approach. The current forms of collaboration are not suited to a process of this kind so new models must be developed. To create value two or more stakeholders from different disciplines must pool their knowledge and/or information. The aim should be to work together to develop a product or service that has a certain value. The interests of the stakeholders must be protected by attributing the value only after the product or service has been realised.

2. RESEARCH QUESTIONS

- How is a design process based on value creation developed?
- What are the stakeholders' interests?
- How can the various abstraction levels be linked together?
- What functions must be incorporated in the design process?
- What is process-oriented project management?

3. RESEARCH METHOD

3.1 SCOPE OF THE RESEARCH

The type of principal determines, for a large part, the nature of the design process. This research focused primarily on the design of a collaboration model in which the principal is the developing investor. This type of principal stands to gain the most from value creation, because it bears responsibility for the investment costs and the operating costs.

In this collaboration model the stakeholders represented in the project organisation make process agreements. The stakeholders are all the interested parties that exercise influence on the project organisation's decision-making in terms of contracting and organisation (internal organisation): principals, contractors, architects and other advisers.

3.2 STRUCTURE OF THE RESEARCH

The structure of the process collection is based on IDEF, model IDEFO. IDEF stands for Integration DEFinition for Function Modeling. The IDEFO method can be used to model complex existing and theoretical systems. For the purposes of this study, a theoretical system for designing a large-scale, complex project based on value creation was mapped out to sub-process level. In IDEFO diagrams, the process functions and the connections between them are indicated with blocks and arrows. The

blocks represent the process functions and the arrows symbolise information flows and/or objects.

The input and the output indicate what happens, the control shows why it happens and the mechanism how it happens (Boer, 1989). Figure 1 is an illustration of an IDEF0 building block. An IDEF0 diagram consists of several interconnected building blocks.

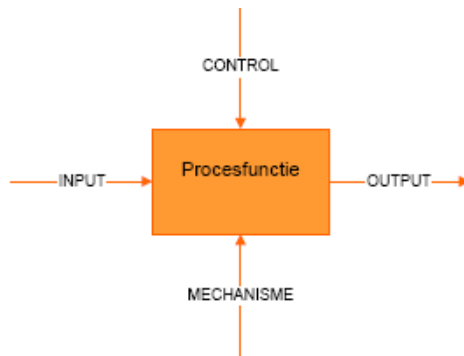


Figure 1 The building block of an IDEF0 diagram

4. THE RESULTS

4.1. DESIGN PROCESS BASED ON VALUE CREATION

In order to realise a design process based on value creation a new system must be modelled. This was done using IDEF0 (see figure 2).

Interests

- Objective-



Figure 2 The design process based on value creation

Input: the information originating from the initiative phase is translated into an objective, which is formulated by the stakeholders. The goal should be to develop a large-scale, complex project by means of a multidisciplinary approach.

Process function: designing a large-scale, complex project. The stakeholders pool their knowledge and/or information. The construction manager coordinates the process.

Output: the end result of the design process consists of a multidisciplinary design whose value is determined afterwards.

Control: the interests of the stakeholders 'control' the design process. They must be protected by allocating and distributing the value only after the project has been completed.

Mechanism: the process function is executed by the project stakeholders. In this effort, each stakeholder uses the services and resources of his/her own organisation.

4.2 STAKEHOLDERS' INTERESTS

It is not advisable for the parties involved in a complex partnership to make long-standing agreements with each other (Maas, 2005). You cannot be sure how other stakeholders, society and politics will change and develop over the course of time. The objective of a complex partnership is subject to internal and external influences and is therefore dynamic. A change of scope may conflict with the individual interests of one or more stakeholders. This is why stakeholders in complex partnerships often treat their information and information supply strategically.

It is important to steer the partnership on the basis of the individual interests of the stakeholders. People are, after all, motivated by interests. In a partnership in a complex organisation, the stakeholders must acknowledge and serve each others' interests. Dedication to the others' interests is imperative. Sometimes it is necessary to give before one can take. Protecting one another's interests is the basis of sound cooperation. If they know their interests are being protected, stakeholders will take an 'open' stance within the collaboration process (Dewulf, 2005).

In a complex partnership of stakeholders, individual interests must be discussed and specified in advance. As the collaboration proceeds, each stakeholder should be aware of these interests at all times. If these parameters are fostered continuously, the collaboration will succeed and win-win situations will ensue. The interests of stakeholders are twofold. They act in the interest of the company and in the interest of the project.

4.3 ABSTRACTION IN THE DESIGN PROCESS

Abstraction levels in the design process are necessary because it is impossible to maintain an overview of everything at a lower level. The abstraction levels reduce complexity by going into detail layer by layer.

4.3.1 *Abstractions / process functions*

Traditionally the design process is planned on basis of the documents produced by each of the many disciplines involved. Each discipline is then put to work separately. This makes it difficult to manage and understand the information flows. This method of plan development entails putting together pieces of a puzzle that have been produced independently of each other (Maas, 2004), which is an arduous if not impossible task to perform after the fact.

With large-scale, complex projects in particular, it is important to divide up the different disciplines among the defined abstractions. This generates concurrent process functions. A process function is a group of stakeholders that are jointly committed to the development of a specific function in the design.

4.3.2 *Design process abstraction levels*

A hierarchy of abstractions in the design process ensures that interests are considered level by level, preventing decision-making from being blocked or disrupted by more complex problem situations at a lower abstraction level. The concurrence of the abstraction levels makes anticipation possible for each abstraction. Despite its usefulness and broad applicability, the practice of breaking down complex situations into hierarchical abstractions is only understood subconsciously (Chee-Kiong, 1995). In order to understand process collection it is necessary to identify the abstraction levels at issue. This makes stakeholders aware of which abstraction level they are working at. According to Maas (2005) the design process comprises four levels of abstraction:

1. commercial development
2. aesthetical development
3. technical development
4. executional development

The information flows and multidisciplinary collaboration between these abstraction levels are iterative. The abstractions are closely interrelated. Abstractions in the design process are relationally represented in an

abstraction diagram. Figure 3 is a schematic representation of the mechanism of the abstraction diagram.

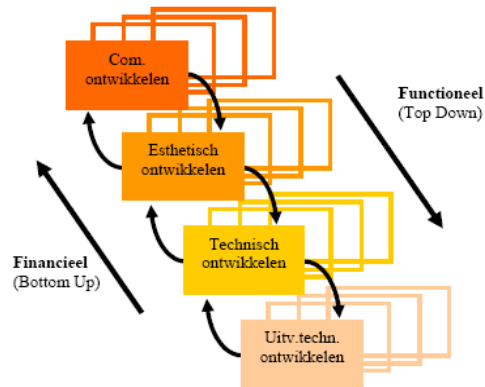


Figure 3 Schematic representation of an abstraction diagram

The steering to lower abstraction levels and the feedback to higher ones is clearly visible. The top-down movement is functional. Each layer provides the substantive input and control for the underlying layer. The essence of the top-down concept is that each abstraction level is positioned below the decision-making at a higher level and then bears responsibility for the transfer to a lower level. The feedback to a higher abstraction level is financial. The detailed elaboration at a given level must be assessed against the starting points of all the higher abstraction levels.

In principle, work occurs layer by layer in this model. When implementing a change in the design it is tempting to 'quickly' skip over an abstraction layer. Skipping a layer results in functional harmonisation problems (top down). In order to coordinate this process it is important to proceed punctually through all the abstraction levels from top to bottom. There is no need to work layer by layer in the bottom-up approach. From the bottom up, it is possible and even desirable to indicate which change is necessary at which abstraction level. In the process, it is important to safeguard the individual interests of the stakeholders (see figure 2: abstraction diagram). The speed at which the abstraction levels are handled can vary. This facilitates an iterative design process in which each party's interests are protected. A management team must coordinate movement through the abstraction levels and ensure that the stakeholders' interests are protected.

As regards value creation, the principal's development need (value) must be met. Anticipating delays in decision-making and changes in the design is an important element of this. The concurrence of the abstraction levels makes this possible for each layer.

The principal's development need can serve as the basis for the fee system. Clear agreements must be made in advance concerning how

value is measured and distributed. The main value elements for a developing investor are: the minimum return on the investment, the minimum residual value of the object and the maximum operating costs. For the fee system it is possible to use an allocation formula incorporating these 'hard' factors.

4.4 PROCESS FUNCTIONS IN THE DESIGN PROCESS

The hierarchy of the four abstraction levels is described in section 4.3.2. These four abstraction levels are the process functions in the design process. Within each process function, stakeholders are bound together functionally as a group. They are jointly responsible for the development of the process function. This creates an environment for multidisciplinary collaboration. The output of development is determined by the stakeholders' performance, and this performance – together with the created value – forms the basis for the fee system. The fee for a process function is determined afterwards.

The chronological order of the sub processes is given below by process function, assuming an ideal situation. Together the sub processes make up the process collection of the design process. Figure 4 shows the structure of the process collection in more detail.

4.4.1 Commercial development (A1)

This process function occupies the highest abstraction level. The input for this process is the objective set at the end of the initiative phase. The developing investor (principal) and the plan development department are the process owners.

Commercial development is comprised of the following sub processes:

- A11 - Project concept
- A12 – Acquiring a site
- A13 – Preparing to lease
- A14 – Selling the project to the end user
- A15 – Applying for funds with the lender

The sub processes are controlled by means of the financial framework: the task-based investment budget set in advance by the principal. Decision-making is incorporated into the functional, spatial schedule of requirements (control A2) and a strict budget (input A2). The end result of the process is an approved investment budget with which the execution contract can be awarded.

4.4.2 Aesthetic development (A2)

This process function is at the second highest abstraction level. The strict budget ensuing from the overlying process function is the input for this process. The process owners are the architects, urban planners, interior architects and the buildings aesthetics committee. The municipal buildings aesthetics committee has a special role to play. It is not bound to the process contractually, but actually does have an influence on the content.

Aesthetic development is comprised of the following sub processes:

- A21 – Describing the aesthetic principles
- A22 – Producing a draft design
- A23 – Producing a site design
- A24 – Producing a spatial design
- A25 – Producing a detailed impression of the design

The sub processes are controlled externally by the prevailing urban planning policy and internally by the functional, spatial schedule of requirements. Decision-making is incorporated into the technical schedule of requirements (control A3) and an architectural design (input A3). The end result of the process is a detailed design incorporating the aesthetic and functional qualities of the building.

4.4.3 Technical development (A3)

The technical development process function is the second lowest abstraction level. The architectural design produced by the overlying process function is the input of the process. All advisers not involved in the technical development are the owners of this process.

Technical development is comprised of the following sub processes:

- A31 – Describing the technical principles
- A32 – Researching the technical possibilities
- A33 – Producing a technical description
- A34 – Producing a technical design
- A35 – Engineering of architectural, mechanical and electrical systems

The sub processes are controlled externally by the Buildings Decree and internally by the technical schedule of requirements. The output generated by the process is the technical engineering (input A4) and the end result is a detailed engineering of the architectural, mechanical and electrical systems.

4.4.4 Executorial development (A4)

Executorial development is the lowest abstraction level. The input for the process is the technical engineering ensuing from the overlying process function. The general contractors, subcontractors and other contractors are the process owners.

Executorial development is comprised of the following sub processes:

- A41 – Examining the site-specific possibilities
- A42 – Producing a study of the building and execution methodologies
- A43 – Designing a workflow for the different disciplines
- A44 – Submitting permit applications and monitoring the approval procedures
- A45 – Preparing to execute the project

The limiting conditions imposed by the building site determine how this process is controlled. The end result of this process is an execution plan which serves as the basis for realising the project.

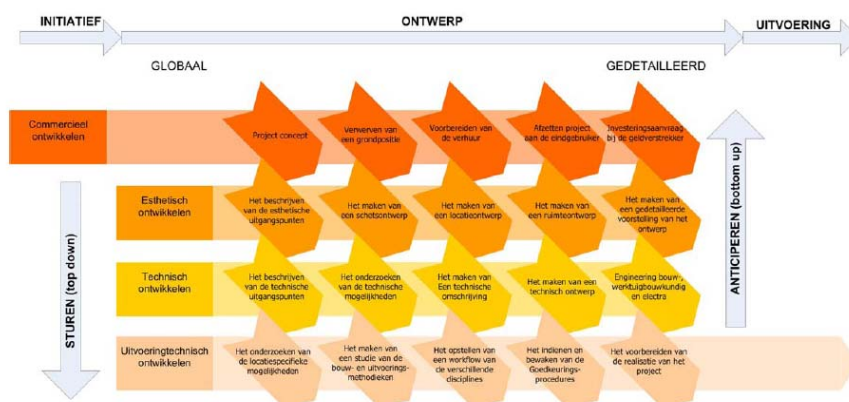


Figure 4 Process collection of the design process

4.5 PROCESS-ORIENTED PROJECT MANAGEMENT

A new kind of collaboration is needed to design large-scale, complex buildings on the basis of value creation. A collaboration model has been

developed based on the mechanism of the abstraction diagram (section 4.3.2) and the process functions in the design process (section 4.4).

The process functions in the design process are the process teams in the model. Within each process team, stakeholders are bound together functionally as a group and are jointly bound by contract to the principal. It is essential that there is a management team, so that the four process teams can be coordinated. As a result, the collaboration between the process teams and the management team can be viewed as a dynamic matrix. Figure 5 shows the functional lines and figure 6 the contractual lines of the collaboration model.

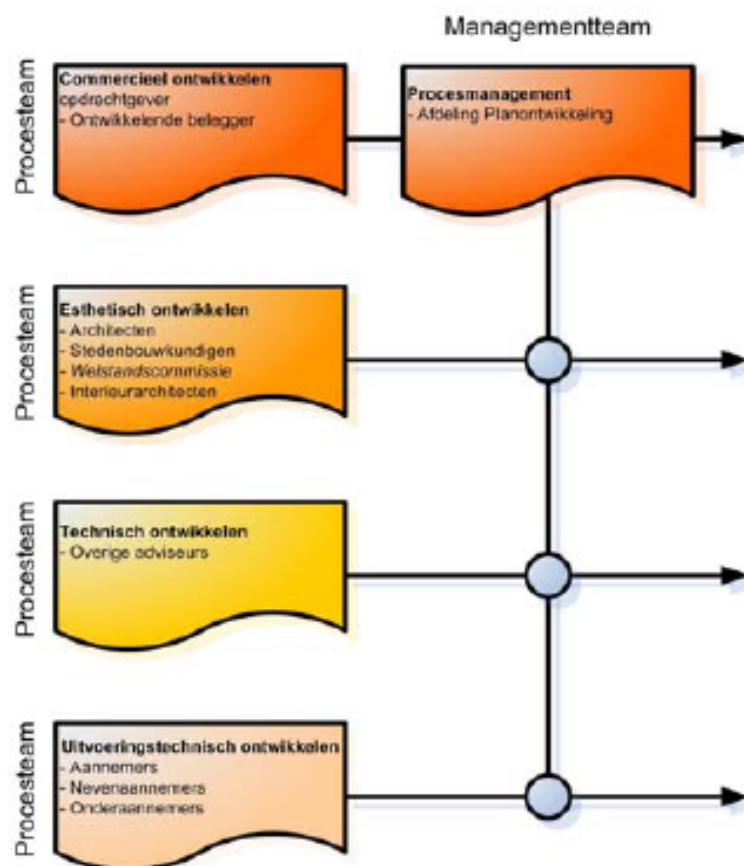


Figure 5 Functional lines of process-oriented collaboration model

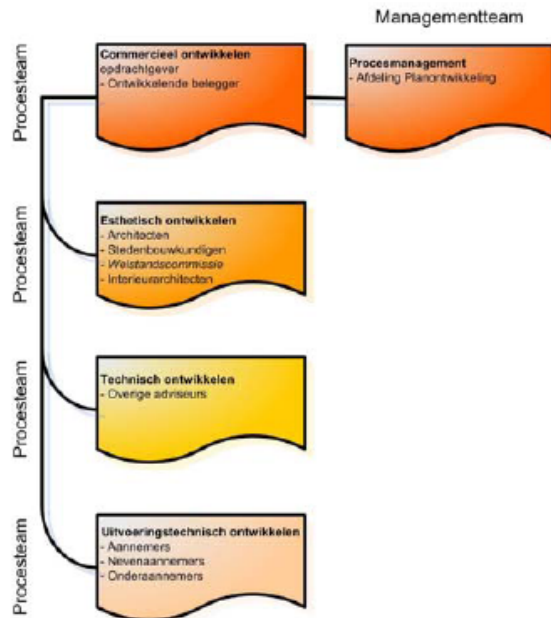


Figure 6 Contractual lines of process-oriented collaboration model

4.5.1 Process teams

Four process teams are represented in the model. Each one is involved in one of the following processes:

- commercial development
- aesthetical development
- technical development
- executional development

The stakeholders in a process team are bound together functionally by virtue of having entered into a single partnership with the principal on a contractual basis.

The stakeholders in the process team are motivated by their own interests. Their task is to create value. The fee system should be based on the value created, and agreements in this respect must be made in advance.

When a stakeholder delays or hinders the process this is referred to as value destruction. Obviously this is undesirable and timely action should be taken to remedy the situation. In such cases the stakeholder is held responsible for delaying the entire design process.

4.5.2 Management team

The management team is responsible for managing the design process, in accordance with the 'top down' and 'bottom up' approaches described in section 4.3.2. Value creation depends on the stakeholders' interests serving as a control. In the iterative design process the management team must be continually vigilant in protecting these interests.

The management team collaborates with the principal (developing investor) on a contract basis. For this purpose, a party must be brought in that has the knowledge and skills to steer the process. The team's involvement in the substance of the process is minimal.

The management team should preferably be staffed by a contractor-type organisation rather than an independent process-management firm. The communication and information lines starting from the lowest abstraction level (executorial development) will be shortest in the former case, which is beneficial to the bottom-up approach. In addition, a contractor-type organisation can provide guarantees for the execution. This result obligation gives the principal certainty at an early stage.

4.5.3 Advantages of process-oriented project teams

- The design process is geared fully towards creating value for the principal. Each of the process teams contributes a specific value, making it possible to apply a fee system based on the created value.
- The matrix structure offers opportunities for iteration in the design process.
- The hierarchy of abstractions makes it possible to consider the complexity of the collaboration is at each level. This prevents decision-making from being disrupted by complex problematic situations at a lower abstraction level.
- The concurrence of the abstraction levels makes anticipation possible at each abstraction level.
- Polarisation of the stakeholders is avoided. The stakeholders in the process teams exchange knowledge and information in a multidisciplinary fashion.
- The technical creativity of the process teams generates commercial opportunities.
- In the top-down and bottom-up approaches, the management team is responsible for protecting the individual interests of all the stakeholders. As a result, the stakeholders are motivated by their own interests.
- The process teams are involved from the start of the design process. Through concurrence, optimal use can be made of each stakeholders' expertise.

4.5.4 Disadvantages of process-oriented project teams

- The result of the design process can be determined in advance only in terms of minimal values.
- Clear agreements must be made during preparation. These agreements must be unambiguous and the preparation requires extra time and attention.
- The design process consists of process steps rather than phases. This makes it difficult to take stock of the situation in the interim.

5. CONCLUSIONS/RECOMMENDATIONS

- The abstraction levels in the design process are necessary because it is impossible to have an overview of everything at a lower level. The abstraction levels reduce complexity as the details are filled in at each layer.
- The management team is responsible for the functional (top down) and financial (bottom up) coordination between the process teams. This makes an iterative design process possible.
- Protecting individual interests is important for value creation.

Section 4.5 describes a collaboration model that facilitates a design process based on value creation. In this model the process teams and the management team are incorporated into a matrix structure. This collaboration model can be used as a starting point for making process agreements in advance (stakeholder performance and value distribution), making it possible to organise a design process in which an environment for value creation is created.

6. CONTRIBUTION TO DEVELOPMENT

It is difficult to transition from the customary style of process control to a value creation process. Success is possible only if all the stakeholders understand the meaning, usefulness and necessity of value creation. To achieve this, the current culture must change. Table 1 describes the type of culture needed.

Value creation

- Mutual exchange of value
- Bringing together knowledge and information
- Multidisciplinary (integration of stakeholders)
- Protection of individual interests
- Value creation
- Distribution of value afterwards
- Stakeholders motivated by individual interests

Table 1 Necessary culture for value creation

Every stakeholder involved in a design process based on value creation must be imbued with the culture necessary to carry it off. Clear agreements must be made about how the created value is to be distributed. A system for specifying created value needs to be developed. Once a system of this kind is in place, a design process based on value creation can be organised using the collaboration model described in section 4.5.

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