

Integrated Product and Process Modelling for Facility Management

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1. Abstract

The economic situation in many enterprises is becoming more and more difficult. To stay competitive all these enterprises need to increase the performance of buildings for greater productivity, health, and safety of occupants, to improve the reliability of facility operation and the level of occupant satisfaction with their work environment, and to decrease the cost and environmental impact of facility operation. The purpose of this article is to present an information system that will allow owners, operators and the public to gain benefits from substantially improved performance of their facilities. The Facility Management System will use advanced information technology to provide life cycle information for all relevant key processes. Existing organization structures, division of responsibility and computer support tools are only partially suitable to meet the new requirements. New ideas are required not only for business processes but also for computer-supported data processing tools. This article identifies and structures the business processes for the use phase of a constructed facility and it includes the different points of view necessary to define the requirements for a multifunctional information support [51,56].

2. Introduction

The exchange of information is an essential basis for the fulfillment of all tasks during the whole life cycle of a construction. In all these phases the mutual exchange of knowledge regarding conditions or changing realities from project and realization for use and demolition must be ensured. The following figure clearly shows the information in function of time with two curves during the entire life time of a construction. The first curve describes the actual state of the information today. The phases from "owner planning" to "completion" is marked by a greater quantity of redundant information. The main reason is a redundant data management from all participants involved in the construction process. Shortly before completion the available information quantity rises to a maximum. After that the curve sinks to a minimum essential information quantity for the initial organization[39].

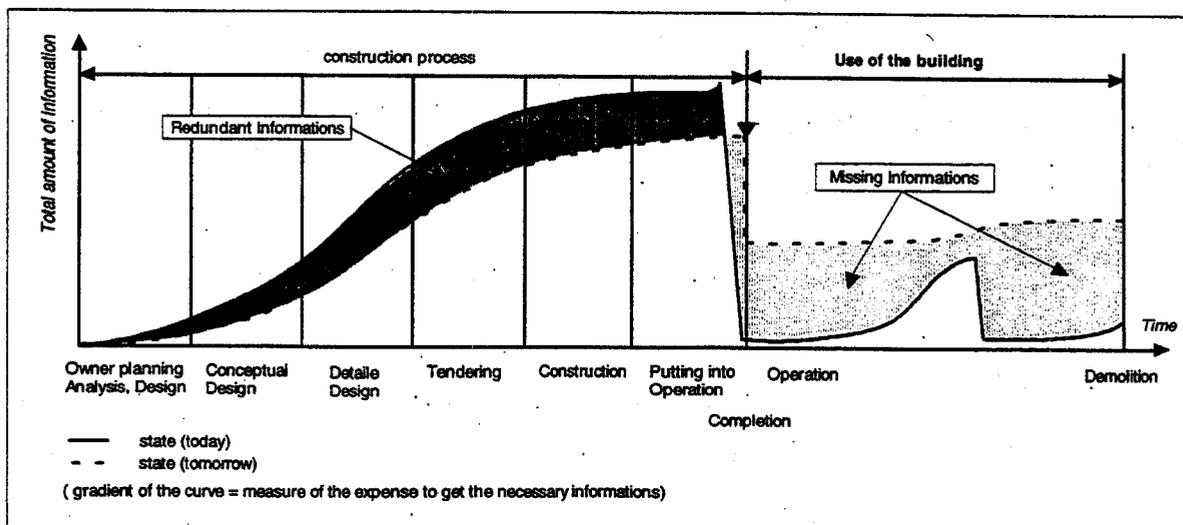


Fig. 1 Information about a building during the whole life cycle

The operator of a construction is usually unable to build a good basis for an efficient operation, even if the information gained during the planning and realization processes is well organized and specifically delivered to him. The data from the building process must be available for a possible reconstruction or a change of use of the object. It is costly to procure or to prepare them again, if this data is not easily available. After such tasks similar errors are often made as after the realization of the whole construction due to a lack of discipline in documentation, so that the newly gained information status cannot be preserved. In the "conclusion and commissioning" phases, the SHOULD-curve shows a quantitatively



smaller amount of information in contrast to the IS-curve due to the elimination of the redundant data. For the transformation into the use phase a level of necessary data which must be submitted is defined. For possible structural measures or use-related activities required for their optimum functioning the necessary data can be taken from this quantity since the required information status is preserved during the entire life time of the construction. Up till now a large part of the research was concentrated on planning, design and construction of structures. In these areas the research work made an essential contribution to the increase of the quality and yield of a construction. The use phase was often neglected. However, here also strengthened efforts in the area of information processing are necessary. It is not enough to consider the care of a construction as completed when it has been put into service. The information created during the construction process has to be maintained for the new status and must not be lost, since a possible loss can prevent an efficient running of the facility.

Procedure

A multitude of institutions with quite different interests is involved in the operation of construction facilities. According to this diversity there are also very different views concerning these problems. Many solution processes already fail due to a lack of understanding of the same problems. Therefore, in a first step it was tried with a broad approach to record and to structure possible processes during the use phase in a model. Thereby, the chosen procedure differs in some respect from conventional attempts, where as a rule a certain problem is focused and its solution is then compiled in detail. However, integration means in fact the contrary, which is the joining of individual elements to build a whole. The integrated consideration of the operation of construction objects, therefore, stands clearly in the foreground with the chosen attempt. During the investigation of the above mentioned processes it becomes obvious that a model for information processing must be very open and has to consider the dynamics of the system. In a second step such a model is presented and explained under different aspects. In conclusion an attempt is made to present a partial process and a part of the operation with the developed methodology, respectively, and the further procedure to an integrated system development as an example.

3. Management of Facilities

A construction facility is supposed to fulfill different purposes in its life time according to the goals of all the parties involved. This use of the facility, however, forms just one aspect of the integrated observation during the period when the facility is built and when it is demolished. In order to have a structure which can be optimally used within a desired period, it must also be maintained, developed and modified according to the changing realities, i.e. it must be taken care of. Finally, a facility should never be considered separately, because it is always embedded in an environment which must accept or integrate the facility. These three characteristic views reflect the interests of the major participants in the use phase of a construction facility.

Viewpoint of the owner: Care

Construction objects are major assets of an institution. This investment must be safe during the expected life time and must perform with the required efficiency. In the center of this viewpoint, which can be characterized as care, is the construction object with its structural parts. By the strategic planning process, as an important subprocess of care, a much longer period of use must be considered and long-term observations carried out in contrast to the construction phase. A further aim of care is to provide the optimal use of the construction object. This requires efficient operation. However, use can change over time, thus requiring structural and operational adaptations. The flexibility of the construction object regarding such changes of use is already heavily influenced during the creation process. The subsequent users and operators should be involved in the organization of the construction from the beginning. Adaptation for other uses during the operating phase may result in interferences in the structure which raises the costs significantly. Of course, it is unavoidable that certain construction objects are limited to a specific use. Finally, a lot of administrative work arises in relation to purchase, leasing, financing and documentation of an object.

The care of facilities requires to a great extent a long term observation of all the activities related to the development of the facility, since the phase of use, e.g. of construction objects, takes, in principle, several decades. Certain factors cannot be recognized or influenced in the short term and can only be observed in a long term view, i.e. in the future. To accommodate these factors strategies are established which do not define specific measures, but rather, they identify only fundamental methods of treatment which enable us to accomplish our goals.

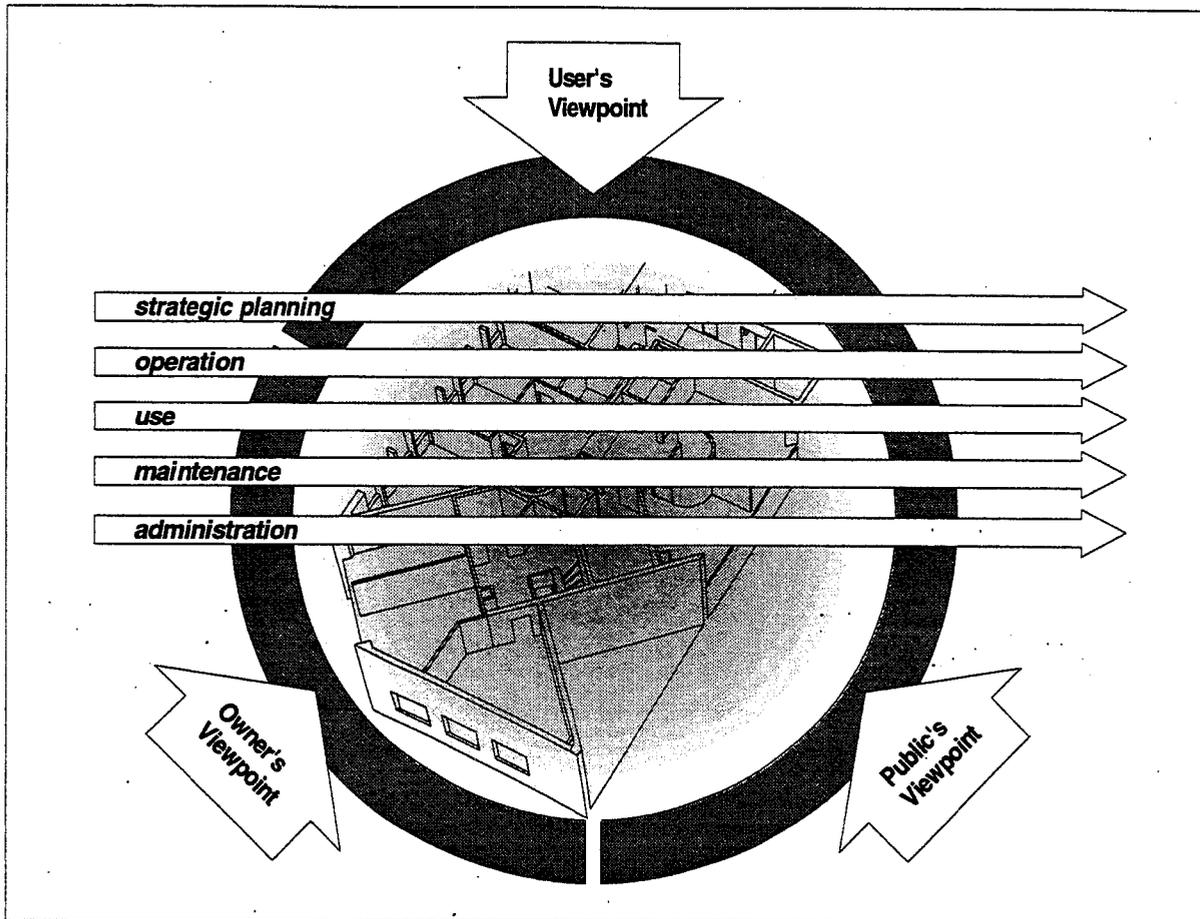


Fig. 2: Processes of Facility Management

The operation of the facility creates the necessary requirements for a smooth satisfaction of the objectives defined for the facility. In the operation here, the supply function dominates in comparison with the execution function. If the expression "operation" is used in connection with an object, then it is, in the first place, meant to be the acquirement and optimum use of resources, the disposal of waste materials and the minimisation of emissions considering specific needs of the supervisor, the user and the public. The expression "maintenance" refers to all the measures within the framework of facility care which ensure and develop the continued existence of the object and its value. Maintenance is divided into three areas of activity namely "supervision", "preservation" and "renovation". The activities of "administration" consist mainly of administrative tasks like financing of the facility, its buying, selling or leasing as well as bookkeeping in relation with the care of the facility.

Viewpoint of the user: Use

In general, use means to utilize something according to its purposes. The purpose of an object is basically determined by the type of use for which the object was conceived. Possible use categories can be found for example in German and Swiss Norms (living, teaching, education, research, industry, trade, technical facilities, etc.). From this classification, it can be seen that the use of an object can be very versatile and that, accordingly, the requirements imposed from the point of view of the user on the form and functionality of the facility can vary to a great extent. Since for the user, the facility is only a means to accomplish his goals, his most important aim is not to maintain the facility, but to be able to use the facility for his purposes in an optimal manner, i.e. he considers how he could use the facility for his purposes in the best possible way. As a result, he may have to modify the facility according to the specific use. Similar to strategic care planning, the future requirements of the facility must be formulated from the point of view of a specific use of the facility and the long term planning. For this purpose, the long term goals are formulated considering the economic, social and ecological developments in the environment of the facility. The strategic planning for use, furthermore, consists of the same areas of responsibility as the strategic planning for care. The difference with strategic planning for care, however, is that the solution of the problems should be performed considering the aspects of use and the organization participating in the use. It has been seen that it is desired to be able to change the ways of use in the course of time. This

requires that the creation and care of the facility is not just based on a specific use, but rather, they enable a certain degree of flexibility with regard to the use. For this reason, certain concepts have been followed in the last few years, e.g. in the area of industrial and trading facilities. Here, flexibility is ensured, e.g. by conceiving the structure in an open way where the parts of the construction which are heavily dependent on the use are connected to the load carrying structure in such a way that in the case of a possible change in use, the corresponding sections can be replaced with minimum expense. The maintenance and development of facilities which depend on use belongs to the central tasks of facility use. Some typical administrative works are realized in relation with the use of a facility. Among these are, e.g., describing in which way the facility can be used. Other tasks relevant to the administration of use consist of documenting the relationships of the user organization with the facility. This includes the data related to the facility for staff, contract and insurance .

Viewpoint of the public: Integration

Every facility must be integrated in its environment throughout its life time. All these tasks, which must be fulfilled by the members of the environment, can also be identified as integration. From the functional point of view, integration can be separated from care and use, because despite the fact that integration can largely influence care and use, its primary goal definitions are different. The primary goal in integration is to influence the facility or shape the environment in such a way that the facility can be embedded in the whole in a positive way. This includes the provision of the necessary infrastructure for the supply of the facility. The realization of any facility in our world means simultaneously its birth in the area of influence of a society in which certain rules of behavior exist. These rules manifest themselves as laws, regulations, standards and guidelines. The legislation and the imposition of regulations is dealt with differently according to the nature of the political state. Interests specific to facilities, however, can also be formulated by certain groups of the population, e.g. through interest groups, engineering societies and organizations. In principle, these groups have no political character but they can be taken into account in the form of standards or guidelines by the legal bodies. Other remarks in the form of recommendations or as technical publications only have the character of advice.

As a member of the community, the facility must be supplied with the vital means for its existence and also be released from its waste materials. For construction facilities, we speak about infrastructure, which, in technical terms, summarises the necessary economic and organizational means. It includes the supply of operational, communication and transportation means as well as the disposal of waste materials. The infrastructure of a facility can be very complex. If we consider, as an example a high technology building with all its supply, disposal and its communication systems, we realize that the technical requirements for such a construction and its environment are very high, because not only the building itself consists of high-quality structural components, but also the public networks for the infrastructure consist of such units. In the same way, as the technology changes inside of the facility, the means in its area of influence must be modified accordingly. This requires a development of existing structures in addition to the usual measures for maintenance .

Table of Terminology

Describing processes by using three characteristic aspects allows the recognition of typical activities for all areas as shown in the following definition matrix [46]. The strategic row is an essential factor, to keep track of the long-term planning. The operation row consists of the dynamic component and the maintenance row contains the value-preserving and value-increasing components. Finally, every aspect includes specific administrative activities. Recognizing this structure allows the representation of the management process as an orthogonal matrix.

Facility Management			
	Facility care (owner's viewpoint)	Facility use (user's viewpoint)	Facility integration with environment (public viewpoint)
Strategic planning	Strategic facility planning Define owner's long-term objectives for facility by considering facility status and condition along with external influences on the facility (social, ecological, technical, economic)	Strategic planning of use Define the user's long-term objectives for facility by considering user's activities and equipment and external influences on the facility	Definition of interests Define the public interest by considering facility influences on its environment and external influences on the facility
Facility operation and use	Facility operation Operate facility to meet user needs based on resource availability and economy of use (e.g. power, water, cooling)	Facility use Perform effective user activities consistent with user objectives and facility capabilities	Operation of utilities Operate utilities for effective resource supply and disposal to satisfy owner and user needs and public interest
Facility maintenance	Maintenance of building core objects Develop and assure acceptable functioning of building core objects (structure, systems)	Maintenance of user equipment Develop and assure acceptable functioning of user-dependent operating equipment and furnishings	Maintenance of utilities Develop and assure acceptable functioning of building utilities and services to satisfy owner and user needs and public interest
Facility administration	Facility administration Support and document object operation and use, including financing, contracting, insuring	Administration of use Allocate resources for facility management consistent with owner objectives and user needs	Operational compliance Comply with laws and regulations concerning facility operation and use

Fig. 3 Table of terminology

Construction Process

The special view of construction processes related to a facility is missing in the matrix shown. Nevertheless, construction is obviously regarded as an important process in the entire life time of a facility. In contrast to other assumptions, the construction process is investigated here as a repetitive process, which runs along similar lines to the creation process, but with other preconditions. According to the SIA [43] and from the constructional point of view, the entire life cycle of a construction facility is divided into the six major phases of strategic planning, preliminary studies, planning and design, realisation, use and demolition or in the ten sub-phases of strategic planning, preliminary studies, preliminary stage of project, construction stage, preparation for execution, execution, putting into operation, completion, use and demolition. There is an emphasis on the construction process in this model of the construction facility and, therefore, it is structured in greater detail. Strategic planning plays a central role in the entire life time of a construction facility. In particular, it determines during the phase of use whether demolition or maintenance measures [41] should be employed.

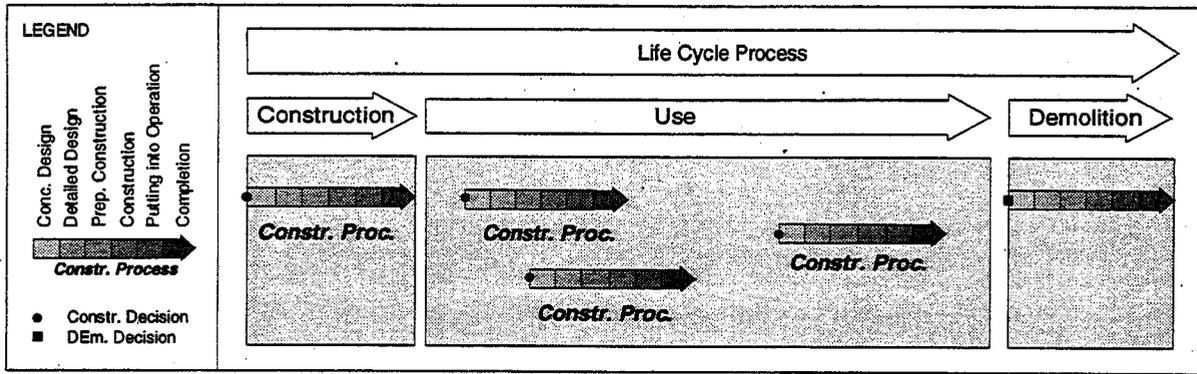


Fig. 4 Bauprozesse über alle Lebensphasen

3. Information Modelling

Exchange procedures in the form of materials, energy and information is possible among the elements of a system [44]. The investigation of the information relationships is the main issue in the information system which can also be viewed as the subsystem of the communication system. The major aspects which have to be investigated are concerned with the participating organization units, the analysis of the processes and the necessary product information for the processes [19].

Aspect of Products

Integrated observation of a machine-made product during its entire life cycle led to the idea of the product model [14]. The product model describes all information related to a product during its entire life cycle, especially during its use. The product is modified during this life cycle by the processes. The manner in which these changes take place is described under the aspect of the processes within the information system.

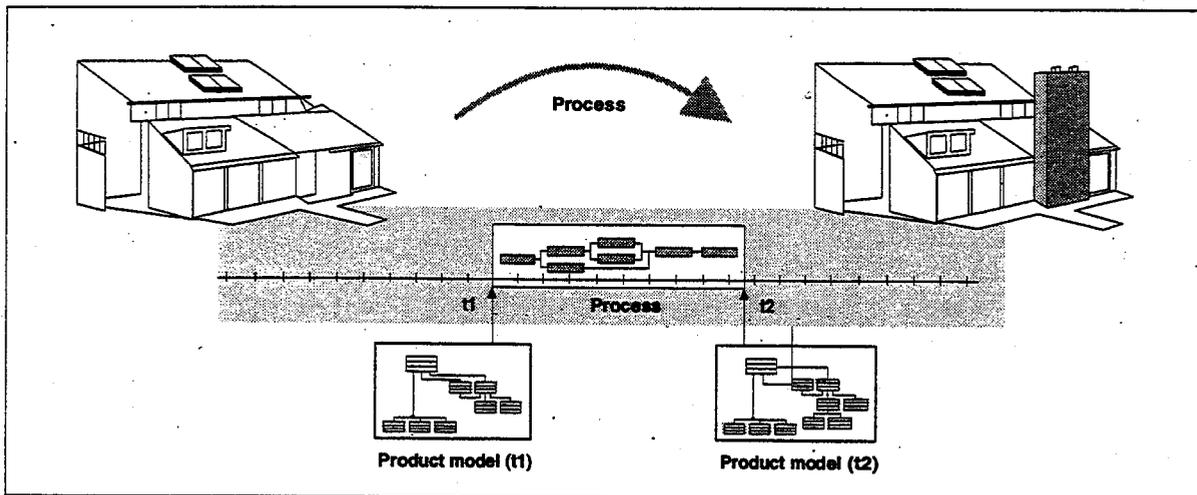


Figure 5: A process is a transformation function from one state of a product to another.

Experience from the computer-supported production of parts in the manufacturing industry is also very important for facility management. Manufacturing of parts cannot be directly compared with the products of facility management processes. But especially for modelling the building itself ideas concerning a product model are also useful for the description of the data in relation to its life cycle. Several research approaches are known in that area as well as standardization efforts (e.g. ISO 10303 "STEP") [22,23].

Provided that basic concepts of integration such as functional and phase integration are to be considered, then an object oriented model is necessary because the observation of product models on the basis of their application requires a combined observation of the data and methods [2, 24,25]. The entire object set for describing a product can be classified according to the object oriented model. It consists of both material as well as non-material objects. The material objects can be further subdivided into the visible and tangible physical and non-physical objects [54]. Every object which is necessary for the illustration of the product information must either be assigned to such a class or be instantiated from it.

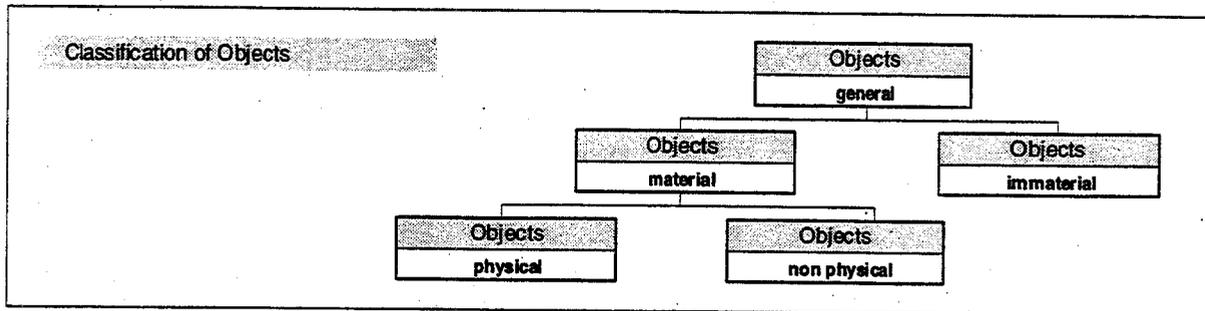


Fig. 6 Classification of Objects

The entire information content of a product model can be described by subsets, the so-called partial models, where each partial model comprises a *set of products with semantically similar characteristics* [20]. Product models for construction facilities must describe a facility for its entire life time, which covers the phases of creation, management and demolition. The aim in developing such product models is to describe all relevant functional aspects during the life time from different points of view. It is not the responsibility of this work to investigate the phases of creation and demolition of construction facilities, rather the emphasis is on carrying out the specifications of product models for the phase of use and the phase of management. The development of the product model for a construction facility must, therefore, take place in such a way that using the partial models of the product model, the product "construction facility" can be fully carried out from the point of view of care, use and integration. In the literature, different models can be found [31,32,34], in order to describe the creation of a construction facility as a product model with partial models. The creation of a construction facility, i.e. the actual construction process, however, is not the major issue for facility management, rather it is its maintenance, operation, administration, etc. The product model of the structure, therefore, must be extended towards the product models of the products of management processes. This will be demonstrated as a model for the maintenance process in the next section "Maintenance".

Classes, Attributes, Methods

The complete description of products related to a process is done according to the object oriented paradigm by classes describing the objects, the characteristic attributes and the behavior of encapsulation methods [30,37,42]. The latter are related to the product according to the principle of encapsulation and basically result by their execution in a change of the properties of the product. Consequently, in the product model, the description of classes, their relations, properties and methods of material and non-material system components follows the description of the product considered. In addition to the properties and methods mentioned above, the product model contains information about other properties like the function and status of their classes. Under a specific product model point of view, these perform a certain function and have different statuses within their life time. The status of a class instance is defined by the value of its object attribute, while the function of a class, as long as it deals with a persistent relationship, can be modelled, for example, by association. Non-persistent relationships are, for example, message passing among classes. A hierarchical system view will be explained in more detail in the next sections. Most OOA methods support the observation of a class structure as a hierarchy and corresponding concepts like total-partial-relationship, generalisation, specialisation and inheritance are available. On the other hand, easily understandable concepts for the methods are considerably lacking today. In the most OOA methods, the described methods do not have to correspond to the so-called elementary methods which can be further subdivided and executed. Similar to class hierarchy, it is usually inevitable for the process modelling to subdivide processes into subprocesses or to aggregate subprocesses into a whole process. This procedure can be basically accomplished by different criteria [40].

The object oriented organization of a method into submethods deals for the submethod with performances on the same object. The process oriented organization deals with performances on different objects and finally in functional oriented organization we have the same performances on different objects. The process oriented organization can also be viewed as a result of object oriented methods. The instance of such a class together with the method to be executed forms an elementary part of the process steps. Each non-elementary method of a class can further be refined by an object oriented and process oriented observation. In the process oriented view, the creation of more classes, to which the corresponding methods are assigned, will be necessary in principle in the design. The functional oriented division deals with a relationship which should be considered under the concept of inheritance because as with properties, methods can be inherited as well. The methods are described in the product model in a clear

manner up to the level of elementary methods based on the object oriented approach. During the process modelling, the methods specific to classes will then be related to the executable and controllable components of the organization model using the workflow. Which method of the product model will be eventually used, depends on the product and the degree of accuracy of the results required.

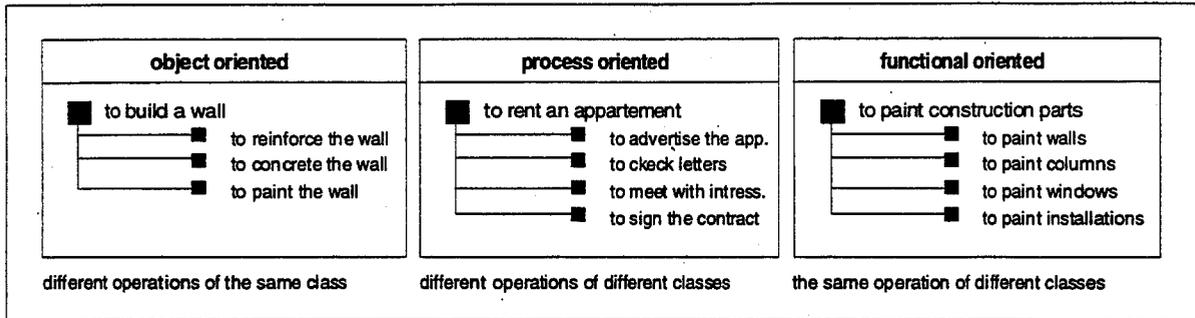


Fig. 7 examples for different organizations of methods

Aspect of Processes

The characteristic key processes of the construction management of facilities was described in detail in the section "Management of Facilities". The creation and the demolition process were deliberately ignored in view of well-known models. According to the chosen model, the processes correspond to transformation functions where the key processes do not deal with sequentially ordered subprocesses of the management process, but instead with a mainly parallel course of events. As a result, the processes are not only connected to one another by their chronological order but also specifically through common events! These can be, e.g. in the framework of a specific key process, the *decisions* made, which can also extend its influence on other processes or *states*, which are relevant to several processes. The modelling of processes, therefore, correponds to modelling the dynamic system behavior of object oriented systems. This includes, for example, the modelling of the process steps and the behavior in specific circumstances or by the coming true of predefined states as well as the examination of specific aspects from the organizational point of view. In this form, an object with an object oriented model can be understood as the *result of operations in a system of parallel active objects*. Here, the objects represent the persistent components of the system under consideration. Concepts for modelling the dynamic behavior are the steps and the behavior of the objects taking into account time and control aspects, like e.g. *states and events*. The process model will be investigated in the following sections under the aspects (behavior, steps, workflow) which are necessary for the description of the dynamic system behavior.

Behavior

Each class of the product model can be in different states in its life time and these states can change during a process. According to the object oriented model, the attributes of a class and therefore its states can only be changed by methods specific to classes. For every class with a nontrivial behavior, the methods relevant to state transitions throughout the life cycle of the class are identified and depicted in a *State-Event-Diagram*. The consistency of the diagram can be examined by controlling whether each state can be described by the class attributes and whether it can be changed only by the methods specific to the objects. The state diagrams specific to the classes are associated with one another by commonly used events and exhibit, in this way, the behavior of the whole system [40].

Process steps

The communication among instances of object classes consists of mutual calls of methods specific to classes and a hierarchy of communicating objects. This functional oriented view of the system is referred to as the *steps* and contains in addition to the description of the *possible message passing* (scenarios) among the objects, the specifications of the participating methods.

Workflow

The partial models of the process model, based on the object oriented analysis methods, have offered so far no possibilities to specify the relationships between processes and organizations. In order to fill this semantic gap, a workflow model is also introduced such that the assignment of organization units "directing" and "executing" to directing and executing objects as an additional dynamic system aspect can be modelled. The assignment of working units to organization units is dynamic and specific to the process. This view is also represented by M. Rusinkiewicz und A. Shet, who define workflow as "activities involving

the coordinated execution of multiple tasks performed by different processing entities". The definition used is similar to the one given previously and is based on the works of Georgakoupoulos, Hornick und Sheth: Workflow comprises a series of ordered, organized working steps necessary for the fulfillment of the goal of the process, which have clearly defined positions and means for their execution. This view of the workflow as the connection joint between the process element and the organization unit exceeds the usual view that workflow only corresponds to informative processes that can be automated [13,41]

Aspect of Organization

We distinguish between *human* and *machine* responsibilities in a socio-technological system. Human responsibilities are based on persons as members of the organization in that field of activity, whereas machine-based communication are based on computers. The computers, which are used extensively today for collection, transfer, processing, storage and application as electronic supports, belong, together with the software, to the resources of an organization. The project participants also need documentation for their work, which can be interpreted as data views on paper. The documents can also be viewed as an interface from the users to the data of the product model, since they represent the form and the collection for the data for an effective use.

PPO-Model

The consideration of the information system in the separate aspects of the processes [6,7,16], the products and the organizations is not based on their independence, but only helps in the *simplification* of the examination of a complex information system. The organization model, the product model and the process model are closely connected to each other. Together, they define the characteristic properties of an information system. The model described below is based on these submodels and is therefore referred to as the PPO-model [46].

Components of the Model

model	content	object oriented concepts
<input type="checkbox"/> product model	<i>description of the product on the basis of the data from different points of view for the entire life cycle of the product</i>	<i>object model</i>
classes	<i>definition of classes forming the structure</i>	<i>class diagrams with class identification, attributes, generalisation and specialisation relationships, aggregational relationships</i>
properties	<i>definition of the characteristic properties of a class</i>	<i>attributes specific to classes</i>
methods	<i>definition of the executable, encapsulated methods</i>	<i>methods specific to classes in class diagrams</i>
<input type="checkbox"/> process model	<i>description of the dynamic behavior by specifying the key processes</i>	<i>dynamic model</i>
steps	<i>definition of the process steps as a result of process chains controlled by events, specification of the activities</i>	<i>event path, event flow diagram</i>
behaviour	<i>behaviour of a class in its life cycle, synchronisation of its life cycle (connecting states and events through synchronisation)</i>	<i>life cycle diagram (state-event specific to classes), concepts of synchronisation (synchronisation of state-event diagrams specific to classes)</i>
<input type="checkbox"/> organization model	<i>description of executables and directives in the course of a process as well as their resources</i>	<i>object model</i>
positions	<i>description of positions as a component of the organization</i>	<i>modelling of positions and their relationships analogous to the concepts of the product model (classes, attributes, methods)</i>
function units	<i>description of function units as a component of the organization</i>	<i>modelling of function units and their relationships analogous to the concepts of the product model (classes, attributes, methods)</i>
materials	<i>description of materials as a component of the organization</i>	<i>modelling of materials and their relationships analogous to the concepts of the product model</i>

Fig. 9 Aspects of the PPO-Modell

Procedure of model development

The development of product, process and organization models is a part of the development of information systems and therefore also goes through the phases of planning, analysis, design and implementation. By developing object oriented technologies and the related concepts of object oriented analysis and design, it is much easier today to develop all models with the same methodology and to produce the relationships between the process, the product and the organization models throughout the entire life cycle with an object oriented view of the system. A principal assumption for the understanding and the application is the simplicity of the method since the development of such a system always proceeds in close collaboration with the participants, who are experts in a specific field and are seldom familiar with methods of information processing.

- Process definition
- Establishing Classes
- Establishing Attributes
- Establishing Methods
- Establishing Behavior
- Establishing Process steps
- Establishing Workflow
- Refinement

4. Maintenance

Aspect of the Processes

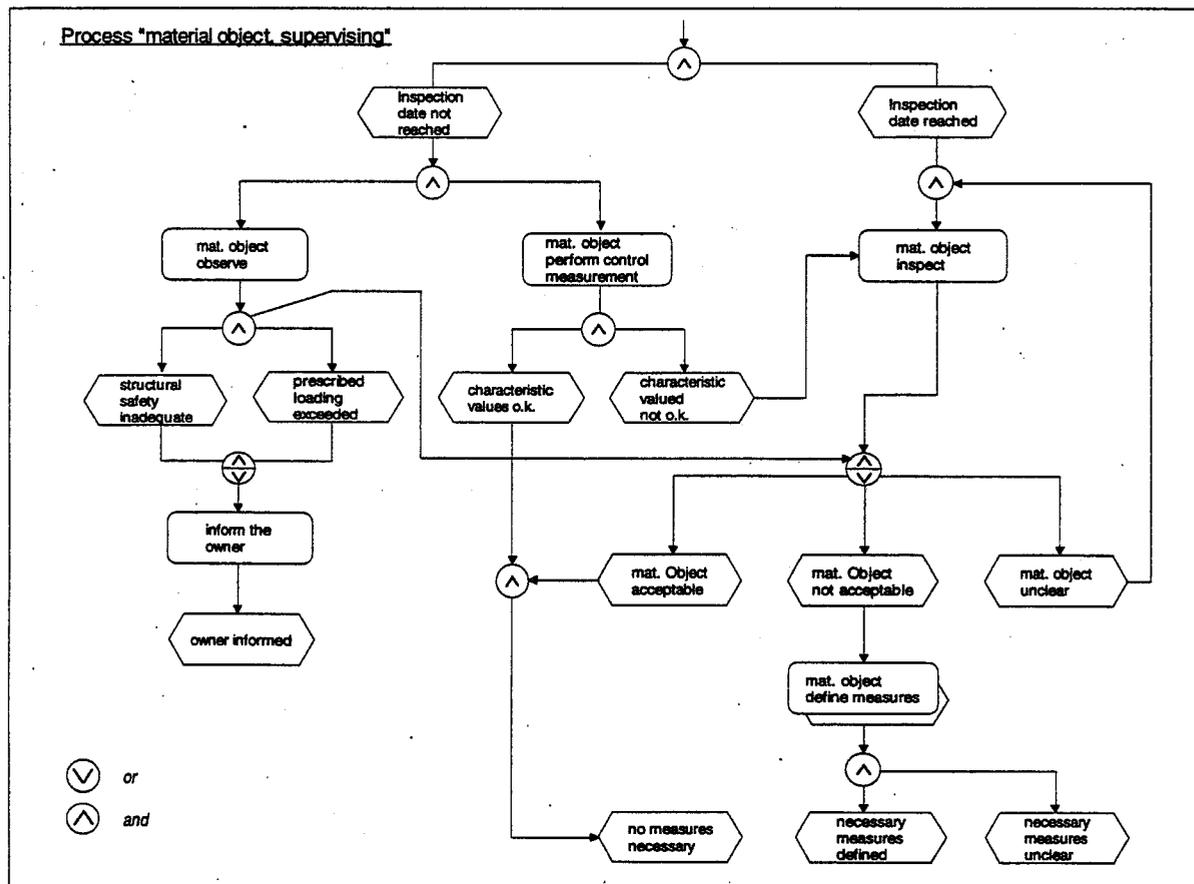


Fig. 9: Example Process "Supervising"

The definition of key processes for the management was valid for all types of construction objects. The further examinations are limited to the maintenance of the building. By definition, key processes belong to those procedures which are aimed at achieving the principal goals of those responsible for the process. The aims of the maintenance of the construction facility is to ensure their continued existence and value, where the expression "continued existence" refers to the continued existence of the material structure of the construction like e.g. the securing of their proper functioning. The necessary steps for process

analysis are influenced on the one hand by the execution of other tasks as well as by the social, economical, technical and ecological constraints. This results in a complex network of possible relationships, whereby it is not necessary to have mutual relationships between all the tasks. Wherever relationships exist, they are formulated as mutual requirements both on the processes as well as on their results (products). The requirements specific to the maintenance imposed on the building and its construction parts include the proper functional efficiency, durability, serviceability while the maintenance specific requirements imposed on the maintenance process and its subprocesses correspond to the categories of costs and dates. The figure above shows a sequence out of the process "maintenance".

Aspects of the products

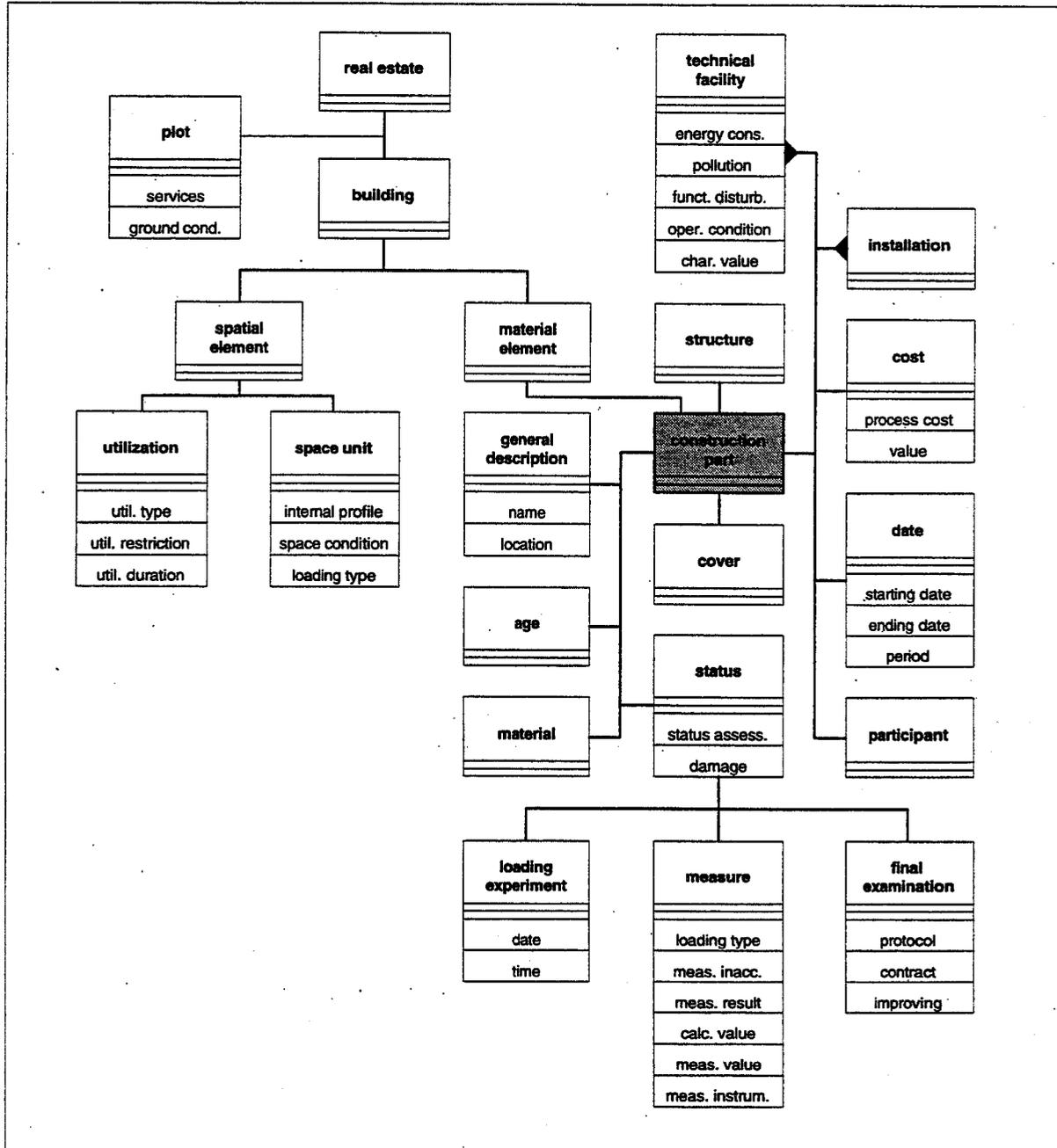


Fig. 10: Choice of properties of the class "construction part"

The classes relevant to the maintenance process are identified in the product model. These are described on the basis of their properties and methods where the *physical material objects* are the most important aspects for the maintenance project. The methods are formulated as independently as possible from the structure or structural part so that it is possible for them to be inherited in the product model. The inheritance is performed in a class structure which describes the building in which the classes are

connected to one another by their whole, their parts and the generalization and specialization relationships. *The generally acceptable organization of a building in its parts is an essential requirement not only for the general understanding, but especially for the encapsulation of the maintenance methods with the classes of construction parts.* Some endeavours are being carried out today for establishing such standards.

class "Physical, non-material Objects"

The organization of a building in parts is not only possible on the basis of the elements but also according to space criteria [48]. An organization on the basis of space, however, is less relevant for the maintenance than for other key processes of construction management.

Aspects of the organization

So far, the participating functional units and the documents arising in the process have been determined for the examination of organizational aspects. The required system support with the consideration of standards [35,36] is under development.

5. Conclusion

The key processes of facility management were recognized in structuring the use phase of an object under characteristic aspects. The matrix proved right and may be used for the definition of the specific processes of an institution whereby the recognition of the mutual dependencies is noticeably eased. It is supported by different specialists from institutions that are active in the area of facility management. They were involved in the creation of the definitions used in the matrix. It is important, that the use and integration of an object are no longer considered as frame conditions, but are integrated into the observations with the same weight, thereby allowing a better orientation to the customer and the public needs. The aim of further work is the analysis of the most important key processes and recognition of their mutual relationships. The informative resources should be defined with the help of the product model and structured with object oriented concepts.

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6. Literature

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