Assessing the Quality of Business Process Modelling Techniques

Bart-Jan Hommes
Delft University of Technology, Fac. ITS/ISSE, PO Box 356, 2600AJ Delft, The Netherlands.
email: hommes@is.twi.tudelft.nl

Victor van Reijswoud
Devote Institute of Technology, Devote nv, PO Box 73, 3980 CB Bunnik, The Netherlands
Email: vreijswoud@devote.nl

Abstract

The conceptual modelling of business processes is becoming popular. The number of techniques and tools is growing fast. At the same time, an appropriate framework for understanding the quality of these modelling techniques is lacking. In this paper we report upon the development of a framework for understanding the quality of business process modelling techniques, called the Q-ME framework. The framework defines the elements that constitute a modelling technique and presents a number of quality properties as well as ways to operationalise them. In this paper, the framework is applied to illustrate the quality of the Dynamic Essential Modelling of Organisations (DEMO) business modelling technique. Conclusions are drawn both on the quality of DEMO and on the application of the framework to study DEMO.

1. Introduction

The modelling of business processes is becoming increasingly popular. Both experts in the field of Information and Communication Technology (ICT) and in the field of Business Engineering have come to the conclusion that successful systems (re)engineering starts with a thorough understanding of the business processes of an organisation: a business process model. Conceptual modelling of business processes is deployed on a large scale to facilitate for instance Business Process Reengineering (BPR), ERP system implementation [6], [21], Total Quality Management and Workflow Automation [1].

The increasing popularity of business process modelling results in a rapid growing number of modelling techniques. This increase in techniques makes the process of selection and/or assembling a modelling technique (e.g. method engineering [12]) more and more complex and time-consuming. Indicative for the huge range of different tools and techniques is the overview of Kettinger [17]. An analysis of the Internet by the authors reveals approximately 350 business process modelling tools, all claiming to support 'effective', 'comprehensible', 'compact', 'suitable' etc. conceptual business modelling (see http://is.twi.tudelft.nl/~hommes/tools.html for this overview).

In fact, techniques are seldom tested on these claims, since there is no framework available for assessing the quality of techniques for conceptual business modelling. Existing frameworks for evaluating quality, focus on the quality of software- and information systems modelling techniques, rather than on business process modelling techniques. Apart from the fact that these frameworks do not have a business focus, there is criticism about the 'vagueness' of quality properties and the lack of operationalisation [18], [8].

The lack of appropriate means to assess (evaluate) the quality of this rapidly growing number of business modelling techniques, and the dominant role these techniques and tools can have in for instance Business Process Reengineering, ERP system implementation, Total Quality Management and Workflow Automation, justifies the development of a conceptual framework for understanding and evaluating the quality of these techniques.

This paper reports on the first steps in developing a Quality based Modelling Evaluation framework, called the Q-ME framework. The aim is to provide a set of well-defined quality properties and procedures to make an objective assessment of these properties possible. In section 2, a general framework for describing modelling techniques will be presented. As an extension of this framework, quality properties for business modelling techniques are identified in section 3. In section 4 the extended framework is illustrated by evaluating the quality of the DEMO business modelling technique. After this, conclusions are drawn and directions for further research are presented in section 5.

2. Modelling Business Processes

Although the usage of modelling techniques for understanding the information and business structure of organisations is increasing, the evaluation of these techniques is a poorly developed scientific field. Some high-level frameworks have been proposed for the description of the elements in an information systems development methodology [25], the evaluation and engineering of methods [12] and the application information systems methodologies in practice [15]. However, these approaches do not focus in detail on the modelling techniques used in a particular methodology. In this section we first introduce a general framework for describing modelling techniques. In section 2.2 the area of business modelling techniques is highlighted more specifically.

2.1. Framework

Based on the Method Theory as developed in [9] and the general description of elements in an information systems methodology as described in the Framework for Understanding [25], we propose a framework that allows the description and evaluation of modelling techniques. In line with [25], we identify a *way of modelling* and a *way of working* in a modelling technique. The Way of Modelling describes the models that are used in a technique (the products) and the Way of Working describes the procedures by which these models are constructed (the process). This division corresponds with the distinction between conceptual product method fragments and conceptual process method fragments as described in [12].

In the Way of Modelling we describe models by their constituting modelling concepts. The constituting modelling concepts are characterised by their notation and their meaning. We also describe the relationships between the different modelling concepts in one model and the notation of this relationship. The individual models are described by their mutual relationships as well as by their goals or purposes.

The Way of Working of a modelling technique is described as a related set of activities together constituting the modelling procedure. Within the framework the procedure is specified at the model level. A complete overview of the way of working is achieved with the description of the mutual relationships between the procedures. Together the Way of Working and the Way of Modelling represent the perspective of the modelling technique. The framework for evaluation is depicted in figure 1.

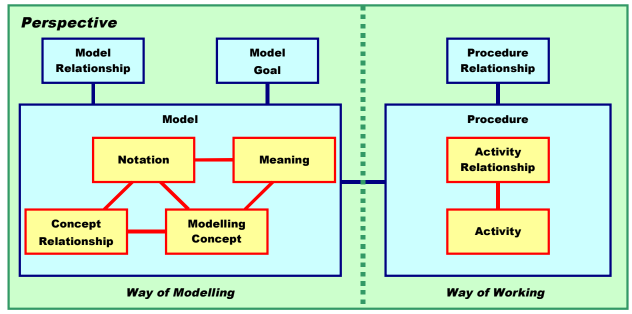


Figure 1: Framework for evaluation

For a detailed description of the four elements that constitute an individual model, we introduce a *modelling concept table*. In this table, each modelling concept is described together with its meaning and notation. The last column of the table describes the concept relationship by means of a meta model. The modelling language used to construct these meta models is similar to the ORM modelling language. Other modelling languages, such as the ER model [3] and the Object Model [24] may also be used for meta modelling. A comprehensive overview of ORM (Object Role Modelling) can be found in [10]. As an example, the modelling concept table of a simple flowchart diagram is shown below.

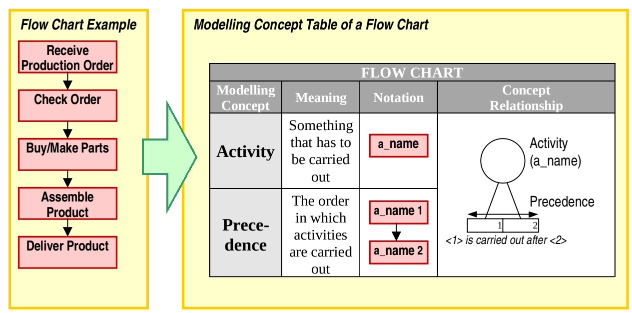


Figure 2: Simple Example of a Modelling Concept Table

A detailed description of the three elements that constitute the way of modelling is achieved by means of a *model table*. This table is drawn in the same fashion as the modelling concept table. It contains two columns specifying the models and their goals. The last column describes the model relationship by means of a meta model. The model table will be illustrated when DEMO is described in section 4.

2.2. Modelling Business Processes

The interrelated set of modelling concepts that constitute the way of modelling represents an application domain. In the case of business processes modelling, this application domain is the business process. This section is a reflection of the existing consensus about what 'business processes' are and thus to what application domain the modelling concepts of the technique should correspond.

In the literature, a 'business process' is commonly defined as a chain of organisational or inter-organisational activities that are necessary to accomplish a product or service. Examples of this definition are "an ordering of work activities across time and place, with a beginning, an end, and clearly identified inputs and outputs" [5] or "A set of activities that, taken together, produce a result of value to a customer" [11]. We will refer to these definitions as definitions of a 'process' in general. The term 'business process' is reserved for a more specific class of processes.

Founded in [26] and [19] we classify processes according to the nature of the activities that are carried out. If the nature of the activities is physical, such as assembling a product, then we speak of a *materiel process*. If their nature is about processing information, such as calculating the price of a product, then we speak of an *information process*. If the nature is about doing something with information, such as making a commitment a supplier to pay for a product, then the corresponding process is called a *business process*.

Often 'core' and 'supportive' business processes are distinguished. A core (or primary) process is initiated from outside an organisation, e.g. the chain of activities that realises the delivery of a product to a customer. A supportive (or secondary) process creates the conditions for the primary process to be carried out [20] e.g. human resource management.

A business modelling technique should provide means to describe the dynamic aspects of the functioning of an organisation as well as the static characteristics of the information space on which the dynamic aspects build. Also the distinction between organisation and environment should be modelled, in order to distinguish between core and supportive processes.

3. The Quality of Business Process Modelling Techniques

This section addresses the quality of business process modelling methods. After a general definition of quality is given, quality properties specific to (business) modelling will be assigned to methods (section 3.1). Some attention to the operationalisation of these properties is paid in section 3.2.

3.1. Quality Properties of a Business Modelling Technique

Quality has been defined in many ways, ranging from extremes as 'conformance to requirements' [4] to 'fitness for use' [16]. The International Standards Organisation (ISO) has done an effort to unite the different views on quality in a general definition stating that quality is "the total of properties and characteristics of a product or service that are relevant for satisfying specific requirements and obvious necessities". This definition is taken as a starting point for a refinement of the definition of quality. Since there is little difference between the meaning of the term 'property' and 'characteristic', we will not distinguish between them and use the term 'property' in the remainder of this paper. The 'product or service' under consideration is the business modelling technique.

A common way to understand the quality of something is to subdivide quality in a number of quality properties that each address a particular aspect of quality. The evaluation of software quality by Boehm [2] is an example of this approach. Boehm decomposes high level quality properties into lower level properties, resulting in a 'tree of quality properties'. This approach is adopted in this paper.

Three quality properties that provide a good basis for the evaluation of modelling techniques are the properties particular to meta models of modelling languages as presented in the FRISCO report as formulated by the IFIP8.1 Working Group [7]. According to the FRISCO report, the following quality properties are important:

- *Expressiveness* - the degree to which a given modelling technique is capable of denoting the models of any number and kinds of application domains;
- *Arbitrariness* - the degree of freedom one has when modelling one and the same domain;
- *Suitability* - the degree to which a given modelling technique is specifically tailored for a specific kind of application domain.

The first two properties, viz. expressiveness and arbitrariness, are properties that are applicable for any modelling technique, regardless of the domain that is modelled. The latter one, viz. suitability, is a property that is specific for the business process domain. Suitability for this business process domain is referred to as 'business suitability' [1].

Both expressiveness and (business) suitability are quality properties of the way of modelling in particular.

The properties are not orthogonal, they influence each other in such a way that an optimum has to be found [7]. A modelling technique that is highly expressive contains modelling concepts that are generally applicable. Therefore, it has low business suitability. On the other hand, a modelling technique that is highly suitable for business modelling contains concepts that are specific for the business domain. Therefore its expressiveness is low.

Arbitrariness is a property of the way of working in particular. Low arbitrariness limits the degree of freedom one has while modelling a domain. A low degree of freedom during the modelling process results in a way of working with results that are reproducible.

Due to the fact that the three properties that were mentioned above specifically address the meta model of the modelling language, their contribution to the overall quality of a modelling technique is restricted to the *modelling concept*, *meaning* and *concept relationship* elements of the framework. In order to cover all the elements that constitute a technique, other properties are necessary. Other properties that are proposed in literature (e.g. [1], [12]) are:

- *Comprehensibility* - the ease with which the way of working and way of modelling are understood by the participants;
- *Coherence* - the degree to which the individual sub models of a way of modelling constitute a whole;
- *Completeness* - the degree to which all necessary concepts of the application domain are represented in the way of modelling;
- *Efficiency* - the degree to which the modelling process utilises resources such as time and people;
- *Effectiveness* - the degree to which the modelling process achieves its goal.

The properties are summarised in figure 3. First of all, product quality and process quality are distinguished. They refer to the quality of respectively the way of modelling and the way of working of a modelling technique. For each property, its area of application and the knowledge that is required to study the property is presented. The figure is a reflection of the informal introduction of the properties in the previous paragraphs, combined with the framework for modelling techniques as presented in section 2.

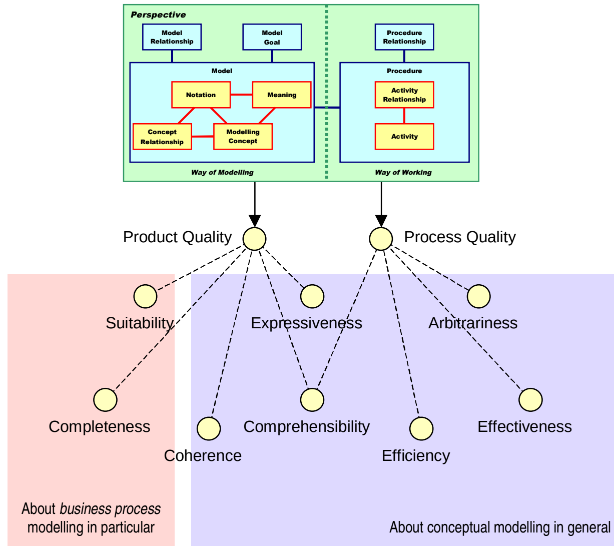


Figure 3: The Quality of a Business Modelling Technique

3.2. Measuring the Quality Properties

In this section we discuss the operationalisation of the quality properties that were presented in the previous section. We will discuss how the quality properties relate to the elements of the framework that was introduced in section 2.1 and how the proposed *modelling concept table* and *model table* contribute as means for the measurement of the quality properties.

Suitability, Completeness

The operationalisation of the properties that have a business focus, viz. suitability and completeness, comprehends a comparison between the modelling concepts of the technique that is evaluated and the consensus that there is about the concepts that should comprise the business domain, as was discussed in section 2.2. As such, the elements *modelling concept* and *meaning* of the framework provide the clothes rack for doing this. This shows for instance that the flow chart example of figure 2 is *suitable*, since it is able to express a process as activities and some form of interrelation between them. It is however *incomplete*, since it lacks the appropriate concepts for distinguishing between core and supportive processes, materiel-, information- and business processes, etc.

Coherence

The two elements in the framework that provide a basis for the operationalisation of the coherence property are the elements that refer to the structure of the way of modelling, viz. the *concept relationship* and the *model relationship* elements. The concept relationship is described by means of a meta model in the last column of the modelling concept table. A model is coherent when there are no isolated parts in its meta model. The overall coherence of a way of modelling is described by a meta model that combines the meta models of the individual models. The way of modelling is coherent when this overall meta model does not contain isolated parts. Furthermore, a meta model of the way of modelling is the basis for an understanding of how the individual models constitute a coherent whole.

Expressiveness

Expressiveness is the degree to which a modelling technique is capable of modelling any number and kinds of application domains. The specificity / generality of the *meaning* of *modelling concepts* is an indication for the level of expressiveness. In literature, meta model transformations are mentioned as a measure for expressiveness [7]. When there is a mapping from a meta model of a technique A to the meta model of a technique B without loss of meaning, it can be derived that B is at least as expressive as A. Furthermore, the ability of a technique to describe its own concepts is an indication for high expressive power.

Comprehensibility

The elements *meaning*, *notation* and *modelling concept* provide a useful 'triangle' for an operationalisation of the comprehensibility property of a modelling technique. Consistency between the notation-meaning and meaning-modelling concept relations is a measure for comprehensibility. The flow chart example is comprehensible in that sense. The notation-meaning relation of the 'flow' concept is consistent because an arrow is a perfect means for sequencing activities. It is obvious that omitting the arrowhead from the arrow notation would make the model very incomprehensible.

Another way of operationalising comprehensibility is to consider the amount of different modelling concepts per model. The lower the number of modelling concepts, the easier the model is to comprehend. This also holds for the deviation in the number of concepts per model.

Arbitrariness

The degree of freedom one has when modelling one and the same domain using a technique is reflected in the arbitrariness property. When there is only one way of modelling a domain using a technique, the technique is said to be *deterministic* or has zero arbitrariness. Arbitrariness is introduced in a technique when there are different modelling concepts or structures of modelling concepts in a technique that have a same meaning. If this is the case, different models can model the same domain and freedom is introduced. The *meaning*, *modelling concept* and *concept relationship* need to be evaluated to determine the arbitrariness of a technique.

Effectiveness, Efficiency

Effectiveness on the level of a single model is the extent to which the goal of that model is achieved by means of the interrelated set of activities that constitute the procedure for that model. It is clear that the elements *model goal*, *activity* and *activity relationship* of the framework need to be evaluated in order to operationalise the effectiveness of a technique. Evaluation of the effectiveness of the whole technique also requires an assessment of the *procedure relationship* and *model relationship*. In order to evaluate the efficiency of a technique, the use of resources by activities must be described. One of the major contributors towards modelling efficiency is automated support. For instance, the degree to which a technique is properly supported by (automated) tools is a measure for its efficiency.

In this paper, no attention is paid to the evaluation of effectiveness and efficiency of a technique. This is due to the fact that not much is known yet about how to evaluate the framework elements that refer to the way of working of the technique. This is not problematic for the evaluation of DEMO in the next section. Since it is a modelling language, the emphasis is on the way of modelling rather than the way of working. The relationship between the properties and the required framework elements for evaluation is given in the figure below.

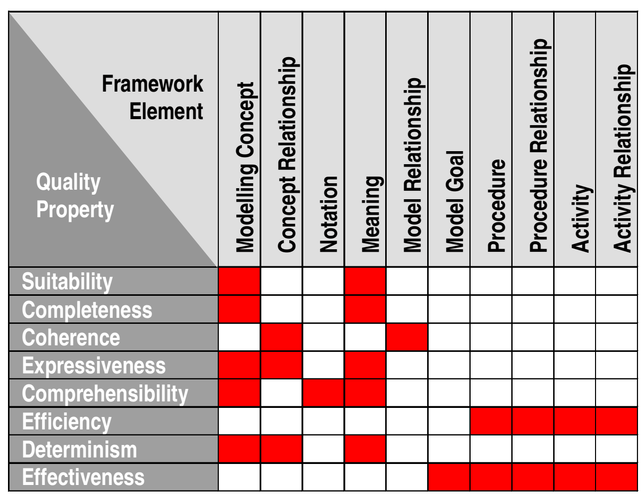


Figure 4: Relationship between properties and elements

3.3. Application of the framework

The proposed framework is intended to aid consultants and method engineers with the evaluation of the quality of techniques. This aids for instance the selection, assembling or improvement of techniques as well as comparisons between techniques. In this paper, the framework is applied to evaluate the quality of the DEMO modelling technique. In [14], the Q-Me framework has been applied to evaluate the quality of the Unified Modelling Language (UML).

4. The Quality of the DEMO modelling technique

In this section, the Q-ME framework is applied to the DEMO method, a communicative action based business process modelling technique. The DEMO method constitutes a cross-disciplinary theory describing and explaining the communicational dynamics of organisations, and of a modelling facility based on this theory. A description of the principle ideas of DEMO can be found in [22] and [23].

The core concepts of DEMO are the levels of abstraction and the business transaction. In order to analyse the business processes of an organisation, DEMO distinguishes three levels of activity. The business process level is called the essential level. At this level the organisation is conceived as a system of authorised and responsible actors that co-ordinate business activities by means of communication. It is only at this level that original information is created. In DEMO the business process level is realised at the so-called informational and documental levels. For the current purpose these levels are not considered.

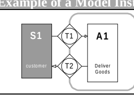
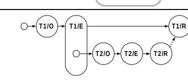
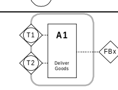
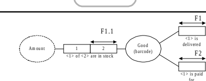
The business transaction is the second core concept of DEMO. A business transaction is the pattern of activity by which the business processes are initiated, executed and co-ordinated. A transaction is composed of three phases: the Order phase; in which two actors come to an agreement about the execution of some future action; the Execution phase; in which the negotiated action is executed; and the Result phase; in which the actors negotiate an agreement about the result brought about in the execution phase. The successful execution of a transaction in the world of communication results in a change in the world of facts in which the actors exist. The transaction involves two actors: the Initiator and the Executor. It is important to note that in DEMO actors are roles in an organisation and not people.

On the basis of these core concepts a modelling facility is developed consisting of four interrelated aspect models. In the next section we will describe and analyse some of these models in detail using the Q-ME framework.

4.1. DEMO put into the Framework

The model cycle of the DEMO modelling technique consists of a number of sub-models. Each of them focussing on an aspect of the business domain that is modelled. To give an overview of these models, we present the *model* and *model goal* elements of the framework by means of a model table (table 1). This table describes the four aspect models of DEMO and their goals. An additional column is added to show examples of the models.

Table 1: Model table of DEMO

WAY OF MODELLING		
Model	**Model Goal**	**Example of a Model Instance**
Interaction	to model the performative communication between of the actors in a business system and its environment by means the transactions	
Process	to model the business process by means of a structure of transactions phases showing the causal and conditional relationships between them	
Interstriction	to model the information that has to be available by means of inspection links between actors and information banks	
Fact	to model the universe of discourse by means of the a structure of fact types that correspond to the results of transactions	

The framework elements that constitute a model, viz. *modelling concept*, *notation*, *meaning* and *concept relationship* are set out in detail by means of modelling concept tables. In this paper we delimit ourselves to the interaction- and the process model. In practise, these models are most often used for modelling and analysing business processes. The modelling concept tables are shown in table 2 and 3.

The description of the *model relationship* element of the evaluation framework encompasses the integration of the individual meta models as presented in the concept relationship column of the modelling concept tables (table 2 and 3). This integration results in an overall meta model which is presented in figure 5. The dotted ellipses in this diagram are an extension to the ORM notation as described by [10]. They can be compared to what is referred to as a 'schema type' in [13]. They group the modelling concepts that belong to one single sub model.

Table 2: Modelling Concept Table of the DEMO Interaction Model

INTERACTION MODEL			
Modelling Concept	**Meaning**	**Notation**	**Concept Relationship**
Composite Actor	system of interrelated actors and transaction types	A B Sx description	(see diagram below)
Elementary Actor	system element co-ordinating or executing transactions	Ax description	
Transaction Type	coherent pattern of communication and action in a business process	Tx	
Composite Executor	(composite) actor executing a transaction type	Tx → Sx description	
Elementary Executor	(composite) actor executing a transaction type	Tx → Ax description	
Initiator	(composite) actor initiating a transaction type	A Ax description — Tx B Sx description — Tx	
Composition	internal structure of a composite actor	Ax Ax Ax	

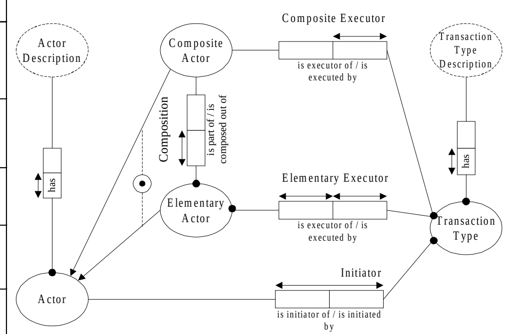
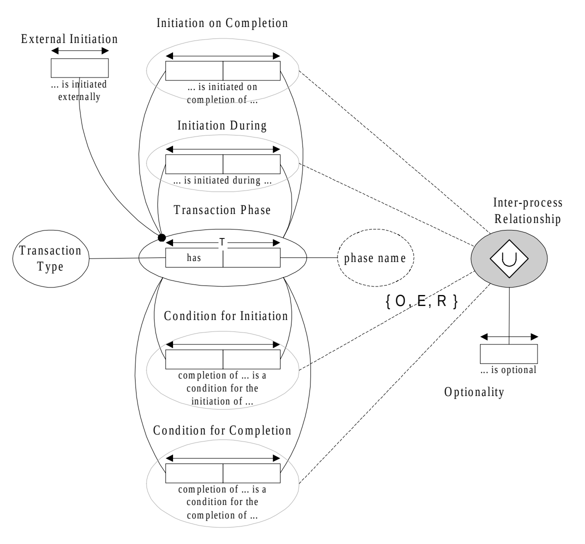


Table 3: Modelling Concept Table of the DEMO Process Model

PROCESS MODEL			
Modelling Concept	**Meaning**	**Notation**	**Concept Relationship**
Transaction Type	[same as before]	Tx/O → Tx/E → Tx/R	(see diagram below)
Transaction Phase	communication part (O,R) or execution part (E) of a transaction type	Tx/P	
External Initiation	initiation of a transaction type by a composite actor	○→ Tx/P	
Initiation on Completion	start of Tx/P is caused by the completion of Ty/P	Ty/P → Tx/P	
Initiation During	Tx/P is initiated during the Ty/P phase	Ty/P ○→ Tx/P	
Condition for Initiation	The completion of Tx/P is a condition for the initiation of Tz/P	Tx/P - - → Ty/P ○→ Tx/P	
Condition for Completion	The completion of Tx/P is a condtion for the completion of Ty/P	Tx/P - - → Ty/P	
Optionality	condtional or causal relationship that is not obligatory	A —+—→ B - - + - - - →	



N.B. Transaction Type: Transaction type has no notation in the process model. It is represented by means of its O,E and R phase. **N.B. Transaction Phase**: The 'x' in 'Tx/P' denotes the transaction type number (t_nr), the 'P' in 'Tx/P' denotes the phase ({O,E,R}). **N.B. Initiation on Completion, Initiation During, Condition for Initiation, Condition for Completion**: 'Tx/P' refers to the first role of the fact type in the concept relationship schema, 'Ty/P' refers to the second role. **N.B. Interprocess relationship**: Notation see the modelling concepts that belong to the union of it. **N.B. Optionality**: Notation A when for the concept of initiation, Notation B for the concept of condition.

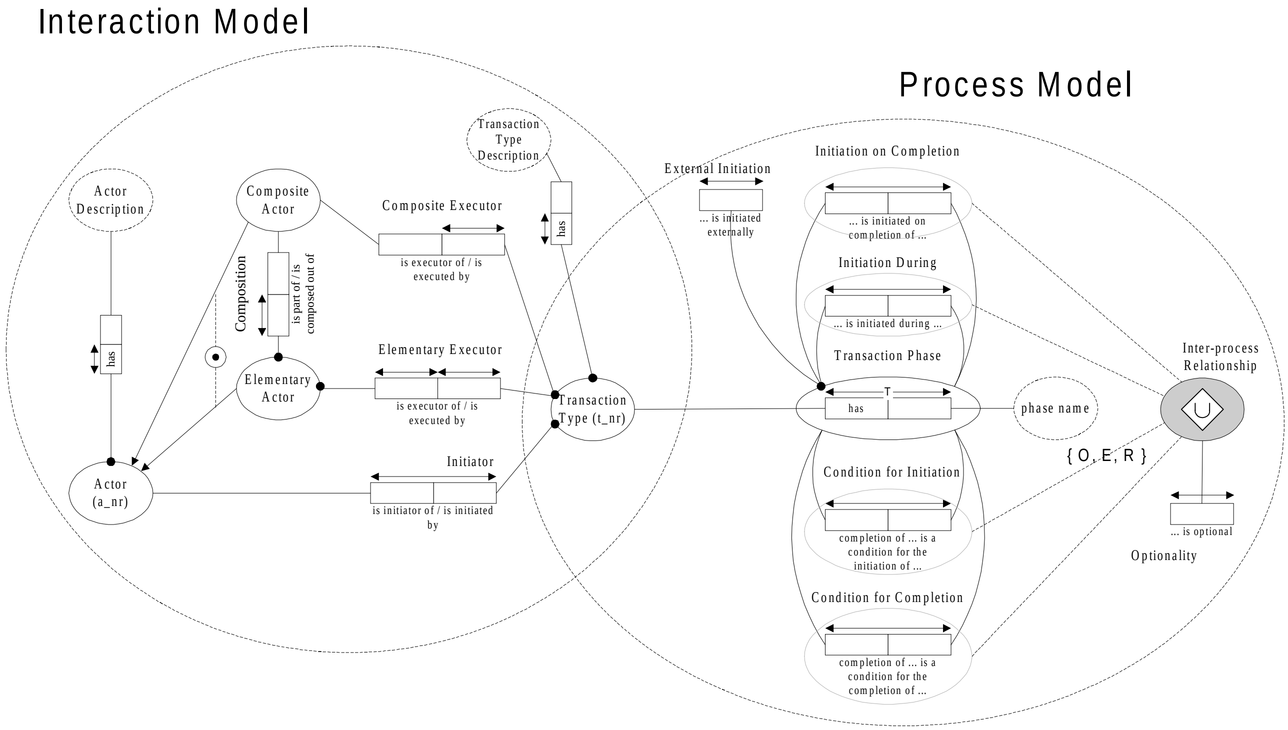


Figure 5: Model Relationship

The overall meta model shows the model relation between interaction- and process model. The 'linking pin' between interaction- and process model is the 'transaction type' modelling concept. The interaction model models the executing and initiating actors of each transaction type whereas the process model models the causal and condition relationships between the order-, execution- and result phases of each transaction type.

4.2. Conclusions on the Quality of DEMO

In this section, conclusions with respect to the quality of DEMO are drawn. In order to do so we will review the quality properties that were mentioned in section 3.2. For each property, the conclusions are underpinned by the evaluation of the framework elements.

Suitability, Completeness

With regard to the definition of a business process that was postulated in section 2.2, it can be concluded that especially the DEMO business process model provides a way of modelling of the activities that must be carried out in order to carry out a business process and their interrelationship. This is realised by modelling transactions phases and their causal and conditional relationships. The well-defined concept of a 'transaction phase' enables modelling business processes at a high abstraction level. Explicitly modelling the 'business activities' is considered to be an advantage when compared to the general concept of an 'activity', mentioned in section 2.2, which can be almost anything (a material-, informational- or business activity). DEMO is incomplete in the sense that it does not distinguish core- and supportive processes.

Coherence

The coherence between interaction model and process model is clear. It is established by the 'transaction type' modelling concept that occurs in both models. Since this concept is the only overlap between the two models, it is easy to keep the models cycle consistent. The coherence of the total model cycle, including fact model and interstriction model has not been investigated yet.

Expressiveness

Due to the fact that DEMO is specifically suitable for modelling business processes, its expressiveness is rather low. A proof for this can be found in the fact that meta model transformations from the DEMO process model to for instance Petri-nets are well possible but not the other way round. It proves that Petri-nets at least as expressive as the DEMO process model. As has been mentioned in section 3.2, the generality/specifity of the meaning of concepts is a measure for the expressiveness of a technique. Especially the 'transaction type' concept is a very specific concept that reduces the expressiveness of the technique. One 'transaction type' contains a lot of modelling information such as communication, action and transaction phases.

Comprehensibility

A comparison of the meaning-notation-concept triangle of the framework and an evaluation of the number of concepts per model reveals that especially the comprehensibility of the DEMO process model leaves much to be desired. Each transaction type concept in the interaction model is always modelled by means of three transaction phases (O, E and R) and two causal relationships between them (O-E and E-R) which leads to an explosion in the number of symbols and arrows in the process diagram. Since it is a repetitive notation, an alternative notation in which the transaction type is represented by one symbol (in stead of five) would reduce the number of symbols in the diagram significantly which makes the diagram more comprehensible. Furthermore, the modelling concept table shows that a solid arrow in the diagram represents both the initiation of a transaction type as well as the transitions between transaction phases.

Arbitrariness

Modelling concepts or structures of concepts that have an identical meaning within a model, introduce a degree of freedom in the way of modelling. A conclusion that can be drawn from the concept relationship in the process model is that such degree of freedom exists. The 'condition for completion' of a certain phase Tx/P is equal to the 'condition for initiation' of the succeeding phase Tx/P+1. For instance, 'the completion of T1/E is a *condition for the completion of T2/E*' is the same as 'the completion of T1/E is a *condition for the initiation of T2/R*', since the initiation of T2/R is always 'caused by the completion' of T2/E. Whenever a domain can be modelled in more than one way, there is a degree of freedom. A drawback is at least that there is a redundancy in the modelling concepts, which is not desirable.

Effectiveness, Efficiency

As has been said, no attention is paid to the effectiveness and efficiency of the DEMO modelling process.

5. Conclusions on the Application of the framework

In this paper we have introduced and illustrated the Q-ME framework for the evaluation of the quality of business modelling techniques. The framework allows an assessment of both the product quality and the process quality of modelling techniques, with regard to a set of properties that have been defined in the literature. The increasing usage of business modelling techniques for reengineering, ERP implementation, TQM and workflow automation projects requires a framework which allows analysts and users to assess the quality of the vastly increasing amount of available techniques, in order to single out valuable and less valuable techniques.

The application of the Q-ME framework to the DEMO modelling technique has revealed both some strengths and weaknesses. The most important benefit of the framework is that it provides a set of categories and properties that allows a uniform and formal description of the model elements within one model type as well as the different model types used within one modelling technique.

A uniform characterisation of a modelling technique forms a precondition for comparison. The meta modelling technique used in the Q-ME framework enables a good evaluation of coherence between the modelling concepts and models used in a modelling technique. This property is important when designing automated support for the technique, such as CASE tools. Also, the level of comprehensibility is revealed by the meta modelling technique. Large numbers of concepts and relationships between the concepts decrease the ease with which users and analysts master a technique.

A major shortcoming of the current status of the Q-ME framework is that is does not include a quantifiable metric to express the quality of a business modelling technique. Although the framework allows a characterisation on the basis of individual properties, the lack of an overall metric makes it difficult to compare the quality of different techniques in an overall rating.

Future research is conducted to improve the framework. The operationalisation of the introduced quality properties is studied in more detail. Especially properties that relate to the way of working, such as effectiveness and efficiency get attention. Furthermore, the theory is validated by means of the application of the framework to other business process modelling techniques. In the future, the results of this application will be compared with the opinion of experts in the field of business process modelling.

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