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Practising Multiple Framing: Challenges in 11 Cases of Business Analysis

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ABSTRACT
Understanding the business context of a current or future information system is crucial for obtaining maximum leverage and benefit. As the understanding of a business is dependent on how it is perceived and conceptualised, working with systems analysis and design benefits from employing multiple framing, taking different aspects into account. Building on theoretical foundations of business framing and modelling perspectives, this paper makes use of empirical material from 11 cases of business analysis, each documented using three types of graphical models: value models, process models, and concept models. Using mostly qualitative techniques, different challenges are distinguished and explored for each model type. Concluding the paper is a discussion of two main issues for analysts, teachers and researchers. The first issue concerns the distinction between perspective challenges and delimitation challenges; the second issue addresses the role of certain challenges in pointing to potential confusion between use of different perspectives.

Keywords
Business Modelling; Modelling perspectives; Value modelling; Process modelling; Concept modelling, Experiential learning

INTRODUCTION
In business analysis, you consciously try to make sense of a business, whether it is your own or somebody else’s. Irrespective if you analyse the business where you normally work or if you are looking into another business as a consultant or external facilitator, the analysis is often an initial or integrated component of a larger development effort that also includes business change in some way. “Business” is here used in a wide sense to denote purposeful activities using and producing information and other resources, and includes also non-profit organisations and public administrations.

As many issues contribute to an existing business situation, the analysis may explore widely different realms of the business, also if there are indications of specific problems already at the outset (cf. Lundeberg, 1993). This can be seen as a focus on problem setting (cf. Schön, 1979) and sensemaking (cf. Weick, 1979) regarding the business and its environment. A core component of business analysis is therefore how the business is defined or conceptualised, or in other words, how it is framed (cf. Bateson 1955/72, Goffman, 1974). The way a business is framed and analysed affects what problems are seen and what actions are taken. In information systems (IS) development, the decisions made consciously or unconsciously in the early analytical stages have more fundamental consequences than in later stages.

Facilitating the analysis, people use different graphs and models to develop and express their framing of the business. Especially in IS development, graphical modelling has become a standard tool to visualise an existing situation and proposing an improved one (cf. Wand & Weber, 2002). Much has been written on modelling and specific techniques and methods, partly because the great variety available (cf. e.g. Olle et al, 1988/91; Avison & Fitzgerald, 1988/2003). Despite some consolidation in the object-oriented arena with Unified Modelling Language (UML), there is still an endless number of approaches available. Although considerable work has been done concerning different modelling techniques and their conceptual arrangements, less has been done concerning concrete modelling artefacts in the wider domain of business modelling.

The purpose of this paper is to explore challenges in using a set of modelling perspectives in business analysis. This study contributes experiences from using a set of multiple perspectives and is undertaken within the overall research question of how businesses are framed using graphical models in the context of business analysis. Instead of developing new techniques, the study focuses on “testing” a set of previously developed modelling perspectives by examining the results of using it in practical situations. People with limited modelling expertise are emphasised in the study, as this is the case in many situations where you analyse and change your own business. Also in situations were you work as an outside consultant, you yourself – or the people you work with – often bring expertise in other areas than modelling. Although the study focuses on the different
modelling perspectives themselves, its emphasis on practical situations means that the challenges explored also have causes in, and consequences for, how the perspectives are being applied and learned.

After this introduction, the paper continues with a theoretical overview of the set of modelling perspectives employed. An outline of the empirical approach is presented in the section thereafter, followed by a summary of the empirical cases examined. Challenges are subsequently identified and discussed and the paper is concluded with a section summarising and discussing the results.

MODELLING PERSPECTIVES

This study emphasises actual model artefacts influenced by a set of generic modelling techniques and methods. It is through the specific model artefact that the framing of the business is expressed. In business modelling, the model artefact most often takes the form of a graph, more or less closely following the rules of some modelling technique. Under the heading of conceptual modelling, Wand & Weber (2002) outline four key elements: a modelling script, resulting from using a modelling grammar, as indicated by a modelling method, in a specific modelling context (cf. Figure 1). As “script” has a certain procedural connotation, the more general term model artefact is here preferred. Furthermore, also grammars are closely related to artefacts: each grammar specifies an abstract set of model artefacts that follows its rules.

![Figure 1. Elements of conceptual modelling (adapted from Wand & Weber, 2002) related to three areas of model work (adapted from Tolis, 1999).](image)

Wand & Weber (ibid.) point to different research opportunities related to each of the four elements. Using their words, this study is intended to shed light on certain issues regarding modelling scripts (e.g. “intergrammar evaluation of scripts”, “evaluation of multigrand script”), modelling grammars (e.g. “better use of grammars”, “use of multiple grammars”), and modelling methods (e.g. “methods to identify types of phenomena”, “methods to classify phenomena”).

As each way of framing and modelling a business contributes to shaping it, some aspects will be highlighted while other will be downplayed. In order to give a richer understanding of a complex business, more than a single perspective may be used. Bateson (1979, p. 92) advocates this as “the method of double or multiple comparison”, illustrating it with the ability to perceive depth when using two eyes instead of one.

“Perspective” is here used to characterise a particular way of framing a business, as expressed by a family of model artefacts sharing the particular aspect highlighted. In this sense, perspectives also apply to generic modelling techniques, although this partly depends on how the techniques are being used. For example, there have been instances where people employ a process perspective using any type of modelling technique, even ER-diagrams that normally belong to another perspective.

Three modelling perspectives comprise the specific set used in this study: values, processes, and concepts. In addition to the dual perspectives of process and data, prevalent in an information systems context, more or less extensive sets of modelling perspectives have been suggested (e.g. Zachman, 1987; Willars, 1988). Believing that too fine distinctions can hamper the practical usefulness, the chosen three perspectives can be characterised as a limited set of simple “few-dimensional” models (cf. Lindström, 1999, p. 154). Compared to earlier specifications that have presented four perspectives (Tolis & Nilsson, 1996), one has been omitted in the current selection (cf. Figure 2). The three perspectives comprising the set used in this study, can be briefly characterised in the following way:

- The value perspective focuses on important factors in the business and the influences these have on each other.
- The process perspective focuses on important transformations of inputs to outputs that are going on in the business.
- The concept perspective focuses on important categories in the business and their relationships with each other.
The perspective left out, behaviour, focuses on processes from the viewpoint of the actors and is evident in modelling techniques such as flow charts and most applications of state transition diagrams. It is not included in the set used in this study for several reasons; the most important is that the perspective has important limitations when analysing the collaboration between different actors. Furthermore, behaviour is already a strong perspective for most people – developed from early years by reading recipes and instructions. Indeed, the two perspectives of transformation and behaviour can be seen mixed-up in many instances of process modelling.

**EMPIRICAL APPROACH**

To address the purpose of exploring challenges of using a set of modelling perspectives in practical situations, two issues are particularly important: the selection of empirical setting and the choice of data material and analysis procedure.

**Empirical setting**

That the set of modelling perspective for this study was given, places some restrictions on the selection of empirical setting. Although the perspectives in themselves are rather wide, so that a number of different modelling techniques fit into each perspective, the aim is to have all three of them used in the same situation, for the analysis of a particular business. Furthermore, in order to facilitate identifying and quantifying the challenges, it is preferable if the number of analysis cases is not too small.

| PARTICIPANTS | A total of 24 international participants in a university course in information management given in English were involved. The participants were generally new to systematically working with a set of modelling perspectives. Some had previous modelling experience. Although the amount of personal work experience varied among the participants, they all had at least 3,5 years of university studies in business administration and related areas. In most cases, the participants did not work in the business they analysed, although some had previously done that or knew somebody who did. |
| TASK | The analyses were normally performed by groups of two participants each. Out of the 11 cases, the exceptions to this were two groups with 3 participants each. Each group by themselves selected and established contact with a business to analyse. Detailed focus of the analysis was not given beforehand, and could be influenced by the participants themselves. Each analysis included modelling using three different perspectives: values, processes and concepts. No particular modelling tool was used; most groups used Microsoft PowerPoint. The participants were introduced to their task in a 4 hour long general introduction. Each of the three perspectives was later presented in 4-hour sessions prior to using that particular perspective. |
| RESULTS | The initial models were later elaborated after discussions and feedback among the groups and the complete business analysis was documented in an integrated report. In addition to communicating the analysis results to the business, the models developed by the groups were part of the examination for the course. |

Table 1. Characteristics of the empirical setting.

The empirical setting selected was a university course in information management, where the participants used the particular set of modelling perspectives for analysing businesses of their choice in a vein of experiential learning (cf. Kolb, 1984). Con-
sidering the characteristics of the setting as indicated by Table 1, and comparing them with typical modelling situations, reveal many similarities with consultants analysing their clients’ businesses. Most important, the cases were generally done by people not working in the business they analysed. The participants’ limited prior knowledge of modelling resembles a situation of a junior consultant more closely than that of a senior one. The expectations from the teachers have a counterpart in expectations from a consultant manager. What differs from many junior consultant situations is that the business to be analysed was self-chosen by the participants, as was the detailed focus of the analysis.

From a research point of view, the main advantages with the selected setting were access to the results of the analyses and control over the perspectives used, while at the same time maintaining similarities with common professional situations. As the author was one of three lecturers in the course, with main responsibility for one of the three perspectives used, the issues of access and control were manageable. However, the study only made use of the material produced in the course, it did not influence the way the course was carried out. Having said that, the involvement by the author is in itself something that requires careful consideration in order to minimise any negative effects. The present study is for example not intended as an evaluation of the specific activities of the particular course, but rather concerns issues that are relevant for people interested in understanding and improving business analysis, also teachers.

Data material and analysis procedure

For each case of business analysis, the material selected for this study consists of three types of models in accordance with the set of modelling perspectives used: a value model, a process model, and a concept model. The models examined were in their initial form; they were later elaborated by the groups into final versions.

When analysing the models, the approach has been largely qualitative. The identification and structuring of challenges was mostly done in a bottom-up, iterative way by examining each specific model in detail. In this study, “challenge” refers to a more or less distinct deviation from the core of the modelling perspectives used. Following the focus on underlying perspectives rather than specific notational details, the analysis has explored semantic and pragmatic aspects more than syntactical and graphical. In practice, this means that challenges regarding symbols used, visual arrangements, line crossings, etc, have been left out in favour of challenges regarding the content of the models and the particular aspects being emphasised.

In order to shed further light on the challenges, some limited quantitative measures have also been used. Following the identification of a specific challenge, the occurrences among all the cases has been counted to gauge how common it is. To avoid the measures being considered too absolute or precise given the limited number of observed cases, they have been converted into three intervals, low/medium/high, to provide a rough indication of the extent of each challenge.

The iterative approach of the analysis has meant that the labels developed for the challenges have been subject to continuous revisions to enhance the clarity of the results. Also the challenges themselves have been iteratively evaluated, both internally to minimise possible overlaps, and against the key concept of challenge. One result of this evaluation was the removal of one tentative challenge that was determined to mirror another challenge without representing a challenge on its own. Hence, the resulting challenges as presented in this paper should not be considered final, but rather as an invitation for further development and expansion through additional iterations, additional cases, and additional structuring.

DESCRIBING THE MODELS

Among the 11 cases of business analyses studied, many different businesses are represented: a humidity control company, a political party, a fashion retailer, a brokerage firm, a hospital department, a fitness chain, a ferry company, an internet business, an organisational consultancy firm, an IT consultancy company, and a newspaper.

To give an overview of the empirical cases, the material is presented as follows: For each of the three modelling perspectives examined, a brief description of key characteristics is illustrated by a specific example model and some measures of the complexity of the models studied. The example models all come from a group that was randomly selected among the 11 cases.

Value framing

The value perspective focuses on important factors in the business and the influences these have on each other. A factor is something that varies over time, and its current and future values are often characterised as objectives, goals, strengths, problem, etc. A number of different modelling techniques, in particular problem/goal models (Röstlinger & Goldkuhl, 1988) and causal loop diagrams (cf. Senge, 1990/94), expresses the value perspective. The particular type of value models used in this study is factor models, comprising identified factors, their values and influence relationships. Figure 3 shows an example of an initial factor model.
To give an overview of the complexity of the models, the number of factors in the initial factor models ranged from 5 to 23 (median of 12), and the influence relationships ranged from 9 to 34 (median of 14). Any bi-directional relationship was seen as shorthand for two ordinary relationships, and therefore counted twice.

**Process framing**

The process perspective focuses on what is going on in a business, in particular transformations of inputs to outputs in different stages. The perspective is salient in techniques such as dataflow diagrams and IDEF0 functional modelling. In the present study, process graphs adapted from Steneskog (1991) were used, comprising identified processes, object relationships (input/output) and actors. Responsible actors could either be indicated below each process or across horizontal “swimlanes”, where relevant processes and/or objects could be placed. Figure 4 shows an example of an initial process model.

**Concept framing**

The concept perspective focuses on important categories in the business and their relationships with each other. Entity-relationship (ER) diagrams and object-oriented models such as UML class diagrams share the concept perspective. In this study,
object graphs (Sundgren, 1992) were used as a particular type of concept models, comprising identified concept types, association relationships and attributes. Figure 5 shows an example of an initial concept model.

![Figure 5. Sample of initial concept model of an internet business, showing different object types associated with each other.](image)

Model complexity among the initial concept models is reflected by the number of concept types ranging from 2 to 17 (median of 4), and the association relationships ranging from 2 to 14 (median of 5).

**FRAMING CHALLENGES**

The examination of the models from the 11 cases has revealed a number of salient challenges related to each of the three perspectives: values, processes, and concepts. In the following, the results of the analysis are presented according to the three perspectives. Each challenge is given a numbered label for easier reference – the actual ordering of the challenges is not significant. In addition to the descriptions provided, the challenges are summarised together with indicators of their extent among the models examined.

**Value challenges**

V1: **Concept factors.** A concept factor is a factor that is labelled only as a process or a thing, without indicating what it is that may vary over time. For example, saying that “Order handling” is affecting “Customers” may indeed be true. However, the follow-on question is what, more specifically, it is about order handling that affects customers, and what in particular about customers that is being affected. With proper specification, perhaps it is “Order handling response time” that is affecting “Customer satisfaction”. Concept factors make it harder to identify specific influence links, and risk the general chaos of “everything influencing everything”.

V2: **Value factors.** Contrary to a concept factor, a value factor includes an unnecessary specification of direction and/or value. For example, “High personnel turnover” and “Lower failure rate” are not only identifying the factors, but also indicating their values as a problem, strength or goal. By instead keeping the extra specification separate, without integrating it with the factor itself, it is easier to indicate if that value is current (e.g. “High” in the first example) or future (e.g. “Lower” in the second example). It is also easier to add the missing value, e.g. that the desired value of personnel turnover is 12%, where this is appropriate.

V3: **Absolute ends.** An absolute end is a factor that does not influence any other factor although it itself is influenced by one or more factors. The existence of an absolute end in a factor model normally indicates a focus on linear chains rather than circular feedback loops. Although linear chains highlight the desired ends, they can also be seen as indicating a too narrow delimitation; with a larger scope they could have been recognised as parts of larger feedback loops. Stopping short of determining the complete loop(s), that the absolute end is part of, may reduce the chances of finding suitable points of leverage that facilitates understanding and changing the business.
Table 2. Summary of identified and quantified value challenges.

<table>
<thead>
<tr>
<th>CHALLENGE</th>
<th>DESCRIPTION / MEASUREMENT</th>
<th>EXTENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>V1: Concept factors</td>
<td>Models that contain factors consisting of only single concepts, representing either things (e.g. “Customers”) or processes (e.g. “Product development”)</td>
<td>High</td>
</tr>
<tr>
<td>V2: Value factors</td>
<td>Models that contain factors also including values (e.g. “High personnel turnover”)</td>
<td>High</td>
</tr>
<tr>
<td>V3: Absolute ends</td>
<td>Models that contain factors not High</td>
<td>High</td>
</tr>
</tbody>
</table>

Table 3. Summary of identified and quantified process challenges.

<table>
<thead>
<tr>
<th>CHALLENGE</th>
<th>DESCRIPTION / MEASUREMENT</th>
<th>EXTENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1: Unspecified relationships</td>
<td>Models that have relationships that are unspecified, i.e. only indicated with an arrow</td>
<td>Medium</td>
</tr>
<tr>
<td>P2: Contingent relationships</td>
<td>Models that have object relationships with questionable properties (e.g. “Satisfied customers”)</td>
<td>Medium</td>
</tr>
<tr>
<td>P3: Relationship isolation</td>
<td>Models that have only a single input and a single output</td>
<td>High</td>
</tr>
<tr>
<td>P4: Open-ended processes</td>
<td>Models whose final output does not fulfil the expectations of the initial input</td>
<td>Low</td>
</tr>
</tbody>
</table>
Concept challenges

C1: **Unspecified relationships.** An unspecified relationship is when an association between two (or more) object types in a concept model lacks a name. For example, just drawing a line between “Sales personnel” and “Customers” does not specify what relationship was intended. That sales personnel are responsible for customers, or that customers are familiar with sales personnel are just two possible interpretations of the unspecified relationship.

C2: **Singular categories.** A singular category is when a concept only denotes an individual object, instead of a set of objects, i.e. a concept type. For example, “The company”, “The warehouse”, “sales department”, are all examples of singular categories. Having singular categories leads to problems with both attributes and relationships, e.g. relationships that indicate associations with many instances becomes hard to use.

C3: **Bare categories.** A concept type without attributes lacks any details about what characterises individual instances of the concept. For example, the concept “Employee” gets its meaning in the analysis by noting that relevant attributes for example include “Year employed” and “Monthly salary”, but not “Highest degree obtained”. Without any attributes, the concept only relies on the common-sense interpretation of its label in the context of the other concepts. Bare categories can be a sign of limited reflection on what it is about the concept that make it interesting to include in the analysis.

C4: **Separate clusters.** Separate clusters occur when the concepts analysed are not related to each other but left in two or more separate groups. Different clusters might be a sign that not enough effort has been put on considering important relationships among the concepts, or possibly that the scope of the analysis has been too broad, so that too diverse concepts have been included.

<table>
<thead>
<tr>
<th>CHALLENGE</th>
<th>DESCRIPTION / MEASUREMENT</th>
<th>EXTENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1: Unspecified</td>
<td>Models that contain relationships that are unidentified, i.e. lack a proper label</td>
<td>Medium</td>
</tr>
<tr>
<td>relationships</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C2: Singular categories</td>
<td>Models that contain concepts that are singular instances (e.g. “The sales department”)</td>
<td>Medium</td>
</tr>
<tr>
<td>C3: Bare categories</td>
<td>Models that contain concepts without any attributes</td>
<td>Medium</td>
</tr>
<tr>
<td>C4: Separate clusters</td>
<td>Models divided into different clusters without relationships to each other</td>
<td>Low</td>
</tr>
</tbody>
</table>

Table 4. Summary of identified and quantified concept challenges.

DISCUSSION

As have been shown in the previous section, a number of challenges have been identified in the initial models from 11 cases of business analysis. In each of the three modelling perspectives used – values, processes, and concepts – more or less widespread deviations from the specified perspectives were found. Each challenge represents an opportunity for reflecting on the way the business is framed using different graphical models. In particular, using a set of complementary perspectives provides the analyst with rich possibilities for making sense of the complexities of the business. At the same time, the study shows how the sometimes fine distinctions between the different perspectives, ultimately expressed in the model’s symbols and wordings, also might present the analyst with some difficult choices. Some of these difficulties have close links to the issues of deletion, distortion, and generalisation, raised by Bandler & Grinder (1975) and discussed by Lundeberg (1993) in relation to processes of business change.

**Perspective and delimitation challenges**

Going beyond the individual challenges, a larger pattern became salient in the analysis of the models. When identifying and quantifying the challenges it became apparent that they are of two kinds: one type deals with individual parts of a model, and the other type with the model as a whole. For example, the process challenge of unspecified relationships is based on individual relationships in the model, whereas the challenge of open-ended processes concerns the overall structure of the model.

This difference in challenges can be seen as refinement of the initial view of business framing and modelling. Up until now, “framing” has been used mainly as a synonym for “perspective”. But framing is more than only perspective – it is also delimitation. Distinguishing between business framing in terms of both perspective and delimitation is also consistent with the literal interpretation of what it means to frame something (cf. Figure 6): the application of a frame affects both what gets into the picture (delimitation) and from what angle it is presented (perspective)
Perspective-crossing challenges

In addition to providing insights into each modelling perspective individually, the different challenges identified also enable us to learn more about the interplay between the three. Engaging in multiple framing using a set of complementary perspectives, represents an added complexity over restricting oneself to a single perspective. With this in mind, some of the challenges can be seen as related to the existence and use of different perspectives.

As illustrated in Figure 7, specific challenges may suggest possible mix-ups, where one perspective is “pushed” towards another. For example, finding singular categories in a concept model can be seen as a step towards the process perspective. Furthermore, contingent relationships in a process model might be a sign that the issues explored have more to do with the value perspective. Lastly, coming across concept factors in value models might indicate a step towards the concept perspective or – especially if they refer to processes and activities – the process perspective. The existence of any of these challenges may thus be used to reconsider the most suitable perspective in the given situation.

Conclusions

Through the challenges identified, this paper has contributed insights into business analysis practising multiple framing. In particular, the results have helped to clarify the distinction between the role of perspective and delimitation in framings, as well as illustrating possible confusion between different perspectives. Although the results will benefit from further structuring and elaboration, careful consideration of the challenges will hopefully promote an increased awareness of the features of different ways of framing, facilitating the selection of appropriate perspective(s) and making the most of them. There are direct implications for further development of the modelling perspectives and how they are learned, and for deepened research about key practices for making sense of and improving complex businesses.
REFERENCES