7 Conclusions and suggestions for further research

This research has devised an approach to analyzing system-level coordination from the point of view of product architecture. The analysis was conducted using the design process of an electric shaver. The findings confirm the belief within product development literature that system-level coordination within design processes is often not fully understood and is an important variable for improving project performance. With regard to this case study, it emerged that an explicit focus on the underlying architecture of the shaver increased the practical and theoretical understanding of system-level coordination. Moreover, the analysis resulted in a significant number of structured options for improvement. These included improved ways of achieving coordination for the given product architecture and options to adapt the product architecture so that coordination is facilitated. Some of these options have been implemented within new design processes for shavers, and it should be possible to measure their impact on project performance in the future.

The present chapter is the last one of this thesis. The first section presents the conclusions and the second suggestions for further research.

7.1 Conclusions

This research started with the assumption that efficient design processes are a requisite for company survival in this day and age. It is thus important for scientific researchers to focus on understanding and improving product development processes. Current research into successful design processes is generally separated into two separate fields of knowledge – engineering design communities and management communities. The first typically focuses on detailed technical issues concerning the construction of physical products, and the second considers how people can work together effectively. Further, several authors have stressed on a general level that technology and organization are closely related and that a clear match between the structure of the product and the structure of the organization is of crucial importance for good project performance. The relationship between product architecture and organization was then explored at a more applicable level. The scope of the research was then defined and the following research question formulated:

*How can the particular architecture of a product be represented such that it offers a clear understanding of the characteristics required for system-level coordination during the design process, and such that it provides a vehicle to generate options for improving the performance of future design projects?*

To answer this question, the thesis was divided into two sections, a theoretical one and a practical one. The theoretical section investigated current knowledge in the fields of engineering design (Chapter 2) and organizational design (Chapter 3) and finally focused on research that combines the two (Chapter 4). Taking this as a basis, Chapter 5 developed a
means to analyze the organization of design processes from the perspective of product architecture. This approach links the organizational and technical bodies of knowledge at a detailed level and forms the foundation of the practical part of the thesis. Chapter 6 then illustrated the approach and examined how it functioned within the real-life design process for an electric shaver.

The conclusions of this thesis will be structured in line with the outline given above. First, the theoretical conclusions that ultimately resulted in the proposed approach will be presented. This is to all intents and purposes the answer to the research question posed above. Second, the application of the approach to the case study will be considered and the questions as formulated in Chapter 4 addressed. The conclusions will be presented under the following two headings:

· Theoretical conclusions.
· The conclusions of the application.

7.1.1 Theoretical conclusions

The following section describes how the research resulted in a proposal to analyze design projects. Four logical steps that can be considered as supportive conclusions of the exploration and discussion of the theory are first presented. The proposal is then set out.

The first important step in linking both perspectives was the following:

· Product architecture and design project teams can both be represented as systems with interacting elements.

This means that product architecture can be modeled as a set of interacting product building blocks, and a project team can be thought of as a collection of interacting (smaller) design teams. According to the DSM approach, these ‘systems’ can be represented in great detail in a matrix. In the case of a product, it is easy to see which building blocks make up the product, and how each pair of building blocks can interact. Different types of interactions can be modeled in order to distinguish different technical reasons for the interaction. Similarly, it can also be shown how a project team is split up into design teams and how they exchange information in order to achieve system-level coordination between the teams. These models are used in product development literature to deduce possible improvements for future design projects. They propose constructing more independent teams and establishing mechanisms to improve system-level coordination. The second step towards linking architecture and organization is:

· Effective product development projects match product architecture and organization.

Current research in the field of product development linking product and organization stresses that effective companies organize their design teams around the product building blocks. The structure of the product reflects the structure of the organization. As a result, the interactions between the building blocks can be mapped to the interactions between the design teams. This leads to the following step:

· Interactions between building blocks are the main reason why system-level coordination between teams is required.

If it is assumed that development projects organize their design teams around the building of the product, then interactions between the blocks can be considered to be the cause of system-level coordination. Put differently, by mapping the product onto the organization one can distinguish what needs to be coordinated (the interactions) from how system-level
coordination is achieved (between the design teams) during the project.

This concept is the main vehicle for understanding and improving system-level coordination. First, the need for system-level coordination can be explained by the characteristics of the existence of interactions between building blocks. Second, system-level coordination can be improved by reducing the interactions, and thus decreasing the need for system-level coordination, or by proposing appropriate coordination mechanisms that fit the characteristics of the interactions. The next step is based on classic organization theory:

- Goal-setting is an efficient coordination mechanism.

Classic organization theory states that coordination can be achieved in different ways. The most preferable within uncertain environments is the strategy of goal-setting (after Galbraith). That is, two interacting teams specify goals on a high level of abstraction such that the detailed actions can be performed in isolation of each other. If both teams achieve their goals, the work is well-coordinated. Should the teams not be able to apply goal-setting, considerably more effort is needed to integrate the work of two teams. Furthermore, based on the work of Thompson, it is argued that the way that a coordination mechanism can be applied is determined by the characteristics of the interaction. This leads to the following:

- Whether the representation of the architecture is adequate for analyzing system-level coordination depends on which types of interactions are distinguished.

It emerged that in order to establish a systematic and meaningful analysis it must be possible to define the interactions such that for each (type of) interaction it is possible to identify its cause and its impact on coordination, and to identify manipulation options.

It was concluded that the available interaction models do not satisfy these criteria. The taxonomy (after Pimmier and Eppinger) that is usually used in technical literature to represent architectures cannot be clearly linked to (architectural) decisions and is unable to indicate characteristics for system-level coordination. Alternatively, the DSM models are only able to make a limited analysis and interpretation since their interaction construct (exchange of information) is much too global. The following answer to the research question thus emerged:

An appropriate way of representing a product architecture that enables the system-level coordination to be analyzed is to document the product building blocks and identify three types of interactions between them. These types are:

- **Functional interaction**: Two building blocks need to exchange energy, material, or information in a functional way.
- **Mapping interaction**: Two building blocks together fulfil the same function.
- Physical interaction, which comprises three subtypes:
  - **Global constraint interaction**: Two building blocks are both subject to the same constraints (e.g. on space).
  - **Side effects interaction**: Side effects (e.g. heat, vibration, magnetism) from one building block influence the functioning of the other building block.
  - **Physical interface interaction**: Two blocks physically exchange energy, material, or information and/or are attached to each other.

This taxonomy is based on a detailed investigation of engineering design literature. The following definitions must be used:

Functions are ‘design goals’, or ‘what needs to be achieved by the product’, without
describing how it is achieved. A function may be expressed as a transformation of energy, material, or information, but this is not essential.

Building blocks are collections of the physical characteristics of a product that are required to achieve the functions.

It is further assumed that generate-test cycles are needed to find physical characteristics that appropriately satisfy a function.

The proposed types of interactions are directly based on the architectural decisions that determine product architecture (after Ulrich). As a result, the cause of each interaction and the way an interaction can be manipulated (by which decision) is completely transparent.

Furthermore, based on the characteristics of the types of interactions the following propositions were theoretically deduced:

- Two teams whose blocks functionally interact are able to apply goal-setting. They have the freedom to make detailed design decisions completely independently of each other as long as they achieve the functional specifications of energy, material, or information input.
- Two teams whose blocks have a mapping interaction are hampered when applying goal-setting. Since both blocks are needed to fulfill a function, they cannot make detailed decisions independently of each other. Generate-test cycles have to be collaboratively performed to find a solution for the mapped function.
- Two teams whose blocks have a global constraint interaction are able to apply goal-setting. A constraint can be decomposed into a smaller constraint for each block, and each team can make all design decisions completely independently of each other as long as each block satisfies its constraint.
- Two teams whose blocks have a side effect interaction need to solve an exception to the original specifications. This coordination cannot be planned for and is reactive. It is not possible to make a clear statement about the level of detail at which coordination has to take place.
- Two teams whose blocks have a physical interface are limited in applying goal-setting. The coordination has to take place at a low level of detail, but it is difficult to make a general statement about its implications.

7.1.2 Conclusions of the application

The conclusions of the practical part will be structured according to the questions formulated in Chapter 4:

- Is the representation of product architecture fully understood, and can each interaction be linked to system-level coordination?
- What system-level coordination activities go with each type of interaction, and are the premises behind the coordination characteristics per interaction type valid?
- Does the analysis result in options to improve the design process, and what are these options?
- What are the effects of these options on project performance, or, at least, how can they be measured?
In order to obtain answers, the analysis has been applied to an virtually finished design process for an electric shaver. The project team was large and comprised smaller design teams that each was responsible for the design of a building block for the shaver. The whole project team was housed in one room. The shaver was very innovative (for both market and company) and was not fully modular. The project was finished within the planned schedule and was a great success in the marketplace. However, the process was exceedingly complex. In broad terms, the following steps to collect the data were performed:

- The shaver was decomposed into ten building blocks.
- The interactions between each possible pair of building blocks was documented according to the proposed types of interaction.
- The system-level coordination effort per interaction was retrospectively identified.
- All of the findings were modeled in a matrix and options suggested to improve the design process according to the logic proposed here. This was then presented to the company.
- The researchers were involved with the implementation of the improvements.

Each of the above-mentioned questions will be considered in the sections to follow. The role of the taxonomy will first be focused on, and then the case-specific findings.

**Common understanding of the interaction constructs**
Thanks to their clear technical background, the identified interactions were very easy to understand. During the documentation of the interactions of the shaver, all interviewees recognized the same interactions. In addition, the presentation of the interactions by several parties within the company showed a high level of consistency and an understanding of the interactions. The main advantage of the constructs was that they were directly based on a physical product and could be checked at any time.

Furthermore, the system-level coordination activities could be clearly related to the interactions. Apparently, the clear technical definitions of the constructs enabled the project members to project their specific coordination activities onto each interaction separately.

**Propositions approved**
Since each interaction could be linked to coordination activities, the characteristics for coordinating all the documented interactions could be compared. Each interaction was compared with the propositions and it was found that although the actual coordination effort could be higher than the propositions, it was never lower. This is as expected since it is known that real-life processes are never as optimal as the prescriptive logic. The following was concluded:

- A mapping interaction between building blocks needs significant system-level coordination between the design teams during the design process. (Goal-setting is hampered)
- The functional interaction and the global constraint interaction minimally correspond to a low need for system-level coordination between the design teams during the design process. (Goal-setting can be applied)
- Intense coordination effort was measured for the interface and side effect interactions but these differed per interaction, and no clear general statement could be suggested (in line with the propositions).

The most spectacular finding was that the mapping type interactions for each observation corresponded to intense system-level coordination.
These findings contribute to the first steps of a theoretical model that states that interaction type A implies coordination type B. By using the particular architecture of a product, it can explain the amount of system-level coordination that is required and suggest effective organizational structures. In addition, the propositions per interaction also play an important role within the generation of options for improvement, which will be described below.

**Understanding and improvement**

Perhaps the most interesting outcome of the research is that it resulted in a significant number of improvements. There were three different aspects in the analysis: it put increased focus on the management of interactions in general, it provided a means to improve the separate management of each interaction, and it created insight into the underlying contingencies of the architecture. These conclusions are addressed below.

**More focus on system-level coordination**

The analysis of the architecture of the shaver significantly emphasized the problem of system-level coordination within design projects. Previously, such awareness and its relationship to the architecture of the product was much less available within the firm. It was concluded that a detailed and clear overview of the interactions triggers structural discussion and encourages reflection on the general way of working. This resulted in a number of insights for the project team. They all agreed on the effective structure of design teams and advocated the one-room approach to achieve easy information exchange. On the other hand, although the company became aware that system-level interactions were insufficiently managed, the focus within each design team remained much higher than the focus on the interactions between the teams. One possible explanation is that the easy communication within the one room has a side effect in that it does not force designers to effectively and formally manage the interactions (where possible). In addition, the number of interactions between the blocks was much too high to be managed by a single hierarchically higher lead designer. The suggested measures for improvement were all in the direction of more focus on the interactions and better responsibilities for the interactions during the design process.

**Improvements for each interaction**

In addition to this general insight, the documentation was used to discuss each documented interaction separately. Based on the objective underlying structure of interactions, project members from different technical backgrounds were able to recognize and discuss what coordination had taken place and how it could have been improved.

It was thus concluded that:
- Documentation of the interactions triggers discussion and encourages reflection concerning the management of each interaction separately, which is very effective in itself.

Further, it can be stated that:
- The logic of the interactions is very helpful in structuring the discussions and guiding options for improvement.

In effect, the ‘ideal’ propositions assist in suggesting more adequate ways for coordinating a specific interaction, or for indicating when intense coordination effort is an inevitable part of the process given the existence of a particular interaction. Proposals were made for each
interaction in turn on how they could be technically adjusted in order to simplify future
system-level interaction. Hence:

- The characteristics of each type of interaction indicate more effective ways for coordinat-
ing existing interactions.
- The characteristics of each interaction type provide insight into how each interaction could
  be technically adjusted in order to facilitate system-level coordination.

Remarkably, options for improvement could be suggested for most of the interactions. The
technical decisions were then considered, in particular within the context of coordination and
goal-setting. Options for better coordination included earlier and more formal goal-setting,
and preventing failure or changes to the goals. Measures to manipulate the interactions
included a reduction in the number of interactions, the simplification of interactions, or the
standardization of interactions. Both types of improvement could be suggested for each
interaction. For mapping interactions, the options for manipulation seemed to be the most
effective since all mapping interactions inevitably result in intense coordination effort.
However, most of the options for manipulation are strongly limited by the company’s overall
policy, as will be addressed below.

The contingencies behind the interactions
The contingencies behind the interactions can clearly be deduced. Using the characteristics
of the interaction types it is possible to discuss the reasons for the underlying decisions. It can
thus be concluded that the typology is able to demonstrate how existing interactions are the
result of the overall policy or way of working of the company. In the case of the shaver, it can
be noted that most of the interactions could be explained by the policy of low unit cost, high
emphasis and priority on styling, the available assembly system, and the established
production structure. The ability to deduce the underlying contingencies of an interaction
structure was considered strongly beneficial. First, it makes the analysis more realistic since
the impact of coordination-friendly advice on other aspects of the company can be outlined.
Furthermore, if the overall policy remains unchanged, it is clear which interactions will
logically return in future projects. This insight could never have been achieved with
traditional DSM models.

To sum up, the analysis resulted in a large number of lessons learned that can be
applied to facilitate future system-level coordination and be expected to increase the
project performance.

The effects of the analysis on the firm
The proposed advice has had an considerable impact on the new product development
policy of the firm. After the presentations there was much more focus on the interactions
during the project and more formal ways for coordination were introduced. Most importantly,
an architecture team was instituted whose goal is to reconsider the current architecture and
to propose a new improved architecture. The scope of this team is wider than the focus here
since all aspects of the business have to be taken into account.

Based on the theoretical reasoning outlined here, these measures can be expected to
initiate increased project performance. Due to the time limit of this research, it was not
possible to measure the effects, however. A performance indicator that documents the extent
to which the lessons learned are being implemented was proposed. This indicator can be
linked to the performance of design projects in the future. This may ultimately validate the claim of improved project performance. It should be remembered, however, that there are still many methodological difficulties.

To sum up, the proposed taxonomy of interactions appears to be an adequate means of analyzing and suggesting options to improve system-level coordination. Its underlying logic also makes its application within other cases a viable option. However, future research has yet to prove these expectations.

Furthermore, the specific findings of the shaver case can only be considered on their own merits. It cannot be concluded that all design projects have a low focus on system-level coordination. However, the findings do add one more example to the literature demonstrating that system-level interactions are often poorly understood and provide an important variable for achieving better performance.

7.2 Directions for further research
After having addressed the conclusions, suggestions for further research will now be made. Before doing so however, it would be useful to take a brief look at the present and past situations, in line with the philosophy of DSM and this thesis.

When looking back it can be concluded that this research has a strong focus. We concentrated on system-level coordination and have applied our approach to only one case. During the research many issues, ideas, and observations passed the review. The concept of product architecture is extremely wide and highly relevant. Many interesting observations could be made during the exploration of the case, for example about the management of design processes, the many human aspects, the broad implications of architecture, and, obviously, the entire process of creating a new architecture.

The research resulted in a great number of interesting and stimulating aspects, and without doubt this thesis contains only a small part of everything that was been said and done. Despite a broadening of the scope, however, we deliberately confined ourselves to the theoretical foundation of product architecture. This was an important step in achieving focus and validity for the results, and was of course interesting in itself. In addition, we believe that the taxonomy of interactions and its ability to represent and interpret the architecture of a product offers a strong foundation for further research.

Broadly speaking, promising directions for further research include the external validation of the approach within other cases, fine-tuning or extending the approach, using the representation to study alternative implications for product architecture, the construction of new architectures, or applying the taxonomy in non-physical situations.

7.2.1 External validation
As already indicated in the introduction to Chapter 1, a multiple-case-study setup is required to validate all the claims that are made in this research based on the analytical generalization of a single case study. There are a number of options:

- To further test and develop the tentative proposals about how the several types of interactions relate to system-level coordination.

For instance, is a mapping type always accompanied by a great need for mutual adjustment?
A multiple-case-study setup with contrasting product architectures will probably form the best basis for proving such a claim. Modular architectures can then be expected to have a low need for mutual adjustment, and integral ones an extremely high need. The ultimate goal is thus to construct a Thompson-like theory that is able to state which type of interaction fits which type of coordination. Such a theory can be used to predict coordination needs, or to find appropriate organizational structures for a particular product architecture.

- To check the functioning of the tool in its role of improving design processes within other cases.

Does it work in the same fashion? The findings can then be separated from the specific characteristics of the shaver case, as well as our specific involvement. If the analysis results in the same type of improvements, this would be strong evidence in favor of the approach. If the analysis yields strikingly different results, it would be interesting to identify the specific reasons that affect the approach. Do they depend on the skills of the investigator, on the specific way coordination was achieved within the case, or is it part of the representation itself? Furthermore, it would be useful to investigate whether the approach is appropriate for other organizational structures (i.e. functional organization), other product architectures, or even other types of products (i.e. software).

- To further validate the proposed performance indicator.

As discussed above, the performance indicator provides a vehicle to link the management of interactions to the performance of design projects. A couple of methodological remarks were noted but observations of different cases over a longer period of time should result in very interesting knowledge.

7.2.2 Refinement or extension of the taxonomy

During the discussion of the results, several aspects that were observed within the case were noted but could not be directly explained by the interactions. A number of extensions that in turn could be the object of further research were suggested, including:

- Increasing the link with axiomatic design to identify coupled design parameters.

An interesting observation (discussed in the previous chapter) is the interference between interactions. The combination of several interactions may cause iteration between design parameters. It was concluded that in order to enrich the analysis, not only the reason why two blocks interact should be identified, but the exact design parameter (location, size, material etc.) involved with that particular interaction should also be modeled. For instance, blocks B and F have a mapping interaction that includes the position of component B1 and the geometry of component F1. To this end, the building blocks should be ‘opened’ into the lowest level of detail to explore all interacting detailed design parameters. The drawback of going into more detail is that it hampers a clear overview and becomes a very technical, complicated exercise. This was the main criticism of the axiomatic approach stated in Chapter 2.2. Hintersteiner and Friedman (1999) recently proposed an axiomatic design solution to identify coupled (interacting) design parameters between building blocks.

- Investigating further the probability that a mapping type of interaction can cause interference with other interactions.

This may be an alternative solution to the above assumptions. Since mapping interactions generally include the detailed specification of multiple design parameters, they are perhaps most likely to cause interference with other design parameters. One could decide to focus on these interactions in particular when searching for ‘coupling’ of building blocks.
Including considerations of sequence.
The current types of interactions take no direct account of time or sequence. In order to
capture the specific sequence of how a company works, the taxonomy of interactions
presented here may be added to a traditional DSM approach. Interactions between designers
(exchange of information) can be enriched by also specifying the type of interaction between
the building blocks they refer to.

Adding considerations of planning.
Within this analysis it is argued that a global constraint interaction causes no system-level
coordination as long as the teams achieve the goal and satisfy the constraint. However, there
is no mention of whether that would take a day or a year. Hence failure of a team may also
occur when they exceed the time limit, which in turn causes additional system-level coordi-
nation. This is not modeled in the current taxonomy. Conceptually speaking the same applies
to cost and quality variables.

Enhancing the types of interaction by including probability of failure or slack.
These aspects turned out to be important in explaining the amount of system-level coordina-
tion involved in functional and global constraints (see the discussion in the previous
chapter). These issues play a leading role in Galbraith’s theory. The downside of adding these
features is that the taxonomy becomes more complex and less objective. What is a probability
of failure, and what is slack? These factors are probably strongly dependent on the personal
opinions of the interviewees.

Changing the approach from retrospective to predictive.
Using the strong theoretical foundation for the interaction types, it would be nice to find out
the extent to which it is possible to predict the amount of system-level coordination that is
required for specific types of interactions between building blocks. Perhaps the above remark
including probability of failure will prove of additional value here. Constructing predictive
models is generally seen as the Valhalla of scientific modeling, but very few models actually
manage to be predictive (Smith & Morrow 1999). This approach may do better. However, we
may have to accept that prediction is very difficult within complex environments as the
following (anonymous) quote indicates: ‘The tragedy of life is that we understand it by
looking back, but have to live it in the future.’

7.2.3 Alternative interpretations
In addition, the role of types of interactions can be applied to more than just coordination.
Here are a few options:

Elaborate the role of power as a cause of an interaction structure.
The description of the contingencies behind the interactions also covered the high priority of
styling that caused many interactions. In fact, these interactions are the result of a trade-off
between all the wishes of the various departments. Many trade-offs can be founded on logical
grounds, but others may be the result of the relative power of the departments. What happens
to the structure when the production manager has the most power within the organization? It
would be very interesting to examine the division of (personal) power among the various
decision makers within a company and to compare this to the interaction structure. This
would provide a very different perspective on the architectural literature.

Examine the social aspects of autonomy.
The role of focus on interactions has been discussed above. Several designers in the shaver
project team mentioned a ‘high’ focus on internal interactions and a ‘low’ focus on external
(system-level) interactions. Sosa and Eppinger also mention this aspect in their study. Based on clear interaction constructs, it would be interesting to study the social and psychological influence of the autonomy of design teams or workers. This type of research is quite common within social science but not that based on product architecture. Similar studies have been conducted in socio-technical research within production environments. This involved the construction of semi-autonomous production cells associated with assumptions of higher satisfaction on the part of the workers. This type of research does not yet seem to be available within product development literature and the proposed taxonomy of interactions would be a good starting point.

- Examine the appropriateness of ICT solutions as a coordination mechanism.

One of Galbraith’s strategies is to increase the information handling capacity by instituting ICT solutions. Similarly, digital solutions are currently very popular. Some researchers have gone so far as to propose substituting direct human exchange of technical information with remote ICT. Others stress the use of information systems as the universal solution for the coordination problem (Lutters 1998). Given the findings of this thesis, particularly the mapping interactions, it would be extremely interesting to investigate for which type of interactions ICT applications would be an appropriate coordination mechanism and for which it would not. The study by Novak and Eppinger discussed above argues that companies with integral architectures can better design their products in-house in close collaboration and leaves the strong impression that not all interactions can be handled remotely.

Furthermore, issues like standardization, engineering change orders (Terwiesch & Loch 1999) outsourcing (Novak & Eppinger 1998), Knowledge management (Sanchez 1999a) can all be further explored using the proposed taxonomy.

7.2.4 A guide to design new architectures

The taxonomy of interactions introduced here is able to generate options to manipulate an existing architecture. It does not, however, contain a framework to construct new architectures that take all aspects of the business into account. Within the literature, a number of top-down frameworks have been developed to support firms in their choice of architecture for a product that will help to achieve the overall performance targets of the firm (Erixon 1998) (Ishii 1997, Ishii 1998, Blackenfelt 2000). However, these top-down approaches have to deal with a wide diversity of relevant factors, complicating a well-considered choice of architecture. An extension of this approach may be to maximally apply established knowledge of an existing architecture in order to contribute to the selection of an adapted architecture. Based on the representation of an existing architecture it is possible to devise an approach that considers the overall effects of small changes to the established architecture. In effect, the combination of an approach that takes the existing situation as its starting point combined with a broad knowledge of the models that take the ‘should-be’ architecture into account, would probably be helpful in guiding the painstaking process of changing established architectures in the right direction. Recent papers reveal somewhat similar approaches (Martin & Ishii 2000), and a very recent dissertation by two colleagues in Groningen has produced promising results in its application to steam irons (Burgsteden and Wobben 2001).

7.2.5 Broadening the scope of the taxonomy

It was mentioned in Chapter 3 that the interaction constructs of classical organizational
theories need some update to be of more practical relevance. Therefore it is worth exploring how the interaction constructs proposed in this thesis can be applied for e.g. an hospital. In such a case, the functions and solutions of the hospital need to be defined and needs to be investigated how the structure results in specific dependence and need for coordination between organizational units. As being a researcher at the faculty of Management and Organization, broadening the scope of the taxonomy seems a very attractive idea.