

## **Deliberately changed boundaries as a means for analyzing business decisions**

### **A work-in-progress paper for the 26th IMP Conference**

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#### **Abstract**

This paper takes industrial network theory as its starting point. It argues that when dealing with business decisions, managers often need to deliberately change their analytical boundaries of the system they are viewing in order to improve the way that activities are structured and resource collections are set up and developed. IMP theory is ambivalent in dealing with this challenge. On one side, IMP theory is naturally more interested in relationships between companies, and as such not very interested in boundaries; changing or not. On the other hand, IMP theory with its battery of theoretical concepts regarding activities, resources, relationships and networks is well placed to deal with such a discussion. We therefore suggest that managers use a practical adaptation of the ARA-model as their basis for understanding their “small worlds” and how they meet up with other manager’s “small worlds”

The authors show two cases to support that managers are deliberately managing their analytical boundaries when dealing with important business decisions. The cases are also analysed to show how this is done, and how the managers use these analyses in the ongoing work in improving activity structures and resource collections. At the end of the analysis, a corresponding ARA-model analysis has been used to show how the managers could have approached their challenges when dealing with the business decisions in the cases.

The authors finally argue that research should be performed within the IMP tradition to develop a conceptual toolkit for how such deliberate boundary change can be done, which includes the concepts of network pictures and the concepts of activities and resources..

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### **Introduction**

Boundaries are a strange phenomenon, and in the opinion of these authors, not very thoroughly discussed within the industrial networks theory. Although there are academic works discussing boundaries, and in particular with papers related to the activity concept, boundaries have been understudied within the tradition. There are, of course, reasons for this. One of the main reasons is that boundaries tend to indicate separation between two entities, whereas the industrial networks paradigm is more used to discussing connectedness, relationships and interaction between different elements. Thus, boundaries may be seen as representing a juxtaposition to some of the most cherished ideas of the industrial networks theory.

We start with observing that boundaries are useful in that they allow “closure” of a part of a system. This closure allows actors to judge the productivity of the said system through systematic application of mathematical tools to information gathered about the system. In particular, one boundary has been used for this purpose, and that is the firm boundary. By applying strict boundaries in the form of legal definitions of the responsibility of a firm, a closed system has been created, and numerous accounting tools have been developed to express the state of this system. Although the firm boundary and the use of accounting tools is the main use of boundaries for “closure”, the principle can be applied much wider than this. Any system where closure can be achieved is open for in-depth analysis of the performance of the system. This is perhaps one of the most useful properties of a boundary, and one we will explore in this paper.

To get more information about this area, we have adhered to traditional IMP methodology and tried to look at what actual managers (actors) do when they handle important business decisions. We illustrate our argument with two cases which deals with typical business activities; supplier selection, product development and competence development. The cases show clearly that the involved actors think in terms of economic performance as they deal interactively with other actors when performing these activities. In fact, even though there are few well-respected tools for doing accounting and productivity analysis across companies, the involved actors nevertheless get by with a number of rules-of-thumb and partial optimization procedures and seem to act with the underlying conviction that the interaction is necessary in order to achieve a higher economic performance. It is also possible to trace techniques and tools from traditional accounting in the way that the actors attack the problems.

We try to use these cases to show that business actors even today actively change the boundaries around their “business system” in specific decision situations in order to be able to use well-known tools for analyzing the performance of the system. In particular, they switch between what we recognize as three “levels” of analysis; single actor analysis, relationship analysis and network analysis (albeit in a limited form). We thus propose to study these processes more closely in order to help business actors to do such analysis, and believe that this requires more research on two central concepts and processes:

- 1) to be able to deliberately change boundaries between levels of analysis to allow accounting tools and methods to be used on other systems than within the traditional firm boundary.
- 2) to be able to add accounting tools founded in the understanding of heterogenous resources and multiple possibilities for forming resource bonds and activity links in the space between companies

We believe that the industrial networks theory is well suited for this research task, since it already contains many of the concepts needed for such a research agenda, such as actor bonds, activity links and resource ties. The concepts developed in the ARA-model also encompasses a natural way of changing the level of analysis from individual firms to relationships to networks, a flexibility well suited to the thought of deliberately changed boundaries. The final part of the paper thus sets out what such a research agenda could do.

### **Theoretical basis**

Boundaries are useful entities. They can be used to limit a system, which can then be analyzed in an organized way. Boundaries thus allow us to delimit parts of a larger system, in order to understand better some of the mechanisms working inside this system (Torvatn, 1996). The drawback to boundary setting is, of course, that any kind of boundary setting runs the risk of leaving out of the system important contributors affecting whatever it is that we want to analyze within the system. In fact, many people will argue that boundaries around a system always systematically cut across important dependencies which determine the workings of the partial system we analyze.

Industrial network theory is based on the idea of interaction being a very important part of doing business. This was observed in many studies of business managers and is expressed as follows: *“These studies provided support for the empirical observation of interaction as a significant part of business and organizational life”* (Håkansson et al., 2009, p16). Industrial network theory development has then been a voyage into finding and expressing the importance of this interaction in conceptual terms. Built as it is upon the idea that business life consists of interacted relationships between actors, and not what is going on inside the actors themselves, means that the theory has a very ambivalent relationship with the concepts of boundaries.

On the one hand, boundaries are seen as unnecessary, and even detrimental, since they cut across the critical relationships which constitute the interaction so dear to industrial network theorists. This means that in certain contexts, even leading theorists of the perspective treat the concept of boundaries with arguments coming fairly close to disdain. For example, in describing what they see as the main view of business theory, Håkansson et al. (2009) claims that *“This view assumes a clear boundary between the company and its environment: Whatever is outside the ownership and contractual control of the firm, is, by definition, in the uncontrollable market”* (p165). Later on the same page, the view is expanded: *“The boundaries of the company are clear and distinct within this perspective and they provide the basis for how the company should relate to others”* (p165). Finally, on p177 when describing how this main view influences accounting, we can read that *“Consequently, there is a need to establish a clear boundary line and this is very much in accord with the distinction between the hierarchy within the firm and the market that characterizes the environment in the market model.”* In these two excerpts, we read a strong resistance to the concept of boundaries, as the concept is seen to be an integral part of a view of management that the industrial networks theory does not believe in, but instead has sat as its goal to challenge.

However, later in the same book which in many ways is a summary of the state of the art of IMP thinking, more conciliatory views can be found. For example, the authors claim that in order to assess relationship value in a better way, *“...we are likely to see the development of more qualitative assessments of micro- and macro-position within a network, rather than with simpler views of market share, margin of operating profit.”* (p207). Similarly, when discussing a knowledge view of boundaries, Håkansson & Gadde (2001, p130) concludes that *“Knowledge*

*has no clear boundaries regarding content. The boundary can instead be perceived as the signals going out from the company or its knowledge surface as viewed by other actors.*” Both these views can be translated into an understanding that boundaries will still exist, but they need to be drawn in different ways in order to capture and analyze other variables than those linked to the traditional firm boundary. The arguments about network pictures, as well as the concepts of “small worlds” and “greater worlds”, as a basis for how a manager chooses to act are also in essence inferring the existence of boundaries of a sort.

Among IMP researchers, those who have dealt with boundaries in a more direct way are usually linked to the activity perspective or to the accounting field. With a basis in the activity perspective, Torvatn (1996) and Dubois (1992 and 1998) have tried to point out how boundaries can be used effectively in a network (Torvatn 1996), and identified different types of boundaries which may be of relevance for networking managers (Dubois, 1998). Within the accounting field, Håkansson and Lind (2004 and 2007) have also touched upon how accounting tools can be used in networks, and points to how this requires boundaries, but set differently than the traditional firm boundary.

Nevertheless, boundaries have not been a central concept within the tradition, and we assume that the main reason for this is that the concept has been linked too closely (in theory and in use) to the main paradigms of business thinking, which centers around the idea of the firm as a separate identity facing an impersonal and competitive market. The authors of this article believe that this means the concept of boundaries has been shortchanged. The concept deserves more attention than that, and should have a place in the industrial networks theory.

We do agree, however, that for the concept to be useful, it needs to be separated from the idea of the firm boundary as a particularly important boundary. As long as the concept is linked to this tradition, it will not be of great importance to industrial network theorists. Many other traditions have recently struggled to develop concepts that take other points of view than the firm boundary. For instance, in logistics, the now well-developed concept of supply chains and supply chain management is in many ways an attempt to develop a boundary different from the firm boundary with which to analyze the production and delivery of goods and services. This field of thinking has also pioneered a concept such as “total cost of ownership” which leads in the same direction. The accounting field has concepts such as “Balanced scorecard” (Kaplan and Norton, 1992), “Open-book accounting” (Kajuter and Kumula, 2001) and “customer accounting” (e.g. Lind and Strömsten, 2006), the marketing field has contributed the value-chain concept (Porter, 1980) and “key customer management” and the recent field of environmental management has contributed concepts such as “cradle-to-grave-analysis”. All of these concepts are similarly at least partly successful attempts to analyze systems with different boundaries than the firm boundary.

We believe that industrial networks theory, with its well-developed concepts on interaction and relationships, should be in the forefront in this development. Few theories are better prepared than ours to account for diverse and flexible ways of defining boundaries. So far, one of the most developed discussions within the industrial network theory of this kind is found in Dubois (1998), where several alternative boundaries to the firm boundary is discussed. For example, she shows how the case company can benefit from thinking about boundaries such as the “standard-specific” boundary.

We would like to continue this work and try to discover more examples of boundaries different from the firm boundary which may be relevant. However, relevant seems to be a crucial word here, and relevance is always in the eyes of the beholder. Thus, we have decided to look at what managers actually do when faced with what they perceive as critical challenges which they need

to handle. We have therefore chosen typical such challenges; choosing a supplier, outsourcing and product development, and look at how these challenges are handled in terms of whether the managers involved apply a deliberate change in boundaries in order to analyze the situation, and if yes, how they do this.

For analytical purposes, we will return to the ARA-model proposed in Håkansson & Snehota (1995), because we find the three level of analysis; firm-relationship-network (figure 2.11, p45) to be useful. We will therefore set out to look for practices where managers can leave the firm boundary and the firm level of analysis in favor of a relationship level of analysis, or perhaps even an analysis comprising more of the network than just a single relationship.

To be specific, we propose that managers could adopt a starting point where they draw a map of important activities and resources in their “small worlds”. Such maps would show activity structures and the central resources currently exploited by these activities. When meeting with other managers (within the firm or outside of it), this map is expanded by adding resources until the maps of the two (or more) managers involved in the analysis “meet”. This allows the managers involved to discuss how activities controlled by one of them interact with those activities controlled by the other(s). By mutual agreement, a boundary can be drawn around those activities in this structure that the managers feel are relevant to the issue at hand, and the managers have created a boundary which is relevant to the decision they are facing, and at the same time allows the use of formal methods for evaluating current efficiency and productivity of the activities within this boundary.

Such a procedure would be akin to the activities-resources-actor (ARA)-analysis proposed in Håkansson & Snehota (1995), albeit less formal and perhaps also less extended. The advantage of using activities and resources is that this framework is structured so as to be independent of firm boundaries, since these are a feature of the actor dimension, and not part of the other two dimensions.

Once the ARA-analysis is carried out, the managers are returned to a more familiar situation where they have a bounded system where formal analysis can be carried out. One part of economic theory, accounting, is very strong on this kind of analysis, and in particular, when it comes to analyzing one particular type of boundaries, the legal firm boundary. We do, however, propose that this analytical framework allows us to use some of these powerful tools to analyse other boundaries as well.

### **Methodology**

This is mainly seen as an exploratory paper testing out some conceptual ways of dealing with boundaries. The idea for the paper is based on empirical observations made in two cases where the authors have discussed with managers in the field how they approach certain decisions which need to be made regarding employment of resources and/or activities related to the companies in the example. This makes the study partly inductive, in the sense that the empirical material has inspired a theoretical discussion which was not thought of in advance.

Two such descriptions are included in the paper as the empirical material. As such, it can be seen as a case study with several cases, but the reader should be aware of the fact that none of these cases were made with this particular article and the challenges it discusses in mind. As such, the cases should perhaps be considered secondary data, as they share a number of commonalities with secondary data. Nevertheless, we believe that they illustrate the concepts we discuss very clearly, and that their content is relevant to the concepts being discussed.

The presentation of the cases is done based on the researcher understanding of the context of the decision. As such, it is neither meant to be the whole truth about the context nor the truth as seen by the actors who have given the information for the cases. The first point does not concern us very much, since we do not believe that such a “truth” is both impossible to reach and irrelevant to action since it is not held by any of the actors involved. The second point is, however, of great importance. We believe that each actor involved in processes such as those we describe use their “network picture” (Ford et. al., 1998) as a starting point for their actions. As such, it would have been better from a methodological point of view to give you as a reader all the separate “network pictures” of the actors involved in the cases, so you could make up your own mind about the situation. We feel, however, that this would severely transcend the space available in such a paper. It is for this reason that we have instead chosen to serve you a researcher’s view of the cases, where information from the different actors have been processed into a holistic presentation of the context, focused on the concepts we will later deal with in the discussion. As such, the presentations of the cases already contain a certain amount of analysis.

## **Empirical examples**

### **Example 1: SIEMENS ELEKTROVARME: A case of choosing a supplier for a central component**

The Norwegian firm Siemens Elektrovarme (later referred to as SE) is situated in Trondheim, Norway, and has for a long time manufactured electrical heaters for private home use. Their purchasing situation has been characterized by a gradual increase in the purchasing costs, as successive generations of their main products have outsourced more and more of the product. At the time of the case (late 1980’s, see Torvatn 1996 for a more comprehensive presentation of the case), their product-related purchasing costs amounted to 60% of sales. The ten most important suppliers in volume constituted almost 60% of the purchasing cost, with the three largest suppliers contributing approx 12, 10 and 10% of the total. Two of these three suppliers were long-term suppliers of the two central technological components of an electrical heater; the heating element and the regulating mechanism.

In the late 1980’s, the digital revolution had finally arrived in the home appliance industry (which electrical heaters are a part of). SE had decided to join this revolution and change from mechanical regulating mechanisms to electronic regulating mechanisms in their heaters. For most of its existence, a long-term relationship with a German firm had supplied SE with mechanical regulating mechanisms, but now a question arose, who would supply the new electronic regulating mechanisms?

The purchasing manager, the production manager and the CEO all sat together to discuss this question, as it was felt to be of great importance to the company. As mentioned shortly above, the regulating mechanism constituted almost 10% of the total purchasing costs, so the component was economically of great importance. However, the component was even more important from a technological point of view, as the regulating mechanism is the customer’s “interface” with the heater, and it was important to use this possibility to expand the customer’s possibilities to control his or her home environment through being able to change the heat settings according to changes in the use of the rooms where the heaters were installed. Finally, SE was used to having long-term relationships with the suppliers of their main technological core components, so the question of choosing supplier for the electronic regulating mechanism was thought to be a choice the

company had to live by for at least some 5-10 years, and thus a decision of great strategic importance.

Some preliminary searches by the purchasing manager quickly narrowed the field down to two possible suppliers. The German supplier which currently supplied SE with mechanical regulating mechanisms, also worked on an electronic regulating mechanism, and they were eager to keep SE as a customer. The other possibility was Siemens Telecom (ST), a producer of electronic control systems for the telecommunications industry. ST had a production facility in Oslo, Norway which could also produce the components necessary for the electronic regulating mechanism for SE's electrical heaters. ST was also part of the same industrial conglomerate as SE, Siemens Norge AS, which gave SE some possibilities in term of priority and co-operation.

The purchasing manager then made in-depth discussions with both possible supplier, discussing different themes in quite some detail, including product design processes, technical development, product quality and performance, product specificity (for SE and its products and production process), volumes and technical support, in addition, of course, to price pr piece delivered. It quickly became apparent to the purchasing manager that there was very little difference between the two potential suppliers in what they were prepared to offer.

The three managers from SE discussed this, and decided to expand their search for differentiating factors between the two possible suppliers. Now, they decided to also include logistics issues, such as cost of transport, possibilities for just-in-time deliveries, delivery precision and component storage. Here, the Norwegian supplier ST had an advantage, since transportation distance from Oslo to Trondheim was significantly shorter than from the German supplier's production facility. This made for cheaper transportation, higher delivery precision and better possibilities for just-in-time deliveries, making storage at the production facility in Trondheim almost superfluous.

Based on this analysis, SE chose ST as the supplier for electronic regulating mechanisms and started this new relationship with a successful product development process where engineers from the supplier and from SE together designed the details of the component to be purchased from ST.

Four years later, when the original case was written (1992), SE was still very satisfied with the relationship. When I talked to the manager responsible for the SE customer relationship at ST, he agreed, but also had his reservations. "Everything is fine with the relationship with SE...", he said, "...but the product they buy from us is based on very old technology [in reality only three years old, but changes happen fast in the electronic industry... authors remark]. Many of the circuits used in the original design are no longer available on the international market. They have long since been replaced by higher performance circuits and we have been forced to buy a stock of the old circuits to use in our delivery to SE. We don't really know what will happen when we run out of these components. We have tried to get SE to upgrade their design, but they feel no need for such an upgrade. Apparently, they don't need that to deliver to their customers, as the existing product has more than enough performance for their use. Even the production facility we used for their product has become a problem. When we started, we used this production line for all our electronic motherboards, but now only the product for SE and a few other products are used by this line. We would have closed it down if not for the relationship with SE."

## **Example 2: Edsbyn's Electric Table: a product developed out of business relationships**

Edsbyn is one of Sweden's most established furniture producers, specialising in office furniture of laminated wood, such as tables and shelf- and drawer-systems. In 2003 the company had a turnover of 300 million SEK and employed 250 people. One of the most important products in its range was the so called "Electric Table" (see figure 1), a product with a particular functional feature, that is, the *adjustable height* of the table surface, achieved thanks to an electric engine and a series of pistons.



**Figure 1: Edsbyn's Electric Table**

### **Focus on the product and on the classical market: restricted development opportunities**

However, just four years before 2003 this product was not even in Edsbyn's catalogue and was produced only in very limited amounts as a reaction to very occasional customer requests for a solution addressed to people with back injuries who needed the possibility to change their working position from sitting to standing. During the 1980s these electrically adjustable tables were produced in almost artisan-like fashion and sold at very high prices (over 30,000 SEK) with healthy margins, but in very low volumes (a total market of 100 pieces per year in Sweden): in the 1980s the product was basically a sort of medical or rehab device largely paid by the Swedish healthcare system, with minimal stimulation to reduce its costs.

Things started changing in the 1990s when Swedish regulations made employers liable to pay the health and rehab costs for the work-related injuries of their employees. Large employers signed therefore agreements with private insurances who required them to screen their employees and take preventive measures, such as purchasing electrically adjustable tables for office workers risking back injuries. The result of this trend was that the total Swedish market increased in the mid 1990s to about 1,000 units sold yearly, with prices decreasing to just over 20,000 SEK due to increased competition and scale economies. However, margins per product were still high and

there was no stimulation to start any extensive development of the product that could turn it into a large sales product, also because it would have been very risk to try to reposition a high-price “medical” product into a low-price mass market product.

### **Focus on a key customer relationship for developing the product**

The stimulus to entertain a substantial development of the Electric Table came instead from a specific customer, Ericsson Microwave System, a company with very special work-organization requirements. In 1996, this large Ericsson unit (over 5,000 employees) contacted one of Edsbyn’s main distributors, SENAB, in search for a solution to refurbish their offices: Ericsson MS major problem was that since they had adopted a project work form, their engineers, after a technical project was concluded, had to move on a new one and to physically move their office equipment consisting of their desks, chairs, shelves and computers. Personnel rotation and physical movements involved yearly almost 20% of Ericsson MS workforce. Considering the inconvenience and the time lost for each transfer, a lot of working hours were lost: 3 full days of work on average. This accounted for extra costs of almost 17 million SEK per year. A new furnishing solution, based on increased flexibility for personnel rotation, was therefore badly needed by Ericsson.

It was in this context that Edsbyn and SENAB came to Ericsson with a particular suggestion: their solution was based on having working stations for each employee consisting of a chest of drawers on wheels and an electrically adjustable table, with specifically redesigned tabletops fitting the needs of Ericsson engineers. While the chest of drawers on wheels could move along with the employee, the electric table was to stay in place and be adjusted for the new employee joining the project room. It was calculated that this solution would reduce the time required to move an employee from 3 working days to just three hours, with minimum disruption of work and inconvenience. Ericsson found this solution very attractive, but they viewed the refurbishing project as an investment which should also yield actual savings, beyond reduced moving costs and considering also the large upfront investment to purchase a total of 5,000 electric tables. Ericsson set therefore a goal to save about 13 million SEK in three years. This constraint set the maximum budget for the Ericsson project at about 42 million SEK, which meant a maximum prize for each electric table of about 8,000 SEK.

### **Focus on the network for finalizing and launching the product**

While Ericsson positive reaction was very good news for Edsbyn, this price cap could become a major problem because the purchase cost for Edsbyn of only the key component electric stand (see figure 2) was already well over 14,000 SEK. It was therefore very important for Edsbyn to obtain a reduction in the cost of electric stands that they purchased from their sole supplier Swedstyle. This company had a long history of producing this key component since 1986, but it had never produced large amounts and its weekly output was between 10 and 20 units in 1996. Moreover, the high margin obtainable and the small market size until this point had been acting as a constraint to developing this component and making more efficient its production. *However, with Edsbyn giving a concrete and solid proposal to deliver to an actual customer as many as 5000 products, the situation had changed dramatically.* Therefore, Swedstyle accepted to engage in an extensive redesign and change in the construction of its electric stand: the major cost-saving development was reducing the number of subcomponents from 150 to just 50. This change had a great impact on final costs for electric stands. After the development conducted at Swedstyle, in

1998 Edsbyn was able to offer Ericsson a price of only 7,000 SEK for each table, which Ericsson immediately accepted.



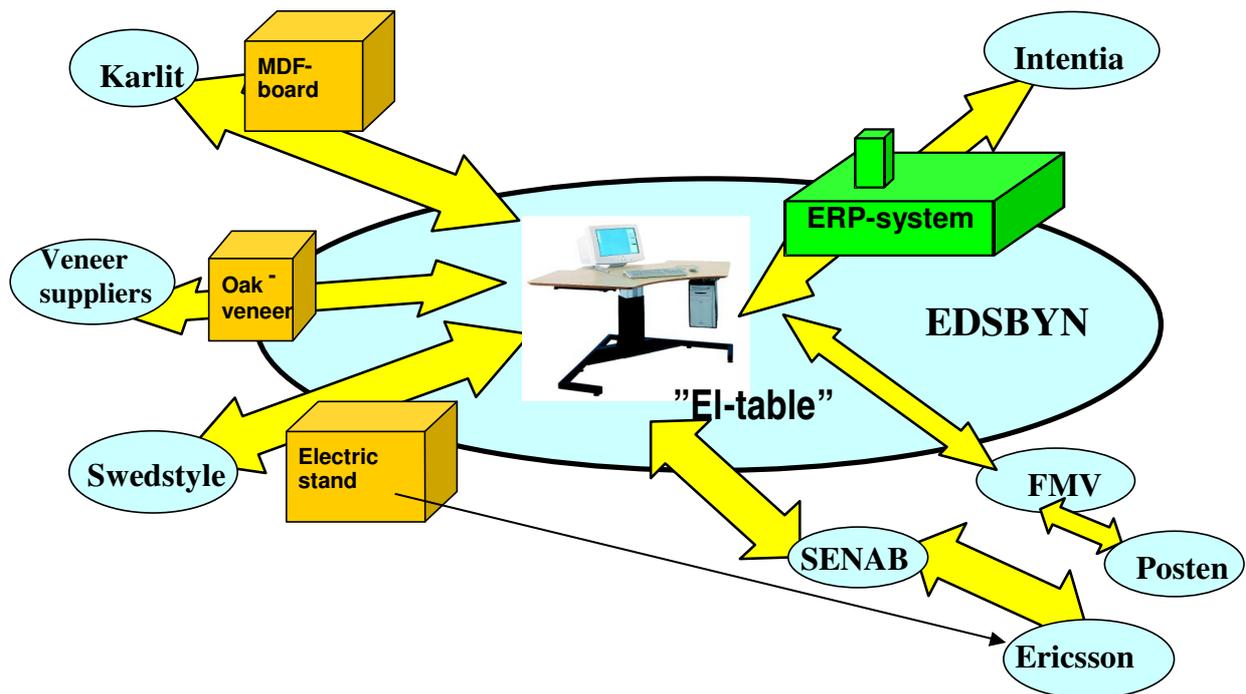
**Figure 2: An electric stand for the electric table**

#### **Focus on the network for further developing the product**

Finally, in 1999, Edsbyn officially launched via its catalogue the Electric Table as a standard, although customizable, product available to all its customers. All Edsbyn's distributors were engaged in the launch campaign and during the first year almost 1,000 customers showed interest, with sales of more than 2,000 pieces. The market success of the Electric Table continued in the following years and was beyond Edsbyn's expectations reaching in 2003 12,000 units sold, for a turnover of about 80 million SEK, that is, 25% of Edsbyn's sales. Swedstyle too was able to capitalize on the success of this product and went from a weekly output of 20 electric stands in 1996 to as many as 500-800 pieces in 2003. There is no doubt that the network of actors (Edsbyn, SENAB, Ericsson and Swedstyle) who are behind the development of the Electric Table created a real market for this type of products in Sweden: in fact, in 2003 the total market had reached 40,000 sold units per year (starting from about 1,000 in the mid 1990s).

Several other producers launched their own simplified and inexpensive electric tables (for instance Kinnarps), but Edsbyn remained one of the main players, with about 30% market share. But to keep sales, it was and still is important for Edsbyn to develop and refine further details of the product in order to address other cost- or service-related issues. As customers of Electric Tables not only increase exponentially in numbers but also became more and more heterogeneous it became important to act along two lines: (1) to increase the efficiency of the whole ordering and delivery process of Electric Tables, all the way to customer locations and (2) to expand the product range by including many new variants and possible combinations of tabletops and stands, as well as varying degrees of customization. In turn, these two development avenues required

Edsbyn to engage a growing network of other actors in order to introduce all technical changes required (see figure 3).



**Figure 3: The network involved in developing Edsbyn's Electric Table**

For instance, in order to make the ordering and deliveries of the Electric Table more efficient Edsbyn had to invest in a new ERP-system, delivered by a new IT supplier, Intenia. In fact, the large increase of orders of this product could not be coped with Edsbyn's outdated IT system. Another issue creating further pressure on Edsbyn's IT infrastructure was the fact that the whole production and delivery process of the Electric Table was much more complex than Edsbyn's other products and from 2001 it would require much tighter coordination and more precise information exchange with Swedstyle. It was in fact in that year that Edsbyn introduced an important change in the logistic flow of Electric Tables to their customers: previously all electric tables had been delivered to customer locations from Edsbyn's premises, but this arrangement entailed often a double transportation of the bulky electric stands (from Swedstyle to Edsbyn and from Edsbyn to the customer) and therefore considerable transportation costs for the customer. Therefore, Edsbyn and Swedstyle decided together to have electric stands delivered directly to end customers, without transiting via Edsbyn. While this arrangement would entail considerable savings of logistic costs, it required to deepen the collaboration and coordination of order management and production scheduling of all Electric Tables between Edsbyn and Swedstyle: it

would in fact have very negative impact if the delivery of tabletops from Edsbyn and of electric stands from Swedstyle would not reach simultaneously the end customer location, causing delays and extra moving/furnishing costs for the customer.

The search of new customers and the possibility to have quicker reaction times on orders made within the frame of large public purchasing agreements (e.g., with FMV) led Edsbyn to reduce the standard delivery time of Electric Tables from four weeks to three weeks. Considering that Electric Tables are always produced to order, this reduction called not only for an internal reorganization of Edsbyn's inventory levels and production processes, but also an external development of at least a couple of key supplier relationships: Swedstyle was involved in shortening their own delivery time, and the coordination with Karlit, the sole supplier of MDF, the main component for tabletops, had to become much closer.

As for range expansions, Edsbyn constantly introduces new shapes and size of tabletops, but needs constantly to consult with Swedstyle in order to verify that a new type of tabletop can work properly with Swedstyle's existing electric stands or if a modification of these stands is necessary and which costs it would entail. The need to involve closely Swedstyle is even greater whenever Edsbyn is invited to fully customize an Electric Table for a specific customer, a trend that was very strong especially during the economic boom of 2000-1. But all these actors need to cooperate closely also when Edsbyn needs to decide which variants of the Electric Table to include in its quick delivery range, that is, products that can be delivered to the customer within 5 days from deliveries.

All in all, by connecting the product Electric Table with this variegated network, both on the user and the supplier side, it has been possible since 1996 to find attractive development opportunities. These opportunities continued appearing within the network around the Electric Table and drove the further economization and expansion of the range for this product, which contributed to making it more and more attractive also for the general market.

## **Analysis**

Analysis of example 1:

First in our analysis, we will turn to the "small world" of the purchasing manager. The total product-related volume passing through his hands in the time of this case was approximately 20 million NOK, and of these, 4 million (20%) was related to the purchase of mechanical control systems. Normally, the manager handled by himself all the purchasing decisions of the company, and thus was very much in control of his "small world". We can relate this "small world" of the purchasing manager to the level of the individual actor, and recognize that the description made in the literature (Håkansson et al., 2009) of an actor's small world fits very well to this manager who was in control of the activity of product-relating purchasing in the case company.

As explained above, the decisions on what to purchase, how much and from whom was normally inside the "small world" of the purchasing manager. However, in the case of choosing a supplier for the new electronic control system, there were several details that made him feel uncomfortable with decision-making solely inside his "small world". It was clear that an important component, the mechanical control, was to be taken out of the product, and a new component, an electronic control was to replace it. This created considerable uncertainty regarding the new resource constellation (Håkansson & Snehota, 195, p45), which needed to be put together. What must the new electronic control look like in order to "fit" with the other

resources? How many other parts also need to be changed, and how can this be done? What can be kept of the existing resources? Based on the answers to these questions, similar questions needed then to be asked regarding the existing activity structure (and the actor bonds). Secondly, it was also clear to the purchasing manager that the choice of a suitable supplier was a decision which would have a large impact on the economy of the company. Partly, this was due to the fact that the control systems constituted approx 20% of the total purchasing costs, but it was also one of two technologically critical components in the product (the other is the heating element) and as such had a great impact on sales and customer satisfaction with the end product, as well as issues related to the production process.

The purchasing manager quickly realized that this change, for reasons mentioned above, was beyond the “rationality” of his “small world”, and thus decided to involve other actors. First, he interacted with other individual actors within his own company, and then he interacted with important individuals belonging to potential suppliers of the control system. What he sought, interpreted in analytical terms, was an understanding of crucial elements of the “large world” within which this change had to take place. This behavior supports the view that interaction is a basis for decision-making in decisions felt as crucial by the managers who engage in them.

Also, we can from this case see attempts by the purchasing manager to consciously shift the boundaries around the system that he views, and it is done for analytical purposes. This is done when the purchasing manager changes from a product/transactional view of the purchasing decision, and to a logistical/relational view. We noted that the purchasing manager first compared the cost and quality of the component between the two possible suppliers, and arrived at the conclusion that there was no noticeable difference between the two. This corresponds to a transactional analysis. However, later he changed to a comparison of the logistics costs, the development costs and the possibilities for just-in-time deliveries between the two suppliers. This corresponds no longer to a transactional analysis, but rather to a relational level analysis. What is analyzed here is really costs and benefits resulting from purchasing the product from a particular relationship partner, and how the choice of a partner affects the possibilities for activity and resource combinations in the purchasing firm.

It is interesting to note that in the way this challenge was handled, there is little trace of the managers involved working to expand the boundary to the network level. The purchasing manager never goes any farther in his analysis than the relationship level. However, the information given at the end of the case shows that such an expansion could have been very relevant. We can see here that the supplier experience difficulties coming from the fast-changing technology in the telecom industry and the fact that this speed of technological change is not at all the standard in SE’s case. The problem is actually starting to affect performance in a serious way, since the manager at the supplying firm mentions that they would have closed down the production line, if not for the relationship with SE. Thus, the relationship to SE becomes a problem because of the need to retain “old technology” and “outdated” components in order to serve SE. The words old and outdated are here paraphrased because they are obviously not objective, but rather situation-specific in that these components seem outdated and old in relation to what other technology and components the supplier works with in relation to other customers. It is also clear that the alternative supplier SE considered using is linked to the appliance industry and not to telecom. This supplier has therefore quite a different situation on the network level and is used to the speed of technological change present in the appliance industry. The problems experienced by the actual supplier as real and creating a problem towards the SE relationship would thus not have been felt by the alternative supplier. In fact, some years later (in 1998), when the researcher involved did a new evaluation of the situation with the purchasing manager, the

supplier of electronic regulators had been changed once again, and the new supplier was, not surprisingly, the supplier with a link to the appliance industry.

As can be seen from the case, the manager involved handled a fairly limited business challenge, and did so by moving his analysis from comparing different products to comparing different logistical situations. In effect, we argue that this represents a boundary change, from a firm boundary point of view to a relational boundary point of view. We also argue that the manager's analysis could have benefited further from taking a network level point of view. Nevertheless, two key decisions were taken by the manager; to voluntarily change the boundary relevant to this decision, and to interact with other external managers in order to gather necessary data about the relational level.

This case was analyzed retrospectively by one of the author's in his doctoral work (Torvatn, 1996). In this analysis, an ARA-approach was used to analyze the purchasing function in the case firm, including the example mentioned in this case, and figures of activity structures can be found in the doctoral thesis (ibid). The manager in this case was interested in the method and found it a powerful tool, albeit cumbersome enough to only be used in the most critical business decisions. The manager also felt that he could have done the analysis himself if he had known about the analytical perspective before the decision was made. While this is no scientific proof, it indicates that the method of drawing activity structures could be employed by managers as part of making important decisions. The trick then is to inform managers that such a method exists and that it can actually be used to voluntarily change the boundaries a manager is dealing with to fit the decision which must be made in a better way.

#### Analysis of example 2

Throughout the 1980s and most of the 1990s, product developers at Edsbyn had applied a traditional "producer-market" boundary in analyzing the application and development potential of the Electric Table. They were focussing on the key ergonomic features of the product and on their high production costs, but also high sales margins, and the logic outcome of this analysis was that this was to remain a niche product addressed to very specific customer needs, namely a rehab and medical device. Applying sound product development principles from e.g., Kotler & Armstrong (Principles of Marketing, 13<sup>th</sup> edition), these product developers weighed against each other the actual and potential product features, Edsbyn's internal strength and the opportunities and risks out there in the anonymous market. Their conclusion, for almost over a decade, was that it would be too risky to reposition this product from a medical niche with high prices to a mass market with low prices: statistically speaking, it seemed very uncertain that enough customers would turn up to buy volumes large enough to cover the large investments required for completely redeveloping this product to reduce its sale price and bring it below 10.000 SEK.

But things changed radically when the analytical boundary of Edsbyn's managers shifted in 1996 from the boundary between their firm and the *anonymous market* to a boundary including a *specific customer relationship*, the one with Ericsson MW. The dyadic interactions with Ericsson provided Edsbyn's product developers with new insights on new functions of Electric Table, new needs it could satisfy and the possibility of very large volumes to be delivered (5,000 pieces). Within the boundary of the Edsbyn-Ericsson relationship, it also appeared that the Electric Table as a resource could be combined in new and very specific ways with the resources on the customer side (employees, teamwork organization and other furnishing elements). The product could namely help build such activity links (Håkansson & Snehota, 1995: 28-30) that could help the customer improving its internal activity structure by eliminating the need of a costly activity

such as moving tables, which required 3,000 lost working days per year. However, in order to completely fit within the boundary of this relationship, Electric Table needed to be developed because its price and costs needed to be cut by well more than half in order for the product to match the accounting system of the customer, who expected to save money from ‘investing’ in the Electric Table.

At this point it became necessary for Edsbyn to expand the horizon of analysis to a third party, because they were not in control of the major cost component, the electric stand, and they did not have the competence to redevelop it internally. Edsbyn had therefore to explicitly apply a *network boundary* wherein also the key supplier Swedstyle had to be involved and mobilized for developing this component. When Swedstyle reduced the Electric Table’s subcomponents from 150 to 50, the end product could fit into Ericsson’s investment plan due to a much lower final price of 7,000 SEK. It is important to notice that the connected relationships within the boundaries of this network played a key role in motivating Swedstyle to do something they had not done for over a decade and would not have been motivated to do in a classical “open market” decision situation: only when facing the nearly sure possibility to sell 5,000 pieces of to-be-developed electric stands via their indirect relationship to Ericsson, did Swedstyle accept to invest time and money to completely redevelop their electric stand to meet Ericsson’s cost target. Eventually, it was a restricted network composed of four companies – Edsbyn, Ericsson MW, SENAB and Swedstyle – who brought together and recombined their internal resources into a new resource constellation within the ‘Ericsson project’ so that the Electric Table could be made fit both the production setting stretching from Swedstyle to Edsbyn and the using setting, including both functional and economic needs of Ericsson.

But the network level of analysis became even more important for the further development of the Electric Table after its official launch as a standard catalogue product in 1999. However, at this stage Edsbyn’s managers were looking at a *network with much broader boundaries* that the four companies involved in the Ericsson project. More actors were included within the boundaries of this network: about 1,000 other customers, logistic partners, other key suppliers like Karlit and many local distributors and assemblers. A network like this included more actors, more resources and activities making it more complex to overview but also offering more opportunities for further improving Electric Table by recombining these resources across the whole network’s resource constellation (Håkansson & Snehota, 1995: 31, pp138-42).

Moreover, a few years after launch of the product Edsbyn’s managers started directing their attention to the activity links within key relationships (with Swedstyle and Karlit) in order to achieve for instance shortened lead times for customer orders. It appeared however clear that solving these issues would require considering a broader network boundary which encompassed the whole activity patterns (Håkansson & Snehota, 1995: 29-30, pp56-9) stretching from Swedstyle and Karlit, via Edsbyn all the way to furniture assembler and final customers. It was within this broader boundary that Edsbyn managed to reorganize the final transportation activities of tabletops and electric stands, which would be performed separately by Edsbyn and Swedstyle respectively, but with the need of much greater coordination in order management, production planning and logistics between these two firms. However, reorganizing the activity pattern across the network became possible only when Edsbyn intervened also at the level of resources by introducing new key resources, namely the ERP system Movex and the relationship with the IT supplier Intentia.

In this case, there are actually several business decision to be made, and they seem to follow in a way that forces the manager to constantly enlarge his “small world” in order to catch more and more complex relationships between activities across a number of firms. Compared to the first

example, the managers involved in this case has to expand their thinking from a firm level to a relational level and further on towards a network level. This is necessary because of the interaction between resources and activities located in separate firms. In this case, as in the first case, managers are able to deal with these challenges, but they seem to lack formal tools to handle the situation.

## Conclusions

In all the examples above, we have seen that managers, when taking real-life decisions they believe is important, do engage in behavior in order to understand some part of the “greater world” that their “small worlds” are embedded in. They try to change the boundaries of the system they are analyzing from the one around their small world, which they know so well, to a system that is larger and incorporates both activities and resources outside of their small world, indeed even resources and activities outside of their firm. In the table below, we have tried to summarize some of the examples from the cases:

Table 1: Summary of examples showing real or possible boundary change

	Within boundary	Actors	Type
Case 1- observed	Production of new component	SE and new supplier	Relational
Case 1- observed	Delivery of new component	SE, new supplier and transport company	Triad
Case 1- possible	Technological speed of change	SE, new supplier, other customers	Network
Case 2 – observed	Delivery of 5000 tables to Ericsson	Edsbyn, Ericsson	Relational
Case 2 – observed	Development of revised table	Edsbyn, Swedstyle, Ericsson, SENAB	Relational, small network
Case 2 – observed	Mass production of table	Edsbyn, Swedstyle, subsuppliers, logistic operators	Network
Case 2 – observed	Shortened lead times In delivery	Edsbyn, Swedstyle, subsuppliers, customers	Network

We believe that these changes in boundaries are deliberate, and part of their behavior. However, it unfortunately also seems clear that the tools the managers rely on in such processes are inadequate and underdeveloped. By helping managers to become even more conscious about such processes, and by helping them to find reasonable alternative boundaries we believe that managers can be made more confident about such processes, and can be able to interact with better efficiency. We suggest that managers apply a modified ARA-analysis as a central tool for this purpose. Managers seem to be knowledgeable about activities and resources belonging to their “small worlds”, so adapting an ARA-analysis will usually mean to merge the “small worlds” of two (or more) managers by mapping out the activities and resources which are in between these “small worlds” into a “larger world” and then discuss how the activities and resources in this “larger world” are related to each other. This “larger world” is actually a description of a system with some boundaries decided not by what actor an activity (or resource) belongs to, but how it is related to (some) other activities and resources which may or may not belong to a different firm. This means that within this new system, this “larger world”, there is a boundary,

but this boundary does not necessarily relate to the firm boundaries. In this new system, it is possible to use many of the formal tools such as accounting tools, productivity measures and even optimization tools wholly or partly.

How can this deliberately changing boundary process be done? First, as shown above, it requires a way to describe a system different from the firm. In this, we propose to use the activity and resource concepts developed by the industrial networks theorists. Secondly, it seems to require an understanding that boundaries are a tool, nothing more but also nothing less. Boundaries are set and used to allow certain types of analytical tools to be used. This must entail to free one selves from the “tyranny” of the firm boundary. The firm boundary is for business purposes in an interacted world, as artificial and tool-like as any other possible boundary. It seems, however, that this boundary in particular loom so large in the consciousness of managers that freeing one selves from this particular boundary is not going to be an easy process. We maintain, however, that boundaries, including the firm boundary, are nothing but tools for managers to understand how their small worlds (which are frequently less than a firm boundary, but at the same time encompass certain crucial external relationships linked to the resources and activities in their small worlds) can fit into a part of the greater world. Any boundary can be used like this, and the industrial networks theory mention several possible such boundaries that are useful for particular kinds of analysis, such as for example the endproduct-related standard/specific boundary mentioned by Dubois (1992 and 1998). Other types of boundaries can be related to different levels of analysis, such as the firm level, the relationship level and the network level (Håkansson & Snehota 1995 and Torvatn 1996).

Perhaps even more important, any deliberate change of boundaries for analytical purposes must necessarily entail interaction with specific counterparts. This is a clear pattern in the observed behavior of managers in the cases we have analyzed. Parallel to the change of analytical boundaries, and in interaction with it, there is an enrollment of actors who know something about elements within this new boundary that is being drawn. This seems reasonable, since actors only know their “small worlds”. Thus, any choice of another boundary for analytical purposes must also include interaction with counterparts whose “small worlds” overlap into the system created by this new and larger boundary. This is necessary in order for the managers involved to obtain the information about resources and activities (and actors) inside this newly created system necessary to perform the analyzes they are trying to make. It is important to understand that this does not necessarily mean that the involved managers have exactly the same view of what a reasonable boundary should be, but they must be able to contribute information about the links, bonds and ties inside the system.

A system where managers get involved in processes where they deliberately change boundaries for analytical purposes will confer certain advantages to the managers. Firstly, they can avail themselves of many of the more formalized tools developed in accounting, economics and optimization theory. Secondly, formal analysis have a high status in business management, and the use of such tools can help those managers who hold a more interactive view of what business is about to reach top management with their suggestions about what should be done when important decisions are made. The minicases show us examples of this, and we believe that even more conscious use of deliberately changed boundaries will allow even more influence to the network view. Most important, perhaps, is that decisions will be better founded since managers who manage to use this system well will be able to understand better the relationships between resources and activities inside their small worlds and resources and activities surrounding them in the greater world outside.

This is not to say that deliberately changing boundaries is a “coloumbi egg”. Far from it. One challenge is that more formal analysis also takes more time and requires more resources to be used. Many problems and challenges managers are faced with are too small for such resource use and should instead be handled by routinisation, rather than particular analysis. Other challenges are too unwieldy, and the problems of identifying a reasonable boundary for the analysis are too large for the process to be used. And in some cases, the system can be identified but the necessary counterparts who would need to be involved to give the analysis meaning, are not interested or does not wish to spare the time and resources for it at this point in time. Finally, there is a methodological danger inherent the method. If any boundary is artificial and arbitrary, who is to prevent a manager from finding the boundary that fits his or her decision, instead of the other way around?

As a summary of this article, we can perhaps propose that boundaries constitute a fourth network paradox. Boundaries are necessary in order to analyze a part of a system, but at the same time, any drawing of a boundary within a network is totally arbitrarily and will always hide the value of relationships working across the boundary and overemphasize those within the system.

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