Project Becoming and Knowing Trajectories

An Epistemological Perspective on Human and Nonhuman Project Making

Doctoral Thesis

by

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For Joachim, Elin and Erik
Abstract

In our ‘projectified’ and ‘knowledge-intensive’ society, industrial projects have been proposed as important “journeys of knowledge creation” or “places for knowledge integration”. To date, such perspectives have mainly used traditional cognitive and contextual theories of knowledge and have thus mostly been focused on human actors and their interaction. However, other research suggests that a) knowledge can be seen as a process (knowing) and b) that projects can be seen as actor networks made by human as well as nonhuman elements.

Combining these two insights, a complementary epistemological perspective is created in this thesis. Drawing from the processual ontological notion of ‘project becoming’ and the actor-network theory notion of ‘heterogeneous engineering’, the processual concept of heterogeneous project making is suggested here. The purpose of this thesis is then to create a processual and interrelational perspective on how knowing is shaped through heterogeneous project making. The empirical basis of this thesis consists of a six-month ethnographical study of an industrial project in the telecom industry that was set up to develop and manufacture a radio base station.

The perspective presented in this thesis suggests that heterogeneous project making can be seen as the continuous shaping of past, present, future and context (knowing dimensions) which in turn shape and relate to a knowing trajectory. The notion of a knowing trajectory implies movement, a path, which is suggested here as elusive, fluent and influenced by the work of many heterogeneous actors, rather than being the result of a (socially or technologically) deterministic process. The perspective developed also conceptualises and illustrates how such a knowing trajectory takes shape. Finally, theoretical and practical implications of this perspective are suggested.

**Keywords:** project, knowing, project making, nonhuman agency, knowing trajectory
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Gävle, April 2009

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CHAPTER ONE

Introduction

“The key to legitimate peripherality is access…”

Lave and Wenger (1991), p. 100, emphasis added

1.1 Legitimacy, Access and Nonhuman Agency

The photo above shows my hand holding a plastic electronic card that has a photo of me in it. As you can see, the card is wrapped up in a plastic holder, which has a blue lanyard marked Ericsson attached to it. I wore this card around my neck when doing a six-month ethnographical study at the Swedish telecom company Ericsson.

1 This chapter is to a great extent inspired by Latour (1995).
2 Ericsson Radio Systems at the time.
If you for some reason had entered an Ericsson facility at the time of my study, no matter if it was a factory or an office building, you would have seen people wearing such electronic cards on a lanyard around their necks. If you had looked around, you would have seen signs telling you to keep the card visible at all times when inside the facilities. At the front gates, as well as at some doors inside the facilities, you would also have seen people putting their cards into small electronic readers, and you would then have seen a little lightbulb on the electronic reader turning green instead of red, after which the door would open up.

**Being without an access card**

When I started my study it took me a while to get an access card. At the time, when I wanted to talk to someone working at Ericsson, I had to call or e-mail him or her beforehand and make an appointment. When I later arrived at the premises, I had to ask the person working behind the desk at the main gates to call the person up, and ask him or her to come down to walk me through the facility all the way to his or her office.

While I waited at the main gate, the person behind the desk gave me a temporary card (without a photo), which had my name and the name of the person whom I was going to meet on it. This card was created in order for me to be identified as a legitimate visitor, but it didn’t open doors. This whole procedure of getting access was rather frustrating since I often got the feeling that I occupied much too much of people’s time. I also dreamed, somewhat naively perhaps, of becoming a ‘true’ ethnographer, one who would be able to walk around among ‘the tribes’ anyway that I wanted, without always being forced to ask for specific appointments.

Anyway, after having discussed my research project with various people at Ericsson (I will get into details later) and been given permission to carry on with it, I asked Bengt, who was then head of the project management department in Gävle and also my main

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contact person at Ericsson, if he could provide me an access card. He said “no problem”, wrote something down on a form and then told me to go and see a woman working in another department.

When I found the woman in her office, I told her that I wanted an access card. She nodded, said yes and took the form I brought from Bengt, read it and wrote something down at her computer. She then asked me to sit down in a chair in her office, in order to get my picture taken. The fact that I wasn’t dressed up suddenly struck me; I was just wearing an old jumper, unflattering glasses (I otherwise often tend to use contact lenses) and – worst of all – having a very bad hair day. Why hadn’t I remembered that the access card obviously meant having my picture taken? Feeling a bit stupid, I rubbed my pale cheeks for some seconds to make them flush a bit and, slightly embarrassed, took my glasses off. The lady didn’t comment. The photo shot was over in a second. “Will this be OK?” she asked me, and pointed at my picture which was shown on a screen in front of us. “I guess so”, I replied. At least I didn’t look grumpy.4

After a couple of minutes had passed, the woman gave me the access card. “You will have to watch something first, though”, she said, and guided me to a room a bit farther down the corridor. Inside the room, there was a chair and a screen. I sat down on the chair, and the lady pushed some buttons. “Just watch this” she said and left. An audiovisual display started and the voice begun to say things about ‘safety’ and ‘ESD’ (static electricity). The voice explained that it was important to wear special kinds of shoes and clothes before entering certain parts of the factory, parts that would be marked with certain

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4 My reasoning here might sound very strange – it certainly did to me when I wrote the text down. Why bother at all how one looks at a photo on an access card? If looks are at all important – why would people bother with how I looked on a card hanging around my neck – if they wanted to know how I look, they just had to look me in the face! I think my spontaneous reaction was based on old experiences, in particular the exciting and yet horrifying process of getting one’s picture taken for the yearly school catalogue, where a bad hair day meant severe embarrassment. There seems, thus, to be something about cameras that makes me relate to them in a certain way. I think this is very interesting, and since it can be related to arguments made in this thesis, I have decided to include this text though it is embarrassing to admit being vain.
coloured stripes defining an ESD-protected area. If one did not wear such shoes, the voice continued, one would cause severe damage to the products produced in the factory. Hearing this, I decided to always use such special shoes and clothes, because the last thing I wanted to do was to damage the products. After the screen had turned off, I took my access card and went back to my office.

**Becoming ‘Someone with Access’**

Having the access card was great. It meant that I could arrive whenever I wanted in the morning, without having to call someone first. I just ran the card through an electronic reader to unlock the gate. Inside the gate, there was a revolving door, where I had to run the card through a reader again, after which the door started to move.

Anyhow, with the card, one might say that I became *someone with access*. This may sound trivial, but it wasn’t. Not for me as a researcher. Besides giving me the freedom to walk around in Ericsson facilities — which enabled me to run into people and events more spontaneously — I also realized that the access card also seemed to open up some ‘mental’ gates. For example, one time I arrived to do an interview with Johan⁵, a product owner working in Kista. I began, as always, to tell a bit more about my study and reassure him that he could trust that I would not spread confidential information of any kind, since ‘Ericsson’ would read⁶ and approve the manuscript before it was to be published. His quick reply was just: “that’s OK, you see, I always trust people wearing an Ericsson access card”.

Hence, the access card was indeed important for me as a project researcher. I strongly felt that with the access card around my neck, I suddenly became someone I wasn’t without it. Now, I could move around more freely and thus also interact with people in a way that previously was not possible. One could thus say that the access card was significant, since it defined me as a legitimate visitor. But at the same time, the access card would not be anything but a piece of

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⁵ As will be described later, I have used pseudonyms for the actors.
⁶ According to a formal agreement, which will be described later.
plastic without me. Thus, in my process of becoming a legitimate researcher at Ericsson, my access card and me must be understood in relation to each other and to other elements such as the gates, the electronic readers, ‘the programming woman’, Bengt, the photo machine, the plastic card and the lanyard. All of these elements can be seen as the makers of each other, i.e. doing the work of defining others. Thus, both nonhumans and humans can here be seen as being co-makers of other beings (human and nonhuman). Or as Latour (2002b) puts it: “Nothing, not even the human, is for itself or by itself, but always by other things and for other things” (p. 256, emphasis in the original).

“Others” refers thus here not only to human others, but also to nonhuman others, such as artefacts. Latour (referring to Gibson 1986) uses a common artefact — the hammer — to illustrate how an artefact is a co-constructor of other beings:

“….thanks to the hammer I become literally another man, a man who has become ‘other’ […..]. This is why the theme of the tool as an ‘extension of the organ’ makes such little sense. Those who believe that tools are simple utensils have never held a hammer in their hand, have never allowed themselves to recognize the flux of possibilities that they are suddenly able to envisage”.

Latour (2002b), p. 250, emphasis added

In the tale about me and my access card, one can understand the access card as acting, since work (the opening of locks) has been “translated”, “displaced” or “shifted out” to the card (Latour 1995, p. 259). Such a notion of agency implies that agency does not need to be intentional or subjective (Landström 1998), which means that both humans and nonhumans are able to act.

This notion also implies that there are two ways to act. Either an actor represents itself, or an actor “speak in the name of actants” (Zackariasson 2003, p. 10). An actant is defined as “…whoever and whatever is represented …” (Latour 1987, p. 84, cited in Zackariasson 2003, p. 10). Hence, the actant “cannot represent itself, but needs an actor to be represented” (p. 10). This implies that both
humans and nonhumans can act as actants, when being spoken for. But while humans can act both as actors (when representing themselves) and as actants (when being spoken for by other actors), “all nonhuman actors are in fact nonhuman actants” (p. 45), since “they cannot represent themselves on the same premise as human actors; they have no voice to make themselves heard.” (p. 45).

In this case, the accesscard can be seen as such a nonhuman actant. The work of this actant in turn contributed to the defining of me as becoming someone with access\(^7\), since when the access card was now represented by others (me, the doors, other humans etc), it meant that I now could act, and was acted upon, in a way different than before.

1.2 Project Making and Knowing

So why is the story about me and my access card at all interesting? Well, in order to clarify this, I will first have to introduce the explicit focus of this thesis. As the title indicates, this dissertation relates to knowledge and projects. While both are ambiguous concepts, they seem to be — separately and together — highly relevant in relation to current industrial practices.

In terms of knowledge, it is often suggested that we now live in a “knowledge society”, i.e. a society in which knowledge is put forward as an important strategic resource that needs to be created and managed (see e.g. Matson & Prusak 2006). Hence, a basic assumption is here that it is crucial for organisations to create knowledge and theories about and methods for how knowledge can be managed and created have been made (e.g. Nonaka 1994). Thus, while theories of knowledge and learning have been put forward for centuries, a “knowledge and learning movement” has embarked more intensively into organisational and management theory during the last decades (Matson & Prusak 2006, p.1).

\(^7\) Of course, there were many other actors also involved in the process of me becoming a ‘project researcher’. I will provide more details in chapter 3.
In terms of projects, it is often claimed that “we seem to be on our way towards a projectized society” (Lundin & Hartman 2000, p. 3) and that industrial companies become increasingly project-based. In line with the knowledge and learning movement described above, some have also applied a knowledge perspective explicitly to projects. When contrasting normative planning perspectives on projects (which merely focus on the execution of predefined goals), project processes have been conceptualised as “constituting problem-solving or knowledge development processes” (Lindkvist & Söderlund 2002, p. 279), project execution has been proposed as being a “journey of knowledge creation” (Engwall 2002, p. 277) and projects have been seen as “places for knowledge integration” (Söderlund 2007, p. 221 my translation). Or as Grabher (2004) puts it, “projects thus indeed appear as a most pertinent form for creating knowledge in the context of application” (ibid., p. 1492, emphasis in the original).

Hence, it seems as if perspectives on projects and knowledge are highly relevant to industrial and academic practices. In the following, perspectives combining these concepts are referred to as being included in a ‘project/knowledge area of research’. In this thesis, I will investigate this area a bit further. The assumption that knowledge is very important in this knowledge society of ours, and that projects can be seen as potential knowledge creators, makes it important to elaborate more regarding the kinds of assumptions that underlie this area of research.

While the area is still very much a work in progress and cannot be seen as homogeneous, some initial reflections can be made. In analysing some of this field’s theoretical contributions, I found that while several interesting and fruitful perspectives exist, we could do much more to enhance our understanding of project/knowledge issues. This is mainly due to two facts: (1) ‘project’ and ‘knowledge’ are both very ambiguous concepts and (2) some commonly used conceptualisations have been problematised lately.

In particular, two potential issues can be outlined. As will be described in chapter 2, much research in this field draws on the
epistemological notion of *knowledge* and focuses ontologically on human participation (human action and interaction) in *projects*. While providing very important insights, such notions can potentially be problematised, contrasted and complemented with other perspectives, as outlined below.

**The first issue** regards the very notion of *knowledge*. While problematising current assumptions about knowledge in organisational theory, which implies an objectified notion, some have instead suggested the situated and practice-based notion of “knowing” (see e.g. Blackler 1995, Nicolini, Gherardi & Yanow 2003). From such a perspective, knowledge is not seen merely as being ‘in the heads’ of individuals, or as being a result, but instead as a social activity not separable from doing. Hence, knowledge can be seen in terms of “a flow . . . of activities”8 rather than “a stock” (Styhre 2007, p. 19 emphasis in the original), if using a “processual view of knowledge” (Styhre 2003, p. 60).

However, while processual notions of knowing seem to be increasingly used by scholars in general, more traditional notions are still often used when explicitly focusing on projects/knowledge. Current epistemological notions have, for example, suggested that projects are “places for knowledge integration” (Söderlund 2007, p. 221 my translation) and that projects can be seen as “knowledge collectives” (Lindkvist 2005). While such notions can be fruitfully used in order to understand knowledge integration (where participants are seen as contributing with different knowledge bases), they might not harmonise fully with the more processual notion of knowing. This is not only due to the obvious difference in epistemological concepts (knowledge versus knowing), but also in terms of project ontology.

The notions above refer to projects as places or collectives, i.e. as a description of what projects ‘are’ or can be seen ‘as’. Hence, they can be described as being based on a “being ontology” (Linehan & Kavanagh 2006). Even a more processual notion that suggests projects are a “form for creating knowledge” (Grabher 2004, p. 1492)

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8 My translation from Swedish.
can be seen as based on an ontology of being (projects as ‘a form’). The notion put forward by Engwall (2002), suggesting project execution as being a “journey of knowledge creation” (with the project ‘being’ a journey, but ‘becoming’ over time) is more processual.

This thesis aims to take an additional step towards a processual perspective and suggest thus instead the more processual notion of knowing. But if a processual epistemological notion is to be used, a processual ontological notion is also needed. Here, I suggest that a “‘becoming’ ontology of projects” (Linehan and Kavanagh 2006, p. 59), which “emphasises process, verbs, activity and the construction of entities” (p. 54) can be fruitfully combined with the processual notion of knowing.

Since I argue that it is important to combine a processual epistemology with a processual ontology, I will in this thesis use the epistemological notion of knowing rather than knowledge and a “becoming” rather than a “being” ontology (ibid.). In contrast to studies focusing on knowledge, knowledge creation or knowledge integration, the focus of this thesis is not on what knowledge project participants have or how they share or create it, nor on results as in ‘what have project participants learned’ or ‘what new knowledge has been created in the project’. Rather, the focus of this thesis is on how knowing, as a process, is shaped through what is here called project becoming (inspired by Linehan and Kavanagh 2006). Hence, the focus of this thesis is not on ‘a project and its participants’ but on ongoing project making in which knowing is inherent.

The second issue regards my notion of project making, and here is where the story of my access card becomes relevant. Lately the importance of including aspects of nonhuman agency when studying projects has been proposed (e.g. Dobers & Söderholm forthcoming; Linde & Linderoth 2006; Linderoth 2002; Lindahl 2003, 2007; Molloy & Whittington 2006). Hence, in terms of the notion of project making, it might be that nonhuman actors also perform project making.
As illustrated in the story of me and the access card, nonhumans can take part in creating legitimacy and access. Thus, it is potentially fruitful to include them when investigating project making, since such action requires legitimacy. Hence, instead of focusing on human action, interaction and knowledge, I here suggest that projects can be seen as being created by many heterogeneous elements\(^9\), i.e. that both human and nonhuman actors perform project making – which implies that they also take part in the shaping of knowing.

In sum, as a contrast and complement to perspectives that focus on ‘projects and knowledge integration’ I will in this thesis develop a perspective that focuses on ‘project becoming and knowing’. By including the notion of nonhuman agency, I will also extend the notion of knowing to include nonhuman elements in the process. Thus, knowing is here seen in terms of “heterogeneous engineering”, i.e. “the successful alignment of human and non-human elements”, as suggested by Nicolini, Gherardi and Yanow (2003, p. 19). Here, I will also use the insight on the significance of access, participation and legitimacy as integrated aspects of learning (Lave & Wenger 1991). These notions are used in spite of the fact that a project cannot be seen as equivalent to a community of practice (Lindkvist 2005). However, even though the notion of community of practice does not fit squarely with that of projects, the negotiation of legitimacy is an important aspect of project work as well (Karrbom Gustavsson 2005).

My use of the notions of access and legitimacy is thus based on the assumption that project making is performed by many heterogeneous actors, who somehow negotiate legitimacy. Therefore, how this legitimacy is created is an important aspect of this thesis.

### 1.3 Purpose of the Thesis

The purpose of this thesis is not to stress the importance of including nonhumans into the analysis, since this has been made by others. I do not want this thesis to become something like a ‘Look, Ma, there is a

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\(^9\) Here, I am inspired by actor-network theory, which will be thoroughly described later.
nonhuman!"\(^{10}\) kind of study. Nor is the purpose to argue that knowing can be seen as a process, since this is no news. Instead, I will here try to develop an epistemological perspective built on a project ontology of becoming, by using both these insights. Thus, the purpose of this thesis is to:

\[
Create a perspective on how knowing is shaped through heterogeneous project making
\]

Exploring this purpose, some important notions can be identified. Firstly, the explicit purpose is to create an epistemological perspective. I use a symbolic interactionist notion of “perspective”\(^{11}\), which refers to “points of view – eyeglasses, sensitizers – that guide our perceptions of reality” (Charon 1998, p. 10), i.e. as “one way of understanding reality” (ibid., p. 12, emphasis in the original). A perspective can be described as being “made up of words – it is these words that are used by the observer to make sense out of situations” and can thus also be described as a “conceptual framework” (ibid., p. 4, emphasis in the original). Hence, this thesis aims to create such a conceptual framework, to enable a novel way of understanding. Thus, rather than aiming to create ‘the’ (most accurate) way of understanding knowing and project making, I aim to create one fruitful way of seeing.

Secondly, three central basic concepts can be identified. These are ‘project’, ‘heterogeneous project making’ and ‘knowing’. The second notion is inspired by the notion of “heterogeneous engineering” (Law 1987). Here, I use this notion to acknowledge that project making is performed by both human and nonhuman elements. Hence, when

\(^{10}\) Being too inspired by the insights of others is always risky. As Czarniawska (2004a pp. 40-41) explains, it is not sufficient just to look for the presence of ‘stories’ or ‘metaphors’ if inspired by such perspectives on organisations. According to her, Solow (1988) once summarized a series of studies on the latter as “‘Look Ma, there is a metaphor!’ studies” (Czarniawska 2004a p. 41). These arguments are relevant here as well – it is not sufficient just to show the presence of nonhumans, or even to simply illustrate what they do – instead they need to be included into the analysis of something else, in this case into the analysis of how knowing is shaped through heterogeneous project making.

\(^{11}\) While Charon (1998) suggests that “people interact over a period of time; out of that interaction they come to share a perspective…” (p. 1), I also emphasise that nonhumans take part of the creation of perspectives (while they do not use them in the same way humans do).
using such a frame, focus should not exclusively be put on humans and their social interaction, since then no pure social or material agents shape projects; instead, human and nonhuman actors perform project making.

Thirdly and finally, by taking these concepts as points of departure the purpose also implies the main research question: How is knowing shaped through heterogeneous project making.

**Outline of the thesis**

The next chapter takes these three central concepts — project, heterogeneous project making and knowing — and discuss them a bit further. Based on this discussion, I will then take the main research question and break it down to four manageable sub-questions. Thereafter, chapter 3 describes the methods I used to create the epistemological perspective. In chapter 4, I address the four sub-questions, by giving them each a subchapter which then concludes with a conceptualisation. Chapter 5 presents the main result of the thesis — a perspective on how knowing is shaped through heterogeneous project making. Finally, chapter 6 discusses the contributions of the perspective developed, criticises the methods used, and finally makes some suggestions for further research.
CHAPTER TWO

Theoretical Framework

This chapter defines and discusses three central concepts that have served as a central frame of reference. These concepts are ‘project’, ‘heterogeneous project making’ and ‘knowing’. The research question is also qualified and discussed and sub-questions are created.

2.1 The ‘Project’ as an Ambiguous Concept

Though projects, as described in chapter 1, can be seen as a common organisational form attracting increasing academic interest, time-limited organising as a phenomenon in practice is not new. The Vikings, for example, organised their trips overseas as time-limited enterprises (Lundin 1998). Organisational theory, however, has primarily concerned permanent organisations (Ekstedt, Lundin, Söderholm & Wirdenius 1999), even though early “enterprise vocabulary was used for time limited efforts rather than for business” (ibid., p. 52). Over time, however, the time-limited efforts came to be located in larger enterprises (Lundin 1998). As an example, the East India Company was at first no permanent organisation. Instead, each trip was regarded as an enterprise in itself, and the trips had different organisations each time (Lundin 1998, Ekstedt et al. 1999).

The company was however later formed in line with changing conceptions of how to organise economic activities. In line with such a development, influential theories and ideas about the permanent organisation were formed during the industrialisation era, and while in practice a “mixture of permanent and temporary organisations was created”, research interests were focused on the permanent (Ekstedt et al. 1999, p. 52).
During the last decade, however, researchers have started to theorize much more extensively about these temporary organisations. Before, literature on what is called project management reflected not so much academic research as normative ideas, methods and techniques on how to plan and manage projects, mainly based on the experiences of practitioners (Engwall 1995). Originating in the 1950s defence industry in the USA, project management evolved from an engineering perspective, largely influenced by ideals of the time including rationalism and scientific management. In the early ’60s, net planning techniques were developed, which then became the breakthrough of the genre (Engwall 1995).

Later, in the early ’90s, Packendorff (1993/2003) reviewed the existing research on projects. He concluded that project research could be divided into two categories, or fields: projects as plans (rationalistic, normative studies on the planning of project organisation) and projects as temporary organisations (theories on social interaction in project organising). Whereas he found much literature in the former field, there was not at all as much to be found in the latter. Thus, studies on such topics as expectations, action and learning in projects were proposed as important future areas of research.

A first obvious question is, of course: What can be defined as ‘a project’? Engwall (1995) argues that the term project is relative and refers to form rather than content. In short, many activities that fit the general definition of a project (in Engwall’s example, a pregnancy) are not called one, while activities called a project might not fit the definitions. Engwall thus suggests that the term project is not one concept, but rather several concepts that have a “Wittgensteinian family-resemblance” to each other (p. 139, my translation). Or as Engwall et al. (2003) argue:

“…close analysis of empirical projects (as defined by the practitioners under study) have shown that the demarcation between the project and its non-project environment is often fuzzy, that there is no single universal quality that distinguishes all
projects from all non-projects, and that the term ‘project’ is used, in practice, with several different meanings”

(p. 116).

Drawing from his research, Engwall (1995) puts forward three different perspectives on projects — as an idea, a venture or a task — of which the two former perspectives draw from a view of an object (the project result *ex ante* or *ex post*) and the third from the viewpoint of an actor (an individual or an organisation) who is given a task to accomplish.

**Projects and boundaries**

Hence, as Engwall (ibid.) suggests, ‘a project’ cannot be seen as an unambiguous concept. One perspective that has been frequently used during the last decade is the notion of projects as being “temporary organisations” (Lundin & Söderholm 1995). Using this perspective, the project as a temporary organisation has been characterised as having a specific purpose, a time frame set up beforehand and a team of resources, which within that time frame undergoes a transformation from a before-state to an after-state. In order for the organisation to be temporary and separate from other organisational activities, it is decoupled from them through “time bracketing”, a process in which the identity of the project is created, and through “partitioning”, a “process of inclusion and exclusion”, where the boundaries of the project are defined (Lundin & Söderholm 1995, pp. 446-447).

Given the temporary character of projects, project boundaries have also been further emphasised. Söderlund (2007, p. 213, my translation from Swedish) in fact suggests that projects can be seen as “the demarcation form of organisation”12. As an example, Sahlin-Andersson (2002) describes project management as being boundary work, i.e. creating task, time and institutional boundaries. She suggests that “project boundary work is *not* in the hands of appointed project managers, but it is dispersed among a much wider group of project facilitators and project entrepreneurs” (p. 259, my emphasis).

12 Original: “avgränsningens organisationsform”
According to her, boundary work as a “rhetorical activity” (p. 259) is “not in the hands of individuals such as managers or decision-makers, but the success of such boundary work is dependent upon many intertwined interpretations” (p. 260).

While all organisations can be perceived as being temporary in practice (since no enterprise will last forever) a difference is that “action in permanent organisations is continuous (no clear beginning or end), whereas action in temporary organisations is discontinuous (organised between beginnings and endings)” (Ekstedt et al. 1999, p. 119). Though not a new phenomenon, this form of organising work has nevertheless attracted much academic interest during the last decade, and a great amount of research has been conducted into various aspects, drawing from various theoretical perspectives13.

**Categorising projects**

While focusing on projects as intended to solve a specific task, attempts have also been made to categorise them and make typologies. For example, when focusing on industrial projects, Berggren (2001, p. 18, my translation14) suggests four main types of projects: research projects, development projects, construction projects and installation projects. In practice, Berggren suggests, there are also “in-between forms”15 of industrial projects, as well as other forms of projects, such as change projects and events.

Another example is Shenhar and Dvir’s (1996) “typological theory of project management”. They suggest a two-dimensional matrix to understand and manage engineering projects. The first dimension is based on the notion of “technological uncertainty”. The authors quote and use Galbraith’s definition of uncertainty as “the difference between the amount of information required to complete a task and the amount of information already possessed” (Galbraith 1977, p. 5 in Shenhar and Dvir 1996, p. 610). Here, they identify four types of

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13 See e.g. Söderlund (2005, p. 153) for an overview of perspectives.
14 Original: “forskningsprojekt”, “utvecklingsprojekt”, “anläggningsprojekt” and “installationsprojekt”.
15 Original: “mellanformer”.

16
projects: (a) low-tech projects (low technological uncertainty), (b) medium-tech projects (medium technological uncertainty), (c) high-tech projects (high technological uncertainty) and (d) super high-tech projects (super-high technological uncertainty).

The second dimension suggested by Shenhar and Dvir is the “system scope dimension”. Here, they identify three types of projects: assembly projects, system projects and array projects. Acknowledging that engineering projects can be categorised by other dimensions (such as industry, size etc.), they suggest that their framework has proved to be “a dominant construct for understanding technical projects” (p. 612).

**Theoretical problematisations**

To try to problematise and/or complement the dominating normative and rationalistic literature of project management and methods, organisational researchers have been working on further developing project theory. Projects are sometimes described as being unique events, elsewhere that they are either unique or repetitive — and yet elsewhere that projects are simultaneously unique and repetitive (e.g. Nylén 1999).

Instead of asking what projects ‘really are’, some researchers base their analysis on how projects are perceived:

"So what is permanent is a matter of how people *conceive* of something as permanent, and temporary is what is generally *thought of* as temporary. The same contention also applies to the difference between what is recurrent and what is unique. What is unique is in fact what is being *described* as unique”

Ekstedt et al. (1999), p. 188, my emphasis

According to Ekstedt et al. (1999), permanent organisations are “slow-moving” in getting things of a non-routine character done (due to routinized, institutional behaviour) and thus “temporary organisations have a distinct comparative advantage over permanent organisations when it comes to action” (ibid., p. 122). A more unique
project is more difficult to evaluate, might not have a fixed end time, and might not be performed by routinized action. Recurring projects on the other hand, are easier to evaluate and to a larger extent performed according to institutional behaviour.

The social turn

This perspective on uniqueness/temporality can be related to several tricky questions about projects. For example, can humans decide (by thinking) that something, here a project, is unique or not, act upon it as if it was and thus make it so? It has been proposed that how the project is perceived is the key issue in terms of how it will be carried out. If the project is seen as unique, it will be handled differently than if it is seen as recurrent (see Ekstedt et al. 1999, p. 57). Or in other words:

“The main thing seems instead to be how you think about the new project as unique or as a clear repetition of earlier experiences. If you think about the new project as repetition, it will in all essentials also become such”.

Lundin (1998), p. 204, my emphasis and translation

The reasoning here relates to what can be called a social turn in organisational research, where organisations and projects are considered not to be something per se – but essentially socially constructed. Ekstedt et al. (1999) suggest that “those who subscribe to the generic idea of a social construction of reality will realise that a project per se can never be recurring or unique and the correct terminology should be that a project is perceived to be recurring or unique” (p. 112). This can be related to Czarniawska-Joerges’s (1993) suggestion that:

“Organizations are socially constructed—and reconstructed—in everyday actions. Organisations can also be destroyed by action, but again it will be a case of social destruction. This does not mean that organisations exist only in our imagination. We cannot ‘wish them

16 Here, they refer to Berger and Luckmann 1966.
From a social constructionist perspective, objects are not seen as having an intrinsic nature. Instead, “the nature of an object is constituted by the meaning it has for the person or persons for whom it is an object” (Blumer 1969, p. 68). This means that “what we see as reality is really a result of perspectives we take on through social interaction . . .” (Charon 1998, p. 36, based on Shibutani 1955).

Adopting this view, people are perceived as social constructors and organisations are perceived as social constructions. It is important, however, to note that most constructionism in this field is not based on idealism. As Czarniawska (2003 p. 131) argues, constructionism “usually does not protest realism, but essentialism, the ‘things per se’” . . .”. But things are, in short, what they are perceived to be, or from a pragmatic view, what they are used as (see Charon 1998).

Important to note here is the focus on the social construction, i.e. that various perspectives are socially developed in interaction between human actors in the lived-in world.

This social turn seem to have influenced rather recent research on projects. The aim of such research seems not to be to provide normative recipes for how to manage projects, but focuses instead on human interaction. In line with such a perspective, the importance of small talk in project practice has been acknowledged (Karrbom Gustavsson 2005), when taking a view of meetings as important places for human interaction and sensemaking (Weick 1995, p. 143, based on Schwartzman 1987 and 1989), and thus being very important in the construction of organisational practice/s.

Others who use a social perspective on projects are Lindkvist and Söderlund (2002), who argue that “the question of ‘what is’ a project may be differentiated from that of ‘what goes on’ in a project” (p. 278). They argue that while there is “considerable agreement” about “what is” a project, there is far less “convergence of views” about “’what goes on’ in projects”. Instead, they suggest that “what the project is about may then differ substantially among the actors
involved” (p. 282 based on Sahlin 1996). This issue has also been addressed by Sahlin-Andersson, who argues that lack of clarity in what a project is about can be seen as an explicit strategy to attract actors’ interest in a project and to facilitate action. In short, if something is expressed unclearly, the space for interpretation is greater. She thus argues that:

“Unclearly formulized ideas, expressions or events that are open to many different interpretations can hold together actors just because they allow different interpretations and therefore allow single individuals opportunities to translate their own personal preferences into them”.

Sahlin-Andersson (1989), p. 69, my translation

Her focus is on interorganisational projects, where she argues that there is and should be a lack of a common framework. Instead, different groups of actors perceive (and act towards) the project differently.

Projects and context

While much literature on project theory and management seems to be focused on, in Engwall’s (2003, p. 790) terms, “the lonely project”, i.e. treating projects as context independent, there are also studies and theories that take project context into account. As Engwall suggests, “no project is an island” and it is important to consider context and history as well (ibid.). Sydow, Lindkvist and DeFillippi (2004) emphasise contextual embeddedness and suggest that “organising projects is a temporary limited process, but projects, as temporary systems, are likely to be embedded in more permanent contexts” (p. 1477). The contextual embeddedness of projects refers not only to the embeddedness of projects within formal organisations. Instead, they suggest that projects are embedded in four levels of context: units, organisation, networks and fields (ibid., p. 1478). Hence, in order to understand the complexities of project organising and contextual embeddedness, “multi-dimensional and multi-level conceptualizations” are called for (ibid., p. 1479, emphasis in the original).
Recent notions such as project-based organisations, project-based enterprises, project-based firms or project-led organisations (see Sydow et al. 2004) indicate that project organising often takes place alongside or subsequent to the organising of other projects. Such a situation is described by Sjögren Källkvist (2002) as a situation where the projects are interlinked in terms of technical and human resources and activities. Thus, there are many interdependencies between resources and activities of the projects that need to be managed (ibid.).

Project ontologies

As introduced in chapter 1, many theories on projects describe them in terms of ‘being’ a place or a temporary organisation. Lindkvist and Söderlund (2002), for example, discuss “‘what goes on’ in a project” (p. 278, emphasis added), which can be seen as an example of such vocabulary. When introducing the term “project ontologies” in order to “‘distinguishing different ways of thinking about what projects are”, Linehan and Kavanagh (2006, p. 52) suggest a “becoming ontology” as a complement to the dominant “being ontology”. Such a becoming ontology “compel us to think differently, to consider a project as an emergent outcome of disparate, ambiguous, political practices” (p. 55 my emphasis). This can be contrasted with a “being ontology” which implies a perspective on projects “as things, as entities, akin to elephants and other organisms, with functions, parts and structure” (p. 53). Such a being ontology also implies a perspective on the organisation as “having goals, knowledge, plans and so on” (p. 53 my emphasis).

Notions of importance for this thesis

This section has addressed the first concept used as a basic frame in this thesis, i.e. the notion of projects. While there has been an increasing focus on projects in theory and practice, the notion of a project is still an ambiguous concept and several perspectives have and can be used. In the following parts of the thesis, I will follow Linehan and Kavanagh (2006), focusing on a “becoming ontology”, rather than a “being ontology”, attempting to further develop a
processual perspective. As introduced in chapter 1, I will focus on the various activities that contribute to what is here called *project becoming*, and thus suggest and use the notion of *project making* – hence focusing on the activities and the actors who contribute to project becoming. This thus contrasts with a focus on projects with participants ‘in it’.

The concept of project making also contrasts with project management, a notion which implies a separation between a manager and an object of management. Here, I instead focus on all the actions and actors who contribute to project becoming, without making an *a priori* distinction of ‘who is managing and who is being managed’. This means also that I make no *a priori* distinction as to who is considered project makers. Hence, actors who traditionally are not seen as project participants, but still contribute to project becoming, can be included in the analysis.

As illustrated in this section, much project theory focuses on human actors and their interaction. But, as suggested by several researchers lately (e.g. Dobers & Söderholm forthcoming; Linderoth 2002; Lindahl 2003, 2007), when theorizing projects, there might also be a need to include *nonhuman agency*. This concept will be discussed in the following section.

### 2.2 Projects and Nonhuman Agency

The second concept that was to be elaborated in this chapter was the notion of ‘*heterogeneous project making*’. Since this concept resulted from my research, rather than being a common notion in project theory, this section is organised a bit differently from the previous section. I will start this section by commenting on some notions on projects, emphasising also material aspects, after which I will discuss the notion of nonhuman agency and its implications.

Though current project theory seems to be inspired to some extent by sociology and social constructionism, there are also other perspectives in use, more in line with traditional project management literature. As
an example, Nylén (1999) uses a perspective on the ‘unique versus repetitive’ issue and asks whether civil works in fact are unique projects or a repeatable process.

Based on extensive empirical research, he argues that though contractors present construction projects as unique, new and separate events, from the client’s view, the projects have very similar features. Arguing the need for limiting what he refers to as failure costs (i.e. costs that are caused by failures), Nylén advocates that civil works are and should be seen as processes rather than as unique projects, since (i) one can then identify and improve the activities that are similar, (ii) the activities that are “really” repetitive but are seen as unique due to what he calls “inflicted uncertainty” can be identified, and finally (iii) the “really” unique activities can be found and handled.

Interesting in Nylén’s argument is that if the project is seen as a process, we can act upon it as such, which he argues as a solution to the failure cost problem. But he also investigates the differences and similarities between projects, since acknowledging them allows for improving the process. In short, he argues that activities that are similar can be improved to be performed more efficiently, and the unique activities need to be identified in order to be handled in a new way. Importantly, such a perspective helps him identify and note important issues such as geographical and technical interfaces between projects.

A researcher taking a related view is Sjögren Källqvist (2002), who stresses the importance of understanding the interdependencies that exist between projects, e.g. in terms of parallel and sequential technical interdependencies. Other relevant researchers here are Lindkvist and Söderlund (2002, p. 279), who focus on social learning processes when suggesting that one can see project processes as “problem-solving or knowledge development processes”. According to them, projects are processes where expectations are “reality tested” in a learning process of empirical observation, error elimination and reflection. While arguing against traditional and rational ‘planning/executing’ assumptions, they still suggest that assumptions can be checked against “hard facts” and “reality data” (pp. 288-290).
This kind of research suggests that there are material and technical influences on project work, which is also suggested by Ekstedt et al. (1999) when suggesting that action can be “induced by physical or structural characteristics” (p. 100). In all, this implies a need for further exploration of the materiality of project work. Hence, it might be important to include not only human, but also nonhuman actors when developing a perspective on project making and project becoming.

As introduced in chapter 1, various researchers have proposed including such a nonhuman agency aspect into project theory (e.g. Dobers & Söderholm forthcoming; Linderoth 2002; Lindahl 2003, 2007). For example, Linderoth suggests that “the temporary organization can be seen as an actor network, and the project process can be viewed as a translation process” (2002, p. 234). Here, he has a particular focus on the problem of linking the temporary to the permanent. He suggests that actor-network theory (ANT) is useful in terms of the concept of black-boxing, and suggests that the result of a project (e.g. a new car model) can be seen as a black box when the project is finished. Exemplifying with the development of a new car model, he suggests that during the project, “designers have tried to close the black box rather carefully by delegating certain tasks to the users, the technological artifacts, and skilled repair people” (p. 237). Then he suggests that: “a prerequisite for this inscription to be strong enough and influence the actors to act in a desirable manner is that the inscription is aligned with the surrounding network . . . ” (p. 237). Such a perspective indeed overcomes the boundary between the temporary and the permanent. Linderoth further claims that not many researchers have used ANT to investigate project work and that there “is much room for studies to combine ANT and the theory of the temporary organization” (p. 240).

In a similar way, Dobers and Söderholm (forthcoming), also suggest that projects should be seen as networks of both human and nonhuman actors. In their research, they use the concepts of translation and inscription (from actor-network theory), focusing on the initial and ending phases of a project. At the beginning of a project, they suggest, the idea of what the project is about is rather
vague, which creates much space for translation. Such a translation phase continues throughout the project, but to a greater extent in the beginning and to a lesser extent at the end of the project.

The other way around, they argue, there is also an inscription phase, “when the effects or results of these activities are passed on from the present project into a materialized form to actors in subsequent projects” (p. 15). Such inscriptions, they suggest, do also continue during the whole project, but to a greater extent at the end of the project. The inscriptions then serve as basis for translations in forthcoming projects. Taking such a view, they suggest that:

“In this view, projects are seen as emerging networks in which coalitions of humans and non-humans, individuals and groups, come together in an ongoing chain of translations and inscriptions”

Dobers and Söderholm forthcoming p.4, emphasis added

But how does this notion of including nonhuman agency in project theory differ from other perspectives on projects? To enable a comparison, I will relate this to a more ‘social’ theory of projects. Blomberg (2003) develops and suggests the use of a micro-social or interactionist perspective on projects when arguing for a perspective that is neither individualistic/voluntaristic nor structuralistic/deterministic. Basically, he discusses the “project phenomenon” (p. 219, my translation) at three levels: “talk about projects” (discourse), “thought figures” and the “base” (project practice). One of his main arguments is that these levels do not correlate, i.e. that talk about projects (discourse) is sometimes very different from what actually happens in project practice.

As an illustration of his micro-social perspective on projects, Blomberg (2003, p. 168 and p. 220) presents an illustration of a network of human actors interacting with artefacts such as a project manual or a building, which at first sight might look similar to an actor-network. However, while he suggests that the artefacts “create
boundaries/frames, in the short term, for possible interaction and constitutes medias for indirect interaction” (p. 168 my translation), one might, if including the notion of nonhuman agency, instead be able to argue that they can be seen as potential actors acting at the same level as the other actors, i.e. doing some form of work. It might not only be that “organisations consist of humans and artefacts whose existence and meaning is recreated by interacting humans” (p. 290, my emphasis and translation), but if such a perspective had been used, the artefacts could have also be seen as co-creators of others.

When discussing the interaction between the actors in a project, Blomberg (2003) focuses on human actors. Drawing from two cases – a female information worker at Ericsson Mobile Phones, and a case from a small company of industrial designers, Blomberg suggests that a mechanical or structural/functionalistic perspective dominates at Ericsson, while at the small design company a more entrepreneurial or humanistic perspective dominates. In short, Blomberg argues that while Ericsson has a principle for project organising that builds on mistrust and a belief in formal, technical control structures, the small design company instead has a principle for project organising that is based on trust, vagueness, personal control and assumed intersubjectivity.

These formal and informal versions bring important implications. According to Blomberg, the formal type “controls and restrains” while the informal “allows and stimulates de-coupling and variation in the interaction of the actors’ action, talk and competence” (p. 227, my translation). In addition, Blomberg claims that the formal type of project organisation leads to conflicts and rigidity and to difficulties at the individual level due to stress and conflicts. Thus, Blomberg, speaking in favour of the informal type, suggests that “in development projects, you should not plan in detail but instead work symbolically in order to create trust in relation to each other and distance in relation to project descriptions and plans” (p. 230, my translation, original emphasis).

17 Original: “ramar”.

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But if nonhuman agency is acknowledged, is it possible to assume that humans are able to create such a distance from project descriptions and plans? If we assume that project descriptions, plans and checklists are artefacts whose meaning other actors can choose to reproduce or not, but also that the artefacts are potential project makers contributing to project becoming and that such artefacts also can be seen as spokespersons for yet other actors (such as managers, other projects or hardware and software components), then the problem may require reframing.

As an example, Räisänen and Linde’s (2004) analysis of Ericsson’s project management model PROPS (PROcess for Project Steering) can be considered. They describe a project management model as “one of the means by which an organization can create new hegemonic networks of power relations and accountabilities that ‘act at a distance’” (p. 103, drawing on Law 1986). Using Callon’s (1987) view that textual inscriptions can be described as intermediaries (“anything passing between actors which defines the relationship between them” (ibid., p. 105)), and his five strategies (Callon 1986 in Räisänen and Linde 2004, p. 113) to enrol actors into an actor network (ascribing roles, mapping an itinerary, defining key concepts, creating an incentive and problematising), they found multiple examples of the strategies in PROPS.

In addition to the strategies suggested by Callon, Räisänen and Linde also suggest that the designers of PROPS created boundary objects (Star & Griesemer 1989), such as the four perspectives and the explicit core values of PROPS. These seemed to be both fluid across boundaries and constituting the glue of the network. In short, they described PROPS to be a “socializing force capable of defining, aligning and disaligning heterogeneous actor groups, work tasks, relations and responsibilities” (p. 118).

These insights about PROPS might be very important to the development of project theory, showing how nonhumans can become very influential in the ongoing creation of reality. It is thus important to include them in organisational analysis. Let us therefore take a look on some of the basic ideas from actor-network theory, and then
discuss how some of them could be used in order to interpret the shaping of knowing through heterogeneous project making.

**Actor-network theory versus the social construction of technology**

Despite its use in recent organisation studies, actor-network theory does not originate in organisational theory. Instead, it stems from work on the sociology of scientific knowledge and technology. Though actor-network theorists reject the term social constructionism, basically because there also exist nonhuman constructors, they share the non-deterministic, non-rationalistic view on the construction of knowledge and technology with other related perspectives, such as SCOT. After a description of the SCOT perspective in the following, I will contrast it with actor-network theory.

The acronym SCOT refers to the Social Construction of Technology (e.g. Bijker 1987, 1995; Bijker, Hughes & Pinch 1987; Pinch & Bijker 1987). Here, technologies are seen as being inherently social in character, which means that technological outcomes are not seen as being predetermined, but instead as being shaped in negotiation among “relevant social groups”. A “relevant social group” refers to “institutions and organizations (such as the military or some specific industrial company), as well as organized or unorganized groups of individuals. The key requirement is that all members of a certain social group share the same set of meanings, attached to a specific artefact” (Pinch & Bijker 1987, p. 30) The process towards “closure” (Pinch & Bijker 1987, p. 44) - when interpretations of the artefact become relatively fixed or stabilised, i.e. when the “interpretative flexibility decreases” (Bijker 1995, p. 270), can thus be perceived as a political process of negotiation between relevant social groups using different “technological frames” (Bijker 1987, p. 159).

Though this tradition perceives everything as being socially constructed, this does not, however, imply that (socially constructed) technology does not affect agency. On the contrary, from this perspective, society and technology are seen as mutually constitutive.
Or as put by Bijker (1995, p. 274), “both emerge as two sides of the sociotechnical coin during the construction processes of artifacts, facts and relevant social groups”.

Though the non-determinism provided by the SCOT perspective is useful when trying to understand project making (implying that the outcome of the project might have been otherwise, depending on relevant social groups and technological frames), some additional aspects may need to be considered. According to Latour, a problem with social construction is the very notion of the social. Simply put, the perspective risks becoming too socially deterministic if the constructors are assumed to be humans. Or in his own words: “Yes, society is constructed, but not socially constructed” (1999, cited in Zackariasson 2003, p. 10, emphasis added).

Instead of focusing on social/technological dualities and using notions such as relevant social groups and technological frames, Latour instead suggests a ‘flat ontology’ of human and nonhuman actors who make up the lived-in world (see Latour 1993), where objects are not fixed or either social or natural (or technological) – but rather being only in relation to each other when creating and constituting actor networks. This actor-network theory (ANT), which originates in the work of Michel Callon, Bruno Latour and John Law (McLoughlin 1999), shares the non-deterministic view of science and technology with SCOT, but the theoretical concepts and some basic assumptions differ somewhat.

ANT suggests that society and technology should not be studied as two separate entities, i.e. society does not create technology, nor vice versa. Rather, everything is built up by human as well as nonhuman actors (such as groups, cars, organisations or concepts), who take on roles in networks. Callon (1987) introduced the notion of an actor network in order to describe such heterogeneous associations and how they transform or consolidate. He explains:

“The actor network is reducible neither to an actor alone nor to a network. Like networks it is composed of a series of heterogeneous elements, animate and inanimate, that have
been linked to one another for a certain period of time. The actor network can thus be distinguished from the traditional actors of sociology, a category generally excluding any nonhuman component and whose internal structure is rarely assimilated to that of a network”.

p. 93, emphasis added

Callon (1987) clearly states, however, that an actor network is not to be understood as a network that links static or well-defined elements. On the contrary, the entities constituting the actor network are able to redefine their identity, relationships can be altered and new entities can be brought into the network. Thus, he suggests: “[A]n actor network is simultaneously an actor whose activity is networking heterogeneous elements and a network that is able to redefine and transform what it is made of” (p. 93).

The dynamic of actor networks can be explained, he suggests, by two mechanisms he calls “simplification” and “juxtaposition”. Simplification is namely paring down a complex reality that exists only in relation, or in Callon’s terms, in juxtaposition to other simplifications. Complexity is by these processes put into black boxes and stays there as long as no one challenges the simplifications. Callon illustrates his case by discussing the introduction of an electric car in France. When the roles gets redefined and or when new actors are brought into the network, the actor network transforms. Or in other words: “The set of postulated associations is the context that gives each entity its significance and defines its limitations. It does this by associating the entity with others that exist within a network” (Callon 1987, p. 95).

The notion of actor network also means that the problem of system and context can be eliminated. Previous studies using the notion of a technological system (here Callon refers to Hughes), had the problem of defining the boundaries of the system in order to examine where the system affected the context and vice versa. As I interpret his reasoning, all are instead through and by actor networks. There are

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18 Here, Callon refers to Schwartz Cowan (1987).
thus no objective boundaries to be found, just interrelations. Hence, according to actor-network theory, nonhumans are seen as being actors in their own right.

When forming new sociotechnical relationships, human and nonhuman actors with previously diverse interests are aligned into networks (McLoughlin 1999). Such a process toward a stabilised set of relations is described by McLoughlin (1999, pp. 94-95) as following the following three steps.

**Translation**, where actor-networks are “the consequence of an alignment of otherwise diverse interests” (p. 94). In this process, the interests of actors change in line with the interests of other (key) human or nonhuman actors.

**Problematisation**, where key human or nonhuman actors construct scenarios in order to show potential members that their interests would be best served by being enrolled into the network.

**Displacement**, where a range of entities are mobilised to stabilise the network after actors have been enrolled.

Thus, human and nonhuman actors form actor networks by processes of translation and problematisation. A specific vocabulary has also been developed to describe such processes (Latour 1995, pp. 270-272). Firstly, Latour writes about “scripts” (i.e. scenes/scenarios), performed by figurative or non-figurative humans or nonhumans. A retrieval of such a script (in words) is called “description” and can be written down in words. A translation of a script to a more durable version is called “inscription” (or “transcription” or “encoding”). This is, for example, when work is delegated to a nonhuman or when feelings are translated into a letter or a sculpture. The term “prescription” is used to illustrate where (transcribed) actors in a scene are supposed to act in a certain way. If actors accept the prescribed behaviour they “subscribe”, hence, this is called “subscription”, if they do not (they choose to act differently) it is called “des-inscription”.

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Prescription is not the same as “pre-inscription”, which instead is “all the work that has to be done upstream of the scene and all the things assimilated by an actor (human or nonhuman) before coming to the scene as a user or as an author” (Latour 1995, p. 272). This means that even though this theory is non-deterministic, in that actors can choose to subscribe or des-inscribe in any given scene, it is more or less likely that they will do one or the other. But, as Latour puts it, humans and nonhumans will still be “very, very undisciplined” (p. 273) even when there is considerable pre-inscription.

“Black-boxing” is another important ANT term. This means that when processes of translation, problematisation and displacement have taken place, certain facts or technology are agreed upon – things seem to be in a certain way. This is, in a non-deterministic fashion, a way to illustrate that nothing is *per se*, but is agreed upon as being. Like other boxes, black boxes can be opened up, but if networks are stabilised, there are, metaphorically, many actors ‘sitting on top’ of the box\(^\text{19}\).

In sum, ANT suggests a different epistemology and ontology than other sociological theories. In his book *We Have Never Been Modern* (1993), Latour argues that we have never been modern in terms of having a separation between what is natural and what is social. This means that the discussions about constructionism versus realism are unnecessary. There is no society who tries to understand nature – neither is there a dualism in terms of nature and society as two sides of the same coin, mutually creating each other. Instead, suggests Latour, there are actor-networks consisting of human and nonhuman actors. There are no micro- or macrostructures, just actors aligning with other actors, creating ‘facts’ (still other actors).

**Notions of importance for this thesis**

In order to provide a more in-depth understanding of ANT and how it differs, I have briefly contrasted ANT to SCOT. But what are the

\(^{19}\) See illustration in Willstrand-Hollmér (2003, p. 209).
implications of including the aspect of nonhuman agency when studying projects?

First of all, rather than merely suggesting that projects should be seen as actor networks, I would here instead suggest the use of some important notions provided by this theory/method. As described, actor-network theory was not developed in order to understand industrial projects, but as a means for understanding science and technology (in terms of developing facts and artefacts). Hence, ANT can be fruitfully used for investigating the heterogeneous engineering of, for example, a new technology or a scientific fact, focusing mainly on non-deterministic translation processes towards stabilisation\textsuperscript{20}.

Here, I am not explicitly concerned by the question of how a specific radio base station came into being (as being a new artefact), but instead in how knowing is shaped through project making. Thus, while it has been suggested that a project can be seen as an actor network (e.g. Dobers and Söderholm forthcoming, Linderoth 2002), the main point here is not to illustrate that the project can be seen as an actor network, but instead to use some implications of this theory/method when investigating project making.

The core contribution of ANT is the unusual inclusion of nonhumans into theories/methods focusing on how reality is created. Or in the words of Latour, the ANT field has “freed the non-humans from being objects” (Landström 1998, p. 64). According to actor-network theory, an actor is “an element that can affect something else, which neither demands intention nor subjectivity, and decentres the human in science. This makes also nonhumans important actors for the networks stabilisation of reality”\textsuperscript{21} (Landström 1998, p. 65, my translation). Hence, ANT can be seen as a theory/method that does “not claim to explain the actors’ behaviour and reasons, but only to find the

\textsuperscript{20} ANT also can be used to investigate how stabilised, or black-boxed, facts are re-opened by new translations of interests and re-configurations of relations.

\textsuperscript{21} Original: “I ANT definieras en aktör som ett element som kan påverka något annat, detta kräver varken intention eller subjektivitet och decentrerar människan i vetenskapen. Det gör även icke-människor till viktiga aktörer med betydelse för nätverkens stabilisering av verklighet”.

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procedures which render actors able to negotiate their ways through one another’s world-building activity” (Latour 1999, p. 21).

Thus, in this thesis, instead of explicitly comparing a project to an actor network, I will instead try to investigate what theoretical and methodological insights the notions of ANT can provide to my research. In the first section of this chapter, I explained the notion of project making execution in this thesis (in contrast to studying project management or project organisation). This concept is closely related to project organising, but should emphasise even more what actors do, i.e. how they contribute to project becoming.

Combined with an emphasis on the heterogeneity of the actors involved in project making, I will thus here extend this concept by suggesting the notion of heterogeneous project making. This notion is inspired by the ANT-notion of “heterogeneous engineering” (Law 1987), which suggests that the construction of new technology is the outcome of the work of many heterogeneous actors. Or in the words of Law, “the stability and form of artifacts should be seen as a function of the interaction of heterogeneous elements as these are shaped and assimilated into a network” (p. 113, emphasis in the original). Defining project making as heterogeneous project making I thus aim to emphasise the basic assumption that not only human, but also nonhuman elements contribute to the shaping of project becoming.

The main advantage with using such a perspective on project making might be that it prevents the perspective from becoming too socially deterministic. Instead of arguing for better planning or project plans, the plans and other artefacts such as machines and computers themselves get upgraded to become potential actors in their own right. This means that they can be ignored, but also that they can align with others to act in their interest, which is a fundamentally different perspective in relation to social theories where artefacts come to being through human interaction and interpretation.
2.3 A Knowledge Perspective on Projects

As described in chapter 1, the third and last concept used and elaborated upon in this thesis is the concept of knowing. As a background to why this concept was used in this thesis, I will describe some recently proposed perspectives on projects and knowledge. If one applies a ‘knowledge perspective’ to project theory, two main contradictory issues seem to emerge: the potential of projects to be ‘knowledge creators’ versus the disadvantage of projects in terms of being ‘learning disabled’.

Projects as knowledge creators

The first theme can be illustrated by the concept of project execution as being a potential “journey of knowledge creation”:

“Project management is not – as it is sometimes depicted in textbooks – the passive process of implementing already-defined objectives. On the contrary, it is the active art of creating conditions, meaning, and expectations for the future. Taking this into consideration, project execution is seldom a process of implementation; rather it is a journey of knowledge creation”.

Engwall (2002), p. 277

Hence, from this perspective, a project is not seen as a process of implementation, but as a process that evolves over time. Projects can also “comprise members that represent different specialities, with different knowledge bases and ways of interpreting experience” (Sydow et al. 2004, p. 1480, emphasis added). Since they involve the making of new products and services by a “highly autonomous multifunctional or multidisciplinary team” (ibid., p. 1481), projects can be seen as having the potential for creating new knowledge.

Hence, research on projects and knowledge can acknowledge that different individuals contribute to the project, and that these individuals have different knowledge or use different perspectives.
Enberg (2007) suggests that “product development requires a wide range of highly specialised knowledge, which is found in individuals located in different departments throughout an organisation, to be integrated” (p. 3, emphasis added). Based on Dougherty’s (1992) notion of “thought worlds”\(^{22}\), Lindkvist (2005, p. 1200) suggests that project members “belong to different functional ‘thought worlds’ . . . with different knowledge bases and ways of interpreting experiences”. Due to this and since they have “little time to erect communal knowledge” they thus need to “coordinate their activities without any strong, shared task-relevant knowledge basis”.

The focus on individuals and the integration of knowledge described above does not mean that only the cognitive aspects of knowledge are emphasised in these types of perspectives. The contextual and social aspects of knowledge are also recognised, suggesting more community-based approaches (e.g. Bresnen et al. 2003). A consequence of such a perspective is the need for knowledge integration in projects (see Enberg 2007, Enberg, Lindkvist & Tell 2006).

Such a perspective can define knowledge integration\(^{23}\) as “the process of goal-oriented interrelating with the purpose of benefiting from knowledge complementaries existing between individuals with differentiated knowledge bases” (p. 10, emphasis added\(^{24}\)). Taking such a perspective, Enberg, Lindkvist and Tell (2006) and Enberg (2007) suggest that knowledge integration is not a matter of combining ‘stocks of knowledge’, but put forward instead an iterative and processual model of knowledge integration based on ‘acting’ (individually) and ‘interaction’ (between social actors) in the development of an artefact. Söderlund (2008) also emphasises the importance of arranging knowledge integration well:

> “Often the basis is made through a relatively clear and demarked goal which a more or less definite and formally demarked group of

\(^{22}\) Based in turn on Douglas’s 1987 retranslation of Fleck’s 1979 “thought collectives” (Dougherty 1992, p. 182).

\(^{23}\) For “the purposes of [her] dissertation” (p. 10).

\(^{24}\) In the original, the entire definition is written with emphasis.
individuals with different background and special competence is set to realize. These demarcations seem necessary in order to generate action and create knowledge, since they are the basis for enterprise to happen and take shape. In this respect, well arranged knowledge integration is central for the success of the project”.

Söderlund (2008), p. 62, my emphasis and translation

Hence, from such a perspective, project boundaries are seen as significant in relation to the formation of action and knowledge. Söderlund (2008) focuses on individuals (with competence), which makes knowledge integration necessary. In a similar vein, Söderlund (2007) thus also argues that projects can be seen as “places for knowledge integration” (p. 221, my translation), including goal-oriented learning and local problem solving, where mechanisms such as deadlines play an important part for the interaction of (human\(^{25}\)) participants.

**Projects as being learning disabled**

Hence, as described above, projects can be seen as potential generators of knowledge (e.g. Sydow et al. 2004). At the same time, Sydow et al. (2004) also point out that “highly focused, fast and autonomous knowledge work carried out in projects have their corresponding downsides (p. 1481)” e.g. in terms of little attention to what happens “outside the project”, little time for reflection and documentation as well as the risk of the team becoming a “knowledge silo” (p. 1481) to which others have no access.

While Sydow et al. (2004) refer to these advantages and disadvantages as “possibilities” and “obstacles” (p. 1481), others suggest that temporary organisations “appear to be disabled when it comes to learning” (Ekstedt et al. 1999, p. 59). Instead, Ekstedt et al. (1999) argue that temporary forms of organising are better suited for action than knowledge formation, since projects generally lead to individual learning, instead of the creation of organisational knowledge. Hence, they suggest that temporary organisations (i.e.

\(^{25}\) His analysis includes only human actors.
projects) and permanent organisations are suited for different purposes, have different qualities in terms of knowledge formation and action, and also call for different kinds of management. Importantly, they stress that projects are not always set up for the explicit purpose of knowledge creation.

Rather, projects are instead often set up to accomplish a specific task. Ekstedt et al. (1999) thus claim that “the most severe criticism that can be raised against project work and project theory is the absence of learning” (p. 58). They suggest that while two kinds of learning could be assumed to take place — learning about project work and procedures as well as learning about the project subject area (e.g. some specific technical development or the like) — they claim that all learning, as well as the issue of “retrieving knowledge”, is restricted to the individual.26

Hence, they suggest that “neither projects not project theory have room for how to handle learning” since projects “do not include any means of storing knowledge”, due to their temporality (p. 59). An important aspect of project work instead becomes to “combine knowledge profiles”, already “possessed” by the members:

“In a temporary organisation individuals and other resources are brought together with a view to using their different abilities in a joint effort during a predetermined period of time and for a particular task. Renewal of knowledge, for instance in terms of genuine learning for the project members, can no doubt take place during the project, but the essential condition is that the resources brought together already possess certain knowledge profiles. Combining knowledge profiles is regarded as one of the most important tasks in project management”.

Ekstedt et al. (1999), p. 127, my emphasis

Thus, in addition to the division into (perceived) repetitiveness and uniqueness of the projects, they also make another classification,

26 Others have made attempts to potentially overcome this issue by investigating how to achieve learning or knowledge transfer between projects (e.g. Björkegren 1999).
building on the combinations of project members. Ekstedt et al. suggest two different strategies for knowledge combination in a project (pp. 148-154). The first is a “homogenising” strategy, where project participants with “similar conceptions, professions and organisation cultures are combined” in the project (p. 154). Such a combination would lead to stable routines, efficiency and incremental change, but would also potentially suffer from the “renewal paradox”\(^\textsuperscript{27}\).

The second strategy would be to use a “pluralistic integration” (p. 154) strategy, where, with the goal of facilitating fundamental change processes, one tries to use “controlled cultural friction” by combining members with “different knowledge and cultural background” (p. 149).

The notion of knowing

Thus, research suggests that projects can be seen as potential places of knowledge integration and creation, but also as being learning disabled. However, in both cases, focus is put on individuals and their interaction, regardless of whether a cognitive or a contextual (or combined) perspective on knowledge is used. Hence, while recent research on projects and knowledge emphasises a dynamic and processual perspective on knowledge integration, knowledge is still seen as “found in individuals” (Enberg 2007, p. 3). Even though some suggest a “community-based approach to managing knowledge” (Bresnen et al. 2003, p. 157) in projects and knowledge management, this has been used more to emphasise the differences in the perspectives of project participants, suggesting, for example, that “each discipline has its own knowledge base and language, which can make the effective codification and transfer of knowledge even more problematic” (Bresnen et al. 2003, p. 157).

\(^{27}\) The renewal paradox (see Lundin & Wirdenius 1989, in Lundin 1998), refers to when an innovative, flexible way of working in the short term paradoxically leads to slow innovation long term. This paradox is based on the empirical observation (of civil engineering projects) that even though projects provide potential opportunities to do things differently, such opportunities are seldom used. Rather, the projects are carried out in a way similar to previous projects.
While the common focus for perspectives on knowledge integration seems to be the participants that constitute the project team (analysed with a contextual, cognitive or combined perspective on knowledge), Grabher (2004) suggests the notion of “project ecologies” in order to contribute to a more contextual understanding of the phenomenon. The notion of project ecologies implies a focus on “epistemic communities” or “epistemic collectives” as the locus of the creation of “project specific knowledge”, which means “all project participants who contribute to the production of knowledge to accomplish the specific task, even if only temporarily and partially” (p. 1493, emphasis added).

While the epistemic communities or collectives include clients, suppliers and corporate groups, Grabher (2004) suggests that the epistemic community represents an organisational layer that is “temporarily tied together” (p. 1507) with two other layers, the core team and the firm, in the organising of a project. In addition to these, Grabher (2004) also suggests that the project ecologies “unfold a wide and latent fabric of personal networks” (p. 1508, emphasis in the original). Hence, this research indicates that contributions to the processes of knowledge creation do not only rely upon the individuals that are involved in an actual project team. In addition, this research also contributes to a problematisation of projects versus context, since “the intricate concoction of core team, firm, epistemic community, and personal networks thus repudiates any straightforward categorization into the static dualism of project and context” (p. 1509).

As illustrated, the various knowledge perspectives on projects described above seem to focus on traditional terms such as ‘knowledge’, ‘learning’, ‘knowledge creation’ and ‘knowledge integration’. While these contribute very important insights, one can also find in the literature on knowledge in organisations other perspectives to use as inspiration. Blackler (1995) suggests that “rather than talking of knowledge, with its connotations of abstractions, progress, permanency and mentalism, it is more helpful to talk about the process of knowing” (p. 1035, emphasis in original). In line with this argument, he suggests that knowledge should not be
regarded as “something people have”, but that “knowing is better regarded as something that they do” (ibid., p. 1023, my emphasis).

While Blackler suggests the use of activity theory in order to understand knowing as mediated, situated, provisional, pragmatic and contested (Blackler 1995, emphasis in the original), other researchers have used other kinds of situated approaches. When problematising the three currently dominating perspectives of knowledge in organisations, Nicolini, Gherardi and Yanow (2003) advocate a new vocabulary around knowing and organisation. The three problematic and dominating perspectives are, according to them, the use of individual psychology to explain organisational knowledge, the view of knowledge as an immaterial substance that can be taken from its context, and finally knowledge as an asset.

As an alternative perspective, Nicolini, Gherardi and Yanow (2003) suggest the use of the processual and practice-based notion of knowing and a “practice-based approach” to understand knowing in organisations. As a basis for their perspective on practice, they credit three important contributors: Marx, Wittgenstein and the tradition of symbolic interactionism and phenomenology.

Using a Marxist epistemology, one can argue that thought and world are inherently inseparable, since they are connected through human activity, so the object for social scientists should be “praxis, understood as what persons say, imagine, conceive, and produce, and think while attempting to carry out these activities” (ibid., p. 8, italics in the original). Practice then becomes “both our production of the world and the result of this process” (p. 8). Knowing is therefore not merely a cognitive activity, but a social activity — in the making of practice as a system of activities, “knowing is not separable from doing” (p. 8). Another important contribution to the notion of knowing in practice is Wittgenstein’s notion of language as social practice. Here, speech acts are not seen as descriptions of the world, but instead as being “part of a practice” (p. 11, my emphasis), i.e. a type of action.
Though the notion of knowing in organisations and the practice-based approach contrast and complement traditional theories on knowledge in organisations, the practice-based approach is not a unified theory or stream of research. Instead it is “a number of research traditions and scholars connected by a common historical legacy and several theoretical family resemblances” (ibid., p. 12), for example the “cultural interpretative framework”, “social learning”, “cultural and historical activity theory” and the “sociology of translation”. Thus, perspectives on legitimate, peripheral participation (Lave & Wenger 1991) as well as the notion of knowing as heterogeneous engineering (based on actor-network theory) can be seen as examples of practice-based approaches to knowing.

Legitimate, peripheral participation is described by Lave and Wenger (1991, p. 35) as “a descriptor of engagement in social practice that entails learning as an integral constituent”. A community of practice is then described as a constellation of human interaction characterised by such attributes as “mutually defining identities”, “knowing what others know, what they can do, and how they can contribute to an enterprise”, “a shared discourse”, “shared stories” and “shared ways of engaging in doing things together” (Wenger 1998, p. 125). He argues that:

“The development of practice takes time, but what defines a community of practice in its temporal dimension is not just a matter of a specific minimum amount of time. Rather, it is a matter of sustaining enough mutual engagement in pursuing an enterprise together to share some significant learning. From this perspective, communities of practice can be thought of as shared histories of learning”.

Wenger (1998), p. 86, emphasis in the original

Learning is then about developing identity by participating in practice. In fact, a sense of identity and learning are perceived as inseparable aspects of the same phenomenon (Lave & Wenger 1991). Taking such a view, learning is understood as an ongoing process of our everyday life when participating in communities of practice, and not as a special kind of activity. Participation here refers to “the social
experience of living in the world in terms of membership in social communities and active involvement in social enterprises” (Wenger 1998, p. 55). Such participation shapes not only our experience but also those communities in an interwoven process. A community of practice then becomes characterised by mutual engagement between its members, a joint enterprise and a shared repertoire (Wenger 1998). Therefore, learning can be understood in political terms, because learning then, by definition, requires access, which is to be negotiated in interaction (Lave & Wenger 1991).

Arguing that an organisation can be seen as multiple communities of practice whose boundaries may or may not coincide with formal boundaries, Wenger (1998) argues that boundary objects (Star & Griesemer 1989) can serve as connections between such practices. Other connections can be constituted by what he calls “brokers”, which refers to “connections provided by people who can introduce elements of one practice into another” (ibid., p. 105, my emphasis). Yet another connection can be constituted by “boundary practices”, practices that in themselves constitute a connection between other practices, such as cross-functional teams or task forces.

Projects versus communities of practice

Given the insightfulness provided by Lave and Wenger’s (1991) framework on legitimate peripheral participation, which delves into learning from a ‘practice-based perspective’, it is very tempting to use their notion of communities of practice when analysing project making. But while some suggest that projects can be interpreted as constituting communities of practice (e.g. Bragd 2002), others claim that projects do not share the characteristics of communities of practice due to the temporality of the projects and the diversity of skill and competence amongst project participants (Garrety, Robertson & Badham 2004; Lindkvist 2005).

Garrety et al. (2004, p. 352) claim, for example, that due to their “ad hoc nature”, projects “have no collective history (although some members of the project may share a history), and no collective future”. The project participants, on the other hand, may in turn
belong to communities of practice (ibid.). Using a similar argument, Lindkvist (2005) proposes instead the concept of “knowledge collective” as being more suitable when describing projects. Focusing on short-term (maximum 1-2 years), “customer-attached product development projects” where “typically a new mix of members are assigned for each new project” (p. 1199), Lindkvist suggests that such a project group can be regarded as a “collectivity of practice” rather than a “community of practice” (ibid.). Such temporary organisations:

“…consist of people, most of whom have not met before, who have to engage in swift socialisation and carry out a pre-specified task within set limits as to time and cost. Moreover, they comprise a mix of individuals with highly specialized competences, making it difficult to establish shared understandings or a common knowledge base”.

Lindkvist (2005), p. 1190

Due to these aspects, Lindkvist suggests that the epistemology of these two groups differs in several dimensions. For example, while the “knowledge community” are based on “decentred knowledge”, “socialisation” and “knowledge-as-practice, communal activity and narratives”, the “knowledge collectivity” are based on “distributed knowledge”, “problem solving” and “individual knowledge and competencies” (p 1205).

Hence, while some use the notion of communities of practice as equivalent to projects (e.g. Bragd 2002), this is not unproblematic. In trying to conceptualise an outsourcing project, I have suggested that the project could be seen as a ‘potential, temporary community of boundary practice’28 (Niss 2002). The notions of “potential” and “community” reflected the perspective that the project might evolve into a boundary practice (a practice which could serve as a boundary encounter) with enough mutual engagement. The notion of “temporary” of course reflected the temporality of the project, and the use of the word “community” was meant to highlight its potential to

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28 Since my licentiate thesis concentrated on an interorganisational project, I actually suggested the notion of a ”potential, temporary community of interorganisational boundary practice”, p. 124.).
constitute a learning community, if there were enough of a feeling of a joint enterprise. Hence, I tried to use the communities of practice concept and Lave and Wenger’s (1991) insights on learning, in spite of recognising that the community of practice concept was perhaps not really equivalent to that of projects.

**Important notions for this thesis**

In this thesis, I will not argue that a project constitutes a community of practice. But, importantly, I will use what I think is the main contribution of Lave and Wenger’s (1991) practice-based approach — the importance of participation, legitimacy and access. But as I use a becoming ontology rather a being ontology (Linehan & Kavanagh 2006), these notions do not here refer to access ‘to’ a project, but to *negotiate legitimacy to perform project making*. Hence, I assume that actors who contribute to project becoming will need to negotiate legitimacy (see Karrbom Gustavsson 2005) to perform as project makers, but that such negotiation of legitimacy might well differ considerably from the negotiation of legitimacy in communities of practice. Thus, while not explicitly using the notion of learning, I will still use some of the insights of situated learning theory. Likewise, while not claiming that a project constitutes a community of practice, I will still use a “practice-based approach” to knowing (Nicolini, Gherardi & Yanow 2003). Knowing thus then becomes:

> “the result of a system of ongoing practices and political processes that are, in effect, two sides of the same coin. One could say that the subject of the knowing is the “action net” identified by these processes. It does not reside in any of its parts, and even less, in any of the representations produced by its different constituencies”.

Nicolini, Gherardi and Yanow (2003), p. 20

Here, knowing is thus not reduced to either learning or knowledge, but instead “knowing is enacted in practice” (Orlikowski 2002, p. 253). If one takes such a view, knowledge is not to be seen as an object that can be separated and transferred between practices, but
instead “the process of knowing” (p. 251) exists only in and by practice:

“Rather, knowing is an ongoing social accomplishment, constituted and reconstituted in everyday practice. As such, knowing cannot be understood as stable or enduring. Because is is enacted in the moment, its existence is virtual, its status provisional.”

pp. 252-253.

Thus, one can argue that knowing is a process which is created in interaction over time, rather than being something the actors posses. If knowing is to be seen as a process that is enacted in practice, the question becomes ‘how knowing is shaped’ rather than ‘what knowledge is produced’.

As was explained in section 2.2, this thesis also emphasises the notion of nonhuman agency. Thus, I will also use the perspective of knowing as “another way to describe the successful alignment of human and nonhuman elements (‘heterogeneous engineering’)” (Nicolini, Gherardi & Yanow 2003, p. 19). Of course, I could have used other forms of practice-based approaches as well, such as Activity Theory (see Blackler 1993, 1995), but such a theory, while including the importance of materiality, does not consider nonhuman activity in the same way as actor-network theory does. Therefore, in this thesis I chose to borrow inspiration from the latter.

2.4 Frame and Research Questions

In the following, I will summarize the main ideas I have borrowed from previous research and used as a kind of frame for my analysis. Here, I combine the idea of project making as being an issue of boundary work (Sahlin-Andersson 2002; Söderlund 2007, 2008) with the inclusion of nonhuman agency into project theory (Dobers & Söderholm forthcoming; Linderoth 2002; Lindahl 2003,

29 The frame was created while conducting the empirical study, not beforehand, as will be described in the next chapter.
2007). If these perspectives are combined, an implication is thus that such boundary work will include not only human but also nonhuman activity.

Since making a boundary involves the explicit shaping of focus, it can be seen as a fundamental aspect of the shaping of knowing. Hence, an initial and tentative epistemological perspective is suggested. The frame, including important notions and assumptions, can be briefly summarized as follows:

1. Ontologically, this frame is based on the processual notion of a “‘becoming’ ontology of projects” (Linehan & Kavanagh 2006, p. 59). Drawing from this, I thus here suggest and use the notion of ‘project becoming’. This notion implies a processual perspective focusing on ongoing project making, rather than on what ‘a project is’.

2. Epistemologically, this thesis is built on the practice-based notion of knowing (Nicolini, Gherardi & Yanow 2003). The processual perspective on knowing used in this thesis can be described as knowledge not being “a stock” but instead “a flow . . . of activities” (Styhre 2007, p. 19, emphasis in the original). In line with this, Styhre (p. 25, emphasis in the original) also suggests a focus on an “epistemology of becoming”.

3. Project becoming and knowing are here seen as constructed through “heterogeneous engineering” (Law 1987) which I here translate into the concept ‘heterogeneous project making’. This means that both human and nonhuman actors can be seen as being potentially able to contribute to project becoming (i.e. act as project makers).

4. Heterogeneous project making is assumed to require legitimacy to perform project making (inspired by Lave &

30 My translation from Swedish.
31 Based on the processual perspective on learning, organising and becoming suggested by Clegg, Kornberger and Rhodes (2005), see Styhre 2007, p. 24-25.
Wenger’s 1991 notions on legitimacy, access and participation).

5. An important notion in project making is that of boundaries (Sahlin-Andersson 2002; Söderlund 2007). In line with the insights of ANT, I will here however not make any distinction per se between ‘project’ and ‘context’ but instead follow how actors shape boundaries.

While ‘project becoming’ is a processual ontological notion, the notion of ‘project makers’ refers to actors who contributes to project becoming. Basically, without project makers, no one contributes to project becoming (i.e. no actor would act ‘upon’ or ‘in relation to’ other project makers or to ‘the project’ as a construct). My notion of heterogeneous project making implies that both human and nonhumans perform project making. However, I have not yet investigated how project becoming takes shape. The main research question therefore becomes:

**How is knowing shaped** through heterogeneous project making?

Here knowing is defined as being inherent in project making. In order to understand how project becoming is shaped, the following research sub-questions have been formulated:

Q1. *What* do project makers make?
Q2. *Who* are the project makers?
Q3. *How* is project making performed?
Q4. *How* are project boundaries created?

The research questions listed above have thus guided my analysis in chapter 4, which is structured around four subchapters, each addressing one question and resulting in a conceptualisation. Thereafter, the main research question is discussed in chapter 5, where the results are summed up and integrated into an epistemological perspective.
To be able to create such a perspective, I have throughout my research taken inspiration from several different theoretical traditions, such as actor-network theory, theories on situated learning and symbolic interactionism. While all of these “practice-based approaches” (Nicolini, Gherardi & Yanow 2003) have important theoretical foundations in common (such as a non-deterministic view on the shaping of knowing), there are also aspects that differentiate them. However, I will argue that borrowing insights from different traditions, or “poaching” as Czarniawska (2001, p. 18, based on de Certeau 1984) puts it, can be fruitful in order to understand the processes I have tried to conceptualise. In the next chapter, I will present the methods I have used to create the perspective, using both theoretical as well as empirical input.
CHAPTER THREE

Method

This chapter describes the methods I used in my research. It starts by describing the abductive creation of focus and then illustrates this process in more depth.

3.1 The Abductive Creation of Focus

As described in chapter 2, the main research question of this thesis concerns how knowing is shaped through heterogeneous project making. While this question has guided the writing of this thesis, it was not made explicit before the empirical study started. The research began with a somewhat broader focus and with a somewhat narrower frame of reference. During the course of my empirical study, the focus of the research sharpened, while my frame of reference instead was expanded. This process can be described as abductive (Alvesson & Sköldberg 1994), fed iteratively by empirical and theoretical input.

During this research process, I have created many temporary focuses, which have helped me to continue. The empirical study was conducted between September 2002 and March 2003, starting about half a year after I presented my licentiate thesis. In my licentiate thesis, which was based on a study of an interorganisational outsourcing project, I created a perspective on “knowledge brokering across the boundaries of organisations”. After finishing it, I wanted to develop a deeper understanding about knowledge and projects. My previous empirical study was based on interviews, and I was keen to try a more ethnographical approach in order to get closer to the actors.

When I then decided to conduct a new empirical study, I had an idea, based on my licentiate thesis, of a project as a potential, temporary community of boundary practice, and the members as being
potentially legitimized brokers. I then decided to study an industrial project to deepen my understanding of how knowledge is brokered and created between the various communities of practices involved. Questions I had included, for example, ‘what characterises the boundaries of project work?’, ‘what is brokering in a project-based context?’, ‘How and why did the actors negotiate access to the project?’, ‘Who is part of defining this potential boundary practice?’ and ‘How could such processes be theorized in terms of power and politics?’

I tried, however, to be open in terms of what I would find during my study. Not surprisingly, the study generated an empirical and theoretical journey far beyond my earlier frames. My research subject, industrial work science, can perhaps best be described as a part of what has been called a “post-disciplinary” era (Law 2000, p. 1), joining researchers with various backgrounds and also borrowing insights from many different theoretical fields (such as engineering, psychology and sociology). I have thus been fortunate to interact with many different actors, face to face or via publications, who in different forms have contributed to my research. Hence, the focus of this thesis evolved through the very process of making it, and is thus an outcome rather than an initial variable. In the remainder of this chapter I will reflect upon the processes that have led to the results presented in this thesis, first describing some of the theoretical input I have used and then some empirical input.

3.2 Theoretical Inspiration

It is not possible for me to define the origins of this thesis. Intellectually, my theoretical journey can be described as “somewhat nomadic” (Law 2000, p. 2), being influenced by theories from many different areas. In the following, I will briefly describe some of the main theoretical influences.

Before conducting the ethnographical study, I was mainly inspired by community of practice research (e.g. Brown & Duguid 2001; Lave & Wenger 1991; Gherardi, Nicolini & Odella 1998; Wenger 1998) and
social constructionists’ perspectives on organisations. I thought of an organisation as made up of multiple communities of practice. Drawing from these theoretical perspectives as well as the empirical study for my licentiate thesis, I saw a project as being a potential temporary boundary practice, and thus also being a boundary object interlinking communities of practices, through which knowledge was potentially created and brokered by the project participants between the various practices involved.

A related view is presented by Bragd (2002), who suggests that the project she studied could be seen as a community of practice. In line with such a view, she called project meetings “cross-communication forums”, and the members of the project “knowledge brokers”. She argued that projects can be seen as “mixed practice zones”, described project work as being a non-rational process (in traditional terms) and also used the term *tinkering*, meaning that instead of planning, one takes what comes along and tries to make the best of it.

Hence, I used the view of a project as a potential, temporary boundary practice as an initial frame. My pre-understanding was therefore that project makers were not only to be seen as interacting in doing the focal project, but also as interacting in — and/or perceiving themselves as being part of — other practices. Was knowledge, I asked myself, being brokered between the practices involved, in the very making of the project, and if so, how?

Thus, I was initially inspired by texts on situated learning and social construction. However, during the course of the study, I became increasingly aware that these theories seemed limited in terms of their exclusion of other important organisational actors (the nonhumans) which I started to acknowledge as being important co-constructors. Therefore, I started to read more texts written by actor-network

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32 The term potential is here very important. Due to the temporality of the interaction, I concluded that such a boundary encounter had a *potential* to evolve into a community-of-practice-like interaction, rather than being one *per se*.

33 See Niss (2002)

34 A similar view is put forward by Lindahl (2003) who illustrates that planned and improvised activities are being made in parallel.
theorists, whom I knew included such actors in their analysis. Though their unusual reasoning sometimes scared me off a bit, I found their main arguments very useful. The most important thing I came to realize was that my study could benefit if I could be more open to who or what could count as an actor.

Hence, during the course of the study and writing this thesis my perspective changed, slightly but significantly. In short, while still very inspired by the social turn of organisational theory, I became to think that there might be a need to consider the materiality of project work and thus perhaps also to include nonhuman agency.

**Inspiration and worries**

It was, however, very difficult navigating in the jungle of all the theoretical ideas, concepts and arguments offered to a PhD student of today. One great fear I had (and partly still have) was that I would not properly understand all the things I read. I was afraid that some misunderstanding on my part would mean that I would use the wrong arguments, or “poach” (Czarniawska 2001, p. 18, based on de Certeau 1984) theories that weren’t meant to be used together, perhaps due to slight differences in ontological and epistemological assumptions.

Next I read a paper by Bruno Latour, which was written as a dialogue between a professor and a PhD student, in which the student asked how he could “apply” ANT when analysing an organisational case study. In short, what the professor then suggested was to forgo underlying frameworks and just create a description. He also emphasised that ANT was not to be applied, but was a theory “about how to study things, or rather how not to study them. Or rather how to let actors have some room to express themselves” (Latour 2002a, p. 1). When finish reading the dialogue, I thought that any ambition of mine to use ANT as a ‘perspective’ in my analysis could be thrown in the garbage can. I did not sleep well that night.

The next morning I sat down to try to figure out what to do next. All the inspiration and joy I had felt by reading the arguments of ANT was gone. Instead, all the frustration I had felt when trying to
understand some of their arguments came back to me. Should I now throw my work away? Basically, I was now terrified that the ideas I had started to develop would not be good enough for any ‘true’ actor-network theorist.

Such thoughts occupied and nearly paralysed my mind for quite some time, which was both frustrating and scary. But after a while, I started to think that I just cannot always care so much about what others think, at least not to such an extent that it makes me totally unable to think for myself. This is, after all, my thesis. It is my work and my doing. However obvious and trivial this reasoning might sound to others, it wasn’t for me. I realized that all my orthodox referring to what others have said, the ones ‘knowing better’, threatened to make this thesis totally uninteresting – and threatened to make me a really bad researcher. Of course, being influenced by others is fine, but I had perhaps spent too much time thinking about whether it was the ‘right’ way of thinking.

My conclusion was that the best I can do is just try my best to write something, to use what I have learned along the course of my PhD studies, my empirical fieldwork and my reading of the texts of others. And also to dare propose some new terms, perspectives and ideas without being so terribly frightened that I have done it all wrong, thought or expressed myself wrongly. Still, I must make explicit that this text is primarily written for fellow scholars interested in theories about projects and knowing, and that my main ambition is not to contribute to some further development of actor-network theory. While no longer seeing ANT merely as a perspective, but more as a method, I have thus aimed to follow the advice to “let the actors have some room to express themselves” (Latour 2002a, p. 1) and “not to limit a priori who or which are the actors and their properties” (Latour, in Crawford 1993, p. 7).

But how can such methodological advice be followed in practice, when studying project making? First of all, ANT is not a theory/method that has its origins in how to study organisations, but was developed as a way to critically study the construction of science and technology. Translating these ideas into organisational analysis,
Latour (1998) has argued that it is important to include nonhuman actors in these studies too. In line with this, he has also argued that there are no such things as micro- and macro-structures, since “all organisations are ‘flat’” (p. 280, my translation).

I would have done things differently if I were conducting a somewhat orthodox ANT study (in terms of studying the black-boxing, or the re-opening, of a scientific fact or a material artefact). For example, I could have started my study by asking how the radio base station had come into being, by following whatever actors took part in its development. I could also have drawn from a specific truth claim, and investigated how this truth had come to being. But that was not my main interest, even though the study came in contact with such questions too. Instead, I was interested in project making and how knowing, as a process, was shaped. Actor-network theorists showed me that there could be actors beyond humans involved in such a shaping. That is why I became focused over time on heterogeneous project making.

Law (1987) suggests that there are two general principles for studying heterogeneous networks. The first builds on the notion of “generalized symmetry”, meaning that “the same type of analysis should be made for all components in a system whether these components are human or not” (p. 132). The other principle is based on the notion of “reciprocal definition”, which implies that “actors are those entities that exert detectable influence on others” (p. 132). While I have not studied an actor network striving for stabilisation (in terms of ‘the creation of the radio base station as an artefact’) but have instead studied project becoming in relation to such a stabilisation, I have still tried to use these two basic principles.

3.3 Empirical Inspiration

In terms of empirical inspiration, I used a variety of methods in my study at Ericsson. As I came to focus on knowing as a process, it became increasingly less relevant to investigate ‘which project participant knew about what’ and ‘who transferred knowledge to
whom’. Over time, the issue became determining how knowing is formed by heterogeneous project making, in terms of analysing how different kind of actors performed project making, what they focused on, how they contributed, how they determined what to focus on and what was defined as important.

Several project researchers argue that the use of an ethnographical method is a fruitful way to conduct project research (e.g. Bragd 2002; Lindahl 2003), since this provides an opportunity to get closer to the actors. For my licentiate thesis, I did a case study using 22 on-site qualitative interviews. In retrospect I think I was not as open to the respondents’ perspectives on what was important as I should have been. Yet how could I have been? I did not know anything about their day-to-day interactions. I had never listened to their conversations on site, never seen frustration or expressions of joy – I had simply not been there to interact with them to any great extent.

Therefore, in the study for this dissertation I decided to try to approach the actors more closely. As Czarniawska writes (2004b, referring to De Vault 1987), the main advantage is that direct observation yields a “novel reading” (p. 17) by someone using another perspective and thus enables an alternative interpretation that may lead to “new insights - a meaning added” (p. 17). Therefore, I decided to study project making with an ethnographical approach.

**Ethnography as multiple methods**

Ethnography can be seen as “the trademark of cultural anthropology” (Schwartsman 1993, p. 1). Originally used by researchers trying to grasp “the natives’ point of view” (Schwartsman 1993, p. 1, citing Malinowski 1922, p. 25) in cultures exotic to them in countries such as Brazil, Samoa and Bali, it has become a method to investigate not only foreign cultures, but also other human interaction, such as organisational life.

An ethnographical method is based on participant or direct observation over a period of time, and is very valuable as a research method because “it problematizes the ways that individuals and
groups constitute and interpret organizations and societies on a daily interactional basis” (Schwarzmann 1993, p. 3). In the field it is, according to Schwarzmann, valuable to let both research questions and methods evolve during the course of the study.

When conducting organisational research based on an ethnographical approach, one can use a variety of methods, including observing the interaction of others, conducting interviews, and studying discourse, artefacts and symbols. One can have an overt role as a researcher, and thus be able to conduct more formal interviews. Alternatively, one can play a covert role in an attempt to get somewhat closer to the ‘natives’. One can do participant observation, taking on a role similar to the ones being studied (e.g. working as a management trainee when studying the practice of management trainees or being a project participant when studying projects) or one can do direct observation, not being a participant in the described sense, but still being on site, observing the actions of others. Ethnography is thus not one method, but rather the use of many methods when the “investigator goes into the field, instead of bringing the field to the investigator” (Schwarzmann 1993, p. 3).

When doing such ethnographical organisational research, it can be of great value to study the interaction that takes place at meetings, since meetings provide important space for interaction and sensemaking (Schwarzmann 1993; Weick 1995). Interactions at meetings have also been studied by project researchers, such as Bragd (2002), Karrbom Gustavsson (2005) and Westling (2002).

At the beginning of an ethnographical study, it is important to listen and observe, not to find out answers, in order to discover important questions to ask later (Schwartzman 1993, referring to Spradley 1970). When doing interviews it is also important to remain open in

35 Having a covert role as a researcher includes, in my view, ethical difficulties. I think that one should give people a fair choice to decide whether or not they want to be studied. This is, of course, not always as easy as it seems. However, I have tried as best as I could to always inform all human participants at the formal and informal meetings I attended, and of course when doing interviews, that the project research was for my dissertation. I always asked if it was all right for me to record meetings and interviews for my thesis.
terms of what the respondent considers to be important issues. Using open questions allows the respondent to answer in a way that is relevant to him/her (Schwartzman 1993). Since the purpose of the research is to understand a practice from the participants’ point of view, one must not interrupt the informant, translate his terms into one’s own during the interview or ‘lead’ the respondent to provide the answers the researcher wants.

Even though this advice all sounded reasonable and worthy of following, I know I sometimes failed. It is difficult to remain silent or just mumble ‘interesting, please tell me more’ when one gets excited about the information and really wants to say ‘oh, great, that means that you….”. So sometimes I said such things, and sometimes I did interrupt. I think I did a bit better towards the end of the study. I also stayed very open towards what I might find, especially in the early stages of my study.

Towards the end, I was able to ask more specific questions about what had, over time, become my specific areas of interest. I think, also, that due to my lengthy stay at Ericsson I was able to ask very informed questions, questions that I know I would never have asked if I had not been there for some time.

### 3.4 Developing a Unit of Analysis

After initial discussions with Bengt, the head of the project management department, I was invited to study a project which is here called X5\(^{36}\). More details of the X5 project will come in chapter 4, but basically, it was a project to develop and industrialise a radio base station for a specific customer. Despite my focus on project \textit{becoming} rather than \textit{being}, I will in the following relate the X5 project to known categorisations or typologies of engineering projects.

Following the categorisation by Berggren (2001), see chapter 2, the X5 project can be described as a development project, which

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\(^{36}\) I have used pseudonyms when naming the project, the customer and the main supplier.
according to Berggren aims to “deliver a specified product or system” (p. 18, my translation). From the point of view of the typological theory developed by Shenhar and Dvir (1996), I would characterise the X5 project as a medium-tech (medium technological uncertainty), system project.

Though technological uncertainty, as suggested by Shenhar and Dvir, can be seen as a continuum, and though not all the characteristics may fit the project in practice, their descriptions of medium-tech projects come the closest to how I would describe the project. Such projects are described as involving adaptation of familiar technologies, but may also involve a limited amount of new technology (not more than 50%) and are thus also described as incremental innovation projects. In such projects, Shenhar and Dvir suggest, the products developed are “additional, non-revolutionary models, derivatives or improvements of a product” (p. 615).

Though the X5 project can be described as having a high degree of technological complexity (e.g. a high interdependence between hardware and software components), I would not define the project as a high-tech project in Shenhar and Dvir’s terms. A high-tech project for them is defined on the basis of technological uncertainty, not technological complexity, and the X5 project cannot be described as a project being set up to create a product that was “new to the industry” or a product which “did not exist in the past” (which is how they exemplify high-tech projects, p. 617). Instead, the X5 project was set up in order to create a radio base station, which mostly involved technologies familiar to them.

As for scope, I characterise the X5 project as a “system project”, where a system is defined by Shenhar and Dvir as “a complex collection of interactive elements and subsystems within a single product, jointly performing a wide range of independent functions to meet a specific operational mission or need” (p. 611). Such systems can in turn, according to them, then become subsystems to even larger systems, as in the case of the radio base station developed in the X5 project. Although Shenhar and Dvir make normative statements and suggestions on how to manage different types of
projects, the intention here is not to investigate how to manage this type of project, but to analyse project making as a process.

**Studying project making**

“Our project work is too complex to illustrate. There are so many interdependencies and connections between the projects. There are many connections and interdependencies between hardware and software”.

Subproject Manager, Production

In ethnographical research it is difficult to know what kind of interaction to study. As Law (1994, p. 46) describes, wherever one might be, one can get the feeling that the “real’ action” is “going on somewhere else”. This happened to me many times and I sometimes felt very unsure about what I was looking for. The project being set up in order to develop and manufacture the radio base station consisted of several hierarchical levels (described in chapter 4). Initially, I wasn’t really sure if studying the making of a subproject would be sufficient or if it would be better to study an entire project or the ‘whole’ X5 main project.

After a while I decided that the making of subprojects, projects and the X5 main project all had to be treated as units of analysis. This was mainly due to the fact that both the main project and the subprojects were regarded, defined and acted upon ‘as’ projects by project makers. It was also very difficult for me to understand the subprojects and projects without understanding the X5 main project. In terms of the notion of unit of analysis, the unit of analysis was not really ‘the project’ either, since I was studying not a *unit* (a project) but a *process* (project making).

Many actors worked in parallel with different tasks and interacted in so many different ways that I simply could not be everywhere at once. My strategy was therefore to start by following Erik, who was introduced to me by Bengt as the subproject manager for production.
For whole days or parts of days, where he was, I was too. The people he met, I met too. The meetings he attended, I attended too.

Soon I also began to interview people he had contact with. I also realized that it could be a good idea to attend project meetings. Inspired by previous research on projects and meetings (Karrbom Gustavsson 2005, Westling 2002), I thought these would be very interesting. Following Erik, I already attended the subproject meetings he was responsible for (once a week) and the weekly (later biweekly) ones he participated in (i.e. the new product introduction (NPI) project his project was a subproject of). In addition, I soon began to attend the main project meetings of X5 (that the NPI project in turn was a part of). Fortunately for me, those meetings at three different project levels took place on different weekdays, which meant that I could attend them all every week. Apart from this, I conducted interviews and basically hung around. In total, I spent about six months at Ericsson (in Gävle and Kista), being there three to four days a week and spending the rest of the week at the university.

The meetings served as very interesting arenas for study (what they talked about, how they talked about it, who participated), and enabled me to grasp something about interactions that were taking place when I was not present. Thanks to this, the interviews, which were conducted throughout the whole study, could focus on whatever issues came up at the moment.

3.5 Making a Thesis

While getting inspiration by reading the texts of others as well as interacting on site is an important part of doing organisational research, writing is also very important. It is impossible, however, to say when the writing process started. I wrote down ideas for this

37 My work duties at the university included, besides having 80% of my full time at my disposal for research purposes, also being head of the division of industrial engineering and management. This task was supposed to take up 20% of my working time, and I felt that I wanted to spend at least a day a week at the university to be able to manage the duties that came with this responsibility.
thesis before I went to Ericsson and when I was on site I wrote down many ideas for themes and theoretical associations.

Since I stayed for such a long time at Ericsson, I came back to the university not only with material (such as notes and documents) to analyse, but with lots of ideas already created and written down during my interaction with project makers. While many of my interpretations were being created on site, I searched for new frames of reference that could help me understand and analyse the process.

During my time at Ericsson, apart from hanging around observing and speaking informally with employees, I also attended a large number of meetings. Initially, I wasn’t sure whether to record the meetings or not, so the first conversations I had and meetings I attended were only documented in my notebook. However, I soon realized that it could be an advantage to be able to go back to certain events during meetings, and I therefore decided (and was given permission) to use a Minidisc (in all, 62 meetings were recorded). During these recorded meetings, I tried to focus on what was said, took notes, and kept a form of log of who said what at what time. This meant that I could later be sure about who had made a specific comment. The main purpose for me in attending the meetings was not, however, so I could record them and then later analyse them all in detail — but to get a sense of what the actors were doing at that time.

At the meetings I had the opportunity to listen to what the project makers discussed, see what they were focusing on and how they interacted. Recording the meetings meant that I could focus on the conversations without fear of missing something important. Apart from providing important input to my interpretations, attending the meetings also meant that I could later ask the project makers much more informed questions during informal discussions or more formal interviews. Interviews enabled me to discuss the issues of the moment, talk about how the interviewee perceived the project and ask for related information, such as their background and earlier experiences. In all, 44 such interviews were recorded on Minidisc.
After returning to the university, I went through the notes I had written during my stay at Ericsson. Drawing from the ideas I had started to develop during my study, I tried to structure my ideas and my empirical material around themes and questions. I tried to think about what I had experienced during my study, what kind of sites I had been at, what kind of actors I had met, what they had been doing and how they had interacted. I then started to theorize more extensively on the themes I had developed, listened to some of the interviews, transcribed some of them, took notes on others and wrote down some more ideas and themes. At this stage, I was looking for interesting aspects of how different actors had acted as project makers and how knowing was shaped.

In my more extensive reading of literature in the field of project theory I compared my ideas with other theories about project work and knowledge. Sometimes I saw similarities and sometimes I saw that some common assumptions could be questioned, based on my interpretations. I also read more ANT literature and more in depth, in order to understand even more about the nonhuman actors that were represented in my material – and how I could include them in my writing.

As the project meetings served more as a basis for me to understand what was going on at the time, rather than as a basis for later analysis, the Minidiscs from the meetings were mainly used as reference material, from which I could transcribe specific conversations in order to illustrate my conceptualisations.

Although I transcribed large parts of the interviews in order to quote from them, I have not used transcripts as ‘facts’ but as illustrations of the themes developed and sources of new ideas. I translated the quotes I used into English and gave the actors pseudonyms or referred to them by job title. Describing the process theoretically, this thesis is hence neither an example of a ‘pure’ (if there are such) inductive grounded theory or a deductive process – it is rather a mixture of both, in an abductive process (Alvesson & Sköldberg 1994).
A reflection on my writing

There are many ways of writing a report about an ethnographical study, depending on issues such as the focus of the study, the research questions, the empirical and theoretical inspiration the author draws from, what kind of readers the author addresses, as well as the ontological and epistemological standpoints taken.

This thesis is not an example of a traditional ethnographical text. As Martin (1992) argues, ethnographies are often written “like beautifully written novels” (p. 24). This thesis is not an attempt to write one chronological narrative, which would describe ‘the’ processual story about ‘the project’. These are my main reasons for not doing this:

1. Heterogeneous project making and hence the shaping of knowing took place at many sites simultaneously, mentally as well as physically, and there was thus no integrated and coherent ‘culture of the project’.
2. The case is based both on my descriptions of the project (as an object) and the processes of project making, which consists of the makers actions and reflections on the same;
3. Hence, the thesis is supposed to illustrate the similar and diverse perspectives created simultaneously throughout the project;
4. And therefore I fear that writing a narrative (‘this was what happened’) would not give the reader what I am after, namely a feeling of fragmentation and coherency.

I have tried to reflect upon the processes of heterogeneous project making by using the voices of many different actors. The text is, however, not a polyphonic one, in terms of being a democratic text where the voices of all actors are equally heard (Martin 1992), even though I sometimes have included dialogues by using direct excerpts from transcripts from recorded meetings. Importantly, since I am the
author of this text, I am, just as Martin describes, the one selecting what should be written and which voices will finally be included in the text.

In terms of the result, most of this text can be described as a mixture between a realist and confessionalist style (Van Maanen 1988), which is simply because the realist style is easiest both in terms of reading and writing, and the use of a confessionalist style can be seen as way of including myself as an “I” in the text (Martin 1992, p. 195).
CHAPTER FOUR

Interpreting Project Making at Ericsson

Taking the research questions as point of departure, this chapter draws from my case study at Ericsson. Each subchapter is based on one sub-question and concludes with a conceptualisation.

4.1 In Search of Project Making

As described in chapter 2, the purpose of this thesis is to develop a perspective on how knowing is shaped in heterogeneous project making. Based on a becoming rather than a being ontology (Linehan & Kavanagh 2006), project making is here defined not in terms of project management (implying a project being that needs to be managed), but refers instead to different kind of actions performed by different sorts of actors when contributing to project becoming. The notion of project making might thus include actions which are traditionally seen as project management (e.g. making plans), but does not exclude other potential forms.

In chapter 2, the main research question and four research sub-questions (Q1-Q4) were presented. This chapter will focus on the latter, while the former will be addressed in chapter 5. Before addressing these four questions, I will first describe my initial contacts with actors at Ericsson, and introduce the project here called X5. As described in chapter 3, my interpretations are based on direct observation of various forms of project making. The interpretations are also based on interviews with project makers. As a result, this chapter does not present ‘the story of the project’. Instead, I will illustrate and comment upon various ways of project making and suggest some conceptualisations.
Getting access to study project making

As introduced in chapter 3, access can be difficult for an ethnographical researcher to obtain. In this case, the fact that I had conducted previous studies at Ericsson (Bengtsson & Niss 2000a, 2000b; Niss 2002) made the process easier. This time, I wanted to study a project for about six months. Considering the fact that I had previously been doing other studies at Ericsson, I expected that time frame to provide sufficient insights.38

I therefore contacted and asked the head of the project office in Gävle, Bengt, if I could study a project that would be executed within a time frame of about six months. The purpose of my study was initially rather vague, but included a focus on something like ‘knowledge creation and knowledge sharing’ in projects, focusing on how different participants would contribute and develop knowledge. Bengt, who had previous positive experiences of co-operating with organisational researchers, suggested the X5 project, a project set up to design and industrialise a rather small, inexpensive, low-capacity, outdoor radio base station for a specific customer. He further suggested that I should talk to Erik, subproject manager for production, and ask him if I could study the project and his work.

When I went to Ericsson for the first appointment and parked my car at the factory parking lot, a sense of familiarity struck me. When Erik walked in to the reception room, he came over to me and we shook hands. Inside the facility, people were passing by as on my previous visits, wearing white coats with something red and blue on their breastpockets. They also wore the access cards on lanyards around their necks.

The project office had been moved since the last time I was there. We went towards Erik’s office but had a stop first at the coffee machine.

38 Some might argue that you cannot do an ethnographical study at a place where you have already been interacting, a place you know about. The very argument for doing an ethnographical study is to study the unknown. But my ambitions here were not to describe ‘the culture of an organisation’ as some kind of a stable entity. Instead, I studied project becoming, as a process and thus an unknown territory.
We sat down there talking for a while and I told Erik about my background, my previous studies at Ericsson and also some about my licentiate thesis. Then I started talking about why I wanted to do another study for my doctoral thesis, describing it rather vaguely in terms of something like ‘knowledge sharing and knowledge creation in project work’. Erik seemed positive and said that the aspects I brought up were crucial for them. He explained that all competitors have access to the same sort of production equipment, but if we can manage knowledge fast, so that “one plus one becomes three”, that is “how we win the game”. I felt glad that he seemed positive to my study.

Arriving at the project office, we met Bengt and started talking with him. He said that it was nice to see me again and I felt pleased. We then walked into Erik’s office and Erik started to sketch the project on his whiteboard while I took notes. “I am just saying that I have experiences and contacts, not that I am good at this” he emphasised. I felt pleased that he seemed to be willing to share his thoughts with me.

After telling me a bit about the project, Erik suddenly asked what kind of use they would get out of me. “None at all” I replied and smiled in order to soften my words up a bit. Erik looked surprised, laughed and said “That was an honest answer”. I explained that I didn’t want to build up any expectations that I would tell them if they are doing things ‘right’ or not in terms of their ways of working. I just wanted to be there, I explained, to be able to understand how they worked. I just wanted to know how their world looked and how they dealt with the issue of ‘knowledge sharing’ in projects.

Erik didn’t look entirely happy with this but said that would be OK. Then he smiled and said that he wanted me to tell him a bit about the activities at the University, that he would like that and find that interesting. I replied that I could do that and perhaps also come back and talk some after the project finished, to discuss how it went.

Bengt came back and we talked for a while about my study and some other things. Bengt then said that he was positive about co-operating
with the University. We also talked some about business critical information. Erik then called Lena, then the main project manager for the X5 project, and asked her if it was OK for me to study the project and she confirmed this. We then decided that Erik would talk to Anna (project manager for new product introduction) the next day at a scheduled meeting.

After this, I followed Erik outside the facilities. We shook hands again, I thanked him for the visit and promised to call him up the next day. When I walked back to my car, I felt pleased with my first day. I took it that I now had been given permission to study the project, it seemed exciting and not that extensive and it seemed as if they considered it OK for me to hang around – even though I wouldn’t be of any use.

After gaining approval from Bengt and Erik, they helped me negotiate the approval of others. We also later made a formal, written, confidentiality agreement, which gave me permission to do my study and get access to necessary information, as well as protecting Ericsson against me giving away what they saw as critical confidential information (by giving Ericsson the right to read and withdraw any such information from my manuscript before it was to be spread and published). The agreement was signed by me, my supervisors and the dean at the University of Gävle as well as the head of the project office and the human resources manager at Ericsson Gävle.

4.2 Q1 - *What Do Project Makers Make?*

The project I was invited to study was to design and deliver a radio base station (RBS) to a specific customer, here called QE. The RBS was intended to become a part of the ‘third-generation mobile telephony’ – or ‘3G’. According to an Ericsson Web page, 3G is a generic term that describes various wireless network technologies:

> “3G combines high-speed mobile access with Internet Protocol (IP) based services. This doesn't just mean fast mobile connection to the World Wide Web — by liberating
us from slow connections, cumbersome equipment and immovable access points, 3G will enable new ways to communicate, access information, conduct business and learn”.

When I started my study at Ericsson in September 2002, several of the people I met had been assigned to the project rather recently, but I also got the opportunity to interview those who had been involved in earlier phases. When asking them how the project came into being, I got somewhat similar answers, such as:

“It was before summer, it must have been in June. It must have been via product management, a need of this. I think that QE, the customer, had made an inquiry when they were to buy macro-systems, that they also needed this smaller system. . . . And Ericsson didn’t have this product, so our portfolio wasn’t really complete”.

Project Manager, MPE (design)

The making of such a smaller system was described by a subproject manager as:

“We are going to make a type of radio base station. For 3G, which will be used in [country] as I understand it. A smaller cabinet. X3 is a larger cabinet that is bullet proof and so on, and this is nothing like that but a smaller variant aimed to cover areas that are difficult to cover with the larger cabinets. This is a cheaper version; it doesn’t have the same capacity but handles fewer calls. But it is not very small either, not like that one over there [points at another one]. It is almost a cube on X cm with a weight... what did they say... of about X kg”.

Subproject Manager, Test Development


40 Since actors came and left during the process more than one individual could be "project manager, X". Thus, all the citations referred to as a statement by “project manager X” need not come from the same individual, but from an individual who at some time had been taking on such a role.
The X5 project was described as being a hardware project, since the software needed in the RBS was developed in a parallel project (X3):

“The software for X5 is developed in X3. So the X5 is a hardware project but we need, of course, information about the software. That it is compatible and that it exists”.

Configuration Manager, X5

The X3 project referred to above was described to me by Erik, who had been involved in that project previously. The X3 project (separated into a hardware and a software project) included the development of an outdoor and an indoor radio base station. When the X5 was to be developed, it was set up as a parallel hardware project, which was then to use software and some other components developed for the X3.41

In the following, I will not present ‘the story of the project’ but instead focus on project making by addressing the research questions described in chapter 2. The first research question regards what project makers make. Hence, in the following, I will describe some of what was made, and then suggest some conceptualisations. Project makers are here defined as actors who in some way performed project making (i.e. contributing to project becoming).

Making problems and solutions

An internal document called the MRS (main requirement specification) was drawn up in June 2002. The purpose of this document was to “settle main requirements for the RBS X5, a small RBS for outdoor use”.42 The MRS hence translates the requirements of the customer (QE) into requirements for the forthcoming product and priorities for the development. The document begins with the following background (emphasis added):

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41 As will also be mentioned later, the X3 project was re-organised into a joint project again in February 2003 and the X5 project was then merged into that project.
42 My translation from the MRS.
“QE requires a pole/wall mounted, . . . , single sector (or omni) RBS for a fast roll-out in . . . with low baseband capacity available in 2002. . . . Another application for this RBS are in-building solutions (…). The priorities (in no particular order) for the development can be summarised as follows:

- Short TTM
- Low development cost
- Reuse of existing hardware
- Reuse of existing software
- Low TK
- Small size
- Low weight”.

Next the document specifies the requirements of the desired product under categories such as climate, storage requirements, transportation requirements, numbers of sectors and carriers, capacity, power supply, manufacturing costs and availability. A couple of weeks later, an extended version of the MRS was created, called MRS0. This document was also “approved” and had an “A” status (the former one did not).

An additional month and a half later, yet another document was created, describing the system’s architecture. In this, the priorities listed above were listed again and the purpose of this document was now to “sketch possible implementations of the RBS X5, a small omni-cell . . . base station for outdoor use. Also the total cost for the execution phase of the product development is estimated”. This document describes that the RBS X5 requires an external power supply; two different scenarios for this are sketched. It also describes X3 as the “product baseline”.

In the document, there are also listed assumptions, such as: “it is assumed that it works with a smaller subrack, i.e., less than X slots”.

47 Other information has been excluded so as not to expose business-critical information.
“it is assumed that it is possible to leave out the 2\textsuperscript{nd} X slot and X”. Some “open issues” are also listed, such as “how to solve the communication & supervision between the climate system and the RBS” and “The MRS0, Rev A, p. 9, says: ‘Future XX shall be possible to connect’. Does this mean retrofitting, or new cabinets? How shall the remote cable get into and out of the cabinet? The solution in the RBS Y1 could be studied”. Also: “Could we use the RNC XX in the final product?” and “How many alarms do we expect from the XX?”

Thereafter, under the heading “Requirements” the document tells that “The Assignment Specification states that the product is developed for the . . . customer QE. However, the MRS0 has requirements, which allow the RBS to be used worldwide, such as the temperature range. This range could be solved by using an . . . . If other conflicting requirements are discovered, they must be highlighted”.

The document then continues to sketch possible implementations with headings such as “Combined baseband and XX subrack”. Under the heading “Overview”, the future X5 is illustrated and the text says that “the building blocks shown in Figure 2 have been identified. (The figure neither gives the blocks’ exact position in the cabinet, nor the relative sizes or positions)”. It also suggests that “many units will be re-used from the existing RBSs, new units can be — cabinet, climate unit, capacitor unit, connection field unit and fan units”.

The “assignment specification” that was referred to in the document above was yet another document - the assignment specification of the X5 project. Amongst other things, this document specified the assignment scope as: “A product X5 ready for deployment shall be available at the end of execution phase. Four configurations shall be available: Demonstration in November-December: X and Y or Z Megalink interface, whichever is preferred by the project. First delivery FOA in January X or X1, whichever is available, Y or Z Megalink interface, whichever is preferred by QE (to be investigated by FOA project manager). Commercial deliveries from February, two configurations: 1) X1 or D, whichever is available, Z interface, 2) X1 or D, whichever is available, X interfaces”. In addition to the
assignment specifications of the main RBS X5 project, there were also assignment specifications for subprojects.

These documents\textsuperscript{44} were all created before I started my study, and I have only second-hand stories on how they came into being, but they are still important to present here. These documents can be seen as the result of processes of negotiation and translation. Basically, the makers of these documents can be seen as having translating the interests of ‘Ericsson’ and ‘the customer’ into the requirements of the forthcoming product and also defined the focus and work of others. Making these documents can thus be seen as a form of project making, contributing to project becoming. After the translation, the documents can be seen as potential actants, potentially influencing the work of others, acting as spokespersons for other actors, such as ‘Ericsson’, ‘the customer’ and also the interests of the ‘forthcoming radio base station’ (when the documents argue for ‘its’ requirements).

Though some of the technical content of the issues defined in the “systems architecture” document are Greek to me, I think that making the documents illustrates the early defining of problems (e.g. as “open issues” above, yet to be solved) and the creation of solutions (e.g. solutions such as reusing existing components). As will be illustrated, project making is not only about solving one main problem (how to design and deliver a specific radio base station), but about the ongoing defining of many problems and solutions throughout the process.

As suggested in the documents, the new RBS X5 was to be created by combining components used in existing RBSs with new units. Hence, what the X5 would finally look like was to be developed over time. Thus, as described in the MRS0, the objective was to create an X5 having specific features in order to satisfy the requirements of a specific customer, but the final solution was to be created over time, including the development of prototypes.

Many other documents were also written, such as organisational charts, schedules, delivery plans, time reports, document plans, risk

\textsuperscript{44} Some abbreviations are changed in order not to disclose business-critical information.
analyses, protocols from milestone reviews, meeting agendas, action-point lists, trouble reports, network plans (illustrating the activities and their interdependencies), integration plans (illustrating which version of components would be included in different versions of the RBS X5), production instructions and quality reports.

Creating reference groups and kinds

In ANT terms, translation (of interests) and inscription (into artefacts which then act as potential actants influencing the work of others) is here happening in an ongoing creation of problems and solutions that contributes to the shaping of focus. To understand more about how problems and solutions were created, I first had to try to understand more about how reality was created. In addition to the documents described above and many other material artefacts created in the making of the X5 (which included many different components, of which some will be addressed later) something much less tangible seemed also to be created – what I here refer to as creating reference groups (Shibutani 1955) and kinds (Hacking 1999). These reference groups and kinds are in turn based on an interrelational creation of reality.

“The reality is in the project, since this is where you spend your time during the weeks. The line organisation changes over time and what’s important with that is to get support with practical issues, such as having somewhere to sit, to get paid and such stuff. But, so to speak, the reality is in the project. At least for me it is”.

Project Manager, Integration and Verification (IoV)

Project makers at Ericsson made several statements to me about what the specific project was. As introduced in section 2.2, some tools from Ericsson’s project management model PROPS were used, such as organisation charts, checklists, milestones and tollgates. The project could thus also be defined as a “traditional project”:

“X5 is a traditional project with Design... well first of all System, the project which specifies what we should build, and
then a Design project, who builds it practically and then we have IoV who verifies it in relation to the requirement specification that System has written. And then we have NPI who build the product and deliver it to the customer. So it’s really a traditional project organisation. This is how it used to…. this is the way it has been at Ericsson the whole time”.

Project Manager, IoV

The project was formally organised through the categorising and organising of competences needed. I interpret this as the making of "kinds" (Hacking 1999), i.e. the creation of classifications. I thus suggest that the making of kinds contributes to project becoming. The project was formally structured with a total project manager and a total project team, which consisted of project leaders that were each responsible for different project functions. Hence, the formal project structure followed a traditional view of how industrial projects can be structured (see, for example, Engwall 1995, p. 69). Here, one can describe project making in terms of the translation of the traditional way of working with projects at Ericsson into the kinds needed for this specific project.

Some of these projects consisted in turn of subprojects (such as the subprojects Production and Test Development). The total project manager was situated in Kista, along with the other project managers. Some of the subproject managers (such as Production and Test Development), were situated in Gävle. Relevant kinds that were defined as being included in the project included a total project manager, a configuration manager and project managers, whereof the latter were each responsible for an area such as System, CBD (design of the backplane) and MPE (mechanics and power design, meaning design of the cabinet, climate unit, cables etc.), NPI (new product introduction), IoV (integration and verification) and Site Solutions (see Figure 1).
These projects in turn, had their own organisation. The NPI project, for example, was organised as shown in Figure 2.

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45 In the original, there are some more functions (such as software design) defined (related to) but not ‘included’ in the project.
When I asked about the different roles defined by the categorisations, Erik described some of them and how they were linked as follows:

“Lena’s [total project manager] role is to keep everything together, she owns the final result. And in her project, she has Design, who designs this. It is a heavy part. Then she has System, who configures this, who says ‘this is the way it should look’. She has IoV who must verify that it becomes how we have imagined it, integration and verification. And then she has NPI, or Supply, which is the industrialisation that supplies the material and produces it. So the responsibility of NPI is to supply material and to manufacture it.

Yes. And you are included in that group? (Camilla Niss)

Yes.

And what is your responsibility then? (CN)

We are one of Fredrik’s [the project manager for NPI] groups. And Fredrik’s groups are… he has some strategic sourcing who writes contracts and steering documents with suppliers, so that we can buy this stuff. That is Åke. Then he has supply chain establishment, who should do the transfer, the final part, so we get the product into serial production. . . . Then he has test design who designs the test so we will be able to test the product when manufacturing it. That part, together with production, which I am responsible for, are the heavy parts. Then he also has a hardware co-ordinator, Joachim. My role and my group’s role, the core of our work is to produce this”.

Subproject Manager, Production

In addition to the functions described here, the NPI project also included serviceability preparation, which was responsible for spare parts. The subproject Production that Erik was responsible for then contained yet other functions, such as production engineering, quality control, revision handling, production\textsuperscript{46}, logistics\textsuperscript{47} and test support.

\textsuperscript{46} In the following called “Subproject Manager for Production, Production”.
\textsuperscript{47} The Subproject Manager for Logistics co-ordinated yet two other functions (planning and supply).
Hence, in many respects, project making in terms of translating ‘the way we organise projects here’ into a specific formal structure of the project, described the project to have a traditional project structure (see Engwall 1995, p. 69). Looking like a hierarchical organisational unit, such a structure has been proposed as a prerequisite for the effectiveness of large projects, but it has also been argued that such a structure can cause restrained creativity (ibid.).

A traditional yet unusual project

As exemplified, it was suggested that the X5 project was a traditional project. On the other hand, I was also told that the X5 was not an ordinary project, but one with pressure to work much faster than usual. According to the assignment specifications, a customer-specific product was to be designed and delivered (many other projects at Ericsson were not customer specific), and the deadlines for delivering different versions of the product were set in a contract. Due to the time pressure, several of the project members claimed that they thus had been permitted (not always clear to me by whom) to take short cuts, not having to follow, as they put it, all normal routines. There wasn’t time, I was often told, to do all the things they normally did.

As an example of this, I was in September 2002 going by car from Kista to Gävle, when Erik called up a project colleague who was home sick. At the time, I could not understand all they were talking about, but registered him saying that “…if they crush our standard lead times, we have to crush our standard routines too. Nothing is ‘sanctum’”. Erik later explained to me that there existed formal models on how to work, and that he had that “in his head”, but that he now, due to these circumstances, took short cuts. “We have an NPI model that we are supposed to go through” he continued, “but now I cheat”.

Erik wasn’t the only one providing these arguments. Others also gave similar descriptions, and sometimes also characterised the vagueness around what they were supposed to do as a problem:
“In the beginning, I didn’t think that there were any clear directions. The directions that existed were ‘cut corners where you can’, so to speak. Don’t do everything that you really should do, but do only what is necessary. But if we were not supposed to perform ‘top level’, on what level should we then perform? And a sponsor of this project couldn’t say, ‘well you must do 50% of what you should do’, you can’t say that because then you say that you should do a 50% as good product. This was confusing, it took quite a long time before people understood that as long as we got the work done, it is not so important to create documents, but we should get it done”.

Subproject Manager, Test Development

So, the fact that the project had a short time limit was often put forward as a factor that made the project unusual. Still, there were some that also suggested that time pressure was becoming a normal feature of the projects at Ericsson:

“The whole project has been short of time. This is how I think that Ericsson projects increasingly tend to become. The time frame gets shorter and shorter”.

Subproject Manager for Production, Production

As illustrated above, the project was described as being an unique or unusual project, due to being fast, yet a traditional project in terms of being organised in a way similar to other projects at Ericsson. In addition to time pressure, other factors, such as a turbulent project context involving parallel reorganisation and downsizing, were also factors that made this project unusual, since these factors, some suggested, contributed to a scarcity of competence and frequent turnover among project makers.

Creating reference groups

Project makers presented me with various documents describing the project, such as plans, project organisation charts, and so on. As will be described in later sections, both the descriptions of the project and those describing it varied over time, since project makers came and
left. My interpretation of this was that project making was constantly ongoing, which made it difficult to define it in terms of the existence of a project with project participants ‘in it’. Project becoming can instead be seen as a continuous process which was made as a sort of ‘in-between’ its makers. One basis for such this seemed to be the making of some sort of ‘us’, and what ‘we’ were supposed to do:

“We have a common goal, that’s what’s most important. We should design a product, then industrialise it and make it at such quality that we can deliver it to the line so that they can produce it when it’s good enough. When it has a ‘reasonable amount of faults’, so that they can produce it in higher volumes. That is our mutual responsibility”.

Subproject Manager, Production

As illustrated in the quote above, project making included the construction of ‘us’ or ‘we’. But who could be called ‘we’? Here, I interpret this as the making of temporary spheres. This sphere notion differs from the community of practice notion in several aspects, firstly because it is created not only by human but also by nonhuman makers (as will be described in section 4.2), secondly because it does not refer to a community with participants sharing perspectives and engagement, and thirdly due to the predetermined temporality of the spheres.

However, what seems to be important here too is the mutual sense of, perhaps not community, but an identity of ‘us’. As illustrated above, Eric relates to a “we” in the makings of the project — ‘the X5-us’. I suggest here that this this temporary sphere can be seen as a “reference group”, which is a group that actors use as a perspective (Shibutani 1955). Such reference groups need not refer to groups of people working closely together, but can be any sorts of groups an actor can use the perspective of, such as we Swedes, we production engineers or we in the project. When I claim that project making

48 Here, I have been inspired by Salzer’s (1994, p. 243) notion of “spheres of meaning”, where an organisation can be seen as an “arbitrary and permeable boundary encapsulating various such spheres”, but the notion I refer to here is not really equivalent to what Salzer describes.
included the ongoing construction of a temporary ‘us’ as a reference group, I do not intend to say that the project was perceived similarly by all. In addition, the project was not static but created over time (such as an unusual project, a fast project, an important project and a small project).

Instead, I suggest that project makers created different sorts of we or us to use as perspectives. In addition to the use of phrases like ‘we’ should do this or that, some project makers also described their use of we metaphors to understand the project. As an example, a project manager described how he regarded the project as similar to a soccer game:

“I see the project as being similar to a soccer game, where Lena [total project manager] is the coach who stands beside the field and yells and pushes ‘now you’re in and you’re out and now you have to consider this and that’ and so on. And then you take a time-out a few times, like the project’s meetings, where you check what’s been going well and what’s not and what we need to do to score a goal. And the goal is here to make these customer deliveries, to release the products when we are finished”.

Project Manager, IoV

However, even though many participants used terms such as ‘we’ or ‘us’, it seemed as if the ‘feeling of we’ varied amongst the participants and over time. When asked whether there was a we-feeling in one of the subprojects, one participant said that:

“Well, I don’t know… We-feeling…well, yes and no. We are a group and it’s a positive atmosphere in the group, but we don’t meet that often and to such an extent… so I am not sure if a real we-feeling has been established yet. But there is a positive atmosphere in the group and it is easy to make contact with those you need to”.

Subproject Manager, Logistics

One reason for the sometimes expressed lack of feelings of ‘us’ were the fact that project makers came and left during the course of the
Some reflected upon this by relating to models of how groups were formed:

“This project increases my belief in the FIRO model; we never get out of the first phase when we continually get new people”.

Subproject Manager, Production

By also referring to the FIRO (Fundamental Interpersonal Relationship Orientation) model, another subproject manager said, when asked if a we-sense in the project developed over time:

“It might develop.. but it might be that it develops from a ‘we in one way’ to a ‘we in another way’. There are many different theories about groups and how it works and... well you have both FIRO and others. But it becomes a bit scattered here, we are all spread out but yes, there is still some amount of ‘we-feeling’ in this project. Maybe it’s the project that constitutes the ‘we-feeling’. That it has to succeed”.

Subproject Manager, Strategic Sourcing

The X5 project was also later, in February 2003, integrated into a larger project, X3, which meant that the project was reorganised in order to consolidate resources. But even though one cannot, due to these circumstances, use the perspective of a community of practice (Lave & Wenger 1991), I argue that project making does include the making of some sort of ‘us’, but it could vary considerably among the project makers. As described, in the overall X5 project that was set up to design and deliver the RBS, the project was formally organised through several projects and subprojects. This translation of the traditional way of working into a project hierarchy of projects and subprojects contributed to the making of many ‘us’, which in turn enabled project makers to use several reference groups as perspectives.

For example, there were many sorts of ‘we’ used as reference groups, such as ‘we in the NPI-project’, ‘we in the MPE (design) project’ and
‘we in the X5-project’. By using such reference groups as perspectives, project makers could relate to themselves and others. For example, the NPI project manager described how different actors within IoV and Test Development (the latter included in the NPI project) interrelate:

“So we have this interplay with IoV as well, where we give and take. . . . They write a document that explains ‘this is what we should test on the radio base’ and we write ‘this is how we will test this radio base’. Then it might be that we misunderstand something so they write a preliminary version, and then we write a preliminary version and so it goes back and forth”.

Project Manager, NPI

Hence, such temporary spheres can be related to the different formal functions included in the project. Project makers had thus the flexibility to use both the perspective of the ‘we in the NPI project’ as well as the ‘we in the X5 project’. Over time, yet other constellations were also created, within or across formal structures. As an example, it was suggested that due to the changing focus and tasks, new constellations were formed over time:

“I don’t think that we [subproject Production] are a traditional group, but more of a loosely coupled group with diverse competencies. Right now there is a group consisting of Joachim, Åke, Gerd and Sture [participants in the NPI project and the Production subproject] in a constellation to chase down material, to bring home material. That is a constellation. Then there are ‘loose horses’ that should do some work. For the future. But we don’t have such interdependencies that we really are a group”.

Subproject Manager, Production

Here, it is interesting to note the reference to a ‘we’, at the same time as suggesting that ‘they’ were not a traditional group. Over time, it was argued, focus will change, and all involved in the subproject Production were not closely interacting all the time. On the contrary:
"They will release the software in a short while and then focus will be directed towards test support. Test support has little to do with chasing material [which was focused on at present as described above]. I fear that if we were too much of a group, people would feel that they are just passing time since they do not have so much in common".

Subproject Manager, Production

Others also addressed different constellations developing over time. A project manager related this issue to changes in focus during the "project life cycle":

"You kind of have a project life cycle. In the beginning, it is much about providing prototypes and this includes a lot of supply issues. So it is a lot ‘Åke [strategic sourcing], Åke, Åke, Joachim [hardware co-ordination], Åke’. And then it was directly from E-Tech up to here. So it was just Åke and Joachim. Then you are getting into building some radio bases and things... with material supply and then Gerd [logistics] came in as part of the team. So then it was kind of ‘Åke, Joachim, Gerd and me’. And now Erik [production] starts to enter also, since now we need to add real production, to produce this in series-like conditions and now Åke will be... I shall not say phased out, but his role get smaller.

... 

So the we-constellation is changed over time? (CN)

Yes”.

Project Manager, NPI

The temporary spheres that were formed over time were more or less espoused. But no matter if the perspective of an ‘us’ was based on a formally created group or a more informal group, they could all be used as perspectives. Being able to take these different perspectives also means that not only ‘we’’s, but also different forms of others (as collectives) were created and related to. I will in the following describe some of these, and then conceptualise the phenomenon.
NPI with and versus Design

As an example of the makings of ‘we’ and others, I will illustrate some about the makings of the reference groups Design and NPI. On the one hand, the overall aim for the X5 project was to deliver a certain number of RBSs to the customer — on time. On the other hand, it seemed also as if project makers used different reference groups as perspectives when assigned different tasks. One role that was explicitly created to act as link between Design and NPI was the hardware co-ordinator, who was supposed to ensure the providing of hardware on request from Design and others in the project, i.e. being responsible for co-ordination of prototypes. The co-ordinator described the role’s purpose as:

“Our purpose is to constitute a link between production and design. On the overall level, which is important to keep in mind. That is what we optimise for. There are always design projects that can say that ‘we could do this much faster if we could do this ourselves’. And that is probably true. But they would secure 25 prototypes for their need. But the real need of everybody else, if you consider delivery times etc., is perhaps 300 prototypes. And they never consider that. And that is why we exist”.

Hardware Co-ordinator, NPI

Acting as hardware co-ordinator, he suggested that there was a general continuous struggle going on between design and supply:

“The continuous struggle between the designers who want to decide as late as possible, and the suppliers who need to know as early as possible”.

Hardware Co-ordinator, NPI

49 The design of the product was formally divided into two projects, the MPE (responsible for the design of the mechanics and power such as the cabinet, climate unit, fan and cables) and the CBD (responsible for designing the backplane), as shown in the organisational chart earlier.
Acting as the go-between, he was a spokesperson for both:

“We are to stitch together production, who is square by tradition and the engineers who also are square by tradition, but in their way. . . . ‘You can’t wait three days before making an order just because you ‘always do’’ [relating to Production]. And ‘now you need to pull yourself together and not just say three days before that ‘we needed this yesterday’. If it was so very important, you should have known about it earlier [relating to Design]”.

Hardware Co-ordinator, NPI

When asked if he thought that the different groups had the ability to take the perspective of the others (as I put it at the time), he said that he thought that this ability was generally very limited:

“This thing with lead times is really foreign for our design departments. They might understand it on an intellectual level, but not that it’s really so in reality. Something you very often hear here [in Kista] is that ‘Gävle will fix this’. Damn helpful city this [ironic], all 96 000 people, or so, will run out and help Ericsson? Who in Gävle? Well ‘Ericsson in Gävle’. Yes, but I know at least four facilities in Gävle where we have operations. Which one? It is like ‘that factory’, where things ‘just happen’, some kind of magic that isn’t any difficult either. That’s the kind of attitude that exists here. I try to explain that ‘when you make an order, 13 people will work with it before it is delivered’. 13 people! That means that if you make it wrong, 13 man-hours, a man week…, has been of waste. Here, the fundamental rule ‘shit in, shit out’ applies in terms of information.

In the reverse case, Production can think that Design are some kind of demi-gods, ‘Design fixes this’. They don’t understand that only the development project for the TRX-card is a hundred people! In Germany. A hundred people! It is not that it’s one guy who is sitting there testing and soldering. They have a very limited understanding about what it takes to design these things”.

Hardware Co-ordinator, NPI
The result of the differences in perspectives was, according to him, that there was a “gap”:

“I am not sure why, but system and design want to cheat in terms of doing the documentation. That is the usual - ‘we don’t bother about it, we just do it, and then we document it afterwards’. And the only thing that is really important for production is documentation.

So they know what to supply and manufacture? (CN)

Exactly. And you have to explain this, that this supplier . . . is no digital designer. She can’t decide what sort of ASIC needs to be put on the printed circuit board. She needs to get a list. What she is really great at, is to supply the material. She is fantastic doing that. There clearly a gap here”.

Hardware Co-ordinator, NPI

Hence, it seemed as if project makers could be using different reference groups as perspectives. Here, it was often suggested that due to the fact that this project was unusually fast, all the normal routines were not followed, which created confusion and negotiation about what needed to be done, when and by whom. Or as was put by a project manager:

“"We have well-established working methods and interfaces. Now when you consciously break with normal working methods. . . , then all that starts to crack. So then you have to pick this up at a higher level saying, ‘well what is important right now’? And then it becomes steered top-down since you kind of need to negotiate different solutions to the problems. And they [the problems] go across boundaries”.

Project Manager, NPI

As an example, when I was talking to the subproject manager for logistics in an early phase, she told me about her frustration that “design” did not provide specifications about the content of the radio base station. It was important to them, she explained, that they got
clear specifications on what components should be included in various versions of the product:

Where is the specification supposed to come from? Design? (CN)

Yes, they are to make the specification, what they want in the delivery. They possess knowledge about which revision states you should have to make it work and to be able to perform the kind of tests you want.

And you haven’t really got it [the specification]? (CN)

No, we haven’t. They don’t tell us want they want exactly. It’s like going to a Volvo store saying ‘I want a Volvo’. ‘Well, what kind of functionality, what colour?’; ‘I want a Volvo’. Do you understand, this is what happens. Then supply doesn’t know what to supply.

And you’re stuck in the middle of this? (CN)

Yes, exactly. Because Supply complains to Sture, ‘what are we supposed to supply’? And he can’t give them a good answer, because he hasn’t got it on paper, what they want. At least we want to know what it will look like today. We understand that it will change, but then at least we have a basis to depart from when modifications are made. Since we don’t know what they want, we cannot place any orders and as long as we cannot place orders…and with new lengths on the cables, new products, there are lead-times.

Subproject Manager, Logistics

While being referred to as “design” here, the makings of such ‘others’ do not only refer to the design projects, as will be described in the following sections, since other projects and actors were involved in the processes of defining what components should be included in what versions of the product. But here, this design notion is included in order to illustrate how project makers related to groups of others. After interaction and negotiations between various actors, definitions of the content and the status of the product developed over time. As a part of this process, different product owners were responsible for
different components and parts and the status of these was co-
ordinated by configuration managers (of the overall project and
projects). When asked to describe how such parts lists were defined,
the configuration manager for MPE (design) explains:

“A request came for a structure of the X3, like a [document] that
you might have seen. They wanted to see a structure of how it
would look and be built up. It was in an early phase. And I have
made this and updated it and got them into PRIM and put them
into PRA/DS4 status, most of them. And this is made in order to
get something reasonable to supply from and to make sure that all
things are there and I have supported Karin [project manager for
MPE] with this”.

Configuration Manager, MPE (design)

When asked how he knew how to make such a structure, he explained:

By experience. Since I have made similar for other products. . . .
On this level, X is bought from E-Tech. What does it contain?
Well it is… [describes the content of the cabinet when it is
delivered from E-Tech]. I got the content from E-Tech, a
suggestion.

Then I knew that the cards were to be included. On a list. And I
have from [X3 products] that these cards are used.

Added in Gävle here? (CN)

Yes. And then the X-card also which we ‘own’ here at this unit.

Then there is also a discussion about what cables are to be
included. Because that depends on what cards are to be used, and
how much cables there are from the supplier. . . .

Yes? (CN)

So it is a discussion with the product owners. I am not the one
defining what cables should be included. I can go around saying
that ‘something is needed here, something is missing’. That is my
role here.
And then I sent this out, asking, is this right? Have you got what you wanted into this? And that is why I have so many updates, I had to sit and update this and it was always something that was to be removed and something that should be added.

Yes. Who did you send it out to? (CN)

Design and system and I think that someone in Gävle got it at some period. Supply.

Configuration Manager, MPE (design)

Hence, the negotiation of what components should be included in the product can be seen as a result of the interaction among several actors (other projects, suppliers, product owners etc.), which will be illustrated more later. Here, this example shows the making of ‘us’ and ‘them’ in the project, where project makers can relate to others by making them ‘a collective other’ (‘the designers’, ‘we at NPI’, ‘product owners’ etc.) and relate to them as such.

Thus, it seems as if project makers (while also being able to use a perspective of an overall ‘we’ in the X3 project) sometimes use perspectives of ‘we’ as reference groups, while also creating ‘otherness’ to relate to. This is one reason why it is so difficult to describe the project as a practice or a community – or even less a community of practice. Instead, I will in the following suggest another conceptualisation.

Q1 - Conceptualisation

As introduced here, project making can be seen in terms of translations and inscriptions in an ongoing iteration of problems and solutions. As the basis for the creation of problems and solutions, I have in this chapter introduced kinds (a concept that will be further explained and elaborated in the next chapter) and temporary spheres. As described, the spheres can be based not only on the idea of an overall RBS X5 project, but also through the creation of other ‘we’
and ‘they’ spheres simultaneously. I here conceptualise these temporary spheres as **interrelational project spheres** and suggest that project makers created and used these as perspectives.

By using the interrelational project spheres as reference groups, a total project manager can, for example, act as a spokesperson (i.e. making the project an actant) for the project. In addition, the project managers, being representatives for different areas, can here be seen as acting as spokespersons for interrelational project spheres, making these actants – e.g. making a ‘we in the NPI-project’.

So project making involves not only defining individual project participants or artefacts such as the RBS, components, project plans or assignments – but also the creation of the relationships between them. This ongoing project making can thus be seen in terms of project becoming. The temporary ‘we’ is made through interaction between both human and nonhuman actors (thus here called *heterogeneous project making*) – e.g. by organisational charts, formal routines and assignments as well as by components and people.

The use of the interrelational project spheres as perspectives in turn makes project makers relate to others. While sharing some similarities, the notion of interrelational project spheres suggested here differs somewhat from the notion of “relevant social groups” (as developing and using different “technological frames”) as suggested by SCOT (see chapter 2), since the actors contributing to these interrelational project spheres are not only human, but also nonhuman (hence they are not ‘social’ groups) and since the issue is not to describe how various social groups understand and shape technological artefacts. Instead, I here use the notion of reference group (Shibutani 1955) to emphasise the ability of actors to use the perspective of many different groups. The ‘we’-formations that are constructed throughout the process are the elusive result of ongoing negotiation and translation – and are not pre-existing or *per se*. These ‘we’-notions are only upheld as long as actors (human and nonhuman) perform necessary associations. Or as Callon (1986, p. 228) puts it: “the definition of groups, their identities and their wishes are all constantly negotiated during the processes of translation”.
In the next chapter, I will turn the focus from the act of project making to the actors, including both human and nonhuman ones. Though the latter cannot use the perspectives of the reference groups as described above, still they contribute to project becoming — and should thus also be included in the analysis. As introduced here, the making of “kinds”, or categories (Hacking 1999) is suggested as an important part of project making and some of these will thus be described in the next chapter.

4.3 Q2 - Who are the project makers?

If, as I suggest, project making can be described in terms of the continuous creation of problems, solutions, kinds and interrelational project spheres, a fundamental question becomes “how to become a maker” of such problems, solutions, kinds and spheres. This can be related to the second research sub-question, “who are the project makers?” which will be discussed in this section.

Basically, I will argue that becoming a project maker is fundamentally a process of creating legitimacy to act as such. In this section, I will include examples of various actors and discuss how these were aligned and legitimized. I have chosen to categorise the project makers in two categories - humans and nonhumans.50 In section 4.2, I suggested that project making is about the making of “kinds” (inspired by Hacking 1999). Such kinds (or classifications) could, for example, be project managers, total project managers, hardware co-ordinators, or test designers. But they could also be kinds like cables, fans, climate units, trouble reports or suppliers. All

50 This is not done in order to say that either humans or nonhumans should be studied or understood in isolation. As suggested by Akrich and Latour (1992), what can be analysed are instead “assemblies of humans and nonhuman actants” (p 259) and the object of analysis is then not a machine nor a human, but instead a “setting or setup” (ibid.). Nevertheless, the very argument here is that both humans and nonhumans can be seen as project makers, legitimizing themselves and others in an ongoing process. In order to be able to describe this interaction, I have to introduce both the human and the nonhuman actors and how they relate.
these kinds are here seen as potential actants, since the kind can ‘act back’ onto others, when relating to the kind.

Hacking (1999) suggest the notions of “interactive” and “indifferent” kinds. The former is exemplified by Hacking with the kind “women refugees”. Such a kind is interactive, he suggests, because it “interacts with things of this kind” (p. 32, my emphasis), i.e. people. An example of an indifferent kind, suggests Hacking, is the quark, since the quark is indifferent to its classification, i.e. it does not act differently just because it is named a quark.

Like Hacking, I refer to constructed classifications – but I do not make a distinction between indifferent and interactive kinds. The reason is, basically, that I do not think that any kind is an inherently indifferent kind. Even though the quark, using Hacking’s example, may be unaware of its classification, it still interacts with it, by taking part in the actor network (of many heterogeneous actors, of which the classification is one) that makes it – and in turn by participating in making it.

When relating this concept to project making, I also add the notion of relevancy. I thus suggest that project making includes creating and relating to what is here called relevant kinds, i.e. kinds that are constructed as relevant in terms of project becoming. In the following, I will describe some human and nonhuman actors and how they were aligned to become project makers. I will also describe how some actors interacted with classifications when acting ‘as’ relevant kinds.

In relation to ANT, the making of such kinds can be likened to moments of translation, but in a way that differs somewhat. Callon (1986, p. 196) describes four moments of translation when some actors “impose themselves and their situation on others”. The first moment is problematisation where some actors (researchers in Callon’s article) “sought to become indispensable to other actors in the drama by defining the nature and problems of the latter” and that these problems “would be resolved if the actors negotiated the ‘obligatory passage point’” of the actors’ (“researchers” in original)
“programme of investigation”. The second moment is called *interessement*, which refers to a “series of processes” where some actors “sought to lock other actors into roles that had been proposed for them in that programme”. His third moment is called *enrolment* and refers to “a set of strategies in which the researchers sought to define and interrelate the various roles they had allocated to others”. Finally, the fourth moment is called *mobilisation*, which refers to a “set of methods used by the researchers to ensure that supposed spokesmen for various relevant collectivities were properly able to represent those collectivities and not betrayed by the latter”.

With the X5 project, the making of relevant kinds can be seen in terms of such moments of translation, but in a somewhat different way than described by Callon (who did not focus on an industrial development project, but instead on “a scientific and economic controversy about the causes for the decline in the population of scallops in St. Brieuc Bay” while presenting “a new approach to the study of power” (p. 196)). Project making can be seen as when actors define roles and interests for others and themselves, but in this case, focus cannot be put explicitly on a few actors who defined the problems and interests of others while trying to translate their specific interests onto others.

Instead, in this case, much work was done to black-box the roles of different actors – for example by setting up formal organisational structures, which can be seen as an actor network, arguing for the roles and interests of some actors in relation to others. So, when the roles and interests of different project makers were to be defined, a great many actors were already involved in these translation processes. In terms of the translation processes of interessement, enrolment and mobilisation, a great many actor networks contributed to these processes (due to the black-boxing of roles and ‘the way we organise projects here’). Or in other words, the problem of developing and manufacturing a radio base station was thus already defined as an interest of several different actors, through the mobilisation of many interrelated actor networks, defining, for example, the roles of various actors in the product development process – such as NPI and IoV.
Using the vocabulary of ANT (Latour 1995), one can argue that much of the work of defining the roles of others had already been inscribed into actants such as PROPS and organisational charts. These actors could now be seen as taking part of the work of defining relevant kinds that would take part in a specific project. Hence, different actors were prescribed to act in a certain way. This does not mean that actors deterministically will act in a certain way (that they automatically will subscribe), but that much work (pre-inscription) has been done before a given scene. When work had been inscribed into the relevant kind (as an actant defining a specific project role, such as project manager or designer), actors could relate to such a kind by acting as such a kind. Hence, I suggest that project making is a process in which human and nonhuman actors create and act upon (and ‘as’) relevant kinds (as nonhuman actors), i.e. those kinds constructed as relevant for the specific project.

Thus, I suggest that project making can here be seen as the ongoing creation of relevant kinds (the ongoing negotiation of what kinds are needed), based not primarily on an attempt to stabilise roles in an actor network, but on the need of creating (temporary) relevant kinds needed for project becoming. The purpose of project makers are not to permanently ‘lock other actors into roles’ in order to stabilise an actor network, but to define and align actors to act as relevant kinds in temporary project making. In the following, I will take a closer look at some of the human actors taking part in these processes.

### 4.3.1 Human Project Makers

“The closer you are, the more fun and more interesting it is to give that ‘little extra’ that it takes at times in projects. Instead of being told by someone else that ‘in our project, we do this and that and we think that this is very important and urgent, can you do this?’ If you take part, you feel the atmosphere and the pressure in a totally different way”.

Subproject Manager, Logistics

That humans can be seen as project makers is no news. Humans are often described as having or representing various competencies when
taking on roles as project participants. It has also been described how an important task for project managers is to co-ordinate such participants, who also can be seen as brokers (Wenger 1998) representing various communities of practice (Garrety, Robertson & Badham 2004). What is less often described, however, is how human actors become able to act as project makers. Drawing from my suggested notion of relevant kinds, i.e. the classification of what kinds should be included project making, we see a process of alignment and legitimization which is here referred to as heterogeneous project making.

Alignment methods and processes

At Ericsson, assigning humans to a project is to be done by the use of different formal methods. These methods were described to me as:

You [as project manager] need to define what resources you need over time. And then you need to write a BTA, an ‘ordering of technical work’, which is a document directed to line managers and units, saying ‘I need this number of people, during this period, having this competence and different profiles’…that you need over time. And then you go to the line to apply for these resources.

Did you do that? Write a BTA? (CN)

Yes, I wrote a BTA but it never got to be… it was only preliminary, but they signed it and gave me the resources. We put it into Replir as well, the system you use to book resources. I put it there as well, since that is where you really put your need… And then the line… The BTA is a form of contract you make at first, a written agreement that says ‘these are the resources you have’. And then you put it into Replir, the software system. You put a need into the software and then the line has to confirm, in Replir, that they will provide these resources.

Does it work well, this system? (CN)

Yes, I think that… I mean the system works well. But then it is a matter of the quality of the input, partly that the manager put
the right demand into the system over time, but foremost that the resources you get are really accessible when you need them. That is a problem we have had. In a downsized organisation, this can become a problem sometimes. To be honest, this is my experience. To some extent... in the beginning... you were promised a resource and then when you came to talk to that person, he said ‘no, what? I work full-time with this [other thing]’. And then you went back... and apparently that person had been assigned to several tasks at the same time.

Project Manager, MPE (design)

Drawing from this description, the alignment of human actors to contribute to project becoming can be seen as the work of many heterogenous actors. ‘Formal routines’, ‘managers’, the ‘Replir system’, ‘other projects’ and the potential participating humans are but some of the actors involved in this process. Hence, it seems as if getting others to become project makers required persuasion – an ability to translate the ‘interest of the project’ into the interest of an actor who could take on the work defined by the ‘relevant kind’ needed.

In the description above, the project manager can be seen as a spokesperson speaking for an actant (the project) that needed the work of others. Simply put, if no other actor acted in the interests of the project, project becoming would not continue. By using different alignment methods, such as writing a BTA, the Replir system and face-to face interaction with potential project and line managers, he tried to persuade others to become project makers:

Who were involved in the project, and how did you write specifications? (CN)

Well we had a bit of a shortage... it was just before the summer vacation so we hadn’t much time, just one or two weeks. So I had to run around in the line organisation looking for help and there was one from ‘climate’ who wrote a climate specification. One from ‘mechanics’ wrote a drawing on the main dimensions. And then one from ‘power’ who specified the need for a power supply. It was an X Volt system we had.
So three separate, rather slender, specifications were written, describing these technical areas.

Project Manager, MPE (design)

Hence, the alignment process seemed to require the persuasion of other actors to become project makers. They can be seen as aligned when they start to act as project makers (contributing to project becoming). Some of the project managers described their alignment strategies, such as the project manager for System, who described his tactic “not to go to the line managers asking for ‘resources’, but to ask for specific people”, people he knew were competent and fast working. “If I get a newcomer”, he explained, “the tasks take twice as much time”. His strategy about this was to “be concrete about who he wanted”. If he asked for a person he and the line manager knew to be very competent, he had “marked a position”. “If they then suggest to me another person”, he continued, “he or she will presumably hold the same competence, and they will not offer me a newcomer”. While the strategies could differ among the project managers, there were also others who suggested similar strategies, or as described by a subproject manager when discussing his alignment strategies ‘in general’:

“Depending on the project, I know how difficult each task is. In one project, one particular task can be difficult, whilst in another project, this task isn’t. Then I tell the line manager that ‘this is the way it is’. In this project, we cannot use Nisse, because Nisse is a newcomer. Here, we need Olle instead, since he is experienced. I establish this in the management team too, informally as well as by presenting this to them at their meetings. I invite myself to their meetings and tell them what’s important for us. They have their hands full just managing the line operations”.

Subproject Manager, Production

Using the vocabulary suggested here, the project managers above can be seen as taking part in the construction of a relevant kind (in addition to kinds such as project manager, x-designer or test designer) that could be needed in the project, the experienced kind. But at the
same time, many described their involvement in the project as being dependent on reasons other than being explicitly selected:

“My regular work tasks disappeared and…. projects came in and someone had to take them on so… yes, I was available”.

Project maker

There were also several of the project makers that did not refer to themselves or were referred to as the experienced kind. This implies a need for project managers to also be able to relate to ‘what is at hand’, since the making of classifications (relevant kinds) does not determine action taken by others, but the relevant kinds are only active if related to. In regard to this project, some project makers suggested that there were a shortage of experienced people involved, since many had not worked with this kind of project before (e.g. had not worked with 3G products). The reason the project did not get the most experienced resources was explained to me as follows:

“I personally think that this is due to the fact that there are larger and heavier projects that precede us. Those have the resources. And Ericsson has these people in a world that has changed, reorganised, and moved people around. Merged organisations. These people are available.

We do good enough and we have to use the people available. We cannot count on old merits\textsuperscript{51}. The people who take part, I am sure they are ambitious, but they don’t have the background to be able to just directly run this race”.

Subproject Manager, Production

Taking the perspective suggested here, one can thus say that there was also another relevant kind created in the project, the ‘good enough kind’, based on a view of the X5 project as a ‘good enough project’. Due to circumstances such as current downsizing, reorganisation, time pressure etc., some project makers suggested that the project did not need to strive for excellence, but for good enough. This, or similar notions, seemed also to be spoken for by others:

\textsuperscript{51} Original “Så vi har inga gamla lagrar att vila på”.
“Allan, who is one of the top managers here, talks about ‘just-enough-isation’\textsuperscript{52}. Thus, it should be ‘good enough’, and I am a great fan of that. And I have seen this in other projects too”.

Project Manager, MPE

Hence, the translation of ‘good enough’ into a relevant kind for a project might be performed by several actors. Balancing a project perspective with an overall perspective seemed also to be important:

“I think I can understand their [line managers’] situation. It might be unfortunate that I understand this and perhaps I am not arguing enough with them. But I understand that they have such a hard time that they have provided me with what they are able to. So that’s why I understand that they have replaced some of my people, if other projects have been heavier or if people are needed elsewhere. Arvid, for example, has put a lot of time into the TPI-project and I realize that it’s important for our survival here. This is why I don’t argue with his line manager about it”.

Subproject Manager, Production

So, the making of relevant kinds cannot be seen as a process internal to a project (if there were \textit{per se} boundaries, which here aren’t), nor an external one. Instead, many different actors contributed to the making of relevant kinds. Not just human, but also nonhuman actors do this when taking part in the defining processes and the making of the relevant kinds needed. As described earlier, actants such as PROPS were considered relevant to the project:

“Luckily, we are pretty good at making projects in this company, so that you can shift people in the project. We use the PROPS model, which includes a common language and a standardised model, for example the NPI stage where you have the standardised functions of production, sourcing, test, serviceability preparation and hardware co-ordination”.

Project Manager, NPI

\textsuperscript{52} My translation of “lagomisering” and “lagom bra”.

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The process of negotiating relevant kinds can also be seen as a result of and resulting in negotiations of what the project ‘was’. Hence, standardised models can also be seen as acting as project makers in the sense that they take part in the process of negotiating relevant kinds (since the models argued for various functions to be included).

In addition to such actants, many other actors participated in such defining processes (defining other sorts of relevant kinds), which included the negotiation of what the project was. On the one hand, some claimed that the X5 project was a very important project, due to specific conditions that were specified in the contract with the customer (which affected other products as well). On the other hand, others suggested that the project was manned with rookies with little experience of 3G products. When I asked a manager of a project office in Kista if the X5 project was prioritised and how it looked to an ‘outsider’, he replied that:

“Yes, good question. I have got this question before, ‘if it is a prioritised project, why do you use rookies’?

We have had the dilemma that we have to get prioritised between the projects. One e-mail defined project X as highly prioritised within the company. For x [organisational unit]. That is one time. Then project Y was defined as ‘highly prioritised’ once. But besides that, there has not been any prioritising between the projects. All are ‘equally important’. That is problematic”.

Manager of a project office in Kista

Hence, the status of the project can be seen as negotiated over time, and as a process in which several different actors took part. Another project maker described how the status of the project had been transformed over time:

“In the beginning of the project it felt like… I got the impression that this product wasn’t that important, we just needed to get it into the factory, deliver some and then the project would be over. That seemed to be the message.
But the more time has passed, the more you have heard that this product is incredibly important, if we don’t deliver this to QE in time, it will have consequences for other products. And I think that this is a general…like…‘aha, was it so important’?”

Project maker (Production)

Hence, the status of the projects was not static but transformed over time through the negotiation among different actors:

“It [the X5 project] was very important in the beginning, but now it has decreased in importance, I think. But it might be because you have now delivered prototypes to the customer, which satisfied them. It was a lot of fuss for a while, but now it has calmed down, which is emphasised by the fact that it has now been shifted into a subproject of X3”.

Subproject Manager, Serviceability Preparation

Hence, the status of the project and what kinds should be included in the making, can be described as an ongoing process of negotiation.

**Project alignment as an ongoing process**

The alignment of human project makers was not something that was done only at the beginning of the project. As described above, other projects were being made at the same time, and actors thus tried to align project makers for these too. So the X5 project and the subprojects can be described here as actants having to compete with other projects (and other actors) over resources.

That the alignment process was ongoing was made explicit many times during the time I was there. Several of the human actors acted as project makers over a period of time and then after some time, for various reasons, left. Some also pointed out that this frequent turnover of participants was very unusual, and due to ongoing reorganisation and downsizing. Thus, as mentioned earlier, when different statements are indicated as made by for example “Project Manager, NPI”, the
statements need not have been made by the same individuals. Hence, the alignment process can here be seen as an ongoing process.\textsuperscript{53}

**Legitimization**

The alignment processes are not only an issue of formally assigning people to become project makers. They also include legitimization. For one to act, he, she or it must be acted upon, i.e. related to and listened to. When reflecting upon their roles, project makers often described their work in terms of acting ‘as’ a relevant kind:

“To be able to be a good NPI project manager you need to know some about technology, but also to be able to get this ‘cable-fellow’ [cable designer] not to go and have some coffee or prioritise some other project, but instead explain to him that this project is the world most important and to get him to do the things that I want.

He has a certain interest in his cable drawing, to create the optimal solution, whilst I am interested in receiving the length and the interfaces in order to be able to get a cable prototype. So you have to convince him that the most important thing for him at the moment is to make a drawing and specify these details so I can deliver prototypes”.

Project Manager, NPI

Taking the perspective suggested here, the project manager can be seen as a human actor interacting with a relevant kind, “NPI project managers”, as a classification. As he suggests, taking on the assignment as a NPI project manager requires being listened to. Only when being listened to and related to can the actor contribute to doing project becoming, persuading others to act in his, her or its interest or act as a spokesperson for others.

As indicated above, legitimization here can thus be described as being based on the actor’s interaction with relevant kinds, as sorts needed in

\textsuperscript{53} Karrbom Gustavsson (2005) describes how project participants came and left during the project. So the phenomenon has been discussed by project researchers, but perhaps not with the use of this kind of ‘alignment’ perspective.
the project, as well as the interaction with other actors. The shaping of the relevant kinds is also an ongoing process. As mentioned, some relevant kinds that were acted upon were defined also in other projects (e.g. the same formal roles were defined in many projects, spoken for by actants such as PROPS), while other relevant kinds were more recently constructed.

As an example, in the making of the NPI project, a new relevant kind was defined, called ‘project manager of the Supply Chain Establishment’. The assignment was described as being a new kind of role. When that project manager was asked what he was supposed to do, he explained that:

I will make sure that Supply’s demands are attended to in new projects. The things that make us able to have lead times, planning, capacity and such — the whole TTC-flow, I will see to that you plan for this in the project. That you already in the prototype stage consider that the product will be producible in larger volumes.

(---)

Do you know what you are supposed to do? (CN)

‘Nja’⁵⁴, you have to figure it out over time. My boss has declared that ‘secure resources to you can establish the supply-flow, the TTC’. That is a rather general description, so you need to seek it out for yourself. And there are no clear areas of responsibility, ‘what is SCE’ and ‘what is NPI’, that this aspect comes down to you. Instead, ‘it depends’ all the time. This makes the role pretty unclear and depending on how you choose to define it, it can entail a little or a lot of work.

Subproject Manager, Supply Chain Establishment (SCE)

Here, the subproject manager can be seen as a human actor interacting with (relating to and hence co-constructing) a newly constructed relevant kind. Other relevant kinds had been shaped over a longer period of time, and actors suggested many definitions of someone such as a project manager (as a relevant kind):

⁵⁴ A Swedish mixture of “no” (nej) and “yes” (ja).
“The principle for a subproject manager is to…you used to say that a subproject manager should have a very small room and a great number of shoes. He should constantly be moving around in the organisation, making sure that things happen. That what you have decided should really happen”.

Project Manager, IoV

Here, such a statement can be seen as when the actor interacts with the relevant kind ‘subproject manager’, and describes how he relates to the kind and describes his strategy for ‘acting as’ such a kind. In a similar way, another actor relates to the ‘relevant kind’ of project manager as:

“I am project manager. And thus you have the great problem for project managers. You have much responsibility, but no authority . . . So what I focus on is to explain the demands, what kind of product we are developing, what schedule we have and the needs attached to this product. To clarify this. And based on this clarify the responsibilities of those respective individuals below me”.

Project manager, NPI

While some project makers presented distinct ideas about what kind of actors they represented, others claimed that their responsibilities were vaguely formulated:

“I haven’t received anything telling what I am to be responsible for, and I have… very vague directives. I have kind of defined it myself. So I can’t say that I have been given it ‘on paper’, what I am expected to be responsible for. . . . I have no experience of this type of project, so I don’t know what kind of directives I can expect”.

Project maker

Hence, relevant kinds are not static but negotiated over time, by the interaction between the kind as a classification (‘I work as a . . .’, ‘my role is to . . .’, ‘new members do this’, ‘experienced participants can . . .’, ‘an x-participant should do this and that’) and the actors relating
and co-constructing relevant kinds. Project makers can also reflect upon the kinds they are supposed to represent and also act as other relevant kinds:

“My main task is really quality control in terms of production. That was my main task, but it has not become such. I have put focus on an earlier step, focusing on what we receive from our supplier, E-Tech, since about X% of the problems we have had have been related to E-Tech”.

Subproject manager, Quality Control

Hence, becoming a legitimized project maker does not mean that an actor needs to act according to a formal role, but that the actor acts (is related to) as a kind that contributes in a relevant way to project becoming:

“Now, at the end…since it has been a bit of a crisis on a day-to-day basis concerning whether or not we are receiving anything from E-Tech. . . . You have to solve things just to keep things going, in some way. It is difficult then to specify what I am supposed to do. Instead, you need to jump in and help out. So Jens [Production] and I are working…when it was busiest here, when we produced a buffer before delivering, I did much of his work too, and helped out getting production resources”.

Subproject manager, Quality Control

Using such a perspective, legitimacy can here be described in terms of whether others relate to the actor as if he/she/it acts as a relevant kind or kinds (which thus do not need to be in terms of formal roles, as described above). As an important part of becoming a legitimized project maker, the actor must be able to interact with a created kind in a way that makes others relate to him, her or it as such (‘the kind that contributes to/affects/relates to project becoming’). But an actor can of course relate to and interact with many kinds (since an actor is not the kind he interacts with) and simultaneously act as both ‘the experienced kind’ and as ‘test designer’.
Even the most basic act of presenting oneself at meetings can be seen as a strategy for acting as, the creation of, and the interaction with, relevant kinds. For example, at an early project meeting in a conference room in Gävle, the participants were asked to present themselves. “The very purpose of the meeting”, suggested the subproject manager, “is to present ourselves and to create a mutual image of what is to be done”. In their introductions, the others stated both what they were to do in the project and a bit about themselves, saying things like:

“I am responsible for production engineering” (relating to the kind ‘responsible for production engineering’).

“I have experience of outdoor cabinets” (relating to the kind that has ‘worked with outdoor cabinets’).

Here the participants of the meeting can be seen as negotiating legitimacy for themselves, a process that begins with the fact that they are present (hence invited to) the project meeting. They can be seen as continuing to negotiate legitimacy as project makers by interacting with different relevant kinds. This, however, does not mean that all the kinds referred to above became relevant kinds in terms of the project. What kinds are seen as relevant is an ongoing process. Nevertheless, this basic session can be seen as an important way to negotiate legitimacy. Relevant kinds are here not necessarily stable entities, formal roles or well-known sorts, but any kind of classification that actors can relate to.

Yet presenting oneself is of course not enough to create legitimacy. The project makers must, through ongoing interaction, continually negotiate and renegotiate legitimacy. One other important means of creating legitimacy is to formally position a relevant kind in the project hierarchy, an attempt to speak for the kind the actor is interacting with when trying to represent it. Hence, the organisational chart can be seen as a nonhuman project maker (as will be described more thoroughly later), being a spokesperson for including some relevant kinds. But while translating a relevant kind into a formal project hierarchy can be an important means of negotiating
legitimacy, formal hierarchy does not per se determine action. Instead, project makers relate to other individual actors acting ‘as’ relevant kinds, as well as to the relevant kinds (the classifications) they represent.

Here, the project manager reflects upon how he once acted ‘as’ project manager for MPE (design), though this role was assigned to someone else:

“We [in the NPI project] could say ‘let’s sit down and wait for the “frozen specifications” in which they have defined the content of the product, in terms of cards, cables and so on’. And then, based on that, supplied the material, assembled the product and delivered it. That would have been very practical for us.

But then there is the issue that we have eight weeks of lead time [on material] so there will be eight weeks in which the project will make some form of validation of the product. So in order to be able to reduce this time, we don’t sit and wait for the specifications, but pull this from the designers.

As an example, we have the configuration manager at MPE responsible for the X-list [specification]. He is responsible for the X-list, in which it is defined what parts are included. I asked him for the latest list and he said that ‘he had not been given the information of the latest revision’. ‘OK, I said, what are you waiting for?’ I asked and thus then acted as project manager of MPE. ‘Well, I’m waiting for information from this and this cable designer”. Well OK, then I went to him and asked him why he had not given the configuration manager the information about his cables, ‘Well that is because I have not made this and that’. Aha, the cables have not been verified, then I go back to the one doing the verification of the hardware and say ‘why have you not done the verifications of these?’, ‘well, it’s because I don’t have this and that’….and then you have pushed this backwards”.

Project Manager, NPI

When asked why he took on the role formally assigned to someone else, he explained that he “acts out of his interests” and that it is faster to act upon these individuals directly:
“So when you ask why I don’t address the project manager for MPE directly, it is not that simple that you just use the formal organisation. This organisational chart just reflects the financial flow. There are interactions and dependencies across the organisational structure.

The project manager for MPE has a responsibility to do the design. Some of her areas are of much interest to us, such as the definition of the product, product numbers so we can make updates. The function as such is not interesting to us, why it is ten meters long and 4 mega-ohm or whatever it may be, is of no interest to me except for the fact that it should be ten meters long and 4 mega-ohm.

To be given this piece of information it is faster for me to contact the ones responsible for these parts directly, not contact the project manager, who might not understand exactly what I am after either. But the guy ‘down there’ knows that and I know that and then we speak directly.”

Project Manager, NPI

Hence, acting as a relevant kind does not mean acting out of a ‘formal’ role, but is rather a process where the actor acts as a ‘kind being relevant’ in relation to other actors when contributing to project becoming. In the above section, I have elaborated on my suggestion that the creation of relevant kinds is an important aspect of legitimizing project makers. Becoming legitimate means being recognised and related to as a project maker, hence getting access to perform project making.

**Language and legitimacy**

To create and relate to relevant kinds requires the ability to communicate. In terms of communities of practice, Lave and Wenger (1991) suggest that learning to talk is a fundamental aspect of learning. Project makers must also learn to talk – but *both like and unlike others*. The balancing act involves simultaneously acting as several different relevant kinds such as the kind who can speak the ‘Ericsson language’: 
“When we become more than three Ericsson people at a party, we start talking gobbledygook."

Hardware Co-ordinator, NPI

Acting as a kind who can speak the ‘Ericsson language’ meant using a great many words and acronyms that seemed very strange to me at first. While I did not need to negotiate legitimacy as a project maker, I still needed to negotiate legitimacy as a project researcher and thus needed to understand at least some of the terms used. Sometimes I asked, sometimes I guessed the meaning (for them) of the acronym by drawing from the overall discussion. Apparently I was not the only one not knowing what the acronyms stood for:

“Sometimes you see that people are using acronyms for half a year, and then when you ask them what they stand for, then they don’t know. Like this thing with Basic CV. It took a long time before getting someone to answer what CV stands for.

What does it stand for then? You come to think of Curriculum Vitae, however you pronounce that …(CN)

It stands for Configuration Version. And I think that… I should guess that 75% of the people in this building don’t know that even though it is so frequently used”.

Project Manager, IoV

A similar comment was made by the hardware co-ordinator for NPI: “I asked a digital designer what ASIC means. And he didn’t know. He was an ASIC designer but he didn’t know what the acronym stood for”.

While it was indeed difficult at times to understand what they were talking about, such comments made me realize that I was not the only one. But as implied above, it could be enough to understand the

55 Original: “fikonspråk”.

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meaning of the acronym without knowing the words: apparently someone could be an ASIC designer without knowing what words the acronym stood for. In my case, I often understood neither the words nor the objects or processes the acronyms referred to. Apparently the vocabulary to know depended on what relevant kind(s) of actor(s) the actor wanted to act ‘as’ in relation to others. Acting as ‘the kind that knows about software’ required, for example, the ability to use another language than the kinds that ‘know about hardware’. Or, as a project manager put it:

“When we talk about software or performance, then there are very, very few that can have an opinion”.

Project Manager, NPI

The creation of such elusive discourses that enable others to relate to you as being a relevant kind of actor is not a process made solely the domain of human actors. On the contrary, nonhumans play a great part in the shaping of both relevant kinds and the requirements involved when negotiating legitimacy to act as such relevant kinds. As mentioned, the project model PROPS can for example be seen as a significant spokesperson for a project language. In the next section, I will discuss how some nonhuman actants negotiated legitimacy, and how they also acted as relevant kinds.

4.3.2 Nonhuman Project Makers

“Without technologies, human beings would not be as they are, since they would be contemporaneous with their actions, limited solely to proximal\(^\text{56}\) interactions”.

Latour (2002b), p. 252

In this thesis, I assume that project becoming is shaped by both human and nonhumans, as is emphasised by my notion of heterogeneous project making. But what counts as a ‘nonhuman’ – and what does a nonhuman do? Latour (1992b) basically suggests that

\(^{56}\) My interpretation of “proximal” is not being able to act at a distance.
work can be “displaced”, “translated”, “shifted down” or “delegated” to nonhumans and if you want to find out what a nonhuman does, you have to “simply imagine what other humans or other nonhumans would have to do were this character not present” (p. 229).

Although I cannot claim that I understood all the technological complexities of the X5 project, I was still able to grasp that much work was translated to and by nonhumans when acting as project makers. In the following, I will present and discuss some of them.

The alignment of components

As introduced in earlier sections, the radio base station that was to be designed and delivered was to be build up by several different components, some of which was to be assembled by the supplier E-Tech and some at Ericsson facilities. The agreement with E-Tech was described by a product owner:

Since E-Tech had total responsibility for the cabinet, they were also given a bit of a ‘free hand’. That is also a prerequisite for us to be able to work properly. So we just gave them the dimensions of what is to be included into the cabinet, and then they defined that the whole cabinet can be maximum X litres and weigh…something. And then they were given information about the weight of all that’s ours and what volumes are required, so then they know how much volume there is left and then they are going to make something out of that.

What parts have they designed and what parts have you had here? (CN)

They have designed the empty cabinet, the subrack, the climate unit, the fan and some power unit as well.

And what things are you putting in here? (CN)

All the radio cards, the MCPA and a capacitor unit.

Product Owner, MPE
Taking the perspective suggested here, the description above can be seen as a record of an actor describing, relating to and thus co-creating relevant kinds (i.e. sorts of components) needed in the project in order to be able to create the radio base. This illustrates that different sorts of artefacts, such as radio cards and capacitor units, were created as relevant kinds to be included.

The physical artefacts that then acted as such kinds could be seen, as Hacking (1999) describes, as being “indifferent”, or unable to reflect on their classification. But since artefacts ‘act back’, they also contribute to the ongoing making of the classifications, i.e. the relevant kinds can be redefined/replaced if the artefact does not act as expected/preferred by other actors (if it des-inscribes in Latour’s (1995) terms). Hence, since nothing is in isolation, I suggest that the actor acting as a kind and the relevant kind as a classification do interrelate. Thus, as mentioned earlier, I do not think that “indifferent” (as suggested by Hacking 1999) is the ideal term to use here. Instead, I suggest that creating relevant kinds is an important part of project making, that actors can act as such kinds and that both kinds (e.g. the classification “x-cables”) and actors acting as kinds (e.g. the cable) are real, constructed and on the same ontological level.

In terms of assigning nonhumans to become project makers, one big issue was, some suggested, that some components had long lead times while others could be in short supply due to being requested by several projects at the same time:

“In this project, we have positive aspects in terms of having many components in common with other products. So there is less material to chase down. New components are often more lead-time critical than components that already exist. On the other hand, this makes a situation of priorities and the risk of shortage for someone else”.

Subproject Manager, Logistics

Hence, aligning nonhuman components (representing the relevant kinds needed) was an important form of project making. Here, negotiating the status of the project was important:
“Here we have delivered a demo to (country) and here is the picture of a very satisfied customer. Such things increase the status. About the prioritisation of the material, we almost always get what we want, for two reasons; one is that we are close to commercial delivery. It is always easy to raise your priority if you can say that a real customer is waiting. And then it is due to that it is such a small configuration. One cabinet for us is like… one board of every printed circuit board-type, that is nothing in a situation of priority when you have another project requesting 80 pieces and I say ‘I need three’. Then I get three. It is he who needs 80 that gets 40”.

Hardware Co-ordinator, NPI

Hence, an important form of project making is to negotiate the status and importance of the project in order to align project makers (e.g. components). As mentioned, artefacts developed in the X3 project, such as software, were also relevant to the X5 project, which created a need for negotiating the importance of X5, sometimes stated as difficult:

“But we are so dependent on X3 and that is such a big project. It becomes a bit like David and Goliath, it is hard to get them to ‘we want this’. But I must wait now for X3 to release their test software so we can get our changes there. As it looks, that is week 50 and that is really too late. And I can’t influence this since they are so much bigger.”

Subproject Manager, Test Development

Basically, without the artefacts that contribute to project becoming, there would be no project. The basis of legitimization for nonhumans seems to be the same as for humans, including the negotiation of relevant kinds to be defined and aligned. The alignment of components was an ongoing process, which was made explicit by the constant revising of what versions of components needed to be included:
“It changes the whole time and you have to deal with that. This is development”.

Hardware Co-ordinator, NPI

Hence, negotiating relevant kind of components was an ongoing process, and the alignment of such components was a process that included several different actors:

“Daily morning meetings where we are going through material status, foremost the material that should go to E-Tech for assembly. So E-Tech takes part too as well as some people from Kista. Status, what kind of prototypes should be delivered and when, do we have material in house and are there released documents. Changes in progress are being gone through and so”.

Subproject Manager, Logistics

Since nonhumans cannot speak for themselves, they need others to speak for them. In the making of relevant kinds, which was done through ongoing negotiation, several documents were created to define (speak for) the relevant kinds needed.

As described earlier, creating the radio base station involved different versions. Project makers referred to something called FAR and ‘revision states’. Several did not know what FAR represented, but described its meaning as follows:

“It means that when we make a prototype . . . then we pick up what we want and we call it a FAR. So it is a definite product. This and this component are included”.

Subproject Manager, Production

The FAR was seen as important for defining what components should be included in different versions of the product, since different versions had different revision states:

“Yes, that is what we wish for now. We want a specification on what articles are included in the FAR. Which articles and what r-
states [revision states] and how many are included in the complete unit. Sort of like a cookie recipe.

... It can be different... in the cards, new components, big differences... this one is dependent on the right r-state on that one and this one is dependent on the right r-state on that one and so on”.

Subproject Manager, Logistics

To determine what kind of component at what revision state (version of the component) should be included in the different variants of the RBS X5, several emphasised the need for an “integration plan”. The project manager for System, for example, described his perspective:

“The integration plan... It aims to describe different steps, all the stuff. What this is about is that some of this stuff comes from this kind of DPM meeting I was talking about, which takes place on Tuesdays. Then there is some software stuff that you get through a software DPM on Wednesdays. And then there is something called a PRA-EM where it apparently is... where you should have it... but it is a X-project who makes an X that we are dependent upon and that must also go in here... when you should verify... since Sven [project manager IoV] has to verify certain stuff before PRA/DS4, we are to make deliveries to the customer and such. And this should be integration-driven. And that is why it is very important that it exists”.

Project Manager, System

Although the project was described as being unusual and fast, the technical interdependencies between the forthcoming product and the parallel creation of other projects and components could not be ignored. Instead, relevant kinds of meetings, products and components needed to be related to. Initially, there was negotiation around who was to be responsible for the integration plan. It was then managed by the project manager of IoV, who organised integration meetings to keep the plan updated.
But while the integration plan defined the version of components to include in different versions of the product, it was also necessary to define how to relate to these various relevant kinds in order to be able to manufacture the new radio base station:

“The specification is the product structure, that System makes, that is in PRIM. And that is the only thing… people say ‘we have the integration plan’ but we can’t produce according to an integration plan. . . . [in PRIM] There are drawings, cable drawings and test instructions and the lot. And that’s what you need to be able to produce this”.

Hardware Co-ordinator, NPI

While project making here may have included an unusual amount of negotiation in relation to different sorts of documents, such as the integration plan, due to the stated unusualness of the project, the case still illustrates how creating documents can be seen as processes of translation. If I had studied another project at Ericsson, the negotiations might not have been this explicit, since the argument and interests of various actors could then have been inscribed and black-boxed into various artefacts and routines (and thus not been reflected upon to such a great extent).

Here, the stated unusualness of the project made such negotiation processes explicit in illustrating how various actors pushed their interests and tried to align others to act in their interest, e.g. when actors representing the NPI project negotiated some relevant kind of documents in order to produce the product. To deliver the radio base station to the customer before the products had reached a certain status was described as very unusual:

Yes, to deliver here [before PR2/DS3, product ready for pre-series], that is very unique. To deliver here [before PRA/DS4, product ready for serial production], that is pretty common. But not before what we call ‘pre-series’. This is very unusual.

...
But was the idea always that they were to be delivered before PR2/DS3 or were they supposed to have had PR2/DS3-status? (CN)

They were supposed to have PR2/DS3 status.

So the plan from the beginning of the project wasn’t that the (customer) deliveries were to be before PR2/DS3? (CN)

No. This is how it has become.

So the project has been made unique? (CN)

That’s right. What was unique from the beginning was that, if you look at how we usually do, then we put the product into PR2/DS3, and then we count on eight weeks before we can start to deliver the material. That it takes eight weeks before we can start to deliver the material. And why does it take such a long time, or why precisely eight weeks? Well, often it is lead time on the material. And I think that it is connected to the lead time on X-cards, to a great extent, I think.

So when you say that OK, now this design is OK, then you place an order to e.g. E-Tech and then eight weeks later you get it. And then we can start delivering this. But we realized that we could not do that. We didn’t have time for eight weeks after PR2/DS3. So we were aware that we in some way needed to handle a situation where we were delivering some weeks after PR2/DS3. Those were the conditions of this project. So from the beginning, this was to some extent beyond what’s normal, it was. But it has transformed from being to some extent beyond the normal to much beyond what’s normal.

Project Manager, NPI

Hence, according to the project manager, this contributed to the need to renegotiate the meaning and value of various relevant kinds, such as the status codes (PR2/DS3 as ready for pre-series production and PRA/DS4 as ready for serial production), which normally served as important communication tools, but now seemed to cause confusion and negotiation in terms of the work and relations between different project makers:
“So inside the project you communicate a lot around ‘that’. You say that you want a PRA/DS4 product. And then you mean different things and it works really great, in normal projects. Then everyone says that ‘I want a PRA/DS4 product.’ Great, then you get it at this date. And if they don’t get it at that date, the schedule is shifted. Then you get it a bit later and then you make the test verification and then you discover that well, this was a little later than expected but now we can start to deliver to the customer, PRA/DS4. Now we say that the commercial deliveries start here [before PRA/DS4]. . . . And then all this falls apart, the level of communication we have on ‘PRA/DS4’.

So the ones in need of products over here, with that status, they really don’t need that PRA/DS4, but it should be a kind like, it should come directly from the production line. It should have passed volume production and should be of such quality that only minor changes can be expected. But the internal customers know that, really. What we are talking about here is that here comes the project manager IoV and then he conducts security tests, radio verification, legal demands that are there. He needs a rather stable product to make sure he doesn’t need to do them again, because it is a very expensive process. And there are also legal demands, that you need approval to be able to sell this on some markets. Then this product needs to match what you have a certificate on.

So he tells me that he needs a PR2/DS3 from me, since I am the one delivering these. But then I say that, ‘you can’t have that’. And then you start to push this back and forth here, and the project manager for System as responsible for making this, I ‘shoot’ 57 at him and he doesn’t know what all this means. Sven [project manager for IoV] doesn’t know either what all this means, all what’s behind PR2/DS3. And I don’t understand either what all this means… and there is surely more stuff here too. So this basis of communication that we have been having, to communicate product information via certain status codes in this product information system, PRIM, has been erased. Our working methods match this [the flow as it ‘should be’] really well, we deliver a product with good quality to the customer when we have PRA/DS4. Should we make customer deliveries before that, then we need to start over, then we need to rethink this from the start. Because then all our checklists, all our working

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57 Original: “skjuter” (metaphorically speaking).
processes, they don’t match any more. And then this cacophony starts [laughter].

Then you need to *reiterate all these demands* that are included in the checklists, try to make people understand the demands you have and it gets really difficult. Since we are all equally surprised, we have built a process that is based on the fact that you comply with the process. The advantage with that is that then you don’t need to understand why you do it. I have many deliveries in between here, bang, bang, and I kind of like don’t need to understand. Tomas [Project manager for System] needs not understand what I need over here [at PRA/DS4] and I don’t need to understand what Tomas does, because that is in our work routines, we have done this so many times”.

Project Manager, NPI

As illustrated in the transcribed interview, the negotiation amongst the implications of relevant kinds such as status codes, routines and documents was a process involving many different actors. Along with the negotiations described above, some project makers negotiated issues concerning both the integration plan and what was called a release plan. While the former defines what versions of components are to be included in different versions of the product, including prototypes, the release plan defined when the product (and the components) should reach the release status of PR2/DS3 and PRA/DS4. But during the project, the meaning of these plans was also negotiated, which had implications:

I was thinking that the release plan and the integration plan were the same thing, and I was pushing hard to get a release plan in the project. I was chasing Tomas [project manager for System]. Tomas said then ‘I have my release plan ready’. ’No’, I said, ‘you do not’. ‘Yes, I have my release plan ready’. And I guess he was right about that, I am not sure what’s wrong and right, since there are different ways of doing this. And this is not a 2G/3G thing, we have been unclear within the company about how to handle this. So we have abused the words. If you look at the management level, they have made the same mistakes; a release plan has been interpreted as an integration plan too. So when I

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58 I have here changed the names of the two specified systems.
went to ask my boss ‘I don’t get how this should work, I don’t get any information about the release plan’, he says that ‘well, System is responsible for that’. Which made me push Tomas even harder.

Yes, and then he says, ’but you have [already] received it’? (CN)

Yes. And above all, there was no one then who made the integration plan. And that is the basis of my work. The integration plan is more important than the release plan really, in the phase we are in right now. Since here we have product numbers and a schedule that defines when this is ready. And then I can start delivering this.

You wanted to know what do they wish and at what dates? (CN)

Yes. So we had no integration plan but a release plan which in turn was unrealistic if we looked at the dates versus the status we had on the cabinet. And then something happened that was very difficult to deal with. Sven [project manager for IoV] wanted PR2/DS3 products. And then he wished for these according to the unrealistic schedule. Because then his schedule was matched with Tomas’s [project manager for System] release plan. And then I had no cabinets, since my cabinets would be ready after this, being able to be delivered. In the form of a R1a and then Sven gets confused. Because he sees that there is a plan that says PR2/DS3, a month before I can deliver PR2/DS3 cabinets in a classical sense. And this required a great deal of communication between Tomas, Sven and me. And when we didn’t know then if we were discussing release plans or integration plans, our communication had a little bit of the character of a conflict.

Project Manager, NPI

What this interpretation made by the project manager illustrates from the perspective suggested here, is that nonhuman actants, such as status codes, plans and routines, can be seen as important project makers if being related to as relevant kinds. But as illustrated here, actors can relate to such relevant kinds in various ways, especially in this case where several black-boxed actants (routines and artefacts) needed to be reopened and renegotiated.
The ongoing negotiations of relevant kinds included many actors, so I will make no attempt to exemplify all of them (which would be impossible). But no matter how the negotiation processes were performed, these plans and specifications can be seen as actants specifying what relevant kind of components should be legitimized as project makers. While much focus was placed on explicitly designing and delivering radio base stations to the customer, the project also included the aspect of spare parts. According to the subproject manager responsible for Serviceability Preparation, this aspect did not get that much attention:

“It might be due to the fact that this [project] has lacked time and that it is focused on one customer or one market, but it is to a great extent directed into prototypes and production. Really. But we are not that interested in that, we are more interested in the aftermarket. And in a completed product, how the final product should be.

... You can’t sell everything [all components] as spare parts, on all levels, you need to have them in sufficient pieces. And spare parts are not like components, but as replacements [units]. Like in this case, the climate unit. Unfortunately, this is a spare part, since it is meaningless to break it down, it is too expensive. And then we need to make sure that there are separate climate units that we can deliver, and not climate units assembled in a cabinet as it is delivered from the supplier”.

Subproject Manager, Serviceability Preparation

Hence, as illustrated in this section, the process of negotiating what relevant kinds should be included in various versions of the radio base station and what components should be grouped into relevant kinds of spare parts included many forms of translations and inscriptions. I will make no attempt to make a ‘whole picture’, since this would be impossible (to trace how every single component became a project maker would be another thesis and I would not want to be the one writing it). I will instead continue this section by introducing some of
the nonhuman actors involved in the process of negotiating legitimacy for themselves and others, while contributing to project becoming.

**Legitimizing suppliers**

As introduced in earlier sections, the X5 project used a main supplier for the cabinet (here called E-Tech). In the following, I will describe some about how E-Tech became a legitimized project maker. In the interview below, Rune described his view on the process:

> [I]f this should be fast, you need to reuse something that exists. We didn’t have anything inside Ericsson, inside the company. So we looked externally, what we had, our collaborators. It turned out that E-Tech in [country] had a product that looked similar to this. It was an Ericsson product in any case, so we sort of owned the concept in some way so that was pretty OK.

> It was a supplier that we worked with, we have three suppliers on enclosure really. We have E-Tech, F-Tech and D-Tech. These are sort of the three main suppliers. These are the ones delivering products to us today. And then E-Tech had a product that fit rather well. So that’s why, so then we sort of took …and tried to build on that and that is where it started. That is why E-Tech came in as well.

> And based on that we made a fast specification, just before summer, and got an inquiry out before people went off on vacation. So E-Tech then during our vacation builds something that was a mock-up…and looks at the specification and build the first mock-up.

> So when we came back from vacation it was here. And then after that, we wrote a bit deeper specification, better documentation, which described this product. But then E-Tech had sort of been selected, there was no procurement, that you made inquiries to to a number of companies, it was just E-Tech, throughout. That was the decision that was taken. Together with sourcing of course.

> Yes. How is such a decision made? (CN)
Well... it is really that...you don’t have any options, that is basically how it is. There are no options. And then you chose that, so that.. what was important was time to market, we had a customer that had made an inquiry. We had to bring forward a product within a certain amount of time.

Project Manager, MPE

Since the work of producing a cabinet can be seen as shifted to E-Tech as a supplier, it can be seen as a nonhuman actant. In order to act, actants have to be spoken for by others; E-Tech, as an organisation, can be seen as being spoken for by several others in this legitimization process. Analysing the above description, E-Tech seemed to have had at least two spokespersons. Firstly, the cabinet as a nonhuman actant can be seen as a spokesperson since it was an actor into which work (what the customer requested) had been translated. This cabinet was already defined as being of a relevant kind, an ‘Ericsson product’, which according to the project manager spoke in E-Tech’s favour. E-Tech had also been one of three main suppliers, a relevant kind (classification) that also spoke in E-Tech’s favour.

Hence, in this process of negotiating legitimacy, interests are negotiated over time. It is thus also rather easy to see here that an actor and his abilities to act cannot be studied or understood in isolation. In contrast to Lave and Wenger’s (1991) theory on communities of practice, where legitimacy is described as evolving from the process of negotiating legitimate peripheral participation by the newcomer when interacting with others in their making of communities of practice, creating the legitimacy of project makers can perhaps best be described not in terms of a ‘state’ of an actor, but as inherent in the work of several heterogeneous actors.

**Plans, acronyms, action points and trouble reports**

As will be described in this section, many texts were created in the project, such as e-mails, plans, action points, action point lists, memos, trouble reports, checklists etc. Such texts can be seen as being produced in an attempt to both focus and legitimize action. Studying
texts in police practices, Ekman (1999) argues that texts should not only “govern/manage” police work, but also “legitimise” it\(^{59}\). It is not, however, enough here to describe texts as being made to govern/manage and legitimize the work of others. Here, the project makers created and related to many plans, of which some will be further discussed in later sections. This process is defined here as the creation of many relevant kinds. In addition to this, I argue that it is important to see that such artefacts must also, in addition to being able to legitimize the work of others, legitimize themselves.

**Tollgates and milestones**

But how does a nonhuman actant legitimize itself? Well, to become legitimized the actant has to be represented as a relevant project maker (explicitly or implicitly) by others. Here, this means that nonhumans must legitimize themselves as being the relevant kind of plan needed. An example of an actant that was represented and acted upon, was the generic model PROPS (PROcess for Project Steering). The PROPS model defines a project as consisting of phases. Prior to the start of the project there is a pre-study phase, followed by the project phases, which are defined as the feasibility, execution and conclusion phases. The different phases each have a tollgate, which is the point at which the decision is made to start the phase.

As an example, tollgate 0, or “TG0” as it is called, is the decision to start the pre-study. Thereafter, TG1 decision point is the start of the feasibility phase, and TG2 is the start of the execution phase. The execution phase was also divided into subphases of sorts, which included tollgate decision points as well. In all, the PROPS model contains five main tollgates, as well as ‘subdecisions’. Prior to a tollgate, the project makers use so-called milestone checklists. As an example, the NPI project did a so-called MS2 (milestone 2) review in early September 2002. The result of the review was documented in a so-called “review record”. “Milestone Checklist 1-8” was described as a tool for the “sponsor to follow the project progress and fulfilment”, the “project to see and assure that all vital item are evaluated and

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\(^{59}\) “styra” and “legitimera” in Ekman (1999), p. 191, italics in the original.
taking into account”, and for the “future receiving line-organization to follow up the progress in the project”.

The checklist contains items such as: “All remaining activities/actions from earlier reviews has been taken care of”, “the feasibility study report is available”, “risk analysis is carried through”, “actionplan is created”, “a project time schedule is created”, and “the existing product assembly and production processes have been considered”.

In all, 40 items were listed under the headings “plan and control project progress”, “commercial handling process”, “project internal/external material supply” and “design supply offer”.

Each checklist item can be answered with a Yes, No or N/A. If the criterion was not fulfilled, there is yet another column that lists “action no.”. In this column, the non-fulfilled items are each given a specific number in the checklist. These numbers then served as a basis for the creation of an “action list”, where each action was listed by number, specified with an action to be taken, the person responsible and a “planned ready date”. The actions could for example be described as: “Check with NN about the demands”, “create a document plan” and “ensure resources, handshake with resource owners”. As the review result, the document states that:

The recommendation is that we are not ready to pass TG2. If all APs [action points] that should be done before 12 September are fulfilled, we will recommend to pass TG2!!! [emphasis in the original]

This example of the use of the milestone checklist above is included here to illustrate and discuss the work done by the tollgates and milestone checklists, when representing relevant kinds of documents needed. Here, I interpret these as actants, performing the work of defining focus, i.e. ‘what should we focus on’ for others. Due to the structure of the milestone checklist, the project makers were asked to define actions to be taken, define who would perform the actions and within what time. Thus, as implied by Räisänen and Linde (2004), we

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60 Translated from Swedish.
61 Translated from Swedish
can see how PROPS can be seen as a project maker, acting at a distance.

Even though PROPS can be seen as an important actant, being spoken for by others, this did not mean that project participants used all the routines and checklists that PROPS suggested. As mentioned earlier, some claimed that due to the unusualness of the project, it was not necessary to do everything ‘by the book’. Still, in this process, some relevant kinds of routine were put forward by some as important:

It is a lot around this with documentation that still needs to be followed, that isn’t made since December in any case. So it is such things I have to deal with here as well.

Can you give me an example? (CN)

Yes, for example the project specification, to update it. And then we have milestones and it should in December have passed or gone through MS4. And not all things are done there and this needs to be done. To make sure you are on track before different TG decisions. Then there is something called product supply approval, that needs to be done before you put the product into PRA and nobody has done that… or some parts of that.. since the supply project has a checklist they follow, some parts are automatically ticked off, logistics agreements… and so on and you need to attend to that.

Project Manager, NPI

With the perspective suggested here, the concept of relevant kinds can be used to understand why some routines and documents were used and others were not. Basically, I suggest that the creation of relevant kinds can be seen as an ongoing process. That is, the sorts of routines, plans and checklists that were needed were the result of ongoing negotiation among a large number of actors. Hence, I suggest that relevant kinds were created over time, as heterogeneous actors used various arguments for the relevance of different kinds of documents.
**Trouble reports**

In the preceding quote, the NPI project manager suggested the importance of conducting a milestone review. A milestone review is partially a process of defining problem areas (i.e. what have we not yet done that we were supposed to do?), and as an attempt to create solutions by delegating work to actors through the creation of an action list. But problems and solutions were also created on a day-to-day basis:

> It is always with a certain amount of optimism that management teams present something like this. ‘It is just a new cabinet’. It is never that easy. I have worked with prototypes for four years and it is never that simple. It has never happened. We have come across masses of problems that no one had thought of. You could not switch boards, move the positions on the printed circuit boards and so on since they are [hard] coded to be in position X in this and that subrack. So oops, what do we do then? We only have one subrack and so on.

Hardware Co-ordinator, NPI

One relevant kind taking part of this problem-solving process seemed to be the so-called Trouble Report (TR). It was explained to me that anyone at Ericsson can write a trouble report upon finding a problem with the product. The actor defines the problem in a software program, which subsequently assigns a specific responsible actor to solve the problem. Hence, the trouble report becomes an actant *in potentia*, arguing for action. The TR-system discussed here is dependent on its relationship to other actors, such as computer software and hardware, project makers, written instructions, accounts, meeting forums etc. The trouble report’s ability to act, and hence be influential on the actions of others, is dependent upon how it is related to by others.

One afternoon when I was observing a main project meeting in Kista, someone claimed loudly that “TRs are the language this company understands”, when discussing ways in which ‘the project’ needed to
adapt to structures and systems at Ericsson. This project maker was not the only one emphasising the importance of TRs.

You say that you write TRs...does it work well...this system..you think? (CN)

Yes, it is good way to sort of get things up to speed since they, at Design, always say 'write a TR on that, so it gets logged'. I mean, I can call them and say that 'now we have problems with this, can you fix this'? And 'yes' they say but maybe...but there is sort of no proof then, nothing will be logged...if you write a TR, then at least you know that the problem gets investigated. Then this might not be possible to accomplish this but at least the issue will be investigated.

Hm.. so that's how they put it, 'write a TR'? (CN)

Yes, that is the message in all projects at Ericsson, when you find problems.

Subproject manager, Quality Control

A trouble report was thus not only written in order to create a specific document, but in order to shape action and focus. Creating a trouble report can also be seen as an attempt to legitimate a problem by making it official:

“What we do when we see a fault is to write a trouble report. And when you write trouble reports, it gets official, it gets into the system. And then it’s not us that take a stand, instead it gets into the big system. Then all the experts are to have their say”.

Project Manager, CPI (customer product information)

In order to understand more about the trouble reports, I went to talk to a product owner in the MPE (design) project. He was busy working, but agreed to let me hang around and to answer questions if I allowed him to work during the interview. While working, he then told me that he had just came back from a meeting about trouble reports. In this meeting, he had been the representative for the X5 project in a
specific forum, whose explicit purpose was, as he put it, to “close TRs”. “To solve them”, he clarified.

In this forum, each project was represented by a representative. From time to time, others (designers) take part too, if the trouble reports are of a very “technical nature” and need further clarifications, he explained. A new list of TRs is distributed to the participants at the forum each week. At the meeting, the representative for the project the trouble report is directed to explains whether it can be solved, or must be moved to the next week or when a proposed solution can be introduced.

He then showed me his list. The project numbers were listed, and I could see the X5 number on a great deal of the posts. The list came from a database, which is a web-based system for all the XX\textsuperscript{62} products. When a trouble report is directed to “the MPE-people” regarding the X5, the trouble report will “land” on him, he explained.

Then the trouble report is distributed by him to the designers in his group he thinks can solve the issue. “Often”, he continued, “the one writing a trouble report also suggests how to solve it. But not always”. I ask him how they solve the problem being addressed in a trouble report.

“There are not two trouble reports that are the same in a way that makes you able to say that ‘this is how you handle trouble reports’ [in general]. Instead, you need to look at the trouble report and then you must see for example that this, it costs this and this much for me to solve this, depending on the project. We are here, in X5, to deliver x [amount] radio base stations. Will we recover the money on that? And it might be that, no, it will be more expensive to introduce the change than to leave it be. And then there is the issue of . . . is it a market issue, do we need to do this anyway, in order to please our customer? And so on, there are several such aspects you need to consider.”

Product Owner, MPE

\textsuperscript{62} Products belonging to this system.
Here, the trouble reports can be seen as actants acting as spokespersons for others (the ones writing them, who in turn can be seen as spokesperson for yet others). In order to become legitimized as project makers, the TRs also need to be acted upon, being related to *as relevant kinds*. They therefore need spokespersons, such as the product owner above. When talking to another product owner in the MPE (design) project, she also described how she worked with the TRs:

I find a fault somewhere and then I go into a system called Clear DDTS. And then I write that this is the trouble, I found it on this product, at this revision state and I found it while doing this and that…and then you can write down that ‘yes, I think that this is what’s wrong but it is not checked yet’, and such. And they. . . you grade the importance of getting these in, you might have noticed something, that it is blue instead of green, that might not be that important. But I have noticed that. Or it is like ‘the shit does not start’ and it is then really high priority.

Is there a grading [system]? (CN)

Yes, there are one, two and three. One is the worst and three is that you have found something. Then if it has landed on my products, I get a little e-mail saying that I have received a new trouble report. And then I enter this system. And then I look at the trouble report and when I look at it, it kind of marks that I have accepted it. That I have seen it, that I will investigate it and then I set a date when I think that it will be done. And then there are some steps on this, that now we have found the problem, now we are going to implement it, now it is implemented and now we are closing it.

You handle this yourself? (CN)

Yes. Since I am a product owner, I can do that. When they are verified and put in, then I can close them.

Product Owner, MPE
When I asked her whether someone who had found a problem on the product she was responsible for could not call her about it instead of writing a TR, she strongly emphasised that it would not be sufficient:

“No no, we can’t accept a job without trouble reports! Then I just say that ‘I won’t do anything until I get a trouble report’. We are not allowed to, since then there can be loads of stuff that gets lost, and that is what you try to avoid. So if you have a trouble report, then it is logged, it is there, I cannot kill it until it’s solved. Or until we have reached the decision that this is something that we won’t do anything about. But then it at least is logged. We cannot do things haphazardly so to speak63”.

Product Owner, MPE

Hence, writing trouble reports can be seen as making potential actants. Both individual trouble reports as well as the relevant kind (classification) trouble reports can here be seen as important actants. For example, some of the project makers of the subproject Production had a meeting with project makers of the subproject MPE (design). The meeting resulted in trouble reports, so the trouble reports can be considered spokespersons for the problems that were discussed during the meeting.

Hence, I argue that a trouble report can be seen as an actant explicitly acting as facilitator of the shaping of knowing inherent in heterogeneous project making, due to its explicit role of shaping focus and translating interests. It seemed also that there was ongoing negotiation around which individual trouble reports represented such a relevant kind (i.e. they negotiated the importance of the individual reports).

I did not make an attempt to investigate how each individual trouble report negotiated its legitimacy to act as a relevant kind, nor do I claim that I know on what basis the defined problem was seen as relevant or not. But on the basis of how project makers related to and represented trouble reports, I do suggest that the concept of relevant kind can be fruitfully used, that TRs can be seen as project makers,

63 Original: “Vi får inte springa på lösa boliner, så att säga”.

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and that writing a TR can be seen as an important translation process contributing to project becoming.

**Action points**

Another thing that struck me rather early, at one of the first project meetings I attended, was that project makers seemed to create and relate to what they called “action points” (APs). As described earlier, this term occurred in the milestone reviews, but elsewhere as well. For example, when I observed project meetings, it often happened that the project makers first discussed something and then one of them looked at someone else, saying something like “great, then I put this AP on you” and then the other person would often say something like fine or yes.

The matter then seemed to be settled. I also noticed that they used lists of action points during project meetings. On the list, which was used and updated during each meeting, action points were listed with names and tasks to be performed. The list could look like this (example from a main project meeting in Kista):

<table>
<thead>
<tr>
<th>Item no.</th>
<th>Action/status</th>
<th>Responsible</th>
<th>Ready/report</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>List and monitor resources assigned to X and discuss deviation with line.</td>
<td>NN</td>
<td>030122</td>
</tr>
<tr>
<td></td>
<td>020904: do as preparation for next replier.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

As illustrated, there were four columns making up the list. One column described the item number, one column defined the action to be done, one column identified the person or people that had been given the assignment and finally there was a column describing when the action should be done.

The action list was part of an explicit project meeting agenda, which meant that the project manager went through the list during the meeting and asked the responsible party if he or she had done the action — and their reply was noted. Some replied that they had taken action, some replied that they had not (sometimes explaining why) and sometimes the ready/report date was postponed after negotiation.
I found this list and the interactions among the actors very interesting. The action list and the action points seemed to be important nonhuman actants, I thought, since they were so often related to and spoken for. It seemed that this way of translating interests was very common:

Is it common to work with action points? Do you use it in all [projects]? (CN)

Yes, it is common, you do that in all projects… Yes, that is what we specialize in here at Ericsson, to put APs on people.

Do you do it then? I mean, if someone ‘puts an AP on you’… because that is how you put it, right? (CN)

Yes, that is right, that is how we put it [laughter] ‘I put an AP on you’! Yes!

Does one do it then [the action], if one has been given one [an AP]? (CN)

Yes, if you accept it, ‘yes, I will handle it’. You will at least get a response from the one you put it on anyway.

Subproject manager, Quality Control

But while they emphasised APs as being very important, it was also emphasised that:

“‘But the action points that we have had during the project meetings, that is kind of like one thing. Then things can show up… the past two weeks there have been a hundred problems, the ones being important right then, so to speak’”.

Subproject manager, Quality Control

Hence, the system of action points can be seen as one means to get things done in terms of translating interests onto other actors. My
interpretation is thus that the action points can be seen as important nonhuman project makers. But at the same time, it was not predetermined that if someone put an action point onto someone else, who in turn accepted it, the action would necessarily be taken (the actor could still choose to subscribe or des-inscribe, as put by Latour (1995). But it was a way of trying to make things happen by inscribing work and interests onto other actors:

Does it normally work in a way that… if you receive an AP, do you do it then? (CN)

Normally. But it depends. When we ran our task force, I was set free, I just said ‘I don’t have time’ and then it is rather OK. But otherwise you try to. It’s the same as with TRs; it is important to try and solve them as soon as possible if you can.

Product Owner, MPE

If seeing the action list and the action points as project makers, their legitimacy can be seen as created by the representation of others. If there was a tight schedule, it sometimes happened that the project manager postponed going through the action list until the next meeting. But very often, the list was represented by checking for new action points and what had happened with the previous action points. To summarize the most interesting aspects of the action list and the action points:

i) The classification ‘action points’ was related to as a relevant kind.

ii) Since the action list and the action points were often seen as relevant, related to, considered important and spoken for by others (such as the project managers and the meeting agendas), they can be seen as nonhuman actants in terms of legitimate project makers.

iii) The legitimization of the action point was shown to be not much related to the list per se. Instead, it is the work of other actors, relating to the list, and the classification (the relevant kind), that creates and re-creates its legitimacy.
iv) Creating action points and action lists represented the creation of *promises*.

Hence, by assigning someone an action point, and getting the assignment accepted, future action is both defined and legitimized. These can be seen as examples of both inscription and translation processes. Inscriptions are made into the action list, actors are aligned, and *focus* has been shaped. It is, of course, important to emphasise that it mattered who suggested something be translated into an action point and how this actor used and represented other actors in order to negotiate the specific action point as a legitimate claim.

**Plans**

According to project management textbooks, planning is an essential part of project management. The project should be well planned in order to create efficiency. In addition to the integration plan, which defined *what* relevant kind of components should contribute to *what* relevant kinds (versions) of the radio base station, several other plans were also made. Such plans could describe several activities and actors (such as a network plan, describing different activities and how they interrelate) as well as other forms of plans. The hardware coordinator, for example, made a plan describing the ordering and supply of prototypes:

> You have written a schedule? (CN)

> It was Fredrik’s idea [project manager for NPI] and it is a good idea. To follow each order precisely. Then it doesn’t steer much, but it’s good since it *makes things real in some way*.

> It is patently very easy to show that your order will come this and this date. And when they ask ‘why do I get a P1b’, you say that ‘well you get that since you ordered that’. If you want something else, you must order something else.

Hardware Co-ordinator, NPI
During the process, several project makers expressed frustration due to what they saw as ‘lack of planning’. The project manager for System, for example, claimed that time and task planning as well as the assignment of responsibilities were unclear. He said that this caused frustration, exemplifying this with what happened during a meeting:

“Sven [project manager for IoV] says ‘then we start at x’ . . . and then I asked ‘what is this date you are talking about’? Then he says 20th December. And then I couldn’t let it be and said ‘it is 6th December’ and then Lena [total project manager] said ‘Karin [project manager for MPE] has said that she won’t be able to make it until the 20th’. And then I feel that we have to decide it, that this applies for all. Not just have this loose talk”.

Project Manager, System

If plans, as I suggest, can be seen as project makers it is relevant to ask what they do. For example, the integration plan does the work of defining what component should be used in what version of the product. Hence, plans basically do the work of arguing for the future work of others (work they can only perform if being related to and spoken for). At this time, this specific actor should do this, so to speak. But importantly, plans do nothing if they are ignored. During an interview with a subproject manager, he emphasised the need for planning:

“Now when it is to happen this fast, planning is really required. I mean if you put a lot of effort into planning and then follow it strictly, I think that you would save a lot of time. I can gladly rush after the ball in whatever way it is kicked, but I think that then there is a rather big risk that you play outside the field”.

Subproject Manager, Test Development

However, one of the main plans they had been given did not meet his expectations:

“I don’t know if you have seen the schedule in this project [shows me]. I nearly laughed myself to death when I saw it. I mean, to
give this out... I think that is strange... to try and follow this with a lot of arrows and lines all the way. You don’t need to know all about this, but I at least want to know main points like ‘IoV will do this’, ‘this is when we will release this’. So that we can see this. Then we need this and this. I don’t need to know what they make with the product, I don’t care about that, but I need to know what they expect”.

Subproject Manager, Test Development

Here, the subproject manager’s statement illustrates that in order for a plan to become legitimized, others must relate to it as such. If the plan is ignored instead — or as in this case even laughed at — then the plan is not a legitimized project maker. Here, the subproject manager suggested that they needed plans (as relevant kinds), but the plan presented to him was not the (relevant kind of) plan he thought was needed.

The perception that the project was unusual was also stated as a reason for not working with ‘normal forms of planning’. As described by a project manager:

“Often this [main] schedule is made first, and then you are building yours on the basis of that. But in this case, there is no great schedule in the main project. But in normal cases, this is what happens. I mean, the main project knows when we are supposed to deliver, when we need the stuff to make this work all the way. And on the basis of that, I put up, for example, that OK, the basis of the pre-series64 is released at this date, then we have prepared these deals, have them ready and it takes for example 40 days between PR2/DS3 until it’s prepared and ready in the systems, I mean, there are lead times on certain things. Now, this is not what happens. Partly we don’t have the time, and partly the schedule doesn’t exist on this level in the main project.

We now are trying to build from below, but really... now we are putting the cabinet into PR2/DS3 in November, and there are actually lead times for us to be able to make all the activities that we should do if we do this by the book and then we are in January before everything exists. The process takes 40-60 days. So now we take short cuts and run this as fast as we can, but then

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64 Original: “förserieunderlagen”.
it gets difficult to have a detailed schedule so to speak. Since we
could actually say that we release this at this date and then 60
days later, this is ready. Yes, but this must be ready much earlier.

So we can’t run this the usual way with… yes, this messes things
up… but now I went through this with Joel yesterday and and we
went through a schedule. And I will start to work with that and
put in our activities and dates a bit so at least we will get a
reasonable schedule. And then we get one and we will see what
this gives back to the project. There is also a checkpoint-list that
you use within the sourcing project. It is much better to use as a
tool for planning and follow-ups.

It looks like this [shows me]. Some checkpoints that define what
needs to be done at certain MS passages [milestones]. I usually
use PROPS just like it is [describes what needs to be done at a
certain passage]. And then you can put up dates at every point,
when we plan to do this and what we plan to do. Then you follow
it up and mark the status with yellow, red and green and then you
see this all the way. So it’s really this that is to be changed into a
schedule, you can say, and there are some other activities that
will be in the schedule too”.

Subproject Manager, Strategic Sourcing

Hence, what was seen as relevant kinds of plans and documents was
negotiated by several actors. According to the subproject manager for
Production, it was not clearly defined what plans to use:

"We don’t have a stringent line in this project, in terms of what
documents to use, what plans we should use, this doesn’t exist in
this project. I miss this very much”.

Subproject Manager, Production

So, while many plans were created during the process, their status and
how they related to other plans was negotiated over time. As
described above, plans can be ignored if they are not seen as being a
relevant kind of plan. On the other hand, if related to and spoken for
by others, project plans can be seen not as mere descriptions or
promises — but as legitimized project makers. Plans need not to look as they do in textbooks in order to be legitimate:

“Our super-easy, trivial schedule with dots and lines, the black and the green. It looks nothing like a schedule should do, according to the book. But it provides an overview, an overall picture of today’s status for people in general. And I think that this is enough right now”.

Subproject Manager, Production

In addition to the kind of plans described above, other forms of documents were also formed and related to as some sort of plans, in terms of negotiating the focus of others. As an example a list of problems was made when the subproject manager for quality control conducted a quality audit on the first radio base stations that came to the factory in Gävle:

Yes, that was the first thing I did. I performed a quality audit on the first nodes we got into the factory. Based on my experience, I was there during assembly and checked… I asked the operator what kind of problems they saw, checked the documentation, all the production documents. So that they sort of corresponded with reality and were related right. So this is from where the list came, that I then tried to push. There were a lot of points that were directed towards production engineering and mechanical design, foremost. So this list has now been ticked off, and been solved.

. . . At the beginning I wrote the report, and then I sent it out…I sort of checked, where do these problems come down [land], on what department, on what area of responsibility.

How did you check that? (CN)

I just knew. So then I sent out an e-mail to these persons and called them up then too and explained why I had put them as responsible and also described the problems orally, so that they would understand. So then I got some responses, with the ones I… that the ones I had defined as responsible knew that they were responsible, so to speak.
Did this work well? (CN)

Yes, it did. But it was kind of hard at the time, since there were a lot of other things going on, so it was a bit difficult getting heard, so to speak, to get the points in progress so to speak. But this was understandable, since the responsible parties had other things dragged along.

Did you deal with this in some way? To make them do something? Or how…? (CN)

Yes, it was hard at first, and then I talked to Erik [subproject manager for Production] and said that we need to prioritise this list too, otherwise we cannot manufacture these nodes, and that… we don’t have enough documents to even be able to produce this. And then he helped me and pushed this onto some project manager above him.

Subproject manager, Quality Control

Hence, I suggest using the notion of relevant kind to understand many sorts of documents. The list created by the subproject manager for quality control can be seen as a spokesperson, speaking for the identified problems and in the interest of several other actors. In order for the list to be listened to, it has to have other spokespersons arguing for its importance and relevance as a relevant kind.

Making various forms of documents that in some way argue for the focus of others can thus be seen as an important part of contributing to project becoming, even though many suggested that there was a ‘lack of planning’ in this project. Hence, the creation of plans and lists that aim to define the focus of others can be seen as an ongoing process of translation and inscription. Using this perspective, making a plan can be seen as the creation of a relevant kind (of plans) and the negotiation of an artefact (the plan) to act as such a relevant kind (of plan). Thus, plans per se do not steer project work — but if being related to as relevant kinds, they can contribute to project becoming, in terms of being acted upon as legitimised project makers.
Q2 - Conceptualisation

The research question that served as a basis for this subchapter focuses on who the project makers are. As has been described by other researchers (Eskerod & Stilling Blichfeldt 2005; Karrbom Gustavsson 2005), in many projects, project makers come and leave over time, which makes traditional theories on the development of roles in groups inappropriate (Karrbom Gustavsson 2005). In the X5 project, there was a frequent turnover of project makers (more frequent than normal according to some of them) and project making was not done by one coherent group.

Instead, based on the arguments made in this subchapter, I suggest that project becoming can be understood by using the concept *legitimized project makers*, i.e. as actors who are related to by others as such. Actors acting as legitimized project makers can be project ‘managers’ or other project ‘participants’, as well as trouble reports, integration plans or cables. These actors relate to the relevant kinds contributing to project becoming. The term *projektmakare* in Swedish has been used before with a different meaning\(^{65}\), but here *project making* refers to human and nonhuman actors’ ongoing interaction when contributing to project becoming.

Here, I have illustrated and argued that the creation of legitimacy of project makers can be seen as an ongoing process. There are several heterogenous actors taking part in these processes, such as e.g. project managers and designers as well as cabinets, suppliers, trouble reports, action lists and plans. I also suggested that the legitimacy of an actor is negotiated through his/her/its ability to speak in a way that makes other actors relate to him/her/it. This includes the ability to speak both similarly to and different from others, as described previously.

\(^{65}\) When the term has been used in Swedish (*projektmakare*) it has had another meaning. Nygren (2006) uses the term *projektmakare* to illustrate humans who have ideas for new projects, being described in terms of being “enthusiasts” (p. 10, “eldsjäl” in the original) and “change agents” (p. 11, “förändringsagent” in the original). Söderlund (2005, p. 267) gives a similar connotation to the notion “projektmakare”, i.e. a project manager who has (sometimes too many) many ideas and visions, which is contrasted with other (human) types of project managers, such as “projektverkare” and “projektstrukturalister”.

Thus, I suggest that all the actors described in these sections (as well as many others) acted as project makers and contributed to project becoming — and thus also the shaping of knowing — if they were related to as relevant kinds (implicitly or explicitly). An actor not related to as such does not contribute to project becoming. As shown in this chapter, no purely social interaction takes place between humans without nonhuman participation. Apart from more material artefacts such as technical components, other artefacts took part too, becoming actants in relation to others. From this perspective, focus is placed on the diversity and ongoing work of legitimized project makers and the way in which they contribute to project becoming (in contrast to participating ‘in’ a project).

As illustrated in section 4.2, project making can be seen as the creation of problems, solutions, relevant kinds and interrelational project spheres (which also function as reference groups for the makers). In section 4.3, I described how legitimized project makers were created. In the following section, I will provide a closer look at their interaction.

4.4 Q3 - How Is Project Making Performed?

According to the perspective suggested here, heterogenous project making is based on the generation of problems, solutions, relevant kinds and interrelational project spheres by human and nonhuman actors. The next question regards how project making is performed. While it is not possible to describe all forms of project making, I will here focus on some places where project making is performed, with a particular focus on various forms of meetings. Meetings are often described as being the sense makers of organisations (e.g. Weick 1995). Meetings have also been suggested as important in terms of project work (Westling 2002, Karrbom Gustavsson 2005). As for project organising, Karrbom Gustavsson (2005) suggests the perspective of “projects as series of meetings”. Studying diesel power plant projects, she argues:

“The meetings had, apart from their formal and rational significance, also an adjusting or uniforming significance. Then
different images or interpretations of ‘reality’ were compared and negotiated and one in some sense common perception of ‘reality’ was created”.

Karrbom Gustavsson (2005), p. 134, my translation

The argument that meetings supported the creation of common perspectives is similar to what was often stated at Ericsson:

“I have project meetings once a week. I have this to gather my flock in order to create common views. There, I gather them, create common views and make sure we’re on the right track”.

Subproject Manager, Production

As exemplified above, the importance of relations and meetings as a means of creating common perspectives was often stated by the subproject manager. And it seemed as if there were a lot of meetings taking place during the time I spend there. Some of the meetings were planned in advance, such as daily morning meetings and weekly project meetings on different levels. Meetings were also planned more spontaneously due to what was happening during the process. There were, for example, meetings about integration, planning and current issues. Since I was following Erik around a lot, I observed many such meetings. It often struck me that meetings were excellent places for me to be at, since they gave me an opportunity to find out what the project makers were focusing on at the moment. I could observe what they were talking about, who was doing the talking and how they brought up and related to different issues.

Many I interviewed suggested that they spend a lot of time in meetings, some said too much:

Here we’ll see… you attend to main project meetings, the integration meeting that you are managing… and then you attend to object meetings...Are there more meetings you attend? (CN)

Yes, in terms of the integration, there are nine meetings in total that you need to attend, or at least have someone attend,
to be able to do that work. It can be seen here [shows me a paper], these meetings. Here it is a great number of meetings, in terms of the integration aspects. Then I attend meetings of the X3 project, where the fusion-, system- and integration verification is done. And that is a number of X3 meetings. And then there are line meetings that take some time. Section meetings, department meeting and other meetings. And then there are meetings dealing with customer activities. When we talk to our local office in [country] and the customer. And…

There are a lot of meetings? (CN)

Yes. Very much. Unfortunately I think that it is about 70% of the working time that is pure meeting time. Unfortunately. I would prefer 50/50, at most.

Project Manager, IoV

The statements made by the project manager above and by others during my study imply that project makers often seem to think that there are too many meetings to attend, as also suggested by Karrbom Gustavsson and Zika-Viktorsson (2007). But meetings can also refer to other forms of interaction besides the planned version described above. Karrbom Gustavsson (2005 p. 144) suggests that meetings can be either formal or informal and either planned or unplanned (so there are four possible sorts of meeting). At Ericsson I attended all four kinds. I attended project meetings (planned formal meetings) which sometimes resulted in unplanned meetings — evolving into topics outside the original agenda — as well as unplanned informal meetings such as corridor chats. I also attended planned informal meetings, such as when some of the project makers decided to meet to discuss something about the project on an informal basis.

What is even more interesting, of course, is what happens at a meeting. As described by Karrbom Gustavsson (2005), project meetings can be a space for interaction and a place for making sense. In addition, a meeting can be seen as an object (as when someone says they don’t do anything but attend meetings) or an actant (as when someone says a meeting stretched out in time). Using the latter
perspective, one could also claim that when initiating a meeting, an actor tries to align other actors by translating their interests into a joint meeting. By doing so, the meeting also becomes a potential actant that aligns some actors while being represented by others.

This implies that a meeting can be seen as another potential legitimized project maker, acting as a relevant kind of meeting (thus contributing to the shaping of focus and project becoming). As an example of how meetings can be defined as more or less relevant, I include below some of my notes written during an X3 project meeting in Kista:

Jakob [total project manager for X3] stands in front of the table talking to us about the new terms of the project [the X5 project had been integrated into the X3 project]. When going through a list of points such as background, project team and schedule, he says that he will also send out descriptions and meeting agendas.

He is then suddenly interrupted by Oskar [project manager], who claims that “he needs to know how the meetings are interrelated” and that he also “needs to know which meetings are important”.

“All meetings are important”, Jakob, a bit defensive, replies.

“That is bullshit”, Oskar replies.

I will not go into further details on how meetings can be negotiated as being important or not, but the notes here illustrate something important: if meetings can be seen as actants, they can be seen as becoming more or less legitimate, depending upon how other actors relate to them. Using the perspective of relevant kinds, both the classification of relevant meetings and the actual meeting can be seen as potential actants. Often meetings were described as a basic means to get things done and to create focus. In terms of the NPI project, for example, some project makers met in the morning for a telephone conference with the supplier, E-Tech. This meeting later
evolved into an internal meeting, called an NPI acute (meeting). The hardware co-ordinator explains:

It starts with a morning meeting, or an NPI acute, which we have each morning. At nine. It is an extremely short follow-up meeting. According to an old model. I have had this kind of tuning meeting [“avstämningsmöte”] in all sorts of projects. . . And this is for us to be able to solve problems. OK, what happened yesterday, and what do we need to fix today?

. . .

They should be fast and effective, these meetings. I do not make long protocols. I send out an e-mail where I write that ‘these points from today were settled’. I don’t write the solutions to them either. It’s just memorandums. We should not get stuck in discussions about solutions, but make a list of priorities. The purpose is to get everyone to know which activities are the most important at the moment.

Does it work well? (CN)

It works really well, actually. It has grown out of the earlier meeting. And then Fredrik [project manager for NPI] said ‘you can manage this meeting’. And then I copied the model from the X project at 2G\(^\text{66}\). ’Cause we had the same thing there.

But this is not something that is decided before, that you should have this kind of meeting? (CN)

Oh no. But it is not unusual that you do. And then it’s a bit of Ericsson-Swedish to call them ‘NPI-akuten’ [acute] also. I don’t know why. But I have seen them in all sorts of places, these small tuning meetings where you can address whatever problem, as they show up. You know that there is a meeting the next morning. This concept has, in some way, been spread not via directives but by simply working [well]. At this ‘meeting-company’ is is also a bit of a luxury to have short, fast meetings as well [laughter].

Hardware Co-ordinator, NPI

\(^{66}\) Here he refers to a specific 2G system.
In addition to such daily meetings, there were also weekly project meetings. A subproject manager describes how such weekly meetings could be used by subproject managers to solve problems and to relate actors to each other:

“Weekly meetings… They foremost serve the purpose of… that we are able to sit down together and you can sort of talk about issues you consider to be a problem, and you have probably made that via phone and e-mail as well but here you get a chance to, so to speak, get it on protocol and address risks. Perhaps even share ideas and establish connections… might be the wrong word since we know each other but distribute connections. Like now when me and Erik know that we need to connect two contacts that can deal with this radio base. These people hardly know about each other but now we need to get them together. Such stuff. You can do this on the phone too. But the meeting, I think, should primarily be used to spread information within the project. From the top and from the bottom. I mean . . . if I have something to tell, I don’t send out e-mails to all just to spread it, if it’s not very important, but just something that I think that people should know, have knowledge of. I know for myself how many e-mails you receive without ever reading them. They pour in. So the meeting should be a distribution centre, you should get the chance to meet, talk about stuff, there might be a problem you want to solve and if you have time then you can do that at the project meeting”.

Subproject Manager, Test Development

The aspect of meetings as being important places to get informed was brought up by others, too. Hence, some project makers brought up the importance of gaining access to the meetings:

I try to attend the technical meetings held by Karin [project manager for MPE] every week. Since I wasn’t at that at the beginning. I checked with Rune [former project manager for MPE] and he didn’t think that it was necessary. But I have got myself into this by myself, just to check that…come closer. Since there is a risk of losing information, we take part twice a week.

What kind of meeting is this? (CN)
It's a technical meeting, a phone meeting that they have with E-Tech. The suppliers from [country]. Then we know what has happened and what will happen . . . Otherwise there is a risk that you describe something and then the next week there is something else that… you are simply keeping informed.

Project Manager, CPI

Hence, according to the project makers, meetings can serve different purposes, such as problem solving, connecting others and keeping informed. Meetings were often described as face-to-face interactions even though other mediums were used as well, such as phone conferences. The advantages of meeting eye-to-eye were often described and some explicitly outlined their strategies:

“The best way of course is to meet eye-to-eye. Therefore, I usually rotate a lot inside the building, seek out persons for very short meetings. I usually start by asking ‘do you have five minutes’? Then I go in and sit down. And then I try to have a short meeting, five minutes”.

Project Manager, IoV

Here, the project manager describes one strategy, how he by asking if he can ‘get’ five minutes, tries to align another actor to participate in a meeting with him. Other actors suggested other strategies, such as sending e-mail invitations, calling someone up asking for a meeting or by various means arguing for the need of daily or weekly meetings. Such strategies can be seen as various attempts to create legitimacy for the meeting, which in turn can be seen as a process including the negotiation of legitimacy for the actors involved. For example, the project manager for CPI described how he, new at working with 3G\textsuperscript{67} (since he had previously been working with 2G products), needed to negotiate access to the information of others:

“It is important to talk to people and to have a look for yourself. All CPI [customer product information] is put on the intranet. You have to, the hard way, get yourself into it. Talk to the ones working at 3G. But that is the problem, you

\textsuperscript{67} He refers to a 3G system which is here only called 3G.
can’t ask if you don’t know what to ask. You first need to get yourself into this. And then you can go up to them and have some meeting”.

Project Manager, CPI

This process can be seen as a negotiation of relevant kind of meetings and also illustrates that many actors can be involved, contributing to project becoming. Although meetings have already been described as important in organisational practices, I think they can be explored a bit further.

One important issue regards the aspect of meeting participation. Kärnbom Gustavsson (2005, p. 123, referring to Goffman 1963) describes meetings as when social (human) actors interact “eye to eye” and “alternately talk to each other” – which perhaps can be described as a commonsensical view of meetings (as exemplified above). Such face-to-face meetings are also referred to by Westling (2002) when he investigates and conceptualises the role of different kinds of meetings for “balancing innovation and control” in product development projects. Distinguishing between issues that are uncertain (an issue of lack of information) and ambiguous (an issue of confusion) (Westling 2002 p. 205, referring to Weick 1995, pp. 98-99), he suggests that in a “system of meetings”, different kinds of meetings can — or should — serve different purposes. Classifying the meetings into four classes according to “formality and the amount of discipline prescribed” (p. 203), Westling suggests that meetings can be seen as – “announcement-, work-, hallway- and private meetings” (p. 203) and that while the latter two can be seen as means of control (reducing uncertainty), the former can be seen as means to support innovation (supporting new frames and interpretations, hence reducing ambiguity).

68 Westling also illustrates what otherwise happens, if for example formal meetings are used as a means to reduce ambiguity, which he argues such meetings are not suited for (p. 209).
69 Westling also sorts meetings into three clusters based on conversational content and problems addressed at the meetings using Thomson’s (1967, in Westling 2002) notion of “the operating sub-system, the administrative sub-system, and the allocating sub-system” (p. 203). Hence, Westling suggests in all a taxonomy of twelve different classes of meetings.
Thus, meetings are considered important both in relation to projects and in terms of balancing innovation and control. However, as emphasised, meetings are often seen as a form of social event, illustrating interaction between humans. Inspired by the perspective used in this thesis, that nonhumans can be seen as actors contributing to project becoming, I will in the following elaborate on the implications for analysing meetings.

Drawing from my observations, I argue that there can be additional actors, besides the present human ones, who participate at project meetings. As will be illustrated, both human and nonhuman actants can take part in the interaction at meetings by acting “at a distance” (a concept used in ANT, see e.g. Law 1986, p. 257) when being spoken for by others. This has also been noted by Zackariasson (2003) who exemplifies this with an actor (Martin) who’s “intentions and wishes are represented in meeting where he is not present” (p. 44). Hence “Martin is brought into the event, but not as a human actor, but as a human actant” (p. 44). To illustrate and elaborate upon this, two examples follow, the first excerpted from my notes about a corridor chat, i.e. an unplanned, informal meeting, and the second, a project meeting, i.e. a planned, formal meeting.

i) An unplanned corridor chat

It is in the middle of October 2002. Erik (subproject manager for Production) has held a project meeting at the Ericsson facilities in Avästtöm, Gävle. I attended the meeting too. The meeting is now over and we move out of the conference room and into the open-plan office. Erik walks towards a woman sitting at a desk. They chat for a short while. Then she tells Erik about a meeting that she and Gerd (subproject manager for Logistics) attended, a meeting she participates in via phone from her project meeting every Tuesday. The woman says that it seems as if there will be a problem with the software of X5.

I see that Erik reacts to this and then he walks a step closer to the woman and asks her what she has heard. She tells him that a person named Algot had seemed upset when they had talked about the software in relation to X5 at the meeting. Erik asks if she knows something more, but she says that she doesn’t, that she
didn’t pay that much attention when they talked about X5, but that she had heard that Algot got upset. Erik says that he should then call Algot and ask him as soon as possible.

When we start to walk away, it seems as if Erik is thinking. I ask him who Algot is and he explains that he is the ‘guru’ in software, the one knowing everything about software. I ask him who the woman was and he explains that it is Kerstin, a woman he had been working with in the X3 project. Erik tells me ‘I don’t know anything about software, no one else here knows either...’. But he knows that there are connections between developing hardware and developing software. So now he says that he should call Algot and if there is a problem, perhaps also pass this on to Fredrik (project manager for NPI) and Lena (total project manager) and since he doesn’t know about software, he perhaps also needs to make contact with someone who does.

This meeting, which was not planned beforehand, can be seen as a place for interaction and sensemaking. At first glance, it might appear as if this was a meeting between two human actors (Kerstin and Erik). But one can also make an alternative interpretation, including some more actors into the analysis.

First of all, there were at least two more actors (actants) taking part in this meeting, acting at a distance. ‘Algot’ (as a human actant) suggested, according to Kerstin, that there would be problems with ‘the software’ (as a nonhuman actant) in relation to the X5 project. Kerstin can here be seen as spokesperson for these two other actors. According to Kerstin, Algot had “seemed upset” about ‘X5’ and ‘the software’ at another meeting and Erik concluded the conversation saying that he had to give Algot a call about that. Though Kerstin wasn’t formally attached to the X5 project, she acted as a legitimate project maker when being listened to by Erik (since she contributed to the shaping of focus).

Thus, to become a legitimized project maker, the actor need not be formally attached to the project. Project making can be performed both by those actors explicitly acknowledged as ‘participants’ (seen as some sort of insiders) as well as by actors related to as being outside the project (seen as outsiders). Importantly, in terms of project
becoming, such boundaries are not *per se*, and both such constructed sorts of actors can act as project makers.

**ii) A planned project meeting**

Here a subproject manager emphasises and illustrates how a planned meeting can be used to connect other actors:

“Fredrik from Kista [project manager for NPI] said ‘Anders, you will get your [radio] base by the 16th’. Yes, great, but then I suddenly realized that then Erik [subproject manager for Production] should have it first and then it should come over to our lab. Yes, then but then we [Erik and me] pair these two people together that will be affected by this. And that might not…

If I had just got an e-mail from Fredrik saying ‘you receive your [radio] base on the 16th, where should I send it’? Then Erik, well, he might have found out about this in some way, but right then he wouldn’t. So that is where the meeting served a purpose. That it was so fast. What otherwise might have taken two days was now settled in two seconds”.

*Subproject Manager, Test Development*

Fredrik can here be seen as spokesperson for the radio base (which will arrive to Anders on the 16th), as a nonhuman actant acting at distance, which in turn makes Anders and Erik agree that they need to connect yet two other actors, who are supposed to interact with the radio base later on. Note that even if not present at the meeting, the radio base can still take part (potentially influencing the future acts of others) in the meeting, by acting at a distance when being spoken for.

**Acting at a distance**

While constituting a basis for the ongoing construction of problems, solutions, interrelational project spheres and relevant kinds, many meetings seemed to concern mutual definition of different aspects in relation to these. According to the subproject manager for Production, the creation of mutual frames was important and took more time in
this project then in what he referred to as normal projects, since many project participants lacked previous experience with 3G products. Since he had previous experience from 3G, he said he used that experience in various ways when acting as subproject manager in the X5 project. One example of this was when he, despite the fact that he was not formally responsible for test design, initiated the creation of focus around some important test design issues:

I think that it started with... it really started with me having a gut feeling to keep an eye on test development. Test development is often difficult and Anders [subproject manager for Test Development] has been on vacation and Hugo has been running this, although he really doesn’t have the time. So you sort of have a package of uncertainty.

But I don’t have responsibility for this, really, other than test support [included in the subproject Production]. And that is really the job after Anders. So when he is done doing his job, I can follow.

... 

This feeling of uncertainty triggered me then to ‘no, now I need to see where we are, do we have progress, have we times planned for different events?’

And what did you do then? (CN)

Yes, what did I do... I can’t remember... I found out some facts with Lisa where we were, what they had been doing. They are the ones providing their input to test development. Since test development is dependent upon them. And then I went down to Anders and tried to understand where he was... tried to understand how he perceived the situation.

We sketched on the white-board. I tried to explain, ‘this is what my world looks like, does your world look like this too’? And then I draw pictures. And then we commonly reached somehow... well either I influenced him, or he thought like me, that ‘here we have an important event that we need to pay attention to, here we sort of, here something happens. And that was week 51 when X3 releases their test software that makes us able to test our radio
bases. It is possible that Anders knew this perfectly well, but I had not heard him push these demands when we got together or at our meetings.

Subproject Manager, Production

The meeting between Erik and Anders described above could also be seen from a commonsensical perspective on meetings, i.e. that social actors meet, interact and shape mutual frames and perspectives. But taking the perspective suggested here, one can also argue that at least one other important actor took part in the meeting as well, i.e. the test software that was to be released at a certain future time.

Thus, the ‘test software’ can be seen as an actant taking part in the meeting by being spoken for, or acting at a distance — here, in fact, acting from future being. By being spoken for, the test software thus acts as a legitimized project maker, acting as the relevant kind of test software needed, and thus contributes to the shaping of focus in terms of project becoming. Actants can thus also act from a distance from a past or ‘contextual’ being. During the meetings, participants at many occasions shared their experiences from past or parallel projects suggesting things like ‘in this project we did this and that’:

“Tomas [project manager for System] brings up, for example, what was made well in the Y7 [another project] and he refers to that. And that was a big project where they needed to work with release planning. So I think that you have brought in experiences from there”.

Project Manager, CPI

Such a form of sharing experiences could be seen as a way for the participant to share knowledge, which in turn can be seen as a basis for knowledge integration. But focusing on knowing as a process such a way of relating to other projects can instead be seen as a complex process between actors in which knowing is inherent, where ‘the former project’ and ‘defined experiences’ act at a distance from a past being.
Q3 - Conceptualisation

As described in chapter 2, the third research question regards how project making is performed. While focusing on different forms of interaction between project makers, I suggest that much interaction takes place in various forms of meetings. The perspective on meetings suggested here differs however from what I call a commonsensical perspective on meetings (focusing only on human actors). Here, I suggest that project making takes place, and project becoming takes shape, via interaction and negotiation between legitimate project makers. Such interaction requires two or more actors who relate and contribute to the shaping of focus.

Such interaction can take place in many ways. Actors can for example interact through meetings (including two or more human actors) as well as through other forms of interaction (e.g. when a project manager relates to a project plan or when a product owner relates to a trouble report). I suggest such interaction to be forms of what I call *project making events*. In this chapter, I have focused on meetings as forms of such events. Below, I describe what I think of as an expanded perspective on meetings, which includes a reconceptualisation of who or what counts as actors. Drawing from my observations, project makers can participate in different forms, shown as a matrix in Figure 3.
I conclude that since meetings are important aspects of projects (as also suggested by Karrbom Gustavsson (2005) and Westling (2002)), we must also acknowledge the nonhuman and the off-site project makers that contribute to project becoming. As described in this section, the notion of acting “at a distance” (Law 1986 p. 257) refers here not only to actors acting at distance from some sort of (seen) parallel existence, but potentially from a past or a future being as well.

This perspective contrasts with other studies in relation to projects and knowledge, where interaction refers to meetings between human actors, as exemplified by Enberg (2007). Enberg also addresses artefacts, not in terms of nonhumans taking part in the interaction, but suggests instead that artefacts can “support” interacting and acting (p. 222). In this section, I have illustrated how legitimized project makers — human and nonhuman — were acting both at a distance and on site and how these can be seen as contributing to project becoming in

<table>
<thead>
<tr>
<th>Type of actor</th>
<th>Location</th>
<th>Human actor</th>
<th>Nonhuman actor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human</td>
<td>On site</td>
<td>acting as a relevant kind (e.g. a project manager) and are also able to represent others.</td>
<td>acting as a relevant kind by other actors (e.g. a trouble report or a plan). Can represent others if being spoken for.</td>
</tr>
<tr>
<td>Nonhuman</td>
<td>At a distance</td>
<td>Human actant participating by acting at a distance if being represented, or by representing himself (via e.g. phone conference) as a relevant kind. Can also represent others.</td>
<td>Nonhuman actant participating by acting at a distance, if being represented by other actors as a relevant kind (e.g. a cable). Can represent others if being spoken for.</td>
</tr>
</tbody>
</table>

Figure 3. Matrix of different forms of meeting participation
terms of the shaping of focus. In the next chapter, I will elaborate some more about the shaping of focus, with a particular focus on the creation of boundaries.

4.5 Q4 - How Are Project Boundaries Created?

Based on the perspective that boundary making is an important part of project becoming it seems important to investigate the issue of project making in terms of ‘boundary making’. In a comment on the relations between science and society, Latour explains that “when I say there is no inside/outside distinction, I mean that we should not believe in the existence of inside and outside . . . So the point is exactly the same: we have to see inside-and-outside as an active category, created by the actors themselves, and it has to be studied as such” (Latour in Crawford 1993, p. 5, emphasis added). That comment has nothing to do with project theory, but his reasoning is relevant here. If one translates this argument to a perspective on project making, ‘project boundaries’, can be seen as active categories, created by other actors, instead of as existing per se.

What is interesting is how such elusive boundaries, as active categories, are shaped. Boundaries are here seen as being made by assumptions (facts) created over time, such as assumptions about the time limit of the project (boundaries between ‘pre-project time and project time’ as well as boundaries between ‘project time and post-project time’). Such facts can also consist of assumptions about the boundaries between the project and its context (i.e. boundaries between those who are included ‘in’ the project and those who are not), as well as assumptions about the purposes and goals of the project (i.e. boundaries between what should be accomplished and what need not be). As emphasised, such assumptions are not per se – but elusive and acted upon.

However, I here argue that in order to be considered ‘as’ boundaries, boundaries have to have spokespersons arguing in their interest. Steering documents, such as assignment specifications, organisational charts and different forms of plans, can be seen as boundary agents, arguing for boundaries relating to the organisation, time and tasks.
But the work of boundary agents depends upon how other actors relate to them.

Many documents were saved onto shared files. As an example, the NPI project had a shared file containing different forms of documents and maps for the subproject. Since participants of one subproject had access to the maps of other subprojects, they could relate to these documents as well. As an example, a subproject manager describes:

“What I have been looking at concerns HWC [hardware co-ordination], I have looked at the plans that Joachim [hardware co-ordinator] sent out. I have been in looking at them. I have been into Åke’s [subproject manager for Strategic Sourcing] to look at the schedules from E-Tech. Delivery plan… I have been looking here”.

Subproject Manager, Production

In addition to such kind of boundary agents, human actors could also act as spokesperson for boundaries. One important work for actors acting as spokespersons for boundaries to do is to define project boundaries for ‘insiders’, i.e. those who are seen by others as project participants. For example, actors acting as project managers can define project boundaries. Here, I suggest that a project boundary agent can be seen as speaking not only for other social actors, but for the project itself (as an actant), by arguing for its boundaries. However, project managers are not the only ones speaking for the boundaries of the project.

In addition, humans can also be recognised as acting from an ‘outside’. Actors can for example act as product owner, customer or supplier to define project boundaries in time and space. These actors can act while present at meetings, but also at a distance when being spoken for by others. One example of this is the contract acting as a spokesperson for project boundaries:

You have been talking pretty much about ‘wonder what the contract says’ and for a while you were talking about ‘if we can’t
deliver in February X pieces [cabinets], then everything will go bad, so to speak’. (CN)

The contract says, I have heard from Dennis, my boss, that QE has the right to cancel all our . . . orders, that is, for X and X . . . But that chance is kind of microscopic, that they will do that.

Under what conditions are they allowed to do that? (CN)

If we cannot deliver these X pieces [cabinets].

In February? (CN)

In February.

Project Manager, NPI

The content of the contract was mentioned by many in the project, but very few seemed to actually have seen it. As the project manager describes, it was said that the contract stated that the customer could cancel, not only the X5 order, but also X and X orders (orders more extensive than that of the X5 project), and thus the dates set in the contract were defined as very important. Hence, the contract (which in turn can be seen as a spokesperson for the customer) can be seen as an important boundary actant, and also as a legitimizied project maker, by contributing to project becoming.

Due to the unusualness of the project, in terms of the fact that the project delivered products before they were formally declared ready for serial production (here called PRA), there were however a lot of negotiations going on about if, what kind (version) and how many products the project could deliver at what time. Such negotiations included thus not only the contract but the work of many actors, such as project managers, defined problems, line managers, the customer and the contract.
Defining boundaries for ‘outsiders’

In defining boundaries for those seen as ‘outsiders’, different actors relating to the project might relate to different boundaries, which can create conflicts of interests:

“The only thing that is a bit worrying now I think, or many… is that Ericsson’s interfaces towards E-Tech are many … at the moment. So I had a talk with Pelle, he is manager of enclosure at strategic sourcing, and he thought that we were to have an item on Per’s [total project manager] agenda now when we have this workshop ‘interface towards E-Tech’. ‘Cause now Karin [project manager for MPE] has a list that she goes through with them [E-Tech], Åke [project manager for Strategic Sourcing] at ours has a list that he goes through with them and then there are some who call directly and talk… and then there are problems in communications. They [E-Tech] don’t know who or what they should listen to and then these kinds of problems happen.”

Project Manager, NPI

So several actors (Karin, Åke and “some who call directly”) simultaneously acted as spokespersons for project boundaries when interacting with E-Tech (as a supplier). Therefore, the boundaries of ‘what should be done’ might become multidimensional, contradictory and blurry. This is, however, inevitable and also a logical consequence of this perspective: if boundaries are seen as constructed and reconstructed over time by a variety of actors, it makes sense that those that are related to are foremost the ones that are supported by the most stable set of arguments (not per se but as built up by other actors).

The negotiation of boundaries can also relate to the negotiation of project scope. According to a product owner at MPE, there could be new demands being directed toward the project over time:

And then we have the latest – we are going to change the temperature interval. It should not be from minus X to plus X [Celsius degrees], but from minus Y to plus Y, whoops!
When did you get these new terms? (CN)

No, they have not gotten into the project yet. For now, this is an open issue. So we can’t work with it.

You have heard this from somewhere? (CN)

Yes, we got really involved. But then Karin [project manager for MPE] said that ‘this is not our scope, then you have to make a new requirement specification’. We work according to the current requirement specification. It that gets updated, we change direction.

Product Owner, MPE

Of course, boundary making is not limited to defining boundaries for actors seen as ‘insiders’ or ‘outsiders’. The above example just shows that boundaries can be created as an interface with an ‘outside’ as well as for ‘insiders’ to act upon. Speaking for project boundaries often involves defining boundaries for a multitude of actors, including the work of many heterogeneous actors. For example, at one point a specific problem was translated into a trouble report by a production engineer about a cable that was too long to fit into the cabinet:

“I have one now, to provide an example, on a cable that needs to… production has written that a cable is too long. And I see what they write… so to speak. But I am not sure that this cable can be made any shorter, since it contains a lot of wavelengths, you can’t just cut in whatever way. And then I have to investigate if we can make it shorter at all and if we can, how short can we make it? Will it be too short? So I kind of like have to look into the problem to be able to answer, to say that I have decided this; it might be that nothing can be made, then it has to be too long. Then it might be another type of solution, where you wire it in another way then”.

Product Owner, MPE

From the perspective suggested here, several actors (e.g. the radio base, the trouble report, the ones writing the trouble report, the product owner and the cables) can be seen as taking part in the
negotiation of boundaries (both physical and technological). How the solution of the defined problem then takes shape depends on several actors’ ability to translate their interests onto others (which in turn depends on the work of many other actors). Hence, problem solving is here not only a matter of human abilities to use cognitive capabilities, but a process of negotiation among several human and nonhuman actors.

Hence, boundary agency is a process in which several actors can take part. A budget arguing for a monetary boundary, can e.g. be seen as defining project boundaries for ‘outsiders’ as well as ‘insiders’. A monetary boundary (as an actant) can, for example, contribute to making the relevant kinds needed (e.g. re-use of existing and/or cheap components), which in turn can be an argument for a specific component when negotiating legitimacy to act as such a relevant kind. A deadline can also act as a boundary agent, as indicated in Söderlund (2007), who suggests that “deadlines demand attention” (p. 224, my translation)\(^70\). In a similar way, a project plan can argue for a boundary in time and also speak for a boundary in terms of which activities should be included within the project – both in relation to insiders and outsiders.

Hence, the notion of *project boundary agency* I suggest here refers to the work of actors arguing explicitly or implicitly for project boundaries. The milestone checklists described in an earlier section are typical examples of how nonhumans can speak for boundaries of the project, in term of defining what to *focus* on in regards to various aspects. The action list can also act as a project boundary agent, since the role of the action list is to define important actions to be taken by project participants, hence creating a boundary between what the project is (to do) and what it is not. Next I will describe how the action list acted as a boundary agent at a project meeting. By the time of this meeting, the project X5 had been reorganised into the X3 project. The main project meeting was held in a conference room at Ericsson in Kista and was led by the main project manager.

\(^70\) Original: ”deadlines kräver uppmärksamhet”.
To start the meeting, the main project manager put up an image on the overhead screen that listed different issues, such as schedule, budget and resources. Each issue was followed by a scorecard, graded from ‘off track’ (marked with red), ‘on track’ (marked with yellow) to ‘excellent’ (marked with green). After going through the items, he concluded by showing a summary picture with the overall status of the project, pointing somewhere in between on and off track and highlighting the ‘Top 3 critical issues’.

A half hour into the meeting, it was then time for the group to go through the action list visible on the screen. The list was called ‘X3 application development project meeting action list’. When going through each item, the responsible party was asked to report on the actions taken. If the person responsible reported that he or she had taken the promised action, he or she was then removed from the responsible column. If the responsible person stated that action was taken, the main project manager then closed the item.

During the meeting, the list changed. Some names were taken off and some new names were put in. Hence, work was inscribed into the list, that in turn talked back onto others (with the help of a spokesperson, here the main project manager), who had their name written besides the assignments. Hence, the action list acted as a project boundary agent (and as a relevant kind), by defining what actions should be included in the project, i.e. where others should direct their focus.

Q4 - Conceptualisation

As described in this section, boundary agency is a complex process that includes the work of many heterogeneous actors. By suggesting the notion of project boundary agency I aim to emphasise the work of actors contributing to the shaping of project becoming by negotiating and representing project boundaries. Project boundary agents can, for example, take the form of project managers arguing for a boundary in time or space, or else project plans, budgets, assignment specifications, organisation schedules, requirement specifications or an e-mail distribution list (defining who is a project participant and who is not). By arguing for project boundaries in whatever dimension
(time, money, material or institutions) agents can act as a project boundary agent.

The work of boundary agents is to speak for boundaries, i.e. to create more or less temporary boundary facts to act upon. These boundaries can also define rules for which actors will be allowed to perform project making. Thus a project plan can act as a project boundary agent, working to define the boundaries of the project. By defining boundaries in time, it also argues for action. Hence, project boundary agents are here described as spokespersons that do the work of arguing for boundaries in various dimensions. A project boundary agent can be related to by others as an ‘outsider’ (related to as being ‘outside’) as well as an ‘insider’ (related to as being ‘inside’). I have exemplified this reasoning in Figure 4 by organising different kinds of potential project boundary agents into a matrix.

<table>
<thead>
<tr>
<th>Humans related to as ‘insiders’</th>
<th>Humans related to as ‘outsiders’</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Project managers</em></td>
<td><em>Line managers</em></td>
</tr>
<tr>
<td><em>Designers</em></td>
<td><em>Customer (human agents)</em></td>
</tr>
<tr>
<td><em>Production engineers</em></td>
<td><em>Supplier (human agents)</em></td>
</tr>
<tr>
<td><em>Test designers</em></td>
<td></td>
</tr>
<tr>
<td><em>Configuration managers</em></td>
<td></td>
</tr>
<tr>
<td><em>Hardware co-ordinators</em></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Nonhumans related to as ‘insiders’</th>
<th>Nonhumans related to as ‘outsiders’</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Technological artefacts, e.g.</em></td>
<td><em>Technological artefacts, e.g.</em></td>
</tr>
<tr>
<td><em>cabinet, cables</em></td>
<td><em>mobile phones</em></td>
</tr>
<tr>
<td><em>Milestones</em></td>
<td><em>Multi-project plans</em></td>
</tr>
<tr>
<td><em>Action list</em></td>
<td><em>Contract</em></td>
</tr>
<tr>
<td><em>Trouble report</em></td>
<td><em>Customer company</em></td>
</tr>
<tr>
<td><em>Change request</em></td>
<td><em>Supplier company</em></td>
</tr>
<tr>
<td><em>Project plans</em></td>
<td><em>Assignment specification</em></td>
</tr>
<tr>
<td><em>Project budget</em></td>
<td><em>Requirement specification</em></td>
</tr>
</tbody>
</table>

Figure 4. Matrix exemplifying potential project boundary agents.
As shown, many of the actors that potentially can act as project boundary agents can also act as legitimized project makers in terms of being able to act as a relevant kind (i.e. being related to as a legitimate contributor to project becoming). They are, however, not the same thing. To be able to act as a legitimized project maker, the actor needs to explicitly contribute to project becoming, while to act as a boundary agent is to argue for a project boundary, hence, a project boundary agent might become a legitimized project maker if ‘listened’ to. In addition to this categorisation, project boundary agents can be seen as speaking for boundaries in relation to ‘outsiders’ as well as ‘insiders’. Hence, when boundaries are upheld by actors acting as boundary agents, they create elusive boundaries for the project makers to act upon.

In this thesis, boundary agency is thus regarded as important in order to understand knowing as inherent in the shaping of project becoming. In his doctoral thesis, Westling (2002) describes how the ongoing creation of project boundaries can be seen as a “tug-of-war”, where actors try to pull the project in different or similar directions in the boundary dimensions of “functionality”, “delivery time” and “human resources”. He describes this tug of war as when several ropes connect to a centre that “constitutes the boundary situation for the project” (p. 91).

While Westling’s perspective supports the notion of project boundary making as an ongoing process and emphasises the existence of different stakeholders contributing in this tug-of-war process, the perspective presented in this thesis contributes an additional notion. The perspective suggested here conceptualises project boundaries as active categories. Based on the concept of project boundary agency developed in this thesis, i.e. the active work of agents to uphold elusive project boundaries, this perspective illustrates and emphasises that this active work is performed not only by human, but also by nonhuman agents.
CHAPTER FIVE
Developing a Perspective

Drawing from the conceptualisations developed in chapter 4, this chapter addresses the main research question: how knowing is shaped in heterogeneous project making. In the first section, two concepts will be suggested: the notions of ‘knowing dimensions’ and ‘knowing trajectory’. Thereafter, these concepts, together with the ones presented in chapter 4, will be integrated into an epistemological perspective.

5.1 Summary of Frame So Far

As introduced in chapter 2, projects have been conceptualised as “places for knowledge integration” (Söderlund 2007, p. 221 my translation). In this thesis, inspired by a “becoming” rather than a “being” ontology (Linehan and Kavanagh 2006), I have suggested a focus on the processual and practice-based notion of knowing, rather than knowledge. While the latter notion can provide important insights (see e.g. Enberg 2007; Enberg, Lindkvist & Tell 2006) on the complexities of knowledge integration, the former notion emphasises knowing as a process and the result of a “system of ongoing practices and political processes that are, in effect, two sides of the same coin” as suggested by Nicolini, Gherardi and Yanow (2003, p. 20, emphasis added). The “subject of the knowing” then becomes ‘‘the action net’ identified by these processes. It does not reside in any of its parts, and even less, in any of the representations produced by its different constituencies” (p. 20).

Taking such a perspective on knowing, the main focus of this thesis has been on project making. Knowing as a process can here be described as inherent in the ongoing shaping of project becoming. Suchman (2003), suggesting a use of a similar perspective on knowing, describes her focus as “less on what engineers ‘know’ than
how they talk among themselves and with relevant others, how they translate their own embodied courses of action into written accounts and other materialisations, and how they assess the meaning and adequacy of materials created by others” (p. 188).

In chapter 4, some basic concepts were developed to constitute a frame. Based on the suggested importance of including nonhuman agency in project theory (e.g. Linderoth 2002; Lindahl 2003, 2007), and inspired by a “socio-material constructionist approach” (Gherardi & Nicolini 2003, p. 205) on knowing, combined with my interpretations from my case study, I suggested in chapter 4 that project making can be seen as the heterogeneous making of problems, solutions, relevant kinds and interrelational project spheres, of which the latter is used by project makers as so-called “reference groups”. The concept of reference groups is borrowed from Shibutani (1955) and included here to illustrate the fact that the project makers used and created the perspectives of several different reference groups simultaneously.

Furthermore, I suggested in chapter 4 that project becoming can be seen as shaped by the work of legitimized project makers, which was illustrated by the conceptualisation of meetings as forms of ‘project making events’. This concept also includes the nonhumans and the non-present actors taking part in meetings while acting at a distance. It was also suggested that some actors can act as ‘project boundary agents’, speaking for and representing project boundaries. As stressed, when speaking for more or less temporary project boundaries, the boundary agents seek to shape project becoming. This relates to the main research question of this thesis – how knowing takes shape. Based on the insights presented in chapter 4, I will next problematise how knowing can be conceptualised here and how it takes shape over time.

5.2 Knowing Dimensions and Knowing Trajectory

Behind the perspective developed in this thesis lies the assumption that knowing is inherent in project making, or in other words, in how different actors relate and contribute to project becoming. In this
section, I will problematise such knowing a bit further. In order to be able to discuss this, I will have to return to the issue of meetings as forms of project making events. Karrbom Gustavsson (2005), using a term by Czarniawska (1993), describes the initiation of project meetings as attempts to create “specialized rationalization actions”. The meetings can be seen, according to Karrbom Gustavsson, as attempts to create “rational, logical and unanimous accounts of what has happened, what is happening and what will happen” (p. 134, my emphasis and translation).

In addition to the production of such accounts, project meetings (in all forms) are described by Karrbom Gustavsson as “momentary stabilisation points” (p. 163, my translation) at which humans seek and create “(temporary) meaning”. Following and trying to expand on such a perspective, I will share my notes from a project meeting held in 2003:

It was a Thursday afternoon in late March and the NPI project team was gathered for a project meeting in a conference room in Gävle. Apart from me sitting at the end of an oval table with my notebook and Minidisc, there were seven other people present, two females and five males. Some of the participants looked a bit tired, while others looked a bit more interested and enthusiastic.

In order to illustrate some of the information he wanted to share with the group, the NPI project manager had connected his laptop to an overhead screen and showed graphical diagrams to the group. He talked while sometimes looking into his notebook, in which I guessed that he had written down information from the main project meeting (which I had seen him do at such a meeting earlier). Apparently drawing from these notes, he told us about what was currently ‘going on’. The others asked him questions, and they discussed a variety of things such as delivery dates, numbers and versions, the ‘Common Basic CV-status’, what had happened to a specific trouble report and some other things.

In the midst of the discussion, one of the project makers suddenly said that he was frustrated about the fact that they were “getting different information at different times”. “Well”, the project

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71 Original: “momentana stabiliseringspunkter”
manager calmly replied, “I deliver status, not everlasting truths. This is what is true today, or more rightly speaking: what was true yesterday”.

To my surprise, everybody (including the frustrated participant) smiled (some even laughed) and seemed happy with the project manager’s reply. I took it that the others agreed with him and accepted that ‘this is the way it is’, even though they sometimes felt a need to express feelings of frustrations about this.

Many descriptions of projects, such as project reports or more academic project case descriptions, can similarly be described as stories about what has already happened. According to Tyrstrup and Holmberg (2002, p. 13), project leaders “basically think in terms of a chronological time-axis”. The writer or describer of a project then tells ‘what happened’, often using a chronological axis, to illustrate the shaping of the project over time.

In an attempt to theorize the dimensions of time in projects, Karrbom Gustavsson (2005 p. 175 my translation), inspired by Rehn (2003), suggests that time in projects can exist in several dimensions: past time (earlier projects), here time (the current project), future time (future projects) and there time (parallel projects). If it is so, that time can be constructed in these dimensions, the question then becomes how these dimensions are constructed and by whom. In the next section, I will elaborate upon the framework of Karrbom Gustavsson (2005). Drawing from my findings, I suggest that this perspective can be extended. Apparently not only time is created in several dimensions — project making can be seen as being made in relation to several dimensions that I here call ‘knowing dimensions’.

While Karrbom Gustavsson’s notion of “there time” is very interesting and fruitful, I think that this dimension can be extended too. As will be described in the following, project makers relate and create in relation to ‘context’, not ‘as such’ but as what it becomes. Other projects can be seen as such a ‘context’ (when project makers relate to what happens in other projects), but they also relate to other

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72 Original: ”dåtid”, ”hårtid”, framtid” and ”därtid”.
actors, such as the customer. Projects are never made in isolation – project making is as much the making of ‘what it is’ as ‘what it relates to’.

In order to deepen this insight by allowing the nonhumans and the non-present to take part in such a process, I will illustrate and conceptualise some observations. As a basis for the conceptualisation, I will start by discussing the knowing dimension in relation to ‘contextual actors’. My interpretation is that project makers acted upon (i.e. were part of creating) other actors that were seen by them as relevant to the project. Such actors included ‘the customer’, ‘PROPS’, ‘other projects’, ‘the line organisation’ and many more. In the following, I will exemplify some of them and show how they were acted upon.

The downsizing process

The development of the X5 project took place at the same time as a company-wide reorganisation process. The company had been laying people off for some time. This was a secret to no one, since Ericsson had (and still has) a status as ‘the’ telecom company in Sweden, an important financial actor and employer. Therefore, their downsizing process had been extensively discussed in the public media.

On one of the first days of my study, in September 2002, the subproject manager for Production (Erik) and I talked about the company’s financial situation during a walk back from a local lunch restaurant. “It is important to realize”, he said, “that some things cannot be done in the same way now as they were done before”. He explained that there “was no money to do any ‘we-activities’” such as team-building exercises and the like, which had been common (and important factors for the success of the project, according to him) in previous projects.

That day I had a chat with the head of the project office (Bengt). After a roundabout discussion, he said that there is “more negative turbulence now than there used to be”. “It used to be turbulent before
as well”, he explained, “but previously this was related to the fact that ‘things went up’. Now it is turbulent in a mentally harder way”.

Later that afternoon, I noticed one event when going through my notes from a project meeting and thinking about Erik’s and Bengt’s words. I had noted that someone at the meeting had asked Erik about the level of financial investment, i.e. how much money they could spend on equipment and so on. The person had asked, with irony, “How does it look in terms of investment – should we be extremely stingy73 or just stingy?” People laughed and Erik had replied that they “simply should assume that we do not have any money at all for investments”. Hence, the ‘financial situation’ of the company (as an actor acted upon as ‘context’) had been translated by him and others into ‘local project conditions’.

In addition to the ‘bad financial situation’, the ‘downsizing process’ seemed a bit like a ghost lurking around. There was no ghost, of course, but the downsizing process was made an actant being acted upon and spoken for. As an example, some also stated that they felt personally affected by the process:

“I feel this personally, that I don’t know if I have a job in February or not. And that is hard and takes a damn lot of energy”.

Project maker

In addition to such statements, others stressed that the downsizing process was a potential threat to the project (e.g. if someone were to be laid off during the project). Hence, the downsizing process was made an actant — not something ‘out there’ — but a nonhuman actant being represented by others. Sometimes this actant also initiated meetings, becoming the mutual topic of interest for various project makers.

73 Original: “extremt snåla eller bara snåla”.

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Making a ‘multi-project context’

In addition to ‘contextual actors’ such ‘the downsizing process’, there were a lot of other contextual actors to relate to. Perhaps other projects should not be seen as a given context or situation, but as actants acted upon and as potential project makers when being related to. Eskerod (1997) suggests that “project participants participate in several projects at the same time” (p. 95, my translation). Here, I suggest that both humans and nonhumans can perform project making and contribute to the becoming of several projects at the same time. That humans can do this was obvious:

“Then the object managers have their own object meetings, since object managers work in other projects as well. Unfortunately, you seldom get resources, personnel that only work with your project, but mostly they are involved in two or three projects and then I try to attend to these object meetings and inform them about X5”.

Project Manager, IoV

In addition, artefacts such as ‘PROPS’ or Replir, as well as various components, contributed to the becoming of several projects simultaneously. When asked to reflect upon the project, the total project manager said:

“Something that isn’t really what I was expecting, is all this that happens all around which you need to keep track of all over the place74. Since it is not that much new in what we do. But all others are dealing with new things all around us and it’s not really… it doesn’t feel that you can keep the narrow scope that you might have imagined yourself at the beginning, since so much influences all the time. I think that this is different from how I imagined it at the beginning when I started out the project. All these connections here and there75”.

Total Project Manager

74 Original: “korsan och tvärsan”.
75 Original: “hit och där”. 175
One example of this was the stated interdependencies between the X3 and the X5 project:

“We in our project are dependent on the platform that is made in X3, so we can’t run pass them, but we inherit what they do. As a basis for the application that we do”.

Subproject Manager, Production

To understand every detail of the interdependencies between the X3 and the X5 projects was too difficult for me and I did not see that as a major issue to investigate. But according to the total project manager, the X5 project was “associated” with the X3, which meant that they were ‘economically separated’ but that the product that was created in the X5 project was to be verified “at a higher system level in X3”. Many stated that there were interdependencies between these two projects. In addition to the suggestion by the subproject manager earlier that the X3 project could not ‘run ahead of the X5’ project, a product manager suggested that the X3 project also served as a kind of ‘pusher’ for the X5 project:

“To some extent this X5 base station has pushed X3 ahead so that this… since it was so urgent with this [X5], it has laid the track for X3, you can say”.

Product Manager

This interdependency also increased the need for information and the negotiation of focus. Hence, it was suggested as an advantage to share some project makers between the projects:

“When I entered the X5 I experienced that if you are just involved in this project but are still dependent on another project, then you get isolated if you don’t get information and of course the dependent project isn’t… they don’t think of informing about everything, there is not a focus in the same way. But if you take

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76 As she put it in Swedish, “Rent ekonomiskt är vi olika, men den produkt som vi tar fram, den ska X3 verifiera på en högre systemnivå”.

77 Original: “legat och spårat”.

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part in both projects, many problems are automatically solved and problems need not even become problems”.

Configuration Manager, X5

Later on, as mentioned, the X5 project was merged into the X3 project. During the time the two projects were economically separated but interdependent, project makers of the X3 project were related to as ‘contextual actors’ that were shaped over time. These could also act as project makers of X5, acting as ‘outsiders’ (i.e. contributing to project becoming from a constructed ‘outside’).

The customer was also related to as a contextual actor. In addition to relating to the contract (being a spokesperson), the customer was also related to when defining the progress of the project. Tomas explained his perspective on the project, that it could be seen either from “inside”, where there was currently a lot of focus on problems and imminent issues, or in relation to the customer and what had happened so far:

“Sometimes you think that this is going rather well. Since when you hear from the [customers]… I try to separate sometimes from [issues] internal to the project and what we are actually sending to [country]. Internally, we are incredibly focused on faults and shortages and problems and are angry and upset about everything that doesn’t work. Then QE was here in October or in the beginning of November, at a demonstration, this is what it looks like. It looks really great so they return really pleased. Then we were to have a demonstration in December but then a surprise-demo came up and that was due to the fact that there was to be contract negotiations in [country]. And then they wanted an X5 with the power on, blinking with some lamps. So we finally managed to get a cabinet together and then we sent it away and on the Monday when they sat there negotiating… it was a huge success.

...  

Then in December there is another demo and it is installation practice plus a voice call, you should make a call through the base station, not through the air but via cable. And it works out
perfectly. . . So they are extremely pleased, totally lyrical at [local organisation in x country] about how great this is.

Then there were X-tests, people are working their ass off since we don’t think that this will work well due to [problem]. But then we realize that it will be OK anyway, and people are working like hell on a Friday and then we send it off on a Saturday since this is really important, since QE will really be there.

And this is how it goes, one thing after another. The Y-test has been passed now also and each such thing works and QE is really pleased and happy and thinks that this is great. And we see the problems accumulating all the time but in the last second you somehow manage to make it. So from that aspect you could say that this has been going brilliantly”.

Project Manager, System

Hence, being related to, such ‘contextual’ actors also contributed to project becoming and thus also to the shaping of focus and knowing. Taking this into consideration, I will in the following take a few project meetings as examples to show how the knowing dimensions past, present, future and context were created.

An informal project meeting

As described in section 4.4, project makers interacted through many sorts of meetings. Analysing what they were creating during these meetings, it seems they were continuously constructing knowing (in terms of shaping action and the focus of their doing in which knowing is inherent) in relation to several dimensions. Below is a transcription from an informal meeting between the subproject manager for production (Erik) and the subproject managers for quality control (Svante) and production (Jens).

The meeting was the kind of smaller, informal, short-term-notice meeting that was so often set up during the project. The transcription is supposed to i) convey a feeling of how things were dealt with as they came along, ii) show how the project makers sometimes
expressed the need to change perspectives on a day-to-day basis and how this can be seen as the simultaneous construction of knowing in relation to the past, present, future and context.

Svante: But how do these nodes (base stations) now…, all these that we are getting from E-Tech, how do the plans look thereafter? All these are getting into the project, as I have understood it.

Erik: Can I sketch a bit… since I hardly get this myself… All the turns… Now I simplify and make this a bit incisive. The thought was that [sketches] here was the pre-series. On let’s say 12 pieces. And then we went on with serial…, that was the idea. And then it has circulated some back and forth if we should take one of these and send it to series [production] in some early version. But now it has turned out, and I haven’t paid attention to that, I don’t know how long one has known this, that is that three, that is… this is week 4 and this is week 5… three of what we call pre-series, we have to take. And deliver out on Thursday. Next week. Which will go to the customer so that they are really there on time. And you will take these from this pre-series.

Jens: Will they go from here or from IoV?

Erik: They will go from here to the customer.

Jens: Yes…

Erik: So next week on Thursday, three must be delivered to the customer.

Jens: Yes. I am thinking what we do if there is a shortage of material. How we prioritise. If we get little and sent it to IoV and then the customer deliveries, I guess that they have higher priority? Or?

Erik: I think that we have to solve this in consecutive order during the morning meeting. Partly we have at what pace the cabinet comes in, and then we have a shortage of material on such which are specified as our own, possibly. And then there are prioritisations with X3….
Jens: Yes....

Erik: ….things. XX, from what I understand, that isn’t now.

Jens: Mm…

Erik: But I think that this is also such… right now, this is how it looks, but how it looks tomorrow... it might look different then.

On the basis of what is presented here, I suggest that heterogeneous project making can be seen as continuous and multidimensional. Here I suggest that project making can be understood as the construction of knowing in relation to a matrix of past, present, future and context. This means that I suggest that each of those knowing dimensions was created and re-created over time. Hence, there was no given context or past history to relate to — rather, the present (what is going on) was constructed, past (what happened) was made over time and the future (what will happen) was both pre-inscribed and acted upon — and there was an ongoing construction of all of these dimensions simultaneously.

Besides the human actors present at the meeting, there were also others (actants) participating at the meeting (acting at a distance), taking part in this construction. Examining some quotes from the meeting can illustrate the importance of making sense of past, present, future and context:

**Past**

The thought was that here was the pre-series. …that was the idea.

**Present**

*Right now, this is how it looks...*

**Future**

They will go from here to the customer.
But how it looks tomorrow… it might look different then.

Context

And then there are prioritisations with X3….
Deliveries from E-Tech

Another example, paraphrased from my notes from an early project meeting in Gävle, will show this multidimensional shaping of knowing. The purpose of the meeting was to create a “mutual image of what we should do”, said the subproject manager for Production. After all had presented themselves, he continued by going through the ‘project organisation’. “We have stolen the organisational structure from X3”, he explained.

Erik says ‘what about the project, what shall we do’? Then he starts to tell:

"We are to deliver to one customer and one product, one configuration. We are to industrialise a cabinet that looks like this and we are to make fewer than X pieces. The product management doesn’t think that this will be a best seller”.

Erik then asks Folke what the cabinet looks like.

Folke describes how E-Tech has assembled a ‘lab-ruska’ [mock-up] with a climate unit on the door. What’s new is the upper fan, new length of the cables and the climate unit on the door. Most of it is taken from other models.

“Does it look like this”? Erik asks and show an image. “Yes”, says Folke.

“We will gain from having as small changes in the routines as possible here”, says Folke, “we are creating a temporary thing here”.

“You get an AP until next time”, says Erik. “What do you need for information for your activities?”

Then Folke describes:
Pre-series November
December X pieces
January X pieces
February X pieces
March X pieces
April-August X pieces /month

“TG2 decision has not been taken yet, so it’s not yet decided that this will happen”, says Erik.

Erik then describes the schedule using the overhead. What is done? Prestudy and feasibility. New mechanics.

Erik also tells about an XX which is software that is to be released at the end of October and is to be integrated into the product.

Several ask when the TG-decision is to be taken. “I don’t know that today”, Erik replies, “but I will investigate it”.

Some say that that there are activities that they don’t dare to start before the TG2 decision is made.

Gerd asks if there will be a representative from the ‘FC’ in the project. Yes, says Erik and writes it down.

. . .

“According to PROPS, you make a prototype and evaluate, make the next one and so on. But now we make several prototypes and improve them in parallel”, says Erik.

. . .

“Do you have any questions?” asks Erik.

“It is clearly forced”, says Folke.

“One thing is that we need to get a cabinet”, says Greger.

“Some administration”, says Isabell, “when are we going to have meetings”? 
Erik describes that they are to write weekly reports. All who have access to the shared file can read each others’ weekly reports. But we are to have as little administration as possible. We are not making any minutes of meetings, just action points.

There is information about this project and the project one level up, on the web, which all can have access to. The project number is XX for time reports.

“On the website there is a lot, such as the product structure”, says Erik. “Anna puts up information and spreads it well, but it can be a bit difficult to find. So get onto the shared file and poke around a bit, so you get familiar with it”.

As in the case of the other meeting, there were many actors taking part in creating this meeting. The obvious ones were the ones on site, but other humans (such as ‘Anna’) and nonhumans (‘the web’) were taking part too, acting at a distance (when Erik speaks for them by saying that Anna will put the documents on the website).

Past

What is done? Prestudy and feasibility. New mechanics.
Folke describes that E-Tech has assembled a ‘lab-ruska’

Present

TG2 decision has not been taken yet
On the website there is a lot

Future

We are to deliver to one customer and one product, one configuration. We are to industrialise a cabinet that looks like this and we are to make fewer than X pieces. The product management doesn’t think that this will be a best seller.

Context

We are to deliver to one customer
Here, I have used a couple of meetings as examples of how some project makers contributed to project becoming. Drawing on and trying to extend the work of Karrbom Gustavsson’s (2005, fig. 8, p. 175) notion of the different times described above, Figure 5 shows how heterogeneous project making includes the shaping of knowing in several dimensions.

According to this figure, project making can be seen as interrelating with actors in several dimensions. An important question is, of course, if the relation to future actions influences how actors act later in time. Shaping the future can be seen as the work of “pre-inscription” (Latour 1995, p. 272). This means that even though this theory is nondeterministic in that actors can choose to subscribe or des-inscribe in any scene, other actors can try to influence them. By defining the future and negotiating with others to act upon it, work is done to direct the focus of others, which contributes to the shaping of knowing. But, as Latour puts it, humans and nonhumans will still be “very, very undisciplined” (p. 273) even if considerable pre-inscription has been done. Hence, shaping the future can be seen as a part of the ongoing pre-inscription process.
Project makers could also relate to future projects and products. Though the X5 project was set up to create a customer-specific product, the radio base could also be related to in relation to future products:

“I have always interpreted this X3 as a prestudy of a real radio base station. It’s a bit of a special construction for [customer]. And there will be no real volumes. But then there might be a ‘real micro’ later that will be the right one. Here, it is about making [X amount of] radio base stations for a customer that really wants them. Then you have to make something that you can sell globally and I don’t think that you will do that with this one, I don’t think so”.

Subproject Manager, Serviceability Preparation

I suggest that heterogeneous project making can be seen in terms of the multidimensional shaping of knowing. Knowing thus depends on the ongoing creation of what is, what was, what will be and how to relate to others. By suggesting the concept of ‘knowing dimensions’ I suggest that knowing as a process is constructed in relation to all these dimensions. Or in other words, ontologically project becoming inherits also an epistemological process, performed by heterogeneous elements in relation to these dimensions.

The related notion that knowledge integration is dependent upon history and intra- and interorganisational context is suggested by Maaninen-Olsson (2007). While not using an explicit knowledge-integration perspective, but instead focusing on knowing as a process, the perspective suggested here also emphasises the importance of the future. Hence, I do not suggest that project makers are ‘affected’ by history or context, but that they relate to what has been in the same way as they relate to what will come. Even though some might claim that we cannot understand our future until it has passed (and become history), I argue that that this doesn’t matter for project making. If knowing is inherent in project making, and project becoming is dependent on the heterogeneous, multidimensional constrution of past, present, future and context, it does not matter if something has
happened or will happen — the important thing is whether an actor acts towards something as if it has happened or will happen.

**Knowing trajectory**

If heterogeneous project making can be seen as the multidimensional shaping of knowing over time, one can ask how such an ongoing formation takes shape. Temporary organisations have been described as including transition or transformation (Lundin & Söderholm 1995; Karrbom Gustavsson 2005). To be able to further conceptualise knowing as a process, I will start this section by analysing the term *project*. The word *project* stems historically from the Latin verb *projicere*, which means to ‘throw forward’ 78, thus implying a process. The ontology underlying the perspective developed in this thesis is also processual, by using a becoming ontology (Linehan & Kavanagh 2006). The question is then finally how to include and illustrate this processual notion? Inspired by the symbolic interactionist idea of a “trajectory” (Strauss 1993 pp.53-54, in Garrety & Badham 2000 pp. 106 79), which refers to “the course of any experienced phenomenon as it evolves over time (an engineering project, a chronic illness, . . . ) . . . [and] the actions and interactions contributing to its evolution”, I propose conceptualising heterogeneous project making as shaping and relating to a *knowing trajectory* 80.

Hence, I suggest that heterogeneous project making over time creates a path, a trajectory, which takes shape via all the activities described above. In project becoming, there is thus a movement going on as long as these activities are done. In their interaction, legitimised project makers relate to each other, and depending on how these are related, problems, solutions, focus (in various aspects, technical,

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79 Garrety and Badham (2000) use the notions of social worlds, boundary objects and trajectory schemes, concepts which are not explicitly used here (though I use the notion of reference groups). Instead, I assume that both human and nonhuman actors contribute to the evolution of a (knowing) trajectory.

80 The notion of ‘knowing trajectory’ has also been used by others, such as Gherardi (2004). Here, the notion of knowing trajectory is used in relation to project making and project becoming, as defined in this thesis.
human, geographical etc.) and what counts as facts (what is known as true) are shaped over time. Thus, from this perspective, focus is not shaped through human interaction, but in a complex web of human and nonhuman interaction. As illustrated in chapter 4, many project makers suggested that there was a lack of planning in the project; some also suggested that plans did not ‘steer’ their work, emphasising instead how important social relations and meetings are in creating common perspectives. But from the perspective suggested here, neither human relationships nor plans shapes project becoming alone. Instead, human and nonhuman actors, such as people, plans, expressions and trouble reports, relate to one another. The way in which these relationships emerge and affect the actors contributes to the shaping of a knowing trajectory. As described in chapter 4, even in meetings, traditionally seen as a form of social (human) event, nonhumans can participate.

Thus, I suggest that such a knowing trajectory is shaped by the interactions and negotiations of project makers. For example, project makers and boundary agents negotiate issues such as ‘what components are relevant’ (written down as product specifications) or ‘who the participants should be’ (on organisation schedules) or ‘when the project should be finished’ (in project plans) or ‘how much the projects should cost’ (encapsulated in budgets), thereby attempting to move the attention and interest of other actors to take place in relation to such boundaries in the ongoing shaping of the project. The boundary agents are speaking for boundaries, and if they are not successful, boundaries will be ignored, challenged or changed.

Gherardi’s practice-based perspective of knowing suggests that “a key element for interpreting knowing in organisations” becomes “the process by which novices become part of professional ‘worlds’ and master linguistic games and microdecisions . . .” (Gherardi 1990 and 1995b in Gherardi and Nicolini 2003, p. 207, my emphasis). This is somewhat similar to the perspective suggested by Lave and Wenger (1991, p. 100), who focus on how “newcomers” become members of communities of practice. This perspective is also used by Karrbom Gustavsson (2005 my translation), who emphasises the interaction among the four categories of novice, experienced, newcomer (to the
focal project) and established (one who has been working ‘in’ the focal project for some time).

These classifications can be theorized further. Knowing, as it is conceptualised here, is clearly not an issue of creating identities of newcomers in (a pre-existing) community of practice. As Karrbom Gustavsson (2005) suggests, a project is re-created over time. She thus suggests that “the site-practice”\(^{81}\) (p. 161) can be seen as an action net that is ongoing despite the fact that participants come and go. But in terms of the perspective suggested in this thesis, project making is not the same as creating ‘a practice’. The classification of novice, experienced, newcomer and established participants might indicate a view of a (one?) “site-practice” or a (one?) “site culture” (Karrbom Gustavsson, p. 161).

Here, I suggest a somewhat different perspective. Knowing is here seen as being shaped in the very making of project becoming, in terms of the ongoing construction of problems, solutions, relevant kinds and interrelational project spheres, which is not pre-existing, but shaped over time. The project makers can thus also use several of these spheres as reference groups (e.g. ‘we at NPI’, ‘we in design’, ‘we test designers’, ‘we X5 project participants’ etc.). Hence, project making differs from creating (one) practice. However, the notions of access, legitimacy and participation as suggested by Lave and Wenger (1991) are relevant in this perspective, too.

As described by Lave and Wenger (1991), access is the key to participation and learning. Here, however, negotiating ‘access’ does not refer to gaining access to participate ‘in’ something, but obtaining legitimacy to contribute to project becoming. Thus, I suggested that they had to be related to as relevant kinds, which are classifications of ‘sorts’ needed ‘in’, or being relevant ‘to’ the project. As described, many different actors act as project makers. Their strategies for negotiating access differ, but include the ability to be related to and the ability to use project language. When negotiating access to a community of practice, a basis for participation for newcomers is to

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\(^{81}\) Original: “sitepraktiken”.
learn the ‘language of the practice’ (ibid.). Here, project language is understood not as ‘the language of the project’, but instead as a multitude of languages.

Firstly, to be able to use project language, the project makers had to show their ability to use a language that was spoken for by agents such as the PROPS manual (‘PROPS-språket’, or PROPS language). Some of the legitimized project makers presented in this thesis can be seen as acting as “intermediaries” when performing “ordering arrangements”, being created by another network as its active attempt to act at distance (Gherardi & Nicolini 2003 p. 210). Hence, actants such as PROPS can be understood both as an actant assembled by an actor network of ‘Ericsson project organising’ and a legitimate actant taking part of making the specific X5 project. Likewise, the trouble report system can be understood as an actor network with trouble reports being translated as intermediaries when they are related to as legitimized project makers.

The use of terms such as tollgates and milestones can also be used as examples. In a meeting discussed earlier in this chapter, the participants asked the project manager if the “TG-decision” had been “taken”. If it had not been, they would not start doing certain activities. By relating to relevant kinds such as “TG-decisions”, while at the same time using interrelational project spheres as reference groups (e.g. ‘we at test design’), they merged the languages while at the same time negotiating participation and legitimacy with project language, making others relate to them as participants. For example, an actor might say:

‘we [the project/test designers] need to….’
‘I [as a test designer] think that…’

But, importantly, numerous reference groups were used at the same time. Not only could a project maker use the perspective of ‘Ericsson’, ‘the project’ or ‘test designers’ (as interrelational project spheres) but also use other types of reference groups:
You said that not all are from “the world of broadband”, but that they come from 2G. What does that signify? (CN)

We have recently put together the pipe 2G and the pipe 3G [broadband]. Since there are not so many 2G projects anymore. What this means, it is two cultures that have been merged. . . It’s not a big collision but those who come from 2G don’t know how you do within 3G and I think that they feel a little insecure. They bring with them a good way of working and now they don’t recognise themselves.

Subproject Manager, Production

Hence, reference groups such as (we in) ‘the world of broadband’ could also be used as perspectives. Even though ostensibly working in the ‘same’ project, project makers sometimes used different and sometimes similar reference groups as perspectives:

“It is always difficult to get… since the NPI projects are very directed onto production and to provide the production with products and services, it is difficult for us who are not that interested in production, but more of aftermarket, to get an ear for our ideas. Our wishes. Not least that Sourcing needs to make agreements for spare parts, as well”.

Subproject Manager, Serviceability Preparation

The use of different reference groups as perspectives can thus result in the negotiation of action and focus. But importantly, such negotiation is not seen as being negative or positive per se. Project makers suggested both negative and positive aspects. As an example of a positive effect, the project manager for customer product information suggested that their usability verifications could add insight not previously seen by the designers, and/or put additional focus on specific issues:

“What’s good is that there are people that look at this from different directions. And there we are some sort of independent instance, who tests this in our way, which they might not have considered. And even if they have considered it, we come and sort of pick at them in the eye. That’s pretty
good actually. Often, they know that it is not good. But then we make these usability verifications and then we take it and design always takes care of that. They almost always attend to that”.

Project Manager, CPI

The usability verification can be seen as taking the perspective of future actors (being thus defined as relevant kinds), who thus can be seen as being translated into becoming project makers (being spoken for and thus contributing to project becoming):

“We make the usability verification. With that, we test ‘the whole’. Otherwise no one, if you say, design builds the radio base and then you have others who take care of the transmission unit and the other unit that takes care of the radio unit that you take from others. But there is no one who tests, how does this fit together. When it comes to spare parts, spare parts should be able to be exchanged on site.

When you are on site, you are to be able to connect to all the external cables that you have, does this work? There are a lot of demands that says that there should not be a lot of cables in the way, if you are to pull out a unit, you should not have to take out another unit. No cables should hinder other things. And we check such things. We don’t make any functional test, that is made at test and verification, but we make this purely methodologically, see to it that it can be installed, that we can do maintenance, that it can be replaced. That we can make a proper installation.

It has happened many, many times that we have received an early prototype and then we have a lot of contact fields and there is all possible stuff there. And then you connect all the contacts and the cables and stuff and then you cannot close the door [laughter]. They have their demands; it is supposed to be a contact there. But then there is a cable with this giant thing on, no one knew that it was that kind of one, or so, that happens pretty often”.

Project Manager, CPI
The use of different perspectives can be important and creative or cause difficulties in understanding (or even conflicts), as project makers might then speak past one another, using different languages:

“Once in another project I asked the project manager for the type test\textsuperscript{82} at IoV, when does the type test start? The answer I got was “yes it is a form of regression”. And that is very interesting. Because I think that on the question “when” you should get the answer “I don’t know”, “later” or “21 March”. I find those to be reasonable answers.

He didn’t think so. Since you were to make the type test as a form of regression, i.e. that you don’t make a totally new type test but you test the new functions and then you make a way on paper, you say that we have tested the other things, we presume that this works together. That is, in his world, the type test had already started, since it was kind of a continuous activity. And there you see this directly, the different ways of thinking. ’Cause what I was interested in was to know, when do you need the new hardware, the new functionality? But that was not what I asked. I asked what I wanted to know but I didn’t ask why I wanted to know it. So we speak past each other since we have different languages.”

Hardware Co-ordinator, NPI

The ongoing negotiation of legitimacy of both human and nonhuman actors, as well as the work of boundary agents, led to the shaping of focus and facts. Nonhumans could not explicitly use project language in terms of being able to speak for themselves, but they were nevertheless co-creators of the same. Technological artefacts can take part in creating language that includes \textit{and excludes} (i.e. acting as a boundary agent). Hence, legitimacy in terms of heterogeneous project making might not only be an issue of the work of project managers ‘co-ordinating’ competencies, but also a result of an ongoing process of translation and legitimization, including the creation of languages. But though the process of legitimization seems to be as important here as when actors interact in communities of practice (Lave &

\textsuperscript{82} Original: “Typprovet”.

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Wenger 1991), and though there are similarities, the strategies and path towards legitimization look rather different.

Firstly, a main difference between communities of practice and project making seems to be that the former are focused on stabilisation (the learning processes are mainly based on the socialisation of newcomers), whereas the latter is based on transformation. Hence, I suggest that the negotiation of access to and legitimacy for communities of practice seems to be a process of becoming like them, whereas negotiating of legitimacy in projects rather seems to be a matter of becoming one through them (i.e. by being made through the interaction with others when acting as and upon relevant kinds).

Importantly, in both cases, there is a need to negotiate legitimacy, but in communities of practice one has to develop skills more similar to those of the others (as with the community of midwives described by Lave and Wenger 1991), whereas for project making, it seems to be more important to relate to and act upon relevant kinds, where ‘formal roles’ can be seen as being co-definers of some of those relevant kinds.

In sum, the negotiation among actors to create and relate to kinds, legitimate project makers and boundary agents can be seen as the ongoing shaping of a knowing trajectory. By the ongoing creation of past, present, context and future, what was once known, focused on and made changed over time. For example, the action list focused activity in terms of ‘what to do next’ (including some activities and excluding others), while the physical boundaries of the cabinet (acting as a boundary agent) argued for the inclusion of some components and the exclusion of others (such as a cable that was too long). In the next section, I will use the notions of knowing dimensions and knowing trajectory and integrate them with the other suggested concepts into a coherent perspective.

83 As suggested by Karrbom Gustavsson (2005); see also Lundin and Söderholm (1995).
84 Compare to Karrbom Gustavsson’s (2005) notion of ‘one of them’ versus ‘one with them’ (my translation) when discussing her role as a researcher.
5.3 Creating an Epistemological Perspective

In chapter 4, drawing from the research questions presented in chapter 2, I suggested some concepts that can serve as a conceptual basis for understanding heterogeneous project making. These concepts were relevant kinds, interrelational project spheres, project making events, legitimized project makers and boundary agency. In this chapter, in section 5.2, I suggested two final conceptualisations, knowing dimensions and knowing trajectory, which I suggest are necessary in order to be able to add a multidimensional and processual perspective on the shaping of knowing through project making.

In the following, I will integrate these concepts into a perspective, which is an attempt to describe, in Rehn’s (2004) words, “what is done and how it’s done, rather than creating metaphysics about in what it is done” (p. 166, my translation from Swedish). Being based on a becoming ontology (Linehan & Kavanagh 2006), the focus of this epistemological perspective is not to illustrate what a project ‘is’ and how ‘its’ inhabitants ‘learn’ or ‘construct knowledge’ — the focus is instead on how project makers contribute to project becoming, and how ‘knowing’, as being inherent in this process, is shaped. To summarize the above conceptualisations into a perspective:

Heterogeneous project making can be seen as the ongoing makings of problems, solutions, relevant kinds and interrelational project spheres. These are shaped through interaction and negotiation at project making events where actors act as legitimized project makers and project boundary agents. By using the interrelational project spheres as reference groups, the continuous multidimensional shaping of past, present, future and context (knowing dimensions) in turn forms and relates to a knowing trajectory.

Based on the view that heterogeneous project making is about the creation of problems and solutions, project making includes making
relevant kinds, i.e., classifications, or sorts, that are related to as relevant in terms of contributing to project becoming. These sorts need not fit into formal classifications of ‘project participants’, such as ‘project managers’, but can be all sorts (such as cables, routines, experienced participants, suppliers, those who know about software, designers, trouble reports, line managers and software) constructed as being relevant in terms of contributing to project becoming.

While human actors can use reference groups as perspectives, nonhuman actors also contribute to the making of ‘interrelational project spheres’. Actors that in some way contribute to project becoming are here called ‘legitimate project makers’, and shown to take part in both the defining of problems and solutions and the construction of relevant kinds and interrelational project spheres. Moments for such project making are here called ‘project making events’ which refer to various forms of interaction, potentially including both human and nonhuman actors, acting on site or at a distance. Project making events thus refer to interaction between two or more project makers when contributing to project becoming.

Another important part of heterogeneous project making is to creating and acting upon boundaries. These boundaries are not seen as existing per se, but instead actors can act as project boundary agents, i.e. arguing for boundaries, hence making ‘the boundary’ a temporary, elusive actant. Heterogeneous project making can also be seen in terms of a ‘continuous multidimensional shaping’ in the dimensions past, present, future and context, which are here called knowing dimensions. This notion implies that knowing is shaped in several dimensions simultaneously, since the actors relate to project becoming in terms of these dimensions. Finally, as a result of ongoing heterogeneous project making, all these activities contributing to project becoming also shape and relate to a knowing trajectory.

Thus, ontologically, the perspective described above does not illustrate what projects ‘are’, in terms of illustrating project ‘being’ (Linehan & Kavanagh 2006). Thus, the perspective does not describe “‘what goes on’ in projects” (Lindkvist & Söderlund 2002, p. 278, my emphasis), but focuses instead on how project makers contribute to
project becoming where knowing is seen as inherent in the process. Thus, this perspective provides an embryo for a processual and multidimensional epistemology.

It is important to emphasise that the perspective presented here is not to be seen as a ‘map’ of what happens, in terms of thinking that at every moment, one could make a snapshot showing who is acting as a legitimised project maker or project boundary agent — and that one is thus able to determine or predict a knowing trajectory. Rather, the perspective aims to provide a conceptual understanding of the processes. When combined with the insight that project making are performed in the dimensions of past, present, future and context (knowing dimensions), we see the most fundamental aspect of this perspective: that the knowing trajectory, as well as the developed radio base station, could have been different.

From this perspective, the constructed artefact and the knowing trajectory (being intrinsically interrelated) are the results of a fundamentally political process. If actors had acted differently upon each other, if other actors had negotiated legitimacy to become project makers, if other relevant kinds had been created and other interrelational project spheres had been used as perspectives, the knowing trajectory would have been different. That is why the conceptual understanding of a knowing trajectory seems so important. But how can I claim that it could have been otherwise when I have just one case? How can I argue that something that cannot be repeated (in exactly the same way) could have been otherwise? The answer lies not, I argue, in the outcome of the project, but instead in the understanding of project making. If the perspective is regarded as relevant, if my interpretations of what happened seem reasonable, it is then the perspective that illustrates that it could have been otherwise, not the empirical result of the project.

This perspective suggests that the formation of a knowing trajectory is based on how actors (human and nonhuman) relate to each other, how they negotiate legitimacy and access and how they create and act upon boundaries. From such a perspective, the shaping of a knowing trajectory should not be seen as either a socially or a technically
deterministic process. The knowing trajectory does not solely depend upon ‘social’ actors (social determinism), nor is the artefact (the developed radio base) the outcome of some ‘inherent’ nature of the technology itself (i.e. some ‘optimal’ solution).

Claiming non-determinism does not mean that no instructions or goals were made early in the process. As described in chapter 4, assignments, plans and main requirements were written early in the project, acting as project boundary agents. Nor does non-determinism mean randomness, that ‘anything’ could have happened independently. By using the created interrelational project spheres as reference groups, interrelational temporary ‘truths’ were created. The aim of the project was to create radio base stations for a specific customer, and radio base stations were outcomes of the project. The project makers did not ‘suddenly’ decide to create a car or some other product instead. On the contrary, the work of actors (legitimate project makers and project boundary agents) shapes the knowing trajectory. Acknowledging heterogeneous project making, this perspective emphasises that these actors can be nonhuman as well as human, causing us to re-evaluate artefacts such as project plans, contracts and technical components. Boundary agents can thus here be seen as upholding the elusive ‘contours’ of the project.

A valid question is whether we can take inspiration from the ANT notions of “heterogeneous engineering” (Law 1986) and ‘actor networks’ while simultaneously suggesting that the project makers used reference groups (interrelational project spheres) as ‘perspectives’, especially since ANT explicitly contrasts with SCOT’s use of the notion of technological frames85. According to ANT, there are no ‘social’ actors who define ‘technology’. However, I suggest here that neither humans nor nonhumans can be understood in isolation but by and for other things (as suggested by Latour 2002b). While nonhumans can ‘act-back’ based on inscriptions, they are not able to use perspectives in terms of being reflexive. That does not mean that they do not act, nor does the human use of perspectives

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85 There are others who have combined these concepts, such as Linderoth and Pellegrino (2005), who suggest that both ‘frames’ (from SCOT) and ‘inscriptions’ (from ANT) can be used as concepts in understanding change projects.
define them (the defining is instead made by and through actor networks). It only means that humans can use reference groups (here the ‘interrelational project spheres’) as perspectives, which in turn are co-created with nonhumans (and the ‘sphere’, if spoken for, can act as an actant as well). The same reasoning is relevant for the making of relevant kinds. These also, just like the interrelational project spheres, exist on the same ontological level as the other actors.

Despite the difficulty, I attempt to illustrate the perspective visually\(^\text{86}\) in Figure 6. The visualisation is intended to provide a processual sense of how knowing is shaped over time by the work of many heterogeneous actors. These can, as seen in the illustration, be seen (by others, as there are no per se boundaries between ‘project’ and ‘context’) as acting from either ‘outside’ or ‘within’ the project. Hence, this perspective on the shaping of knowing through heterogeneous project making implies that not only those traditionally seen as project participants contribute. By adding the notion of knowing dimensions and the notion of acting “at a distance” (Law 1986), actors are shown as contributing to this process when acting (and being acted upon) e.g. ‘from the past’ or ‘from the future’.

\(^{86}\) Here, I want to acknowledge my borrowing of the idea to illustrate the process from Wotherspoon (2001), who in his doctoral dissertation on engineering design graphically illustrated the process. Apart from the fact that he does not explicitly focus on project theory, Wotherspoon also uses another framework, focusing on “social collectives” (e.g. using Strauss’s notion of social world/arenas), and suggested a perspective on boundaries (as ‘membranes’ and ‘plates’ defining the design boundary) different from mine. He uses the interactionist notion of trajectory as I also do, but not explicitly in the form presented here (the “knowing trajectory”).
Shaping of knowing through heterogeneous project making

Continuous multidimensional shaping of knowing in the dimensions past, present, future and context:

Elusive temporary boundaries
- Relevant kinds (classifications of ‘sorts’ that contribute to project becoming).
- Project boundary agents representing boundaries
- Legitimised project makers (h and non-h). Can be seen as acting from ‘within’ or from ‘outside’.

Interrelational project spheres (reference groups used as perspectives).
- Creation of problems and solutions
- The focal artefact, having a variable ontology (from existing (related to) but not materialised - towards existing and materialised).

Figure 6. The shaping of knowing through heterogeneous project making
The illustration thus attempts to capture heterogeneous project making over time, and the simultaneous shaping of a knowing trajectory. The focal artefact (here the radio base station) is illustrated here as having a variable ontology, existing not only at the end of the project (in its material form), but also as an idea (being created and related to), as described and illustrated in documents, as a ‘mock-up’ and forms of prototypes before taking its ‘final’ material shape (while still having a variable ontology). This latter reasoning is inspired by Kreiner (2002), who uses the insight of the variable ontology of things, i.e. that “existence is a matter of degree and will vary over time” (p. 116), and then suggests the notion of “tacit foreknowledge” when theorizing about knowledge management and product development.

My interpretation of Kreiner’s arguments is that the concept of tacit foreknowledge can explain why people co-ordinate their actions in product development, despite (or even due to) lacking initial instructions. In short, since people have previous experience generating “generalized possibilities” (p. 120), they can relate to — and mobilise action towards creating — the not–yet-materialised focal artefact.

Such reasoning is relevant here too. The focal artefact, the radio base station, was clearly existing (being spoken for and related to, mobilising others), long before it had materialised. It existed in many ontological forms: as an idea, as described in documents such as contracts, assignment specifications and main requirement specifications, and in several physical versions. But rather than focusing on humans’ tacit foreknowledge, I here focus on knowing as an ongoing process, in which the artefact took part. Kreiner suggests (followed later by Enberg, Lindkvist and Tell (2006) and Enberg (2007)) that lack of initial instructions (and lack of interaction as suggested by the latter authors) can in fact stimulate spontaneous co-ordination (that the ‘tacit foreknowledge’ instead serves to coordinate focus).

Taking this perspective even further, we can acknowledge that the focal artefact, before and after being materialised into its final form,
created relations to others – humans as well as nonhumans. Hence, I would suggest a complementary focus on the work of the artefacts, especially the focal, not-yet-materialised artefact acting at a distance (from a past as well as a future being). Latour (1992a) contrasts the notion of translation with the notion of trajectory when discussing the development of different cameras (which did “not have a single non-human in common”, p. 114). Here, the notion of trajectory does not refer to a deterministic path, nor even to the fact that different versions of the artefact (e.g. the prototypes) needed to have nonhumans in common.

The notion of knowing trajectory instead refers to the fact that project makers related to, acted upon each other and created focus over time. When relating to the knowing dimensions, project makers (such as old or forthcoming versions of the artefact) could act at distance, translating interests from the past as well as from future being. By relating to each other, a knowing trajectory was thus shaped by the makers.

In terms of the ongoing creation of focus, Engwall (2002) argue against the rationalistic approach where perfect goals can be set beforehand, predicting an objective future. Firstly, he argues that goals are rather to be seen as political products. Secondly, there is no objective, foreseeable future, and people are not simply following goals set in advance. The project group, rather than merely implementing something, instead shapes what is to be done over time. Goals are thus formed during the project process, through negotiations, based on practical experience developed during the execution phase. In addition to this, Engwall (2002) also claims that the opportunities to influence the goal become limited over time. In fact, he writes that “the performed actions introduce inertia into the process” (p. 273), since “actions in turn build upon previous actions, it becomes more and more difficult to change direction” (p. 273). He describes this metaphorically as “it is like a carpenter sculpting a piece of wood; once the first cut has been made, the process is irrevocable” (p. 273).
The integrated perspective I have developed can be used to further develop Engwall’s insights. Rather than seeing ‘previous acts’ as ‘fixed’, we see they are what they become in the hands of the translators of them. The negotiation Engwall proposes can thus be understood in terms of negotiations *among a multitude of heterogeneous actors*. By also using the notion of kinds and project boundary agents, an explicit focus can be drawn towards how actors legitimize themselves to contribute to these processes and how actors actively seek to ‘frame’ project becoming. Using such a multidimensional perspective of knowing and project becoming, this perspective does not focus on ‘knowledge’ as being ‘in the heads’ of participants. Instead, the notions of *heterogeneous project making, knowing dimensions* and the *knowing trajectory* instead implicate knowing as being inherent in very complex, multidimensional processes of interaction and negotiation.
CHAPTER SIX

Contributions, Quality Criteria and Further Research

In this chapter, the contributions of this thesis are presented. Thereafter, the quality of the results and methods used is discussed. Finally, some suggestions for further research are put forward.

6.1 Contributions

As described in earlier chapters, the point of departure of this thesis is the increased academic interest in ‘projects and knowledge’, which has resulted in such notions as projects being “places for knowledge integration” (Söderlund 2007, p. 221 my translation). While providing important insights, such a notion implies an ontological perspective of being (a place for…). In contrast, I have here instead used the idea of a becoming ontology (Linehan & Kavanagh 2006). I have thus tried to contribute to an “epistemology of becoming” (Styhre 2007, p. 25, emphasis in original) by using the processual and practice-based notion of knowing. By doing so, we can focus on project becoming and how knowing is shaped. By also acknowledging the idea recently proposed by project researchers of the importance of nonhuman agency (see Dobers and Söderholm forthcoming; Linderoth 2002; Lindahl 2003, 2007), the epistemological perspective developed in this thesis acknowledges not only humans, but also nonhumans, as potential co-constructors of knowing when contributing to project becoming.

Inspired by my empirical observations and the ANT notion of “heterogeneous engineering” (i.e. the “successful alignment of human and non-human elements”, Nicolini, Gherardi and Yanow (2003), p. 19), I suggested here that the makings of projects could be seen in terms of ‘heterogeneous project making’. With such a concept, I refer to the heterogeneity of the actors that contribute to project becoming
and the shaping of knowing. By using such a notion, a theoretical perspective was then developed and presented in chapter 5. The perspective presented as a result of this thesis includes several new (to theories on project becoming and knowing) concepts, such as ‘project boundary agency’, ‘legitimate project makers’, ‘relevant kinds’, ‘interrelational project spheres’, ‘project making events’, ‘knowing dimensions’ and ‘knowing trajectory’. These concepts are thus not from ANT, but are instead developed as a result of the abductive process of creating this thesis, where some of the basic assumptions of ANT (as described in previous chapters) have served as methodological and theoretical inspiration.

The purpose of this thesis was thus to create a new perspective on project becoming and the shaping of knowing, and not to provide a normative model on how to manage projects or integrate knowledge. In terms of contributions, the result presented here is mainly directed to scholars interested in theories related to projects and knowledge. Thus, I will in the following mainly focus on the value of the perspective for use in contrast or as a complement to other perspectives, and only, at this stage, put a minor emphasis on practical implications. In order to exemplify how this perspective complements and contrasts with other perspectives, I will in the following compare some notions included in this perspective with some notions suggested by others.

**Knowing trajectory versus knowledge collectivies**

As discussed in previous chapters, while the popular notion of ‘communities of practice’ (Lave & Wenger 1991) has contributed many important insights to a more practice-based approach to knowledge and learning, this notion does not fit exactly into project theory. Thus, Lindkvist (2005) has created another group epistemology, the notion of ‘knowledge collective’ (for temporary organisations) in contrast to ‘knowledge communities’ (for

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87 Some of the notions, such as the notions of “knowing dimensions”, “knowing trajectory” and “relevant kinds” have been used before with various meanings. I thus do not claim to have invented new concepts, but rather define the concepts in relation to project becoming.
communities of practice). In addition to problematising the use of the latter concept when analysing projects, the concept of the knowledge collective contributes important new insights. If a project group is seen as a knowledge collective rather than a knowledge community, the “general type of knowledge base” is seen as “distributed” rather than “decentred”, and thus e.g. “individual knowledge” rather than “knowledge-as-practice” gets emphasised (see p. 1205).

Since the perspective suggested here is inspired by a becoming ontology (Linehan & Kavanagh 2006), this thesis does not focus on whether or not project participants constitute a community or a collective, but focuses instead on how various actors contribute to project becoming. Hence, what the project ‘is’, is simply not that relevant, with a focus instead on project becoming. This perspective can also include elements that are not explicitly included in the “group epistemology” (based on human participants) of Lindkvist (2005), but also contribute to project becoming: the nonhumans.

Thus, rather than emphasising individual knowledge and competencies (and “knowledge integration” (Enberg 2007; Enberg, Lindkvist & Tell 2006)), this perspective uses the practice-based notion of knowing rather than knowledge. Not because the project are seen as a community of practice, but because this perspective is based on and contributes to a practice-based approach (Nicolini, Gherardi and Yanow 2003), seeing knowing as inherently situated and processual. Furthermore, by suggesting the notion of a knowing trajectory, the perspective also emphasises the processual nature of the perspective, as well as the fact that knowing takes shape over time. Hence, the perspective developed here emphasises the practical doing of actors, rather than their knowledge, since knowing is here seen as inherent in their ongoing process of contributing to project becoming.

The interrelational perspective presented here thus suggests that project making is not a socially or technologically deterministic process. Instead, relying upon the work of many heterogeneous actors, the knowing trajectory could have been different. Enberg, Lindkvist and Tell’s (2006) perspective shows knowledge integration in projects
as an iterative process of acting and interacting (in relation to the focal artefact) that renders important managerial implications for how to support knowledge integration. In contrast, this perspective suggests a complementary focus on how complex heterogeneous project making (including many actors beyond the human project participants and the focal artefact) contribute to project becoming and thus also to the shaping of a knowing trajectory. Thus, I argue that the perspective presented here can be seen as a complement to group epistemologies such as the notion of knowledge collectives (Lindkvist 2005) and to the notion of knowledge integration (Enberg, Lindkvist & Tell 2006; Enberg 2007).

As described in chapter 2, Grabher (2004, p. 1493) suggests the notion of “epistemic community”, which widens the perspective on who might contribute to, in his terms, “production of knowledge to accomplish the specific task”, by suggesting that clients, suppliers and corporate groups can contribute as well. As described, such a perspective also problematises the dualism between project and context. With the perspective in this thesis, this insight can be seen as being complemented, but by using the more processual notions of project becoming and knowing. From the perspective presented here, focus is thus not on collectivites or communities and ‘participants’, but on project making. By also including the nonhumans, this perspective emphasises even further that many different actors contribute to these processes.

**Knowing dimensions versus knowledge transfer**

The perspective suggested here can also be seen as a contrast and complement to another aspect of knowledge and projects, the notion of knowledge transfer. Adopting a more traditional perspective on knowledge and projects, we can see knowledge as transferred not only between project participants, but also between the project and the organisational context. We can see how “the studied projects import knowledge, procedures, structures, experience, values, and ideas from their organizational context, as well as how they export similar features to the context again” (Engwall 2003, p. 803, emphasis added).
Using a similar perspective, Björkegren (1999) describes how knowledge can be transferred from one project to the next by using “bearers” – individuals and routines. As a contrast, the perspective suggested here instead emphasises a focus on knowing as a process inherently situated and thus also inseparable from practice (thus here seen as being inseparable from heterogeneous project making). Taking the perspective suggested here, knowledge is not an entity that can be imported, exported or transferred. This does not mean that artefacts such as project reports etc., created in the making of one project, cannot be related to in the making of another project. But it means that various documents, plans and project evaluations should be seen as potential actants rather than codified knowledge that per se can be transferred.

From this perspective, project becoming does not end when the project is being formally terminated, but when the project is no longer related to or spoken for. Even a formally terminated project can still be related to and acted upon — as when people say they did this or that ‘in ‘X-project’ and should do so in this project too. Hence, the project can then still be seen as an actant (acting at a distance), potentially influencing the actions of others. Hence, from this perspective, it is difficult to discuss learning between projects as if knowledge belonged to a project or a context and can then be taken out. Rather, the notion of knowing dimensions suggested in this perspective implies that a past project can be seen in present terms: as being present or not when being spoken for by others (e.g. as stories, products, documents etc.). Similar to this, a contextual actor (an actor related to as being ‘outside’ the project) can contribute to project becoming if he/she/it is related to as a legitimized project maker (implicitly or explicitly) by others.

In addition, the relevant kinds created and acted upon in the project do not necessarily cease to exist after the project is formally terminated. On the contrary, kinds as classifications can act in relation to many other actors. Project makers not only create new kinds, but also relate to pre-existing kinds, defining and thus co-creating ‘project-relevant kinds’. Hence, from the perspective suggested here,
knowledge or perspectives can never be ‘taken out’ of a project, but knowing is instead inherent in the shaping of project becoming, a process which includes many actors, of which some are kinds, i.e. classifications of sorts that are related to (such as project managers, software experts, newcomers, radio base stations or whatever).

Thus, from this perspective, knowledge is not transferred between practices or between projects, but rather made by the work of heterogeneous actors. If someone, for example, attempts to share his or her experiences from a previous project, e.g. orally or in writing, this expression is only in relation to others. The same reasoning applies to documents such as written project reports. These contain not knowledge per se, they become instead potential actants. Thus, what they become is determined by the work of others.

In sum, the notion of knowing dimensions can thus be contrasted with the notion of knowledge transfer. From this perspective, knowing is constructed in several dimensions simultaneously. So, instead of referring to knowledge as being transferred from one project to another, this perspective implies that project makers of a later project can be seen as relating to an earlier project (hence contributing to the becoming of both projects), thus making the earlier project an actant, which then also acts as a project maker contributing to the becoming of the later project.

Since the knowing dimensions also include future and context, other actants can also be created, acting at a distance from ‘the future’ or ‘the context’. Hence, rather than focusing on knowledge, this perspective focuses on the actors that in various ways contribute to project becoming and therefore also the shaping of the knowing trajectory. This perspective can thus be seen as a complement to perspectives focusing on knowledge transfer per se, and contributes by problematising the complexity of these processes and the heterogeneity of the actors involved.
Project making events versus project meetings

The importance of meetings has been emphasised before, both in general organisational theory (e.g. Weick 1995) and in explicit perspectives on projects (Karrbom Gustavsson 2005; Westling 2002). The perspective presented here differs from a ‘commonsensical perspective’ on face-to-face interaction, where the participants are assumed to be human as well as on site. By contrast, the perspective developed here illuminates new aspects of meetings, by illustrating them as forms of *project making events*. I will in the following suggest the complementarity of this perspective.

From this perspective, both humans and nonhumans can act at meetings, and can act in two ways. An actor (or actant) can act when being physically present at the meeting, or acting “at a distance” (Law 1986, p. 257), being spoken for by others. This perspective, of course, has theoretical implications. First of all, it implies a view of meetings as events where actors interact, not ‘within’ or ‘influenced by’ a context (as a micro-event being influenced by macro actors), but ontologically as a ‘flat’ meeting between actors (spoken for or ‘direct’). Knowing is then not shaped by ‘organisational culture’, or ‘structures’, but by the direct and active work of actors contributing to project becoming by speaking for themselves or for others.

The most fundamental aspect of such a perspective is that if knowing is understood as a process, this implies that every time actors meet (directly or from a distance) to define, redefine or act upon (confirm) reality, the knowing trajectory is shaped. As put by Dobers and Söderholm (forthcoming), “projects are not linear models of how ideas are implemented through plans and diffused throughout society, but are the effects of heterogeneous interests, emotions and consensus, as well as carelessness, conflict and clashing intention” (p. 4). From such a perspective, project making events can be seen in terms of moments of negotiation, contributing to project becoming, which contains complex processes of translation and inscription of heterogeneous interests.
In this thesis, I have not made any demarcation between what kind of meetings support innovation and what kind of meetings contribute to control. Even though Westling (2002, p. 206) suggests that in a system of meetings, some meetings had the capacity for “housing ambiguity and multiple perspectives” (supporting innovation) while other had the capabilities to create “predetermined behaviour” (supporting control), I have not here classified them. As has also been emphasised by Karrbom Gustavsson (2005), an initially planned, formal meeting can involve into an unplanned meeting (which she refers to as “meetings in meetings”, see matrix p. 144).

Taking the perspective suggested here, meetings are thus not to be analysed by categories but by result. Each meeting is here seen as a new project making event, in which many different actors can participate. Hence, taking the perspective suggested here, the meetings are not a priori determined to ‘have’ any capacities, but meetings are instead seen as evolving out of heterogeneous project making. The shapings of the knowing trajectory can then be seen as a function of the heterogeneous engineering (here called heterogeneous project making) that takes place through different forms of project making events. While this thesis uses meetings as examples of project making events, the notion of project making events also refers to other forms of interaction between project makers, e.g. when a production engineer interacts with the radio base station or when a project manager reads an e-mail. Hence, project making events do not only refer to meetings, but to all forms of interaction between project makers that in some way contributes to project becoming.

**Project boundary agency versus project boundaries**

This thesis agrees with several other studies on projects that actors can contribute to project becoming in terms of several projects simultaneously. From the perspective developed here, humans can not surprisingly act as legitimized project makers and contribute to the becoming of several projects in parallel, by acting as relevant kinds. As illustrated, nonhumans, such as documents, plans and components, can act as relevant kinds too, contributing to project becoming.
Taking the perspective suggested here, both human and nonhuman agents can also be seen as ‘project boundary agents’ if they perform the active work of speaking for the boundaries of the project. Thus, the use of this perspective, I argue, can shed additional light on issues of inclusion and exclusion, as well as the ‘framing’ of projects and problems.

The argument that project boundaries can be seen as active categories, being spoken for by what is here called project boundary agents, has implications. For example, the distinction between what is temporary and what is permanent becomes fuzzy. One can thus discuss the relation between the temporary and permanent (see e.g. Linderoth 2002), not in terms of how experiences from a project can be incorporated into the permanent organisation after the termination of the project, but rather by acknowledging that actors who contribute to project becoming might also contribute to the becoming of other projects and practices. Hence, there are no per se boundaries between the ‘project’ and its ‘context’, or between ‘the project’ and ‘the organisation’; such boundaries can instead be seen as “active categories” (Latour in Crawford 1993, p. 5) created by the actors themselves.

Studying an industrial project, Bragd (2002, pp. 137-138) suggests, in relation to Lundin and Söderholm’s (1995) claim of the importance of separation (of project and context), that the project needs to “harmonise” with the line organisation (being “tuned in” as she calls it), i.e. that the project could not make “isolated decisions” or actions, but had to “mirror” the line organisation’s current state through coordination and collaboration. Instead of focusing on separation or harmonising, the perspective suggested here instead provides a focus on the work of project boundary agents. If one uses such a perspective, there is no per se boundary between the project and a permanent organisation. Instead there are actors speaking for boundaries, making the boundaries “active categories” (Latour in Crawford 1993, p. 5). Matters of separation or harmonising between projects and line organisation can be studied as constructs and not as matters per se.
6.2 Practical Implications

While the main purpose of this thesis was to create a theoretical perspective (directed to fellow scholars) on the shaping of knowing, and not to provide managerial solutions on how to ‘manage knowledge’, I will still make some tentative notes on potential practical implications of this perspective. Here, practical implications refer to what kind of insights this perspective can provide to those who aspire to become project makers and/or those who seek to manage knowledge.

While not giving any recipes on how to manage knowledge integration or knowledge transfer, this perspective instead problematises these notions, which is a contribution in itself (by challenging ways of thinking). It also emphasises that the process of shaping a knowing trajectory is a non-deterministic process that can be influenced. Hence, the knowing trajectory does not take shape randomly, but can be seen as a result of the active work of actors, when contributing to project becoming. This perspective both illustrates the complexities involved in the processes in terms of the heterogeneity of the actors involved and the multidimensional shaping of knowing, but at the same time, the perspective also illustrates the political nature of the shaping of the knowing trajectory — the importance of the successful alignment of actors, which includes the ability to translate interests.

The perspective presented in this thesis includes both human and nonhuman actors. In an example from the case study, if a project maker thought there was something wrong with the radio base stations’s door (e.g. it didn’t close right), he or she can write a trouble report (speaking then for the radio base station and its door). As an inscription, the trouble report can then act back onto others. Hence, the creation of a knowing trajectory is based on translation and persuasion processes. By persuasion processes I do not always mean intentionally persuasive actors. But whether or not they are intentional is not important here. What is important instead is that this shows an actor never acts alone, but in relation to others. Hence, it does not matter if an actor has knowledge if he is not related to – and
the use of knowledge depends on where focus is directed (which is based on processes of negotiation).

It has been argued that project managers need to use improvisation skills to manage projects. Lindahl (2003), for example, uses the perspectives of planning/control and improvisation, and suggests these as parallel “logics” (see pp. 346-347 my translation) and as prerequisites for each other. Using a similar perspective, Tyrstrup (2005) argues that project leadership is about stepping up as sense makers, telling others what to do when unexpected events occur. Project plans are here of two sorts: one contract on paper, which those involved know will be altered along the way and one plan existing in the heads of project managers planning what to do in practice.

From such a perspective, project managers are expected to react to unexpected events, which require some improvisation skills. Such unexpected events could include late deliveries, faulty products, change requests etc. Drawing from the perspective presented in this thesis, it seems relevant to also take other actors (not only project managers) into consideration. The problem is that when we argue that projects are constantly changing and that the key to success is improvisation (in addition to planning), we need to take into account more of what one needs to improvise towards. We may be still trapped in a planning perspective on projects, seeing project managers as the ones who need to adapt and react to events not included in the plans.

This view of constructing and reconstructing projects could, I suggest, be changed to a view of project becoming where actors such as plans, components, assignments, customer requirements, project members, project managers etc. are in constant negotiation. If so, the focus could change from a need for improvisation skills or planning skills to a need for negotiation skills. However, we must remember that the outcome of persuasion in terms of ‘power’ cannot be traced down to single actors. As Latour (1986) described, power is not something an actor “possess”, since “when an actor simply has power nothing happens and s/he is powerless; when, on the other hand, an actor excerts power it is others who perform the action” (p. 264,
emphasis in original). Hence, taking this perspective on persuasion and negotiation skills, the latter can perhaps be seen as an ability, but only in relation to the work of others – and persuasion can thus be seen as an interrelational phenomenon.

In sum, for a practitioner this perspective does not provide any easy recipes for managing projects, knowledge or knowledge integration. But it can provide a new way of seeing and understanding how projects and knowing are shaped, which might help project makers to develop individual strategies on how to influence and contribute to such processes.

6.3 Quality Criteria

In this thesis, I have created a perspective on the shaping of knowing though heterogeneous project making. As described in chapter 3, this perspective has been formed through an abductive process, fed iteratively by empirical and theoretical input. In this chapter, I will discuss quality issues: the validity and reliability, as well as the strength and weaknesses of this research.

A first important question is if the result of my research — the created perspective — could have been different. The answer to that question is a resounding yes. If I had used other ‘glasses’ (i.e. theoretical perspectives defining projects, knowledge and knowing) when studying project making, I would have been able to see other things and would have conceptualised various things differently. As a consequence, I do not suggest that the perspective created in this thesis is the (only and best) way to understand knowing and projects, but that it is one fruitful way.

The created perspective needs to contribute something relevant, but what is relevant is a matter of discussion. Here, I suggest that the perspective theoretically adds new insights in relation to previous understanding of projects and knowing. This can be related to the quality criterion of “interpretive richness”:
“Good research according to the criterion of interpretive richness thus enables a qualitatively new understanding of relevant fragments of social reality. This represents a break with earlier ideas, at least on certain points. . . . The reader is encouraged to think and think again”.

Alvesson & Sköldberg (2000), p. 279, emphasis added

Inspired by some notions and methodological implications of actor-network theory, combined with other relevant perspectives, I claim to have made several points beyond an obvious reading. As an example, I have directed attention to the fact that there can be many more actors taking part in meetings than the present human actors that are normally included in the analysis. Hence, I have made an attempt to create a perspective “rich in points”.

“Research rich in points has some linkage to empirical conditions while also clearly going beyond what the empirical material (preliminary, first-order interpretations) is able to say. Its novelty value – developing insights, problematization of established ways of thinking – thus becomes important”.


So, the perspective created as one perspective here clearly highlights some issues — such as nonhuman project making and knowing as created in the interaction among human and nonhuman elements — while simultaneously downplaying other issues, e.g. cognitive profiles of humans.

Acknowledging that the presented perspective is but one way of seeing does not mean that I suggest that it is just any way of seeing. I do not intend to dismiss the notion of reliability as irrelevant to this form of study. Instead, I suggest that the notion can be modified somewhat. The notion of reliability, i.e. if the measuring instrument is trustworthy and stable (Ericsson & Wiedersheim-Paul 1991), leads to questions of whether “repeated investigations of the same phenomenon by the same method will yield the same answer” (Kvale 1989, p.79). Such a question might not be appropriate in this kind of
study. Instead, I suggest that reliability can be related to in terms of being a matter of awareness (see Niss 2002, p. 57) of what perspectives have been used by the researcher as being the ‘measuring instrument’. I think that the qualitative researcher can be seen reliable, without being mechanical. In this thesis, the abductive process has thus been made explicit as far as possible, balanced with the need to not take up too much space.

In sum, the quality of the result of this thesis should not be measured in terms of judging if the ‘best’ perspective has been created. The perspective suggested here is not valid in terms of being ‘true’ or ‘correct’ (which is how we often define something as ‘valid’, see Kvale (1989 p. 73)), but instead the validity of the research can be related to as an “harmonious relation between an empty intention and a fulfilled meaning” (Kvale 1989, p. 75, based on Giorgi 1988) and thus the research process of “investigation, continually checking, questioning, and theoretically interpreting the findings” (ibid., p. 77) becomes important.

This view of validity thus relates to the process of my research. The theories and methods used in this study were not chosen or used randomly but were driven by empirical input as well as by theoretical input searched for during the course of the study. Thus, while the perspective created here could have been different, I still could not have created a perspective out of nothing. That is why I have tried to make explicit the abductive character of the methods used: so that the reader can evaluate whether my interpretations, use of frames and my conceptualisations seem reasonable and trustworthy.

As evidenced in chapter 4, I interacted frequently with the actors who took on roles as project managers and subproject managers. Also, I spend much time attending various forms of meetings. This has, of course, shaped my interpretations. A lot of work was done by actors such as designers, production engineers and test engineers when I wasn’t present, and not all actors that contributed somehow to the X5 project (since there are no per se boundaries) have been able to provide their opinions throughout my study (I made no attempt to interview them all). But in terms of the final result, they are not
excluded, since the perspective provides the insight that there can be a
great many actors contributing to project becoming.

In sum, I have tried to be explicit about what I have done during my
study and also to say something about the theoretical and empirical
journey this thesis results from. Such a description might hopefully
make it a bit easier to judge my interpretations and suggestions on
new theoretical concepts. Secondly, I would also argue that this PhD
thesis is theoretically and empirically well grounded by extensive
reading and a relatively long time spent in the field, that it relates to
other research and that it contributes some important insights to the
area of study.

An ethnographical study?

My claim to have conducted an ethnographical study risks criticism
from those who claim that anthropological research must be
conducted over a much lengthier period than my six months spent on
site. I can well understand that a lengthy stay among those one wants
to study can be beneficial. But it is important here to acknowledge the
differences between studying a foreign community or tribe, versus
studying organising processes.

Czarniawska (2004b, following Czarniawska 2000a) exemplified this
by arguing that she didn’t study a “community of city managers”, but
instead “an action net of city management: interconnected acts of
organizing” (p. 15). Her study of 14 months (of which four were in
the field) suited her purpose better then to have studied ‘city
management’ for 20 years — since actions make things change, there
is no way to find or study some “essence” (ibid. p. 15). Organisations
are thus not to be studied as having an essence as study objects, but
rather to be seen as products of organising. What should, instead, be
studied is the process of organising, and how actions are linked to
other actions in the creation of actors, objects, relations etc.

In the case presented in this thesis, the focus of my study was to study
project making and the shaping of knowing. As illustrated in this
thesis, during this time some actors contributed for a limited period of
time and then left. There was thus no essence to be found, but rather actions and actors to be studied. While six months might not seem such a long time, it still gave me masses of empirical material, and, more importantly, gave me lots of ideas on how to problematise and expand theories on projects and knowing.

One could ask what I was trying to understand using the ethnographical method of direct observation and interviews — and if I had a chance of understanding it. Recently, Charreire Petit and Huault (2008) have directed harsh criticism towards the researchers who suggest the importance of a paradigm shift in understanding organisational knowledge. While such researchers, according to Charreire Petit and Huault (2008), take a constructivist perspective on organisational knowledge (that it is socially constructed, complex and context-based), at the same time they use conventional, positivist methods and validity arguments (i.e. based on a search for objectivity).

While I can agree with much of their criticism, which is not directed towards the theories of constructivism themselves, but towards the way the theories are used, I also think that some of their assumptions can be problematic. Basically, Charreire Petit and Huault suggest that since organisational knowledge, according to constructivists, is situated in practice, researchers can never claim to understand its creation, unless they take part in the practice. Thus, they suggest that only methods such as ethnography (emphasising participatory observation) or action research can be seen as legitimate methods when using such a perspective. In sum, they suggest that problems, meaning and result should be co-created in practice. Any distance from the practice studied should be avoided, which seems to imply a need for the researcher to go native.

All this reasoning sounds fair at first sight, but the basic assumptions are problematic. Firstly, what are researchers interested in organisational knowledge really aiming at? What are they looking for? If they are studying the practice of test designers, do they want to become designers themselves, negotiating legitimate peripheral participation (Lave & Wenger 1991)? And if so, why? Is that really
the only way to understand how knowing is shaped — by sharing their perspective and developing a mutual language and understanding? Rather, I think that researchers aim to develop another language, stemming from the perspectives of academic practices, i.e. trying to translate what they interpret into a discourse for their peers (i.e. other researchers interested in organisational knowledge).

Secondly, even if participation was the only way of understanding practice, one must ask what organisational practice is — or even better, what it isn’t. The constructivist perspective importantly makes us realize that meaning can be both shared and different in organisations. So as a researcher, whose meaning are you looking to understand? Using the frames of this thesis, the focus of the researcher should not be on the organisation, the group or the project, but on project becoming, with a focus on the actors contributing to such becoming.

Except for having the manuscript sent to my two contact persons at Ericsson for a check for business-critical information, I have not discussed the manuscript and my perspective with the people I interacted with during my study. One reason for this is that there were so many actors (actors came and left, some were present only at a single meeting etc.), and some are not working at Ericsson any more. While the actors agreed to take part, I excluded overly personal information about the interviewees and also used pseudonyms for various details, projects and project makers. One other reason for this is that I do not see this as a validity problem. In earlier research (Niss 2002), I was very keen to discuss my interpretations with my informants, and was very happy when they agreed with my interpretations. I then used this to claim that I had grasped ‘their’ reality, trying thus to argue the validity of the research. However, since I suggest here that a project can be perceived differently by its makers — and that the perspective created here is but one of many — why would their approval of my perspective indicate high validity?

As an example of my reasoning, I will use an example from some related research. When studying knowledge integration in projects, Enberg (2007) describes how one of her written reports was strongly
resisted by a project member, who regarded the report as “‘crap’ which had nothing with project work as he experienced it to do” (p. 56). At the same time, other project members gave her positive response on the report, suggesting for example that it had enabled them to “see things from a new perspective” (p. 56). I think that this emphasises two things: firstly, that perspectives can vary amongst project makers and secondly, that researchers use and create yet other perspectives. Thus, I do not think that the first harsh comment in any way indicates low validity; rather, it merely emphasises their differences in perspectives. Hence, I do not think that ‘approvals’ of such case reports indicate high validity either. If I was searching for ‘the truth’ about the project, such statements would have been, without a doubt, very valuable. But since that is far from my intentions here, such comments are less valuable. In fact, I think that if I had used them as validity arguments (as I did in my licentiate thesis), it would have been very contradictory to the arguments made in this thesis.

Hence, in line with such reasoning, the validity of this thesis should here instead be judged by those taking part in the academic practices and discourse it is immersed in. Being familiar with both theory and practice of academic research, such scholars should be the ones to judge the validity of my study, evaluate whether I have been studying what I set out to study and if my interpretations and conceptualisations seem reasonable. That issue is therefore in the hands of such readers to evaluate. I will thus finish this discussion with the words of the Subproject manager for Production, who strongly emphasised that:

“I do not want to read your manuscript until it’s finished and published. It would surprise me very much if we were using the same perspective on the project. If your professors are satisfied with what you are writing, I am too”.

Subproject Manager, Production

Hence, the validity of this thesis is, I suggest, in the hands of such readers.
Some reflections on doing ethnographical research

In order for the reader to be able evaluate the validity of this thesis, I will in the following provide some reflections upon the research process. My interaction with the projects makers included a great deal of fun and also led to many interesting discussions, but during the process I sometimes also felt feelings of frustration. Apart from the constant negotiation of access when new people started to act as project makers (as described in chapter 4), the feeling of non-usefulness was striking at times. Lindahl (2003) argues that it is important for researchers of projects to get an actual task, in order to legitimate the long-term presence. Otherwise, the project participants could be sceptical towards the researcher. As described, I had no such task. I was, in other words, rather useless to them.

As described earlier, the subproject manager for Production asked me in the beginning what they would get out of it and I simply replied honestly and said ‘nothing’. But in spite of the fact that I had no actual task, they were very open and generous with their time. The subproject manager for Production, with whom I spent the most time of all the project participants, expressed however, at times, feelings of frustration. He said that though he knew that it was not part of the deal, he still could not help thinking that I could give them feedback and advice. Because of the fact that I was both a researcher in the field, and capable of taking part in the project at several different levels, I could have, he thought, be of much more use. Two things bothered him somewhat:

1. To have someone there who followed him.
2. To have a competent woman (his terms) that just takes part in the project without helping out. “You could contribute a lot” and “I know you are working, but sort of not for me”.

Arguing against this, I stressed the importance of me not intervening too much, for example by giving away information about what had been said at specific project meetings to someone who had not been present. I insisted on this due to several reasons. I know that by being
present, I as a researcher do take part in what is happening. By interacting with the participants, I contributed to what happened. By asking my questions and attending with my Minidisc at meetings, I was an actor among others. But I did not want an actual task. Basically, I knew too little about their practices to have been of much assistance (I was, after all, there trying to understand them), and I did not want to risk messing things up.

In addition, if I had been given a task, I would not have been ‘free’ to move around between different sites of the project in the way that I did. When I got interested in observing specific project forums, or when specific events occurred, I was more or less free to be present there. It might be that I would have learned different things by having a task, but I would have lost other opportunities too. So in retrospect, I am very pleased with my role and very grateful that I was legitimated as a researcher in spite of the fact that I did not have a task.

In any case, I think I was far from being only a fly on the wall, in terms of being able to see and listen but also being totally different from and indifferent to them. Such a metaphor (see e.g. Gustavsson 2002, Law 1994), implies the ability of the researcher to be both present and distant, seeing and hearing what is going on. Here, I do not think that such a metaphor describes the way the others related to me. I do not think that I was particularly important to the project makers or to their work, but I do think that they related to my presence in various ways. Not that they, of course, should be treated as a homogeneous group in that respect. But some of them did say that they liked the idea of becoming part of a doctoral thesis and some of them seemed to like having someone outside the project and the company to talk to, or as one put it after an interview:

“I thought that it was fun to talk. You actually get some time to reflect, as well”.

Hardware Co-ordinator, NPI
In sum, my impression was that very few seemed sceptical of my presence, while most seemed encouraging and appreciative. This was of course very pleasant, and I was (and am) very grateful to the actors I met. So, apart from realizing and acknowledging the use of different perspectives, and the fact that a researcher does take part (by asking questions, observing or whatever), I think that the researcher must also interact with the project makers to such an extent that he or she can ask informed questions. But even at the beginning of my study, I think that my questions contributed to some reflections:

“And do you remember at the beginning, when you asked that really clever question when we were talking. I said that we, in order to be better than our competitors, need to see how important it is to get Design to talk to Production and Sourcing and get the horizontal to work. And then you asked ‘what are the incitements for them to do that?’ The designer, you know, with really large, round glasses, who is really great at printed circuit boards, shall sit together with a purchaser, they hardly understand each other but should together come up with something really great. So now I think a lot about that, what kind of incitements are we going to come up with to make them think that it is fun to move forward together”.

Subproject Manager, Production

I will never know if they focused more on information sharing and communication (which some of them seemed to have interpreted my study to be about) then they would have if I had not been there. But I do think that by ongoing interaction and presence, my ability to talk to them grew over time. The other way around, for example, the subproject manager for Production started to use terms such as practice and sensemaking and was eager to find out more about them.

Hence, while Karrbom Gustavsson (2005) describes her study of project work as attempting to become “one with them”, not aspiring to become “one of them” (p. 88 my translation), I think that I would describe myself as becoming one by them, i.e. becoming increasingly related to by them ‘as’ a project researcher. Though I was in the field for nearly six months, being a researcher I could never become one of
them in the sense of being recognised by them as a project participant. Hence, I was not doing participant observation, but rather direct observation (Schwartzman 1993). As described, they accepted me and my Minidisc at their meetings, they answered my questions at interviews, they let me hang around and they invited me along for lunch and coffee breaks — but they did not relate to me as a project participant.

But even if I had wanted to become a ‘project participant’, I do not think that the study would have improved. Rather, I resist the idea that one practice or one project that could be fully understood from the ‘inside’ really existed. Such a perspective would contrast rather sharply with that developed in this thesis, believing that actors can act as several relevant kinds and use several reference groups as perspectives simultaneously. Hence, from this perspective, there was no project to participate in, but instead there were project making to relate to.

**Is this an example of less-discriminating research?**

A basic claim of mine is that I have included nonhuman actors in my study, a must for understanding heterogeneous project making. Some might argue that I have not, that I instead have focused on social interaction, since I have talked so much to people, listened to the human participants at meetings etc. Zackariasson (2003), who made a similar claim in his thesis, defends himself partly from such criticism by arguing that “if I studied human interaction 80%, this would mean that I studied nonhuman interaction 20%” (p. 63) and that this in turn meant that he had in fact included nonhuman interaction, albeit to a lesser extent then human interaction.

My argument is that everyday human interaction does not take place without the enrolment of nonhumans – so there is no such thing as ‘pure’ human interaction (or ‘the social’) to be studied. Instead, it comes down to using the insight that there can be many different forms of actors (not limiting these to humans), and paying attention to how various actors act upon other actors and how they make other actors become actants by representing them in various ways.
Importantly, since nonhuman actors cannot represent themselves but are only actants if being represented by others, it is crucial to pay close attention to how those nonhuman actors are represented by other actors (how they become actants), what they do to get represented and how they do it. Thus, studying nonhuman actors means to study their representation and how they make others represent them. In addition, one must study how human actors represent themselves, how they try to translate their interests into the interests of others and how they are trying to get other actors to represent them. Thus, it is not a matter of studying something like a door (as a nonhuman) for some length of time to understand ‘its’ actions: if you want to study a door as an actor you need to study how others represent it and how the door acts in order to get others to represent it.

6.4 Further Research

The main result of this study is a novel epistemological perspective on knowing and project becoming. Using this perspective allows one to focus on the many heterogeneous actors that contribute to the shaping of a knowing trajectory, by acting on site or from a distance. This means that actors ‘far beyond’ those whom we usually think of as project participants can be included in the analysis. While this thesis is based on a single case study, the next step would be to use this perspective when studying other projects. As described, the X5 project is here characterised as a “development project” (Berggren 2001, my translation) and as a “Medium-Tech”, “System project” (Shenhar & Dvir 1996). Hopefully, the perspective developed in this thesis can add fruitful insights to both similar and different kinds of projects. Additional studies could then also refine the perspective. If using this perspective, the nonhumans and the humans acting at a distance are also to be included in the analysis. If they get enthusiastic spokespersons, these project makers could perhaps contribute to a great many more interesting insights on project becoming and knowing.
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