Object-Control: A Study of Technologically Dense Knowledge Work

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Abstract

Drawing on the literature on active objects and combining it with an ethnographic study of engineering work, this paper offers an alternative and complementary understanding of the problem of control in knowledge-intensive work. This problem largely concerns the question of how creative processes of knowing are enabled on behalf of the organization. The dominant response to this question revolves around the idea that when work becomes complex, managers attempt to control the norms and identifications of employees, rather than their behaviours. Through the concept of *object-control*, the idea is introduced that organizational objects participate on behalf of the organization in processes of knowledge control by *interpellating* organizational members; that is, organizational members are invited to interact with the objects and to creatively develop knowledge in order to solve organizational problems. The study covers ground that the established notions of normative control and identity regulation have neglected, and suggests new ways of advancing the scholarship of organizational control by taking the active participation of organizational objects into account.

Over the last few decades, and from different perspectives, it has often been argued that knowledge is taking over from labour and capital as the main productive source of capitalist organization (e.g. Bell, 1974; Drucker, 1993; Virno, 2004). This is also reflected in the increased interest in knowledge work among scholars of organization (e.g. Alvesson, 2004; Robertson & Swan, 2003; Starbuck, 1992).[1] A particularly interesting consequence of this emphasis on knowledge work and knowledge as a main productive source of organization is that it problematizes the understanding of organizational control; that is, the understanding of the processes through which it is decided 'what things get done and how they are done' in organizations (Johnson & Gill, 1993, p. x). The emphasis on knowledge has shifted the focus from the coercive to the enabling aspects of control – in the sense that knowledge-intensive organizations do not want employees to behave in a predetermined way,

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but to use their knowledge creatively. This, in turn, means that organizational control, which used to be perceived as a problem of monitoring employee compliance in order to 'ensure that employees do as managers say' and as organizational rules prescribe, has now become a problem of how to 'ensure that employees realize the full fruits of their own expertise and ingenuity for the purpose of the organization' (Sewell, 2005, p. 687). In other words, there is a shift from behaviour control toward knowledge control; the goal of the latter is to elicit as much knowledge as possible from knowledgeable workers and induce them to use it in order to solve organizational problems. This paper engages in the discussion of how this knowledge elicitation may operate.

The most established answer to the question of how knowledge is elicited revolves around the idea of normative control and identity control. In contrast to traditional forms of control, such as supervision and bureaucracy, which primarily constrain action and operate in an explicitly coercive mode (e.g. Weber, 1947), normative control does not target the behaviour of employees directly but indirectly, through their norms, values, thoughts and identifications, and aims to *enable* creative and productive action (Barley & Kunda, 1992, p. 364; Etzioni, 1961). This is considered particularly relevant to knowledge work, where creativity and non-routine problem-solving are essential to the success of the firm. Traditional forms of control fail to enable such behaviour because they operate through constraint, through monitoring and correction of deviances from rules, striving towards predictability and simplification, whereas normative and identity control aims to produce subjectivities that enable creativity (e.g. Alvesson, 1995). The exercise of normative control has been fruitfully analysed; for example, in the form of attempts to produce a specific culture through socialization practices (e.g. Kunda, 1992), and more recently in studies that pay special attention to the notions of identification and identity regulation (e.g. Alvesson & Willmott, 2002; Brown & Lewis, 2011; Pratt, 2000).

This paper acknowledges the explanatory value of normative control, but offers an alternative approach to how knowledge is elicited in knowledge work, which reappraises the role of organizational objects – i.e. the products of an organization – in processes of control. Although the active role of objects in processes of organizing has been gaining attention in research (e.g. Knorr-Cetina, 1997; Latour, 2005; Pickering, 1995), it has yet to make a mark in the literature on organizational control, which focuses predominantly on human agency. While human meaning-making and interpretation are spotlighted in such studies, the material level is played down and objects are assigned the role of passive stuff to which meaning is ascribed by humans (Alvesson & Kärreman, 2007a; Kunda, 1992). This treatment of the material level tends to 'exaggerate the muscle of symbolism' (Ashcraft, Kuhn, & Cooren, 2009, p. 24), as well as the importance of managerial arrangements external to the operative work. Managerially initiated rituals and ceremonies that attempt to exert normative control often elicit different effects from the ones intended, such as cynicism and irony (Fleming & Spicer, 2005). This over-reliance on symbolism is especially problematic with regard to knowledge and innovation work, which is often performed by experts who work with and develop various types of objects. As noted by Knorr-Cetina (1997, p. 9), the 'object worlds' of experts need to be taken into account in order to gain a comprehensive understanding of what guides their work.

Instead of treating objects as the *output* of organizational control – as the passive stuff that organizations work on – I wish to turn the relationship around and consider the role of organizational objects as *input* to processes of knowledge control. Drawing generally on scholarship that argues for an interactive attitude to objects (e.g. Latour, 2000; Law, 1994), but particularly on the idea of objects as stabilizers of human relationships (Latour, 2005) and as 'objects of knowledge' that are perpetually in the process of being defined (Knorr-Cetina, 1997), this paper offers a novel framework that revolves around the notion of what I shall label *object-control*. To theorize

object-control I will draw on the concept of 'interpellation' (Althusser, 1971; Law, 2000). Bringing in the ideas of Law to modify Althusser's notion somewhat, I shall argue that organizational objects participate in organizational processes of control by interpellating organizational members. This means that the organizational objects (a) act on behalf of the organization by establishing knowledge relationships in which members are invited to processes of knowing aimed at solving organizational problems, and (b) act on their own behalf in these processes by resisting certain treatments and accepting others, that is, they 'act back'. In this process, object-control arguably both *stabilizes* the formal organization, when the object acts on its behalf, and *rearranges* it, when the object acts on its own behalf, thereby enabling a dynamic elicitation of organizational knowledge.

Object-control responds directly to the new problem of control in organizations, where control is aimed at eliciting not so much the labour capacity of workers as their potential for knowing (Sewell, 2005). This study thus introduces a new vocabulary that tones down the role of traditional managers and management and articulates the role of objects of knowledge in processes of knowledge control. Object-control is presented as complementary to normative control in particular, but also to traditional control forms, such as direct supervision and bureaucracy. Drawing on the literature on active objects and on an ethnographic study of engineering work, the paper thus suggests new ways of advancing the scholarship of organizational control by taking the active participation of organizational objects into account.

Active Objects: Perpetually Unfinished Stabilizers in Processes of Organizing

To outline the role of active objects in processes of organizing it is necessary to situate it in the compass of theories of organization. Traditionally, organization is viewed as constituted by a set of contracts (Coase, 1937), a set of bureaucratic rules (Weber, 1947), a set of norms (Ouchi, 1980) or a set of resources (Barney, 1991). Although the relevance of such elements is undeniable, these views tend to be relatively static, favour a priori above emergent understandings of organization and assume that rules and so on precede activity. Thus, they neglect operative work in favour of abstract notions and, in terms of control, exaggerate the ability of management to shape organizations rationally and intentionally – for instance, by designing contracts, rules, norms or resources (Kuhn, 2008).

As a response to these shortcomings, a constructionist, practice-oriented and more dynamic view of organizations has emerged, which takes more explicitly into account their social and operative aspects. From such a perspective, which is advocated here, the organization is understood as an ongoing accomplishment, characterized by dynamism, complexity, negotiation and struggle, where established and emergent patterns coexist (e.g. Cooren, Kuhn, Cornelissen, & Clark, 2011; Fleming & Spicer, 2008; Kuhn, 2008). From this point of view, rules, norms, goals and so on, do not predetermine the organization but are seen rather as stabilizing and controlling elements that are simultaneously present in and emerge from organizational practice (see also Schatzki, 2001). It is in light of such a practice-oriented understanding of organizations that objects enter the picture – as emergent elements that have stabilizing effects in the constitution of organization and are resistant to certain interpretations and practices.

There is a growing body of literature that theorizes objects as stabilizers and active participants in social processes. Objects are viewed as the material that 'makes society durable' (Latour, 1991), and as the stuff that stabilizes and organizes social relationships because of their ability to 'remain' (e.g. Knorr-Cetina, 1997; Latour, 2005; Orlikowski, 2007; Pickering, 1995; Suchman, 2005). As Czarniawska (2008, p. 3) notes, relationships between people 'leave traces' in objects. Put

differently, reminders of relationships are 'stored' in objects, because objects tend to stay in place for a while and remind us here and now of what happened there and then (Cooren & Fairhurst, 2009; Law, 1994). Nevertheless, objects are not mere extensions or symbolic representations of human relationships. Although created by humans, objects have 'built in affordances' (Engeström & Blackler, 2005, p. 310) that make them *resistant* to human attempts to make sense of objects. For example, a bicycle 'affords' certain practices and resists others. What I draw from these ideas is the view that objects are simultaneously constructed by humans and stabilizing and resistant participants in relationships between humans.

In the context of organizations, there are different types of objects that are of relevance. One common distinction is made between 'technical objects' and 'objects of knowledge' (Ewenstein & Whyte, 2009; Knorr-Cetina, 1997; McGivern & Dopson, 2010; Suchman, 2005), of which the latter are the focus of attention here. The object type is determined by its use. Technical objects are relatively stable and used as instruments and tools. A bicycle, for example, is typically used as an instrument of transportation and an assembly line is typically used as an instrument of management control. Objects of knowledge are different from technical objects and are distinguished by their unstable and perpetually unfinished character. Knorr-Cetina (1997, p. 13) conceives objects of knowledge as 'always in the process of being … defined'; they are 'problematic' rather than predetermined. This trait is particularly conspicuous in knowledge work, where the objects of the knowing processes of knowledge workers are in a state of continuous development. For example, take the engineer who works on an electronic component. In engineering practice, a component cannot be reduced to an instrument; instead, it is the object of the engineer's knowing process. In other words, as the engineer interacts with the component, a relationship is established in which knowing takes place. The relationship is interactive in the sense that the engineer attempts to know the component while it 'strikes back' (Latour 2000, p. 107), which means that it gives the engineer feedback by resisting certain kinds of treatment and accepting or encouraging other kinds. The engineer and the component thus establish a relationship in which they continuously affect each other's behaviour. In this way the object of knowledge – common in this type of innovative work (Ewenstein & Whyte, 2009; Knorr-Cetina, 1997; Suchman, 2005) – *participates* in the production and elicitation of the engineer's knowledge of what to do and how to do it. Hence, relating to Sewell (2005), the component participates in the process of organizational control that aims to elicit knowledge from knowledgeable workers, and encourages them to use it to solve organizational problems. Leaving this participant out would arguably make the analysis of how engineering work is controlled unnecessarily incomplete.

The above implies an interactionist approach to the agency of objects, i.e. to the way in which objects intervene and make a difference in social relationships (Cooren, 2006; Latour, 2005). From an interactionist point of view, the agency of objects is not granted a priori, but stems from physical or narrative interaction with them in practice (e.g. Latour, 2005; Law, 1994; Pickering, 1995). From that perspective, the agency of an object is *situated* and may transform over time and through space (McGivern & Dopson, 2010). In addition, the interactionist perspective implies a *pluralist* view in the sense that different people interact differently with the same object (Ewenstein & Whyte, 2009).

In light of the above review, my approach to organizational objects can be defined and limited by three assumptions: (a) objects are stabilizing reminders of organizational relationships; (b) objects participate in organizational practices of knowing as perpetually unfinished and resistant objects of knowledge that 'act back' when acted upon; (c) the relationship between humans and objects is thus interactive and the agency of objects emerges once they are interacted with. On the basis of these assumptions, this study aims to expand the scholarship of

control to further the understanding of how knowledge work is controlled through the notion of object-control. In the following, *interpellation* will be put forward as a crucial concept, on the grounds that object-control elicits knowledge through interpellation.

Interpellation: objects as elicitors of knowledge

The concept of interpellation was developed by Louis Althusser (1971) to describe how ideology constitutes individuals as subjects, how it gives them identity. According to Althusser, interpellation takes place when 'ideology "acts" or "functions" in such a way that it "recruits" subjects among the individuals […], or "transforms" the individuals into subjects' (1971, p. 118). Althusser's typical example is the police officer who addresses someone on the street, yelling 'Hey, you there!', whereby the person turns around, and in that instance becomes a subject (p. 118).

The idea pursued in this paper is that *objects* interpellate people (Law, 2000), in the sense that they puzzle and provoke and invite to action. In organizational settings, through the mechanism of interpellation, objects exert control by participating in the initiation and realization of knowing processes, where it is decided what to do and how to do it. This approach differs somewhat from Althusser's original concepts in that it postulates a somewhat looser connection between interpellation and ideology. In Althusser's view of interpellation (1971), ideology is eternal and individuals are 'always-already subjects', even before they are born (p. 119). The picture of the world he paints is heavily biased toward structure, consisting of abstract individuals who do little more than fill in existing subject positions. In that scheme, individuals largely find their place in predetermined ideological configurations such as the family, religion or the law. Reasonably, 'the organization' may also be seen as such an ideological configuration whose subject positions (manager, worker, etc.) are filled by individuals. Although I draw on Althusser's original notion, I think of interpellation not necessarily as the way in which a universal ideology acts, but as the way in which organizational objects participate in a more dynamic form of organizational control that both represents and rearranges the organization.

This is not to say that concepts such as ideology are irrelevant. The objects discussed in this paper are *organizational*, which means that they have emerged in a particular context of organization, i.e. in a particular ongoing accomplishment that, as mentioned earlier, is characterized by dynamism, struggle and the coexistence of established and emergent patterns (e.g. Fleming & Spicer, 2008; Kuhn, 2008). For example, an organizational object emerges in relationship to organizational roles such as that of 'manager', 'employee' or 'expert', and therefore functions as a reminder of these relationships. One may say that, to some extent, the organizational context is thereby 'stored' in its objects. However, 'the organizational context' is not a single thing but many things and, in line with the interactive and plural view of objects taken here, interpellation, as I wish to understand it, acknowledges multiple orders rather than a universal one (Law, 2000).

Three things are central to the understanding of interpellation that I put forward here: first, objects of knowledge interpellate various actors in different ways and thus give rise to different types of knowledge relationships. Second, interpellation does not determine action, it *invites* to action. Interpellation is not seen as one-way communication but as something that must be *recognized* by the interpellated individuals for any knowledge relationship to be established and for any object-control to take place. Third, the established knowledge relationships are not watertight compartments. Although different actors (e.g. a manager and an engineer) are interpellated in different ways, they can at least partly recognize each other's knowledge relationships, which is why compromise and negotiation can take place. These three reasons point to the idea that the interpellation

of an object does not predetermine action, but gives rise to a knowing process where different strands of knowledge struggle for influence (see Fleming & Spicer, 2008) – a struggle whose outcome is uncertain.

Thus, combining interpellation with the tradition of active objects results in the view that organizational objects exert control by interpellating humans in a situated way that stabilizes the organization, but also produces a struggle that induces the rearrangement of formal organizational relationships. Objects of knowledge thereby participate in the simultaneous practical enactment of established *and* emergent patterns of organization. This dynamic will be tackled in the empirical section.

Method

The data reported in this paper was drawn from an ethnographic study conducted between March 2002 and July 2005 at one of the Swedish sites of GT,[2] an international developer of telecom technology for mobile phones (in 2003, corporate GT had more than 50,000 employees; the site where my fieldwork took place had about 800). I was granted ample access to the company, initially gained through a middle manager at GT who had been a student at my university. I was allowed to observe and record all meetings, interview anyone I liked, and for about half a year, in 2004, I had my own temporary ID card which granted me unlimited access to the corporate building where the engineers worked.

Data collection

In total, 76 interviews with managers and engineers were conducted, recorded and transcribed. They generally lasted between one and two hours and their transcribed length was between 8,000 and 15,000 words. The interviews were semi-structured and discussion-oriented in the sense that I had an overarching agenda and a number of topics that I wanted to discuss, but the direction of the discussion partly depended on the response of the interviewee. I asked questions such as: 'How would you describe your work?', 'How do you do it?', 'How would you describe your work with others?', 'What do you do when you encounter problems?' Later interviews were more specific and my questions were about phenomena that I had observed, such as the problem-solving activities around a new power amplifier, discussed below. In addition to the interviews, I conducted 45 observations of various meetings, with an emphasis on the operative engineers' weekly work meetings (I observed 20 work meetings). The meetings lasted for one to two hours, except one that lasted for a whole day. Most observations and all interviews were recorded and transcribed, and the excerpts presented in this paper have been translated into English by the author.

Between February and June 2004, the most intense phase of the study, I spent 29 workdays at GT, interviewing people or observing meetings, but also just 'hanging out' (Dingwall, 1997) with staff. I usually went there for an interview or observation and stayed the whole day – sitting in the laboratory observing staff at work, sometimes chatting, going for coffee breaks and having lunch with them. In order to form a continuous, everyday picture of how staff worked, I also shadowed (Czarniawska, 2007) one engineer for a full work week in March 2004. I was able to do that without any restrictions: I followed him in all that he did, from the moment he arrived in the morning until he left in the evening. All in all, this extensive ethnographic engagement gave me good insight into the pace and dynamics of everyday work at GT.

Exploring the role of objects

This study was initially designed as a relatively broad ethnography of how knowledge work was managed at GT. There was no predetermined strategy of how to study the role of objects in that context; instead, I followed the ethnographic ideals of openness to field insights and proximity to the object of study (e.g. Prasad, 2005; Schwartzman, 1993). The analysis was not separated from data collection but took place continuously throughout the study (Charmaz, 2006). However, I realized relatively early that objects had a central role in the everyday work of the engineers. At meetings, engineers talked a great deal about objects: transmitters, receivers, ASICs (application-specific integrated circuits) and power amplifiers. They also spent much time in the laboratory 'interacting' with objects – they observed them and produced symbolic representations of them (e.g. drawings or calculations), which they then used to modify them, much like in Barley's descriptions of technical work (1996).

The idea of analysing the role of objects systematically emerged from a certain ambiguity about the origin of the engineers' work. Although I was familiar with the site, its actors and the everyday work of the engineers I still asked myself (a) where does their work 'come from' and (b) how do they know what to do? I had noted that new work projects – which appeared to be unplanned and were closely related to objects such as transmitters, receivers or amplifiers – often emerged and gave rise to intense activity, but I had never had the chance to follow the process of their emergence.

Then, in an interview with one of the engineers, I came across an opportunity to analyse the emergence of one of those work projects. The engineer told me that there was a discussion about the development of the power amplifier (PA) of the radio. I became interested in this PA initiative – or the 'PA track', as they called it – and asked if I could follow its development. The engineers kindly invited me to all the meetings where they suspected or knew that the PA would be discussed. I thus 'shadowed' the trajectory of a specific object, investigating the relations of which it was part (Bruni, 2005). I followed the PA's traces in the organization from its early appearance at work meetings to its disappearance six weeks later. During this part of my study, I observed and recorded two work meetings where the PA was discussed and four 'PA meetings' (one to two hours each) and I interviewed the central participants. The idea behind my research strategy was that shadowing the PA would help me understand from within the operative work process how relationships are established, how work tasks emerge and how the engineers come to know what to do – in other words, how work is controlled in the sense of the factors that determine 'what things get done and how they are done' (Johnson & Gill, 1993, p. x).

Data analysis and conceptualization

The production of concepts is central to scholarly theory-building (e.g. Becker, 1998; Charmaz, 2006). Concepts make up the 'knowledge of the world' in the shape of abstractions from empirical cases that are intended to be relevant to the world outside the particular case as well (Becker, 1998, p. 128). Furthermore, concepts are not produced in a vacuum but are, of course, informed by other concepts and ideas, i.e. by theory (e.g. Alvesson & Kärreman, 2007b). In this study, the development of the central concepts results from combining the close reading of the case of the PA object with tentative constructions of analytical themes, which were revisited in light of the case material and in line with the analytic strategies suggested by grounded theory (Charmaz, 2006; Glaser & Strauss, 1967). The themes produced not only stemmed from the case, however, but were also examined against insights from the literature on organizational control. This procedure led to the

general observation that the control of the engineers' work was more decentralized than one might have expected on the basis of the literature, and that the emergence of the PA as a participant in their work gave rise to a tension-ridden community, which, however, operated in a relatively concerted way to further knowledge about the PA. The PA thus grew in importance and became a participant in an emerging process where 'what to do' was discussed. This insight from the data problematized the general tendency in the literature to assume that formal management is the main source of control. In turn, to make sense of the participation of the PA, I drew on the literature on active objects, in conjunction with the literature on organizational control. It was through this dynamic interplay between the researcher's observations and the works of other researchers that the central concepts of this study emerged.

The PA as Participant in the Elicitation of Knowledge

To shed light on object-control, I shall present below an episode from my study at GT. As noted, GT produces telecommunication technology for mobile phones; to put it simply, it produces what is 'behind the screen' of a mobile phone. The particular episode presented here concerns the staff who work on the integrated radio of mobile devices (hereafter, 'the radio group'), and describes how an initiative to develop a new power amplifier for mobile devices emerged, gained momentum and eventually disappeared. I shall first provide an outline of the episode and then present close-ups that illustrate particularly well three central phenomena that object-control gives rise to: the establishment of knowledge relationships, the re-presentation of the formal organization and the rearrangement of the formal organization.

Outline of the course of events

Around New Year in 2004, the power amplifier (PA) started to become an issue at GT. Harry, the line manager of the radio group and responsible for, among other things, bringing clients' needs into the product development process, considered the current solution somewhat outdated. He thought it was good in terms of power consumption, but too complicated and relatively large. Clients (producers of mobile phones) had expressed the desire to have the current PA design modified into a simpler construction, so that they could use GT's design, but choose to replace the actual PA component in their cheaper models. Harry's view was that GT's existing PA design was limiting for clients and convinced the R&D department that it was important to look for alternatives. Securing their authorization to look into the issue, he went to Lars, an experienced engineer who had a technical specialist role in the radio group. Lars already knew about this problem and, after a brief chat with Harry, he started to work out a potential solution, which he later presented to Harry and the R&D department. His solution was to remove a part of the PA design, which would increase the PA's power consumption but would reduce its size and cost. And hopefully, this would make it possible to replace the relatively sophisticated PA component with cheaper alternatives.

Following this stage, the PA was moved to a new level and new actors became involved with it.[3] Fred, an engineer responsible for contact with the suppliers of components for the PA, was informed of the need to develop a new PA and so was Carl, project leader of the radio group. Fred was the first to bring up the PA as an important issue at one of the weekly work meetings. And at a subsequent work meeting, Carl started to schedule specific meetings where the PA would be discussed. He stressed that developing a new PA would mean a lot of work for the whole radio project, especially for Fred and also for Jake, who had constructed the algorithm of the existing PA. 'It's going to be a giant job for us,' he said.

In the following weeks, the engineers discussed the PA at four PA meetings but were not able to decide what to do. Many aspects were taken into consideration and the issue seemed to become increasingly complex. The PA was discussed in terms of its relationship with various actors, who represented different strands of knowledge. In particular, the following relationships were brought up: first, the PA's relationship with the overall production. In that regard, Thor, the manager of the larger project of which the radio group was a part, stressed that a new solution would affect the project as a whole. Second was the PA's relationship with the clients: Harry and Fred pointed out that the clients would appreciate a new solution and that they expected renewed and stronger complaints about the current PA. Third was the PA's relationship with the suppliers of components: Fred stressed that they should act swiftly if they wanted to have new components for a new PA design. Fourth was the PA's relationship with the technology. In that respect, Carl in particular, and Harry and Fred, discussed the possible technical consequences of a new solution.

The engineers had great difficulties in coming up with a solution and concluded at the third of the four PA meetings that they needed, as Harry put it, 'a comment from Jake', who was the designer of the existing solution.Later, they received a comment from Jake. On the basis of measurements of how the PA would react to changes, he pointed out the technical difficulties of making the PA replaceable because of its complex relationship with other parts of the radio. Enlightened by this statement, Carl called a last 'decision meeting' where he, Harry and another manager discussed the topic back and forth for about an hour. Eventually, the technical limitations overshadowed the other aspects of the issue and they decided not to develop the new solution.

Establishment of knowledge relationships

The previous section outlined how the PA emerged from a previously dormant state and became a participant in the work of the engineers and how knowledge relationships were established between the PA and each engineer. As we have seen, after the PA made its appearance it was transformed into an 'object of knowledge' that was problematic and incomplete (in the sense that it did not satisfy the clients) and continuously in the process of being defined (Knorr-Cetina, 1997, p. 13; McGivern & Dopson, 2010). When confronted with the incomplete PA, the engineers attempted to 'know' it in order to solve the problem of the PA being possibly too large and too complicated for GT's clients. An important aspect of this process – which I see as a process of object-control, operating through interpellations, as will become clear below – is that the PA invited the engineers to think of what it could be, of what it was not yet at that point (Ewenstein & Whyte, 2009).

As one would expect, because objects of knowledge tend to give rise to different perspectives (Ewenstein & Whyte, 2009), interpellation is not a straightforward process but a tension-ridden one. In the case study, different actors were interpellated in different ways, and the PA became a site of struggle between different bodies of knowledge (Fleming & Spicer, 2008). This heterogeneous interpellation and struggle is more clearly illustrated in the following episode from the third of the four PA meetings.

Third meeting: discussing the feasibility of a new PA. After a rather long introduction by Thor – where, among other things, he pointed out that a new PA would consume a lot of human resources – the group started discussing the possibilities of implementing the ideas for a new PA. The discussion went on for quite some time but the participants could not come to any conclusion. Then, in an attempt to move the discussion forward, Harry asked, 'What does your gut feeling tell you, *will* we get a solution here, now? … Will our customers be able to easily replace the PA?' After further discussion, Carl said his gut feeling told him that the suggested solution would be problematic for the clients to handle. Also, he saw that time would be a problem, because the suppliers needed specifications from GT within a few

weeks and the person to provide them was Jake, who was busy with other work at the time. Fred recognized that the clients would probably need assistance from GT, but added that 'sooner or later the clients are going to protest against the old PA … and we'll have to change to this [new] design'. He felt that this was the right time to make the change because, if they waited, it would be quite some time before the suppliers would be able to deliver the updated components to the company. Harry pointed out that if they redesigned now, it would be at least theoretically possible for their clients to replace the PA: 'It might include a lot of work, but [it] will at least be *possible.*' Thor's view of the matter, in turn, seemed to indicate 'danger'. He warned that this idea meant that there would be work for the software department too (the radio group is part of the hardware group). 'We have to look at the whole picture, so that we won't risk [missing the deadline in March 2005]', he argued. He also pointed out the uncertainty of the project; that 'everything must be analysed and systemized', that it would involve much work. Stressing that they would have to be able to do it on time, he added: 'These kind of things are deadly dangerous, you know.'

This example shows how object-control operates in multiple directions and gives rise to situated and conflicting knowing processes. In this particular case, object-control can be seen to interpellate the participants in different ways. The different knowing processes it invites construct different and conflicting kinds of knowledge about organizational problems and solutions, all in interaction with the PA. When Harry interacts with the PA, it is seen to invite knowing that constructs a customer relations problem; in the case of Lars, it is seen to invite knowing that constructs a technical problem, while for Fred it becomes a problem of component supply, and for Carl and Thor, a problem of project management. This multidirectionality also gives rise to a struggle between different strands of knowledge. More specifically, developing a client-friendly solution appears to conflict with the overarching project, and it conflicts with the complex physical structure of the PA.

The connection between interpellation and knowledge also suggests that object-control does not control so much by restriction and coercion, but by interrupting the trajectory of the employees' work and inviting them to engage in knowing practice in order to solve the problems at hand. Being interpellated means being able to use knowledge to act back on and 'manage' the interpellator (which is not so clear in Althusser's version of the concept). Thus, object-control does not predetermine action, but gives rise to a creative and dynamic knowing practice. This practice is creative in the sense that new knowledge of the PA emerges in the shape of new problems and solutions, and dynamic in the sense that who or what has the authority to define the problems and solutions is not predetermined; on the contrary, it is a relatively open issue as this authority shifts among different knowledge relationships that struggle for influence. This makes object-control precisely the type of control that Sewell refers to, as mentioned earlier, which enables employees to 'realize the full fruits of their own expertise and ingenuity for the purpose of the organization' (Sewell, 2005, p. 687). Below I shall expand further on the role of the organization in this process.

Making the formal organization present: stabilizing organizational structure and ideas through reminders of the past

We have seen how the PA participated in the establishment of knowledge relationships. In the process, various strands of knowledge were elicited, between which a struggle ensued. The nature of the established knowledge relationships deserves a closer look. One question that arises is 'How come the individuals involved knew, in broad terms, what to do, although they had no external help, when the PA was injected into their work trajectory?' The answer resides in the fact that the PA is not just any object; it is an *organizational* object with an organizational history, and it materializes previous organizational knowledge (Ewenstein & Whyte, 2009; Reckwitz, 2002). The

engineers already had a knowledge relationship with the PA, grounded in past interactions, although this did not become relevant and actualized until they were interpellated, that is, until the practice of knowing was initiated (see Spinosa, 2001).[4] As an organizational object, the PA enabled a *re-*presentation and thereby triggered a 'reminder' of the organization of which it is a product. To put it differently, established roles and bodies of knowledge were 'made present' (Cooren, 2006, p. 83) through the interpellation, and thereby, the PA fulfilled a stabilizing function.

The re-presentation of the formal organization emerged quite clearly at the third meeting, presented in detail above, when Harry asked 'What does your gut feeling tell you?' It can be seen from their discussion that Carl anticipates problems in the project's coordination, Fred's response is that they need to act swiftly in order to have a chance to get a new PA in time from their suppliers, Harry feels that it would be very attractive to have a more client-friendly solution, while Thor's response, that 'these kind of things are deadly dangerous', shows that he worries about the problems that a new PA would cause to the project as a whole. In other words, when interpellated by the PA, the people involved are seen to act out their roles in the formal division of labour. One explanation for this is the organizational character of the object, which enables it here and now to remind the individuals involved of previous organizational practices (Cooren & Fairhurst, 2009). The PA has a history of interacting with the engineers and during this new encounter they are reminded of their formal roles as representatives of different aspects of the organization (customer relations, supplier relations, technical possibilities and the project as a whole), and attempt to know the PA on behalf of the organization through these roles.

Parts of the formal organization are in this sense 'stored' in the PA, and through the PA the interaction at the meeting is not just interpersonal but becomes organizational (Taylor & Cooren, 2006). Through the PA, the organizational members come to interact with the organization as a historical construct, whereby its structure becomes present and operational, and the engineers are reminded of their organizational roles (customer relations manager, technical expert, project manager etc.), which contain behavioural cues. In other words, by inviting the engineers to a knowing process through an organizational object of knowledge (the PA), object-control makes present historically produced social relations in the organization.

Rearranging the formal organization: the PA contributes to the production of a community, and acts back

Historical relationships do not predetermine emerging processes of establishing organization but only function as input into such processes (e.g. Fleming & Spicer, 2008). Object-control, on the other hand, not only re-presents but simultaneously *rearranges* the formal organization, thus participating in its emergence by contributing to the establishment of a knowledge community (formed around the PA), and by acting back when being acted upon.

In the episode described above, the knowledge relationships produced through interpellation seem not to reflect the formal hierarchy, but to establish a new order. If they only mirrored the formal organization, Harry (or possibly Thor) would be the actor who had most influence on decisions related to the PA. Instead, a temporary and tension-ridden knowledge community is seen to emerge, and the PA to become a participant in a struggle between conflicting strands of knowledge. More precisely, the formal hierarchy is seen to be neutralized and rearranged according to the authority that rests on knowledge of the PA. Thus, the PA is a participant that needs to be taken into consideration, and those who can speak knowledgeably on its behalf gain power.

If we return to the third meeting to see how it ends, this becomes clear: after Thor's warning that 'these things are deadly dangerous', the discussion continued for another while. Then Thor asked:

'Do we still believe that it's possible and that this has been sufficiently investigated?', whereby Harry replied: 'It hasn't … I've got a feeling that we need a comment from Jake.' They did not reach any agreement, other than that they needed to have another meeting, to make a 'list of the pros and cons' of developing a new PA, and to have Jake's comment. Thus, it becomes clear that the knowledge relationships that seem to have the highest validity are not those of the people who have the highest degree of formal decision power (Harry or Thor), but the relationship of someone at the bottom of the formal hierarchy (Jake). This is also illustrated at the final meeting, which highlights that it is not so much Jake as a person, as his ability to speak on behalf of the PA, that matters.

Final meeting: making a decision. Only three people met this time, to decide whether they thought a new PA was a good idea: Carl, who made the list of pros and cons on the basis of his communication with Jake, plus Harry and Victor. (The latter, the line manager of the radio group, had not been much involved up to that point. His knowledge relationship with the PA seemed to be vague, and he did not say much at that meeting either.) Harry started by posing key questions in relation to the PA: how much workload would it mean, what were the key technical advantages and 'can the *customer* really use these advantages?' Carl nodded in agreement. After they had discussed the issue for a short while, Harry asked Carl: 'What's your feeling, or what is Jake's feeling?' Carl replied that a replaceable PA would not be possible 'because of the demands of the inner loop budget' (a calculation that describes the relationship between systems, such as between the different components in the PA design, and between the PA design and the whole radio). Harry nodded, 'yeah, this system of power regulation [which is part of the PA design] makes it naïve to believe that just any PA [component] would work'. Carl agreed: 'Exactly. That's Jake's short summary: advantages in terms of flexibility – none.' After that remark, they seemed to move toward a negative decision, but then Harry's fascination with the possibilities of an exchangeable solution rose again. 'Ah it … damn! It *is* attractive to let the customer make that decision,' he said. The discussion continued for another fifteen minutes, then Harry and Carl concluded that they should drop the idea of a new PA solution.

Again, it is Jake's relationship with the PA that carries the most weight in this knowledge-intensive struggle of what to do, which illustrates how the formal organization is rearranged in terms of hierarchy. But this is also the most conspicuous example of the PA participating in the rearrangement by *acting back* (see Latour, 2000). As we have seen throughout the episode, Jake's 'feeling' was that the technical difficulties of producing a new PA solution would be overwhelming. As a result, Harry conceded that, because of the 'system of power regulation' that supported the current PA solution it would be 'naïve' to think that a design with an easily replaceable PA would be feasible. Arguably, it is not so much Jake as a person who rearranges the hierarchy, even though his say appears to be stronger than that of his formal superior; he is seldom present at the meetings. It is more the materiality of the PA design that resists certain treatments, including management control in the form of suggestions to make one of its components replaceable. Jake is knowledgeable about the PA's materiality, and when he cites the 'inner loop budget' as a reason for not going ahead with the suggestion, he speaks on the PA's behalf. As indicated above, the 'inner loop budget' measures among other things how the PA design would behave if a component were replaced, and its 'demands' are so high that making a design with a replaceable PA component becomes unfeasible.

This account shows that the roles of the participants are not static but emerge as the participants interact with each other and with the PA. Although the roles of manager and employee are embedded in the organizational apparatus, they become ambiguous and rearranged in practice. For the individuals involved, formal authority is not enough to allow them to act in an effective way, partly because in practice it takes knowledge of objects – objects that resist certain treatment and thereby

resist the power of hierarchies – to act. In light of this, we can see that the PA participates in the emergent process in which it is decided what to do, and it does so in two ways: (a) by taking part in the construction of a temporary community, in which various strands of knowledge are elicited and engaged in a struggle; and (b) by acting back when exposed to certain treatments, and thus taking part in the struggle itself.

Discussion

As was noted in the introduction, organizational control in knowledge work is not so much about direct control over behaviour as control over knowledge elicitation (Sewell, 2005). Object-control achieves this in a rather subtle way. It operates through interpellation, establishing knowledge relationships and a community in which knowledge of what to do and how to do it is elicited. In the case examined here, we saw that, in this process, the organization was re-presented, as the members of the 'PA community' were reminded of the historical relationships between themselves, the PA and the organization as a whole. At the same time, these relationships were rearranged because of the ongoing struggle between different bodies of knowledge, in which the PA was an active and resistant participant, and those who could speak on its behalf were not necessarily formally appointed managers.

Object-control is not to be seen as a replacement for other concepts of control, but as a complement and a heuristic tool that is the result of a mediation between two literatures. The present study builds on previous ideas of objects of knowledge (Knorr-Cetina, 1997), and supports empirical observations of the dynamic nature of such objects, which transform over time (McGivern & Dopson, 2010) and tend to give rise to multiple perspectives on the same problem (Ewenstein & Whyte, 2009). Going one step further, it argues that through their participation in knowing processes, which are also processes of control in which it is decided what to do and how to do it, such objects support the control that the organization exerts.

On objects, knowing and control

The study extends previous scholarship, where the controlling effects of objects were hinted at, by departing from the view of objects as extensions of formal management. In the existing literature, Cooren (2006), for example, mentions objects in processes of control (more specifically, work orders stored in computers), but focuses on how they are utilized to enable managers to check that subordinates have done what they were ordered to do. In that study, objects are thus understood as 'technical objects', as managerial instruments. This instrumental and mainly constraining aspect of objects is commonly considered in studies that investigate the disciplinary effects of technology (e.g. Labatut, Aggeri & Girard, 2012). The present study expands this understanding of objects and posits that *organizational* objects also fulfil a controlling function as 'objects of knowledge' (Knorr-Cetina, 1997) in their capacity as participants in struggles between different bodies of knowledge. In this role, objects do not function as instruments of surveillance, checking that rules are followed, but as elicitors of knowledge. Through their participation, organizational objects not only stabilize existing relations, but simultaneously participate in the ongoing constitution of new relationships.

This positions object-control in the theory of organization as outlined in the introduction (e.g. Kuhn, 2008): as an ongoing accomplishment, characterized by negotiation, struggle and the coexistence of historical and emerging patterns. To explain *how* organizational objects participate in the

constitution of organizations, object-control stresses the role of objects as interpellators, as actors that invite knowing processes.

The primary value of the concept of object-control is that it constitutes an alternative to normative control as a means of understanding how knowledge is elicited in organizations, by positing that organizational objects participate in processes of knowing. Most theorists distinguish between control as a constraining vs. enabling force (Sitkin, Cardinal, & Bijlsma-Frankema, 2010), and the theorization in this study places object-control in the latter category. The controlling effects of object-control, in contrast to those of bureaucracy or supervision, are to be understood as productive and enabling rather than constraining. One main feature of object-control is precisely that it interrupts the formal hierarchy, allows for rearrangement on the basis of knowledge relationships, and invites organizational members to make use of their knowledge. Instead of employing bureaucracy as a guide for action, or electronic systems for monitoring and correcting deviances, object control involves the creation of a temporary community whose trajectory is guided by various knowledge relationships with the object. Object-control may thus be seen as a form of governance, rather than dominance. To dominate is to 'ignore or attempt to crush the capacity for action of the dominated', whereas to govern is to 'acknowledge' the capacity for action and 'utilize it for one's own objectives' (Rose, 1999, p. 4). Accordingly, object-control does not ignore or constrain the knowledge of employees, but elicits it, encourages its use and makes use of it on behalf of the organization by enabling creative knowing practices, where different strands of knowledge struggle to solve organizational problems. The concept of object-control is thus aligned with scholarship that acknowledges the close relationship between knowing and control in organizations (e.g. Kärreman, 2010; Kuhn & Jackson, 2008), but adds a vocabulary for understanding how *knowing practices are practices of control, in which organizational objects participate through interpellation in a struggle over knowledge*.

This element of governance and the close relationship between knowing and control make object-control precisely the type of enabling control that is often linked with knowledge work (Alvesson, 1995; Kärreman, 2010; Sewell, 2005). As Robertson and Swan note (2003, p. 835), the goal of control in knowledge work is to 'facilitate knowledge work processes (i.e. innovation, flexibility, knowledge creation)'. The knowledge-intensive organization does not want management to manage coercively. That would suppress rather than elicit knowledge. The knowledge-intensive organization wants qualitative knowing practices to take place on its behalf.

Object-control and normative control

The dominant answer to how knowledge work is controlled, is 'through normative means'. Instead of monitoring and correcting deviances, or controlling behaviour directly, organizations control the norms, values and identities of people, with the aim to promote a 'responsible autonomy' so that 'knowledge workers can be trusted to work in the interest of the firm' (Robertson & Swan, 2003, p. 836). The element of governance places object-control in the same category as normative control (Kunda, 1992) and identity regulation (Alvesson & Willmott, 2002), which also attempt to explain how work is controlled when it is too complex to be guided by bureaucratic or hierarchical means. However, although object-control and normative control both strive to elicit knowledge, they operate in different ways.

First, the target of object-control is not the norms and values of the employees, but their knowledge of organizational objects. *The elicitation of knowledge, in other words, is indirect under normative control but direct under object-control*. Normative control does not target knowledge related to the operative work, but the knowledge of and identification with the norms of the

community within which the work takes place. The knowledge of norms is expected to lead people indirectly to engage in knowing processes that are useful for the organization. Object-control does not make this detour via the larger normative community that we often call 'the organization', but directly targets employees' knowledge of their own work. Second, it follows that *object-control operates inside the labour process, whereas normative control operates from a distance*, typically through attempts to construct appealing identities (e.g. 'we belong to the elite') and positive associations with the organization (e.g. Alvesson & Kärreman, 2007a; Pratt, 2000). Third, the locus of control is different. While normative control builds on the assumption that managerially manufactured norms induce people to use their knowledge, object-control theorizes control as multidirectional, situated in a struggle between various bodies of knowledge of organizational objects. This *shifts the locus of control from relationships between management and employees to relationships between employees and organizational objects*. As a consequence, object-control provides a tool for making sense of control as work gets done, rather than as managers perform.

De-fetishizing the manager: broader implications for understanding organizational control

The characteristics of object-control outlined above add nuance to the general perception of organizational control. Most research assumes that only humans, and especially managers, are agents of control, suggesting that people exert control by engaging in either supervision, mutual adjustment, standardization of procedures or bureaucracy, or socialization or normative control (Vázquez, 2006). Object-control introduces a new agent to processes of decision-making in organizations, and thereby proposes new avenues for investigating organizational control by departing from the anthropocentric norm.

This has certain implications for our understanding of management control and the role of managers. The theorization of processes of knowing in terms of control, organizational objects as participants in these processes and knowledge relationships with these objects as an important source of influence tones down the power of formal management control, such as supervision and the formulation of rules or norms. The role of Harry in the case study exemplifies this: in the capacity of his higher formal position, he could have simply decided that the company would develop a new PA design, citing the clients' needs as the reason (which pertains to his knowledge relationship with the PA). Harry, however, did not use his formal position in this way, arguably because the PA resisted his suggestions and empowered other strands of knowledge than Harry's. Of course, Harry may exert control in different ways; for instance, through normative control, in an effort to influence the employees' values and norms and define their realities. Defining realities, however, is a rather grand task and authors who study normative control have pointed out that managers rarely seem to actually engage is this type of work (Alvesson & Sveningsson, 2003). Without neglecting the relevance of managerial normative control, object-control suggests a different perspective on how knowledge is elicited, which may prevent the exaggerations of the 'muscle of symbolism' that Ashcraft et al. (2009, p. 24) have warned of. Taking object-control seriously is thus a suggestion that we 'de-fetishize' the manager and consider new, more modest, managerial roles in processes of control, enabling scholars as well as practitioners to rethink the role of management under material constraints.

The non-anthropocentric focus of object-control has several implications for future research on identity regulation as a means of control in knowledge work (e.g. Alvesson & Willmott, 2002). First, on the basis of the general assumption that humans become something among other things through their relationships with objects (Taylor & Cooren, 2006), from the perspective of the

concepts of object-control and interpellation employees may identify not only with managerially induced values that are associated with the organization but also with their organizational objects of knowledge. This study does not explore identification per se, but suggests that it is worth investigating further the likelihood that employees gain a sense of identity in the organization as they engage in knowing processes with organizational objects. Thus, for scholars interested in identity regulation, the notions of object-control and interpellation may extend understandings beyond management-initiated identification with organizational images (Pratt, 2000), human resource management strategies (Alvesson & Kärreman, 2007a) or organizational routines (Brown & Lewis, 2011). Brown and Lewis (2011), for example, have demonstrated that time-keeping routines serve as a source of identification for lawyers. An analysis of how the lawyers may be 'interpellated' by their objects of knowledge (e.g. law cases) could enhance their study by bringing to the fore an alternative source of control and identification and pose questions such as: In what different ways do organizational routines and objects of knowledge interpellate lawyers? How may these ways of interpellation interact and what are the controlling effects of these interactions? Do routines and objects of knowledge reinforce or counteract each other?

Second, the present study can help broaden the scope of recent scholarship that focuses on communication as constitutive of organization, otherwise known as CCO (e.g. Cooren et al., 2011; Kuhn, 2008; Taylor, 2011). In many ways, the argument made here aligns with those of the CCO perspective, not least by seeing organization as an ongoing practical accomplishment in which materiality is regarded as an actor. Advocates of this perspective also see 'control as inherent in knowing' (Kuhn & Jackson, 2008, p. 474). The CCO approach has a good grasp of how objects may function as instruments in the hands of humans, who speak on their behalf (e.g. Cooren et al., 2011). By theorizing objects as objects of knowledge, however, this study broadens the CCO view. It suggests that objects are not merely instrumental but may play a more independent role as participants in processes of knowing. Also, by developing the concepts of object-control and interpellation, it proposes a vocabulary for discussing *how* this happens. Thus, the CCO analysis of how communication constitutes and controls organization(s) may be extended to include the questions 'On behalf of which objects do people speak?' and 'How do objects of knowledge interpellate various actors to speak on their behalf?' In other words, adopting the conceptual framework outlined here could broaden the CCO literature's scope of inquiry into the relationship between communication, materiality, knowing and control.

Third, object-control complements not only normative control but also the more traditional scholarly repertoire of control types. Research has shown that different forms of control often coexist and interact (Vázquez, 2006) so it would be fruitful to investigate further the interaction between object-control and other forms of control. There is also evidence that, in contrast to common assumptions, bureaucracy (Walton, 2005) and hierarchy (Diefenbach & Silience, 2011) tend to persist in organizations. In that respect, interesting insights can be gained from a closer look into how these coercive and dominant forms of control coexist and interact with the more enabling and knowledge-eliciting form of object-control.

Furthermore, this study has certain implications for management practice. The concepts suggested here favour a less management-centred way of thinking about control. More specifically, they tone down the importance of formal management systems, both normative and bureaucratic, in favour of management that is based on the objects of knowledge of the organization. For example, instead of focusing mainly on the development of culture change programmes, performance management systems or knowledge management systems that treat knowledge as a transferable commodity, the influence of object-control would lead management to focus more on making sense of

the object-centred communities of knowledgeable employees, acknowledging and cultivating them, and letting them develop largely undisturbed by most systematized interventions. Thus, this study may open a new perspective to managers on what organizational objects of knowledge do, and help them shape their managerial practice accordingly. Apart from managers, employees can also use object-control to make sense of their work, not only in the struggle to know objects, but also as a potential tool for increasing their influence and status through the argument that it is *their* relationships with the objects of knowledge that give rise to most of the valuable 'knowledge work' that is often claimed to be the main productive force of an increasing number of organizations. The question of whether object-control will ever be used in this way is left to future studies.

Finally, this study has some limitations that need to be pointed out. First, there are, of course, limitations to the agency of objects. Object-control is not a case of technological determinism, and deciding what to do and how to do it is always the result of multiple agencies (see Cooren, 2006). Because the present study aims to articulate the notion of object-control, not to provide a comprehensive analysis of what controls knowledge work, it does not do justice to other forms of control, such as institutional circumstances (e.g. the education of engineers in the case company), and to traditional methods in particular, such as bureaucracy and formal hierarchy. Although this is beyond the present study's scope, as noted, it would be interesting to study how, for example, bureaucracy and object-control may intersect or coexist. Second, this study is situated in technologically dense knowledge work and the notion of object-control developed here mainly pertains to such contexts. However, this does not exclude its potential relevance to other, non-technical, contexts, where the qualified use of knowledge for the development of objects is central to the progress of the work involved.

Conclusion

This study has suggested an alternative perspective on organizational control, which focuses on the contemporary challenge of understanding how knowledge is elicited from knowledgeable workers. Object-control is not intended as a replacement of other types of control, but calls for a change in the attitude to organizational objects. The concept of object-control advocates a view of organizational objects as active participants in processes of controlling knowledge, proposes a vocabulary for describing *how* they may participate in such processes and encourages attention to objects as participants in processes of control. This change of perspective promises to bring to the fore new aspects of organizational control.

Notes

1   Knowledge work describes work that is knowledge- rather than labour- or capital-intensive. Although it is a rather vague construct and difficult to define in more concrete terms, researchers tend to agree that in such work esoteric expertise, rather than widely shared knowledge, matters; employees are engaged

in complex problem-solving, rather than standardized or routine tasks; and the creativity of employees is important to the success of the firm (Alvesson, 1995, 2004; Starbuck, 1992).

2   The name of the company as well as names of the staff are pseudonyms.

3   The engineers refer to both the PA design and the PA component as 'the PA'. I shall follow their example. For the reader, however, it is useful to know that when they talk about 'replacing the PA' or 'making the PA replaceable', they do not mean the whole design, but one component.

4   This may sound like a cognitive view of knowledge, based on the assumption that knowledge resides in the engineers, but it is not. On the contrary, it assumes that knowledge resides 'between' the engineers and their objects of knowledge and is brought forth in the practice of knowing. In line with the views of Spinosa (2001), there is thus a potential in the engineers as well as in the object in their capacity as participants of the engineering practice, and both are necessary for knowledge to emerge.

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