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Performing boundary work: The emergence of a new practice in a hybrid operating room

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ABSTRACT

This paper addresses the processes of boundary work, in relation to the introduction of new technology, unfolding during the emergence of new medical practices. Inspired by Gieryn's fluid and practical view of boundaries and boundary work, and by Actor-Network Theory's description of scripting processes, we study the processes of negotiating and (re-)constructing boundaries in order to reveal both the interactions between different kinds of boundary work and their situatedness in the context of the emerging practice. We conducted a longitudinal and qualitative study of a generic Hybrid Operating Room at a Swedish university hospital, where sophisticated imaging devices are combined with open surgery procedures in a single room; consequently, medical requirements regarding radiology, surgery and anesthesia, as well as the specificities of the new technology, all need to be met at the same time. The study shows how the visibility of boundaries is a result of as well as a condition for boundary work, how boundary work is a dynamic and iterative process, and how it unfolds in a recursive relationship between practice and boundaries.

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1. Introduction

Ongoing technological advancements in health care are making it possible to achieve more and more. In order to exploit this potential, demands for new forms of organizing work across disciplines and medical specialties are emerging and changing the ‘dynamics of practices’ (Nicolini, 2006). One example of this is the introduction and use of *hybrid operating rooms* (Hybrid ORs), expected to grow with the evolution of technology (Kaneko and Davidson. 2014). The hybrid concept entails combining sophisticated imaging devices and open surgery in a single room. Multiple methods of diagnosis and treatment are combined in order to benefit high-risk patients suffering from complex problems (e.g. Bonetti et al., 2010); the rooms are designed and built in order to enable the treatment of patients without moving them between locations. In this way, hospital staff and resources are organized around the patient, instead of being determined by traditional separations between medical specialties (Hirsch, 2008). This makes it particularly interesting to study the emergence of a new *hybrid* practice, whereby new ways of working not only emerge from the specific functioning of a new technology (Barley, 1986), but also from the need to simultaneously meet the requirements of different disciplines and medical specialties, e.g. radiology, surgery and anesthesia. The emergence of such new practices includes efforts which may be described as *boundary work* (Gieryn, 1983), i.e. work which discursively and materially shifts or maintains conceptions of the boundaries between the different groups.

The concept of boundary work has been used to explain a wide variety of phenomena, e.g. professional identity (Håland, 2012; Liberati et al., 2016), politics (Allen, 2009), symbolic capital (Burri, 2008), and knowledge sharing (Beckhy, 2003a; Evans and Scarbrough, 2014). Most studies, however, tend to define typologies of boundaries and boundary work in a way that treats them as mutually exclusive, without addressing social and contextual factors (Liberati et al., 2016; Liberati, 2017) or the relationship between different types of boundary work (Faraj and Yan, 2009; Zietma and Lawrence, 2010). As Liberati et al. (2016: 32) stress “the social factors that influence knowledge and practice integration across disciplinary domains have not been thoroughly explored”. Therefore, our aim is to analyze the very performing of boundary work during the emergence of a new medical practice, instead of using boundary work to explain professions, their identities, their power, or their knowledge-sharing. This study thus shares Gieryn, (1983) original goal of understanding the accomplishment of boundary

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work in practice; in order to reach this goal, it focuses on the scripting processes described in Actor-Network Theory (ANT) (Akrich and Latour, 1992; Latour, 2005). Paying attention to the processes of negotiating and (re-)constructing boundaries allows us to reveal the interactions between different kinds of boundaries and boundary work, as well as their situatedness in the context of the emerging practice.

In the longitudinal and qualitative study presented here, we followed the initial use of a Hybrid OR at a large university hospital in Sweden. The introduction of the Hybrid OR with its new technology infrastructure, meant that staff with different specializations, who had not previously shared common practices, needed to negotiate and integrate not only new technologies and material arrangements, but also each other's established practices into their everyday work. We use scripting processes (Akrich and Latour, 1992) to unfold how boundary work develops, making established boundaries both visible and open for negotiation, allowing a new set of boundaries to emerge, contributing towards stabilize it through inscription and becoming materialized into a specific writing device, namely the method card.

Our conclusions are threefold. Firstly, as boundaries are not a priori given, their visibility is both the result and a necessary condition of boundary work. Secondly, boundary work is a dynamic and iterative process whereby different kinds of boundary work are performed at the same time, and within the same process. Thirdly, boundary work builds on a recursive relationship between practice and boundaries: the emerging practice drives and constitutes changes in boundaries while the new configuration of boundaries stabilizes and legitimizes this practice. Thus, boundary work can be stabilized but never completed. As for the practical implications, our study shows that the introduction of new technologies not only changes practice; over time, these technologies may also change professional roles and identities, and possibly also education. This is particularly important within a setting such as advanced health care, characterized by ongoing technological advancements and the increased specialisation of knowledge.

1.1. Boundary work and scripting processes

The concept of boundary work was developed to explain how demarcation between science and non-science is routinely accomplished in practice (Gieryn, 1983). Examining the work historically performed by scientists in order to establish science's uniqueness, Gieryn focused attention on the rhetorical styles of scientists, stressing that boundary work is not limited to the demarcation of boundaries, but that boundaries are "… ambiguous, flexible, historically changing, contextually variable, internally inconsistent and sometimes disputed" (Gieryn, 1983:792). Emphasizing both the fluidity of boundaries and the never-ending work done in relation to those boundaries, however, Gieryn has mainly addressed discursive processes. Boundary work has revealed itself as a very useful notion when it comes to enhancing the study not only of science, but also of professions and knowledge, in a number of important ways (Lamont and Molnàr, 2002). The traditional understanding of professions results from the societal division of labour (Fournier, 2000). Instead, she suggests a shift towards looking at professions as a result of *the labour of division*: the active work of striving to produce exclusive boundaries.

Research into boundary work, however, tends to put a lot of effort into identifying different types of boundary work. Four main categories are worth distinguishing here: boundary closure, boundary spanning, boundary breaching, and boundary blurring. *Boundary closure* consists of the establishment and demarcation of boundaries, whereby professionals protect the autonomy and control of resources (Gieryn, 1983; Burri, 2008). This kind of work may, according to Faraj and Yan (2009), lead to the reinforcement of boundaries: "encompass[ing] the ways in which a team internally sets and reclaims its boundaries by increasing member awareness of boundaries and sharpening team identity". *Boundary spanning* consists of establishing common ground between different, established areas of expertise (Beckhy, 2003a; 2003b; Levina, 2005), for example focusing on how knowledge is managed across organizational boundaries (Carlile, 2004), how boundary organizations coordinate groups while maintaining their identities (O'Mahoney and Bechky, 2008), or how knowledge is translated between diverse groups (Evans and Scarbrough, 2014). The spanning of boundaries may lead to breaking through established boundaries and influencing the creation of new ones, also called *boundary breaching* (Zietma and Lawrence, 2010). The key strategies of this boundary work are the framing and mobilizing of resources. The spanning of boundaries could also lead to *boundary blurring*, whereby expertise in established professional areas is transformed "into more synthetic forms of knowledge that transcend established specialist domains" (Evans and Scarbrough, 2014: 125). These new forms will then be of practical use in areas of overlap between communities (Amin and Roberts, 2008; Powell et al., 1996). This work may also include expansion of the jurisdictional control of the core work domains (Beckhy, 2003a).

During recent years, the issue of boundaries, and their role in boundary work, has gained renewed interest following an increased focus on processes and a decreased focus on structures (Hernes and Maitlis, 2010). Although several scholars have conceptually recognized the fluidity of boundaries and their ongoing construction in practice, most research has treated the different types of boundary work as mutually exclusive analytical tools, overlooking the relationships between them (Faraj and Yan, 2009). One interesting piece of work striving to overcome this limit is the contribution made by Carmel (2006), who finds that, in the context of an intensive care unit, doctors and nurses simultaneously work towards obscuring and reinforcing boundaries. However, these two actions are directed towards different boundaries: They obscure their professional boundaries and reinforce the organizational ones. Others have recently tried to identify contextual factors influencing the emergence of different types of boundary work in different settings. Liberati (2017) has identified three patterns in boundary work – separating, replacing and intersecting – in different health care settings associated with different contextual factors in each setting: The level of acuity of the wards, the patients' state of awareness, and the holistic versus specialized clinical approaches.

In line with the aspirations of these recent works, we view boundary work as "the never-ending, hands-on, largely visible process through which boundaries are negotiated placed, maintained and transformed by individuals over time" (Nippert-Eng, 2004: 263). Here, we will draw on ANT, thus providing ourselves with tools for understanding a variety of possible courses of action, without presupposing any analytical distinctions in advance. As Latour (2005: 23) emphasized, "instead of taking a reasonable position and imposing some order beforehand, ANT claims to be able to find order much better after having let the actors deploy the full range of controversies in which they are immersed". More specifically, we will use the scripting processes presented by Akrich and Latour (1992) to describe the ongoing negotiations of boundaries as they emerge in practice, during processes through which actors develop and agree upon a set of activities. These scripting processes include iterations between prescription, subscription, and conscription.

Prescription has to do with what a device allows, or what it anticipates (Akrich and Latour, 1992). It is an attempt to predetermine the setting that users are asked to imagine, in which a

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