

Developing a Tool for Cross-Functional Collaboration: the Trajectory of an Annual Clock

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Abstract

This empirical study examines how practitioners from the organizational functions of human resources, occupational safety and occupational health services within a Finnish industrial organization view the challenges that production supervisors face in their daily work. The article presents a formative intervention, which focuses on supervisors' changing work and how these organizational support functions could collaboratively serve supervisors better, especially in their task of promoting well-being at work. The article approaches this collective learning effort from the framework of the Cultural Historical Activity Theory (CHAT), by examining how cross-functional collaboration evolves and the transitions through which it develops in an intervention process. The development of collaboration is analysed through a process of collective concept and tool formation by following a cross-meeting trajectory of specific annual clock episodes. An annual clock, a co-ordinating tool used in organizations to assist the yearly planning and management of specific operations, emerged in the intervention as the practitioners' attempt to synchronize overlapping and inconsistent well-being related practices assigned to supervisors. The article presents a framework that can be applied in this kind of combined empirical analysis of tool development and the evolving collaboration. The analysis shows how the idea of the annual clock grew through multifaceted conceptualizations, in which it first had the status of a conceptual object, then a collaborative tool, and eventually a script for becoming a novel cross-functional practice. Simultaneously, the mode of interaction expanded from a function-based co-ordination to task-oriented co-operation, and finally to communication.

Keywords: well-being at work, supervisor, concept formation, intervention, script, activity theory

Introduction

Today, well-being at work is tightly connected to an organizations' productivity, and consequently, its importance has increased in strategic business management. In large organizations, well-being at work covers a wide-ranging area of organizational activity,

for example, maintaining employees' work ability; preventing occupational accidents; and developing professional skills, work practices and the functioning of work communities (Anttonen et al., 2008). Accordingly, the design and management of well-being related strategies and procedures are divided into specialized organizational functions such as human resources, occupational safety and occupational health services. This division of labour, in which the functions mainly focus on mastering their own area of expertise, places pressure on the design and implementation of more comprehensive well-being promotion agendas and correspondingly, on the creation of novel hybridized work practices and network-like collaboration (Launis & Pihlaja, 2007; Anttonen et al., 2008; Seppänen et al., 2012).

This intervention study examines the challenges that are related to the cross-functional promotion of well-being within a production unit of a Finnish industrial company, which was recently acquisitioned by a global corporation. It focuses particularly on how well-being practitioners from the aforementioned functions of human resources, and occupational safety and occupational health services representing the levels of local production unit, business line and corporation, build collaboration during an intervention process. An intersecting point of their collaboration, also forming the focus of the intervention process in question, is production supervisors' changing work. The starting point for the study was the examination of how corporate acquisition and transforming practices may have added confusion to supervisors' work. The aim was to learn how the functions could better support and serve the supervisors, whose responsibility it is to carry out well-being related strategies and procedures in their daily work on the shop floor, and who consequently have a substantial influence on frontline workers' well-being at work.

The article approaches this collective learning effort from the framework of Cultural Historical Activity Theory (CHAT) by examining how cross-functional collaboration evolves and the transitions through which it develops in an intervention process. The CHAT-based intervention follows the methods of Developmental Work Research (Engeström et al., 1996), in which collective work activity is developed through the expansive learning actions facilitated by researcher-interventionists.¹ The data of the study comprises eight intervention planning meetings and three intervention workshops. This article focuses on a thematic cross-meeting trajectory of specific annual clock episodes.

An annual clock refers here to a co-ordinating tool, which is typically – in graphic or in written form – used in organizations to help in the planning, scheduling and managing of specific operations that take place within a period of one year. In this study, the idea of the annual clock emerged as the practitioners' attempt to synchronize the overlapping and inconsistent well-being-related practices assigned to supervisors. Here, I follow this collective endeavour of tool development by analysing six specific episodes, in which the practitioners discuss and develop the annual clock. The research question is as follows: How is the annual clock conceptualized and developed and how does it mediate cross-functional collaboration? I will particularly concentrate on the empirical analysis of the case and describe how a combined analysis of tool formation and evolving collaboration can be conducted with the help of a framework that theoretically distinguishes between

¹ As the intervention process and the applied methods are not the focus of this article, I will not describe them here.

three forms of interaction: co-ordination, co-operation and communication (Raiethel, 1983; Fichtner, 1984; Engeström, 1992).

Next, in two subsequent sections, I describe what promoting work-related well-being means as a joint challenge across organizational boundaries, after which I take a theoretical glimpse at the frame of co-ordination, co-operation and communication.

Towards collaborative promotion of well-being at work

Due to its inherently broad and dynamic nature, well-being at work is hard to grasp in organizational settings: no straightforward processes or single ownership of well-being promotion can be defined. Drawing on the terminology of CHAT, it represents a fragmented, partially shared object of activity that drifts in between multiple interacting collective activity systems, which in this context refer to the above mentioned organizational functions. In practice, a shift from function-based to cross-functional network-like well-being promotion is demanding, since the predominant concepts, operation models and tools that different experts use direct their practices towards different kinds of objects of activities (Launis and Pihlaja, 2007). For example *human resource* practitioners, among their other tasks, have traditionally been responsible for defining training needs and arranging formal course-based training for personnel (Schaupp, 2011). The current mainstream of resource-based well-being promotion emphasizes the human resource function's role as the supervisors' partner in implementing focal practices such as developmental discussions and personnel surveys. The guidelines for *occupational safety* procedures, on the other hand, are firmly regulated by the law. Especially within manufacturing, safety professionals' tools and models, for example risk assessments and accident investigations, originate from industrial accident prevention and the engineering discipline. *Occupational health services*, with their origins in epidemiological tradition, have focused on different types of load factors and their effects on employees' health (Mäkitalo 2005). The predominant way to arrange occupational health services is to purchase them from an external service provider. The collaboration between the provider and the client organization comprises the prevention enacted by the law such as health assessments and workplace health surveys, and the supplementary health care services agreed on in a service contract.

The interest of this study is the way in which these historically established and accumulated function-specific organizational activities are conducted on a daily basis in relation to supervisors. This starting point of the intervention is hypothetically depicted in Figure 1 with the help of the triangular models of collective activity systems, which consist of the dynamic and intertwined elements of subject(s), object, mediating tools, rules, community and division of labour (Engeström, 1987).

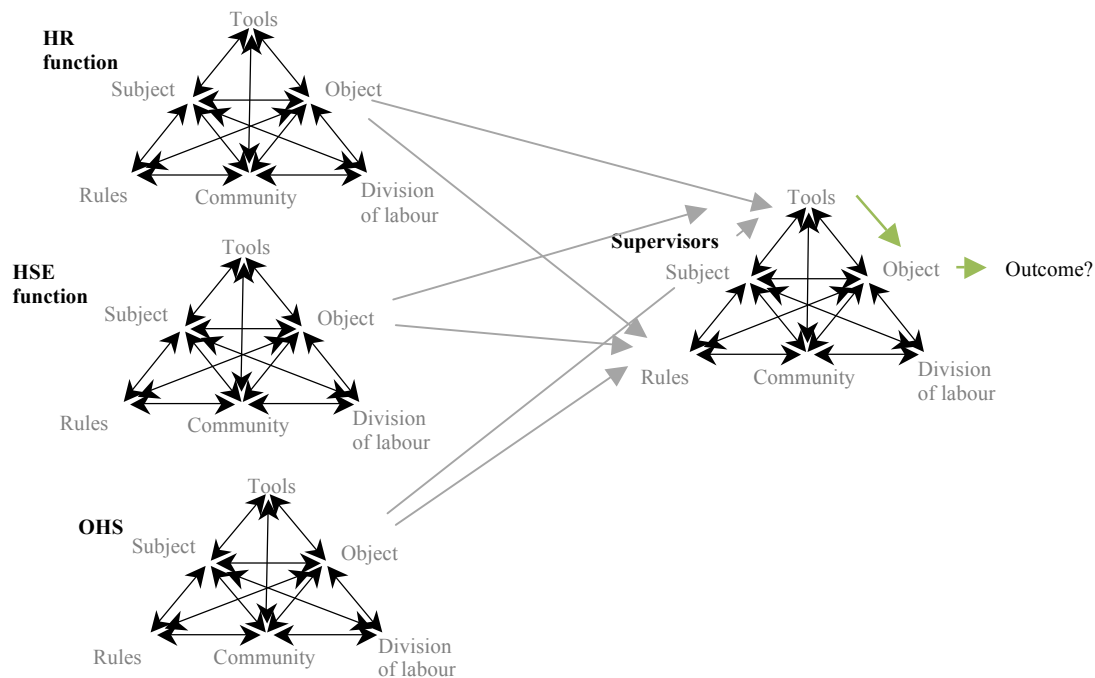


Figure 1: Hypothetical starting point of the study; function-based promotion of well-being at work

The figure illustrates how, in practice, supervisors are the target of relatively fixed procedures, which result from function-specific and top-down implemented design processes. The arrows in the picture demonstrate how the respective functions (HR, HSE, OHS)² provide tools and rules for the central activity, which here is a business unit's line organization in which supervisors are the focal actors (subjects in activity theoretical terms). From the supervisors' point of view, the challenge is how to keep up with the transforming practices and how to utilize the numerous tools when pursuing the anticipated outcome, that is, workers' well-being at work: in other words, how the separate tools become instruments for the supervisors (Béguin & Rabardel, 2000). In interpreting the challenge from the standpoint of the functions, the question is how to serve the supervisors – not considering them primarily the end users of the function-specific services and standardized products, but rather the functions' joint internal clients and co-producers of tailored services (Bowen & Greiner, 1986). This requires not only becoming more familiar with the supervisors' work, but also crossing traditional boundaries by designing and implementing novel cross-functional work practices. The aim of the intervention was to gain new insights into the familiarized ways of working, to detect historically evolved tensions, and to find new solutions and models for future

² The abbreviations of the respective functions follow the terms used in the target organization: HR (Human Resource function), HSE (Health, Safety and Environment function), where emphasis is on occupational safety, and OHS (Occupational Health Service).

collaboration by involving supervisors and practitioners in the joint analysis of their work activities.

Drawing on CHAT, collaboration builds on collective objects. The object forms the meaning and shared motive for the collective activity. The object of activity consists of the concrete product or service that is being produced, but it also contains the meanings and objectives that the particular community of actors assign to it (Leont'ev, 1978). For the purposes of the intervention, well-being promotion formed a ready-made, yet explicitly acknowledged partially shared object of activity – a good reason to gather around the same table. However, the participants need to equip the object with meaning; otherwise it remains vague. According to Engeström (2004, p. 18), the challenge in network intervention settings is not limited to a stepwise expansion of the object but also to finding ways in which participants construct new shared models, concepts and tools to master their objects. Therefore, it is the mediating artefacts that sculpt collaboration. This double-stepped conceptualization is the very essence of this article: how to find a shared core for collaboration (object) and how to construct new mediational means for doing so. Figure 2 illustrates the setting for this collective concept and tool formation by depicting a two-way process, in which participants have the opportunity to both co-create “something new” and re-define their existing objects and tools. (In the figure, the supervisors’ activity system is in faded text because their voice was modest with regard to the sample data, which is discussed in the empirical section of this article.)

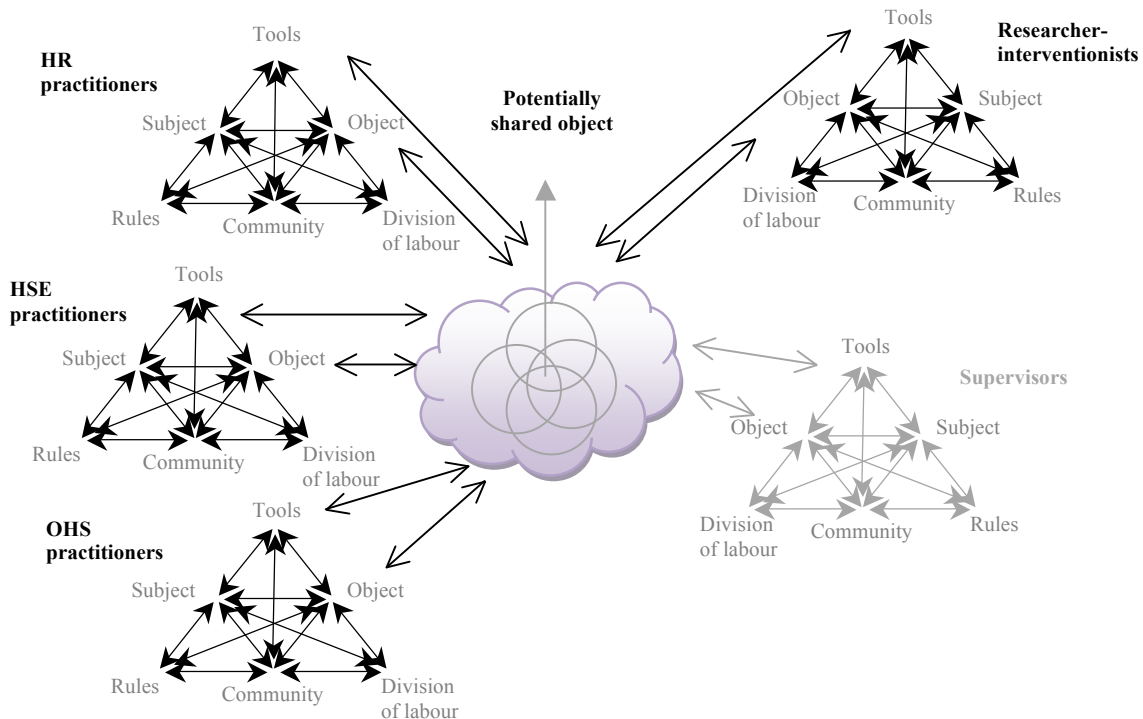


Figure 2: Intervention as a collaborative arena for collective concept and tool formation

Basing their thinking on Vygotsky’s notions of everyday and scientific concepts, Engeström, Pasanen, Toiviainen & Haavisto (2005) claim that this kind of collective concept formation between participants representing different activity systems opens up a “creative middle” in which new concepts and instrumentalities evolve through vertical and

horizontal shifts. In vertical debates, bottom-up everyday concepts and top-down scientific concepts emerge, whereas horizontal debates refer to the exchange between divergent views and meanings. The trajectory of the annual clock examined in this article provides a view of how this kind of discursive co-creation of a tool emerges through a multi-phased process of conceptualization. The conceptualizations, in turn, enable us to examine the different functionalities and anticipations that different practitioners attach to it: Does the tool become shared? Does it have the potential to renew practices?

A framework for analysing modes of interaction and concept formation

The research on organizational knowledge creation in multi-professional settings has recognized that communication may be problematic due to differences in occupational languages and conceptualizations (Bechky, 2003). It is thus crucial to analyse cross-boundary interaction in more detail to avoid overly straightforward conclusions on how – if at all – something shared is achieved. Among CHAT researchers this methodological question has been particularly acknowledged in third generation activity theory studies, in which examining the network dynamics of interconnected activity systems has called for the development of conceptual tools to understand dialogue and multiple perspectives (Engeström 2001, p.135). One framework applied for this purpose is the model originating from Raeithel (1983) and Fichtner (1984), which presents three types of epistemological subject-object-subject relations: *co-ordination*, *co-operation*, and *communication*.

Engeström (1992) has visually modelled the general structures of these different collaboration types and suggested possible mechanisms of transition between them. The frame has been applied in various studies, for example in the dialogical analysis of court work (Engeström 1992; 2008), studying interaction between a health care professional and an elderly client (Engeström, 1992; Nummijoki & Engeström, 2010), and in the analysis of conversations between educational psychologists and teachers (Leadbetter, 2004). It has also been used to examine interaction in intervention contexts (Engeström, 2008; Ahonen & Virkkunen 2004; Seppänen, 2012). However, this frame has seldom been applied in the study of collective tool formation in multi-boundary settings, a purpose for which I use it as an analytical device in this article. In the subsequent sections, I introduce the focal features of each interaction mode of co-ordination, co-operation, and communication. The conceptual building blocks of each mode of interaction are *subjects*, *objects* and *scripts*. On a general level, the modes differ in how the interplay between these elements is structured: how subjects (actors) are related to the object, to other subjects, and how their interaction is scripted. The interaction is principally defined by the level of which object, subject-relations and script are the focus of participants' critical attention at a given time (Engeström 2008). Figures 3, 4, and 5 depict the general structure of each mode (the solid lines indicate which of the elements are the focus of the subjects' critical attention, whereas dashed lines refer to elements that are not under this critical attention.)

The first mode, *co-ordination*, is the normal flow of interaction in which actors follow their scripted roles. Engeström (2008, p. 67) emphasizes the social, cultural and artefactual characteristics of the script: "Scripts evolve historically to codify and regulate standard procedures in repeatedly occurring cultural situations". According to Engeström, scripts inherently have a rule-like quality in attributing to the expected roles and inputs of the participants. Scripts may be available in explicit forms, such as meeting agendas;

however, the participants are not usually aware of them. That is, scripts co-ordinate the participants' actions behind their backs, without being more specifically questioned or discussed (*ibid.*). In co-ordination, the interaction situation is thus based on presenting participants' own perspectives by bringing their own issues (objects) into the discussion (Ahonen & Virkkunen 2004, p. 68). For the intervention carried out in this context, I consider co-ordination to be an obvious point of departure, since most of the participants represent different professional backgrounds and organizational functions and do not interact with each other in their regular routine.

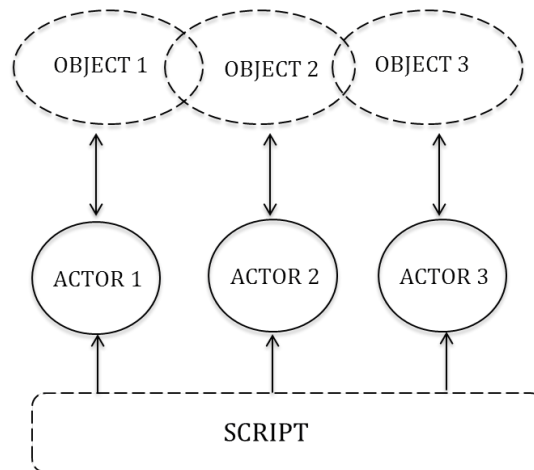


Figure 3: General structure of co-ordination (Engeström 2008, p. 50)

The second mode is co-operation. Engeström (2008, p.51) defines it as “a mode of interaction in which the actors, instead of focusing on performing their assigned roles, focus on a shared problem, trying to find mutually acceptable ways to conceptualize and solve it”. This also means that the participants are able to discuss the script underlying the collaborative activity. However, they do not question or re-conceptualize it. Thus, co-operative processes demand that the subject sees the object from an external viewpoint, balancing his or her actions with the actions of other subjects (Fichtner, 1984, p.217). Looked at from the intervention point of view, this indicates that the wider and more heterogeneous the participants' backgrounds are, the bigger the challenge may be to find a genuinely common meaning and motivation (shared object) for collaboration.

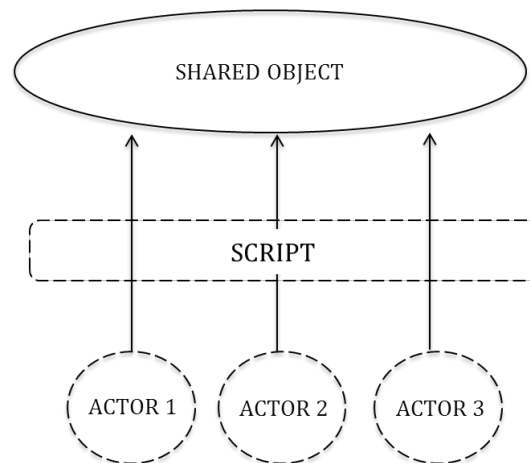


Figure 4: General structure of co-operation (Engeström 2008, p. 51)

By communication, Engeström (2008, p.51) refers to interaction in which the actors focus on re-conceptualizing their own organization and interaction in relation to their shared object. This means that both the object and the script are re-conceptualized. In the long run, communicative interaction may not be limited to the given object, but participants learn new ways in which to collaborate. However, as transitions to communication are rare in the on-going flow of daily work (ibid.), I consider communication a true learning challenge also in intervention settings. Therefore, the explication of the script by how we collaborate – as practitioners in work settings and as participants in the intervention setting – should be reflectively discussed in the course of interaction.

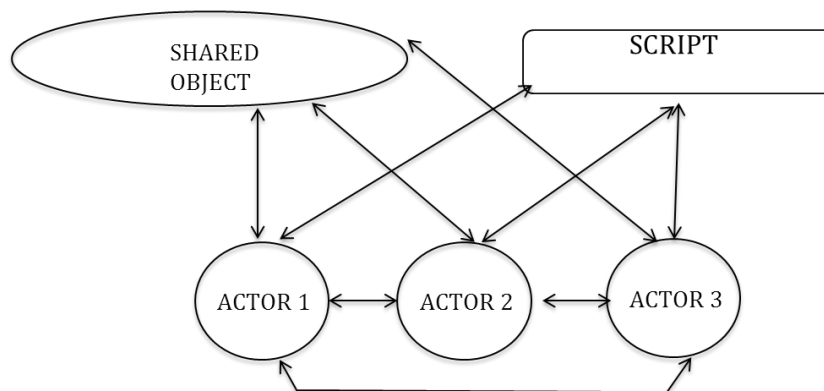


Figure 5: General structure of communication (Engeström 2008, p. 51)

In empirical analysis, it is important to define the criteria for distinguishing transitions between these qualitatively different modes. Engeström (2008) has recognized disturbances, ruptures and expansions as typical transition mechanisms that trigger the shifts. In addition, the current study aims to elaborate that the notion of script itself can be taken as an empirical and methodological question. To understand the development of collaboration in a network context it is important to identify and recognize how scripts

emerge and develop in interaction, how they are jointly constructed, and what difficulties this type of multi-scripted interaction may cause (Engeström, 1992).

Context of the intervention

In this section, I describe the starting point of the intervention and introduce the composition of the participants' network. I also describe the data collection phase.

Corporate acquisition as a starting point

The manufacturing facility under study has long historical roots. The company was run as a family-owned business for a long period of time and developed a leading position in the production of technical components. The company grew, expanded internationally and established factories abroad. The factory in question is located in Finland and provides jobs for approximately 600 employees, who mainly work in production.

The company was bought by a global corporation. Due to this large-scale merger, the plant was still going through significant functional and operating changes when the study was implemented (2011–2012). The changes – not affecting the production per se – were greeted with high expectations regarding growing business opportunities. However, the extensive change process and the renewal of the procedures, combined with growing economic pressures, blurred the division of labour and caused tiredness, especially among supervisors. Based on the interviews, the researchers found that supervisors experienced new accumulated tasks as additional work. Many of the new tasks stemmed from the changed division of labour: factory-based local services had transformed into centralized corporate-level services. The supervisors felt that whereas before they had received tailored, on-time local solutions to respective problems, they were now managing these extra duties by themselves, IT-assisted. Accordingly, supervisors' work was to a great extent bound to computers and they felt that they lacked the time to attend to production on the shop floor and supervise employees in the way they were accustomed to. This also created a dilemma regarding the supervisors' role in well-being promotion. Supervisors were expected to follow harmonized, function-specific procedures in dealing with employees' issues and concerns, whereas they themselves emphasized that it was their presence in production that was crucial for these concerns.

Data and implementation of the intervention

The on-going change process and the supervisors' transformed role formed the basis of the study. A representative network of practitioners from different levels of the organization was gathered together. They formed a steering group with the three researcher-interventionists and held regular planning meetings, in which they jointly discussed the progression of the study and prepared the implementation of the workshop sessions. Altogether, eight planning meetings and three workshops were held during the one-and-a-half year study. In the three workshop sessions, the participants' network was extended to include six supervisors from the factory's two different production departments (four production supervisors and two production managers as their line superiors). The composition of the network in terms of the participants is presented in Figure 6.

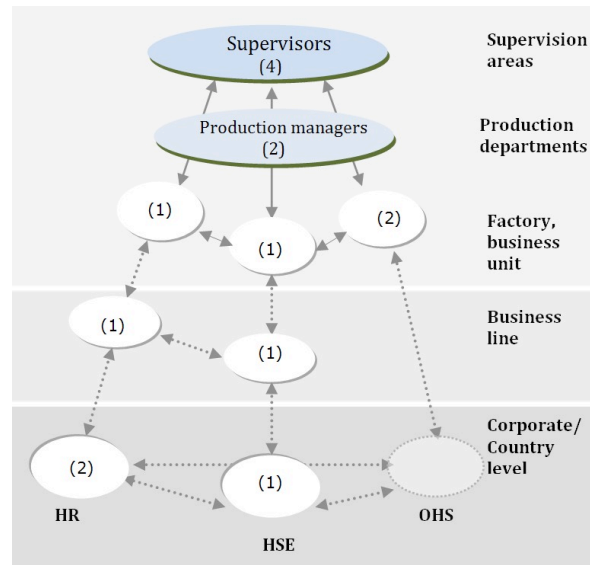


Figure 6: Composition of participants' network

The intervention provided the opportunity for manifold data collection. The intervention data, comprised of the planning meetings and the workshop sessions, formed the core of the data. In addition, the researchers conducted 15 individual interviews and 4 group interviews among the practitioners, representing different functions, as well as among the supervisors and other key informants (e.g. shop stewards and members of the safety committee). The meetings and the interviews were audiotaped and transcribed. The researchers also followed the work of two supervisors and made field notes from the observations. The data was complemented with a set of documents describing the focal well-being-related practices.

The data analysed here originates from five distinctive planning meetings and one workshop session and is delimited to follow the specific episodes of these meetings in which the annual clock was discussed. These episodes constitute the continual cross-meeting trajectory of the annual clock. Next, I introduce the methods that were applied in analysing this trajectory.

Methods of analysis

As the first step, the transcribed data from the planning meetings and the workshops was organized into topic-related episodes on the grounds of the discussion contents. The topic-related episodes consisted of speech turns, the number of which varied from 3 to 171, but more typically were around 20 to 50. The six episodes related to the annual clock differed qualitatively from the other topic-related episodes since they formed a continuum that seemed to also advance collaboration among the practitioners. I used the notion of the *trajectory* (Strauss, 1993, p. 54) as an analytical concept to further examine how interaction evolved in these particular episodes and how the annual clock was conceptualized in participants' discursive actions (Engeström, Engeström & Kerosuo 2003; Kerosuo, 2004).

To proceed in the analysis, I used the frame of co-ordination, co-operation and communication presented above. For solving the methodological problem of spotting and

differentiating between the modes of interaction, I exploited the concept of a *turning point*. Merja Kärkkäinen (1999, p.109) defined a turning point as an event in the discourse during which the participants begin to define their object in a new way. By studying collaborative learning and object formation in two teacher teams' planning meetings, she came across specific indicators for a turning point that include disturbance clusters (dilemmas, disturbances, innovation attempts), questioning and the interaction of different voices.

Utilizing these categories, I identified *dilemmas*, *disturbances* and *innovations* in the data and named them *discursive turning point indicators*. I considered disturbances as unintentional deviations from the script, which cause dis-coordination in interaction (Engeström, 2008, p.52). Discourse disturbances include difficulties in understanding, disagreements, or rejections between or among participants (Kärkkäinen, 1999). In this data the disturbances were typically manifested by a critical question or an analytical turn at which point the predominant perspective dictating the discussion changed. By an innovation I refer to discussion points in which new ideas and conceptualizations emerge. A dilemma, in turn, indicates a tension, which manifests itself as hesitations, reservations, even arguing with oneself (Billig *et al.*, 1988, ref. in Kärkkäinen, 1999, p. 112).

Along with the turning point analysis of participants' interaction, I iteratively analysed the conceptual development of the annual clock by sketching the interplay between the subjects, the objects of the discourse, and the scripts, with the help of Engeström's visualized models (see Figures 3, 4 and 5). In the next section I present the findings of my analysis.

Co-construction of the annual clock

In this section, I will focus on two episodes of the annual clock continuum in particular: the first episode, in which the idea of the annual clock was formulated, and the last episode, in which the potentiality of the annual clock becoming a cross-functional practice was discussed. The episodes in-between are briefly introduced to form a comprehensive view of the multi-layered process of collective concept formation.

Episode 1: From function-based co-ordination to co-operation

In the first episode, an expansive transition from function-based co-ordination to co-operation took place. The shift happened through three discursive turning points. This meant a transition from the practitioners' function-scripted roles towards more jointly and explicitly defined objects of discussion. The transition is illustrated in Figure 7. At the bottom of the figure, developments in the mode of interaction are summarized. The main mediating tools and artefacts of the discussion are placed in between the subjects and objects (cf. Engeström, 2008). The discursive turning point indicators related to the respective phases of interaction are located at the top of the frame. The arrows demonstrate how the discussion proceeded and through which conceptual tools and material artefacts it was mediated.

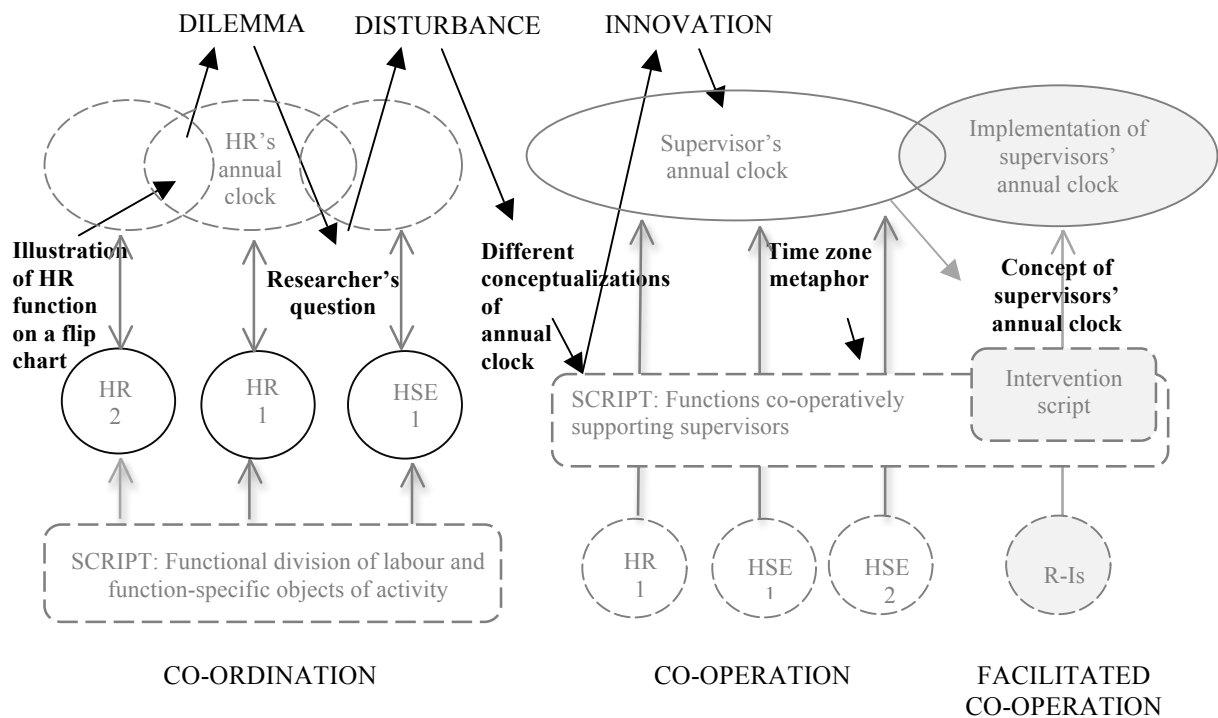


Figure 7: An expansive transition from co-ordination to co-operation

The first episode started with the prevalent script, which was based on the functional division of labour and the function-specific objects of activity within the organization. This *function-specific script* was manifested while speakers positioned themselves into the representative roles of their respective functions. Phrases such as “I as HR manager”, “in our team”, and citing other functions as third parties (Linell, 2009) like “these other services” were common, and I interpreted them as linguistic cues of the function-specific script.

The emergence of the annual clock was a significant shift that changed the script, generated a new object, and eventually affected the whole progress of the intervention. Initially, the discussion picked up speed from the previous discussion episode in which participants debated the division of labour between different sections of the HR function and demonstrated this by drawing a structural illustration on a flip chart (interpreted here as a mediating material artefact). The discussion revolved around function-specific practices that may cause overall confusion among supervisors. The annual clock episode as such started as the HR manager began to explain that HR uses an annual clock as a co-ordination tool to synchronize the focal operations taking place during the year. Soon, a *dilemma* appeared in talk between the local HR manager and the business line HR manager: the HR’s annual clock contained only the main HR service processes and excluded some existing, on-going procedures that were assigned for supervisors. The use of *but* shown in the excerpt below can be considered a sign of a dilemma (Engeström & Sannino, 2011).

HR manager 2: And it's like, we³ have talked about it in our team, this HR's annual clock. Well, now it comes from all of these, some project for supervisors comes from [department A]. Then one comes from the business side, and then one from services. And these are not scheduled, so they overlap. Everybody pushes their own; now this and now this, and, (--)

HR manager 1: The annual clock exists, it just came from [Mrs. X], but it only contains these main processes. But then there are HR services, like recruitment, which are on-going. But these come up all the time and (--)

HR manager 2: (--) so they come as new tasks even though they should have been included and (--)

HR manager 1: Yeah.

The discussion continued with the researcher-interventionist's (R-I) question: "It [HR's annual clock] is only your tool and not the supervisors'?" The HR manager responded and said that "it should be introduced to supervisors, as a matter of a fact I started to do this...". These two turns (here considered mediating communicative tools) were the source of an arising *disturbance*, which is expressed in the following HSE manager's turn in which he questions the whole rationale of the function-based annual clocks. He emphasizes that supervisors should not even know about their existence.

HSE Manager 1: Well, at this point I see, now I start to see, if I speak, look like a superv... Well, **I'll try from the supervisor's perspective**. Now, if **I as a supervisor am** told that there is a kind of annual clock, and if then there's HR's annual clock, and then quality's and occupational health's annual clock. And then other annual clocks come from business and... And project-based annual clocks and others, so everybody introduces an annual clock that the supervisor should understand. It's hopeless. [...] HR can build their own annual clocks. But it shouldn't even be introduced to a normal supervisor, that here's a kind of HR annual clock that you must go through. It should not be the supervisor who runs after the annual clock, in a way. HR must schedule their own operations; when and what issues they bring up according to the annual clock. The supervisor must be left blissfully unaware of the existence of the annual clock. Because **this is a service organization** that serves the supervisors and they have 12 other annual clocks directly from the business side.

This questioning disturbance generated an *innovation*. The innovation started with a conceptualization of a business-based annual clock that should surpass other clocks. The initiation was led by the HR manager as she maintained that nobody has actually drawn an annual clock from the supervisors' standpoint. If they did so, the clock would mediate understanding related to the impossible operational environment in which supervisors are trying to accomplish all their tasks. The concept of a *supervisor's annual clock* appeared for the first time at this point. The HR manager concluded that "It should be drawn" which, despite the conditional form, indicated a shift from talk to action.

The disturbance followed by the innovation of the supervisor's annual clock transformed the script and the mode of interaction from function-based co-ordination to co-operation. I

³ underlining = personal pronouns as script indicators; **bold underlining** = change of the script; [brackets] = researchers supplementing comment ; (--) = overlaps, uncompleted sentences

named the script accordingly as *functions co-operatively supporting supervisors*. The linguistic cues of this transformation can be tracked from the excerpt above, in which the HSE manager changes perspectives from “I [as a HSE manager]” through “I as a supervisor” to the more generalized, passive form of “this is a service organization”. The new script emerged, not solely as the result of this perspective taking, but intertwined in the process of object formation. At the end of the episode, two researcher-interventionists became involved in the conversation. They reinforced the evolving co-operation by proposing the joint implementation of the supervisors’ annual clock. As a summary, in Figure 7 the interventionists’ involvement is illustrated by a shadowed, overlapping form.

In its initial phase, the annual clock appeared mainly as a conceptual tool. It started, however, to shape the common ground for co-operative collaboration. In addition, the practitioners attached two functionalities to it: firstly, the clock could explain the supervisors’ complex operational environment to the practitioners who are responsible for planning processes and assigning tasks to them. This would benefit the practitioners by providing them with a bigger picture of the functions’ interwoven service processes. Furthermore, the clock could help the supervisors perceive the temporal order of various tasks occurring during the year. Both notions were the first conceptualizations with which the practitioners tried to outline the general idea of the annual clock from both the functions’ and the supervisors’ viewpoints.

Episode 2: Emphasis on factory level co-operation

Four months later, in the fourth planning meeting, the annual clock was further conceptualized. It was now comprehended as the local factory’s own business-based tool, which would mediate the focal well-being related processes and their temporal order to the supervisors. However, the continuation of the co-operative collaboration was not self-evident. Comparing the two first episodes distinctly shows the impact of a shared script. In the first episode, the *functions co-operatively supporting supervisors* script emerged as an outcome of a joint object formation. At the beginning of the second episode, the researcher summarized the last meeting’s contents and proceedings. However, she did not succeed in mediating the idea of an annual clock to the participants who were absent from the last meeting. As a result, a *disturbance* in the form of a misunderstanding regarding the annual clock arose. I interpret that the disturbance derived from a mismatch between the participants’ scripts: the participants who had not attended the last meeting based their comments on the function-specific script, whereas the other participants continued to further *innovate* the clock on the basis of the last meeting’s shared script.

Episode 3: Expanding the object in co-operation

The third annual clock episode took place in the sixth planning meeting. The episode was dominated by creative co-operation. In this phase of the intervention, the co-operative *functions co-operatively supporting supervisors* script seemed to be stabilized and shared by the participants. This productive phase has to be analysed in the context of the entire intervention. The planning meeting took place one and a half months after the second workshop session in which practitioners had evaluated function-specific practices together with the supervisors. This had presumably advanced mutual understanding. However, the analysis showed that the conceptualization of the annual clock was still pre-eminently ongoing and incomplete. In effect, the annual clock appeared at this point to be more a combination of multiple perspectives than a single entity. This was manifested by the epistemic variation that I found in examining the three *innovations* as they developed in

the course of the exchanges. The two first innovations aimed at expanding the annual clock's functionalities, whereas the third, in contrast, tried to limit its use. In the expanding innovations the participants outlined the clock as a shared planning tool between service functions, which would also provide the supervisors with a better understanding of managerial activities. The clock was also envisioned as a joint quarterly performed evaluation practice. This notion was the first conceptualization in which it was comprehended that the annual clock involved the functions and the supervisors in a joint practice. The focusing innovation, in contrast, emphasized that the annual clock should, for simplicity, function as a temporal co-ordination tool for the supervisors.

Episode 4: Communication regarding implementation

In the following seventh planning meeting, the researcher-interventionists took an active role in facilitating the concrete production of the clock. They explained the agenda: the aim of the meeting was to jointly prepare the annual clock in anticipation of the last workshop, in which it would be presented to the supervisors. The task assignment functioned as an explicit script, which enabled the communicative mode of interaction. In comparison to the other episodes and modes of interaction, this communication phase was characterized by the rich use of mediating tools. The researchers referred actively to different theoretical models that had been made familiar to the practitioners and had been used jointly in previous meetings and workshops. The practitioners also exploited models, particularly the existing model of the HR function's annual clock (the root model in the first episode), to outline the draft of the supervisors' annual clock. This intense phase of joint *innovations* led to multiple conceptualizations regarding the clock: a representation of the supervisors' temporal co-ordination tool, the service functions' shared planning tool, and a shared evaluation practice. However, the series of innovations was followed by a *dilemma*, as the logic of the clock was problematized from the viewpoint of occupational health services: collaboration between health services and the supervisors was irregular and could thus not be placed on the clock. The dilemma proved that communication was focused on the task assignment of producing the clock, and not on clearly reflecting the clock from the different viewpoints. As the script changed, collaboration moved back to co-operation and the discussion on the different functionalities of the annual clock remained fragmented.

Episode 5: Double-scripted presentation of the annual clock

The fifth episode took place in the last workshop session, in which the practitioners presented the annual clock draft to the supervisors. A clock-type graph was introduced as the supervisors' temporal co-ordination tool, with which supervisors would be able to keep track of the proceedings of various tasks and duties occurring during the year. After the brief presentation, the practitioners and researcher-interventionists continued the adapted, co-operation-scripted way of discussion and joint development. Supervisors did not actively participate to the discussion. The continuum of the fast-paced series of three *innovations* and two *dilemmas* was the consequence of a double-scripted discussion structure, in which the practitioners continued co-operation with each other. However, in talk in which practitioners reviewed the annual clock's different functionalities and potentialities, they concurrently kept their professional and functional stances in relation to the supervisors. The innovations covered the earlier ideas of the annual clock as the service functions' planning tool and a shared evaluation practice, whereas the dilemmas dealt with the practical problems of joint development.

Episode 6: Annual clock as a potential cross-functional practice

The aim of the last meeting was to evaluate the one-and-a-half year intervention process, gather practitioners' prospects for future collaboration, and to draw the conclusions. The annual clock was debated in three various sequences during the meeting. For the analysis I combined these sequences into one episode, which is depicted in Figure 8. The episode comprised two innovations and one dilemma, which are next described in more detail. The progress of the complex, multi-mediated discussion can be tracked by following the arrows in Figure 8.

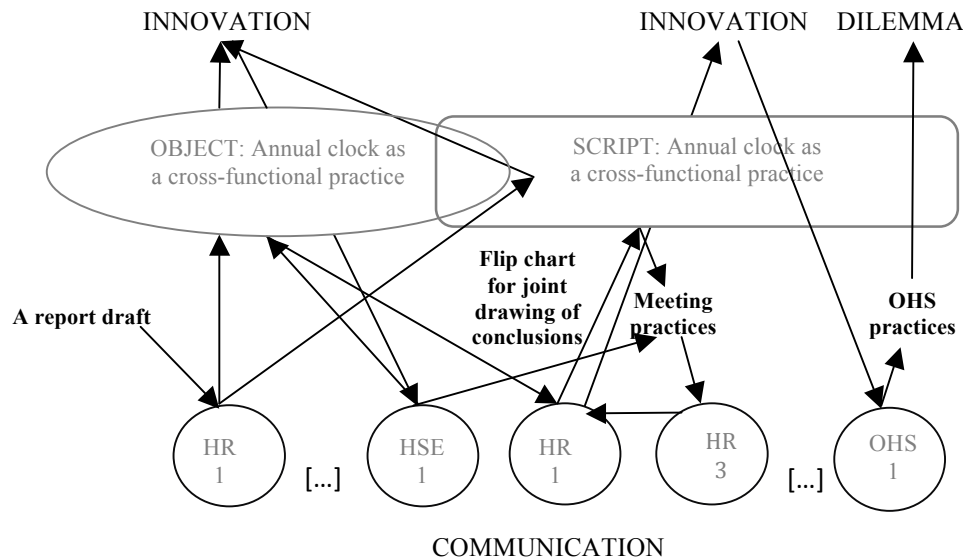


Figure 8: Communication structure of the last episode

The last episode is a manifestation of an evolved and expanded level of collaboration, namely the communication mode, in which both the object and the script merged into one and became the focus of attention. As a result of the reflective exchange, the conceptualization of the annual clock turned into a *cross-functional practice* script, defining how collaboration could be developed in the future. A report draft, into which the researchers had collected the main steps of the intervention, strongly mediated the discussion. The fusion of the object and the script is presented in the HR manager's excerpt below, in which she extended the notion of the annual clock into a summarizing practice in which practitioners from different functions, together with supervisors, could evaluate the well-being promotion-related practices.

HR1: The management of the wholeness [referring to a concept used in the report draft] made me think, I read this report, and as a good idea, we could exploit the annual clock as a summative tool and as a rear view mirror tool, to review successes. That we could gather all these actors now, at some point, twice a year, or even quarterly, if it would be possible, to gather them around the same table to discuss how the annual clock has worked, and how all these elements, pieces have been handled, and what we have learned from them, what was good and what needs to be developed. It could be one gathering point and then we could look at it as a whole, and there would also be supervisors present to tell how they have experienced the different pieces and what has been difficult, and so forth. So that we could somehow try to

come up with like a summative factor to this whole process if these actors could be gathered together.

The practitioners gave priority to the annual clock among the main conclusions of the intervention process. The practical implementation of the annual clock as a new cross-functional practice was debated from different viewpoints. The practitioners planned how it could be incorporated into the existing meeting practices on the business unit level. This *innovation* grounded the potential of a new practice to emerge in practice. However, at the end of the meeting, a *dilemma* arose: even though the joint evaluation practice was considered promising, the challenge was how to match the schedules of different kinds of work shifts in practice and find the required time for the joint meetings.

Review of the findings

The development of cross-functional collaboration was analysed as a process of collective concept formation, which took the form of developing an annual clock, a tool for co-ordinating and developing well-being promotion practices in one of the corporation's local business units. The analysis showed how the idea of the annual clock grew through multifaceted conceptualizations during the intervention. First, it had the status of a conceptual object, then a collaboration tool projected with different functionalities, and eventually a script for becoming a novel cross-functional practice. Firmly hand in hand with the advancing conceptualizations, the mode of collaboration among the participants expanded from function-based co-ordination to task-oriented co-operation and in the end to communication.

The aim of the analysis was, first and foremost, to explore the evolving terrain for crossing traditional function-specific boundaries. I was particularly interested in determining the transitions through which collaboration develops, more precisely, how the transitions between different modes of interaction are manifested by discursive actions and which conceptual tools and material artefacts mediate these shifts. The outcome of the episode-based analysis is summarized in Figure 9. The figure illustrates the shifts in the development of interaction that were analysed with the help of an analytical concept of discursive turning point. The line following the proceeding of the episodes (x-axis) marks the turning points that were expressed in talk as five dilemmas, two disturbances and twelve innovations. Interaction in the annual clock episodes covered all three modes of co-ordination, co-operation and communication, of which co-operation was the most dominant form (y-axis).

The two transitions to the mode of communication were facilitated by researcher-interventionists. The first shift to communication in the fourth episode was to a great extent a result of the researchers' pre-scripted task assignment. In the last episode, in contrast, the discussion was practitioner-initiated and also more reflective in nature as it focused on anticipating the annual clock as their own potential cross-functional practice in the business unit. Although the transition to communication here was practitioner-initiated, it was strongly mediated by a report draft compiled by the researchers.

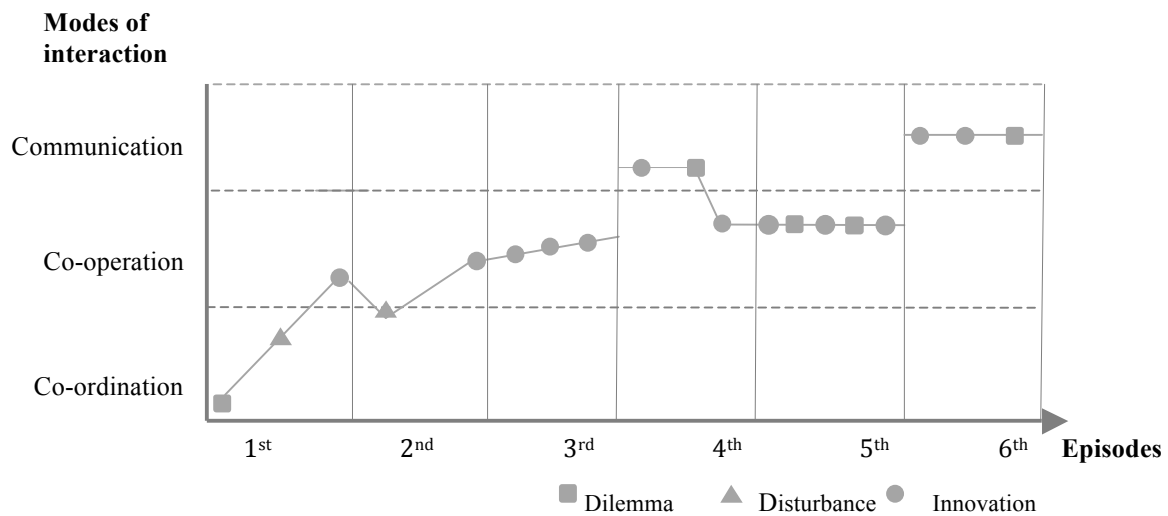


Figure 9: Development of collaboration through the discursive turning points

In addition to a discursive turning point, another analytical concept applied in the analysis was the notion of a script. I recognized four types of different scripts, which were methodologically differentiated on the basis of linguistic cues. First, the intervention script functioned as a meta script. It was a pre-drafted researcher-initiated agenda that intended to guide practitioners through the respective learning actions of an expansive learning cycle (cf. Engeström, Rantavuori & Kerosuo, 2013). Towards the end of the annual clock's trajectory, the researcher-interventionists actively facilitated its realization. This was particularly pronounced in the task assignment in the fourth planning meeting discussed above.

In the co-ordination phases, the script reflected the predominant functional division of labour and the organizational position of the respective speakers. I named it the function-specific script accordingly. The reappearance of the function-specific script during the discussion was characteristically the underlying trigger of the arising dilemmas and disturbances. Typically, in the dilemmas and disturbances, the respective conceptualization of the annual clock was experienced as being at odds with the predominant way of organizing functional-specific practices. The third script, functions co-operatively supporting supervisors, developed in a reciprocal process in which participants' contributions intensified and the annual clock started to show its potential as a shared tool. In the co-operation phases, the discussions were strongly task-oriented (Engeström, 2008), as a result of which they provided the drive for collaboration to develop further (Nicolini, Mengis & Swan, 2012). Parallel to the tool development, the annual clock started to take the shape of a script since the conceptualizations encompassed new functionalities on how to use it jointly as a cross-functional tool in relation to supervisors. Finally, the fourth script, annual clock as a cross-functional practice appeared in the last meeting and can be considered a more matured form of cross-functional collaboration, as the annual clock's meaning as an object and as a script partially merged (see Figure 8). This combined form of conceptualization then became a shared vision of a collaborative evaluation practice.

Discussion and conclusions

This study contributes to third generation activity theoretical research with interest in formative interventions as a co-configurative and cross-boundary arena for multi-agency collaboration and learning (Engeström et al., 1995; Kerosuo, 2006; Engeström, Rantavuori & Kerosuo, 2013). The article explored how well-being practitioners' cross-functional collaboration developed through a multi-phased process of collective concept and tool formation during an intervention process. This kind of collective learning effort has been studied from various angles in CHAT-based developmental work research interventions, for example boundary crossing (Kerosuo, 2004; 2006), building collaborative agency (Virkkunen, 2006), co-operative object formation (Ahonen & Virkkunen, 2004; Engeström, Pasanen, Toiviainen & Haavisto, 2005) and the co-configurative development of a boundary crossing tool (Toiviainen, Kerosuo & Syrjälä, 2009). This article – before proceeding to further conclusions on collective learning or its outcomes – aimed at making a methodological contribution to the empirical analysis of intervention data by emphasizing the importance of the thorough examination of the tension-laden and dynamic collaborative terrain. The performed analysis affirmed the benefits and applicability of the framework of co-ordination, co-operation and communication for this intended purpose. The deployment of the model enabled not only the analysis of how subjects construct their own or shared objects of activity, or how the interaction is scripted, but the analysis of the richly nuanced interplay between these central elements through which collaboration is manifested. I argue that the explication of this interplay would help to surpass possible pitfalls that may lead to overly straightforward analysis of the formation of shared understanding. This is particularly important in cross-functional settings into which participants bring along ingredients from their own activity systems and in which this mixture of perspectives is always combined in an original, novel way.

The starting point for the study was to provide a view to production supervisors' changing work and to learn how the organizational functions of human resources, occupational safety and occupational health services could better support and serve supervisors in their work of promoting well-being at work. From the perspective of cross-functional collaboration, the promotion of well-being may be considered an emergent runaway-like object of activity (Engeström, 2009) that is located in no man's land, but which at the same time should be everybody's business. The study showed that well-being promotion as a shared object of activity was also hard to grasp at the conceptual level. This indicates that in intervention settings, broadening perspectives and crossing boundaries requires discursive construction of new shared concepts and meanings. As follows from the activity theoretical thinking, this happens through mediation, since subjects are connected to their objects only through mediating artefacts and tools (Vygotsky, 1978; Engeström, 1987). Here, building common ground for collaboration required the creation of shared mediational means, an annual clock as a conceptual tool, which enabled the group to collectively grasp the object. In other words, the annual clock can be understood as a boundary object (Akkerman & Bakker, 2011). An acknowledged prerequisite for a boundary object is that in order to facilitate collaboration it should be flexible enough to adapt to participants' diverse needs while remaining robust enough to maintain the orientation to the common task at hand (Star & Griesemer, 1989, p. 393).

However, a challenge appears when we consider whether the annual clock could survive, in some form or another, outside the intervention setting. In the last workshop session

(Episode 5), in which the annual clock was introduced to the supervisors for the first time, practitioners' interaction was double-scripted. On the one hand, they followed the established co-operation script, but on the other hand, in their speech turns they kept their professional and functional stances in relation to the supervisors, which was shown in their function-specific scripts. This is logical in view of the fact that the presence of the supervisors re-challenged the practitioner-initiated and co-designed way of service functions collaborating together: the annual clock came up against the organizational reality of function-based and top-down managed procedures. This implies that deeply-rooted functional boundaries may be broken by creating a shared tool that motivates collaboration and enables participants to work qualitatively in a new way across boundaries (Bechky, 2003; Nicolini, Mengis & Swan, 2012). However, the development of a boundary-breaking tool does not yet ensure continuous, sustainable collaboration between different activity systems (Kajamaa, 2011). Although the annual clock seemed to deliver the expectation with regard to widening the understanding of supervisors' work and expanding the potential for cross-functional collaboration, its usefulness in real activity remains to be seen.

The study raises questions concerning the implementation and facilitation of multi-scripted interventions. In particular, the empirical findings encourage further elaboration of the role of scripts in building a qualitatively new kind of collaboration. The four distinguished scripts were inherently different in their nature; based on this I maintain that the definition of the script as an "algorithmic, stepwise character, dictating the sequence of events from beginning to end" (Engeström, 2008, p.67-68) is a good point of departure. However, in multi-disciplinary network settings, scripts should be scrutinized empirically and thus exposed to more open-ended characterizations. This is particularly important in acknowledging the role that script-originated disturbances may play in the course of interaction. In this intervention data, colliding scripts generated dilemmas and disturbances throughout the intervention. The practical challenge for interventionists is how to distinguish between different scripts and how to recognize script-originating disturbances from other obstacles and conflicts that may impede interaction. I maintain that to implement cross-functional interventions successfully, interventionists need more analytical tools, which prompt them to evaluate obstacles in interaction not only with hindsight after the intervention but when the process is actually underway. The framework of co-ordination, co-operation and communication may help to make the script visible for the purposes of joint reflection on collaboration, and also aid reflection upon the potentially shared object.

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