

SOCIAL MEETS STRUCTURE: REVEALING TEAM COLLABORATION ACTIVITIES AND EFFECTS IN ENTERPRISE SOCIAL NETWORKS

Complete Research

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Abstract

Enterprise social networks (ESNs) are increasingly added to organizational IT infrastructures for more inclusive, open, and “social” communication. Many organizations recognize the potential benefits that ESNs can offer for improved team collaboration. Albeit there is extensive research testing the effects of general IT support on teams, it is still poorly understood what activities teams perform to realize the ESN’s potentials and to foster team collaboration. Drawing on our revelatory case study, we contribute to addressing this research gap by exploring this special case of an organization that uses an ESN for all work-related matters. Our findings describe four effects of team collaboration emerging from ESN-supported social and structure activities. Social activities emphasize interactions on the relationships among team members, whereas structure activities emphasize interactions on objects, including content and processes. We explain tensions within the effects of (1) unified, collective, yet relevant communication, (2) visible, active, yet controlled participation, (3) formalized, guiding, yet flexible processes, and (4) reusable, yet maturing information objects with team states, challenges and responses identified in team collaboration.

Keywords: activity, enterprise social network, qualitative study, enterprise social software, team collaboration, team mental model

1 Introduction

Following up on the success of publicly accessible social media (Kaplan and Haenlein, 2010) with global outreach such as Facebook or Twitter, organizations increasingly invest into enterprise social networks (ESNs) (DiMicco et al., 2009; Turban et al., 2011). Social media, networks and software denote “a group of Internet-based applications that build on the ideological and technological foundations of Web 2.0, and that allow the creation and exchange of User Generated Content” (Kaplan and Haenlein, 2010, p. 61). Organizations use ESNs to promote wide-spread participation (Kaplan and Haenlein, 2010), build and maintain relationships (DiMicco et al., 2009), share information and improve collaboration (Turban et al., 2011), and to enable the networking of people and forming of communities (Maier and Schmidt, 2014). User interaction and communication behaviors may change in organizations due to the rise of “social” features available in ESNs (Treem and Leonardi, 2012). Yet, this change does not occur only by the fact that employees have “new” technology available, but depends on how they use it (Leonardi, 2013). Research on organizational work groups and project teams shows that also within a single organization interaction and communication behavior may differ considerably depending on the way how teams interact and communicate (Pentland, 2012). Consequently, teams that heavily rely on IT are required to adapt their work processes and need to perform activities that e.g., focus attention on the task or drive people to get to know each other (Nunamaker et al., 2009).

While ESN usage has been studied extensively on the levels of individuals, organizations, and (inter-organizational) networks, it is currently unclear how teams make use of ESN functionalities to effectively manage their work. Given the potential of ESNs as a collaboration tool, it becomes important to understand what effects are induced by ESN functionalities how they affect team activities (Curşeu, 2006; Turban et al., 2011). This raises the following questions: What team-level effects arise when teams use ESNs for their collaboration? What activities do team members perform that are associated with these effects?

We performed a revelatory case study of an organization with an ESN-centered information and communication infrastructure and collected data in 12 semi-structured interviews. After describing the research field and related work in the next section, we present the design of the study, sample and results, discuss the main contributions, before we conclude with theoretical and managerial implications and give an outlook to future work.

2 Related Work

Facing social media's popularity in private use contexts, McAfee (2006) first advocated possible business applications for social media. Analogous to "Web 2.0", he established the notion of "Enterprise 2.0" as a concept for bringing benefits of social software use into work-related contexts of organizations (McAfee, 2006). ESNs increasingly replace not only conventional "1.0" Intranet yellow pages, but also other organization-internally used social media such as wikis or blogs (Koch et al., 2007). Social network sites commonly feature user profiles, relational ties between users and allow to view and traverse these connections (Boyd and Ellison, 2007). Accounting for the growing functional complexity, interoperability and decreasing platform boundaries of social networking sites, Kane et al. (2014) emphasize their adaptability for other technologies such as third-party applications through application programming interfaces. Thus, social network sites are not mere sub-types of social media in general, but rather "social media networks": multifaceted collections of ways for individuals to connect, communicate and interact with each other through one platform (Kane et al., 2014). ESNs offer capabilities of social media networks, but in spite of being open for the general public, they are limited to the organizational boundaries (DiMicco et al., 2008, 2009). ESNs also differ from social media networks in terms of audience, goals for use, design, users, and user behavior, which means that e.g., user behavior is influenced by company user guidelines and/or organizational and team norms (Ellison et al., 2014). A key implicit property of ESNs is that they revoke the isolation between individual users to raise awareness for each other while communicating, collaborating and cooperating (Brynjolfsson and McAfee, 2007). In this respect, Richter and Riemer distinguish "context awareness", the "awareness of shared contacts, shared interests or former affiliations, which helps to establish a sense of belonging and togetherness" (Richter and Riemer, 2009, p. 3), from "network awareness", the awareness "of the activities and situational presence of others in the personal network" (Richter and Riemer, 2009, p. 3). Provided that organizations possess the necessary abilities to exploit an ESN's potentials, they can make practices of knowledge work and its outputs more visible (McAfee, 2006).

While the impact of ESNs on and for organizations was subject to empirical investigations in the recent past (Leonardi, 2014; Pan et al., 2015), there exists far less empirical research on the potential benefits for team collaboration. Considering the team level in ESN-related research is, however, deemed important since past research found that teams using ESN functionality develop their own group norms, social identities, and social influence processes affecting team commitment for joint action (Shen et al., 2010). This implies that depending on how teams design their collaboration, their effectiveness may differ throughout an organization (Pentland, 2012). It can be argued that ESNs provide the ability to "work out loud", so that team collaboration benefits from abundant communication and transparency (Hinchcliffe, 2011). ESNs also afford a sense of "virtual co-presence", which, in turn, shapes team interactions and collective task completion (Subramaniam et al., 2013). Teams use ESN functionalities differently in their daily work practices such as for work coordination, meeting organization, work coordination, status updates, problem-solving, and for discussions and opinions (Richter and Riemer,

2013). These activities can be categorized into one of the major team processes referred to as teamwork and taskwork (Marks et al., 2001). Whereas teamwork describes activities for managing members of the team, e.g., developing role relatedness, refining roles and role duties, taskwork describes activities when performing the task, e.g., generating solutions or delivering outputs (Morgan Jr. et al., 1993) Alongside this, teams dynamically evolve through cognitive, motivational, or affective team states, which are also referred to as emergent states (Rico et al., 2008). Consequently, when teams make use of functionality for supporting their communication, for structuring their processes, or for processing information, this can have positive or negative influence on emergent states such as team cognition, trust, cohesion, conflict (Curşeu, 2006), team mental models, or transactive memory (Coultas et al., 2014). Given the potential of ESNs as a collaboration tool, it becomes important to understand how ESN functionalities affect teams activities in team collaboration (Curşeu, 2006; Turban et al., 2011).

3 Study Design

We study an organization that capitalizes on the ESN's "social" components for performing its core business processes. This special case of an organization uses the ESN as the single platform for all work-related activities and therefore differs from other ESN use cases, in which ESNs are rather used as add-ons to the existing IT infrastructure.

Our case study is unprecedented and revelatory (Yin, 2009), as it explores an ESN setting exhibiting characteristics of an organization engaging in truly "social" business operations, including its processes and people by performing its operations directly on the ESN. The ESN's adaptability and extensibility with situational applications (Cherbakov et al., 2007; Maier and Remus, 2011) is of special importance in this case, because they enable its users to shape the ESN according to the business needs by experimentation and appropriation (Richter and Riemer, 2009, 2013).

As the following sub-sections illustrate, our study design is instrumental (Creswell, 2007) in that it provides insights into the issue at hand drawing on purposive sampling (Silverman, 2005). Resulting is a saturated picture of practicing an intense and leading use of this technology.

3.1 Case Organization: IntEx

We conducted our case study within the national branch of an international nonprofit organization operating in the service sector, in the following referred to by the pseudonym IntEx, which operates in over 100 countries with about 90,000 active volunteers worldwide. IntEx cooperates with over 8,000 companies and partner organizations. We focused our study on IntEx's national branch in Austria, consisting of a national head office coordinating the activities of eight regional chapters across the country. Each of these entities is run by a group of seven to eight executives. The executives are elected for a one-year period and lead the team members within their functional areas.

The organization experiences substantial fluctuation because members' roles change over time and most members quit their voluntary services for the organization around or after graduation or upon entering paid employment. Commissions for each functional area coordinate and align the activities between all regional chapters and the national head office. Each commission consists of the respective executives of each region plus the national executive. Core business processes of IntEx are concerned with recruiting and human resources services and include managing job applications, placements, customer relations, events, invoicing, and promotion campaigns. Within these processes, most tasks are knowledge-intensive, vary in their degrees of routine and are highly interrelated among functional areas, which requires their execution in teams.

3.2 IT Artefact: the Employed Enterprise Social Network

IntEx's teams use the Web-based ESN platform Podio by Citrix Systems, Inc.¹ as a collaboration tool for all organization-internal communication. Podio is grouped into employee networks for the national branch, and for each regional chapter, which reflects IntEx's organizational structure. Members of the organization sign up with their corporate email accounts to authenticate their use and to authorize access to their respective Podio employee networks. Teams can set up workspaces within each of these employee networks, into which members either join by themselves or are part of by default. Podio offers social software features (Boyd and Ellison, 2007; Richter et al., 2011) such as activity streams, content sharing, liking, and commenting, following, user profiles with online/offline information, overview on a user's connections, search, private messaging and group chat. These features support typical practices such as status updates, work coordination, social praise, problem-solving, meeting organization and, information storage (Richter and Riemer, 2013). A workspace in Podio can be enhanced by adding, modifying, or deleting so-called "apps", a concept traditionally researched under the term "End-user Computing" and more recently explored as "Situational Applications" (Cherbakov et al., 2007). Apps in Podio are either developed from scratch using a built-in configuration tool or reused from an "app market" repository of pre-configured apps. Apps offer support for handling structured as well as unstructured data. Users can freely modify both, the structure of the handled data as well as the data presentation through views and filters. At the same time, apps integrate with social software features like activity streams, commenting and notifications.² The functionality of Podio is comparable to ESNs developed by competing vendors, such as Jive or Salesforce Chatter, which offer similar feature sets (Drakos et al., 2013). However, Podio's functionalities put particular emphasis on bringing together groups of people with the help of workspaces and customizable apps in easy to use ways, e.g. Podio supports data import from spreadsheet files into apps.

One of the authors contributed to introducing Podio and enabling members to use Podio in one of IntEx's regional chapters in the period October through December 2012 and has since acquired insights on the ways in which teams use Podio in this regional chapter. It was the last regional chapter within the national branch to transition to Podio, while the other regional chapters introduced Podio in Early- until Mid-2012. At the time the data for this study was collected in Mid-2014, the transition to Podio was successfully completed in the entire national branch of IntEx for one and a half years already and legacy systems were only used to retrieve archived data at rare intervals.

3.3 Procedure and Sample

We combined a standardized open-ended interview with an interview guide approach (Patton, 2002), following an appreciative inquiry style (Bushe, 2011) for collecting data. We performed 12 interviews with members working either full- or part-time as team leaders or team members in the national or a regional chapter of the organization.

The interviews were exploratory in nature, focusing on concepts including context and network awareness (Richter and Riemer, 2009), the sense of virtual co-presence (Subramaniam et al., 2013) shaping team interactions of communicating, collaborating and cooperating (Brynjolfsson and McAfee, 2007), and the team processes of teamwork and taskwork (Marks et al., 2001). For each concept, we asked standardized open-ended questions such as "how does the use of the ESN support you / your team to be aware of your activities inside the network?", "how does the ESN support you / your team to ensure participation in the ESN?" and "how do you / does your team use the ESN to make it fit to your specific (collaboration) tasks?". According to the interviewees' responses and their respective job roles, we asked follow-up questions to elucidate the discussed themes in-depth. A pilot interview was carried out to check the interview guideline's plausibility and understandability. Afterwards, the wording remained

¹ <http://www.podio.com>

² For a comprehensive list of features visit: <http://www.podio.com/site/features/features-index>

unchanged, but we revised the structure and order of the questions. One of the authors conducted all interviews, which were performed from June through July 2014, lasted 50 minutes on average, with durations ranging between 30 and 68 minutes, and were held either face-to-face or in three cases via Internet telephony. One author recorded, subsequently transcribed and pseudonymized the interviews, assuring interviewees' anonymity. We used ATLAS.ti as a software for qualitative data analysis for coding and analyzing the transcripts systematically (Miles and Huberman, 1994).

Table 1 gives an overview of the stratified sample representing all levels of hierarchy of the organization up to the national level. The table outlines the interviewees' job roles, the teams an interviewee is part of, the average weekly working hours as estimated by interviewees, the interviewee's length of service with the organization, age and gender as well as the identifiers used for pseudonymizing the statements made by the interviewees.

Identifier	Interviewee job role (organizational unit)	Part of teams	Avg. work hrs./week	Service with org. ³	Age, gender
NTL 1	National team leader (Corp. relations)	N.I, N.II	40	40 m. ⁴	24, m
NTL 2	National team leader (Finance & legal)	N.I, N.III	50	21 m.	23, m
NTL 3	National team leader (Exchange)	N.I, N.IV	42.5	22 m.	23, f
RTL 1	Regional team leader (President)	R.I, N.V	50	16 m.	23, f
RTL 2	Regional team leader (Finance & legal)	R.I, R.II, N.III	40	9 m.	21, m
RTL 3	Regional team leader (Exchange)	R.I, R.III, N.IV	27.5	9 m.	23, f
RTL 4	Regional team leader (Corp. relations)	R.I, R.IV, N.II	27.5	16 m.	20, m
RTL 5	Regional team leader (Human resources)	R.I, R.V, N.VI	15	16 m.	20, m
RTL 6	Regional team leader (PR & marketing)	R.I, R.VI, N.VII	20	16 m.	21, f
RTM 1	Regional team member (Exchange)	R.III, R.VII	7.5	16 m.	27, f
RTM 2	Regional team member (Finance & legal)	R.II	7.5	9 m.	23, m
RTM 3	Regional team member (Project man.)	R.VII	3	9 m.	20, f
	average		26.72	16.58 m.	22.33

Table 1. Breakdown of interviewees

We conducted the analysis in three steps: First, we structured the data inductively by open coding, informed by the coarse scheme of team input, team process and team outcome (Mathieu et al., 2008). Exemplary codes used in this stage were "activity stream", "chat" or "skill" for input codes, "announcing", "sharing information" or "including others" for process codes and "efficiency", "effectiveness" or "changing the structures" as output codes. We checked the codes from open coding for inter-coder reliability (Miles and Huberman, 1994) on an amount of 10% of the transcribed interview data. The second coder received a documented set of all codes used by the first coder and applied them to the original transcript. We then compared the coded transcripts from both coders, counting the agreements of same codes used. Dividing the number of agreements by the total amount of agreeing and disagreeing codes used returned a resulting inter-coder reliability of 85%, indicating a definitional clarity of the used code set. Second, we identified key patterns within this scheme in axial coding, which explain how ESN-supported activities are realized in collaboration, as perceived by IntEx executives and employees. We used axial codes such as "instant feedback" and "directing the team's attention". Our unit of analysis was on the level of teams to study team-level effects and activities. We gained insights on individual team member's roles in teams for both, members of one and the same team as well as across different

³ Length of service equals the interviewee's experience with the ESN, except otherwise noted.

⁴ Interviewee's experience with the ESN: 21 months.

teams. We described the activities for team collaboration and led to a dichotomy of social and structure activities supported by the ESN, which will be described in section 4. Third, four effects on team collaboration, as detailed in sub-sections 4.1 through 4.4, emerged across interviews during selective coding (Corbin and Strauss, 1990). These effects showed a large extent of conformity and saturation over the conducted interviews as each effect was consistently mentioned by at least 50% of all interviewees. In the three steps of this iterative process, the authors collaboratively developed and discussed the intermediate codes and the focus for subsequent analysis during and after each step. To validate our results, we presented the activities leading to the four effects to three interviewees in a one-hour meeting and asked them for feedback, encouraged to state critical remarks, to suggest improvements and to relate our findings back to their individual experiences and realities. From these consultations, we received sound agreement on the identified activities and the four effects. By this, the practitioners confirmed that we captured our evidence in a meaningful way.

4 Findings

Having a single platform for the majority of communication needs and business transactions, the ESN supports activities performed by team members for all work-related matters in our case organization. We categorize the activities that take place in two distinct types: *social activity* and *structure activity*. Social activity refers to activities in which team members use ESN features to engage in inter-personal team interaction (Pentland, 2012). We therefore define social activities as interactions on the relationships among team members within the ESN. Structure activity refers to activities in which team members use ESN features for task organization (Espinosa et al., 2012) and team coordination (Rico et al., 2008). This enables mediated team interactions. We therefore define structure activities as interactions on objects, including content and processes within the ESN. Social activities thus represent direct interactions among team members, while structure activities handle objects that enable mediating interactions among team members.

In the following, we present and interpret our results from the conducted interviews based on four identified effects. Within these effects, we describe ESN-supported social and structure activities and how their combination triggers the effects. We further explain the tensions that characterize each effect by disaggregating them into team states, challenges, and responses, which will be discussed in greater detail in the subsequent section.

4.1 Relevant Communication

In IntEx, the ESN has been established as the predominantly used IS platform to do one's work and every member of the network benefits in eased ways to reach out to others. The ESN offers a number of communication channels on a common platform. These channels encourage both, direct (peer-to-peer) and collective (multicast) communication, which gets unified, collective, and is yet relevant.

The functionalities of the ESN provide IntEx's team members with a variety of communication channels that promote communicating within teams and these channels replaced email messaging completely for internal communication. Instead of email, team members use the ESN's social software features such as microblogging, liking, and commenting in the activity stream for collective communication among more than two team members. These communication channels do not limit the audience per se and thereby ensure that the communication reaches the entire team. Communications remain accessible for future interactions and team members can communicate inclusively with anyone in the workspace (*social activity: communicate inclusively; effect: unified, collective*):

"I think it's easier to stay in contact. Also, to have everything on one platform. [...] If you need something, you know where you have to post the question, and you know that you're within the network and you can connect to anyone who is in there." – RTL 4

By including others in collective team communication, information sharing becomes easier for team members who engage in the common discussion either through commenting within the activity stream

of a workspace or through using a group chat. Having all of the aforementioned communication channels in one place results in less effort required for handling messages while keeping an overview of the conversation.

“When I see that somebody is asking for a favor in their [ESN] status update, I just click ‘like’ and write some words in there without having to open a new window. And when I check my emails, I have to open the whole email; I have to read through the whole email. Then I have to click another answer button. Then I have to click another send button. [...] It’s easier doing it on [the ESN].” – RTM 1

In contrast, direct communication between only two team members can take place through direct chat messages or the task scheduling feature. The sender can choose which channel to use according to the audience that needs to be targeted. For example, a commonly visible post on a workspace’s activity stream targets all members in this workspace, whereas a direct message for private matters addresses one single user (*structure activity: choose suitable communication channels; effect: relevant*). This gives a sender, who wants to share information with others, several options to structure the communication by including or excluding certain receivers of this information. Overall, communication becomes more relevant.

“When you delegate a task from the task [scheduler], there, it’s much easier to fix a deadline, because, you can just set a date. [...] Whereas, if you delegate a task in a group, and you want this group to communicate, then I think it’s better to delegate these tasks in the chat. Otherwise, if you want to have a direct impact on a really specific thing, then, I would mention the person who has to deliver the task directly in the comments.” – RTL 5

In cases where elaborate replies are not required, interviewees particularly mentioned the liking feature as an easy and more convenient way for team members to receive instant feedback from others (*social activity: give instant feedback; effect: relevant*).

“Because if [my proposal is] good, everybody clicks on ‘like’ and then you know that it’s good. You just get a response, without getting a response, kind of.” – RTL 6

Table 2 summarizes the aforementioned activity types and the activities enacting them, which induce unified, collective, yet relevant communication within the ESN.

Activity type	Activity	Effect
social	communicate inclusively give instant feedback	unified, collective, yet relevant communication
structure	choose suitable communication channels	

Table 2. *Activities and their effect to induce unified, collective, yet relevant communication*

The social activity of *communicating inclusively* on the ESN-provided channels resulted in *unified* and *collective* communication. *Unified* communication can enable teams to communicate more effectively, as integrated communication channels reduce complexity in managing the options on how to communicate (Riemer and Taing, 2009). *Collective* communication in teams, e.g. teams using microblogs, can mitigate the need to handle “messaging overhead” consuming substantial amounts of working time, as can be traditionally observed with email group conversations (Mankins et al., 2014). This allows teams to develop converging task and team mental models (Lim and Klein, 2006). However, with excessive communication, the challenge of information overload arises. An individual’s information-processing capacity might be exhausted with increasing numbers of information items, diverse and overabundant information and decreasing quality, value and half-life of information (Eppler and Mengis, 2004).

To respond to this challenge that might arise with *unified* and *collective* communication, we found that teams again carry out social and structure activities. Teams use lean communication (Dennis et al., 2008), e.g., the “like”-feature, for *giving instant feedback*. Showing the number of “likes” to an item instead of receiving verbose feedback emails on the item, may therefore counteract information overload as the amounts of conveyed information is low. Moreover, *choosing suitable communication channels*

out of the variety of channels available, such as microblog posts with commenting and liking capabilities, group chats or direct messaging, ESN communication channels can offer a feed-forward instrument to guide a team by shaping the place in which the subsequent team interaction occurs (Limayem and DeSanctis, 2000). By doing so, teams adapt their communication behavior using lean communication (Lowry et al., 2009). This restricts the amount of information shared to a level necessary to remain relevant.

4.2 Controlled Participation

In the ESN, thresholds to participate are set low per default: the ESN is the primary work environment in which team members perform their tasks in order to achieve common goals. Users become aware of the work of others, can provide documentary remarks on their own contributions, and direct others' attention to certain matters of interest. Overall, participation gets visible and active, while being controlled.

Interviewees get work done in teams within the ESN and the ESN visualizes team members' participation. Using the ESN's workspaces and notifications, they become aware of what others in their team are working on (*social activity: become aware of others' work; effect: visible*). Not using the platform results in the perceived feeling to miss crucial information:

"I know that certain things that I have to know, and also that I want to know, will be shared on [the ESN]. Of course, it is kind of my job just to be then up to date what is happening. If I would not use it, [...] I would be a few steps back." – NTL 2

The ESN's automated notifications on team members' updates visualize participation, but do not provide explanations on the actual change performed on the content. It merely provides meta-level information on who changed what. To show others the actual changes that were made on the content, those who perform the changes additionally use available ESN features, such as commenting or group chat (*social activity: explain own work for others; effect: active*):

"So you have to put more effort in really documenting everything, to write everything down, to make it available to others." – RTL 2

The ESN also allows focusing the entire team's attention to a particular subject in a way that is surprising and entertaining (*social activity: direct the attention; effect: controlled*):

"I was giving them information for the meeting. And it was quite a long post. Then, at the very end of the post, I wrote, they should comment with the picture of a hamburger. So, actually I could see then, who was posting a picture of a hamburger. I think, this can be a good method to get the people to read your messages until the end, because then, they will be expecting something like that. So this is what I use and it actually worked out quite well." – NTL 2

Using social features for directing attention, explaining one's own work for others, and becoming aware of the work status of others makes collaborating in a team more active, as it lowers a team member's barrier to participate.

We also found that teams use ESN features to limit participation at times. By attributing roles to workspace members, the creator of a workspace can define access rights and user permissions for altering the design of apps inside (*structure activity: control permissions; effect: controlled*), so that crucial information can be protected against unauthorized and possibly harmful changes:

"We also have some apps with not that crucial information, which can be edited by everyone, if they see space for improvement. But apps including important and crucial information for our work, it's for safety reasons just editable by admins." – NTL 1

Table 3 summarizes the activity types and the activities enacting them, thus leading to visible, active, yet controlled participation.

Activity type	Activity	Effect
social	become aware of others' work explain own work for others direct the attention	visible, active, yet controlled participation
structure	control permissions	

Table 3. Activities and their effect to induce visible, active, yet controlled participation

The social activities of *becoming aware of others' work* and *explaining own work for others* aim at rendering participation within teams *visible* and *active*. The result of *active* participation is that team communication and work become highly *visible* inside the ESN by augmenting the automated notifications feature with the provision of explanations on own updates and modifications performed, e.g. on a file. *Visible* participation can further support engaging others in collaboration who were initially not included or thought after, possibly even bringing together just the right people serendipitously within the organization. This improves the team's "meta knowledge" of who knows whom, who knows what (Leonardi, 2014), and what others do (Riemer et al., 2010) without necessarily engaging in explicit verbal communication (Salmon et al., 2008). As a result, team situation awareness is generated, which describes a state in which teams have a shared understanding of elements in their environment as well as the current situation and future status (Endsley, 1995). However, excessive awareness cues can result in work interruptions causing distractions from work (Wajcman and Rose, 2011).

To respond to this challenge, the structure activity of *controlling permissions* and the social activity of *directing the attention* through defined user roles for each workspace is a means to restrict participation of individuals. Consequently, attention is refocused on the amount of task knowledge required to fulfill the responsibilities in the team (Salmon et al., 2008). This way of *controlled* participation has a facilitating influence on collaboration, because clearly defined responsibilities can sustain the ESN use for efficient and effective participation (Kolfshoten et al., 2012).

4.3 Flexible Processes

The workspaces in the ESN are adaptable so that users can map processes inside ESN apps by themselves. ESN processes represent information on process instances, i.e. business transactions, in more formalized ways. At the same time, these processes are sufficiently flexible to be changed or extended as needed.

The ESN supports formalizing a variety of IntEx processes, especially processes for managing job applications, customer relations, project management, invoicing, and promotion campaigns. This allows that all major business transactions and respective information of the case organization can be managed inside the ESN. Organization-internal as well as -external information exchange can be formalized by relying on the ESN's provided app capabilities for information transfer. Inside apps, data can be stored in adaptable design structures resembling a relational database. Stakeholders external to the organization can provide data by filling in embedded forms on external webpages, which send the entered data directly into the ESN's apps (*structure activity: absorb externals' data with forms; effect: formalized*). Members in IntEx use this feature heavily, e.g. for processing job applications:

"For example, when we get [job] applications, there is this [Web] form which is filled in [by externals]. Then, the filled in form appears in [the ESN]. And in [the ESN] then, we can work on this form, comment it, or, delegate some tasks about it, for example, to set an interview, or things like this." – RTL 5

By formalizing processes, the ESN provides guidance to its users, so that handling further process instances becomes more efficient. This also enables team member to guide others in the team (*social activity: lead others on new processes; effect: guiding*):

"So it's really good to [...] take a lead, so that everybody can follow you, because everybody knows how it works there. If you create an app that is very easily understandable." – RTL 2

Shaping the ESN's workspace and app structures by themselves, team members improve coordination in terms of process guidance across several organizational units, such as departments, functional areas, groups, and teams (*structure activity: coordinate with cross-unit workspaces; effects: formalized, guiding*):

"We do have several workspaces that are cross-function – that are very useful. [...] First of all, getting to know each other, who is in that other team that I need to work very closely [with], but also to share information there [is very useful]." – NTL 3

Newly introduced processes benefit from flexible process structures as the user who introduces the new process can define the new structures in the ESN accordingly. The ESN enables its users to adapt the design of ESN workspaces and the respective apps inside the workspaces to changed process needs. In this way, team members can implement improvements deemed necessary directly by themselves (*structure activity: adapt apps to process needs; effect: flexible*):

"Specific questions we ask in the [job] application processes can easily be edited to what we want. And, yes, if you build another app, it's always easy to put in your own text or what you want to save in this specific app." – NTL 1

"When you can modify everything, then you can make it more countable and you can do your analysis. And if [the ESN] wouldn't be that modifiable [...] - I wouldn't use it." – RTL 2

Table 4 displays the discussed activity types and the activities enacting them with the effect to formalized, guiding, yet flexible processes.

Activity type	Activity	Effect
social	lead others on new processes	formalized, guiding, yet flexible processes
structure	absorb externals' data with forms	
	coordinate with cross-unit workspaces adapt apps to process needs	

Table 4. Activities and their effect to induce formalized, guiding, yet flexible processes

Formalized and guiding processes in ESN apps are created by the structure activities of *absorbing externals' data with forms* and *coordinating with cross-unit workspaces* as well as with the social activity of *leading others on new processes*. These activities enable team to develop a shared understanding of their *task-knowledge coordination*, which describes how tasks but also relationships between subtasks and team members can be divided and organized (Kanawattanachai and Yoo, 2007). Consequently, this combination of structure and social activities for achieving formalized and guiding processes is particularly adequate for settings in which activities are pre-determined, predictable, less knowledge-intensive (Chung and Jackson 2013), tasks are repetitive, and the likelihood of unexpected events is little (Rousseau and Aubé 2010). However, teams need to re-establish their common understanding of processes and procedures (Johnson et al., 2007) once task demands change. When teams fail to negotiate a common understanding of their roles, responsibilities, task procedures or likely contingencies (Mathieu et al., 2000), they will experience misalignments of procedures and coordination problems.

To respond to this challenge, teams perform the structure activity of *adapting apps to process needs* to create *flexible* processes. which requires teams to self-manage their actions and to adjust to changes accordingly (Rousseau and Aubé, 2010). When processes require a more flexible environment, the ESN apps need to allow for adaptation (Maier and Remus, 2011).

4.4 Maturing Information Objects

Because of using the ESN as a single platform, information inside the ESN becomes a highly visible and at the same time highly accessible object. Information objects can be reused and adapted in new or reoccurring situations and tasks. Having their potential for reuse and adaptation in mind, users also put more effort in creating objects that are easy to reuse.

Over time, it can also happen that team members leave their teams or the entire organization, new teams are built or existing teams restructured. Because executive boards of national and regional entities are elected for one year, they require a planned transition from one generation to the next. Interviewees highlight the use of ESN features to create reusable information objects.

“And also, after generations, it’s still very easy to give information over – knowledge or data – to other people. Because you just give them access to a certain workspace. Especially, positions are changing, and then they have access to all the data.” – RTL 1

Bearing its potential of reuse in mind, interviewees also feel encouraged to invest more time to create objects that can be easily reused and adapted by others (*structure activity: create reusable information objects; effect: reusable*):

“And so we have to focus, I would say, nearly half of our time on making documents fancy or thinking of ‘How can I use these documents more often than once?’. [...] So we have to think about more how we can make it in a way that everybody understands it really easily, so that they use it, and less on the one-use issue.” – RTL 2

At the same time, objects mature through their reuse, adaptation and improvement over time within the organizational ecosystem. Adapting information objects helps members of a team to be more efficient when performing their tasks (*structure activity: adapt information objects to changing needs; effect: maturing*):

“They can adapt things to find also, for example email templates, to send it to companies, or, also to students who apply for a job here. They just can use the templates to copy-paste it to the mail. And they also can change it and adapt it, and that’s what’s really good.” – RTL 4

“I built on the structure that was already implemented. [...] I used already some parts and then improved in that.” – RTL 3

Interviewees mention that the ESN’s ease-of-use and accessibility supports them to reuse and adapt the structures. They also feel encouraged to discuss improvements on existing objects and to give suggestions to others, so that these objects are able to mature over time and others can benefit from adaptations and improvements upon their reuse (*social activity: discuss information objects; effect: maturing*):

“[...] at first, when we use a new app, normally in the whole [Regional Chapter], we just discuss it before, if it is really necessary” – RTL 4

“I definitely think that everybody [...] has his or her say in [discussing changes]. [...] everybody that is actually part of the workspace can at least give suggestions on changes, yes. – NTL 2

Summing up, Table 5 details the discussed activity types and the activities enacting them to create reusable, yet maturing information objects.

Activity type	Activity	Effect
social	discuss information objects	reusable, yet maturing information objects
structure	create reusable information objects adapt information objects to changing needs	

Table 5. Activities and their effect to induce reusable, yet maturing information objects

Team members realize the structure activity of *creating reusable information objects* to prepare them for their potential reuse in the future. *Reusable* information objects incorporating already existing generalized task knowledge, give team members the opportunity to exploit the work of others efficiently, as there is no need to “reinvent the wheel” (Austin, 2003; March, 1991). However, task knowledge might turn out to be erroneous, which requires teams to converge on their shared understanding to yield accuracy (Lim and Klein, 2006; Mohammed et al., 2010).

To respond to this challenge, we found that teams explore alternatives to *mature* existing information objects by performing the social activity of *discussing information objects* with others. Teams also

perform the structure activity of *adapting information objects to changing needs*, which concludes an object's maturation over time (Maier and Schmidt, 2014). Discussions allow team members to build consensus on meaning by eliciting overlaps of their individual understandings (Bittner and Leimeister, 2014). This is in line with previous research describing activities for sharing, interpreting, combining, and storing information to foster group learning (Argote et al., 2000).

5 Discussion, Implications and Limitations

Our study offers two contributions: (a) four ESN-enabled team-level effects and (b) associated social and structure activities. In this section, we discuss the counterbalancing nature of properties constituting each effect and detail theoretical and practical implications, as well as limitations of this work.

The ESN-enabled team-level effects are described with properties that allow for distinguishing base effects and complementary effects. In the section above, we identified team states in which social and/or structure activities are performed, which result from these effects but are not necessarily stable over time, which led to challenges for team collaboration. Once a team state emerged with the help of social and/or structure activities associated with an ESN-enabled base effect, e.g., *collective* and *unified* communication, its positive impact on the team was not necessarily stable. Although the ESN-enabled base effect was perceived as positive, it also presented a challenge for the team over time, e.g., excessive communication leading to information overload. Teams performed social and/or structure activities to respond to the challenge, which was associated with ESN-enabled complementary effects, e.g., *relevant* communication. Consequently, our findings demonstrate that ESN-supported activities do not only lead to a *single* effect, but that an effect's properties constitute tensions: For example, communication is collective, unified, *yet* relevant, which splits it into a base effect (collective, unified) and a complementary effect (*yet* relevant). Complementary effects offer additional properties that counterbalance properties of base effects. In Table 6, we decompose the tensions by relating team states with challenges and responses, in order to explain how base effects are counterbalanced by their complementary effects.

Base effect	Tension			Complementary effect
	Team state	Challenge	Response	
unified, collective communication	perform social activities to develop task and team <i>mental models</i>	excessive communication can result in <i>information overload</i>	perform social and structure activities to <i>adapt behaviors</i> using <i>lean communication</i>	relevant communication
visible, active participation	perform social and structure activities to foster <i>team situation awareness</i>	too many awareness cues originating from the environment can result in <i>distraction</i>	perform social and structure activities to foster role-relevant sharing of <i>task knowledge</i>	controlled participation
formalized, guiding processes	perform social and structure activities to maintain effective <i>task-knowledge coordination</i> in routine task settings	exceptions from formal processes can result in <i>misalignments</i> of procedures and <i>coordination problems</i>	perform structure activities to adhere to novel task demands from <i>non-routine tasks</i>	flexible processes
reusable information objects	perform structure activities to <i>create sharable task knowledge</i>	shared information objects can contain <i>erroneous task knowledge</i>	perform social and structure activities of <i>consensus building</i> to foster <i>group learning</i>	maturing information objects

Table 6. Tensions of team states, challenges, and responses for each effect

Our findings have implications for theory and practice. Our findings add to a better understanding of ESN-related team research. Here, we contribute by establishing a conceptual connection between ESN-

enabled team effects and team states. This conceptual connection is detailed by drawing on the differentiation between base and complementary effects that are characterized by counterbalancing properties. A better understanding of these properties is deemed important, since they help explaining why teams are able to maintain their team states over time. Implications for practice are that the identified social and structure activities which can take place on ESNs allow for a better understanding of ESN-enabled team-level effects in team collaboration settings. These solely ESN-induced effects support an organization's operations, including internal communication and participation, its processes and the handling of structured and unstructured data contained in information objects.

Our study may have some limitations. The activities and effects identified in our study stem from researching a single non-profit organization. This organization is characterized by a high amount of organizational change, a comparatively young workforce, employees at the beginning of their professional careers, and a high fluctuation. Yet, this special case of ESN use illustrates how an organization adopted the ESN as the central information and communication infrastructure supporting its inter-organizational business processes. For this, the ESN's adaptability and extensibility with workspaces and apps is of special importance and our findings rely on users being able to shape the ESN according to their needs. This might not be the case for all commonly available ESN solutions, at least not to this extent. The number of 12 interviews conducted is limited. However, our data analysis showed saturation for the revealed activities and effects. Another limitation concerns that one of the authors had been affiliated with the studied organization prior to the research, causing a potential bias. On the one hand, this affiliation opened the doors to the organization and for having open conversations with the interviewees. On the other hand, two co-authors not affiliated with the case organization counteracted this potential bias who continuously challenged the coding, categorizations, and conclusions. Even though the conducted results' validation with three interviewees confirmed our findings, the interviewees mentioned further topics of interest not investigated by our study, such as the role of trust in governing participation, differentiating an object's changing purpose through its reuse and the role the ESN vendor plays in changing features and tools of the ESN-provided work environment.

6 Conclusion

In this paper, we explored how ESNs affect team activities in team collaboration. First, we investigated ESN-supported activities for team collaboration and categorized them in two types of activities: social and structure activities. We found that teams instantiate these types of activities to either foster direct interactions on the relationships among team members or with objects as mediated interactions. Second, we found four effects of ESN use resulting from a combination of social and structure activities. Third, our findings explain the tensions that characterize each effect by disaggregating them into team states, challenges, and responses. This provides an understanding of how our case organization replaced traditional IS with an ESN for its operations. We add to the scientific knowledge base four effects of ESN usage on team collaboration that are the result of social activities being intertwined with structure activities. We further revealed that tensions within the effects exist, which we described with team states, challenges and their according responses.

Further research may concentrate on the situational character of the effects, e.g., by observing patterns of their impacts with respect to specific contexts (team, task, activity), on additional or different activities and effects that might exist in for-profit organizations. Further quantitative studies are needed to measure the possible impact of identified effects on collaboration success and performance.

For organizations rethinking their information infrastructure by employing ESNs, orchestrating the effects stemming from ESN-supported social and structure activities bears potentials for team collaboration. Relying on team states, challenges, and responses, our case explicates how these potentials are realized through tensions on communication, participation, processes, and information objects on the ESN as one integrated platform.

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