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TOWARDS MANAGED STRUCTURATION: EXPLORING BRIDGING MECHANISMS FOR IS-ENABLED CHANGE IN MULTI-SITE IMPLEMENTATION PROJECTS

Complete Research

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Abstract

This paper aims to enhance our understanding of the bridging mechanisms underlying information system (IS) enabled change in multi-site implementation projects, and explore opportunities for intentionally shaping such change. To achieve this, we develop and empirically demonstrate the added value of a multi-site practice perspective. The perspective conceptualizes IS-enabled change as a product of interactions between processes in two related socio-technical systems: the project and local implementation sites. We introduce the term 'bridging mechanisms' to pin point three interaction types between the project and local site that contribute to IS-enabled change: practice alignment, shifting actors, and shared action. We analyse bridging mechanisms during the implementation process of a government funded project implementing IS in order to enhance older adults' social networks and enable them to live at home independently at three local sites. Drawing on insights derived from this empirical analysis as well as previous literature, we discuss how the multi-site practice perspective brings together known change interventions in a holistic perspective on multi-site implementation. Moreover, we propose three practical applications of bridging mechanisms, i.e., bridging tactics, that allow for managed structuration during multi-site IS implementation.

Keywords: Multi-site implementation projects, IS-enabled change, Bridging mechanisms, Socio-technical systems

1 Introduction

Multi-site information systems (IS) implementation projects are those that develop (semi-) standardized IS, and implement these IS at local sites. They include a project site in addition to multiple local sites. These projects are increasingly common in IS implementation (Sia and Soh, 2007), among the working population, e.g., enterprise software (Pollock and Hyysalo, 2014; Van Fenema, Koppius, and Van Baalen, 2007; Markus, Tanis, VanFenema, 2000), and among citizens, e.g.,telecare implementation (Boonstra and van Offenbeek, 2010; Barlow, Bayer, and Curry, 2006).

Many multi-site IS implementation projects face the -understudied- challenge of generating local change through IS implementation. Previous research has highlighted that in order to achieve the desired local IS-enabled change, it is important to explicitly manage the IS implementation process with careful consideration of the local social context (Zack and McKenney, 1995). However, in multi-sited implementation projects IS is developed through an interactive process between project actors and multiple local sites (Pollock and Hyysalo, 2014). Then the particularly difficult part is managing the local integration of IS implementation at multi-sites (Wagner, Newell, and Piccoli, 2010; Leonardi and Barley, 2008; Sia and Soh, 2007; Lucas, Walton, and Ginzberg, 1988), and by doing so, generate the

desired local IS-enabled change. Therefore, a better theoretical understanding of multi-site IS implementation leading to local change is needed (see also Grabski, Leech and Schmidt, 2011).

In order to better understand how multi-site implementation projects allow local socio-technical change, and to take steps to intentionally shaping such change we pose the following research question: *When, i.e., through which mechanisms, do multi-site implementation projects contribute to IS-enabled local change*? To answer this question, we must go beyond "the local and immediate circumstance surrounding [IS] adoption and use" (Williams and Pollock, 2012, p.1). Therefore, we extend our analysis to include IS development in addition to adoption. We propose a multi-site practice perspective on IS implementation that considers both the process of IS development and its embedding within existing local practices, thus enabling (or constraining) socio-technical change at local sites.

This study contributes to the literature in two ways. First, it introduces the term *bridging mechanisms* to the existing implementation literature. Bridging mechanisms are mechanisms for IS-enabled change that connect practices at project and local sites. Based on the multi-site practice perspective, we identify three such mechanisms: practice alignment, shifting actors, and shared action. They provide a theoretical underpinning for known change interventions. Second, we demonstrate the added value of the bridging mechanisms construct through an embedded case study of a multi-site implementation project. Third, we contribute to managerial knowledge by proposing three bridging tactics opening the way towards managed structuration.

In the next section, we draw on previous literature to develop a multi-site practice perspective and introduce bridging mechanisms. In an embedded case study, we explore how these bridging mechanisms are enacted in a government funded project implementing IS infrastructure and applications aiming to enhance older adults' social networks and enable them to live at home independently. We discuss theoretical contributions of our perspective and show how bridging mechanisms can be used to inform managerial bridging tactics for IS-enabled local change.

2 Theory development

To enhance our theoretical understanding of IS-enabled change in multi-site implementation projects, we develop a multi-site practice perspective. This perspective allows us to identify three mechanisms for IS-enabled change between project and local sites, that we call *bridging mechanisms*. The theoretical and societal relevance of studying multi-site implementation projects within the societal domain are explained at the end of this section.

2.1 The socio-technical change in multi-site IS implementation projects

Within the multi-site implementation literature, there is a general lack of studies that combine an analysis of social processes related to implementation with a detailed account of changes related to the technology at hand (Lyytinen and Newman, 2014; Williams and Pollock, 2012; Leonardi and Barley, 2010). Such an analysis can extend our knowledge of interactions between multiple actors (i.e., project and local actors) throughout the full implementation process, as it helps us to identify bridging mechanisms for change in interactions between project and local actors.

In order to acknowledge both the social and technological roles in multi-site IS implementation projects (Elbanna, 2007; Lyytinen & Newman, 2014), and highlight the role of the technological artifact (Orlikowski & Iacono, 2001), Lyytinen and Newman (2014) suggest to integrate these two streams of literature. A process-oriented perspective[1] could be enriched with a detailed analysis of the technology

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[1] See for example Lyytinen, Newman, and Al-Muharfi, 2009; Shepherd, Clegg, and Stride, 2009; Van Fenema, Koppius, and Van Baalen, 2007; Howcroft and Light, 2006; Wagner and Newell, 2006; Chae and Poole, 2005; Nurmi, Hallikainen, and Rossi, 2005; Scott and Wagner, 2003; Hirt and Swanson 1999.

involved[2]. Doing so places technology at the center of the implementation process. Williams and Pollock (2012) provided two suggestions for such research. First, they argued that analyzing the role of technology in multi-site IS implementation projects requires "follow technologies through space and time". That is, first, to trace "the long-term development of packaged systems both *prior to* and *after* their […] implementation" (p. 15, original emphasis). Second, in order to understand social dynamics during the implementation process, the evolution of an IS needs to be studied in relation to the multiple actors involved (Williams and Pollock, 2012). In line with Leonardi (2009) and Leonardi and Barley, (2010), Williams and Pollock suggested that technological and social change are linked and should not be analyzed in isolation. Adopting a holistic, process-oriented approach to multi-site IS implementation by following the interactive socio-technical process through which IS is developed and implemented, allows a better understanding of the underlying power structures (Leonardi & Barley, 2010) as well as IS- enabled local change. Empirical studies that adopt such a holistic perspective are rare. Outside Pollock and Hyysalo (2014), who analyzed how a software vendor enrolled key customers in selling the product and by doing so shaped a new reference user role, we did not find studies analyzing multi-site IS implementation processes using a holistic perspective. In the next section, we provide a theoretical grounding for such a perspective.

2.2 The multi-site practice perspective

What is missing in the multi-site implementation literature is a process-oriented perspective on socio-technical change to enhance understanding what accounts for local IS-enabled change. We draw on Greenhalgh and Stones (2010), Pentland and Feldman (2007), Johnston (2001), and Stones (2001) to fill this gap and develop a multi-site practice perspective. Like these authors, we combine the process oriented structuration theory with insights from socio-material literature, as their theoretical foundations share important common elements and have the potential to enrich each other's valuable insights (Greenhalgh and Stones, 2010; Pentland and Feldman, 2007; Johnston, 2001; Stones, 2001). Combined the theories enable a detailed account of the relative contributions of human and IS actors within project and local practices and therefore an assessment of IS-enabled change within multi-site implementation projects. IS-enabled change is defined as socio-technical re-configurations of the relative distribution of resources between local actors (both human and technological) that are the consequence of the implementation of new (understandings of) IS.

We now introduce the multi-site practice perspective and elaborate on its key elements and the connections between these elements (see figure 1; appendix A provides a list of definitions). The perspective includes two site types. First, the project site, i.e., the change agent site, is the site where the development and implementation of IS is executed and managed. Second, the local site, i.e., the change recipient site, concerns the site where the IS is implemented (based on Armenakis and Harris, 2009). Moreover, both sites consist of three levels: structural, physical, and practice. First, the structural level includes the socio-technical structures drawn upon by project and local actors. These structures are defined as rules and resources (Giddens, 1984), i.e., actors' shared understandings about the relative distribution of resources among actors. Groups of actors, e.g., stakeholders, may draw upon distinct social structures, and thus perform and understand actions through diverse combinations of reflections, rules, and resources, i.e., social multidimensionality (Boonstra and Van Offenbeek, 2010).

Second, the object level consists of human and IS actors. We follow the suggestions of Greenhalgh and Stones (2010) and Pentland and Feldman (2007) to argue that humans and IS can both be considered actors. An actor is an entity capable of performing action (e.g., humans can build connections with others, a computer screen lights up by the push of a button). This is a departure from earlier conceptualizations of technology as a structure (Orlikowski, 1992), or as mediator for the enactment of structures (Orlikowski, 2000). Although human and IS actors can both be defined as actors, this does

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[2] e.g., Berente and Yoo 2012; Williams and Pollock, 2008; Elbanna, 2007; Pollock and Cornford, 2004.

not mean that they are the same. To begin, although human and IS actors both consist of particular combinations of material and non-material parts (Faulkner and Runde, 2013; Leonardi, 2010), the nature of these parts is fundamentally different. Moreover, whereas the particular organization of the material and non-material parts allows both human and IS actors to access a range of resources (e.g., knowledge and abilities), the type of resources available to them is again different. On one hand, IS actors draw on performative resources for their (reactive) actions. Performative resources determine the how and when of action. On the other hand, human actors in addition draw on ostensive resources for reflective action. Ostensive resources refer to situated understandings of the rules, i.e., the why behind the how and when of an action (based on Pentland and Feldman, 2005; 2007; Feldman and Pentland, 2003). This conceptualization visualizes the relative roles of both types of actors during implementation.

Third, there is the practice level comprising of situated practices (Orlikowski, 1996; 2000) and linking the structural and object level (Orlikowski, 2000). Situated practices are the recurrent "embodied [resource] mediated arrays of […] activity centrally organized around shared practical understandings" (Schatzki, 2001, p.2). Therefore, we understand situated practices as those consisting of related, socially meaningful actions. Here, actions entail the enactment of resources by an actor. The mutual relationships between these actions are established through interactions between them (Barley, 1986; Leonardi and Barley, 2010) (e.g., there is a relationship between pressing a key on the keyboard and a character appearing on the screen). The structural level enables and constrains practices, because a particular distribution of resources among actors allows for a range of optional actions and excludes others (Stones, 2001; Giddens, 1984). Thus, depending on the situation, an actor can chose to perform a range of actions. In turn, these actions can reinforce or change pre-existing structures, while producing actors' identities. This briefly summarizes how practices link structures and physical actors.

In summary, we have outlined the key elements of the multi-practice perspective. We defined multi-site IS implementation as consisting of two types of sites, i.e., the project and multiple local sites. Each of these sites has a socio-technical structure, which enables and constrains action. At each site, human and IS actors perform related, socially meaningful actions enabled by the structure, i.e., "practices". Next, we explore the possibilities for interaction between sites through bridging mechanisms.

2.3   Bridging mechanisms

When project (e.g., the project manager or developed software) and local actors (intended user groups, preexisting hardware) jointly engage in the IS implementation process, interactions occur *between* project and local sites. Whereas the current multi-site IS implementation literature underlines the relevance of the interaction between project and local actors to generate IS-enabled change (Wagner, Newell, and Piccoli, 2010; Howcroft and Light, 2006), it remains relatively silent on the mechanisms for the IS-enabled change that underlie these interactions (except for Sabherwal, 2003) and how they relate to social and technical elements. To fill this gap we introduce *bridging mechanisms* and theoretically deduct three such mechanisms: practice alignment, shifting actors, and shared action.

First, **practice alignment** relates to the negotiation process (Wagner, Newell, and Piccoli, 2010) that shapes meaningful relationships and boundaries between the practices (Mørk et al. 2012) through recurrent interactions between those practices. The alignment between project and local practices is different from the alignment of actions within a single practice (e.g., Black, Carlile, and Repenning, 2004; Barley, 1986), because it includes the possibility that practices at one site can enable a new enactment of resources at another site. Moreover, how the both actors make sense of the practices they observe at the practice site differs as both local and project actors draw on different sets of ostensive resources.

Second, **shifting** actors refers to human or IS actors that participate in both local and project practices and thus shift between actor groups. Pollock and Hyysalo's (2014) conceptualization of a reference actor, however, seems to refer to a local actor that shifts to the project site. Indeed, Pollock and Hyysa-

lo (2014) showed that such shifts enable change as reference actors 1) build tradable knowledge; 2) help construct IS as a consumption object for others; and 3) link vendors and customers.

Third, **shared action** refers to a particular action that is part of two or more practices, thus creating an overlap between those practices. In principle, shared action is different from multiple actors performing the same action within a single practice (e.g., Orlikowski, 2000). Although the action is performed jointly by project and local actors, how human actors at both sites make sense of the action in relation to the wider practice to which they belong might (i.e., either the project or local practice). For example, in the context of a multi-site implementation project, project and local human actors might jointly formulate the IS requirements. However, whereas project actors may understand this action as a way of increasing the likelihood of project success, local actors involved might want to better understand the implications of IS implementation on existing work practices. Over time, project and local human actors might develop a shared understanding of the action, creating hybrid structures. We now explore how these bridging mechanisms are enacted though an embedded case study.
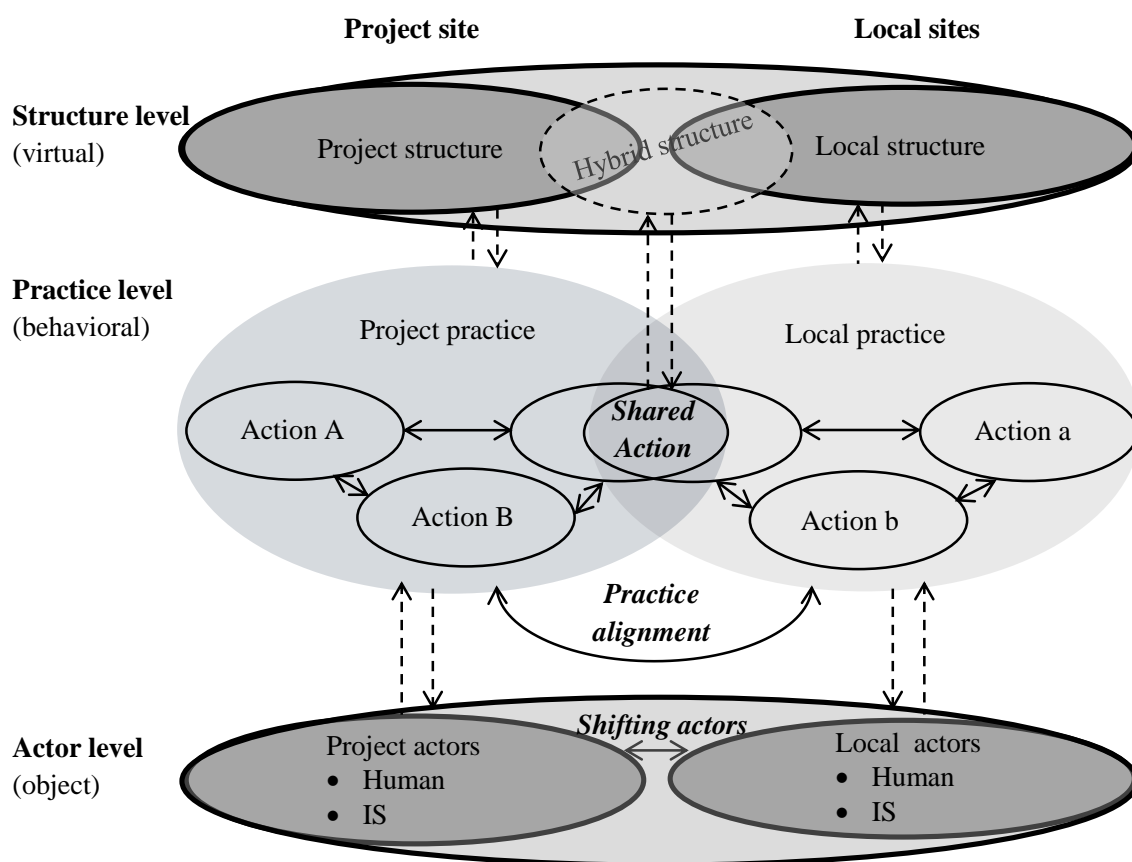

Figure 1:   *A multi-site practice perspective on IS-enabled change (with the bridging mechanisms in **bold italic**)*

2.4   Studying the multi-site practice perspective in a societal setting

The case we selected to analyze the presence of bridging mechanisms is a government funded project implementing IS within a societal context, targeting older adults at three local sites. For the analysis of bridging mechanisms the societal context is particularly appropriate because the villages are relatively autonomous. Such decentralized control tends to problematize the implementation process (Lyytinen and Newman, 2014) and thus increases the necessity of creating bridging mechanisms in order to es-

tablish local change. Moreover, the absence of managerial pressure and sanctions to participate in IS implementation at the local sites eliminates some alternative mechanisms to establish change.

From a societal perspective, considering the rapid world population aging (United Nations, 2013), and the frequent calls to develop IS to support this aging population (e.g., Ambient Assisted Living Joint Programme, 2012) studying IS implementation among older populations is increasingly relevant.

3 Methods

3.1 Case selection

To explore how bridging mechanisms are enacted empirically, we conducted an embedded case study. The multi-site IS implementation project we selected developed and implemented IS in three villages (population <600) in the Netherlands.

The selected case met all four criteria for the joint analysis of changes in relative roles between actors and socio/technical practices within multi-site projects (Leonardi and Barley, 2010). First, we analyzed both IS development and local adoption in order to consider how pre-existing power structures shape the IS implementation process, including the available IS. Second, by including both the project and local sites in the analysis, we were able to assess the relative contribution of multiple actors to the implementation process that brought about IS-enabled change. Third, we adopted a longitudinal approach, which is necessary for observing subsequent and interrelated practice and alignment processes at and between multiple implementation sites. Finally, we compared the three villages targeted by the project as multiple local sites. The villages were selected by the three participating municipalities, and comparable in several respects: they had a population of approximately 500-600 people; a limited service availability; and they were located within 15 kilometers of the same city, i.e., service center.

3.2 Operationalization

An overview of all key elements in the multi-site practice perspective and their conceptual and operational definitions are provided in appendix A. We distinguish between human and IS actors at both the project and local site by considering human actors at the project site to be people either employed by the project or an official member of one of its bodies. At the local sites, village members were involved with the project, for example, the target population or a community leader. IS actors included all IS involved in the project and/or local practices, as well as the IS developed during the implementation project, i.e., a care management tool "OnlineContact," local support tool "Noaberschap," library service, and online bakery shop. We operationalized he bridging mechanisms: practice alignment, shifting actors, and shared action, as follows. Shared action occurred when multiple people involved at both the project and local sites performed the same social behavior together. Practice alignment occurred through interactions between project and local actors doing different activities. Finally, shifting human actors is conceptualized as project managers hiring local people, not only to device user requirements, but to organize and manage local IS implementation. Shifting IS actors is operationalized as the implementation of an IS at a local site.

3.3 Data collection and analysis

We collected multiple types of data. First, the authors attended nearly all official meetings within the project between January 2011 and June 2014. These included project team meetings, board meetings, advisory council meetings, and local sounding board meetings in each of the three participating villages (an overview of the attended meetings is included in Appendix B). During these meetings, research notes were made to complement the meeting minutes. When appropriate, the meetings were audio taped. In addition, we participated in project activities at each of the local sites, went through email

communication between the project actors, and collected newspaper articles regarding the project published in local newspapers.

We analyzed the data by selecting the key events and interventions per local site and placed these events and interventions within multi-site practice perspective. We explored the bridging mechanisms that could be identified per site. Then, we compared the local sites in a cross-case analysis.

4   Results: description and analysis

In this section, we describe the implementation project as well as the implementation process at local site 1-3. We analyze and compare how interactions between local and project actors at the local sites relate to the three bridging mechanisms: practice alignment, shifting actors, and shared action.

4.1   Description of the multi-site implementation project

The project selected for this case study aimed to implement IS-based services that would allow older adults to live independently for as long as possible. Goal was to implement new IS applications developed by an IT developer or in cooperation with local actors, in addition to providing IT training for the IT illiterate. The project ran from early 2011 to December 2013, in three villages, i.e., local sites, each with a population of approximately 500-600 (Statistics Netherlands, 2014). The formal project planning dictated that the project establish a local organizational structure, which included hiring project employees and involving village members in the project by setting up local sounding boards. In addition, a need investigation had to be conducted to determine the IS services to implement. This investigation revealed that older village members desired a place and occasion to meet. Therefore, in addition to IS implementation, the notion of "meeting each other" became a central project theme. Then, the IS service had to be developed and implemented. This implementation was supposed to include three parts: 1) hardware to be implemented at the community center, possibly equipped with newly developed software; 2) ten tablets per site as personal technology; and 3) newly developed software to fulfill local needs. Although hardware implementation was successful at local sites 1 and 2 (but not at local site 3), software development was considerably delayed. Moreover, the role of IS in the project changed. Whereas the initial project ideas relied mostly on the community hardware providing external services, new insights centered on personal hardware and highlighted the potential of the local service exchange. Finally, changes induced by the project needed to be sustained. This required interaction between the project and various local actors, ranging from older adults as the intended users, to community leaders. Whereas the project ran relatively smooth at local site 1, it encountered significant problems at local sites 2 and 3.

4.2   Description of the implementation process at local sites 1-3

Initially, the village members from local site 1 were not convinced of the feasibility of the IS implementation project. This attitude began to change after the village developed a community vision in May 2010 that prioritized organizing activities for older adults. The formulation of this goal and the project support to refurnish a room in the community center, increased the willingness among the community center board and the local interest group to cooperate with the implementation project because they were both targeting the older population. The project appointed a local project employee, who had lived in the village most of her life and was well known by many of its members (shifting human actor). The project employee organized several activities as a form of practice alignment, thus creating regular interactions between project and local practices. These activities included weekly informal gatherings, monthly informative gatherings and a tablet course. The informal gatherings attracted approximately 10-15 people each week (of the 82 people aged 65 or above living in the village), and the turn up at information gatherings was usually higher. In addition, two tablet courses were organized for older adults without computer experience. The older course participants received a tablet from the project (shifting IS actor). After the tablet course ended, a local village member volunteered to set up a monthly "ICT helpdesk" during the informal gatherings. In the summer of 2012, a

Personal Computer (PC) and beamer, co-funded by the project and community center, were installed in the community center (shifting IS actor). During the next year, three locally developed software applications were introduced and abandoned (shifting IS actor), i.e., a library application in cooperation with the library, a bread service in cooperation with a bakery, and a local IS developer from local site 3 developed "Noaberschap," a web-based application for offering and requesting neighborly help. These software implementation initiatives developed from shared actions between project and local actors, whereby local actors were initiating and feeling responsible for the development and implementation of software. None of these applications were used frequently. At the end of the project, project management and local stakeholders organized a brainstorm session (shared action), and the continuation of the projects' activities was discussed. After the brainstorm, volunteers took over the organization of the informal and informative gatherings, and the ICT helpdesk was continued. From a technical perspective only few of the formal project objectives were met.

Similar to local site 1, there was an initial lack of enthusiasm for the project at local site 2. In particular the active members of a local community of older adults felt threatened by the project because it targeted the same population of older adults catered by the community of older adults. This feeling was expressed during a meeting with the later appointed project manager in April 2011. Ironically, the changed project focus "meeting each other" strengthened the perception that the project would compete with the local older adult community because the proposed project activities showed considerable overlap with the community's activities, at least in the eyes of its members. As a result, there was little practice alignment. Because of the community member concerns, the informal and informative gatherings were not implemented by the project. Because of health problems and job shifts, the project had considerable problems appointing a project employee at local site 2. Eventually, a social worker was appointed, who started organizing tablet courses for older adults without computer experience (practice alignment & shifting IS actor), much similar to local site 1. A local computer expert and active organizer of local computer (i.e., PC-based) courses for older adults offered to provide the classes along with the project employee. This was one of the first active local contributions to the implementation process, i.e., practice alignment. Moreover, the project employee brought key local actors together in a task force to jointly implement "Noaberschap" (shifting IS actor & shared action). Because the personnel changes delayed the implementation process, the project actors decided to extend the project at local site 2 by six months until June 2014. This allowed the software developed by the project, i.e., OnlineContact, to be tested at local site 2 (shifting IS actor). The application is an agenda that patients and (in)formal caregivers can share to coordinate care activities. The test showed several technical difficulties with the software.

Unlike the other sites, local leaders at local site 3 were relatively positive about the technological solutions initially suggested by the project. During a workshop in October 2011, actors at local site 3 were fed back the initial results of the needs investigation, and invited to brainstorm with the project management regarding potential technological and non-technological solutions (shared action). Although project actors intended to engage in shared action with local actors, local actors were reluctant to take on the role of active participants. It was believed that decisions regarding the project focus and planning were the responsibility of the project experts. This reluctant attitude forced the project actors to take initiative and develop an adjusted project focus and planning based on their own interpretation of the need investigation results. A local project employee was appointed in September (shifting human actor) who had lived in the village her entire life. The project employee started organizing informal and informative gatherings (practice alignment). However, the finalization of the project employee's contract proved problematic because it was unclear which organization involved in the project would be the official employer. By the time the contract was finalized the relationship was damaged and the project employee abandoned her role as project actor and thus stopped being a shifting actor. An external conflict manager was appointed by the project to assess the situation and propose ways forward during Summer 2012. This did not stop a local IS developer from designing and developing a local web-based application, i.e., "Noaberschap" (shifting IS actor). Eventually, although the conditions of the project employee to continue her job were not met, she decided to continue her work for the project organizing gatherings and implementing "Noaberschap" (practice alignment). However, the rela-

tionship between the project employee and the project remained problematic. When the project ended, along with her employment status, the former project employee continued to organize the informal and informative meetings, albeit under a different name and not before she publicly distanced herself from the project.

4.3   Research analysis: Bridging mechanisms and change outcomes

In the descriptive part of the results section, we observed divers interactions between divers project and local actors, which we conceptualized as bridging mechanisms, including: practice alignment, shifting and shared action. With this, we empirically demonstrated the relevance of bridging mechanisms. In addition, we found that the extent to which these mechanisms are present differs per local sites, clearly affecting change outcomes. Table 1 summarizes and compares the bridging mechanisms per site.

We found that at local site 1, local and project practices aligned relatively smooth. This was in part because local and project actors realized they had overlapping goals and were willing to help each other to achieve these goals. The interventions proposed by the project fitted well within the local context and inspired more active local involvement. This created a situation where local volunteers were willing to take over project tasks in close consultation with, and with support of, the project actors. This situation is different from local site 2, where project interventions were perceived as an ill-fit with pre-existing local practices, thus leading to a limited implementation of social interventions, and local site 3, where the professional relationship between local and project actors was problematic, resulting in a hostile takeover of the project tasks by local actors.

Next, at local site 1, we observed local human actors becoming involved in project practices, and project IS actors being implemented at local sites, i.e., shifting human and IS actors. This involved the appointment of a local project employee at local sites 1 and 3, who continuously shifted between local and project roles. Shifting IS actors included the tablets, PC, and beamer, and the software developed by the project implemented at local sites 1 and 2. At local site 3, the local actor appointed by the project distanced herself from the project and the IS hardware, i.e., a community computer to communicate with the local municipality was abandoned and removed from the community center. This meant that both the human and IS actor stopped shifting and restricted themselves to the local and project domain respectively.

Furthermore, we found occasions where project and local actors engaged in new forms of shared action. In all cases, shared action was legitimate from both project and local perspectives, although their meaning might differ between project and local actors. At the start of the project, local actors at sites 1 and 2 engaged in sounding board meetings, where project and local actors worked together to some extent. At local site 3, these meetings were soon discontinued. In other occasions, project and local actors joined forces to organize activities. For example, at local site 2, local and project actors set up a local taskforce to organize an event with the goal of drawing attention to the new "Noaberschap" application and the wider socio-political context that inspired the application's development. The brainstorm meeting at local site 1 is another example of a shared action.

Finally, we observed IS-enabled local changes after the project ended. At local site 1, for example, the brainstorm session (shared action) led to a list of tasks to be taken over and a list of people willing to take on particular responsibilities. This assisted local volunteers to become organized and start managing the former project interventions (e.g., informal and informative gatherings). Moreover, the brainstorm helped to sustain previous initiatives enabled through practice alignment, such as the locally initiated ICT helpdesk. In addition, the implementation of IS hardware was sustainable at local site 1, i.e., the shifting IS actor became an integrated part of the local context. Older adults who participated in the tablet course took their tablets home and continued to use them during at least the next 6 months. In addition the PC and beamer implemented at the local community center continued to be used. At local site 2, the lack of practice alignment hindered the implementation of the project's social interventions (i.e., informal and informative gatherings) and restricted activities to a tablet course and

software implementation. Similar to local site 1, the tablet course participants at local site 2 took their tablets home and continued to use them. Finally, at local site 3, the problematic relationship between the project actors and local project employee, i.e., shifting local actor, limited the project's technological interventions to the Noaberschap software implementation, which was largely abandoned. Despite lack of bridging mechanisms, the social interventions implemented by the project were sustained, but not before the local project employee distanced herself from the project. Clearly, this was not the local change initially envisioned by the project actors.

Bridging mechanism	Local site 1	Local site 2	Local site 3
Practice alignment	**Smooth alignment** • Initial misalignment is realigned after realizing common goals and project refocusing; • Project efforts to organize social gatherings and tablet courses resonate well with local ideas to organize more local activities for older adults.	**Problematic alignment** • Initial misalignment is a barrier to establish reinforcing project and local roles; • Project aims to realign after its' ideas are perceived as a threat to local roles and practices; • Local actors, such as the community center board and local website maintainer, become involved.	**Problematic alignment** • Initial alignment weakens when project and local actors fail to establish reinforcing project and local roles in the context of project change; • The integration of the local actor employed by the project within project practices proceeds problematically; • Local actors attend project activities.
Shifting actors	**Shifting human & IS actors** • The local project employee continuously shifts between local and project roles; • The project makes community and personal hardware available to local actors; • The project develops IS software and makes it available to local actors.	**Shifting IS actors** • The project makes personal hardware available to local actors; • The project develops IS software and makes it available to local actors.	**Shifting discontinued** • The local project employee experience difficulties adapting, and distance herself from the project; • The project remove the unused project hardware; • The project locally developed software and makes it available to all local sites.
Shared action	**Shared action** • Local actors participate in sounding board meetings; • Local actors initiated various IS implementations; • Local and project actors engage in brainstorm on how to make project activities sustainable.	**Shared action** • Local actors participate in the local sounding board meetings; • Local and project actors cooperate on the local implementation of "Noaberschap."	**Limited shared action** • Conflicts between the project management and the local project employee hinder the continuation of local sounding board meetings; • Local actors refuse to engage.
Local IS-enabled change	• Continuation of implemented social interventions; • Continued use of implemented hardware.	• Continued use of implemented personal hardware.	• Continuation of implemented social interventions.

Table 1.   Comparing interactions across the local sites

4.4   Research analysis: Toward managed structuration

Taken together, the three bridging mechanisms, practice alignment, shifting actors and shared action, enabled socio-technical changes both at the project and local sites. In turn, these changes affect subsequent interactions between project and local actors, and eventually enabled local change. Project actors were not oblivious to local concerns at the three local sites. We observed project actors attempting to actively and intentionally build structural patterns of interaction with local actors in order to estab-

lish sustainable change through bridging mechanisms. However, this process towards manages structuration is demanding for project actors. We observed that it involved considerable technological and social change at the project site. For example, the role of technology within the project changed considerably. Whereas the initial project idea centered on community hardware and software making external services locally accessible, over time, increased attention was given to personal technologies, i.e., tablets, IS literacy, service, and information exchange between local actors. Moreover, the idea of locals meeting each other became an integrated part of the project's interventions, signaled by the inclusion of social interventions. Because the project changed to adjust to the local sites, social change is accompanied by technological change and vice versa (see table 2). Nevertheless, tension remained between incorporating the general needs of older adults and adjusting project interventions to the specific circumstances at each local site. Although the initial misalignment at the local sites were not resolved completely, the project actors managed local concerns by addressing the issue during local sounding board meetings (shared action), through selective implementation of social and technical interventions (practice alignment), and introducing more advanced technology (i.e., OnlineContact, shifting IS actor) at local site 2 that did not require social intervention.

Domain	Changing from:	To:
IS	• Community IS, complemented with home technology • Software focus on external service delivery • IS supplier A.	• Personal tablet technology, complemented with community IS if appropriate • Software focus is on local service and information exchange • New IS supplier B, in addition to formalized local IS development initiatives • IS literacy
Social	• Focus on (predominantly) technological interventions	• Including (predominantly) social interventions in addition to (predominantly) technical interventions to establish IS-enabled local change

Table 2.   Changes at the project site

5   Discussion

This paper conceptualizes "what goes on inside" IS-enabled change processes (Iveroth, 2011) within multi-site implementation projects. We develop a multi-site practice perspective in order to better understand the mechanisms through which multi-site implementation projects connect project and local practices and by doing so contribute to IS-enabled local change. The perspective addresses two concerns in the multi-site implementation literature. First, we embedded the multi-site IS implementation process within its socio-technical context by 1) adopting an the holistic analysis of the practices enacted by project and local actors and 2) considering practices, actors and socio-technical structures. Second, we clarify the role of IS by conceptualizing it as an actor, albeit of a different nature than human actors. We demonstrate the added value of our perspective through an embedded case study of a government funded project implementing IS aiming to enhance older adults' social networks and enable them to live at home independently. In line with previous studies, the multi-site implementation project had unexpected and unintended structural consequences (Leonardi, 2007; Orlikowski, 1996). However, our study shows that the high degree of complexity multi-site implementation projects does not entail that such change cannot be managed.

5.1   Theoretical implications

With the multi-site practice perspective and the introduction of the bridging mechanisms, we contributed to the literature by bringing together known change interventions in a holistic perspective of multi-site implementation projects. The perspective allows the positioning of change interventions within socio-technical theories as well as a better understanding of their cohesion. It answers to calls to embed multi-site implementation projects (Iveroth, 2011) and project management (Winter et al. 2006)

within the complex socio-technical systems to which they belong, highlighting the role of social (inter)action.

Our findings show that establishing bridging mechanisms to contribute to IS-enabled local change in a context of decentralized control, requires social and technological changes (Lyytinen and Newman, 2014; Williams and Pollock, 2012; Leonardi and Barley, 2010; Leonardi, 2009; Markus, 2004) at the project site. Bridging mechanisms are a consequence of the reflective action of project actors on one hand (Schön, 1983) and active engagement by local actors on the other. Reflective action of project actors entails an active and dynamic search for an efficacious match project and local interactions through bridging mechanisms. Optimizing this match often requires the project actors to adjust to local practices. Moreover, achieving desired local change requires active local actor involvement, which is established through dynamic leadership. In the context of dynamic leadership, project ownership and responsibility for project activities shift between project and local actors at timely occasions. By shifting ownership, local and project practices are required to interact and adapt to better complement each other. As a consequence, both the project and local site can undergo considerable social and technological change, which should enable project actors to better manage local change. Taking into account this dynamic nature of creating bridging mechanisms between project and local sites, managerial effort needs to be directed in order to achieve emerging optimization, instead of predefined outcomes.

The first bridging mechanism presented in this study entailed the alignment of practices at project and local sites. This practice alignment triggered new patterns of local interaction, for example, through the organization of a range of gatherings. However, the way practices were aligned differed for each local site, which is problematic to multi-site implementation. To overcome the tension between standardization and customization (Larsson and Bowen, 1989) in multi-site IS projects (Gann and Salter, 2000), a modular implementation approach emerged that included not only IS-based interventions, but also social interventions. Depending on the local situation, project and local actors determined the interventions to include and exclude. For example, at local site 1, social gatherings were supplemented with a tablet course and IS implementation; local site 2 included only a tablet course and IS implementation; and local site 3 comprised only social gatherings. This points to the possibility of tailoring a standardized socio-technical approach through service modularization (Voss and Hsuan, 2009).

With regard to the shifting actor mechanism, we argue that local knowledge brought in by shifting actors can be used to develop and implement context sensitive interventions (see also Pollok and Hyysalo 2014). Shifting actors resemble existing principles such as linking pins (Likert, 1961, 1976), circularity in responsibility (Ackoff, 1989), and double-linking (Romme, 1997), because those are also mechanisms for linking organizational groups. Shifting actors have double roles both at the project and local site, e.g., "employee and villager" or "product and service." Findings show maintaining these double roles is a complex and challenging process. For shifting human actors, this requires considerable flexibility from both the project practices and the local actor. Moreover, shifting IS actors is often hindered by non-adoption, i.e., lack of integration into local practices. However, when shifting actors can manage their double roles, they are in a unique position to "translate" and "relate" (Iveroth, 2011) actions across sites.

Another way to stimulate IS-enabled local change was to complement shifting IS actors with occasions for shared action, as happened at local site 2 where a local task force was formed for the introduction of a particular IS, including project and local actors. Such shared action is related to user-developer communication, user participation and user influence (Bano and Zowghi, 2014; McKeen, Guimaraes, and Wetherbe, 1994; Ives and Olson, 1984; Robey and Farrow, 1982), but it is not the same. Such action requires us to conceptualize "users" not as "those using IS," but as "local actors", and recognize their embeddedness within a particular socio-technical context (Lamb and Kling, 2003). Thus, while jointly organizing events, project and local actors would draw upon different sets of ostensive resources to make sense of these activities. Moreover, in shared action project and local actors are equals not just in terms of taking initiative, but also in terms of having responsibilities and inter-

ests. Thus far, and to the best of our knowledge, such contextualized user involvement perspective was missing (Bano and Zowghi, 2014; He and King, 2008).

5.2 Managerial implications

The empirical demonstration of bridging mechanisms allows us to inductively derive three bridging tactics, i.e., practical applications of bridging mechanisms. Managers can apply bridging tactics to shape the multi-site implementation change process through the informed manipulation of project-local interactions, i.e., managed structuration. First, in order to align project practices with local practices while minimizing appropriation costs, managers can consider a modular implementation approach. Such an approach allows for both standardization and flexibility. Incorporated modules could include IS-based and social interventions, and should be developed in close consultation with reference users (Pollock & Hyysalo, 2014). Second, managerial attention can be directed at the integration of shifting actors within project and local systems. Such integration is likely to require investments in time, flexibility, and feedback. Finally, shared action could be established by facilitating joint activities organized by both project and local actors. Such shared activities may help to engage local leaders with the project, which eventually can help to make project outcomes sustainable. Ideally, in these joint activities, project and local actors share not only decision power, but also responsibilities.

5.3 Limitations and future research

Our study has several limitations. Although statistical generalization is impossible based on our embedded case study, findings are theoretically generalizable in two respects (Klein and Myers, 1999; Lee and Baskerville, 2003, 2012; Yin, 2014). First, based on our case study we were able to draw specific, managerial implications of the relationships and processes suggested in theory. Second, the case study provides rich insights into the way bridging mechanisms play out in practice (Walsham, 1995). We suggest that future research applies the multi-site practice perspective to assess its relevance in other project management contexts. For example, within the business context future research could assess how the functioning of bridging mechanisms changes in the presence of managerial pressure and sanctions. Moreover, where we distinguish between two sets of practices, i.e., project and local practices, previous literature has shown that there might be more than two relevant stakeholder groups and thus sets of practices, involved in multi-site IS implementation (Lyytinen and Newman, 2014; Boonstra and van Offenbeek, 2010; Bob-Jones, Newman, and Lyytinen, 2008). We encourage future research to analyse how more complex forms of multi-site IS implementation, i.e., allowing for three or more types of sites, could enhance insights into dynamic inter-group practice interactions.

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Appendix A

Construct	Conceptual definition	Operational definition
Multi-site		
Project site	Change agent site (Armenakis and Harris, 2009)	The implementation site that is mainly responsible for developing and implementing IS
Local sites	Change recipient sites (Armenakis and Harris, 2009)	The multiple implementation sites where the IS is implemented.
Structural level		
Structure	A virtual, socio-technical set of 'rules and resources' (Giddens 1984), i.e., the shared understandings about the relative distribution of resources among actors enabling and constraining action.	Considering the 'absent totality' of social structures, their existence can be deducted from action, but not be observed directly.
Practice level		
Practice	Recurrent "embodied, knowledge mediated arrays of […] activity centrally organized around shared practical understandings" (Schatzki 2001, p.2).	Patterns of social behavior, i.e., how what people and IS involved in the implementation project 'do' relates together.
Action	The enactment of resources by an actor.	Social behavior, , i.e., what people and IS involved in the implementation project 'do'.
Shared action	An particular action that is part of two or more practices, creating overlapping those practices.	Project and local actors performing the same social behavior together.
Practice alignment	The negotiation process (Wagner, Newell, and Piccoli, 2010), shaping of meaningful relationships between actions or practices (Mørk et al., 2012) through recurrent interactions between those actions and practices.	interactions between project and local people and IS doing different things, i.e., performing different social behavior.
Actor level		
Actor	Human and nonhuman entities capable of performing action.	
Human actor	Living material that embodies action through the reactive and reflective enactment of resources.	People involved in the implementation project. People involved at the project site are either employed by the project or an official member of one of its bodies. At the local sites, those involved are village members who are involved with the project, for example the target population or a community leader.
IS actor	Dead or lifeless technical subsystem that is modular, recombinable, distributive, communicable, and has a memory (Pentland and Feldman, 2007; Orlikowski and Iacono, 2001) and embodies action through the *reactive* enactment of resources.	IS used in project and/or local practices and IS developed during the implementation project, i.e., a care management tool 'OnlineContact', a library service, a local support tool 'Noaberschap', and a bakery service.
Shifting actors	Actors performing actions within multiple or different practices	Hiring local people; Implementation of IS at the local site

Table A1:   Conceptual and operational definitions of key concepts

Appendix B

Attended project meetings

Project team, Groningen, the Netherlands: May 30, 2012; May 30, 2012; July 6, 2012; Augustus 15, 2012; Augustus 24, 2012; September 12, 2012

Project board, Groningen, the Netherlands: January 12, 2011; April 4, 2011; July 6, 2011; October 5, 2011; January 11, 2012; April 4, 2012; Juli 4, 2012; January 23, 2013; 24 april 2013; 4 september 2013; November 20, 2013; May 21, 2014

Project sounding board, Groningen and Ten Boer, The Netherlands: March 3, 2011; July 11, 2011; September 12, 2011; November 14, 2011; January 23, 2012; March 12, 2012; June 9, 2012; November 12, 2012; March 11, 2013; October 14, 2013

Local sounding board at local site 1, The Netherlands: February 28, 2011; March 29, 2012; June 18, 2012; November 27, 2012; May 22, 2013; October 30, 2013

Local sounding board at local site 2, The Netherlands: April 26, 2011; April 10, 2012; May 28, 2013; November 19, 2013; April 8, 2014

Local sounding board at local site 3, The Netherlands: March 20, 2011; October 25, 2011; November 30, 2011; February 16, 2012;