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Knowledge sharing behaviour within organisations: a diary-based study of unplanned meetings between researchers

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ABSTRACT
This paper analyses Knowledge Sharing (KS) behaviour of employees during unplanned, work-related face-to-face meetings with colleagues. Hypotheses were formulated from theory on how this behaviour relates to three categories of known KS antecedents (knowledge components, organisational distance, and network aspects). Data are obtained from detailed diaries on behaviour of 138 R&D employees of a research-based multinational company during their unplanned KS meetings with each other. Results show that such meetings show a lot of tacit KS and thus should not be overlooked in KS strategies. Also, the KS behaviour during these meetings relates significantly to several KS antecedents and for example, KS activities differ during meetings within and between teams. The data also suggest that a stronger emphasis on intentional unplanned meetings and a culture of shared responsibility for problems would yield more employee involvement and tacit KS, than simply steering on teams structure.

1. Introduction
Knowledge flows within organisations are important for successful innovation (Coradi, Heinzen, & Bottelier, 2015) and competitive advantage (Carlucci & Schiuma, 2006). Increased knowledge sharing (KS) is highly associated with success of new product development (NPD) programmes (Markham & Lee, 2014). In particular, tacit knowledge is important for innovative organisations as it strengthens problem solving skills (Mascitelli, 2000). To optimise tacit KS, leaders not only have to mix the right people and cultivate their commitment and interactions, but they also need to know how organisational members interact with each other (Nonaka, Toyama, & Konno, 2000). Many different types of interactions between employees have been distinguished (Yi, 2009) and during different types of interactions knowledge is shared in different ways (Martin-de-Castro, López-Sáez, & Navas-López, 2008).

In face-to-face meetings, people can transmit meaning and thus share tacit knowledge better than on paper (Mascitelli, 2000). Because the type of communication that promotes innovation occurs mostly in spontaneous encounters (Allen, 1997; Brown et al., 2014), these are the focus of this paper.

Existing studies on spontaneous face-to-face KS have focussed on the number of interactions, the characteristics of people that meet (e.g., Ford & Chan, 2003) or knowledge quality (e.g., Durmuşoğlu, 2013). The KS behaviour during the meetings is largely overlooked (Yeo & Marquardt, 2015), as is the matter of how to measure such behaviour (Yi, 2009). Also, existing studies on unplanned meetings often focus on social meetings (e.g., North & Kumta, 2014), neglecting work-related unplanned meetings. Therefore, the goal of this paper is to analyse how KS behaviour is related to some of the well-known antecedents of (the amount of) KS. This way more insight is obtained in how organisational members interact with each other and how knowledge managers can specifically stimulate the behavioural aspects of these meetings that they see as most beneficial to their organisation. As tacit knowledge is so important to organisations, we specifically try to identify specific behaviour related to tacit KS. The next section of this paper reviews existing literature on KS behaviour to identify relevant aspects, which is structured according the conceptual framework of van Wijk, Jansen, and Lyles (2008) into knowledge, organisational, and network aspects. Based on the literature review, seven hypotheses are derived and statistically analysed. To do so, data were collected with diaries among 138 R&D employees in one large multinational company. The paper ends with a discussion of findings and conclusions and recommendations.
2. Knowledge sharing behaviour

2.1. Knowledge

Knowledge regards justifying personal belief towards the truth, which dates back to Plato (Nonaka & Takeuchi, 1995). It is defined as (Ford & Chan, 2003) “a fluid mix of framed experience, values, contextual information, and expert insight that provides a framework for evaluating and incorporating new experiences and information. It originates and is applied in the mind of knowers.” This definition encompasses implicitly the common distinction in most knowledge management literature between explicit knowledge (which is objective, a fact) and tacit knowledge (embedded in a person in the form of knowledge, experience or expertise) (Hau, Kim, & Lee, 2016; Martin-de-Castro et al., 2008). Effects on organisational performance can differ greatly; Haas and Hansen (2007) showed that explicit KS led to time saved, while tacit KS led to improved task quality. Tacit knowledge is more valuable for competitive advantage, as it is harder to imitate (Hau et al., 2016) and often a hidden source of innovation (Rosendaal & Bijlsma-Frankema, 2015). As the exact border between these two knowledge types is hard to identify, they are sometimes placed on a continuous dimension (Nonaka & Takeuchi, 1995). Hansen (1999) solved this problem by focusing on the codification of knowledge to distinguish complexity of knowledge, where non-codified or tacit knowledge is said to be more complex.

KS behaviour is defined as “a set of individual behaviours involving sharing one’s work-related knowledge and expertise with other members within one’s organisation” (Yi, 2009). As Yeo and Marquardt (2015) state, it is a cognitive and behavioural process involving individuals. To be able to stimulate tacit KS, organisations need to understand how knowledge is shared between employees (Coradi et al., 2015) and thus how to measure behaviour that ensures that knowledge is shared. With regard to the cognitive element of the process, involvement is mentioned as an important aspect (e.g., Hau et al., 2016; Mascitelli, 2000). Although there is not a clear line between explicit and tacit knowledge (Richtnér, Åhlström, & Goffin, 2013), it is known that the more tacit the underlying knowledge, the harder to transfer it to another person (Hau et al., 2016; van Wijk et al., 2008). Especially, knowledge that is more tacit is said to only be shared when spending time together in the same environment (Nonaka & Konno, 1998). More involvement is demanded from both participants (Mascitelli, 2000) in time and effort (Hau et al., 2016). We therefore pose:

$H_1$: Involvement of sender and receiver is larger if tacit knowledge rather than explicit knowledge is shared.

With regard to the behavioural element of the KS process, many synonyms for cooperative behaviour are used, such as collaboration, communication, coordination and interaction. The boundary between such labels is unclear and they are used inconsistently (Rousseau, Aubé, & Savoie, 2006). In general a dichotomy comes forward, with a distinction between (brief) interactions and more time-consuming and interdependent collaboration (Storey & Perks, 2014). Both of these categories have significant effects on innovation, but collaboration more so than interaction (Olson, Orville, Ruekert, & Bonner, 2001).

Berends (2005) identified through which specific employee activities KS takes places. He identified a taxonomy of 29 “moves” (=a basic unit of communication in which knowledge is shared in a certain way), which he grouped into 5 categories of KS activities:

- Descriptions (of others, own activities, knowledge, problem, findings, earlier interaction, etc.); they aim at providing an adequate representation of one’s believed reality to the other during the meeting.
- Actions (showing something, handing over a publication, on the spot calculating or trying, etc.); they also consist of non-linguistic elements and are situated in a material environment (e.g., equipment, a blackboard).
- Questions (asking a question, questioning, asking for help); they are an important element of interactions.
- Proposals/suggestions (hypothesising, warning, instructing, etc.); they differ in two important respects from descriptions as they (a) are not necessarily claimed as valid/effective and (b) include an appeal to follow or explore an option.
- Evaluations (giving arguments, agreeing, rejecting, concluding, etc.); they consists of reactions on earlier moves.

Besides the further development of one’s knowledge, these (categories of) KS moves have the potential to support the performance of research work through: a contribution to the solution of a problem, a change in the problems a researcher is working on, and/or being activated to undertake new actions (Berends, 2005). Berends also related these behavioural categories to the involvement dimension and stated that descriptions need less involvement than the other categories and can more easily be stored in an explicit way. They often “only” yielded knowledge but not justified solutions, which mostly thrived on the other types of moves. As descriptions are more like a “one-way” communication, it is assumed, that descriptions belong to the less interdependent interaction type, while the other more personalised categories are assigned to joint collaboration towards justification. This leads to the following hypotheses (see also Figure 1):

$H_2$: Collaborative KS activities (actions, questions, proposals, evaluations) relate to a higher involvement than interaction (descriptions).
H3. Knowledge shared through collaborative KS activities (actions, questions, proposals, evaluations) is more tacit than knowledge shared through interaction (descriptions).

2.2. Organisational aspects

The organisational aspects mentioned by van Wijk et al. (2008) are all studied at the firm’s level, but this does not mean that this category is not relevant for inter-employee KS behaviour during a meeting. Knowledge transfer within organisations is a process between actors at different organisational levels (Yi, 2009; Yeo & Marquardt, 2015). For organisational learning to take place, the interaction of both knowledge components is necessary and at different levels, for which Nonaka and Takeuchi (1995) identified a spiralling process. KS within teams is called “externalisation”, KS between departments “combination” and KS between two individuals “socialisation”, whom could be from the same or a different team/department. Team members need to share individual knowledge to be able to fully use members’ knowledge and experience-based skills to solve new problems (Huang, 2009). In addition to within team meetings, employees should also meet with other employees (Durmuşoğlu, 2013), as cooperation with other teams and departments often produces the critical information leading to genuine innovation (Love & Roper, 2009).

Closer organisational proximity is likely to lead to more tacit KS (Hansen, 1999; van Wijk et al., 2008), because effective tacit KS requires a significant amount of common knowledge and a close relationship (Hansen, 2002), regardless whether mono- or multi-disciplinary teams are regarded. Therefore, involvement in each other’s problems will vary with organisational proximity, as employees cannot be involved in everything in their organisation and will pay most attention to their own team’s tasks. Following H3 and H4, it can be expected that organisational distance might also influence which KS activities are used to share knowledge.

To test possible differences in KS at different levels, organisational distance is introduced as H5 with a distinction between KS meetings “within teams”, “between teams” and “between departments” (see also Figure 2):

H4.1. Organisational distance is negatively related to the ability to share tacit knowledge

(a) Within teams more tacit knowledge is shared than between teams.
(b) Between teams more tacit knowledge is shared than between departments.

H4.2. Organisational distance is negatively related to the involvement during KS meetings

(a) KS meetings within teams have a higher involvement than between teams.
(b) KS meetings between teams have a higher involvement than between departments.

H4.3. Organisational distance relates to the KS activities that are used to share knowledge

2.3. Network aspects

As van Wijk et al. (2008) put forward, their network aspects operate at the dyad- or network level. But again, this does not mean that this category is not relevant for studying specific meetings and the behaviour during these meetings. Specifically the relational and cognitive dimension of network is relevant, with topics distilled from Van Wijk et al. regarding trust and shared vision. Employees have to be willing to voluntarily share knowledge with their colleagues, which is not always the case (Ford & Chan, 2003; Yeo & Marquardt, 2015). Therefore “group cohesiveness, which is a dynamic process reflected in the tendency for a group to stick together, is important for understanding the performance of groups” (Huang, 2009). Group cohesiveness increases the willingness to work together, and thus is important for collaborative behaviour to take place during meetings. Huang (2009) writes about group cohesiveness as heedful interrelating.
meaning carefully and intentionally interrelating, plus a commitment to the group task.

The word “carefully” is interpreted here as intentionally approaching colleagues that you expect to be more involved and who share your problems (the group task). Problems from outside the group are less likely to feel like shared problems, thus lower involvement can be expected. As organisational proximity usually increases physical proximity, it also increases the chance for coincidental meetings when on the move through the building. Such meetings increase group cohesiveness, as they have been shown to lead to higher levels of achieving goals together and a shared vision (Kahn & McDonough, 1997). So it is assumed that organisational distance is not only likely to decrease KS about shared problems, but also the intentionality to approach these colleagues.

Hau et al. (2016) specifically showed that both intention and shared goals (and thus also shared problems) increased the frequency of tacit KS, discussing this in light of the theory of planned behaviour (actual behaviour depends on the intention to do so). Following H2, it can be expected that intentionality and having shared problems then might also influence which KS activities are used to share knowledge.

Therefore, the following hypotheses are posed with regard to intentionality (H5) and shared problems (H6) leading up to the full conceptual model as shown in Figure 3:

- During intentional meetings more tacit knowledge is shared (H5.1).
- Employees more intentionally approach colleagues that they expect to be more involved (H5.2).
- During intentional KS meetings different KS activities are used than during non-intentional meetings (H5.3).
- Organisational distance is negatively related to the intentionality through which knowledge is shared (H5.4).
- KS within teams is more intentional than between teams (H6.1).
- KS between teams is more intentional than between departments.
- Shared problems relate to more tacit KS (H6.1).
- Shared problems relate to more involvement (H6.2).
- KS about shared problems is done through different KS activities than if the problem discussed is not shared (H6.3).
- Organisational distance is negatively related to KS about shared problems (H6.4).

(a) KS meetings within teams more often deal with shared problems than KS between teams.
(b) KS meetings between teams more often deal with shared problems than KS between departments.

3. Method
A diary-method was chosen to collect data, as it outperforms a one-time questionnaire or interview in the validity of data on activities undertaken (Tan, 2003) by cutting time lag between the event happening and being recorded (Bolger, Davis, & Rafaeli, 2003). As many unplanned KS meetings are short, they are easily forgotten when filling in a questionnaire at some point of the day or week or when asked about them during an interview. Logging meetings in a diary throughout the day should capture more of these meetings and provide more accurate data on what really happened during the meeting. In addition, a diary can ask specific questions on each specific meeting. Berends (2005) identified the moves through extensive observation of a few researchers, but with the limitation that only a few employees can be observed that way. A diary still provides a certain extent of detailed information on the moves that he...
identified, while at the same time offered the opportunity to work with a much larger sample of participants.

The diary was kept for a whole work week to capture the different types of meetings that might occur on different days of the week (like start-up meetings on Monday mornings). To minimise behavioural changes (Hawthorne effect), we explained that results would be kept confidential and individual behaviour would not be reported to management. Greenberg et al. (2005) stated three additional problems with diaries that should be considered namely memory (when is it completed), authorship (who filled it out), and mortality (how long a respondent was diligent). The diary created for this study was a printed booklet positioned on the desks of the participants, so that its visibility would prompt them to fill in their meetings right after they happened and not at the end of the day. To further deal with memory issues, the first author walked around in the building during the week that the diaries were kept, as a reminder to fill out the diary. It was regularly observed that participants were writing in their diary, reducing possible authorship problems.

The diary was tested during one week with 40 university researchers. They reported 251 different meetings and indicated having had no major problems filling in the diary. Comparing the answers of participants of the same meetings showed high levels of agreement about the KS activities that took place. Therefore, based on the results of this pilot, the diary format was not changed for the actual study site. At the study site, there were no signs of data mortality from Tuesday through Thursday, as there is no decline in the number of meetings in the logbooks. The percentage of participants that was present at work each day appeared to explain the higher number of meetings on Monday. However, the relatively low number of meetings on Friday compared with Tuesday might be due to mortality, as there were less meetings than expected based on the number of participants in the building during that day.

The diaries were used in a case study of one multinational research organisation, which is a provider of document management and printing. Their R&D department is spread across several locations globally, of which the location of the study site (the headquarters in the Netherlands) is the largest with over 1000 employees. Multidisciplinary project teams are working on developing new technology and deriving new products for the strategic business units. This concerns both hard- and software products (web-based document and fleet management). The data collection for this study was performed in the building containing most of the employees focussed on research (so excluding the development phase of R&D projects). These people are working at the early phases of NPD. As Song, Lee, Lee, and Chung (2007) state “During this period, decisions are often made without a full understanding of technological obstacles or opportunities, resource capabilities of the organisation, prospective market needs and responses, or the hidden factors occurring behind the scenes, such as interactions among involved parties”. This has also been called front-end fuzziness of R&D projects for the embedded uncertainties and ambiguity of knowledge during this phase. Furthermore, their work environment more resembles an office building. Their activities consist, among others, of framing problems and solutions, analysing print heads, data collection, cleaning and visualisation, experimenting, testing, building models, and reporting findings.

All 269 employees of the research building were approached. After one full week of keeping a diary, 138 diaries (51%) were returned. Ninety-six per cent of this sample was male, aged between 19 and 60 (M = 41, SD = 10), which was representative of the parent organisation. They were spread out regularly over all departments in this building, and at least 1/3 of the employees of each department participated. Also most of the teams within the departments were still represented by at least 1/3 of the team members. People are located in the building based on the project that they are working on, so team/department members are not necessarily collocated together. The projects are multi-disciplinary, where the teams/departments are not.

3.1. Measures

The first page of the diary asked for days present at work, name, and where the workspace is located. The rest of the diary contained identical pages to fill in data on two meetings per page. Only unplanned face-to-face meetings in which work-related issues came up had to be logged. For each meeting, respondents logged date, start time, duration, and conversation partners. This information was used to see if employees who met both filled in the same conversations. To expedite time and effort, all questions on KS behaviour and its relation with possible antecedents were in the form of multiple choice. The initial questions regarded the five categories of KS activities identified by Berends (2005), where people had to tick which ones took place during the conversation. Reference was made to the last page of the logbook that contained the specific moves of each category as examples to further clarify the meaning of each possible answer category. Respondents also had to indicate the expected involvement of the other on a five-point-scale.

To identify whether mainly tacit or more explicit knowledge was shared during a meeting, possible alternative sources for acquiring the knowledge had to be ticked in descending degree of codification. It was presumed that knowledge is less tacit when it is available through more than one person and most explicit when available in a fully codified form (e.g., on paper). So,
possible answers in decreasing order of indicating that complex/tacit knowledge was shared, were “yes, non-human”, “yes, other person” and “no, only this person”.

With regard to the network category, participants had to fill in intentionality following Brown (2008), choosing between intentional unscheduled visit and initiated after coincidental visual contact. To identify whether meetings were intentional or initiated on the spot, the diary also asked who initiated the meeting (the respondent or the other) as only the initiator knows whether the meeting was an intentional visit or not. With regard to shared problems, it was asked which issues were addressed during the meeting and respondents had to tick whether the knowledge shared regarded a shared problem, a problem of the respondent, a problem of the other, or that it was not problem oriented.

3.2. Procedure

During the week of data gathering at the study site, 855 meetings were marked with 2 participants, 55 meetings with 3 participants, and 8 meetings with 4 participants; so the final data-set contained \((855 \times 2 + 55 \times 3 + 8 \times 4 =)\) 1907 cases. The data were checked for the influence of age (12 participants did not want to disclose their age, so \(N = 126\)) through correlation with the different diary variables. The only significant correlations were that older employees used fewer descriptions \((r(126) = -0.275)\) and proposals \((r(126) = -0.250)\), initiated fewer meetings after visual contact \((r(126) = -0.244)\) and had fewer meetings that were not problem oriented \((r(126) = -0.227)\). As all these correlations were low, age was not considered for further analyses. With the lack of variance in gender, this was not tested further either.

Most of the hypotheses \((H_1, H_{4,1}, H_{4,2}, H_{4,1}, H_{3,3}, H_{3,4}, H_{1,3,4,5})\) regard nominal variables and thus were tested for significant differences with \(\chi^2\)-tests of cross-tables constructed from the data-set. Involvement is a scale variable, so to test these hypotheses \((H_1, H_2, H_{2,2}, H_{2,2}, H_{1,2})\), the means were compared and tested with \(F\)-tests.

4. Results

The next three sections discuss the tests of possible relationship between the KS behaviour aspects (involvement and KS activities) and, respectively, the knowledge, organisational and network aspects identified in the hypotheses. But first, a brief description of the variables is provided here.

On average, participants had 14 KS meetings per week \((SD = 8\), see Figure 4) and shared knowledge with 5 different colleagues \((max = 12 different colleagues)\). They spend 45 min of their day involved in unplanned, work-related meetings \((min = 1 min/day; max = 6.5 h/day)\) which is over 10% of an eight-hour workday. Forty-five per cent lasted 5 minutes or less and 80% lasted up to 15 minutes.

During 56% of the meetings knowledge was shared by asking and answering questions, while the other four KS activities only took place in about 20% of the meetings (see Table 1). Table 1 also shows that in 73% of the meetings only one KS activity took place, but in 20% of the meetings, respondents combined 2 activities in a meeting and 7 meetings even contained all 5 KS activities. A check for possible combinations of KS activities (see Table 2) shows that in case of more than one activity during the meeting, a proposal is often combined with questions \((43% of the proposals)\) but the other three activities are also combined with questions a lot too \((26–36\%)\).

The involvement in the meetings was high in general, because in 83% of the meetings, the participants mentioned at least a medium \((=3)\) up to high \((=5)\) involvement. As degree of involvement did not have a normal distribution, the \(F\)-tests for significance of differences in means have to be interpreted carefully.

4.1. Knowledge aspects (H1-H3)

Only in 4% of the interactions the knowledge that was shared, was also available in a codified, non-human source (e.g., on paper), which was presumed to indicate the most explicit knowledge form. In 19% of the
from the other four KS activities. Although the test was significant at the 95% threshold ($\chi^2(4, N = 640) = 10.94, p < 0.05$), this is mainly due to deviations caused by the “questions” category. The test shows that especially when questions were asked, it was more often possible to get the answer from a different person as well. So H3 (Knowledge shared through collaborative KS activities is more tacit than knowledge shared through interaction) is not accepted.

### 4.2. Organisational aspects (H4)

Almost half (47%) of the meetings took place between team members, 15% between people from different teams in the same department and 38% between people from different departments. It was hypothesised that organisational distance would decrease tacitness of the shared knowledge, but meetings within teams and those between departments show nearly identical results on possible alternative (human or codified) sources for the same knowledge that was shared (see Table 5). Although the $\chi^2$-test was significant ($\chi^2(4, N = 949) = 17.13, p < 0.01$), mainly the between-teams meetings (from the same department) reported that more often the same knowledge could also have been obtained from different persons. So H4–1 (a) (within teams more tacit knowledge is shared than between teams) can be accepted, but H4–1 (b) (between teams more tacit knowledge is shared than between departments) not. For that reason, it seems safe to reject the entire hypothesis H4–1 (organisational distance is negatively related to the ability to share tacit knowledge).

There does not appear to be a relation between organisational distance and involvement either ($F(2, 1123) = 0.99, p = 0.38$; see Table 6). So H4-2 (organisational distance is negatively related to the involvement during KS meetings) is also rejected.

### Table 2. Overview of combination of KS activities.

<table>
<thead>
<tr>
<th></th>
<th>Descriptions</th>
<th>Actions</th>
<th>Questions</th>
<th>Proposals</th>
<th>Evaluations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Count</td>
<td>% of total</td>
<td>Count</td>
<td>% of total</td>
<td>Count</td>
<td>% of total</td>
</tr>
<tr>
<td>Descriptions</td>
<td>58</td>
<td>18</td>
<td>134</td>
<td>13</td>
<td>93</td>
</tr>
<tr>
<td>Actions</td>
<td>58</td>
<td>14</td>
<td>117</td>
<td>11</td>
<td>68</td>
</tr>
<tr>
<td>Questions</td>
<td>134</td>
<td>32</td>
<td>117</td>
<td>36</td>
<td>159</td>
</tr>
<tr>
<td>Proposals</td>
<td>93</td>
<td>22</td>
<td>159</td>
<td>15</td>
<td>83</td>
</tr>
<tr>
<td>Evaluations</td>
<td>53</td>
<td>13</td>
<td>104</td>
<td>10</td>
<td>83</td>
</tr>
<tr>
<td>Total</td>
<td>423</td>
<td>321</td>
<td>1067</td>
<td>372</td>
<td>395</td>
</tr>
</tbody>
</table>

### Table 3. Tacit knowledge and involvement.

<table>
<thead>
<tr>
<th></th>
<th>Mean involvement (N/SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes, non-human (codified)</td>
<td>3.87 (40/0.99)</td>
</tr>
<tr>
<td>Yes, other person</td>
<td>3.55 (174/1.26)</td>
</tr>
<tr>
<td>No, only this person</td>
<td>3.66 (727/1.18)</td>
</tr>
</tbody>
</table>

### Table 4. KS activities and involvement.

<table>
<thead>
<tr>
<th></th>
<th>Mean involvement (N/SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Descriptions</td>
<td>3.02 (127/1.35)</td>
</tr>
<tr>
<td>Actions</td>
<td>3.89 (82/1.20)</td>
</tr>
<tr>
<td>Questions</td>
<td>3.54 (406/1.23)</td>
</tr>
<tr>
<td>Proposals</td>
<td>3.73 (66/1.16)</td>
</tr>
<tr>
<td>Evaluations</td>
<td>3.72 (120/1.02)</td>
</tr>
</tbody>
</table>

### Table 5. Descriptive statistics for organisation structure.

<table>
<thead>
<tr>
<th></th>
<th>Same team 891 (47%)</th>
<th>Different team, same department 289 (15%)</th>
<th>Different department 727 (38%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alternative source</td>
<td>Yes, non-human 19 (4%)</td>
<td>1 (1%)</td>
<td>20 (6%)</td>
</tr>
<tr>
<td>Number in parentheses indicate column percentages</td>
<td>Yes, other person 79 (17%)</td>
<td>38 (30%)</td>
<td>59 (17%)</td>
</tr>
<tr>
<td>No, only this person 377 (79%)</td>
<td>88 (69%)</td>
<td>268 (77%)</td>
<td></td>
</tr>
<tr>
<td>Single KS activities</td>
<td>Descriptions 130 (62%)</td>
<td>11 (5%)</td>
<td>69 (33%)</td>
</tr>
<tr>
<td>Number in parentheses indicate row percentages</td>
<td>Actions 65 (42%)</td>
<td>24 (16%)</td>
<td>65 (42%)</td>
</tr>
<tr>
<td>Questions 289(42%)</td>
<td>123 (18%)</td>
<td>277 (40%)</td>
<td></td>
</tr>
<tr>
<td>Proposals 52 (46%)</td>
<td>8 (7%)</td>
<td>53 (47%)</td>
<td></td>
</tr>
<tr>
<td>Evaluations 93 (44%)</td>
<td>35 (16%)</td>
<td>85 (40%)</td>
<td></td>
</tr>
</tbody>
</table>
Looking at the KS activities that were used, especially the same team meetings use descriptions a lot more often ($\chi^2(8, N = 1379) = 41.66, p < 0.01$, see Table 5). The between-team meetings show less descriptions and proposals and more questioning took place. The meetings between people from different departments show no irregularities in KS activities, but overall $H_{4.3}$ (organisational distance relates to the KS activities that are used to share knowledge) is accepted.

### 7. Network aspects ($H_5$–$H_6$)

With regard to intentionality, 72% of the meetings took place because somebody intentionally walked over to meet the other person (or they have adjacent workspaces). The other 28% of the meetings started because people happened to see each other and then decided to interact. There is no significant difference in tacitness of the knowledge shared during intentional vs. coincidental meetings ($\chi^2(2, N = 942) = 1.64, p = 0.44$, see also Table 8). So, $H_{5.1}$ (during intentional meetings more tacit knowledge is shared) is rejected. The mean involvement was significantly higher during intentional meetings ($F(1, 1115) = 9.60, p < 0.01$; see Table 7), so $H_{5.2}$ (employees more intentionally approach colleagues that they expect to be more involved) is accepted.

The coincidental meetings are also significantly more often based on giving descriptions ($\chi^2(4, N = 1370) = 62.3, p < 0.01$), and less on actions/questions; the most important activities during intentional meetings. So $H_{5.3}$ (during intentional KS meetings different KS activities are used than during non-intentional meetings) is also accepted. The last variable in Table 8, organisational distance, also provided a significant $\chi^2$-test ($\chi^2(2, N = 1891) = 14.0, p < 0.01$), however $H_{5.4}$ (organisational distance is negatively related to the intentionality through which knowledge is shared) must be rejected, as the opposite appears to be true. Meetings with people from the same team (so with low organisational distance) were less intentional.

With regard to the shared problems variable, 11% of the meetings were not problem oriented and 45% of the meetings did not concern a shared problem. As expected, when the problem is not shared it is more often possible to consult other people or explicit knowledge sources to obtain the same knowledge as shared during the meeting ($\chi^2(4, N = 948) = 23.60, p < 0.01$, see also Table 10). So, $H_{6.1}$ (shared problems relate to more tacit KS) is accepted. In case of a shared problem, the involvement of participants was generally higher too. The not problem-oriented meetings show the lowest involvement (see Table 9). These differences are significant ($F(2, 1123) = 0.99, p = 0.38$), so $H_{6.2}$ (shared problems relate to more involvement) is also accepted. When people did not share the problem discussed during the meeting, they more often used questions to share knowledge, and gave fewer descriptions (see Table 10). People with shared problems evaluated much more often and needed to ask fewer questions. During not-problem-oriented meetings, particularly descriptions and evaluations were preferred ways of sharing knowledge ($\chi^2(8, N = 1374) = 207.56, p < 0.01$). So, $H_{6.3}$ (KS about shared problems is done through different KS activities than if the problem discussed is not shared) is also accepted.

People from the same team share more knowledge on shared problems, while meetings between people from different teams or departments more often regard problems of only one person ($\chi^2(4, N = 1899) = 12.6, p < 0.05$). $H_{6.4}$ (a) (KS meetings within teams more often

### Table 6. Organisation structure and involvement.

<table>
<thead>
<tr>
<th></th>
<th>Mean involvement (N/SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Same team</td>
<td>3.69 (554/1.16)</td>
</tr>
<tr>
<td>Different team, same department</td>
<td>3.55 (162/1.24)</td>
</tr>
<tr>
<td>Different department</td>
<td>3.62 (410/1.24)</td>
</tr>
</tbody>
</table>

### Table 7. Intentionality and involvement.

<table>
<thead>
<tr>
<th></th>
<th>Mean involvement (N/SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intentional unscheduled visit</td>
<td>3.71 (810/1.20)</td>
</tr>
<tr>
<td>Initiated after coincidental visual contact</td>
<td>3.46 (307/1.18)</td>
</tr>
</tbody>
</table>

### Table 8. Descriptive statistics for intentionality.

<table>
<thead>
<tr>
<th>Numbers in parentheses indicate row percentages</th>
<th>Intentional or not</th>
<th>Intentional unscheduled visit ($N = 1358$ (72%))</th>
<th>Initiated after coincidental visual contact ($N = 533$ (28%))</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tacitness</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes, non-human</td>
<td>29 (73%)</td>
<td>11 (28%)</td>
<td></td>
</tr>
<tr>
<td>Yes, other person</td>
<td>121 (69%)</td>
<td>55 (31%)</td>
<td></td>
</tr>
<tr>
<td>No, only this person</td>
<td>534 (74%)</td>
<td>192 (26%)</td>
<td></td>
</tr>
<tr>
<td>KS activities</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Descriptions</td>
<td>114 (55%)</td>
<td>94 (45%)</td>
<td></td>
</tr>
<tr>
<td>Actions</td>
<td>131 (85%)</td>
<td>23 (15%)</td>
<td></td>
</tr>
<tr>
<td>Questions</td>
<td>541 (79%)</td>
<td>143 (21%)</td>
<td></td>
</tr>
<tr>
<td>Proposals</td>
<td>78 (69%)</td>
<td>35 (31%)</td>
<td></td>
</tr>
<tr>
<td>Evaluations</td>
<td>146 (69%)</td>
<td>65 (31%)</td>
<td></td>
</tr>
<tr>
<td>Organisational distance</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Same team</td>
<td>604 (68%)</td>
<td>282 (32%)</td>
<td></td>
</tr>
<tr>
<td>Different team, same department</td>
<td>204 (71%)</td>
<td>83 (29%)</td>
<td></td>
</tr>
<tr>
<td>Different department</td>
<td>550 (77%)</td>
<td>168 (23%)</td>
<td></td>
</tr>
</tbody>
</table>

### Table 9. Issues addressed and involvement.

<table>
<thead>
<tr>
<th></th>
<th>Mean involvement (N/SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shared problem</td>
<td>3.83 (498/1.08)</td>
</tr>
<tr>
<td>Problem of one person</td>
<td>3.59 (503/1.26)</td>
</tr>
<tr>
<td>Not problem oriented</td>
<td>3.16 (122/1.22)</td>
</tr>
</tbody>
</table>
unplanned work-related meetings. The data shows that such meetings happen frequently (on average 14 times/week) and take up quite some time (on average 45 min/day). Our study showed that 78% of these meetings was held with the only person that could provide the knowledge that was shared during this meeting and only 4% of the shared knowledge was available in a codified form. So clearly, these meetings also support KS within organisations and it is not wise for knowledge managers and academics to ignore them when developing strategies to increase KS and innovative output.

Another contribution of this paper to existing literature is its focus on behaviour/activities during KS meetings. The five different KS activities that were distinguished related significantly to known KS antecedents regarding the network and organisational aspects of employees. It thus seems wise for future studies to take behaviour into account when studying KS. Although these first results have not confirmed a relationship of KS behaviour with sharing more tacit knowledge forms, behaviour did show significant relationships with other variables. For example, within team meetings consisted more of descriptions, where between-teams meetings deal with shared problems than KS between teams) is thus also accepted, but \( H_{6-4} \) (organisational distance is negatively related to KS about shared problems) is only partly accepted. The last hypothesis, \( H_{6-5} \) (employees more intentionally approach colleagues that share the problem they want to share knowledge about) is rejected, because the intentional meetings deal more often with problems that are not shared (\( \chi^2(3, N = 1888) = 87.27, p < 0.01; \) see Table 10).

8. Discussion

Table 11 provides an overview of which hypotheses were accepted with regard to KS behaviour during such meetings, which is visualised in the final model in Figure 5. As the relationship between organisational distance and shared problems was only partly confirmed, this is only drawn with a dotted line, while the other accepted hypotheses are drawn with continuous lines.

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requires a significant amount of common knowledge and a close relationship, which might be even more the case in basic research environments. The epistemic boundaries that arise because of organisational distance, hamper mutual understanding, and shared meaning across group boundaries Berends, Garud, Debackere, and Weggeman (2011). However, it could also be, that existing theory on tacit knowledge might not be extendable to work-related unplanned meetings in general or that the project structure of the case organisation successfully enlarged tacit KS between teams/departments within their project team.

The results did confirm that in general, most KS meetings still take place between people within close organisation proximity (47% between-team members and 15% between different teams from the same department). So although the case organisation is accommodating their researchers in multi-disciplinary project rooms and succeeding in sharing tacit knowledge across boundaries, it was still hard to increase the number of KS meetings across departmental boundaries. As Nonaka and Takeuchi’s (1995) spiral for organisational learning shows that both KS within teams (externalisation) and between departments (called combination) is essential, a lack of inter-departmental KS can hamper organisational learning. People within the same team had more coincidental meetings during which they described things to each other. Team members also more often felt that they shared problems, which appears to decrease their need to ask each other questions. Likely, this is a result of the fact that they have been working together longer and previous moves have created a beneficial context of understanding and awareness. It is not a new claim that more managerial attention is necessary to increase “combination” of knowledge between research departments, but this study adds that this demands more research into how the network between-teams/departments can be strengthened. How can knowledge managers create a culture of perceived shared responsibility for problems and the tendency towards intentional interactions across team boundaries?

Figure 5. Model following from the results.
It is not new that shared goals create a collaborative attitude to behaviour during unplanned work-related meetings (Coman, Robillard, Sillitti, & Succi, 2014). The results of this study thus confirm Hau et al’s (2016) findings that having shared problems relates to both people in the meeting being more involved in the problem at hand and sharing more tacit knowledge. However, the study adds to existing knowledge that shared problems also relate to an increase in joint evaluation, which is a valuable KS move. The other “network” variable studied here, having intentional meetings, related to more meetings with questioning and performing actions together, which are also important KS activities. Such KS activities relate to both participants in the meeting being more involved than when they describe things to each other. The finding that organisational distance was not related to involvement or sharing more tacit knowledge, regardless of the knowledge form that was shared. A possible explanation might be that all participants are researchers in early stages of the R&D process, where every new aspects could be of relevance and is thus merited to deserve (high) involvement. But it could also be a downfall of the way the question was posed, which might have evoked the desirable answer of showing involvement in colleagues’ problems. In future studies, one could consider using different ways of measuring involvement.

9. Conclusions, limitations, and recommendations

The finding that organisational distance was not related to involvement or sharing more tacit knowledge, strongly limits the amount of influence managers can have on unplanned work-related KS behaviour through creating specific teams and departments. As Markham and Lee (2014) stated, “simply being assigned to a group of people for a short period of time with a common goal may not meet the knowledge sharing demands in contemporary NPD”. Following the results, it would seem important for knowledge managers to try and stimulate intentional networking and co-responsibility for problems among research departments. Perhaps, then people will share knowledge with more than five colleagues per week and across team boundaries. In the case organisation studied here, it would increase involvement, the use of more collaborative KS activities and sharing more tacit knowledge. Too many businesses (and academics) focus on the formal implementation of knowledge management systems to stimulate KS. This study has identified a valuable (often overlooked) category of meetings (unplanned, but work-related) that also has the potential to support increased KS. Both the intentional meetings as the coincidental ones showed tacit KS taking place, which is important for all knowledge-based organisations, so these meetings should be part of knowledge management policy. It would be interesting for a future study to identify how much specifically the “accidental” KS has added to organisational problem solving and performance.

A limitation of this study is that it only observed behaviour of employees in one organisation, and only their research personnel. Similar studies in different organisations and including, development, marketing, and manufacturing employees must point out whether the importance of network over organisational distance is true for all organisations and departments or only in certain contexts. As mentioned in the discussion, the sample of researchers formed a very specific, male-dominated setting. As for example, females have been shown to require a more positive social interaction culture before they would perceive a knowledge sharing culture as positive (Connelly & Kelloway, 2003), it is unclear whether the results are generalisable to other (less technology oriented and male dominated) organisations.

Future studies could also be more holistic by including additional measures. For example, specific tasks and also the stage within the research and development process might influence which KS behaviour is best suitable. Also, other methods of measuring behaviour (e.g., camera observation, activity tracking) could be tried to provide more insight in detailed KS behaviour. And although Penn, Desyllas, and Vaughan (1999) reported a study that found that over 80% of observed work-related conversations took place in a manner that was unplanned, this does not mean that planned meetings are less relevant for future studies. Such meetings generally take longer and take place in meeting areas, so in a different spatial context than the unplanned meetings near the workspaces or in the hallway (Appelman & Meulenbroek, 2014). Also, planned meetings are generally meetings with larger groups and thus probably show different behaviour, which also deserves further study.

The five categories of KS behaviour showed clear relationships with many other knowledge sharing antecedents. They should thus be clarified further in future studies. For example, three different types of questions are combined in the “questions” category namely “asking a question”, “questioning (asking a critical question)” and “asking for help”, which could be split up in future studies. A question could be more explicit, while a critical question might involve more tacit knowledge. A test of the diary showed hardly any inconsistencies and participants indicated that the categories were clear and easy to use. But as this study used a diary, it was not possible to determine to what extent each participant was correct in interpreting the categories of behaviour and when they took place or not. Future studies could use more qualitative methods like interviews and personal
observation to get more insight in this. Last, perhaps the most important future research goal would be to study how much each KS activity contributes to different types of innovation outcomes, as ultimately that is the goal behind knowledge management in organisations.

Disclosure statement
No potential conflict of interest was reported by the authors.

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References


