Exploiting Mobile Technologies to Build a Knowledge Mobilization Capability: A Work System-based Method

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Abstract
Recently it has been observed a proliferation of knowledge management (KM) projects in many organizations. This phenomenon was driven by the increasing popularity of the knowledge-based view of the firm; which regards knowledge as a key competitive resource. However studies showed that a large proportion of KM initiatives fail. As a result a number of actors in both academia and the practitioner world are calling for a new approach of KM. One promising approach is knowledge mobilization. This paper suggested a new method for building a knowledge mobilization capability using mobile information and communication technologies (M-ICT). The proposed method is grounded on the Work System Approach and the so-called Braudel Rule for new technologies innovations.

1. Introduction
Observers are concerned about whether Knowledge Management (KM) initiatives could be roll out successfully. A review of the literature on disappointments and failures in KM showed a host of inter-related barriers that impede the too often costly KM initiatives. For instance, Fahey and Prusak [11] highlight the problems often associated with conventional KM as “the eleven deadliest sins of knowledge management”: (i) not developing working definition of knowledge, (ii) emphasizing knowledge stock at the detriment of knowledge flow, (iii) viewing knowledge as existing predominantly outside the heads of individuals, (iv) not understanding that a fundamental intermediate purpose of managing knowledge is to create shared context, (v) paying little heed to the role and importance of tacit knowledge, (vi) disentangling knowledge from its uses, (vii) downplaying thinking and reasoning, (viii) focusing on the past and the present and not the future, (ix) failing to recognize the importance of experimentation, (x) substituting technological contact for human interface, and (xi) seeking to develop direct measures of knowledge. As a result, KM programs, many of which continue today have been only marginally successful. Some reports state that 84% of KM programs fail [16].
KM barriers seem to be linked to the IT-supply-driven approach characterizing knowledge management projects. Such an approach assumes that knowledge is as an organizational asset which is independent of the individual; and the mission of knowledge management is to make such an asset more widely available to organizations’ members [13]. Therefore it suffices to make knowledge available using cutting-edge information technology and people will come to use and share available knowledge. Driven by such an approach, a number of companies implementing KM projects tend to pay less attention to the planning of their KM endeavours, e.g. supporting strategy, articulating useful KM goals, involving end-users, selecting useful contents and so on. They also regard KM technology as the main if not the only enabler of their KM programs [4]. Consequently they do not initiate motivational programs that would stimulate individuals to participate in KM activities. [19]’s study which involved 431 firms revealed that it is only after the technological capability exists that firms realize how vital the people factors are.
Those organizational impediments give rise to personal impediments where end-users feel that KM initiatives implemented by their companies are not useful. Additionally they feel that they lack incentives to both giving away their knowledge and investing portion of their time in KM activities [4].
Given the strategic importance of knowledge to enable the intelligent organization and the questionable added-value of KM’s initiatives, a number of authors have called for the need to revisit the current approach of KM. Davenport and Glaser [9] summarized the problem best “knowledge management, which was all the rage in the mid-to late 1990s, is still a good idea, but it needs a new approach, p.6”.

One recent approach of KM that is triggering an increasing interest within both academia and the practitioner worlds is knowledge mobilization.

The purpose of this paper is to propose a method for building a knowledge mobilization capability using mobile information and communication technologies (M-ICT). The rest of the paper proceeds as follows. In the next section, we present a brief overview of knowledge mobilization. Then we discuss the dual role of M-ICT in enabling knowledge mobilization. Next we introduce the theoretical basis of our proposed method. A presentation of the proposed method follows. The paper concludes with some remarks and avenues for future research.

2. Knowledge mobilization

To mobilize means “to make or become ready for action”. Keen and Tan (2007) [13] argued that a major current limitation to progress in KM application and impact is that there is a very clear difference between the fundamental dynamics of knowledge management and of knowledge mobilization. KM addresses the supply side of information and the creation of environments for communication and collaboration. Knowledge mobilization, reflects the demand side that is dominated by knowledge being part of individual identity and hence personal choice of whether, where, why, and with whom to share knowledge and expertise. Carlsson [7] describes and defines the contrast between mobilization and management: (i) information management: the transaction processing and database era: organize data to turn it into information; (ii) information mobilization: the Web and its prodigies, bar coding: create mechanisms for access to and distribution of information; “google” as a verb; (iii) knowledge management: a spectrum of information resources and communication facilities: supply-driven; (iv) knowledge mobilization: activation of information and communication as needed, where needed, when relevant and to whom: demand-driven.

Fig 1 contrasts management with mobilization based on situation-handling orientation of information and knowledge. Knowledge mobilization views information and knowledge in terms of situational needs—“what do I need to know now?”; while knowledge management tends to focus more on “what knowledge can we provide to our employees and what mechanisms can we put in place for them to make most effective use of it?” [13]. According to Keen and Mackintosh [14] knowledge mobilization is turning knowledge into action. Otherwise it is just being well informed. Keen and Tan [13] thus suggest that the added-value of KM would rest on linking the corporate supply side of knowledge, i.e. knowledge management with the demand side, knowledge mobilization. The demand point is where the person is at the person’s moment of relevance for some element of information. The supply point is where the information is. How to link demand and supply is a key to knowledge mobilization.

3. Mobile Technologies and knowledge mobilization

As discussed earlier, one mission of knowledge mobilization is to link demand side of knowledge with the supply side. The demand point is where the person is at the person’s moment of relevance for some element of information. The supply point is where knowledge is. The purpose is to enhance the ability of human to get the information and communications as they need it, when they need it, in the form that they need it, form the people who can
help them use it, so they can take effective action [14].

From the technological perspectives, mobile information and communication technologies (M-ICT) have a number of key features that make them suitable for performing a dual role in knowledge mobilization: enabling access to knowledge at the moment of relevance and enhancing knowledge supply. In this section we will first introduce key features of M-ICT; which are relevant to knowledge mobilization. Then in light of those features, we will examine possible contributions of M-ICT to knowledge mobilization. The third paragraph will focus on how to exploit M-ICT to build a knowledge mobilization capability.

3.1. Mobile technologies’ features relevant to knowledge mobilization

3.1.1 Timeliness. Timely information support refers to the users’ access to knowledge and information resources they need when the information is relevant and needed.

M-ICT can allow users to have timely information support in a number of ways. First, with a mobile device and a wireless connection, i.e. UMTS, the mobile user can access the Internet as well as diverse databases whenever time is available and irrespective of location to get the information he or she needs. Wireless bandwidth is increasing which supports the demands of business applications such as e-mail with attachments, multimedia contents and Web services. During the past decades mobile technologies leaders have deployed great efforts to achieve high-speed wireless networks. The mobile evolution was often depicted as a linear progression from analog to digital to multimedia to broadband: 1 G, 2 G, 3 G and 4 G [20]. The third generation (3G) provides more bandwidth. A speed of 384 Kbs could be possible while on foot and 144 Kbs while travelling. 4G is the next generation of wireless networks to replace 3G while on foot and 144 Kbs while travelling. 4G is the next generation of wireless networks to replace 3G. The fourth generation (4G) provides even faster speeds of up to 384 Kbs and is expected to support a variety of applications.

Second, the current development of positioning technologies has the potential to enhance the timely information support enabled by mobile technologies. Location-awareness has been regarded by many researchers as among the most distinctive features of M-ICT. Knowledge of the mobile user’s current location makes it possible to establish the relevance of the information and knowledge support and thus to provide the mobile user with information support adapted to his or her context [14]. The third enabler of providing mobile users with timely information support is the proactive delivery of information. Relevant information comes to the user rather than the user having to look for it [14]. The proactive delivery of information support has the potential to be more enhanced through notification cues that provide meta-information, i.e. information about information to their intended recipients [21]. The cue may be as simple as indicating an incoming mobile phone call or as complex as providing the priority, the sender, and a summary of a new e-mail message. Based on the information provided by the cue, the recipient can decide whether or not to seek additional details.

3.1.2 Ubiquity. Ubiquity is a key characteristic of mobile terminals. A mobile device in the form of a mobile phone, a mobile smart phone, Personal Digital Assistant (PDA) or a communicator can be mobilized to meet the users’ demands for information access, storing and communication at any time and irrespective of location as they are at hand all the time [21]. The ubiquitous features of mobile terminals free the users from the time and space constraints that may impede their access to the information systems capabilities. This is a key characteristic of mobile information systems compared to traditional (wired) information systems, where users have to be in a specific place, e.g. the office or home in order to use the system’s capabilities [14]. Additionally, as the mobile device is “always on” it enables the user to get access to the mobile system’s functionalities at any time and with reduced booting time compared to laptop computers, especially in situations where the user has only little time to satisfy his or her information and communication needs.

3.1.3 Adaptive communication medium. Another attribute of M-ICT is that it can provide flexibility to the user in terms of the communication medium that they could select when it comes to collaboration and coordination in the field with co-workers. The communication medium carrying the information support can take such forms as SMS, MMS, e-mail, phone call, pushed alert or real-time access to database. The selection of the communication medium would depend on both the environment where the user is operating (e.g. face-to-face meeting with a customer, in a train or restaurant) and his or her information support value chain (provider versus receiver of the support). For example, knowledge of the user’s current activity through a shared mobile

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2 Technically knowledge mobilization can build on integrating a fuzzy ontology with its description logic in the semantic web architecture and thus offering knowledge support through a mobile platform. This type of technology development is carried out within the Tekes 40211/08 knowledge mobilization project.
calendar would enable co-workers to select the communication medium that fits his or her contextual environment. A co-worker could push a text message to the user’s smart phone if the user is in a face-to-face meeting, thus enabling him/her to read the alert and potentially exploit it during a meeting for example. The fit between the medium and the context has the potential to reduce the functional deficiency of information overload, where the amount of information that a user encounters extends his/her cognitive processing capacity. For example, although information support could be highly relevant to the task on hand for a user, unless it is provided using the appropriate communication medium, it may have an overloading rather than supporting impact (e.g. receiving market information via a phone call during a sales encounter with a customer).

3.1.4 Simple and natural input/output. A further key characteristic of M-ICT is the ability of the users to use speech and audio for their everyday interactions. A hands and eyes-free approach using audio-based augmentation would enable the user to perform simultaneously other tasks while listening or speaking. This is of great interest to mobile workers whose need for information support is both time-dependent and space-independent. Speech augmentation would provide the users with a simple and natural mechanism to enhance the productivity of their working time even in situations where their cognitive and physical capabilities are engaged in other activities such as driving the car. Let’s take sales representatives as an example. With a speech-based data entry, after each sale encounter the sales representative could make a voice entry of the information he or she had gained from the meeting with the customer. Likewise, as the sales representatives spend a large proportion of their time driving from one location to another, they can make voice-based entry of the sales reports while driving. They could also update their knowledge base by listening to market and technical information, e-mail notifications, news update and calendar events while driving from one location.

3.2 The dual role of mobile technologies in knowledge mobilization

The previous section describes key features of M-ICT which are relevant to knowledge mobilization. In this section we will show how the above-discussed features qualify M-ICT to play a dual bridging role in terms of both enabling timely access to knowledge and information resources and enhancing knowledge supply (cf. Table 1).

<table>
<thead>
<tr>
<th>M-ICT Features</th>
<th>Timeliness</th>
<th>Ubiquity</th>
<th>Adaptivity</th>
<th>Natural Input/output</th>
</tr>
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<tbody>
<tr>
<td>Relevant access to knowledge</td>
<td>✓</td>
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<td>✓</td>
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<tr>
<td>Enhancement of knowledge supply</td>
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3.2.1. Enabling access to knowledge at the moment of relevance. As [14] argued, the weakness of the knowledge management supply chain is that intended customers have to come to the knowledge resources. If that’s easy to do, they access it. If not they don’t. In many instances they have to be in a specific place (typically the office), use a specific tool (their personal computer), and most of all, adapt to how the knowledge is stored and organized. Knowledge mobilization builds on the assumption that available information is just information; accessible information at the moment of relevance adds to knowledge. Moment of relevance is a moment, largely unpredictable, when workers need immediate access to information and communication resources [13]. Access to knowledge at the moment of relevance could be supported by the ability of mobile technology to deliver knowledge to users where they need it (ubiquitous feature), when they need it (timeliness feature), in the form they need it (adaptive communication feature and simple and natural input/output feature). These would ensure that insufficient knowledge at the point-of-action is avoided. Think of a physician who is not treating directly a patient but needs to know that something has happened. An event-detection system could push anytime and irrespective of the physician’s location alerts when a hospitalized patient’s monitored health indicators depart from what is expected. The physician can then act immediately and consider whether to visit the patient or call in for another treatment [8]. Without a ubiquitous terminal, i.e. mobile device, it is not unlikely that the physician would not know at the right time if the latest developments in the patient’s health would necessitate an immediate action. For instance, if the physician suspects, based on the alert, that the patient may experience a stroke, she needs to make sure that the patient is diagnosed and treated within an hour or his chance for full recovery drop rapidly [8]. If the physician feels that by the time she reaches the patient it would be too late, then she would need a number of knowledge objects to be mobilized for her quickly and irrespective of her location in order to make an effective decision that would save the patient’s life.
3.2.2. Enhancing knowledge supply. In addition to convenient access to relevant knowledge, the ability to help users take effective action would depend on the quality, i.e. usefulness of the knowledge distributed. This raises the problem of quality control and update of knowledge stored or prepared for mobilization. If the knowledge database includes idiosyncratic, untested or obsolete knowledge, it will put the acceptance of the system and the quality of users’ performance at high risk. Literature on knowledge management’s disappointments and failures point us to this problem. In one failure story [17], end-users complain that the information in the intranet was outdated and not useful. As a result they continued to use alternative sources when they wanted particular information. When asked to give an example of the kind of knowledge which users were finding useful on the intranet the best example that could be found was of the corporate bus timetable. In another case [6], users complained about the serious defects in the quality of the information being stored in the system. In the absence of a filtering mechanism, only 10-15% of the content was being maintained systematically.

The knowledge supply chain would benefit from M-ICT features such as ubiquity and simple and natural input/output. If we take the example of pharmaceutical sales representatives; immediately after making a call, the sales representatives could complete all reporting by means of a handheld device. This could happen just after the meeting or, if the sales representative has some time available, before the following meeting. At the next available opportunity, the sales representative can upload the sales call information he or she has obtained to the corporate database. Reporting information gleaned from sales visits after each sales meeting has a number of advantages. The accuracy of the sales information would improve compared with reporting all information obtained from meetings at the end of the working day or the weekend. Additionally quick reporting would enable the sales representatives to rapidly share useful knowledge about physicians’ experience with the company’s drugs. They can then use such knowledge in their interaction with the physicians they visit. With the natural input/output feature of M-ICT, the sales representative can elect to make a speech-based entry of the information he or she had gained from the meeting with the customer.

Additionally the ubiquity feature of M-ICT would also make it possible to enhance knowledge supply by obtaining rapid feedback from knowledge users about the usefulness and accuracy of knowledge being used. After using a knowledge object, i.e. a lesson learned to handle a situation, i.e. negotiation with a customer, the worker can immediately send a feedback about the lesson learned. For instance the feedback would mark the lesson learned as useful or no longer valid. By marking the accessed lesson learned as outdated, the update process could be triggered. These would ensure that other knowledge seekers are no longer using a wrong or an obsolete lesson [10].

3.3 Exploiting M-ICT opportunities

As shown in the previous section, M-ICT offers immense opportunities for knowledge mobilization (KMob) thanks to its bridging role in linking the supply side of knowledge with the demand side. The challenge for companies planning to employ M-ICT to mobilize knowledge is to avoid becoming another typical knowledge management failure story. By reviewing the literature on knowledge management disappointments and failures, it becomes apparent that a large proportion of KM projects fail due to unrealistic optimism about the role of KM technology.

The 2001 KPMG [15] study revealed that a large number of companies still regard KM as a technology issue. Companies indulging into this temptation pay little attention to the human and organizational aspect of the KM initiative. They build KM systems, e.g. intranet and expect that knowledge workers will participate in knowledge related activities in addition to doing their regular jobs. This means staying a little later each night to share what they had learned in the course of doing their jobs and coming in little earlier each morning to learn from others [8]. But as the literature warns “technology alone won’t make a person with expertise share it with others. Technology alone won’t get an employee who is uninterested in seeking knowledge to hop onto a keyboard and start searching or browsing”. The mere presence of technology will not create a learning organization, a meritocracy, or a knowledge-creating company” [9]. For Hansen [12], major investments in information systems will, however, never pay their way until IS/IT accepts a subordinate, enabling role in KM. IS/IT is a means, not an end in itself, and must be effectively integrated with people-based KM initiatives. All of these point us to the fact that employing M-ICT to enable knowledge mobilization would require more than going wireless, i.e. providing workers with a mobile device or building a wireless connection to knowledge repositories. Exploiting M-ICT opportunities would require a more balanced method, which places the enabling tool, i.e. M-ICT in its right place. The method should recognize that M-ICT could have a major enabling role in knowledge mobilization, but they should not
be the headline. Rather, the starting point should be how well the real work is done and how M-ICT can best mobilize knowledge and information resources to enhance performance. As [14] pointed out, knowledge is not a thing, a bucket load of data, a website, or a piece of “groupware” software. It is not information either, which is everywhere to the degree that we all complain about information overload. It is the ability of human to get the information and communications as they need it, when they need, in the form that they need it, form the people who can help them use it, so they can take effective action. In the following section we will introduce the theoretical basis for a new method aimed at exploiting M-ICT key features to build a knowledge mobilization capability. The theoretical basis consists of the work system approach and the so-called the Braudel Rule.

4. The work system approach: Describing work and informing design

The work system approach (also called work systems theory) is a contemporary IS-theory with an objective to bridge the gap between research and practice when it comes to information systems design and analysis. “Business and IT professionals can apply this theory for understanding and analyzing information systems. Academic researchers can apply it for gaining a deeper appreciation of past research and for developing future research projects [1]. The focus of WSA is contextual use of information systems [18]. Therefore it uses the concept of work system as a unit of analysis. A work system is a system in which human participants and/or machines perform work using information, technology, and other resources to produce products and/or services for internal or external customer [3]. Alter [2] defines an IS as a work system whose processes and activities are devoted to processing information, that is, capturing, transmitting, storing, retrieving, manipulating and displaying information. WSA has a prescribing orientation. Its explicit goal is to provide business people with an approach that they can use to attain a good understanding of a work system, how well it performs, and how it might be improved. One major purpose is to facilitate the collaboration between IT people and end-users so that implemented ISs would meet the expectations that triggered their implementation, e.g. supporting the work system. The work system framework is the central model in the WSA. The framework has a pragmatic objective, which is the creation of the so-called work system snapshot. A work system snapshot aims at enhancing collaboration between IT people and end-users.

According to Alter [3] often, IT people focus on the technology rather than how the technology can help users perform their work. Users may then become overwhelmed by technical details and grow unwilling or unable to express their business needs clearly. The result: unrealistic expectations, poor communication and frustration, all of which lead to failed projects, poorly re-engineered business processes and ineffectual information systems.

Table 1 Elements of work system snapshot [2]

| Customers | They are the people who use and receive direct benefits from the products and services produced by the work system, i.e. implemented KM system [2, p.466]. |
| Products and services | They are what the work system produces for the customers. A work system’s products and services may take various forms, including physical products, information products, and service, intangible and so on [2, p.466]. |
| Process | They are set of steps or activities performed within the work system. These steps may be defined precisely in some situation and relatively unstructured in others [2, p.466]. |
| Participant | They are people who perform the work. Some may use computers and IT extensively, whereas others may use little or no technology. When analyzing a work system the more encompassing role of work system participant is more important than the more limited role of technology user (whether or not particular participants happen to be technology user [2, p.466]. |
| Information | It includes codified and non-codified information used and created as participants to perform their work |
| Technologies | They include tools (such as cell phones, projectors, spreadsheet software, and automobiles) and techniques (such as management by objectives, optimization, and remote tracking) that work system participants use while doing their work [2, p.466]. |

The point of departure in selecting the WSA as a theoretical basis for the method suggested is the fact that the key concepts and ideas presented as the work system’s constituents are highly relevant to knowledge mobilization’s core mission. For instance both WSA and knowledge mobilization share the pragmatic scope of designing an IS that enables action, i.e. an IS that users will want to use and from which the business can gain an effective and efficient work. Additionally, both theories advocated that the starting point for any IS design should be end-users everyday life routines. Alter [3] for instance suggests that from a business view point, the work defines the system, not the technology that is used to do the work. He argued that defining a work system in terms of the technology it used is often counterproductive. Doing this focuses attention on the technology rather than the work that is being done and the results that are being produced for customers Alter [3, p35].
Similarly when it comes to knowledge mobilization, (Keen and Mackintosh, 2001) argue that Knowledge mobilization does not really mean anything independent of people who use it. Otherwise it is just information.

5. The Braudel Rule: Expanding the limits of the possible

The Bruadel Rule is an approach for identifying the potential added-value of new technologies. Derived from the work of the economic historian Fernand Braudel, the rule builds on the assumption that a new technology becomes a value-adding technology, if it can expand the limit of the possible within the structure of people’s everyday life. Expanding the limit of the possible means making it possible for people to achieve what was taught to be impossible. He argues that as long as the everyday life runs without problems, people will not have any economic motivation to induce a change; innovations are left unexploited. It is only when people face obstacles and barriers that they start looking for technological inventions that would support them in breaking those barriers as well as in opening up new opportunities.

Earlier attempts to characterize new technologies’ value based on Braudel’s work have been done by [14]. They define the Braudel Rule as “changing the limit of the possible within the structures of everyday life”. They then use this rule as a tool to analyze the value of a number of technologies for people, based on the extent to which those technologies can change the limit of the possible within the structures of individuals’ everyday life, i.e. to provide people with new sources of freedom. BenMoussa (2008) [5] built on the work by [14] and translated the Braudel rule into a framework that characterizes the value of the new ICT as “freedom new ICT”, “opportunity new ICT”, “convenience new ICT”, and “feature new ICT. Freedom new ICT is a metaphor that attributes a new technology’s value adding effect to the technology’s ability to free potential users from the barriers they face within the structure of their everyday life routines; and where available technologies fail to provide the support needed in terms of removing those barriers. Opportunity new ICT attributes new technology’s value-adding effect to the technology’s abilities to provide new and innovative support that outperforms existing technologies and would thus justify their adoptions. Convenience new ICT. This refers to new technologies that would be merely a convenience to potential adopters. They are “nice to have” rather than “must have” technologies. Feature new ICT. Those technologies provide some new functions that potential users would not need within the structure of their everyday life routines. They may create a disturbing rather than a supporting effect if potential adopters will have to invest time in learning a feature technology that would not provide them with tangible value.

From the perspective of knowledge mobilization, the Braudel rule implies that for M-ICT-based knowledge mobilization systems to create value for end-users, they must (i) expand the limit of the possible for potential adopters as to the ability to have the knowledge needed mobilized at the point of action, i.e. functioning as a freedom or opportunity technology for potential users (ii) go beyond convenience and novelties that offer some new features but do not expand the limit of the possible within the everyday life’s routines [13].

6. Proposed method for exploiting M-ICT to build a knowledge mobilization capability

The proposed method includes three major steps: disaggregate, expand and reaggregate (cf. Fig 2).

Figure 2 the proposed method for building a knowledge mobilization capability

Disaggregate
Use the WSA to define the elements of the current KM systems and identify their weaknesses as to Knowledge mobilization

Expand
- Determine how M-ICT with its strengths and limitation could help deal with the knowledge mobilization weaknesses identified in step1 and/or offer new opportunities for support.
- Use the Braudel Rule to envision how M-ICT can function as “Freedom technology” or “opportunity technology” in terms of enabling knowledge mobilization processes

Reaggregate
Define the new knowledge mobilization system with re-invented work elements

In step 1, the analysts work with participants on both defining the current KM system and identifying its weaknesses as to its ability to mobilize knowledge for its customers, i.e. users. Step 2 involves assessing how M-ICT with its strengths and limitations could help deal with knowledge mobilization weaknesses identified in step 1. In step 3, analysts work on
describing M-ICT enabled knowledge mobilization system with its re-invented work elements.

6.1.1 Describing the already implemented KM systems. Before envisioning a new future it is important to assess the current state of already implemented KM initiatives. According to [1], understanding a work system requires an understanding of at least six elements: customers, product & services, process and activities, participants, information, and technologies. Therefore this step involves describing the already implemented KM systems by identifying their customers, products and services, business processes, participants, information, and technologies. In the following we will introduce each element of the work system. Questions that would drive the description of the elements of a KM system are summarized in Fig 3.

Customers: Customers of a KM system would include current and future users of the system, e.g. sales force, physicians, field technicians, managers of those employees and so on.

Products and services: Examples of a KM system’s products and services include accessing knowledge and information resources from the wide range of internal and external information sources, e.g. lesson learned, expert finder; categorization of information to support rapid recognition, case based reasoning; search within a wide range of internal and external information, forums for interactive and collaborative exchange, i.e. virtual teamwork.

Process: For KM systems, key activities would include identifying (i) work process of the KM system’s customers to ensure that the KM systems is relevant to their day-to-day activities, (ii) knowledge areas significant to the KM system’s customers, (iii) knowledge creation processes, i.e. the process of which new knowledge is created by combining and integrating different modes of knowledge, (iv) knowledge validation processes, i.e. controlling activities like testing new and eliminating obsolete knowledge, (v) knowledge presentation processes, i.e. display of knowledge, e.g. format, data standards, etc, (vi) knowledge distribution processes, i.e. sharing and distributing knowledge between cooperating organizations and among organization members, (iv) knowledge application processes, i.e. use of knowledge in particular context [10], (vii) managerial processes, e.g. organizational structure for KM initiatives, incentive systems, quality control system, (viii) type of IT platform.

Participants: Participants of a KM system would include customers of the KM systems, planners, users’ representatives, senior management, IT analysts, programmers, support people, trainers, consultants, etc.

Information: In the case of a KM system, information created by the participants would include (i) mapping the work of the KM system’s customers, (ii) identification of knowledge areas where the KM system could create value, (iii) identification of processes for knowledge creation, validation, presentation, distribution, and application; (iv) type of incentive systems to implement, (v) type of organizational structure, e.g. creating new roles such as knowledge managers, knowledge analysts, editors, etc.

Technologies: For a KM system information and communication technologies would include intranets, extranets, web sites, database management systems, communication technologies such as instant messaging, software supporting video conferencing, etc.

Figure 3 questions for describing the elements of a KM system, adapted based on Alter model [3]
6.1.2 Pinpointing the weaknesses as to knowledge mobilization. This sub-step involves identifying weaknesses of existing KM systems as to their ability to mobilize knowledge for their customers. Examples of questions that would guide the analysis of each element of the work system include the following.

- **Customers**
  - Are the customers of the KM system people who do the real work, i.e. people whose productivity matters?
  - Are the customers pleased with the KM system?

- **Products and services**
  - Are the KM system’s products and services really what its customers want?
  - Do the KM system’s products and services enable its customers to get information and communication as they need it, when they need it, from the right people?
  - Do the KM system’s products and services help customers to handle situations effectively?

- **Process**
  - Are customers’ work processes captured and well understood?
  - Are knowledge areas significant to customers identified?
  - Are knowledge processes, e.g. knowledge creation, knowledge validation, identified?
  - Do knowledge processes enable knowledge mobilization?
  - Are there managerial processes, e.g. incentives, quality control, metrics to control progress identified?

- **Participant**
  - Does the KM system have an organizational structure, e.g. knowledge-related roles?
  - Does the organizational structure support knowledge mobilization processes?
  - Are participants’ roles well defined?
  - Do participants have skills, knowledge, and resources to carry out KM system’ activities?

- **Information**
  - Is the information created by the participants, e.g. customers’ work processes, type of knowledge processes, adequate and support knowledge mobilization processes?
  - Is the information created systematically verified and updated?
  - Is the information created integrated and systematically shared?
  - Do users understand how to use the information created, e.g. processes for reporting knowledge?

- **Technologies**
  - Does the KM technology support knowledge mobilization?
  - Does technology create obstacles for the KM system’s customers?
  - Does the technology used enable the KM systems’ customers to access needed knowledge resources at the moment of relevance and support their action?
  - Do users master the use of the KM technology?
  - Are there better technologies for enabling the KM system?

6.2. Step 2: Expand

The above questions will certainly alert the analysts to a number of knowledge mobilizations gaps and opportunities. After the team collaborates to answer the above questions. The next step will be to determine how M-ICT with its strengths and limitations could help deal with the knowledge mobilization-related weaknesses. That is how M-ICT could invent new knowledge freedoms and opportunities by expanding the limit of the possible within the structure of everyday life; as suggested by the Braudel Rule. Examples of the questions that would guide the analysis at this step would include:

- **Customers**
  - How M-ICT can expand the customers’ limit of the possible within the structure of their everyday life when it comes to mobilizing knowledge resources?
  - How the overall customer experience will improve?

- **Products and services**
  - How M-ICT can enhance the ability of current products and services to mobilize knowledge to customers?
  - Can M-ICT enable new knowledge mobilization products and services?
  - Could the new knowledge mobilization products and services free potential KM systems’ customers from knowledge mobilization-related barriers? Could they offer new opportunities as to knowledge mobilization?

- **Process**
  - How M-ICT could help deal with weaknesses and/or enable opportunities associated with supporting customers’ work processes and the way knowledge processes are carried out?

- **Participant**
  - How M-ICT can facilitate knowledge mobilization by supporting the work that needs to be done by the participants?
Information
Can M-ICT enable providing information where it will affect action?

Technologies
How M-ICT can contribute to knowledge mobilization?
- How M-ICT can complement existing KM-technologies?
- Can M-ICT integrate with existing technological platforms?

6.3. Step 3: Reaggregate
We have disaggregated the old KM system, identified both its weaknesses and opportunities for improvement. We also envisioned how M-ICT could expand the limit of the possible by helping deal with the old KM system’s weaknesses and/or enabling opportunities for mobilization. This step entails constructing new M-ICT enabled knowledge mobilization (KMob) system, with re-invented elements. Examples of questions that would guide the reaggregation phase are as follows.

Customers
- Who are the customers of the new KMob system?

Products and services
- What products and services the new KMob systems will offer to its customers?

Process
- What type of change in knowledge processes, e.g. creation, validation, application is needed to enable the new M-ICT enabled- KMob system?
- What type of change in managerial processes is needed?

Participant
How the new KMob system will affect (i) the organizational work role, e.g. need for new knowledge roles, (ii) needed skills, knowledge and resources, (iii) type of incentive systems, (iv) type of work to be done by participants.

Information
- How the new KMob system will affect the type of the information that participants will have to create?

Technologies
How the new KMob system will affect (i) integration with the existing technology being used by the customers, (ii) the efforts needed to use the technology, and (iii) the need for training?

7. Conclusions, limitations and avenues for future research

Knowledge as well as the use of knowledge at the point of action has the potential to create a profound impact not only on firms’ workforce but also on the competitive advantage and the entire strategy. Given the fact that in many organizations the real work, e.g. sales is carried out in a mobile work setting, the restriction of KM resources to stationary workplaces cannot enable the mobile work force to tap effectively into information and knowledge stored in corporate databases. Mobile workers’ knowledge need is situational. They need on-demand and often unpredictable access to a wide range of knowledge resources, and in many cases they are not willing to spend time searching in corporate knowledge repositories. This supply/demand gap of knowledge has been a major failure factor in many KM projects. Hence the idea triggering knowledge mobilization has been to fill such a gap by ensuring that insufficient knowledge at the point of action is avoided.

From a technological perspective, we showed that M-ICT has the potential to play a bridging role in filling the above knowledge supply/demand gap. However based on cases of KM disappointments and failures, we pointed out that going wireless, i.e. simply putting the KM applications mobile will not be enough to reap the benefits of mobile technologies in enabling knowledge mobilization. We showed that employing M-ICT for knowledge mobilization purposes involves recognizing that M-ICTs could have a major enabling role in knowledge mobilization, but they should not be the headline. Rather, the starting point should be how well the real work is done and how M-ICT can best mobilize knowledge and information resources to enhance performance. Consequently we introduced our suggested approach for exploiting M-ICT to build a knowledge mobilization capability. By adopting the Work System Approach and the Braudel Rule as our theoretical basis, the relevance of M-ICT-based knowledge mobilization systems to end-users work is emphasized and the added-value of the resulting systems is ensured.

Finally in line with the objective of this paper, some methodological guidelines are described. These guidelines will hopefully stimulate other researchers to empirically examine how M-ICT could be exploited effectively to enable knowledge mobilization systems.

Perhaps one limitation of this study is that the paper’s space requirement precluded elaborating in more details the questions that would guide the application of the method and illustrating the method
with the aid of use cases. Another limitation is that the method has not yet been tested using real world cases. This is a first attempt and more research has to be done. One natural avenue would be to apply the method in a case study of knowledge mobilization implementation in order to test it operational aspect. Another avenue would be to use insights from the task technology fit framework to elaborate the method and enhance its robustness in providing guidance to managers before they embark into the cloudy waters of knowledge management in general.

References