Chapter 19
Three Phases of Mobile Learning State of the Art and Case of Mobile Help Seeking Tool for the Health Care Sector

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Abstract The Internet mobile device enabled social networks of today stand accused of being so-called 'weapons of mass distraction' or worse. However, we point out that modern fears about the dangers of social networking are overdone. The paper goes on to present three phases of mobile learning state of the art that articulate what is possible now and in the near future for mobile learning. The Learning Layers project is used to provide a case of barriers and possibilities for mobile learning; we report on extensive initial co-design work and significant barriers with respect to the design of a mobile Help Seeking tool for the Healthcare sector (UK). We then provide an account of how the Help Seeking tool is being linked to a Social Semantic Server and report on a follow-up empirical co-design study.

19.1 Introduction

The current context is that rarely does a day go by without dire warnings and overt action to either ban mobile devices and access to social networks from the workplace or school, or for monitoring of some description to be put in place to 'police' behaviour. Put simply, social networks and mobile devices stand accused of being so-called 'weapons of mass distraction' or worse. For example, we have the following suspect claim (Infographic 2012): "Social Media Distractions Cost U.S. Economy $650 Billion". Indeed, in schools we have this recent example of 'policing' (CBSlocal 2013): "Glendale Unified School District in California is paying $40,500 to Geo Listening to collect and analyze all social media public posts of 13,000 students … even if it was done off campus". However, a McKinsey

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Global Institute report (Chui et al. 2012) claims that social networking within companies could increase the productivity of 'knowledge workers' by 20–25 %. Modern fears about the dangers of social networking and the use of mobile devices for learning are overdone.

The first part of this chapter provides a three-phase overview of mobile learning state of the art, which incorporates a view of the emerging technologies and their pedagogical affordances, attendant barriers and how to overcome them, and which highlights emerging trends in mobile learning. The Learning Layers project is then described using the frame of design research to illustrate what is possible in social networks and mobile device-mediated learning. We report extensive initial co-design work and significant barriers with respect to a mobile Help Seeking tool for the Healthcare sector. The chapter then provides an account of how the Help Seeking tool is being linked to a Social Semantic Server and we briefly report on a follow-up empirical co-design study. We conclude by highlighting associated challenges.

19.2 Three Phases of Mobile Learning State of the Art

In this section we examine state-of-the-art mobile technologies and their pedagogical affordances, including barriers, how to overcome them, and emerging trends in mobile learning (m-learning). In order to achieve this we propose the following new three phases, which are discussed individually below but which never-the-less overlap:

- Focus on new patterns of connected social learning and work-based practices.
- Focus on designing for 'm-learning' at scale.
- Focus on the boundaries of learning that the 'm' in m-learning forces us to explore.

Each phase or focus has a key argument associated with it, which are as follows:

- A key-evolving pedagogical affordance of mobile devices is the ability to use social media and apps to enable new patterns of connected social, learning and work-based practices.
- Design research allows us to engage in inquiry surrounding the transformative possibilities for m-learning. Particularly, designing for 'm-learning' at scale is a big challenge.
- Participants in new mass communications are now actively engaged in generating their own content and contexts for learning. User/Learner-generated context for us (Cook et al. 2012) is conceived in such a way that users of mobile digital devices are being 'afforded' synergies of knowledge distributed across people, communities, locations, time (life course), social contexts, sites of practice (such as sociocultural milieus) and structures. Of particular significance for us is the way in which mobile digital devices are mediating access to

external representations of knowledge in a manner that provides (equity of) access to cultural resources.

With respect to the first state of the art (focus on new patterns of connected social learning and work-based practices), we argue that a key evolving pedagogical affordance of mobile devices is the ability to use social media and apps to enable new patterns of connected social learning and work-based practices. A review by Cochrane (2013) notes the dearth of research into social m-learning. Indeed, there is still a focus on content whereas a key theme for the future of m-learning may be augmentation. For example, FitzGerald et al. (2013) have suggested a useful taxonomy of Augmented Reality used in m-learning projects; this taxonomy has six dimensions: (i) device or technology used, (ii) mode of interaction, (iii) method of sensory feedback to the user, (iv) personal or shared experience, (v) fixed/static or portable experience, and (vi) learning activities or outcomes. Augmented Context for Development work by Cook (2010) was found to be useful both to Cochrane and FitzGerald et al. because it provides an example of a m-learning project that focussed upon augmenting the learners experience in the field by the provision of a Vygotskian environment for personal and collaborative meaning-making (we return to this below). Indeed, this and other projects point the way for Augmented Reality to be used for situated and constructivist learning, particular where collaboration and student inquiry form key aspects. However, as we point out in the introduction, social networks like Facebook and Twitter stand accused of being so-called 'weapons of mass distraction", diverting workers and students away from their 'real' work. Schools are cautious—anxious, maybe about new digital technologies and media. In Introduction, we provided key examples to counter these fears and concerns. Furthermore, recent work has examined how social media and personally owned mobile devices could be used as a means of providing a bridge from media use in everyday life to the expectations of school and higher education potentially has enormous attraction. Some research (see Cook et al. 2012 for a review) suggests that in Higher Education Facebook, for example, provides affordances that can help reduce barriers that students with lower self-esteem might experience in forming the kinds of large, heterogeneous networks that are sources of social capital. 'Trust' is a key issue in this respect. Thus, there appears to be considerable potential for mobile devices and social networks in terms of sustainability in the integration of informal and formal institutional dimensions of learning. However, although a new educational paradigm is emerging, there exists a need for more debate and further research, particularly around notions of sustainability, scalability and equity of access to opportunities to build social capital. We also need to examine how mobile devices are reconfiguring the relationships between spaces, between public spaces and private ones, and the ways in which these are penetrated by mobile virtual spaces. For example, we need to examine further the importance of the human body as the key interface in the 'interpenetration of physical and virtual spaces'.

With respect to the second state of the art (focus on designing for 'm-learning' at scale), we argue that design research (we define this below) allows us to engage in inquiry surrounding the transformative possibilities for m-learning; and particularly,

this is a big challenge. Carmean et al. (2013) point out that 'features'-oriented affordances of mobile devices are not enough as a way of characterising m-learning. They propose that we need to examine the deeper affordance of mobile devices, particularly the immediacy and the connection natively built into such devices. Indeed, they propose that if we are to understand the potential for new learning experiences and support that new mobile devices afford, then we need to examine mobility + design. We fully agree with Carmean et al.'s well-argued assertion that design research allows us to bring out 'never-seen before possibilities'. However, in terms of scaling up m-learning, a key research theme, Cochrane (2013) points out that several larger m-learning projects have tended to focus on specific groups of learners, rather than developing pedagogical strategies for the integration of m-learning within tertiary education in general. It appears that the situation in m-learning research can be typified as being typically content centric, a focus on the device. We agree with Carmean et al.'s assertion that designing for m-learning can help unlock the web of individualised choices that are available by encouraging us to design for access to small chunks, and to make these customizable to individual's needs, experience and agency. Specifically, design research allows us to engage in inquiry surrounding the transformative possibilities for m-learning. Designing for 'm-learning' at scale, beyond pilots and content-centric approach, is a big challenge. To help elucidate the issues, below we describe in some detail work by the authors on an investigation of a design research approach (The Help Seeking tool). With near global ownership of mobile devices imminent, the more technical concerns surrounding 'cross-platform mobile development' becomes crucial. To summarise, the current state of cross-platform development techniques falls into two broad approaches: cross-compilation ("native" apps) and mobile web applications ("web apps") also referred to as the 'responsive web'. A trend which could significantly help scale learning is Learning Analytics (LA), this is one of the promising techniques that has been developed in recent times to effectively utilise the astonishing volume of student data available in formal education. Finally, we note that while some describe MOOCs (massively open online courses) as a fad possessing poor quality, lack of student engagement, lack of business model, and high dropout rates, others think that the MOOCs will soon become the de facto way to remediate and educate a broad swath of students in a wide variety of content areas, i.e. to assist in scaling. De Waard's (2013) work on MobiMOOC provides an example of how a mobileMOOC or mMOOC's would work. What is encouraging about de Waard's exposition of the affordances of the mMOOC is that she is clear on the reasons for the mobile additions from a reflexive pedagogical perspective.

With respect to the third state of the art (focus on the boundaries of learning that the 'm' in m-learning forces us to explore), we argue that participants in new mass communications are now actively engaged in generating their own content and contexts for learning. Indeed, for us mass media are witnessing a paradigm shift in which the 'user' can generate their own content with a mobile phone or another digital device. Thus these activities at the boundaries of learning are made up by a lot of individuals publishing user-generated content (in the form of videos that users have produced themselves or digital media that have been copied from some other

source, the latter may be subject to copyright restrictions). Consequently, we suggest that what we are seeing is the emergence of 'user-generated contexts'. Not only do the twenty-first-century structures of mass communication provide a wide range of augmentations to communication but in addition, through the agency of users, the context within which communication takes place is augmented by users to suit the needs of the individual and/or the conversational community; above, we explored in detail to themes that expand on these trends:

- Bring your own device (BYOD)
- Mobile games
- Learner/User-Generated Contexts.

Examples of one-to-one programmes in US (post-compulsory) and UK (school) illustrate that there is a rising opportunity for the use of personal technologies for formal learning as well as learning in informal situations, e.g. work-related activities. Clark and Luckin (2013) conclude that the research on iPad use in the schools context report "increased motivation, enthusiasm, interest, engagement, independence and self-regulation, creativity and improved productivity". BYOD refers to the policy of permitting learners or employees to bring personally owned mobile devices (laptops, tablets, and smart phones) to their educational establishment or workplace. Although BYOD has many potential advantages, before adopting BYOD in a formal learning context there are many things to consider as these challenges or requirements will need to be met in order for you to reap the benefits, as work reported by JISC above illustrates. A case study by LaMaster and Ferries-Rowe (2013) describes the implementation of mobile technology at Brebeuf Jesuit Preparatory School using a BYOD approach; they describe a strategic plan that resulted from student, faculty and user consultation, which can be used as a template for other institutions. Also, work by Deloitte (2013) illustrates that as the buzz around BYOD dies down to some extent, Bring Your Own Application (BYOA) is likely to step to the forefront of debate. The proliferation of cloud-based applications means that BYOA does not even require installation, and so could be near-impossible to restrict.

We can expect to see widespread adoptions of games in education; this is another area that a growing number of researchers are investigating in terms of the boundaries of learning. For example, Benford et al. (2004) have evaluated systems for location-based multi-player games, seeking to understand how in situ users share location information at a distance through comparing self-reporting and GPS readings. However, very often games require that the learner maintains the high level of engagement and arousal within the game scenario. Given this, a question that arises is: can a game approach be applied to all scenarios of learning?

Finally, we draw on the phenomena (at the boundaries of learning) whereby that society is currently witnessing a significant shift away from traditional forms of mass communication and an editorial push towards user-generated content and augmented communication contexts to explore different expositions of learner-generated contexts. Of particular significance for us is the way in which

mobile digital devices are mediating access to external representations of knowledge in a manner that provides access to cultural resources.

In the next section, we elaborate on design research and the application of Vygotskian theories,, in order to set up a design case study to support informal learning practices, in particular help seeking actions, in a Healthcare workplace environment. The case study is framed into a European research project called Learning Layers.

19.3 Design Research in the Learning Layers Project

19.3.1 Design Research

Design research allows us to engage in inquiry surrounding the transformative possibilities for learning technologies. In the Learning Layers Project (described below), we develop technologies that support informal learning in the workplace (Healthcare professionals in NE England and the Construction sector in North Germany). Co-design is being used with all user groups to help shape our designs and tools and to understand the context. Design research aims to have impact on real-world problems whilst providing a frame for inquiry that is rigorous and yet experimental; it has recently been characterised as follows:

> … a genre of research in which the iterative development of solutions to practical and complex educational problems also provides the context for empirical investigation, which yields theoretical understanding that can inform the work of others … [although potentially powerful] the simultaneous pursuit of theory building and practical innovation is extremely ambitious (McKenney and Reeves 2012).

19.3.2 Vygotsky

Society experienced technologically and socially driven transformations during the industrialisation of the first third of the twentieth century; it was against this background that Lev Vygotsky defined the characteristics of human development as a development which is based on the instrumental conditioning of reflexes or as the extension of the body by tools for mastering nature (Vygotsky 1930/1978, p. 19). The "higher psychological processes", as Vygotsky termed them, result from a relation "between human beings and their environment, both physical and social" (p. 19). Vygotsky considered "social interactions" to be those like 'to speak' as the transformation of practical activities such as 'to use a tool'. The leading processes are that of internalisation and that of the instrumental use of a tool; this happens where "An operation that initially represents an external activity is reconstructed and begins to occur internally" (Vygotsky 1930/1978, pp. 56–57). Vygotsky then

went on to propose the Zone of Proximal Development (ZPD). This was a significant paradigm shift, because up until that point a child's mental development had been assumed to be indicated only by those things that children could achieve on their own, whereas Vygotsky took the view that "what children can do with the assistance of others ['the more capable peers'] might be in some sense even more indicative of their mental development than what they can do alone" (Vygotsky 1930/1978, p. 85). Furthermore, development in a ZPD has a forward looking, temporal and prospective dimension. Indeed, in addition to reorganising the visual-spatial field (a "centre of gravity" of current attention) Vygotsky proposed that "the child, with the help of speech, creates a time field … he can act in the present from the viewpoint of the future" (Vygotsky 1930/1978, pp. 35–36).

Recently, Cook (2010) has extended some of Vygotsky's concepts to adult learners (MA Landscape Studies, University of Sheffield, UK) to explain the way they collaborate using mediating tools (mobile phones, Augmented Reality, language). This work provides a description of the components of a 'context' that emerges at run-time (i.e. when learners engage with a task/activity using tools like mobile devices and language), whereby context is conceived as "a core construct that enables collaborative, location-based, mobile device mediated problem solving where learners generate their own 'temporal context for development' within the wider frame of Augmented Contexts for Development (ACD)" (Cook 2010). We firmly believe that tracing the links between multiple 'temporal context for development' is a key to understanding cross-contextual learning and meaning-making (this is a core notion in our proposal for the design of innovative 'recommendation services', more details described below).

The ACD appears to act as part of the substitute for what Vygotsky calls 'the more capable peer'. As Cook (2010) states, mobile devices can be used as mediators in an ACD using them as the more capable peer that is able to guide and scaffold the learners to find the solutions. The main elements to develop the ACD are: (a) the physical environment, (b) a pedagogical plan, (c) tools/devices for an augmented oriented approach, (d) learner co-constructed 'temporal context for development, and (e) collaborative learners' interpersonal interactions using tools (which overlaps with (d)).

19.3.3 Learning Layers

The context for our recent work is Learning Layers (http://learning-layers.eu/), a large European Commission co-funded project (FP7 IP) which investigates scaling the use of Technology Enhanced Learning (TEL) in workplace informal learning where users have previously been reluctant to use TEL for learning (Healthcare is the focus of this study). The consortium consists of 17 institutions from seven different countries.

19.4   Help Seeking Tool

The focus of the remainder of this chapter is from the perspective of Learning Layers work package 2 (WP2), one of six R&D work packages in the project. Figure 19.1 shows how we organise the project. All three interaction layers (i.e. WP2-4) draw on a common Social Semantic Layer (WP5) that aims to ensure that informal learning is embedded in a meaningful context.

WP2 is concerned with the 'Networked Scaffolding—Interacting with People', developing technology support for current working practices of an individual so that it is persistent over multiple work/organisational contexts and so that it extends into larger networks of people. We adopt as a basis for our work the term "scaffolding", which draws on Vygotsky's ZPD but which can be attributed to Wood et al. (1976) who described it as a "process that enables a child or a novice to solve a problem, carry out a task, or achieve a goal which would be beyond his unassisted efforts" (p. 90). Our Networked Scaffolding idea proposes on the one hand a low-barrier approach that collects and semantically analyse Q/A typically asked in practice, we create a scaffolding resource of 'solved questions' and 'similar and more capable peers' that workers have asked about a concept or problem in a particular learning context. On the other hand, from the analysis of this actions we identify learning patterns to provide support to novel informal learning challenges associated to the practice of exchanging Q/A.

This work contributes to the building of recommendations services/algorithms that are being realised with Social Semantic Server (SSS) technology from other WP5 (described below).

19.4.1   Overview of WP2 'Networked Scaffolding—Interacting with People'

In Learning Layers WP2, we have focused our design research over the last 2 years (2013 and 2014) on the study and understanding of Help Seeking in the Healthcare

Fig. 19.1 Organisation of Learning Layers
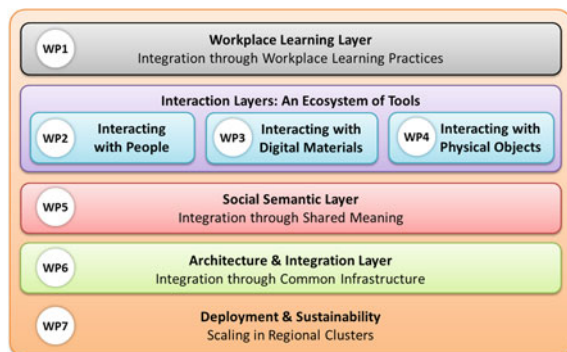
sector (NE, England). The Help Seeking design and development team emerged from the Layers Open Design conference in February 2013 and has subsequently engaged in extensive and iterative design refinement of ideas. The co-design approach has been selected as the most suitable, because it is necessary to identify the user needs and problems, particularly because our context is one where staffs in the Healthcare sector are not confident about the use of technologies in their work practice (we elaborate on this point below).

Results derived from the analysis of the initial co-design activities in the Healthcare sector have confirmed that 'putting guidelines and pathways into practice', in particular national health guidelines, can be a problem (it represents a systemic pain point) and that as such it important to support conversations and discussions about the implementation of guidelines locally. In this context, we claim that there will be conversations over time in which these additions to the local implantation of guidelines will evolve. Our hypothesis is that these conversations will take place within Personal Learning Networks or PLN (Cook and Pachler 2012; this chapter includes a literature review of work-based practice, tagging and 'trust') and in a more organisational level through Shared Learning Networks (SLN). APLN is a group of people organised by an individual and formed by her trusted colleagues. On the other hand, a SLN is a network which contains everybody registered on the learning system.

These networks play a key role, and therefore we take the view that the development of those networks, as well as the associated help seeking of opinions in such networks, requires scaffolding. The outcomes of these conversations will feed into the local implementation of national guidelines. Therefore, the Help Seeking prototype provides peer support for workplace decision-making and problem-solving (i.e. informal learning) by scaffolding: (1) the 'building, maintaining and activating' of a trusted Personal Learning Network, and (2) the movement from using a trusted PLN to SLN. Our aim with the Help Seeking prototype is twofold: supply computer support for a range of workers in the UK's Healthcare sector to assist them in identifying (i) relevant more and trusted capable peer(s) from and with whom to learn (informal learning) and, (ii) trusted resources from their PLN. These aims are partially realised by the use of trusted recommender systems to support informal learning at work; they are typically used to build trusted networks and resolve the information overload problem, people are overwhelmed with information and have difficulties in finding the right piece of information or right person in such a space.

The Help Seeking prototype envisaged usage (i.e. a use case, see Santos et al. 2014a, for details) is as follows: a nurse uses the app to seek support in the course of her/his activities: (1) asks a question by typing a question; (2) annotates the type of problem by creating tags or selecting existing tags (from a data base of suggested problem types); (3) selects from her group of trusted colleagues (from data in her PLN) to whom the question should be circulated to. Automatically related national guidelines, peers, meeting notes and questions are recommended for her, this information is suggested by the sematic analysis of the question and corresponding tags using the Social Semantic Server or SSS (Kowald et al. 2013; Seitinger et al.

2013). The nurse checks the information and authorship of the resources and may choose to add a new person to her PLN as appropriate, adding tags to relate specific knowledge to this person. After some minutes, some colleagues provide short answer to her question.

19.4.2 Early Co-design of the Help Seeking Tool

In order to redefine our initial user stories, wireframes and various interactive prototypes, we have engaged in discuss with users in initial co-design sessions over a period of about 13 months (November 2012–December 2013).

The user stories on which our design ideas were initially based were based on empirical work done by WP1 and refined during Application Partner Days in February 2013. A specific user story was combined with findings from the Application Partner days in February 2013, to present an initial use case of a GP (General Practitioner) looking for some help with cascading national guidelines. This original user story was used to develop the first storyboards, and also fed into the designs made for the (internal) Design Conference in Helsinki in March 2013. Following the Design Conference, the iterative process of showing the designs, working through them with users, refining and reworking, then re-representing to users took place over a series of months between April and September 2013. In April 2013, having been shown the first iteration of the design idea for the Help Seeking tool, in which the example of sharing national guidelines was used, valuable feedback was noted from Healthcare staff at a specific practice. This meeting in the co-design process highlighted *uneasiness with technology, issues with trust and a reluctance to use anything like social networks*. However, it also showed that internal technology solutions, such as the intranet were being used, and although there was a reluctance to use smartphones, the issues around sharing and finding information and time constraints were clearly identified. In order to give users a clearer idea of how the technology might work in practice, a clickable, in-device wireframe was developed using Balsamiq (a rapid prototyping tool). This was tested in two selected Practices. In brief, the search for a scenario which would be useful to all the individuals across Practice A and Practice B, with its range of personnel and its different contexts, proved challenging. The final solution at the end of year 1 concentrated on a use case (given above) which describes assisting a user to develop a network of contacts which would be useful in a range of work and learning scenarios (i.e. the PLN).

As the above represents a first cut design decision, we proposed that we should use mobile devices to support the collaborative Help Seeking; this support is needed due to the lack of time and mobility issues of staff (e.g. nurses can sometimes work in different locations during the same day). A Proof of Concept (Fig. 19.2, a simulation of an Android app which is interactive and simulates certain functionalities) was constructed and demonstrated/trailed with Practices A and B.
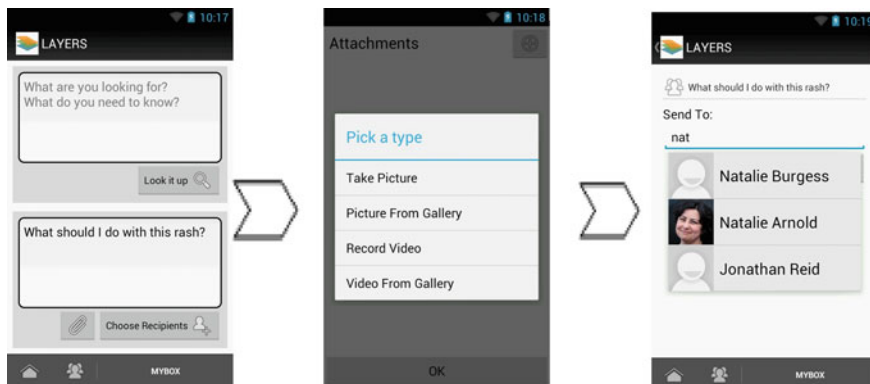
Fig. 19.2 Android proof of concept

The app allowed users to enter a question, add an attachment (image, video) and choose from a list (pre-populated for this Proof of Concept) which contacts they would send the question to. The reaction to Help Seeking using a mobile tool was mixed: some users are currently only comfortable with using desktop applications, some avoid technology, and others are very confident users. As mentioned above, since the project will evolve over a number of years, it seems essential to design not only for the current moment but also for a future in which those users who are not familiar become more confident with technology. After further co-design sessions, the design idea of the Help Seeking tool was refined. The addition of tagging of people, questions and documents in order to build a trusted network (PLN) also accords with the advances made by other technical partners on the Social Semantic Server, so that it is envisaged that the SSS will be able to analyse and recommend tags, useful contacts (similar and more capable peers), answers to questions and documents which relate to problem. Contacts will be sourced from a wider SLN or beyond via questions or key words and added to the PLN as appropriate. Tags allow the recording of other important details (e.g. specialisms, place of work). Ideally, the tool will clip data from received sources (e.g. email) and store in relation to contacts (but this is currently out of scope for technical and security reasons).

19.4.3   Help Seeking: Follow-up Empirical Co-design Study

Our initial co-design work, described above, highlights that a big problem is reticence in the Healthcare sector to use social and mobile media in workplace practice. However, as we also explained above, we believe that modern fears about the dangers of social networking are overdone. Consequently, we predicted that when we introduce a cut-down version of the Help Seeking tool to users, in a series of empirical co-design sessions, they would realise there is nothing to fear and will

themselves ask for the full functionality of the Help Seeking tool to be re-added (this has been our experience on other projects). Recently in year 2014, we have conducted a cross-case analysis (Holley et al. 2014) based on interviews done to real HC staff. GP Practice Managers have access to an online network of their own peers, and Sonia (a Practice Manager) often turns to her online peers for support: "I use it in the first line". Indeed, unless there is a practice specific issue, the Practice Managers' Network is consulted; thus this is an online group that share knowledge and practice at a cross-organisational level, and can be described as having self-selected areas of expertise (they create their own profile). This is an interesting concept, in that there seems to be the need for mutuality or reciprocity to the trade of help. Furthermore, Sonia acknowledges that the healthcare assistants and practice nurses in the Practices lack their own peer mentoring groups of this type; and she goes on to suggest that this is in fact a barrier to learning (this points to need for Help Seeking tool) in that she has to act as a filter point for practice nurse updating. She is uneasy in this role as she is pressurised. Sonia then goes on to relay the sets of educational events, national and local guidelines that she has to deal with on a regular basis.

Two in-depth co-design workshops were conducted over the period October 2013 to October 2014, for details see Santos et al. (2014b). The research involved tool use, pre-post workshop questionnaires and workshop observations. By October 2013, we had identified three already existing healthcare networks in the north of England that were regarded as worthy of deeper inquiry. These are a well-established Practice Manager's Network, a new network of Nurses and a group of Data Quality Leads members who want to form a network. In the first workshop, an existing Professional Networking tool (LinkedIn) was used to discuss with Healthcare staff the benefits and limitations of social tools. Concurrently, results from the initial co-design sessions (described above) were used to develop the first prototype version of the 'Help Seeking' tool (a WordPress based following a responsive design so it can be run on mobile devices like phone and tablets and on desktops). This version 'beta 1' was evaluated during the second workshop. Results from the first and second workshops were used to identify a design criterion relevant for our Help Seeking tool.

There was strong support for using tags to find relevant discussions. Our future plans include to support and facilitate the use of tags providing scaffolding mechanisms when (1) composing questions and as an alert to similar problems; and (2) when searching, finding existing groups and filtering information. For example, in order to facilitate the searching and filtering of information the use of tags seems to be generally accepted as a good solution, particularly with positive finding with respect to using tags to find a relevant discussion or groups (see above). Indeed, workshop 2 found that the Help Seeking tool should provide support to make links with similar groups: "Would also like the facility to create and link to other relevant groups (e.g. PMs) in order to open up communication channels for particular purposes". This is in line of our idea of providing Socio-Historical tools and services where humans and the system (i.e. the Help Seeking tool and recommender

system) work together connecting people with people, people with data, and data with data.

Furthermore, trust seems to be closely linked to contacts with same professional profile. An issue was raised towards the end of workshop 1 about ignoring suggestions from LinkedIn that do not relate to a person's professional identity. One of the Practice Managers commented that during the workshop they had sent an invite to connect to every Practice Manager that LinkedIn was recommending, even if they did not already know them. They commented that "it couldn't hurt to do this". However, the same person was making some choices and ignoring some recommendations—they said they were not interested in connecting to the BMA (British Medical Association) or to Practice Nurses even though LinkedIn was making these suggestions as well. Information from the users (not only the personal details provided by the individuals manually, but also the semantic analysis of their actions) will be saved as 'Key profile factors'. This information will be used by the Help seeking tool to recommend similar and more capable peers, in order to scaffold the process of building, maintaining and activating their PLN.

Overall we found, as predicted, that by 'workshop 2' participants were beginning to exhibit changes in their perception towards using social networking tools and seemed to have a clear interest in developing the Help Seeking tool to improve their current networking limitations: "This is the way forward. This is how we are going to communicate more than the once a month [that is currently achieved face-to-face] at the group Practice Manager meeting, without wading through a load of emails"; and a comment by a senior Nurse … "I didn't see the benefit of LinkedIn but I do for this [i.e. the Help Seeking tool]".

Many of the findings provided in this follow-up empirical co-design study support the direction that the Help Seeking tool is taking but also provided new requirements to be built into the next version.

19.5 Innovation in Context: Help Seeking Using the Social Semantic Server

We are currently leading on innovative work to bring the semantic approaches of WP5 (see Fig. 19.1) into the design of the Help seeking tool (Kowald et al. 2013). The SSS collective knowledge services are able to provide useful information based on human contributions and that these will get better as more people participate. Because the SSS may be unfamiliar to many readers, below we unpack some of the main ideas. This is followed by a new conceptualisation of how the Help Seeking tool and the SSS might fit together from a Vygotskian perspective; we confirm that the design research goal of 'the simultaneous pursuit of theory building and practical innovation is extremely ambitious' but attainable.

19.5.1   Social Semantic Server

The Social Semantic Information Spaces (Fig. 19.4), is claimed to be a space where "information is socially created and maintained as well as being interlinked and machine-understandable, leading to new ways to discover information on the Web" (SIOC 2009, please refer to this web page for explanation of acronyms in Fig. 19.3).

The relation between actors, activities and objects of action–activity has been a core challenge in Vygotsky-informed research and cultural-historical activity theory. Consequently, the next section presents an innovative conceptualisation of how the Vygotsky-informed research described in this chapter can be used to inform a rethink of the SSS and hence move us beyond the state of the art.

19.5.2   Layers Social Semantic Server and Help Seeking Tool in Healthcare Sector

The SSS can generate metadata to relate people and data, people and people, data and data. The goal of the following conceptualisation is to explore the integration of our Help Seeking tool's cultural-historical approach (Vygotsky) with the SSS.

In Fig. 19.4 we have three people: Patricia, Mark and Natasha. They all search for and read an article called "Registration guidelines on diabetes" which is downloaded from the Intranet onto their respective PLNs (the solid lines in Fig. 19.4). From this the SSS will begin a service known as *user event service* (or looking at what people are doing and finding patterns); in this instance, the pattern is three people have all downloaded the same document meaning they have shown an interest. From the SSS's perspective we draw a (dotted lines in Fig. 19.5)

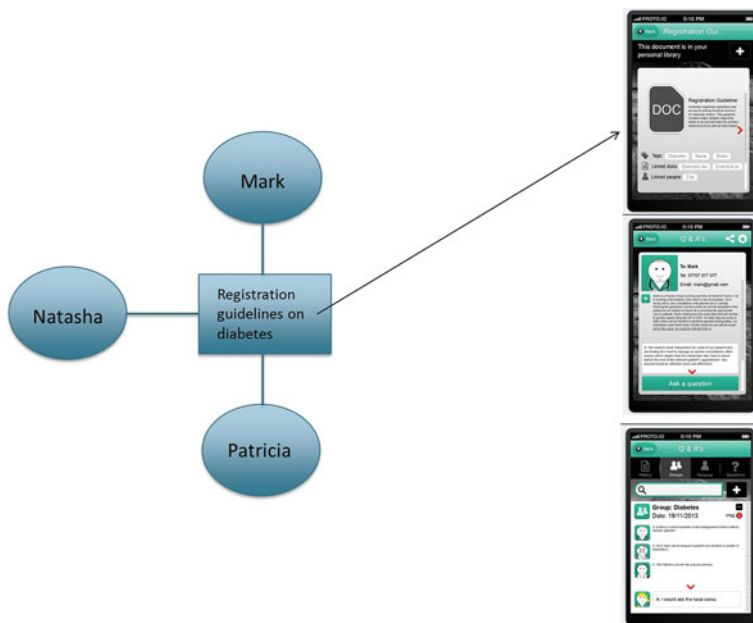**Fig. 19.3** Social semantic information spaces (with Layers tool and service included)

Fig. 19.4 Triggering event service

connection between the 3 people, since they all downloaded and (we assume) have read the same article.

Patricia asks Mark (who she has previously tagged in her PLN, as a 'more capable peer') a question about booking interpreters for a patient via her contacts facility in the app (the arrow in Fig. 19.5 to Patricia's PLN). For the SSS this is part of the *meaning-making system*, since they both have looked at the "Registration guidelines on diabetes" document; the SSS *user event service* draws in a *relationship between those two sets of data* (dot dash lines on the right in Fig. 19.5). Note that at the moment this relationship is detected because it is tagged by Mark and Patricia.

Now the SSS pushes a service called *recommendation service* (making links to pertinent information, Q&A or people, which is part of the *guidance service group*), because it has seen that Patricia and Mark both are in this discussion (bottom right PLN screen in Fig. 19.6). The SSS assumes that Natasha probably would like to be in the discussion too (because of the similar interests of the three persons). Consequently, the SSS suggests to Natasha that she joins the discussion (arced line across the top in Fig. 19.6); the SSS is therefore scaffolding a collaborative 'temporal context for development' or put simply creating common ground for a conversation.

In summary, Natasha discovers a discussion that she also finds useful thanks to the SSS's high-level service "recommendation". The services and connections provided/made by SSS in this example are: (1) user event service (finding a
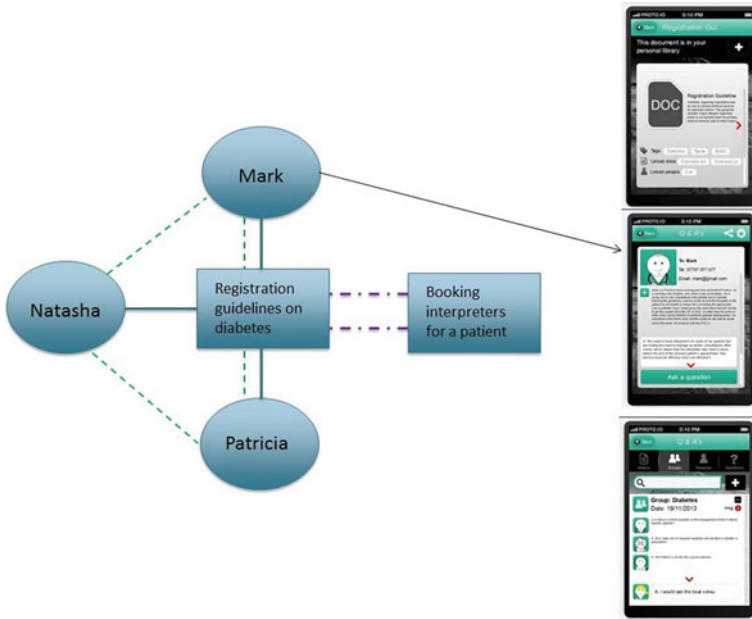
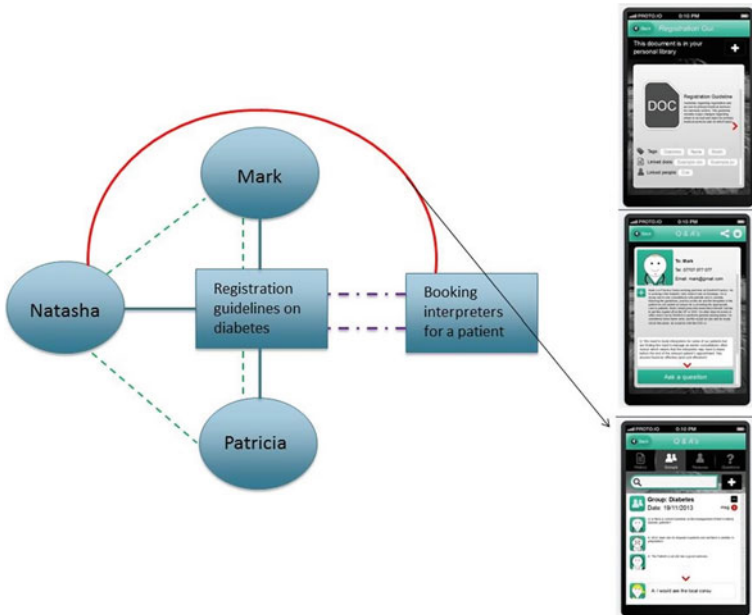Fig. 19.5 Connection between the three people and relationship between two sets of data

Fig. 19.6 Recommendation Service

pattern), (2) connection between the 3 people (dotted lines), (3) relationship between two sets of data (dot dash lines) and (4) recommendation service, i.e. suggesting that a person consider joining a discussion (arced line). Furthermore, in Vygotskian terms, we have in play two key concepts: More Capable Peer and Temporal Context for Development. From a conceptual point of view, we note that future work needs to hook these insights into our Vygotskyian concepts (and related notions of reciprocal collaboration) in order to refine the design of the Help Seeking tool. Key questions that arise are as follows. *Can we speculate that the centre of gravity and time field allows collaborators in the Practice Network to focus attention on future oriented and shared temporal context for development? Is some form of collaborative filtering a function that enables this context complexity to be dealt with?*

19.6   Conclusions

We conclude that from a research perspective all three of our phase argument-driven inquiries have proved a powerful lens through which to drill down into the state of the art of m-learning and also as vehicle to make connections. For example, take the second phase argument exploration (focus on designing for 'mobile learning' at scale); we are fully convinced that design research allows us to bring out 'never-seen before possibilities' of mobile learning. Designing for 'mobile learning' at scale, beyond pilots and content-centric approach, is a big challenge that is worthy of our attention. If we link across to our first phase argument (focus on new patterns of connected social learning and work-based practices) we see that designing for augmented social learning has the real potential to take us beyond content-centric views of learning, and that this has the potential to revolutionise equity of access to learning. However, although a new educational paradigm is emerging, there exists a need for more debate and further research, particularly around notions of sustainability, scalability and equity of access to opportunities to build social capital. Finally, with respect to our third phase argument exploration (focus on the boundaries of learning that the 'm' in m-learning forces us to explore) our strong belief is that not only do the twenty-first-century structures of mass communication provide a wide range of augmentations to communication but in addition, through the agency of users, the context within which communication takes place is being augmented by users to suit the needs of the individual and the conversational community and we predict that augmented social learning will give rise to a stream of innovations that will shape the modern society and culture.

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Author Biographies

John Cook is Professor of Learning Innovation at UWE, Bristol. Previous to this he was Professor of Technology Enhanced Learning (TEL) and Director at Learning Technology Research Institute, London Metropolitan University. John was part of the successful Education Research Assessment Exercise (RAE) submission; London Metropolitan University appeared in the upper quintile of the 2008 RAE Education Unit of Assessment. John has over 14 years previous experience as a full-time lecturer at various Higher Education Institutions. He has over 10 years project management experience and has been part of research and development grant proposals that have attracted over £5 million in competitive external funding. FP7 examples include MATURE IP and Learning Layers IP. In addition, he has published/presented around 280 refereed articles and invited talks in the area of TEL, having a specific interest in several related areas: hybridity in learning, informal learning, mobile learning in all sectors, augmented reality, 3D web and visualisations, social web, and work-based learning. John is a founding member of The London Mobile Learning Group. He was Chair/President of the Association for Learning Technology (2004–06) and Chair of ALT's Research Committee (2008–2012). John sits on various journal editorial boards and conducts Assessor and review work for the EU and UK Research Councils.

Patricia Santos has got a Computer Engineering degree and a PhD in Information, Communication and Media Technologies, focused on the research areas of Technology Enhanced Learning (TEL) and Human Computer Interaction (HCI). In 2011 Patricia presented her PhD thesis (focused on new representation of test and assessment using interaction contexts such as: geo-located routes of questions answered with mobile phones, use of maps for representing questions and 3D virtual worlds for assessment environments) obtaining the qualification of Summa cum Laude. Since 2007, she has been collaborating with the GTI research group (Interactive Technologies Group, UPF). Patricia has been involved in several European and national R&D projects in the field of TEL. Her role has been especially focused in the design of mobile and ubiquitous learning applications to support indoor and outdoor activities, pilots and experiments done in real educational contexts, in the evaluation of research results, in organizing R&D meetings and workshops, developing reports and deliverables, and participating in project meetings and reviews. In addition, Patricia has five years of teaching experience in different subjects (TEL, HCI, Programming…) in different Catalan universities (UPF, UAB and UOC). Since 2013 (March) Patricia is researcher in Technology enhanced Learning in UWE working in the European research project Learning Layers: http://learning-layers.eu/