

**Social Network Innovation in the Internet's Global Coffeehouses:  
Designing a Mobile Help Seeking Tool in Learning Layers**

Professor John Cook and Dr Patricia Santos

*Department of Arts and Cultural Industries, University of the West of England, Bristol,  
UK*

Bower Ashton Campus  
Kennel Lodge Road  
off Clanage Road  
Bower Ashton  
Bristol  
BS3 2JT

Corresponding author: [john2.cook@uwe.ac.uk](mailto:john2.cook@uwe.ac.uk)

# **Social Network Innovation in the Internet's Global Coffeehouses: Designing a Mobile Help Seeking Tool in Learning Layers**

In this paper we argue that there is much that we can learn from the past as we explore the issues raised when designing innovative social media and mobile technologies for learning. Like the social networking that took place in coffeehouses in the 1600s, the Internet-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 some of the 1930s ideas of Vygotsky. Part of the Learning Layers project builds on this work; 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 briefly report on a follow-up empirical co-design study. We conclude by highlighting associated challenges.

Keywords: social media; mobile technology; Personal Learning Networks; design research; Social Semantic Server, Vygotsky

## **1. Introduction**

In this paper we argue that there is much that we can learn from the past as we explore the issues raised when designing innovative social media and mobile technologies for learning. First, we want to draw on the historical significance of coffeehouses, something that Green (2012) has recently articulated: “The Starbucks on Russell Street near Covent Garden piazza is one of London’s many cloned coffeeshops. Can you imagine walking in, sitting next to a stranger and asking for the latest news? Or slamming a recent novel down next to someone’s coffee and asking for their opinion before delivering yours? It is not the done thing. But 300 years ago, precisely this kind of behaviour was encouraged in thousands of coffeehouses all over London”. However, like the social networking that took place in coffeehouses in the 1600s, the Internet-enabled social networks of today, for example Facebook and Twitter, stand accused of

being so called 'weapons of mass distraction' or worse. In the next section we unpack this theme. The paper goes on to present the 1930s ideas of Vygotsky as a significant paradigm shift, particularly 'the more capable peer' and the temporal nature of development. The Learning Layers project is then described which builds on Vygotsky's work using the frame of design research. We report extensive initial co-design work and significant barriers with respect to a mobile Help Seeking tool for the Healthcare sector. The paper 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.

## **2. Learning from 300 years old coffeehouses**

The obvious question is why do we think we can learn from the social networking that took place in coffeehouses 300 years ago? 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 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, as Standage (2013) points out, in fact in England in the late 1600s, very similar concerns were raised about coffeehouses! In 1677, Anthony Wood, an Oxford academic said: "Why doth solid and serious learning decline, and few or none follow it now in the University?" he asked. "Answer: Because of Coffea Houses, where

they spend all their time” (Standage, 2013; note that ‘coffea’ is the coffee plant). As well as complaining that Christians had abandoned their traditional beer in favour of a foreign drink, critics worried that coffeehouses were keeping people from productive work. However, rather than acting as enemies of industry or distractions to academics, coffeehouses in the 1600s were in fact crucibles of creativity and communication because of the way in which they facilitated the mixing of both people and ideas. As the poet Samuel Butler put it, “gentleman, mechanic, lord, and scoundrel mix, and are all of a piece” (Standage, 2013); the implication being that people from different sections of society and skill sets could meet and network. Indeed, members of the Royal Society, England’s pioneering scientific society, frequently retired to coffeehouses to extend their discussions “Scientists often conducted experiments and gave lectures in coffeehouses, and because admission cost just a penny (the price of a single cup), coffeehouses were sometimes referred to as “penny universities.” It was a coffeehouse argument among several fellow scientists that spurred Isaac Newton to write his “Principia Mathematica,” one of the foundational works of modern science” (Standage, 2013).

Now the spirit of the coffeehouse has been reborn in our social-media platforms which are readily accessed via mobile devices. For example, a McKinsey Global Institute report (Chui, et al. 2012) claims that social networking within companies could increase the productivity of ‘knowledge workers’ by 20 to 25 percent. OpenWorm (2014) is an open source project dedicated to creating the world’s first virtual organism in a computer and fostering growth of a completely open computational biology community. Modern fears about the dangers of social networking are overdone. However, as we explore in the Learning Layers project below, we will see that these concerns are very real and need to be investigated and ‘designed for’ if we aim to build

mobile tools to give access to the potential of social media and the benefits of the social economy. First, however, in the next section we describe our approach to inquiry, namely design research.

### **3. Design research and Vygotsky in the Learning Layers Project**

#### ***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 follow:

“... 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).

Over the last 2 years we have led on the development and deployment of a Design Seeking and Scaling Framework (Cook, Bannan, B. and Santos, P., 2013) that is specifically oriented towards guiding research into scaling and places an emphasis on design that is based on a new empirical work (a description of this framework is not the focus of this paper); however, we will outline this approach below in the context of Learning Layers. The design research that we conduct uses as a key conceptual basis the

work of Vygotsky; below we will now briefly explain some of his key concepts (for more detail see Vygotsky 1930/1978; Cook, 2010a; Cook, 2010b).

### *3.2 Vygotsky – ideas from the past*

Society experienced technologically and socially driven transformations during the industrialisation of the first third of the 20th 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, pp. 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 internalization 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, p 56-57). Vygotsky then went on to propose the Zone of Proximal Development (ZPD) as follows:

"It is the distance between the actual developmental level as determined by independent problem solving and the level of potential problem solving as determined through problem solving under adult guidance or in collaboration with more capable peers ... The zone of proximal development defines the functions that have not yet matured but are in the process of maturation, functions that will mature tomorrow but are currently in embryonic state. These functions could be termed the "buds" or "flowers" of development rather than the "fruits" of development. The actual development level characterizes mental development **retrospectively**, while the zone of proximal development characterizes mental development **prospectively**." (Vygotsky, 1930/1978, p. 86, **our bold**)

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). Consequently, in this paper Vygotskian theory is well placed as the basis for conceptualising the way in which social network learning and innovations takes place. Furthermore, as can be seen by the words we have highlighted in bold in the above quote, that development in a Zone of Proximal Development 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 (2010a) 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, 2010a). 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

innovative ‘recommendation service’ in the Social Semantic Server design described below).

The ACD appears to act as part of the substitute for what Vygotsky calls ‘the more capable peer’. As Cook (2010a) 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 (e.g. an assessment activity), (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)).

### ***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 (i.e. Healthcare and Construction). The consortium consists of 17 institutions from 7 different countries. Total project budget over 4 years is 12 Million Euros (i.e. over 16 Million USD).

As we mentioned above, over the last 2 years we have led on the development and deployment of a Design Seeking and Scaling Framework (Cook, Bannan and Santos, 2013). The first iteration around the framework has effectively guided the synchronization of our conceptual ideas, designs artifacts and feedback collected in co-design meetings with Healthcare practitioners. This was used to implement various Help Seeking prototypes described below. Briefly, the Design Seeking and Scaling framework was shared with a project team in June. We predicted in June 2013 that the framework would enhance the rigor and discipline of our work and help us deal with a



complex project; we therefore proceeded to use it to guide co-design evidence gathering and the design and development of a prototype called ‘Help Seeking’ tool (the focus of this paper). We observe that the internet fuelled coffeehouses are very much alive in Learning Layers, as the multiple tools used in the project to communicate and interact (illustrated graphically in Figure 1).



Figure 1. Social Networking and other tools used in Learning Layers.

Using the Design Seeking and Scaling framework had the effect of orchestrating the team discourse about research, users and design artifacts. It also helped us to interface with other Learning Layers work packages and design teams (outside our work package) as it makes our assumptions transparent. Specially, colleagues now seem to be on the look-out for systemic pain points and mechanisms for scaling rather than dwelling too heavily on the problems and concerns of users (although the latter remain a major concern for us). The Design Seeking and Scaling framework makes it necessary to document the information gathered; for example the designs generated, the co-design feedback, the feedback into theory, and so on, for each phase in a specific context. It is systematic in this sense (even if the current version does not capture parallel activities).

#### 4. Help seeking tool

The focus of the remainder of this paper is from the perspective of Learning Layers work package 2 (WP2), one of 6 R&D work packages in the project. Figure 2 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.

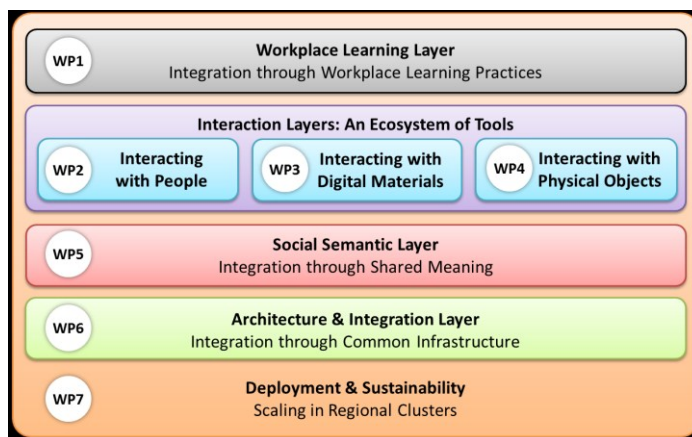


Figure 2: Organisation of Learning Layers

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/organizational 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, Bruner, & Ross (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). Also, Networked Scaffolding proposes a low-barrier approach that collects questions typically asked in practice, we create a scaffolding resource of ‘resolved questions’ that workers have asked about a concept or problem in a particular learning context; this thus contributes to the building of question/answers (recommendations services) that are

being realized with Social Semantic Server (SSS) technology from other WP5 (described below).

#### ***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 sector (NE, England). The Help Seeking Design & 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 staff 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 cascading ‘local training’ on the implementation of national health guidelines can be a problem (it represents a systemic pain point) and that as such it is 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 paper includes a literature review of work-based practice, tagging and ‘trust’) and in a more organizational level through Shared Learning Networks (SLN). 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.

The Help Seeking prototype envisaged usage (i.e. a use case, see Santos et al., 2014a, for details) is as follows: a nurse uses an 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 semantic data base); (3) selects from her group of trusted colleagues (from data in her PLN) who the question should be circulated to. Automatically related national guidelines, meeting notes and questions are ‘flagged’ for her, this information is suggested by the semantic analysis of the question and corresponding tags using the Learning Layers 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.

#### ***4.2 Details of initial co-design work in WP2***

Arriving at the above use case has taken time and a lot of co-design. In order to redefine the our initial (November 2012 – December 2013) user stories, wireframes and various interactive prototypes, we have engaged in discussed with users in initial co-design sessions over a period of about 13 months. Note that because these sessions were designated ‘to inform design’ we are not approved to report details of this work (other work below went through strict UK NHS (National Health Service) ethical approval; we acknowledge the work of partners at University of Leeds and Tribal in generating designs and in gathering this extensive co-design data).

The user stories on which our design ideas were initially based were acquired in research for WP1 (who conduct empirical work in the workplace) and refined during

Application Partner Days in Leeds and Bradford, 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 a diagnosis. 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, and the development of four Design Teams, 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. Since this is a 4 year project, with the objective of supporting (scaffolding) users in new ways of dealing with problems at work, it was felt to be worth pursuing. 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 both Practices. In Practice A, a GP who is familiar with Android devices, clicked through without assistance, whereas in Practice B this was done as a demo, as users were unfamiliar with this type of device. 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 example of NHS Guidelines, being cascaded

to users locally and annotated by individuals in a shared way, was found by some to be useful, but not to others. 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 (Figure 3, a simulation of an Android app which is interactive and simulates certain functionalities) was constructed and demonstrated / trailed with Practices A and B.

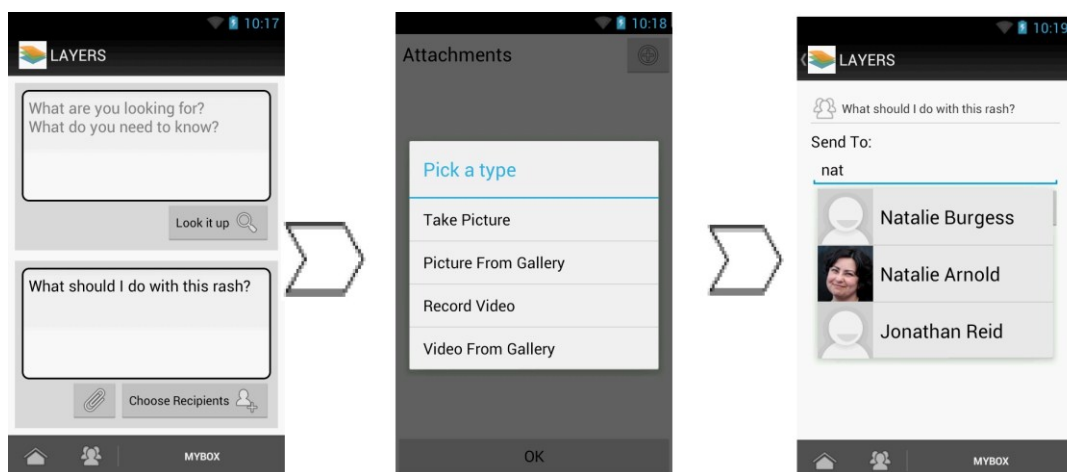


Figure 3: Android Proof of Concept

This allowed users to have hands on experience with the technology: familiar to some, less so to others. 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 discussion with Application Partners, and following further consortium meetings, in which technology partners shared developments, 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 (in this version called a Personal Learning Network or PLN) also accords with the advances made by other technical partners on the Social Semantic Server, so that it is envisaged that the server will be able to read tags and feedback useful contacts, answers to questions and documents which relate to the tags. Contacts will be sourced from a wider Shared Learning Network (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). This version of the Help Seeking tool has been developed from wireframe into a clickable prototype (see below).

Furthermore, Holley et al. (2014) have recently conducted a cross-case analysis of the operation of the GP Practices (gathered as part of year 1 WP1 work, and because WP1 have NHS ethical approval these anonymised co-design comments can hence be reported briefly using different names here). GP Practice Managers have access to an online network of their own peers, and Sonia 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 further notes: “And that’s pivotal really, you need to ... be abreast of change all the time”. Sonia then goes on to relay the sets of educational events, national and local guidelines she has to deal with on a regular basis. 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?*

## **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 Figure 2) into the design of the Help seeking tool (Kowald et al., 2013). Social Semantic Server proponents (or the SSS provide by WP 5 in Learning Layers) claim that their services are putting more intelligence and more meaning into the Internet. The WP5s claim goes on that the SSS collective knowledge systems 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.

### 5.1 Social Semantic Server

The socio-semantic web or information space may be seen as a middle way between the top-down monolithic taxonomy approach like the ‘Yahoo! Directory’ and the more recent collaborative tagging (folksonomy) approaches. The Social Semantic Information Spaces (Figure 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 Figure 4). This could have the effect of serving up a double espresso for the Internet powered coffeehouses that we want workers to access via our mobile devices.

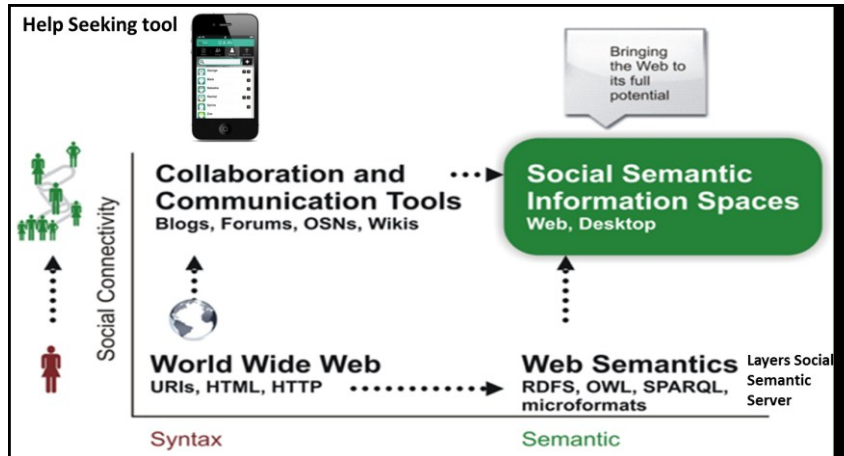


Figure 4: Social Semantic Information Spaces (with Layers tool and service included)

However, a valid external critique that Learning Layers has received is that WP5’s SSS is grounded in the Artifact Actor Networks approach (Reinhardt et al., 2009). It is not clear that this will be sufficient for implementing the proposed services like the Help Seeking tool. The relation between actors, activities and objects of action-

activity has been a core challenge in Vygotsky-informed research and cultural-historical activity theory. The choice of Artifact Actor Networks in WP5 therefore seems to skip much of the state of the art. Consequently, the next section presents an innovative conceptualisation of how the Vygotsky-informed research described in this paper can be used to inform a rethink of the SSS and hence move us beyond the state of the art.

### 5.2 Layers Social Semantic Server and Help Seeking tool in Healthcare sector

The SSS can generate meta-data 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.

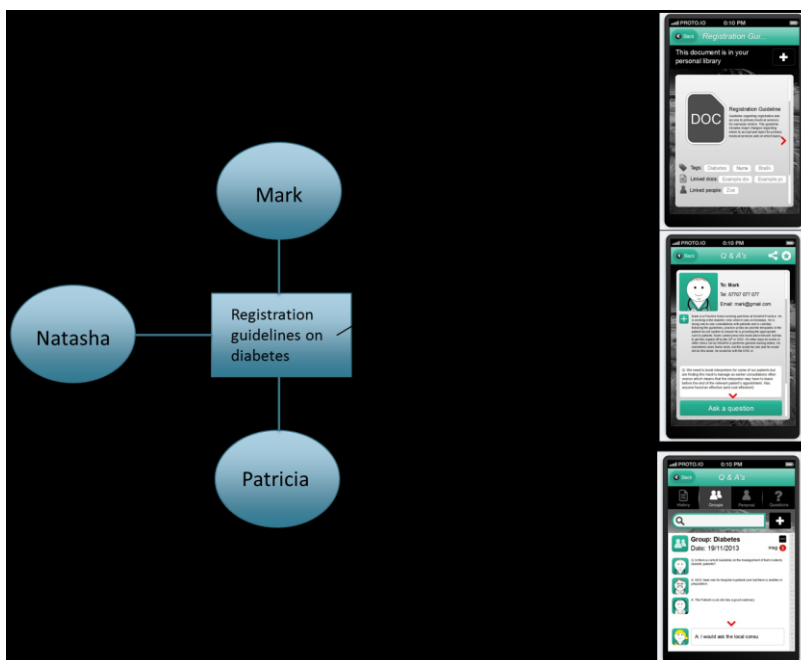


Figure 5: Triggering Event Service

In Figure 5 we have 3 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 Figure 5). 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 3 people have all downloaded

the same document meaning they have shown an interest. From the SSS’s perspective we draw a (dotted lines in Figure 6) *connection between the 3 people*, since they all downloaded and (we assume) have read the same article.

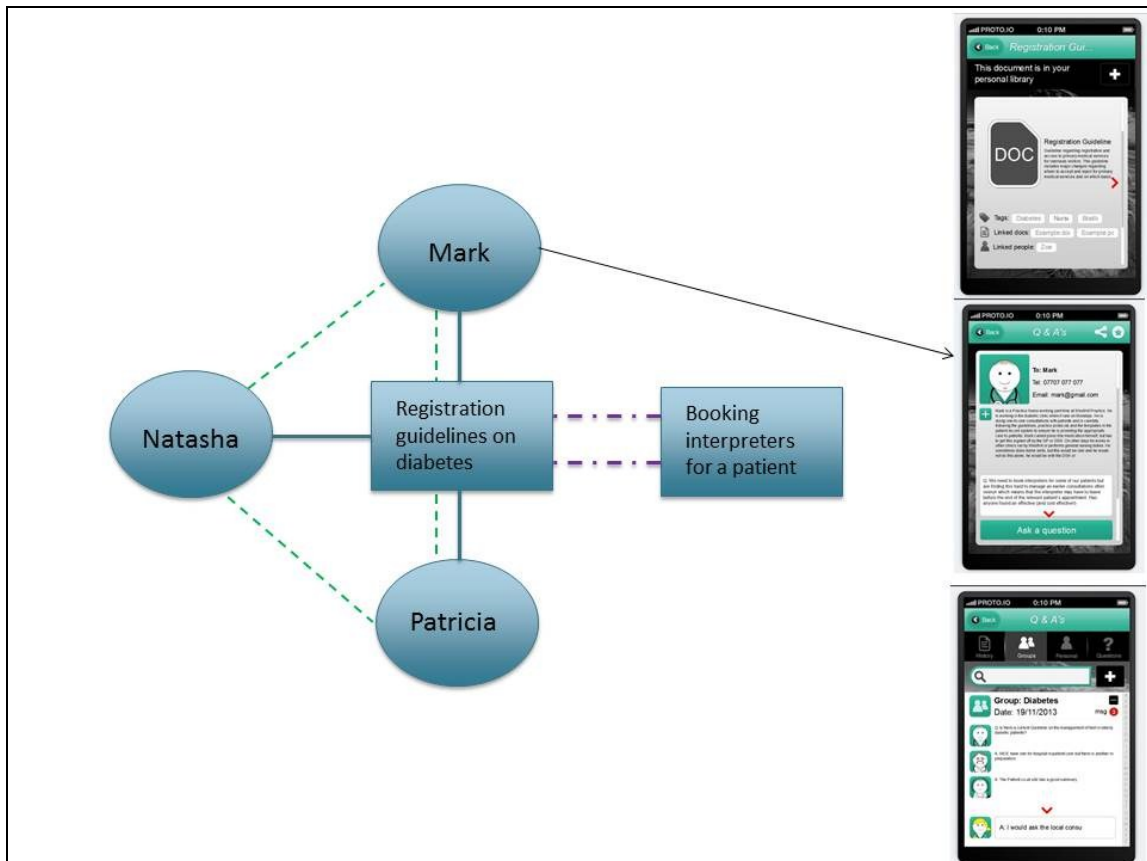


Figure 6: Connection between the 3 people and Relationship between two sets of data.

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 Figure 6 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 Figure 6). 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 Figure 7). 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 Figure 7); the SSS is therefore scaffolding a collaborative ‘temporal context for development’ or put simply creating common ground for a conversation.

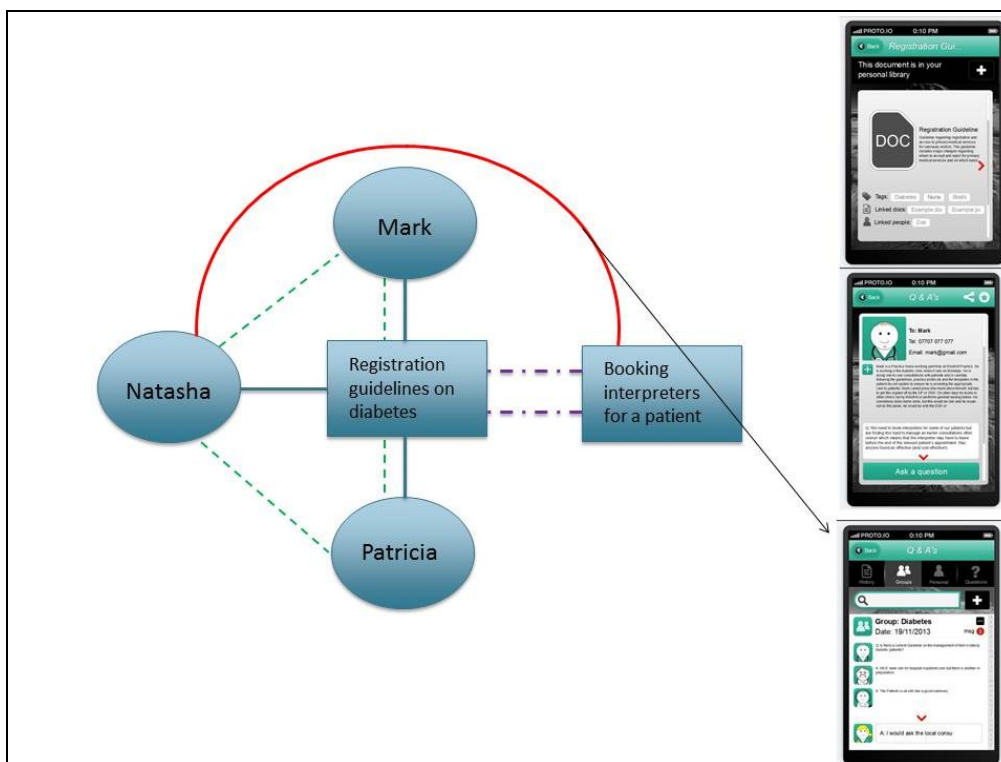


Figure 7: Recommendation Service

In summary, Natasha discovers a discussion that she also finds useful thanks to the SSS’s hi-level service “recommendation”. The services and connections provided/made by SSS in this example are: (1) user event service (finding a 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 (there is also lots of Vygotskian mediation going with signs and tools which we have omitted for clarity; see Holley et al., 2014 for detail).

## **6. Summary of 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 work place 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). In this section we very briefly report on this empirical work to provide supporting evidence of effectiveness of our proposed approach from the user's perspective when compared to an existing application (LinkedIn); for details see Santos, et al. (2014b).

Three in-depth co-design workshops were conducted over the period October 2013 to October 2014 (n = 13 workshop 1; n = 15 workshop 2; workshop 3 is not reported here). The research involved tool use, pre-post workshop questionnaires and workshop observations. By October 2013 we had identified 3 already existing healthcare networks in the North of England that were regarded as worthy of deeper inquiry. These are a Practice Manager's Network, a Nurses Network and a Data Quality Leads Network. As is required for all research involving NHS staff, this follow-up empirical co-design study was submitted for and obtained ethical approval from both

the University of Leeds School of Medicine Ethical Committee and the National Health Service (NHS) Ethical Committee. 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 version of the 'Help Seeking' tool (which is WordPress based and can run on mobile devices like phone and tablets and on desktops). This version 'beta 1' was evaluated during the 2nd workshop. Results from the 1st and 2nd workshop were used to iterate and improve the Help Seeking tool. Finally, the 3rd workshop was used to further refine the design of the Help Seeking tool and orient our work towards scaling.

There was strong support for using tags to find relevant discussions; in response to the Workshop 1 question 'Please indicate how important you think it is for each of the following features to be included in a Help Seeking tool', in responses for the feature 'Search and find a specific discussion by using a Tag', we found that 77% were in favour, 15% were sitting on the fence and 8% were thinking it is not important.

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.

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. 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.

## **7. Challenges and Conclusions**

There are certain assumptions built in the Social Semantic Server (it is based on Artefact Actor networks and Piagetian schemas) that still need resolving with respect to the Cultural-Historical approach (Vygotsky) of our Help Seeking tool. The example conceptualisation described above has enabled our WP5 colleagues to move forward in

defining SSS service requirements for the Help Seeking tool; this may include algorithms for collaborative filtering (this is future work). However, we firmly believe that tracking and linking multiple temporal contexts for development together will provide a key to cross-contextual learning and meaning making (this is hence regarded by us as a core notion in the innovative recommendation service in the Social Semantic Server design described above).

Personally, the final challenge is to balance our coffee and wine intake! As fully paid up members of many internet powered coffeehouses we must continue to remind ourselves of the following saying: “Lord, give us coffee to change the things we can, and wine to accept the things we can’t”.

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