Part III - Managing development of digital competence in organisations

The previous parts have considered the individual's competence and learning. In order to consider organisational aspects of IT competence, we shift focus from individuals to groups. We will base the identification of groups on people who share a set of tasks, called a *practice*. Such groups constitute the units in a theory of learning at work within the class of situated learning theories. Situated learning refers to learning that takes place within the practice where the learning is applied.

Pedagogical theory – Situated learning – Communities of Practice

According to (Wenger, 1998) a *community of practice* (CoP) has three crucial elements; domain, community and practice. First, it has an identity defined by a shared *domain* of interest, whereby membership implies commitment to the domain. Therefore shared competence is an important factor that distinguishes the members from others working on the domain. Members in a CoP value their collective competence and learn from each other. Second, members in a CoP create a *community* through engagement in joint interactions and discussions, by helping each other, and also by sharing information. They also build relationships that enable them to learn from each other. However, members of a CoP do not necessarily work together on a daily basis. The third characteristic element of a CoP is the *practice;* the doing in a historical and social context which provides meaning and structure to the activities. The shared practice is created by practitioners who develop a shared collection of resources such as tools, experiences, and ways of addressing recurring problems. For example, a group of supermarked workers would constitute a CoP when they share the concern for the goods and customers, they interact, discuss and help each other, and they use common tools for sales and pricing og goods.

CoPs often differ from the formal organisational units, appearing neither on an organization chart nor on a balance sheet. In the supermarket, managers may be part of the CoP, and in a large organisation, the accountants spread around in different departments may interact sufficiently to constitute a CoP.

Newcomers get socialised into a CoP by imitating its members, and also by getting punished or neglected if behaving in ways which are not acceptable in the community. The members may also tell newcomers explicitly how to behave, and the novices may have attended formal education which has prepared them for the introduction. When a community of practice receives a new member, it is mainly the newcomer who will have to adapt, while the community is less receptive for changing their practice.

Pedagogical theory – Situated learning – Interaction between CoPs

In line with (Wenger, 2000) and (Cobb et al., 2003), we consider three aspects of interaction between CoPs; boundary interactions, brokers, and boundary objects. In *boundary interactions*, members from different communities take part in common activities. This might be short encounters, like when a health manager calls the computer support for getting help in connecting to the network, or longer practices, for example when health managers participate in a course conducted by health information specialists.

A *boundary object* is a material thing which makes sense in more than one CoP, and which also has a structure that is common enough to be recognized in both CoPs (Star and Griesemer, 1989). Boundary objects are used for communication between CoPs, and they may provide a common understanding of a phenomenon as well as give rise to misunderstandings. A database could be a boundary object for accountants and computer scientists, where both parties would recognise its ability to store and retrieve financial data. However, the accountants would emphasize its role of representing the financial affairs of their company, while the computer specialists could regard it as an instantiation of a relational database management system.

Brokers are at least peripheral members of two CoPs and can introduce parts of practice from one CoP to the other. A headmaster could be a broker between the community of teaching practice and the community of school management practice in the town. Construction engineers could be members of engineering, architectural and construction work practices, providing some joint understanding between the three partners.

Chapter 12. Roles and competence

The learning aim of this chapter is to be able to identify groups with different roles as learners and supporters and to specify conditions for these groups developing into communities of practice.

12.1. Roles

Corresponding to the subject matter areas described above, four types of practice are identified. The first group is *users,* and they are characterised by having the domain of the information system as their primary domain of work. In the case described, health managers constitute the primary user group. Second, people having information as the main domain of their practice, like accountants and archivists will be called *information officers.* Third, *IT specialists* and a number of other people have IT as their main domain of work, so these are in the IT practice. Fourth, some users, who by definition know their tasks, develop specific skills in using computers, so they provide support to their colleagues, and this group will be called *super-users.* Each of these four groups can form CoPs, and the latter three can contribute with their specific IT related competence in training and supporting others, hence they will be called *IT-supporters.*

IT specialists

Larger companies or agencies would have computer specialists who carry out a mix of tasks. Network administration and user support would normally be the two most time consuming ones, while procurement and application tailoring could be other tasks.

The idea of a community of practice is that people share a domain of interest, and we could say that the IT systems and their users in the organization is the domain of the computer specialists. They would normally share information about the technology and its users through lunch conversations, meetings, e-mail, documentation and random encounters in the corridors. Larger organisations could also have a database for storing user requests and responses, where the computer specialists can search for topics with which they are unfamiliar. In these ways they may develop a shared repertoire of cases, problems, software and users, so that they constitute *communities of IT practice*. IT specialists meet users in boundary encounters on the phone and face to face, helping out those who need more IT competence, and they learn about users' tasks and information through interacting with them. They also have boundary interaction with other communities of IT practice, e.g. at computer vendors, thus keeping updated in the IT field.

Software companies and at IT vendors can also have departments for support. For these organisations, their customers will constitute their users. A newly established, small company might just have a flat structure, where all members do development and support. These would constitute a community of practice, where the software product constitutes the shared domain of interest. A big vendor, on the other hand, might have a call centre in India with several

hundred staff members, who serve customers worldwide. If they have the opportunity to communicate and exchange experience, they may also be a community of practice, where the users' requests and the corresponding responses constitute the shared domain. In between these extremes, there are many medium sized IT companies, where the user support is located in a department of a smaller size, such that the formation of the community is simpler than in the huge call centre case.

An IT department in a non-IT company would use the software and hardware vendors as their lifeline for support. They would engage in boundary interactions with the vendors, and the software and documentation would constitute the boundary objects of these practices.

Superusers

Super-users are users who have specific IT skills and have taken on the role of supporting their peers in an organization (Boudreau and Robey, 2005, Olfman, et al., 2003). ‘Key users’ (Fitzgerald and Cater-Steel, 1995), ‘business coaches,’ ‘subject matter experts’ (Olfman, et al., 2003), ‘power users,’ ‘local heroes’ are other terms for this role. Super-users could have a primary domain of work completely remote from information or IT, for example nursing, sales or farming. They would therefore belong to two communities of practice; one on the IT side, and another on their primary domain, and they would also be brokers between these communities. They could influence the communities of IT practice with their user competence, and introduce IT competence amongst other users.

A community of super-user practice could emerge if they engage in activities where they meet and exchange experience specifically on their super-user activities and role.

The significance of super-users is described in a study of implementation of a companywide information system where adoption was slow (Boudreau and Robey, 2005). It was found that most user communities avoided the initial training programme, and when the software was implemented, the users found ways of avoiding using it. Rather than entering data, they got some groups of information officers (see below) to carry out the data entry. Later, some self-initiated super-users found out how to operate the new software, and this competence was spread in the communities as folk wisdom. In the end, most people used the system, after the user communities had found workarounds and tweaks in order to get the system performing as needed. This competence was also spread throughout the relevant user communities. The account of this story in Boudreau and Robey's paper is told through a theoretical lens of human agency. If we try to regard it with the ideas from communities of practice, the organisational change eventually took place due to the broker role of the super-users.

Almnes (2001) conducted a study of superusers amongst nursing home personnel in Norway, using qualitative interviews and logs of requests. The study showed that the feeling of belonging to a group is important for superusers, since their role is the only ones of its kind amongst those whom they meet daily. Further, the study concludes that in addition to meetings, e-mail lists, newsgroups and lists of frequently asked questions may also be

advantageous. The organized group should also provide the necessary opportunities for the superusers to update their skills, whether new software or other updates necessitates it.

On the contents of their role, Almnes (2001) recommends that superusers should be involved in planning and conducting courses, in order to include user tasks in the training contents.

Communicating frequently with users, the superusers receive requests for changes of computer systems. They are in a good position to communicate these requests to the computer department or those in charge of the software and hardware. This aspect of their role should be used so that the requests from the users are taken into account. The meeting of superusers could also be an agenda for discussing and distilling such requests.

The superusers could also act as communication link in the opposite direction. When systems updates occur or tools are replaced, the users need to be informed and trained in the altered functionality. The superusers could naturally take on this obligation, and provide small training sessions locally if needed.

The selection of people for the superuser role seems to be the most important issue for creating a well functioning support system. She could preferably be one whom people often calls for assistance, which would guarantee that she is a caring person. Local managers should be avoided, since they are often too busy and not always available. In addition, many people do not like to expose their misunderstandings to their boss. People who are unwilling to take on the role should also be avoided. They may behave hostile or less caring towards their peers, and if so, the users will soon stop consulting them.

The superuser should be given responsibility of the resources necessary for carrying out the role. The resources for sending users for training, is an obvious responsibility that should be attributed to the superuser.

The superuser is the first person in the support chain. She should handle most of the normal requests dealing with use of the computer system, for which she has received special training. In addition, the superuser should be able to take care of user requests concerning the operating system and standard tools.

The superuser has to be more proficient in the computer system than those she is going to support. This seems self evident, but nevertheless, users with ordinary qualifications have been appointed superusers without having necessary skills or been given additional training. In addition to computer skills, the superuser also ought to have skills in guiding others. Helping others carrying out their tasks instead of pushing the buttons for them is a basic principle for guiding people who struggle with computer systems.

Some IT people change their career into other occupations, and they will naturally be more skilled in IT than their peers. If they have the necessary inter-personal skills, they would become very good at supporting colleagues as well as communicating with the IT specialists.

Information officers

Information officers are normally people of other professions than IT, but who have data management as their main responsibility. This could be accountants keeping the books, clerks doing data entry, statisticians producing reports, epidemiologists analysing data, surveyors measuring locations, or archivists storing and retrieving files. Information officers are the experts on information in the IT competence model. This expertise enables them to be IT-supporters for this aspect of IT-competence. Having IT as their main tool for work, they often develop into super-users, thereby achieving double expertise in relation to the information system.

In larger organisations, there may be an accounting department, a central archive, or a management information systems group, each having a number of staff working closely together. They could constitute communities of information practice within their application area. However, such specialists can also be scattered around in an organization, leaving them few opportunities for developing into a community. In these cases, user forum meetings, e-mail groups, professional societies or the odd phone call may provide sufficient contact for their expertise to be shared and thrive. If they work in a place where there is also a community of information practice in the same domain, like the accountancy department or the central archive, these communities could provide the support for the scattered individuals.

Trainers

Larger organisations have human resource department where educationalists are hired for organising and planning training, and they may also act as instructors themselves. Schools are obviously special in this respect, as their main staffs have formal pedagogical qualifications. They would normally constitute one or more community of teaching practice in each school.

School teachers and business instructors sometimes also do IT training. In schools, IT competence could be an end in itself or a means for the students to learn other topics. In the latter case, the teacher may be fluent on tasks and information but short on the technological competence. Professional teachers bring training methodology into the realm of user support and training, and this competence is hardly found amongst IT specialists, superusers or information officers.

Users

For the majority of IT users, the technology is a means to get work done, and not an aim in itself. They find IT problems annoying and prefer to spend their time on their primary tasks. Their shared domains of interests are therefore not IT or data, but any other work area; hence they may constitute communities of non-IT practice. Correspondingly, the eventual learning of IT use taking place in these communities will be of secondary importance to the learning of the main tasks.

12.2. Competence requirements

Table 6 summarises the competencies which information officers (column 1) and superusers (column 2 and 3) bring into their practice. In addition, they have the skills of ordinary users. The teacher's professional competence is the row "Help others."

Table 6. Advanced competencies for information officers (1) and superusers (2 and 3).

	1. Information	2. Information Technology	3. Tasks in the users' practice
Problem solving	Check and correct data quality.	Detect and correct erroneous use of the software.	Find mismatches between tasks and technology.
Learning	Learn new data elements and ways of manipulation.	Learn new functionality and user interface elements.	Find ways of using the software for better task support.
Help others	Support and train on manipulating data.	Support and train on functionality and user interface.	Support and train on the appropriate functionality for users' tasks.
Technical communi-cation	Explain how the information represents the business domain to software people.	Explain poor functionality and user interface to software people.	Explain user tasks to software people.

12.3. Activities where learning is the primary aim

Learning can take place anywhere and anytime, but some activities are carried out with learning as their main purpose. Having identified the CoPs relevant to building user competence, we can proceed to characterise the activities where the different communities meet and where learning is supposed to take place. These activities encompass training and support.

In-service training is acknowledged by Wenger (1998) as useful when providing a place for reflection on the practice, and as an opportunity for getting to know people whom one would otherwise not meet (pp. 249-250). However, Wenger remarks that often in-service training or education are too detached from practice to foster learning which strengthens the individuals' participation in the communities. This could easily happen when the tasks and information are not included in IT user training, or when tasks and information included do not match the learners' experience.

User training would be carried out by IT supporters. In addition to the time spent in the training sessions, where both trainers and learners participate for an hour or up to a couple of weeks, the trainers carry out preparation and evaluation of the session without the presence of users. In a community of practice, the practice would constitute the tasks of the majority, while the minority would be peripheral people who could learn the tasks through interacting with the majority. A training session is of an opposite kind, where the majority of learners is

supposed to adapt to the minority of trainers. Unless all trainers are super-users, it is highly unlikely that the trainers and the trainees develop a common knowledge base during a two weeks in-service training session, so such activities constitute boundary interactions rather than CoPs.

User support is the second type of learning support which users seek. These encounters normally last for a short time, like a few minutes. Contrary to training sessions, the topic of the support sessions are initiated by the users and the support is targeting the user's current problem. The IT-supporters would normally not prepare specifically for a certain encounter, but they may subsequently note down information about the support.

In in-service training, there may be more than one type of IT-supporters, so that a mix of competence takes place during training sessions. Support is normally carried out by individuals, so the competence mix in that case takes place at the users' site. The mix of IT-supporters in in-service training and support, and their corresponding competence is illustrated in

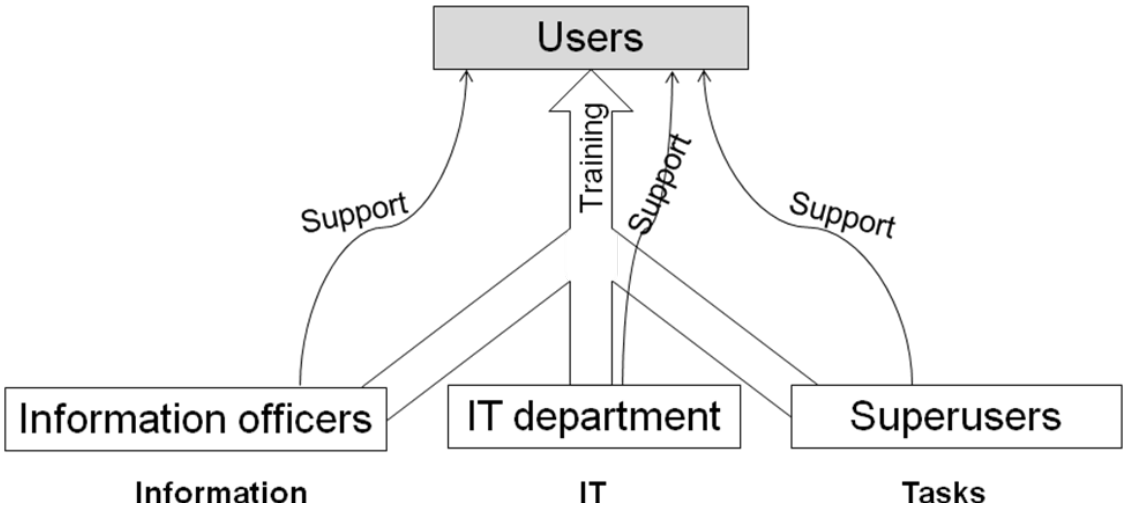

Figure 45. Learning activities as interactions between communities of practice. Communities of IT practice are marked with white while communities of non-IT practice are labeled grey.

The arrows point in the direction of the main purpose of the activities. However, all activities will also influence in the other direction, so that the communities of IT practice learn how users conceive and learn the IT systems, the information and how the training and support activities are carried out.

12.4. Summary

In addition to IT skills and understanding, users need to learn also task and information competencies. Superusers and information officers have the right background for including these competencies in training and support. Enabling the developing of these groups into communities of superuser practices and information practices could boost their contributions to IT competence in the organisation.

7. **Identify, organise, authorise and cultivate superusers.**
8. **Include IT, information and use competence in support and training.**

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