18 MAKE TECHNOLOGY INVISIBLE, OR KEEP IT VISIBLE? The Role of Intra-organizational Transfer and Integration of Project Outcomes

Henrik C. J. Linderoth
Umeå School of Business
Umeå University
Umeå, Sweden

Abstract *Today's organizational renewal and change is conducted primarily within projects (i.e., temporary organizations), and, in varying degrees, includes information and communication technology (ICT) systems that should mediate or trigger intended changes. However, the definite duration of a project process and the indefinite duration of ICT-mediated change processes cause challenges for the permanent organization when intra-organizational transfer of intended and emergent project outcomes would be managed. However, when studying the interaction between ICT and an organizational context, it is of crucial importance to also include the ICT in the analysis. Accordingly, the aim this paper is to uncover technology features and their consequences for the permanent organization when intra-organizational transfer of intended and emergent project outcomes is managed. In order to achieve the aim of the paper, three case studies of ICT projects are analyzed and discussed. The ICT features predefinition of processes to change and the ease of making the ICT into an obligatory passage point will have consequences for the permanent organization's management of intra-organizational transfer of intended and emergent project outcomes. The conclusion is that these features of ICT have an impact on arrangements to be made by the permanent organization in order to support the intra-organizational transfer and integration of intended and emergent project outcomes.*

Keywords Organizational change, ICT, inscriptions, project management

Please use the following format when citing this chapter:

Linderoth, H. C. J., 2007, in IFIP International Federation for Information Processing, Volume 235, Organizational Dynamics of Technology-Based Innovation: Diversifying the Research Agenda, eds. McMaster, T., Wastell, D., Ferneley, E., and DeGross, J. (Boston: Springer), pp. 267-281.

1 INTRODUCTION

Today's organizational renewal and change is conducted primarily in temporary organizations (projects) (Ekstedt et al 1999; Lundin and Söderholm 1995; Söderlund 2005) and, to a varying degree, includes information and communication technology (ICT) systems that should mediate or trigger intended changes (Barrett et al. 2006; Boddy and Buchanan 1992; Henfridsson 1999). To organize an ICT-mediated change process in the organizational form of a project, however, is not without inherent conflicts between the task to be solved (the IT-mediated change) and the organizational form used to solve the task (the temporary organization). First, learning and knowledge development in the project process regarding emergent use of a system can challenge budgeted use of resources and timelines (Linderoth and Lundqvist 2004). Second, the use of ICT systems in daily practice regularly drifts away from original intensions and goals, no matter who defines them (Ciborra 1996). This situation causes problems for determining goals at the beginning of a project process when uncertainty is high (Kreiner 1995). Third, in contrast to the indefinite duration of ICT-mediated change processes (see Bresnen 2006; Orlikowski 1996), temporary organizations have a definite duration. Thus, it can be claimed that the fluidity of ICT-mediated change processes has implications not only for the temporary organization, but also for the permanent organization that hosts the project. Because ICT has the potential to transform a wide array of organizational processes and structures, all of the change options are not known when a project is initiated. Rather, change options emerge over time when actors enact and make sense of a technology (see Orlikowski 1996; Orlikowski and Hofman 1997). Because of time and budget constraints, therefore, all of the options for emergent changes and organizational development are not possible to realize within a single project. Thus the definite duration of the temporary organization and the indefinite duration of ICT-mediated change processes create a critical issue for the permanent organization: How can the intra-organizational transfer of intended and emergent outcomes from an ICT-mediated change project be managed?

When this inherent conflict arises between ICT-mediated change processes and the temporary organization, no particular attention has been paid to the ICT itself. However, when studying ICT in some organizational contexts, it is of crucial importance to include the ICT in the analysis of outcomes of the interaction between the technology and the organizational context (see Monteiro and Hanseth 1996; Orlikowski and Iacono 2001). Thus, if deeper knowledge is to be gained about the challenges faced by the permanent organization in hosting the ICT-mediated change project, the focus cannot be merely on the inherent conflict between the change processes and the organizational form in which the process is temporarily managed. It is well known in the ICT research literature that ICT, in the shape of a blurred mixture of social and technical components, has an impact on actors and their roles and relationships in the context in which a system is deployed (Hanseth and Monteiro 1997; Monteiro and Hanseth 1996). But what impact do ICT features have on challenges for the permanent organization when the intended and emergent outcomes from a project would be transferred to the permanent setting? This issue has not received adequate treatment in the literature. Accordingly, the aim of this paper is to uncover technological features and their consequences for the permanent organization when intra-organizational transfer of intended and emergent project outcomes is managed. In order to achieve this aim, three ICT projects will be analyzed and discussed.

2 TRANSFER THE TEMPORARY TO THE PERMANENT

Bearing in mind the role of technology features and the inherent conflict between ICT-mediated change processes and the temporary organization, how can the problem be approached in a way that enhances the understanding of intra-organizational transfer of project outcomes? Concerning this overall problem, three questions can be raised. How can a successful transfer be viewed? Why does transfer occur? What is the impact of the technology features on the transfer?

The successful transfer of project outcomes can be viewed from a number of perspectives, such as ROI, achievement of goals, and perceived benefits. But a pragmatic stance is taken in this paper. A successful transfer of project outcomes is viewed as occurring when outcomes become an integrated and standard part of the operating system in the permanent organization (see Meredith and Mantel 2005). Accordingly, when ICT usage has triggered a change of organizational processes, integration is achieved, as an expression of a successful transfer of project outcomes. However, if integration is expressed in this manner for a successful transfer of project outcomes, why does integration of project outcomes occur? In the literature focusing on diffusion of innovations (see Rogers 1995), there is a basic assumption that there should be a fit between the characteristics of an innovation and an appreciation of these characteristics among potential adopters. This view has been criticized for neglecting the role of actors when innovations diffuse (Latour 1987). Latour (1986) claims that the 100th actor is as important as the first actor in a diffusion chain, and each actor can modify, adopt, neglect, or betray an innovation. Thus, Latour's idea that innovations are transferred along a chain of actors indicates that the organization hosting an ICT-mediated change project needs to add links in the chain after the termination of a project in order to facilitate intra-organizational transfer of project outcomes.

However, one basic claim in this paper is that features of the ICT will have an impact on the intra-organizational transfer of project outcomes. Accordingly, these features will have an impact on the *shape* of the links in the transfer chain. Thus, it will be of crucial importance to understand the various features of the ICT that have been implemented. In this paper, the concept of inscriptions, taken from actor network theory (ANT), is used as a tool to uncover technological features. Inscriptions refer to the technology designers' assumptions about the role of technology in a future context of use, about the context itself, and about potential users' capabilities and competencies (Akrish 1992). Designers' assumptions are inscribed into a technology in strong or weak modes, and, in the process of inscription, tasks are delegated to the technology and to the future user, respectively (Hanseth and Monteiro 1997; Latour 1991, 1992). However, the patterns of action inscribed in the new technology can cause conflicts with established norms and with actors' prevailing roles and relationships in a process (see Linde and Linderoth 2000; Orlikowski 1992, 2002). Patterns of action, for example delegation of tasks, can partly inform actors of future actions to be taken when ICT should be integrated into the permanent organization (Linderoth 2002b). Even if, for example, actors are knowledgeable about the task of identifying the process to change by means of the ICT and learn the actions to perform in order to integrate ICT usage into the permanent organization, a crucial question remains: To what extent have intended and emergent project outcomes been integrated when a project is terminated?

Intended and emergent changes may be realized to a greater or lesser extent before the project is terminated. Taking this into consideration, how can the integration of changes triggered by ICT be viewed? In the ideal ICT-mediated change project, it can be claimed that integration occurs when the technology has become an *invisible* part of the operating system, or is viewed as something that no longer needs to be considered a black box (Callon and Latour 1981). However, because optional changes—intended and emergent—may not be possible to implement during the project lifetime, viewing integration or a successful transfer of project outcomes as the creation of a black box is not without problems. To place issues related to ICT-mediated changes in the black box implies that these issues are no longer considered. However, Linderoth (2002a) argues that the concept of a black box can still be used if changes realized and integrated into the permanent organization are put in the black box, at the same time as issues of further optional changes are considered. Otherwise, the entire issue of ICT-mediated change is made invisible after the termination of the project. Accordingly, the challenge for the permanent organization is to consider issues not dealt with in the project, and to place accomplished issues in the project in the black box. But what organizational arrangements are needed in order to manage issues emerging from the project? And what role do inscriptions in the system play when designing the organizational arrangements? In the remainder of the paper, three ICT-mediated change projects are analyzed in order to uncover the impact of technological features on the formation of organizational arrangements that should facilitate an intra-organizational transfer and integration of intended and emergent outcomes of a project.

3 DATA COLLECTION AND CASE DESCRIPTION

One basic claim in the paper is that inscriptions, including the technology designer's delegation of tasks to technology respectively to the organization hosting the project, will have consequences for the intra-organizational transfer of outcomes from ICT-mediated change projects. Therefore, a crucial issue is the selection of cases that vary in the features of the ICT that is implemented. One such variation indicated is the delegation of tasks to technology respectively to the organization hosting the project. For one case, this means a system should be identified in which the processes affected are already inscribed in the system (i.e., delegated to the technology). In another case, a system should be identified where the processes affected are not identified (i.e., it is delegated to the host organization to identify processes to change by means of the technology). A third case is also included in the analysis. During its analysis, another dimension of technology features emerged as an explanation for actions that the permanent organization has to perform in order to achieve the intra-organizational transfer and integration of emergent and intended project outcomes. This dimension was the ease of making the ICT into an obligatory passage point (OPP), which, as described by Callon (1986, 1987), is something that actors must pass on the way to their goals. In the context of this paper, OPP refers to whether or not actors can avoid using ICT, and to how much effort is needed to avoid passing the OPP.

The first case is a longitudinal study of a project involving the implementation of electronic patient records (EPR) in a clinic at a university hospital. This clinic was the 11th of 21 clinics at this hospital to receive the new EPR system. The project process for

our chosen case followed a traditional structure, the main tasks in the project process being adaptation and adjustment of the system and organizational routines, followed by a "big bang roll out." The project group was goal-oriented on the operational level. Some project group interviewees stated that the goal was to implement the system by 1 October 2002, but they also had more qualitative goals, as they stated that they should create a system as good as possible for the clinic. The overall goals of the hospital-wide implementation (e.g., to increase access to information, improve patient security, and improve efficiency) were, however, not often mentioned by interviewees. In our chosen clinic, the project ran for 1 year; we followed its progress during its last 6 months, interviewing a total of eight people: six from the project group, the chair of the steering committee (who was head of the actual clinic), and one from the hospital's central support unit responsible for the overall implementation of EPR in the hospital. Further data were collected by participant observation at project and steering group meetings, at demonstrations of the system for end users, and at two sessions of end-user education. Additionally, we had access to all protocols from meetings of the steering and project groups, as well as to the project description and other related material. Three additional follow-up interviews, with the former project manager, the head of the clinic, and the person in the central support function, were conducted 3 years after the termination of the project.

The second case is a longitudinal study of the implementation of telemedicine in a Swedish county, a process that was followed by the researcher from 1994 to the present. The overall goal of the telemedicine projects was to investigate potential consequences of the use of telemedicine along a number of dimensions such as competence development, patient service, and potential cost reductions. At the outset, two parallel projects, PAT (telepathology) and GT (general telemedicine), were running between 1996 and 1998. In the GT project, communication channels were established among two health centers and three clinics at a university hospital (dermatology; orthopedics; and diseases of the ear, nose and throat). In the PAT project, communication channels were established between two clinics at a university hospital (pathology and cytology) and two clinics at two county hospitals (surgery and gynecology). Since the terminations of the PAT and GT projects, there have been a number of small projects initiated as a consequence of the county's decision to support further investments in the technology. The main study was accomplished between 1994 and 1999. Data were collected through 62 semi-structured interviews and participant observation was employed in 18 project-group meetings. After the first study, informal contacts have been kept with informants in the actual settings, a few follow-up interviews have been conducted with representatives for the project settings studied between 1996 and 1998, two managers at a central support function have been interviewed and document studies have been conducted, and 1,800 telemedicine consultations that took place between June 2003 and January 2006 have been analyzed.

The third case is a retrospective study of a project implementing an e-learning system in a company in the telecom industry. The motive for the project was to control the process of distribution and use of training material in after-sales services (i.e., customer care centers and repair firms managing guarantee repair and other repair services). The company is operating in a highly competitive industry in which launches of new product models are essential for maintaining a competitive position. Thus, one critical activity is the early distribution of training material containing information about the functions and features of the new product model and how to detect errors. The purpose

of the project was to implement a system in which information and repair advice regarding the company's new product models could be distributed to companies around the world that are responsible for warranties and after-sales services. Five interviews were accomplished with representatives for the project and the system vendor.

4 MAKE THE SYSTEM INVISIBLE, OR KEEP IT VISIBLE?

In section 2, a claim was made that the integration of project outcomes was completed when technology use was taken for granted—in other words, when technology was made invisible. This view was not without its complications, however, as the definite duration of a project implementing ICT-mediated change implied that opportunities of organizational change and development would probably remain after the termination of a project. Thus, a crucial issue for the permanent organization will be twofold: to make ICT invisible and to keep it visible. In this section, the work of the temporary organization and the permanent organization to make ICT invisible and keep it visible will be described and analyzed for the three selected cases.

4.1 Electronic Patient Records: More Visible than Wanted

In the electronic patient records (EPR) case, a large number of predefined, interconnected processes for change were inscribed into the system, meaning that system designers tried to get potential adopters to accept the designers' view on the organization of information flow. It should also be noted that laws and regulations prescribing the information to be documented and how it should be documented have a significant influence on the designers' inscriptions in an EPR system. In any case, the organization has the option of influencing the complexity of the project process, as the system consisted of five interconnected modules that could be implemented separately. At the time, however, it had been decided within the hospital that all modules should be implemented in the project. Hence, a main task for the project group became the identification of all processes affected, and then the adaptation and adjustment of these processes in accordance with routines inscribed in the system. In particular, project group members had to attempt to adapt the system without violating rules and regulations when inscribed routines would cause too many complications in the daily operations. Thus, the feasibility study (the identification of prevailing processes and their relationships) in the beginning of the project became rather comprehensive and was one important activity used to prepare the ground for a smooth integration by making the system invisible after the termination of the project, because misfits between the system and organizational processes would be very visible for end users. The project's feasibility study was one of the most thorough among projects that had been undertaken by the hospital at that time, and a manager in the central EPR support function stated that the feasibility study was one of the reasons for the project's success. Due to the comprehensive feasibility study, the project manager stated that they could already detect problems in their early stages that had been caused by mismatches between prevailing processes and system features, and for that reason, the project group could start working at solving some crucial problems in advance.

During the feasibility study and the remainder of the project process, a number of issues concerning further organizational development and change can be expected to be detected because of knowledge development and learning that occurs during the project process (see Orlikowski 2002; Robey et al. 2000). A crucial issue for the permanent organization is how the intra-organizational transfer of these project outcomes would be managed. An alternative is to exploit the knowledge developed in the project process by enhancing the scope of the project, which implies that more resources are needed and/or that timelines for the project are exceeded, as was the case in projects implemented in other clinics at this hospital. In the clinic studied, all issues that could cause an increase in the scope of the project were handed over to the clinic manager, who decided if a further project would be started. The manager in the central EPR function stated that matters had been handled differently. In another clinic that had implemented EPR (a clinic not included in the present study), the permanent organization dealt with emergent project outcomes by returning to the outcomes in clinic meetings (when coming activities were planned, for instance) whereas in other clinics, nothing happened.

It is not only important to mange the transfer and integration of emerging project outcomes, but, as previously noted, one of the project group's main tasks is to try to make the system as invisible as possible. Because the ICT becomes an obligatory passage point (Callon 1986, 1987) for everyone who must manage or retrieve patient-related information, all users of the system can make their own sense of the technology, which will guide their coming actions. Roughly expressed, in the extreme cases, users either use the system without further notice, or they actively try to bypass the system in order to make requested information available (e.g., by asking the secretary for printouts). Even if the work of the project is to make the system as invisible as possible for the end user, the large number of inscribed and interconnected processes in the system implies that the change from managing paper-based patient-related information to managing the information electronically will be highly visible. From an analytical point of view, transfer of intended project outcomes can be claimed to occur by *switching*. During a short period when the system is rolled out into the operations, the mode in which information is managed and retrieved would be switched from paper-based records to electronic records. If the transfer is successful, the system should become invisible and should not be considered further. However, because the system becomes an OPP, it will probably not become invisible, or will not be taken into consideration, for the sole reason that it has become an OPP! Even if the integration of the system could be regarded as successful immediately after the termination of the project, support is needed if the integration is to persist and if the system is to become invisible. This could, however, be a long process. In the case studied, immediately after the project was terminated, the project manager got a position as the one responsible for managing the system. In an interview three years after the roll out, she revealed that many of her activities concerned issues related to hardware and software problems, the training of new users, and further training of old users. Issues concerning further organizational development triggered by use of the system have been more or less absent, but those issues that appeared during the project process are still being dealt with. Issues concerning the EPR system at the university hospital are still highly visible, a matter that became clear during the autumn of 2006. It was reported in the regional broadcast news that surgery had been postponed at the hospital due to severe problems with the EPR system when it was upgraded.

As this EPR case has demonstrated, the intended outcomes—for example, that the system should become an OPP—and the emergent outcomes that evolve from learning and knowledge development can be considered for a long time after implementation of the system. Thus, the integration needs to be maintained in the permanent organization by establishing a function that has resources to cultivate the integration, thereby making the technology invisible, but also keeping it visible in order to exploit emergent project outcomes.

4.2 Telemedicine: Institutionalized Visibility

In the second case, the telemedicine system implemented is basically a videoconferencing system to which optical equipment can be connected. The work of identifying processes to change is delegated to the permanent organization, because the generic feature of the technology was just the possibility of transmitting live and frozen pictures in real time. When the permanent organization initiated the two projects in the clinics concerned, the search for processes to change was only undertaken in these clinics. It is the project group, however, to whom the responsibility falls for identifying potential processes to be changed. In PAT and GT, the two projects initiated in 1996, the project manager for the PAT project had a relatively clear idea about a few applications for the technology and actions to help realize the ideas. On the other hand, it was decided for the GT project that applications to be tested (processes to change) should be sought out during the project period. Depending on which optical equipment was connected to the telemedicine system, the number of possible processes in which to intervene was reduced. If an otoscope (ear camera) was connected to the system, for instance, interventions would be delimited to processes connected to ear-related problems. The search for processes in which to intervene, and the actual interventions were made throughout the project period and occurred even 2 or 3 years after the termination of the GT project, although none of the applications tested during this period was transferred and integrated into the permanent organization. However, a spinoff from the first project was an initiation of a "one person project" in the Department of Dermatology, which had also been in the first project. A new application was identified, allowing the dermatologist to serve a hospital 140 km away via telemedicine, instead of sending her/him to this remote hospital by bus three or four times a week. The project was considered to be a great success, as the dermatologists' discomfort with catching the bus at 5:30 in the morning was removed, and today the department is one of the county's heavy users of telemedicine. In the PAT project, two applications identified at the outset—pathology conferences with two other hospitals—are integrated into the routine activities. Activities were established with a few more hospitals, even if the need for conferences occurs only two or three times per month at each hospital. A third application identified at the outset was tested, but it faded away due to lack of engagement by one party.

Although there was little intra-organizational transfer and integration of applications tested in the initial projects between 1996 and 1998, the county saw the potential usefulness of the technology and supported a further investment in telemedicine infrastructure. During the 18 months following termination of the PAT and GT projects, actors interested in testing telemedicine could apply for money for equipment to initiate their projects, but overall coordination of the projects was lacking. In order to coordinate the

further deployment of telemedicine and make it more visible, a support function, TeleMedLab, was established in 1999. Its assignment was to maintain the systems, test new technologies, support users, and promote use. The manager for TelMedLab states that many projects are completed in which participants are satisfied with the results, but when outcomes should be integrated into the daily praxis, nothing happens. He is also waiting for the breakthrough, as telemedicine has not yet become an important strategic issue for the county.

In comparing the telemedicine case to the case of the EPR system, in addition to the dimension of need to identify process to change and decide how to organize changed processes, a further and rather obvious difference is how the system becomes an obligatory passage point. In the EPR case, the system becomes an OPP when it is rolled out and it is decided that all information related to patients should be managed via the system. But, as shown in the telemedicine case, the mere fact that the equipment is rolled out is no guarantee that the system will become an OPP. Because the technology functions as an intermediary for knowledge and information transfer, the telemedicine system is more fragile as an OPP. The actors have other alternatives; they can access information and knowledge, for instance, usually by sending the patient to a medical specialist. An essential part of the project group's work is thus to make the system into an OPP by convincing indispensable actors of the benefits of system usage, a goal that is aided by making appropriate organizational arrangements, like the creation of supporting routines (Linderoth 2002b). Based on developments in the telemedicine projects studied, it can be claimed that the OPP becomes rather stable if indispensable actors are convinced about the benefits of using the system, as occurs when actions are already tested in daily operations. For the same reason, the OPP can vanish immediately when the project is terminated, because appropriate organizational arrangements are not made and necessary decisions are not taken (e.g., to block or remove alternative paths of action). Thus, if the project group manages to establish the technology as an OPP, it can be claimed that the technology has become invisible or taken for granted. But, in order to facilitate further organizational change and development, the permanent organization needs to establish a function, like TeleMedLab, that will serve to keep the technology visible.

4.3 E-Leaning: Invisible for the Rest of the Organization

In the third case, the e-learning system implemented was originally developed for use in universities and similar contexts. The course provider can either develop the learning material on his/her own, or the vendor can assist in the development of a course. Furthermore, the course provider can choose how sophisticated the design of the course material should be, from a simple use of office tools, to flash animations for more advanced users. For the user, the interface reminds one very much of Windows Explorer. Further features of the basic version of the system are, for example, the possibility of seeing who is logged into a certain course, and opportunities for course participants to chat with each other. The content on the platform is managed by an administrator who, among other things, determines when materials should be released, views activities of registered users, and decides if a test should be passed before a user can proceed to the next level of the course.

The e-learning system is similar to the telemedicine system in that system designers have delegated to the host organization the task of identifying the processes to change. In this case, it means that the permanent organization's task is to identify processes where it has a need for learning and knowledge development, but course participants need not be physically present at one location. At the outset, the project group exhibited relatively clear problem recognition and had ideas about how to solve the problem of their lack control of how the information material for new product models was used and who used it. The clear problem recognition aspect was also confirmed by the vendor representative, who stated the project group had a very clear idea of what they wanted to achieve. In other organizations, the motives for implementing the system were very vague and the vendor had to help them identify the processes with which to start. The process of making the system invisible followed a traditional project management approach, based clear goals and subgoals and detailed work break down structures (see Packendorff 1995; PMI 1996). However, due to the project group members' problem recognition, the project was divided into four stages, which eased the integration. The first stage, the technical implementation of the system, was managed in accordance with traditional project management ideas. The integration of the change was, however, accomplished in the two following stages that were managed in the permanent organization, but still by the same people who accomplished the technical implementation project. The second stage was to create an organization for maintaining the system. A few people were assigned the responsibility for maintaining the system and they were located in the same building as the previous project group, a group nearly identical to the group responsible for the development of training material for use on a world-wide basis. However, integration could not be reached if the system not was promoted. Accordingly, the third stage was to identify and establish the role of the facilitators who would promote the system in their geographical regions and decide when the material should be released because a new product model could be launched at different times around the world. The fourth and final stage was an evaluation of the outcomes of the process.

The role of the facilitators in the present e-learning case could, in one sense, be considered similar to the role of the TelMedLab in the telemedicine case as the role of keeping the technology visible in order to facilitate integration and interorganizational transfer of project outcomes. But TeleMedLab should also facilitate the use of telemedicine in other processes than those originally intended. So, in another sense, the role of the facilitator in the e-learning case was similar to the role of the former project manager in the EPR project, to work for integrating intended project outcomes and to make the system invisible. Thus, in the e-learning case, it can be claimed that the function for integrating intended project outcomes was established, but the question remains: What about using the system in other processes than the intended ones? A representative for the steering group stated that the e-learning system could be used in other processes where there was a need for training and learning and participants were not physically present at the same location. However, someone has to work to achieve the intra-organizational transfer of emergent project outcomes and the further deployment of the system. By the time the third case was completed, no more initiatives had been taken.

Finally, in another sense, the e-learning system has the same features as the EPR system, because the transfer of intended project outcomes also occurred by switching the process to change, even if the switch was implemented after the temporary organization

was terminated. In the EPR and e-learning projects, the systems became an OPP when they were rolled out, as indispensable information was inscribed into the systems and could only be accessed via the system (e.g., information about new products or patient related information). However, due to the fact that the e-learning system intervened in one process compared to the EPR system that intervened in a large number of inter-connected processes, the integration of intended project outcomes was managed by facilitators, and the work to maintain the system as an OPP was done by the group developing training material for new product models.

5 DISCUSSION

Two features of the ICTs studied here have consequences for the permanent organization's management of intra-organizational transfer of intended and emergent project outcomes: (1) predefinition of processes to change, and (2) ease of making the ICT into an OPP. Predefinition of processes to change means that the processes to change were inscribed in technology or that it was delegated to the host organization to identify processes to change. Predefinition of processes does not mean, however, that processes to change are specified in detail. Rather, the permanent organization is informed about where to start to search for processes to change by means of the ICT. In the EPR case, for example, all existing processes concerning the management of patient-related information were potentially affected. In the telemedicine and e-learning cases, predefinition of processes to change had a much broader scope, and the actual knowledge about appropriate processes to change could be relatively low. When the predefinition of processes to change is discussed, two claims about implications for further action could be made: (1) When processes to change are inscribed into the technology, *there is an idea about what to do*. (2) When it is delegated to the organization to identify processes to change, *is there an idea about what to do*? If there is an idea about what to do, the temporary organization may be too focused on solving the task and the potential for generating emergent project outcomes may be reduced. A further question also could raised: Does a system that is determined *a priori* to intervene in a large number of organizational processes demand too much attention and too many resources from the temporary and permanent organization in resolving its integration issues, which, in turn, could imply that issues of further organizational development and change disappear from the agenda? When there is no clear idea about what to do, a number of outcomes may emerge, but with less focus on accomplishing something. Alternatively, the project may merely expand in scope, implying that budgets and timelines will be exceeded. In the former case, the permanent organization may need to stimulate emergent project outcomes (e.g., in the project's steering group); in the latter case, the permanent organization needs to ensure that there is a focus on at least one idea (e.g., through traditional project management methods), and that other emergent outcomes are managed. Thus, especially when the change processes not are predefined, it is crucial for the permanent organization to make arrangements for emergent outcomes from the temporary organization to be managed for further exploitation; otherwise, the technology becomes invisible when the project is terminated.

The second dimension—ease of making the ICT into an OPP—depends on two things: whether the information required could be inscribed into the new ICT, and

whether alternative ways of accessing the information could be disconnected. If it is easy to make the ICT into an OPP, as in the EPR and e-learning cases, either the permanent or the temporary organization needs to investigate the actions needed to make technology invisible after it has become an OPP. If the ICT becomes an OPP in a single process, as in the in e-learning case, it is necessary to ensure that ICT contains updated and relevant information. But if the system becomes an OPP for a large number of interconnected processes, as in the EPR case, a general support function is probably required in order to support end users, due to the complexity of the ICT. If the ICT is an intermediary for information transfer, as in the telemedicine case, the system does not automatically become an OPP. A crucial task for both the permanent and the temporary organization is to make arrangements that support the use of the ICT (see Linderoth 2002b) and to decide if changes are needed in the permanent organization in order to reorganize activities to facilitate use of the new system, and to block alternative ways of action. Making the ICT into an OPP also implies that technology is made invisible, however. Therefore, the permanent organization needs to establish a function that should keep technology visible—a function that supports and initiates new projects, for instance.

The three projects studied here can be grouped in a matrix along the dimensions of technological features: predefinition of processes to change and ease of making ICT into an OPP (Figure 1). This classification of ICT can be used as a starting point when discussing generally what happens when an ICT-mediated change process is framed in a temporary organization. The initiation of a project can be seen as an attempt to domesticate the ICT-mediated change process, by reducing complexity and making the processes manageable. If processes to change not are predefined, it may be believed within the permanent organization that this will be done in the project (see Markus and Benjamin 1997), because the essence of a project is to manage clearly defined tasks in a goal-directed manner, an opinion which could be found in any basic text book on the subject. This also means that initiators of projects try to place the ICT in the upper part of the matrix, and most probably in the upper right square, regardless of the features of the ICT. When placing the ICT in the upper left square, it can be claimed that the aim is to make technology invisible after termination of the project, because

> …something has to be transformed or changed as a consequence of the existence of the temporary organization, and therefore, these changes are to be achieved before the organization is terminated (Lundin and Söderholm 1995, p. 442).

Thus, managing the ICT-mediated change process in a temporary organization implies, *per se,* a risk of making technology invisible and losing further options for organizational change and the development of the permanent organization. This risk is highly evident for ICT when the predefinition of the processes to change is low. It can be claimed that the permanent organization should not follow the temporary organization in the predefinition of processes to change. Rather it is necessary for the permanent organization to obtain knowledge and information about emergent project outcomes in order to keep technology visible, a function that could be performed by the organizational arrangement suggested earlier in this section. However, if these knowledge and information links are not established, it is likely that the technology would become invisible.

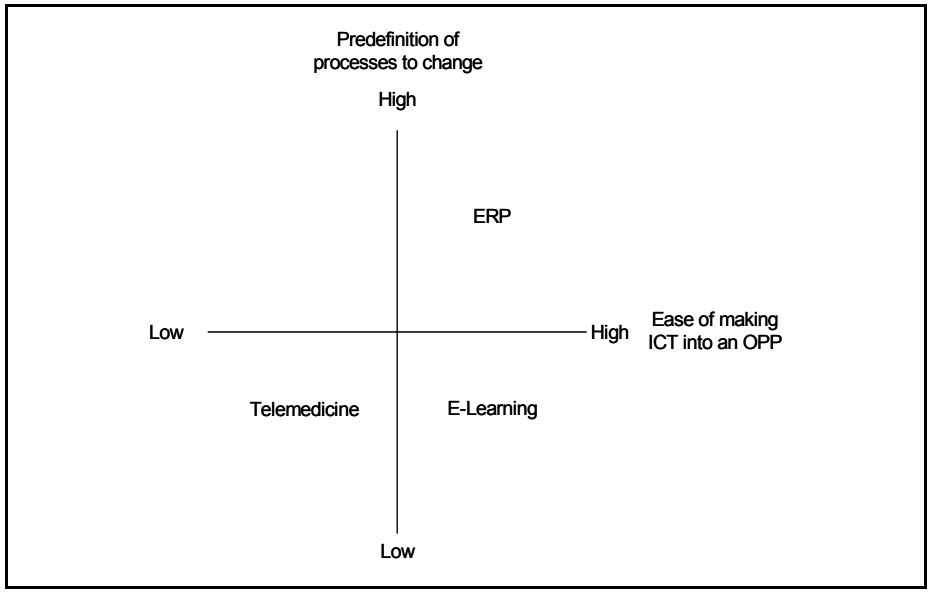

Figure 1. **Dimensions of Technology Features**

6 CONCLUSIONS

Organizing ICT-mediated change processes in a temporary organization creates challenges for the permanent organization regarding the intra-organizational transfer and integration of intended and emergent project outcomes, challenges that arise out of the inherent conflicts between the characteristics of change processes and project processes. The character of these challenges originates from features of the ICT that is implemented. By uncovering these features, the permanent organization can become informed about actions to take when the project is terminated, in order to facilitate the intra-organizational transfer of intended and emergent project outcomes. Furthermore, the framing of an ICT-mediated change project in a temporary organization implies that technology may be made invisible after the termination of a project, and that the opportunity for further organizational change and development may be lost. In order to keep technology visible, the permanent organization needs to make arrangements that support the visibility of technology. Any such arrangements will depend, of course, on the features of the ICT being implemented.

References

Akrish, M. "The De-scription of Technical Objects," in W. E. Bijker and J. Law (eds.), *Shaping Technology/Building Society*, Cambridge, MA: MIT Press, 1992, pp. 205-224.

Barrett, M., Grant, D., and Wailes, N. "ICT and Organizational Change: Introduction to Special Issue," *Journal of Applied Behavioral Science* (42:1), 2006, pp. 6-22.

Boddy, D., and Buchanan, D. *The Expertise of the Change Agent*, New York: Prentice Hall, 1992.

Bresnen, M. "Conflicting and Conflated Discourses? Project Management, Organizational Change and Learning," in D. Hodgson and S. Cicmil (eds.), *Making Projects Critical*, Houndmills, England: Palgrave Macmillan, 2006, pp. 68-89.

Callon, M. "Society in Making: The Study of Technology as a Tool for Sociological Analysis," in W. E. Bikjer, T. Hughes, and T. Pinch (eds.), *the Social Construction of Technological Systems*, Cambridge, MA: MIT Press, 1987, pp. 83-103.

Callon, M. "Some Elements of a Sociology of Translation: Domestication of the Scallops and the Fisherman of St Brieuc Bay," in J. Law (ed.), *Power, Action and Belief. A New Sociology of Knowledge?*, London: Routledge, 1986, pp. 196-233.

Callon, M., and Latour, B. "Unscrewing the Big Leviathan, or How Actors Macro-Structure Reality and How Sociologists Help Them to Do So," in K. Knorr-Cetina and A. Cicourel (eds.), *Advances in Social Theory and Methodology: Toward an Integration of Micro and Macro Sociologies*, London: Routledge & Kegan Paul, 1981, pp. 277-303.

Ciborra, C. U. "Introduction: What Does Groupware Mean for the Organizations Hosting It?," in C. U. Ciborra (ed.), *Groupware and Teamwork*, Chichester, England: John Wiley & Sons, 1996, pp. 1-19.

Ekstedt, E., Lundin, R., Söderholm, A., and Wirdenius, H. *Neo-industrial Organizing. Renewal by Action and Knowledge Formation in a Project-Intensive Economy*, London: Routledge, 1999.

Hanseth, O. and Monteiro, E. "Inscribing Behavior in Information Infrastructure Standards," *Accounting, Management & Information Technology* (7:4), 1997, pp. 183-211.

Henfridsson, O. "IT Adapting as Sense Making," Department of Informatics, Umeå University. 1999.

Kreiner, K. "In Search of Relevance: Project Management in Drifting Environments," *Scandinavian Journal of Management* (11:4), 1995, pp. 335-346.

Latour, B. "The Powers of Association," in J. Law (ed.), *Power, Action and Belief: A New Sociology of Knowledge*, London: Routledge, 1987, pp. 264-280.

Latour, B. *Science in Action*, Cambridge, MA: Harvard University Press, 1987.

Latour, B. "Technology is Society Made Durable," in J. Law (ed.), *a Sociology of Monsters: Essays on Power, Technology and Domination*, London: Routledge, 1991, pp. 103-130.

Latour, B. "Where Are the Missing Masses? The Sociology of a Few Mundane Artifacts," in W. E. Bijker and J. Law (eds), *Shaping Technology/Building Society*, Cambridge, MA: MIT Press, 1992, pp. 225-258.

Linde, A., and Linderoth, H. C. J. "Remove the Blinkers and Discover the Conflicting Programs of Action: A Dynamic Perspective on Management of 'Fuzzy' Projects," in D. P. Slevin, D. I. Cleland, and J. K. Pinto (eds.), *Project Management Research at the Turn of the Millenium: Proceedings of the PMI Research Conference 2000*, Drexel Hill, PA: Project Management Institute, 2000, pp. 357-368.

Linderoth, H. C. J. "Bridging the Gap between Temporality and Permanency," in K. Sahlin-Anderson and A. Söderholm (eds.), *Beyond Project Management: New Perspectives on the Temporary-Permanent Dilemma*, Malmö, Sweden: Liber, 2002a, pp. 224-240.

Linderoth, H. C. J. "Fiery Spirits and Supporting Programs of Action: The Keys to Exploration and Exploitation of Open Technologies," *International Journal of Health Care Technology and Management* (4:3/4), 2002b, pp. 319-332.

Linderoth, H.C. J., and Lundqvist, A. "Learn Not to Learn: Paradoxical Knowledge Creation and Learning in ERP Projects," in *Proceedings of Sixth International Research Network on Organizing by Projects (IRNOP VI) Conference*, Turku, Finland, August 25-27, 2004.

Lundin, R. A., and Söderholm, A. "A Theory of the Temporary Organization," *Scandinavian Journal of Management* (11:4), 1995, pp. 437-455.

Markus, M. L., and Benjamin, R. I. "The Magic Bullet Theory in IT-Enabled Transformation," *Sloan Management Review* (38:2), 1997, pp. 55-68.

Meredith, J. R., and Mantel, S. J. *Project Management: A Managerial Approach* (5th ed.), New York: John Wiley & Sons, 1995.

Monteiro, E., and Hanseth, O. "Social Shaping of Information Infrastructure: On Being Specific About Technology," in W. J. Orlikowski, G. Walsham, M. R. Jones, and J. I. DeGross (eds.), *Information Technology and Changes in Organizational Work*, London: Chapman & Hall, 1996, pp. 325-343.

Orlikowski, W. J. "The Duality of Technology: Rethinking the Concept of Technology in Organizations," *Organization Science* (3:3), 1992, pp. 398-427.

Orlikowski, W. J. "Improvising Organizational Transformation Over Time: A Situated Change Perspective," *Information Systems Research* (7:1), 1992, pp. 63-92.

Orlikowski, W. J. "Knowing in Practice: Enacting a Collective Capability in Distributed Organizing," *Organization Science* (13:3), 2002, pp. 249-273.

Orlikowski, W. J., and Hofman, J. D. "An Improvisational Model for Change Management: The Case of Groupware Technologies," *Sloan Management Review* (38:2), 1997, pp. 11-21.

Orlikowski, W. J., and Iacono, S. "Research Commentary: Desperately Seeking the 'IT' in IT Research—A Call to Theorizing the IT Artifact," *Information Systems Research* (12:2), 2001, pp. 121-134.

Packendorff, J. "Inquiring into the Temporary Organization: New Directions for Project Management**,"** *Scandinavian Journal of Management* (11:4), 1995, pp. 319-333.

PMI. *A Guide to Project Management Body of Knowledge*, Drexel Hill, PA: Project Management Institute, 1996.

Robey, D., Boudreau, M-C., and Rose, G. M. "Information Technology and Organizational Learning: A Review and Assessment of Research," *Accounting, Management & Information Technology* (10:2), 2000, pp. 125-155.

Rogers, E. M. *Diffusion of Innovations* (4th ed.), New York: The Free Press, 1995.

Söderlund, J. *Projektledning och projektkompetens*, Malmö, Sweden: Liber, 2005.

About the Author

Henrik Linderoth currently holds a position as assistant professor at Umeå School of Business, Umeå University. His research interest is primarily focused on ICT-mediated change processes. Henrik has done studies of ICT use in the health care sector and is currently studying ICT use in the building and construction sector. He can be reached by e-mail at henrik.linderoth@ usbe.umu.se.