Successful Innovation in Tele-Care: Continuous Co-creation and Situated Re-Innovation

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Abstract. Successful IT-enabled innovation is often attributed to benefit realization. However, often the results of the innovations are disappointing. Reason for this is argued to be a divide between development of the technological solution, and the organizational implementation and change that should ensure realization of the planned benefits. To handle this dilemma, it is advised to strengthen the management of the realization project accepting technology development and organizational change as entangled. Information technology is thus best described as a socio-material construct having the technical and the social inextricable linked. This paper challenges the belief in an inherent divide by suggesting integration of the technological and organizational development in the pilot-phase as well as subsequent phases through co-creation and situated re-innovation. With reference to a case on tele-care this paper elaborates on co-creation and situated re-innovation and illustrates how this can be organized in practice.

Keywords: Situated Re-Innovation, Co-creation, Socio-Materiality, Benefits Realization, Tele-Care, Public Sector, Digitalization.

1. Introduction

Information technology (IT) both enables organizational innovation and is developed when implemented and adapted as part of these organizational innovations (Markus 2004). Such IT-driven innovation processes are complex and the efforts are often disappointing. The British Computer Society (2004) states that "only around 16 percent of IT-projects can be considered truly successful". It is well-known and many different challenges have been reported; both technological e.g. low usability and unstable software and organizational e.g resistance, lacking commitment and training. There is no doubt that the challenges are severe and solutions will be valuable.

Because "the typical project team will generally focus upon delivering a technical solution, and only worry about its organizational impacts, once it is operational, rather than managing organizational change as an integral part of the project" (Ashurst et al.

2008, p. 353) organizations often fail to effectively predict and manage IT-driven organizational innovation (Markus 2004). This divide in the IT-driven organizational innovation can be significant when innovations miss the benefit target.

Organizations struggle to achieve the expected benefits, and often the actual effect is worse than calculated as costs from introducing new IT such as extra work and los of work security is often missing in the business case. Less efficient organization with lower service at a higher cost (Hood and Dixon 2015) can be hidden behind a successful business case.

Progress of information technology has among others provided mobile, small scale and flexible IT and new uses in a broader range of domains e.g. tele-care solutions within eldercare. The new forms of technology demand an understanding of technology as sociomaterial ensambles of humans and technologies fundamentally intertwined(Leonardi 2012, Orlikowski and Scott 2008b) and is therefore seen as a theoretical lens, which may help us understand how technology, the other material and the social develop and adapt in concrete situations.

If the material (including IT) and the social are inseparable, IT need be flexible to fit situations as the material and the social changes with situations (for example a new place or next weekday). Keeping the IT-element of the material static under these circumstances create risk of misfit in situations and can obstruct benefits. The more misfits the less benefit. Situated re-innovation furthering a beneficial fusing of the material and social may lower the risk of misfit in situations. Only deep insight in the material (including IT) and the social of the use situations can lead to these beneficial fusions and thereby successful socio-material innovations. Merely actors in the situations have this (tacit) insight, which directs our focus towards co-creation between the customer and vendor with intensive user involvement.

Luckily the progress of IT also offers easy incremental, component-based IT-development and malleable platforms allowing for technology to adapt fitting the situations and accumulating materialized benefits. Being malleable and easily developed in small chunks (components) IT is flexible enough for (re) innovations of socio-material ensembles.

This paper reports from a case of continuous co-creation and situated re-innovation that seem promising in order to achieve both economical and work benefits still delivering better service to citizens. This paper suggests that continuous co-creation and situated re-innovation is favourable for two reasons.

First, it provides the basis for exploiting the new IT into useful solutions flexible enough to create benefits in most use-situations because continuous co-creation ensures deep insight in the use-situations.

Second re-innovations in the situations ensure useful local socio-material solutions and thus increase chance of benefits to materialize (better economy, work and service). Both address the essence of the problematic divide between developing the technology and developing the organization.

Our research question is "How organizational innovation may be organized as continuous co-creation and situated re-innovation taking the sociomaterial entanglement of the material and social in situations in account?"

The paper is organized as follows. Section two present theory on innovation and argue how and why innovations of sociomaterial ensembles can be organized as co-creation and re-innovation. As this is illustrated by an empirical example, the research approach providing this example is described in section three and the empirical example in section 4. The potential of these ideas is discussed before the conclusion suggests further research.

2.   Innovating the sociomaterial

2.1. IT-driven innovation

Developing and implementing an IT system into an organization is frequently viewed as IT-driven innovation where organizational innovation comes after and separated from the product innovation as an implementation process. This process is in rare cases treated as organizational innovation, but generally as pure implementation through training and mandatory use or as planned top-managed organizational change. This pattern is described in benefit-realization as the problematic divide between IT-development and organizational development (Ashurst et al. 2008).

Product-innovation is often described as; creating ideas, choosing the most likely idea and developing the product, before launching (Cooper 2008). This general linear model fits IT-driven innovation nicely as mapped in figure 1. It shows clearly how development and implementation is separated by the delivery. This approach has serious shortcomings as we elaborate below. Other more circular and experimental innovation models exist, but the traditional approaches of IT-driven innovation are surprisingly frequently applied (Markus 2004).
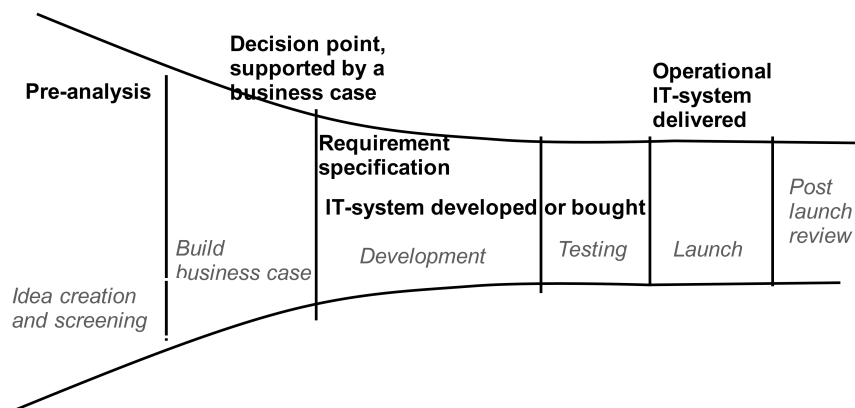

Fig.1   The classic stage gate model of innovation first presented by Cooper (1990) and here the basis of mapping the often used IT-driven innovation model.

As it is the goal of IT-driven innovation to improve the organization, the effects on the organization is usually analysed and documented in a business case, grounding the management decision process. This early the economic, market and structural aspects

is likely to play a leading role in idea-generation and choice, giving less room for aspect of use, users and their deep insight in practice. From the decision point until delivery/launch, the organizational innovation is typically out of view, even though exactly that innovation carries the potential benefits. Hereto comes that changes in the organization, the environment or the IT-system (etc.) is likely to happen before the delivery of the IT-system, creating new situations that may not be accounted for in the designs and plans.

Benefit realization advice to focus on realizing the planned benefits during implementation through proactive and classic management; defining goals, planning, clarifying responsibilities and committing management (Ashurst et al. 2008). This neither support employees' daily experimenting and coping in drifting reality that may provide un-thinkable[1] solutions (Ciborra 2002), nor does it address the essential challenge of the divide. Rather the management style risks creating difficult and counterproductive working conditions by enforcing distant plans of processes and products (Ciborra 2002). The organizational innovation is frequently conceptualized as acceptance, adoption, adaption or implementation and is underplayed both in practice and in our theoretical understandings of innovation that incorporate an IT-system. After all it is IT-driven innovation – or is it?

2.2. Continuous Co-creation and Situated Re-innovation

Understanding technology and organizational life as either discrete entities or even as mutually dependent ensembles is not sufficient to capture how technology is intrinsic to all actions and relations in organizational life (Orlikowski and Scott 2008a). One research stream assumes IT to be discrete independent entities with inherent characteristics that influence or moderate humans and organizations, the other assumes that IT, humans and organizations form mutually dependent ensembles, shaping each other through ongoing interaction (Orlikowski and Scott 2008a). In the socio-material technology understanding, the social (here: humans and organizations) and the material (which the IT is part of) is inherently inseparable; they start out in relationship and stay so. They are assumed only to exist through their emergent but constituent entanglement.

The first two streams have commonly served as the basic understandings in research and have in turn influenced both general IT management and specific IT development practice and theory, meaning that many prescriptions and advice from theory in the field rests on limited understandings of technology. This may lead to inappropriate management and innovation practices.

The flexibility, integration, embeddedness and other potential of newer hard- and software allows for practices with IT that can hardly be captured focusing on IT and humans (organizations) as separate entities interacting in specific events and processes. The entangled nature of the social and not only the material in general, but especially of IT have become more evident and essential both to understand practice with IT and design IT within practice. The actual use of IT has become difficult to predictable. Boundaries and relations between humans and IT are enacted in practice. The flexibility and malleability of IT allows for many – even unthinkable uses in a

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[1] Innovations are bounded by what people can imagine – thinkable innovations; unless the innovation appears by accident or freely experimenting. (Ciborra 2002)

sociomateriality that shapes the contours and possibilities of everyday work (Orlikowski and Scott 2008a).

For example the entanglement of a mobile phone and its owner blurs who – or what has agency (Callon 1986, Latour 1987) and can only be captured in the sociomaterial view of the three streams. In a work practice IT, the other material and the social fuse together in patterns of workflow configuring situated work performance (Suchman 2007). So analyzing the two, material and human, as separate will create risk of misinterpreting the real world of IT-enabled innovation (Wagner et al. 2010, Wagner et al. 2010). "Sociomateriality centers upon the investigation of how technology is inherent to everyday activities and interaction. In fact, this term is deliberately constructed to remind scholars that every phenomenon that is considered 'social' is also fundamentally 'material' (Leonardi and Barley 2008, Kolb et al. 2012, Leonardi and Barley 2010)" Peter W. Seely (2015, p. 29).

IT-systems are often sketched, planned and decided blindfolded as the studied practice is rarely seen as sociomaterial and enacted which limit the imagination for altering. The level of analysis is likely to be abstract and carried out by non-practitioners risking low quality and un-usefulness. During development the sociomaterial practice-knowledge is substituted by a requirements specification, frequently only describing the IT-system. During planning of and implementation the abstract descriptions of practice still frame the actions, leading to misfit with the actual sociomaterial situation. This hinders development of beneficial work patterns and performances, because the fusion will involve inappropriate processes, IT-systems, and understandings.

A useful fusion (solution) will be situated, meaning a configuration of the available social and material that is beneficial in that concrete situation. The classic approaches cannot provide this because of the separation of practice-knowledge from the planning, decision and design. Iterative development of an IT-system in a pilot-project is not even sufficient as preparation for a roll-out implementation, as that too assumes the situations to be the comparable all over.

In all sociomaterial innovation need to be organized to allow for situated development of entangled social and material configurations that can fuse into beneficial solutions. Developing the IT-system and organization together through an iterative experimenting process of co-creation will accommodate drawing on the practitioners' deep insight in the work and capacity for creativity. Iterating in the pilot will lead to re-innovations integration learning from the fusions in the earlier situations. Keeping to re-innovating by adapting the system, the other material and the social in any new situations by means of co-creation when the IT-system spread in the organizations will ensure the fusions (solutions) to become beneficial also in new situations.

The case described below is pursuing socialmaterial development and serve as a role model in of co-created and re-situated innovation.

3. Research Approach

Our case is an example of IT development part of the development of a new organizational practice. We have followed the close and ongoing collaboration

between a service provider within telecare solutions and one of their customers – a municipality. The practices in question are tele-care services within public home and health care, more specifically new IT based practices were developed to substitute physical visits payed to help citizens in need of care in their homes.

The provider of tele-medical solutions has developed a number of standardized solutions for hospitals and municipalities. In this case they are exploring new territory and use the collaboration to further develop their existing solution of virtual meetings.

The municipality in focus has almost 100t inhabitants and covers an area of 1400 square km from dense populated areas to rural areas with low bandwidth coverage. As all other municipalities in Denmark, the municipality is faced with a growing demand for service especially in the elderly sector as the proportion of elderly is increasing, meaning a growing need for manpower and escalating costs will be faced if the services are to be kept unchanged. In 2010 - as a reaction to the expected situation - the municipality launched the Innovation Center for Health and Care to work with welfare technologies. A four-year research and development project was initiated with a budget of 30 million DKK (aprox. 4 million Euro) to experiment and gain experiences with welfare technologies. Virtual home and health care is one of these initiatives. The idea came from another project, a hospital used virtual visits to allow chronic patients to receive part of their treatment and follow up visits from home. The results showed that the patients were more satisfied and got better and at the same time the treatment were delivered at lower costs. The innovation and development manager in the municipality believed that it should be possible to implement a similar solution and gain some of the same advantages using virtual visits in their home and health care service. In collaboration with a tele-medical service provider (the vendor) a pilot in one of the rural subunits of the home care organization was initiated to experiment and build a business case to decide whether there were potential.

The development project was initiated through a series of meeting between the vendor and the municipality negotiating the themes and terms of the experiment. These meetings provided a first insight in the situation and the development needs towards useful innovation for example insight into the technology at the stage it had reached, a preliminary business model and the joint innovation process and implementation in the municipality.

Our research project started when the small-scale pilot project was terminating. The pilot had resulted in an IT-solution that was reckoned useful among the involved users, managers and the vendor. The challenge was how to successfully implement the IT in the full organization as the customer and the vendor did not find a classic "roll-out" to be an option due to differences in culture, working conditions and the portfolio of served citizens. Advice was given on how the socio-materiality of IT could call for situated innovation and re-innovation through continued co-creation allowing the IT-system, other material and the social to become well-integrated and thus useful in different social-material situations.

In this paper we report from the first round of the case study studying the joint collaboration on developing the virtual home and health care solution as a new phenomenon (Yin 2009). Our data is comprised of first and secondary data to build a rich case with multiple types of data and perspectives along with the possibility to test those insights (Walsham 1995). So far we have met three times with the responsible managers from the vendor and the municipality to learn about the project and discuss

what to investigate. In the spring of 2016 we did the first round of interviews in the municipality focusing on the management and organization of the telecare project. Ahead of the interviews we asked for available documentation on the project. We received external presentations, internal presentations and communications aimed at the employees and the citizens, process plans for implementation, role descriptions, accumulated idea catalogs for the use, workshop minutes, meeting minutes, working plans etc. We interviewed the innovation and development manager who initiated the project, the project manager in charge of the following roll out and also the local manager in the pilot and the IT business developer who was the internal IT employee involved in the steering committee. The interviews were semi-structured following individual interview guides (Kvale and Brinkmann 2009) focusing on themes such as different types of collaborations, outcome, general experiences, challenges encountered, business model, implementation process, status etc. The interviews lasting 1-1,5 hours were tape-recorded. The collected data have been revisited – read or listened to and coded (Bryman 2015) – to inform a first level of knowledge and analysis on how co-created situated re-innovation is understood and managed and how it plays out in practice. The aim is to test our initial understanding and conceptualization, which will inform the following rounds of study.

The illustrative case story presented below is the first and preliminary result of our case study.

4. The Case of Socio-Material Innovation

The case reports on situational re-innovation and co-creation as part of the pilot as well as the subsequent development and implementation of the tele-care solution in the user organization.

The idea of the Virtual Home and Health Care project is to provide care in the home of citizens virtually, if accepted by the citizen to be serviced. The virtual visits are primarily used for services guiding or observing the citizen such as medication, alcohol treatment, safety, food & structure. The project is a development project for the municipality as well as for the vendor as the product and the practices need to be re-developed to make workable solutions.

The technical solution is made up of two communicating screens. The practitioner operates one screen; this screen has functionalities to manage the calls, display data on the citizen as well as data on tests taken during the call. The other screen is placed in the home of the citizen. The functionalities of this screen are simpler. The screen makes a calling sound and the video call gets on when the citizen accepts the call. The screen of the citizens may be used in combination with other devices such as a weight with data transferred through Bluetooth, or equipment for tests like blood pressure etc., which are displayed and analyzed by the system. The system runs over the Internet either through a landline otherwise a special device combining SIM cards from three Tele-operators is used to secure the best data connection possible.

To getting started a pilot ran in one of the 12 home care groups in 2013. Of the 140 citizens served 18 tried out virtual visit. Based on the pilot a revised business case was created showing potential economic benefits, as well as benefits to the employees and the citizens. However the pilot also showed IT infrastructure and support was

quite a challenge. When it was decided to introduce virtual home and health care in the rest of the organization it was moreover decided to continue with the as responsible regarding development, but also maintenance and support.

Involvement of the employees is seen as essential. The employees are seen as "the drivers of change". Situational change and co-creation are therefore important building stones to ensure the involvement of employees along with external expertise.

4.1. Co-Creating Socio-Material Practices

To get the pilot project going all employees were invited to a workshop. At the workshop the vendor presented and demonstrated their virtual meeting product and the functionalities. A set of screens in different rooms provided a sandbox for the home care employees to get a feel of the new way of communicating. During a workshop the employees were asked to come up with ideas on how *they* saw virtual home and health care could provide value. All suggestions were displayed and discussed in plenum and then grouped into overlapping and similar suggestions. The employees were then asked to give points to the suggested services they found valuable. The five highest rated services were selected for the pilot. Next the employees were invited to suggest citizens to be involved in trying out receiving service virtually. Shortly after the first five citizens were approached, then five more etc. resulting in a total of 18 citizens.

As part of the pilot a number of screen-responsible were appointed. These employees are at best employees with an open mind and a special interest in changes and technology. They were educated in the system as well as technical issues, and were expected to motivate and help their colleagues learning to use the system, identifying potential citizens and setting up the system in the home of the citizens including dealing with the internet connection and take care of minor trouble shouting.

On the way a number of different challenges surfaced some primarily organizational, other in relation to the citizens and their relatives and not at least ensuring an IT-system fit to the situational demands. The close ongoing collaboration between the municipality and the vendor and their subcontractor has been essential to develop the IT-system to meet the needs. As the project manager expressed "they are technicians and a bit nerdy, whereas we have a sense of the practice and how it can be used".

Moving from physical visits to virtual visits demands a shift in mind. Within home and health care (and other types of care) the discussion of "warm hands" is an issue and has created resistance from employees, citizens and relatives as virtual visits are seen as low quality. However physical visits are not only seen as a gift, some find these visits privacy intruding, stigmatizing and disempowering. Meaning for some citizens the virtual visits are preferred. Moreover the virtual visits are easier to plan and keep on track time wise, meaning less waiting time and more timely treatment, which especially in relation to medication is important.

In relation to objections from the citizens the way virtual visits was presented was of outmost importance, meaning the one "selling" the idea should see and present it as an advantage. Suggestions on how to present the virtual visits have been developed. To overcome the resistance of relatives' new communication material targeting the

relatives and an invitation of the relatives to join when setting up the systems has reduced the problems.

Different changes in the IT-system were made. One example was employees getting distracted by their own picture, which took up half the screen - side by side a picture of the citizen. The employees could not distract themselves from checking their own appearance. It was decided to change the screen to display the citizen and just a small picture of the employee in the corner (on the practitioner screen).

Another issue has been the need for citizens to initiate contact. A solution has been made for the citizens to call the care worker. If they push a bottom then the call is directed to a mobile phone of the employee, who answers and arranges to make a virtual call to the citizen. This has made a mobile solution needed meaning, rather than making the virtual calls from the few centers, where the practitioner screens are located, there has been a wish for a mobile solution following the employee on route. Currently a new pilot is made on making calls work on Ipads – meaning every route has an Ipad, which the employee on call can bring along. A subcontractor of the vendor has developed an app for this. The app has been thoroughly tested by the subcontractor – however when implemented in the work settings in the municipality technical problems with the sound and the system shutting down has been experienced. This has led to several rounds of changes in the system.

Based on the pilot a revised business case was made including economic benefits as well as benefits for the employees and citizens to ensure fit.

4.2. Re-Inventing Technology and Practice

For the following roll out it was decided to continue the close collaboration with the vendor, who should not only develop but also support the daily use of the IT-system. A hierarchical collaboration organization was established with employees from the vendor and the municipality. A steering committee was formed, project managers were appointed and project groups established along with fixed meetings to ensure collaboration.

To manage the roll out of the virtual home and health care to the rest of the organizations a standardized process was developed based on the experiences from the pilot project. Clear roles and responsibilities were defined along with a fixed time schedule of information meetings, workshop, milestones ect. Each roll out was scheduled to a period of 12-14 weeks. The local managers of the individual home and health care group is project owner and involved to ensure management support and help the process runs smoothly, resources is freed and selection of screen-responsible. To involve and ensure co-creation of practices in the groups the sandbox solution and the co-creation workshops are repeated.

The standardized process prescribes a workshop to ensure involvement of the employees and to include the particular need they see within their portfolio of citizens. Again a couple of citizens are selected in the first round and later two other rounds with more citizens are picked. This process is followed, as it is believed that there are essential differences between the home care groups in terms of internal culture and working conditions, which needs to be considered to make this a success and create ownership.

In some of the following implementations it turned out that the technical qualifications were a challenge for some of the screen-responsible. In the first plan they were serviced with an online support unit from the vendor, however this have shown insufficient, therefore the vendor has hired in a support employee who assist in the setting up of screens at the citizens and solving daily technical problems.

5. Discussion and Conclusion

The above described organizational innovation with an IT-system can be sketched as below in figure 2. While the two organizations tend to their daily businesses of elderly care and technology development, they do in parallel attend collaboratively in the innovation of the socio material situation of the care-takers daily work.
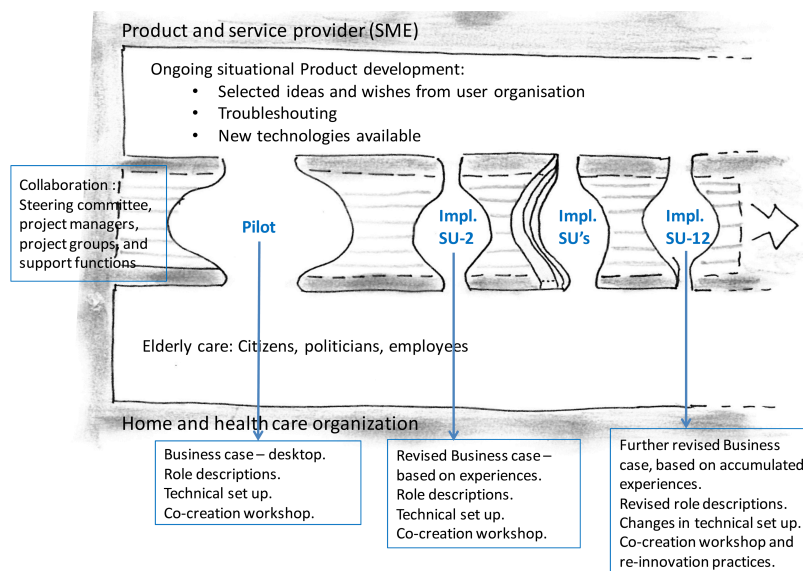

Fig. 2 shows a sketch of the continuous co-creation and situated re-innovation as play out in the case.

Developing both IT and organization in the field provide realistic feedback on the tested fusion of the material and the social, also the actual use of the tele-care system sparked creative input from workers at both side based on their deep insight in the practice. The process of developing solutions through pilot projects is well known, but the degree of the co-creation as in the number of iterations and integration in practice is rare. Typically that kind of pilots is reckoned too expensive.

The pilot provided appropriated IT for the situation at hand in the pilot care group. The innovation process, with the co-creation and situational developments ensured usability and usefulness of the IT-system and support and acceptance among the employees in the group. Both organizations realized this effect and worried about the

implementation and how to ensure acceptance and use in the next groups introduced to the new practice. The decision was to give the other care-groups the same possibilities of influence in their work. Establishing a rather formal organizational frame and process around and for implementations help guaranteed that each implementation did include both exploration and creative thinking about the new work practices. In each implementation round the organizations were collaborating as closely as in the pilot harvesting feedback in the co-creation and re-innovating accordingly.

So in this case organizational innovation was organized through un-usually close collaboration, iterative intertwined development and co-creation of technology and organization in practice situations. As the full configuration of the material and social was often changed during the iterations, this provided situated re-innovation.

Continuing this innovating practice during the implementations let new learnings and feedback from other use situations add value to the solutions, and allows for each employee to create their own situational practice based on the implemented configurations.

Summing up
- Co-creation between developers and practitioners from the use situations have the potential for providing beneficial configurations of material (including IT) and social, as deep knowledge about practices is present. Joint creative workshops and use of prototypes in work is feasible.
- Continuing Co-creating iteratively allows for both developers and practitioners to integrate learning from earlier experiments in their thinking about new may be more beneficial configurations. Continued experimentations exploiting both technical possibilities and the creativity of the practitioners provide mutual inspiration and learning.
- Re-innovation as in the iterative practice supports learning that helps moving towards better solutions through feedback. Collaborating in evaluating and revising elements before re-configuration and re-evaluation can be organized through steps and phases.
- Situated re-innovation ensures that the configurations of the material and social is evaluated and re-invented in their practice context to increase fit in the situation. Having the idea-generation, and choice of ideas to develop among practitioners ensures informed (about the actual practice) decisions. Evaluating innovations based on use in work situations offer insightful, detailed and concrete learning.
- Continued co-creation and situated re-innovation in organizational innovation increases the chance of benefit harvest by creating better fit in use situations as they develop over time. The longer time effect is still to be investigated.

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