

Preparing for Technology-Related Organizational Change

An Activity-Theoretical Perspective

Alexandre Koloskov

*MSc Analysis, Design and Management of Information Systems
Information Systems and Innovation Group
Department of Management
London School of Economics and Political Science*

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ABSTRACT

ICT-related change is usually studied from the point when a technological artifact has arrived in an organization. Applying an activity-theoretical lens, this paper explores the contradictions within a medium-sized organization's central activity system, the manifestations of which motivated the decision to engage in a substantial change and shaped the object of the initiative. It illuminates the preparatory Business Process Re-engineering phase of an ERP implementation, examining the explicit and implicit mediating roles played by the organizing vision of the ICT before the actual artifact has been chosen and installed. Finally, the unfolding of object-oriented processes of socially mediated learning that took place during Business Process Re-engineering is analyzed, exposing how these processes resulted in the divergence of expectations and preparations for the arrival of technology amongst members of different organizational groups.

Introduction

The relationship between Information and Communications Technology (ICT) and organizational change is a topic that has been drawing considerable interest from both academics and practitioners for several decades. The changes that continue to occur as ICTs permeate organizations and become intensely involved in interorganizational relations, decision-making processes, operational procedures, horizontal and vertical social interactions as well as employees' work practices are multi-faceted, complex and unpredictable to say the least (Ciborra 2004). The ongoing interest in phenomena that emerge as these technologies become ever more deeply embedded in social systems has been pursued by scholars and practitioners with the help of a plethora of theoretical lenses, models and methods that have been advanced to illuminate, explain and in some cases attempt to predict, the consequences of the increasing 'digitalization' of the organizational workplace.

The study presented in this paper focuses on the early stages of the unfolding experiences of an international organization as it prepares to harness a specific type of ICT, an Enterprise Resource Planning (ERP) system, to enable the effective reinvention of its operations and culture – its very essence. This paper 'imports' a theoretical framework – Cultural-Historical Activity Theory, henceforth AT – that is

not widely used in IS but affords coherence with established approaches within this multidisciplinary landscape. AT is used to explore the ways in which ERP software is implicated in the collective learning processes that occur as organizational members collaboratively engage in the dialectic development and articulation of a future form for their organization. The first section presents a concise discussion of relevant literature on technology-related organizational change and elaborates the scope of the study. AT is then introduced as a lens for studying artifact-mediated collaborative learning and is subsequently applied to analyze and interpret the findings. The final section summarizes the central argument, commenting on the implications for practice and the contribution of the findings in relation to broader discussions about ICT and organizational change.

Studying Technology-Related Organizational Change

Scholars from several fields, most notably organization studies, administrative science, strategic management and information systems have championed various techniques for understanding organizational change so as to manage or 'control' it. The central importance of rational analysis and managerial agency are hallmarks of such instrumental approaches. Advocates of managing change by means of planned interventions initiated and orchestrated by managers in response to perceived problems, opportuni-

Corresponding Author
Email Address: alexandre.koloskov@gmail.com (A. Koloskov)

ties or threats to the organization build on the basic linear assumption that a desired future state can be articulated and a series of controlled logical steps, within the scope of a thoroughly planned initiative, will successfully lead the organization to this goal. These approaches also offer numerous rational, logical, 'hard and fast' rules and practical methods that promise to deliver sustainable benefits from investments in ICTs (e.g. Hammer and Champy 1993; Kotter and Schlesinger 2008; Peppard and Ward 2005).

Peppard, Ward and Daniel's (2007) 'Benefits Dependency Network' exemplifies a methodology that builds on the ideas of business process re-engineering (BPR) and involves a systematic top-down approach where managers start with a strategic vision of their organization from which they derive desired future benefits which, in turn, serve as a basis for the design of ideal future business processes which can then be 'delivered' through the implementation of integrated large-scale ICTs like ERP systems. Ultimately, the goal of the intervention is to replace the current working practices with the presumably superior reengineered process model.

The Limits of a Single Paradigm

Rationalizing and standardizing entire existing activity systems so that they correspond to 'best practice' abstractions and can be represented as business processes in the digital language of the ERP software, incorporates "a conception of organizations as procedural machines and imposes a behavioural mechanics throughout the organization" (Kallinikos 2004:157). No matter how many experts are involved, and how careful they are in designing the 'new' processes, the inherent reductionist logic of such exercises necessarily ignores the contingent nature of everyday work and creates an idealistic and linear representation of organizational activities. Thus, "invisible work" (Engeström 2008:23), the tacit and informal aspects of successfully accomplishing real tasks is omitted from the organizational blueprint. If the operation of the system along these streamlined paths does not allow sufficient flexibility for situated adjustments, improvisation and bricolage – inevitable and uncontrollable features of the change-related learning processes that occur as employees embed the former into their everyday work practices – they are likely to look for (and find) ways to circumvent the software (Ciborra 2004). This, in turn endangers the realization of the benefits it was supposed to deliver. More importantly, potentially valuable local attempts to adapt to changes in the real-world operating environment and develop innovative ways of working "from below" (Engeström 2008:26) are either stifled outright by the restrictions imposed by the software, or perceived by managers as signs of 'resistance to change' which need to be

neutralized or contained rather than embraced and cultivated. Finally, the culture and history of the organization, which give meaning to the institutional structures and established routines that constitute its activity systems, are portrayed as 'things' that must be changed and forgotten, respectively.

Does this suggest that change can not be managed methodically at all? Intepretivist researchers who question the assumptions of objectivity that underlie most managerial accounts argue that improving and broadening understanding of the heterogeneous phenomena, composed of natural-scientific (ICTs) and social-scientific (humans, organizations) elements, in question is best achieved by exploring the new insights that alternative paradigms can provide (Ciborra 2003; 2004; Orlikowski and Baroudi 1991; Robey and Boudreau 1999). Change and innovation within social systems are complex, multi-faceted processes that can not be adequately understood from one single theoretical angle. Social constructivist theories deriving from science and technology studies and the sociology of scientific knowledge have significantly influenced interpretive studies of organizational change (Orlikowski 2000).

Constructivist Alternatives

Sociological and anthropological theories of situated action provide the basis for such a prominent constructivist stream that enquires into the contingent local practices of individual members of organizations and the way that they really use (or don't use) ICTs in their everyday work. This perspective leaves room for both intended and unintended consequences of technology-related organizational change to emerge from the ongoing recursive interplay between the interpretive, technological and institutional layers of a given change initiative (Orlikowski 2000).

Another constructivist approach, Actor Network Theory (ANT), is grounded in the belief that "technology is society made durable" (Latour 1991). It helps researchers to uncover the dynamic and unpredictable socio-political processes of negotiation, translation, representation and dissidence that define and shape both the process and the real outcomes of technology-related organizational change in practice. Though it is not explicitly associated with ANT, Swanson and Ramiller's (1997) notion of organizing visions applies such constructivist logic to the peculiar processes by which organizations discover and make sense of IS innovations in the context of a vibrant commercial market that churns out new ICT 'solutions' at a dazzling pace. The authors argue that a broadly-based, culturally- and historically-evolving discourse amongst an interorganizational community of journalists, academics, practitioners

and other interested parties is involved in the creation of a collective image of a particular innovation – an organizing vision. To a significant degree, this shapes cross-contextual interpretation and legitimation of the artifact, delineating its ‘proper uses’ and affordances, and influences internal decisions about which ICTs an organization ‘needs’ (ibid.).

Why not Constructivism?

By focusing on the ‘moulding power’ of local contexts or vested interests constructivist accounts obscure important facets of the relationship between ICT and organizational change. They tend to overestimate the general malleability of ICTs and underestimate their historical character. Furthermore, such accounts all but ignore the collective, object-oriented and artifact-mediated dimensions of social learning processes. Finally, the underlying conceptual frameworks do not readily lend themselves to the analysis of the early stages of change initiatives, before the technological artifact has been introduced into an organization.

This paper draws on Cultural-Historical Activity Theory to address these gaps. It is argued here that the initial phase of deliberate managerial change initiatives, when an organization is engaged in plotting a vision of its future and preparing for the ‘arrival’ of ICT, is an important scene of processes of collaborative knowledge creation. The consequences of these processes frame the further progress of the implementation of the ICT and the broader trajectory of organizational change, and thus warrant closer analysis.

Activity Systems, Object-Oriented and Mediated Learning

Cultural Historical Activity Theory (henceforth AT) was developed for psychological studies of conscious human activity in the second half of the 20th century (Leont’ev 1978; Vygotsky 1978) but has since been elaborated, expanded and applied to the study of collaboration and learning in organizational contexts (Engeström 2008). It is based on the conceptualization of an individual’s interaction with the world in terms of a hierarchy of deliberate activities that are driven by particular motives and directed at corresponding external objects, conscious goal-oriented actions that constitute these activities and subconscious contingent operations which, in turn, constitute actions.

Learning and skill development can lead to the collapse of some actions into operations, freeing up cognitive capacity for other actions. Under certain conditions (e.g. intense stress) operations may be propelled back into an individual’s consciousness.

Individuals are always simultaneously engaged in a number of activities (Wiredu 2005).

From an AT perspective, organized collective human activity is seen as “a systemic formation that has a complex mediational structure” (Engeström 2008:26) and is always directed at an object – an external thing or motive that, to varying degrees, corresponds to the fulfillment of the needs of the particular activity’s participants or subjects (see Figure 1). In a subject’s consciousness, the object has a dual nature – it simultaneously corresponds to distinct individual as well as collective needs. The pursuit of the object leads to its transformation into a particular outcome. This process is never direct but rather always mediated by a set of tools – physical artifacts with objective properties that limit and constrain activities in particular ways and psychological ones such as mental representations, signs and symbols. These two types of tools are intricately linked, since the conscious use of a physical tool necessitates a mental representation of it, which is created through the process of interiorization (see below).

Below the surface of this triangular ‘subject – tool – object’ relationship, activities are also mediated by three types of social factors. Subjects act or operate according to a set of formal and informal rules and some sort of established division of labour. Finally, subjects always act within some sort of community, which provides the immediate social context of the activity system. All mediating components – tools, rules, community and division of labour – embody, to various degrees, historically-evolved idealizations of collectively, socially defined meanings.

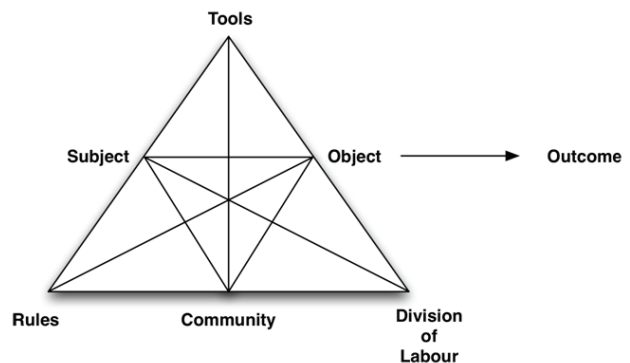


Figure 1: The complex mediational structure of a human activity system (Engeström 2008:26)

All of the components of an activity system are inter-related, and in dynamic tension within themselves and with each other as the activity unfolds. Contradictions are inherent within each component (level 1), amongst the interrelated components (level 2), as well as between external environmental factors and neighbouring activity systems (levels 3 and 4) in particular. These contradictions are of significant interest in that they are both critical for understanding

the causes of disturbances within the central activity system and constitute potential sources of innovation and change.

Object-related contradictions arise from the ongoing dialectic between personal and collective motives and the associated differences in mental representations of objects in a subject's consciousness. For other components of an activity system contradictions emerge from differences between manifestations of the components in the physical world and subjective mental representations, referred to as personal senses. Individuals perform actions by externalizing their mental representations of an activity system to transform an object and subsequently interiorize their subjective perceptions and interpretations of the changed material nature of the object and the other components of the activity system that mediated their interaction with the physical world. The resulting "subjective properties are shaped by the subject's idiosyncratic interpretation of the independent properties, connections, and relations of the objective world" (Wiredu 2005:95).

Individuals gain experience, refining these personal senses, by repeating a particular action under different conditions. Moreover, personal senses necessarily differ from subject to subject, and collective activity is thus never perfectly aligned. In terms of its cyclical and reflexive nature this theorization of the individual learning process bears similarities to descriptions of learning loops in managerial accounts (Andreu and Ciborra 1998) or enactment of technological structures in constructivist studies (Orlikowski 2000). However, AT is distinguished by its emphasis of the inherently mediated and social nature of learning occurring within a collective activity system.

If an activity system is riddled with contradictions, how can it function coherently and effectively, delivering the outcome desired by its subjects? A certain degree of disturbances can be contained by the relatively stable mediating components of the system, guiding individual actions and maintaining a general state of stability that is required to accommodate a relatively smooth and coordinated flow of collective actions. However, level 2 contradictions that manifest themselves as persistent bottlenecks, inefficiencies and frequent breakdowns can substantially inhibit the achievement of collectively desired outcomes. Such contradictions invigorate the innovative potential of an activity system by motivating attempts to search for solutions and collectively develop new work procedures or introduce new tools. In contemporary organizations, such solutions are often mediated by ICTs and their special character needs to be considered in detail.

The Special Character of ICT Artifacts

ICTs combine a tangible material form, exhibiting objective design properties that constrain users' actions, with more intangible abstract attributes of complexity, invisibility, and conformity (Brooks 1987).

The complexity and invisibility of ICTs, can be elaborated by alluding to the objectifying strategies of functional simplification and closure as critical constitutive elements of ICTs (Kallinikos 2004). The former refers to the reductionist nature of the way in which specific causal relationships are selected, represented and instrumentalized in order to achieve functional utility. These relationships are strong abstractions, or simplifications, of the contingent and heterogeneous nature of reality. These abstractions embody a cross-contextual, historic tangle of assumptions and ideals (*ibid.*). One of the main reasons for the invisibility of software is the persistent lack of adequate visualization tools, which can represent its underlying complex conceptual structures in ways that are comprehensible to a wide audience (Brooks 1987). As the simplified relationships (and thus the functionality of the software) only hold for a standardized set of inputs, closure substantially restricts the environment within which humans encounter ICT. The majority of the functional structure thus remains invisible, or "underground", and is not subject to direct local interference (Kallinikos 2006). This implies that, no matter how 'changeable' a particular ICT may seem on the surface that is perceptible to its users, its internal logic is very much protected from and thus recalcitrant to the specificities of real organizational contexts.

Finally, conformity is a prerequisite for and a consequence of embedding ICTs into real organizational contexts with particular imbrications of historic, technological and social constraints that the artifacts must adhere to. Technologies are never put into practice in a vacuum, but rather are adopted within the pre-existing idiosyncratic organizational environment into which they are implanted. Most contemporary organizations will already have a particular mix or portfolio of different kinds of ICTs in place which their members will have integrated, to a greater or lesser degree, into their work practices (Mathiassen and Sørensen 2008; Orlikowski and Iacono 2001).

From an activity-theoretical view, artifacts are symbols of "shared cultural-historical understandings" (Wiredu 2005:102). ICTs can thus be conceptualized as embodiments of a complex tangle of scientific knowledge, prescriptive assumptions about social relations and principles of organizing. However, this collection of objectified intentions and layered

cultural-historical ideals remains largely hidden from the user's view. Instead, the socially constructed understandings that provide basic meaning to an ICT artifact in a particular organizational context are conditioned by organizing visions – themselves collectively shaped bundles of cultural-historical knowledge (Swanson and Ramiller 1997). Individuals subsequently create personal senses of the affordances and 'proper uses' of ICTs as they act within the mediating contexts of the activity systems that constitute the organizations and groups that they are members of.

With the help of this conceptual lens, the following sections explore a detailed account of the early stages of an ongoing technology-related organizational change initiative.

Setting the Scene

Technical Cooperation International, henceforth TCI, is an independent organization within the United Nations system, which, for over 40 years, has been providing project-based technical cooperation, knowledge transfer and advisory services to support the economic development efforts of developing countries around the world. The organization employs technical experts who design and deliver projects with the long-term goals of reducing poverty, improving the ability of local firms to engage in global trade and developing industrial infrastructure in an environmentally sustainable way. TCI has over 650 employees working at its European headquarters and over 2,800 experts and consultants on temporary assignments to its various projects in developing countries. Headquarter staff are organized into three principal functional divisions which are responsible for project management, research and field operations and project support and administration, respectively. The organization also operates field offices in over 40 different countries. TCI is given its mandate by a General Conference comprised of representatives of the governments of its 173 member states, which pay annual contributions to finance its ongoing operations, determine its policies, approve its thematic programmes and budget and elect its Director-General. Individual projects are funded through further, project-specific donations from member state governments or other intergovernmental bodies.

The organization has recently embarked on a 4-year Organizational Renewal initiative (henceforth, OR) in order to implement the fundamental changes that were identified as necessary to realize its new strategic vision. An ambitious mission statement articulated this vision, expressing the objectives of improved quality, greater impact and increased annual throughput (in US Dollars spent) of projects and the

ability to provide better information about project outcomes to stakeholders to reinforce TCI's reputation and relevance. OR was launched outright with the creation of a dedicated 'change office' comprised of two senior managers from within the organization as well as an experienced organizational change consultant who joined TCI full-time after having earlier conducted the feasibility study for this initiative. It also involved the formation of two part-time 'task forces' to plan and carry out initiatives to improve organizational efficiency and effectiveness and introduce changes to management practices and working culture, respectively.

In order to establish momentum for the initiative the team implemented a series of 'quick wins' – incremental changes to streamline administrative procedures and reduce the reliance on paper to a minimum. Subsequently an extensive Business Process Re-engineering (BPR) exercise was carried out following the Benefits Dependency Network methodology (Peppard et al. 2007). Over 70 employees from across the organization thus participated in the reinvention of TCI's project management cycle from beginning to end. Subsequently, an ERP software package would be implemented and customized based on this re-engineered process model.

This study focuses on the events and developments that transpired over the course of two months, starting 3 weeks before the beginning of the BPR exercise and ending one week after the last workshop. The research was conducted from an interpretive stance, in an attempt to systematically discover, explore and understand the variety of interpretations of OR within TCI (Klein and Myers 1999; Schultze 2000). Over a period of 4 weeks the author participated in all 6 BPR workshops, capturing the discussions that took place among participants (10 to 15 people per session) who were selected from different departments in the organization and the process designs that they agreed on. Each workshop lasted a full working day, and involved a different group of participants. The researcher subsequently assisted the BPR team (consisting of the original OR team and 4 external consultants) in their analysis of the collected data and the production of a comprehensive process re-design blueprint.

The data was supplemented by 10 semi-structured interviews with employees and managers from different functional divisions, numerous informal conversations with other organizational members, attendance of OR-related presentations and documents related to the organization, and OR in particular. Quotations from interviewees, the OR change team as well as BPR workshop participants are used to illustrate the analysis.

TCI as a Human Activity System – ‘Artisans versus Administrators’

It is important to note that the organization committed to the significant costs and risks associated with the initiative in a proactive and anticipatory way, rather than being forced into it by a crisis. In the words of a senior manager who has been at TCI for over 25 years: “there is an urgency about organizational renewal, but its not based on fear, its based on let’s improve.” The recognition of developmental potential indicated the existence of contradictions within the organization.

From an AT perspective, TCI’s Project Managers (PMs) can be represented as subjects of a central activity system (see Figure 2) directed at the transformation of the object of transferring technical knowledge, in the form of projects, into outcomes of economic development impact in recipient countries. The imperfections identified above can be conceptualized as disruptions to the smooth realization of the ‘scripted’ or planned delivery of projects that are symptomatic of systemic contradictions.

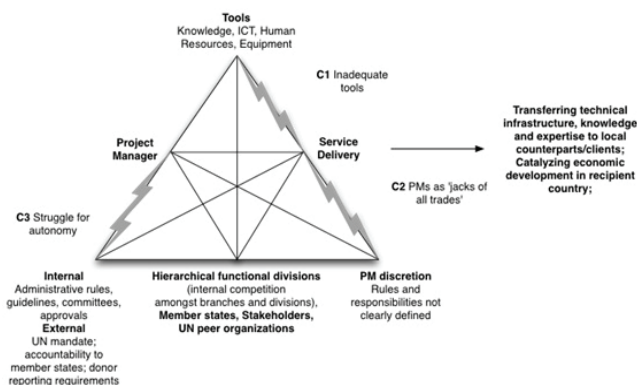


Figure 2: TCI Project Management as a human activity system with level 2 contradictions

Three contradictions between different components of the system (level 2) can be identified. The first one reflects the tensions between the tools that mediate the activity, particularly ICTs, and the object of service delivery. Obtaining complete, accurate and timely information about projects entailed a significant amount of manual work in TCI’s fragmented landscape of legacy ICT systems. Instead of providing an infrastructure that supports project delivery by enabling fast and convenient use and production of information, these tools actually imposed the additional burden of surveying disparate sets of data and manually compiling them into a coherent whole, thus distracting attention, effort and time from the original object.

The division of labour was also in contradiction with the object. In practice PMs were responsible for all aspects of a project from conception and plan-

ning to delivery and closure. Moreover, incentives strongly favoured individual performance, “protection of turf,” and discouraged collaboration with colleagues. The lack of a clear and robust definition of roles and responsibilities across the organization meant that PMs were free to develop individual approaches to accomplishing their work. Many became “jacks of all trades” engaged in “artisanal” crafting of projects, whose attention to the object of delivering high quality projects was diffused amongst a range of administrative, financial, and logistical concerns that punctuated the everyday delivery routine.

The degree of autonomy afforded to PMs necessitated the creation of a vast array of controls and rules so that their activities would conform with the relatively stringent financial rules and regulations imposed upon the organization by member states and the UN system. The consequence was a historically accumulated set of intricate and often redundant bureaucratic checks and balances. This made work at TCI ‘paper intensive,’ opaque and slow. An employee described the culture of the organization as being “overburdened by monitoring and controlling.” Instead of establishing ways of working effectively within these constraints, PMs engaged in actions to avoid or circumvent them, distracting their efforts from the original object.

The contradictions between these mediating components and the object are linked to a deeper issue, ingrained in the history of the organization. TCI’s culture was shaped by a strongly held belief, built up over many years, that the organization is “in many ways unique” and operates in “a situation that is very complex and heterogeneous” implying, in turn, that any form of standardization is unthinkable. This state of affairs was manifested in the immediate hierarchical organization, where problems with collaboration and trust across TCI’s three divisions abounded. A senior manager thus described PMs as “100 Rembrandts, each working away at their own masterpieces.”

As PMs reveled in their artisanal role their subjective understanding of the object gradually drifted from the collective ideal of service delivery to the individual ideal of protecting their own autonomy. This fundamental contradiction with the collective object of the organization led to a fragmentation of the community – an ongoing struggle for autonomy between PMs and the rest of the organization, often seen as administrators rather than collaborators. Senior managers were growing increasingly concerned at the consequences of this deep contradiction: deteriorating project quality and the widening of the ‘opportunity gap’ – TCI’s inability to convert available donor funds into projects with positive and tangible outcomes. Their response was the launch of OR – a

culturally more advanced activity system mediated by the tools of Business Process Re-engineering and ERP software to transform the object of establishing a minimum standard of quality in TCI's central activity into the realization of the objectives in the mission statement.

Object-Oriented Interiorization of the Organizing Vision of ERP

OR was explicitly shaped by its significant technological component. The implementation of an ERP system came to be seen as an indispensable measure if the organization was to achieve a fundamental change in the way it 'does business.' In TCI's immediate environment, the organizing vision of ERP had reached a stage of institutionalization, where it seemed like all of its peers within the UN system were either in the process of implementing such software or were already using a version of it. Systematic change management would allow TCI to benefit from the software's purported affordances of precise control, seamless coordination, provision of accurate and relevant information in real time, procedural transparency and the ensuing organizational efficiency and effectiveness. Directed by their object, the subjects of OR interiorized the prevalent organizing vision of this ICT. According to a senior manager who championed OR, the new system was expected to have both explicit and implicit controlling effects, as an obligatory point of passage to "force people to change the way they work" and by rendering individual actions vulnerable to inspection in real time, respectively. In the consciousness of OR's subjects, the ERP system was an instrument of control, the equivalent of a Latourian machine (Latour 1987), a stratagem to bundle the contradictory actions of employees, making them predictable, transparent and directing them along a "controlled corridor of activity," towards the collective object.

BPR Workshops as Collaborative Object Reconstruction

The re-engineering of whole processes of work into a series of standardized operational sequences was deemed a necessary and desirable measure that would allow the object of OR – an improvement of the average quality of projects – to be transferred to the subjects of TCI's central activity system. The OR team had prepared a detailed model of the desired future project management process to frame the BPR workshops. Although no direct reference was made to technology, the model implicitly embodied their personal sense of the ERP system as an instrument of control. Each workshop was opened by a brief motivational speech by a senior manager that reiterated the paramount aim of BPR as facilitating a sustained transition to a more standardized "industrial" form

of project management with a "minimum quality of project documentation and a corresponding minimum quality of outcomes." This was an attempt to construct and 'hand down' the object, directing the activities of workshop participants towards it. The BPR workshops were organized along the prescriptions of starting from this object and then systematically "fleshing out" concrete models of how to realize it. Participants were urged not to consider concrete ICTs at all, but rather to collectively define a 'technology-independent' ideal set of activities to constitute the redesigned process. The resulting clear and unambiguous model would later provide the specification against which the ERP software would be selected and implemented.

However, workshop participants, who were themselves subject of TCI's central activity system, did not simply accept the object that was handed down but rather went about creatively reconstructing it themselves. They often questioned the logic and correctness of the process model that they were tasked with filling in and found it difficult to fit their experiences and knowledge into its linear constraints. Discussions tended to deviate from the prescriptions of the methodology as participants inexorably reverted to analyses of the current situation, bringing out and exploring various manifestations of the level 2 contradictions presented above. They framed and anchored their debate using various rhetorical artifacts: vignettes of personal experience, organizational acronyms, existing forms, documents and rules. In these debates the different perspectives of the organization that each participant held "met, collided and merged" (Engeström 2008:129) to form new collective knowledge about how to improve project management at TCI.

The functionalities and affordances of ICTs were explicitly discussed during phases of modeling future processes and analyzing scenarios to evaluate their feasibility. These discussions revealed that the majority of participants only had a nebulous and inchoate understanding of ERP systems: "[it] is not much more than a brick to people [like us] who have not seen it in practice or worked with it." They relied on anecdotal fragments, supplied by the consultants and OR members, of the functionalities and affordances to construct personal senses of an idealized ERP system. They supplemented this understanding with their own experiences with and knowledge of contemporary ICTs, conceptualizing the system as another, more sophisticated element of a portfolio of information services, an information tool that would enable them to fulfil the tasks that their everyday work put before them in a more effective fashion (Mathiassen and Sørensen 2008). Statements like "if we use IT properly I should never ever have to retype my name again" exemplify the character of

these personal senses and suggest that, for the purposes of most participants, the entire ICT landscape should perform like a heterogeneous whole, an enabling platform that provides relevant information when and where it is needed.

The Unresolved Divergence of Personal Senses

Unlike other central issues related to the level 2 contradictions identified above the dichotomy (see

Figure 3) between the personal senses of ERP held by subjects of OR and those constructed in these workshops by subjects of the central activity system were not explicitly discussed, clarified or reconciled at any point. Instead, the divergent understandings of what the new system would afford remained unresolved and buried under the surface of the re-engineered process model that should form the basis for the selection and implementation of a concrete software product. It is likely that this subtle contradiction would be the source of disturbances and in-

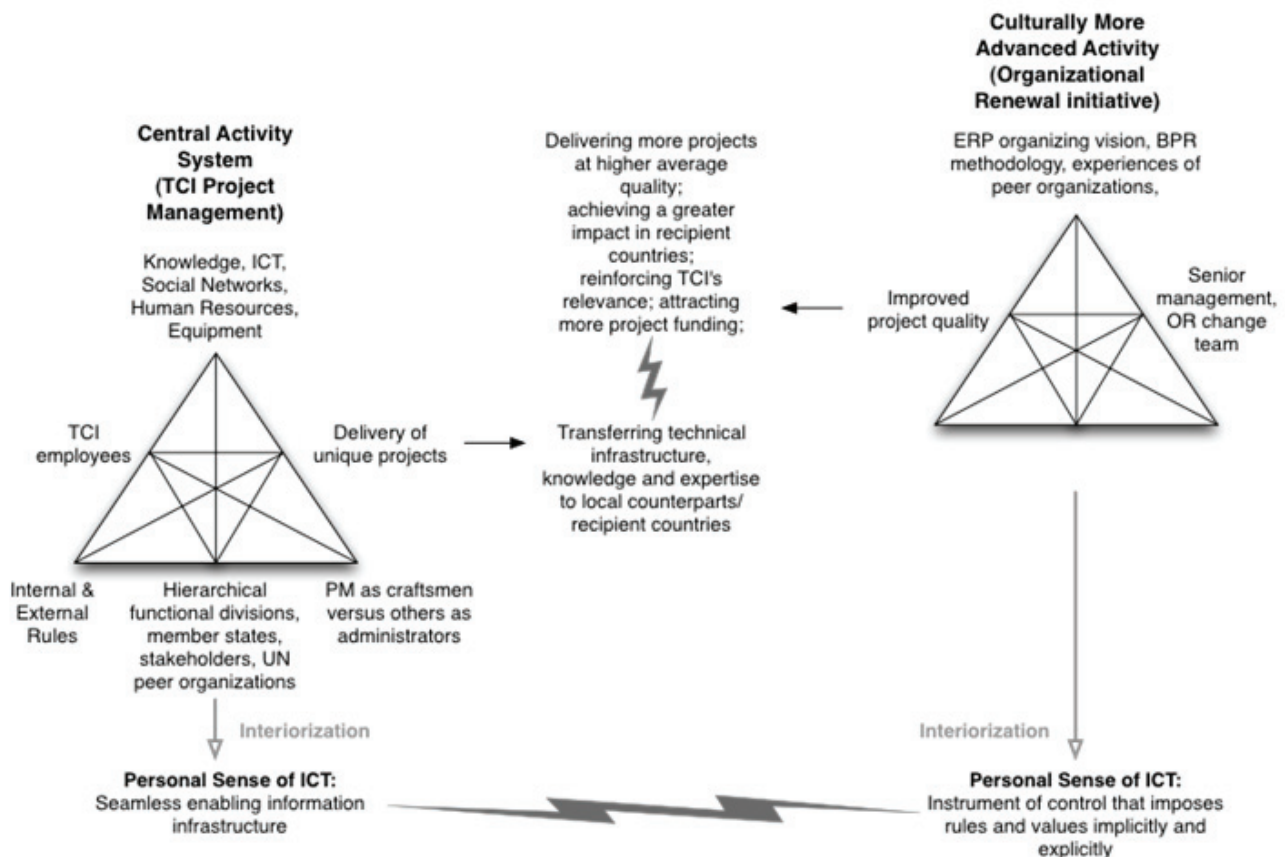


Figure 3: Contradictory personal senses as a product of object-oriented interiorization

novations throughout the impending implementation process and beyond.

Conclusion

Most studies of the relationship between ICT and organizational change focus on what occurs when a technology is implemented and the period thereafter. The arguments presented in this paper emphasize the explicit and implicit mediating roles of a particular ICT before it has arrived in the organization. It is rare that the perspectives of managers and employees are truly aligned, and, given their distinct objects, it is in fact questionable whether such an alignment is possible or even desirable (Engeström 2008). Thus, it should not be surprising that the personal senses of an 'invisible' ICT that is as complex as an ERP differed qualitatively be-

tween the subjects of TCI's central activity system and those of OR, whose actions were directed by a different object and informed by a powerful organizing vision. These personal senses of technologies shaped the organization's preparations for the arrival of technology and thus will have an impact on the implementation stages and what lies beyond. BPR methodologies should, therefore, inform and train participants on the specific functionalities and affordances of the ICT, so as to ensure a broadly shared basic understanding and pre-empt conflicts in the implementation phase. Moreover, managers of change initiatives may benefit from heading into BPR discussions with a flexible perspective and a blank notebook. Among the difficult debates and idiosyncratic propositions, these dialectic collaborative processes produce a wealth of innovative ideas for developing the central activity system.

Finally, investigating the influence of conflicting personal senses, and the contradictions that they may spill out into, on the full trajectory of an organizational renewal initiative and their development along the way provides an enticing avenue for further research. It is the author's sincere belief that a wider acceptance of AT in Information Systems would provide a substantial addition to the "diversity of understandings" available to IS scholars (Avgerou 2000). There have already been successful attempts to apply AT in IS studies of innovation and learning (Kietzmann 2009; Wiredu 2005) and this paper provides initial evidence that the lens is applicable for the study of ICT-related organizational change.

References

- Andreu, R. and Ciborra, C. (1998) Organizational Learning and Core Capabilities Development: The Role of IT. In Galliers, R. D. and Baets, W. R. J. (Eds.) *Information Technology and Organizational Transformation* (pp. 87-106). Chichester: John Wiley.
- Avgerou, C. (2000) Information systems: what sort of science is it? *Omega* 28(5). pp. 567-579.
- Brooks, F. P. (1987) Essence and Accidents of Software Engineering. *Computer* 20(4). pp. 10-19.
- Ciborra, C. (2003) Hospitality and IT. In Ljungberg, F. (Ed.) *Informatics in the Next Millenium* (pp. 161-173). Lund.
- Ciborra, C. (2004) Encountering information systems as a phenomenon. In Avgerou, C., Ciborra, C. and Land, F. (Eds.) *The Social Study of Information and Communication Technology: Innovation, Actors, and Contexts* (pp. 17-37). Oxford: Oxford University Press.
- Engeström, Y. (2008) *From Teams to Knots: Activity-Theoretical Studies of Collaboration and Learning at Work*. New York: Cambridge University Press.
- Hammer, M. and Champy, J. (1993) *Reengineering the corporation*. New York: Harper Collins.
- Kallinikos, J. (2004) Farewell to constructivism: technology and context-embedded action. In Avgerou, C., Ciborra, C. and Land, F. (Eds.) *The Social Study of Information and Communication Technology: Innovation, Actors, and Contexts* (pp. 140-161). Oxford: Oxford University Press.
- Kallinikos, J. (2006) *The Consequences of Information: Institutional Implications of Technological Change*. Cheltenham: Edward Elgar.
- Kietzmann, J. H. (2009). *In Touch out in the Field: Coalescence and Interactive Innovation of Technology for Mobile Work*. Department of Management. Information Systems and Innovation Group, London School of Economics and Political Science.
- Klein, H. H. and Myers, M. D. (1999) A Set of Principles for Conducting and Evaluating Interpretive Field Studies in Information Systems. *MIS Quarterly* 23(1). pp. 67-93.
- Latour, B. (1987) *Science in Action: How to Follow Scientists and Engineers Through Society*. Milton Keynes: Open University Press.
- Latour, B. (1991) Technology is society made durable. In Law, J. (Ed.) *A sociology of monsters: essays on power, technology, and domination* (pp. 103-131). London: Routledge.
- Leont'ev, A. N. (1978) *Activity, consciousness, and personality*. Englewood Cliffs: Prentice-Hall.
- Mathiassen, L. and Sørensen, C. (2008) Towards a theory of organizational information services. *Journal of Information Technology* 23(4). pp. 313-329.
- Orlikowski, W. J. (2000) Using Technology and Constituting Structures: A Practice Lens for Studying Technology in Organizations. *Organization Science* 11(4). pp. 404-428.
- Orlikowski, W. J. and Baroudi, J. J. (1991) Studying information technology in organizations: research approaches and assumptions. *Information Systems Research* 2(1). pp. 1-28.
- Orlikowski, W. J. and Iacono, C. S. (2001) Research Commentary: Desperately Seeking the "IT" in IT Research - A Call to Theorizing the IT Artifact. *Information Systems Research* 12(2). pp. 121-134.
- Peppard, J., Ward, J. and Daniel, E. (2007) Managing the realization of business benefits from IT investments. *MIS Quarterly* 6(1). pp 1-11.
- Robey, D. and Boudreau, M.-C. (1999) Accounting for the Contradictory Organizational Consequences of Information Technology: Theoretical Directions and Methodological Implications. *Information Systems Research* 10(2). pp. 167-185.
- Schultze, U. (2000) A Confessional Account of an Ethnography about Knowledge Work. *MIS Quarterly* 24(1). pp. 3-41.
- Swanson, E. B. and Ramiller, N. C. (1997) The organizing vision in information systems innovation. *Organization Science* 8(5). pp. 458-474.
- Vygotsky, L. S. (1978) *Mind in Society - The Development of Higher Psychological Processes*. Massachusetts: Harvard University Press.
- Wiredu, G. O. (2005) *Mobile Computing in Work-Integrated Learning: Problems of Remotely-Distributed Activities and Technology Use*. PhD Thesis, Department of Information Systems, London School of Economics. available at <http://www.lse.ac.uk/collections/informationSystems/pdf/theses/wiredu.pdf>.