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# Work transformation following the implementation of an ERP system

## An activity-theoretical perspective

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## Abstract

**Purpose** – The purpose of this study is to introduce the Human Resources (HR) module of the SAP suite in the Italian branch of a leading multinational pharmaceutical company. This study can be re-conducted within the interpretive tradition of information technology studies focusing on the attempt to understand and describe how software users in the HR department interpreted the enterprise resource planning (ERP) technology, how they changed their work practices and the changes that occurred in organizational discourses and meanings alongside the process.

**Design/methodology/approach** – The case study/intervention took start with the impulse of the Italian HR department manager, who was struck by the way that the ERP system technology implementation was affecting work life of the employees in the department. This research/intervention used interviews, focus groups and internal documents as sources of data. The authors conducted and analyzed 20 narrative interviews and 3 focus groups with middle managers, and they analyzed about 120 pages of internal memos.

**Findings** – The implementation of ERP systems is almost invariably accompanied by great expectations of increased process rationalization, efficiency and cost-effectiveness, and upper managers' discourses make large use of what Engeström *et al.*, 2010 have called process efficiency rhetoric. But the ERP technology, most likely, will neither revolutionize management nor will it become a "complete calculation machine" that runs an entire work organization (Quattrone and Hopper, 2005, p. 731).

**Originality/value** – The implementation of the ERP system has caused conflicts and disturbances, aggravating contradictions that already existed between activity systems and introducing new types of contradictions. Pre-existent contradictions become clearer; there is a stronger interconnection between activity systems. The individual agents could experiment an expansion in their activities if only they will initiate a movement of expansive learning and if they are not prevented from doing so by coercive control. The natural expansion of the subjects' scope of activity and horizons of possibilities could be sustained by the ERP technology if it is not used as a tool for domination and if the upper management does not try and separate what cannot in actuality be separated: The actors' capabilities of improvised learning, which makes the institution of a new mode of the activity possible, and their capacity to assume collective control of the meaning and direction of the transformation of the activity. ERPs are technologies that can naturally bring transformations in the activity system and networks where they are introduced, but in some cases, they can easily and in a non reflective manner be intended as tools for oppression by the upper management.

**Keywords** Corporate culture, Corporate identity, Employee involvement, CHAT

**Paper type** Research paper



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## 1. Introduction

Changes in information technology, especially ERPs, are interesting organizational events for examining expansive development of work activity.

This paper analyses the process of expansive development following the introduction of enterprise resource planning (ERP) systems in the Human Resources (HR) department of a multinational pharmaceutical company.

ERPs have been defined as enterprise-wide packages that tightly integrate business functions into a single system with a shared database (Lee and Lee, 2000). Shared databases, simultaneously accessible from different locations and organizational positions, allow access to real time information to support decisions and enable constant management control. In principle, they ensure visibility of any organizational object (Dechow and Mouritsen, 2005) and allow unprecedented levels of organizational integration (Davenport *et al.*, 2004).

In the case of ERPs, it is apparent that information technologies are not neutral and can be understood as "[…] attempts to institute particular versions of the organization, its members, and their acitivities." (Bloomfield and Vurdubakis, 1997, p. 641). ERPs largely purport a rationalist "technological imperative" (Markus and Robey, 1988). The configuration and implementation of a new interactive system is strictly coupled with an agenda of organizational transformation and involves the redesign of employee activities.

Despite the transformation agenda for increased control and efficiency embedded in these technologies, the actual enactment of the system can lead to very different situations (Boudreau and Robey, 2005).

Researchers have offered a succession of interpretations for information technology's consequences on work activities and have proposed different specific theoretical perspectives which direct attention toward social contexts and processes, social interpretation and enactment as explanations for the different observed outcomes. These include structuration theory (Poole and DeSanctis, 2004), organizational learning (Robey *et al.*, 2000), actor-network theory (Dechow and Mouritsen, 2005), the practice-based perspective (Orlikowski, 2000) and cultural historical activity theory (Nardi, 1996; Kaptelinin and Nardi, 2006).

The study presented hereinafter is based on the activity-theoretical perspective and expansive learning (Engeström, 1987). It documents the 2.5 years process of implementation of ERP technology in the HR department of the Italian branch of a multinational pharmaceutical (SAP R/3 modules: PY = payroll, PT = personnel time management, MSS = manager self service, ESS = employee self service).

As activity theory pays particular attention to issues of agency and innovation (Sannino *et al.*, 2009), in our case study analysis, it served as an overarching framework to understand the contradictions faced by managers and employees during the ERP implementation. In such a process, it gradually became clear that many difficulties and resistance to change depended on the tension between visible, explicit work and implicit, largely invisible aspects of activity that enable the work to get done. There are often significant discrepancies between the espoused organizational image of the actions that constitute an individual's work and the actual activity (Orr, 1996). The reengineering of work processes actuated with the system implementation uncovered this tensions and discrepancies and led to question the taken for granted systems of activity of the HR department.

While the activity system approach helped to explore such tensions and contradictions, the expansive learning approach sustained their visibilization and the possibility to deal with them.

The aim of the present case is, therefore, to describe how managers and employees in the HR department enacted the ERP technology and to understand how they faced the challenges in their work activity alongside the process. Lessons learned from the case will finally be highlighted and discussed.

## 2. Work after the implementation of an ERP system

The implementation of computer-based information systems has been a major organizational change driver in the past years.

Enterprise resource planning (ERP) systems provide organization-wide access and analysis capabilities across functional divisions and company units at the local, national and international level (Davenport, 1998; O'Leary, 2002)

The main promised benefit of an ERP system is improved financial performance, increasing efficiency in the use of resources. The implementation of such a system reaches far beyond a change in technology. The main benefits are to be gained from a massive business process reengineering, changes in the organizational structure, the roles and skills of organizational members and knowledge management activities (Robey *et al.*, 2000; Davenport, 1998, Liberati et all. 2016). ERPs requires the adopting organization to reengineer its processes to conform to allegedly best business practice embedded in software routines (Robey *et al.*, 2000).

Much of the published research on ERP systems is implementation related and largely from a managerial perspective. The most diffused approach evaluates the ERP impact on managers' control and decision-making capabilities. The impact of ERPs on users' work practice is comparatively under-researched (Dillard and Yuthas, 2006).

ERP systems provide alternative sets of pre-programmed processes from which an organization can choose. The ensuing business process reengineering privileges the logic of the enterprise system over the reality of the existing organization (Davenport, 1998). Pre-existing practices are normally replaced by those designed into the system, which represent the recognized "best practices". Processes become more formalized and more difficult to change. Integrated systems like ERPs, therefore, impose constraints on its users and allow less degrees of freedom to enact and modify the technology in use, as the work of different users and organizational units is tightly coupled (Boudreau and Robey, 2005).

Although ERPs are assumed to constrain human action, users can choose to resist such systems simply avoiding to use them as much as possible (inertia) or working around system constraints in unintended ways (reinvention) (Boudreau and Robey, 2005). Users enact transformations of organizational practice in response to their local interpretations and needs, rather than being passive recipients of a model that is embedded in the technology (Orlikowski, 2000; Gilardi *et al.*, 2013; Moja *et al.*, 2014).

Both along the implementation process and with the actual use of the system after the "go live", the integration principle can be enacted in different ways, partly because ERPs system require a lot of different supplements that are created outside the ERP to function, and planned work processes are often coupled with turnaround practices (Quattrone and Hopper, 2005). ERPs need to be complemented, fixed and sometimes circumvented to maintain the organization's activity systems working.

It has also been suggested that integrated information systems provide management with a mechanism for workforce visibility and control (Zuboff, 1988). In this perspective, the ERP system acts as an electronic panopticon that translates and records employee behavior, without the employees knowing when and for which reason their activities are being monitored (Kayas *et al.*, 2008; Sia *et al.*, 2002). This function of the system can be used by the management to exert disciplinary power, evaluate employee performance and efficiency and appraise individual and work units.

## 3. The case

A primary multinational pharmaceutical company was in the final stage of the company-wide implementation of the business management software solutions application and service (SAP/3) package. Being the last organizational unit to be included in the ERP system, employees in the HR department faced significant challenges in the effort to change their activity to adjust to the logics of a system that had been only partly customized for the company, primarily to meet the needs of other departments, such as sales, accounting and finance, production and logistics. In fact, HR was considered essentially a staff department, supporting other more strategical organizational areas.

HR activity was highly complex. The 25 employees of the HR department were often confronted with the necessity to tackle unpredictable situations related to the administration of the workforce which could only be partly foreseen, depending on the frequently changing national work law, on trade unions' actions, on work group dynamics and on the personal situations of the employees.

The employees experienced great difficulty to meet the system's request to organize their activity around prescribed routines. They were asked to rely on the system as a guide for decision and for any need for information, increasingly isolated from fellow employees and managers both in their own department and other functional areas. They had to depend on the system's prescriptions for most decisions and ask for specific authorizations for all non routine actions. They felt that the SAP system threatened their professional competencies and imposed too rigid procedures.

The research/intervention project took start after a few informal encounters with the manager who was responsible for the unit at the time. She was struck by the way that the ERP system implementation was affecting work life of the employees in the department.

She reported a situation of deep crisis, diffused discontent and work-related stress among the employees. Concretely, the crisis manifested itself in an increase in sick leaves, low work productivity and frequent inter-group conflicts throughout the department, as well as several incidents in dealing with the manufacturing and sales workforces that questioned the HR' capability to carry out its very function.

The practitioners re-conducted the unit's crisis to the enforcement of the use of the ERP technology and talked about the situation as a matter of "we" and "them", recurring to a rhetorical juxtaposition between the local branch and the headquarters.

A research/intervention was proposed, to be carried out in the perspective of expansive learning (Engeström, 1987) and especially expansive visibilization of work as a methodology for dealing with major transformation of work (Engeström, 1999).

Expansive learning is energized by disturbances and contradictions and may lead to the redefinition of the object of an activity and to the reorganization of its structure

(Engeström, 1987, 2000). The primary role of the researcher/interventionist is to invite the actors to recognize and analyze the contradictions in their practice (Kajamaa, 2012; Ivaldi *et al.*, 2015).

The application of a complex stepwise cycle of expansive learning, as a tool for transforming work and organizations, ideally proceeds in stages of expansive learning actions (Kajamaa, 2012): questioning the current practices; analyzing the collective work activity; modeling the new solution to solve the contradictions paralyzing the activity; examining and testing the new activity model in practice; implementing the new model; reflecting on the process; and consolidating and generalizing the new practice (Engeström, 1987, p. 322).

The study here presented is limited to the initial stages of the cycle, which concern in particular the assessment of the ongoing crisis, fostered by the implementation of the SAP system in the unit, the agents' questioning of their current work practices and the analysis of the multiple interdependencies that connect different organizational communities and activity systems.

The first step of the research/intervention used interviews, focus groups and internal documents to produce a better understanding and representation of the situation.

In all, 20 narrative interviews and 3 focus groups with middle managers were recorded verbatim for analysis; in addition, about 120 pages of internal memos related to the ERP implementation phase, and the field notes generated by an intern who spent one year working in the department were used as a support in making interpretations.

The interviews lasted about 1.5 h each and were loosely focused on the work life of the person after the implementation of the ERP system. The analysis of internal memos provided by the interviewees complemented the narrative data, anchoring events and critical incidents in an interactive context. The focus groups lasted about 3 h each. They focus provided a space for the confrontation of the agents' experiences and the questioning of their activities.

The subsequent planned phase was the institution of a change laboratory, involving some representatives of the HR central unit and the ERP system implementation steering group. Unluckily, the higher managers' preoccupation that the overt expression of criticism and the search for creative solutions could impeach the final SAP implementation outcome led to the premature closure of the project.

Even if the envisioned change laboratory sessions could not take place, all the participants in the project received a feedback in the form of a research report, as well as the transcription of their own interviews and of the focus groups in which they had participated. The research/intervention produced an initial movement of expansive learning, to the extent that it encouraged the actors to manifest and construct in patterns of discursive action the contradictions that they encountered in their work activity. As this had until then been deemed out of order and tacitly stigmatized as anti-organizational behavior, the actors could use the interview and focus group situations to try to make sense of, deal with and transform the contradictions they experienced (Engeström, 1999).

### *3.1 Assessing the crisis: the analysis of the contradictions*

In the first stage of the project, as described above, the HR managers and employees were involved in assessing the perceived impact of the ERP on their activity. A number

of contradictions were identified, that eventually led to the identification of a network of multiple interconnected activity systems, focused on a partially shared object.

*3.2 Contradiction Number 1: process rationalization vs community building*

The implementation of ERP systems is almost invariably accompanied by great expectations of increased process rationalization, efficiency and cost-effectiveness and upper managers' discourses make large use of what Engeström *et al.* (2010) have called process efficiency rhetoric. But the ERP technology, most likely, is neither bound to revolutionize management nor it can become a "complete calculation machine" that runs an entire work organization (Quattrone and Hopper, 2005, p. 731).

In this case, the actors recognized that in the ERP system there was a better, clearer definition of the division of labor. This was also perceived as a potentially favorable feature of a rationalized, formalized process design:

> Today everything is very clear, you know exactly what is the piece of work that is required of you and you have a good idea of your specific contribution to the business processes on which you are placed.

On the other hand, the actors also felt somehow devalued and at loss as the system/technology became the real pivotal feature of the organizational life. The word bureaucracy came up with surprising frequency, often to indicate the supremacy of the technology/machine over the people:

> Before, we were responsible for processes, we were the right arm of the business and we were so good at following the managers and supporting them, and they recognized us as interlocutors worth of respect. The HR function was a reference for the departments, now with standardization the principles that guide us in our daily work have changed: we are bureaucrats!

The ERP system fostered more formalized and standardized processes that provided more intelligibility but, at the same time, seemed to prevent the actors to appropriate the object of their work.

The activity is localized, practice is segmented through process design (Engeström *et al.*, 2010). In such a rationalized system, knowledge that is situated, collective and diffuse could hardly find a place in the ERP system. While upper managers and ERP consultants were focused on the process efficiency and cost-effectiveness rhetoric, the protagonists of our case study invariably resorted to a community building rhetoric, as they reckoned that their action oriented competences were being dismissed or sidetracked:

> The ambition to distribute skills so as to make each one nonessential engendered the fact that everyone owns some knowledge that they hold for themselves and is no longer disseminated throughout the system. The knowledge you have of people, of some less formal aspects of the organization cannot be entered in SAP. Before, you would talk informally to your colleague to tell him "look, if you have to do this, be careful with these two or three things". Now we are told that everything we need is in the system and we no longer need to get in touch with colleagues, but in this way everyone minds their own business and a lot of skills are lost.

Part of the problem in the present case resided in the way the top management had decided to implement the ERP system, which did neither facilitate nor encourage the social appropriation and discursive interaction among the participants. The system's implementation and the associated process reengineering program, was managed in a

coercive way, from centre to periphery, from finance and control to other less powerful departments. A number of competence centers were created at the central headquarter, which had the explicit mandate to appropriate all the relevant knowledge from the peripheral units:

> H.R. Direct is currently experiencing a critical phase due to the fragmentation of processes: there's a sense of confinement, a feeling of wear and tear, action as defined in the processes limits the desire to know. The reason for this is that the model requires a system of permissions that are required for any change that makes day-to-day work very hard.

*3.3 Contradiction Number 2: execution vs responsibility*

ERP systems promise to significantly reduce hierarchical structures of control and to expand the scope of each employee's role, yet in actuality, in our case study, the actors expressed feelings of reduced responsibility and impoverished work content, as if they were dutiful executors of pre-planned scripts:

> Now you have to do only what you are allowed to by your permissions, you should never put yourself on the line to bring a result home. The system prescribes exactly what you are allowed to do and you must not invent new ways of doing things more effectively.

This transition was not painless, and several persons commented that they had the feeling to have lost the sense of what they were doing in their everyday work. Practitioners felt that they had been deprived of something vital: the personal relationship with the object of their activity:

> The introduction of this model was, in my opinion, as suffering a mutilation and when one suffers a mutilation the worst thing to do is keep going as nothing happened: there is nothing worse than being told: "don't worry, it's nothing". But no! If your leg has been amputated you cannot turn a blind eye! Let's look at what has been cut off first and then let's think about finding a prosthesis.

To reduce costs and improve productivity, the ERP systems was designed to limit informal exchanges between employees and to regulate and coordinate all activities so that the individuals spend most of their working time using the information system. This configuration of the activity was not problem-free and the results were sometimes paradoxical:

> A ticketing system was introduced, a crazy system that wants to depersonalize every relationship in the company. Now whatever you want, or any information you need to do your job you have to open a ticket. Before, you went to your colleague who you knew was an expert in that field and you told him "I'll get you a cup of coffee". At the coffee machine you explained the problem, you asked some crucial questions about your problem and you had available the knowledge you needed to do your job in a simple and fast way. Now, instead, you have to open a ticket and wait for someone to answer you. Then, since at the headquarters they do not know anything about what Italian legislation is, the following can happen: so, my office neighbor opens a ticket to know the conditions of employment of a person. At the headquarters they start asking each other how to respond, they go to extreme lengths just to figure out who knows something, then it crosses someone's mind to ask me and I must respond in writing. Finally, from the headquarters they send an email to my office neighbor giving him the correct reply in 4-5 days, something I would have done in 5 minutes at the coffee machine. That's what an ERP is.

The ticketing system was used essentially as a tool for control; in the reorganized hierarchical work system, a number of system delegates were appointed with the specific role of checking that the system's processes are applied correctly. In the SAP system, people did not feel encouraged to take responsibilities for the final outcomes of the activity, as adherence to the prescribed role expectations and process design was paramount:

> Being able to interact without tickets would certainly have its advantages, but the reason for the tickets is related to the possibility to control and monitor the work done by everyone. Each one must give an account of the hours he/she works and, by means of the tickets, there is a record of everything one does. So, I must try to only do work that can go under a ticket otherwise when a delegate comes in he/she will dispute the fact that out of eight hours, I can only justify four or five. I do not work to solve problems any longer but only to justify my position through the tickets.

The practitioners felt that they no longer played a role as HR specialists but rather as interchangeable executors of given scripts in a bureaucratic mechanism. At the same time, they reported having to do a lot of extra work to amend for all the faulty actions undertaken while following standard, company-wide prescriptions that cannot adequately respond to local situations. This had to be done largely after hours and was not recognized by the managers as a valuable contribution. Nonetheless, when problems arised, such as unusually high levels of absenteeism, work-related litigations, trade unions' initiatives leading to slow downs in production and diffused discontent among the employees leading to low productivity, the local HR business partners were held responsible.

## 4. Constraint and control vs empowerment

HR employees' main concern were deskilling, the loss of existing knowledge and the prospective lack of personal, non-system-mediated interaction with other employees. The system became the center point of all activity. The practitioners felt that their interaction with the system was mostly frustrating, as it was no longer in their power to make sense, both individually and collectively, of their everyday activities. Even if ERPs have the potential to make all relevant information visible for the employees and to reduce the segregation of tasks, this feature was not supported in the local implementation:

> There is so little information that I can see, because the profile provides few permissions. Now with respect to my work I can only access very basic personal information. I do not have the right to extrapolate any reports and this prevents me from fully grasping the meaning of what I do.

> The model is rigid and provides fixed and rigid types of training. We have a number of people who enroll in training courses in the catalog. We receive entry lists but we do not exercise an orientation function for educational processes any longer, we cannot retrace who tells these people to enroll in training proposals. In the past, the manager asked us to also give guidance in relation to the overall company needs.

The ERP system's ability to warrant greater information visibility was converted into a tool for capturing and recording the employees' behavior:

> I'll explain how the ticket system works. Our payroll system didn't work anymore so I asked for help from an expert colleague from the parent company. He told me that he could not give me any explanation in that regard as the new procedures required the opening of a ticket. I did what I was told and began waiting, after two days of waiting I called my friend again and told him that if he did not act the work I was doing would go up in smoke, he replied that he was strictly controlled by the delegates and that he could do nothing, but I was advised to submit a reminder through the computer system. I did what I was asked, and another day went by! At the end of the fourth day of waiting, it was Friday night, I was desperate! At about 4:00 p.m. I had to go to the bathroom, just for a few minutes mind you! Only 5 minutes must have gone by, the time to go to the bathroom and come back and what was on the screen?
>
> We tried to contact you to solve your problem but you were absent from your work station! Please do not leave your work station when requests for action are still open. Your request was queued to the others, you will be contacted next week after we have processed all the other urgent needs.
>
> Come on, are they crazy?? The following week I submitted my resignation.
>
> Theoretically, I do not interact with anyone, I only interact with requests traced via ticket. The point of being locked inside the office was to lose no time in interpersonal relationships. The headquarters wanted everyone to be closed inside an office and the employee connection to be only with HR Direct or the call center. Basically, I have to manage the tickets but then there is the add on of my colleagues coming in and out of my office because they have problems that must be solved. Then you mustn't complain if I only process four tickets in eight hours. But this is the only visible part of my job. In fact the tickets are tracked, but everything else leaves no trace and when the delegates meet me they tell me I'm doing little work. The crux for me is that I'm doing non-recognized activities.

Users had to overcome significant implementation problems, but the transition from inertia to reinvention of activity required a great deal of effort, knowledge work and experimenting. The workers felt that it also required a great deal more support and recognition on the part of the process owners and delegates:

> We're justifying a system, using the machine as Headquarters wants, but we provide the manager with the excel file so he doen't go wrong, so seen from the outside the system does not generate errors because we make up for inefficiencies in a non-visible way. If someone asks the headquarters' operators "how does the Compensation & Benefit process work in your office?", they may answer "the process involves this and that at the global level and it is so all over the world". But in reality there are details at the local level, at the country level and even at the global level that they do not even know about. We have created tools to manage local specificities. It is a kind of game, considering that the excel file is not only not recognized but is also penalized.

The stress upon standard control was accompanied by a lack of recognition of local situations that bore potentially serious outcomes. For example, the fact that the head of HR is held responsible for any breach of contract or violation of worker rights according to the national law was not acknowledged. The necessity to conform to the specifics embedded in the system even lead to the infringement of workers' rights by the Italian law.

In a specific episode, the local trade unions were threatening an industrial action when the system had automatically compensated pre-existent errors of overpayment and produced zero-sum monthly payslips for the factory workers:

> "Officially" they have taken away many parts of my job. But as SAP went live I have found myself babysitting the guys in the competence centers: I've been getting wrong hiring letters as January, for careless mistakes or ignorance of our laws. It is not the amount of work that tires me, I've always worked hard and if I have never left it is because I like what I do, but it drains my energies to have to continuously set right the errors they commit over there […].

Frequent reference to a dialectical relationship between process ownership (formal responsibility) and actual responsibility emerged in group discussion. Formal responsibility requires adherence to prescribed procedures and allows formal control; actual responsibility has to do with the person having to get the work done properly.

### *4.1 Assessing the situations: contradictions within the nodes of the activity system and neighboring activity systems*

With the contradictions highlighted in the previous section, the participants were able to expand the focus of their discourses from an individual and singular perspective to a more systemic view, thus seeing the ERP both as a tool (the technology in itself) and as an object and, finally, as a social configuration (the ERP system). The subsequent development of the analysis made use of the activity system model as a tool for the investigation of social systems of activity.

We here organize the exposition of their reflections following Engeström and Sannino's schema:

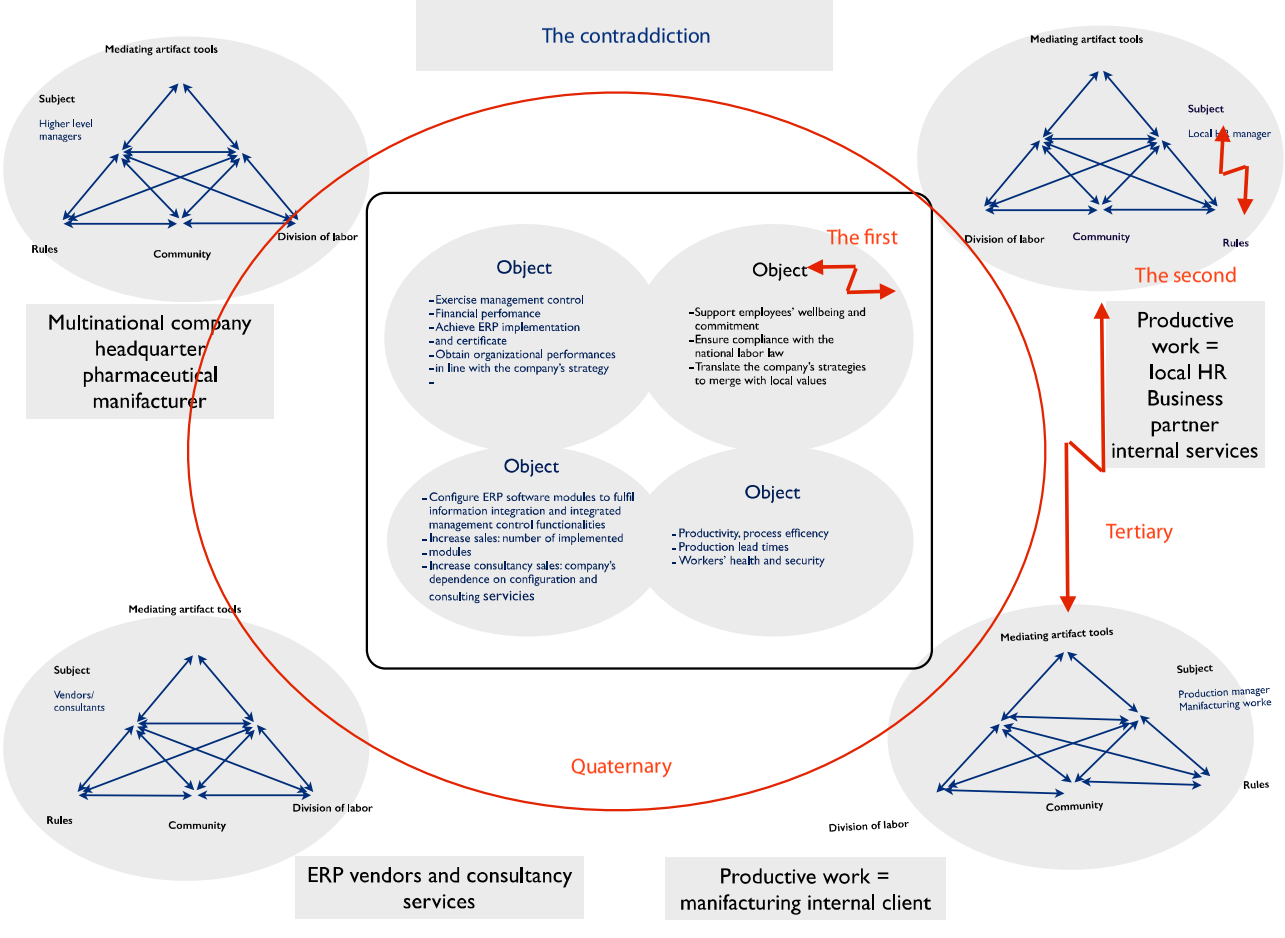
> In different phases of the expansive learning process, contradictions may appear (a) as emerging latent primary contradictions within each and any of the nodes of the activity system, (b) as openly manifest secondary contradictions between two or more nodes (e.g. between a new object and an old tool), (c) as tertiary contradictions between a newly established mode of activity and remnants of the previous mode of activity, or (d) as external quaternary contradictions between the newly reorganized activity and its neighboring activity systems. Conflicts, dilemmas, disturbances and local innovations may be analyzed as manifestations of the contradictions. (Engeström and Sannino, 2010, p. 7) (see Figure 1).

### *4.2 Primary contradiction: within the object of activity*

Looking at the recent history of the local HR department activity system, its object of the activity appeared as twofold. On the one hand, they aimed to ensure the employees' well-being, selecting the persons that had suitable attitudes and personal resources to do a certain type of job, helping people to devise a suitable career path and to select among training options or bringing people to understand the compensation mechanisms. On the other hand, they were invested with the mission to maximize people's work contribution and effort in return for the wage that reflected the labor market situation labor law.

This embodied a fundamental use value/exchange value contradiction that had shaped the HR specialists' activity from the beginning. While the practitioners felt their "employee service" orientation very strongly, the "maximal return", or with a more critical definition, "work exploitation" function had become more salient in recent times. In fact, the actors reported that in the past few years, the deteriorating labor market situation and changes in the national law towards a more flexible configuration of the employment relationship had fostered increased pressure to hire qualified and experienced workers with fixed term contracts and low wages.

**Figure 1.**
The contradiction



A further contradiction was brought upon their activity by the introduction of the cost center system for management control. When the ABC costing system became fully applied, the HR department turned out among overhead costs and began to feel increased pressure for productivity and personnel reduction.

The implementation of the ERP system, therefore, happened in a situation that was already full of contradictions. The ERP system aggravated this contradiction because it provided central management with real-time appraisal of the costs associated to the HR department without quite adequately portraying the benefits it achieves.

With the ERP implementation, the HR specialists were facing a formidable learning task. They had to devise how to work with the system, to tackle the system's problems, to reinvent their work-ways and to translate the tacit, diffused knowledge and competencies embedded in their original system of activity in a way that was compatible with the system's prescribed processes. This was a highly creative task. At the same time, they felt increased control, increased pressure and insecurity.

*4.3 Secondary contradiction: between two or more nodes of the activity system*

The ERP system was perceived as more than a technology, hence more than a tool or a mediating artifact. In the practitioners' recognition, the ERP appeared foremost a set of stringent rules (coupled with "panoptic" managerial control of their everyday actions). These newly implemented rules imposed courses of actions that were perceived to impeach the agents' pursuit of their object of activity. This expressed a contradiction between the new rules and the historically developed object of the activity system (Engeström and Sannino, 2011). This type of contradiction emerges in different events of the agents' work-life.

For example, a local HR hiring manager is contacted by a production line manager who requests a piece of information: How many days of vacation leave does a particular employee have? The HR manager cannot answer the question directly. He explains that this type of information must be obtained through a traceable request made through the ticket system. The request will then be processed centrally. But the line manager says "But they don't know anything about this kind of matters! They'll simply ask you guys and I need the answer now". Following the system rules, the HR manager knows that they cannot take care of the employees' needs directly. They are somehow destitute of what had been the most valued object of their activity.

The practitioners now perceived that they were forced by stringent rules and procedures when they had previously worked with great autonomy. The strong pressure to get through the go live stage to obtain SAP conformity for the company pushed forward the rationalization of work processes and transition to a more formal, bureaucratic-like division of work. The agents felt the new rules as coercive and meaningless. Over a lengthy period of time, they might have eventually got around to understanding the value of a more coherent and formalized process design, but this could only be achieved through an expansion of the activity system that involving direct participation. In actuality, the ERP system seemed enforced upon them and their role in solving the system's emergent problems was taken for granted, looked upon as residual, inessential detailing.

The adoption of the new technology and new set of rules, therefore, brought on an aggravated secondary contradiction that manifested itself in tensions between the object and the rules, between the community and the rules and between the community

and technology. This tension evolved in a tertiary contradiction, as some actors began to question their activity and to envision a wider scope of possibilities to overcome the current provisional organization of the activity system.

*4.4 Tertiary contradiction: between a newly established mode of the activity and the remnants of a previous mode of the activity*

When the ERP module implementation process culminated in the Go live, working within the ERP system was enforced as a primary goal of the activity. The urgency to develop strategies to overcome the system's configuration problems and invent the necessary complements to make the system work for the specific activity needs implied a formidable effort on the part of the employees. The employees had not only to conform to the system's rules but also to invent ways to work around the rules and find solutions for emerging problems.

In the initial phase, the employees showed inertia, resisting using the system pathways as much as possible.

The system felt as an emanation of management control. In the previous configuration of the activity, HR employees had enjoyed great autonomy and had had extensive responsibility. They were in constant contact with production managers and all departmental managers and had to ensure that anything related to personnel management, from hiring to sick leaves, from work shifts to careers, from in-work training to wages, bonuses and pay slips was handled in the right way. They felt that they were the true specialists. Some of them mastered a sophisticated knowledge of the ever-changing and tangled Italian labor law. Some of them were adept in the difficult art of finding the right person not only for a certain job description but also for the actual, concrete workplace environment. Some of them were experienced in dealing with trade unions representatives. To carry on their work, they used to refer informally to their colleagues when one did not know how to handle a specific situation.

While their knowledge and competences were built gradually over time, their work was performed largely in an improvised way. They felt that very little of their work could recounted as routine. Very few of the situations that they treated were basically the same.

With the ERP system, they had to consider a somewhat radical change of vision. In the first place, they were to analyze their engagements and see what part could be considered as routine. A good part of their work was to be translated from improvised mastery of events to standard operating procedures.

While previously they held an extensive responsibility for the outcomes of their department's function, and their performance was appraised largely in an informal way, mediated by personal relationships, the system brought on clear visibility of each one's behavior and introduced the necessity for accountability of their time.

The ERP technology made everything more formal. The application of standards and procedural rules menaced to erase the improvisational nature of their work. Each one was pushed to work with the system, while interpersonal informal interchanges were limited. This foreclosed informal collaboration in the department. This, in actuality, destituted the community of practice that the Italian branch HR specialists had worked with until that moment, in which highly specialized knowledge and competence were diffused among the employees and largely available when needed.

The employees were prone to resist this innovation, as they felt that they were giving away their most treasured knowledge and skills to an alien entity, the headquarter process owners, who did neither deserve it nor were able to grasp the meaning of what was being offered to them.

### *4.5 Quaternary contradiction: between the newly reorganized activity and its neighboring activity systems*

To make analytic sense of the situation, a network of interconnected activity systems were identified. The contradictions and difficulties that emerge in the activity were explained with the ambiguous definition of the object and motives of the activity network.

The activity system of the Italian HR department business partners appeared to be interconnected with at least three other activity systems: that of the upper level managers of the central headquarters; that of their internal clients, the Italian branch employees; and that of the SAP vendor and consultancy services (Figure 1).

The four activity system appeared tightly interconnected because they shared a common goal, here represented as a partial area of overlapping of their objects: to succeed in the ERP implementation final stage. But the goal so expressed took different meanings in the complexity of each activity system, as the specific motives that it translates are intrinsically different.

For the upper-level managers (the system's main sponsors), the principal motive is to go through with the system implementation to gain the incentive that they were promised in case of success. A company with a fully implemented ERP system has increased stock value, and the upper level managers receive a bonus in stock so as to align their interest with that of the stockholders. The managers' object of activity was in effect twofold and coupled use value and market value. The use value side of their activity was about obtaining organizational behaviors in line with the company's mission and strategies, performing management control activities to obtain this alignment. The exchange value side was about pursuing financial performance and increasing stock value (in so gaining bonus prizes), in spite of any consideration of the intrinsic value of the company's activities (product quality, employees' well-being or customers' best interests).

The local HR business partners strived to conform to their hierarchical superiors' orders to keep their jobs in a prestigious company and in a workplace environment that had so far granted them a satisfactory professional experience, even if these orders seemed in contrast with the most valued part of their object of the activity: to be true HR specialists at the service of the internal clients' needs. This aggravated a contradiction that was already felt within the object of their activity.

For the ERP vendor and consultancy services' activity system, it was about coming to a milestone in the ERP configuration and implementation project having fully implemented the last system modules and stabilizing/increasing their perspective sales. Their goal was to limit the chances that unforeseen problems with the system's functioning emerge after the go live phase, and this is why they tended to limit the companies' requests for system tailoring and to limit customization options, forwarding the choice between options that have already been tested by the software developers in the integrated architecture functioning. They also aimed to increment the ERP technology's scope within the company, to sustain the company's dependence on

consultancy services and future system updates. For them, a true appropriation of the system by its users would be counterproductive and by presenting their product as the carrier of a complete "best practices" process re-configuring they add to their own weight in driving the company's future choices.

For line managers and for all the Italian employees engaged in everyday work, the system was about obtaining all necessary information and detailed option choices in a quick and easy manner when it is needed. Before the ERP implementation, they relied on real persons in the HR department who took charge of finding the requested information and to give necessary advice. After the system Go live, the expected course of action was that they dialogue directly with the system to obtain what information they needed, without knowing who was taking care of their requests or even without anybody taking charge directly. This made things more difficult for them and represented an added burden. The fact that any system interrogation was kept track of aggravated pre-existent contradictions that characterized the activity of supervisors.

## 5. Discussion

The implementation of the ERP system had caused conflicts and disturbances, aggravating contradictions that already existed between activity systems and introducing new types of contradictions. What kind of role did the ERP system play in the network of activity? Partly a tool (as a technology), partly an object of its own (as it embeds specific goals), the SAP's boundaries were hard to draw.

Pre-existent contradictions became more clear; there was stronger interconnection between different activity systems. The practitioners were in the position to experiment an expansion in their activities through a movement of expansive learning, but they felt they were prevented from doing so by coercive control.

Information technologies are not deterministic in their effect (Zuboff, 1988), and ERP's outcomes depend on the formative context of application (Sia *et al.*, 2002) or on the way that it is enacted in use (Orlikowski, 2000). The centralization of information achieved with the ERP technology does not automatically correspond to the centralization of power; in fact, it could even lead to a decentralization of power if information is gathered and spread throughout the organization (Bloomfield and Vurdubakis, 1997). The process model embedded within the ERP could bring about the empowerment of employees, increased scope of their activities and less time spent on tedious tasks. Providing data that are more accurate and reliable and reducing the margin for errors, it could free up employees' time for more complex tasks (Ripamonti and Scaratti, 2012). Adler and Chen (2011) suggest, for example, that the design and actuation of management control systems could support motivation and help reach greater effectiveness of "large scale collaborative creativity".

In this contextual and historically situated enactment of the technology, the ERP system was used and perceived exclusively as a tool for control. The central administrative system and its emissaries, the regional delegates, were perceived to be invested with unquestionable power. The employees felt highly constrained in their everyday practice.

The integrated information technology granted company-wide information accessibility, provided that the employee had the right authorizations. But initially, it was not clear what type of information was being fed into the system. The SAP module provided the infrastructure, but the task of translating the contextually relevant

information into widely intelligible bits of information could only be performed by the same employees. And the ERP cannot tell the people in the system what use they could make of the data it captures.

ERP systems, as Quattrone and Hopper (2005) comment, probably deserve to be an object of study "not primarily all the things they make possible, but that they can make those things impossible that we have grown accustomed to taking for granted" (p. 731).

One crucial contradiction of information technology-mediated work systems could be the necessity to reconfigure patterns of shared activity to recreate the fundamental organizational capability to get work done (Weick, 1995; Zuboff, 1988). The participants felt this matter strongly as they experienced the difficulty to make things work when isolated from a community. The burden of isolation was not counterbalanced by the information resources provided by the ERP system. The fundamental role of the community, which characterized a vast body of the employees' discourses, seemed irreducible in the logic of process efficiency. In both theory and practice, this gap represents "a challenging tension which cannot be easily resolved" (Engeström *et al.*, 2010, p. 7).

The ERP technology could have be used to sustain an expansion of the employees' scope of activity if it had not been used as a tool for coercive control and if the upper management had not tried to separate what cannot in actuality be separated: the actors' capabilities of improvised learning, which makes the institution of a new mode of the activity possible, and their capacity to assume collective control of the meaning and direction of the transformation of the activity.

## References

Adler, P.S. and Chen, C.X. (2011), "Combining creativity and control: understanding individual motivation in large-scale collaborative creativity", *Accounting, Organizations and Society*, Vol. 36 No. 2, pp. 63-85.

Bloomfield, B.P. and Vurdubakis, T. (1997), "Visions of organization and organizations of vision: the representational practices of information systems development", *Accounting, Organizations and Society*, Vol. 22 No. 7, pp. 639-668.

Boudreau, M.C. and Robey, D. (2005), "Enacting integrated information technology: a human agency perspective", *Organization Science*, Vol. 16 No. 1, pp. 3-18.

Davenport, T.H. (1998), "Putting the enterprise into the enterprise system", *Harvard Business Review*, Vol. 76 No. 4.

Davenport, T.H., Harris, J.G. and Cantrell, S. (2004), "Enterprise systems and ongoing process change", *Business Process Management Journal*, Vol. 10 No. 1, pp. 16-26.

Dechow, N. and Mouritsen, J. (2005), "Enterprise resource planning systems, management control and the quest for integration", *Accounting, Organizations and Society*, Vol. 30 Nos 7/8, pp. 691-733.

Dillard, J.F. and Yuthas, K. (2006), "Enterprise resource planning systems and communicative action", *Critical Perspectives on Accounting*, Vol. 17 No. 2, pp. 202-223.

Engeström, Y. (1987), *Learning by Expanding*, Orienta-Konsultit Oy, Helsinki.

Engeström, Y. (1999), "Outline of three generations of activity theory", pp. 1-4.

Engeström, Y. (2000), "Activity theory and the social construction of knowledge: a story of four umpires", *Organization*, Vol. 7 No. 2, pp. 301-310.

Engeström, Y., Kajamaa, A., Kerosuo, H. and Laurilla, P. (2010), "Process enhancement versus community building: trancending the dichotomy through expansive learning", *Activity Theory and Fostering Learning: Developmental Interventions in Education and Work,* PP. 1-28.

Engeström, Y. and Sannino, A. (2010), "Studies of expansive learning: Foundations, findings and future challenges", *Educational Research Reviw*, Vol. 5 No. 1, pp. 1-24.

Engeström, Y. and Sannino, A. (2011), "Discursive manifestations of contradictions in organizational change efforts: a methodological framework", *Journal of Organizational Change Management*, Vol. 24 No. 3, pp. 368-387.

Gilardi, S., Guglielmetti, C. and Pravettoni, G. (2013), "Interprofessional team dynamics and information flow management in emergency departments", *Journal of Advanced Nursing*. doi: 10.1111/jan.12284.

Ivaldi, S., Scaratti, G. and Nuti, G. (2015), "The practice of evaluation as evaluation of practices", *Evaluation*, Vol. 21 No. 4, pp. 497-512. doi: 10.1177/1356389015606538.

Kajamaa, A. (2012), *Enriching Action Research with the Narrative Approach and Activity Theory: Analyzing the Consequences of an Intervention in a Public Sector Hospital in Finland*, Educational Action Research, pp. 37-41.

Kaptelinin, V. and Nardi, B.A. (2006), *Acting with Technology: Activity Theory and Interaction Design*, MIT Press.

Kayas, O.G., McLean, R., Hines, T. and Wright, G.H. (2008), "The panoptic gaze: analysing the interaction between enterprise resource planning technology and organisational culture", *International Journal of Information Management*, Vol. 28 No. 6, pp. 446-452.

Lee, Z. and Lee, J. (2000), "An ERP implementation case study from a knowledge transfer perspective", *Journal of Information Technology*, Vol. 15 No. 4, pp. 281-288.

Markus, M.L. and Robey, D. (1988), "Information technology and organizational change: causal structure in theory and research", *Management Science*, Vol. 34 No. 5, pp. 583-598.

Moja, L., Liberati, E.G., Galuppo, L., Gorli, M., Maraldi, M., Nanni, O., Rigon, G., Ruggieri, P., Ruggiero, F., Scaratti, G., Vaona, A. and Kwag, K.H. (2014), "Barriers and facilitators to the uptake of computerized clinical decision support systems in specialty hospitals: protocol for a qualitative cross-sectional study", *Implementation Science*, Vol. 9, p. 105. doi: 10.1186/s13012-014-0105-0.

Nardi, B.A. (1996), "Studying context: a comparison of activity theory, situated action models, and distributed cognition. Context and consciousness: activity theory and human-computer interaction", pp. 69-102.

O'Leary, D.E. (2002), "Knowledge management across the enterprise resource planning systems life cycle", *International Journal of Accounting Information Systems*, Vol. 3 No. 2, pp. 99-110.

Orlikowski, W.J. (2000), "Using technology and constituting structures: a practice lens for studying technology in organizations", *Organization Science*, Vol. 11 No. 4, pp. 404-428.

Orr, J.E. (1996), *Talking About Machines: An Ethnography of a Modern Job*, Cornell University Press, Ithaca, NY.

Poole, M.S. and DeSanctis, G. (2004), "Structuration theory in information systems research: methods and controversies", *The Handbook of Information Systems Research,* pp. 206-249.

Quattrone, P. and Hopper, T. (2005), "A time-space odyssey: management control systems in two multinational organisations", *Accounting, Organizations and Society*, Vol. 30 Nos 7/8, pp. 735-764. doi: 10.1016/j.aos.2003.10.006.

Ripamonti, S. and Scaratti, G. (2012), "Weak knowledge for strengthening competences: a practice-based approach in assessment management", *Management Learning*, Vol. 43 No. 2, pp. 183-197.

Robey, D., Ross, J.W. and Boudreau, M.C. (2000), *Learning to Implement Enterprise Systems: An Exploratory Study of the Dialectics of Change,* pp. 1-48.

Sannino, A., Daniels, H. and Gutiérrez, K.D. (2009), *Learning and Expanding With Activity Theory*, Cambridge University Press, Cambridge, MA.

Sia, S.K., Tang, M., Soh, C. and Boh, W.F. (2002), "Enterprise Resource Planning (ERP) systems as a technology of power: empowerment or panoptic control", *ACM SIGMIS Database*, Vol. 33 No. 1, pp. 23-37.

Weick, K.E. (1995), *Sensemaking in Organizations*, Sage.

Zuboff, S. (1988), *In the Age of the Smart Machine: The Future of Work and Power*, Basic Books, New York, NY.

## Further reading

Engeström, Y. (2009), *The Future of Activity Theory: A Rough Draft. Learning and Expanding with Activity Theory, Engeström, Yrjö*, Cambridge University Press, Cambridge, MA, pp. 303-238.

Robey, D. and Boudreau, M.C. (1999), "Accounting for the contradictory organizational consequences of information technology: theoretical directions and methodological implications", *Information Systems Research*, Vol. 10 No. 2, pp. 167-185.

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