Trajectory of IT artifacts in live routines: Organizing project-based workforce in professional services through Enterprise Systems

Merja Mattila
Aalto University, Finland
merja.mattila@aalto.fi

Matti Rossi
Aalto University, Finland
matti.rossi@aalto.fi

Joe Nandhakumar
Warwick Business School, U.K.
joe.nandhakumar@wbs.ac.uk

Abstract
Professional services organizations are under the same pressures to streamline their operations and increase efficiency as industrial organizations. One way of making the operations more efficient and leveraging a global workforce is to use enterprise systems for HR and project personnel management. However, it seems that the process-oriented nature of enterprise systems is better suited for manufacturing than knowledge based operations. We use an interpretative longitudinal case to show how the organization and its systems evolve from quite rigid control oriented unified process model into a more flexible coordinated support system. Drawing on the theories of IT artifacts and routines (e.g. Pentland and Feldman, 2008) we argue that professional services organizations should pay more attention to the trajectory of IT artifacts and organizational routines over time. Our contribution is to demonstrate how IT artifacts evolve over time to accommodate to the local needs of users.

1. Introduction
Professional services organizations are increasingly implementing new enterprise systems to manage project-based workforce and meet new demands for flexibility, speed, and uncertainty. Enterprise systems, “large integrated, process-oriented packages designed to meet most needs of organizations” [1] have been effective for planning and optimization in traditional organizations. However, the process-centric model underlying such enterprise systems, has been seen to be at odds with the need for flexible organization of local practices and routines [1; 2; 3; 4; 5] in the context of complex, global operations that are interdependent across boundaries. Although implementing enterprise systems in such settings aims to produce planned changes, such implementation often leads to ‘misfit’ between organization and its enterprise system [1]. Challenges of incorporating enterprise systems into daily routines and work practices have been an increasingly important issue in IS research [1; 3; 5]. Strong and Volkoff [1] argue that literature rarely explores the nature and role of the IT artifact which is “underspecified, and often treated as a black box”.

Pentland and Feldman [6] criticize the “artifact-centered” assumptions about systems design and use and argue that research should focus on organizational routines (that developers seek to embed in the enterprise systems) as live, “generative systems” which could lead to different performance depending on the circumstances. Research in this tradition seeks to emphasize the interactions between different aspects of routines as those are performed over time [7; 8; 9]. For example, Feldman and Pentland [10], seek to explore the mutual constitution of routines through two aspects: the ostensive aspect, which is the “abstract, generalized idea of the routine” and the performative aspect, which consists of “specific actions, by specific people, in specific places and times”. IT artifacts such as enterprise systems are often designed to “ensure the reproduction of particular patterns of action” [6]. The procedures embedded in the IT systems could reflect the ostensive aspect of the routines, while the systems generated contents (e.g. transaction records) reflect the performative aspect of a routine.

These studies however provide limited insights into the change of the IT artifacts in the context of emerging routines over time [11]. Leonardi [11] claims that users often modify IT artifacts rapidly to fit their needs in organizations. Hence IT artifacts in use could also be seen as “flexible” not because of any inherent properties but due to the users’ ability to change the material constituent of the IT artifacts [11]. Similarly, Nicoloni et al [12] argues that studies on “artifacts” or “objects” (both symbolic and material) in collaborative work [e.g. 13; 14; 15], in organizations place little emphasis on the transformation of objects and the impact that has on collaboration.

Implementing IT artifacts in an organization could result in patterns of action emerging from the living routines, which may not be the planned or idealized patterns reflected in the artifact and process design. At
the same time, features of IT artifacts may continuously be changing, in response to emerging routines in the local context, through efforts by the users to modify IT systems. We, however, have limited understanding of the dynamics between the trajectories of changes in the IT artifacts and the routines over time, which is essential for implementing enterprise systems to produce specific changes and routines. To explore these trajectories of changes – in both the IT artifacts and the routines - we studied the use of enterprise systems in the intricate project-based, workforce organizing process in large, global consulting company. There are only few studies on enterprise systems in human resources (HR) processes, despite major ES vendors such as SAP and Oracle have provided HR management modules for years.

In sum, we have a limited understanding of the dynamics between the trajectories of changes in the enterprise systems and the routines over time in complex organizational contexts. Addressing this gap requires moving the focus away from conceptualizing routines and IT artefacts as rigid entities towards a more dynamic view of them and their co-evolution over time. In order to do this, in this study we focus on the use of enterprise systems in a complex workforce organizing process, which requires highly flexible organization of local practices, in a large, global consulting company. We draw on Pentland and Feldman’s [6] work on the concepts of the mutual constitutive of ostensive and performative aspects of routines, and their representations on the IT artifacts. The following figure (Figure 1) illustrates the interplay between Designed (Ostensive routines), Performative Routines and IT Artifacts. Designed routines could be part of the IT system, which could affect the actual performance of the routines. The IT artifacts could represent both enacted routines and designed routines through this interplay and we show here how the performative routines could modify the designed routines with the enterprise system.

Figure 1. Interplay of IT Artifact and routines (adopted from Pentland and Feldman [6])

The rest of the paper is organized as follows. Section 2 introduces the research design and methods. In section 3, the designed staffing process and performative routines are analyzed. Finally, sections 4 and 5 include the discussion, implications and future directions.

2 Research design and methods

2.1. Case context - overview

This research is based on an interpretive case study [16; 17], which involved collection of detailed, qualitative data at Neon (a pseudonym) from 2008 to 2014. In this longitudinal study we traced Neon’s staffing practices and the use of IT systems over six years, as the company transformed from a locally-focused company to a project-based, highly integrated IT service provider in Northern Europe.

Recently, the company had grown through acquisitions, mergers, and strategic alliances, and benefited from the robust outsourcing demand. To achieve effective utilization of the company’s human capital it implemented a new global project delivery model and staffing process. During the past five years Neon implemented three major organizational change initiatives in the years 2009, 2011 and 2013. It also streamlined its functions and processes several times. In 2009 Neon’s organizational structure focused on three dimensions: Countries, Industries and Service lines. Previously industries had had an important role, but in the new organizational structure their role diminished as employees were transferred to large competence centers. These centers were located in Service Lines, while the project delivery ownership remained in Industry units. As the selection of appropriate project members for projects was mainly made in Service Lines, friction appeared between Industry sectors and Service lines. Neon responded into this by implementing a leaner organizational structure in 2011. In this structure previous Industries and Service Lines were combined together as Business
Lines while Countries were replaced by Market Units (combinations of different countries).

In 2013 Neon implemented a project-based accounting model and supported it by implementing a new matrix structure based on four Service Lines and four Industry Groups. There were also reductions in workforce. By the end of 2013 Neon reduced its workforce by 20%.

Outsourcing of project work from Nordic countries to low cost countries was seen as a primary means to improve financial results. In 2008 Neon made a strategic decision that 40% of employees would work in the low cost locations by 2011 and it reached this goal. The new global project delivery model and the staffing process provided tools to increase utilization rates and to find suitable project work for professionals located in large competence centers. New ES functionalities and collaboration tools were implemented to support the staffing process. The following figure (Figure 2) illustrated the field research periods, the organizational changes as well as the implementation of IT artifacts in the staffing process.

![Figure 2. Field research periods, organizational structures and IT artifacts in staffing process](attachment:image)

### 2.2. Data collection

From the interpretive stance, the study focused on generating qualitative data [16], which consisted of transcripts from in-depth interviews at Neon, field notes from observations, and excerpts from documents. The main emphasis was on the analysis of interview transcripts and notes whilst official documents complemented the data collection. We used these materials during the whole research process in order to get a bigger picture about the phenomena and updating existing data. The data collection spanned from December 2008 to May 2014, including 50 interviews in four phases, conducted by the lead author. In order to make a better perspective of how the staffing routines were structured we classified interviewees’ “main roles” during the staffing process. These main work roles were: Sales Manager, Customer Manager, Business Manager, Project Manager, Staffing Manager, Line Manager, HR Manager, Project Member, Controller, and ES Developer. Our interviewees were individuals assumed to have insight into staffing routines and organizational artifacts. Face-to-face interviews lasted for 40-80 minutes, they were recorded and later transcribed for subsequent analysis.

### 2.3. Data analysis

The analysis continued [18] throughout the study. Along with the data generated from the current phase of field research, all the transcriptions and notes from previous phases were reread and discussed thoroughly in the research group meetings between the authors. These meetings were held either face-to-face, by phone or by Skype. In the first phase of coding we identified the relevant descriptions of everyday staffing routines and practices of the participants before and after the implementation of the proposed staffing process and IT systems. Since different systems were implemented at various stages, we traced the practices and routines around each IT systems. In the second phase of coding we categorized [18] and separated the routines and practices indented and emerged in the local context. This also helped us to identify what kinds of IT artifacts were used and how they had evolved over the years.

In the final stage of coding we focused on categorizing how the staffing process and the IT artifacts had evolved over the years (i.e. the trajectories of change). Throughout the analysis, we drew on theories and concepts regarding IT artifacts and routines (e.g. Figure 1) in exploratory fashion, as sensitizing device.
3. Findings and Case analysis

3.1. Transformation of staffing process

In order to succeed in the project-based business, selection of appropriate project members for each project was a critical aspect of the company. This was known as “staffing” process, which involved a complex process of specifying staffing needs and requirements, translating competency, searching for appropriate and available candidates as well as evaluating and selecting them.

The staffing function at Neon went through different forms of organization over the past few years with the changing organizational structures of the company. At the very beginning the company sought to establish a centralized, corporate level staffing organization that would deal with all staffing needs. Since then the focus has varied between global and local organizations. In the last phase of the research the staffing function reflected the project-based organization structure, in which there were four Service Lines and four Industry Groups.

Three of four Service Lines (namely A, B and C) had their own staffing teams to meet the staffing needs of the businesses. The structure of staffing teams and everyday operating practices differed in Service Lines in response to different business logics. The Service Line A had large competency centers in offshoring countries from which staffing managers were searching persons for project assignments. The staffing team in the Service Line B focused mainly on continuous services in each location. In turn, the Staffing Line C acted as a product development partner for certain customers. Due to different business logics the volume and the nature of staffing requests varied between Service Lines. However, all staffing teams were using the same staffing process model and the same IT tools.

The fourth Service Line (named as D) did not have its own staffing organization. As its employees had permanent roles, they did not use staffing services.

Most of the staffing personnel served the Service Line A, which was also responsible for the whole global staffing process. Over the years, the number of staffing personnel decreased from approximately 50 persons to less than 20 persons. Respectively, the number of persons in certain staffing area handled by a staffing manager increased from 500 persons to 700-800 and even to 1000 persons. It meant that a staffing manager handled approximately 3 staffing requests per day (or 15 requests per week). Despite the significant development in the IT tools, the workload of staffing managers was considered high.

3.2. Staffing practices

The initial trigger for the staffing process came either directly from a customer or the project sales process initiated it. Staffing personnel was expected to be quite proactive and to collaborate closely with Sales persons. Besides formal competence requests sales persons asked for example project managers to assist in the sales cases. Further sales capacity checks were requested occasionally which included a listing of appropriate capabilities, location and predicted availabilities.

At the beginning of the staffing process a resource requester entered a staffing request into the ES RM (the Resource Management in the ES) or into the PM system (the Project Management). The PM was expected to be used by project managers who were working on large delivery projects. Other resource requesters and the staffing personnel commonly used the ES RM.

The creation of a staffing request required that a project ID had been created into the ES first. The staffing request described a position, what kind of job a person would be doing, competencies, timeline, and a location. A resource requester was able to enter additional information, for example, the customer's preferences, into the staffing request. If the staffing manager already knew appropriate candidates, they were contacted along with their line managers by phone, by email or by collaboration tools such as Lync. This was carried out to make sure that both persons and line managers were interested in the job and the requested competencies were in place.

After the staffing request had been created into the system, the staffing manager began to search appropriate candidates by making a competence search into the MyData system, which is the competence and CV database. Generally, the competencies were updated into MyData every time a project ended or at least once a year during annual development discussions. An employee entered all competencies and competence ratings, while a line manager approved them. After the line manager had approved the CV, it was marked as “valid”. If the CV had not been checked according to the process, it was automatically marked as “outdated”. These CVs were supposed to be sent to customers without editing. In addition to the competencies in MyData, competencies were also updated into HR-owned stand-alone tool, PP. Competencies in PP were at a more general level and they were used for HR purposes.

The system also checked the available capacities of candidates. This data was gathered from the project database, into which the resource reservations were
entered. The continuous updating of project reservation data was seen as essential for the staffing process.

Once the staffing manager found the appropriate candidates, their details were passed on to the resource requester. The evaluation of candidates was done by using a new IT tool of the ES, which was called MyStaffing. The requester could compare candidates and their technical competencies against each other in order to make the final staffing decision, after which the corresponding resource reservations were updated automatically into the project data, and the staffing request was closed.

In order to promote consulting culture and internal mobility Staffing implemented the idea of self-staffing. This meant that the employees should be more active and present themselves for open project jobs. The concept of self-staffing included two things. First, open staffing requests were broadcasted to all Neon employees and they were able to browse open staffing requests, ask further information and to respond to the requests through the MyStaffing system. In this way employees were encouraged to search for assignments.

Second, Staffing encouraged managers and employees to create advertisements of employees’ current or future competencies into the MyStaffing system. All project managers and sales persons got these advertisements and an availability report at least once a week by email. In this way they could easily browse through available persons and look for suitable persons.

3.3. Analysis of artifacts in staffing process

The above description illustrates that the global staffing process relied heavily on a set of critical IT and other artifacts. Our analysis identified the roles of five key staffing artifacts: Staffing request, Competence catalogue, Digital CV, Project reservations and Candidate evaluation, and focused on situations where they were used in unintended ways. We traced the links of these artifacts to two self-staffing artifacts, RSS Feed “Internal open job” and RSS Feed “Advertisement”, as well as a potentially very useful artifact which was not used at all, the Feedback tool.

A staffing request was a description of an open position, requested competencies, timeline, and a location stored in two systems in an electronic form. A resource requester entered a staffing request into the ES RM or the PM systems and made a staffing need visible in the company. However, sometimes the staffing need was so urgent that a resource requester had no time to exploit the staffing process. Our analysis indicated that in such a case the resource requester and a staffing manager tried to solve the situation by using their own informal networks, as one project manager described:

“If it is something very urgent, I usually contact the staffing manager directly. And we try to get it solved urgently in a way, which does not follow the process and the tools. If we have more time, we use the ES.”

Project Manager, Service Line C

Often a staffing decision was made as early as in the sales phase. Although Staffing was expected to collaborate closely and proactively with the sales function, we realized that the staffing personnel do not have time or resources to get involved into the sales process very early. Due to this sales initiatives and resource needs often arrived at the staffing function too late. This lack of visibility to the sales pipeline and future project schedules causes challenges as one interviewee illustrated:

“The challenge is that sales persons would like to know pretty soon who the possible persons are and if they are available in the near future or not. ... We don’t know the future projects’ schedule and no one wants to stay on hold for possible upcoming tasks but takes available project tasks instead.”

Staffing manager, Service Line A

During the sales phase a project ID was typically not available, but entering of a staffing request into the system required a project ID in the ES. We observed that in these cases the workaround was to use an ID of a long-term reservation project:

“The first challenge is that the ES RM requires a project ID before a staffing request can be created. And this is quite stupid requirement for example in the Sales phase. Quite rarely anyone can create a project ID in that phase. And if it is a very urgent matter a customer needing a person tomorrow, it is quite rude for Staffing to say that we are not going to serve you without a staffing request. Please, create requests and fill the coupons first and then we can discuss more. So, we have solved this in that way that we use our long-term reservation projects for that. We pick up a project ID from a reservation project to a staffing request. ... In the end of the day there will be the right project and everything goes right.”

Staffing Manager, Service Line C

We noticed that a resource requester entered a staffing request into the system very rarely, and staffing manager did it instead. Even if a resource requester entered the staffing request, a staffing manager usually contacted the requester to ask for more information.

The broadcasting of the open staffing requests to Neon staff as RSS Feeds “Internal open jobs” was part of Neon’s self-staffing concept, which encouraged employees to search for open staffing requests and apply for the positions. However, we observed that for
example due to customer NDAs some staffing requests were not visible in the system at all.

“You can set up different privacy levels for the request. It can be the whole Neon, it can be just our Service Line level or it can be private. These private requests are not listed anywhere, because our NDA customers want privacy. We cannot tell the whole Neon that our customer is working on this kind of project. Almost every time our requests are private, limited to just our Service Line.”

Project Manager, Service Line C

The staffing manager searched appropriate competencies from a Competence Catalogue in the MyData. The MyData was the competence and CV database, which included all relevant technical competencies at Neon. We observed that the codification of competence catalogue and updating of competencies caused a lot of maintenance work and increased the size of the database. Also the multi-dimensional structure of the database made the competence hierarchy difficult to maintain as the same competence located for example in the technology hierarchy and in the technology vendor hierarchy. Basically, we noticed that the maintenance work had to be a common effort of different parties as it required knowledge of Neon’s offerings as well as technological changes and trends. However, we observed that the maintenance work was not highly appreciated as one interviewee described:

“We had one person in our Service Line, who took care of the competencies in the system. During the last co-operation negotiations he had to leave. In principle, it may belong to the staffing managers, but no one has said it out loud. If we have free time, we will try to look after them.”

Staffing Manager, Service Line C.

Generally, employees entered and rated their competencies themselves. A line manager often checked the competences and ratings, but as they had a common interest to show higher competence ratings, the ratings were not reliable. We noticed that in practice, a resource requester interviewed a candidate to make sure that a candidate’s competencies were at the requisite level.

Staffing personnel exploited and shared official competence data, such as CVs and CV summaries, competence ratings, or superior’s evaluations only. We observed, that staffing managers usually had so tight schedules and heavy workload that they were not able to go through RSS Feed “Advertisement”, in which an employee or a superior advertised employee’s current or future competencies and skills. Also the unstructured form of advertisements caused that they were not commonly reviewed during the fast-paced staffing process. We observed that the critical factor was how well the advertisement had been made in the first place.

Competencies in the Competence Catalog formed an important part of the digital CV. If the competence search did not find appropriate competencies or competencies were not univocal, there was no field for additional comments about the nature of the competence. We observed that the CVs were often too long including e.g. all the possible competencies during the last 20 years as one staffing manager said:

“CVs are usually very long and exhausting. CV should be tailored for a certain capability. If we are searching C programming coders, only C competencies should be summarized in the CV and persons should forget all the other interesting competencies.”

Staffing Manager, Service Line C

Previous work and project experience was even more important part of the digital CV than competencies. As the project information came directly from the project database, it was fairly objective and reliable. A staffing manager was able to filter information in the digital CV to some extent. For example names of the projects could be left out or sometimes project information was not visible due to for example, a non-disclosure agreement with customer. It was not possible to filter a CV according to for example industry area or technological competencies. In practice, creation of a case-specific CV required several iteration rounds, as a resource requester was not allowed to edit an automatically created CV. Generally, we noticed that the quality of CVs varied in the organization according to, for example, businesses, units, technologies, and persons.

Employees’ availabilities or project reservation data had to be up to date and correct for staffing purposes. This reservation data was also gathered from the project database. Due to various reasons reservations data was not always updated into the systems. Obsolete project reservations caused a lot of extra work for staffing managers and decreased data quality, as one staffing manager illustrated:

“We communicate that if they make reservations, project members are able to book hours into the project even if there is no work for them in the project at the moment. If costs are collected into the project, it will motivate project managers to release project members for other projects. But where are the checks and balances that make this all work? Real life and tools are not going at the same rate.”

Staffing Manager, Service Line A

The maintenance of project reservations was easier for certain functions and businesses. For example, if 30 persons worked continuously for a support unit, it was not reasonable to allocate them to several support
projects. Further, sometimes it was even impossible to find a real project into which the future project work could be allocated. In these cases long term reservation projects or placeholder projects were used:

“We have a slightly different procedure compared to other Neon. We have these kinds of reservation projects. Due to the nature of our business, where the length of our customer or delivery projects is three months, it is impossible to predict future by using this data, although all the data is up to date. And then we have created these kinds of long-term projects, into which line managers are updating reservations of each team member. A line manager enters and updates reservations in one place.”

Staffing Manager, Service Line C

In the last phase of the staffing process the evaluation of candidates was made in the MyStaffing tool. We realized that compared to the previous evaluation tool in the ES RM, the implementation of MyStaffing evaluation feature in 2013 offered a great improvement in usability. It also removed boundaries between countries and organizational units by providing a global view to competencies.

A resource requester evaluated candidates by using the MyStaffing evaluation tool. During the evaluation a resource requester evaluated just the same CVs, which were sent to customers. In the MyStaffing tool a resource requester compared candidates and their competencies with each other. As employees and line managers had a common interest to make competence ratings higher than they were, a resource requester tried to check the real levels of competencies by interviewing the persons. Interviewing of candidates was also necessary in the cases where line managers did not know their new subordinates and their competencies. This happened quite often as yearly employee turnover was about 9-10 %.

Staffing personnel did not share information about employees’ “soft skills”, such as motivation, collaboration skills, or drive, but they focused on the data in CVs. Although there had been discussions about how this information could be collected and used, common rules did not exist. In 2012 Neon implemented a tool, the Feedback system in MyProjects, which included for example customer feedback data. For some reason it was not used at all, neither was it connected with the ES. Opinions regarding storing of soft skills varied in the organization. Some interviewees were of the opinion that feedback should be collected systematically, while others considered soft skills and project feedback too context-dependent and subjective for later use. We observed that although there was no official process for collecting information about employees’ soft skills, several persons - such as a staffing manager, a resource requester, a line manager or a customer - examined and evaluated also candidates’ soft skills during the staffing process. These evaluations were done by interviewing candidates by phone, Lync/Skype or face-to-face.

At the latest in the evaluation phase an employee’s superior confirmed that a person was able to work for the project. After the staffing decision had been made, the resource requester closed the staffing request. This closing of the staffing request confirmed and updated project reservations into the system automatically. However, we observed that a staffing request remained open quite often which caused maintenance work for staffing managers as they had to check the status of a staffing request beforehand. It also caused confusion as a person’s project reservations were not updated correctly into the system.

From our analysis, we summarized the changes in the artifacts and routines over time, along with their relationship with each other (Table 1).

<table>
<thead>
<tr>
<th>Shared artifact</th>
<th>Artifact’s trajectory of change</th>
<th>Routine’s trajectory of change</th>
<th>Artifact’s relationship with other IT artifacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Staffing request</td>
<td>Evolved over the years in response to local conditions as e.g. more fields were added into it.</td>
<td>Routines regarding e.g. the way requests were entered changed as two different systems were implemented. Urgency of staffing required more flexible routines, while staffing personnel had an important role in checking and entering requests.</td>
<td>Quality of the staffing request had a significant impact on the whole staffing process and the use of other IT artifacts. E.g. poorly defined job description caused improperly targeted competence searches or internal job applications.</td>
</tr>
<tr>
<td>Competence catalogue</td>
<td>Evolved as several competence databases were combined into a single database. Gradually provided a global view of competencies. Codifying and rating of competencies and structure of database remained</td>
<td>Competence searches became beneficial even in local staffing. Maintenance routines and responsibilities were still confusing and varied in the organization.</td>
<td>Impacted on e.g. the quality of digital CV and RSS Feed Advertisements. Affected outside the staffing process to e.g. local staffing</td>
</tr>
<tr>
<td>Digital CV</td>
<td>Project reservations</td>
<td>Candidates’ evaluation</td>
<td>RSS Feed: Internal open job</td>
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<tr>
<td>Was created automatically by using competence and project databases.</td>
<td>Gathered from the project database. Were used for showing candidates’ availabilities.</td>
<td>Evolved from highly manual process to more automatic evaluation in the system. System development enabled flexible CV comparisons, but made the process too formal in some cases.</td>
<td>Made staffing requests visible. Supported self-staffing concept.</td>
</tr>
<tr>
<td>Automatically created CV became more useful and compulsory as competencies and project experiences became more accurate. Although filtering functions evolved they didn’t meet the needs of users.</td>
<td>Project reservation data became more accurate as it was required to be entered into the systems more regularly.</td>
<td>Evolved from a vision to concrete RSS Feed. Most of the staffing requests were broadcasted to Neon’s employees, who were able to apply them.</td>
<td>Evolved from a vision to concrete RSS Feed. Unstructured form of advertisement reduced its value. Not commonly used for future career paths.</td>
</tr>
<tr>
<td>Updating of CV evolved as a resource requester was not allowed to edit the digital CV any more. Even more iteration rounds were needed.</td>
<td>Continuous updating of project reservations became compulsory in the organization. Maintenance routines were made easier for units as reservation or placeholder projects were allowed. Two systems for maintenance routines caused challenges.</td>
<td>Broadcasting routines varied in the organization as some staffing requests were not broadcasted to employees due to e.g. customer NDAs.</td>
<td>Checking routines varied in the organization as only some staffing managers reviewed them during the fast-paced staffing process.</td>
</tr>
<tr>
<td>Producing of “a good CV” for versatile needs in the organization created pressure for the quality of the competence and project databases.</td>
<td>Obsolete project reservation data caused problems throughout the staffing process. Not connected to project based accounting as e.g. booking of hours was possible without reservation</td>
<td>Maintenance of request (or lifecycle) was not given enough attention as it often remained open at the end of the evaluation. This impacted e.g. project reservations (were not updated either).</td>
<td>Impacted the staffing process as “hidden” candidates were found. Strengthened self-staffing concept in the organization.</td>
</tr>
</tbody>
</table>

The Table 1 shows that IT artifacts evolved and changed roles in response to local conditions throughout the research. New routines (performative) emerged while some designed routines were replaced. To further illustrate these change trajectories we consider one shared object, Competence Catalogue (CC), as an example of an IT artifact, which evolved over the years and played different roles during the staffing process. As the CC developed, it gained new functionalities and replaced several smaller catalogues, gradually offering a global view of competencies.

The CC was designed to reflect the ostensive staffing routines during the second phase of staffing, searching of competences. We observed that the CC became crucial for local staffing regardless whether the formal staffing process was taken into use or not (performative routines). For example with the help of a staffing manager, a resource requester was able to make quick searches from the competence catalogue in order to find a suitable person for local project purposes. While the CC reflected ostensive aspect of the routines, it simultaneously helped to instantiate performative staffing routines as its versatility allowed for several different local usage practices within different divisions. Further IT artifacts also reflected instrumental and symbolic dimensions [c.f. 6]: our analysis indicates that the CC reflected the instrumental dimension of IT artifact by supporting Neon’s organizational objective of providing global view of competencies. The symbolic dimension reflected the associations linked with assumptions as for example the employee’s country of origin was assumed to have an impact on competences and their ratings. Staffing managers and resource requesters...
employed performative routines such as personal interviews to check the information embedded in the IT artifact.

4. Discussion and Implications

The analysis above illustrates how the IT artifacts used in the staffing process transformed with new features over time in response to the emerging performative aspects of routines. At the same time, such routines emerged as inter-dependent actions carried out by multiple participants supported by coordinating IT artifacts. We found that the interplay between IT artifacts and emerging local routines was recurring and generative, and illustrated the trajectories of changes in the enterprise systems and the routines over time in complex organizational contexts. By shifting the focus towards the IT artifact-embedded routines and the dynamic relationship between the roles of multiple IT artifacts in practice, we sought to illustrate the importance of materiality in routine theory [c.f. 6] and novel insights into the change trajectories of IT artifact-routines. We have shown that within the clusters of multiple IT artifacts some of the artifacts, such as Competence Catalogue or Staffing Request, were dominant, reflecting a form of hierarchical order among IT artifacts. This provided opportunities for management team to effectively influence the routine and limit the workarounds. For example, as described above, in response to workaround devised to avoid entering Project ID and causing confusions, new routine was designed into IT artifact to reflect the practices at performative level. The following figure (Figure 3) depicts the interplay between the routines and IT artifacts.

![Figure 3. The interplay between the routines and IT artifacts](image)

The multiplicity of IT artifacts are in the center of interplay, influencing both the performative and ostensive routines. On one hand, for example the Competence Catalogue (CC) technology sets limits on how competencies were presented on the system. On the other hand, local competence catalogues were gradually banned in the organization while the use of global CC became mandatory. Further, as we illustrated with the example of Competence Catalogue (CC), the generative routines around the IT artifact evolved as the CC transformed to support local staffing practices, before the formal staffing process was initiated. This indicates that in order to design a workable staffing process the organization should pay attention to the interplay between IT artifacts and performative routines that in turn might help to ensure the effectiveness of the ‘designed routines’ and the quality of data collected during enactment of the routines [3].

Further, this study provides better insights into the transformation of IT artifacts (and transformation of roles in general [12]) and the impact that has on routines over time, which is left largely unexplored in the literature. We showed that multiple artifacts helped to shape the complex routines in the staffing process, while the roles played by the artifacts varied from instrumental to symbolic, depending on the circumstances. The instrumental and symbolic dimensions of artifacts should therefore be taken into account in designing IT artifacts.

While perceptions of constraint, as Leonardi [11] argues, could cause users to change IT artifacts, users often found new uses for IT artifacts designed to guide certain routines, and some of the routines could be performed without the use of IT artifacts. At the performative level we found that some unpredictable patterns of action emerged with the evolving IT artifact and its relationship with other IT artifacts, which were not intended or even prevented through the original design of the artifacts.

The analysis demonstrates that complex HR processes could be automated to a certain extent through the use of IT embedded processes. However, there is variation and improvisation, which becomes visible through the performative routines. As some of the emerging performative aspects of the routines
could be vital for the fulfillment of the tasks and for the functioning of the system, there should be ways of accommodating these either within the system or as project management support processes, while preserving the enterprise systems capability for global coordination and control.

Finally, this paper offers a way to address the limitation of existing studies treating enterprise systems as ‘black box’ [1]. The case shows how the routines designed in the enterprise system were first quite inflexible, and although provided a way to gather control information, were of limited use in every day work. By tracing the trajectory of changes in the enterprise system and the interplay with ostensive and performative aspects of routines, we were able to show how the system accommodated for local variations in routines and transformed to enable functionality and workarounds [c.f. 19]. This in turn allowed for the varying work practices in different parts of the case company. Thus the analysis of relationships of the routines shows that even some workarounds can be formalized and become part of a flexible enterprise system.

5. Future research

Future research could pay attention to the arrangement of locally flexible work processes that allow for performative routine engagement while preserving the capacity of enterprise systems to collect information and codify the ostensive processes. The co-existence of these is by no means easy, but as our case study demonstrates, there is a dire need for more flexible and informal ways of supporting everyday routines, while retaining the coordination possibilities of the integrated system.

References