

Inspiring Innovative Practice: Gender and Diversity as Key Factors in Software Migration Processes

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ABSTRACT

Software migration processes in organisations are a challenge for employees as well as for management. In a recent empirical study we inquired with members of three organisations about their experiences during an operating system migration to Linux. The focus of our research was on how gender and diversity should generally be addressed to support a successful software migration. We conclude that gender and similar dimensions of diversity are facilitators for discovering workplace-related diversity in a particular organisation. These aspects of diversity can then be addressed by measures accompanying a software migration process. In this paper we present such workplace-related aspects of diversity along with measures we identified as best practices.

1 INTRODUCTION: OBSERVING CHANGE

Software belongs to the work equipment that shapes today's working environments in many professions. Individual and collaborative work routines as well as social relations in an organisation are structured by software solutions. Software enables people to perform their tasks, but at the same time unavoidably determines part of the ways in which they can do so. Most of the time we do not notice that our actions and relations are thoroughly structured by the kind of tools we use. Sociotechnical systems design, however, is an approach that pays attention to these very ways in which the social relations of work are solidified in, or conversely, shaped by technology. Thus, when new software is designed or installed and used within a work environment, a sociotechnical approach means to carefully study the work being performed and the working relations, in order to meet the organisation's needs – and those of the employees.

People get used to the software they use – no matter how well or poorly it is designed. They learn shortcuts and tricks and invent workarounds wherever necessary. But from time to time organisations change the software their employees are using, either because it is outdated or because management has decided in favour of a „better“ alternative. The

resulting software migration processes need to be planned and executed very carefully in order not to interfere too much with people's daily work and to set up tools for work that actually suit the tasks to be carried out with them. A socio-technical analysis and design is needed that takes into account current work routines with and without computer support.

The challenge is even greater if the software exchanged is not just an e-mail program or a word processor but an operating system, because this requires the migration of quite a number of software applications. In a recent empirical study we examined the migration process towards Linux on desktop computers with members of three large organisations¹ (Hecht, Maass, Schirmer forthcoming). The migration process had already been completed or was under way. We wanted to understand from a sociotechnical perspective how the organisations managed to implement the migration process. Our aim was to discover and develop innovative ideas for how to best understand the end users' needs and to have them participate in the process.

In our study we used close observation and interview techniques to get into touch with a variety of users at work (27 persons in total; varying in gender, age, positions and tasks) and to find out how they experienced the software migration at their workplace. We wanted to discover how their organisation managed to support them well – or how they failed to do so. We also conducted expert interviews (see with the responsible IT-managers of the respective organisations as well as focus group discussions with members of the IT support teams.

The staff of a large organisation tends to be very heterogeneous and therefore has quite diverse requirements concerning the software they need for their daily work and how they like to be informed or even involved in a software migration process. Our hypothesis was that organisations often fail to meet the diverse needs of their staff because they are not aware of this diversity. Often much more attention is paid to the software stack installed on people's PCs than to the tasks they are actually carrying out with it.

Our study revealed that employees react very differently to the software migration, both in terms of their personal interest and in terms of their capability to work with the new software. This result matched our hypothesis. Many people were disappointed because management had not informed them well or had not involved them sufficiently. They missed an appreciation of their expertise as those who are expected to continue with the daily work routines.

1 In cooperation with the European Academy for Women in Politics and Business, Berlin (EAF) and with IBM. The project was funded by the Federal Ministry of Education and Research (BMBF).

Focusing on gender and diversity² we developed innovative suggestions how to support a wide range of people in a software migration process. Thereby we want to contribute to gender-equitable working conditions. But at the same time we are also careful not to add to a reconstruction of gender (and further internal diversity aspects). We do not want to reaffirm stereotypes that should rather be deconstructed and disproved with an emancipatory intent. In the next section, part 2, we will therefore discuss *how* gender and diversity can best be taken into account when planning changes in an organisation such an operating system migration. The practical results of our study comprise a list of relevant diversity dimensions and best practices. In part 3 we will give examples for both, followed by a brief conclusion in part 4.

2 FOCUS ON DIVERSITY

The connection between workplace structures and the diversity of employees is a concern of social science, particularly gender studies. The term diversity refers to the fact that people differ one from another not only individually, but also by certain common characteristics such as their gender, migration background, age etc. These so-called dimensions of diversity form a conceptually endless list (Krell 2007, 9), but certain criteria are usually identified as the main categories of diversity: „Race, gender, ethnicity/nationality, organizational role/function, age, sexual orientation, mental/physical ability, religion“ have been termed the „Big 8“ in the US (ibid.).

The term diversity does not only describe differences between people, but also refers to the fact that these differences are laded with hierarchy and social inequality. Such differences get functionalised to place a person in a specific position in power structures and have consequences for the opportunities the person has (Bereswill 2008, 102). In an organisation, diversity is generally reflected by an uneven distribution of tasks between men and women, migrant and non-migrant employees etc. The various tasks and the people who carry them out are often segregated by the department they belong to or by hierarchy level (see e.g. Leitner 2001).

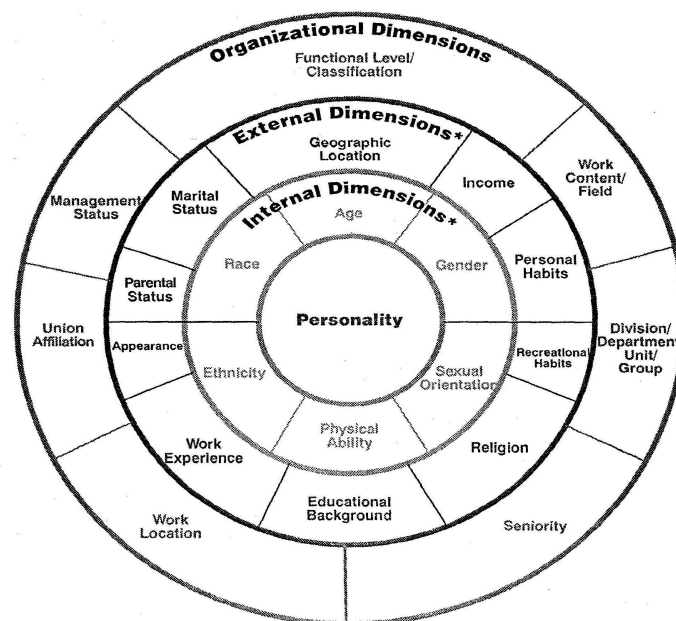
Gender studies and socio-technical research have shown that workplaces that rank low in society or in organisations are often not well studied when technology is developed and requirements are elicited. That might be jobs that can be termed „women's work“, but as well jobs where migrants or people of colour dominate in numbers. When the performed work is analysed certain aspects remain „invisible“. They are overlooked or not considered important from the analyst's point of view (Star & Strauss

2 In the context of this research we understand gender as one dimension of diversity as will be explained. We do not conceive of gender as a dimension that is inherently privileged in the analysis, but nevertheless as a dimension that we often focus on because its impact on social structures is particularly strong.

1999, Kumbruck 2001, Maass & Rommes 2007). Thus, taking diversity into account when planning a software migration means to try to engage people from all departments and all levels of hierarchy in the process. It means to be careful not to neglect the employees whose departments or level of hierarchy seem less important, who are only concerned with „simple tasks“ or „easily exchangeable“. Respect for diversity will result in offering employees the opportunity to conjointly discover their needs in the migration process and regarding the design of the future sociotechnical system. This is why we consider gender and diversity key factors for a well-designed and successful software migration process.

Gardenswartz and Rowe (1998) have created a model with four layers of diversity (see fig. 1). It has its roots in „diversity management“ and is widely used in this context today. „Diversity Management“ aims at uncovering and considering diverse needs and abilities at the workplace from two different perspectives (Vedder 2006, 6): On the one hand, the „equity perspective“ follows political movements and anti-discrimination laws and addresses the diversity of employees in order to act against discrimination. On the other hand, the „business perspective“ seeks to use

FOUR LAYERS OF DIVERSITY



Source: From Lee Gardenswartz and Anita Rowe, *Diverse Teams at Work*. Burr Ridge, Ill.: Irwin Professional Publishing, 1994. *Internal dimensions and external dimensions are adapted from Marilyn Loden and Judy B. Rosener, *Workforce America!* Homewood, Ill.: Business One Irwin, 1991.

Fig. 1: The four layers of diversity Source: Gardenswartz and Rowe (1998, 23)

the wide range of competences among diverse employees for improving the organisation's performance and profit. The „Four Layers of Diversity“ (Gardenswartz and Rowe 1998) might be used from both perspectives. The model allows to differentiate further than the „Big 8“: The innermost layer, comprising the dimensions that form the *personality*, are a „unique combination of personal characteristics“ (26). The layer of *internal dimensions* contains the above mentioned dimensions of gender, race, ethnicity etc, that can not be changed at will and that have a „powerful effect (...) on opportunities in organizations“ (ibid.). *External dimensions*, the third layer, comprise dimensions like the educational background, income or work experience. They describe acquired, but often relatively stable characteristics of people. Finally, differences like e.g. The particular department or work group someone works in, a person's position in the hierarchy, her seniority or the content of the work form the *organisational dimensions* of diversity.

In our research we do not completely adhere to this model, but put the idea of the different levels of diversity dimensions to use. We started out selecting people for our study along internal diversity dimensions: young and old, women and men etc., because we knew that these dimensions often correlate with a person's place within the diversity dimensions on an external and organisational level. Paying attention to the internal dimensions we could therefore make sure to include people working in various positions and accomplishing various tasks. Thus the internal diversity dimensions do not by themselves influence how employees deal with software migration and what support they need. But they do serve as an eye-opener in the analysis people's needs in a wide variety of workplaces. They help to identify workplace-specific features, like tasks carried out, the structure of cooperation within teams, familiarity with technology, or openness towards change. These workplace-specific features have a high impact on how work is conducted. A person's requirements for a software migration process are not directly determined by their position within the internal diversity dimensions and only partly connected to external dimensions and or their personality. These requirements mostly depend on the workplace-specific aspects. If this is not acknowledged, stereotypes, that are attached to seemingly coherent groups of people, are easily reconstructed and may result, for example, in „special courses for women“. This would mean to confine people to their „difference“ and to reconstruct e.g. the category „woman“.

If close attention is paid to the tasks an employee has, how the tasks are accomplished and under what circumstances, the specific needs that stem from this constellation can be discovered. We strongly advise to have the prospective users of the new software participate in the planning of the sociotechnical changes. When designing or applying the technical support for work practices, it is crucial to thoroughly understand the employees' daily work. That way not only the best measures to accompany the migration process can be discovered, but also the software can best be

chosen and customised in order to suit that work.

We emphasise this strategy of offering different measures, some of which will be mandatory for everyone, such as attending information meetings, and others among which the employees can choose. Depending on workplace-specific requirements and personal preferences there are always types of support that are better suited for a person than others. Particularly in regard to the personal preconditions, however, it is important to give people an opportunity to choose for themselves. That way they will not be patronised. A predefined concept, that prescribes the path to software migration for different people, would also ruin the chance for individual change and development. For example a person who has considered himself not interested in and easily overwhelmed by new technology might enjoy a chance to get to know a new system and to thereby reconfigure his own identity regarding this aspect.

3 WORKING WITH DIVERSITY

Before presenting aspects of diversity and best practices that we found we will make suggestions how management can proceed in order to deal with diversity as an innovative factor for a software migration. We propose to first discover workplace-related dimensions of diversity. The employees' differences regarding the internal diversity dimensions can be considered a point of reference to start with. The vertical and horizontal organisational structure as well as different types of jobs and education that people in the organisation have should be analysed. It has to be made sure that people from all different areas of the organisation are considered in, or better, participate in the preparation of the migration process. In the course of interviews and observations as well as planning sessions with various stakeholders the management can find out, what criteria are crucial for shaping the employees' needs and requirements in a software migration process. Afterwards measures have to be planned that suit the identified diversity of employees and encourages them to participate actively in the software migration process.

Rather than dividing staff according to diversity dimensions such as gender or age, this should help those who manage the migration process to consider workplace-specific aspects. The diversity and the best practices that we identified and describe below can serve as examples.

Aspects of diversity and best practices for software migration

In the following we present a sample of workplace-related diversity aspects along with accompanying practices that meet the specific requirements. They are based on the study described in part 1. Along the three case studies and our perspective on gender and diversity described in part 2 we identified different best practices and came up with new ideas

during the analysis of the material³.

Employees with tasks that require close cooperation with others

Workplaces at which employees cooperate intensively with colleagues pose other challenges for the software migration than workplaces at which employees work more isolated. Cooperation often requires the exchange of digital material such as documents. Microsoft's file formats, for instance, have become the standard formats for various file types. In addition the fonts usually installed on computers depend on the operating system or are not open source software. Both issues can lead to considerable complications with formatting texts and presentations if people who work conjointly on one document have different office systems and different fonts installed on their computers.

Our interviews revealed that this issue of „instable“ documents was very annoying for employees when their organisation migrated to a Linux operating system. Moreover we could gain insight into the difference in importance the users and the IT-administration attributed to this issue. While IT-people sometimes saw it as a minor task to reach consistent documents and to use tools for reformatting documents, the regular users felt that having to accomplish such additional tasks disproportionately took away their time and attention from their actual tasks and goals. One employee always inquires with her colleagues before sending them a document, whether they „already have Linux or still need doc“ (CI4).

Related good practices:

Differing document formats are an important issue when migrating. The organisations in which we conducted our research have learned from many difficulties their users had. They offer, for example, support in converting document formats. In one of the organisations the users could send their Microsoft .doc-files to an email address and would receive OpenOffice .odt-files „of real good quality“ in return (BI1). The organisations also prepared document templates that had to be used after the migration in order to reduce confusion and formatting trouble.

Workplaces with customer contact

Employees who work with direct customer contact need very dependable systems. They are easily threatened by a change in software, since their stress will likely increase when they have to work with a new system they don't know well while interacting with customers in service encounters. A call center employee who is talking to someone on the phone and has to simultaneously deal with unfamiliar functions of the software will not be able to provide the service quality he or she is supposed to deliver.

Related good practices:

In this case it is absolutely necessary to train the employees in advance of

³ For the complete list of diversity dimensions and best practices see Hecht, Maass, Schirmer (forthcoming).

„live“ use of the new system(s). Documentation of differences between the old and the new programs can be very helpful for quick reference. If possible, grave changes should be avoided when migrating the operating system. While this holds true for every type of workplace, it might be of particular importance in the case of workplaces with customer contact. In large organisations it could be useful to migrate those workplaces last, after initial problems have been identified and solved at the backoffice.

Local workplaces or telework

Offices that are not located centrally in the company's buildings, but somewhere else far away involve specific disadvantages and thus needs for the employees. This holds true for field staff of an insurance company or people who do telework. Contact with colleagues in these jobs is rare and IT-staff is usually not available for immediate support. Compared to employees who work together with many colleagues in large offices at the central location they have different needs in the process of a software migration and also when it comes to IT-support generally. Employees in a large office usually ask their co-workers if they encounter a problem. Field staff lacks these colleagues who they can ask briefly when confronted with technical innovations. And „they don't have the IT-Support, the people who are just around the corner“ (AF1).

Related good practices:

Field staff depend on support by email, phone or remote maintenance. For an introduction to the new software they should be provided with detailed documentation material so that they have a chance to learn on their own. Trainings should not be mandatory and possibly be offered in different locations so as to reduce necessary travel. An online forum can be very useful to bring these users in touch with each other and provide them with virtual colleagues.

Corporate culture of mutual support

How people deal with new situations at work is also closely related to the organisational culture and the way they are used to work as teams and in cooperation with each other. If the members of an organisation or of a department are used to support each other and this is encouraged by the organisation then they also help each other when learning to work with the new system: „There is always someone close who knows more and can help another person“ (CE1). It is very important to be aware of the organisational culture in this regard when planning a software migration. It influences the need for fixed organisational procedures, formal support and the institutionalisation of feedback channels, for example.

Related good practices:

A good practice we found in our study was training one person from every office who later disseminates the information as needed to their colleagues. Either they also offer trainings to their colleagues or train them step by step while they are doing their regular work and respond to

questions as needed. By engaging colleagues as mentors for their department, it is possible to provide an easy to approach first level support. This also rewards and furthers the lively interest some employees have in the software migration process.

Time constraints

People who work within narrow time limits will be affected differently by a software migration and need different support than others. For example, part-time work usually leads to a condensation of the workload and if there is no time left for learning to use the new software, it will increase the stress on employees.

Related good practices:

Employees will need working hours during which they are released from their usual tasks. Information should be accessible very quickly and trainings should not take away too much time. And, if there are employees whose schedule is restricted, for example if they can not attend workshops in the afternoons, then it has to be made sure that activities necessary for working with the new software, is offered when they are available.

Differences in personality

In addition to workplace-related differences we found differences between the employees' individual personalities. Some of these differences will likely have an impact on the employees' needs for a software migration process. For example, people who are interested in new technology and like to experiment might like to test the new software at an early stage. They are also possibly good candidates as mentors for their colleagues. Quite to the contrary might employees who have become very familiar with a certain application might see their expertise and status endangered by new software. They might respond negatively to the upcoming changes.

Characteristics of organisations

We also found factors that concern the organisation as a whole. We concluded that its *size* and the *depth of its hierarchy* will have an impact on how to accomplish the software migration. It can also have strong effects, whether the organisation is a *public* institution, oriented towards public service and administration or a *private*, market-oriented, enterprise.

General recommendations for a software migration process

From the long list of best practices we want to mention some general recommendations that we find particularly important.

Communication and information should be characterised by openness and honesty. This seems trivial to point out, but some of our interviewees saw an advantage in informing the employees late and rather scarcely and they gave several reasons for that. In our study we learned, however,

that a good migration process is based on building and maintaining trust between those responsible for managing the software migration (usually management and IT-department) and the employees. Otherwise employees will not feel appreciated: "They should not present everything as easy and smooth and promise that within a short time it has all changed and is running as well as before. - That's just not the way it is. They should tell it like it is and admit, we convert the systems, but there might be difficulties. We will have to tackle them together. We will support you through this." (CF)

To apply a variety of *push and pull media* as information channels will accommodate different approaches of people. Push media, such as emails or newsletters will bring the necessary key information to everyone. Pull media mean that people have to actively access the information. This function can be served by intranet webpages or forums. While information for everyone has to be kept down to a suitable amount and depth, pull media offer the chance to inform in more detail for those who are interested.

The employees' *participation* in the planning and implementation of the migration process is central to our suggestions. To have them participate e.g. in planning workshops or prototype testing will bring about crucial knowledge concerning their needs that is otherwise impossible to access. In large organisations it will be impossible to have everyone participate. Therefore it is likely that some employees have to be found who are willing to represent their co-workers in the planning. This participation needs to happen on a voluntary basis if it is to be successful.

4 INSPIRING INNOVATIVE PRACTICE

In order to better support the staff during a software migration process on end users' desktops we propose to pay much attention to the diverse needs and requirements among the employees and to come up with a wide variety of measures to support them individually. Taking diversity into account will result in a better, more appreciative relationship between end users and the IT department that manages the migration process.

Software migration processes often do not proceed very smoothly. Software migration poses technical as well as social challenges, that must be addressed at the same time. Key to a successful migration process is to carefully listen to the people working with the software and to closely examine their diverse needs. Equally important is to involve them in the process and give them a voice. This consideration of diversity carries innovative potential for software migration processes: Various measures of communication, of information and participation have to be implemented, some of which are more suitable for one type of employee while others are more appropriate for others.

As a result of our study we compiled a comprehensive list of measures which we found to be good practices or which were inspired by obvious shortcomings and their negative effects in the three organisations. These measures should be offered to the employees without a priori determining on the basis of internal diversity dimensions which measure is meant for whom. Rather they should accommodate workplace-specific requirements. This approach opens up space for some self-determination of the employees, respects their individuality and implies the chance to migrate more successfully.

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