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The Adoption of Open Source Desktop Software in a Large Public Administration

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Abstract

Several public administrations are currently migrating towards open source software (OSS) on the desktop. In this paper, we describe a case study of a large Belgian public administration that is currently migrating its desktops towards Linux and OpenOffice.org. The goal of the paper is to discuss whether such a migration is feasible, and why and how the migration could be undertaken. We describe the implementation trajectory followed and compare our findings to previous studies in this field. We offer several guidelines that can contribute to the formation of “best practices” for the transition towards OSS on the desktop. Our results indicate that a migration towards OSS on the desktop is feasible, but requires a change in the attitude of end users.

Keywords: *open source software, adoption, public administrations, Linux, OpenOffice.org*

Introduction

In the past few years, open source software (OSS) has become a viable solution for organizations, and is being increasingly adopted. Until now, the most often adopted type of OSS was infrastructure software such as Linux (see e.g., Dedrick and West 2003; Lundell et al. 2006). Recently, there is a growing interest in migrations towards OSS on the desktop. This trend is primarily driven by public administrations (PA). Cities such as Munich and Vienna for example, have announced the migration of their desktops towards Linux and OpenOffice.org.

A migration towards OSS on the desktop has a much larger impact on the organization than the adoption of open source infrastructure software, since the former will affect most users in the organization. It is therefore important to try to minimize disruptions and discomfort. Research has shown that *know-why* and *know-how* are important for an effective adoption (Swanson and Wang 2005). Moreover, the fact that a growing number of PAs are currently adopting OSS on the desktop entails the risk that other PAs will follow a bandwagon strategy, without duly investigating this decision (Fiol and Connor 2003; Swanson and Ramiller 2004). Instead, decision makers should carefully consider *whether, why* and *how* they should adopt OSS on the desktop. In other words, they should be *mindful* in their adoption decision (Swanson and Ramiller 2004).

We feel that additional research on the organizational adoption of OSS on the desktop is required to determine in which context OSS may offer certain advantages, and how the migration should be performed. This will allow organizations to learn from the experiences of previous migrations. In this paper, we present a case study of the Belgian Federal Government Department of Justice (FGD Justice) that has migrated 2,500 desktops towards Linux and OpenOffice.org since August 2005. The migration of an additional 7,500 desktops is planned for the near future. The case is rather unique in several different aspects. First, this migration is most likely the largest migration towards OSS on the desktop in Belgium, and is among the largest within Europe. Second, the migration affected both users with and without prior experience with Microsoft Windows and Microsoft Office. Hence, this case study allows us to compare the experiences of both groups of users. Finally, the migration was quite complex and affected nearly 300 locations. The results from this case study will be contrasted to previous studies in this domain, including our own research on the adoption of OpenOffice.org by the Brussels PA (Ven et al. 2006, 2007). The main aim of the paper is to provide more insight into *whether* the migration within the FGD Justice was feasible, and *why* and *how* the migration was undertaken.

Methodology

We have conducted a descriptive case study in order to report on the migration towards OSS on the desktop within the FGD Justice. The case study approach allowed us to study the phenomenon in its real-life context (Benbasat et al. 1987; Yin 2003). Since the use of a single informant may lead to unreliable results (Benbasat et al. 1987; Phillips 1981), we have used the key informant method to identify two informants that were highly knowledgeable about and involved in the migration. Our informants were the director of the ICT department and the Director of the Strategy and Methodology Management Directorate of the ICT Department¹.

The primary mode of data collection consisted of two face-to-face interviews which were conducted by a two-person team. Based upon previous research, a case study protocol was crafted, including an initial set of questions. These questions concerned various topics (e.g., cost comparisons, pilot project, and training), in order to obtain a thorough description of the migration trajectory. The aim of the first interview was to obtain important background information on the migration. After this interview, the case study protocol and questionnaire was finalized. During the second interview, detailed information on the migration was obtained from our informants. This interview was digitally recorded for future reference. One of the researchers focused on posing the interview questions, while the other researcher took notes and supplemented the interview with additional questions. This strategy allowed us to view the case from two perspectives and to compare the impressions of both researchers afterwards (Eisenhardt 1989; Yin 2003). We also obtained additional sources of evidence, such as articles that appeared in internal publications, documentation and presentation materials on the migration, documents on the organizational structure of the FGD Justice, documents comparing the costs of both Microsoft Windows and Linux, and annual reports. Secondary information included press releases and newspaper articles. Follow-up questions took place via e-mail. A draft copy of the case study report was reviewed by our informants to increase the validity of our findings.

Findings

In this section, we will start by providing a brief overview of our case, and then continue with a description of the migration trajectory that was followed.

Case Description

The migration took place in one of the departments of the FGD Justice, namely the Judicial Order (which includes the

¹ This Directorate includes the ICT Project Management Office.

various courts of law and the offices of the public prosecutor). The ICT department of the FGD Justice was responsible for performing the migration. It consists of 120 employees and is responsible for the IT infrastructure of nearly 22,000 users in almost 400 buildings all across Belgium. Approximately 11,000 users are situated in the Judicial Order.

Most departments within the FGD Justice have desktops with Microsoft Windows and Microsoft Office at their disposal. In the Judicial Order however, approximately 40% of the IT equipment in 2004 was based on terminal clients with outdated software. As part of the modernization of the IT infrastructure, these terminals are gradually replaced with desktops with Linux and OpenOffice.org. Since 2005, all new desktops within the Judicial Order have Linux and OpenOffice.org installed. It was decided to start by migrating the 230 Courts of the Peace, since these were still completely terminal based. The migration towards desktops with Linux and OpenOffice.org was therefore considered an important improvement. The first Courts of the Peace were migrated in August 2005. Up until now, close to 2,500 desktops are migrated, and the aim is to migrate all remaining desktops in the Judicial Order in the following years (an estimated additional 7,500 desktops). Currently, migrations are underway in the Courts of First Instance.

Desktops are covered under an annual subscription to the Novell Open Workgroup Suite, which amongst others includes OpenOffice.org and SUSE Linux Enterprise Desktop. Our informants indicated that the main reason for choosing this distribution was that it is optimized for desktop use, and that it ships with an enhanced version of OpenOffice.org that supports Microsoft Excel macros.

Reasons for Adoption

There were three main reasons for the migration towards Linux and OpenOffice.org, namely *cost savings*, *the avoidance of vendor lock-in*, and *government guidelines*.

It was estimated that a 4-year subscription to the Novell Open Workgroup Suite would cost one third of a corresponding Client Access License (CAL) from Microsoft. When taking into account additional costs such as training and maintenance, the Novell solution was estimated to be 30–50% cheaper than a Microsoft based solution. On the other hand, it was less clear how the Total Cost of Ownership (TCO) of both solutions would compare, if all types of costs were taken into account. The migration towards Linux was also considered a means to reduce hardware costs. Our informants expected that the lifetime of the computer hardware would be prolonged, since Linux can perform well on less powerful systems. The reduction in license cost is also one of the most often cited reasons for the adoption of OSS in previous studies (Brink et al. 2006; COSPA 2005; Fitzgerald and Kenny 2003; Waring and Maddocks 2005; Zuliani and Succi 2004a). On the other hand, our case study at the Brussels PA, and previous research has also shown that the TCO of OSS is unclear (COSPA 2005; Drozdik et al. 2005; Russo et al. 2003; Wichmann 2002).

A second important reason was the desire to minimize vendor lock-in. Our informants indicated that they wanted to remain as independent from their vendors as possible. Migrating towards Linux and OpenOffice.org was a way to reduce their dependency on Microsoft. On the other hand, our informants also did not want to become dependent on Novell. As a result, only the desktops within the Judicial Order will be migrated to Linux, while the other desktops in the FGD Justice will continue to run Microsoft Windows. Currently, 15–20% of all desktops within the FGD Justice are running Linux. Over time, this percentage should evolve towards 60%. Consequently, this is not a radical migration towards Linux, and the aim is to use both Microsoft Windows and Linux in the organization.

Third, the Belgian government has issued guidelines with respect to the use of open standards and OSS. It has been recommended that all FGDs use open standards in order to facilitate communication between FGDs and civilians. Additionally, it is recommended that FGDs try to lower their operational costs and try to avoid dependence on a single vendor. The use of OSS is suggested as one way to realize this. The FGD Justice is the first PA in Belgium that has initiated such a large-scale migration towards OSS.

Pilot Project

Before commencing the full-scale migration, a number of pilot projects were initiated. A master image containing the

standard installation for the desktops was assembled and tested by the ICT department. Since Belgium is bilingual², two separate master images had to be constructed (one Dutch and one French).

Since the initial migration would focus on the Courts of the Peace, a pilot was started in 4 Courts of the Peace in 2005. Each Court of the Peace consisted of 5–10 users on average. Two Dutch-speaking and two French-speaking Courts of the Peace were selected, in order to test both images. Each pilot has lasted a couple of months to allow users to familiarize themselves with the new environment. The main aim of the pilot was to test the feasibility of the migration and to identify potential problems and solutions. To this end, OpenOffice.org was used in the daily work of a number of end users to verify that OpenOffice.org was able to support all tasks within the organization. The pilot highlighted the following issues:

- The most important problem was that the migration required a *change in the attitude* of end users. End users had to be convinced to learn to use OpenOffice.org and needed to adapt to another user interface. This problem was also found in our case study at the Brussels PA, as well as by other studies in this field (Drozdik et al. 2005; Rossi et al. 2005; Zuliani and Succi 2004a,b).
- End users articulated a *need for training* with the new environment. Note however that end users previously did not have access to desktops. Hence, training would also have been required if desktops had been migrated towards Microsoft Windows and Microsoft Office.
- The pilot also highlighted *specific technical issues* due to a particular combination of old and new hardware and software. This combination led to incompatibilities which could sometimes be irritating for end users. These issues were however not Linux and OpenOffice.org specific, as the same issues would have been encountered if the organization had migrated towards Microsoft Windows and Microsoft Office.

The results of the pilot confirmed the feasibility of the migration, and that Linux and OpenOffice.org satisfied all requirements. Consequently, the results supported the decision to continue with the full-scale migration.

In 2006, it was decided to initiate an additional pilot in a Court of First Instance. In contrast to the Courts of the Peace, the Courts of First Instance already had access to desktops with Microsoft Windows and Microsoft Office. Given this different situation, a pilot was conducted in order to identify other potential issues. This pilot produced similar results, although users did experience slightly more difficulties in adapting to the new environment.

Consistent with our case study at the Brussels PA, and previous literature in this field (Brink et al. 2006; IDA 2003), we can conclude that it is recommended to conduct a pilot project prior to a full-scale migration. This pilot can first of all help to determine whether the migration is feasible and support the decision to continue with the migration or not. Second, the pilot helps in identifying typical problems that might arise during the migration.

Migration

The ICT department was responsible for creating the master images. An external firm was contracted to install the master image on the users' desktops and to perform the physical installation of the desktops in the offices.

Users in the Courts of the Peace were immediately migrated from the terminal based clients towards desktops with Linux and OpenOffice.org. Since the migration towards Linux and OpenOffice.org was considered a substantial improvement by users, no real problems with this “big bang” approach were reported. Users within the Courts of First Instance were also immediately migrated when their desktop was replaced. Although users within the Courts of First Instance experienced slightly more difficulties in adjusting, no major issues were reported.

The big bang approach taken by the FGD Justice deviates from recommendations in literature. According to these studies, users should first have the chance to become familiar with OSS on Microsoft Windows, such as OpenOffice.org and Firefox, after which the migration to Linux can be undertaken (COSPA 2005; Drozdik et al. 2005; IDA 2003). However, in the Courts of the Peace, there was no prior experience with Microsoft Windows or Microsoft Office. As a result, the migration of users towards desktops would be disruptive either way. Hence, it was not opportune to perform the migration in two steps, especially given the limited resources of the ICT department. The limited size of the ICT department also did not allow for installing OpenOffice.org on the Microsoft Windows desktops in the Courts of First Instance prior to the migration towards

2 Belgium consists of a Dutch-speaking region (Flanders) and a French-speaking region (Wallon). In the capital, Brussels, both languages are in use.

Linux.

The migration did not seem to have suffered from the big bang approach. In our case study at the Brussels PA, we also observed that a big bang approach was feasible. These results seem to suggest that a big bang approach can be successful, and can be an appropriate strategy when resources are limited. Additionally, an immediate migration may be more desirable for users, since they do not need to adjust twice, and it may force them to familiarize themselves more quickly with the OSS environment. One factor that facilitates this may be the much improved usability of Linux and OpenOffice.org in the last 3–4 years, which offers a user experience comparable to Microsoft Windows and Microsoft Office.

Training and Support

Training of end users in the Courts of the Peace posed a considerable logistics challenge. The migration affected 230 Courts of the Peace that are situated all across Belgium. It was decided to equip a truck as a mobile training facility to provide training in the vicinity of the Courts of the Peace.

Training was not mandatory. However, since end users were asking for training, almost all users within the Courts of the Peace took part in the training session (a total of 800 users). Training consisted of a one-day session that was provided by an external firm. This firm also created a textbook specifically for this session, which was given to the participants afterwards. Training consisted of both theory and practice. Therefore, each user had access to a desktop to start practicing with the applications. Training focused on general office tasks, such as word processing, Internet and e-mail. End users received their training within one week before or after the migration of their desktop.

Currently, end users have access to a manual and the textbook that was developed by the external firm. Users can also rely on a help desk in case of specific problems. Within the Courts of First Instance, an ICT responsible is present that fulfills the role of system administrator. This person also acts as first-line support for end users. Within the Courts of the Peace, no such responsible is present, given their limited size.

The approach taken by the FGD Justice closely mirrors the approach taken by the Brussels PA. It is also consistent with literature: the training was organized immediately before or after the migration (COSPA 2005; Zuliani and Succi 2004a,b), was focused on generic capabilities in office productivity (COSPA 2005; Russo et al. 2003), and seemed to have increased the acceptance of end users (Brink et al. 2006; COSPA 2005; IDA 2003; Kovács et al. 2004; Rossi et al. 2005). Users also have access to various forms of support in case of any problems (Brink et al. 2006; IDA 2003; Zuliani and Succi 2004a,b).

Functionality

Our informants indicated that users within the Courts of the Peace and the Courts of First Instance are satisfied with the Linux/OpenOffice.org combination. Especially for the users in the Courts of the Peace, the migration towards desktops was an important improvement. Although no formal survey among end users has been conducted, there are no known complaints with respect to usability or functionality. The only remark is that it takes a rather long time to start OpenOffice.org. Hence, the *quick-start* feature of OpenOffice.org is used to load OpenOffice.org in memory when booting the desktop, in order to minimize start-up time afterwards. In general, users consider Linux and OpenOffice.org to be a fully fledged alternative to Microsoft Windows and Microsoft Office.

At this moment, there is no official document format in which documents need to be exchanged. Hence, users must choose their document format in function of the recipient(s). Most often, the Microsoft Word format is used, since this can be opened by both OpenOffice.org and Microsoft Office users. In general, the import/export filters of OpenOffice.org are sufficient to handle the conversion process. Our informants could however not exclude the possibility that some incompatibilities may arise with very complex documents.

These experiences are consistent with our case study at the Brussels PA and previous literature. The import/export filters of OpenOffice.org are adequate in most cases (COSPA 2005; Drozdik et al. 2005; Russo et al. 2003), and the functionality of OpenOffice.org is deemed sufficient for daily use of an office productivity suite (COSPA 2005; Rossi et al. 2005; Zuliani

and Succi 2004b).

Evaluation

In general, the ICT department considers the migration towards Linux and OpenOffice.org a success. The most important problem during the migration was the complexity of the organization. The ICT department is responsible for nearly 400 buildings, in which the IT infrastructure is a combination of outdated and new equipment. This sometimes led to hard to debug problems that caused disruptions for end users. These issues were however not specific to the migration towards Linux. Although the migration highlighted these issues, the same problems would have surfaced if users had been migrated towards desktops with Microsoft Windows. Some users, with a negative attitude towards the migration however incorrectly attributed these issues to the migration towards Linux. Our informants indicated that immediately following the migration, there was a temporary lapse in productivity. This was caused by the fact that end users needed to attend the training session, and had to learn to use OpenOffice.org in their daily work (as the training did not cover all possible topics). No complaints were however known by our informants, which may suggest that productivity did not decrease or increase noticeably in the long term.

In the future, the ICT department will try to organize additional training sessions, and to improve problem solving procedures to guarantee a prompt response. Additionally, the ICT department considered organizing a session for all employees to demonstrate certain features of Linux, such as the Beagle desktop search tool. Other topics include multimedia features such as connecting an iPod under Linux. Although these topics are not relevant for the average office user, the session is primarily a marketing initiative to illustrate that Linux is a fully fledged alternative to Microsoft Windows. This way, it is hoped to create a favorable attitude for future migrations.

Discussion

The migration towards OSS on the desktop is a significant change for end users. It is therefore important for organizations to know *whether*, *why* and *how* OSS should be deployed on the desktop. The case study that was presented in this paper has allowed us to identify a number of lessons learned that can be relevant for other organizations. These lessons are shown in Table 1.

- **Whether to Migrate?** Our results show that a migration towards Linux and OpenOffice.org was feasible within the PA. The results of a pilot project were used to justify the decision to initiate the migration. Nevertheless, there are always some incompatibilities that need to be resolved.
- **Why Migrate?** The main reasons for migrating towards OSS were reductions in cost and vendor lock-in. There are however a number of remarks with respect to this observation. First, our informants indicated that although license costs were significantly lower, other factors such as training and maintenance reduced this cost advantage. Moreover, it was unclear how the TCO of a Windows and Linux based solution would compare. Second, although our informants did not want to be dependent on Microsoft, they also did not want to become dependent on Novell either. As a result, they opted for a mixed environment with both Linux and Microsoft Windows.

Consequently, although cost and reduction of vendor lock-in were cited as the main reasons for the migration, these factors should not be mindlessly followed by other adopters. Although the reasons cited for the adoption of OSS in this case are valid reasons, organizations considering the adoption of OSS should investigate the relevancy of these factors in their organization-specific context (Swanson and Ramiller 2004).

- **How to Migrate?** In the main part of the paper, we have described how the migration was undertaken by the FGD Justice, and we compared their approach to previous research, including our case study at the Brussels PA. In general, our results are consistent with previous research. On the other hand, we have found evidence that a big bang migration can be a legitimate strategy in some circumstances. One of the main issues in the migration was that it requires a change in the attitude of users to adapt to new applications.

Table 1. Lessons Learned from the Migration

<p>WHETHER TO MIGRATE ?</p> <ul style="list-style-type: none"> • Feasibility: The migration towards Linux and OpenOffice.org is feasible, but some incompatibilities and problems are inevitable. <p>WHY MIGRATE ?</p> <ul style="list-style-type: none"> • Cost: A migration towards Linux and OpenOffice.org may result in savings in license costs. Other costs can reduce this cost advantage, making the real savings difficult to quantify. • Vendor Lock-in: A migration towards Linux and OpenOffice.org may reduce the dependency on a single vendor. • Government Guidelines: Government guidelines with respect to the use of open standards and OSS may influence the decision on the use of OpenOffice.org. <p>HOW TO MIGRATE ?</p> <ul style="list-style-type: none"> • Pilot Project: It is recommended to perform a pilot project, since it helps to determine the feasibility of the migration and it may identify a number of issues that may arise during the migration. • Migration: A so-called “big bang” migration may be appropriate, when faced with limited resources. • User Attitudes: It is important to create a positive attitude with end users in order to facilitate the migration. Resistance to change is the most important issue during the migration. • Training: Training is required in order to facilitate the migration, and overcome possible resistance by end users. General training sessions are preferred over training sessions detailing the difference between Microsoft Windows/Microsoft Office and Linux/OpenOffice.org. Training should be given immediately before or after the migration. • Support: It is recommended to have various forms of support for end users. • Functionality: Although the functionality of OpenOffice.org is deemed sufficient for daily use, some incompatibilities may remain. The conversion facilities of OpenOffice.org are adequate for most documents.

One of the unique characteristics of the case was that users in the Courts of the Peace did not have any prior experience with Microsoft Windows and Microsoft Office. Interestingly, few differences were found between the migration in the Courts of the Peace and the Courts of First Instance (in which prior experience was present). Our informants however indicated that users in the Courts of First Instance generally reported somewhat more difficulties and were requesting additional training. This small difference between both groups might be explained by the fact that some users in the Courts of the Peace had access to desktops with Microsoft Windows at home. Hence, some prior personal experience with Microsoft Office was also present.

Conclusion

The main contribution of this paper is that we have described *whether* the migration within the FGD Justice was feasible, and *why* and *how* the migration was undertaken. We also compared their approach to previous research, including our case study at the Brussels PA. As a result, we have offered several guidelines that can contribute to the formation of “best practices” for the transition towards OSS on the desktop. Given the fact that the migration was performed in a large, complex

environment³, the lessons learned from this case study can also be relevant for other large-scale migrations. This may enable organizations to learn from the experiences of previous migrations. The fact that we were able to validate a number of findings from previous studies in a large organization is another contribution of our current research. Nevertheless, decision makers should carefully consider the implications of these findings in their organization-specific environment (Fiol and Connor 2003; Swanson and Ramiller 2004).

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³ The migration affected 300 locations spread across Belgium, and had to deal with a complex mix of IT equipment.

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