

# Escaping Path Dependency: Adoption of Network Effect Technologies as Organisational Innovation

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**Abstract:** In spite of strong barriers to change and innovation in network markets, from time to time large organisational adopters take the lead in adopting a minority system. Taking the example of the German municipality Munich in the market for desktop PC operating systems, both the impact of network market rigidity or lock-in on an organisational level and the preconditions for resisting these pressures are investigated. Munich's process of adopting an alternative software environment is then conceptualised as a case of innovation relying on shifts in the perception of costs and benefits, bringing together theories of organisation and of social movements.

**Keywords:** Organisational Innovation – Technology Adoption - Path Dependence – Network Effects – Structuration Theory

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## 1 Introduction

A Schumpeterian understanding of innovation always consists of two equally important parts: invention and diffusion. It is highly contingent, however, which of these two aspects is more difficult to achieve. In organisation science, most of the prominent approaches focus on difficulties in terms of inventive activities, as in, for example, March's (1991) distinction between "exploitation and exploration" and the concepts of "single- and double-loop learning" (Argyris and Schon 1978) or "explicit and tacit knowledge" (Nonaka and Takeuchi 1995). There are, however, environments where the problem is not finding a new solution but its implementation. One such environment are network markets whose main characteristic is that the amount of individual utility in adopting a technology or practice depends on the total number of adopters, often referred to as "installed base" (Farrell and Saloner 1986). David (1985) and Arthur (1989) describe these market structures as path dependent and developed theoretical mechanisms such as "increasing returns" or "network effects" to explain their rigidity. Nevertheless, very little is known about how these market mechanisms actually are transmitted into organisations and how they interact with "conventional" barriers for organisational innovation (Daft 1978). In looking at an organisational adopter of a minority system in the desktop software market, this paper uses structuration theory (Giddens 1984; Orlikowski 1992; 2000) to conceptualise the conversion of network market phenomena into organisational path dependence. This process is far from being trivial and, even more important, understanding its dynamics is the precondition for organisations to escape path dependent rigidities.

Particularly large organisational adopters of new technologies or practices are crucial in these network market environments, because they are highly visible to possible followers (Westphal et al. 1997), and their engagement in new products or processes usually requires substantial investments of time and financial resources. In other words, in network market environments, the "mere" adoption of a new technology or practice by a large organisation is a highly innovative activity.

Consequently, the recognition of the innovative power of organisational "first movers" on the demand side of network markets leads to the fundamental research question dealing with the

adoption as an innovation process: How and why does an organisation take the lead of adopting a minority system in a market with strong network effects? To answer this question, two steps are necessary: First, in response to criticism of the alleged path dependent nature of software markets (in particular: Liebowitz and Margolis 2001), and because of lacking empirical evidence (Campbell-Kelly 2001)<sup>1</sup> on the consequences for organisational adopters in these markets, the actual empirical logic behind network effects has to be demonstrated. This requires linking rather well established theoretical concepts of path dependency on the market level with the seldomly addressed question of their transmission into organisational contexts. Second, the organisational response to these constraints has to be shown and captured theoretically: The strategies that lead to an un-locking on different organisational levels and the reasons for an organisational first mover to invest substantial time and resources still lack proper theoretical explanations.

As an empirical case for undertaking both steps, I look at the example of the public administration in the Bavarian capital, Munich, the first large municipality in Europe that decided to adopt GNU/Linux as its standard operating system for desktop PCs. With its about 14.000 workstations in diverse fields of application, it is a rather big adopter in a market that Shapiro and Varian (1999, p. 24) call “everyone’s favourite example” for “lock-in” and “increasing returns” – what they identify as constituting characteristics of network markets.

The paper is structured as follows: To further develop the theoretical background of the research question, the idiosyncratic characteristics of the market for desktop PC operating systems as a role model for network markets and path dependency are presented, relying on the existing (mostly economic) literature. This is followed by a brief method section, dealing with case selection and data collection and analysis. Then, out of an adopter’s perspective, technical, economical and organisational innovation barriers are examined by looking at the case of the municipality of Munich. Finally, in analysing Munich’s decision to be the first large-scale adopter, the innovation process is described, and a theoretical framework for the innovative forces behind it is developed.

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<sup>1</sup> There are probably two reasons for the lack of empirical evidence on this issue: First, most of the academic discourse has resided in the domain of economics where theoretical claims are readily converted into mathematical models. Second, most of the few existing empirical studies on the issue (e.g. Gandal et al. 1999; Koski 1999; Kretschmer 2004; Alexy and Henkel 2007) do without the (important!) distinction between desktop and server markets and rely on large-scale quantitative data (Berlecon Research 2002; Gosh et al. 2002) which makes it difficult to research (intra-organizational) dynamics.

## **2 Network market structures: innovation barriers in the market for desktop PC operating systems**

Not least due to Microsoft's antitrust trial in the United States Together, the amount of research dealing with software markets in general and the market for PC operating systems in particular has grown during the last years (e.g. Katz and Shapiro 1998; Liebowitz and Margolis 2001; Klein 2001; Werden 2001; Reddy et al. 2001). Nevertheless, there are only a few, mostly large-scale (e.g. Gandal et al. 1999; Koski 1999; Kretschmer 2004) empirical studies that actually analyse the reasons behind organisational adopting decisions, and none of them differentiate between desktop and server usage of the operating system.

Two broad research perspectives can be identified among the existing literature <sup>2</sup>: Typical for the first one is a famous statement by the two main proponents, Stan Liebowitz and Stephen Margolis (2001, p. 235): „Our message is simple: Good products win.” If industry standards or monopolies – like Microsoft's dominance in the operating system and office sector – develop, it is the logical consequence of superior product performance in a “natural” monopoly market, and thus a socially desirable state in which everyone is better off. However, the large number of vendors of commercial GNU/Linux distributions in the still (relatively) small market for open source operating systems demonstrates that the existence of several competing manufacturers of PC operating systems is not principally absurd; the monopoly probably not that “natural” after all. As a result, the second perspective also admits the importance of product and service qualities, but at the same time strengthens the specific *mechanisms* in network markets that can be at least equally important for a final equilibrium state. Moreover, it emphasises the possibilities to transform “natural” monopolies into competitive markets via regulation or collective standard setting (Shapiro and Varian 1999; Varian et al. 2004).

### **2.1 Mechanisms at work in network markets**

Both views share this distinction between network and “classic” markets because of certain mechanisms (“network effects”) that (sometimes repetitively)<sup>3</sup> lead to standard battles or require regulatory authority (e.g. the liberalisation of European markets for electricity or gas). Recent literature on path dependency (e.g. Arthur 1996; Beyer 2005; Sydow et al. 2005)

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<sup>2</sup> For an extensive description, see Dobusch/Schuessler (2007), pp. 5-10

<sup>3</sup> In the market for video technologies, the battle VHS vs. Betamax (Cusumano et al. 1992) was followed by the battle DVD vs. DivX (Dranove/Gandal 2000) and the most recent and still undecided competition between the HD-DVD and Blue-Ray standards.

theoretically differentiates between different types of mechanisms (see *table 1*) to explain these network effects on markets like the one for software. There, the source for network effects is not so obvious, compared to markets with large-scale physical networks like the ones for electricity.

**Table 1: Mechanisms constituting network markets<sup>4</sup>**

(Meta-) Complementary	{	Direct and indirect network effects	The more something is done, the greater the benefits (also for the individual actor) of doing it
	{	Investment and learning spirals	An investment decision leads to further investment into the same and a growing stock of idiosyncratic assets
	{	Complementarity	Two (or more) in principle autonomous mechanisms reinforce one another.

“Classic” or direct network effects mean that people adopt the operating system (they expect) the majority adopts because of direct profits on the individual level, depending on the size of installed base on the market level. These direct network effects seem to be relatively small in the market for desktop operating systems since there are several standardised protocols, data formats, and interfaces for file exchange across operating systems. There is no or at least very little *direct* advantage for an individual in preferring Windows compared to more niche solutions such as GNU/Linux or MacOS.

Very strong, however, are *indirect* network effects<sup>5</sup> stemming from the supply and variety of applications, of software service providers, and of competent workers, which is directly and reciprocally correlated to the installed base of the complementary operating system. After Microsoft’s parallel introduction of Windows 95 and Windows NT 4 in the mid 1990s, these effects over time led to the failure or marginalisation of all other competitors, such as IBM’s OS/2, Apple’s MacOS or Unix (Koski and Kretschmer 2004, p. 8), and a constant market share of more than 90 percent for Microsoft Windows in the desktop market. The main difference between direct and indirect network effects is that the advantage of adopting the majority system for the individual user varies with this user’s dependence on (certain types and the variety of) complementary goods. This explains why, in niche markets, alternative

<sup>4</sup> Adapted version of a table taken from Dobusch/Schuessler (2007).  
<sup>5</sup> Varian (2004) calls them “demand side economies of scale”.

operating systems were able to survive<sup>6</sup> and why there may be differences in dependence on the dominant standard between different types of (especially: organisational) adopters.

The second type of mechanisms, investment, and learning spirals refer to Williamson's (1985) notion of "asset specificity". Adopting a technology typically leads to specialised investments in complementary and largely intransferable assets. Williamson even speaks of "lock-in" (1985, p. 53) on a particular supplier to characterise the rigidity that may be connected with asset specificity.<sup>7</sup> In the market for desktop operating systems, end-users and/or administrators specialise in a particular operating system and/or related applications; organisations invest routinely in (specialised) application software with Windows as a system requirement. The consequence involves very very high barriers for new (or renewed) competitors, even if they waived license fees, as Varian et al. (2004, p. 21) explain:

"If you switch from Windows to Linux, it can be very costly. You may have to change document formats, application software, and, most importantly, you will have to invest substantial time and effort in learning the new operating environment. Changing software environments at the organizational level is also very costly."

Not only is Microsoft's leading market position unchallenged, it is even regularly able to force their customers to adopt new versions of its operating systems (cf. Koski and Kretschmer 2004)<sup>8</sup> or new price models with constant payments (called "Software Assurance").

The third category of mechanisms, complementarity, can be both part of a mechanism – actually both indirect network effects and investment spirals include complementarity – and a mechanism on its own as a meta-mechanism, linking two in principle autonomous ones. This reciprocal connection between two dynamics I will refer to with the term "complementarity" (see also Ackermann 2001; Sydow et al. 2005). In the desktop software market, for example, investment and learning spirals on the organisational level reinforce and are reinforced by indirect network effects on the macro level.

Taken together, all three mechanisms continuously reinforce – or at least (re-)produce – the existing monopoly market structure in the market for desktop operating systems. This market

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<sup>6</sup> The Apple MacOS, for example, dominated the market segment for desktop publishing for a long time.

<sup>7</sup> Interestingly, Williamson only focuses on "bilateral" lock-in between two transaction partners but leaves out the problems arising from "unilateral" lock-in.

<sup>8</sup> "By tailoring applications software to the most recent release of Window and gradually reducing support and 'patches', Microsoft encourages users to upgrade their operating system as well in order to take advantage of the full network of applications, even if the added functionality of the operating system itself would not have been worth the upgrade cost." (Koski/Kretschmer 2004, p. 12)

structure is both constraining – for adopters of operating systems – and enabling as far as Microsoft is concerned: Endowed with monopoly profits and control over the standard operating system, it was and still is able to expand its operating system monopoly to other application areas, such as browsers (Cusumano and Yoffie 1998).<sup>9</sup>

## **2.2 Path breaking Linux?**

The reasons why there is still competition in the market for desktop PC operating systems lie in the idiosyncratic characteristics of Free and Open Source Software such as GNU/Linux – the different development process (von Hippel and von Krogh 2003), no license fees, access to source code ,and strong competition among several suppliers<sup>10</sup> – that are impossible to imitate for Microsoft if it wants to prolong its business model. However, the barriers to migration especially in the market for desktop operating systems – contrary to the server market – still seem to prevent Microsoft from serious competition in this field (Berlecon Research 2002; Gosh et al. 2002). Especially large organisations hesitate to switch their desktop software environment to alternatives provided by open source software competitors, and still little is known why and how they do so (Alexy and Henkel 2007).

The rare examples, however, that try to defy Microsoft’s monopoly advantage in the desktop market should receive all the more attention: first of all, to give empirical evidence for the actual impact of the alleged necessities and working of forces in network markets, and second, to gain insight into the innovative contribution of early organisational adopters in the process of possibly breaking a dominant technological path.

## **3 Methods**

### **3.1 Case Selection**

Case study research can be used to do both theory building and testing (Flyvberg 2006). The following case study design is an attempt to live up to this potential: It shall demonstrate to what extent the case – selected by theoretical sampling (Eisenhardt 1998) – represents a “black swan” that cannot be explained with existing theory on network markets and path

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<sup>9</sup> Following Giddens (1984), structures are always constraining and enabling on both sides, i.e. also for adopters: For them, of course, the proprietary Microsoft standard is better than no standard at all. But this doesn’t mean that an open standard would be even more beneficial for them.

<sup>10</sup> For an overview of the differences between Free/Open Source and proprietary software, see the two anthologies by DiBona et al (1999) and Feller et al. (2007).

dependency. Because of this lack of explanation, I shall propose a theoretical framework to fill this gap.

A large-scale organisation like the municipality of Munich, with its about 16.000 public servants and about 14.000 desktop workstations, that decides to be the first organisation of its kind – at least in Europe – to migrate its complete desktop software environment from proprietary to open source software, is a mixture of a “critical” and an “exceptional case”. (Yin 1994, pp. 38-40). It is critical as far as economic theory is concerned, which has major difficulties to explain why an organisation should take the lead in the presence of strong network effects (cf. Varian et al. 2004, p. 35).<sup>11</sup> It is an exceptional case, as in network markets, obviously only one organisation can be the first to try to escape a dominant (technological) path.

In evaluating the migration process in the municipality of Munich, insight into the preconditions for innovative actions should help in the process of generalising to theoretical propositions. These, of course, can only rely on – as Yin (1994, p. 36) calls them – “analytical generalisations”, not on statistical ones.

### **3.2 Data collection**

Again following Yin (1994, p. 8), the unique strength of a case study is “its ability to deal with a full variety of evidence”, including documents, artefacts, interviews, and observations. To live up to this potential and for triangulation reasons, the data was collected following a case study protocol over the period of two years from the following sources:

- Seven open-ended interviews with actors on different organisational levels, including political administration (2 interviews), central IT department (3), and subordinate IT departments (2). The interviews lasted from 45 minutes up to two hours, and were semi-structured by a very open entry question to generate narrations (Schütze 1983; Meuser and Nagel 1991; Witzel 2000), followed by more narrow questions concerning the reasons for the migration decision, the barriers and the driving forces during the process, and previously unexpected developments. All interviews were transcribed and

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<sup>11</sup> So Varian states: „It would be nice to have a more systematic derivation of dynamics in network industries. Unfortunately, microeconomic theory is notoriously weak when it comes to dynamics”. The diffusion process *after* an innovator has succeeded, on the contrary, can be explained rather easily with the help of “bandwagon effects” (cf. Leibenstein 1950; Banerjee 1992).



- together with transcripts of two interview-like talks at practitioner conferences – entered into a case study database.
- Forty-nine archival documents collected include the “Client Study” of Unilog Integrata (consulting firm, 2003) on the technical and economic preconditions for any migration of desktop PC software, slides and handouts of conference presentations given by diverse actors during the years 2002 to 2007, and several agenda papers and decision drafts.
- As a source of external information, 102 articles published in the two largest German online IT-news portals (“heise.de” and “computerwoche.de”) and three daily newspapers (FAZ, SZ, FR) from 2001 to 2007 that dealt with Munich’s migration process were collected and included in the case study database.

The data collection approach focused on the time span between the introduction of Windows in the mid-1990s and the beginning of the actual migration in autumn 2006.

**Table 2: Case study database**

<b>wordly transcripts</b>	
interviews / persons	7 / 7
talks / persons	3 / 3
Σ transcripts / persons	10 / 9
<b>per functional area (transcripts / persons):</b>	
political administration	2 / 2
central IT	5 / 3
decentral IT	2 / 2
external*	2 / 2
<b>media coverage (2001-2007)**</b>	
articles (online / print)	68 / 34
<b>archival documents</b>	
sets of slides	11
agenda papers	31
miscellaneous	7

\* „external“ includes service provider and consultants

\*\* includes articles from the following sources: Heise.de, Computerwoche, Frankfurter Allgemeine Zeitung, Frankfurter Rundschau, Süddeutsche Zeitung

### **3.3 Data analysis**

In adopting the cyclical ideal of qualitative research (e.g. Flick 2002, p. 73; Strauss and Corbin 1990), the data analysis was divided into three parts that were *not* undertaken in strict consecutiveness: Inductive generation of theoretical categories of both mechanisms enforcing and weakening path dependency is complemented with chronological process descriptions. These two parts are connected in a final theoretical integration.

For categorisation, the literally transcribed interviews and talks were paraphrased in multiple, consecutive rounds of data reduction with focus on the meta-category “barriers and drivers for the adoption of an alternative (i.e. non-Microsoft) desktop operating system” (Mayring 2003, Meuser and Nagel 1991, Miles and Huberman 1994).

The chronological reconstruction of the migration decision process – stressing the years 2001 to 2006 – in form of a thick description was built with the help of all available data, using media coverage mainly for cross-checking interview and archival data as well as for the right temporal order. Finally, a theoretical explanation for adopter innovation was set up by integrating the inductively generated categories and the process description as presented in the following sections.

## **4 Adoption as innovation: Munich’s GNU/Linux migration process**

### **4.1 Opting for path dependency: The introduction of PCs in Munich**

In the beginning and in the end, there was external expertise: Ironically, the process of IT decentralisation in Munich and the introduction of Microsoft Windows started the same way in 1988 as it came to an end about 15 years later. The still-cited “Zündel-Gutachten” demanded a paradigmatic shift in IT strategy from very centralised mainframe computing to decentralised department servers. Unfortunately, the desktop PC did not play any role in the expert advice – it estimated a PC demand of about 10 units for the whole municipality<sup>12</sup>.

Whereas the – for managing the *decentralisation* process<sup>13</sup> – newly created central IT department was working at full capacity and made large investments to build up multiple data processing centers, the 17 now rather autonomous IT-departments slowly but steadily introduced PCs on their own. After prices had sharply decreased, desktop PCs were purchased

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<sup>12</sup> M-061124-Int-ML, 65-70; For an explanation of the logic behind the shortcut references see appendix A.

<sup>13</sup> M-061124-Int-ML, 53-56

mainly to replace electric typewriters.<sup>14</sup> Since desktop PCs did not appear in the IT strategy paper, there was no IT strategy dealing with them or their interconnection. For the same reason, the decision on the operating system was mostly made by the original equipment manufacturers (OEMs) that delivered the hardware, although some departments adopted different proprietary solutions.<sup>15</sup>

In 1995, the new IT strategy “FORTIV 95” brought the “silent” introduction of desktop PCs to an end, but it did not affect other tacit developments during this early era of client-server-computing: The rise of multiple department-specific software applications, complemented with an increasing variety of administration tools and processes, had the most far-reaching consequences.

Whereas the technical architecture suggested by the “Zündel-Gutachten” was altered by the new strategy<sup>16</sup>, the 17 rather independent decentralised IT departments remained. As a consequence, these departments purchased the largest proportion of software applications on their own, leading to an “uncontrolled growth” of different technical and organisational solutions for identical or very similar problems.<sup>17</sup> This increase in variety and software platform specific extensions occurred not only in an unplanned fashion, but also remained unrecognised until the first considerations of potential migration scenarios began. Nevertheless, even the central authorities realised the full extent of this variety only after several close investigation attempts..

In a nutshell, Munich’s administration did not at all “opt for path dependency” – it completely slipped into it with consciousness growing very slowly, as suggested by path dependency theory. The actual dimension of its dependence on Microsoft’s desktop software environment<sup>18</sup> was revealed only during the migration process – and after the decision to migrate had already been made.

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<sup>14</sup> M-070309-Int-WH, 27-30

<sup>15</sup> For example, the central IT department introduced the proprietary Unix-based “Global View” as a terminal-server desktop system. (M-060808-Int-GS, 508-514)

<sup>16</sup> Instead of a terminal-server architecture, FORTIV95 proposed a client-server structure on the basis of Windows desktops and Unix servers and to emulate existing terminal applications within this architecture.

<sup>17</sup> M-060315-Int-PH, 317-323; M-070125-Int-DG, 144-148; M-070125-Vor-SchießlSiebert, 46-54

<sup>18</sup> If not mentioned otherwise, Microsoft’s desktop software environment refers to Microsoft Windows and Office.

## **4.2 The pre-migration decision process**

One core concept of path dependency theory in a narrow sense<sup>19</sup> is that of “small events”: A series of small, partially unrelated or even stochastic events sets in motion a self-reinforcing process that eventually leads from a contingent state at the beginning to a state of ex-ante unpredictable lock-in (David 1997; Sydow et al. 2005). Interestingly, the case of Munich demonstrates that small events can also play a decisive role at the end of path dependency, for example, in the early stages of a path breaking process.

During his engagement in Munich’s city council, Gerd Baumann was a backbencher, a “Hinterbänkler”: As an unsalaried council member, the jurist continued working in his day job additional to his political engagement. Only months before his time in the city council came to an end in 2002, however, he set the ball rolling that finally made Munich the first big municipality in Europe to break its ties with Microsoft as the preferred desktop software vendor. Using the niche word processor “Ami Pro”<sup>20</sup> at home, he requested the responsible council committee to check whether cheaper alternatives could replace Microsoft’s Office Suite. The most important motive for this initiative was his rejection of the Microsoft monopoly, emphasising the specific role of public administrations:

“Microsoft’s market power, their ability to dictate the prices, had always annoyed me.” (M-070131-Int-GB, 131-132)

„I am suprised much how the public administration is prepared to put up with! Not only Munich, all firms and administrations have been helpless in front of Microsoft’s licence fee models.” (M-070131-Int-GB, 73-76)

Additional to Microsoft’s pricing policies, Baumann heavily criticised some Windows functions as “Spyware”<sup>21</sup> unbearable for public administrations. The heads of the central IT department might have shared several of his concerns regarding Microsoft, but did not see any realistic chance of switching – even in the limited area of office suits – when Baumann started discussing the issue in autumn 2001. So they tried to fulfil (and the same time turn down) the council committee’s request with a mere comparison of “pros and cons” between Microsoft

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<sup>19</sup> “Narrow” is meant in the tradition of David (1985) and Arthur (1989) and compared to scholars using “path” and “path dependency” only as a metaphor for the truism that “history matters” (e.g. Karim/Mitchell 2000). For an extensive discussion, see Dobusch/Schüßler (2007).

<sup>20</sup> Now: “Lotus Word Pro”

<sup>21</sup> M-070131-Int-GB, 51-57; The automatic connection and data transmission from Windows PCs to Microsoft servers via Internet is – with reference to the movie “E.T.” – sometimes referred to as “calling-home-function”.

Office and other Office Suites – mainly Sun’s Star Office, but also Corel’s WordPerfect and Lotus’ WordPro (see *table 3* for a translated version of one of the presented tables).

**Table 3: Product comparison prepared by the central IT department for the responsible council committee’s meeting in Nov. 2001<sup>22</sup>**

Advantages	Disadvantages
<ul style="list-style-type: none"> <li>▪ StarOffice is Open Source Software</li> <li>▪ Lower purchase costs</li> <li>▪ End of dependence on Microsoft</li> <li>▪ Cross platform applicability (StarOffice)</li> </ul>	<ul style="list-style-type: none"> <li>▪ Re-working in existing documents necessary because of               <ul style="list-style-type: none"> <li>- partial lack of import/export</li> <li>- different macro languages</li> <li>- different object models</li> </ul> </li> <li>▪ New product line needs requires more training and, therefore, leads to higher training costs</li> <li>▪ There is no in-house training personnel</li> <li>▪ Insufficient online-help (StarOffice)</li> <li>▪ StarOffice/SmartSuite data formats are mostly not suitable for data exchange. Documents would have to be handed on in MS Office or RTF format.</li> <li>▪ The already deployed – and paid for – MS Office products would have to be replaced all over although they are often not even amortised (to ensure readability in internal data exchange)</li> <li>▪ No mail-client (SmartSuite)</li> </ul>

Dissatisfied with their IT official’s analysis, the political members of the committee demanded a second, more in-depth evaluation with special focus on economic efficiency, also taking into consideration the desktop operating system, as Microsoft had already cancelled its support for the Windows version in use.<sup>23</sup> Confronted with this task, the head of the IT department asked for the permit to commission someone for an expert opinion on the subject.<sup>24</sup> The official’s attempt to turn it down thus led to an expanded and much more detailed search for alternatives.

One year later, a draft of the expert’s report convinced the central IT officials that a migration from Microsoft to GNU/Linux was at least technically and economically possible. When this result was presented to the council committee, the situation surprisingly was the opposite way round compared to autumn 2001, as one of the officials describes:

“When, for the first time, we proposed Linux on the basis of the external study in autumn 2002 in the IT committee [...] we got a lot of stick ((laughs)) [...] and I thought we don’t even need to continue, we slunk off with our tails between our legs.“ (M-070309-Int-WH, 764-793)

<sup>22</sup> (M-011114-SiU-BeschlVorlage)

<sup>23</sup> e.g.: M-060412-Int-CS, 27-32; M-070309-Int-WH, 433-439; M-060304-Vor-FS, 100-105

<sup>24</sup> M-070309-Int-WH, 114-120 and 216-228

This time, the politicians could not believe that a complete migration from proprietary Microsoft software to open source software was possible, and they called for a product demonstration at the next meeting. This, of course, was an easy exercise for the IT officials: GNU/Linux on a stand-alone desktop ran smoothly, and a presentation in spring 2003 convinced the politicians to continue working on the issue.

At the same time, the results of the “Client Study”<sup>25</sup> and its recommendation to migrate alerted Microsoft – up to the CEO level: In April 2003, Microsoft CEO Steven Ballmer interrupted his holidays in Switzerland to visit Munich’s mayor. But, again, an attempt to turn down the migration plan even strengthened the momentum behind it: The amount of media coverage skyrocketed, thus increasing pressure on politicians to resist to the monopolist’s power.<sup>26</sup> As another consequence of the increased public interest, many firms and other municipalities encouraged Munich’s officials and politicians to stay on their way and offered knowledge exchange.<sup>27</sup> Additionally, Microsoft’s move also motivated its competitors IBM and Novell/Suse to upgrade their offers of assistance during a potential migration process.<sup>28</sup> In May 2003, after weeks of heated seesaw changes in the calculation of the different alternatives, the council made the principle decision<sup>29</sup> in favour of a GNU/Linux migration and authorised its IT department to work out a detailed draft (“Feinkonzept”) for the project.

**Table 4: Chronology of events leading to the migration decision**

2001/08	Baumann asks for alternatives to MS Office in the council’s IT committee
2001/11	IT officials present a list of “pros and cons” to demonstrate the lack of a viable alternative to MS Office, leaving the committee members unsatisfied
2002/01	The IT committee asks for more (especially: economic) information and authorises the IT department to obtain expert advice
2002/08-12	The consultancy “Unilog Integrata” conducts the “Client Study” that – in the first version – recommends a GNU/Linux migration
2002/12	IT committee rejects first migration plans presented by IT officials
2003/04	Microsoft CEO Ballmer visits Munich’s mayor Ude; huge media coverage
2003/04-05	Unilog Integrata repeatedly re-calculates its cost estimates due to renewed offers <sup>30</sup> by Microsoft and IBM/Novell
2003/05	City council decision to work out a detailed project draft (“Feinkonzept”)

<sup>25</sup> If not mentioned otherwise, “Client Study” refers to the first version of the expert opinion provided by the consultancy Unilog Integrata (2003).

<sup>26</sup> M-060808-Int-GS, 427-431; M-070309-Int-WH, 469-476, 478-488 and 489-492

<sup>27</sup> M-070309-Int-WH, 737-752

<sup>28</sup> M-030526-MO-heise

<sup>29</sup> This decision was backed by all factions represented in the city council except the conservative CSU.

<sup>30</sup> In the legal sense, both Microsoft and IBM/Novell only provided price information as a basis for cost calculations and no offers, as the tender procedure had not started at that time.

### **4.3 Migration problems make (mechanisms of) path dependency visible**

After the principal migration decision, the IT administration set up a project organisation to verify the results of the “Client Study” and to develop a detailed migration plan. Three external consultants – provided by IBM free of charge – supported and guided the making of this detailed draft. All interviewed people involved in the project underline the importance of IBM’s commitment, as the following examples illustrate:

„During the phase of checking technical feasibility, one firm keenly guided us, not to say pushed us; this firm was IBM.“ (M-061124-Int-ML, 238-240)

„City council did not provide extra funds for making the ‚Feinkonzept‘ but in advance IBM had given a written promise of free support during this phase. They kept this promise and got deeply involved with three people. (M-070309-Int-WH, 271-278)

The close examination of existing technological and organisational structures not only led to a better understanding of the major challenges, but also to additional objectives to be fulfilled in the course or even with the help of the migration. What had started in 2001 as a search for an alternative office software suite had ended as a complete restructuring of the municipality’s IT organisation and processes:

- After the migration, only one standardised and centrally developed operating system version (“Basisclient”) replaced the several different Windows versions.<sup>31</sup>
- As a consequence of the standardised client, many prior decentralised tasks and routines (e.g. operating system set up<sup>32</sup>, administration and configuration) were going to be fulfilled by a central client team.
- In introducing a new standardised tool to manage office forms and master documents called “Wollmux”<sup>33</sup>, the city’s corporate design guidelines were to be reinforced and – for the first time in history – to be implemented uniformly in the whole municipality.
- The change of the operating system gave reason for a general consolidation of the municipality’s diverse software landscape, reducing the variety of applications in use.

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<sup>31</sup> „Now, 15 years after our decentralisation, we suddenly, by introducing a standardised client that is administered in a standardised way, we thus retrieve the decentralised processes. (M-061124-Int-ML, Z 580-588)

<sup>32</sup> Although all departments had adopted the same operating system (Windows NT), its set up in terms of administration tools, settings, and support software varied. (M-070309-Int-WH, 451-456)

<sup>33</sup> „Wollmux“ is a neologism combining the German „eierlegende Wollmilchsau“ (colloquial for “all-in-one device suitable for every purpose”) and the name of the Linux mascot “Tux”.

All these measures required at least partial re-centralisation feared by the decentralised IT officials. So, both central IT officials and politicians stressed the complete independence of the organisational restructuring from the migration process. This was a rather anachronistic position, as the reorganisation directly followed from insights of the second study (“Feinkonzept”) and was to be executed in the course of introducing the new open source software environment. But to underline the “independence” of the reorganisation, a separate council decision was made in spring 2004 before the final migration decision (see below, *table 5*). The underlying motion even ends with the following sentence as the last paragraph:

“The restructuring process is to be seen independent from a still outstanding decision to migrate to Linux or Open Source.“ [M-040331-SiU-ITStrategie(SPDA Antrag)]<sup>34</sup>

And one of the leading migration project managers alleges:

“The Linux introduction is not accompanied by any organisational changes.“ (M-060315-Int-PH, 705-708)

One of his colleagues, however, analyses the situation differently, admitting organisational changes as necessary consequences of the migration process but still calls them unintended:

„It is no real project goal to re-centralise the IT but alone due to the decision for a standardised „Basisclient“ it has already happened in this area.“ (M-060808-Int-GS, 173-176; see footnote 30 for a second example)

The reason for this difference between „talk“ and “action“ (Brunsson 1989) was the severe concerns by decentralised IT officials regarding the migration project. Their daily work dealt with the desktop operating system and its complementary application software. And it was their expert’s knowledge – gained over years of practice – that depreciated rapidly under a new operating system<sup>35</sup> because of the „creative destruction“ of skills and knowledge in every technological innovation process (Tushman and Anderson 1986). Additionally, they feared losing competencies and influence by the introduction of a centrally administered and standardised Linux client operating system. So, unsurprisingly, the heads of the decentralised IT departments raised their voices against the migration plans as soon as these assumed a

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<sup>34</sup> In German: “Der Umstrukturierungsprozess ist unabhängig von einer noch zu beschließenden Migration auf Linux bzw. Open Source zu sehen.“

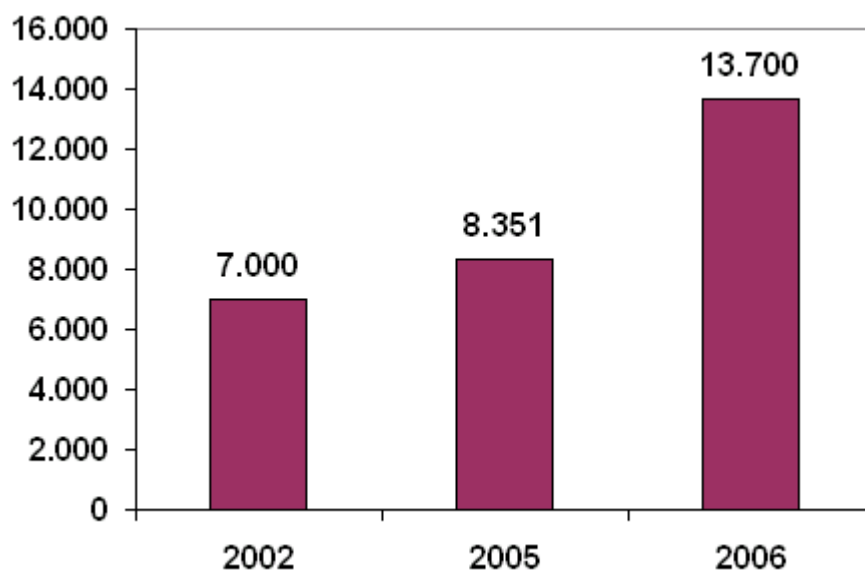
<sup>35</sup> “There was resistance on a department level, especially from the IT staff [...] who feared their knowledge collected over years on Windows operating system could be worth nothing and they had [...] to start again from the beginning. That’s not completely wrong; it’s a huge adjustment [...] and this was repeatedly a reason for resistance.” (M-070309-Int-WH, 297-306)



definite form. The project manager responsible for coordinating the decentralised IT department recalls:

“In the beginning, they always said ‚Let them have a try. It won’t work anyway.’ And suddenly there were concrete implementation plans and suddenly everybody went: ‚Oh No! Never! Who shall do this? We have no money, no personnel, no know-how.’ They were all there at once and said: ‘We won’t do it. We won’t do it. We won’t do it. We’ll stick to Windows!’“ (M-061124-Int-ML, 240-249)

Their resistance even made it into the press<sup>36</sup> and provoked Microsoft CEO Ballmer to express its Schadenfreude publicly<sup>37</sup>. Therefore, by strictly distinguishing between the migration and the reorganisation project in terms of talk and decision making, the politicians and the central IT officials also tried to divide the (expected) resistance.



**Figure 1: known number of macros, forms and templates to migrate at different points in time (M-070125-VorA-Schieß/Siebert)**

As opposed to the resistance of lower level IT staff, another problem had not been anticipated, at least not to its full extent: the real dimension of the necessary migration effort. Although two studies had been made to depict the administration’s software landscape, its actual shape only appeared step by step during the migration. For example, the actual number of office macros, forms, and templates was revealed only *after* the definite migration decision by the city council in June 2004. Many people waited to report their “real” numbers until the migration plans became more “serious”, i.e. threatened to affect their daily work. So the number of office objects to be migrated rose from 7.000 after the first analysis in 2002 up to 13.700 at the beginning of the actual office migration in 2006 (see Figure 1). Moreover, not

<sup>36</sup> e.g. M-040109-MO-CW

<sup>37</sup> M-040301-MO-heise

only the quantity but also the quality and application area of program adaptations like macros was not discovered until the migration itself, as an external consultant supporting the office migration delineates:

“Excel- or Word-macros partially depict very, very complex work routines and have grown over many years. These are all hidden special purpose applications. These have all never been put on record. (M-070125-Vor-SchießlSiebert, 273-277)

Some central IT officials, however, claim that coping with these problems leads to substantial benefits as well: It corrects prior uncontrolled growth of specific applications (“Wildwuchs”) and involvement in the migration process is seen as on the job training for the decentralised IT staff.

**Table 5: Chronology of events from the migration decision to the first roll-out**

2003/05	City council decision to work out a detailed draft (“Feinkonzept”) for the migration project
2004/01	Resistance of decentralised IT officials receives public attention
2004/03	City council decides on a new IT strategy and a restructuring of the IT organisation
2004/06	City council definitely decides in closed session to migrate Munich’s desktop software environment to open source alternatives
2004/09-12	Call for tenders; discussion whether software patents put a risk on the migration
2005/04	The tender of a consortium of two medium-sized enterprises (SoftCon/Gonicus) is accepted
2005/07-09	Politicians and IT officials admit delays of the migration process
2006/09	Start of client software roll-out

Summing up the case description, I would like to emphasise three remarkable aspects of Munich’s odyssey from Windows to Linux: First, technology adoption and organisational change - especially concerning different degrees of organisational (de)centrality - are deeply intertwined and reciprocally enforcing. Second, roles and preferences of individual actors change during the process, converting some of them from opponents into proponents and vice-versa.<sup>38</sup> Third, external advice and interventions play an important catalytic role in the process, but at the same time are only “perturbations” of overall internal organisational dynamics. Therefore, in the subsequent Sections I try to theoretically capture these internal dynamics insofar as they lead to rigidity as well as foster change.

<sup>38</sup> This finding suggests that it is impossible – or at least, misleading – to simply reduce individual attitudes towards the adoption of Free and Open Source Software to their job functions as it is tried by Alexy and Henkel (2007), and underlines the importance of applying a process perspective in researching adoption decisions.

## **5 Spirals of path dependency: mechanisms of rigidity and interventions for change**

The classic trajectory of path dependent processes proceeds from a contingent situation with multiple options in the beginning to a lock-in situation with only one (perceived) alternative left (David 1985; Arthur 1989), leading to the truism that “history matters”. However, the interesting question is *how* history matters: What are the mechanisms that connect contingency and lock-in, and how do they work over time?

The best way of identifying a lock-in is to look at difficulties in (attempts to) adopting a new, maybe even better alternative. Then, the focus lies on the mechanisms<sup>39</sup> that reinforce the continuous (re-)adoption of an alternative over time, requiring a process perspective (Van den Ven and Poole 2005). By coding the data along the meta-dimensions “makes switching easier/more difficult”, different types of structural constraints and their mode of continuous reproduction and/or reinforcement (“duality of structure”, Giddens 1984) have been identified as well as corresponding path breaking activities. Grouping related structures and their modes of reproduction then leads to three spirals of *accumulation* of constraining structures<sup>40</sup> over time (“spirals of path dependency”). These inductively generated spirals are then contrasted with the different analytical mechanisms listed in *table 1*.

### **5.1 The Experience-Ignorance-Spiral: Network effects at work on organisational level**

One fundamental barrier to any kind of change can be the “TINA principle”<sup>41</sup>: the strong belief that “There Is No Alternative”. Regarding desktop software, this perception of lacking alternatives was dominant in Munich on all organisational levels and rested deeply in one-sided, private, and professional experience. A politician, for example, refers to the “*general belief that one cannot get away from Microsoft.*”<sup>42</sup> Later on, the actual quality of alternative software environments surprised not only end-users but also IT experts such as the migration project lead, who admits the following:

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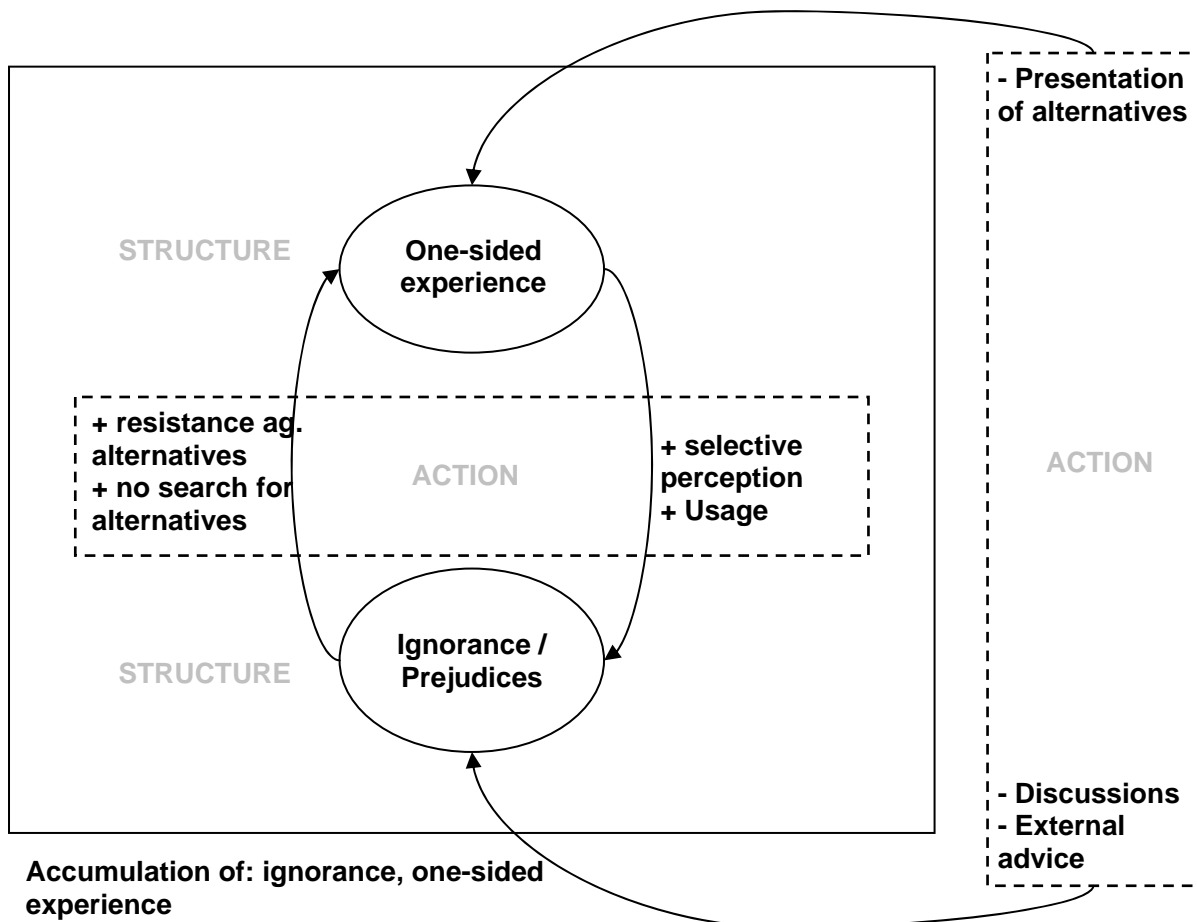
<sup>39</sup> See also: Dobusch/Schuessler (2007)

<sup>40</sup> Following Giddens (1984, p. 25) notion, “structure is not to be equated with constraint but is always both constraining and enabling”. This is also true in this case: structures constraining the possibility to switch desktop software environments of large organisations enable anybody who controls the dominant design in many ways, e.g. Microsoft’s expansion to other related markets. The point of view, i.e. the answer to the question “who is path dependent?” matters a lot when speaking of structures as constraints.

<sup>41</sup> Of course, “TINA” can also be attributed to the belief that a certain kind of change is inevitable and this way can drive change – as was demonstrated by its prominent advocate, Margaret Thatcher.

<sup>42</sup> M-070131-Int-GB, 128-130

„I and many others have been surprised that Linux and OpenOffice had been so good when the [first] study was made, that they were real alternatives. Because we didn't have the know how and the market overview. We only knew our world.“ (M-060315-Int-PH, 657-662)



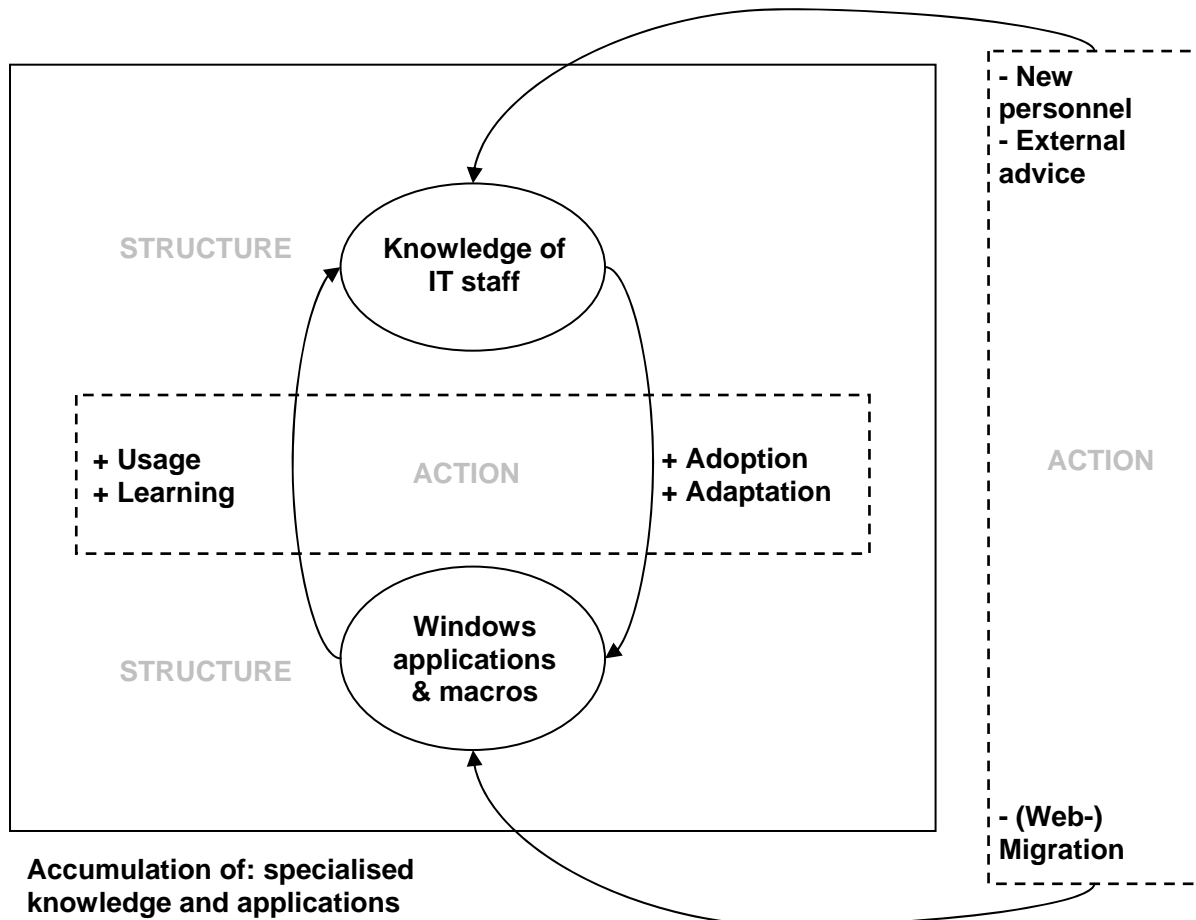
**Figure 2: Experience-Ignorance Spiral and respective interventions for change**

Obviously, the spiral of one-sided experience and ignorance resides and works in a rather cognitive domain of signification (Giddens 1984, p. 29) but its origins – above all Microsoft's total desktop market dominance – and consequences – for example, the continued (re-) purchase of software – are tangible, indeed. In other words, the roots of this spiral clearly are direct and indirect network effects with corresponding actions (and expectations) on the adopter's side.

Whereas discussions and external expertise helped to reduce general ignorance of alternatives, prejudices regarding specific functional deficits of alternatives prevailed, again on all organisational levels. So, the striking impact of product demonstrations on the opinion of

politicians<sup>43</sup>, IT officials<sup>44</sup> and users<sup>45</sup> underlines the important role of one's own experience and usage in developing *and* overcoming prejudices.

## 5.2 The Software-Knowledge-Spiral: Investments and learning as reasons for rigidity



**Figure 3: Software-Knowledge-Spiral and respective interventions for change**

All interviewed actors on all organisational levels agreed on one point: special purpose applications that require Microsoft Windows or Office are by far the greatest migration barrier. This is not only because of missing Linux alternatives or purchasing costs, but also because of the untransferable skills, know how, and complementary artefacts accumulated and (re-)produced over years of *learning by doing*<sup>46</sup>. The dominant mechanisms are clearly both investment and learning spirals that lead to the accumulation of specialised assets, be it software or skills.

<sup>43</sup> M-070309-Int-WH, 764-793

<sup>44</sup> M-060315-Int-PH, 427-429; M-070309-Int-WH, 547-553

<sup>45</sup> M-060315-Int-PH, 444-450; M-070309-Int-WH, 403-412

<sup>46</sup> Williamson (1985) also emphasises the importance of „learning by doing“ for generating specialised assets.

Again, the intervening actions aimed at altering constraining structures: New personnel<sup>47</sup> and external consultancies<sup>48</sup> delivered new and different knowledge and helped to technically migrate<sup>49</sup> specialised applications. All applied measures, however, require substantial investments of time and money, and are therefore by-products of an innovation process already in progress.

Different to the experience-ignorance-spiral, the software-knowledge-spiral accumulates specialised products and competencies that can be traded on regular markets for products and services. Therefore the structural domain is more that of “domination” on the basis of resource allocation and authorisation (Giddens 1984, p. 31). Another difference to the former spiral is that it works foremost on only one organisational level, namely, that of decentralised IT. For them, dealing with Microsoft’s products is the major part of their job, and their skills and competences are directly related to its applications.

### ***5.3 Decentralisation-Diversity-Spiral: Complementarity of organisational structures and market environment***

The discussion on possible alternatives also revealed some kind of “second order ignorance”: ignorance of ignorance. Before the migration process, nobody knew the actual amount of software diversity in the municipal administration. The high degree of software diversity silently developed over time as a consequence of the decentralised IT organisation: Different departments used a broad variety of applications for identical tasks.<sup>50</sup> For any migration project, however, this diversity increases the absolute number of applications to address and the complexity due to differences and complementary functions of the different software programs. Actually, this reveals cascades of complementarity: The multitude and diversity of applications stabilises or even reinforces the process of decentralisation that in turn increases application diversity. This reciprocal process again is complementary to indirect network effects on a market level that provides the greatest diversity of application software only for the dominant operating system.

The main consequence of the decentralisation-diversity-spiral for the migration process was the need for complementary change projects aiming at organisational restructuring and

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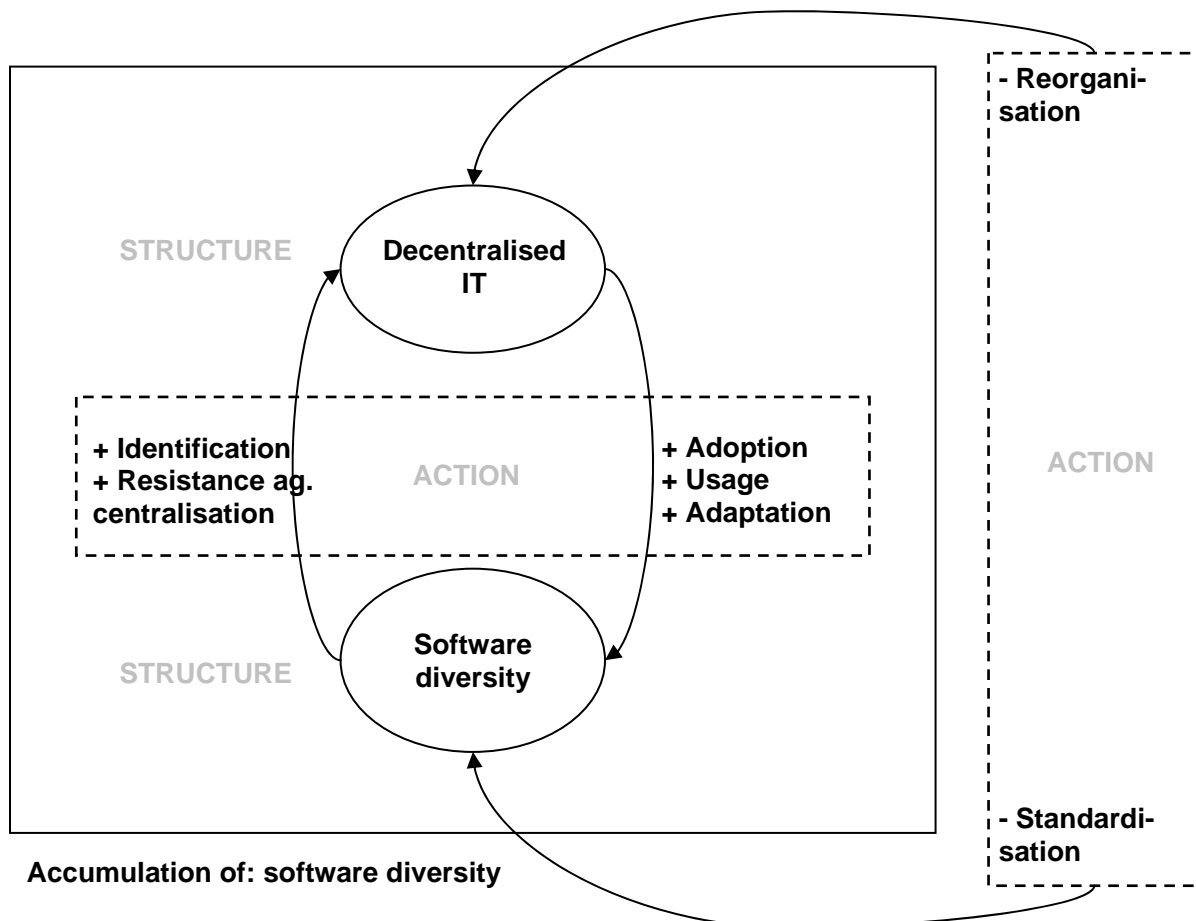
<sup>47</sup> M-061124-Int-ML, 883-885; M-070125-Int-DG, 386-390

<sup>48</sup> M-060304-Vor-FS, 559-561; M-070125-Vor-SchießlSiebert, 124-134

<sup>49</sup> Originally, in the “Client Study”, emulation software was calculated as the only migration option. In the course of the migration project, several other migration possibilities from changing the operating system to using web applications have been preferred in most cases.

<sup>50</sup> M-060315-Int-PH, 317-323

standardisation of (functions of) applications. Whereas the majority of the decentral IT officials resisted these complementary projects, for the central IT officials and politicians, these projects appeared Janus-faced: they resulted in both extra effort and some kind of “collateral utility” as the migration thus functioned as a carrier for increasing their influence and control possibilities.



**Figure 4: Decentralisation-Diversity-Spiral and interventions for change**

In Munich, the decentralisation-diversity spiral describes only the accumulation of application diversity over time, whereas the degree of decentralisation remained rather constant. However, the power of decentral IT departments to resist re-centralisation increases hand in hand with their specialised knowledge, enforcing the decentralised status quo, and thus again belongs to the structural domain of domination via resources (Giddens 1984, p. 31). As far as different organisational levels were involved, this conflict was worked out mainly among the IT staff, with the politicians acting as arbitrators in the end.

#### **5.4 From path dependency to path breaking**

The three “spirals of path dependence” identified are rooted deeply in the empirical data and do not fit precisely into the analytical mechanism categories presented in Section 2. This, however, is not very surprising and does not prove wrong either the analytical categories or the empirically derived spirals. On the contrary, each spiral can be assigned a dominant mechanism (see *Table 6*), while the other mechanisms only play a subordinate role. Additionally, the spirals are not “pure” in terms of mechanisms, as they span different levels of analysis: Implicitly or explicitly, all spirals refer to Microsoft’s dominance on the market level and describe the – of course, only (very) marginal – contribution of an organisation to this macro situation. If not always directly, as in the Experience-Ignorance-Spiral, network effects on the market level reinforce the functioning of organisational dynamics due to complementarity between two or more mechanisms: Learning in the Software-Knowledge-Spiral, for example, is, in this sense, complementary to indirect network effects on the market level that let software producers restrict compatibility of their applications to only one software environment.

**Table 6: Dominant mechanisms in spirals of path dependency**

(Dominant) mechanism	Spirals of path dependency
Direct and indirect network effects	Experience-Ignorance-Spiral
Investment and learning spirals	Software-Knowledge-Spiral
Complementarity	Decentralisation-Diversity-Spiral

Juxtaposing the mechanisms at work and the case description also demonstrates that the genesis of path dependency need not be based on the same mechanism(s) as its continuation. When Munich’s IT officials introduced client PCs, they tried to increase the flexibility of their IT infrastructure. As an unintended consequence of this purposeful action, they not only opted for a certain technological path, they also made their small contribution to the emerging market dominance of Microsoft Windows. So far, Munich’s story is no different from most other large organisations that introduced client-server computing in the early 1990s. Munich backed the right horse when it adopted Windows compared to others that purchased expensive but short-lived terminal-server-solutions.<sup>51</sup>

But whereas the lack of feasible alternatives and product quality may have been a major cause for its adoption in 1990, this obviously cannot be the reason for reluctance in adopting alternative operating systems more than a decade later. As has been demonstrated so far, the

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<sup>51</sup> The municipality of Frankfurt/M., for example, first invested into the proprietary system CLIQ on Unix basis around 1990, not introducing Windows PCs until 1994.



case of Munich's municipality gives evidence for several mechanisms that led to rigidity in desktop software environments over time and are probably at work in other comparably large organisations as well. Taking this as a starting point, the following sections investigate why and how Munich became different from other comparable organisations.

## **6 Path breaking innovation: generating and sustaining momentum**

### ***6.1 How a “reactive sequence” can lead to “shifting involvements”***

Similar to the mechanisms leading to rigidity, the process of unlocking can also be described as a spiral of actions. Differently to the self-stabilising or –reinforcing spirals of path dependency, this spiral is more fragile and similar to the recursive creation of trust (Golembiewski and McConkie 1975) and Mahoney's (2000, p. 526 ff.) concept of “reactive sequences”: As in the latter, it is not clear whether the next turn will accelerate or slow down the process. Small events may generate or stop momentum, heavily dependent on different and often contradictory external context variables. Once set in motion, however, all investments made into the process would be “sunk” in case of failure. These “sunk costs” of the innovation process stabilise it similar to investments made into relationships built on reciprocal trust. The logic behind this stabilisation is best described by the saying “In for a penny, in for a pound!”: The search for an alternative office software led to the search for alternative operating systems which, in turn, led to the restructuring of the IT organisation and strategy. In addition, these fundamental changes in the subject correspond with Orlikowski's (2000, p. 405 f.) emphasis on “the recursive interaction between people, technologies and social action” and that “technology structures are emergent, not embodied”.

The critical and still unanswered question, however, is why an organisation invests such a huge amount of money, time and attention? At first glance, all interventions for change set by the municipality's officials – be it the search for alternatives, the recruitment of new personnel, the investment in new software or the organisational restructuring – are just (monetary and non-monetary) costs. Confronted with this impression, one of the leading officials in the migration project reasoned the following:

It has to do with ideology. [...] Suddenly people said ,Something has to change. The monopoly issue, the information security issue, all this has to be politically framed.' [...] Overnight [software] had become a political issue, an ideology.” (M-061124-Int-ML, 613-616, 647-650, 652-653)

Although he was the only one to state this explicitly, there is much evidence in all the other interviews for his perception of the migration process as a political one. Actually, the demonstrative effort of many interview partners – even without being asked respective questions – to stress that they were “not ideologists”<sup>52</sup> and that the decision was “ideology free”<sup>53</sup> is a strong indicator for both the underlying political motivation as well as for the pressures for non-political justification of the decision.

Hence, generating momentum meant turning an economic and technical decision into a political one, and thus changing the nature of costs and benefits in a manner described by Hirschman (1982) in his book “Shifting Involvements”: He distinguishes “private interest and public action” and describes the shift between the two forms as “the fusion of – or confusion between – striving and attaining” (p. 85), which leads to activities usually considered as costs becoming benefits.<sup>54</sup> This political nature of the innovation project is not only a reason for the municipality’s major investments, it may also be the explanation why municipalities and not corporations took the lead in adopting the minority system in the network market for desktop PC operating systems: As partly political institutions, they are probably more susceptible to political arguments. This, of course, does not prevent major corporations from building upon their pioneering activities.<sup>55</sup>

A necessary precondition for all of this, of course, is the existence of an alternative perceived as superior, or at least viable, as has also already been recognised by Hirschman (1982, p. 64): “The extent to which public action is really taken up may well depend on the ready availability or appearance of a ‘cause’”. And the sad story of IBM’s OS/2 in the early 1990s and the niche role played by Apple Computer show that “any alternative” was *no* alternative for the vast majority of professional adopters in the desktop software market for more than a decade. A member of the project team in Munich phrases this more floridly:

„OS/2 has never been on the agenda in Munich. Never. And Mac either. [...] The strategic approach to move from the dependence on one manufacturer to another one – that didn’t knock anybody’s socks off.”  
(M-061124-Int-ML, 299-309)

Although “small events” played a “big” role in starting off and enhancing the innovation spiral, it needed orientation, a centre to coil up: The new software environment had to provide

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<sup>52</sup> E.g. M-070309-Int-WH, 831-843

<sup>53</sup> E.g. M-060412-Int-CS, 361-363

<sup>54</sup> For an extensive discussion see Dobusch (2007).

<sup>55</sup> For example, the largest company that announced its migration after the first large municipalities had begun to migrate was the French car manufacturer PSA Peugeot Citroen (20.000 desktops; cf. <http://www.golem.de/0701/50251.html> [13th May 2007])

(at least the promise of) new perspectives, differentiated enough from the status quo, to justify the huge efforts associated with the migration. In line with structuration theory, ideas and ideology are not enough to be influential, as they need to be “materialised” via transformation into resources such as, in this case, financial support, new personnel and computer hard- and software.

The lock-in situation in the market for desktop operating systems and its potential resolution by leading adopters such as Munich is analogous to that of a heavily criticised but still dominant scientific paradigm in the sense of Kuhn (1996): In spite of constant and severe critiques of Microsoft’s monopoly (practices) – even leading to the U.S. antitrust trial and antitrust measures by the European Union – there was no “paradigm change” due to the lack of an alternative *perceived as viable*<sup>56</sup>.

## **6.2 Bringing together organisation and social movement theory**

Conceptualising the path breaking process as a reactive sequence, the decision to search actively for alternatives was definitely the “critical juncture”<sup>57</sup> in Munich’s path breaking process. By the time that Munich’s officials started to look for an alternative seriously and called for external advice, the time was ripe: The anti-monopolistically motivated search by Munich met with the Free and Open Source Software movement and its – differentiated enough – approach of providing software without license fees and dependency on one sole manufacturer.

The driving force behind the innovative adoption process in Munich is the *idea* of overcoming the dependence on a monopolistic vendor, with improvements in terms of costs and software quality being “only” peripheral intentions.<sup>58</sup> The strong rejection of Microsoft’s monopoly runs like a red thread through all interviews of actors on all organisational levels:

“The dependence on Microsoft always puzzled and annoyed me.” (M-070131-Int-GB, 139-140)

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<sup>56</sup> “Viable” is here again used in the sense of “differentiated enough” compared to the dominant standard that it justifies the investment of remarkable switching efforts.

<sup>57</sup> Mahoney (2000, p. 513) defines them as critical events in the *beginning* of path dependent processes: “Critical junctures are characterized by the adoption of a particular institutional arrangement from among two or more alternatives. These junctures are ‘critical’ because once a particular option is selected it becomes progressively more difficult to return to the initial point when multiple alternatives were still available.”

<sup>58</sup> It is important to emphasise that “peripheral” does not at all mean unimportant. Most of the discussion process and both studies centred around issues of “peripheral intention” such as migration costs, potential long-term cost savings, software quality improvements and so on.

„I am no ideologist in this topic but I think that the council’s decision is correct, as a principle, to preserve vendor independence as long as possible, to not concede to a monopolist without resistance.” (M-070309-Int-WH, 831-843)

„Any monopolist is suspicious in the first place. This can be said in general. (M-061124-Int-ML, 157-159; all translations L.D.)

But this strong motivator needed direction that was given by another idea, or even ideological camp: the Free/Open Source Software movement. They provided the ideational toolset in the form of normative frames and cognitive programs (Campbell 2004, p. 94; 2005; see *table 7*) to guide and fuel the path- (and paradigm-) breaking process. In this sense, the story of Linux in Munich is also one of overlapping dynamics of social movements and organisations. Consistent with McAdam and Scott (2005, p. 14), who state a growing convergence between research on organisations and social movements, especially in their focus on structures and processes, this study takes theoretical tools provided by the social movement scholar Campbell and applies them in this organisational study to integrate both domains.

**Table 7: Typology of ideas (Campbell 2004, p. 94)**

	<b>Foreground</b>	<b>Background</b>
<b>Cognitive (Outcome oriented)</b>	<b>Programs</b> (ideas as elite prescriptions that enable [...] the charting of a clear and specific course of action)	<b>Paradigms</b> (ideas as elite assumptions that constrain the cognitive range of useful programs available [...])
<b>Normative (Non-outcome oriented)</b>	<b>Frames</b> (ideas as symbols and concepts that enable decision makers to legitimise programs to their constituents)	<b>Public Sentiments</b> (ideas as public assumptions that constrain the normative range of legitimate programs available to decision makers)

In Munich, the dominant frames attached to the migration enterprise were deduced from widespread economic “wisdom” resting in neoclassical premises<sup>59</sup>: Monopolies are bad, competition is good. An example for an outcome oriented program, on the other hand, is the imperative of only purchasing web-based applications in the future, as these are completely independent from the desktop operating system.

In the terms of structuration theory, these framing processes occur in the legitimation domain and mobilise and nurture resource mobilisation in the other two domains (signification and domination): “[I]n the theory of structuration ideology is not a particular ‘type’ of symbolic

<sup>59</sup> This, of course, does not imply neoclassical economists to be in favour of FOSS alternatives as the example of Liebowitz and Margolis (2001) impressively and – as far as their defense of the Microsoft monopoly is concerned – ironically demonstrates.

order or form of discourse. [...] ‘Ideology’ refers only to those asymmetries of domination which connect signification to the legitimation of sectional interests” (Giddens 1984, p. 33). Even though Giddens’s notion of ideology is not exactly the same as the one explicated above, its “bridge function” between the different areas of structuration is compatible with case and theory: It is momentum mainly stemming from the legitimation domain that fuels interventions directed at the spirals of rigidity primarily working in the other two domains.

## 7 Conclusions

Innovation barriers in network or “natural monopoly” markets (Varian et al. 2004, p. 25) can hinder even the adoption of obviously better alternatives (cf. David 1985; 2000; Liebowitz and Margolis 1990). As GNU/Linux is (at least not *obviously*) superior compared to the established Windows standard<sup>60</sup>, its adoption by Munich’s municipality gives evidence for the importance of ideas and ideologies in innovation processes. In line with the more general notion of innovation as a paradoxical process (Ortmann 1999), this case gives indications for the reasons why organisations make the first step, in spite of strong barriers to change.

Hirschman’s notion of “public action” and its transformation of costs into benefits explains the enormous momentum embedded in the political adoption process in Munich. In line with the only post-hoc rationality of innovation, this corresponds with the necessity of a direction for innovative momentum, provided by ideas of a social movement that may appear irrational from the viewpoint of the status quo.<sup>61</sup>

In the Linux case, two ideological camps work together in what Hajer (1993) calls a “discourse coalition”: The “anti-monopoly camp”, mainly consisting of politicians, and the “open source software camp”, mainly represented by IT experts. Together, these two camps generate enough momentum to overcome the strong innovation barriers of the desktop software markets. Therefore, ideologies –concrete systems of ideas and motivations not deducible (bounded) rationally from existing knowledge – can play a bridging role between the ex-ante irrationality and the ex-post rationality of innovative processes. Only time will

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<sup>60</sup> Varian/Shapiro (2003, p. 12): „There have been several attempts to compare the TCO of Windows and of Linux in various computing environments. In most of the studies the difference in TCO is on the order of 10 or 15 percent. This difference is not large; a 10 percent difference in TCO could easily be swamped by local conditions, random events, and other considerations. To a first approximation, it seems reasonable to suppose that neither of these two platforms has a striking advantage over the other in terms of conventional measures of TCO.”

<sup>61</sup> This is also similar to the logic of scientific innovation as described by Kuhn (1996) or Feyerabend (1977), who emphasise the necessity of an alternative paradigm that may not appear rational to representatives of the dominant paradigm but is the *conditio sine qua non* for any paradigm change.

show whether the rise of the competing business models of Free and Open Source Software have the power to effectively challenge the “dominant design” (Anderson and Tushman 1990) of proprietary software production.

Of course, much more research is needed, especially concerning early organisational adopters of minority systems in network markets, especially in the business sphere, and on the distinct channels that link social movements and organisational decision processes.

## Appendix A: Shortcut references to qualitative data sources

### Shortcut logic:

CaseAbbreviation-YearMonthDayLetter<sup>62</sup>-Documenttype-Initials/Media<sup>63</sup>-Comment, line numbers

### Example:

M-061124-Int-FS, 12-19

### Case abbreviation:

M	Munich
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### Document type

Int	interview
Vor	talk
Sit	minutes (of a meeting)
SiU	agenda papers (e.g. proposals, decision drafts, ...)
Stud	expert's report
IntA	interview supplements (e.g. handouts, drawings, ...)
VorA	talk supplements (e.g. slides)
MO	media article (online)
MP	media article (print)
Son	Miscellaneous

<sup>62</sup> Letters distinguish otherwise identical shortcuts of the same date

<sup>63</sup> Initials of interview partners are arbitrary and anonymous.

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