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Mitigating risk in computerized bureaucracy

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Mitigating Risk in Computerized Bureaucracy

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"Πάντα χωρεῖ καὶ οὐδὲν μένει"
"All is flux, nothing stays still."
Plato quoting Heraclitus in Cratylus, 402a

"It is not the strongest of the species that survives, nor the most intelligent that survives. It is the one that is the most adaptable to change."
Charles Darwin

Abstract

This paper presents an important aspect of the pragmatic dimensions of mitigating the risks that stem from computerized bureaucracy, and thereby, preserving the organizational integrity of a firm. A case study is used to provide valuable insights into the mechanics of such mitigation. The case refers to the problematic implementation and use of a computerized reservation system in a large budget hotel in London, United Kingdom. Following the empirical findings, Ciborra's notions of bricolage, improvisation and tinkering are examined as practical and useful ways of addressing the downsides of computerized bureaucracy.

Keywords: computerized bureaucracy, IS security, organizational integrity, managerial discretion, metaschematization, bricolage, improvisation, tinkering.

1. Introduction

This is the final in a series of three papers addressing the phenomenon of 'computerized bureaucracy,' and its wider impact on modern organizations. The first two were written with joint author Professor Ian Angell. In the first paper, we introduced and raised the issue of computerized bureaucracy by identifying a distinct form of bureaucracy that comes with the use of computerized systems (Angell and Samonas, 2009). In the second paper, we presented a sound theoretical framework for the analysis and discussion of the central role that power, trust and discretion play in IS security; in the same paper, we also discussed the benefits of active discretion for the organizational integrity of a firm, as well as the importance of involving the top management, selecting the 'right' people, and providing staff with extensive and meaningful training (Samonas and Angell, 2009). In both papers, IS security is treated within the context of the systemic concept of 'organizational integrity' Angell (1991, 2000, 2005, 2009).

Integrity is not seen as an element of the CIA model (Angell and Samonas, 2009; Dhillon and Backhouse, 1996; Peltier, 2004), rather as the often neglected, yet fundamental systemic property of homeostatic wholeness (Angell and Smithson, 1991; Angell and Samonas, 2009; Dhillon and Backhouse, 1996). IS security is then considered to be a vital component of the organization as a whole, and not an isolated issue that is being raised solely through the extensive use of ICTs (Angell and Smithson, 1991; Angell, 2005; Dhillon and Backhouse, 1996). Dhillon and Backhouse have adopted the very same concept of integrity in their collaborative and individual work over the years (Backhouse and Willison, 2006; Dhillon, 1995; Dhillon and Backhouse, 1996, 2000; Dhillon, 2001).

This paper aims to unveil the pragmatic dimensions of mitigating the risks of a computerized bureaucracy and preserving the organizational integrity of a firm. To this end, a case study is used to illustrate how this kind of risk mitigation works in practice, within an organizational setting where managers may have been granted substantial discretion of action by the top management of the firm, but they are still locked into a computerized bureaucracy. The case refers to the problematic implementation and use of a computerized reservation system in a large budget hotel

in London, United Kingdom. The research is predominantly qualitative and was conducted over a period of two (2) years, during which, the researcher was gathering and analyzing empirical evidence through official internal documents and more than 35 semi-structured interviews.

The paper is structured as follows. First, the theoretical background of the case is presented, in way of an overview of computerized bureaucracy and organizational integrity. Second, the key findings of the case study are presented and then analyzed, with emphasis given to the mechanics of the mitigation of risk of a computerized bureaucracy. In the discussion that follows Ciborra's notions of bricolage, improvisation and tinkering are examined as practical and useful ways of addressing the downsides of computerized bureaucracy. Finally, the conclusion provides a brief summary of the goals of this paper and makes suggestions for future research.

2. Theoretical framework

Computerized bureaucracy

The term 'computerized bureaucracy' is certainly not novel; it was originally coined to describe a bureaucracy that has been partly or fully computerized (Inbar, 1979). Inspired by the metaphor of 'organization-as-a-computational system' (Cornelissen and Kafouros, 2008), this conceptualization treats any bureaucracy that operates under normal conditions as a social computer (Inbar, 1979). In this context, and following the breakthrough introduction of computerized systems into the workplace, it was argued that it is feasible and necessary, not only to model, but also to computerize standard decision-making procedures of bureaucracy; that is, 'primarily repetitive tasks and functions of classification and judgment carried out in an office with relatively standardized documentation and information as both input and output' (Inbar, 1979). According to Inbar, the computerization of bureaucracy presents many great benefits and challenges, regardless of its potential drawbacks.

More specifically, Inbar predicted that bureaucracies would ultimately be transformed into gigantic hybrid computers, with strong technological and social components. In his view, computerized bureaucracy is serving a dual purpose and functionality. First,

it substantially reduces the problems that arise from the idiosyncrasies of bureaucrats and from human errors in general. Second, it effectively addresses the fundamental systemic problems of bureaucracy, namely its machine-like rigidity that results in the lack of flexibility and self-correctiveness (Inbar, 1979). However, he also saw the increase of computer crime as a potential drawback of computerized bureaucracy, although he suggests that the hazard of computer crime cannot possibly hinder the overall positive contribution of computerization to society, which is through the substantial refinement of bureaucracy and the improvement of its quality of service.

Developing a different notion of computerized bureaucracy, Angell et al (2009) argue that the use of technology introduces certain bureaucratic norms into organizations, as computers are 'bureaucratizing' the process of problem solving along with other tasks and processes that are employed in contemporary organizations. In their view, the term 'computerized bureaucracy' refers to a distinctive kind of bureaucracy that is being established through the implementation and extensive use of ICTs; the term then depicts a complex and multifaceted phenomenon, with both technical and organizational implications, and one which appears to have serious consequences for security professionals, since it is conceived within the context of 'organizational integrity'.

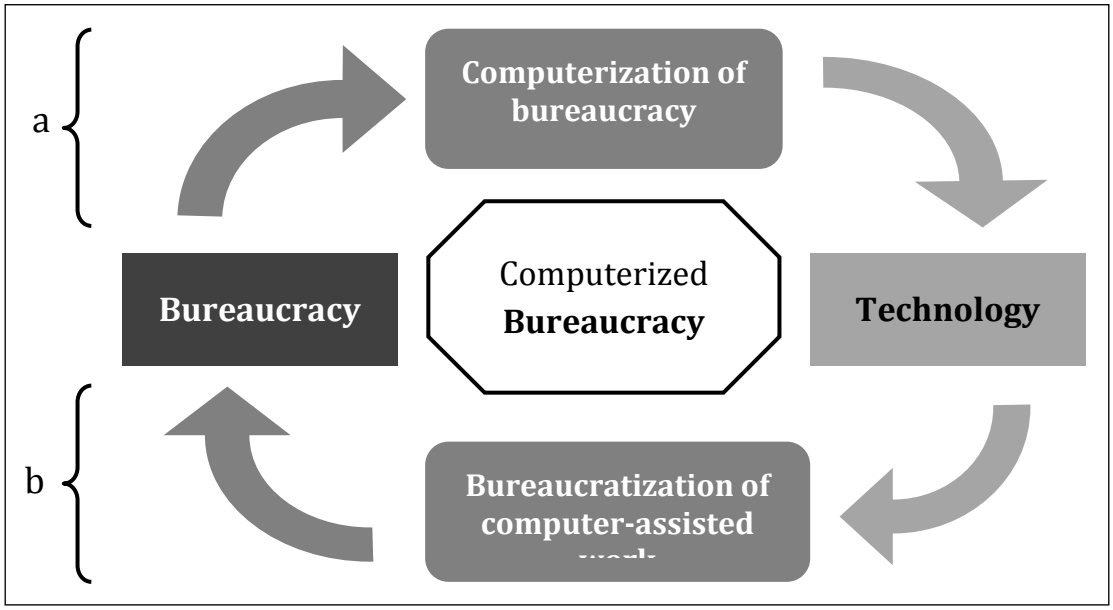

Fig. 1: The duality of computerized bureaucracy. SOURCE????

Evidently, the notions of computerized bureaucracy that have been developed by Inbar (1979) and Angell et al (2009) respectively (see Fig. 1), are grounded in different premises and depict different aspects of the same phenomenon; namely the extensive and manifold use of formalized processes in organizations. Inbar's conceptualization is centred on bureaucracy and considers technology as a mere tool, whereas in the definition introduced by Angell et al, the focus is shifted to the study of technology as a regulative regime (Angell and Samonas, 2009; Bloomfield and Vurdubakis, 2002; Samonas and Angell, 2009).

Organizational integrity

The concept of 'organizational integrity' aims at providing practical and pragmatic recommendations to managers through the development of a contextual and systemic approach to IS security. As Angell et al (1991) argue, the integrity of the processes that maintain the identity and stability of an organization should be defended at all costs, since the very existence of an organization depends on its 'organizational integrity' – a term that denotes the cohesion, coherence and wholeness of an organization (Angell and Smithson, 1991).

The extensive, but nevertheless inherently problematic integration of computerized information systems with an organization's human activity systems implies that maintaining the integrity of information systems is inevitably intertwined with general security and wider organizational issues (Angell and Smithson, 1991; Angell, 2005). In this respect, issues of organizational integrity transcend the security of computerized systems by uniformly addressing the technical, formal and informal sub-systems of an organization as illustrated in the TFI-model (Dhillon and Backhouse, 1996):

- At a first level, the technical sub-system supports, and is supported by, the formal sub-system, which is actually a bureaucracy that replaces the meanings and intentions of organizational members, with rule and form.
- These two (2) sub-systems operate within a larger environment 'informal' sub-system, where the meanings and intentions of organizational members are established, understood, altered and discharged.

– Over time, the ‘informal’ sub-system is created, which consists of cohesive social groups of organizational members with overlapping memberships in the two (2) aforementioned sub-systems. Some of these social groups can significantly affect the wellbeing of the organization, since they may possess enough power to influence other informal groups or even the formal structures of the organization.

Based on two (2) empirical case studies, Dhillon et al (1996) argue that failure to achieve a proper balance between the three sub-systems generates uncertainty creates complexity, and eventually introduces risks due to the continuous and out-of-control interactions of the sub-systems (Dhillon and Backhouse, 1996).

From a systems-theoretical viewpoint, every organization establishes controls that seek to check and regulate the interactions among the three (3) sub-systems and to protect its integrity as part of homeostasis and of growth (Angell and Smithson, 1991). However, controls alone are inherently insufficient, since they are nothing more than ‘actions intended by the system to cause effects that are predicted on expectations based on prior experience’ (ibid), and certain aspects of control are a risk to organizational integrity (Samonas and Angell, 2009). Since controls may mostly identify predictable hazards, only vigilance by the staff can recognize and deal with the unusual risks; this vigilance can only come from understanding both the control mechanisms and the risks, and from a positive attitude to the way the company detects, deters, corrects, prevents, tolerates, mitigates dangers, and recovers from damage (Angell and Smithson, 1991; Samonas and Angell, 2009). Hence, there should be a balance between the formal security procedures of organizational control and individual freedoms (ibid).

In general, it seems that there is no universal ‘recipe’ for minimizing risks and maintaining organizational integrity (Angell and Smithson, 1991; Dhillon and Backhouse, 1996). An elaborate security policy looking to safeguard organizational integrity by addressing all three (3) aforementioned sub-systems of the organization is an important, but only the first step in a continuous process of observation and experimentation that seeks to identify the systemic opportunities and hazards (Angell and Smithson, 1991; Samonas and Angell, 2009). Such a policy should be followed up with an understanding of what to do, how to do it, and what happens beyond or

even despite the intentions of management (ibid). The active involvement and commitment of staff at all levels of the organization, and not just senior management, are necessary and sufficient conditions for the development of a successful security policy; hence, training courses in security awareness are inevitably a major part of this process (ibid).

3. Research approach

The empirical findings are based on a case study that was developed over a period of two years. A case study research approach was seen as appropriate, since such an approach facilitates the understanding of the complexities of the hospitality environment, whilst playing "an influential role in building and advancing the body of knowledge for hospitality IT" (Connolly, 2005). Furthermore, the case study approach is particularly useful, because it helps researchers focus on practical issues, rather than solely theoretical considerations (Connolly, 2005; Yin, 1994).

The case refers to the problematic implementation and use of a computerized reservation system in the Rainbow Hotel, a large budget hotel in London that is part of a branded budget hotel chain. Budget hotels have become the fastest growing area in the UK accommodation sector, (Jones, 2002; PriceWaterHouseCoopers, 2002; VisitLondon, 2009), and they are regarded as one of the most successful strategic innovations in the European hotel industry (Fiorentino, 1995). The commercial success of budget hotels essentially lies in the provision of a purpose-designed service, which appears to be particularly successful in pulling customers down from full-service hotels, and up from inexpensive, but lower quality, types of accommodation (Fiorentino, 1995). In London, the branded budget hotel sector holds a major share in the city's total room supply growth since 1991, with more than 4,500 rooms in 19 boroughs (PriceWaterHouseCoopers, 2002; VisitLondon, 2009).

Data collection comprised of official internal documents and more than 35 semi-structured interviews, centred on the 'work diary' of the Reservations Manager of the budget hotel. For the purposes of the research, the Reservations Manager was kindly recording all the problems that she had to face in her day-to-day interaction with the

computerized reservations system used in her workplace. The interviews would then focus not only on the problems arising from the use of the computerized reservations system, but most importantly, on the different, and in many cases novel, ways that staff employed to efficiently address the problems. In this context, the researcher was keen on investigating how are the problems related to computerized bureaucracy addressed within the organization and in what ways are the people involved.

4. Case Study

Background of the case

The Rainbow Hotel is the flagship of Blackmore Hotels – a small chain of six unclassified, yet corporately branded budget hotels that are scattered across central London, comprising of more than 2,000 rooms in total. In particular, the Rainbow Hotel comprises of more than 500 rooms and offers a range of facilities such as a restaurant, a conference room, a bar and an Internet café. The hotel has a £5 million turnover, and during busy periods room occupancy rates exceed 95%. Over the years, the hotel has managed to attract a considerable number of returning customers, especially summer language schools and tourist groups from the United States of America.

Like most budget hotels, the Rainbow Hotel employs high numbers of temporary and part-time staff; it is indicative that almost half of the staff working at the Reception and the Reservations Office are full-time students. In fact, more than three-quarters of staff are employed on temporary contracts, since only managers and supervisors are working on a permanent and full-time basis. Temporary staff are employed in most roles, functions and divisions, with the exception of the Maintenance Division as well as the top management; that is, the Hotel Manager, the Front-office Manager, the Facilities Manager, and the Reservations Manager. When there is unprecedented demand for work in the Food-and-Beverage, Maintenance, or Accounting Division, extra staff are seconded to the hotel from other Blackmore hotels. Housekeeping and security are the only functions that are currently being outsourced by the hotel.

Technology at Blackmore Hotels

In terms of processing reservations, Blackmore Hotels rely heavily on technology. The hotel chain has been using computerized reservation systems for many years in order to handle their reservations and manage all their core front-office and back-office operations. However, a central reservation system was not in place, and so, all the hotels of the chain were using the same computerized reservation software, but independently of one another; the only interoperable features were those relating to accounting and bookkeeping. Since 2004 and until recently, all Blackmore Hotels were running the same non web-based client-server reservation system, which was developed by a British medium-sized hospitality technology company. The software was designed to enable the execution of a number of different tasks concurrently in multiple, easy-to-use windows with simple and clear data entry. The main functionality was contained within a single screen, making the use of the software as simple and efficient as possible. The software integrated a significant, but limited, number of property management features, which were not used by Blackmore Hotels. Overall, it can well be argued that the adoption and use of this particular reservation was a success story for Blackmore Hotels, especially since the very few problems that arose over the years were efficiently tackled by the customer support of the vendor.

The top management of Blackmore Hotels were offered the choice of upgrading the client-server software to a central reservation system for all the hotels of the chain, and hence take full advantage of the features provided by the software. However, taking into consideration the intense competition within the London budget hotel sector, they seemed keener to switch to a more advanced computerized reservation system that would essentially:

- Integrate full property management system functionality;
- Improve the chain's yield management;
- Attain tighter operational and financial control across all hotels of the chain.

Xenia, the reservation system that was eventually selected, marked an important turn in the firm's business model and strategy, and it was a considerable investment for Blackmore Hotels, as it was bought for over £1,000,000. According to the vendor, *Xenia* serves all segments of the market, including luxury, upscale, mid-price,

economy, budget, specialized service and limited service hotels, because it is designed to be flexible, modular and scalable to suit any size hotel. It is indicative that over the past few years *Xenia* has been used by large international hotel chains, like the Wynn, the MGM Mirage, the Four Seasons etc. With *Xenia*, the central reservations system and property management system of a hotel or even an entire a hotel chain are seamlessly integrated into one database. *Xenia* integrates traditional property management system functions, like deposit handling and room blocking, as well as sales and catering functions, and in this respect it is actually much more than just a central reservation system. In the hospitality industry such integration is called 'true integration', and it is seen as a major benefit for consumers and hotel investors alike as it allows for real-time reservations and multiple inventory management through a single database (Bardi, 2007; Oliva, 2001).

Customizing Xenia

During the customization of *Xenia* for the Rainbow Hotel, many features of the software were deemed unnecessary and they were, therefore, disabled; for example, all the features relating to guest membership programs, as well as Very Important Person (VIP) guests were disabled, since they could not possibly be used in a budget hotel. Other features were retained, but never used; for instance, the automatic room allocation feature was never used, because it could not take into consideration one of the hotel's main business rules, regarding the sharing of toilet and shower facilities only by guests of the same sex. Some of the features that were retained and used, proved to be particularly helpful in the day-to-day operations of the Rainbow Hotel. For example, the reception staff can simultaneously check in and out a group of guests on *Xenia*, provided that all the members of the group arrive and depart together; this has indeed saved much time and effort, since in the previous reservation system, every single guest of the hotel had to be individually checked in and out, regardless of whether they were part of a group reservation or not.

Inevitably, the main functionality and the core features of the system had to be retained, even though they did not always seem to quite fit with the business processes of the Rainbow Hotel. In such a case, the hotel had to adapt its business processes to the functionality of the system, rather than the other way round.

Dealing with 'regular' and 'irregular' tasks

In order to examine the overall front-office functionality of *Xenia* in a systematic way, it is necessary to distinguish the 'common' and 'normal' from the 'uncommon' and 'exceptional' cases that the system has to deal with. Following the work of Angell et al (2009), the distinction adopted here is between 'typical'/'regular' and 'singular'/'irregular' cases; the former categorization refers to usual tasks that happen often and are part of a 'normal work routine', whereas the latter includes tasks that are not happening regularly or according to the usual rules, or even unexpected tasks (Hornby et al., 2000). For reasons of simplicity, only the terms 'regular' and 'irregular' will be used in this paper. According to this distinction, there are actually four (4) different categories of front-office tasks that *Xenia* is expected to process in the operational context of the Rainbow Hotel.

In Figure 2, the vertical axis represents the distinction between regular and irregular front-office tasks of the Rainbow Hotel, as they are conceived according to the hotel's standard practice. Similarly, the horizontal axis represents the same distinction, based on the processes inscribed on *Xenia* by its developers, as well as on the functionality that was retained after the customization of the system for Blackmore Hotels.

Xenia / Rainbow	**Regular tasks (r)**	**Irregular tasks (i)**
Regular tasks (r)	R_rX_r	R_rX_i
Irregular tasks (i)	R_iX_r	R_iX_i

Fig. 2: Categorization of front-office tasks handled by *Xenia*.

In this context, the first category (R_RX_R) comprises of tasks that are conceived as regular by the Rainbow Hotel and are treated as such by *Xenia*. This is where the business processes of the hotel and the business logic of *Xenia* are completely aligned. The empirical findings suggest that the majority of tasks performed in the Rainbow Hotel are included in this category.

The second category (R_RX_I) introduces complexity, as it refers to all those tasks that are seen as regular by the Rainbow Hotel, but are treated as irregular by *Xenia*. An indicative example of this category is the treatment of a certain kind of no-shows. More specifically, a problem occurs when the primary guest of a shared room, whose name appears on the reservation as the contact person, checks in later than the secondary guests of that same room, with whom he shares the room. As a result, *Xenia* cannot properly generate the room charges during the End-of-Day (night audit) sequence, until the primary guest checks in. If the reservation has been paid for in advance, which is the norm in the Rainbow Hotel, a discrepancy in the balance of the reservation will then appear. Therefore, although this is a common situation for the Rainbow Hotel, it is being treated as an irregular situation by *Xenia*.

The third category (R_IX_R) refers to all the tasks that are treated as irregular by the Rainbow Hotel and as regular by *Xenia*. A characteristic example of this category occurred, when a group twenty (20) people arrived at the Rainbow Hotel and requested to check in. However, this was not possible, as the group reservation could not be found on the system. The Reservations Manager, who was on duty on that day, recalled that the Reservations Team had received an enquiry from an associated online travel agency many months before. The Rainbow Hotel had accepted the enquiry by confirming their availability, however, a group reservation was not placed on Xenia, as the hotel was awaiting the final confirmation of the agent, which was eventually never received. In the meantime, the group contacted the online hotel agent, who claimed that the reservation had been confirmed and therefore, it should appear on the reservation system of the Rainbow Hotel. The Reservations Manager double-checked the email inbox of the Reservations Team but to no avail, since she could only find the email correspondence that was related to the enquiry. For some unknown reason, the final confirmation email of the agent had never reached the Rainbow Hotel, the reservation was never placed, and the group were patiently waiting to be given rooms, as they had already paid a commission to the agent. Luckily, there were only very few rooms available and an *ad hoc* reservation had to be placed there and then. Eventually, the group were treated as walk-in guests by the system and they were given the last available rooms of the hotel without any further delay. In this case, an unexpected event for the Rainbow Hotel was treated as a regular event by *Xenia*.

The fourth category (R_IX_I) introduces even more complexity, as it includes all the tasks that are seen as irregular by both the Rainbow Hotel and *Xenia*. The odds of having to deal with such cases may be significantly low, however, tasks that belong to this category can create serious problems to the smooth operation of the hotel. A certain group reservation that was recently accepted by the hotel, illustrates the challenging nature of this category of tasks. Four (4) guests from this group reservation requested to share a twin room in a rather unusual way. Initially, Ms A would share the room with Ms B for a period of X days; after this period, Ms B would move to another room and so, Ms A would share the room with Ms C for a period of Y days. Finally, after that period of Y days, Ms C would also move to another room, giving her place to Ms D, who would share the room with Ms A for a period of Z days. So, in this group reservation, the group requested that Ms A shares her room with three (3) other people, in three (3) different periods of time. If this request was not part of a group reservation that involved many more rooms and guests checking in and out on different days, it would probably fall in the first (R_RX_R), or even the second (R_RX_I) category of tasks. However, given the complexity of the situation, the placement of this reservation on *Xenia* is actually a task that belongs in the fourth category (R_IX_I).

When system faults occur and/or irregular tasks need to be dealt with by the Rainbow Hotel staff, technical support comes mainly from the System Support Managers of Blackmore Hotels. The System Support Managers are almost always very busy, and hence, they cannot guarantee reasonable response times, due to two (2) main reasons. First, the poor technical support provided by the vendor of *Xenia*, and second the high cost of any subsequent to the initial customizations of the system. In the latter case, each customization of average difficulty and complexity costs approximately £5,000. Considering the high costs, Blackmore Hotels have urged the Reservations Managers to re-consider and prioritize their requests for changes on the system, before forwarding these requests to the central administration. This means that, practically, in the case of all those issues that cannot be resolved through further customization of the system, the organizational processes and the staff of Rainbow Hotel have no choice but to adapt to the processes already prescribed in *Xenia*.

Against this background, and considering the low quality technical support of *Xenia*

(both from the vendor and the System Support Managers), a small group of permanent staff[1] prefer to spend considerable time to learn the system on their own, as a viable solution to their problems with *Xenia*. This group of staff makes strenuous efforts to become less dependent on technical support staff through acquiring a high level of user expertise. Over time they have succeeded in becoming capable of detecting previously unknown problems with *Xenia* by double-checking and following up on 'awkward' or 'irregular' actions and transactions occurring with the computerized reservation system. After spotting an 'irregular' case, which can be a system error, a human mistake or both, they make every effort to fix it themselves in the first instance, and only consider asking for technical support as a 'last resort'.

This is usually achieved through improvisation and the 'metaschematization'[2] of tasks that are considered irregular by *Xenia*, into regular ones that can be handled by the system with relative straightforwardness. In other words, the smooth operation of the Rainbow Hotel ultimately lies on the tailoring of the hotel's business processes according to the functionality of the system, through the pigeonholing of irregular tasks into the system's predefined categorical schemas. Such a metaschematization of tasks involves the:

- Deconstruction of a demanding task into a series of logical steps;
- Combined use of different features and functions of *Xenia*;
- Avoidance of problematic features and functions of *Xenia* that will only add more complexity.

The example presented in the fourth category (R_IX_I) of front-office tasks is very much indicative of this; in order to place this complex group reservation on *Xenia*, the

[1] The research findings indicate that, in the Rainbow Hotel, temporary clerical staff (receptionists, Reservations team staff, etc) usually have low motivation, and they are less keen on spending considerable time and effort to engage with *Xenia* in a thorough way.

[2] Etymologically, the word 'metaschematization' comes from the Greek term *metaschematismos* (μετασχηματισμός < μετα + σχήμσ = over, across + shape), which is equivalent to the English term 'transformation'. When referring to organizational tasks, the term 'metaschematization' is used in this paper instead of the term 'transformation,' as it is considered more appropriate for the occasion. This is because the former denotes a change in the scheme or systematic arrangement of tasks (REF), whereas the latter, implies a change in the actual form of tasks.

Reservations Manager had to deconstruct the requirements of the reservation into smaller elements and essentially transcribe these elements into regular tasks that the system can effectively process with minimum hassle.

5. Analysis

When ICTs were first used in the hospitality industry in the 1950s, only large multinational hotel chains could afford to invest in technology (O'Connor and Piccoli, 2003), and smaller hotels were seeking to reduce their technology costs in unorthodox ways. Since most computer applications were focusing exclusively on the automation of repetitive and time-consuming tasks, hotels were borrowing software from other industries on the assumption that it could be easily adapted for use in the hospitality industry (ibid). Of course, this was only partially successful and, in fact many and considerable changes to business processes and procedures were required to accommodate the modus operandi of computerized systems; rather than the other way round (Connolly and Haley, 2008; O'Connor and Piccoli, 2003).

Hence, the early use of ICTs in the hospitality industry can be characterized as expensive, complex and even frustrating, as systems were perceived to make life more difficult with their inflexibility and bad design (ibid). Over the years, problems stemming from the usability of computer systems have been significantly reduced with the help of specialized software that has been specifically developed for the hospitality industry. Front and back-office operations, such as reservations, check-in, billing, accounting, payroll, procurement and administration, are now standard features in most hospitality software (Buhalis, 2003). Yet, the typical hospitality computing environment remains quite complex (O'Connor and Piccoli, 2003), and the use of ICTs in the hospitality industry still appears to be largely ‘unplanned and unmanaged’ (O'Connor, 2004).

Nowadays, hotel managers are required to support the adoption of ICTs, in an effort to enhance productivity, improve service quality and guest satisfaction, and obtain customer loyalty (Kim and Ham, 2006). However, at least in the case of UK hotels, ICT productivity gains mainly accrue from the full exploitation of the networking and

informational capabilities of ICTs, rather from ICT investments per se (Sigala, 2003). In this context, management and staff are required to illustrate their ability and skills to use technology and exploit its capabilities (Connolly and Haley, 2008; Sigala et al., 2001). Given the fierce domestic and international competition, contemporary hospitality businesses need to be 'flexible, agile and aggressive, by reducing bureaucracy and formalization and by being more open to risk and innovation' (Connolly and Haley, 2008); and training is a necessary and sufficient condition for the development of all these qualities. The problem is, though, that due to the high percentages of labour turnover and part-time staff, on-the-job training is usually provided in hospitality businesses (Sigala et al., 2001). The high labour turnover in the hospitality industry is certainly a major hindrance to the provision of proper and adequate staff training (ibid); although, it appears that it is not the only one.

In the case of Blackmore hotels, it could be argued that Xenia would indeed perform very well and with few problems, if it was used for what it was originally designed for; that is, for large high-end hotels or hotel chains with numerous points-of-sales and profit areas, where 'true integration' (Bardi, 2007; Oliva, 2001), real-time reservations and data mining based on guest profiles are absolutely essential to their business. According to its vendor, Xenia is a scalable system that can cover the whole spectrum of the hotel industry, and therefore, it can also accommodate the needs of smaller and/or lower-end hotel units or hotel chains. However, in the case of the Rainbow Hotel, customizing the software to suit the needs of a large, but low-end, hotel was a highly demanding task that appears to have created all sorts of complications in the overall use of the system.

Most notably, it seems that the alignment of the business processes of the hotel with the processes inscribed into the system by its developers, still requires considerable effort on the part of the Rainbow Hotel staff, and the top management in particular. This is mainly due to the fact that *Xenia* was built on a set of categorical schemas and definitions, which in some cases are fundamentally different to the ones employed in the business model of Blackmore Hotels, and by extension, of the Rainbow Hotel. Although standard hotel operations, such as the back and front-office are indeed very similar in most hotels, yet they are not and they cannot be exactly the same across the entire hotel industry.

Instead of adopting a computerized system that would essentially map and automate its core business processes, needs and requirements, the Rainbow Hotel bought a customizable software, which eventually introduced new business terminology, philosophy and processes. Whilst the previous computerized system was a very good match to the *modus operandi* of the hotel, *Xenia* seems to be far from close, in that matter. With *Xenia*, the hotel is not merely processing its guest reservations, but it is also adopting the structure of formal rules that is embedded on this computerized reservation system. In this way, the hotel is actually adopting the 'bureaucracy' that is embedded on the computerized system; as the Reservations Manager notes, the formal business processes of the hotel share striking similarities with the user-manual of *Xenia*, since the implementation of this software. Following Inbar's (1979) line of reasoning, this is certainly not surprising, especially since much of the bureaucracy of modern organizational environments has gradually transformed into a computerized bureaucracy through the extensive use of information technology. In this respect, the majority of formal rules and processes in the Rainbow Hotel now refer to the embedded terminology and practices of *Xenia*, in one way or another; but most importantly the hotel's formal rules and processes are developed around the capabilities and the functionality of the computerized reservation system.

For example, the placement of a reservation on the system implies a specific number of steps that have to be carried out in a strictly pre-arranged order, which is ultimately dictated by *Xenia*. As it appears, the 'natural' process that Inbar (1979) and Kallinikos (2005, 2006a, 2007) describe, and in which the formality of a bureaucracy is transmuted into a computer software, is significantly disturbed in the case of the Rainbow Hotel. Instead of adopting a computerized system that would essentially map and automate its core business processes, needs and requirements, the Rainbow Hotel bought a customizable software, which eventually introduced new business terminology, philosophy and processes. Whilst the previous computerized system was a very good match to the *modus operandi* of the hotel, *Xenia* seems to be far from close in that matter. With *Xenia*, the hotel is not merely processing its guest reservations, but it is also adopting the structure of formal rules that is embedded on this computerized reservation system. In this way, the hotel is actually adopting the 'bureaucracy' that is embedded on the computerized system.

The problem is that by adhering to this computerized bureaucracy, the Rainbow Hotel is essentially putting its organizational integrity at risk. Whilst staff can efficiently process a wide array of tasks that can be classified as 'regular', they face significant difficulty when they are called to deal with singular and/or 'irregular' events. According to Angell et al (2009, 2010), this is exactly the point where managerial discretion and autonomy comes in to preserve the systemic integrity of the organization by externalizing Ashby's Law of Requisite Variety (ibid). In the Rainbow Hotel, the discretion of the Reservations Manager is not taken away or restricted whatsoever, and this is probably the main reason behind the to date adequate mitigation of the risks generated by the computerized bureaucracy of *Xenia*. The very process of metaschematizing 'irregular' organizational tasks into 'regular' ones requires not only dedication and hard graft, but also a range of special skills and qualities such as creativity, improvisation and innovation.

6. Discussion

In the current era of modernity and globalization, more control implies more unpredictability, more uncertainty and less controllability, and hence, more risk (Angell and Ilharco, 2004; Angell, 2005; Ciborra, 2002; Hanseth and Braa, 2000; Hanseth, 2007). The use of technology only amplifies this problematic situation, as the integration of computerized information systems into human activity systems comes at the expense of increased interdependence and loss of variety, and therefore it results in more systemic risk (Angell, 2005; Ciborra, 2002; Hanseth, 2007). More specifically, although technology is designed to control uncertainty, it actually creates 'new and riskier contingencies' that the ones it was originally supposed to deal with (Kallinikos, 2006, 2007). In this respect, humans seem to "end up deploying technology to create a world more difficult to master" (Ciborra, 2002).

Through the application of the principles of functional simplification and closure (Luhmann, 1993), the bureaucratic rules that comprise the formal sub-system of an organization are prescribed into the *modi operandi* of technological systems; or in other words, the technical sub-system of an organization. This 'highly regulated' prescription (Kallinikos, 2005, 2006) is exactly what Inbar (1979) conceives as

'computerized bureaucracy'. As Kallinikos (2005) notes, the informal sub-system of an organization can interact with the technical sub-system of that organization through "prescriptions, the specification of skill profiles and requirements and role formation". In this respect, computers can deal with 'objectivity', that is with well-structured problems in an amazing speed and detail, but they cannot cope with 'subjectivity,' subtlety and ambiguity (Angell and Ilharco, 2004). Therefore, computerization is ultimately a 'prisoner of societal consequences' that cannot possibly be controlled, regardless of the management's initiatives and good intentions (ibid).

Although, many managers still believe that most of their problems can be sufficiently addressed by the computerization of organizational tasks, processes and ways of problem-solving (Angell and Ilharco, 2004; Ciborra, 2002; Inbar, 1979), it appears that nowadays, computer systems impose their own 'bureaucracy', leaving little or no freedom for action to staff. It is frightening to consider that bureaucracy, as well as technology, are becoming increasingly autonomous, self-preserving and self-perpetuating (Winner, 1977). Ironically, although much of computerized bureaucracy is being introduced in the name of efficiency or security, it can easily degenerate into chaos when its bureaucratic description of the world is incapable of dealing with singular events (Angell and Samonas, 2009). Computerized bureaucracy can potentially have a devastating effect in the organizational integrity of firms, mainly by misinterpreting 'singular' situations as 'regular' (Angell and Samonas, 2009; Samonas and Angell, 2009). As Kallinikos (2005) succinctly notes:

> "*Technology deals with the unexpected by excluding it, and therefore, it is inherently incapable of dealing with unexpected events that may cause large-scale disruptive events.*"

This last feature of technological systems, namely their incapacity to deal with unexpected incidents, calls for the establishment of a concatenation of security mechanisms that will be able to address only a specific array of unpredicted and unforeseen events. However, this gives rise to a 'constructed hierarchy of technologies', since the first order security mechanisms that oversee the primary processes of the technological system are being monitored by second order security

mechanisms, and so on (Kallinikos, 2005). According to the relevant literature, these risks can be mitigated through the exercise of appropriate staff discretion, which then allows for the employment of what Ciborra calls 'bricolage, improvisation and tinkering'.

Studying the crossroads of social and technological systems in the context of information infrastructures, Ciborra et al (2002) argue that the implementation and use of technology in modern organizations is guided by a "mood-affected vision that relentlessly navigates, discovers, and encounters the world". Their extensive ethnographic research indicates that modern managers strive for control, however, due to the effects of drift in the implementation and use of technology, managers end up 'striving for failure' (Ciborra, 2002; Tjornehoj and Mathiassen, 2008); according to Ciborra's research findings, the effects of drift include the development of new ways of knowledge sharing, the emergence of new intermediary roles, high centralization, bypassing existing applications routines, too much formalization, opportunistic games, lack of knowledge sharing, inter-functional rivalry and lack of use for collective decision making (Ciborra, 1996; Ciborra, 2002). Drift occurs when technology is not used as planned, which essentially means that technology diverts from the functions and operations that it was originally designed for. The 'openness' and 'plasticity' of technology accommodates the execution of 'mundane activities' and 'informal practices' (Ciborra, 2002); namely, bricolage, improvisation and tinkering, or in other words:

> *"[…] The realm of hacking; practical intelligence; the artistic embroidery of the prescribed procedure; the short cut and the transgression of the established organizational order as embedded in systems and formalized routines. […] Passion and improvisation; moods and bricolage; emotions and workaday chores; existence and procedures will become integral to systems design and use, casting new shadows and lights on the unfolding world of technology." (Ciborra, 2002)*

Bricolage refers to the 'widespread virtuoso tinkering', that is to the discovery of new applications of the technology by its users through the combination of the resources they have available (Ciborra, 2002). Improvisation, on the other hand, refers to the

highly situated “extemporaneity and unpredictability of human intervention”, and has the following characteristics (ibid):

- The focus of attention is on emerging circumstances and current conditions;
- Intuition is guiding the action where no script seems to be in control – improvisation has little to do with scripted plans;
- On the spot surfacing, restructuring, and testing of intuitive understanding;
- Solving a problem with no preconception of how to do it beforehand;
- Situational decision-making.

In the case of bricolage, improvisation and tinkering, learning is based on ad-hoc solutions, learning-by-doing and muddling through, and it requires the combination of “known tools and routines to solve new problems” (Ciborra, 2002). New knowledge is then created “in a somewhat blind and unreflective way”, and for this reason, it can either have a highly positive or highly negative impact on the organization (ibid). The end result largely depends on the mood, with which each organizational member enters a given situation; for example, fear, anxiety, happiness, panic, boredom, or improvisation (ibid).

7. Conclusion

This paper presented a case study that unveiled the mechanics of the mitigation of risk generated from a computerized bureaucracy, in an organizational setting where managerial discretion is not restricted or taken away by the top management. The empirical findings are in line with the theoretical considerations on computerized bureaucracy that have been developed so far (Angell and Samonas, 2009; Samonas and Angell, 2010). For example, the findings confirm the conceptual link between computerized bureaucracy and organizational integrity. They also confirm that, whilst computerized bureaucracy can address with ‘regular’ events with relative straightforwardness, it is inherently incapable of sufficiently dealing with ‘singular’ or ‘irregular’ events.

In this context, the findings indicate, the metaschematization of ‘irregular’ organizational tasks into ‘regular’ ones, which a computerized system can easily

handle, was a necessary and sufficient condition for the successful processing of tasks. The research also suggests that in many cases metaschematization is an intellectually demanding process, and in this respect it requires staff to be not only dedicated to their work, but also able to possess or develop a range of special skills and qualities, such as creativity, improvisation and innovation. This last point essentially represents an oxymoron, since it can be seen as both a threat and an opportunity.

Staff who are locked in a computerized bureaucracy are frequently called on to find viable solutions under the stressful conditions and restrictions that such a bureaucracy entails. On the other hand, the engagement of staff into highly demanding and intellectual projects can also be treated as an opportunity. The regulative regime of a computerized bureaucracy provides an excellent opportunity for staff to develop certain skills and qualities that it would be difficult or even impossible to develop otherwise; it is a training ground, an intellectual bootcamp, full of nasty surprises and challenging missions.

Of course, this should in no way imply that the shortcomings of computerized bureaucracy are desirable, or that meaningful training is no longer required – quite the contrary! It is just that through the labyrinths of computerized bureaucracy, talented staff can exercise and master uniquely important skills, such as bricolage, improvisation and tinkering. Overcoming the hindrances that arise from computerized bureaucracy, staff can learn, even the hard way, how to adapt to a constantly changing environment and make a positive contribution towards the so much needed systemic integrity of an organization.

8. References

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