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Adapting to Survive: Lessons Learned from an Investigation into the Effects of Contextual Change on Information Systems

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Abstract In an effort to create shareholder value in the new frontier opened by a world but volatile economy, organizations have long ago realized that processes, structure and control procedures have to be reconstructed anew. It follows that information systems should be approached not as static artifacts but as dynamic entities able to model the ever-changing organization. In this paper we report of a case study investigating the effects of privatization on the systems of an industrial organization. Our findings illustrate the vulnerability of information systems in turbulent environments, provide insight into the causes of misfit due to contextual change, and establish flexibility as a success variable of contemporary information systems.

I. INTRODUCTION

In information systems (IS) development one works towards establishing what is needed now, and using some hindsight towards what might be needed tomorrow. Any approach, methodology, or a group of tools begin with and base their eventual success on one objective: to achieve a ‘complete’ and ‘correct’ set of system requirements. Reference [1] termed this

stage the ‘freezing factor’ and held it responsible for much disappointment in total integrated systems development. Because of the systems’ complexity and interdependencies, it is extremely difficult to change the design once programming has commenced. System requirements have to be defined beforehand and also in one go so that all likely future demands can be catered for in its design. As a consequence, “an artificial freeze has to be imposed on the ‘getting agreement’ exercise after a while, partly to enable a start to be made, but mainly to ensure that no new requirements are introduced while project development is under way (*ibid.*: p.5). This freeze results in systems that are built for one (hypothetical) point in time – a fallacy – as they must work over some time continuum [2].

If the future is one which change will have to be reacted to continually, we understand ‘disappointment’ as a resulting phenomenon due to the destabilization imposed by change on IS which have not been designed to provide for it. On the contrary, the post-industrial organization should possess adaptability and therefore must be characterized by frequent,

early – continuous change in structures, domains, goals, etc., even in the face of apparently optimal adaptation [3]. It is our contention that so should its IS.

Needless to say, the myriad of reasons that determine whether an IS is successful or not can be matched by an equal number of explanations. Arguably, the prevalent method of inquiry followed today revolves around the concept of ‘fit’ as defined by the contingency approach in organizational theory. There have been many attempts to apply this line of reasoning to information systems field (see [4]; [5]; [6]; [7]; [8]; [9]; [10]). In general, such research is grounded on the argument that any determination of information requirements must be based upon the organizational use to which the information system is put. Hence, the success of any information system must be measured in terms of what it accomplishes in the organization. Thus, a direct approach is mostly followed aiming to define what the relevant factors of a pair of components are and then develop a standard solution with standard metrics. This largely positivist stance adopted by the majority of researchers has deprived the information systems field from the rich and insightful descriptions that are mainly possible through interpretive case studies. Nevertheless, the premise of such research is important as it helps the practitioner to reevaluate his mental frames of reference resulting in more effective implementation strategies of computerized IS in organizations.

Setting epistemology aside, it is surprising to report that flexibility as a determinant of fit or as a dependent variable for IS success has achieved considerably little attention. Works that deal with this issue - albeit implicitly or with varied placement of emphasis – include those by [11], [12], [13], [14], [15], and [16] amongst others. For this we hold responsible our very own beliefs and assumptions about systems development. We can safely say that what we have come to believe about systems is that they do indeed need to be maintained, and that after implementation they simply enter the “maintenance-forever” phase. The case study reported in this paper aims to challenge this very reality by arguing that ‘maintenance’ is simply not enough for the truly global and contemporary organization of the 20th century. To the best of our knowledge, no research has been reported that tries to address and enhance our understanding of this issue from an interpretive point of view. As described herein, such an approach allowed us to (a) illustrate the vulnerability of IS to contextual change, (b) understand the effects of change on IS and the ensuing repercussions on organizations, and (c) contribute valuable insight on the subject of IS flexibility. In the next section we outline the case study and present the research methodology. A presentation of the results follow, and an ensuing discussion closes the article.

II. RESEARCH METHODOLOGY

The study was carried out over a period of eight months during which we worked as members of National Power’s (NP) Information Technology Strategy and Planning Unit (ITSPU). NP is a devolved organization operating within and outside the UK electricity sector. It is one of the world’s largest international contenders in the fast – growing independent power market, and the biggest in the UK with an over \$6 billion turnover. NP was moving from a period of relative certainty during the privatization process, to a much more uncertain time in the UK electricity market. This was coupled with an expansion into new, and unfamiliar, international markets.

The fact that it is only price that distinguishes NP’s electricity from that produced by its competitors, resulted in the company having to set new and clear objectives in addition to a rapid and radical reorganization. NP’s IS were put in place in 1990. Upon its establishment, the company was a ‘green field’, and the task of putting the IS into place was undertaken by an international consulting firm. The classic ‘big-bang’ approach was adopted for their development using a proprietary methodology. Taking into account the continuing change that they have been experiencing post-privatization, we investigated how their main systems had fared adopting an interpretivistic epistemological position. Interpretive research methods [17]; [18], aim in producing an understanding of the context of IS, together with the process whereby the information system influences and is influenced by such a context.

A. DATA SOURCES AND COLLECTION

With our initial unit of analysis being the larger intra-organizational context and the management information system (rather than the application subsystems), we opted for a design that would allow us to obtain data from multiple levels and perspectives throughout the organization. Three data sources were identified: (a) the Information Technology Services department which would provide us with a holistic perspective of the organization and its systems, being responsible for the company’s IT infrastructure as a whole; (b) the individual business units, and (c) the users of the systems at a number of sites across the company. Triangulated data was thus collected providing multiple perspectives on an issue, allowing for cross-checking, supplying more information on emerging concepts, and yielding stronger substantiation of constructs [19]. Data was being collected on a daily basis primarily through documentation review, informal discussions and observations, and several interviews were conducted with managers on both the business and the systems sides.

Using a questionnaire as a guide, the interviews were mostly semi-structured and were conducted in a way that allowed for a focus on the issues under investigation, whilst permitting the interviewees to expand on areas of personal interest that they thought were important. All interviews were tape-recorded and verbatim transcripts were made from the recording as soon as possible thereafter. As [20] note: “Presenting verbatim extracts of subject’s comments is obviously selective, but it does allow the reader to examine the subject’s perceptions of the phenomena directly” (p. 591).

Data was analyzed within each business unit, as well as across the various units to detect similarities and compare differences using *open coding* [21] as a form of content analysis. Open coding is based on an analytic technique that tends to force the generation of a core category or categories, together with their properties and dimensions. Once the core categories were established, *axial coding* [21] was performed. As [22] maintain, it is the data itself that should guide the researcher’s interpretation, further coding and collection of data. Adhering to this rule, we terminated this process when we believed that the collected data was exhausted with respect to providing enough evidence in explaining what have been observed across the various business units. The categories together with the identified concepts are listed in Table 1.

Categories	Concepts
<i>Environmental Context</i>	Regulation Customers Competition External relationships
<i>Organizational Context</i>	Structure of company Culture of company Strengths and weaknesses Corporate strategies
<i>Information Systems Context</i>	Attitude towards systems and technology IS policies and practices IS structure and operations
<i>Change</i>	Origins of change Nature of change Change as a threat to IS
<i>Information Systems Fit</i>	Perceptions of IS fit Types of and Causes of IS fit/misfit
<i>Information Systems Flexibility</i>	Definition of IS flexibility Enablers of IS flexibility

Table 1: Categories and Concepts

III. RESULTS

The scope of this article is to illustrate the effects of change on IS and to provide some insight as to how they can be made adaptable to changing organizational conditions. The synthesized analytical framework (Figure 1) which is derived directly from the analysis of our data, provides a basis by which the categories and key concepts are ordered, and subsequently interpreted, providing an explanation with regards to certain phenomena as we observed them.

The need for IS flexibility has its source in a set of circumstances that originate in the environment in which the organization resides (*arrow 1*), and are basically the result of the actions of the industry regulator, and the organization’s customers and competitors. Based on their knowledge and continuous observation of this environment, assumptions are formulated by the managing directors of the company, which are then translated into organizational initiatives for change in response to environmental shifts. These may affect the strategy, structure, and culture of the organizational context.

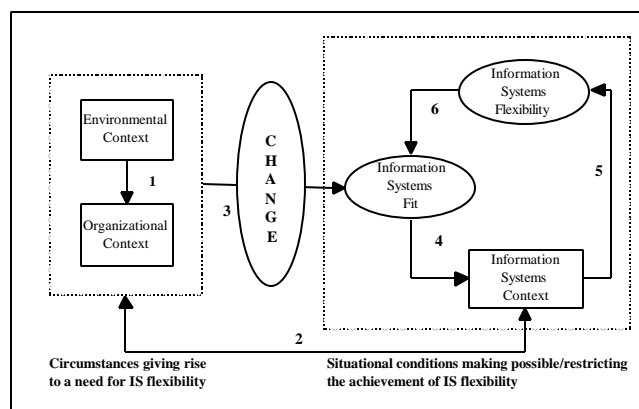


Figure 1: A Synthesized Analytical Framework

The outcomes of this stage are: (a) these proposed changes have a direct effect on the fit of existing IS (*arrow 3*); and (b) they have an effect on the IS context (*arrow 2*), i.e. the structure, operations, policies and practices of the IS department. Being bi-directional, arrow 2 emphasizes the connection between the processes of the IS fit and flexibility and the organizational context where they take place, and highlights the duality of their nature – these processes may be the result of imposed change, but they should also be seen as causing organizational change themselves.

At the same time, any possible IS misfit requires corrective action which must be undertaken by the systems department (*arrow 4*), and it is the outcome of the employment of any evaluation practices or mechanisms that are currently in place. The (largely) maintenance activities that follow, allow for an

initial perspective on the flexibility of the systems; how easy, for example, was it to provide for this disequilibrium. They also allow for an increased understanding and knowledge regarding flexibility itself and the situational conditions that make it possible, or equally restrict its achievement. Possible assumption changes by developers and managers alike, may result to a proactiveness (*arrow 5*) with respect to future systems, and the ways they should be developed. In turn, such IS with a higher level of flexibility means an improved ability to cope with unforeseen changes, and hence a better fit with less disruption (*arrow 6*).

Two points must be raised regarding this synthesized analytical framework. Firstly, it should be remembered that it only provides an abstraction of reality, and as such it is necessarily a simplified one. For example, most arrows that illustrate relationships and interactions between contexts and processes should be bi-directional: in some cases, the position of the company within the structure of the industry itself is such, that it gives the power to influence the environment (*arrow 1*); the IS department in an attempt to improve the systems fit, may employ new policies and practices that could result in severe restructuring and lay-off (*arrow 2*). In order not to overcomplicate the framework, such interactions are not depicted, but are identified in the analysis and it is made clear when and where they occur. The second point is that we can make no claim that the concepts and interactions that are identified are exhaustive. Further studies on IS flexibility may add to, challenge, or indeed modify the ideas and conceptualizations as presented here.

Due to space constraints, the rest of the article focuses on the right side of the diagram, and offers an interpretation of the situational conditions resulting initially to IS misfit at NP, whilst paradoxically at the same time making possible the emergence of true flexibility in an unorthodox way. In summary, the following can be said for the categories that are not analyzed explicitly in the rest of the paper:

Environmental Context: Competition was fierce in the domestic market, whilst there were strategic moves to expand to international markets such as India

Organizational Context: Innovation was encouraged at the business units, which were enjoying a great deal of autonomy. At the same time however, a level of mistrust and territorialism was also evident, crippling co-operation across organizational functions.

Information Systems Context: NP was consciously attempting to be on the edge of technology and had granted permission to business units to develop their own systems atop the organizational infrastructure

Change: The change that NP was experiencing was of an evolutionary nature, steady and permanent albeit a fast one.

Considering the above, what kind of IS could possibly fit such an organization consisting of autonomous units, staffed as large by seemingly independent and sophisticated users, and where change reigned supreme? The following section describes the effects of change on inflexible systems, together with the ensuing repercussions for the host organization.

IV. STRUCTURAL, PROCESSUAL AND TECHNOLOGICAL MISFIT

The analysis of data indicated three major types of misfit being experienced at NP. For the purpose of clarification, we have termed these as **structural misfit**, **processual misfit** and **technological misfit**.

A. STRUCTURAL MISFIT

The systems at NP were built around the structure of the company, and either just after they were implemented or at the point that they were implemented, the company changed. A review was carried out in the three months to February 1992 of the suitability of the IS to operate following the devolution of business activities to power stations. The systems in question were mainly the Finance (WALKER) and Plant Reliability-Integrated System for Management (PRISM) systems. The findings of the review were that the systems available were suitable for devolved use with some minor modifications. Those modifications represented only those aspects of the systems that could directly prevent devolution. It was also recognized that as those systems were designed prior to devolution, other changes could be usefully made to enhance effectiveness or efficiency. In the time space of almost three and a half years (February 1992 to May 1995), one would expect that the modifications would have been completed successfully, resulting to no misfit at all. However, evidence shows that this is not the case – the process of devolution made demands on the systems that could not be satisfied by simply maintaining them (*arrow 2* in Figure 1).

The finance systems we put in, we set up for a particular structure, culture – whatever you want to say and that changed in the last couple of years tremendously. It was like trying to fit a square in a rounded hole, and the number of changes requests to the systems increased, and have been coming non-stop ever since.

Procurement for example, was a central activity that had specialist people dedicated to this task. Devolution meant that this task was now undertaken ‘part-time’ by non-specialist personnel, as people were required to be more flexible and to work on different job aspects. This meant that the task was now only four or five hours a week of an employee’s time, resulting in a negative perception about the systems as being geared

towards professionals, and hence too complicated and difficult to use.

In the early days, we regretted some of the assumptions that we made, as we used to design systems to particularly reflect the structure of the organization, or the way people worked, and while it may have been true at the time, it wasn't always true in the longer term.. and I think one of the major problem areas was in the procurement side of things, and still is...

The very clear division of the organization into distinct business units provides another example of structural misfit. The systems were designed to fit this structure, but in time the business cycle has come to cross all the function areas; the systems now fit the functional breakdown, but they do not fit the organization as one entity. In addition, systems are perceived as being too 'big' for what the organization needs for what it does now. This type of misfit has serious implications for the ways that development projects will be managed in the future. It indicates a change to the structure of the systems development units themselves, and poses a question as to how they will operate in the future (arrow 4 in Figure 1). A senior developer explained:

You cannot shrink the business continually and expect those projects of that size to remain unchallenged. So far as the changes concerned, the threat is that if the operation is reduced, we get to a particular financial level where the IS activity becomes disproportionately large in terms of operation. I think that is perhaps the single area where the greatest threat is.

B. PROCESSUAL MISFIT

This type of misfit refers to the inability of an IS to keep providing the same level of service to a business process. It would not be an exaggeration to say that no process has remained the same since the early stages of privatization; processes have not only changed but they have kept on changing. IS that support these kinds of business processes are the most vulnerable to change as they deal with voluminous and complicated data at the half-hour level. The systems at the Energy Management Centre (EMC) – a business unit, had to scrapped altogether and a new breed of systems based on the concept of data warehousing had to be developed to account for the changed processes. A senior manager commented:

The part of the systems that you can define – that you know it has to be a deliverable – your interfaces, getting the data from the power stations and into your offer file – that is the easy part. What it is, it is the analysis of all that – the kind of thinking – the strategy point of view. It is all around the main deliverable for the EMC – that's what is continually changing. It is impossible to define or specify in advance a deliverable. It changes every day!

Processual misfit is also evident with other business units such as Fuel. One manager commented:

I have seen a couple of instances where management information systems have failed to cope with the pace of change and have caused the organization to make inappropriate decisions as a result, and we then had to run to catch up with the circumstances.

It is probably this type of misfit with 'intellectual' systems such as Management Information Systems (MIS) and Decision Support Systems (DSS), that hinges to a need for a different approach to development (arrow 4 in Figure 1). One developer responsible for developing such systems for the Sales and Marketing and Strategy and Financial Planning units remarked:

If everything is changing which it does do, then one thing that I have found is that it is actually quite difficult to alter the scope of an application whilst under development. You tend to fix your scope at the beginning, and you refine it into more and more detail, and by that stage it is quite difficult to stick your head above the parapet and see if you are still at the same place. Then you show it to the users for acceptance test, and they say "Oh! But that was all very well then – we do things differently now!"

What one might define as 'operational systems', and expect them to be stable, are in fact equally vulnerable to change. For example, although the process of work management might seem as fairly stable, it had changed in the sense that the way the work is done at power stations now is much different. For a start, there is not the same number of personnel that was available at one time, and there are no planning departments now, which there were before. There was a much greater emphasis on cost-benefit that determines the maintenance philosophy in deciding to change processes or operations. A manager from NP's Generation unit provides some evidence for our argument:

Some of the changes were never at the outset envisaged as being as extensive as they actually were, which resulted in us making more changes to the systems that we have otherwise had anticipated. It also meant that some of the more refined facilities of the systems have become less used. So yes, they have been inflexible in the sense that it would require a large amount of effort to change or add some functionality.

C. TECHNOLOGICAL MISFIT

This type which is caused simply by advancements in technology, seemed to affect all the main systems at NP. As those were designed five years ago, they were character-based and with busy screen representation. In the sense of usability, they are perceived as not being up to current practice standards. This means that in order to use the systems, users have to get

familiar with them for some time, and this is not always possible under the current situation – few employees, many tasks, little time. Users have now to be fairly able to switch from one system to another and perform various tasks at the same time. Technological misfit does not immediately mean that an existing process can be performed more effectively with new technology, in terms of the quality of information needed to make a decision. Indeed, managers commented that for many people at NP, that seems to be secondary, and they draw a parallel with the fashion world. They see however this desire to work with the most current and ‘sexy’ system as a natural thing – a progression, but at the same time they are also aware of the fact that it might lead to a diversion from what the business actually wants. Most managers, feeling powerless with this technological evolution have decided to consciously ‘ride’ along with it. What they are finding however, is that the line between ‘going there because it is there’, and ‘going there because you know why you go there’ is becoming more blurred, as the rate of this technological process increases.

In summary, the implications of the three types of misfit that follow are the result of IS at NP that have not been designed to provide for change. These were:

The quality of information provided limits the purpose which particular systems were designed to serve.

Accessing the information is difficult. Users are asking for a lot of information but they do not know how to get at it.

Users need the information in different ways and at the same time, the number of users who need this information is increasing. This demands a level of sophistication that existing systems cannot provide.

The current level of integration between the systems hardly approximates the one required. As a result, the information flows suffer considerably.

Management information has been neglected. Attempts to provide for it by combining systems or building on top of operational systems, has produced ones that are over-complicated and under-utilized.

D. THE IMPLICATIONS OF INFORMATION SYSTEMS MISFIT AND THE EMERGENCE OF TRUE FLEXIBILITY

It was at this point in our investigation, that we were faced with a paradox. How, on one hand, is it possible for such a level of IS misfit to exist, and yet an organization as heavily dependent on its systems as NP, to be able to flex and adapt successfully to continuous environmental contingencies? Although there was a negative overall perception regarding the fit of the systems, with a large percentage of those not being used as they were supposed to – user activities and tasks did not seem to be disrupted in any way. We expected otherwise, but we found that users were not tied down by the systems. What explains

this phenomenon is perhaps the simple rule of survival: threatened by adverse circumstances, one has no choice but to adapt. One manager from Finance commented:

You think that you have a financial accounting system, and you think you are producing the company’s trading account, and one day you find that everybody is doing it in a different way by the spreadsheets. And you could say “You shouldn’t do that! It is all there. It is a waste of time!” But people do not waste their time for the sake of it, do they? It is obvious then that they are doing it because there is some great hole in there.

The same phenomenon is evident in what a manager from Generation said:

Systems have fallen away and people are not using them as much as they should. And just about everybody, everywhere, is taking data out of the main systems, and either re-keying it in, or use whatever method is available to them to get data into little applications, so that they can then move the data around and use it the way they want to, because they see that the system they access – the PRISM system – is inflexible. What we are trying to do now is to recognize that this is a key requirement, and just deal with the data – not to deliver them any systems.

The Sales and Marketing business unit makes heavy use of the Finance systems. This is what a manager there said:

As changes occur in the business world, if you cannot get to change the system because the money or the project team has gone – they do it with a spreadsheet – they do not bother with the system that you have spend half of your life to develop – that’s a hidden problem as well. I mean, we look at systems and say “Oh! We never change the system. It is a bloody success!” But really, what happens is that the buggers put a Lotus spreadsheet there to do their work with it. I mean our Finance systems are crap. If I wanna know how much money I have spend on contracts at the end of this month, I go and get a bloody spreadsheet. WALKER cannot tell me – not in the way I wanna say it. So people do bits and bobs around the edges, don’t they?

There were a number of conditions that made possible the development and existence of the above phenomenon (arrow 5). If we consider our discussion thus far, those become clear. NP upon privatization put in place a number of IS; continuous change since then has practically crippled them with respect to what their initial purpose was; at the same time the policy of the company was such that it gave users almost complete autonomy and freedom with respect to meeting their own systems and informational needs; people used this freedom and have developed small applications of their own, and along with application packages have cannibalized the over-arching systems to give themselves a system that is working by

adapting it to their particular need. A truly flexible IS, but certainly not a planned or intended one.

Information Technology Services even had a name for this situation. When we were asking for comments, they were referring to it as the ‘Lotus Cult’. An appropriate name we thought – ‘cult’ signifying a kind of underground alliance – for the groups of users who have a disregard for the formal IS imposed on them, and in a way have taken control of their own ‘fate’. We must note however, that this underground activity has come to be seen as essential even by the ‘authorities’ themselves. One member of the ITSPU team said that if one ever attempts to take this away, parts of NP would stop operating within a day, and the company would soon collapse. To us, as researchers faced with this phenomenon, there remained an obvious question that we soon asked. We were curious to find out what the plans for future development were in the light of this situation. The leader of the ITSPU team gave us an answer:

Why don't we just build them a Lotus system that does all that? Well, the real reason is that they will not use it – they all got a slightly different view of what they want it to be.

V. ENABLING FACTORS FOR INFORMATION SYSTEMS FLEXIBILITY

Within ITS and the various business units, the idea that you should ask people what they do with a system before you impose it on them, was perceived as “anathema”. Users, it seemed, have criticisms about what the systems are not able to do, but when they are actually asked what they like or what they would use a particular system for, then they do not have an answer. What can be postulated from this however, is that there is a clear need for systems that are able to adapt to unforeseen circumstances. The one described above is a good example but it was the result of certain conditions giving rise to circumstances that made it possible.

The challenge we face therefore as systems developers is to try and offer the user a flexible IS. Will an old mindset and unchallenged ways of thinking suffice for approaching this task? To that a manager of the systems development team at Finance offered us his view:

Flexibility... I think it is a difficult area which is why I think the solution does not lie in providing these people with a system, because you work in a department, you have your own way that you want to produce information. I am not pointing out that there are rights and wrongs with that but then somebody else comes along in this department and has certain key parameters that he thinks are important to him – there may be valid changes because the business has changed or

from a better understanding of information needs. But to actually try and deliver that in a system, you just are prescriptive again, and as soon as you have done that, you take the flexibility away.

In trying to identify what was perceived as necessary prerequisites for the attainment of flexibility (arrow 4 in Figure 1), the answers of senior managers and developers focus on *people* and *technology*. In general, advancements in technology are seen as highly enabling with respect to both what developers and users themselves can do. For example, new technologies hold the promise of providing the users with more ‘hands-on’ user-friendly tools that allow them to generate their own inquiries, and deliver their own development without coming back to the IS center for an implementation of the change they want.

The use of traditional methodologies on the other hand, is seen as severely limiting any possibility of achieving flexibility. With respect to a number of methodologies that have been used at NP, opinions range from bad, to worse than bad. It is because those methodologies were so constraining and inadequate which guaranteed that no one would go near them. This ensured that nothing was done in a disciplined fashion and instead the development of the systems was driven underground – very paradoxically resulting to unintentional but flexible IS.

People themselves play an important role in achieving a flexible information system. Managers refer to a new breed of sophisticated users that is needed, and call it an ‘intelligent population’ – users who are technologically competent and never say “I have always done it this way!”. For an information system to flex and adapt, the first and foremost of its components that should be able to do the same, is the people themselves. What managers are effectively asking for, is a new culture, and the same applies to the developers themselves. They, in addition, must have a strong understanding of the business, be aware of the changing organizational and environmental realities, and furthermore, be prepared to accept this fact even though this realization may result in a paradigm shift with respect to the ways they carry out their work.

VI. DISCUSSION

The last statement of the Finance manager in the previous section is very radical as it questions our very basic assumptions regarding the nature of an IS. By being radical it also communicates an urgency, addressing something that is fallacious and requires our immediate attention. The need for IS that can live and breathe without being doomed to fail due to prescriptive thinking before implementation is not a call for the

future. It is a requirement for the present. A move towards this direction is supported by another fact. In NP, models of producing software or IS, which have the traditional specification design delivered in one big chunk, have stopped being followed. The time horizon for new development projects is now perceived as a very short one. The longest time period whereby a system must produce the expected benefits is now two years, from five to eight that was six years ago. But methodologies, in the name of rigor, precision and correctness, define big and time-consuming development processes, which do not fit the new reality. NP has lost its faith in methodologies and it is not hard to see why. They are simply unable to cope with the pace of change in both business and technology. As a result, they produce sub-optimal systems that have to be either modified continuously or completely re-developed after their implementation. The above also has implications for the ways the actual development teams in organizations are structured and operate. As a consequence, the idea of having systems analysts and designers is fast becoming obsolete. One manager said that it is not good anymore having a team – getting a piece of paper, putting down the requirements and saying: “Well, here we are chaps!” For him, the very name ‘Information Systems Department’ is erroneous. He mentioned that this should be changed to ‘data – pointer department’. In other words show him where the data that he wants resides. The user then starts with what he wants to do, the question he wants to answer, or the decision he wants to understand and make, and then has the means to just build the application. The application is then used, and can be kept or equally can be thrown away. True flexibility at the user end is the ability of the user to develop a system that matches precisely the way he views the world at the moment. The ‘Lotus Cult’ as described in the previous section is an illustration of that. It was a mix of certain conditions that allowed the users at NP to transform the formal over-arching and organizationally invalid systems into working ones. Will therefore the systems department as we know them be discarded completely or given a new or different role? We cannot be sure of the outcome, but we can be certain that things as they are now will not remain the same for very long.

We would like to finish this article with an argument for the future. It is we believe that the battle for flexibility or ‘livingness’ of IS will be decided not at the user end (micro level), but at the organizational level (macro level). Flexibility will not be assessed with respect to how well a system or application allows the user to ‘get what he wants, when he wants it’. Current research is looking for example at tailorable systems as a probable solution and is centered around the concept of ‘end-user orientation’ (see for example, [23]; [24]). Although research at the user level is needed, we will strongly argue that it will soon lose its momentum and relevance because the nature of the problem that it addresses will be

transformed to a different level. The time it will take for this to happen will be much shorter than what academic research is usually accustomed to.

There is a simple reason for this. Users are getting more informed and sophisticated by the day, while at the same time, technology is advancing with great leaps. As a result, flexibility will become a managerial problem at the macro level; users themselves will be able (and increasingly enabled by the technology) to satisfy their changing needs at the micro level. Our case study provides the necessary insight needed to understand this point of view. NP had a flexible IS, and its employees did not need any models or the most recent technology to achieve that. All they ever used was a Lotus spreadsheet to produce systems that were working, by constantly adapting them to their particular needs. By doing so, they achieved maximum flexibility at the micro level, but in the eyes of the company, they created a whole sub-universal system that got out of control. It became difficult to manage and to keep an eye on its evolution. Such was the perceived problem that led to the introduction of a whole new business unit – Business Systems Department – whose main role is to stop this from continuing to happen. A false move that will lead back to ‘dead’ systems? Probably so.

If we wish to understand the issue of flexibility to a sufficient enough depth so as to contribute to the practice of IS, priority should be given to research that addresses what is a managerial issue: how to allow for maximum flexibility at the user and business unit level, without the introduction of conflict that could jeopardize the integrity and stability of the organization as an entity. In other words, **an interface is needed between the user end and the organization, and this can be technical, economic, social, cultural, or a mixture of them all.** Isolating and paying attention to one level or to one aspect of this interface, will be at the expense of the others, and ultimately will have negative consequences on the flexibility of any contemporary IS.

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