The Night of the Bug: Technology and (Dis)Organization at the *Fin de Siècle*.

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Acknowledgements

We would like to thank Faith Noble and Brian Bloomfield for their helpful comments on an earlier draft of this paper and the anonymous referees for their constructive criticisms and helpful suggestions. We acknowledge the ESRC Virtual Society Programme (Award No: L132251046) for funding relating to this paper and also the ESRC Evolution of Business Knowledge research programme (Award No. RES-334250012).

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Abstract

Euro-American forms of social organization are increasingly performed via ever more intricate computer systems and networks. Against this backdrop, the corrosive spectre of computer failure has assumed the role of the 'network society's' dreaded other, the harbinger of dis-organization and dis-order. At the close of the twentieth century anxiety over the probable effects and consequences of the so-called 'Millennium Bug' provided a stark contrast to the then prevailing Internet euphoria. This paper suggest that the Bug, and the extensive (and costly) efforts that were dedicated to its extermination, provide us with a useful illustration of the ways in which IT applications have been used to think and enact particular (historically and culturally situated), notions of human and technological agency, competence and organization.

Keywords: computer failure, manageability, memory, millennium bug, Y2K

9,088 words

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An Age of Smart Machines?

In his *Elementary Forms of the Religious Life,* Durkheim (1912) famously argued that the powers of a totem have little to do with the totemic entity itself, but rather flow from its status as a symbolic representation of the social group that worships it. Similarly, Levi-Strauss (1962) in his own account of totemism, argued against the functionalist view that certain species acquire totemic status because they are economically valuable. Instead he described totem-taboos as essentially meaning-fixing rituals. Totemic species and their various associated food taboos are he claimed, 'good to think' with (*bonnes a penser*). As Douglas and Isherwood (1980:61) comment, '[a]nimals which are tabooed are chosen, … because they are good to think, not because they are good to eat'. Clearly every social collectivity can be said to generate its own, historically specific, totems and practices for worshiping them. The present paper focuses on what we might call, (not altogether frivolously), a class of contemporary totemic objects: information technology (IT) applications. The artifacts and devices with which we furnish our world, Douglas and Isherwood suggest, should be seen as more than merely functional objects. Rather they constitute the means for rendering the categories of a culture stable and visible. Work carried out in anthropology, sociology, cultural studies and the social study of technology, has sought to demonstrate the status of technological artifacts as 'community performances' (Cooper and Woolgar, 1994) and - at the same time - the means for the performance of communities (e.g. Munn, 1986; Kidder, 1981; Law, 1994). Whatever their many differences, all these perspectives share an interest in the ways in which

artifacts and their associated forms of practice can be understood as historically and culturally situated enactments of order and organization. Here we propose to re-examine a specific episode from the recent history of organizational engagements with IT: the so-called 'millennium bug' and the efforts that were dedicated to its extermination. The paper argues that the 'millennium bug' episode constitutes a useful historical lens through which to view the complex ways in which IT applications have being used to 'think' and enact social organization.

Not unlike Durkheim's (1912) Aborigines, management practitioners - or for that matter consultants, journalists and politicians -worship/fear in computer technologies the projection of their own mode of organizing. Visions of organization in mainstream texts tend to go hand in hand with a view of computer technologies as agents of order, co-ordination, power and control. And yet, in the closing years of the twentieth century, at the height of the first phase of Internet euphoria, politicians, information technology experts and corporate executives were becoming increasingly concerned with the possibility that the computer systems upon which their organizations and institutions were dependent, constituted in fact a mode of entrapment. For at the stroke of midnight of December 31st 1999, experts argued, computer mediated order and organization could be dramatically usurped by dis-order and dis-organization as a result of the failure to fix the aforementioned Bug (or more dramatically 'Millennium Bomb') problem (Yourdon and Yourdon, 1997). The Bug was born out of the standard assumption built into many electronic and computer systems that all years start with 19, and that only the last two digits will ever change. At the dawn of 2000, as expert opinion had it, such systems could come to 'believe' it was January 1900 (e.g. Jones, 1998). This 'confusion' would render computer behaviour dangerously unpredictable and erratic. On January 1st 2000 it was feared that computer 'mis-

understandings' of this nature could cause the global network society to disintegrate (e.g. De Jager, 1993). Thus, in the voluminous literature and folklore that grew around the 'Y2K problem' the 'Bug' came to represent the disruptive *other* of the Information Society - an unwelcome reminder of the continuing inability of *techne* to conquer *tyche*.

Pauchant and Mitroff (1992), among others, had been alarmed by the 'dangerous invisibility' of familiar technologies, which typically 'disappear' into the background of organizational life, thus making the crucial and continuing dependence of organizations upon them easy to 'forget'. Forget that is, until things go wrong. In the shadow of the 'Bug', 20th century society had to painfully re-discover and make explicit the nature of its dependence on IT applications. Self-appointed computer soothsayers spun apocalyptic scenarios involving the switching off of 400 billion embedded microchips leading to failures in business and transportation; power outages; cash, food and petrol shortages; spreading panic and riots in urban areas; unleashing anarchy and disorder everywhere or even bringing about The End Of The World As We Know It (TEOTWAWKI) from the accidental firing of nuclear missiles (e.g. Perez, 1998; Ahmed et al. 1999). By providing the mechanism for everything to fall apart simultaneously the Millennium Bug thus constituted a highly appropriate fable for the self-proclaimed 'Risk Society' (Beck, 1992). Bug anxiety found its most dramatic (and well-publicized) expressions in the actions of those (including reputed computer experts) who sought to survive the expected meltdown by stockpiling food and bottled water; by withdrawing large sums of money from their savings accounts and converting it into gold, or buying their own power generators and taking refuge in specially constructed bunkers in the wilderness in a bid to escape the predicted mayhem. In many business circles, a climate of opinion had emerged during the late

1990s that was such that no insurance company would provide Y2K insurance cover - except under near impossible conditions. In the UK and US, it was the sheer unknowability of the threat posed by the Bug that rattled computer experts and those whom they advised. Among other things, the original computer code in which programs were compiled had often been 'overwritten' so many times that the date locations had long been lost. Throughout the developed world therefore, governments, institutions and corporations committed massive resources in an immense operation to urgently identify and solve their various Y2K related problems thus diverting organizations from the path to oblivion[i].

The dawn of the new century failed to dispel the uncertainty as to whether the monumental bug-busting operation that was carried out at such a heavy cost was indeed a prudent and effective application of the 'precautionary principle' which averted disaster (e.g. Philimore, and Davinson, 2002), or alternatively a hysterical response to hype fuelled by IT consultants, ERP vendors and assorted fellow travelers whose earnings and importance it so dramatically improved (e.g. Booker and North, 2007)?

Indeed, it could be argued that this very ambiguity, this inability to, as it were, provide 'closure', has contributed to a sort of 'Y2K amnesia'. The ephemerality of the (on-line) media by means of which much of the Y2K debate was conducted has both facilitated and exacerbated this forgetfulness. For instance corporate webpages dealing with the issue were often taken down –seemingly with alacrity- soon after the (non?)event. Social science also seems to have been afflicted by this condition since - bar a few exceptions (e.g. Philimore, and Davinson, 2002; Booker and North, 2007)- the whole Y2K episode tends to remain unaccounted for. This article is therefore an attempt to recover this incident in the belief that the history of the Great Millennial

Bug Hunt, provides us with a useful illustration of the ways in which IT applications have been used to 'think' and enact particular (historically and culturally situated), notions of management and organization. The origins of the present article lie in a two-year (1998-2000) qualitative research investigation on the social conditions and consequences of the take-up of new technologies of electronic networking and delivery carried out by the authors in the UK and the US (see for instance, Knights et al 2002; 2007 for accounts of this work). During this time preparations for, and post-mortems in the wake of, 'Y2K' figured prominently among the preoccupations of our informants. (One organization for instance, had just issued card-swipe machines to thousands of UK retailers that were unable to read post-2000 card expiration dates.) Intrigued by our observations and by the accounts of our interlocutors, we, in addition to technical books and periodicals, also collected and examined over 500 articles, representative of the coverage in the popular and business media in the run-up to, and in the immediate aftermath of, the 'Night of the Bug'. These investigations have supplied the material for this discussion[ii].

In line with Douglas and Isherwood's (1980) suggestions, this article intends to keep open the question of whether a definitive answer to the issue of the Bug's role or impact, the order of risk presented by it, and the success or otherwise of the efforts dedicated to its extermination can be given. Rather, it sets out to explore contemporary accounts for evidence of the processes by means of which the technological, economic and social threats represented by the 'Bug' were made sense of, articulated and enacted. The Great Millennial Bug Hunt provides, we argue, an important historical example of how 'success' and 'failure', and their associated ascriptions of (human and machine) agency and responsibility are performed in relation to information technology applications. The rest of the paper is organized as

follows: sections two and three provide a brief account of the Bugs' emergence into public consciousness and of the efforts dedicated to its extermination; while section four discusses the ways corporate and government actions to this effect have been interpreted and re-interpreted. Finally we conclude with an examination of what the 'lessons of Y2K' might be for contemporary understandings of organization, manageability and expertise.

The Ghost in the Machines

During the 'roaring nineties' (Stiglitz, 2003), it became something akin to an article of faith that Euro-American societies were witnessing the micro-electronically assisted birth of a 'New Economy' characterized by, among other things, a revolution in the way goods and services are distributed and consumed. This conviction found its clearest expression in the dotcom mania of the late 90s. In one of the more surreal moments from that era, a 26-year-old former human resources manager named Mitch Maddox, changed his name by deed poll into DotCom Guy and declared that on January 1st 2000 he would take up residence in an empty house in Dallas, Texas, and for a whole year fulfil his every need (whether for food, entertainment, furniture or companionship) solely via the Internet. The curious, or those with a high boredom threshold, could view DotCom Guy, consumer of the future, in the course of his mission via webcams[iii] (Delio, 2003). However peculiar DotCom Guy's mission might appear, it was certainly in tune with the cyber-utopianism of the 1990s. It is also oddly reminiscent of the future world conjured by E. M. Forster (1977) in his 1909 tale *The Machine Stops*. The story describes a technologically advanced world where humanity inhabits the Machine, a vast technological apparatus, which caters to every human need and desire. Whenever, (what we might term today), consumers

want food, food is provided by the machine. Whenever they desire entertainment, the machine provides stimulation. Whenever they want to go to sleep, a bed is made to appear. Whenever they desire human interaction that is also provided via a screen. The inhabitants are thus totally dependent on the machine and can imagine no other way of life. For no apparent reason, however, gradually the machine comes to a stop. One by one its operations malfunction: the flow of consumer goods ceases; the lights go out. The inhabitants of the machine-world who believed that they lived that way by choice are now condemned prisoners awaiting the end. Those who lived off the Machine, were about to die with it.

Even as DotCom Guy was signing his deed poll papers and finalising his sponsorship agreements[iv], anxiety was building up among managers, shareholders, politicians and IT experts that the machine might indeed be about to stop. The same technology hailed by dotcom apostles as the liberator of organizational and social potential from the bounds formerly imposed by space and time, also threatened to bring the self-proclaimed 'network society' (Castells, 1996; 1997) crashing down. In the words of *The Economist* (4/10/1997:25):

> 'The new century could dawn with police, hospitals, and other emergency services paralysed, with the banking system locked up and governments (to say nothing of nuclear reactors) melting down, as the machines they all depend upon stop working, puzzled over having gone 100 years without maintenance. The cover of a news magazine asked recently 'Could two measly digits really halt civilization?' and answered 'Yes, yes- 2000 times yes'.

The source of this anxiety was of course the 'millennium bug', or as it came to be called, (exhibiting remarkable persistence in the habits that had caused the problem in the first instance), 'Y2K'. Origin stories tend to describe the Bug as legacy of the

sloppy programming habits of the 1960s and 70s - habits which, looking back with the hindsight of an era that prizes standardisation so highly (Ritzer, 2000), must appear particularly scandalous. In those far-off days, so-called 'COBOL Cowboys' are reputed to have 'worked according to whim, sometimes deliberately hiding dates (behind names of girlfriends, cars and *Star Trek* characters), either as a kind of signature or because they thought it amusing or even in order to guarantee their continued (re)employment (Anson, 1999:66). Thus, as late as 1997, the Department of Social and Health Services in Washington State is said to have discovered to its horror 'that many of its computer functions, were being governed by one word: 'Bob' (ibid: 122). Furthermore 9/9/99 had been routinely used as the code for terminating programs thus raising the spectre that September 9th 1999 might provide the 'Bug' with its first bite. It has been argued in the Cowboys' defence, that they were confident that by 1999 the product of their pioneering efforts would have been long superseded[v]. Be that as it may, technological progress clearly failed to meet the Cowboys' expectations and bring deliverance from the Bug(s). Instead,

> `folly has compounded folly. In many cases the original COBOL code has been rejiggered so many times that the date locations have been lost. And even when programmers find their quarry, they aren't sure which fixes will work. The amount of code that needs to be checked has grown to a staggering 1.2 trillion lines. Estimates for the cost of the fix in the US alone range from $50 billion to $600 billion…Whether we'll be glad we panicked into action or we'll disown the doomsayers depends on how diligently the programmers do their job in the next 50 weeks' (Taylor, 1999: 50-1)

'Y2K' entered public consciousness in 1995 and 1996. This followed the publication of Peter De Jager's (1993) `Doomsday 2000' article in *ComputerWorld*

magazine and hearings held on the Year 2000 problem by the US House Government Oversight and Reform Subcommittee (De Jager, 1996). The 1993 article begins:

> `Have you ever been in a car accident? …The information systems community is heading toward an event more devastating than a car crash…we're accelerating toward disaster'[vi]

De Jager's argument was elaborated in a rapidly proliferating series of commentaries[vii] and endorsed by other experts: `No one who examined the problem in those early days doubted its reality. No one asserted that there was no risk and that action was unnecessary' (Guenier, 2000: 3). From then on, the managerial classes became avid consumers of Bug-related literature. In January 1997, the Yourdons' apocalyptic *Time Bomb 2000* appeared. Co-written by a software engineering expert who had previously authored a number of influential books on the subject, *Time Bomb 2000* remained in the New York Times' business bestseller list for more than five months, and was subsequently translated into Spanish, Portuguese and Japanese. In 1998, the UN convened a Y2K summit while Cap Gemini conducted a survey of the business world which indicated that a majority of the largest US corporations were already experiencing Millennium Bug-related failures. The chief executive of research firm Triaxsys was reported in *Wired* (January 11, 1999) to have said that 'You'll see for the first time some highly visible failures that companies are not able to keep quiet'.

Set against this backdrop, the concept of the 'Bug' deserves some further elaboration. In his exploration of the language of computing, Bloomfield (1989:415) notes that '[a]s well as meaning a defect, 'bug' is also synonymous with the idea of something small or unimportant … a bug can be thought of as an intrusion or corruption in an otherwise flawless piece of program logic'. If that is indeed the case,

then the story of the *Millennium* Bug is strongly reminiscent of those 1950s films in which normally innocuous insects are suddenly transformed into voracious monsters[viii].

One implication that can be drawn from Bloomfield's account is that stories about software bugs are ultimately fables about (human and machine) agency, social organization, trust and the allocation of blame (see Douglas, 1992). A pertinent question to ask then, is how were these stories told, by whom and for what purpose. According to IT lore, the word 'bug' alludes to the times when computers still had valves. Apparently inexplicable faults would often be traced to short circuits created by moths ('bugs') flying among the valves. The term has since become shorthand for any inexplicable malfunction. Of course the causes of the 'Millennium Bug' were well known. Instead the adoption of the term points at a broadening of its meaning to allude to properties of the software that exist, as it were, by accident and *not* by design. This is similar to the use of the term 'bug' by vendors to gloss the faults discovered by consumers in their software. The term 'bug' (with its associations of external pollution of the workings of the computer) thus came to be part and parcel of re-negotiations of responsibility between vendors and users[ix]. It could therefore be argued that in the context of the 'millennium bug', the 'official' adoption of the term - (the UK's logo for instance is shown in figure1) – was not unrelated to fears concerning a possible tidal wave of litigation (against IT designers, vendors or consultants) in the wake of year 2000-related computer failures. Instead, the notion of a 'Millennium Bug' provided a useful rhetorical device for bringing together diverse interests by suggesting a common enemy.

INSERT FIGURE 1 ABOUT HERE

Thompson (1967:159) has famously described uncertainty as *the* fundamental problem of organization, and identified coping with uncertainty as being 'the essence of the administrative process'. Occidental management practitioners have long employed computer technology as a key weapon in their prosecution of what Bauman (1991) calls, a 'relentless war' against uncertainty and ambivalence. Under the shadow of the Bug however management could no longer rely upon its information technologies, which now themselves appeared irredeemably ensnared in undecidability and ambivalence. Not unlike Plato's *pharmakon* in Derrida's (1981) analysis of *Phaedrus*, computer code was being simultaneously hailed as the ultimate 'cure' for all organizational ills *and* feared as a poison 'a slow accumulation of arsenic' as Jones (1988:19) describes it, active at the very 'heart' of contemporary organization[x].

Millennium Bug narratives often represented modern technology as almost beyond human comprehension and control. A striking feature of the way the Millennium Bug debate was conducted from mid to late 1990s is the ambiguous status occupied by knowledge and expertise. Conventionally, decision makers such as managers and politicians have been consumers of advice purveyed by IT specialists. In other words, those with an expert knowledge of the mysterious workings of the machine, would frame problems and solutions for their less 'computer literate' managerial and political clients. In the era of 'Y2K', however, many experts would report their own bafflement and their advice and predictions appeared enmired in uncertainty and ambiguity. Furthermore various computer experts were rumoured to be using their Y2K compliance fees to store up on life's essentials, buy firearms to defend their stash from marauding mobs, and then head for the hills. In fact, the late 1990s witnessed much jockeying for claims to Y2K expertise. This included the

emergence of a bewildering variety of (self-help) experts in Y2K survival. The Internet in particular became the channel for the dissemination of advice on everything from how to secure your assets by purchasing gold, to how to survive the ravages of the coming Apocalypse on a diet of earthworms: 'I know [earthworms] may not sound appetizing now, but if you are starving they will taste wonderful. And they will save your life'[xi]

Premonitions of the End Of The World As We Know It.

> 'I bought this book [Anderson, 1999] about a month ago and followed everything the book said. It will take awhile but I believe I will be prepared for Y2K. I took all of my husband's money to buy a power generator. I have been burying food in the backyard. I bought 30 sf freezer and have filled it with Bird Pies. I plan on going out and buying 6 months supply of drinking water next week. I know we are facing armaggedon but with the help of this great book, I think we will be one of the few survivors.'
>
> Reader review in amazon.com[xii], November 18, 1999.

It is arguably the very imagery associated with information technology as a privileged instrument of reason and organization that makes the corrosive specter of failure stand out more starkly than in other domains. In the attribution of failure to computer technologies, the expectation of efficiency, mastery and control is disappointed. Computer failures are, so to speak, the revenge of Information Society's repressed, the (re-)occurrence of what has been denied. As titles like. 'Powerless', 'Doomsday 2000' or. *How to Survive Y2K Chaos in the City* (e.g. Leslie, 1999; De Jager, 1993; Eirich and Eirich**,** 1998) indicate, underpinning many narrations of the significance of 'Y2K' had been the anxiety that at the stroke of midnight, the magic of

the information society might fail and the world could revert to chaos. Social organization, the message was, existed in the shadow of the Bug, thus making 'Y2K' a leading contender for the title of 'risk society's' (Beck, 1995) greatest nightmare. All information technology applications, from the safety-critical systems running power plants and military installations, to everyday consumer appliances such as toasters, kettles or VCRs, were now under suspicion. With machines rejecting human control, panic and civil unrest could ensue as basic goods such as food and water became scarce (e.g. Anderson, 1999). Against this background it seemed that experts, corporations and the US and UK governments were, to say the least, prepared to give the benefit of the doubt to the doomsday scenarios so forcefully articulated in De Jager's jeremiad: 'The economy worldwide would stop…you would not have hot water. You would not have power' (1993). Few with any influence were inclined to listen to dissenting voices that were questioning the received wisdom[xiii]. As the UK's TaskForce 2000 chief Robin Guenier put it in a 1997 conference,

> 'The side effects will be horrifying – from social security payments to power system failures to payroll problems to food-retailing to bank accounts; very many files will be inaccessible and therefore effectively lost … It is the most expensive single technical and professional problem facing humanity.' (*The Guardian,* 1997).

Y2K was viewed as an acute problem of manage-ability and govern-ability[xiv]. In the US, every state governor ordered the activation of emergency operations in readiness for the night of the bug even though 49 out of 50 state authorities answered 'No' when asked if they were concerned that they had any computer systems that would not operate after December 31st. The spokesperson for the one exception – Pennsylvania – defended the expression of continuing concern simply by noting that

‘any program could fail’ even though, like elsewhere, technology experts hired by the state had laboured for three years to fix the anticipated problems and no critical system could be identified that was liable to fail[xv].

Or take banking. Gary North has compiled a list of many hundreds of articles that broadly support his contention, prior to the Night of the Bug, that sometime before June or July 2000, `depositors may see how their money may disappear in the scrambling of the bank’s computers’. They will then demand payment in cash, resulting in `the mother of all bank runs. It will spread to every bank on earth’[xvi]. A survey of US financial institutions conducted in 1997 found 66% of respondents indicating that they expected the problem to hit their PC Networks while 55% said that the compliance issues would affect most of their software (survey by Hart-Riehle-Hartwig Research Group reported in *Computerworld* 07/11/97). In January 1999 *Wired* ran an article titled `Are You On the Leper List?’ This reports the requirement upon federally insured banks by the US Federal Financial Institutions Examination Council (FFIEC) to evaluate borrowers on the basis of Y2K compliance. Because the information contained in these reports was not made publicly available, however, `leper lists’ were compiled by other interested parties. For example, Weiss Ratings released its own survey of banks and Savings and Loans companies in which 127 out of 1,500 institutions scored ‘below average’.

However, even if individual systems could be rendered Y2K compliant in time, they and the organizations that housed them were still vulnerable to failures elsewhere in the global network. Manuel Castells, author-laureate of the Network Society, had argued at (great) length (1996; 1997; 2000) that in the information age, network space has superceded physical space. The various “flows of capital, flows of information, flows of technology, flows of organizational interactions, flows of images, sounds and

symbols" (Castells, 1996:412) that constitute the "network society" are accomplished via a multitude of computer enacted interconnections and interdependencies, each of them liable to failure on the night. On that particular night in December then, there was going to be no such thing as a 'safe place' in a 'tightly coupled' networked world. Narratives of the Bug were therefore narratives of boundary breakdown. Among the Great and the Good in the US, the UK and elsewhere in the 'first world' there was considerable anxiety about other countries' (in)ability to prepare themselves in time for the night of the two zeros[xvii]. The 'well organized' such as the US, and the dis-organized such as Russia and Italy (the usual suspects), or for that matter Japan (which had by then fallen out of favour with business commentators) - to say nothing of 'third' world countries - were all inextricably networked with one another.

Nowhere did the Millennium Bug problem appear more pressing than in the case of the computers controlling the world's nuclear arsenals (see Ahmed et. al., 1999). Doomsday scenarios were even circulated in which Russia's military computers, being out of date and unable to deal with the Bug, might launch their missiles automatically.

> 'Once the [Russian] system collapses including the computers connecting the silos to the main system, the missile silos in Russia will assume that Moscow has been vaporized and automatically retarget their missiles at the United States. After this occurs, launching would commence. The result would be a full scale nuclear attack' (Perez, 1998:4)

In accordance with the Mutually Assured Destruction (MAD) doctrine, the United States would in turn launch its own missiles and the world as we know it would really be at an end. 'Smart machines' it was feared, might indeed start exercising agency by themselves and with disastrous consequences.

The Great Millennial Bug Hunt

> [On the night of December 31st] U.S. and Russian military officers … who were there to make sure no nukes accidentally went off, labored to keep busy, channel surfing … and showing one another Russian Internet fare…. When the clocks changed in Moscow and no bugs were reported, the Russian team applauded and U.S. Major General Thomas Goslin Jr. congratulated Russian group leader Colonel Sergey Kaplin. He may have deserved even more congratulations. Russia spent $4 million on Y2K military preparations while the U.S. spent nearly $4 billion. In fact, Americans spent an estimated $100 billion to be ready on all fronts, from telecommunications to sewage treatment' (Stein, 2000).

Whilst there were various Y2K-related problems throughout the world both before and after the Night of the Bug these tended to be minor annoyances rather than calamities (e.g. Manion and Evan, 2000). Certainly, none matched the expectations stoked up by the doomsayers and therefore received little media coverage. Y2K-related failures among the un-ready would have provided important discursive support for subsequent accounts of the efficacy of the official Bug-busting effort. How, then, was this lack of evidence of mayhem and disaster interpreted? Governments and corporations that spent millions of dollars on this mission mainly responded by confirming the wisdom of their actions. A Report issued by the UK government in April 2000 detailed the elaborate lengths (and associated costs) to which it went to support the bug busters in their search and destroy mission.. Subtitled 'Realizing the Benefits of Y2K' the report was unremittingly self-congratulatory. The foreword, jointly authored by the Minister (Margaret Beckett) responsible for addressing `the

year 2000 problem' and the Secretary of the Cabinet and the Head of the Civil Service (Sir Richard Wilson) celebrates the high priority placed by the Government on 'squashing the Bug', claiming that the 'UK became an acknowledged global leader and influence in addressing this issue'. The foreword also stressed the 'enormous amount of work [that] was put into identifying, fixing and testing Bug problems'. Across the government, more than 300,000 critical systems were checked. In the Ministry of Defense alone the effort to eliminate the bug involved 1350 staff at its peak and cost about £150 million. The Inland Revenue spent £30 million in tackling the bug, a figure that is justified in the Report by suggesting that the cost of dealing with a systems failure could have been 10 times this amount[xviii] ('Modernizing Government in Action':10).

It is the writers of histories that get to name the winners. According to the UK Government's brief history of the bug, the bug was defeated because the government, together with business, which it galvanized into action, committed sufficient resources to its elimination. Thus the Report acknowledged that some fears of the bug may have been exaggerated, but argued that the Government played a central role in allaying such anxieties (a *Home Check* booklet was issued to all householders in the UK in October 1998; a *Last Chance* guide was issued to 1.3 million businesses in September 1999) as well as educating its citizens about how to avoid or minimize its anticipated effects. The verdict of the Report ws that 'the hard work paid off. The UK passed into the year 2000 without any significant problems' (ibid). The Y2K project was `one project which could not – and did not – come in late' (ibid:3). The evidence offered in support of the claim that the project was a success, consisted in pointing out that the night of the Bug came and went without incident. In 77 pages there was hardly a hint of any lessons learned about whether the exercise was cost-effective. This contrasted

with the many pages devoted to the lessons allegedly learned about the value of public/private partnerships[xix] and a multitude of other benefits relating to how the government `manages its business', such as its `promotion of a wider understanding of the role and importance of IT in service delivery and more fully integrated IT into senior managers' thinking' (ibid: 5). In this respect, the Report was not unequivocal. Whilst the Bug extermination mission was declared an unqualified success *the objective of the mission was subtly redefined* in a way that justified the resources it consumed in terms other than (merely) zapping the bug. Margaret Beckett in a press release issued by the Cabinet Office on the day of the Report's publication stated:

> `The work that was done, in both private and public sectors has had benefits that go far beyond simply beating the Bug…Increasing the focus on the business role of IT means that many organizations are now better placed than they would otherwise have been to meet the challenges of e-commerce'[xx]

The 'Foreword' to the Report therefore redefined the terrain by claiming that `the bug was not an IT issue'. The real objective of the Government was not, as the Prime Minister himself had characterized it in March 1998, to ensure that the national infrastructure was as ready as it could be for the Night of the Bug, that specific problems in the public sector were dealt with, and that awareness and that action was promoted in the private sector. Instead, post the night of the Bug, the objective is redefined, as `a business issue' and *not* an IT one. Why was it a business issue? It was an issue because a focus upon the Bug had, according to the foreword to the Report 'forced IT out of the back room and into the boardroom' (ibid: 3). According to the report then, the Great Bug Hunt was essentially a(n expensive) 'cure' for the institutional forgetfulness identified by Pauchant and Mitroff (1992). As a consequence, it was claimed, `both business and Government are now better equipped

for the technological and management challenges of this century' (ibid:3).

The defense of 'Y2K' spending was being conducted in the face of a perception that business may had committed, spurred on by Government, massive resources to zapping a bug that had proved virtually harmless or readily dealt with in countries that had not sponsored elaborate and costly Bug hunts. Those of a cynical disposition might prefer to see here an example of the ways that social collectivities deal with 'cognitive dissonance' (Festinger et al, 1964). Festinger and his associates studied the reaction of the disciples of a certain Marian Keetch who sat expectantly while December 21, 1955 passed without the cataclysmic floods that had been predicted by her contact on planet Clarion. 'The key for them', Festinger et al (op cit) noted, 'was to come up with a good reason to explain [this absence].... In this case, Mrs. Keetch declared that the faith of her group had caused God to cancel the destruction of the world. In fact her remaining adherents became more active proselytizers after the non-event. To doubters then, the news that Ministers in the euphoria of the post Y2K triumph 'were considering whether to continue the model of Action 2000, a private limited company that advised traders free on Y2K, to promote other technology issues such as e-commerce, particularly among small businesses' (Grande, 2000:6) might have appeared not entirely dissimilar to the sects' post-cataclysm proselytizing enterprise.

On the Construction of Pests, Problems and Potions

One approach to the 'what happened' question is to consider some reflections of Robin Guenier, Executive Director of Taskforce 2000. In an article titled 'Y2K – What Really Happened?' he noted that `as little seems to have happened' after the Night of the Bug, commentators have been suggesting that much of the worldwide

spending of an estimated £400 billion was unjustified. Yet, he went on to observe, `there is little sign of a serious review of what happened'. His own assessment was that there had been no unexceptional overspending given the size of the projects involved, that there was no fraud and that there was no hype, only some ignorance and misinformation and exaggeration by journalists. He echoed the Government message that 'dedicated and hardworking people did a huge amount of work'[xxi]. Concerning the sensitive question of why the world did not come to an end in countries where equivalent precautionary spending had not been incurred, such as Russia and Italy, his explanations can be summarized as follows:

- developing countries are less technologically dependent, are more used to things going wrong and better able to cope when they do; (- an interesting reversal in which technological 'backwardness' instead of being considered the cause of instability, risk and danger, becomes a source of strength).
- the Y2K problem was essentially a problem for bigger, more complex organizations;
- in Spain and Italy, insofar as large corporations are global not national in nature, they did not ignore the Y2K problem.

Guenier conceded that 'it's difficult to believe that every organization got it right, that every programme was finished on time, that nothing of significance was missed – throughout the entire developed world'. His was then a rather qualified justification for the massive spending given that there is so little hard evidence to support the original claims made in relation to the Bug.

To his credit, the person most closely linked to bug fever, Peter De Jager (2000:1) also addressed the question of 'why were places like Italy not impacted by Y2K'? noting how his `view of the problem is contradicted by a fact I cannot refute, and

make no attempt to' (ibid). After a close examination of his understanding of the technical nature of the problem, De Jager repeated his view, shared by many others, that `there would be enough 99/00 boundary crossings' to make a decision to do little or nothing about the risk `an example of gross negligence. I could not in good conscience advise anyone to ignore this problem and only worry about the problem when it occurs' (ibid:5). Anyone who accused him, or others like him, of scaremongering or preying upon public fears, De Jager concluded, `should have the decency to admit that the only reason we can be judged harshly at this point is with the impunity of 20/20 hindsight. We chose the safer, but more expensive, path into the future' (ibid). Those who failed to take such precautions are regarded as gamblers or reckless decision-makers who `did not choose that path after careful consideration of the issues'. Instead, they were accused of choosing to do little or nothing `by default':

> `They ignored the problem entirely and were lucky that our considered and carefully weighed risk avoidance strategy was, with 20/20 hindsight, faulty' (ibid:5).

Another possible interpretation was afforded by those who believed as fervently as the doom merchants that Y2K was not a threat but rather, a hoax or scam of monumental proportions. Notably, David Loblaw established a website in 1997 entitled *Year 2000 Computer Bug Hoax* that explicated this view of Y2K and provided extensive links to skeptical commentaries[xxii]. The message of this site is summed up in the claim that `No one who is making money on it or whose reputation is on the line is going to drop their poker face until 01/01/00'. To such skeptics, opinion leaders in America and the UK, at least, had been victims to a mass hysteria comparable to the Dutch tulip fever of the mid-sixteenth century. Fuelled by the perennially popular appeal of 'end of the world' scenarios, it aroused a level of

excitement and dramatic tension unmatched by the mundaneities of everyday life[xxiii]. By mid-1999, some degree of skepticism had apparently been embraced by a majority of the US population. Despite the dire warnings issued by providers of Y2K solutions and vocal pundits, 78% of adults who participated in a national US survey in June 1999 expected that computer glitches would produce either 'no problems at all' or only 'minor inconveniences'[xxiv]. But, of course, this could equally be interpreted as evidence of the reassurance and confidence instilled by government and industry through the extensive spending on Y2K[xxv].

. Our concern here has not been to make judgments about whether or not the historical 'facts' supported diverse claims about the effectiveness of a missile, the threat posed by the Bug or the efforts of bug-busters to defuse this threat. Rather, by suspending (dis)belief in contemporary accounts of success or failure, we have considered how failure and success and the differences between them, cannot be abstracted from the complex moral and political processes, beliefs and practices within which they are named as such. 'Success' and 'failure' are themselves products of specific social performances of agency, knowledge, competence, moral responsibility and the like. For those interested in the forms by which technological systems and artefacts participate in the making and unmaking of human affairs, the Millennium Bug represent an examples of the 'technological dramas' (Pfaffenberger, 1992) through which 'the categories of culture' are performed (Douglas and Isherwood, 1980).

Concluding Remarks

In *fin de s*iècle IT discourses, technology appears Janus-faced, as both the liberator and destroyer of organization. At the close of the twentieth century, the 'millennium

bug' and the 'Internet revolution' provided commentators on social and business affairs with two related fables of organization and dis-organization (Cooper, 1986). Both became occasions for 'panic spending' on IT applications and the associated expert labour in most (self-styled) 'first world' countries.

In the years following 'Y2K' however, the event appears to have quickly receded from (official) corporate memory. This is not entirely surprising. Euro-American organizations have a low tolerance for ambivalence and the 'Millennium Bug' has remained shrouded in it. In line with Douglas and Isherwood's (1980) argument, our focus in this paper has not been on questions of, for instance, the 'truth' of narratives concerning the extent of the problem, or whether the Bug's timely extermination best accounts for the (non-)events of January 1st 2000. Indeed, our analysis has kept open the question of the true magnitude of the Y2K problem, the order of risk represented by it, or the success of the bug-hunters in removing this risk. Definitive answers to such questions would seem to depend upon the plausibility or weight given to the stories of the merchants of doom, exposers of scam or the believers in sheer luck. Whatever we might mean by 'complexity', it certainly entails that a range of different, even contradictory, accounts can be constructed and made to fit the available 'facts'.

The Bug and the efforts devoted to its extermination are an interesting historical example of how engagements with seemingly straightforward technical problems are at the same time (morally and politically loaded) processes for the allocation and of agency and responsibility (see Douglas, 1966; 1970; 1992) at work in the case of technological systems. 'Y2K' was in many ways the vehicle for long-held anxieties concerning the nature of organization in an increasingly (technologically) interconnected social world. This dimension was perhaps more readily apparent in the often vociferous debate sparked by the so-called dotcom bubble (see Knights et al,

2002) but can also, to some degree, be glimpsed in the *post hoc* re-labelling of the 'Millennium Bug' as a 'business', not an IT issue. The Bug, it will be recalled, was said to have finally 'forced IT out of the back room' (where until then it had dwelt in obscurity), 'and into the boardroom', (where, presumably, the serious thinking gets done). Not unlike Levi-Strauss' (1962) totems then, computer technology, was identified as 'good to think' with, rather than merely as a collection of functional objects.

Throughout this discussion we have endeavoured to keep in sight the ways in which routine deliberations about technological malfunctions (what/who went wrong and how to fix it) also entailed the rehearsal of broader cultural anxieties and preoccupations. In the run-up to the night of the Bug, (late/high/post) modern society, a society that described itself (boastfully) as a 'network society' and (anxiously) as a 'risk society' was able to simultaneously enact both descriptions.

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[i] Robin Guenier, Director of the UK's Taskforce 2000, has estimated the total worldwide spending as being in the region £400 billion (Guenier, 2000).

[ii] See also note xxv.

[iii] At DotComGuy.com.

[iv] Alas 365 days later DotCom Guy emerged into much reduced circumstances. Rumour has it, that the intervening bankruptcy of his dotcom sponsors meant 'that poor DotCom Guy was left in the lurch without his promised $98,280 paycheck' (Delio, 2003).

[v] It is interesting that the millennium bug panic having given the *coup de grace* to so-called 'legacy systems', it also facilitated their replacement with of the shelf standardised packages such as Enterprise Resource Planning Systems (ERP), prompting many in the late 1990s to talk of an 'ERP revolution' (e.g. Kumar and Van Hillegersberg, 2000).

[vi] See for instance www.year2000.com/archive/cw-article.html

[vii] See especially Gary North's Y2K Links and Forums that provides comprehensive coverage of the Y2K literature at www.garynorth.com/Y2K

[viii] See for instance *Them!* (Dir. Gordon Douglas, 1954) in which the world is under threat from giant ants, the product of human carelessness with radioactivity.

[ix] The case brought by Andersen Consulting against retailer J. Baker Inc. at the Massachusetts State Superior Court is instructive in this respect. Between 1989-91 Andersen had advised J. Baker Inc on the acquisition and installation of a merchandising and inventory system. The system it turned out was not year-2000 compliant and to make it so would cost an extra $3 million which Baker was trying to recoup from Andersen. Andersen Consulting was asking the court for a declaratory judgment that it had fulfilled its contractual obligations and that it is not responsible for 'upgrades' to that system. The fact that Andersen Consulting would adopt this course of action in spite of the inevitable bad publicity was widely perceived as an attempt (e.g. Zerega, 1998) to send a signal to other potential claimants. In other words it was done so that 'other companies would take notice of the seriousness with which the consultancy intends to litigate claims'. The message having been sent, the case was settled through mediation in 2000 (see Baldwin, 2000).

[x] Is information not routinely described as the 'lifeblood' of modern organization?

[xi] Quoted in Grossman, 1998:8

[xii] Available at http://www.amazon.com/exec/obidos/tg/detail/-/0965497410/qid=1118064744/sr=8-1/ref=sr_8_xs_ap_i1_xgl14/104-3822950-1444707?v=glance&s=books&n=507846

[xiii] For an extensive listing of such commentaries, see http://www. garynorth.com/Y2K/results_.cfm/No_Big_Problem

[xiv] Fears were even voiced that terrorists, criminals and neo-fascists might launch attacks under the cover of Y2K failures (US Naval War College, 1999).

[xv] See www.Y2K-news/bugs/alert.html

[xvi] At www.garynorth.com/Y2K/results_cfm/Banking.

[xvii] See for instance the 'Y2K Global Guide in *Business 2.0*, January 1999, especially pp. 54-5.

[xviii] What we might call the 'textual construction' of failure (Bloomfield and Vurdubakis, 1994). As Pinch observes failure – like success - needs to be 'accomplished'.

[xix] In September 1977 the incoming Labour government addressed the Y2K issue by setting up and funding a private company – Action 2000 - on the understanding that `the business community was more likely to act on the advice of a high-profile independent spokesperson with experience of the private sector'. The outgoing Tory administration had provided funding to the Computing Services and Software Association to support its Taskforce 2000 which had been an industry initiative.

[xx] See www.citu.gov.uk/2000/press_rel/cabinet_office/17—00.html

[xxi] See www.year2000.com/archive/really.html

[xxii] See www.angelfire.com/oh/justanumber/

[xxiii] See www.Y2K-news.com/readyornot/people/hysteria.shtml

[xxiv] See Y2Knews.com/readyornot/people/hyp.shtml

[xxv] We can further illustrate this view by reference to findings drawn from our research carried out during that time in a major UK clothing and fashion accessories retailer (here pseudonymously called) Xtra. The company's heavy dependence on its IT systems (in the UK January 1st is the first day of winter sales) meant that it spared no expense in putting together a top-notch bug-busting team and in rendering its systems Y2K compliant. This emphasis ensured that the IT department(s) as a whole, and the database group in particular, were spared the full rigors of the recurrent waves of staff layoffs which swept through the organization. The crossover into 2000, closely supervised by the full compliance team, went without a hitch. In January, when the 'critical date' was well past, the organization threw a champagne party to celebrate its success in squashing the bug, and to thank the staff responsible for their efforts. Barely a week later, most of the bug-busters were laid off. The company shareholders, or so the story went, fired by stories of the bug *not* wreaking havoc among the non-compliant at home and (especially) abroad, had demanded immediate and deep cuts among IT staff. Thus the same set of 'facts' proved capable of supporting two antithetical assessments of what

constitutes success and failure. Xtra's smooth passage into the new millennium is construed both as a success ('management') and as a failure ('shareholders') in swift succession, reward being followed by punishment.