The Risk of Bugs: Risk Communication and Y2K in the US and UK

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Using the Hood, Rothstein and Baldwin (2001) framework, this paper describes the size, structure and style of the US Government's and UK Government's response to Y2K. It then compares and contrasts selected print media and popular opinion polls in the US and the UK on the topic. It concludes by examining the governments' responses to Y2K and by considering the extent to which the governments' responses can be explained by an Opinion-Responsive Hypothesis.

In the mid 1990s Y2K was largely driven and promoted by a professional elite – government, industry, the media – with little heed to public opinion. Convinced or cajoled, both governments at the highest levels accepted the potential seriousness of the threat and embarked on a massive public and industry awareness-raising campaign. They did not have the resources to police Y2K compliance across their entire infrastructures the way they did within government departments and agencies. Rather, they had to convince, pressure and persuade organisations to become Y2K compliant. Communications was critical to this intervention. The governments wanted to raise awareness so that people and organisations would fix their systems and the government would thereby secure stability in the face of the uncertainty. As public opinion/anxiety dropped throughout 1999 (and the public even became somewhat skeptical) the government was locked into a large-scale bureaucratic response; it was as thorough and vast as the perceived problem was in 1998, but it was expensive and in some ways inflexible once it got started.

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In a letter to President Clinton dated July 31, 1996, Senator Pat Moynihan wrote, "the computer has been a blessing; if we don't act quickly, however, it could become the curse of the age" (Moynihan, 1996). Senator Moynihan, the senior Senator from New York and respected academic in his own right, was commenting on the results of a Congressional study into what became known as Y2K.

Y2K, or the 'millennium bug,' referred to the fact that in computer programs created in the 1950s onwards, most year entries had been programmed in two-digit shorthand – 1965, for instance, was entered as '65'. Initially this short hand was adopted to save on expensive computer memory. Through time it simply became standard practice. As the year 2000 approached, however, anxiety grew that systems would be unable to distinguish between twentieth century entries and twenty-first century entries (e.g., Would '01' be treated as '1901' or '2001'?). Such ambiguity, it was feared, would result in systems failing altogether or producing inaccurate or unreliable information (See for example, NAO 1997 and GAO 1997). Because of the growing dependence on technology and interconnectedness between organisations and systems, the US and UK governments faced a major technological challenge: to ensure their respective national infrastructures, based in all three sectors and across thousands of organisations, who in turn relied upon millions of suppliers, would be Y2K compliant in a relatively short time frame. Moreover, as uncertainty and alarm was on the rise, particularly in 1998, the governments faced a crisis of confidence. How, then, could they convince the public the infrastructures would be Y2K compliant?

This paper is the result of an on-going comparative research project that is considering how governments manage uncertainty and information technology, using Y2K as the common focus. Despite the cost and scope of Y2K efforts, it remains a largely unresearched topic post January 1, 2000 (Quigley, 2004). This research deploys the Hood, Rothstein and Baldwin (2001) risk regulation regime framework. Hood et al examine variety in risk regulation by examining three distinct (but overlapping) pressures that potentially inform government responses to risk - the technical nature of the risk (market failure pressures); the public's and media's opinions about the risk (opinion-responsive pressures); and the way power and influence are concentrated in organised groups in the regime (interest-driven pressures). From these three pressures Hood et al derive three distinct hypotheses.

This paper deploys Hood et al's second of the three, the Opinion-Responsive Hypothesis. The Opinion-Responsive Hypothesis suggests that public attitudes shape regulatory regime responses. That is, that risk regulation is the way it is because that is how those affected by the risks want it to be. Hood et al look to public and media salience of the issue and uniformity of opinion to explore this hypothesis (90).

This paper is organised in the following manner. I first introduce the Hood, Rothstein and Baldwin framework and follow it by a description of the size, structure and style of the US Government's and UK Government's responses to Y2K. I will then compare and contrast the volume, tone and content of selected print media in the US and the UK and

examine the extent to which this coverage mirrors public opinion polls at the time. I will conclude by considering the extent to which either governments' responses to Y2K can be explained by an Opinion-Responsive Hypothesis.

The media analysis includes a section on the health sector, however, the Y2K problem can largely be understood as a challenge of interdependencies across sectors. So while the health industry had Y2K challenges within its own sector, there were numerous problems at the interface of its sector with other sectors. Power supply, clean water, transport, and telecommunications, for instance, are critical to all major sectors. And in turn, the heath sector and emergency services (e.g., police; fire fighters) are also critical to all other parts of the national infrastructure. In a sense, they were all in it together. Certainly, that is the way the governments responded to the Y2K problem. So while this paper includes a brief analysis of the media coverage of the health sector in particular, this paper is largely about both countries national infrastructures, which includes but is not limited to health and emergency services.

In the mid 1990s Y2K was largely driven and promoted by a professional elite – government, industry, the media, among others – with little heed to public opinion. Convinced or cajoled, both governments at the highest levels accepted the potential seriousness of the threat and embarked on a massive public and industry awareness-raising campaign. The governments had to move mountains in a short time. They did not have the resources to police Y2K compliance across their entire infrastructures the way they did within government departments and agencies. Rather, they had to convince,

pressure and persuade organisations to become Y2K compliant. Communications was critical to this intervention. The governments wanted to raise awareness so that people and organisations would fix their systems and the government would thereby secure stability in the face of the uncertainty. As public opinion/anxiety dropped throughout 1999 (and the public even became somewhat skeptical) the government was locked into a large-scale bureaucratic response; it was as thorough and vast as the perceived problem was in 1998, but it was expensive and in some ways inflexible once it got started.

Risk Regulation Regimes

Hood et al argue that the recent literature on risk and its management has sought to explain trends from a macroscopic or world historical perspective (see for example Beck 1992; Majone, 1994). Yet this broad brush, macro-level approach has failed to explain risk regulation variety across policy fields and geographic locations, despite emerging evidence that such variety exists. (See for example, Cheit, 1990; Shrader-Frechette, 1991; Breyer, 1993; HSE, 1996 and 1998; HM Treasury, 1996).

In their study of risk regulation in the UK, Hood et al deploy the 'regime literature' by way of exploring variety in different policy areas[1] (Hood, 2001:5). Using this diverse literature as their springboard, they define regimes as follows: "the complex of institutional geography, rules, practice and animating ideas that are associated with the

[1] (1) Attacks by dangerous dogs outside the home; (2) lung cancer caused by radon gas at home; (3) and at the workplace; (4) cancer caused by benzene from vehicle exhaust; (5) and at the workplace; (6) attacks on

regulation of a particular risk or hazard" (2001: 9). This broad definition allows for flexibility as Hood et al read across various policy contexts while drawing together a variety of institutional perspectives in order to understand what shapes risk regulation.

Hood et al posit the hypothesis that within these regimes context shapes the manner in which risk is regulated. 'Regime context' refers to the backdrop of regulation. There are three pressures that Hood et al examine when exploring 'context' – the technical nature of the risk (market failure pressures); the public's and media's opinions about the risk (opinion-responsive pressures); and the way power and influence are concentrated in organised groups in the regime (interest-driven pressures). These three elements are commonly employed explanations in the public policy literature and can be related, to some extent, to a normative theory of regulation as well as a positive one (61). Figure 1 depicts the three pressures acting on the risk regulation regime.

children by paedophiles; (7) injuries and deaths from vehicles on local roads; (8) health from pesticides in food; (9) and in water (Hood et al, 37).

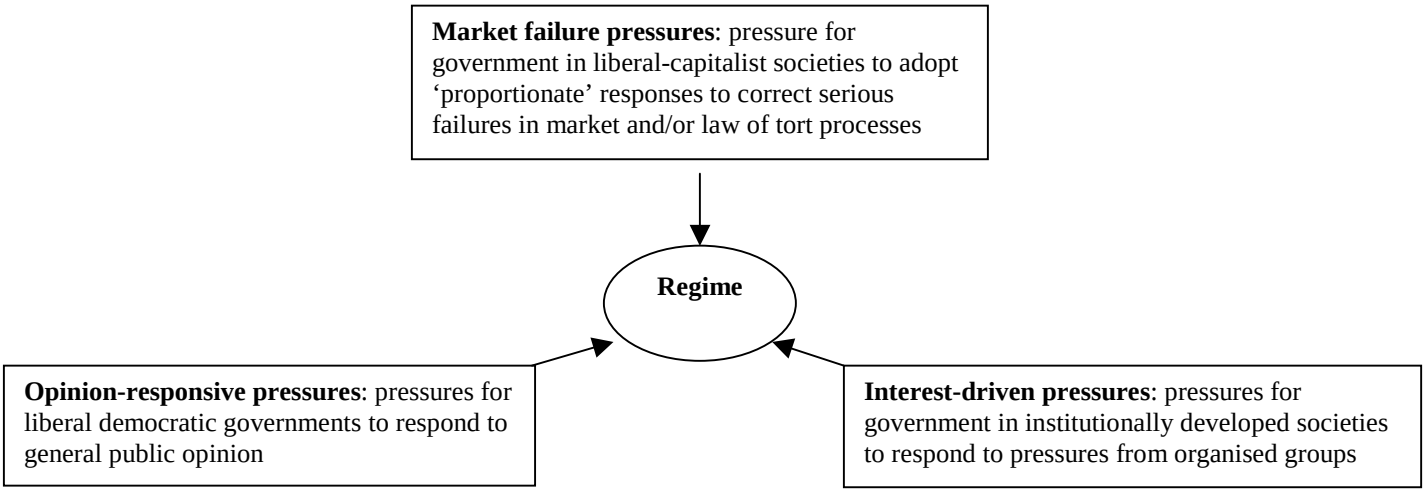


Figure 1: Three Shapers of Risk Regulation Regimes

Hood et al derive three separate hypotheses, each linked to a competing pressure: Market Failure Hypothesis; the Opinion-Responsive Hypothesis and the Interests Hypothesis. Their research examines the extent to which each hypothesis explains the size, structure and style of risk regulation, or what they call 'risk regulation content,' across the nine policy areas they selected. Regime Content refers to the policy settings, the configuration of state and other organisations directly engaged in regulating the risk, and the attitudes, beliefs and operating conventions of the regulators (21).

Each of the three critical elements in 'regime content' is characterised further through the three elements of a cybernetic control system – information gathering; standard setting and behaviour modification. In this sense control means the ability to keep the state of a system within some preferred subset of all its possible states. If any of the three components is absent, a system is not under control in a cybernetic sense (23-25). They

note in their research that risk regulation has tended to focus on standard setting. But to consider risk regulation in only that light is limiting because it does not explore the full spectrum of regulatory activity. Indeed, all three components are interdependent. Therefore, in addition to referring to the style, structure and size of the regulatory regime, they refer to the regulatory regime's ability and willingness to gather information, set standards and modify behaviour by way of keeping the environment under control. Table 1 below summarises the approach, with the three hypotheses in parentheses.

Risk Regime Context (3 Sub-Hypotheses)	*Shapes*	Risk Regime Content	Information Gathering	Standard Setting	Behaviour Modification
1. Technical Nature of the Risk (Market Failure Hypothesis)	→	Management Size			
		Management Structure			
		Management Style			
2. Media / Public Opinion of the Risk (Opinion Responsive Hypothesis)	→	Management Size			
		Management Structure			
		Management Style			
3. Organised Groups in the Regime Space (Interests Hypothesis)	→	Management Size			
		Management Structure			
		Management Style			

Table 1: Hood, Rothstein and Baldwin's (2001) Risk Regulation Regime Framework

Hood et al's framework is a comparative tool. The Hood et al framework examines how different types of risk are managed across the UK. As an extension, this research takes (in some respects) the *same* risk (Y2K) and examines it across different institutions, sectors and indeed, countries, by way of examining possible variation in risk regulation. This paper is part of a larger comparative project that is considering how governments manage the risks associated with their technology. The millennium bug is the chief case study. (See Appendix 1: Methodology for additional notes).

Because so little analysis has been brought to bear on the Y2K case thus far, I have opted for a largely inductive approach to the case, in which, as far as possible, I adhere to a standard of letting the data (both the historical documents and the opinions of the

interviewees) generate the findings. The Hood et al framework is sufficiently flexible in that it casts a wide net – it considers the technical; the law; the market; the media; public opinion; interests and institutions, when examining the critical factors in government's approach to risk regulation. For the purposes of this paper, I will test the second of the three hypotheses, The Opinion-Responsive Hypothesis, and thereby test the notion that the two governments' responses to Y2K were driven by public opinion.

How did the Governments React to Y2K? Size, Structure and Style of the Regulatory Response

Size

Size refers to how much regulation is brought to bear on any risk through the given regime. Size can be conceived in two separate ways – 'aggression,' denoting the extent of risk toleration in standards and behaviour modification, and how far regulators go in collecting information about the risk. The other is the overall scale of investment that goes into the regime from all sources. Hood et al note that regulatory size is what is broadly at issue for those who are concerned about the balance between state and the market, the threshold of risk toleration in regulation, the degree of 'anticipationism' in risk regulation, or the extent of the regulatory bureaucracy. Debates focus on under regulation / over regulation (31).

Both governments' responses to Y2K was massive but not equally distributed across the each feature of a cybernetic control system – information gathering; standard setting and behaviour modification. In the US, the first noises about Y2K came from members of the IT industry (c. 1994-1996), then they slowly made their way onto the operational workload of departments and Office of Management and Budget (OMB) (c. 1995-1996) and then eventually onto agenda of congressional committees (c. 1996-1997). (See GAO 2000, pp 44 to 51, for timeline and list of key reports). In this early phase the UK response seems to be about six months to one year behind that of the US. This time lag can partly be attributed to the fact that that the Y2K story was emanating form the US – home of most of the world's IT and IT industry. One Cabinet Office interview subject noted that he and his colleagues first became aware of the problem after one of his colleagues had come back from a IT conference in the US where Y2K had been discussed. Note, the learning was not happening between governments but rather between industry (based largely in the US) and the two governments.

Y2K was bit of a black hole at this early point. Theoretically, the problem seemed possible but no one really knew in practice what impact it might have. Information gathering exercises were frustrating. On the government side in both countries, departments were running behind. Some agencies seem to go in fits and starts whereas others didn't seem to be taking it seriously at all. Incomplete and inconsistent reports were common. (See for example NAO 1998; OMB, 1997). There were a wide range of systems (critical; non critical; embedded; IT; communications) but no reliable inventories and no consensus emerging about the magnitude of the risk and how it would be handled

– not from government; industry or the academy. By late 1997/early 1998, without reliable information concerning the extent of the problem but not willing to take the risk, the governments decided to move from information gathering to standard setting and behaviour modification. Both executives set tough standards for their respective governments. Following a speech on the topic by Prime Minister Blair (1998), Cabinet Office (CO) promised, "no material disruption to essential public services upon which the public rely" - and then brought the stick to departments by issuing standardised templates to all departments and agencies and by requiring regular reporting. Similarly, President Clinton issued Executive Order 13073, which promised, "no critical Federal program would experience disruption because of the Y2K problem." The President also addressed the issue publicly but not until July (Clinton, 1998). Similar templates were issued in the US as the UK. While both governments template-reporting may seem like a form of information gathering at first blush, by early 1998 after Bair's speech and EO 13073, the templates were forms of behaviour modification. The templates came not to mean 'Are you Y2K compliant?' but rather '*When* will you become Y2K compliant?' Virtually all systems would follow a standard, guaranteed-to-work approach; essentially inventory; fix; test; and audit every system. Reporting requirements were frequent and exhaustive; they were made public and there was low tolerance for anything less than a form of demonstrable or verifiable Y2K compliance.

While both governments managed their departments and agencies with this 'nuclear' option – inventory; fix; test; audit everything – the two governments deviated in their approach to the critical industries of their respective economies. The US government

made no bones about it; EO 13073 directed the government to help industry, including the health industry, but it was up to industry to sort its own problems out. The US government believed there were sufficient market incentives in place for industry to move towards compliance. The US government was concerned that the infrastructure worked but it preferred to create fora in which organisations could share information. By comparison, the UK reaction is more interventionist. While in some respects the UK's Y2K National Infrastructure Forum (NIF) is similar to the US's sector-level Working Groups, the NIF seem more cohesive - reporting was organised by sector but consolidated into one global report. At a glance, citizens could see the progress of the entire infrastructure, public and private, and they were all working towards the same goal – 'no material disruption to service' and were measured by in large the same process. Certainly, there were escape clauses for industry in both countries – The US Government's Working Groups and the UK Government's NIF were voluntary bodies made up of key representatives from the main sectors in the infrastructure. But achieving compliance was not in the law. Nevertheless, while the US talks about 'market incentives' for compliance, the UK discusses group pressure at the NIF – representatives from organisations pressuring each into compliance and making public declarations about compliance.

Structure

Structure overlaps with size to some extent. It refers to the way that regulation is organised; what institutional arrangements are adopted; and the way resources invested in

regulation are distributed. Like size, structure can be conceived in at least two separate ways. One is the extent to which regulation involves a mix of public and private sector actors – for instance, with non state organisations operating as intermediaries, auxiliaries, or self-controllers – particularly in the distribution of compliance costs between regulators and regulatees. Another is how densely populated the regulatory space is by separate institutions, and how far the risk involves multiple, overlapping systems of regulation, where each specific regime may reinforce or effect one or more of the others. It broadly concerns the balance between direct and indirect enforcement; the distribution of compliance costs, and 'joining up' regulatory activity across different organisations, systems or levels of government; and levels of redundancy.

Prior to the two governments' setting their standards for Y2K compliance, there weren't that may structures in place specific to Y2K. Y2K monitoring was built largely on existing structures – OMB/CO; legislative committees and auditors; departmental executive committees, with perhaps the only notable exception being the UK's Taskforce 2000 (DTI, 1996), which the UK Government felt was largely ineffective and eventually replaced it with Action 2000, a committee established by the UK Government and charged with working with the government and the private sector to reduce the impact of the millennium bug on the UK economy to an acceptable risk (NAO, 1999A, 11). Action 2000 was intended to move beyond the Taskforce's mandate of "raising awareness" to getting organisations to act on the problem. Only when the Government (political) Executives intervene in early 1998 do we start to see new committees within the Executives, such as MISC 4 (Y2K Cabinet Committee), Action 2000 and the National

Infrastructure Forum (NIF) in the UK and the President's Council on Y2K as well as various Working Groups across sectors in the US. We also see in the US a corresponding growth in the Senate with the Y2K Senate Committee, for instance. The structures were largely devised to change behaviour – to get people and organisations moving on Y2K. There were few formal feedback loops put into the process, however. It was largely a top-down approach. Organisations, particularly within government, may not have been finding many Y2K related problems but the Governments did not construct any way of gathering that information. In short, by early 1998, the marching orders were set – full Y2K compliance or bust.

In addition, both governments put more emphasis on communications, though the UK government seemed more anxious to co-ordinate this aspect centrally than the US government did. The Media Communications Unit (MCU) at Cabinet Office began side-stepping the media and paying for means of communicating with the public directly. They held public events, paid for advertising in papers and issued numerous publications to various audiences, including SMEs and micro-businesses (Cm 4703, 2000: 32). The President's Council on Y2K was a relatively small operation with on only person working specifically on communications (though arguably John Koskinen also spent a lot of his time on communications). In the main departments and agencies had a relatively free hand to run their communications strategies. The Council did, however, publish quarterly reports on the readiness of the infrastructure and held 'community conversations,' which frequently included John Koskinen attending 'town hall meetings'

across the US discussing Y2K (See for example, President's Council on Year 2000 Conversion, 1999).

Because of the task the governments wanted to accomplish – to bring the entire national infrastructure in line – the project necessarily involved a balance in both public and private sectors actors. But this balance does not suggest that the government was only treading onto the private sector's turf. The reverse is also true. The US Government has always had a tradition of outsourcing IT and the UK had emulated the practice during the eighties and nineties and therefore, both governments depended on private sector counsel to fix and verify the governments own Y2K problems. From OMB/CO down to departments, the private sector played a large part in fixing the government's Y2K problems.

There is no doubt that the Executive level intervention played an important role in getting agencies to modify their behaviour but so too did the shift from defining the problem as an 'IT problem' to a 'business problem,' which typically occurred for most organisations in 1998. With this shift in tact, IT people were frequently no longer in charge of the operation; non-IT generalists were in charge – either as Executives on the departmental board, or the Y2K coordinators within the divisions. The act of creating intermediaries between the 'centres' and the operational front line had the effect that Y2K was a joined up, coherent response from a macro-level, but was driven less by the technical nature of the risk, because those in charge didn't necessarily know or understand the technical

nature of the risk. Instead, the project was driven by the strategy of 'no disruption' and the standardised steps that had to be followed to ensure it.

Intermediaries also played a role in acting as a buffer on behalf of industry, particularly in the US. The Congress and the GAO played a much more active role than the House of Commons and the NAO. For instance, between 1996 and 1999, congressional committees and subcommittees held over 100 hearings on Y2K and the GAO issued 160 Y2K reports and testimony statements between 1997 and 2000. The NAO, by contrast, published seven reports and the PAC held three hearing on Y2K. That noted, US Committee staff members said that association representatives frequently appeared before committees by way of buffering specific organisations. Indeed, the private sector was frequently left to regulate itself in Y2K. The governments created fora for them to share information but did not force anybody to do anything. The following tables summarise the reporting structures in both governments.

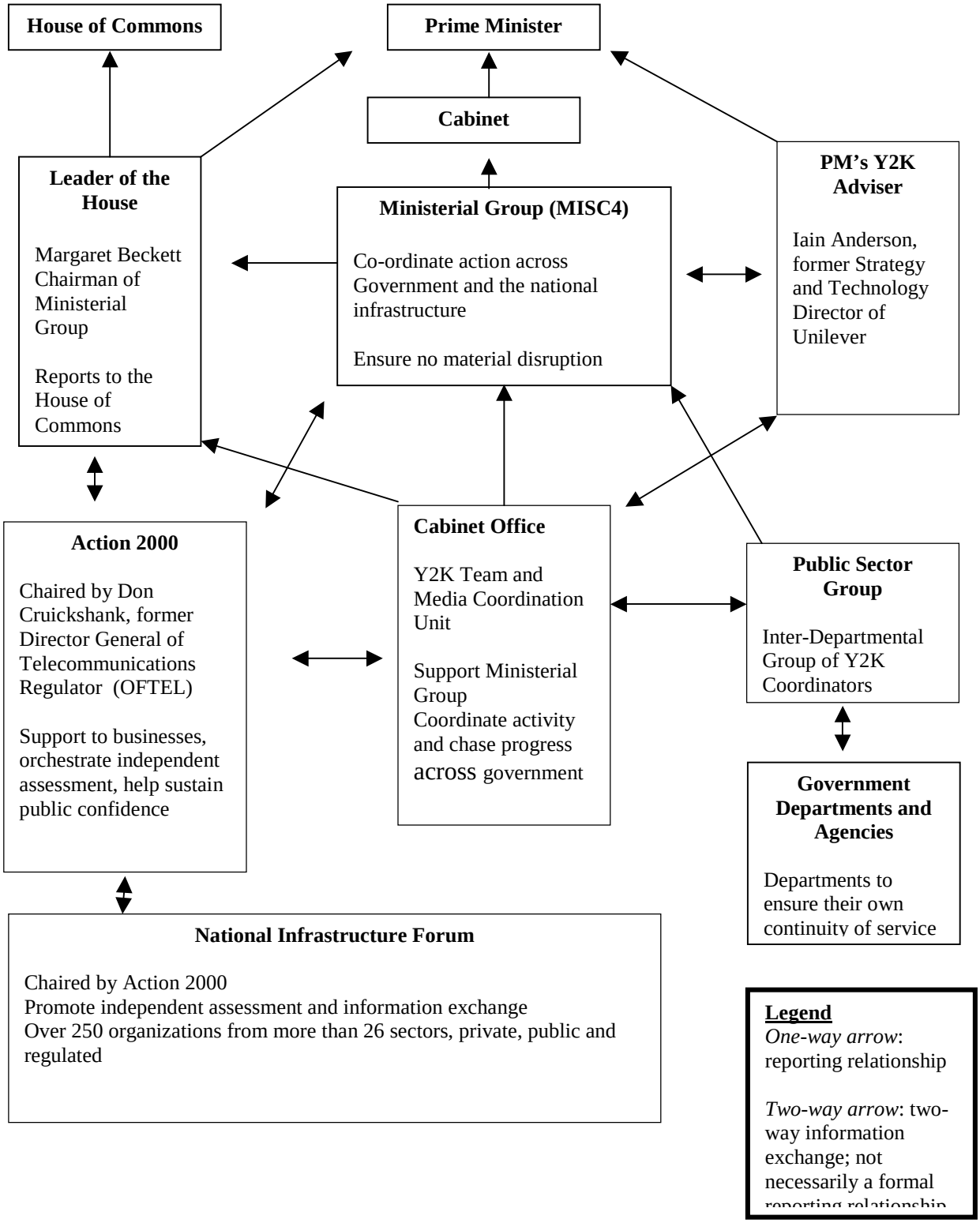
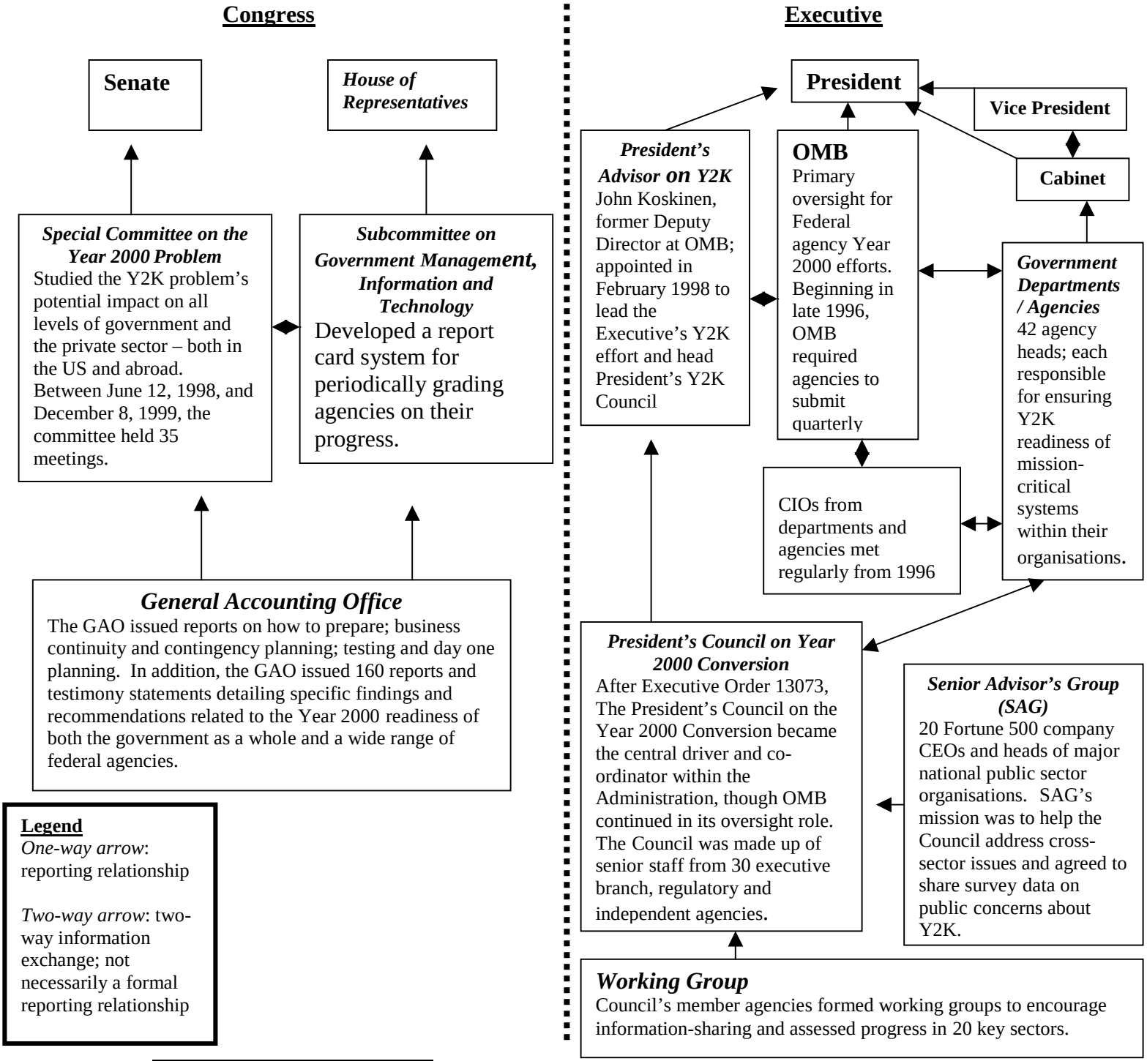


Figure 2: Government Year 2000 Framework as of June 1998 (sources: NAO, 1999A, 13; Cm 4703, 2000, 69)

Figure 3: Y2K Institutional Arrangements in the US Government[2]



[2] The division between the Executive and the Congress is presented as a dashed line rather than a solid line by way of representing the information-sharing that occurred between the two branches. Formally, GAO often studied government departments and agencies and similarly, members of the Executive testified before committees. But informally, also, OMB, the President's Council and staff working for the congressional committees shared information on their respective remits.

Style

Style overlaps with the other two. It involves the operating conventions and attitudes of those involved in regulation and the formal and informal processes through which regulation works. Style can be conceived in two ways – how far is regulation rule-bound or discretionary, and how far is it based on direct command and control approaches rather than other policy instruments. The other is the various regulatory actors and in particular the degree of zeal they show in pursuit of policy objectives. For style, culture and attitudes are important.

In some respects the response to Y2K has a 'stereotypical' bureaucratic zeal to it – command and control; hierarchical; detailed; thorough; slow; expensive; inflexible; and process-focussed. Indeed, in some ways it seems impervious to administrative changes that were supposed to be occurring under the aegis the New Public Management (Hood, 1991) or Reinventing Government (Osborne and Gaebler, 1992) - flexible; outcome-oriented; cost-effective, though it should be noted that the more tight-fisted approach from the UK, in which each department funded its own plan, seemed to keep costs down considerably.

Nevertheless, this seemingly thorough style had gaps, especially when it came to behaviour modification inside and outside of government. While the governments' Y2K paper-trails were massive (be they for behaviour modification or information-gathering),

government agencies and departments still missed most government deadlines. While both US and UK government agencies sent letters to their supply chain seeking Y2K assurance they rarely got them; and could not really force their suppliers to be compliant anyway. Equally, external auditors were loath to give assurances that government departments and agencies were compliant because it was difficult to be 100% sure; they opted to audit the process only. These gaps did nothing to reassure government, and in fact resulted in the government spending more on contingency plans, in case of unforeseen failures.

Information-gathering and behaviour modification in the US could be more intrusive than in the UK. Vice President Gore confronted agency heads personally when their agencies fell behind. Congress and the GAO grilled agency heads publicly on Y2K. The House of Representative's Subcommittee on Government management, Information and Technology reduced agencies to a letter grade, as one interview subject from the committee staff noted, with the intention of embarrassing slow agencies into action. This confrontational style had a trickle-down effect. Agency heads in the US were much more aggressive with their staff – looking for individuals to be named and held to account. But staff too had, some (limited) ability to push back, and some did.

What we do see in both countries is an unusual collaboration between the oversight agencies (be they from the legislature or the Executive) in policing the government strategy among agencies. There seemed to be little political gain to be had from Y2K.

As such, groups that might normally be competing, such as CO and the NAO or OMB and the GAO, were actually working together formally and informally.

Among the organisations in the infrastructure, the two governments had similarities and differences in their approaches. Both gathered information only at the sector level; the fora they created was voluntary and tenuous. The NIF and the WG were there to reassure public that the respective national infrastructures would be Y2K compliant. The fora were not necessarily there to expose organisations that were not. Witness one organisation dropping out of the NIF without any public declaration. Whether they were or they weren't, both national infrastructures were going to appear to be compliant by the end of 1999. Nevertheless, there are some significant differences in their approaches to the infrastructures. By way of modifying behaviour and enforcing a high standard of compliance, the US government appealed to incentives - Y2K compliance was good for one's business. The *Y2K Act* was created to encourage people to share information and not to penalise them if they made mistakes. The UK seemed more corporatist – all working under one government strategy – 'no material disruption.'

In sum, both governments had a similar approach to their departments and agencies. It was a thorough, resource-heavy, centralised operation with standardised reporting requirements; all worked towards 'no material disruption to service.' With respect to industry, both governments created self-regulating fora in which organisations critical to the infrastructure could share information and commit to compliance. While the fora

were voluntary and had escape clauses, the UK approach seemed more cohesive as UK industry worked under the same strategy as the public sector.

Media Analysis

In Hood et al's analysis, the writers compare the media salience of risk domains by counting the number of articles in two different newspapers, a tabloid and a broadsheet. They note that their analysis does not assume that high circulation newspapers reflect public opinion. But they do assume it reflects the flavour of the public debate, not least because opinion leaders read such sources (93). Hood et al draws on Gaskell et al (1999) for this analysis. In Gaskell et al's analysis, they conclude that increasing amounts of coverage of technological controversies are associated with negative public perceptions (385), or what is often referred to as Quantity of Coverage Theory. While Hood et al do not define what they mean when they refer to the 'flavour of public debate,' we might assume from Gaskell that greater volume means negative perceptions, though Hood et al do not indicate that explicitly.

I will draw the analytical framework of Rowe, Frewer and Sjoberg (2000), which examines not only volume but media tone and content when considering how science and technology is communicated to the public. By examining volume, tone and content, I hope to demonstrate links between media coverage and public mood that volume of coverage alone could not demonstrate.

A Media Analysis of the Broadsheets

The following newspapers have been selected by way of obtaining an overview of print news coverage of Y2K: the Wall Street Journal (WSJ), the New York Times (NYT), the Financial Times (FT) and the (London) Times (LT)[3]. The papers were selected because they are among the most read papers in their respective countries and because they represent two 'types' of papers (financial and mainstream), which attracted different (but overlapping) audiences in the run up to Y2K. For additional notes please see Appendix 1: Methodology.

Volume of News Print Coverage

The financial newspapers covered the story more than any other type of paper. The FT's total coverage, 218 articles, started early in 1997 and continued, albeit with some peaks and troughs, throughout 1997 and 1998. Interest peaked in the FT, like every other paper in this study, in the fourth quarter 1999. The WSJ covered the story more than any other paper, totalling 262 articles. Its coverage of Y2K started later than the FT (early 1998) but grew rapidly, each quarter showing greater volume, with the exception of a slight reduction in the second quarter of 1999.

[3] Including the Sunday Times

With respect to the broadsheets, the LT printed 35% more stories than the NYT, producing more stories than the NYT in each quarter, with the exception of the second quarter 1998 and the fourth quarter 1999. The NYT demonstrated slightly more interest in Y2K after January 1, 2000. Overall, however, the pattern of coverage in both papers is similar in that, comparatively, the broadsheets show moderate and consistent interest in the story throughout. Figures 4 summarises the result for each newspaper and Figure 5 summarises the results, sorted by newspaper type.

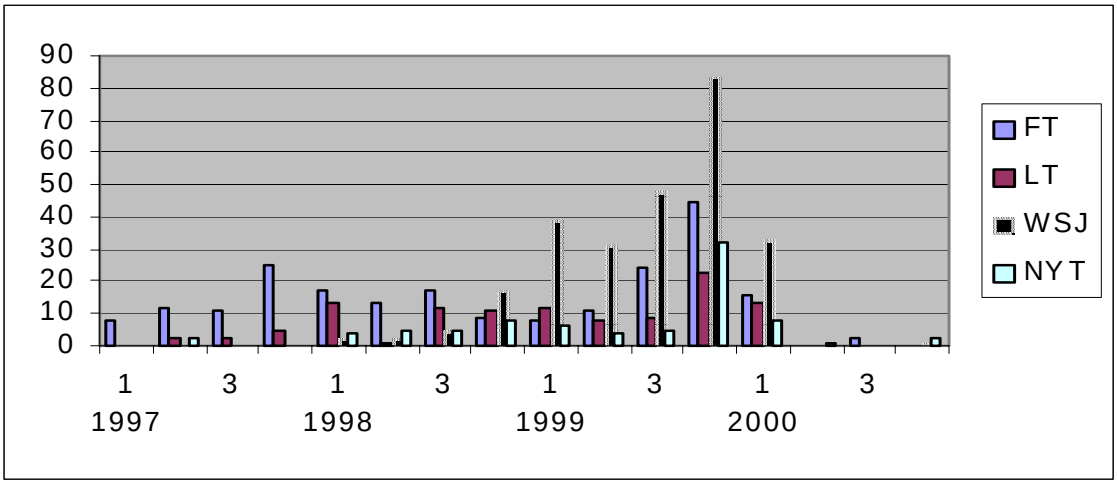


Figure 4: Volume of Media Coverage: Sorted by Newspaper, by Quarter, 1997-2000

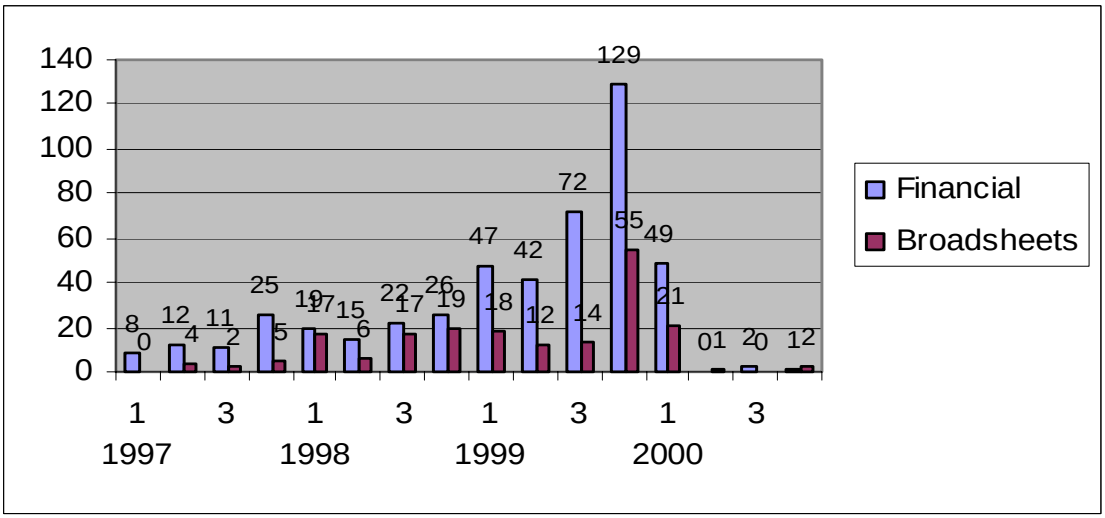


Figure 5: Volume of Media Coverage: Sorted by Newspaper Type, by Quarter, 1997-2000

At the level of national coverage, the UK started its coverage earlier and publishes relatively consistently on the topic from the fourth quarter 1997 onwards. There is a noticeable bump, however, in the fourth quarter of 1999. Its early coverage can be attributed largely to the coverage in the FT. The US coverage, on the other hand, starts later but grows quickly. Figure 6 summarises the coverage at a national level.

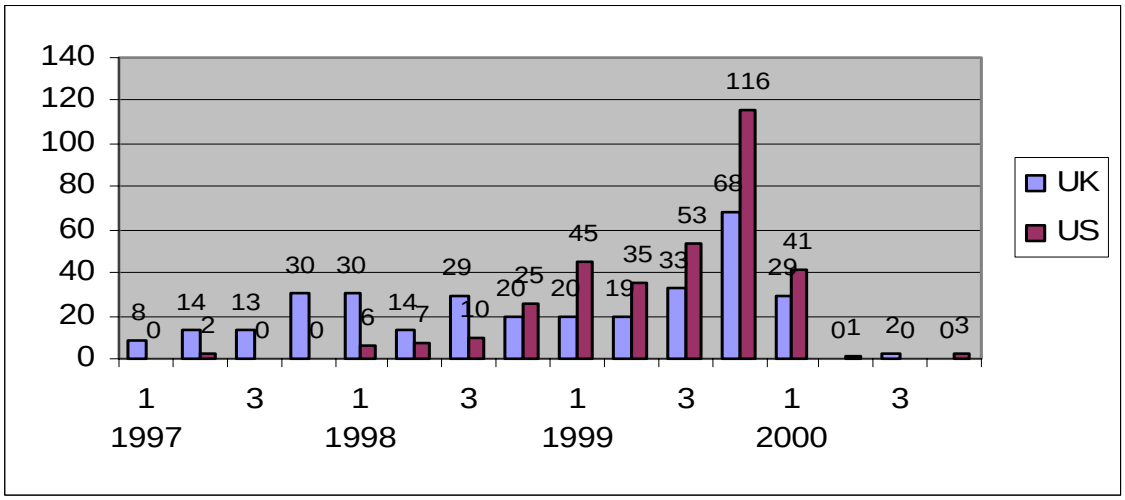


Figure 6: Volume of Media Coverage: Sorted by Country, by Quarter, 1997-2000

Median word count per article is considerably different when comparing the US coverage with the UK coverage. The typical American articles had 305 (90%) more words on average than UK articles. This comparison holds across both newspaper types: the US articles were relatively longer. Figure 7 summarises the media word count per paper and per country.

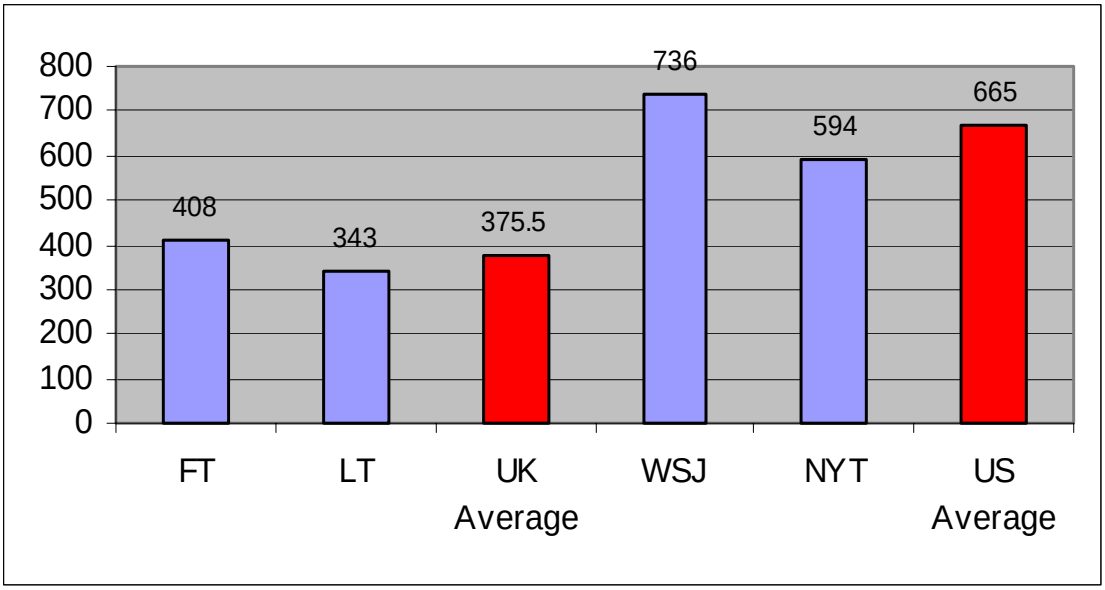


Figure 7: Volume of Media Coverage: Median Word Count per article, Sorted by Newspaper, by Quarter, 1997-2000

Volume of Health-Related Coverage

The newspapers that covered the Y2K story most also covered health-related Y2K stories most. Figure 8 below indicates the number of Y2K stories that refer to Y2K in the headline and then raises a health sector-related issue in the body of the text. Among the newspapers studied here, the order in volume of coverage was similar to the overall order: the financial papers covered it more than the other broadsheets.

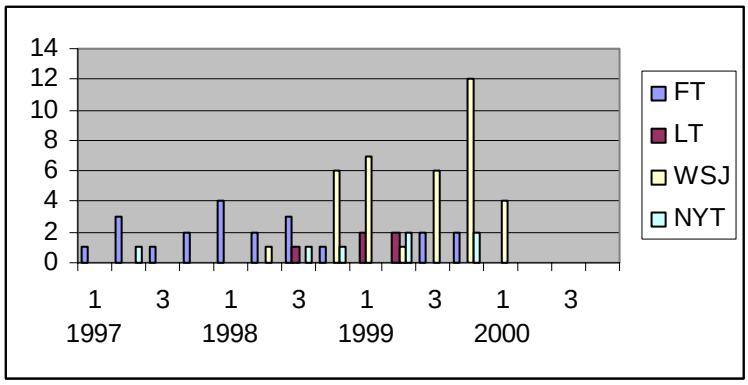


Figure 8: Volume of Coverage on the Health Sector, Sorted by Newspaper

Some of the issues that were covered by the papers included, whether or not emergency health services would be ready for the date-changeover; anxieties over people pre-ordering excessive volumes of prescription drugs in anticipation of delivery hiccups early in the new year, which in turn fanned anxieties of a prescription drug shortage; the prevalence of embedded systems (small micro-computer systems) in medical equipment and whether or not they were Y2K compliant; and the Y2K compliance of local doctors' IT systems.

In terms of volume of coverage, health-related stories might be compared with aviation – a few references every quarter. But health-related stories appeared far less than coverage dedicated to the finance/banking/insurance industry, which was largely considered to be the most vulnerable sector and was spending the most money on the problem.

Nevertheless, as noted, anxieties about the interconnectedness of the systems across sectors abound. For instance, gas supply, power, and transport all play a critical function for all organisations, including in the health sector. Hence, the problem did not stop at the door of an organisation; and it was for that reason that the governments created the cross-sector fora, such as the NIF and the Working Groups.

Public Opinion Polling: What were people saying?

In interviews in the US, John Koskinen recalled that his team had conducted one poll but referred to it little. In the UK, no interview subject recalls any public opinion polling at all. At first blush, the absence of popular opinion polls contrasts with trends at Number 10 and the White House at the time (See for instance, Murray and Howard, 2002)**.**

There are two plausible explanations for this absence of popular polling. First, there were numerous polls being conducted by the private sector available for government consumption and therefore the governments did not have to commission their own. This is only partly correct. IT companies, such as Gartner, Cap Gemini and PA Consulting frequently surveyed companies' Y2K readiness and published the polls. Indeed, Taskforce 2000 and the NAO refer to these poll results in their reports. (See for example NAO 1997 and 1998). But these survey results were commissioned by companies in a conflict of interest; as IT consultants, arguably, they had a lot to gain from a large response to Y2K and therefore the results could be biased towards exaggeration. Moreover, these polls concentrated on elite groups (e.g., IT directors) not the population

as a whole. The only 'popular' opinion polls, which we shall consider below, were published from mid 1998 onwards, after both governments had made decisions about the manner in which Y2K would be managed. Second, and more likely, is that despite the occasional political rhetoric about IT, IT is rarely seen as political issue. In many ways, Y2K was "damned if you do, damned if you don't." The governments were unlikely to win votes if January 1, 2000, passed without incident, but they might lose votes if there were serious problems. In an interview with John Koskinen, Koskinen noted Senator Trent Lott told him that the Senate would support the President in his Y2K efforts – which it did - because the public would not distinguish between Executive and Congress if there were a major Y2K-related failure; they would blame both.

The US newspapers published popular opinion polls, though it was much more common in the popular main stream press such as *USA Today* than in papers such as *The Financial Times, Wall Street Journal, (London) Times* or *the New York Times*. *USA Today* polling was co-sponsored by the National Science Foundation and was carried out by Gallup. In December 1998 a substantial number of those surveyed believed there would be systems failures in Banking (63%); Air Traffic (46%); Food and Water (37%); and Emergency Services (36%). By December 1999, anxiety levels dropped anywhere from one third (Food and Water) to a half (Banking). The December results are Banking (34%); Air Traffic (27%); Food and Water (25%); and Emergency Services (22%). Figure 9 summarises the results.

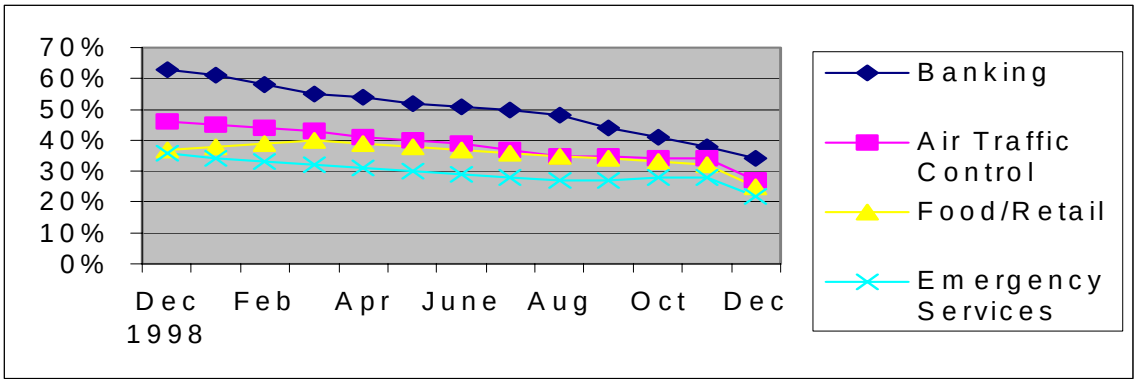


Figure 9: Public Opinion: Percentage of Americans who think it is likely that these systems will fail as a result of the Y2K bug

In the UK there was far less polling, and the results are not as easily compared across time as in the US polls. Gallup did ask people in the UK about Y2K at the beginning of 1999 and then again at the end of 1999. (See Figure 10 below). While the two sets of questions are not exactly the same and therefore any interpretation is necessarily constrained by this variation, like the US, there seems to be a downward trend to anxiety levels in the UK. In January 1998, 54% of those surveyed in the UK described it as "a serious threat." By December 1999, 51% describe themselves as "not very worried" and a further 41% were "somewhat concerned." While the January 1999 poll results look like something closer to 'panic' as anywhere from one third to one half of those surveyed described Y2K as a serious threat, by December 1999 only 8% are aligning themselves with such catastrophic language ("very worried"). Nevertheless, it bears noting that in December 1999 the middle option – "somewhat concerned" – attracts 41% of the

respondents. Like so much of the Y2K story, there were many fence-sitters; people who felt relatively confident put not absolutely certain that things would be alright.

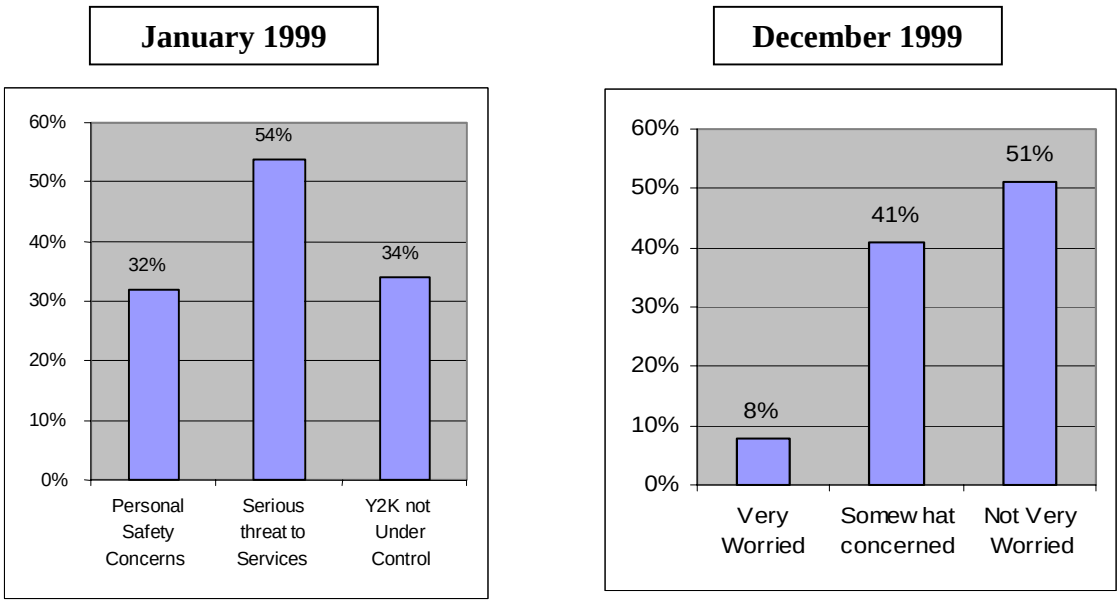


Figure 10: UK Public Opinion: Two Surveys

Tone of Media Coverage

When analysing the tone of the newspaper headlines, I adopted the Rowe, Frewer and Sjoberg (2000) framework and categorised headlines as either 1) alarming; 2) reassuring; 3) alarming and reassuring; or 4) neither alarming nor reassuring.

52% of the FT's headlines can be described as alarming whereas only 13% can be described as reassuring. Expressing 'alarming' to 'reassuring' as a ratio, the FT's coverage can be described as 52/13. The WSJ's coverage was slightly less alarming than the FT's coverage, at 39%, but the WSJ was almost as likely to run a reassuring headline

as an alarming one; 37% of the WSJ's headlines were reassuring. Hence the WSJ's ratio is 39/37. The LT was the least likely to be alarming or reassuring though on the balance it was more often alarming than reassuring, with a ratio of 25/20. The NYT was the only paper to run more reassuring headlines than alarming ones, with a ratio of 27/29. Figure 11 summarises the percentage of articles with 'alarming' headlines. Figure 12 summarises the percentage of articles with 'reassuring' headlines. Table 2 summarises the newspapers' 'alarming' to 'reassuring' ratio.

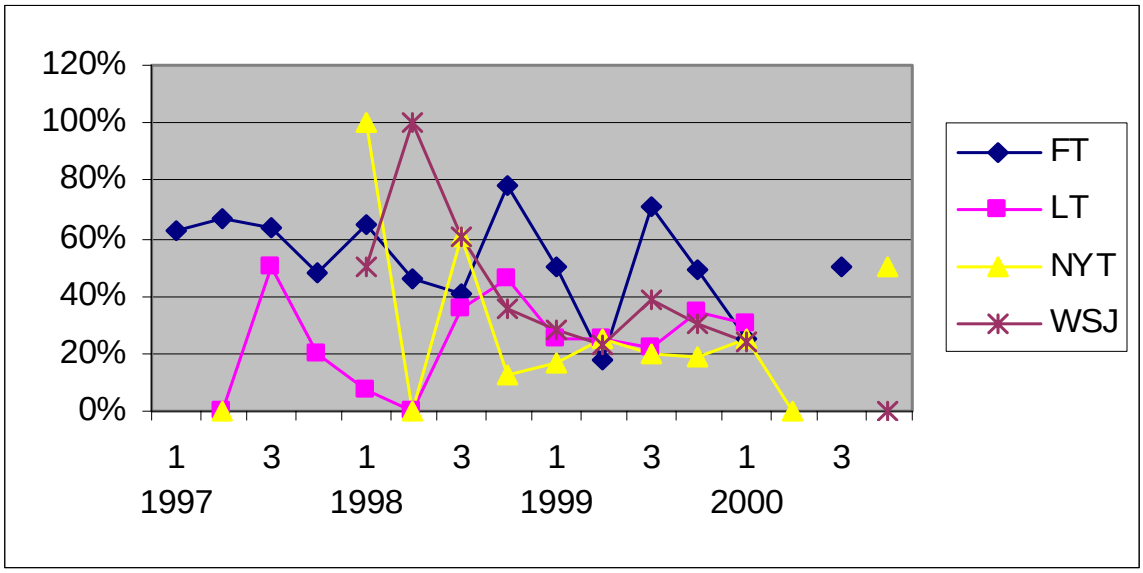


Figure 11: Tone of Media Coverage: Percentage of Articles with 'Alarming' headlines, Sorted by Newspaper, by Quarter, 1997-2000

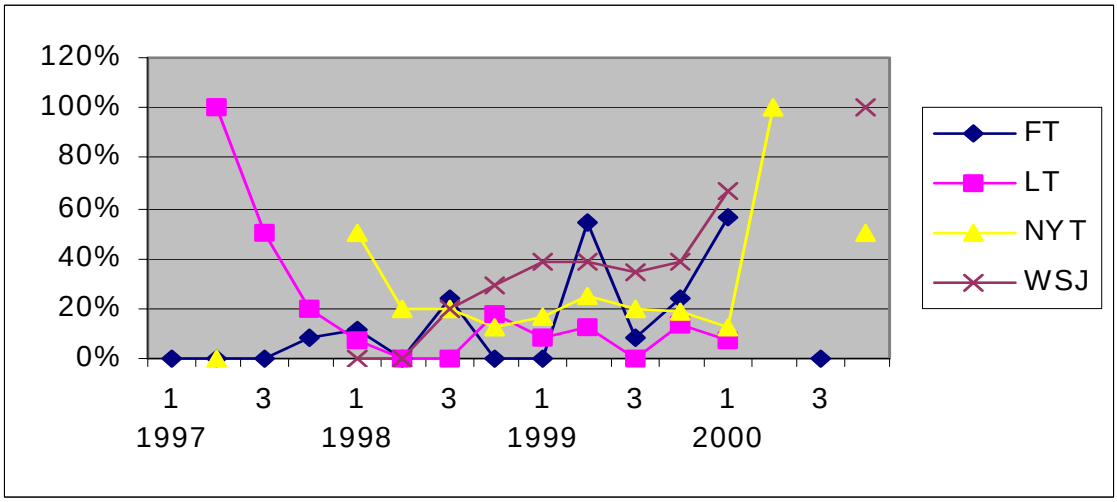


Figure 12: Tone of Media Coverage: Percentage of Articles with 'Reassuring' headlines, Sorted by Newspaper, by Quarter, 1997-2000

Newspaper	Alarming	Reassuring
FT	52%	13%
LT	25%	20%
NYT	27%	29%
WSJ	39%	37%

Table 2: Tone of Media Coverage: Ratio of Alarming headlines to Reassuring headlines, Sorted by Newspaper, by Quarter, 1997-2000

On a national level, the headlines in the UK press were more alarming than the headlines in the American press. 41% of UK stories had alarming headlines whereas 32% of American stories had alarming headlines. American newspapers were also twice as likely to publish a reassuring headline than their UK counterparts.

The tone of the coverage changed considerably over time. The US coverage starts in 1998 with 75% of its stories containing alarming headlines. The UK coverage never reached that level of alarm. From the start of the coverage in the first quarter 1998 to the second quarter 2000, the US newspapers become less and less likely to use alarming headlines. From the first quarter 1998 to the first quarter 1999 there is a downward trend, peaking at 75% at the outset and dropping to 24%. There is a plateau of alarming headlines fluctuating from 24% to 31% throughout 1999. The UK coverage, by contrast, is much more schizophrenic. The trend of alarming headlines over three years is downward, but only slightly. Of the eleven quarters between the second quarter 1997 and the fourth quarter 1999, only on two occasions was a trend in one direction followed by a similar trend the following quarter. That is, between the second and fourth quarter 1998, one sees two consecutive upward movements. Similarly, in the fourth quarter 1998 and the second quarter 1999, one sees two consecutive downward movements. All other

quarters alternate – down, then up; down then up; down then up; and so on. Figure 13 summarises the percentage of articles that use alarming headlines, sorted by country.

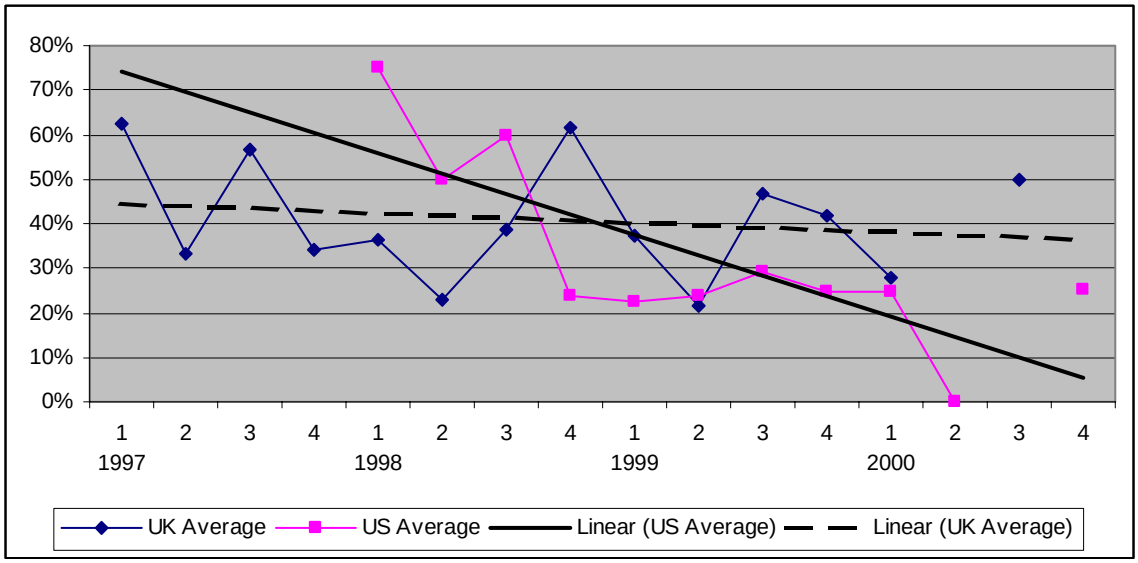


Figure 13: Tone of Media Coverage: Percentage of Articles with 'Alarming' headlines, Sorted by Country, by Quarter, 1997-2000

Tone: Health Coverage

	Alarming	Reassuring
FT	14	2
LT	1	1
WSJ	14	14
NYT	3	1

Table 3: Alarming versus Reassuring Headlines in Selected Newspapers (Listed as total number of headlines, not as a percentage)

Like volume of coverage, health stories followed the same patterns in tone of headline as the papers' coverage generally. The FT was much more likely to be alarming than the other papers.

Sources and References Contained within the Media Coverage

	UK		US
IT Industry	24%	Critical Sectors	49%
Critical Sectors	23%	IT Industry	28%
National Government	22%	National Government	27%
Industry Associations	13%	Regulators	20%
Regulators	12%	Industry Associations	16%
National Legislature	6%	National Legislature	12%
Academic	2%	Academic	5%
Popular Polls	0%	Popular Polls	3%

Table 4: Sources Contained within the Media Coverage

	UK	US
Other Jurisdictions	36%	32%
Government Departments / Agencies	21%	20%
Cost of Compliance	21%	19%
SMEs	8%	8%
Benefits of Y2K	5%	3%

Table 5: References within the Media Coverage

'Sources' refers to events, publications and/or sources that journalists use and refer to in a story. Stories can have numerous sources. The sources identified here were selected either because they were common themes in the articles, or because they were

conspicuous by their absence. Table 4 lists the Sources in descending order of frequency, sorted by country.

22% of the articles in UK newspapers uses a central government event, publication or source as a source in the story compared with 27% in the American coverage. 6% of UK stories uses a UK legislative event, publication or source as the source in a story compared with 12% of American coverage using a US legislative event, publication or source as the source in a story. 12% of the articles in UK newspapers use a regulator event, publication or source as a source in the story compared with 20% in the American coverage.

23% of UK articles use a critical sector in the UK economy as a source of the story compared with 49% of US articles that use a critical sector in the US economy as a source of the story. ('Critical Sectors' can be defined as those sectors participating in the National Infrastructure Forum in the UK and the Working Groups in the US. The US government identified 20 sectors; the UK government identified 26). 13% of UK coverage uses industry associations (e.g., trade groups) as a source in the story compared with 16% of US coverage. 24% of UK coverage uses the IT industry as a source compared with 28% in the US. 2% of UK coverage uses academics as a source compared with 5% of US coverage. 5% of US coverage uses mass public opinion polls as a source compared with the 0 % UK (i.e., I only found one poll, published by the FT).

‘References’ refers to institutions, sectors, jurisdictions and story lines to which articles refer. Articles can have more than one ‘reference.’ Again, the references identified here were selected either because they were common references in the articles, or because they were conspicuous by their absence. There is significant overlap in references and sources. Table 5 lists the References in descending order of frequency, sorted by country.

The UK media refers to its central government in 21% of the articles; the US media refers to the Executive in 20% of the articles. Both media refer to SMEs (small to medium – sized enterprises) in 8% of articles. 36% of UK articles refer to jurisdiction other than the central government’s jurisdiction, be it sub or supra level government, compared with 29% of the US coverage.

5% of UK coverage refers to fringe benefits that can be associated with Y2K work compared with 2% of the US coverage (e.g., having a reliable inventory of systems or list of suppliers; developing contingency plans; certain organisational units working together for the first time). The UK print media refers to actual Y2K-related systems failures (as opposed to hypothetical failures) in 6% of the articles whereas the US print media refers to them in 8% of their articles. 21% of the UK articles quantify the cost of Y2K compared with 19% of US articles.

Summary and Analysis of the Print News Coverage

The 1997/early 1998 coverage oscillates from alarming to reassuring, though mainly alarming, due largely to the uncertainty surrounding the scope and magnitude of the problem. In this particular period, newspaper articles rarely include a detailed explanation of what the Y2K computer bug is and how it could disrupt operations. If Y2K is described in detail at all, it is usually one short paragraph, which refers to a 'glitch' because many computers may not be able to read dates. Often, companies' Y2K vulnerabilities are described strictly through their dependence on IT and/or external suppliers; and the consequences of 'worst-case scenario' systems failure – e.g., power failures; grounded aviation; food and water shortage; inoperable health care and emergency services. In this early coverage, both the Congress and the House of Commons were either emphasising the high degree of uncertainty or (more typically) were similarly alarming in their claims (see for example, GMIT Subcommittee, 1999; Science and Technology Committee, 1997/98). Moreover, some large, credible organisations started to declare how much they were spending on Y2K and the amounts were considerable ("RBS targets the millennium bug - bank taking a £29 M charge despite advice against move" Financial Times, November 28, 1997). Some organisations speculated publicly on rather far-fetched contingency plans (e.g., "KLM says millennium bug may ground its flights," Financial Times, October 17, 1998). The IT industry and IT/Y2K specialists were almost completely alarming, with some developing 'speculative' data to communicate their perceived anxieties. (6% and 5% of articles in the UK and US

print media, respectively, contain this speculative data, which largely turned out to be inaccurate/unfounded. Edward Yardeni, from Deutsche Bank, for instance, famously predicted that there was a 70% chance of a world recession as a result of Y2K (1998)). At the same time, there was little central co-ordination in government, which at times resulted in individual departments' communications teams being put on the defensive (e.g., Civil Aviation Authority; Federal Aviation Administration). The sum of these circumstances loaned themselves to rather spectacular and alarming headlines.

There were few nay-sayers and they got little coverage. In its testimony on Y2K to the Standing Committee on Science and Technology, the Health and Safety Executive (HSE) warned against overreaction with respect to embedded systems. The HSE noted that one health trust had tested over 7,000 pieces of medical equipment and only 200 had any type of date/time functionality at all, or about 3% (1997/98, Chapter 4, page 4). (The HSE did not indicate whether or not the date functionality in these systems was critical to the operation of the system or what kinds of medical equipment they examined.) Similarly, despite apocalyptic claims of pending nuclear disasters on January 1, 2000, HSE reported that high-risk nuclear installations' safety-critical systems were not time/date dependent (Chapter 3, page 5). But for all intents and purposes, these warnings were ignored; they did not figure into the committee's conclusions and recommendations. The media eventually brings out these issues but in general, not until much further along into 1999. Similarly, academics were almost completely silent on the Y2K issue throughout.

The financial papers were particularly interested in the story because by mid 1998 almost every large corporation had a Y2K plan, and in the US, the Securities Exchange Commission (SEC) ordered that publicly traded companies disclose information about their plans. Companies spent anywhere from millions to tens of millions to hundreds of millions dollars on it. The nine Wall Street firms that claimed to spend the most on Y2K, for example, claimed to spend collectively $2.8 B (Smith and Buckman, 1999). As noted, 21% of UK articles and 19% of US articles mentioned the cost of Y2K compliance. But spending a lot on compliance was not reported sceptically or cynically. In almost all cases, the cost is reported by way of showing the magnitude of the perceived problem. In the early phases, some of the other key investigative questions included, which companies were developing plans and which were not? Would they finish on time? What would the consequences of a large-scale systems failure be – on the company? - On its trading partners? – On its customers? On society as a whole, domestically and internationally? How would Y2K effect the financial health of certain companies/sectors? There is a considerable amount of coverage given to financial analysts speculating on the Y2K readiness of companies/sectors. Similarly, there was a professional consensus that financial systems were vulnerable to Y2K-related problems because most financial transactions are date-dependent. As financial newspapers, this vulnerability gave the newspapers more reason to give the story more coverage. Relatedly, the insurance industry was concerned that it would have to pay for its clients' Y2K-related incidents. In the US and the UK, insurance companies started drafting clauses in agreements to exclude Y2K-related failures. This controversy received considerable attention in early 1998.

From early 1999 many companies, including government agencies and departments, had large Y2K operations in place, and they were starting to see results. Equally important, as Y2K rose in the popular conscience, many organisations were discovering better ways to communicate Y2K compliance to the media and to the public. Indeed, many large companies had Y2K operations in place before 1996, including for example the US Social Security Administration, which had been working on Y2K since 1989 (Petzinger, 1996; President's Council on Y2K, 2000). In the main, however, the tone of the coverage becomes less alarming from early 1999 onward as companies trawl through their IT and embedded systems and check with suppliers to ensure that the suppliers were Y2K compliant. Companies also started developing contingency plans, and then communicated their level of compliance through the press; shareholder meetings; annual reports; government fora; news releases, etc. Ironically, then, as Y2K coverage increases throughout 1999 as the big date approaches, alarming headlines decrease, particularly in the US, as Y2K fixes are applied; contingency plans are developed; and because in some cases organisations checked and failed to discover Y2K-related vulnerabilities. In contrast, alarming headlines continued in the UK, but as noted, due largely to the coverage in the FT. But this latter day 'alarmism' can partly be attributed to the FT shifting its focus from domestic matters to countries that seemed to be more vulnerable. (See for instance, Blitz, Hope, and White, 1999, on the Mediterranean countries; Jack, 1999, on Russia).

Interestingly, only 6% of articles in the UK and 8% in the US refer to 'actual' Y2K failures. In most articles, 'failure' is a hypothetical scenario. While many believed that all Y2K-related failures had to be hypothetical until January 1, 2000 actually passed, this is not strictly so. The Y2K problem from a technical standpoint can be understood partly as a system's ability to process (unambiguously) a year entry. In many cases, this challenge would occur well before January 1, 2000. Any system that forecasts would have to process the year 2000 before January 1, 2000. For instance, the travel industry has an international system for bookings that forecasted into 2000 as of February 1999. When the system had to process the year 2000, there were no date-related problems reported ("Travel industry relaxes as Y2K deadline passes." Author not named. Wall Street Journal. February 5, 1999). Many companies' fiscal year started on April 1, 1999. Again, few (no) problems were reported. On a similar note, many programmers used to programme '9999' to refer to the end of a programming loop. IT specialists speculated that the '9999' problem would raise problems on September 9, 1999 (9999). Again, there was nothing. There may have been problems but either they were fixed in advance or fixed on the fly with little consequence. Nevertheless, given the lack of concrete evidence of 'actual' failures, it is little wonder that the tone in the coverage, for the most part, became less alarming when comparing 1998 with 1999. What one does see as the end of 1999 approaches is an increase in stories about the benefits of Y2K. These benefits were largely true but emphasising the positive was also a convenient way for government and industry to emphasise the 'good' in what was an extremely expensive risk management exercise, whose scope and cost were starting to look exaggerated by the end of 1999, particularly among non IT people.

In sum, at the outset in 1997/98, most press coverage focussed on elite groups and institutions – government; critical sectors; regulators; trade associations; and the IT industry, driven largely by uncertainty; perceived dependence on technology; and interdependency across sectors; and alarming claims. SMEs received some (little) attention as did public opinion. Press coverage was anxious in 1997/98. But as volume of coverage increased through 1998 and 1999, the 'alarming' tone decreased, as did public anxiety. Nevertheless, public anxiety could still be considered significant at the end of 1999, as anywhere from 8% to 30% of the respective populations expected some Y2K-related problems in the national infrastructure. So, what did people actually do as the New Year approached?

A Complication: Did Y2K cause people to alter their behaviour?

When Gallup asked Americans whether or not Y2K concerns would result in people modifying their behaviour, the results are different from the poll results cited above. They reveal greater and sustained anxiety. In December 1998, 47% said they or someone in their household has already decided or would decide to avoid air travel; 26% said they would stockpile on food and water; 16% said they would withdraw all of their money from the bank. In this case, we do not see a downward trend over the course of 1999. By December 1999, 51% say they would avoid air travel (up 9 % from 1998); 42% said they would stockpile food and water (up two-thirds); 6% said they would withdraw all money

from the bank (down two-thirds). There is no equivalent survey result for the UK.

Figure 14 summarises the US results.

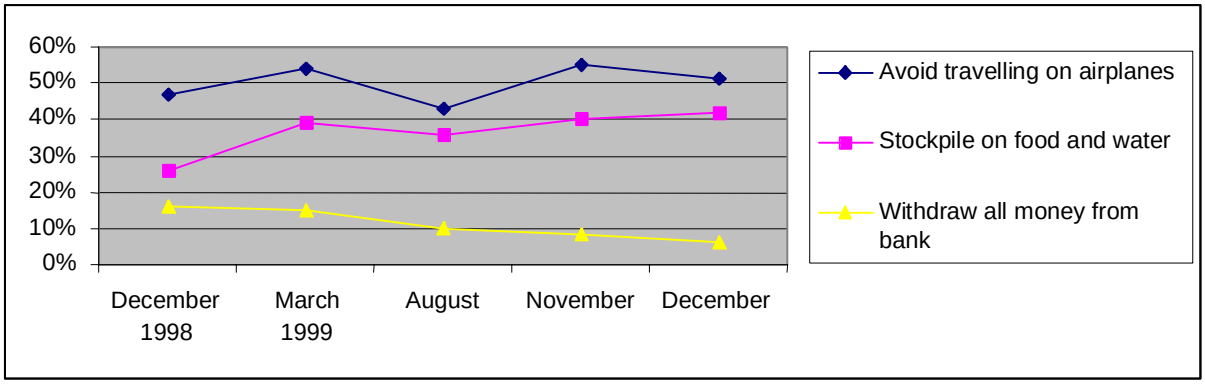


Figure 14: Percentage of Americans who say they or someone in their household have already done or probably will do to protect themselves against problems

Despite this evidence of actual or anticipated behaviour modification, there is very little evidence to support a claim that people did actually change their behaviour. One article in the *Wall Street Journal* does note an increased demand for some medicines; guns; lip gloss; smokes; canned vegetables; and wine among the US public (Starkman, 2000). At least three of those could be attributed to millennium celebrations. The other three (medicines, guns and canned vegetables) might be Y2K related. Yet despite all polling results that indicate high levels of anxiety in the US, there is little evidence to suggest that either the US or UK population modified their behaviour to any significant degree (Zuckerman and Wolf, 1999). There may have been slight inflation due to Y2K-related purchases in the fourth quarter 1999, though this cannot be attributed conclusively to Y2K. The media does report anecdotal shifts in demand, but never enough to constitute a trend. Somewhat ironically, perhaps the only exception is the drop in demand for IT in

the last quarter of 1999. Many organisations introduced an IT purchasing freeze; they did not want to introduce new bugs into their systems in the late stages of Y2K preparations (Kehoe, 1999).

There are, however, examples of the governments/sectors preparing for behaviour modification that didn't happen. The Bank of England and the US Federal Reserve printed extra cash lest there be a surge in demand in the last quarter in 1999. Moreover, the Federal Reserve created a special program to support small businesses in need of loans to make Y2K related repairs. But demand for cash in general was typical of other years and few loans were issued under the special program (Schlesinger and McKinnon; 1999; and Wall Street Journal, November 23, 1999 (author not named)). Investment houses tried to anticipate Y2K related activity in mid 1999 and then became cautious in late 1999 lest there be Y2K disasters (Tan, 1999). Both acts proved unnecessary as market behaviour seemed unaffected by the bug. Indeed, some analysts eventually chose to ignore Y2K altogether. (Wall Street Journal, September 13, 1999; author not named). Pharmaceutical suppliers worried about people stockpiling drugs and thereby creating a shortage, but again, other than a slight increase, this did not occur (Lagnado, et al 1999). There was a slight decrease in demand for airline tickets on New Year's Eve (Gomes, 1999) but travel is relatively light on that particular night every year. And indeed, the slight decrease in 1999/2000 can just as easily be attributed to people wanting to spend the 'Millennium Night' at a home base with their families. Indeed, people participated in Millennium celebrations in great numbers in US and in UK cities alike, seemingly without fear.

Some Considerations from the Risk Media/Communication Literature

It should be noted that many people worked on Y2K for a long time. Many plans were robust. Indeed, most interview subjects that I meet that worked on Y2K say they were not concerned about the systems they worked on; they knew they would work when the time came. This observation is consistent with research conducted in the Netherlands, which found a higher degree of confidence with respect to the millennium bug among IT professionals than lay people. It also observes that neither were particularly worried (Gutteling and Kuttschreuter, 2002). But this observation does not sit comfortably with the Gallup poll results, which indicates Y2K anxieties concerning critical services were still running at between 22% and 34% in December 1999. While the UK public seemed less anxious, still 8% considered it a serious threat in December 1999.

First, I would like to make a methodological note. While I am uncertain as to how Gallup collected the information in its polling, it is possible that they very act of asking people about certain risks triggers a heightened risk response. That is, Were people saying they were concerned about certain services/systems because the questions were framed to illicit such as response? It is difficult to believe that by December 1999, 22% to 34% of Americans actually thought that the services in Figure 9 would fail (i.e., banks; aviation; food and water; emergency services) and 8% of UK citizens considered Y2K a serious threat yet few modified their behaviour. If it were true that these services were genuinely at risk of failure, it would constitute a major collapse of the national

infrastructure. This anticipated collapse would surely have resulted in greater panic than what we actually witnessed. And therefore, these polling numbers may be somewhat exaggerated and must be treated and interpreted with caution.

Within the context of existing risk research, researchers have noted that many people base their perceptions about risk primarily on information presented in the media (Fischhoff, 1985; 1995; Kitzinger and Reilly, 1997). Researchers have also noted the media's propensity to report the dramatic over the common but more dangerous (Soumerai et al, 1992), its tendency to sensationalise (Johnson and Cavello, 1987) and its dependence on experts without having expertise itself to counter-act the claims it receives from the experts (Freudenberg, et al, 1996). There seems to be elements of all of the above in the Y2K coverage.

In some respects, the Y2K issue follows the Issue Attention Cycle representing peaks and troughs in volume of media coverage, particularly in the UK, though it is evident in all of the newspapers in question. Some have argued these peaks and troughs reflect the fact that people are becoming bored of the topic in question (Hilgartner and Bosk, 1988; and Kingdon, 1995). And indeed, Y2K was an obscure problem in many respects, which few people really understood in detail. Moreover, the story had been covered very thoroughly for well over a year by mid 1999, with hypothetical 'bang,' yes, but little real or practical 'bang' to it, as few real problems ever materialised. One congressional committee staff member noted it was very difficult to get the NY Times to cover the story because there was very little progress or anything new about the story from one day to the next.

Another take on the Issue Attention Cycle comes from Downs (1972) who notes that people will become disenfranchised with solutions when they consider the cost. And indeed, with respect to Y2K, one might speculate about various contingency plans that people considered, but ultimately, they decided to ignore because they were too costly, such as buying generators or stockpiling food and water. As far as withdrawing cash goes, where would one put the cash? And would it be any safer in the new location? (After all, the central governments insure deposits up to a maximum in registered banks).

Wahlberg and Sjoberg (2000) note that the media's influence is too often taken for granted when in fact much of the evidence points the other way – that media are probably not a strong causal factor of (especially not personal) risk perception. Risk perception may be effected by the media but the effects are lessened by impersonal impact; that general risk perception is more easily changed than personal risk perception; and finally that it is not conclusive that risk perception changes behaviour. Similarly, Mutz and Soss (1997) note that the media raises people's perception of the salience of a subject in the community but are much less successful in changing people's mind on a particular subject. Similarly, Atwood and Major (2000) note that people do not think of themselves as being as vulnerable to risks as others are. Indeed, some people are unrealistically optimistic, ignoring the news and denying personal vulnerability.

Also, because Y2K was seen as a 'one-off' people were less likely to draw upon past experiences to inform present-day risk perception. (It would be interesting, however, to

see how people in the North Eastern US would react to a similar problem today after having had the experiences of 9/11 and the massive power outage in 2002).

In other areas of research, it has been suggested that most individuals gain information from a variety of sources, not just the media, (Verba and Nie, 1972), including other individuals, government organisations and advocacy groups. And indeed, throughout 1999, with an army of people working on Y2K related problems, it is likely that many people were speaking about either the extent of their organisations' preparations or the lack of real Y2K problems that were emerging.

This research would suggest the US results seemingly pose a challenge to Quantity of Coverage Theory. In the US, coverage increases throughout 1999, but the alarming tone to the headlines decrease and so too does public anxiety. This trend suggests tone trumps volume. In the UK, however, this observation does not hold. In the UK, coverage increases, tone is schizophrenic and public opinion still seems to decrease.

Conclusion: To what extent were the governments' responses to Y2K influenced or shaped by public opinion?

As Hood, Rothstein and Baldwin note, public opinion is an elusive concept. Any examination that tries to map government movements against public opinion necessarily faces considerable methodological constraints. For instance, public opinion can change

over time, place and occupation. Some sections of the population will have a greater stake in protecting some services over others. Similarly, some of the changes in public opinion with respect to Y2K – both anxiety-generating and -diminishing - was the result of the governments' interventions. CO or White House Y2K communications operations can have the effect of coordinating good news messages about Y2K; but the very act setting up a Y2K Office at the White House or at CO can generate negative headlines, as can any other Executive intervention, such as the Prime Minister's speech or EO 13073. Moreover, one cannot claim conclusively that individuals' and/or organisations' behavior with respect to Y2K was spurred on by government efforts alone. As noted in the literature section, people get their information from multiple sources and are capable of making reasoned judgments about how to act to protect themselves, their families and their businesses, without necessarily following the advice of government.

That noted, the initial media coverage did not seem to reflect public opinion. Y2K was low on the public radar in 1997; no organisations were tracking public opinion because presumably few people outside the IT industry were particularly concerned about it. Indeed, even within the IT community, there was varying degrees of awareness about Y2K; and even among those who knew of the bug, most were unsure of its consequences outside of the individual systems for which they were responsible.

At this time, media coverage was sporadic and mostly alarming, though at times schizophrenic, though no different than the claims of the national legislatures. One interview subject from the FT suggested that the FT (and papers like the FT) try to

influence government policy. And indeed, this seems the more likely driver to the alarming coverage in late 1997 and early 1998. Figure 15 charts significant government interventions in relation to the alarming tone of the headlines on a national level. In the US, significant executive interventions – such as EO 13073; the President's speech; and *The Y2K Act* - occur when the percentage of alarming headlines is high; and the quarter following the intervention the percentage of alarming headlines drops. It is similar in the UK in that significant executive interventions – such as the creation of the Y2K Cabinet Committee and Action 2000; and the Prime Minister's Speech - are followed by a drop in alarming headlines. But unlike the US, in the UK the downward motion is not consistent; it is usually a decrease followed by an increase. This is not to suggest that the percentage of alarming headlines in the US or the UK decreased necessarily because of the government's interventions. And indeed, as noted above, the very act of intervening can generate even more negative headlines. However, it does seem to indicate that the governments intervened when there was alarm amongst leading media sources and the momentum for alarm among those sources was increasing.

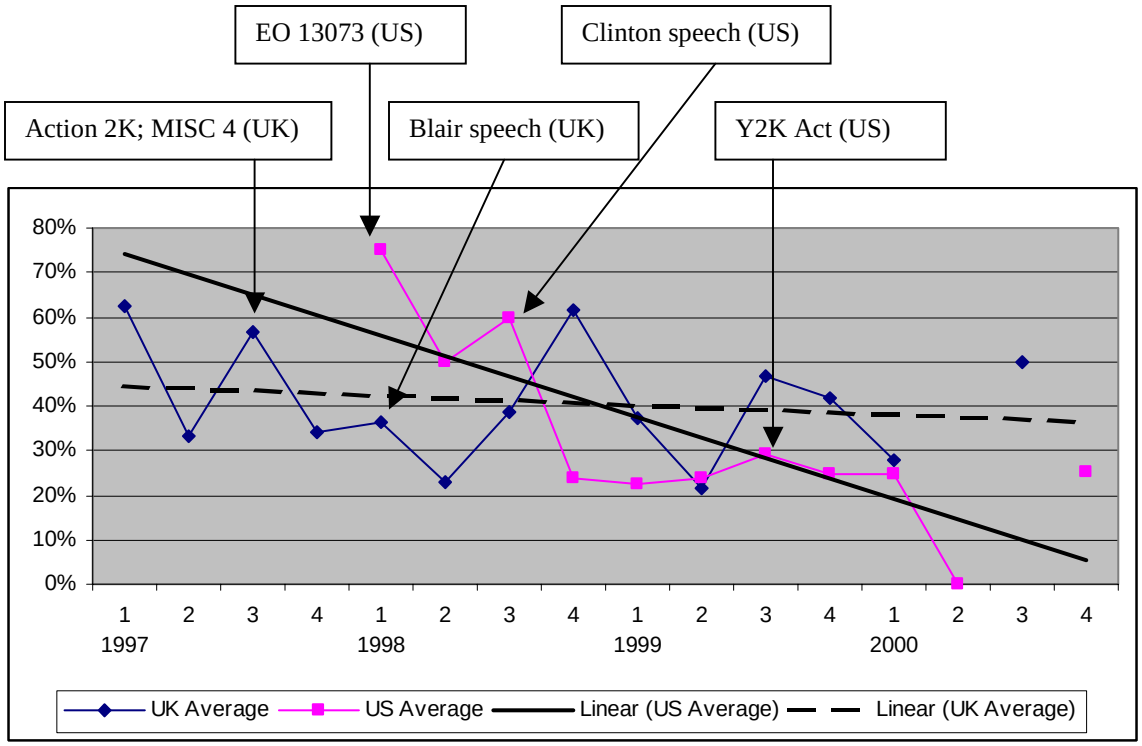


Figure 15: Tone of Media Coverage: Percentage of Articles with 'Alarming' headlines, Sorted by Country, by Quarter, 1997-2000

To return to Hood et al, they do not assume that the media reflect public opinion but rather that "it reflects the flavour of the public debate, not least because *opinion leaders* read such sources" (93; my emphasis). One might conclude that the Executives committed significant interventions when *professional* opinion about Y2K was most anxious – that is, among industry leaders; the media and government. They were concerned about available resources and the uncertainty concerning the magnitude of the task.

In many respects, the governments approach to Y2K is an incredibly successful public awareness campaign. Indeed, it might be described as something akin to a "preference shaping strategy" (Dunleavy, 1991). The government had to move mountains in a short time. It could not police Y2K compliance across the entire infrastructure the way it did within the government departments and agencies. Rather, it had to help convince organisations to become Y2K compliant.

Communications was critical to this intervention. The governments wanted to raise awareness (*develop anxiety?*) so that people would check (and fix) their systems and the government would thereby maintain stability in the face of the uncertainty. And indeed, Y2K-compliant became a label of good corporate citizenship; it represented taking your business seriously; anything less than full compliance in most sectors in the national infrastructures, such as health and aviation, was not acceptable. By 1999, after raising awareness/anxiety for the good part of a year, the US government was worried that it had done too good a job – and that public awareness would result in hoarding and stockpiling; public enemy 'number one' was no longer the bug but the public itself; and therefore they embarked on a strategy of bringing public anxiety down through operations such as the US Government's Community Conversations.

As public opinion/anxiety dropped throughout 1999 (and the public even became somewhat skeptical) the government was locked into a large-scale bureaucratic response; it was as thorough and vast as the perceived problem was in 1998, but it was expensive

and the standardized response was long and inflexible once it got started. Throughout 1999 the governments' response seems to deviate from public opinion.

Y2K seems like a rather mundane dress rehearsal in a post-9/11 environment. In fact, Y2K offers us an exceptional opportunity to examine how governments respond to risks that include industry, governments, regulators and the media, with potential health, safety and economic consequences. Indeed, the current state of risk management has much in common with the period leading up to Y2K. What is important now is to focus on the study in retrospect and try to understand the strength and weakness, opportunities and constraints that shaped the regulatory response and in so doing draw lessons to make present risk management more effective.

Appendix 1: Methodology

This paper is the result of an on-going comparative research project that is considering how governments manage uncertainty and information technology, using Y2K as the common focus. The data concerning Y2K in this paper come mostly from primary and secondary UK/US government documents, including government department and agency Y2K files, National Audit Office (NAO)/General Accounting Office (GAO) publications and documents from the British Parliamentary Library and the Library of Congress. In addition, I have conducted over 60 semi-structured interviews with civil servants and

representatives from private sector IT service providers. All interviews for this paper were conducted between July 2001 and April 2004.

For the media analysis in this paper, I counted the headlines that appeared between January 1, 1997 and December 31, 2000 that included the term(s) "Y2K," "millennium bug," "millennium bomb" and/or "Year 2000 computer problem" in the four newspapers selected. I also interviewed two senior IT journalists. The purpose of the media analysis is to provide a flavour of the media coverage in the run up to Y2K. The media coverage is not comprehensive. It does not include, for instance, articles that use less common terms in the title to refer to the bug. This search method limits the results particularly in the 1997 period when many terms were being used to describe Y2K. It also does not include articles that do not refer to the key search terms in the title but do refer to them in the body of the text. Searching for the reference in the body of the text provides a considerably larger number of articles, but includes many articles relating to the millennium which have nothing or little to do with the computer bug, or they mention the bug only in passing. For this reason, I chose to search for articles with the key terms in the title and thereby identify articles that were primarily about the computer bug. It also does not include the tabloid press, or the IT press.

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