



Comptroller and Auditor General
Report on Value for Money Examination

2

Year 2000 Compliance Projects

February 1999

© Government of Ireland 1999
ISBN 0-7076-6736-4

The report was prepared on the basis of information, documentation and explanations obtained from the bodies referred to in the report.

The draft report was sent to the Accounting Officers of the Departments and the Heads of the organisations examined and their comments were requested. Where appropriate, these comments were incorporated in the final version of the report

Report of the Comptroller and Auditor General

Year 2000 Compliance Projects

I have, in accordance with the provisions of Section 9 of the Comptroller and Auditor General (Amendment) Act, 1993, carried out a value for money examination of Year 2000 compliance projects in certain Government Departments and State Bodies

I hereby submit my report of the above examination for presentation to Dáil Éireann pursuant to Section 11 of the said Act.

A handwritten signature in black ink, appearing to read 'John Purcell', with a large circular flourish at the beginning.

John Purcell
Comptroller and Auditor General

11 February 1999

Table of Contents

	Page
Summary of Findings	i
Year 2000 Compliance Projects	
1 Introduction	1
2 Planning and Management	6
3 Project Execution and Costs	17
4 Achieving Compliance	24
Appendix	
Project Summaries	

Summary

Since the mid 1990s, Government Departments and State Bodies have spent significant resources in order to ensure that their business operations will not be adversely affected by the Year 2000 problem. The pervasive nature of the problem in terms of the potential failure of key systems which depend on computer processors and the consequent disruption to the provision of public services has increased the urgency of ensuring that all affected systems are rendered compliant before the critical date when the problem might take effect.

To have due regard to achieving value for money, it was necessary that projects established to achieve Year 2000 compliance should be planned, managed and completed by reference to established best practice. In an ideal situation, sufficient time should be available to maximise value by taking the opportunity to add functionality to systems in the course of Year 2000 compliance work. This examination considered how four Government Departments and two State Agencies have organised and managed Year 2000 compliance work. It also looked at how three Departments are monitoring the efforts of bodies under their aegis to achieve compliance. The key questions considered by the examination were

- whether the planning and management of Year 2000 compliance projects conformed to best practice
- whether compliance strategies have been implemented in the most efficient and cost effective way
- whether, based on the analysis carried out within the examination, systems are likely to achieve compliance on time.

Ernst & Young (Ireland) conducted the examination in association with a liaison team from the Office of the Comptroller and Auditor General

Planning and Management

In March 1997, the Centre for Management Organisation and Development (CMOD) issued an advice note establishing best practice for the planning of Year 2000 compliance projects. Departments were requested to submit project plans by the middle of 1997 which would aim to achieve compliance by the end of 1998. Departments with bodies under their aegis were requested to collect information on the steps being taken to ensure that they would achieve Year 2000 compliance on time. The Government established an Interdepartmental Monitoring Committee to oversee Year 2000 compliance work and to report on progress on a regular basis to Government. While the arrangements for central monitoring were effective, the advice note should have given greater emphasis to the need for senior management support for Year 2000 work. It would also have been preferable for the advice note to be released up to one year earlier to allow for proper consideration of the opportunities to maximise value for money by building in improvements to the functionality of systems covered by Year 2000 compliance projects.

Although Departments generally took action on foot of the CMOD advice note, there were several areas in planning where best practices were not fully observed. The project boards set up to oversee Year 2000 compliance work have not had sufficient authority to ensure that the projects were adequately resourced. The quality of investment analysis (i.e. consideration of the costs and benefits of projects) has been limited as statements of the costs and benefits of alternative solutions were not prepared by any of the organisations examined. Although a risk management approach has been applied, insufficient attention was given to contingency planning at the project planning stage. Delays in obtaining resources in the Department of Agriculture and Food have led to an important project starting later than had been originally expected. In the Office of the Revenue Commissioners, the project managers accepted requests for changes in the functionality of programs without a proper assessment of the impact these would have on the costs and benefits of the project or on the project time schedule and risk profile.

Some bodies under the aegis of the Departments of Health and Children and the Department of Education and Science have been slow to respond to requests for information by their sponsoring Departments. The Government has issued instructions to improve the frequency of reporting of progress by bodies under the aegis of Departments.

Project Execution and Costs

There are four broad approaches to solving the Year 2000 problem. Systems may either be converted by recoding the date or be replaced by new systems which are already Year 2000 compliant. The conversion or replacement may be done internally by the organisations themselves or externally by vendors or consultants. The solution strategies adopted by the organisations covered by the examination varied according to the nature and extent of the problem and the availability of resources. In all cases, it was found that the solution strategies adopted were appropriate in the circumstances.

The organisations generally started Year 2000 compliance projects in the course of 1997. In Finance and Agriculture work on two key projects planned for replacement was delayed until 1998 due to a shortage of skilled staff. In Agriculture it has been decided to make the existing system compliant at a cost of £815,000. In Finance there was a need for greater external consultancy than originally planned. All the projects examined were proceeding according to plan.

While the cost of Year 2000 project work is controlled at project level, the full cost of all Year 2000 work has not been established. There is no centralised system to comprehensively and systematically monitor full costs, including opportunity costs, and which would provide a method for assessing the overall financial implications including the extent to which value for money has been achieved. In mid 1997, Departments submitted a forecast of the additional costs they expected to incur to achieve Year 2000 compliance. Work already funded from

existing information technology budgets and the opportunity costs caused by the need to divert staff from other valuable work were not included in the forecast. A contingency fund of some £40 million was established at the end of 1998 and much of this is expected to be used in the health sector.

Achieving Compliance

During the examination it was clear that none of the projects examined would meet the originally suggested target in the CMOD guidelines of achieving compliance by the end of 1998. While effective management of all project risks will have a critical impact of whether the projects are completed successfully, the likely achievement of Year 2000 compliance will largely depend on the results of testing. None of the organisations have completed their testing. Using best practice advice, the Department of Social, Community and Family Affairs originally estimated that testing for its projects would require 18 man years of effort. This has since been revised to 44 man years. The Office of the Revenue Commissioners have a significant exposure to testing risk. In other organisations where work has been outsourced, there is a dependence on vendors. The position of bodies under the aegis of Departments is less clear and for some Departments the monitoring arrangements and reporting to Government have been increased.

The organisations examined have not paid sufficient attention to contingency planning in the event that either problems emerge in testing or the projects are not successfully completed on time. The Department of Social, Community and Family Affairs is planning to produce a business continuity plan by the end of March 1999 while Finance have stated that an existing key system can be made compliant should development of the new system be delayed. The other organisations are now beginning to pay more attention to this issue. Although, there is optimism that the work will be completed in time, it would be prudent to review and update plans for the continuance of critical public services in the event that full Year 2000 compliance is not achieved.

The experience gained from the planning, execution and monitoring of Year 2000 compliance projects has highlighted three areas in information systems project management where value for money is at risk. The involvement of senior executives in project planning and their ability to secure adequate resources for projects is critical for successful project management. The pressure caused by a shortage of key information technology analysts and programmers has highlighted some inflexibility in recruitment and staff retention procedures and an inability to respond quickly to sudden externally imposed threats. The lack of a comprehensive investment analysis to underpin the solution strategies adopted by the organisations makes it difficult for them to demonstrate that they have maximised value for money in the conduct of Year 2000 compliance projects.

Year 2000 Compliance Projects

1 Introduction

Background to the Year 2000 Problem

- 1.1 Many computer hardware devices and software applications have been designed using a long established date convention which uses two numerical digits to identify the year, for example representing 1998 as 98. In certain cases, there is no mechanism in place to distinguish the year 2000 (which would be represented by 00) from the year 1900. If the century date change has not been properly catered for, then computer software and hardware components which use the two digit year convention could produce faulty results or even stop functioning entirely.
- 1.2 While resolving each individual incidence of the problem is technically a straight forward task, a very large number of components and lines of computer code must be checked and many of these may need to be changed. As a result, the investigation of the extent of the Year 2000 problem and the organisation of resources to put it right has become a major logistical challenge.

Unique Aspects of the Year 2000 Problem

- 1.3 The Year 2000 problem has a number of factors which make it unique among business and information technology problems. These features include
 - A fixed deadline which allows only a limited period in which to solve the problem
 - Every organisation trying to address the same problem at the same time
 - The whole of an organisation's business may be affected including
 - Information technology systems
 - Plant and equipment (e.g. computer controlled equipment)
 - Business partners (e.g. electronic data interchange)
 - Suppliers (e.g. providers of materials have the same problem)
- 1.4 The extent of exposure to the Year 2000 problem ranges from software applications, active and archived databases, operating systems and communications software for personal computers and mainframes to microprocessors in equipment such as medical devices, security systems, lifts, and office equipment. Public Sector organisations are heavily reliant on computing for business purposes and as a result the Year 2000 problem presents significant potential risks to the ongoing provision of public services.

Response of the Government and the Civil Service

- 1.5 Information Technology practitioners in certain Government Departments, which use large mainframe based systems, began consideration of the Year 2000 problem in 1995. In September 1996, the Department of Finance issued an advice note with examples of paragraphs which could be inserted in procurement contracts to confirm that equipment and software being acquired was Year 2000 compliant. The following month, a Year 2000 special interest group was established on a Civil Service wide basis to identify and address common technical issues.
- 1.6 In March 1997, the Department of Finance issued to all Government Departments and Offices a Year 2000 and Euro Changeover Planning Advice Note which gave detailed advice on the drawing up a Year 2000 compliance plan and on initiating a Year 2000 compliance project. In September 1997, the Government established an Interdepartmental Year 2000 Monitoring Committee to oversee Year 2000 compliance activities and on foot of the Committee's reports have issued a range of instructions throughout 1998 to Departments and Offices to give added impetus and urgency to tackling the problem.

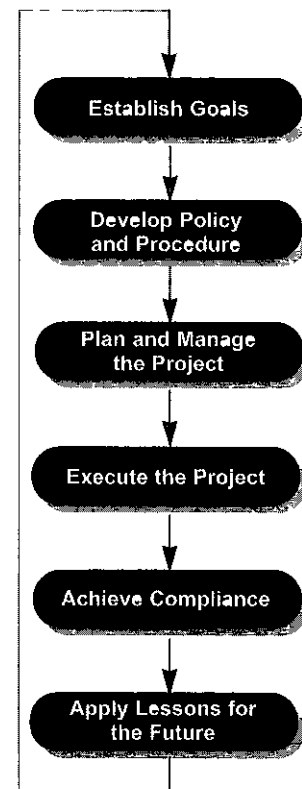
Best Practice Principles

- 1.7 The world wide scale of the problem has given rise to a general agreement among professionals on a basic set of 'best practice' principles and processes through which the extent of the problem within organisations should be assessed and resolved. To ensure efficiency and effectiveness, compliance processes must be properly structured, planned, managed, monitored, and completed. For the purposes of this examination, six broad areas were identified as having the most impact on the conduct of projects (See Figure 1.1). The assessment of project planning and management is based on these six areas.

Value for Money Context of the Year 2000 Problem

- 1.8 An assessment of the value for money implications of the Year 2000 strategies of public sector bodies would require specific consideration of the economy, efficiency and effectiveness of the strategies adopted. There are many ways in which certain solution strategies for Year 2000

Figure 1.1 Year 2000 compliance processes



compliance may implicitly present value for money challenges to a project as a whole. For example, a strategy with the greatest probability of achieving effectiveness may be the highest cost solution and the most inefficient. Likewise, the most efficient solution strategy may have the most risks and may not be effective. Accordingly, the pursuit of value for money usually requires some trade-off between the effectiveness of the strategy and the economy and efficiency of execution. However, it is imperative that Year 2000 compliance projects should be concluded effectively because compliance must be achieved by a specific date.

Objectives and Scope of the Examination

- 1 9 The examination was concerned with the value for money aspects of the planning and management of Year 2000 compliance projects in certain Departments and State Bodies¹. A number of key systems covered by the compliance projects were identified and reviewed to assess the progress achieved to date. The organisations and projects covered by the examination are summarised in Figure 1.2. Further details of the Year 2000 compliance projects covered by the examination are set out in the Appendix

Figure 1.2 Summary of organisations, systems and project scope

Organisation	Systems/Projects Examined
Department of Social, Community and Family Affairs	Eleven key systems dealt with in one Year 2000 compliance project
Office of the Revenue Commissioners	Four projects for all Year 2000 conversion
Department of Agriculture and Food	Three projects for Year 2000 compliance
Department of Finance	Two projects (FMS and PMG) managed by the IT Unit One project (Unipay) managed by CMOD
National Treasury Management Agency	One project involving Year 2000 and Euro compliance
Central Bank	A series of projects under overall management of the Information Systems Department

- 1 10 The PMG project is included in the scope of the examination as it is replacing the existing system which is not Year 2000 compliant. The project was planned prior to

¹ In the report, the Departments and State Bodies are collectively referred to as the "organisations"

the commencement of formal Year 2000 compliance planning in 1997 and is therefore not regarded by the Department of Finance as a Year 2000 compliance project.

- 1 11 Three other Departments were examined to assess the steps they are taking to ensure that the bodies under their aegis are addressing the Year 2000 problem. These are as follows

Departments	Principal Bodies under Aegis
Department of Education and Science	90 bodies including Vocational Education Committees, Colleges of Education, Institutes of Technology and Education Centres. (Universities are excluded as they are monitored by the Higher Education Authority)
Department of Health and Children	Health Boards, Large Voluntary Hospitals
Department of Public Enterprise	Commercial State Sponsored Bodies

- 1 12 The examination was particularly concerned with whether an organisation's approach to compliance is likely to be successful, whether the policy and project planning took account of criteria to achieve value for money, whether project management systems were structured for the effective delivery of projects and whether project execution is efficient
- 1 13 Using the best practice framework, the following questions were specifically considered
- whether the planning and management of projects conformed to best practice
 - whether compliance strategies have been managed and implemented in the most efficient and cost effective way
 - whether, based on the analysis carried out within the examination, systems are likely to achieve compliance on time.
- 1 14 The scope of the examination did not include
- certification that the IT systems considered would be Year 2000 compliant or a detailed technical assessment of specific compliance solutions
 - the compliance of non-IT computer chip based devices (eg lifts) and the compliance of external business partners
 - examination of individual Year 2000 projects of the bodies operating under the aegis of Departments assessed in the examination

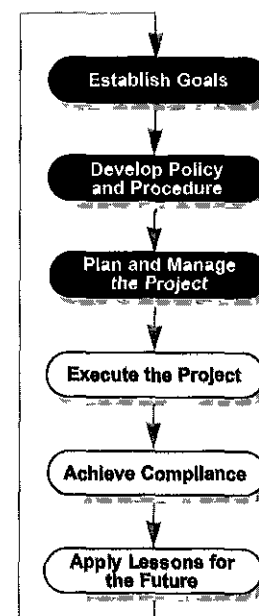
Methodology and Approach

- 1.15 A limited tender was organised to find a reputable organisation with the relevant technical expertise and a suitable methodology which specifically catered for the assessment of Year 2000 compliance work. As a result, Ernst & Young (Ireland) were appointed to conduct the examination on behalf of the Office of the Comptroller and Auditor General. A liaison team from the Office participated in the fieldwork and was involved in the development of issues for the report.
- 1.16 The Ernst & Young Year 2000 Compliance Methodology was used in carrying out this examination. The principal steps involved were
- Initial contacts were made with the organisations covered by the examination. Year 2000 compliance projects were defined by reference to the original project plans, their current status and estimates to completion.
 - An initial questionnaire was developed for use by the organisations to provide basic information on the Year 2000 projects covered by the examination.
 - Individual interviews were held with the organisations to discuss the examination scope and the questionnaire.
 - A findings reference table was produced which provided a framework for making an assessment of the projects against industry recognised best practice in relation to Project Management and in relation to Year 2000 Methodologies. The table also incorporated an assessment of the specific value for money considerations to be addressed in the examination.
 - Individual tables of findings in each organisation were produced detailing examination issues arising from the questionnaire responses, the outcome of the interviews and the analysis using the reference table. Where required, clarifications were sought and reflected in the tables.
 - The organisations were asked to review the initial findings and analysis through a review of the tables of findings.
 - The tables of findings were used as a basis for drafting the report.

2 Planning and Management

2.1 As the Year 2000 problem is common across all Government Departments and Offices, there are benefits in the provision of strong central co-ordination and monitoring procedures. Good co-ordination, planning and management is also essential within organisations at project level.

2.2 This chapter first considers how, in terms of best practice, central co-ordination and monitoring was implemented across Government Departments and Offices. It then assesses the planning and management of the Year 2000 solution strategies followed in the organisations from a value for money perspective.



Central Co-ordination and Monitoring

2.3 The Year 2000 problem presented the Civil Service with an exceptional range of issues which need to be tightly managed and co-ordinated within a fixed time period (See Figure 2.1). These issues extend beyond the sphere of information technology development and maintenance and have important implications for the business operations of Departments. It was important that central leadership, monitoring and advisory roles should be established from the outset.

2.4 The central advisory role is discharged by the Centre for Management Organisation and Development (CMOD) which is part of the Department of Finance. CMOD promotes best practice in the planning and execution of information systems projects throughout the Civil Service. It also aims to ensure that value for money is obtained from the resources spent on information technology. However, individual Departments retain responsibility for the planning and management of their own IT including Year 2000 compliance projects. On the advice of CMOD, the Government established an Interdepartmental Monitoring Committee to review regular information on progress towards compliance and to make recommendations to Government, as appropriate. CMOD acts as the technical secretariat for the Committee. In response to the reports of the Committee, the Government has been issuing instructions directly to Departments for the purposes of ensuring the achievement of compliance.

2.5 In March 1997, the Department of Finance (Finance) issued a circular to Departments and Offices concerning IT systems and the Year 2000. This circular advised Departments and Offices to verify the Year 2000 compliance status of their IT infrastructures and systems and to draw up plans for the migration of non-compliant

Figure 2.1 Issues arising from the Year 2000 problem

Issue	Implications
No schedule slippage possible	Project progress tracking is an imperative
Increasing pressure on limited resources	Obtaining staff to work on projects promptly is an issue
Increasing costs of consultancy and solutions	A seller's market for skills and solutions which may penalise late buyers
Increasing staff retention issues	Retention of skills in a buoyant market place is a significant issue, in particular within the Civil Service
Emerging contingency planning focus	As organisations realise it may not be possible to complete Year 2000 compliance projects in time, contingency planning becomes a priority. Contingency planning is needed for external dependency exposures outside of the organisation's control
Not just an IT project	Co-ordination of Year 2000 projects which affect all business operations (e.g. co-ordinating user testing)
Impacts to other business initiatives	As limited resources are redirected to Year 2000 projects, both long term IT strategies and short term imperatives are affected (e.g. EMU)

systems to Year 2000 compliance. Departments were also requested to estimate the time and resources required and to submit their plans to Finance by 1 July 1997.

- 2.6 The primary purpose of the circular was to obtain an overall view of the state of planning for addressing the Year 2000 problem and of the likely additional costs which might arise across Departments and Offices. The circular also sought to establish goals for achieving Year 2000 compliance and to put in place a policy framework within which Departments could organise Year 2000 compliance projects. The objective was to ensure that all Civil Service infrastructures and systems would be compliant by 1 January 1999 (or earlier for those systems which process post 1999 date-based information before 1 January 2000) and to ensure the ability of the Civil Service to continue providing public services.
- 2.7 A detailed and comprehensive advice note on how to determine Year 2000 compliance of infrastructures and systems and on how to draw up a Year 2000 compliance plan was issued by CMOD at the same time as the circular. CMOD have pointed out that the advice note was part of a series of guidance notes issued in recent years which establish best practice for the planning, management and implementation of information systems in the civil service. In preparing the Year 2000 advice note it was

assumed that Departments would already have had due regard to best practice guidance contained in earlier guidance notes. While the Year 2000 advice note generally reflected best practice for organising Year 2000 compliance projects at the time, it could have given greater emphasis to the need for senior management in Departments to ensure that sufficient priority was given to achieving Year 2000 compliance

Key Point: Need for further advice notes

- 2 8 The knowledge and experience, available internationally, of implementing Year 2000 compliance projects has developed considerably since March 1997 and topical information has been disseminated electronically by CMOD through the IT managers network. However, no further formal advice notes have been issued to Departments. As Year 2000 projects move into their most complex and critical stages of integrated testing, CMOD should consider whether it would be appropriate to issue further updating advice notes in line with the development of Year 2000 compliance practice, especially in the areas of testing, risk management and contingency planning.

Key Point: Opportunity lost to secure value for money

- 2 9 The requirement to rework systems to achieve Year 2000 compliance provided a significant opportunity for Departments to improve the operating efficiency of their systems by incorporating an analysis of business processes into the planning of Year 2000 projects and by adopting solution strategies which would, at the same time, achieve Year 2000 compliance and improve business processes. While the steps undertaken by the Department of Finance and CMOD in 1997 were very effective in promoting action on Year 2000 compliance, the advice note should have been issued in 1996, or earlier, to allow sufficient time to properly consider adding value to the functionality of the systems. In some cases, the timing of the release of the advice note did not allow sufficient time for an orderly consideration of how to maximise the value obtained from the compliance projects

The Monitoring Committee

- 2 10 The Interdepartmental Year 2000 Monitoring Committee, which includes private sector participation, was established in September 1997 to monitor the achievement of Year 2000 compliance throughout the Civil Service and to keep the Government informed of progress. The Committee reports every two months to the Government on progress within each Department and highlights issues of concern. The Monitoring Committee's reports have significantly increased awareness of the Year 2000 problem and the urgency with which it needs to be treated. On the basis of their reports, the Government has issued a number of instructions on such matters as the involvement of senior management in the process, the establishment of multi-disciplined monitoring committees, the need to ensure that staff are available and the need to address other staffing difficulties

Planning and Management of Year 2000 projects

Basis for Assessment of Projects

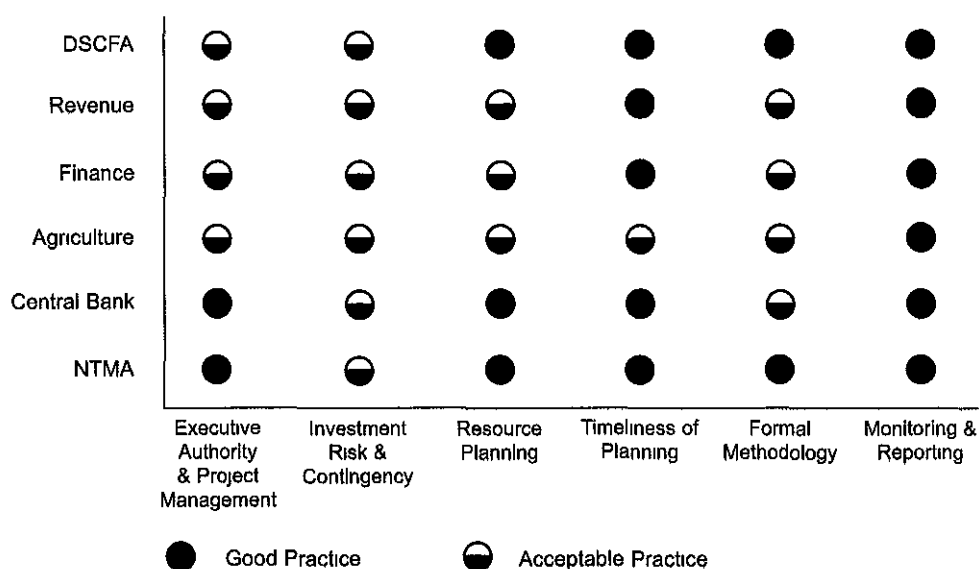
- 2 11 The efficient planning and execution of Year 2000 compliance projects was essential to ensure their effectiveness. The basis for the assessment of efficiency was to look for indicators of the use of best practice in information technology project management as applied to the Year 2000 problem. The framework used to consider project management efficiency is summarised in Figure 2.2. Figure 2.3 illustrates the performance of each of the organisations reviewed in each area of project planning and management.

Figure 2.2 Efficiency in Year 2000 projects

Concept	Measurement bases	Specific performance measures
An efficient Year 2000 project achieves Year 2000 compliance with minimum effort	<ul style="list-style-type: none">● Executive involvement in Project Management decisions● Project Management structures● Use of a formal project management methodology● Assessment of costs and benefits of projects● Taking opportunities to enhance the functionality of systems	<ul style="list-style-type: none">● Frequency of formal reporting● Variance in mandays to achieve project milestones● Existence of<ul style="list-style-type: none">- investment analysis- contingency plan- scope management procedures● Number of change requests resolved● Number of issues resolved

Executive Involvement and Project Management

- 2 12 An essential factor for the successful outcome of a project is that senior management should be involved in key decisions affecting the direction of the project, ensuring that adequate resources are made available at the appropriate time, resolving issues affecting the scope and ensuring that projects are managed. A senior official should have the power to allocate to the project all of the financial and staff resources required to execute the project according to plan. In Government Departments this power is constrained by a lack of delegated budgetary authority and by Civil Service recruitment procedures. These limitations of authority have greater impact in smaller Departments as they have limited overall levels of resources. The constraints do not exist to the same extent in the two Agencies examined, where executives managing projects have greater authority and flexibility to obtain the necessary resources.

Figure 2.3 Evaluation of planning and management of Year 2000 projects

Source Analysis on behalf of Office of the Comptroller and Auditor General

- 2 13 In the Departments examined, the Management Advisory Committees continued to control the prioritisation of all systems development and maintenance activity and the allocation of resources. As a result, the functioning of project boards specifically set up to oversee Year 2000 work was limited to co-ordination of Year 2000 compliance. In these circumstances it was essential that there should be close co-operation between the Project Boards and the Management Committees. While this was achieved in the larger organisations some delays arose in other organisations caused by deliberations over the staffing and prioritisation of Year 2000 work. Where it was planned to fund Year 2000 compliance projects from existing resources, the required change in the prioritisation of work in favour of Year 2000 compliance did not always prevail. The reports of the Monitoring Committee have helped to address this deficiency by giving a greater focus at the most senior levels to the need for Year 2000 compliance.

Investment, Risk and Contingency Planning

- 2 14 The choice of strategy on which any information technology project is based should be supported by an investment analysis detailing the costs and benefits of the alternative strategies and confirming that the approach adopted will produce the most benefits over time. A risk analysis which outlines factors which could prevent a successful completion of the project and the proposed means of containing the risk factors should also be included together with a contingency plan to cater for the possibility that the project will fail to achieve its objectives.

2.15 Although covered in the advice note, best practice was not followed in respect of the requirement for investment analysis of alternative solutions as part of Year 2000 compliance planning in any of the organisations under review. There were several reasons for this:

- depending on the nature of the system and the time available, there was usually one primary option for compliance
- due to the unique nature of Year 2000 projects, there was insufficient time to adequately evaluate the technical and economic merits of potential alternative solutions
- reliable information from vendors about the Year 2000 compliance of their products was not always available
- for some systems there were no precedents on which to base cost estimates.

2.16 In general, a solution based on the primary option was developed without exploring alternatives on the basis that these would have required extensive research which would not necessarily have shown them to be more advantageous. The appropriateness of the solution strategies applied is considered in Chapter 3.

2.17 The advice note recommended that user sections should review and update their business continuity plans to minimise exposure due to the potential failure of systems at Year 2000. For the organisations examined, there was no evidence that this had been done at the planning stage and several organisations indicated that their focus was on achieving compliance as soon as possible rather than diverting resources to draw up contingency plans at such an early stage. To this extent, the organisations examined did not adhere to best practice. Contingency planning is becoming a significant issue in Year 2000 compliance planning because, as the time available to complete projects diminishes, there may not be sufficient time to pursue alternative solutions in the event of project failure.

2.18 CMOD have stated that, given the range and extent of Year 2000 compliance work:

- early attention to reviewing and updating business continuity plans would have been demanding and in the majority of cases unnecessary
- confidence that considerable progress would be made has been justified, reducing greatly the extent of revising business continuity arrangements
- there is no evidence to suggest that there may not be sufficient time to pursue alternative solutions in the event of project failure.

The importance of contingency planning is discussed further in Chapter 4.

Resource planning

- 2 19 In the case of the very large projects in the Department of Social, Community and Family Affairs (DSCFA) and the Office of the Revenue Commissioners (Revenue), all Year 2000 work was planned and undertaken by a team with detailed knowledge of the systems and their calculations of resource needs were based on guidelines provided by GartnerGroup¹ and on sampling programs. The projections were accurate enough to provide a proper basis for planning Year 2000 compliance projects. The projects in the other organisations examined were on a smaller scale which has enabled resource projections to be reasonably estimated
- 2 20 It was established at an early stage that DSCFA and the Central Bank did not have sufficient in-house manpower for Year 2000 work. As a result of their detailed manpower planning of Year 2000 projects, these organisations increased their resources and built in a contingency allowance to the project plan to obtain external assistance, if required. The other organisations planned their Year 2000 projects on the basis of using resources already available for existing systems maintenance work.

Key Point: Delays in obtaining the necessary resources have increased costs and project risks

- 2 21 The Year 2000 compliance plans drafted in the Department of Agriculture and Food (Agriculture) and in the Department of Finance (Finance) pointed to shortages of IT staff. While information systems managers in these Departments clearly articulated the implications of the lack of manpower, their requests were not acted upon in sufficient time with the result that important projects fell behind schedule.
- 2 22 Agriculture had planned to introduce a new Cattle Disease Testing computer system to meet the up-to-date needs of its disease eradication and veterinary control sectors. This system would take two to three years to put in place and would include Year 2000 compliance in its functionality. However, since by January 1998 the new project had not commenced, it was decided, as a contingency measure, to make the existing system Year 2000 compliant at a cost of some £815,000.
- 2 23 In Finance, the planning and design work for an upgrade to the PMG system, which would include Year 2000 compliance, was delayed due to a loss of skilled staff. The delay has necessitated a tighter project schedule which reduces the time available for alternative action in the event of project slippage. However, the Department is satisfied that the existing system can be made compliant should it be necessary to do

¹ *A worldwide business and information technology consultancy firm. Their project cost guidelines are based on the number of lines of code to be checked and are suitable for use in Year 2000 compliance projects for mainframe based systems such as those in DSCFA and Revenue*

so. The delay also led to the need for more external consultancy resources than had been originally envisaged.

Use of Formal Methodologies

- 2.24 The purpose of a formal methodology is to document procedures under which a project is conducted so that they may be communicated to and understood by all of the parties involved. This should include procedures to manage the identification, investigation and disposal of significant issues which arise during the project and to streamline the consideration of any proposal to change the project scope.
- 2.25 It is particularly important that any proposals for change in the scope of a project should be evaluated in terms of the incremental costs and benefits of the change and the impact of the proposed change on the risks for the successful completion of the project. The best method of achieving this is to maintain issue and change management logs for the duration of the project and to have formal change management procedures to evaluate and approve a request for change. This structured approach ensures that change requests are presented, evaluated and disposed of consistently.
- 2.26 Government Departments generally use a project management methodology called PRINCE which has been recommended by the Department of Finance. The PRINCE methodology is a standard and comprehensive project management methodology for information systems development projects. For Year 2000 projects, compliance guidelines such as the CMOD Advice Note were necessary to supplement the PRINCE methodology to ensure a comprehensive approach to projects. Reliance was also placed on the experience of the project managers to customise the methodology to suit the circumstances of each project.
- 2.27 Of the organisations examined, DSCFA and NTMA are using formal documented project management methodologies. Revenue, Agriculture and Finance use adaptations of PRINCE in the form of cut down templates and guidelines as they regard the full PRINCE methodology as being too cumbersome for Year 2000 projects and smaller application development projects. The Central Bank adopts a similar approach based on a different methodology.
- 2.28 Strict change management procedures are particularly important to ensure that Year 2000 compliance continues to receive top priority in the execution of projects. DSCFA developed issue logs and change planning procedures which have been consistently applied. In the case of the PMG development project, formal issue and change request arrangements are in place. The remaining organisations recorded project issues and change requests in a less structured way, principally through minutes of meetings.

Key Point: Changes in expected outputs increase the risk of not completing projects on time

- 2 29 In Revenue, at the request of line managers, individual project managers added extra features to some programs during conversion without a proper assessment of their impact on the resource requirements, time schedule and risk profile of the projects. The changes in scope have only been considered in the context of their expected impact on the applications affected and were not assessed in terms of the costs and benefits to the project as a whole.

Bodies under the Aegis of Departments

- 2 30 The role of Departments in monitoring progress in compliance of bodies under their aegis can vary, depending on the statutory and funding arrangements involved. The role of the Department of Public Enterprise is to monitor compliance in terms of broad policy. It is not responsible for the provision of resources to achieve compliance as the bodies concerned are mainly commercial state bodies. The Department of Education and Science (Education) and the Department of Health and Children (Health) directly fund, through their Votes, the bodies under their aegis and are more actively involved in ensuring that the bodies within their remit are achieving Year 2000 compliance. Because their responsibility is limited to financing and broad policy matters, in the event of difficulties by these bodies in achieving compliance as the Year 2000 deadline approaches, the Departments may lack the necessary authority and resources to pursue other avenues.

Key Point: Timely information was not being received regarding progress towards compliance from bodies under the aegis of Departments

- 2 31 The three Departments examined have requested regular progress reports from the bodies under their aegis. The examination found that while bodies under the aegis of Public Enterprise responded promptly, many of the bodies under the aegis of Health and Education were slow to respond. This affected the ability of these two Departments to monitor progress towards compliance.
- 2 32 In April 1998 both Education and Health issued questionnaires to bodies under their aegis to establish their state of readiness for the Year 2000. To further improve the supply of information on Year 2000 compliance activity, bodies under the aegis of both Departments have been required since September 1998 to make regular two monthly or one monthly returns. Table 2.1 shows the number of bodies which had responded by July 1998 to the initial questionnaires and the number of bodies which had made at least one response by December 1998. While the response rate was poor up to July 1998, there had been a significant improvement in the case of both Departments by December 1998, apart from some of the smaller institutions which have been slow to submit returns.

Table 2.1 Level of returns from the bodies under the aegis of Education and Health

Department	Number of Bodies	Number of Bodies Responding	
		July 1998	Dec 1998
Education			
Vocational Education Committees	33	14	33
Colleges of Art & Design and Institutes of Technology	13	10	13
Colleges of Education and of Home Economics	6	4	6
Education Centres	29	12	25
Other Bodies	9	5	9
Total	90	45	86
Health			
Health Boards	8	5	8
Large Voluntary Hospitals	14	10	14
Other Bodies	49	18	19
Total	71	33	41

Source Department of Education and Science and the Department of Health and Children

- 2.33 Within the Departments, contingency plans have not yet been developed to cater for project failure as the power, procedures and availability of resources to intervene are unclear. The Government has set up a contingency fund of £40 million, most of which is expected to be used to fund non-IT Year 2000 costs which cannot be funded from normal capital and revenue.
- 2.34 The Departments concerned have taken a number of steps to increase awareness in the bodies operating under their aegis. These have included the circulation of compliance guidelines, the holding of seminars and the establishment of working groups.
- 2.35 Education have obtained external support to assist their own Year 2000 monitoring team in survey work concerning bodies under their aegis. Health also sought but were unable to identify satisfactory external support. Instead Health initially assigned responsibility for co-ordination work to one departmental official, later increasing this to two officials on a fulltime basis as well as one person seconded from a major hospital to deal with compliance within the health services.
- 2.36 In July 1998 the Government decided that each Department with bodies operating under its aegis should
- establish a multi-disciplined Year 2000 monitoring committee, chaired by an Assistant Secretary to ensure the achievement of Year 2000 compliance in the

bodies and to report on progress to the Department's management team and to the Minister every two months

- ensure that meetings are arranged with the Chief Executive Officers in these bodies to have them fully apprised of the implications of the issue and the important need to involve themselves personally in addressing it.

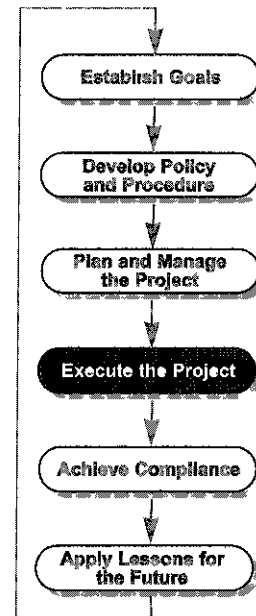
2 37 In addition, five Departments (Public Enterprise, Health, Education, Environment & Local Government and Justice, Equality & Law Reform) were required to report to the Government every two months on the progress being made by the bodies under their aegis in achieving Year 2000 compliance. All other Departments with public bodies under their aegis should, at their discretion, report to the Government on progress should the need arise.

3 Project Execution and Costs

- 3.1 This chapter looks at economy and efficiency aspects of the execution of the Year 2000 compliance projects. Efficiency is considered in terms of the appropriateness of the solution strategies chosen and the timeliness of project execution. Economy is reviewed by reference to the incremental cost incurred on Year 2000 compliance projects and the opportunity costs and benefits of undertaking Year 2000 work.

Appropriateness of Solution Strategies

- 3.2 There are four broad strategies available to organisations for the conversion of individual systems. The circumstances in which each solution is the most cost effective are set out in Figure 3.1. The solution strategy applied to each Year 2000 compliance project covered by the examination is also shown. Figure 3.2 shows, for each organisation, the relative significance of the solution strategies adopted.



Assessment of Solutions Selected

- 3.3 All of the organisations examined made an inventory of their software applications, supporting hardware and systems software, other automated activities, and non-IT components. Items identified as non-compliant were prioritised and a series of Year 2000 compliance projects were proposed to ensure compliance.
- 3.4 DSCFA decided that their systems could be made compliant by a focused conversion of their large systems which reside on their mainframe computers. The option selected reflected good practice for large systems of this type. The project was executed as planned.
- 3.5 In Revenue, all major applications are being re-developed as part of the Consolidated Tax (Contax) project, a major project integrating all tax assessment and collection procedures. Revenue identified the systems which could be replaced in time by Contax and decided to convert the remaining applications using internal resources. This was the most suitable approach in these circumstances.

Figure 3.1 Solution strategies selected for compliance projects

<p>1. Internal Conversion: This strategy is appropriate for very large self developed and maintained mainframe systems where time is not available to design, develop and test a replacement, or where the organisational impacts are too risky to take this approach</p> <p>Approach used by DSCFA (all systems) Revenue (all systems excluding Contax applications) Finance (Unipay - reporting systems) Agriculture (Beef Export Refund, Headage) Central Bank (All except Swift)</p>	<p>3. Internal Replace Appropriate where the new systems provide additional functionality on modern technical architectures and the project can be completed on time. Costs are of lasting benefit.</p> <p>Approach used by Revenue (Contax applications) NTMA Central Bank (Swift system)</p>
<p>2 External Conversion Appropriate where the maintenance of in-house skills is not economically viable. This approach introduces a significant external dependency</p> <p>Approach used by Agriculture (Cattle Disease Testing)</p>	<p>4. External Replace Appropriate where a major new system is required or where the original system was developed externally. This approach introduces a significant external dependency.</p> <p>Approach used by Agriculture (Financial systems) Finance (FMS - upgrade) Finance (PMG)</p>

Source Analysis on behalf of Office of the Comptroller and Auditor General

Figure 3.2 Significance of solution strategies adopted

DSCFA	Internal Conversion	
Revenue	Internal Conversion	Internal Replace
Agriculture	Internal Conversion	External Conversion and External Replace
Finance	Internal Conversion	External Replace
Central Bank	Internal Conversion	Internal Replace
NTMA	Internal Replace	

Source Analysis on behalf of Office of the Comptroller and Auditor General

- 3 6 As part of its ongoing information systems strategy Agriculture had proposed to replace its cattle disease testing system and financial system with new systems which would better satisfy the current business requirements and which would be Year 2000 compliant. However, due to delays in the commissioning of the new systems, the Department decided, as a contingency measure, to make the existing systems compliant.

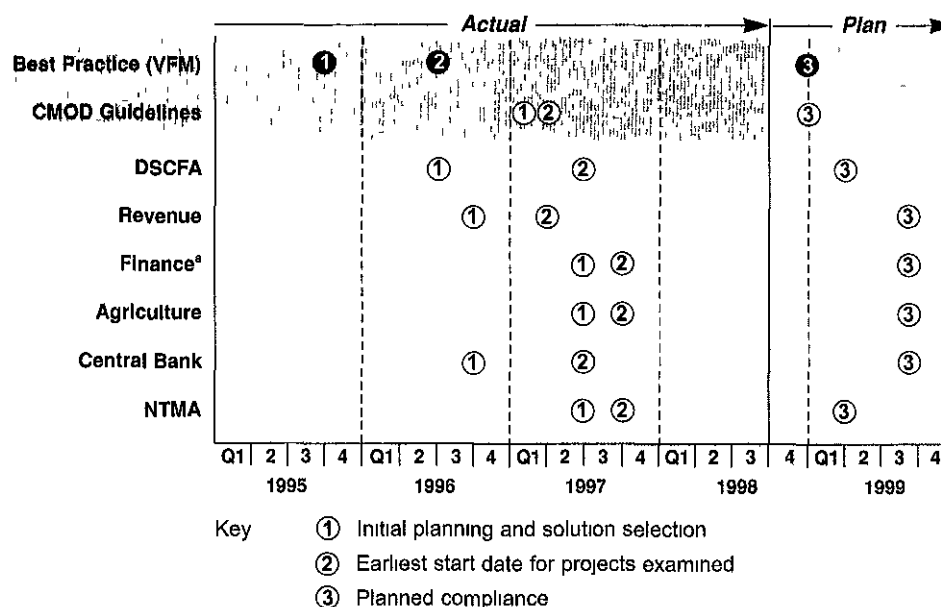
Key Point: The solution strategies selected were appropriate

- 3 7 The nature and complexity of the systems covered by the examination vary significantly. Each organisation applied the recommended approach of taking an inventory of their systems, identifying the exposure to the Year 2000 problem and selecting a suitable approach to achieve compliance. By reference to best practice the consultants engaged on the examination have confirmed that, from a value for money perspective, the specific solution strategies adopted by the organisations were appropriate under the circumstances.

Timeliness of Execution

- 3 8 Figure 3.3 shows the timeliness of Year 2000 activities in the organisations examined as compared with best practice and the CMOD guidelines. To provide sufficient time to secure added value from Year 2000 compliance projects, large scale IT users with their own systems maintenance capability, such as DSCFA and Revenue, should have developed solutions and obtained finance in the course of 1996. Smaller users who rely on frequent upgrades of vendor packages would not be required to start work at this early date. CMOD's Advice Note, which issued in March 1997, advised that all plans should aim for compliance by the end of 1998 (or earlier for systems which process forward dates) but it was apparent during the examination that none of the organisations covered would meet the target.
- 3 9 It is acknowledged that an earlier start to Year 2000 compliance planning would have been difficult as some vendors have been slow in providing certification that their products are Year 2000 compliant and the tools and methods for solving the Year 2000 problem were less developed prior to 1997. These factors may have made planning a more time consuming process. Nevertheless, an earlier start would have provided more time to plan for and achieve added efficiency from the reworking of systems through business process analysis and might have avoided the need to invoke the contingency arrangements in Agriculture.

Figure 3 3 Timeliness of execution of Year 2000 projects



Note ^a The figure does not include the PMG project as it is not considered by CMOD to be a Year 2000 compliance project

Source Analysis on behalf of Office of the Comptroller and Auditor General

Key Point: The projects have generally proceeded according to plan

- 3 10 So far, the projects examined have been executed in accordance with the project plans. Where time slippages have occurred they have been due to resource problems or amendments to scope rather than to time overruns in the execution of project tasks. All of the organisations concerned have stated that their projects are on schedule to meet planned completion targets.

Cost Effectiveness

- 3 11 The relevant costs of Year 2000 compliance consist of the actual additional cost of projects which would not have been incurred if the Year 2000 problem did not exist and the loss of value arising from the need to divert resources from other valuable work. A framework for the consideration of cost economy issues is set out in Figure 3 4. Government Departments and Offices originally estimated that they would incur additional costs totalling £12.8 million in achieving Year 2000 compliance in respect of IT systems and office equipment. The estimates do not include the cost of projects for new IT systems which were replacing older non-compliant systems and which were already provided for in existing IT budgets. On this basis, the cost of developing the new PMG system, which amounted to £1 million and for which planning commenced in 1996, is excluded from Year 2000 compliance costs.

Figure 3.4 Economy in Year 2000 projects

Concept	Measurement bases	Specific performance measures
An economic Year 2000 project achieves systems compliance at the lowest possible total expenditure	<ul style="list-style-type: none"> • Cost implications of Year 2000 solution strategies • Procurement of resources (in-house versus contracting out) 	<ul style="list-style-type: none"> • Project costs • Return on investment (relative to criteria) • Cost of contingency plan

3 12 Table 3.1 shows the original forecasted costs and current projected cost outturn for each of the organisations for Year 2000 projects which were not already being funded within existing IT strategic plans. The amounts only reflect the additional direct costs incurred on Year 2000 projects. The projected outturn of additional direct Year 2000 costs for the organisations under examination is based on information provided by the organisations and does not include all existing resources diverted to Year 2000 projects or any opportunity costs.

Table 3.1 Summary of cost projections

Organisation	Forecast £000	Projected outturn £000	Comment
Departments and Offices			
DSCFA	8,463	4,400	Lower than expected expenditure on staff and consultancy
Revenue	700	1,200	Additional IT equipment
Finance	241	162	Excludes cost of PMG replacement system. Cost of acquisitions was less than expected
Agriculture	1,570	1,680	Projected outturn includes the CDT system which was not in the original forecast. Other forecasted resources were not required
State Bodies			
Central Bank	621	621	No change in scope reported so far
NTMA	144	188	Contract assistance to expedite project

Note The original forecast covers direct expenditure on Year 2000 work which was not already provided for in the Departmental IT plans. The original forecast for all Government Departments and Offices was £12.8 million

Source Analysis on behalf of Office of the Comptroller and Auditor General

- 3 13 The projected costs of the four Departments under review were presented to Government in September 1997 to obtain approval for additional financial requirements at that time. The original cost estimate of the DSCFA provided for unfavourable scenarios in three areas: the estimate of work effort, staff turnover due to demand for staff in the private sector and the cost of contract support. To date these scenarios have not occurred to the extent anticipated. Costs not originally identified for making the cattle disease testing system and the finance system in Agriculture compliant were offset by other projected costs not being required.

Bodies under the Aegis of Departments

Key Point: Funding arrangements for Year 2000 projects in bodies under the aegis of Departments leaves little scope for adding value to the systems

- 3 14 It is not possible to assess the costs of Year 2000 compliance within the bodies under the aegis of the Departments examined as the required information is not collated by the parent Departments. Health have been provided with an additional IT capital provision of £10 million for Year 2000 work in the bodies under their aegis for 1998 and 1999. Bodies under the aegis of other Departments are expected to fund Year 2000 compliance out of their own resources without additional State funding. However, where additional funding is clearly warranted, parent Departments are supporting the efforts of bodies to secure additional resources.
- 3 15 A drawback of this approach is that opportunities to give added value to existing processes may not be incorporated into compliance plans where justified by an investment analysis. This could result in loss of value for money in the longer term where, for example, replacement of a system might be better than conversion. Health have stated, for example, that due to difficulties in obtaining funding for compliance work, they adopted a policy of repair rather than replace wherever possible. They also recommended that bodies under their aegis should not prejudice the success of their Year 2000 programmes by trying at the same time to provide additional enhancements or functionality.

Opportunity Costs

- 3 16 The diversion of resources into Year 2000 projects means that organisations defer or forgo the benefits which would accrue from the implementation of the deferred projects. No attempt has been made to estimate these opportunity costs in the individual Departments concerned. Accordingly, the analysis of the potential business impact (e.g. through consideration of pay-back criteria) which Year 2000 projects might have on the existing workload of information systems departments for the development and maintenance of systems fell short of best practice. In the absence

of this material it is not possible for the organisations to demonstrate that full value for money has been achieved.

- 3 17 In the Departments examined, only Revenue were able to conduct compliance projects without a significant diversion of staff from other strategic developments. As the overall benefits of Contax were estimated at £74 million when this project began in 1989, Revenue should obtain a worthwhile payback in not delaying the Contax project.
- 3.18 DSCFA have continued to initiate and approve projects on the basis of the business cases submitted to the Management Committee but Year 2000 work has led to the displacement of some projects which were in the 1997-1999 investment plan, for example, the integrated long term schemes project which was delayed for eighteen months. As a result of Year 2000 work, 34 change requests to existing applications were also deferred.
- 3 19 In Agriculture the Year 2000 problem reinforced the need for additional permanent IT staff and increased the priority for replacing the cattle disease testing system. The opportunity to add functionality to the new system was also recognised. Although the conversion of the existing system will provide less added value than its replacement, the additional resources should, in the long term, advance the Department's ability to introduce effective and cost saving systems to support animal health and movement issues. However, an investment analysis has not been made available to support an opportunity cost calculation.

Central Monitoring of Year 2000 Costs

Key Point: Overall costs of Year 2000 compliance are not being systematically and comprehensively monitored and the extent to which efficiency and cost effectiveness are achieved cannot be established

- 3.20 The Interdepartmental Year 2000 Monitoring Committee does not have a role in the monitoring of Year 2000 compliance costs. The funding and value for money aspects of achieving compliance are regarded by CMOD as matters for management in individual Departments and are dealt with in the interactions between the Departments and the Department of Finance through the Estimates process and the IT Expenditure Control process. However, no centralised system has been put in place which would enable the full costs of Year 2000 compliance to be validated and recorded in a comprehensive and systematic way in respect of Departments and across the wider Public Sector. Such a system would provide for the monitoring of costs and the overall financial implications of Year 2000 compliance including the extent to which efficiency and cost effectiveness are being achieved.

4 Achieving Compliance

4 1 The effectiveness of Year 2000 compliance projects will be determined by whether the work is completed in such a way that the potential problems from Year 2000 do not subsequently materialise. A considerable effort has been made to put project monitoring systems in place to ensure that the projects have a successful outcome. This includes the establishment of the monitoring committee which collects information from all Government Departments and Offices and which reports progress to the Government on a two monthly basis.

4 2 The critical project milestone for achieving compliance is 31 December 1998 which would leave sufficient time for the testing of systems throughout 1999. However, there are some systems where full compliance must be achieved before the end of 1998. For example, the OECD have reported that a survey of large firms in Australia in November 1997 revealed that almost one-third of respondents had already experienced Year 2000 problems and that the Government Sector there had the highest risk of late project completion.

4 3 The actual effectiveness of the projects will not be known until after 1 January 2000. A framework for considering effectiveness is set out in Figure 4.1. While the experience gained from testing the work done may give some indication as to whether the projects will be completed successfully, the bulk of testing work still remains to be done in 1999. This chapter takes all of the evidence which was collected during the examination, at the monitoring committee level and at project level, and assembles a picture of the status of the projects as at September 1998. Based on the project status, an assessment of the risks to the timely completion of projects is made.

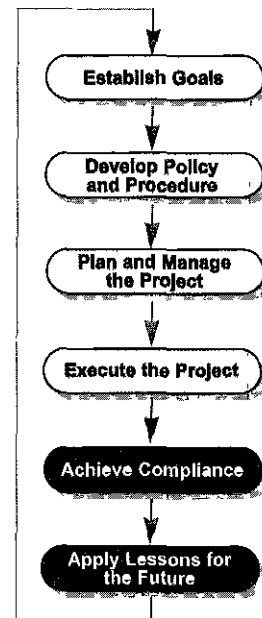


Figure 4 1 Determining Effectiveness in Year 2000 Projects

Concept	Measurement bases	Specific performance measures
An effective Year 2000 project ensures that the business operations which depend on the systems affected by the Year 2000 problem continue to function without interruption	<ul style="list-style-type: none"> • Timeliness of completion of projects • Robustness of the solutions employed 	<ul style="list-style-type: none"> • Extent of errors detected during testing • Sign off dates achieved for completion of project phases • System availability after the critical deadline • Extent of rework and maintenance after the critical deadline

Methods Applied to Monitor Progress

- 4 4 During the examination, data was collected on the time frames established for projects to meet planned milestones and on the performance to date of the organisations examined in meeting them. The only quantitative measure of progress is the proportion of planned resources used which is computed by expressing actual resource inputs spent to date as a percentage of total planned resources. This measure ignores the outputs achieved and is not a reliable basis to assess the likelihood of timely project completion. Accordingly, the Interdepartmental Monitoring Committee refers to the achievement of project milestones at task, module and program levels to determine progress. The Committee also uses other measures to assess progress such as the allocation of staff, the security and operation of contracts and the delivery and implementation of products and testing cycles.
- 4 5 Table 4.1 shows the status of projects at September 1998 and the potential risks to completion times for each of the organisations examined.

Table 4.1 Project status as at September 1998

Body	Projected Completion	Planned Resources Required (man years)	On Target	High Risks ^a
DSCFA	Feb 1999 ^b	118	Yes	AR
Revenue	June 1999	109	Yes	AR, TS
Finance	June 1999	mixed	Yes	VF, TR, TS
Agriculture	June 1999	mixed	Yes	AR, VF, TR, TS
Central Bank	June 1999	3	Yes	Risks not classified as high
NTMA	June 1999	2	Yes	AR
Note	a	AR Adequate Resources VF Vendor Failure	TR Technical Risk TS Testing Risk	
	b	February 1999 is the expected completion date for the projects examined		
Source	Analysis on behalf of Office of the Comptroller and Auditor General			

- 4 6 All of the organisations examined have clearly communicated their intention to ensure full Year 2000 compliance for the key systems examined and most have not reported significant variance from planned time frames. DSCFA plan to achieve compliance for the systems covered by the examination by February 1999. Their actual performance has so far achieved the planned time frames without significant variance.

The scheduling of testing for some applications was adjusted to take account of staff availability problems but this did not affect the overall schedule

- 4 7 The Agriculture and Finance projects are on schedule but have not demonstrated timeliness. The primary reason for time frames being missed was the shortage of skilled staff. The later start has increased project risk and obliged these Departments to outsource more work than originally planned on certain user applications in order to remain on schedule

Risk Assessment

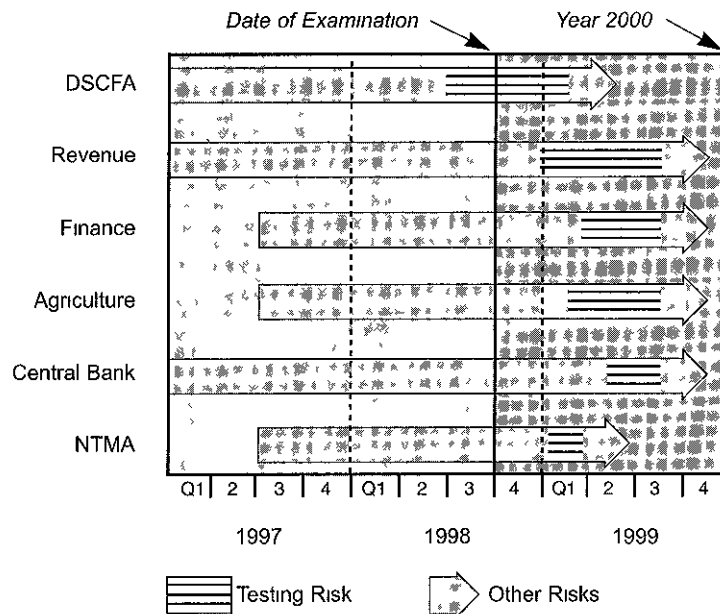
- 4.8 Risk assessment examines the risks acknowledged by project management which apply to projects and the control which project managers establish to contain these risks. There are two components to risk - risk probability (the likelihood of the risk arising) and risk impact (the potential impact on a project if the risk does arise). The organisations identified a broadly similar range of risks but the degree of risk applied to each project was different. Figure 4.2 shows the position of Year 2000 projects at the end of September 1998 and the current exposure of the projects to risk

Availability of Adequate Staff Resources

Key Point: Civil Service projects have had problems in securing adequate staff resources

- 4 9 All organisations examined made it very clear that staff resource issues had serious potential impacts on their projects. Officials with ultimate project responsibility in the Departments indicated that they did not have adequate control of this risk as their ability to manage staff resources is limited by Civil Service structures and procedures. While there is some flexibility in the assignment of available staff there is a ceiling on staff numbers with the result that these officials did not have the power to obtain additional resources over and above agreed staff complements. Within the current recruitment procedures it is difficult to replace staff who are leaving with others who have equivalent skills
- 4 10 While all of the organisations examined considered the availability and retention of analysts and IT staff to be a high risk area, the impact was acute in Agriculture and to a lesser extent in Finance. Typical reactions reported to resolve this risk were to rely on the Civil Service Commission's undertaking to have technical panels in place and to convey to the Department of Finance the necessity to introduce measures to stem the loss of staff. Early in 1998 an additional 30 IT posts were sanctioned in Agriculture to deal with IT priorities including Year 2000 compliance work. During 1997 and 1998 the required recruitment panels were exhausted but have since been

Figure 4 2 Risk status of project plans



Source Analysis on behalf of Office of the Comptroller and Auditor General

restored By contrast, the Central Bank and the NTMA are able to regrade IT staff and outsource or recruit freely to resolve this risk.

- 4.11 The problem of IT staff losses and the non-availability in 1997 of the technical panels from which they could be recruited has been recognised as the greatest threat to achieving Year 2000 compliance within Government Departments. In order to address this problem, the Government decided, in July 1998, that the Civil Service Commission and the Department of Finance should work together to ensure that effective recruitment and selection systems are in place to provide for a constant and timely supply of suitable technical staff to enable Departments to keep staff on Year 2000 compliance work. In December 1998 a number of retention measures were introduced, in consultation with the unions, to retain IT staff who would be otherwise lost on promotion to non-IT areas. One such measure is the payment of substantial loyalty bonuses in April 2000.

Vendor Failure

- 4.12 The risk of vendor failure applies where a project is outsourced and would occur where the vendor does not deliver the project within agreed scope. Frequently vendor failure is a result of misunderstanding in the specification of deliverables at the start of the project resulting in disputes over non-performance as the deliverables are subjected to user testing.

- 4 13 Although good project management arrangements may be in place vendor risk exists to some extent in all outsourced projects. Such risk is high in respect of the PMG system in Finance and the cattle disease testing system and financial system in Agriculture. For example, the replacement of the Agriculture financial system was planned in 1996, for reasons other than Year 2000 compliance, and was outsourced to an internationally established vendor using leading practice software. The project failed to complete user acceptance testing in September 1998 and an alternative date for live running has not yet been set. As a result, the existing accounts system is being made compliant.

Technical risk

- 4 14 Technical difficulties occur where the Year 2000 compliance of components of the overall solution such as operating systems, hardware and database software, are not within the control of the organisation. These components become significant project risks, if at this point, they are not compliant. Finance have reported a risk in this area with regard to the FMS system.

Testing Risk

- 4 15 The final phase of Year 2000 projects is concerned with the testing of the rectification work performed. All Year 2000 projects, irrespective of the solution strategy chosen, require an elaborate testing effort (estimated by some experts to require up to 45% of overall project time) to ensure that the functionality required of the systems is achieved. Technical testing should, firstly, be conducted by the staff amending or implementing programs, then extensive integration testing is required at the point at which all modified or new programs are brought together.
- 4 16 The testing effort is quite extensive due to the large size of many of the applications and the complexity of the interactions between individual programs. This complexity is exacerbated by the fact that many of the potential errors which can arise in the process will not become apparent until all the programs are available at the same time to be tested in combination in the final stage of the project. In the case of the testing phase, both risk probability and risk impact are at their highest.

Key Point: The likely achievement of Year 2000 compliance will largely depend on the results of testing - none of the organisations have completed their testing

- 4 17 The effect of this feature is that the achievement of compliance is not certain until systems testing results are seen to be positive. These concerns are illustrated by the experience of the DSCFA. At the impact assessment stage, DSCFA estimated that some 18 man years of testing would be required, based on GartnerGroup findings. At an early stage in the project it was clear that this estimate was insufficient. The outturn for all aspects of testing is now expected to be 44 man years.
- 4 18 The experience of DSCFA illustrates the complexities of the testing phase and could be used as a benchmark for other large projects. There was a significant exposure to testing risk in Revenue's projects. The tracking records of individual programs showed that significant delays were being encountered at the integration testing stage¹ and this was preventing the due dates for the completion of individual programs from being achieved.
- 4 19 It was felt by the organisations that errors identified during the testing of small projects should be capable of being rectified without seriously impacting on the overall timescales.

Contingency Allowances and Contingency Plans

- 4 20 It is a common practice to build in some extra time into a project plan as a contingency allowance for the risk and uncertainty in the estimation of required resources. Some of the organisations incorporated an element of contingency in their plans. DSCFA allowed for additional staff to the planned manpower requirements to cater for the possibility of a high loss of staff during Year 2000 conversion work. The Central Bank also recruited additional staff for the period and introduced special grades for key IT staff. The NTMA outsourced a well defined element to bring forward the projected end of the project.

Key Point: Too little attention has been paid to contingency planning

- 4 21 Contingency planning is the process of preparing plans to address the possibility of project failure. Contingency planning is required for Year 2000 projects because of the short time span available to rectify failure. There are two aspects to contingency planning - providing for alternative solutions in the event that the original compliance strategy fails (e.g. during testing) and planning (as part of risk management) for the

¹ A program may not be regarded as Year 2000 compliant until integration testing has been successfully completed. It is not possible to begin integration testing until all the related programs have reached the same stage, so that they may be tested together

continuance of operations in the event that Year 2000 compliance is not achieved by the critical date

- 4 22 In general, the organisations examined have made plans to deal with either potential situation CMOD considered that existing contingency arrangements for the continuance of business operations in the event of systems failure should also cover potential problems arising from failures caused by the Year 2000 problem There was no evidence that the organisations have checked their contingency plans to confirm this.
- 4 23 There are several reasons for the lack of emphasis on contingency planning up to now For example, the pressure on resources at the outset of compliance projects led DSCFA to defer consideration of contingency options but they expect to produce a contingency plan by March 1999 In the Central Bank, there is a dependency on vendors to produce solutions in good time and little alternative contingency work can be done There is a growing awareness of the need to make adequate contingency arrangements. An example of action which has already been taken primarily for contingency reasons was the decision in Agriculture to make compliant the existing Cattle Disease Testing system which was originally due for replacement
- 4 24 The current status of projects, where the main testing effort will take place in the course of 1999, may not provide sufficient time margins to pursue alternative solution strategies. It is felt by CMOD that there are options to make existing systems compliant, should the need arise. For example, in the case of the PMG system such a contingency arrangement has been put in place. However, adequate plans should be made for the continuance of business operations in the event that full Year 2000 compliance is not achieved before the critical date

Likelihood of Achieving Compliance

- 4 25 Although there are significant differences in the nature and complexity of the projects examined and in their current position, some general observations can be made about the current state of preparedness for the Year 2000
- Most large-scale projects are only now approaching or entering the testing stage. It is quite late for Year 2000 projects to be approaching this stage.
 - Most large-scale projects now face the stage of greatest complexity and risk
 - The whole area of contingency planning, specifically for Year 2000 failure, is only starting to be addressed
- 4 26 Of the organisations examined, DSCFA and NTMA are best placed to complete their projects by the required dates, despite high risks with staffing.

- 4 27 The Central Bank and Revenue are forecasting that they will complete their projects by June 1999. The level of confidence in their projections must be subject to the risks described in this chapter. The Revenue project is subject to testing risk. If testing should overrun to the same extent as at DSCFA, then the project will not be completed until late 1999. The risk management approach has not been properly documented by the Central Bank but no high risks have emerged so far. In common with other organisations, the Central Bank has some dependence on the ability of vendors to supply upgrades or alternative solutions to their applications.
- 4 28 Agriculture and Finance have not met their original planning targets and have outsourced some application projects to third parties. While their projects are currently planned to be timely, they have to manage a higher exposure to staffing risk, vendor risk and testing risk to achieve compliance.
- 4 29 The examination did not assess the likelihood of achieving compliance in the bodies under the aegis of Departments. However, there have been deficiencies in the provision of information by these bodies which prevents the sponsoring Departments from obtaining the required level of assurance on the progress being made. In order to address the deficiencies, the Government decided, in July 1998, that additional measures (as described in Paragraphs 2.36 and 2.37) should be taken by Departments to monitor compliance.

Lessons for the Future

- 4 30 The special nature of Year 2000 compliance projects presented difficulties in building in mechanisms which would provide for the achievement of economy, efficiency and effectiveness in project management. Where projects started late, the overriding requirement to achieve effectiveness through successfully completing the compliance work on time required some trade-off with economy and efficiency. The maximisation of value for money from the projects required early assessment of the extent of the problem, planning and investment analysis for the proposed work, rapid selection of the most appropriate solution, and effective control and decision making throughout the implementation process.
- 4 31 Against this background, the examination findings have consistently highlighted three issues which represented potential obstacles to the achievement of value for money: project approval structures, staff recruitment and replacement procedures and the lack of attention to investment analysis.

Project Approval Structures

- 4 32 There was a marked contrast between the approaches to project responsibility of the Government Departments and the State Agencies (Central Bank and NTMA) covered by the examination. As the lines of communication between project manager, senior management (who have ultimate control over project resources) and the project sponsor (the official with responsibility for the outcome of the project) were short and within the same organisation, the latter could respond more quickly to the needs of the project teams. By contrast, the authority for the approval and resourcing of projects is not solely in the hands of individual Government Departments.

Staff Recruitment and Replacement Processes

- 4 33 Time critical projects such as Year 2000 compliance projects require effective planning and swift implementation of plans. Individual work programmes become undermined if a pool of appropriate staff is not readily available from which replacements may be appointed, when required. The Strategic Management Initiative (SMI) has changed the structures of accountability within Departments to provide more flexibility. However, the issues identified in this examination suggest that constraints on obtaining the appropriate resources, at the time they were needed, posed a threat to the effectiveness of the projects and to obtaining value for money. While delegated sanction granted to Departments in 1998 has eliminated a certain amount of referral to the Department of Finance, it has not addressed the inability of Departments to respond quickly to IT staff shortages which may occur at short notice.

Investment Analysis

- 4 34 An investment analysis is necessary to enable the originating Department and the control units of the Department of Finance to make informed decisions on the selection of projects, their timing, and the extent to which other development work should be progressed in parallel. When the project is completed and the system is operational, the investment analysis provides a basis against which to measure the benefits actually achieved from investing in the project.
- 4.35 The standard of investment analysis to support their Year 2000 project proposals varied among the organisations examined. The full investment potential of the projects was not adequately considered in the decision making processes to start up Year 2000 projects. While the larger organisations made detailed calculations of expected cost savings over a range of activities, in the smaller organisations the benefits of replacing old systems were not fully costed. It is recognised that with smaller systems remedial work may be so small as to make consideration of alternatives impractical

Appendix

Project Summaries

The Central Role of CMOD

Through the Civil Service IT Group, consideration of the Year 2000 issue began in late 1995. CMOD became the focus of involving suppliers and providing information in mid-1996. It issued an Advice Note on achieving Year 2000 compliance in March 1997. These actions were effective. By September 1997 every Department surveyed had

- assessed the impact of Year 2000 compliance
- identified Year 2000 requirements
- identified the cost of Year 2000 projects
- planned Year 2000 projects
- begun remedial activity

Individual Departments followed CMOD recommendations and this resulted in many good practices, in particular inventories of IT systems and equipment, project management structures, and compliance plans covering the required range of issues.

In addition, on CMOD's recommendation, the Government established an Interdepartmental Year 2000 Monitoring Committee - with private sector representation - in September 1997 to oversee the achievement of Year 2000 compliance for IT systems and other office equipment in the Civil Service. The monitoring of compliance is being undertaken by the Committee, and the regular reporting it requires is ensuring the impetus of organisations to execute the projects required to achieve compliance. CMOD provides the Chair and Secretariat to the Monitoring Committee.

Project Summaries

Figure A1.1 Summary of bodies and systems covered by the examination

Organisation/Project	Systems
<i>Department of Social Community and Family Affairs</i> One project for all Year 2000 conversion	Key social welfare systems including <ul style="list-style-type: none">• Central records• Claim registration• Nine systems supporting specific social welfare programmes
<i>Revenue Commissioners</i> Four projects for all Year 2000 conversion	<ul style="list-style-type: none">• Assessment and Collection• Customs & Excise• PAYE• Administration• Consolidated Tax systems• Common routines
<i>Department of Agriculture and Food</i> One project for all Year 2000 conversion	<ul style="list-style-type: none">• Three applications supporting payments to farmers• Financial systems
<i>Department of Finance</i> IT Unit CMOD	<ul style="list-style-type: none">• PMG issues and receipts• Applications used by most Government Departments
<i>National Treasury Management Agency</i> One project including Year 2000 and Euro compliance	<ul style="list-style-type: none">• Financial systems
<i>Central Bank</i> A series of projects under overall management of the Information Systems Department	<ul style="list-style-type: none">• Financial and Payroll systems

Department of Social Community and Family Affairs

The DSCFA has comprehensive information systems supporting the registration and payment of social welfare schemes. The examination covered eleven of these systems. DSCFA is, with the Office of the Revenue Commissioners, one of the largest information systems users in the State. It is, therefore, experienced in developing and implementing information systems. The project is large, requiring 118 man years to complete.

An assessment commenced in 1996 identified some 30 core systems that must be Year 2000 compliant before 1 January 2000. Eleven of these were classified by DSCFA as fatal in terms of the impact on business should compliance not be achieved. The examination focuses on these eleven applications.

The technical approach selected to make these applications compliant is appropriate because the applications will be used for a substantial period after conversion.

The resources available to the Department are such that this level of work, spread over three years, can be undertaken by existing resources provided that ongoing maintenance is restricted to an absolute minimum and staffing levels are maintained

The project is being conducted rigorously using the PRINCE methodology and no changes have been required to scope or project organisation

Revenue Commissioners.

Revenue has very comprehensive information systems to assess and collect taxes - PAYE, VAT, Customs and Excise, etc. The examination covered these systems. Revenue is developing new systems to integrate common aspects of assessment and collection in all these systems. This system, which is known as the Contax project, is a very large undertaking.

An assessment, conducted with external assistance in 1996, concluded that it would not be possible to complete work on the replacement of these applications by Contax systems by the Year 2000 deadline. Consequently conversion of a large number of applications would be required. The technical approach adopted is appropriate where programs will be replaced in the medium term

The project is being conducted under PRINCE guidelines, but a formal documented set of project management procedures is not available to support project managers. Some changes, which have been made to the functional scope of the projects, have had an adverse impact on the timescales for completion.

Department of Agriculture

The examination covered the systems supporting payments to farmers. These are the Department's financial systems and three specific applications supporting the payments of Headage/Premium, Export Refunds, and Cattle Disease Testing (CDT).

The background against which Agriculture initiated their project is the most complex of the six organisations examined. Agriculture had not developed animal health and movement control applications as intended in their information systems strategy studies developed in 1991 and reviewed in 1993. The reasons for this are understood to be a combination of resource shortages to develop technical architecture and systems, changing business needs as a result of policy changes in the EU and the impact of BSE. Agriculture was unable to obtain approval to increase resources to meet these needs. The Year 2000 problem added to resource requirements. Approval to obtain more resources was not received until 1998

Agriculture complied with CMOD's request to assess and plan for Year 2000 in March 1997. Agriculture planned a project which would convert the Headage and Export Refund systems and replace the CDT systems using its own staff. The Headage and Export Refund systems are relatively small projects, requiring a total of 12 man years.

Agriculture was not able to secure the internal resources to conduct the project as planned, and in June 1998 outsourced the CDT system at a cost of £815,000.

The Department's finance system replacement project was considered within the study, although not originally one of the selected projects. The project has been added to the examination due to the risk that the system may not be implemented by the Year 2000. The project is a very large undertaking to replace the Department's accounting systems - general ledger, payments, and client database. While the project was initiated prior to the Year 2000 compliance programme, it must be completed by Year 2000. The potential failure of this system highlights the risk of vendor dependency where systems are outsourced.

The overall Year 2000 project, including individual application projects, is conducted using PRINCE guidelines, informally applied.

Department of Finance

Finance has two units providing information systems support: The Finance IT unit - responsible for IT in the Department - and CMOD - responsible, in different ways, for IT applications used commonly throughout the Civil Service. CMOD also had a role in initiating compliance throughout the Civil Service.

The examination covered three projects, one of which, the Unipay common payroll system is supported by CMOD. The other two systems, which are the responsibility of the Department of Finance's IT Unit, were the implementation of the Financial Management System (FMS - the general ledger financial system used by Government Departments), and the replacement of the Paymaster General Payable Order Reconciliation system.

In 1995, as part of the work programme identified in its IT plan, the Department of Finance IT Unit planned to commence investigating the implications of replacing the PMG because of its age and design, either by way of a package solution or a redesign of the existing system. Staff losses initially delayed this exercise until 1996, at which time a project plan identified the scope of the project and estimated the resources necessary to execute it. As the requisite resources and skills were not available in the IT Unit or in CMOD to carry out the redesign project entirely in-house and no suitable package having been identified, it was decided in 1997 to approach the market

for a bespoke solution. A detailed specification of requirements was therefore drawn up for use in this exercise, which by this stage was also being driven by Year 2000 considerations. A suitable supplier having been identified, the project was outsourced in 1998.

Most applications were too small to justify the use of the PRINCE process. The larger Year 2000 projects are conducted using a scaled-down PRINCE template.

Central Bank

The Bank's Information System Department is responsible for the Year 2000 compliance of the main IT systems while other departments are responsible for ensuring compliance of locally developed or purchased applications and non-IT equipment. The Bank's approach has been to incorporate Year 2000 compliance into its ongoing review of IT applications, rather than implement it as a separate project.

The Bank has maintained up to date technical architectures and systems, so that its hardware, operating software, primary financial system, and regulatory systems are generally confirmed by vendors to be Year 2000 compliant. It is proposed to test these in 1999.

The Central Bank first priority project is to be European Monetary Union (EMU) compliant by 1 January 1999, completing remaining Year 2000 work in 1999. Work is in progress on five applications dealing with financial transactions and a payroll system. One third of this work will be left for completion in 1999.

The Year 2000 compliance work is conducted as part of the Bank's annual business plan, and without recourse to a documented project management methodology. The conduct of application projects is based on a template method originally introduced to the Bank by external consultants in 1988 and adopted for all application projects since then.

National Treasury Management Agency (NTMA)

The examination focused on the NTMA's financial systems. The NTMA is undertaking a well defined and relatively small scale replacement project to make these systems both Year 2000 compliant and Euro compliant while modernising their functionality.

The Year 2000 and application projects are being conducted using a formal written methodology that conforms to best practice.

Departments with Bodies under their Aegis

Department of Public Enterprise

The study focused on the role of the Department in ensuring compliance of major State enterprises, such as Aer Lingus, the ESB and Bord na Móna. The responsibility of the Department for these bodies is generally limited to broad issues of policy.

Regular monitoring of compliance commenced in April 1998. The following month the Minister advised the Dáil that Year 2000 compliance within these bodies is an operational issue and is the responsibility of each individual body. The Minister also met the Chief Executives of the bodies in July 1998 to underline the importance of the issue and enlist their full co-operation. The Department convenes meetings with managers of State sponsored bodies every second month to review progress on compliance.

Department of Education and Science

The study focused on the role of the Department of Education and Science in ensuring compliance of Vocational Education Committees (VECs), Institutes of Technology, and Educational Boards, a total of 90 bodies. The Department is responsible for funding these bodies. They range from large organisations, on which Year 2000 has significant impact, to small bodies with small IT infrastructures, on which Year 2000 has minimal impact.

The Department complied with the instructions from CMOD and wrote to all bodies in October 1997. It appointed a monitoring committee, chaired by an Assistant Secretary. All sections of the Department are represented on this committee, as is the Higher Education Authority. The Department commissioned a survey and engaged management consultants to assist in collecting and analysing returns. The bodies concerned are now required to make returns to the Department every two months. The Department is also setting up special interest groups to assist in the development of a common approach to issues.

Department of Health and Children.

The study focused on the role of the Department of Health and Children in ensuring compliance of Health Boards, Voluntary Hospitals, State Boards and Institutions for the mentally handicapped. This consists of 25 "significant" bodies for which Year 2000 compliance is an issue and 45 other smaller bodies.

The Department complied with CMOD guidelines and wrote to all bodies in October 1997. In April 1998, the bodies were surveyed in order to monitor compliance projects. The bodies concerned are now required to make regular returns on either a monthly or two-monthly basis. In order to raise awareness, the Department has held a number of seminars and workshops on the Year 2000 issue

A sum of £10 million was provided in the IT capital allocation of the Department in 1998 and 1999 in respect of Year 2000 compliance work while a further £1 million was provided in the supplementary estimate for 1998 in respect of non-IT aspects. A contingency sum of £40 million has been set aside by the Minister for Finance to cover Year 2000 costs and the Department expects to call on this contingency sum to fund non-IT Year 2000 costs which cannot be funded from normal allocations.