

INTERBANK CONVENTION  
ON AUTOMATION PROBLEMS  
(CIPA)

**Working Group**

# **The Year 2000 Problem**

*Final report*

November 1996

Original title:

Gruppo di lavoro “**Cambio data anno 2000**” - *Rapporto conclusivo*.

*The following people participated in the CIPA Working Group, which was co-ordinated by Gerardo Pieretti (Banca d'Italia): Domenico Andolfo Adamo (Banca d'Italia), Sandro Barigelli (ICCREA), Virgilio Cacciavillani (Credito Agrario Bresciano), Maurizio Castellani (Banca d'Italia), Alessandra Di Iorio (ABI), Claudio Di Legge (ICCREA), Stefano Fabrizi (Banca d'Italia), Paolo Francioni (Banca Popolare Etruria e Lazio), Maria Pia Giovannini (ICCRI), Domenico Marchetti (SECETI), Franco Negri (SIA), Angelo Nolli (SSB), Sergio Pagano (ICCRI), Carlo Paolini (ICCRI), Mario Pattarini (Banca Nazionale del Lavoro), Pierluigi Polentini (Banca d'Italia), Giorgio Prioreschi (IMI), Marilena Traversa (Istituto Bancario S.Paolo TO), Gabriele Massimo Vignoli (ABI).*

## CONTENTS

### PART ONE

<b>FOREWORD</b> .....	<b>5</b>
<b>1. A DIFFICULT BEGINNING FOR THE THIRD MILLENNIUM</b> .....	<b>7</b>
1.1 THE IMPACT ON INFORMATION SYSTEMS.....	7
1.2 THE IMPACT ON FIRMS .....	8
<b>2. A PRAGMATIC APPROACH TO SOLVING THE PROBLEM</b> .....	<b>10</b>
2.1 THE NEED FOR A COMPANY PLAN.....	10
2.2 TURNING THE PROBLEM INTO AN OPPORTUNITY .....	11
2.3 IDENTIFICATION OF AREAS OF INTERVENTION.....	13
2.4 SURVEYING EXTERNAL AREAS .....	14
2.4.1 The importance of knowing suppliers' intentions.....	14
2.4.2 A special case: software packages .....	15
2.5 SURVEYING INTERNAL AREAS .....	17
<b>3. HOW TO HANDLE THE ADAPTATION OF APPLICATIONS SOFTWARE</b> .....	<b>19</b>
3.1 WHAT THE MARKET HAS TO OFFER.....	19
3.1.1 General characteristics.....	19
3.1.2 Factors for making a choice.....	20
3.2 A POSSIBLE APPROACH .....	21
3.2.1 Software inventory.....	21
3.2.2 Impact analysis .....	22
3.2.3 Planning.....	23
3.2.4 Software modification: possible solutions .....	25
3.2.4.1 <i>Extending the year field</i> .....	25
3.2.4.2 <i>Coding</i> .....	26
3.2.4.3 <i>Time windowing</i> .....	26
3.2.5 Choosing the best solution.....	27
3.2.6 The need for organising the software modification process.....	28
3.2.7 Testing and re-release.....	28
<b>4. COST ESTIMATE MODELS</b> .....	<b>32</b>
<b>5. COST ESTIMATE FOR THE BANKING INDUSTRY</b> .....	<b>34</b>
5.1 ANALYSIS OF THE QUESTIONNAIRE .....	34
5.2 ESTIMATE OF COSTS.....	36

### PART TWO

<b>6. INTERBANK STANDARDS</b> .....	<b>40</b>
<b>7. AIPA AND THE BANKS</b> .....	<b>42</b>
<b>8. IT TRADE ASSOCIATION DOCUMENTATION</b> .....	<b>43</b>
<b>9. BIBLIOGRAPHY</b> .....	<b>50</b>
<b>10. INDEX OF FIGURES</b> .....	<b>51</b>
<b>11. ANNEXES</b> .....	<b>52</b>
11.1 FORM FOR THE EXTERNAL AREA SOFTWARE SURVEY .....	52
11.2 FORM FOR THE INFORMATION SYSTEMS SURVEY.....	53
11.3 PRO FORMA LETTER TO SUPPLIERS FOR PRODUCT COMPLIANCE .....	55
11.4 THE TIME-WINDOWING METHOD .....	56
11.4.1 Fixed windowing .....	56
11.4.2 Mobile windowing.....	56
11.4.3 The characteristics of windowing .....	58
11.5 QUESTIONNAIRE.....	59
11.6 LIST OF INTERBANK PROCEDURES.....	61

## FOREWORD

The initiatives envisaged by CIPA in the "Action plan for interbank automation in payment systems for the period 1.1.96-30.6.97" include a study of the impact that the Year 2000 date change will have on the banking industry's information systems .

The Working Group set up for this purpose worked to achieve two major objectives:

- to provide a set of guidelines to which the banks could refer;
- to define the rules for date management for interbank applications,.

With regard to the first objective, the Group studied the organisational and technical aspects connected with the adaptation of information systems to cope with the Year 2000 date change. The Group released a short "handbook" that banks are free to use as a reference framework, tailoring it to their own needs where necessary.

As regards the second objective, the Group developed the rules to be used for date change management in interbank applications. All banks participating in the National Interbank Network **will have to comply** with these rules.

In addition, the Group has made a rough estimate of the costs that the banking industry will face in tackling the Year 2000 problem .

The Secretariat of CIPA wishes to thank the co-ordinator and all the participants in the Working Group and their companies for their valuable contribution to this collaborative effort.

Rome, November 1996

THE SECRETARY

Alberto M. Contessa

# **PART ONE**

# 1. A DIFFICULT BEGINNING FOR THE THIRD MILLENNIUM

## 1.1 The impact on information systems

In most information systems (in the broadest sense of a set of programs, operating systems, system software, etc.), the *year* information in the date field is represented by only last two digits.

In the early days of computing as well as in the more recent past, this widespread practice was used for two reasons:

- the dd/mm/yy standard enabled users to save two digits in terms of storage capacity, time required for data entry, space taken up in print-outs, etc. by comparison with the dd/mm/ccyy standard;
- it was expected that applications would be replaced before the year 2000<sup>1</sup>.

However, the fact is that information systems, originally created with the intention of simplifying firms' operational and decision-making processes, could lead to a very complicated beginning to the third millennium.

The American analyst Doug Bartholomew [1] warns that "... companies have to cope with a bomb ready to explode".

The following example may help to clarify the problem [2]: let us imagine that in the year 1996 a firm wants to compute the age of an employee born in 1955. In 99% of the cases, the program made available by the company's information system will compute the age by calculating the difference between 1955 and 1996, yielding 41 as the result. The same computation, if performed in the year 2000, would yield -55.

The sense of discomfort created by this event is amplified even more by the fact that the problem is undoubtedly trivial in technical terms - as we will see, the possible solutions have all been outlined already - yet it could create considerable damage, some of it even irreparable, for most firms around the world.

This is perhaps the crucial issue in the whole Year 2000 debate.

According to a study released by the Gartner Group, malfunctions caused by the date-change problem will affect 90% of applications unless preparations are made in time.

---

<sup>1</sup> To simplify matters, it has been agreed to consider the year 2000 to be included in expressions such as "twenty-first century" or "new/third millennium", even though, strictly speaking, this is not correct.

## 1.2 The impact on firms

The problem takes on even larger proportions when one considers that the measures that need to be implemented by the year 2000<sup>2</sup> are not confined to automated information systems only, but also affects many other sectors in a firm. A simple but non-trivial example is the need to modify all forms in which have the first two digits of the year are pre-printed as 19 (i.e., bank cheques).

Remaining within the area of information systems, it is also necessary to consider the impact that the Year 2000 problem will have on end-user computing applications, which in recent years have become an integral part of firms' information systems.

The year 2000 could have even greater repercussions in this case than with traditional applications, due to the extreme compartmentalisation of projects and a general lack of the security and control measures that are usually available on enterprise applications.

Moreover, suppliers of system software (operating systems, TP-Monitors, DBMS) and packages might only provide Year 2000 solutions for the latest versions of the modules already installed with firms. This will force firms to upgrade these modules, a process complicated by interactions with the other components of their information systems.

Finally, the problem could also involve certain hardware components, particularly those contained in older personal computers.

By fortunate contrast, more recent applications have been designed using a four-digit year; therefore the Year 2000 problem should not arise with these, with the exception of possible "points of contact" with existing procedures that handle dates differently.

The date change problem itself is in fact only the tip of an information technology "iceberg" that will severely test the organisational and technological capabilities of Italian firms over the next three years. Other events that will affect firms' information systems in the same period include:

- the "changeover" to the euro;

---

<sup>2</sup> Among other things, it is important to remember that the year 2000 is also a leap year. In fact, all years divisible by 4 are leap years, with the exception of those in which the last two digits are "00"; these years are leap years only when they are divisible by 400. Thus, 2000 will be a leap year, whilst 3000 will not be and 1900 was not.



- the spread of new hardware and software architectures (client-server, object-oriented, etc.);
- the conversion or substitution of obsolete programming languages.

It is therefore highly likely that the same sections of an information system will have to be adapted to cope with more than one of the above changes. Some of these events (e.g., the changeover to the euro) could have tighter deadlines than the Year 2000 problem.

It is clear, therefore, that the Year 2000 problem is not only occurring within a context of profound change, but is also adding to firms' planned commitments. For this reason, any solution to the problem must be part of a broader strategic plan that all firms have to develop **as soon as possible** in order to avoid economic losses or, in the worst cases, being cut off from the market.

Indeed, it is realistic to expect that demand for computer services will rise markedly in all sectors of the economy -- not just the banking industry -- as the deadline approaches, with costs increasing as supply becomes scarce.

## **2. A PRAGMATIC APPROACH TO SOLVING THE PROBLEM**

This section presents a general outline for organising the process that each company should use to identify the effective adaptation requirements associated with the Year 2000 problem.

Obviously, in the rest of this document all evaluations will be basically concerned with the role of the year 2000 in information systems. Although we do not mean to overlook the problems that the date change will cause in other company departments, there is no doubt that the "explosive" side of the problem mainly concerns the world of information technology.

Special attention will be devoted to the need to identify , for each component of the information system, the internal or external body responsible for promoting and/or carrying out the required modifications in order to manage the year 2000 effectively.

With this in mind, an entire section will be dedicated to analysing the problems related to software package management in the next three years.

### **2.1 The need for a company plan**

Considering that the Year 2000 problem affects most components of a firm , and is therefore "interdisciplinary" in nature, it is crucial to establish organisational arrangements that ensure the necessary contacts between the departments operating in the various sectors involved.

To this end, it is advisable to appoint a single unit or person to co-ordinate all the activities connected with handling the date change in the year 2000; this function should be assigned to a senior manager or, in the case of more complex information systems, a specific unit.

The unit's (or manager's) main duties include:

- preparing a "Company Year 2000 Plan", which should be a comprehensive collection of the action plans in the firm's individual departments;
- determining the human and technological resources required and the related costs;
- creating a checklist to track the progress made in implementing the company plan and bring to light any critical areas.

The plan should also consider the impact of the changeover to the euro on information systems (see section 3.2.3).

In order to develop the plan, the unit/manager should have broad authority to:

- increase awareness across the firm of all the technical and organisational aspects related to the Year 2000 problem;
- stimulate company departments to determine which aspects of their activities might be affected by the modifications;
- ensure that company departments develop a specific departmental plan showing, among other things, links with other departments or external institutions, links with projects already started or to be started in the next three years and the constraints imposed or the opportunities created by technological innovations;
- promote the implementation of all organisational, methodological and instrumental measures necessary to facilitate the adaptation of applications.

## 2.2 Turning the problem into an opportunity

The first impression one has in beginning to tackle the Year 2000 problem is that firms will have to make large investments with no tangible additional benefit. Indeed, the adaptation of applications is aimed at preventing malfunctions, not achieving better performance.

Moreover, there is an enormous contrast between the simple nature of the problem and the consequent financial outlays, the organisational complexity of the adaptation process, and, above all, the impossibility of postponing the dead-line.

Nevertheless, major crises can also represent an opportunity to take steps that will generate significant indirect benefits for firms.

"What is the extent of the Year 2000 problem?" is one of the most frequently asked questions that usually arises when talking about the date change threat.

Among the answers to be found on the Internet site devoted to the Year 2000 problem [3], the most significant is:

***The size of the problems caused by the year 2000 is inversely proportional to a company's understanding of its own information systems.***

This statement highlights the heart of the Year 2000 problem, but also reveals the greater opportunity that the problem itself may create for a firm.

If every information systems unit had a complete and detailed map of the components in use, the impact of the date change in the year 2000 would be far less worrying, at least as far as applications software is concerned.

Unfortunately, the reality is different: firm's software inventory is often incomplete, out of date, and, in some cases, even entirely unmanaged.

Obviously this "pathology" may exist and be detected independently of the Year 2000 problem. Nevertheless, it is important to emphasise that since the date change problem also has an organisational dimension, the intensity of its impact will depend on whether the company's information technology units have laid the foundations for creating an environment that facilitates change.

From this point of view, the need to identify all of the components of the information systems that require modifications to handle the date change can (although "must" might be a more appropriate word) represent an opportunity for a company to acquire, once and for all, a reliable and comprehensive understanding of its information systems.

Achieving this objective would turn the Year 2000 **threat** into a valuable **opportunity** to increase efficiency, avoiding major investment to get results with negligible added value.

Therefore, we should also work towards the important aim of building an organised system for information systems management (**ISM: Information Systems Management**) while working to solve the Year 2000 problem. Such a system would consist of organisational, methodological and technical tools that enable a firm to manage information systems effectively in terms of component lay-out and interconnections.

Among other features, "configuration management" and "central data dictionary" systems would be indispensable elements of the environment.

Obviously, the information in the **ISM** environment will be especially useful for the management and control of information systems, particularly for large-scale maintenance.

The following diagram outlines an example of corporate functions that would use the information managed by the ISM system.

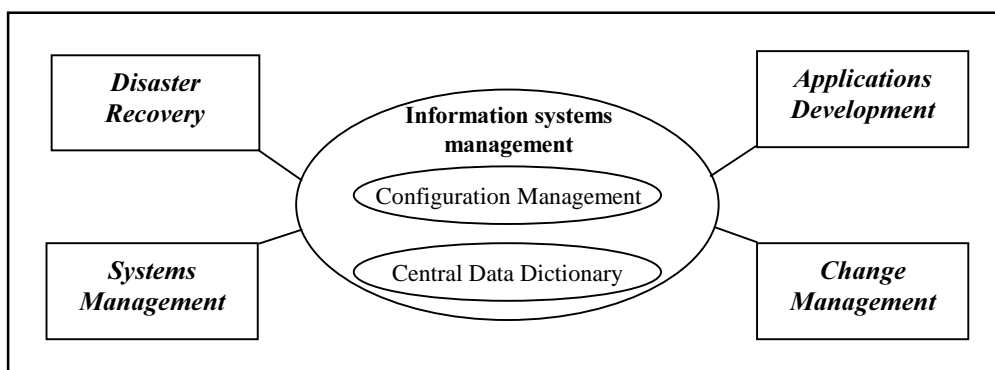


Figure 1

A further opportunity the date change may offer would be for an evaluation (to be taken into account in the company plan) of the possibility and benefits of replacing, rather than merely adapting, older, less efficient and hard-to-maintain

applications with applications packages or new applications that are more appropriate to current company strategies.

## 2.3 Identification of areas of intervention

As is always the case in situations with complex functions and relationships, the best way to manage processes is to delineate the various areas of intervention with precision.

To this end, it is advisable to identify the areas involved and collect all the information necessary to assess the size of the problem and the time needed to solve it in order to schedule actions properly.

In order to maximise the effectiveness of the survey, the first step is to establish the criteria for classifying the individual areas.

One possible approach is to identify the body **responsible** for ensuring the proper operation of the area under analysis. In this regard, two types of area can be distinguished:

- **external:** areas in which an external “body” is in charge of the modifications to be carried out;
- **internal:** areas in which a “body” within the company itself is in charge of the modifications to be carried out.

In essence, the external areas can be identified by the products that the company acquires from outside suppliers. This category therefore includes operating systems, firmware embedded in hardware devices and applications packages.

Conversely, "ad hoc" applications developed by the firm (with or without the assistance of an external software house) represent the "internal area".

This classification makes it possible to identify with precision the body that will perform the initial verification of the state of the area under analysis and, where necessary, carry out the subsequent adaptation.

Once the areas involved have been classified, it is necessary to collect detailed information characterising the areas themselves.

In order to construct an information “portfolio” on the firm’s "information technology world" to be used to implement the environment for "Information systems management" mentioned above, the collection and classification of

information must be organised in such a way as to allow the future exploitation for corrective, adaptive and/or developmental maintenance.

Clearly, the deeper and more comprehensive is the internal awareness of the firm's information portfolio, the quicker and more accurate will be the definition of the implementing measures.

Among other things, the aim of this phase is to bring to light the possible critical points that the Company Year 2000 Plan will have to take into account.

## **2.4 Surveying external areas**

The first step in dealing with external areas to take a census of the software products in use based on parameters related to the problems arising from maintenance activities.

In particular it is necessary to link the following information to each product:

- the supplier;
- the version used by the firm;
- the latest version released by the supplier;
- any customisation;
- type of user licence;
- terms of the maintenance contract;
- direct or indirect links to other products or applications;
- operating working environment (hardware as well as software).

This information can also be used to pin-point the type and extent of the work that the firm's internal structures will be required to handle.

In order to facilitate the survey process, it might be useful to consult the current list of maintenance contracts and complete a questionnaire containing the above information.

An example of such a questionnaire is shown in section 11.1.

### **2.4.1 The importance of knowing suppliers' intentions**

The focal point of the problem for external areas is to know the strategies of the body "must" take charge of adapting software (where necessary) to handle the year 2000.

Once the survey of products and their maintenance contracts has been carried out, it will be possible, in general, to differentiate between those products whose Year 2000 strategies are known and those whose strategies are not.

For the latter, it will be very important to receive a formal statement of suppliers' intentions as quickly as possible. To this end, suppliers' trade associations have contacted their member companies, asking them to supply the relevant information by 31/12/1996. Where thought necessary, banks may write to individual suppliers on this issue. A suggested pro forma letter is shown in section 11.3.

Any written communication by the banks should give the list of products in use, together with the current "level"; in the case of products that are not yet Year 2000 compliant, it is advisable to request the level of the version that will be compliant and the date on which that version will be available.

#### **2.4.2 A special case: software packages**

One of the most heavily discussed issues relating to the Year 2000 problem is the necessity of identifying the body responsible for any modifications to be carried out on software packages.

Essentially, the matter hinges on the following question: can one claim that the problems caused by the date change are the responsibility of the supplier and therefore, if a maintenance contract has been signed, the supplier itself will have to eliminate the problem without additional costs for the customer?

Conversely, even though the arrival of the year 2000 is a fully foreseeable (in fact, certain) event, can one state that solving the problem requires such extensive modification of software that the suppliers will exclude the necessary changes from the terms of the maintenance contract?

In addition to deciding who should pay for the modifications, other problems also arise. In fact, even supposing that suppliers decide to adapt software at their expense, they might provide Year 2000 solutions for the most recent version of the software but may not necessarily do so for older versions.

In this case, users could be forced to upgrade these components, making it necessary to ensure compatibility with other products used by the firm.

It is also important to underscore the critical nature of software packages that are no longer in production or, even worse, whose supplier is no longer in business. In both situations firms cannot delay updating and must quickly start installation of more recent versions, or they must find, purchase and install new products.

Meetings on these topics were held with suppliers' trade associations (ANASIN, ASSINFORM, ASSINTEL, BANKINFORM) to define a basic set of guidelines to facilitate relations between banks and the suppliers, mainly with regard to:

- the type of services available, especially the testing environments (service centres);
- the methodologies offered;
- the professional roles involved;
- the possibility of deactivating protection mechanisms (expiration date) present in some products in order to allow testing simulating the year 2000;
- publicising development strategies for the software products;
- the need to make "Year 2000 compatibility" explicit for products that will soon be released.

The suggestions that emerged from the meetings are contained in a report drafted by the associations. The text of the report is given in section 8 of this document.

With regard to the cost of modifications, the wide variety of situations has made it difficult to cast the problem within contractual categories that can be dealt with uniformly. Any evaluation of costs will therefore have to be postponed until the specific contents of the contracts are analysed.

It goes without saying that a compromise will have to be reached in situations where contracts are more difficult to interpret.

The aim of containing the costs of adjustment will have to take into account the need to guarantee the proper operation and constant availability of installed products.

In this regard, it may be helpful to use the following maintenance classification in contracts with suppliers:

- **corrective maintenance** - maintenance carried out to cope with malfunctions that arise after the guarantee period has expired;
- **adaptive maintenance** - maintenance to update software because of legal changes or technological, managerial and operative developments by means of logical and technical modifications of the program or its parameters that do not make substantial changes in the program structure;
- **developmental maintenance**
  - ⇒ **from a functional standpoint** - maintenance carried out to add new functions, or
  - ⇒ **from a technological standpoint**, maintenance carried out to port programs to new hardware platforms or operating systems.



Another useful reference is that provided by the ISO 9000 standards [4]. The ISO rules approach the maintenance issue from a different point of view from the traditional one mentioned above; in particular, the following types of intervention are identified:

- **problem-solving:** identification, analysis or correction of non-compliance that causes operational problems;
- **interface modification:** when additions or variations are made to hardware or software-controlled components;
- **function expansion or performance improvement.**

## 2.5 Surveying internal areas

It is advisable to conduct a census of internal areas similar to that carried out for external areas.

In this case, however, the existence of greater "historical knowledge" about the firm will very likely facilitate the development of a comprehensive and detailed survey of the information necessary to create the ISM environment.

Obviously, the survey could also serve as an opportunity to identify obsolete applications and remove them from the information system.

In addition to a general description of each application, it is also advisable to collect information on its size and the languages used. It is also important to clarify whether the applications are already able to handle the year 2000, and, if they are, what solution was adopted, so as to be able to evaluate any effects on related applications.

It is also important to identify applications that will undergo a complete overhaul by the year 2000. In this case it is obviously not necessary to plan adjustments.

During the survey, it would be advisable to evaluate the possibility and/or benefits of dealing with the oldest applications in some other way than merely making adjustments for the date change (see section 3.2.3).

In order to enhance the efficacy of the planning process, it is also important to know whether in the next three years an application will undergo large-scale maintenance other than that related to the date change (i.e., the changeover to the euro, etc.), in order to assess the benefits and drawbacks of carrying out this maintenance at the same time.

In order to have maximum information to improve planning of the modifications, it is advisable to highlight for each application:

- any links to external bodies;
- the use of files shared with other procedures;
- the use of services available on the interbank network;
- any direct and indirect links to other internal procedures;
- the presence of files subject to legal constraints;<sup>3</sup>
- the use of historical databases.

Moreover, the informational or statistical processing of operational data for final users should be analysed for each application, as should the use of non-computerised tools (such as paper forms, etc.), which may require modifications.

A structured form (see the example in section 11.2) may facilitate the survey.

---

<sup>3</sup> In this regard, it is important to bear in mind the fact that in some cases the law requires old records to be kept for even ten or twenty years and may require calculations that have produced specific documents to be redone. This could act as constraint on the choice of solutions (see section 3.2.4) for adapting the applications involved to cope with the year 2000.

### **3. HOW TO HANDLE THE ADAPTATION OF APPLICATIONS SOFTWARE**

This section will outline a possible approach to handling the adjustment of applications software in internal areas for the year 2000, from the inventory of the firm's information systems to the testing and release of the modified components.

#### **3.1 What the market has to offer**

The Year 2000 problem must be solved in a relatively short space of time.

Some authoritative studies have indicated the organisational and financial burden of adopting an approach to the problem based on "manual" techniques.

The size of the problem and the tight time constraints imposed by the fixed dead-line make it unfeasible to carry out the modifications using only internal resources and, at the same time, increase the difficulty of recruiting high-skilled resources from the market at sustainable costs.

These considerations make it necessary assess the advisability of using the services and automated tools already available on the market.

##### **3.1.1 General characteristics**

In general the available services are based on using services similar to those adopted for large-scale maintenance activities, appropriately adapted with methods linked to the special features of the intervention.

More specifically, some companies offer consulting and field services for the *inventory*, *impact analysis*, and *planning* phases, leaving the purchaser the responsibility for scheduling the adaptations, the related testing and the re-release of the programs.

Other firms cover the entire maintenance process and therefore offer, in addition to the above services, consulting services during the *modification*, *testing* and *re-release* phases. Their services usually also include Change Management and Application Re-documentation.

Some firms make their computing centres available as "*Service Centres*" to carry out all the activities related to the date change and/or offer the possibility of performing the program modification in their laboratories.

Finally, other companies offer services regarding:

- *Certification of Year 2000 maintenance processes*
- *Training*
- *Software inventory*
- *Tools research*

These services usually include tools that, in the various phases, can help:

- identify, through code syntax and semantic analysers, all software segments affected by the date change (date fields, instructions);
- provide quality metrics for the products under analysis;
- automatically modify code and data, albeit partially;
- temporarily alter date fields contained in the files to allow testing of the modified applications with reference to time intervals that span the change of century;
- facilitate the creation of "bridges" between modified and unmodified applications (and files).

Useful references on the above can be found in the documentation provided by the trade associations (see section 8).

### **3.1.2 Factors for making a choice**

Identifying the offer best suited to specific company requirements depends upon a variety of considerations, particularly those relating to the way services and tools satisfy the "Year 2000" project requirements while, at the same time, allowing efficiency goals to be pursued.

The following variables, among others, must be taken into account:

#### *a) with reference to company organisation*

- the current level of knowledge about the company's information technology systems;
- the availability of automated maintenance tools (central data dictionary, configuration management, etc.);
- the availability of code structure analyser tools;
- intentions regarding the establishment of an environment for the management of information systems;
- software development policy ("in house" or "outsourcing");
- the availability of skilled applications personnel;
- the age of the applications;

b) *with reference to services available*

- the availability of methods and tools allowing the information collected during the inventory and analysis phases to be stored in a database;
- the type of approach (data and/or programs) chosen to locate the components affected by the date change;
- the hardware platform used by the tools suggested for the various stages of the adjustment process.

## **3.2 A possible approach**

The following sections trace an ideal line of action to help managers in charge of their firm's Year 2000 project, offering suggestions for drafting a detailed plan leading to the final release of "new software". The utility of applying the following method to a *pilot application* in relation to the level of confidence with which the *pilot application* can accurately represent the firm's entire software base will be evaluated.

### **3.2.1 Software inventory**

The advantage of having an inventory of the software "objects" belonging to the company does not depend solely upon the need to adapt them to cope with the year 2000: in fact it yields benefits in many of the activities connected with the management of the company's information.

As noted earlier, in the case of large-scale maintenance it is essential to know which classes of objects may be affected by adjustment or developmental measures.

Developing a software inventory is therefore one of the first steps to carry out in order to start creating the databases on which the "Information systems management" environment will be based.

For example, the inventory should definitely include programs' source code, DDL, Copybook, JCL, Include, Forms, SQL instructions, Macros and Tables.

In order to create the database, the objects should be organised and classified as homogenous classes to facilitate subsequent consultation and/or processing.

The collection and classification of objects must be complete, ensuring that all the components of the company's information systems have been covered. Indeed, from a strategic point of view, a partial classification of the company's information base would be of little use.

Finally, for the sake of the overall efficiency of the process it is important to be sure that suitable organisational steps have been taken to ensure permanent links between the resulting database and its sources: these objects are structurally dynamic, a characteristic which rapidly makes occasional observations obsolete.

### **3.2.2 Impact analysis**

The aim of *Impact Analysis* is to identify the time and cost requirements of adjustment measures in order to establish a precise schedule for each individual intervention. This involved identifying the applications (and other linked objects) to be modified - including those for which it is not known whether adaptation has been carried out - and extracting the information (objects involved in the date change, quality metrics, etc.) that will permit an assessment of the dimensions of the project.

Generally speaking, one can say that the way one must proceed will depend on the level of interconnection of internal applications and on the amount of software to be modified.

For example, when dealing with applications characterised by a high level of integration, it might be advantageous to carry out the analysis for homogeneous subgroups, at least as long as the dimensions of the collection allow the process to be managed easily.

In all cases in which the analysis is carried out for subgroups, possible mismatches between data shared by several applications caused by modifications carried out, and the need to set up special "bridges" to handle the mismatch that has arisen for the required amount of time must be taken into account. This aspect is particularly critical during the testing and release phases (see section 3.2.7).

In order to carry out this phase, one can choose between the data or program component as the starting point for analysis. This choice will depend on the confidence the administrator of the information system has in the level of knowledge about the company's archives and, more particularly, on the availability of a complete and updated Central Data Dictionary.

In addition, procedures that provide services to several applications, such as: table systems that cross several applications, the generalised routines for date management and reused software must be analysed.

The depth of the impact analysis will mainly depend upon who will be selected to handle the updating activities, i.e. whether the task will be assigned to an internal unit or an external firm.

In the case of outsourcing, the impact analysis should aim to estimate the overall dimensions of the problem: indeed, external firms tend to utilise tools known to them and to repeat detailed analysis, even when supplied with precise information. This overall estimate will therefore be useful in evaluating offers from different companies, and, above all, in establishing the magnitude of the investment.

Independently of the method and/or the tools used by the selected external contractor, Configuration Management and Central Data Dictionary tools can be used to carry out such a general survey if they are available.

Conversely, if a firm plans to use internal resources only, the analysis will have to be carried out in great depth, since body of knowledge thus acquired will be utilised in the subsequent Planning and Modification phases.

Finally, in the case of applications already Year 2000 compliant (e.g., those developed recently) the need for impact analysis should still be evaluated: a deciding factor could be the links with other applications and/or the outside world (which could act as constraints in the development phase) and the use of special instructions (ACCEPT).

### **3.2.3 Planning**

As mentioned above, the Year 2000 problem affects the entire company, both because its impact goes beyond IT departments alone and because it has arisen in a wider context of change which could affect firms by the end of the century.

In such a complicated scenario, the network of links that will involve company "objects" and, in particular, information system components in a series of events which will take place in the next three years (the changeover to the euro, etc.) will require careful scheduling of all activities, with adherence to the schedule mostly determining the success of the entire adjustment process.

It is therefore of fundamental importance to carry out the Inventory and Impact analysis phases. These phases will serve to highlight the information - particularly the implicit and explicit links between the various components - necessary for the subsequent Planning phase.

In order to reduce costs and intervention time, the main aim of the Planning phase, in addition to determining resource distribution and implementation times, is to estimate, application by application, the advisability of taking one of the following approaches:

- 1) carrying out the Year 2000 adjustment only;

- 2) carrying out the Year 2000 adjustment, and, at the same time, re-engineering the application;
- 3) substituting the old application with a new one and, at the same time, evaluating whether it would be advisable to use new tools and/or new architectures (object-oriented, client/server, data-warehouse, etc.);
- 4) substituting the application's "informative" part with applications which can be developed autonomously by users through the use of end-user computing tools;
- 5) substituting the application with an applications package.

Obviously, in the cases described under 1) and 3), it will need to be decided whether to carry out the intervention with internal or external resources.

As mentioned above, the Plan should also indicate the constraints arising from "concurrent projects" or events which affect other corporate sectors.

Project management tools such as PERT and Gantt can be used in this phase to provide an overall view that can help to identify and solve conflicts between activities and resources before they arise and, subsequently, to assist in monitoring the progress made by the projects and in implementing any necessary corrective measures in crisis situations.

The possible impact on information systems of commitments agreed at the European level merit specific attention. Indeed, it is clear that some of the programs affected by the date change will also be affected by modifications to be carried out for the changeover to the euro.

In such cases, the evaluations underlying the choices noted above are even more pressing, especially as regards the advisability of replacing pre-existing applications either with new applications or applications packages.

When it is decided to make adjustments only, the existence of modifications affecting the same software "objects" requires technical and organisational solutions which will optimise the intervention as far as time and costs are concerned.

There are two possible approaches: solving every problem by intervening "once and for all" and solving problems "one at a time". Both hypotheses having positive as well as negative aspects of varying nature and size.

For example, the methodological approach adopted for the date change could be extended to the changeover as well, even though the underlying problems have different impacts and objectives (they concern large-scale modifications and developmental modifications, respectively).



Moreover, adjusting a software module to both the year 2000 and the changeover in the same operation will tend to reduce the time required to modify the "objects", but one runs the risk of significantly increasing the complexity of demanding activities, such as Modification and Testing.

Conversely, should one choose the "cascade" approach, with separate activities for the two major events, the various phases will be more manageable but will also involve a larger commitment of human and technological resources and longer completion times, which will have to be taken into account.

### **3.2.4 Software modification: possible solutions**

The choice of the most appropriate technical solution for the Modification phase is one of the most important decisions to be taken in solving the Year 2000 problem. Indeed, although the activities related to the date change are highly organisational in nature, it is also true that the various technical solutions currently proposed differ (sometimes considerably) as far as costs, complexity, risk, future development, etc. are concerned.

Before discussing the choice itself, it is advisable to examine, albeit briefly, the types of approach that the market currently offers. As far as the "year field" is concerned, the following three equivalent classes have been identified:

- extending the year field;
- coding according to a specific algorithm;
- definition of a time interval in which the natural sequence is inverted ("time windowing").

#### **3.2.4.1 Extending the year field**

Extending the year field from 2 to 4 digits is the most "natural" solution, and is that which seeks to eliminate the date problem at its roots. Indeed, this approach makes date management in company information systems "standard". On the other hand, lengthening the date field makes it necessary to update every application, even those which, in theory, could continue handling dates using the old method.

In particular, each of the following application components will have to be updated: "video maps", listings, record lay-out, source code, etc.

In this hypothesis one must not underestimate the necessity of synchronising the adaptation (either by using identical modifications or by creating special "bridges") of all applications that interact with date information in shared files; In addition, it is important not to underestimate the problem of re-processing stored

historical data with years given with two digits and the problem of the increased storage memory requirements (disks) the adjustment will impose.

#### **3.2.4.2 Coding**

The coding approach is based on the fact that, using particular criteria, it is possible to represent several thousand numbers with 2 digits.

By comparison with lengthening the date field, this solution has the advantage of not altering the file structure.

On the other hand, here, too, it is necessary to ensure the "homogeneity" of the algorithms used by the various applications (either by using identical modifications or by creating special "bridges") in order to allow those applications to communicate when necessary. It will also be necessary to establish specific functions to access files, in order to ensure that dates are not displayed to users in their coded format.

#### **3.2.4.3 Time windowing**

This method is based on defining a 100-year time window in which it is possible to determine unambiguously the century to which an event belongs, starting from a date in which the year is represented by two digits only.

The "window" can be defined in the following way:  
First of all one must specify the *base year*, i.e. the lower boundary of the time window. The upper boundary is fixed by adding 99 years to the base year. For the years on both boundaries only the last two digits are taken into account.

Under this approach, each year (represented by two digits) numerically greater or equal to the *base year* will be considered to belong to the century to which the lower boundary belongs, while each year lower than the *base year* will be considered belonging to the century to which the upper boundary belongs.

An example will help clarify the method. Let us imagine one must examine an event starting from the year 1970 (the base year).

Applying the method described above, the lower boundary of the time window is represented by 70, while the upper boundary (2069) is represented by 69. Therefore years from 70 to 99 will be considered to belong to the 20th century (from 1970 to 1999) whereas years from 00 to 69 will be considered to belong to the 21st century (from 2000 to 2069).

Note that in this way a *previous company life* for a given phenomenon has been implicitly defined. This life is represented by the period between the base year

and the current date (in the above example, setting the current year equal to 1996, the previous life amounts to 26 years).

When the base year does not change (in the above example the base year is permanently equal to 1970) one speaks of “fixed” time windowing.

By contrast, “mobile” time windowing<sup>4</sup> is when the base year increases at the same rate as the current year (supposing a previous life of 26 years, the base year would be 1970 if the current year were 1996, while it would be 1971 if the current year were 1997, and so on).

Time windowing, especially the mobile version, has the advantage that data is not modified in any way and only some programs will have to be adapted to the new way of "sorting" the date.

In addition, the synchronisation of the modifications carried out on applications which have shared files can be more "gradual" than that required by the date field extension or coding approaches, since with both structure and content of data being unmodified the correct performance of every application is assured for every date preceding the year 2000.

On the other hand, the method can not be used in applications (in reality rather rare) that require time windows wider than 100 years.

### **3.2.5 Choosing the best solution**

Which of the three available methods should be used? In all likelihood, none of the solutions are suitable for every application. Each method has its pros and cons, and both direct and indirect costs vary widely between the various methods.

Even limiting the universe to that of a single company, it is unlikely that only one of the three methods will be uniquely appropriate to the situation of the firm's information systems.

One can therefore conclude that the choice of the approach to the Year 2000 problem must not exclude a priori the possibility of the coexistence of various solutions.

In substance, the impact of the three solutions on processes and data components can be summarised as follows:

---

<sup>4</sup> Section 11.4 gives a description of the two types of windowing method.

	<b>Processes</b>	<b>Data contents</b>	<b>Data structure</b>	<b>Need for synchronisation</b>
<b>Lengthening year field</b>	✓	✓	✓	<b>High</b>
<b>Coding</b>	✓	✓		<b>High</b>
<b>Time windowing</b>	✓			<b>Medium</b>

*Table 1*

### **3.2.6 The need for organising the software modification process**

No matter which solution is chosen, there are many operational approaches to carrying out the modifications. The spectrum ranges from a totally manual approach (to which the considerations outlined at paragraph 3.1 are pertinent, except for some special cases involving small projects) to situations in which the process can be made highly, although not totally, automatic.

In any case one has to bear in mind that during the next three years software will undergo ordinary corrective, adaptive and developmental maintenance.

In substance, one can not assume that the software modifications for the Year 2000 problem will be made in an invariable context.

In order to structure the activities and control the "correct" flow of the entire maintenance process, the availability of all information connected to the software "objects" to be modified becomes particularly significant, making it necessary to use only the tools of the "Information System Management" environment and to follow strictly the rules that govern its operation. In this environment the tools and the rules of the "Configuration Management" and the "Central Data Dictionary" systems will be particularly important.

### **3.2.7 Testing and re-release**

Supposing the best solution to the problems described has been found, even with all the difficulties of defining a "best" in such a complex context, the Year 2000 problem still leaves us with two final difficulties to overcome: testing the modified applications, and releasing the new software.

Some estimates for the year 2000 indicate that 50% or more of the commitment necessary to adapt the company's information systems will be devoted to testing activities (from module testing down to acceptance tests). The real "critical mass" of the activities for the "date change" adaptation begins with the testing [3].

Indeed, despite the assistance provided by sophisticated automatic tools, large-scale maintenance, such as that involved with adjusting software for the year 2000, could produce some likelihood of software "regressions".

Therefore, once the modification of software is complete, and well before 31 December 1999, we believe that *parallel* operation of the procedures is necessary in order to ensure that the modified information system is capable of providing the same level of service as the previous version.

We must underscore the importance of carrying out this *parallel* phase, because it essentially represents the final verification of the *formal equivalence* of the modified applications before their re-release.

Carrying out this phase requires, among other things, the solution of problems linked to:

- the difficulty of simulating the conditions of the change of century;
- the presence of "expiration dates" in some of the software products that could have 31/12/1999 as the limit date for their operation.
- the absence of actual test data;
- the insufficient availability of technological resources;
- the limited availability of non-working days (usually week-ends) during which the production systems are available for off-line testing;
- the difficulty of involving final users.

Obviously, solving these problems depends upon the firm's technical and organisational characteristics. Generally speaking, finding a solution, paying particular attention to costs and completion times, requires taking one or more of the following initiatives:

- the setting up (from scratch, if necessary) in each company's structure of a "test environment" dedicated to testing activities for the year 2000. In this regard, the experience of some firms that have made use of the "disaster recovery" environment as a test platform to deal with previous large-scale maintenance problems, is particularly significant, since this environment is by its very nature physically separate from the final production environment;
- the use of *service centres* made available by suppliers;

- the setting up of specific "routines" that emulate system functions when programs read the current date;
- the use, at the highest possible level, of techniques and tools that allow activities to be automated, especially with regard to "non-regression" tests;
- the verification of the actual extent of the "expiration-date" problem and the definition of agreements with suppliers that envisage the availability of software versions able to operate with dates subsequent to 1999;
- the taking of measures to ensure that user involvement is gradual and, if possible, limited.

The lack of real test data is certainly one of the most important aspects among those listed here.

Indeed, while it will certainly be possible to create a significant database, it will be difficult, if not impossible, to involve the users in carrying out a test that will consider the repetition of "working days" with date beyond 31/12/1999.

In this regard, the advisability of using software products that manipulate data by shifting it in time, can be evaluated. In this way it will be possible to carry out, albeit artificially, the "tests" simulating the real situation. This is software that logs the daily activity of the users of a given application and then reruns the same "operative path", thus testing the Year 2000 compliant version of the application while limiting user involvement.

The size of the problem of releasing the new software must also not be underestimated.

It is extremely clear that it will not be possible to release the new versions of every application adapted to the year 2000 at the same time (for example, over one week-end).

Compatibility problems between various applications affected by the date change (modified and unmodified applications) might therefore arise, particularly, for example, when an application whose year field has been extended to four characters shares files with other applications.

In this case, the firm will either be capable of modifying every application at the same time in order to move to the "compliant" versions in one moment, or (and this is the most likely scenario) will need to spread the maintenance activities over some span of time, which implies the coexistence of modified and unmodified software and therefore the need for specific "connections" between them.

To check that such connections exist is therefore a fundamental step of the re-release phase, because compatibility may not have been verified, either out of necessity or for speed, during the testing phases.

In this regard, it is important to emphasise that such activities under efficient and secure conditions, far from being carried out with manual methods, can benefit greatly from the availability of the "Information Systems Management" environment discussed earlier.

Finally, it must be acknowledged that applications may generate unforeseen malfunctions when they are re-released, despite having undergone rigorous and lengthy testing.

The re-release phases will therefore have to be planned with the necessary gradualness (foreseeing the possible need for roll-back) in order to reduce disruptions to users arising from possible (and not unlikely) malfunctions.

#### 4. COST ESTIMATE MODELS

A number of models for making cost estimates for solving the Year 2000 problem are suggested below. They based on a study recently carried out by the Gartner Group [5].

The estimates given by these models have a  $\pm 40\%$  margin of error.

**Therefore, the yielded guidelines provide only a rough assessment of the costs.**

In every suggested model:

costs are INCLUDED for:	costs are NOT INCLUDED for:
project management	software tools
resources	machine resources
code/data analysis	acceptance tests
correction	documentation
module/integration testing	standard updating
release into production	

It is important to emphasise the importance of the module/integration tests, which could account for half of the estimated global cost, due to the necessity of developing and/or updating the operative environment for testing the modified routines.

Within the framework of the models, the reference measurement unit will be **FTE (FULL TIME EQUIVALENT)**, equal to 2000 man-hours.

##### 1) Lines of source code method

The number of lines of code (LOC) of the software portfolio affected by the problem is computed; both lines to be adapted and lines not to be adapted for the date change are considered.

The lines to be counted for the estimate are "executable" ones, i.e. those belonging to the COBOL "procedure division" (or the equivalent in other languages); comments and data definitions are excluded.

A cost of \$1.10 per line of executable code is estimated and 1 FTE is equivalent to 100,000 LOC.



## 2) Method for estimating complexity

The software modules are classified as simple, medium and complex according to their structural and functional characteristics (the function performed, the number and the type of operations in which dates are processed, the age and size of the related application, etc.).

A number of man-hours representing the commitment required to modify a module can be assigned to the related type of module. One possible classification is:

- simple: from 5 to 15 man-hours
- medium: from 15 to 30 man-hours
- complex: from 30 to 45 man-hours

The following formula is used to compute the overall cost for reaching year 2000 compliance:

$$Cost = \sum_{i=1}^3 H_i \cdot C \cdot P_i \cdot T$$

where  $i =$  complexity class

( $i : 1 = \text{simple}; 2 = \text{medium}; 3 = \text{complex}$ )

$H_i =$  hours required for a class  $i$  module

$C =$  cost per hour

$P_i =$  percentage of total type  $i$  modules

$T =$  total number of modules

In FTE the expression becomes:

$$FTE = \sum_{i=1}^3 \frac{H_i \cdot N_i}{2000}$$

where  $N_i =$  number of class  $i$  modules

Neither method makes explicit reference to the adoption of any particular technical solution (see section 3.2.4).

## 5. COST ESTIMATE FOR THE BANKING INDUSTRY

After having examined the repercussions that the year 2000 will have on information systems in the banking industry, a rough estimate of the economic burden that the entire banking industry will have to bear has been made.

To this end, a questionnaire (see section 11.5) was sent to a sample of banks in order to identify the amount of software that each bank estimates will have to be modified for the year 2000.

The survey refers to the software belonging to the so-called "internal areas", i.e. the software for which technical modifications are carried out at the initiative of each bank (using either internal or external resources).

Thus, applications packages purchased from market suppliers, the adaptations of which are carried out by the suppliers themselves, as well as programs managed by consortial centres and the like, have not been considered.

### 5.1 Analysis of the questionnaire

The banks in the sample were asked to indicate:

- a) the number of programs;
- b) the number of lines of code in the programs;
- c) the percentage of programs affected by the date change, with reference to the programs under a);
- d) the percentage distribution of the programs according to the language used;
- e) the percentage of programs mentioned under a) in relation to the firm's entire applications portfolio, including applications packages and programs managed by consortial centres and similar units.

The analysis of the results from the sample<sup>5</sup> highlights qualitative and quantitative aspects of great interest.

The distribution of programs by the language used (see figure 2) shows that the Year 2000 problem mostly affects COBOL programs (73%), while the impact on Assembler programs is not negligible (10%).

---

<sup>5</sup> On the basis of the usual classification of deposit money, the sample is made up of 6 "major", 8 "large", 20 "medium", 17 "small" and 11 "minor" banks, together with the "Institute of Issue", 1 consortial centre and 5 service centres.

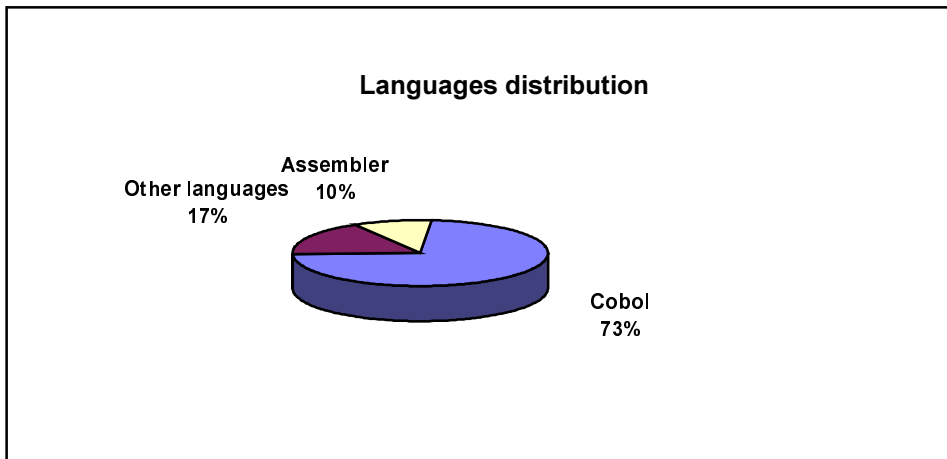


Figure 2

On average the programs consist of about 900 lines of code.

The percentage of programs involved in the date change adjustments is distributed in an almost uniform way between 0% and 100% (see figure 3).

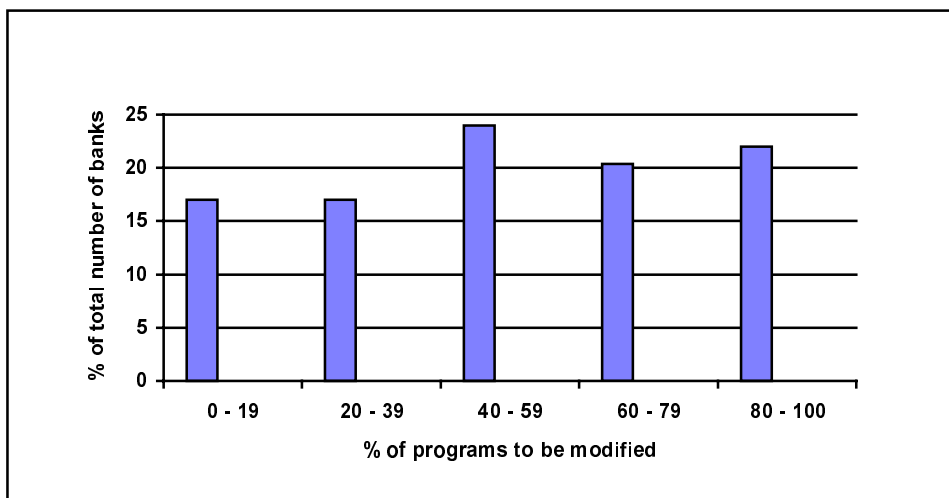


Figure 3

In particular, the graph shows that more than 50% of the sample needs to modify more than 50% of the programs, with peaks that reach 100%.

From the sample data it is also possible to compute an estimate of the software managed directly by the banks versus that acquired from outside (packages and consortial centres).

In this regard, the sample responses show a prevalence of "in house" development of applications (see figure 4).

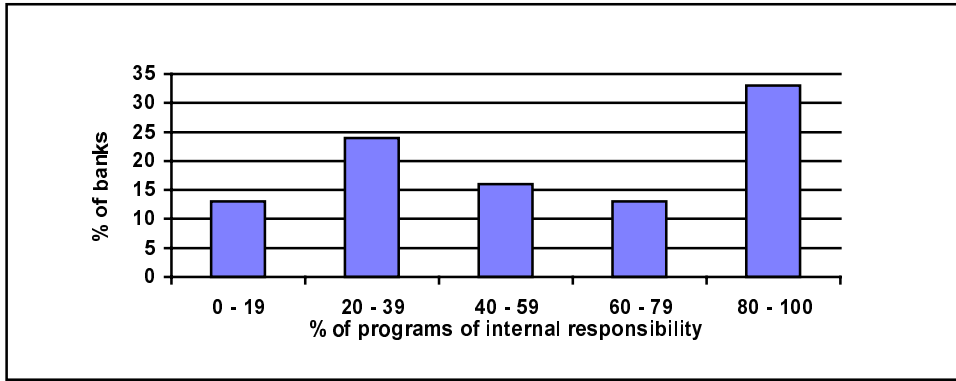


Figure 4

This approach is more common for large banks and decreases in a uniform way to rather low levels for small banks, which mostly make use of off-the-shelf packages and/or make use of information services offered by consortial centres (see figure 5).

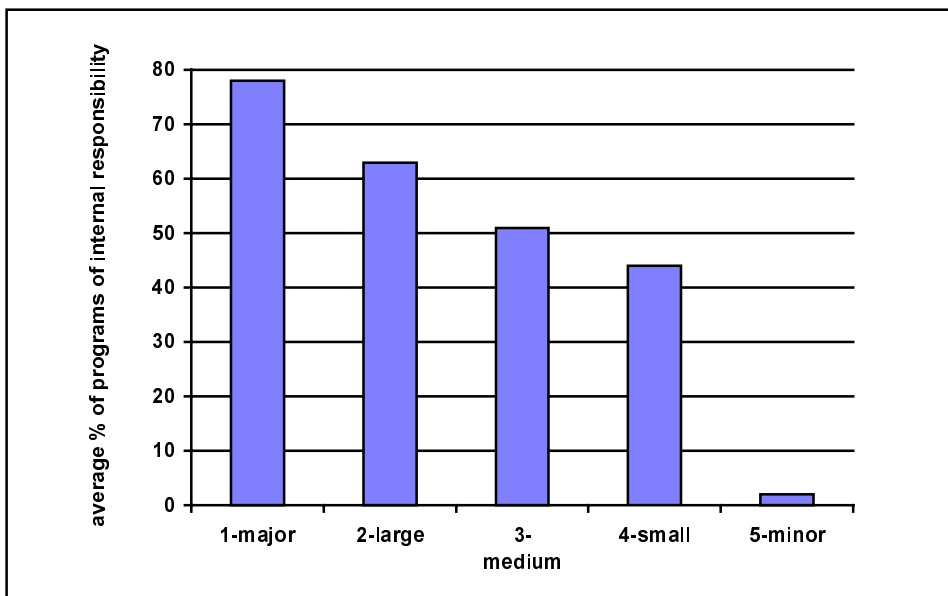


Figure 5

## 5.2 Estimate of costs

Using the models described above, it is possible to estimate the costs (with reference to "internal areas") which each bank will face to adapt its information system.

To this end, with reference to the lines of source code method, figure 6 indicates a direct relationship between cost and the number of lines of code to be modified for a given language.

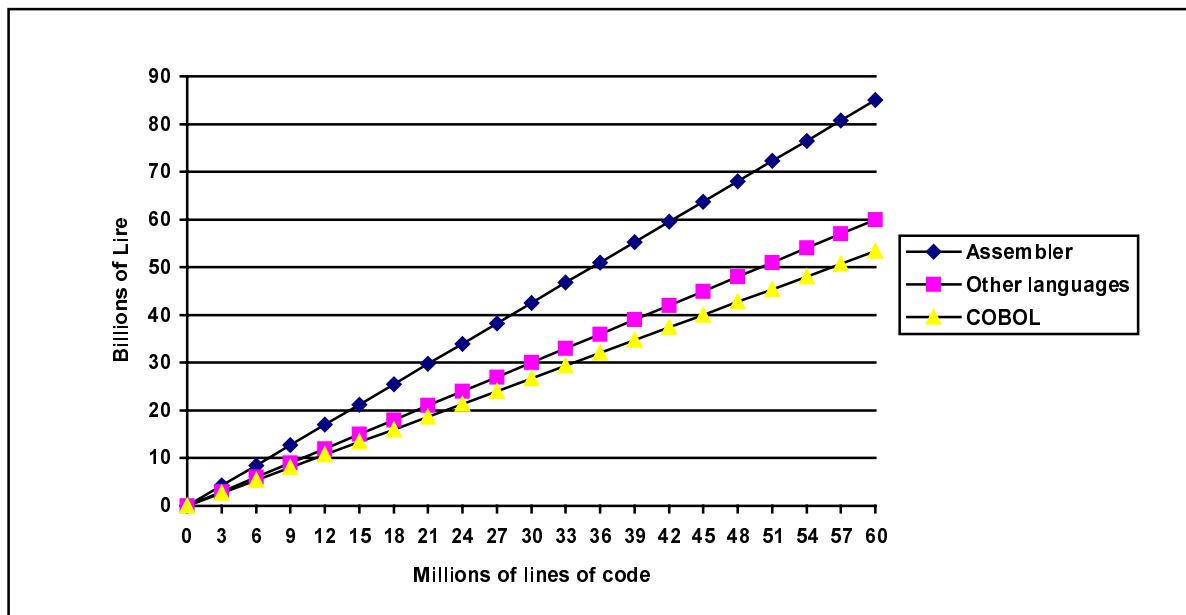


Figure 6

By way of example, a company that has to adapt a million lines of Assembler code and 4 million lines of COBOL code will face a total cost of 5 billion lire, of which 1.4 billion for the Assembler code and 3.6 billion for the COBOL code.

The application of the estimate method to the entire banking industry yields an estimated cost of about 600 billion Lire<sup>6</sup>.

The estimate refers **only** to the costs of resources engaged in the activities mentioned in section 4, making no distinction between internal and external resources; the costs of purchasing automated tools (the use of which is probably indispensable), using the machines, carrying out acceptance tests and any documentation and updating of standards are **not** taken into account.

It must be pointed out that the estimate is a broadly indicative global value, referring to both internal and external costs. **Actual cash outlays** by the banking industry will depend on the set of choices that each bank makes with regard to the use of human and/or technological resources external to the bank itself.

It goes without saying that the expense will in any case be influenced by the dynamism of the market; this will be affected, on one hand, by competition between

<sup>6</sup> The values are based on an exchange rate of 1520 lire to the dollar.

suppliers, partially as a result of banks resorting to purchasing strategies based on competitive criteria, and on the other, by the fact that, as the dead-line approaches, demand for computer services could increase substantially, without a corresponding increase in supply.

In order to cope with the "**big bang**" of the millennium change (in addition to the other initiatives mentioned above), it seems advisable to identify immediately solutions (contracts with the suppliers, etc.) which will grant access at sustainable costs to the (high-quality) resources necessary to cover any support requirements in the period of greatest exposure to risk (i.e. from 1 January 2000).

## **PART TWO**

## 6. INTERBANK STANDARDS

One feature of the Year 2000 issue shared by all operators in the banking market consists in the problems that could be generated by the presence of information containing date fields in the messages transmitted over the national interbank network (RNI).

To deal with this eventuality, interbank applications (see section 11.6) which require uniform behaviour by every participant in the network have been assessed<sup>7</sup>.

In particular, the analysis carefully examined date fields embedded in the standard frames used by the messages exchanged by banks, and worked out a set of rules to ensure the proper operation of the applications at the change of century. All participants in the RNI will have to comply with those rules.

The rules have been laid down with the primary aim of containing costs for the banking industry, simplifying program modification activity and reducing, as much as possible, the need to synchronise the actions carried out by the individual banks.

The evaluation of applications programs has revealed that the possible solutions for resolving the Year 2000 problem in interbank applications are:

- structurally modifying the date field by adding two extra characters to represent the century;
- using the "mobile windowing technique", which would entail keeping the two-digit year representation in the messages in use today.

The analysis highlighted the impossibility of adopting the same solution for all dates in the messages. It was agreed that, in most cases, it will be possible to apply the "windowing" technique because the dates used in the messages exchanged by the interbank applications fall within the time frames handled by the algorithm. In some date types (birth dates, judicial measures, etc.) the year information cannot be handled with this technique.

The following rules for processing interbank messages have been specified:

- A) for messages that use two digits to represent the year:

---

<sup>7</sup> With the exception of Eurocheque, POS and SETIF, the survey did not examine "competitive" applications, since the Year 2000 adaptation process for these will be co-ordinated by the competent Application Centre.



- 1) adjust the formal checks on meaningful dates to accept the value "00" in the year field, leaving the applications to verify the correctness of the full dates;
  - 2) adopt the mobile windowing technique to identify the actual century using a 30-year parameter<sup>8</sup>.
- B) applications that give the year using four digits will continue to do so;
- C) dates that are not satisfactorily handled by the mobile windowing technique (i.e. date of birth, date of measure, etc.), will have to be handled with a four-digit format (with the exception of some date fields, such as those listed in 11.6);
- D) with regard to new procedures, the choice of date representation is left to the development teams, which will have to weigh carefully the disadvantages of higher transportation costs against the benefits of easier-to-handle applications. Should it be decided to continue using two digits, the rules given under A.1 and A.2 will have to be followed;
- E) dates using a one-digit year representation do not need to be modified, since the analysis is identical to that carried out for the decade date change.

As regards the Bancomat automatic teller application, for which a solution has already been developed for the card expiration date problem (which required the modification of the applications running on the ATM and on host computers), the previously established criteria will be maintained. In particular the established criteria state that:

- if the expiry date on the Bancomat card is greater than or equal to 80 and less than or equal to 99 the first two digits of the year are to be considered as "19";
- in all other cases - dates greater than or equal to "00" and less than or equal to "79" - the first two digits of the year are to be considered as "20".

These criteria have been extended to other date fields in the Bancomat application and in the applications connected to the Bancomat itself (the *numero verde* toll-free number, Eurocheque, POS, Setif) (see section 11.6).

---

<sup>8</sup> The mobile windowing algorithm is critical only if a message is exchanged at the turn of the year between two EDP centres connected to the RNI and contains dates with the year "AA" either 30 years before or 69 years after the system date (in the hypothesis of PP=30); in this situation, the system date, which is the computational basis for the algorithm, will be different for the two centres. The first centre will have 31.12.CCYY as its system date, while the second will have 0X.01.(CCYY+1). To overcome this critical point it is necessary to insert (if it is not already present in a more restrictive form) a admissibility check for dates, which. must not be more than 29 years before or 68 years after the system date.

## **7. AIPA AND THE BANKS**

The Group held meetings with AIPA (the Italian Authority for Information Technology in the Public Administration) to learn what initiatives it had launched in the public administration concerning the Year 2000 problem, especially as regards the exchange of information between the banking industry and the public administration itself. In this regard, AIPA reported that it had sent out a circular to all affected institutions urging the start, before the end of the current year, of suitable initiatives to make information systems Year 2000 compliant and the preparation of timely reports on the solutions identified and their planned implementation schedule.

## **8. IT TRADE ASSOCIATION DOCUMENTATION**

## Document produced by the IT Trade Associations

1. The Trade Associations will contact their member firms in order to supply banks, by 31/12/1996, with information on the Year 2000 compliance of the software products listed in their catalogues; as far as possible, the firms will in any case provide prompt answers to any questions on this issue that their users may have. In particular, with reference to non-compliant products, the information will include the release date for the new version and the planned solutions for the adjustment. Finally, with regard to products that will come on the market as from 1/11/96, the Associations will ensure that their member firms make Year 2000 compliance explicit.

2. The Associations are of the opinion that a "standard" methodology for adjusting software to cope with the year 2000 should contain the following steps:

a) **SW inventory**: identifies the system and subsystems present. For each application, specifies and classifies the software objects which are available in source form (e.g. pgm, jcl, dsect, copy, proc/parmlib, etc). It assumes that properly compiled source code (matching the versions in use) will be available for every application.

**Input**: every source element available for an application together with an indication of the respective environment version (e.g. type and release of compilers, monitors, DBMS, etc.).

**Output**: quantitative data expressed in LOC, or equivalent units, on the amount of software considered.

Type of elements delivered; list of elements mentioned but missing in the consignment; elements not mentioned but present in the consignment.

b) **Documental reverse**: supplies and updates following variations the diagrams of interprocedural data flow between applications for every system and subsystem.

**Input**: source elements related to one or more applications which have passed the software inventory phase.

**Output**: record of the interprocedural flows and the interrelations between applications, subsystems and systems.

c) **Impact analysis**: systematic search, at different levels of granularity, to locate the points affected by the Year 2000 problem and to define the technical

approaches to intervention. It is to be carried out in detail, involving every object of the application.

**Input**: source elements related to one or more applications which have passed the software inventory phase; criteria for analysis of the problem; possible constraints arising within the firm and/or externally.

**Output**: quantitative indication of the amount of software affected by the Year 2000 problem. List of the software objects affected by the problem together with identification of the points and the modes of impact.

**d) Intervention planning**: detailed planning of resources and Year 2000 maintenance for the entire information system, if necessary divided into several self-contained software sections. Planning for putting the applications adapted for the year 2000 into operation.

**Input**: updated documentation on physical/logical interdependencies between applications and software subsystems; indication of the priorities established by the firm; indication of organisational constraints; details of the technical characteristics of the software products extraneous to the internal adjustment process.

**Output**: detailed program of the intervention, including details of critical paths and milestones which may shift due to external causes. Possible personnel training programs

**e) Change management**: the setting up of a suitable environment and in-course control of modifications of the software undergoing Year 2000 adjustment. This activity requires the definition of "communication standards" between the working groups involved in the operations; it remains active for the entire duration of the project and requires a control level suited to the planned "change rating".

**Input**: each new version, and related state, of each element in the inventory, produced during Year 2000 work.

**Output**: statistical data on the volume of modifications. Information flow to the various working groups together with the details of the modified modules, the version and the related state. Technical traceability by single module.

**f) Modification of software and data**: maintenance of objects, with the level of automation being determined in relation to the degree of linearity contained in the Year 2000 solution selected by the client. Reapplication of the modifications of the objects modified, if necessary for other purposes (e.g. the single currency), during the Year 2000 work.

**Input:** source elements which have passed the software inventory phase and have subsequently undergone change management; results of impact analysis and documental reverse; technical documentation if available; planning of Year 2000 activities.

**Output:** source elements which have been modified, compiled and tested at "unit test" level. Modules for data conversion and data structure modification; if necessary, modules for interfacing between software batches included in the "planning".

**g) Testing:** verification of the environmental requirements and software testing using both "functional equivalence" criteria, and "Year 2000 compliance" criteria. Testing is carried out in an environment which simulates the operating environment.

**Input:** test site; Year 2000 test plan; software objects under maintenance; if necessary, test tools.

**Output:** documented evidence that the software has the same functional capacities as it had before the maintenance was effected, and that it is Year 2000 compliant.

**h) Release:** verification of the environmental requirements and general conditions established in the activity plan; migration into operation of software batches following the planned schedule and procedures.

**Input:** tested software batches, production environments.

**Output:** software batches in operation.

3. In addition to the services related to the methodological steps specified above, the member firms of the Associations are ready to offer the following services:

**a) Certification of maintenance processes:** identifies the quality targets required for the adaptation to the year 2000, defines the reference standards, indicators and criteria for the qualitative measurement of the process and certifies the validity of the process and organisation through constant monitoring.

**Input:** presupposes the availability of any certification of the process to which it refers, the methodologies adopted, planning of the intervention and the organisational levels.

**Output:** certification of the process to which it refers (e.g. software inventory, impact analysis, etc.), continuous reports on the processes under examination, with any required corrective action.

**b) Tools:** a service that uses market research and comparative laboratory studies to identify the automated tools to ensure achievement of time and quality targets identified in the planning phase.

**Input:** automation levels established in the planning phase, results of the market research, pre-established tests.

**Output:** list of suitable tools.

c) **Training:** a service which identifies and carries out training in methodologies, tools and instruments used in Year 2000 activities.

d) **HW Inventory:** identifies the company's electronic equipment, including computers and non-computing equipment (e.g. security systems, personnel access turnstiles, air conditioners, etc.). It assumes that every electronic hardware device, supplied with a programmable chip, may not be Year 2000 compliant.

**Input:** all electronic hardware devices. For electronic computers, firmware, Control Unit hardware containing bootstrap microcode, ROM and BIOS in PCs, etc, are to be included.

**Output:** type of the listed objects, with details of models, suppliers, hardware manufactures and the critical nature of the object in question. List of the individual elementary components, where hardware has been bought separately and then assembled by the company. List of hardware suppliers from whom Year 2000 compliance of the relative equipment is to be requested.

e) **Test sites:** sites for carrying out testing, parallel testing and disaster recovery or contingency plans related to the Year 2000 problem. The sites must have adequate hardware resources (physical and logical CPUs, disc capacity, remote linking facilities, etc.), operating systems (multiple operating systems, TP versions and databases, etc.), software for Year 2000 testing and personnel qualified to carry out the tests. It must be possible to carry out tests in conditions simulating the period leading up to the year 2000, the moment of the date change, and the period after the year 2000.

**Input:** information systems or subsystems, together with their related databases, to be subjected to technical or functional testing. Systems or subsystems to undergo parallel testing for a length of time defined by the user. Disaster recovery plan and contingency plan for cases in which mission critical software could malfunction at the moment of the passage to the year 2000.

**Output:** results of the tests and parallel tests. Backup of databases prior to the year 2000. Activation of the contingency plan and disaster recovery plan, with any required activation of the related recovery procedures (e.g. reconstruction of the damaged database, activation of the original applications not modified for the year 2000, activation of alternative applications and procedures, etc).

4. The Associations have specified the professional profiles of persons who, depending on the methodology cited, can operate in the individual phases of process:

***PROFILE A***

A person with very extensive experience in IT and organisational problem solving. He/she works in a structured project environment characterised by strong technological and/or developmental features, developing organisational solutions and the necessary structures for the project. He/she is responsible for the quality and suitability of products/services chosen, integrated and delivered, in accordance with client requirements.

***PROFILE B***

A person with solid experience in specific areas of IT. He/she works in a limited and structured project environment, or in working processes/activities characterised by considerable autonomy and responsibility; he/she participates in the optimisation of tools and/or activities. He/she is responsible for ensuring that work schedules are respected and that the product/service meets user requirements.

***PROFILE C***

A person with diversified experience in software development and maintenance and in the utilisation of tools/environments. He/she works in a confined and structured project environment or in working processes/activities characterised by autonomous responsibility. He/she is responsible for ensuring that the product/service meets user requirements. He/she works towards productivity targets while conforming to specified technical and qualitative standards.

***PROFILE D***

A person with experience in software development and maintenance. He/she works in a confined and structured project environment. He/she works towards quality targets while conforming to specified technical and qualitative standards.

***PROFILE E***

A person who works in a structured management environment. He/she maintains scheduled commitments, produces quality output while working rapidly.



The professionals described above will work in the individual phases as follows:

<i>Type of service</i>	<i>Professional profiles</i>
HW Inventory	B
SW Inventory	B
Documental reverse	B
Impact analysis	B/A
Intervention planning	A
Change management	A/B/C/D
Software and data modification	A/B/C/D/E
Test sites	A/B/C
Testing	B
Quality certification of maintenance processes	B/C
Tools	
Tools training	B/C
Technical support for release	A/B/C

5. The Associations will invite member firms:

- to develop suitable approaches for facilitating the protection of investments in software that is not planned to be made year 2000 compliant;
- to develop "ad hoc" commercial solutions that take into account the temporary nature of any additional licences needed to create testing environments;
- deactivate protection mechanisms which depend upon system dates (e.g. expiration dates) to enable simulations of the year 2000 date change in testing applications.

6. As regards the question of who should bear the costs of any modifications of software related to the Year 2000 problem, with particular reference to products supported with maintenance services in the broadest sense of term, the Associations are of the opinion that the great variety of existing contractual situations makes it impossible to divide the problem into general categories. Therefore, they are of the opinion that any evaluation of individual cases must involve an analysis of the clauses contained in specific contracts.

## 9. BIBLIOGRAPHY

- [1] D. Bartholomew, *Time's running out*; Internet - <http://www.year2000.com/>.
- [2] P. de Jager, "Doomsday"; *Computer World*, September 1993.
- [3] R.J. Sander; *Frequently Asked Questions About The Year 2000 Computer Crisis*; Internet - <http://www.year2000.com/>.
- [4] Associazione Bancaria Italiana, "*La Banca e il Sistema Informativo: Contratti e Garanzia di Qualità*"; May 1995.
- [5] Gartner Group, *Research Note*; 28 December 1995.

## 10. INDEX OF FIGURES

Fig. 1 Information systems management .....	12
Fig. 2 Survey: Distribution of languages .....	35
Fig. 3 Survey: Programs to be modified .....	35
Fig. 4 Survey: Programs of internal responsibility .....	36
Fig. 5 Survey: Distribution of programs of internal responsibility according to class .....	36
Fig. 6 Code modification costs (Assembler, COBOL and other languages) .....	37
Table 1 Impact of techniques on processes and data .....	28

## 11. ANNEXES

### 11.1 Form for the external area software survey

#### "External areas" software survey

Product form n° .....	Product name = _____
Date ...../...../.....	Completed by: _____

**Description:** .....

.....

Present operating level	ver/rel .....	Last released level	ver/rel ...
Computing System = .....		Operating system = .....	

Is the product expected to be in operation after 1999?     yes     no

#### Information on the product and the related maintenance contract:

Supplier: \_\_\_\_\_ date of purchase ...../...../.....

#### Product:

Customization carried out	<input type="checkbox"/> internally	<input type="checkbox"/> by the supplier
Maintenance	<input type="checkbox"/> the company's responsibility	<input type="checkbox"/> the supplier's responsibility
Source code available	<input type="checkbox"/> yes	<input type="checkbox"/> no
Additional programs implemented	<input type="checkbox"/> by the company	<input type="checkbox"/> by the supplier
User licence	<input type="checkbox"/> for a indefinite period	<input type="checkbox"/> expiry date ...../.../....

#### Maintenance contract :

Is corrective maintenance foreseen ?	<input type="checkbox"/> yes	<input type="checkbox"/> no
Are there precise references to types of errors covered by the contract?	<input type="checkbox"/> yes	<input type="checkbox"/> no
Is developmental maintenance foreseen ?	<input type="checkbox"/> yes	<input type="checkbox"/> no
Is adaptive maintenance foreseen ?	<input type="checkbox"/> yes	<input type="checkbox"/> no
Is cancellation of the contract by the supplier foreseen ?	<input type="checkbox"/> yes	<input type="checkbox"/> no
Is maintenance foreseen for the current version only?	<input type="checkbox"/> yes	<input type="checkbox"/> no

## 11.2 Form for the information systems survey

### Information systems survey

Product form n° .....	Application area:
Date .../.../.....	Completed by:

**Description:**

.....  
 .....

Year of release		Year of last revision		Computing system		Operating system	
-----------------	--	-----------------------	--	------------------	--	------------------	--

**General information:**

Will the application be in operation after 1999?	yes <input type="checkbox"/>	no <input type="checkbox"/>
Is an overhaul foreseen within the next two years?	yes <input type="checkbox"/>	no <input type="checkbox"/>
Is it year 2000 compliant?	yes <input type="checkbox"/>	no <input type="checkbox"/>
Are there any stored files subject to legal constraints?	yes <input type="checkbox"/>	no <input type="checkbox"/>
Are there any files with historical series?	yes <input type="checkbox"/>	no <input type="checkbox"/>
Are all-purpose routines for dates utilised?	yes <input type="checkbox"/>	no <input type="checkbox"/>

**Size information on the application:**

Number of programs	on-line	batch	video-form	print-outs
Percentage distribution of languages used	COBOL	Assembler	Other languages	
Number of internal files in the application	relational	hierarchical	index	sequential
Number of files shared with other applications	relational	hierarchical	index	sequential

**Files accessed by "end user computing":**

Name of the file	User	Access	
		Direct	Use of extract

**Links to other internal procedures:**

File	Procedure	Access mode

**External links:**

File	Entity	Input/Output

### 11.3 Pro forma letter to suppliers for product compliance

Company Name  
XXXXXX Road  
ZZZZZZZZZZ

Dear Sirs,

Subject: Year 2000 compliance of software products.

We would like to inform you that we need to know the Year 2000 compliance status of the software products marketed by your company, particularly those currently used by us (see attached form).

Should products listed in the attached form not be capable of managing the year 2000 properly, we would ask your company to supply the following information for each product:

- the version which will ensure Year 2000 compliance;
- the date of availability and any necessary prerequisites for its use;
- the procedure for migrating to the new version.

Should you have any queries, please do not hesitate to contact us. Thanking you in advance for your kind reply, we remain

Yours faithfully,

## 11.4 The time-windowing method

### 11.4.1 Fixed windowing

The fixed algorithm uses a "BASE YEAR" to establish the lower boundary of the time window, straddling the 20th and 21st centuries.

#### A) VARIABLES

SYSTEM YEAR: CCYY  
YEAR UNDER EXAMINATION: AA  
BASE YEAR: BLL  
where LL = lower boundary of the time window  
RESULT: XXAA  
where XX= reference millennium

#### B) ALGORITHM

1) identifying the reference millennium

if AA < LL then XX = 20  
if AA = LL then XX = 19  
if AA > LL then XX = 19

#### C) EXAMPLE

SYSTEM YEAR : 1996  
BASE YEAR: 1966  
YEAR UNDER EXAMINATION: 75  
RESULT: 1975

### 11.4.2 Mobile windowing

The mobile windowing algorithm uses a parameter (PP = number of years) to be subtracted from the system year (date on which the processing is carried out) to establish the lower boundary of the time window (BASE YEAR).

#### A) VARIABLES



PARAMETER: PP  
 SYSTEM YEAR: CCYY  
 YEAR UNDER EXAMINATION: AA  
 BASE YEAR: BLL  
           where LL = lower boundary of the time window  
 RESULT: XXAA  
           where XX = reference millennium

## **B) ALGORITHM**

1) calculation of the BASE YEAR

$$BLL = CCYY - PP$$

2) comparison of the year under examination with the boundary of the time window:

$$AA < LL ?$$

$$AA = LL ?$$

$$AA > LL ?$$

3) establishing the reference millennium

$$\text{if } AA < LL \text{ then } XX = BB + 1$$

$$\text{if } AA = LL \text{ then } XX = BB$$

$$\text{if } AA > LL \text{ then } XX = BB$$

## **C) EXAMPLE**

PARAMETER: 30  
 SYSTEM YEAR: 1996

1) calculation of the BASE YEAR

$$CCYY - PP = BLL$$

$$1996 - 30 = 1966$$

2) comparison of the year under examination with the boundary of the time window:

$$AA < 66 ?$$

$$AA = 66 ?$$

AA > 66 ?

3) establishing the reference millennium

if AA < 66 then XX = BB + 1 i.e. XX = 20

if AA = 66 then XX = BB i.e. XX = 19

if AA > 66 then XX = BB i.e. XX = 19.

### 11.4.3 The characteristics of windowing

#### Fixed windowing

Can only handle one hundred years straddling the 20th and 21st centuries; it does not allow the definition of an admissibility rule for dates (ante-period and post-period). For each year the ante- and post-periods change by one year, with the former increasing and the latter decreasing.

When consulting historical files the base year (if changed) used by the "windowing" on the date the file was created must be taken into account.

#### Mobile windowing

Allows an admissibility rule for dates to be established in relation to the system date. This specific characteristic of the mobile "windowing" is considered important.

If, for example, the PP parameter is set at 30, that means that the admissible dates cannot be more than 30 years prior to the system date or more than 69 years after the system date.

When consulting historical files, in order to recheck the admissibility rule for dates, one must take care to substitute the system date with an external parameter equal to the creation date of the file itself.

## 11.5 Questionnaire

### The Year 2000 Problem

The CIPA "Year 2000" working group is conducting a survey to identify the scope and extent of the problems that the banking system will have to solve in order to handle the passage to the new millennium.

Accordingly, you are kindly requested to complete the attached form as indicated in the following instructions:

#### Section 1

- ⇒ the information refers to applications programs, the technical modifications of which are carried out at the initiative (responsibility) of the company. This therefore excludes applications packages purchased from vendors the technical modifications of which are carried out at the initiative (responsibility) of suppliers and programs managed by consortial centres and similar bodies;
- ⇒ the estimates must be supplied taking into account all the computing platforms available within the firm;
- ⇒ the value indicated under point C refers to the sum of all programs belonging to applications affected by the date change in relation to the total number of programs indicated under point A;
- ⇒ the values to be indicated under point D refer to the programs affected by the date change as specified under point C.

#### Section 2

- ⇒ compare the data given in section 1 with the entire applications portfolio of the firm, including application packages.

**ABI code of respondent bank**

--	--	--	--	--	--	--	--

#### **Section 1**

A) Number of programs	<table border="1"><tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr></table>								
B) Number of lines of code (thousands)	<table border="1"><tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr></table>								
C) Programs affected by the date change (%)	<table border="1"><tr><td> </td><td> </td><td> </td><td> </td></tr></table>								
D) Program distribution according to language used:									
• COBOL (%)	<table border="1"><tr><td> </td><td> </td><td> </td><td> </td></tr></table>								
• ASSEMBLER (%)	<table border="1"><tr><td> </td><td> </td><td> </td><td> </td></tr></table>								
• OTHER (%)	<table border="1"><tr><td> </td><td> </td><td> </td><td> </td></tr></table>								

**Section 2**

Please indicate the percentage of the bank's total applications portfolio represented by the programs indicated under point A in section 1

## 11.6 List of interbank procedures

- |  |  |
|--|--|
| 1. AGENTE UTENTE (AUM, AUF, AUT)       | 24. LIQUIDAZIONE TITOLI  |
| 2. ANAGRAFICHE PROCEDURALI             | 25. MEMORANDUM   |
| 3. ARCHIVIO PIAZZE BANCARIE            | 26. MESSAGGI SITRAD [Giri tra banche, BONIFICI (msg. 001), INCASSI (msg. 011), Documentate, MESSAGGI LIBERI (msg. 097, 098 e 100)] |
| 4. ASTE TELEMATICHE                    | 27. MID  |
| 5. BANCOMAT                            | 28. MIF MTO  |
| 6. BI-REL                              | 29. MONTE TITOLI   |
| 7. BONIFICI ESTERI e ACH               | 30. MTS  |
| 8. BONIFICI IMPORTO NON RILEVANTE      | 31. NUMERO VERDE   |
| 9. BONIFICI IMPORTO RILEVANTE          | 32. NUOVA CENTRALE DEI RISCHI  |
| 10. CAB                                | 33. RILEVAZIONE ONERI INTERBANCARI   |
| 11. CASSA COMPENSAZIONE E GARANZIA     | 34. P.O.S.   |
| 12. CAT                                | 35. QUADRATURE FRA CENTRI APPLICATIVI  |
| 13. CED BORSA                          | 36. RAC  |
| 14. CHECK TRUNCATION                   | 37. RECAPITI LOCALE  |
| 15. COMPENSAZIONE GIORNALIERA RECAPITI | 38. RISERVA OBBLIGATORIA   |
| 16. CONTO FISCALE / CNC                | 39. SEGNALAZIONI SALDI (fra Centri e SIA)  |
| 17. CORPORATE BANKING (interbancario)  | 40. SETIF  |
| 18. DECADALI                           | 41. SIPS (Giri e Cambi)  |
| 19. DISPOSIZIONI DI PORTAFOLIO         | 42. SMTS   |
| 20. EAS                                | 43. TESORERIA  |
| 21. ESITO ELETTRONICO                  | 44. UIC  |
| 22. EUROCHEQUE                         |  |
| 23. INCASSI COMMERCIALI INTERBANCARI   |  |

### Legend for the values of the column "Controllo" in the following tables:

1. carry out formal checks on the significant dates in order to accept the value "00" in the year position leaving verification of the validity of the dates in their entirety to the applications;
2. employ the "mobile windowing" technique to identify the reference century using a 30-year parameter.

**note 1:** if the year is between 00 and 79 the first two digits are '20'; if the year is between 80 and 99 the first two digits are '19'.

**note 2:** the year field is not increased to 4 characters because it refers to the algorithm for computing the fiscal code which is currently represented by two characters.

AGENTE UTENTE (AUM, AUF, AUT)						
MSW/TR		FT		Formato	Descrizione	Controllo
IDC	Sotto campo	Tipo Record	POS			
L'applicativo "Agente Utente", essendo prevista l'attivazione generalizzata dell'EAS, verrà meno all'approssimarsi dell'anno 2000.						
ANAGRAFICHE PROCEDURALI						
MSW/TR		FT		Formato	Descrizione	Controllo
IDC	Sotto campo	Tipo Record	POS			
031				GGMMAA	data di riferimento	1,2
482				GGMMAA	data richiesta	1,2
		AP0	14	GGMMAAAA	data versione	
		AP9	14	GGMMAAAA	data versione	
		AP9	34	GGMMAA	data creazione file	1,2
		AP9	115	GGMMAA	timbro applicativo	1,2
		AP1 BCM	79	GGMMAAAA	data blocco	
		AP1 BCM	87	GGMMAAAA	data recesso	
		AP1 BON	9	GGMMAAAA	data attivazione	
		AP1 BON	17	GGMMAAAA	data recesso	
		AP1 BON	41	GGMMAAAA	data adesione circuito veloce	
		AP1 CTR	14	GGMMAAAA	data decorrenza	
		AP1 CTR	22	GGMMAAAA	data recesso	
		AP1 DIP	14	GGMMAAAA	data decorrenza	
		AP1 DIP	22	GGMMAAAA	data recesso	
		AP1 DOC.	9	GGMMAAAA	data adesione	
		AP1 DOC.	17	GGMMAAAA	data recesso	
		AP1 GIRIB	9	GGMMAAAA	data adesione	
		AP1 GIRIB	17	GGMMAAAA	data recesso	
		AP1 GIR	9	GGMMAAAA	data adesione	
		AP1 GIR	17	GGMMAAAA	data recesso	
		AP1 ICI	9	GGMMAAAA	data decorrenza	
		AP1 ICI	22	GGMMAAAA	data decorrenza T. O. attuale	
		AP1 ICI	35	GGMMAAAA	data attivazione RI.BA.	
		AP1 ICI	43	GGMMAAAA	data attivazione RID	
		AP1 ICI	75	GGMMAAAA	data attivazione EDI	
		AP1 ICI	83	GGMMAAAA	data attivazione MAV	
		AP1 ICI	99	GGMMAAAA	data recesso	
		AP1 ICI	107	GGMMAAAA	data recesso EDI	
		AP1 MEL	9	GGMMAAAA	data adesione	
		AP1 MEL	17	GGMMAAAA	data recesso	
		AP1 OPR	9	GGMMAAAA	data adesione	
		AP1 OPR	17	GGMMAAAA	data recesso	
		AP1 BIR	9	GGMMAAAA	data attivazione	
		AP1 BIR	17	GGMMAAAA	data recesso	
		AP1 SIPS	19	GGMMAAAA	data attivazione banca aderente	
		AP1 SIPS	27	GGMMAAAA	data recesso	
		AP1 SMTS	9	GGMMAAAA	data decorrenza adesione	
		AP1 SMTS	17	GGMMAAAA	data recesso	
		AP1 SMTS	34	GGMMAAAA	data attiv. applic./scambio chiavi 1	
		AP1 SMTS	47	GGMMAAAA	data attiv. applic./scambio chiavi 2	
		AP1 SMTS	60	GGMMAAAA	data attiv. applic./scambio chiavi 3	
		AP1 SMTS	73	GGMMAAAA	data attiv. applic./scambio chiavi 4	

		API SMTS	86	GGMMAAAA	data attiv. applic./scambio chiavi 5	
		API SMTS	99	GGMMAAAA	data attiv. applic./scambio chiavi 6	
		API SMTS	112	GGMMAAAA	data attiv. applic./scambio chiavi 7	

**A.PI.BA. (Archivio Piazze Bancarie)**

MSW/TR		FT		Formato	Descrizione	Controllo
IDC	Sotto campo	Tipo Record	POS			
Tutte le date sono espresse su 6 caratteri				GGMMAA		1,2

**ASTA TELEMATICA - ASTABOT**

MSW/TR		FT		Formato	Descrizione	Controllo
IDC	Sotto campo	Tipo Record	POS			
031				GGMMAA	data di riferimento operazione	1,2
6C2				GGMMAAAA	durata del prestito	
6C4				GGMMAAAA	dati del collocamento	
6C5				GGMMAAAA	dati generali	
600				GGMMAA	data di regolamento	1,2

**ASTA TELEMATICA -COLLOCAMENTO TITOLI DI STATO A MEDIO E LUNGO TERMINE  
MEDIANTE ASTA**

MSW/TR		FT		Formato	Descrizione	Controllo
IDC	Sotto campo	Tipo Record	POS			
031				GGMMAA	data riferimento operazione	1,2
6C2				GGMMAAAA	data emissione data rimborso	
6C3				GGMMAAAA	termini per rimborso anticipato	
6C4				GGMMAAAA	dati del collocamento	
6C5				GGMMAAAA	dati generali	
600				GGMMAA	data di regolamento	1,2

**BANCOMAT**

MSW/TR		FT		Formato	Descrizione	Controllo
IDC	Sotto campo	Tipo Record	POS			
031				GGMMAA	data di riferimento	1,2
205				GGMMAA	data rich. autorizzazione	1,2
221				GGMMAA	data rinnovo disponibilità	1,2
206				GGMMAA	data risposta autorizzazione	1,2
221				GGMMAA	data scadenza carta	nota 1
222				GGMMAA	data emissione carta	nota 1
038				GGMMAA	data di nascita	1
204				GGMMAA	data validità PKC	1,2
215				GGMMAA	data validità AP	1,2
200				GGMMAA	data emissione carta	nota 1
200				GGMMAA	data scadenza carta	nota 1
201				GGMMAA	data inizio periodo ATM	1,2
202				GGMMAA	data inizio periodo POS	1,2
203				GGMMAA	data validità CCS	1,2
241				GGMMAA	data blocco banca	nota 1
206				GGMMAA	data risposta autorizzazione	1,2
214				GGMMAA	data validità Key pubblica	1,2
214				GGMMAA	data validità interbancaria	1,2
		A70	13	GGMMAA	data transazione	1,2

		A71	13	GGMMAA	data transazione	1,2
			55	AAMM	data scadenza carta	nota 1
			63	GGMMAA	data rinnovo disponibilità periodo	1,2
			79	GGMMAA	data ultima transazione effettuata	1,2
			93	GGMMAA	data emissione carta	nota 1
		A72	13	GGMMAA	data transazione	1,2
			44	AAGGG	inizio periodo	1,2
			69	GGMMAA	data ultima operazione	1,2
		A73	13	GGMMAA	data transazione	1,2
		A20	13	GGMMAA	data transazione	1,2
		A21	13	GGMMAA	data transazione	1,2
		A97	13	GGMMAA	data transazione	1,2
		A93	13	GGMMAA	data transazione	1,2
		A94	13	GGMMAA	data transazione	1,2
		A22	13	GGMMAA	data transazione	1,2
		A02	13	GGMMAA	data transazione	1,2
		A03	13	GGMMAA	data transazione	1,2
		A18	13	GGMMAA	data transazione	1,2
		A19	13	GGMMAA	data transazione	1,2
		A90	13	GGMMAA	data transazione	1,2
		A91	13	GGMMAA	data transazione	1,2
		A04	13	GGMMAA	data transazione	1,2
		A05	13	GGMMAA	data transazione	1,2
		A00	13	GGMMAA	data transazione	1,2
		A01	13	GGMMAA	data transazione	1,2
		A16	13	GGMMAA	data transazione	1,2
		A17	13	GGMMAA	data transazione	1,2
		A12	13	GGMMAA	data transazione	1,2
		A13	13	GGMMAA	data transazione	1,2
		A14	13	GGMMAA	data transazione	1,2
		A15	13	GGMMAA	data transazione	1,2
		A06	13	GGMMAA	data transazione	1,2
		A07	13	GGMMAA	data transazione	1,2
		A08	13	GGMMAA	data transazione	1,2
		A09	13	GGMMAA	data transazione	1,2
		A10	13	GGMMAA	data transazione	1,2
		A11	13	GGMMAA	data transazione	1,2
		A36	13	GGMMAA	data transazione	1,2
		A37	13	GGMMAA	data transazione	1,2
		A38	13	GGMMAA	data transazione	1,2
		A39	13	GGMMAA	data transazione	1,2
		3 <sup>a</sup> traccia BCM	37	AGGG	data inizio del periodo di prelievo	
			57	AAMM	data scadenza carta	nota 1
			98	AAGGG	data di emissione della carta	nota 1

**BI - REL**

MSW/TR		FT		Formato	Descrizione	Controllo
IDC	Sotto campo	Tipo Record	POS			
61K				GGMMAAAA	data di regolamento	
60W				GGMMAAAA	data valuta	
64E				GGMMAAAA	testata del movimento	
D31				GGMMAAAA	data riferimento operazione	
61L				GGMMAAAA	data messaggio da ritrasmettere	

**BONIFICI ESTERI ED ACH**



MSWTR		FT		Formato	Descrizione	Controllo
IDC	Sotto campo	Tipo Record	POS			
D28				GGMAAA	data ordine	1,2
031				GGMAAA	data riferimento	1,2
032				GGMAAA	data valuta	1,2
033				GGMAAA	data valuta destinatario	1,2
066				GGMAAA	data regolamento originaria	1,2
172				GGMAAA	data riferimento del cambio	1,2
360				GGMAAA	timbro ricezione ordine	1,2
362	1			GGMAAA	timbro ricezione	1,2
365				GGMAAA	data regolamento stanza	1,2

**BONIFICI IMPORTO NON RILEVANTE**

MSW/TR		FT		Formato	Descrizione	Controllo
IDC	Sotto campo	Tipo Record	POS			
D28				GGMAAA	data ordine	1,2
D32				GGMAAA	data valuta originaria	1,2
D33				GGMAAA	data valuta destinatario origin.	1,2
D65				GGMAAA	data regolamento richiesta	1,2
F02	3			GGMAAA	totali file transfer (1 spezzone)	1,2
031				GGMAAA	data riferimento	1,2
032				GGMAAA	data valuta	1,2
033				GGMAAA	data valuta destinatario	1,2
066				GGMAAA	data regolamento originaria	1,2
112				GGMAAA	data inizio emergenza	1,2
113				GGMAAA	data decorrenza pagamento	1,2
114				GGMAAA	timbro immissione msg in rete	1,2
152				GGMAAA	data creazione file	1,2
172				GGMAAA	data riferimento cambio	1,2
360				GGMAAA	timbro ricezione ordine	1,2
362				GGMAAA	timbro ricezione	1,2
365				GGMAAA	data regolamento	1,2
		515	14	GGMAAA	data creazione file	1,2
		520	70	GGMAAA	data valuta	1,2
		520	76	GGMAAA	data regolamento richiesta	1,2
		520	82	GGMAAA	data ordine	1,2
		520	88	GGMAAA	data valuta destinatario	1,2
		520	94	GGMAAA	data riferimento	1,2
		520	302	GGMAAA	data regolamento	1,2
		520	320	GGMAAA	data regolamento originaria	1,2
		520	351	GGMAAA	data inizio emergenza	1,2
		520	360	GGMAAA	timbro immissione in rete	1,2
		523	54	GGMAAA	data riferimento	1,2
		523	354	GGMAAA	timbro immissione in rete	1,2
		524	58	GGMAAA	data riferimento	1,2
		524	75	GGMAAA	data valuta	1,2
		524	81	GGMAAA	data regolamento richiesta	1,2
		524	87	GGMAAA	data regolamento	1,2
		524	141	GGMAAA	data creazione file	1,2
		525	30	GGMAAA	data riferimento del cambio	1,2
		528	70	GGMAAA	data valuta	1,2
		528	76	GGMAAA	data regolamento richiesta	1,2
		528	82	GGMAAA	data valuta destinatario	1,2

		528	88	GGMMAA	data riferimento	1,2
		528	126	GGMMAA	data riferimento del cambio	1,2
		528	159	GGMMAA	data regolamento originaria	1,2
		528	165	GGMMAA	data ordine	1,2
		528	171	GGMMAA	timbro ricezione ordine	1,2
		529	184	GGMMAA	data inizio emergenza	1,2
		599	14	GGMMAA	data creazione file	1,2
<b>BONIFICI IMPORTO RILEVANTE</b>						
MSW/TR		FT		Formato	Descrizione	Controllo
IDC	Sotto campo	Tipo Record	POS			
D28				GGMMAA	data ordine	1,2
D65				GGMMAA	data regolamento richiesta	1,2
031				GGMMAA	data riferimento	1,2
032				GGMMAA	data valuta	1,2
033				GGMMAA	data valuta destinatario	1,2
066				GGMMAA	data regolamento originaria	1,2
309	2			GGMMAA	data limiti di esposizione	1,2
310	2			GGMMAA	valori limiti di esposizione	1,2
311	2			GGMMAA	valori disponibilita'	1,2
316	4			GGMMAA	dati preavvisi non confermati	1,2
360				GGMMAA	timbro ricezione ordine	1,2
362	1			GGMMAA	timbro ricezione	1,2
364	1			GGMMAA	timbo ricezione preavviso	1,2
365				GGMMAA	data regolamento stanza	1,2
<b>CAB</b>						
MSW/TR		FT		Formato	Descrizione	Controllo
IDC	Sotto campo	Tipo Record	POS			
031				GGMMAA	data di riferimento	1,2
087				GGMMAA	data attivazione sportello	1,2
088				GGMMAA	data cessazione sportello	1,2
		01 TESTA	013	GGMMAA	data di riferimento	1,2
		39 CODA	013	GGMMAA	data di riferimento	1,2
		31 DETT.	064	GGMMAA	data attivazione	1,2
		31 DETT.	070	GGMMAA	data cessazione	1,2
<b>CASSA COMPENSAZIONE E GARANZIA</b>						
MSW/TR		FT		Formato	Descrizione	Controllo
IDC	Sotto campo	Tipo Record	POS			
031				GGMMAA	data riferimento	1,2
032				GGMMAA	data scadenza Pagamento	1,2
D31				GGMMAAAA	data liquidazione	
631	2			GGMMAAAA	liquidazione	
<b>CONTO ACCENTRATO IN TITOLI</b>						
MSW/TR		FT		Formato	Descrizione	Controllo
IDC	Sotto campo	Tipo Record	POS			
031				GGMMAA	data riferimento operazione	1,2
600				GGMMAA	data riferimento movimentazione	1,2
<b>CED Borsa</b>						
MSW/TR		FT		Formato	Descrizione	Controllo
IDC	Sotto campo	Tipo Record	POS			

IDC	Sotto campo	Tipo Record	POS			
031				GGMMAA	data riferimento	1,2
G13				AAAAMMGG	data eseguito	
G16				AAAAMMGG	data scadenza	
G37				AAAAMMGG	data risposta premio	
G42				AAAAMMGG	data scadenza termine PTE	
G51				GGMM	data riferimento ordine	
G59	1,2,3			GGMMAAAA	date richieste	
		11	20	AAAAMMGG	data immissione	
		12	158	AAAAMMGG	data eseguito	
		12	158	MMGG	data eseguito	
		12	166	AAAAMMGG	data scadenza	
		12	174	AAAAMMGG	data risposta premio	
		12	241	GGMM	data riferimento ordine	
		12	334	AAAAMMGG	data scadenza termine PTE	
		19	20	AAAAMMGG	data immissione	
		21	20	AAAAMMGG	data immissione	
		22	11	GGMMAAAA	data sistema	
		29	20	AAAAMMGG	data immissione	
		01	38	AAAAMMGG	data richiesta	
		03	10	AAAAMMGG	data scadenza	
		03	18	AAAAMMGG	data eseguito	
		03	32	AAAAMMGG	data contabile	
		03	40	AAAAMMGG	data risposta premio	
		04	43	AAAAMMGG	data contabile oper. orig.	
		04	51	AAAAMMGG	data eseguito oper. orig.	
		04	65	AAAAMMGG	data contabile premio acceso	
		04	79	AAAAMMGG	data contabile rip. acceso	
		04	87	AAAAMMGG	data estinzione massima	
		08	112	AAAAMMGG	data riferimento ordine	
<b>CHECK-TRUNCATION</b>						
MSW/TR		FT		Formato	Descrizione	Controllo
IDC	Sotto campo	Tipo Record	POS			
031				GGMMAA	data riferimento	1,2
066				GGMMAA	data regolamento originaria	1,2
069	5			GGMMA	data emissione dell'assegno	
100	2			GGMMAA	file errato	1,2
362	1			GGMMAA	timbro applicativo	1,2
365				GGMMAA	data regolamento stanza	1,2
		70	14	GGMMAA	data riferimento	1,2
		71	65	GGMMA	data emissione dell'assegno	
		80	14	GGMMAA	data riferimento	1,2
		80	26	GGMMAA	data regolamento stanza	1,2
		81	65	GGMMA	data emissione dell'assegno	
		82	75	GGMMAA	giornata applicativa	1,2
<b>COMPENSAZIONE GIORNALIERA RECAPITI</b>						
MSW/TR		FT		Formato	Descrizione	Controllo
IDC	Sotto campo	Tipo Record	POS			
031				GGMMAA	data riferimento operazione	1,2
325				GGMMAA	data saldi (valuta)	1,2

365				GGMMAA	data regolamento	1,2
<b>CONTO FISCALE / CNC</b>						
MSW/TR		FT		Formato	Descrizione	Controllo
IDC	Sotto campo	Tipo Record	POS			
031				GGMMAA	data riferimento	1,2
152				GGMMAA	data creazione file	1,2
362	1			GGMMAA	timbro applicativo	1,2
479	1			GGMMAA	evidenza totali (data creazione file)	1,2
		CF1	14	GGMMAA	data creazione file	1,2
		CF1	40	GGMMAA	data scadenza	1,2
		CF9	14	GGMMAA	data creazione file	1,2
		CF9	40	GGMMAA	data scadenza	1,2
		CF2	68	GGMMAA	data accreditamento	1,2
		CF3	26	GGMMAA	data delega	1,2
		CF3	63	GGMMAA	tabella tributi	1,2
				00MMAA		1,2
				00AAAA		
				0000AA		1,2
		CF4	66	GGMMAA	data nascita	1, nota 2
		CF6	68	GGMMAA	data accreditamento	1,2
		CF6	90	GGMMAA	accredito riferimento	1,2
<b>CORPORATE BANKING (interbancario)</b>						
MSW/TR		FT		Formato	Descrizione	Controllo
IDC	Sotto campo	Tipo Record	POS			
		CN	14	GGMMAA	data creazione flusso	1,2
		EF	14	GGMMAA	data creazione flusso	1,2
		EF	42	GGMMAA	data creazione originaria	1,2
		EF	115	GGMMAA	giornata applicativa	1,2
		IB	14	GGMMAA	data creazione flusso	1,2
		IM	14	GGMMAA	data creazione flusso	1,2
		IR	14	GGMMAA	data creazione flusso	1,2
		H1	68	AAAAMMGG	data creazione disposizione	
		H1	82	AAAAMMGG	data esecuzione disposizione	
		H1	82	AAAAMMGG	data valuta debitore	
		PC	14	GGMMAA	data creazione flusso	1,2
		PE	14	GGMMAA	data creazione flusso	1,2
		P8	34	AAAAMMGG	data creazione documento	
		P9	20	AAAAMMGG	data conTipo Record	
		P9	28	AAAAMMGG	data sdoganamento	
		RA	14	GGMMAA	data creazione flusso	1,2
		RH	15	GGMMAA	data creazione flusso	1,2
		SL	14	GGMMAA	data creazione flusso	1,2
		10	11	GGMMAA	data creazione flusso	1,2
		10	17	GGMMAA	data valuta	1,2
		10	17	GGMMAA	data limite di pagamento	1,2
		10	17	GGMMAA	data esecuzione disposizione	1,2
		10	23	GGMMAA	data valuta destinatario	1,2
		14	23	GGMMAA	data pagamento	1,2
		50	96	GGMMAA	data valuta di addebito	1,2
		51	66	GGMMAA	data autorizzazione Int.za Finanza	1
		51	92	GGMMAA	data valuta di addebito	1,2
		51	110	GGMMAA	data effettiva di pagamento	1,2

		61	78	GGMAAA	data contabile	1,2
		62	14	GGMAAA	data valuta	1,2
		62	14	GGMAAA	data accensione pratica	1,2
		62	20	GGMAAA	data registrazione contabile	1,2
		62	20	GGMAAA	data scadenza pratica	1,2
		62	34	GGMAAA	data scadenza tasso	1,2
		63	26	GGMAAA	data valuta	1,2
		63	32	GGMAAA	data registrazione contabile	1,2
		64	14	GGMAAA	data contabile	1,2
		65	11	GGMAAA	data liquidita'	1,2
		65	14	GGMAAA	data contabile	1,2
		65	33	GGMAAA	data liquidita'	1,2
		65	55	GGMAAA	data liquidita'	1,2
		65	77	GGMAAA	data liquidita'	1,2
		65	99	GGMAAA	data liquidita'	1,2

#### DECADALI

MSW/TR		FT		Formato	Descrizione	Controllo
IDC	Sotto campo	Tipo Record	POS			
031				GGMAAA	data riferimento	1,2
698				GGMMAAAA	data segnalazione	

#### DISPOSIZIONI DI PORTAFOGLIO

MSW/TR		FT		Formato	Descrizione	Controllo
IDC	Sotto campo	Tipo Record	POS			
031				GGMAAA	data di riferimento	1,2
D55				GGMAAA	nuova scadenza	1,2
123	4			GGMAAA	evidenze portafoglio	1,2
134				GGMAAA	data rimessa	1,2
155				GGMAAA	data scadenza	1,2
362	1			GGMAAA	timbro ricezione	1,2

#### EAS

MSW/TR		FT		Formato	Descrizione	Controllo
IDC	Sotto campo	Tipo Record	POS			

Tutte le date sono nel formato UTCTime (AAMMGGHHMMSS Delta con l'ora di Greenwich). Ove necessario sono applicabili i controlli 1 e 2.

#### ESITO ELETTRONICO ASSEGNO

MSW/TR		FT		Formato	Descrizione	Controllo
IDC	Sotto campo	Tipo Record	POS			
031				GGMAAA	data di riferimento	1,2
066				GGMAAA	data regolamento originaria	1,2
365				GGMAAA	data regolamento	1,2
D65				GGMAAA	data regolamento richiesta	1,2
362	1			GGMAAA	timbro ricezione	1,2

#### EUROCHEQUE

MSW/TR		FT		Formato	Descrizione	Controllo
IDC	Sotto campo	Tipo Record	POS			

031				GGMAAA	data di riferimento	1,2
Z02				AAMM	dati di 2 <sup>a</sup> traccia (data di scadenza)	nota 1
038				GGMAAA	data di nascita	1
Z65				GGMAAA	dati operatività carta (data inizio valid.)	nota 1
INCASSI COMMERCIALI INTERBANCARI						
MSW/TR		FT		Formato	Descrizione	Controllo
IDC	Sotto campo	Tipo Record	POS			
D65				GGMAAA	data regolamento richiesta	1,2
031				GGMAAA	data riferimento	1,2
032				GGMAAA	data valuta	1,2
066				GGMAAA	data regolamento originaria	1,2
112				GGMAAA	data inizio emergenza	1,2
146	4			GGMAAA	data autorizzazione int.za Finanza	1
152				GGMAAA	data creazione file	1,2
153				GGMAAA	data di pagamento	1,2
154				GGMAAA	data limite di pagamento	1,2
155				GGMAAA	data scadenza	1,2
172				GGMAAA	data riferimento cambio	1,2
365				GGMAAA	data regolamento stanza	1,2
		420	14	GGMAAA	data creazione file	1,2
		421	171	GGMAAA	data autorizzazione int.za Finanza	1
		421	203	GGMAAA	data valuta	1,2
		421	210	GGMAAA	data limite di pagamento	1,2
		421	216	GGMAAA	data scadenza	1,2
		421	222	GGMAAA	data regolamento	1,2
		421	363	GGMAAA	data riferimento	1,2
		421	385	GGMAAA	data regolamento richiesta	1,2
		430	28	GGMAAA	data riferimento	1,2
		430	72	GGMAAA	data valuta	1,2
		430	78	GGMAAA	data scadenza	1,2
		430	142	GGMAAA	data riferimento cambio	1,2
		430	148	GGMAAA	data di pagamento	1,2
		430	154	GGMAAA	data limite di pagamento	1,2
		430	166	GGMAAA	data regolamento richiesta	1,2
		430	173	GGMAAA	data inizio emergenza	1,2
		431	28	GGMAAA	data riferimento	1,2
		431	72	GGMAAA	data valuta	1,2
		431	78	GGMAAA	data scadenza	1,2
		431	142	GGMAAA	data riferimento cambio	1,2
		431	148	GGMAAA	data limite di pagamento	1,2
		431	154	GGMAAA	data pagamento	1,2
		431	177	GGMAAA	data regolamento	1,2
		431	184	GGMAAA	data regolamento richiesta	1,2
		431	190	GGMAAA	data inizio emergenza	1,2
		438	283	GGMAAA	data riferimento cambio	1,2
		443	75	GGMAAA	data di pagamento	1,2
		443	81	GGMAAA	data valuta	1,2
		443	88	GGMAAA	data regolamento	1,2
		443	94	GGMAAA	data scadenza	1,2
		443	132	GGMAAA	data riferimento	1,2
		443	258	GGMAAA	data riferimento cambio	1,2
		443	275	GGMAAA	data limite pagamento	1,2
		443	281	GGMAAA	data regolamento richiesta	1,2

		443	287	GGMAAA	data inizio emergenza	1,2
		445	77	GGMAAA	data valuta	1,2
		445	84	GGMAAA	data regolamento	1,2
		445	90	GGMAAA	data limite di pagamento	1,2
		445	96	GGMAAA	data scadenza	1,2
		445	237	GGMAAA	data di riferimento	1,2
		445	263	GGMAAA	data riferimento cambio	1,2
		445	269	GGMAAA	data regolamento originaria	1,2
		445	285	GGMAAA	data regolamento richiesta	1,2
		445	291	GGMAAA	data inizio emergenza	1,2
		447	52	GGMAAA	data di riferimento	1,2
		449	14	GGMAAA	data creazione file	1,2
		449	395	GGMAAA	timbro applicativo	1,2

**LIQUIDAZIONE TITOLI**

MSW/TR		FT		Formato	Descrizione	Controllo
IDC	Sotto campo	Tipo Record	POS			
031				GGMAAA	data di riferimento operazione	1,2
631				GGMMAAAA	data liquidazione	
659				GGMAAA	data inizio - data fine - Aderente	1,2
628				GGMAAA	data inizio - data fine titolo	1,2

**MEMORANDUM**

MSW/TR		FT		Formato	Descrizione	Controllo
IDC	Sotto campo	Tipo Record	POS			
031				GGMAAA	data riferimento	1,2
365				GGMAAA	data regolamento	1,2

**MESSAGGI SITRAD**

MSW/TR		FT		Formato	Descrizione	Controllo
IDC	Sotto campo	Tipo Record	POS			
031				GGMAAA	data riferimento	1,2
032				GGMAAA	data valuta	1,2
033				GGMAAA	data valuta destinatario	1,2
197				GGMAAA	data riferimento originaria	1,2
362	1			GGMAAA	data consegna messaggio	1,2

**MID**

MSW/TR		FT		Formato	Descrizione	Controllo
IDC	Sotto campo	Tipo Record	POS			
031				GGMAAA	data di riferimento	1,2
197				GGMAAA	data di riferimento originaria	1,2
378				GGMAAA	data prestito	1,2
379				GGMAAA	data rimborso	1,2
062					all'interno si trova:	1,2
				GGMAAA	data di riferimento originaria	1,2
				GGMAAA	data prestito	1,2
				GGMAAA	data rimborso	1,2

**MIF**

MSW/TR		FT		Formato	Descrizione	Controllo
IDC	Sotto campo	Tipo Record	POS			
Tutte le date hanno l'indicazione dell'anno su 4 posizioni.						
<b>MTO</b>						
MSW/TR		FT		Formato	Descrizione	Controllo
IDC	Sotto campo	Tipo Record	POS			
Tutte le date hanno l'indicazione dell'anno su 4 posizioni.						
<b>MONTE TITOLI</b>						
MSW/TR		FT		Formato	Descrizione	Controllo
IDC	Sotto campo	Tipo Record	POS			
031				GGMMAA	data riferimento	1,2
032				GGMMAA	data valuta	1,2
362	1			GGMMAA	timbro ricezione	1,2
365				GGMMAA	data regolamento stanza	1,2
720				GGMMAA	scadenza giri differiti	1,2
721				GGMMAA	data emissione MT60	1,2
725	1			AA	n. disp. di servizio	1,2
729	1			GGMMAA	inform. convocazioni	1,2
731	1,2,3,4			GGMMAA	termini operazioni	1,2
733	1,2			GGMMAA	data incasso e valuta	1,2
735	2,3,4			GGMMAA	operatività titolo	1,2
752	9,13			GGMMAA	specifica di retrocessione	1,2
757	1			GGMMAA	identificativi fattura	1,2
761	3			GGMMAA	spec. e/c precedente	1,2
762	4			AGGG	estratto conto (segm. 1)	
763	3,4			AGGG	estratto conto (segm. 2)	
770	1			GGMMAA	informazione cespite obblig.	1,2

<b>MONTE TITOLI - FILEM21</b>						
MSW/TR		FT		Formato	Descrizione	Controllo
IDC	Sotto campo	Tipo Record	POS			
		TS	14	GGMMAA	data creazione file	1,2
		CD	14	GGMMAA	data creazione file	1,2
<b>MONTE TITOLI - FILEM23</b>						
MSW/TR		FT		Formato	Descrizione	Controllo
IDC	Sotto campo	Tipo Record	POS			
		TS	14	GGMMAA	data creazione file	1,2
		CD	14	GGMMAA	data creazione file	1,2
		DT	73	GGMMAAAA	data scadenza cedola	
<b>MONTE TITOLI - FILEVAR (da emittente a CAMT)</b>						
MSW/TR		FT		Formato	Descrizione	Controllo
IDC	Sotto campo	Tipo Record	POS			
L'applicazione verrà sostituita, entro il 1997, dall'applicazione ATIE che contiene i campi anno a quattro posizioni.						
<b>MONTE TITOLI - FILEVAR (da CAMT a utenti)</b>						



MSW/TR		FT		Formato	Descrizione	Controllo
IDC	Sotto campo	Tipo Record	POS			
L'applicazione verrà sostituita, entro il 1997, dall'applicazione ATIE che contiene i campi anno a quattro posizioni.						
<b>MONTE TITOLI - FILETSS (da utente a CAMT)</b>						
MSW/TR		FT		Formato	Descrizione	Controllo
IDC	Sotto campo	Tipo Record	POS			
L'applicazione verrà sostituita, entro il 1997, dall'applicazione ATIE che contiene i campi anno a quattro posizioni.						
<b>MONTE TITOLI - FILETSS (da CAMT a utente)</b>						
MSW/TR		FT		Formato	Descrizione	Controllo
IDC	Sotto campo	Tipo Record	POS			
L'applicazione verrà sostituita, entro il 1997, dall'applicazione ATIE che contiene i campi anno a quattro posizioni.						
<b>MTS</b>						
MSW/TR		FT		Formato	Descrizione	Controllo
IDC	Sotto campo	Tipo Record	POS			
031				GGMMAA	data di riferimento	1,2
389				GGMMAA	data di negoziazione	1,2
365				GGMMAA	data di regolamento	1,2
<b>NUMERO VERDE - BLOCCO</b>						
MSW/TR		FT		Formato	Descrizione	Controllo
IDC	Sotto campo	Tipo Record	POS			
031				GGMMAA	data riferimento	1,2
241				GGMMAA	data attivazione	nota 1
242				GGMMAA	data blocco	nota 1
<b>NUMERO VERDE - ALLINEAMENTO DATI</b>						
MSW/TR		FT		Formato	Descrizione	Controllo
IDC	Sotto campo	Tipo Record	POS			
031				GGMMAA	data riferimento	1,2
200					dati comuni carta	
					(all'interno si trovano i sottocampi:	
				GGMMAA	data emissione carta	nota 1
				GGMMAA	data scadenza carta)	nota 1
038				GGMMAA	data di nascita	1
		HR/EF	14	GGMMAA	data creazione File	1,2
			40	GGMMAA	data elaborazione	1,2
		10	11	GGMMAA	data creazione disposizione	1,2
			17	GGMMAA	data segnalazione	1,2
		36	51	GGMMAA	data di nascita	1
			85	GGMMAA	data scadenza	nota 1
			91	GGMMAA	data emissione carta	nota 1
<b>NUOVA CENTRALE RISCHI</b>						
MSW/TR		FT		Formato	Descrizione	Controllo
IDC	Sotto campo	Tipo Record	POS			
L'applicazione è in sviluppo con tutte le date a quattro cifre						
<b>RILEVAZIONE ONERI INTERBANCARI</b>						

MSW/TR		FT		Formato	Descrizione	Controllo
IDC	Sotto campo	Tipo Record	POS			
031				GGMMAA	data di riferimento	1,2
374	1			GGMMAA	periodo rilevazione	1,2
365				GGMMAA	data regolamento	1,2
<b>P.O.S.</b>						
MSW/TR		FT		Formato	Descrizione	Controllo
IDC	Sotto campo	Tipo Record	POS			
850				AAMMGG	richiesta di pagamento	1,2
851				AAMMGG	risposta richiesta pagamento	1,2
<b>QUADRATURA TRAFFICO TRA C.A.</b>						
MSW/TR		FT		Formato	Descrizione	Controllo
IDC	Sotto campo	Tipo Record	POS			
031				GGMMAA	data di riferimento	1,2
362	1			GGMMAA	timbro applicativo	1,2
479	1			GGMMAA	evidenza totali (data creazione file)	1,2
<b>RAC</b>						
MSW/TR		FT		Formato	Descrizione	Controllo
IDC	Sotto campo	Tipo Record	POS			
A31				GGMMAAAA	data riferimento	
A30				GGMMAAAA	data riferimento orig.	
A09				GGMMAAAA	data inizio validità	
A53				GGMMAAAA	data fine validità	
A26				GGMMAAAA	data attivazione	
A27				GGMMAAAA	data cessazione	
A90				GGMMAAAA	data applicativa di riferimento	
		RC0 (rc. testa)		GGMMAAAA	data riferimento	
		RC1 (rc.dett.az.)		GGMMAAAA GGMMAAAA	data inizio validità data fine validità	
		RC2 (rc.coda az.)		GGMMAAAA GGMMAAAA GGMMAA	data riferimento file data creazione file timbro applicativo	1,2
		RC3 (rc.ATM)		GGMMAAAA	data riferimento	
		RC4 (rc.dett.ATM)		GGMMAAAA GGMMAAAA	data attivazione data cessazione	
		RC5 (rc.coda az.)		GGMMAAAA GGMMAAAA GGMMAA	data riferimento file data creazione file timbro applicativo	1,2
<b>RECAPITI LOCALE</b>						
MSW/TR		FT		Formato	Descrizione	Controllo
IDC	Sotto campo	Tipo Record	POS			
031				GGMMAA	data riferimento	1,2
365				GGMMAA	data regolamento	1,2
<b>RISERVA OBBLIGATORIA</b>						
MSW/TR		FT		Formato	Descrizione	Controllo
IDC	Sotto campo	Tipo Record	POS			

031				GGMAAA	data riferimento operazione	1,2
033				GGMAAA	valuta conto accreditato	1,2
032				GGMAAA	valuta	1,2
624				GGMAAA	data inizio e data fine limite minimo	1,2
625				GGMAAA	giorno evidenza limite minimo	1,2
62F				GGMAAA	data messaggio da ritrasmettere	1,2

**SEGNALAZIONE SALDI - Messaggi C.A.-SIA**

MSW/TR		FT		Formato	Descrizione	Controllo
IDC	Sotto campo	Tipo Record	POS			
031				GGMAAA	data di riferimento	1,2
074				GGMAAA	data di regolamento presunta	1,2
074				GGMAAA	data valuta	1,2
362				GGMAAA	timbro applicativo di ricezione	1,2
365				GGMAAA	data di regolamento	1,2
Y59				GGMAAA	data di regolamento	1,2

**SETIF**

MSW/TR		FT		Formato	Descrizione	Controllo
IDC	Sotto campo	Tipo Record	POS			
		HH	14	GGMAAA	data creazione	1,2
		HH	40	GGMAAA	data elaborazione	1,2
		TT	14	GGMAAA	data creazione	1,2
		TT	40	GGMAAA	data elaborazione	1,2
		10	11	GGMAAA	data creazione	1,2
		10	17	GGMAAA	valuta banca	1,2
		10	23	GGMAAA	valuta destinatario	1,2
		12	11	GGMAAA	data creazione	1,2
		13	11	GGMAAA	data creazione	1,2
		13	17	GGMAAA	valuta	1,2
		13	23	GGMAAA	data scadenza incassi	1,2
		14	11	GGMAAA	data creazione	1,2
		14	17	GGMAAA	valuta	1,2
		14	23	GGMAAA	data scadenza incassi	1,2
		15	11	GGMAAA	data creazione	1,2
		21	14	GGMAAA	data operazione	1,2
		34	27	GGMAAA	data emissione	nota 1
		34	33	GGMAAA	data scadenza	nota 1
		34	39	GGMAAA	data inizio periodo BCM	1,2
		34	73	GGMAAA	data inizio periodo POS	1,2
		35	11	GGMAAA	data creazione	1,2
		36	51	GGMAAA	data nascita	1
		41	31	GGMAAA	data scadenza (EUR)	nota 1
		41	56	GGMAAA	data inizio periodo (EUR)	1,2
		37	14	GGMAAA	data prelievo (EUR)	1,2
		43	19	GGMAAA	data prelievo	1,2
		43	97	GGMAAA	data scadenza (EUR)	nota 1

**SIPS**

MSW/TR		FT		Formato	Descrizione	Controllo
IDC	Sotto campo	Tipo Record	POS			

L'applicazione SIPS verrà ristrutturata. La nuova procedura GEC è prevista entro il 1997.

SMTS						
MSW/TR		FT		Formato	Descrizione	Controllo
IDC	Sotto campo	Tipo Record	POS			
031				GGMMAA	data riferimento	1,2
Tutte le altre date hanno la indicazione del secolo.						
TESORERIA - Messaggi a Banca d'Italia						
MSW/TR		FT		Formato	Descrizione	Controllo
IDC	Sotto campo	Tipo Record	POS			
031				GGMMAA	data di riferimento	1,2
365				GGMMAA	data di regolamento	1,2
TESORERIA - Segnalazione saldi fine giornata						
MSW/TR		FT		Formato	Descrizione	Controllo
IDC	Sotto campo	Tipo Record	POS			
031				GGMMAA	data di riferimento	1,2
325				GGMMAA	dati saldi (data valuta)	1,2
365				GGMMAA	data di regolamento	1,2
UIC - CENTRO APPLICATIVO						
MSW/TR		FT		Formato	Descrizione	Controllo
IDC	Sotto campo	Tipo Record	POS			
031				GGMMAA	data riferimento	1,2
K03				GGMMAA	data rif. segnalazione	1,2
K20	1,2			AAAAMMGG	periodo variazione	
K34	1			AAAAMMGG	data inizio godim. interessi	
K35	1			AAAAMMGG	data scadenza	
K36	1			AAAAMMGG	data inizio trattazione	
K37	1			AAAAMMGG	data fine trattazione	
K38	1			AAAAMMGG	data inizio esercizio	
K39	1			AAAAMMGG	data fine esercizio	
K45	1			AAAAMMGG	data quotazione ex	
K51	VARI			AAAAMMGG	date varie	