

Resolving the Year 2000 ("Y2K") problem will be one of the major challenges facing all the information technology (IT) industry over the next few years. As banks rely heavily on their information technology systems, this problem has particular relevance to the banking sector. The Hong Kong Monetary Authority (HKMA) is concerned that disruptions in bank operations as a result of systems not being able to process transactions beyond the year 2000 could have a significant adverse impact on the stability of the banking sector. Accordingly, the HKMA has undertaken a number of initiatives to ensure that authorised institutions in Hong Kong take appropriate steps to address the problem well before the year 2000. The HKMA has also conducted a survey on the status of how and when authorised institutions expect to fully address the Y2K problem. This article summarises the results of the survey and the HKMA's supervisory approach in addressing this problem in the banking sector.

REPORT ON THE YEAR 2000 QUESTIONNAIRE SURVEY

Introduction

The Year 2000 ("Y2K") problem arises from the fact that some computer systems use only two digits to represent the year in storing a particular date. This originally stemmed from the need to save storage space and input time (and thus costs) in early computer systems. This early convention can cause problems when systems encounter dates beyond 31.12.99. The computer itself may be unable to distinguish between the year 1900 and 2000 or using "00" for calculation purposes will result in an error condition occurring. The effects are not always consistent as they depend on how each program was written and their interaction with other systems.

Whilst the Y2K problem is simple in nature, it has become a multi-faceted issue. The reason is that there are numerous types of computer systems and an equally large number of computer languages in use today and the use of computers is widely spread throughout the community. In relation to the banking sector, this poses a particularly significant problem as banks are heavily dependent upon computer processing in their day to day operations. Furthermore, with the high volumes of interbank transactions, there is a real threat to the stability of the banking sector if this problem is not properly addressed by all institutions.

The Y2K issue is not a problem limited to computer systems and it could significantly disrupt an institution's business. Institutions whose systems

are not Y2K compliant may encounter significant problems in processing transactions. Some of their counterparties may decide only to deal with compliant parties and hence loss of business may result. Credit risk may also arise if the businesses of institutions' customers suffer because of not being compliant. Errors occurring due to non-compliant systems can also put an institution at risk from a legal liability point of view.

Reason for Survey

In August last year, the HKMA sent a letter to the two industry associations requesting them to remind their members of this problem. This was followed up by a circular to all authorised institutions requesting that they confirm with the HKMA that they were aware of the problem. The results indicated that whilst authorised institutions were aware of the problem, only a relatively small number of institutions were able at that stage to provide an indication of when they expect to be fully compliant.

This was a concern to the HKMA as it indicated that authorised institutions might not have fully appreciated the potential impact of the Y2K problem. To help address this, a joint seminar with the Hong Kong Association of Banks and the Deposit-taking Companies Association was conducted in May 1997. The seminar was attended by top level management of all authorised institutions. It illustrated the potential scale of Y2K projects, tools available to assist institutions, the importance of testing modifications, contingency issues and the likely consequence of non-compliance on an institution's operations. The HKMA also

made it clear that it will make the Y2K issue one of its top supervisory priorities in the next 12 to 18 months.

In order to obtain the status of the current position, the HKMA also conducted a survey on how and when authorised institutions expect to fully address the Y2K problem. This information is valuable in helping to direct the supervisory approach of the HKMA to ensure that the banking sector is not significantly affected as we approach the year 2000.

Basis of Survey

The survey was conducted on the basis of a questionnaire sent to all authorised institutions in Hong Kong. A total of 363 responses were received out of a possible 365. The two non-responses were institutions which intend to cease operations by the end of the year. The questionnaire required institutions to respond on a number of aspects regarding their Y2K projects. These included:

- the current status of Y2K compliance;
- the approaches adopted for implementation of the modifications;
- the expected costs of remedial measures;
- level of management overview;
- timing of implementation and testing; and
- their consideration of other related issues.

Survey Results

Current status of Y2K compliance

The proportion of institutions that have confirmed that their systems are already Y2K compliant was 11%. This represented a large decrease from the result of the preliminary survey conducted in January 1997 where 29% considered their systems to be Y2K compliant. In some respects, this is a good sign since it indicates that institutions have examined their systems in a more critical manner. For systems that were considered critical to the continuing operation of the institution, 82% of institutions expect to be Y2K compliant by end of 1998 and another 4% have confirmed that they will be compliant by end of 1999 (Chart 1). For non-critical systems, the results were 74% by

Chart 1
Expected date of Y2K compliance
for critical systems

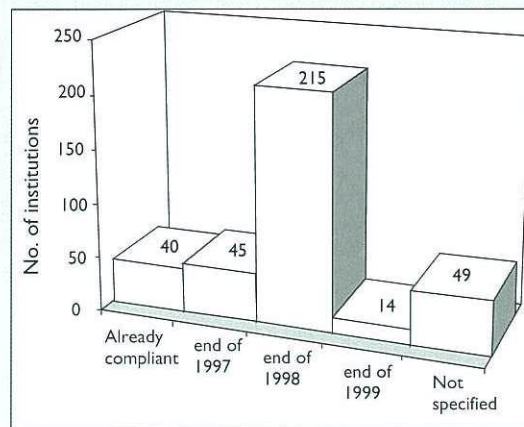
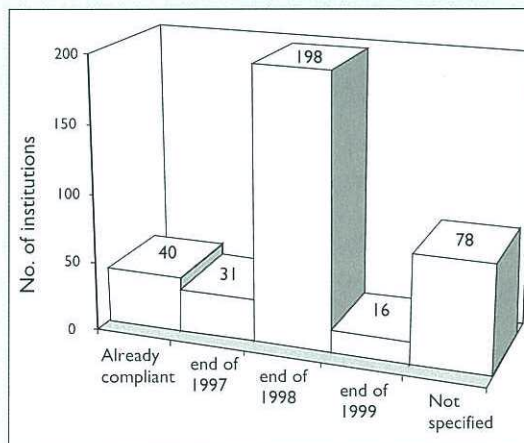


Chart 2
Expected date of Y2K compliance
for non-critical systems



end 1998 and another 4% by end 1999 (Chart 2).

It should also be noted that there were still a number of institutions (14%) which were not able to specify a date on which they expect their critical computer systems to be Y2K compliant. This is, however, an improvement on the situation in January where 46% of institutions did not specify a date. The HKMA will follow up with those institutions to ascertain the reasons for their difficulties in specifying a date.

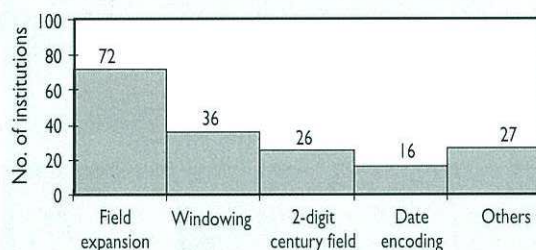
Approaches adopted by institutions in addressing the problem

Institutions which are not yet Y2K compliant will be replacing their existing non-compliant

systems with new compliant systems or re-programming their existing applications for Y2K compliance.

For institutions that are planning to adopt a reprogramming approach, the most popular is the "field expansion" method where the number of digits used to represent the year will be expanded from two to four (Chart 3). The advantage of this method is that it only has to be done once. But it requires a significant amount of effort in testing the software and its compatibility with other systems.

Chart 3
Y2K methodologies adopted by institutions



The second most favoured method is "windowing". Under this method, the two-digit year code is converted with a pre-set number called the "window boundary". This enables the system to interpret the two-digit year as either a "19" century date or a "20" century date. For example, with a window boundary set at 60, a year in the range of "00" to "60" will be taken as year "2000" to "2060" while year "61" to "99" will be taken as "1961" to "1999". The main advantage of

this method is that only a conversion function for the year field is required and the two-digit year is maintained. However, the implicit century digits will have to be changed once the pre-defined boundary is reached. Further, it will not work if the range of dates used in the system is greater than the window size.

The "2-digit century field" technique creates a separate 2-digit field to indicate the century date (19, 20, etc.). However it requires a separate century field to be created for every date in the database and reprogramming to use these new fields.

"Date encoding" is a technique that requires the underlying data to be changed and converted using an encoding / decoding scheme so that the data can then be used to represent different century dates.

Expected cost of remedial measures

Out of a total of 323 institutions which are not yet Y2K compliant, 43% or 139 were able to provide information on the expected cost of remedial measures. The average expected cost of such measures was around HK\$3.6 million but this varied with the size of the institution. The average costs of remedial measures for banks, restricted licence banks (RLBs) and deposit-taking companies (DTCs) were HK\$4.4 million, HK\$3.9 million and HK\$2.2 million respectively (Table 1).

For the 184 institutions which did not provide budget information, 41 indicated that their budgets were either set globally or that the Y2K project

Table 1
Budgeted cost of remedial measures

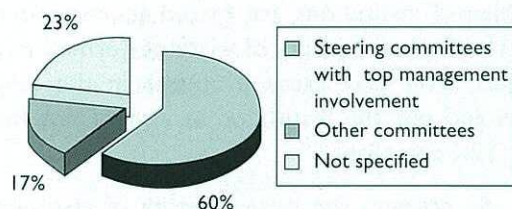
Budgeted cost of remedial measures	Banks	RLBs	DTCs	Total
less than HK\$0.5 million	10	6	6	22
HK\$0.5 to 1 million	29	1	20	50
HK\$1 to 10 million	31	11	17	59
HK\$10 to 30 million	3	1	—	4
more than HK\$30 million	3	1	—	4
Project budgeted and managed globally	25	5	11	41
Budget to be set	22	9	3	34
No separate budget set	46	17	46	109
	169	51	103	323
Average budgeted costs (HK\$ million)	4.4	3.9	2.2	3.6

was being managed and budgeted by the head office. 34 institutions were in the process of establishing a budget for their Y2K projects but a significant number (109) did not have separate budgets for their Y2K efforts. Many of these are due to difficulties in separating Y2K costs from the overall information technology budget. The HKMA will examine each case and check that reasonable resources have been allocated to address the problem.

Level of management overview

Regarding the level of management oversight over Y2K projects, 77% of institutions have formed a separate committee to manage the project and senior management is involved in a large majority of these committees (Chart 4). This result indicates that management appreciates the importance of the Y2K project and, in particular, the potential size and complexity of the project. Accordingly, they have chosen to establish a separate body specifically to concentrate on managing their efforts.

Chart 4
Level of management overview



Timing of implementation and testing

Out of a total of 252 institutions which have specified a date for implementing the changes, the majority (82%) of institutions either have already commenced or will commence their implementation of the modifications within 1997. The other 18% will begin in 1998. Some 22% of the institutions were not able to specify a date on which they plan to implement their Y2K modifications (Chart 5). Again this will be followed up by the HKMA. From the survey, it appears that institutions will be testing the changes as they are being implemented. Accordingly, some 94% of the institutions which have specified a completion date for testing aim to do so by the end of 1998 (Chart 6).

Chart 5
Planned starting date of implementation

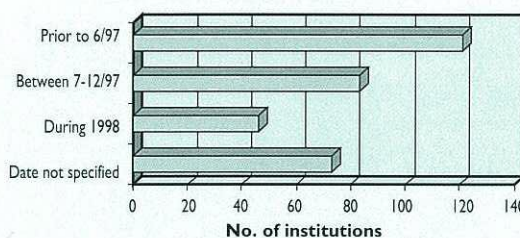
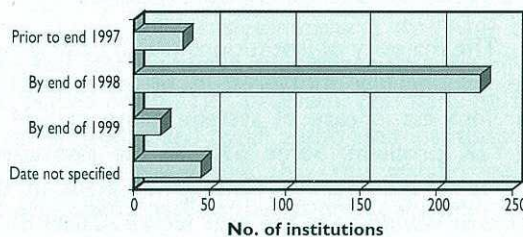


Chart 6
Planned completion date of testing

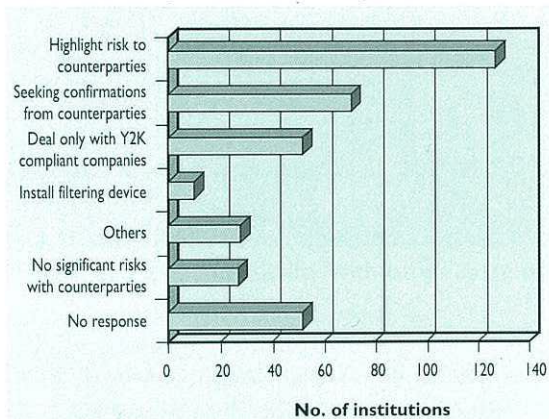


Consideration of other issues

Institutions were surveyed on their consideration of other issues associated with the Y2K problem. These included their requirements for Y2K compliance by their counterparties, contingency plans and other risk mitigation measures such as insurance coverage.

The responses indicate that the majority of institutions, at present, do not have any particular requirements for Y2K compliance by their counterparties. Some institutions do not consider themselves to be at risk due to the limited number of counterparties with whom they deal. Only 16% of the institutions have indicated that they will only deal with those that are Y2K compliant. The preference of most institutions is to highlight the risks involved with their counterparties and seek their confirmation that they are working on a Y2K compliant solution. A very small number of institutions are considering devices to filter data passed between the institution and their counterparties to ensure that non-compliant data are detected (Chart 7).

Chart 7
Measures institutions have taken in respect of counterparties



Note: Multiple responses to different categories were allowed

The majority of institutions (75%) have or will have contingency measures in place to protect their interest in case of system failure caused by the Y2K problem. Some 63% of the institutions have established formal contingency plans in this regard or will do so in the near future (Chart 8).

Chart 8
Contingency measures

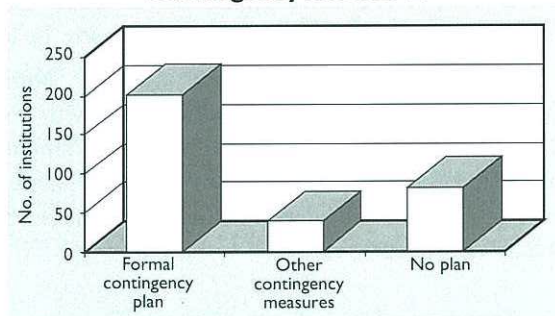
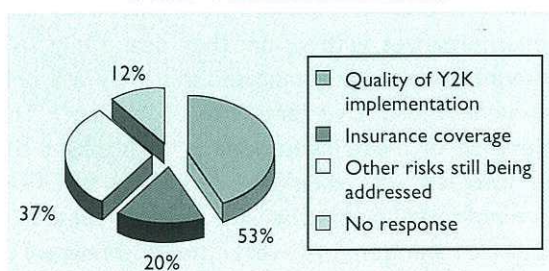


Chart 9
Other Y2K considerations



The responses of the institutions also indicate that many institutions are still considering the risks involved and ways of mitigating such risks. Only 20% of the institutions are considering any sort of

insurance coverage to ease the impact of financial losses arising from the Y2K problem. Their main concern at present is to concentrate on the quality of implementation of their Y2K programmes to ensure that this process is carried out smoothly and effectively (Chart 9).

Assessment of Responses

The above results indicate that the situation regarding awareness has improved significantly since the beginning of the year. It confirms that in the majority of institutions, the Y2K problem has attracted senior management's attention. This is reflected in the number of institutions which have established a separate committee to manage the project. However, the survey also indicates that there may still be some institutions which have not fully considered all of the implications of the Y2K problem. This is a similar situation to that experienced in other countries such as the US.

The survey indicates that some institutions will need to carefully consider whether a separate budget needs to be set for addressing the Y2K problem. This will facilitate the effective monitoring of progress and the adequacy of the resources allocated. Insufficient resources may become a problem if institutions are forced to compromise the standard and quality of work performed in the project. This may cause problems in the longer term and put the institution at risk of not being fully Y2K compliant.

At present, the large majority of institutions are concentrating on the implementation of their Y2K projects and this is their main priority. However management will also need to place emphasis on issues such as contingency measures, legal liability and counterparty compliance. Many experts believe that even the most prepared organisations may encounter some implementation problems. In order to avoid any major disruptions to their business, management of institutions would need to consider these other risks closely and adopt such measures as necessary to mitigate such risks.

The Way Forward

The results of the survey provided a sound basis from which the HKMA's supervisory efforts on the Y2K problem can be directed. All institutions have also been requested to provide their formal

plans regarding the Y2K problem to the HKMA. Their progress against this plan would be closely monitored and discussed during on-site examinations, prudential interviews and tripartite meetings.

In its day to day supervision of banks, the HKMA will be focusing on those institutions which still have not taken appropriate measures to deal with the Y2K problem. It will check that resources allocated by the institutions to their Y2K projects are sufficient and commensurate with the scale of the institutions' operations. The HKMA also intends to discuss issues concerning other aspects of the Y2K problem such as counterparty compliance and contingency measures with the institutions. The HKMA is aware that institutions may need third party consultants and experts to assist them in implementing their Y2K plans. These external parties may require high level access to an institution's computer systems and databases. Therefore the HKMA will check that institutions are adopting appropriate measures to maintain adequate security over sensitive information.

Disclosure of information will enable members of the public and bank counterparties to be kept informed of the progress made by authorised institutions in Hong Kong in handling the Y2K problem. The HKMA believes that this will have a positive effect on the stability of the banking system. Accordingly, it will consider various options for disclosing regular updates on the Y2K compliance situation in the banking sector and review the need for disclosure requirements by authorised institutions on the Y2K problem.

The Y2K problem is not confined to the banking sector alone. Hence the HKMA will liaise with other regulators, both local and overseas on their approach to the issue.

The comprehensive measures that have been adopted emphasise the importance that the HKMA has placed on the Y2K problem. This issue must be properly addressed by all authorised institutions in Hong Kong to ensure that the stability of the banking sector will not be adversely affected. ❖

– Prepared by the Banking Development Division