

Managing Risk in Euro Currency Conversion

by Patrick O'Beirne

Risks are present in virtually every software project, and as a result, "risk management" is typically discussed in very generic terms. However, there are a few types of projects for which the risks seem particularly pervasive and severe; they deserve a specific discussion of risk-management issues and guidelines. Y2000 projects are perhaps the most widely recognized example in the US, but in Europe, the euro currency projects may involve even greater risks.

As the countries of Europe enter the 21st century, they face a challenge of historic proportions. Conversion to a common currency, the euro, will not only involve economic issues — for example, the reduction in exchange rate risks and the increase in price transparency — but also a number of business and technical issues. This article will explore a number of business and technical issues concerning the euro conversion and suggest ways of managing the risk.

The transition to European economic and monetary union (EMU) is marked by the changeover to the euro currency from 1999

to 2002. The coincidence of this transition with the Y2000 problem has been much commented on recently (see Table 1). Common issues for both are estimating, project management, defect management, regression testing, dependence on external contractors and package software, missing source code, and operating system, application, and hardware upgrades. In this article, I will focus on what is distinctive about the euro conversion. [Note: I have made use of many ideas from a 60-page article by Pieter Dekker on "Preparing Information Systems for the Euro." The larger article is available on the Information Society Project Office (ISPO) site, at <http://www.ispo.cec.be/y2keuro.>]

On 1 January 1999, the euro will be created from the present ECU (European Currency Unit). Rates of conversion between the euro and the participating national currencies will be irrevocably fixed, and the euro will become the national currency in the participating countries. To say that, for example, a euro is 0.776655 Irish pounds is just like saying that a foot is 30.48 centimeters — it is simply a different scale of measurement of the same entity. As of 1 January 1999, enterprises can begin operating in euros if they wish. On 1 January 2002, the new euro banknotes and coins will be put into circulation in substitution for banknotes and coins in the old national currency units.

During the transition period, two different currency units will be used within the member states; at the end, only the euro will be the legal expression. Financial information systems will have to be prepared in order to deal with this unique transition scenario.

Planning the changeover of information systems to the euro is not just a matter of dealing with the technical conversion. For many enterprises, there will be strategic decisions that will fundamentally affect the way an enterprise conducts its affairs. These can change the functionality that is expected from information systems. For this reason, I contend that the introduction of the euro is primarily a problem of managing requirements.

Every business process is affected by the euro. You should perform a "thought experiment," or a simulation of what will happen to your business during the transitional period, to see how new requirements might be generated for IT systems. This simulation must cover setting prices, order processing, delivering, invoicing, and payment systems, and it must also consider the attendant transitional problems that may occur as trading partners go through their own E-day.

BUSINESS ISSUES

The strategic preparation must involve the entire company; this is much more than an accounting problem. Don't leave it to the accountants or IT people to solve for themselves. Do you want IT people making business decisions?

The impact of euro conversion on retail systems is pervasive — consider price displays, labels, pack pricing, bar codes, psychologically sensitive price points, weighing scales, the unit pricing directive, the loss of margin on low-unit-price items, consumer information, personnel training, adapting cash registers, scanning systems, cash office management, security, the use of credit cards, and so on. Sales and purchasing price lists will have to be reviewed. But people seem to be making an automatic assumption that everything — price lists, invoices, even statements — will

Table 1: Comparison of Y2000 and euro currency projects

Y2000	Euro changeover
Maintenance project	Strategic decisions
Every application that uses dates	Every application that uses money
Database expansion possible	Database conversion of amounts
Embedded systems	Vending machines, cash registers
Supply chain management	Trading partner synchronization
Fixed deadline	Transition period (but banks must be done on 1 January 1999)
Liability and litigation concerns	Consumer legislation concerns
No functionality change	New functionality and user training
Future date testing	New functionality testing
No fallback	"No compulsion, no prohibition"

have to be dual priced. The EC leaves it to national legislation, and there is as yet no legislation on this issue in any country. It is a customer information issue, and it's up to you to decide what to do. I would warn of the risks of taking on too much change in systems, given that IT resources will be stretched already for Y2000 conversion.

Monetary union also means that the exchange risks between participating member states will disappear. Therefore, businesses may now wish to compete in a wider market, requiring new language, legal, and marketing competencies. New products may require IT changes, but that is a normal part of systems development and should not be a risk except in resource terms.

Enterprises are sometimes able to profit from price discrimination in different geographic markets. After the introduction of the euro, these hidden price differences may become painfully visible. Addressing this should only be a data maintenance task and so should not pose an IT risk.

SUPPLY CHAIN

In some industries, customers use information systems for ordering, payments, or bookkeeping that are developed by their suppliers. The problem for the supplier/developer and the customer/user of such

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Where users need to revise and correct the data files manually, there is a risk of incorrect data entry or even fraud.

software is in the coordination of their changeover schedules.

Plan the synchronization with your trading partners carefully. Consider the effect of time lags in order/delivery/invoicing/payments/statements processing. You may have a dependence on external service providers of information systems (e.g., stock exchange feeds, bureau services) that will change to the euro on 1 January 1999. Once one major enterprise changes, it will have an effect upstream and downstream in its value chain. This is particularly profound when EDI is used.

TECHNICAL RISKS IN SOFTWARE LOGIC AND DATA

There are a large number of technical risks involved in the euro conversion, some of which I will summarize here. Lack of space prevents me from providing detailed examples, but the reader should find the risk categories fairly obvious and understandable.

Avoidable Rounding Differences

Article 235 of the regulations prohibits the use of cross-rates or inverse rates derived from the inverse of the fixed conversion rates. This is because inverse ratios produce nonterminating decimals; these figures must be truncated or rounded somewhere, and will therefore fail when converting amounts with more than that number of significant digits. If your system really cannot handle the prescribed method of multiplication or division, the risk will have to be managed by using a rate with more significant digits than the largest number you ever convert.

“Triangulation” is prescribed as the method for converting participating currencies via the euro. If this involves too many logic changes, you may have to manage the risk using direct conversion factors with sufficient

precision, as above. According to the Giga Group, “Almost every system falls over when it has to do triangulation; the computer starts to choke.” Such anthropomorphism is amusing as, of course, the triangulation logic is either there or not.

Unavoidable Rounding Differences

Converting amounts forward and backward between the euro and participating currency units will unavoidably cause rounding differences. The addition (as in invoices) of amounts that have been rounded results in an accumulation of the rounding differences. Repricing small unit prices in euro figures rounded to the nearest cent can cause a loss of net margin. The effects of these rounding differences vary from being merely a nuisance to being able to bring information processing to a halt because of the accumulation of discrepancies that require reconciliation.

Other Technical Risks

- Interfaces between systems, specifically EDI, will require an agreed changeover of currency denomination.
- Systems may suffer “data pollution”; that is, amounts expressed in euro may accidentally be combined with amounts expressed in the national currency unit.
- Conversion of historical data requires that all instances of the same data be converted in exactly the same way. This poses a particular risk where the data is not normalized, as is commonly the case in MIS/DSS data warehouses.
- Countries such as Italy and Spain have a national currency unit without decimals, and their systems may need to be modified in order to work with euro cents.
- Thresholds such as report ranges, validity checks, credit limits, and

reorder points must be converted to euro, and they may be embedded in code rather than in data.

- Displaying information in two currency units at the same time can be difficult, because the amount of space on displays and printed reports is limited.

RISKS IN STAFF RESOURCES

Here the obvious risk is that IT departments may need additional staff to cope with both the euro and Y2000 conversions. And as Pieter Dekker observes in his paper, the introduction of the euro will require training of existing employees for new functionality, as well as a familiarization period for people to grow accustomed to working with a new currency. To the extent that manual currency conversions are required, this will also introduce the risk of clerical errors.

RISKS IN CONVERTING END-USER APPLICATIONS

As we have also found in Y2000 projects, a large area of risk involves end-user applications whose existence may not even be known to the IT department. Identifying only the spreadsheet cells or database fields to modify may be difficult, as most end-user applications are poorly structured and completely undocumented. Unfortunately, it is impossible to design a utility that can automatically convert spreadsheet models to euro. To avoid double conversion, identify the currency unambiguously so you know what's converted and what's not.

RISKS IN INTERNAL CONTROLS

An important part of financial computing applications is a set of internal controls that deal with unusual transactions, access privileges, and potentially fraudulent insertion, modification, or deletion of financial information. Where users need to revise and correct

the data files manually, there is a risk of incorrect data entry or even fraud. The conversion to the euro may also give rise to a substantial number of "suspense" or "clearing" items in financial systems. These items need to be analyzed and resolved in time to ensure that no irregularities have occurred. Testing systems for new functionality will also require the creation of new test cases.

RISKS IN MODIFYING EXISTING SOFTWARE

In practice, most financial systems are currency-agnostic; that is, they just process numbers within one base currency, and no currency is implied. The only time a currency symbol appears is on input screens as a prompt or on output reports as a column heading or data format. After all, who asks if an accounting package is "dollar-compliant" or "pound-compliant"? Therefore, there are only one or two places where the specific euro conversion rules have to be applied: input and output. If these are well-modularized, the entire application's conversion may be isolated to two modules. It may only be necessary to modify the input routines and rely on report generators to produce the required outputs.

I believe the magnitude of the task is overstated in the media. The Gartner Group is quoted as saying, "The cost of fixing each line of code is estimated at \$1.10, with billions of lines of code having to be changed." I consider "billions" to be a gross overstatement. After all, how many lines of code handle currency conversions in a system? One module — maybe shared among many applications if the company has any concept of reusability. Another example comes from the Giga Group, which states, "The monetary union has said that all systems will have to be able to account for six significant decimal places, making most systems, which now account for two, obsolete."

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In fact, the six-significant-figure rule only applies to the conversion process, not the entire accounting system, which will continue with two decimal places when referring to amounts of money for payment.

CHANGEOVER TIMING STRATEGIES

When the European Union set out in 1992 on its voyage to EMU, the Y2000 "iceberg," as Capers Jones puts it, was not visible in anybody's radar. The Y2000 conversion is a maintenance project with a fixed deadline and no functionality change, it requires regression tests and future date testing, and it has no fallback. In contrast, the euro conversion is a new functionality project with a three-year transition phase, it requires requirements testing, and it can rely on "No compulsion, no prohibition" as a fallback. This clause, described below (see sidebar, p. 27), is the lifeboat for those companies that are not ready for the euro on 1 January 1999. They can, in theory, wait until 1 January 2002. If there really is serious economic disruption, as forecasted by Dr. Ed Yardeni of Deutsche Morgan Grenfell, even that date may be put back by political decree.

Regardless of the timing of the euro introduction, IT departments will need to decide on an overall strategy for introduction of their new systems. The alternatives are familiar from previous IT undertakings: the "big bang" approach and the gradual/phased approach.

Big Bang Approach

In the "big bang" approach, the enterprise prepares for a changeover of all its information systems at the same time. This strategy avoids the problems of working with a mixed system (part euro, part national currency unit).

A big bang approach at year-end may not be possible if previous financial periods must remain "open" or "active" for an extended period (i.e., more than a few weeks). It carries the same risks as all big bang projects: the need to be able to recover from an unsuccessful implementation.

Gradual Approach

Under this approach, the systems would change over to the euro on an "as-necessary" or "when-ready" basis. A disadvantage of this method is that special interfaces between these systems need to be built to convert data from one currency unit to the other. Such interfaces have a very short useful life and may therefore be relatively expensive. An additional risk is that of data pollution, in which users inadvertently combine financial data denominated in different currency units.

CHANGEOVER TECHNICAL STRATEGIES

There are a number of technical strategies for achieving the euro conversion. These may apply separately to input and output functions.

Manual Solution

This means using a single-currency system and a calculator. This method may suit when almost all transactions are in the national currency unit and only a few transactions are in euro. A full conversion can wait until the euro becomes the most important currency unit.

Manual conversion, however, is notoriously susceptible to clerical errors. When dealing with real-time transaction processing (such as at cash registers), manual processing may be too burdensome.

Parallel Systems

Another solution is to use two versions of the existing financial information system in

parallel. One of the systems could be used to process amounts in the national currency unit, the other could be used for euro. For example, one cash register could be used for the national currency unit and another

for euro, or an enterprise could run two copies of the same software simultaneously.

One risk with this strategy is that users of two identical information systems with different currency units could easily mistake

THE TIMETABLE AND REGULATIONS

One currency, two denominations. The timetable for the euro is a transition period from 1999 to 2002, during which there will be two denominations of legal tender in each member state. Philip Hamell of the Euro Changeover Team of the Irish Department of Finance likens the changeover to the euro to Aristotle's theory of "substance" and "accidents" (better known in Ireland as the basis of "transubstantiation"). On 1 January 1999, the pound in your pocket still has the accidents (look and feel) of a pound, but its substance (nature) is changed and is now really the euro.

No compulsion, no prohibition. In the legal framework, the fundamental principle applicable during the transitional period is called "No compulsion, no prohibition." It states that acts to be performed under legal instruments stipulating the use of one of the units possible — the national currency unit or the euro unit — shall be performed in the stipulated unit unless otherwise agreed by the parties (Article 8(1) of the 109L(4) Regulation). This rule ensures that economic agents will only have to use the unit to which they have agreed. However, economic agents may feel obliged to deal with the euro before the end of the transitional period for competitive reasons (e.g., because customers may require invoices in euro) or logistical reasons (e.g., to avoid a high-risk "big bang" conversion to euro on 31 December 2001)

Legal framework. The legal framework as far as we are concerned is the Article 235 regulation (Council Regulation 1103/97 of 17 June 1997), which specifies the following:

Article 2: Freedom of contract. This means that people are free to agree to their own terms independent of this legislation. "Freedom" of course assumes there is no element of coercion from a stronger partner.

Article 4: Conversion and precision. This specifies that a fixed six-significant-figure conversion rate of one euro expressed as each national currency is to be used without rounding or truncation. Only in Ireland (and the UK when it joins) will this mean six decimal places. For the Italian lira, for example, it might be 1,987.65.

To convert euro to national currency: multiply by the rate.

To convert national currency to euro: divide by the rate.

Inverse rates are not allowed because the inverse of those rates gives a nonterminating decimal, and precision will be lost at some point at which your numeric precision stops. Whether that makes any practical difference depends on the size of numbers you have to handle. Only you can answer that, knowing the precision of your language and file structures and your business data.

Triangulation. The famous "triangulation" rule is that to convert from one participating currency to another, you must convert via the euro and round the euro amount to not less than three decimal places. Other methods are allowed only if they produce the same result, and that is the let-out clause that software companies will be using. Triangulation is not a matter of national or local government enforcement, but a matter of dispute resolution/litigation. Unless there is a dispute, the method of calculation is not relevant. And it is only relevant where an alternative method, if used, reaches a different result. There are certainly no plans to set up a "Triangulation Enforcement Agency" in Brussels. However, at the national level, there may be consumer protection laws that impose certain additional requirements on parties in a transaction.

Article 5 states that you must round to the nearest cent for amounts to be paid; therefore rounding does not apply to other numbers, such as unit prices (e.g., a phone charge of .00416p/sec).

The euro in print. There is no law that you must use the euro glyph. It is likely to be used in promotional material as a logo, but businesses will not adopt it until it is a normal part of all keyboards, printers, and screen character sets. Microsoft has introduced the symbol in Office 97 applications, but it is not accessible by the Ctrl+Alt+E combination recommended by the EU. The ISO 4217 Maintenance Agency has adopted the currency code "EUR" for the euro.



The euro glyph.

the euro system for the national currency system. Furthermore, each system may receive only part of the transactional data. Where transactions are not independent but are related to other transactions, this can be a problem.

Segmented Changeover

In some situations, the currency unit used will depend on the type of transaction. For instance, all purchases from corporate suppliers could be in euro, while all sales to individuals could be in the national currency unit. This approach would, however, require the implementation of an interface between the two systems that converts the amounts from one currency to the other. Here the risk also exists that users could get confused about the currency that the system uses.

Historical Database Conversion

Even after the enterprise has switched over to the euro, it needs to keep its historical data available in the national currency unit in order to maintain the existing audit trail. In most countries, national law requires

enterprises to keep their accounting records in their original form for at least 5 to 10 years. Retroactive changes of historical data should be avoided at all cost, because this could cause synchronization problems between the two systems. It is impossible to represent amounts before 1 January 1999 in euro, as the currency did not exist. This would cause anomalies when comparing data that was collected during the floating-rate era.

Possible solutions for this problem, and their risks, are:

- **Print hard copies.** However, print-outs may be not detailed enough, or they may be organized in such a way (e.g., sorted by the wrong key, unsorted, fragmented) as to make it impossible to access the data in an efficient manner.
- **Maintain double systems.** This involves using two versions of the existing financial information system at the same time.

RISKS IN PACKAGE REPLACEMENT OR UPGRADE

Selecting the right software package, developing custom-made modules, or even configuring the parameters of standard software requires a significant amount of lead time. It is common to read of software suppliers who say, "There is still no definitive interpretation of EMU compliance for accounting software" or "Our development plan is ... subject to the directives from Brussels becoming available in time." The fact is, the rules have been known since 1996 and are embodied in Regulation 235 of July 1997. There will never be a specification for euro compliance from Brussels; that will be a matter for the marketplace to decide. If your vendors give you that excuse, tell them, "There's nothing more coming from Brussels, folks — get on with it." Then tell them what *you* want the package to do.

EURO CONVERSION RESOURCES ONLINE

The Tenagra euro2002 discussion list is a mailing list set up specifically to explore IT strategies and techniques for the euro conversion. To join this listserv, send an e-mail message containing just the word "subscribe" in the body of the message to: euro2002-discuss-request@euro2002.com.

The following Web sites also provide useful resources:

- <http://www.iol.ie/sysmod/eurofaq.htm> (the euro FAQ from Systems Modelling Ltd.)
- <http://www.ispo.cec.be/y2keuro/src/wdiseuro.htm> (Pieter Dekker's paper on IT systems)
- <http://europa.eu.int/euro/> (EU information Web site)
- <http://amue.lf.net> (Association for the Monetary Union of Europe)
- <http://euro.fee.be> (Federation of European Accountants)
- <http://www.ispo.cec.be/y2keuro> (call for sharing best practices)
- <http://www.emuaware.forfas.ie> (Forfás Awareness Campaign)
- <http://www.ecu-activities.be/> (EURO-PAPERS site)

“Euro Compliance”

The functional requirements of “euro-compliant” software depend both on the business of your enterprise and the changeover strategy you have adopted. Therefore, no standard definition of “euro-compliant” exists. Hence, you should always verify for yourself whether so-called euro-compliant software actually meets your needs. And remember the following caveats:

- Enterprises usually have little influence on the type of changeover solution that package vendors will choose in dealing with the euro.
- Some software vendors may not have the financial and human resources necessary to produce euro-compliant versions of their software. Do not unconditionally rely on their good intentions.
- The “euro-compliant” software may turn out to be less reliable than the previous release of the same software.
- The price of an upgrade can be excessive if the original software was poorly designed, a substantial amount of unnecessary functionality was added, or the software vendor takes advantage of the situation.

Very few “multi-currency” packages currently meet the Regulation 235 criteria, as they were designed for the management of floating rates, not a six-digit-precision fixed-rate regime. The euro requires more than most multi-currency packages provide. Multi-base-currency packages have been proposed and may suit some, but one size does not fit all. Some large package vendors are offering a dual-base-currency system, which essentially treats the euro as the real base currency and captures converted data in parallel in the national currency.

Ask about the euro migration suite your software vendors should provide. This includes

database conversion, which requires particular care where databases are not normalized and contain redundant data for performance reasons. Database conversion may be impossible if numeric price or money data is buried in text or descriptive fields. Beware of mindless automatic conversions. Many people seem to be unaware that euro pricing is more than a simple recalculation — the whole pricing structure may need to be rebased in euro. That’s why business involvement is so important.

Those companies currently operating a single-currency ledger may not appreciate having to use a multi-currency package to make the transition to a single currency. See <http://www.iol.ie/sysmod/eurex01.htm> for a worked example of how a small company might go about this.

SUMMARY

The changeover to the euro has three specific features:

1. *New products or services may introduce new functionality.* These new requirements must be managed just as in all other new projects, particularly at this difficult time for obtaining IT resources.
2. *The transitional period involves handling two denominations of currency with a fixed conversion rate.* There is no need to spend any more than is absolutely necessary for a transitional period. Coordinate with your trading partners to reduce this effort.
3. *The conversion effort is plagued by exaggerated claims of difficulty.* Don’t be fazed by these pronouncements. Take full advantage of any shortcuts to minimize the amount of changes to your system. After all, at the end, they will look much as they always did, just with a different currency symbol.

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