

Expert systems—the second wave

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1 A basis for success

1.a Expert systems—the second wave

The expert systems business has been through a terrible period in 1987–88. In the USA, the “Gang of Four”—the new venture software companies which once led the industry—have all run into losses and cut back staff more or less severely. Symbolics, whose high priced Lisp workstations have made it the biggest single company in artificial intelligence (AI), has hit an equally dramatic reversal of fortunes.

In the UK, the picture is also “loadsalosses” to adapt a current local catchphrase. Most of the companies which pioneered expert system developments have been losing money, and financial rescues in various forms have been the order of the day.

The story in the rest of Europe is less dramatic because the business is generally at an earlier stage of development, and more heavily dominated by internal development programmes in the electronics giants like Siemens, Bull and Olivetti. A few companies, mostly small, have built profitable expert systems businesses such as Prologia in France, Epsilon in Germany, AI Software in Italy, Lithp Systems in the Netherlands, Computas Expert Systems in Norway and Infologics in Sweden. But the bigger companies are still supporting negative cash flows and some, such as Olivetti, prefer to give their products away to substantial customers rather than attempting to commercialize them at this stage.

The pessimist can match the current commercial difficulties with corresponding scepticism about the prospects for expert systems as a worthwhile and distinctive technology, at least as far as the mainstream data processing (dp) business is concerned. On this view, expert systems will always be too esoteric and ill-adapted to commercial software needs to become a major development tool. To the extent that the technology is used at all, it will be absorbed into conventional programming environments as little more than an optional extra facility in Cobol or fourth generation languages (4GLs).

Not surprisingly, Ovum takes a more positive view. While many of the tools and techniques which were important in the first wave of expert systems development are in sharp decline, we see a second wave beginning to gather strength (Fig. 1). The second wave is being driven by:

- a rapidly increasing number of real, operational applications;
- more mature technology, much closer to the real needs of mainstream data processing;
- a more realistic marketing focus on the products with the most long-term potential.

The wave is strong enough to overcome the many negative factors which remain—although they will continue as significant constraints. We believe that it will in the longer term support a sector of the software industry which is valued for its distinctiveness, which will grow at over 30 per cent per year well into the 1990s, and which will be seen as being of major importance to the biggest vendors and users in the computer business.

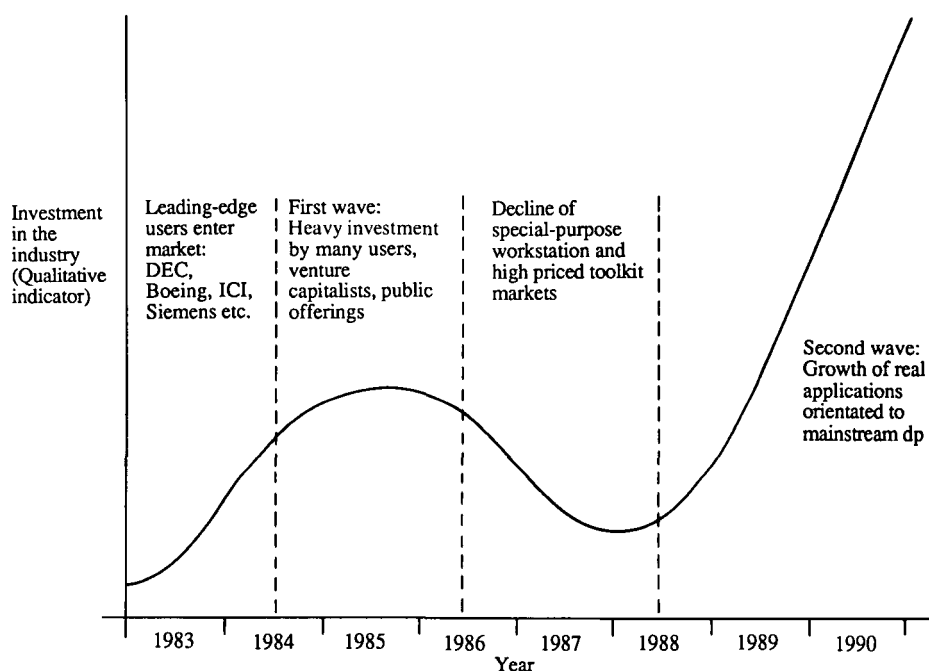


Figure 1 Expert systems—the second wave

1.b Applications

The individual applications of expert systems are already far too numerous for anyone to keep track of them. But the general trend can be seen by looking at one sector which Ovum has recently researched in depth—banking and other financial services. Here are some of the key developments we have found in a sector which has always led the mainstream commercial application of new technologies.

- 1 Real implementations are now beginning to come on stream in significant numbers. As recently as mid-1987 operational expert systems in financial services were few and far between. Often systems which had been quoted as operational turned out on closer examination to be still at the trial stage.

The fact that this picture is now changing was illustrated by an Ovum study in the second quarter of 1988. We contacted 29 banks at the leading edge of expert systems work in the USA and Europe. We found operational expert systems in 19 of them and studied 12 in more depth. Of these, at least seven had gone operational only within the previous 12 months. Our conclusion is that users who have pioneered the development of expert systems are at last beginning to see real results—and having started, the results are building up rapidly.

- 2 The applications are starting to show identifiable returns. Although explicit financial returns are rarely quoted, the qualitative benefits are often clearly strong enough to justify the cost of the systems in full. Examples from the financial services sector include:

—John Hancock Mutual Life insurance company of Boston developed a system with Applied Expert Systems (Apex) to recommend suitable financial service products for clients; results have included doubling the amount of business generated by sales calls, and a five times increase in the recommendation of new business by satisfied customers.

—Security Pacific in California developed a system to detect and prevent fraud using automatic teller debit cards; soon after it went into operation in April 1988 they were able to report it had saved \$144,000 in potential losses over one weekend.

—At Banque Hervet in France, an expert system to advise on loans to small businesses has reduced the time to take a loan decision from ten days to 1.5 hours.

These are not isolated examples; our records include many more, and the evidence is that they are growing in number all the time.

- 3 Technology leadership is starting to pay off for some users. Because they are further up the learning curve, and many of their staff understand how expert systems could be used, they are finding that they can put through ideas and implementations for expert systems more quickly and effectively than their competitors. One example was the Security Pacific fraud detection system which was requested by end users and developed, implemented and operational within six months.
- 4 Users are being more realistic in the applications they tackle. The earlier approach, as advocated by Ed Feigenbaum and others, mainly in the USA, was to “go-for-broke”. Feigenbaum and his followers argued that expert systems had to be big and ambitious to be worthwhile. Now users are aiming at less grandiose targets, which may still require a substantial investment by the time the system has been integrated with conventional software. In many cases AI is no longer the preserve of a high-tech specialist group. Instead the tools are being distributed to the MIS department and end users for more routine applications.

The examples quoted all come from the financial services sector, but there is evidence of a similar upsurge of applications in other leading industries. Examples include the increasing number of operational systems for supporting the maintenance of telecommunications networks, (by AT&T and GTE among others) and the work on expert systems for production scheduling in manufacturing industry (with Arthur Andersen and Carnegie Group playing leading roles).

1.c Technology

While applications are becoming more real, the technology for implementing them is moving closer to the needs of mainstream data processing.

- 1 There is more stability in the categories of tools available for expert systems development, and better understanding of their capabilities. This makes it easier for users to match the choice of a tool to reasonable expectations of its performance. It is increasingly recognized that the best development tool may be neither the cheapest nor the most sophisticated, but the one which offers a usable degree of functionality combined with good support and good facilities for integration with conventional software.
- 2 Suppliers are beginning to provide solutions to the problems of integration. Alternative routes include:
 - integration via C (KEE, Nexpert Object, XiPlus, Crystal etc);
 - integration within the Unix environment (implementation in a Lisp under Unix, new versions of KEE, Nexpert Object);
 - integration in the mainframe environment, typically via Cobol and using such facilities as CICS, DB2 and SQL (the Aion tools, AICorp’s KBMS, Telecomputing’s Top-One).

Although the newest tool releases in all these areas promise much, it is important to recognize that delivery on the promises has yet to be widely demonstrated.

- 3 The widespread move towards implementing most tools in C is increasing their general acceptability for mainstream software development and providing much better performance, as well as easing the task of integration.
- 4 Lower cost and conventional hardware is now well-established as both a development and a delivery vehicle for expert systems. Sun in particular has shown that users do not need to have an expensive special-purpose workstation to develop AI software. Now the trend is being taken further as mainframes, 386-based PCs and Macintoshes are increasingly used for expert systems.

1.d Marketing

The expert systems vendors have had at least as much to learn as their users about the realities of their market. The signs are that the lessons are being learnt, and the vendors are beginning to focus on the areas which will bring them good business in future.

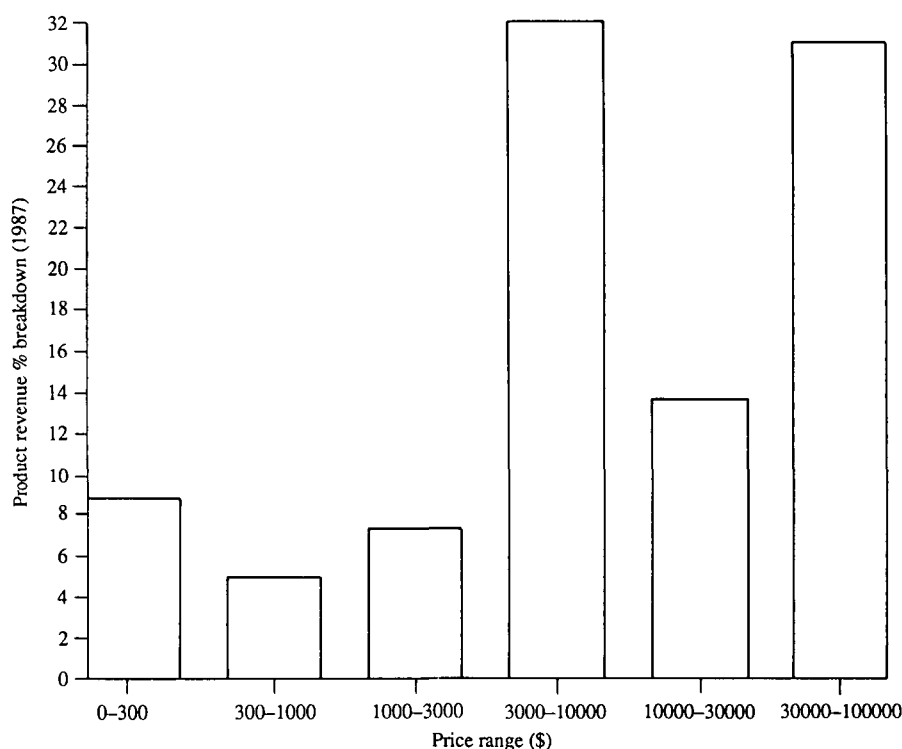


Figure 2 Expert systems product revenue by price range

- 1 The two product categories which we believe will be the most lucrative are:
 - single user tools for workstations and 386-based PCs, costing \$3,000 to \$10,000 per copy.
 - integrated tools for expert systems development on mainframes costing upwards of \$100,000.

As Fig. 2 shows, sales of products in the first category above overtook sales of expensive \$30,000 to \$100,000 single user workstation tools in 1987—and Ovum expects their advantage to increase in coming years. The proposition that the general run of big companies would pay \$50,000 a copy for multiple copies of an AI software tool to be used by one person is now being shown to be false. So incidentally is the alternative proposition, that expert systems could be a tool for ordinary office users, like wordprocessors or spreadsheets. The sales of tools costing around \$100 show that expert systems is *not* a mass market.
- 2 The leading vendors have now built significant user bases. These are beginning to generate additional orders, a continuing flow of maintenance and support revenue, reference applications, and run-time software license fees. On this basis some vendors can afford worthwhile investment in further product enhancement and support, and so offer a more realistic proposition to new customers—who will generally not have the leaders' commitment to AI for its own sake.
- 3 Vendors are learning to avoid the "AI turn off". The overselling of AI in the past has given the whole area a negative image in the eyes of many potential customers. The vendors are responding by positioning their products as practical software development tools, offering direct advantages in terms of productivity and speed of development. Some, such as Lucid, the leading supplier of OEM Lisps, are deliberately avoiding the expert systems or AI labels.
- 4 Vendors are beginning to leverage specialist expertise by offering applications shells. These range from environments with specific functions added to support development of a class of applications, to systems which come with a more or less complete knowledge base for a particular task. The route is favoured by many who have either dropped out of the overcrowded and unprofitable market for generic products (such as Teknowledge) or never entered it (Syntelligence, Intelligent Applications). In many cases the shell seems to be mainly a marketing ploy, a way to start talking with potential customers who are really targets for custom development. The application shell may still provide the kernel of a system, and some (the Carnegie Group/TI Testbench, Intelli-

corp's Simkit) are building up a real track record. But the industry has yet to see a major product success with an applications shell.

1.e Negative factors

Against all these reasons for optimism, the negative factors must still be kept in mind. They are essentially the same factors which have held back the development of expert systems in the past:

- Too many projects still end in failure—in the sense that they do not produce an operational system of value.
- Although the technology is beginning to settle down there is still too much instability in key areas, such as interfaces and data exchange standards.
- The hype and oversell continues, particularly now in the area of applications shells, raising the resistance level of sceptical users.
- The MIS departments remain justifiably conservative about software innovations, and many will remain reluctant to adopt such a new technology as expert systems until its value has been conclusively demonstrated. Until this happens expert systems will remain primarily an “end-user” phenomenon, with most development taking place in departments responsible for specialized technical functions rather than for dp as such.
- The small size, financial weakness and short track record of many vendors will continue to limit their marketing capability and their credibility as suppliers of vitally important systems.

Some of these negative factors are very serious, but we believe that the momentum which has now built up in the expert systems business is sufficient to overcome them and provide sustained growth. However, the growth will be constrained. Expert systems will creep gradually into the mainstream of data processing, rather than sweeping all before it.