VALUING COMPUTER SOFTWARE AND SOFTWARE COMPANIES

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PART I – AN INTRODUCTION TO SOFTWARE

Software is Everywhere

To begin with the crassest possible announcement: I make a good living from valuing software, but somewhere, deep in me, there is a little Luddite - or perhaps my one-eighth Irish ancestry, which is hesitant to admit the obvious: software is like the air we breathe; we can't live without it.

Like another long established practice, we are hitched to software "for better or worse". It enables airlines to crowd us together like sardines and call it "maximizing passenger loads". It deter-mines the much cursed traffic light sequences, but without them, crime rate would be higher as cops would have to regulate traffic. It also hands-on mobile phone calls from cell-to-cell, thus making it impossible to get away from Bell's "diabolical instrument".

Many of us remember the good old days when checks could take a week or more to clear - software now does it within 24 hours. To our chagrin, credit card charges are entered immediately; long gone is the time when credit card charges from Europe or Asia took at least six weeks to arrive on this continent.

Software also is a key factor in many "medical miracles", At Emory University, doctors have implanted a glass cone in the brain of a patient who suffered a brain stroke. Chemicals encouraged the brain's nerves to link with electrodes inside the cone, allowing the transmission of the brain's electrical impulses to a lap top computer through an antenna like coil on the patient's head. With specialized software the brain's signals could move a cursor across the computer screen and point at messages, such as "see you later", "nice talking with you", "I'm thirsty", "something to eat, please".

Valuing Computer Software and Software Companies
Part I – An Introduction to Software

Every day we come across software that:
- turns off the coffee maker when the brew is just right
- triggers a car's anti-lock brakes
- runs assembly lines
- keeps toilet paper on supermarket shelves
- creates video games that help pigs put on weight faster

And how much software do you think is carried on the Cassini probe? Maybe not quite as much as they've got at Cape Canaveral......

Introduction

"The 21st Century Economy" is being driven by innovation in technology, which to a large extent depend on computers. According to Business Week, August 31, 1998:

The information revolution will continue to boost productivity across the economy. Over the next 10 years, such information-dependent industries as finance, media, and wholesale and retail trade will change the most.

Increasing globalization with simultaneously provide much larger markets and tough foreign competitors. The result: Companies will have even more incentive to innovate while cutting costs.

This Means Increasing Demand for Software
as No Computer Can Do Anything Without It

Today, we have only four hours to discuss "Valuing Computer Software and Software Companies" to which I could devote four days. For simplicity, the presentation has been broken down into four sections and two cases, based on real transactions, which will be discussed after the break.

Part I   An Introduction to Software.
Part II   Technology Outlook, September 1998.
Part III   Valuing Software in use.
Part IV   Valuing Software companies.

In preparing this presentation, I have relied on many published sources, including in particular:

- The 21st Century Economy - Business Week, August 31, 1998
- Technology Insights - Merrill Lynch, September 14, 1998
- The Software Industry, 1998 Annual Report - Deloitte & Touche LLP, May 1998
- 1998 Global Survey of Chief Information Executives - Deloitte Touche Tohmatsu, Spring 1998
- The Top Technology Innovators - Information Week, September 14, 1998

What is Computer Software?

The question is neither irrational nor stupid; remember when Spreadsheets and Financial Projections were done by hand? Using a slide rule was considered progressive. Now, the Pentium on my desk has more power than the whole mainframe at the Wall Street investment bank where I worked over 37 years ago.

Things are going faster and faster, but without software a computer is totally ignorant. The comment by Lady Ada Lovelace, Lord Byron's daughter, who financed Charles Babbage's mechanical predecessor of the computer, still applies:

The Analytical Engine has no pretensions whatever to originate anything. It can only do whatever we know how to order it to perform.

That was in 1843, one hundred and two years before ENIAC, the first successful electronic computer, which took up the whole gymnasium at the University of Pennsylvania.

To put it simply, software instructs a computer what to do, how to do it, and how fast. Computers are expected to become even faster in the near future, and cheaper, due to two recent developments in chip technology: IBM's replacement of aluminum by copper, and Intel's doubling of the amount of data a chip can store; this means that computers will continue to follow the "Moore Law", based on the 1965 pronouncement by Gordon Moore, Co-founder of Intel, that microprocessors double in power and speed every eighteen months. About 2004, this law will come up against the Laws of Physics, but I'm backing Moore.

My own definition of software, based on Webster, is:

"Both the precise sequence of instructions that enable a computer to undertake a particular activity and the writ-ten code, flow charts, sub-routines, objects, languages, procedures, documentation, data, etc. that are used to prepare it".

Types of Software

There are two types of software: Systems Software and Application Software.

Systems Software is essential for any computer to function at all; It includes not only operating systems such as Windows, but also service and utility functions, that handle data management, sorting, merging & conversion, system accounting, diagnostics, performance measurement, report generation, and security control. There are only about 70 varieties in general use.

It is highly unlikely that you will ever have to value Systems Software on its own; normally, except for depreciation purposes, it is grouped with the related hardware. Therefore, we will not discuss it further.

Application Software is that required by any computer to carry out specific functions related to the management, storage and processing of data. We all use it in our offices, for accounting, spread sheets and word processing.

This presentation deals with Application Software and discusses some of the problems of valuing it and the organizations that create it.

Categories of Application Software

There are five main categories of Application Software. These are based on different technologies and serve distinct markets.

- Enterprise: Software products on various platforms that control business processes and activities. They may serve a single vertical market (such as Financial Services), or supply a function (like Accounting) in many industries.
- Packaged: Software that runs on a personal computer or Server; normally used to improve individual productivity, such as word processors, spread sheets and personal information managers.
- Engineering: Software on various platforms that assists in the design and production of items ranging from food to mechanical devices, computer chips and, yes, even other software.
- Edutainment: Software usually running on PCs that offers entertainment or education, mainly oriented to the under twenty crowd. The above mentioned video games for pigs also falls into that category, but I refuse to draw any parallels to couch potatoes.
- Internet/E-Commerce: Software used for accessing the Internet, transmitting information between participants and entering into business transactions. This category is almost totally integrated with services, whether from: a Telco, ISP (Internet Service Provider), Computer Reservations System or Bank ATM (Automated Tele Machine).

What Makes Software Different From Anything Else?

As discussed, today's society is dependent on computers which can't function without software; it is therefore needed by nearly every business and millions of consumers.

- The market life of any particular piece of software is limited, generally assumed to be about two years by investors and tax departments; this is very important when valuing it. However, established programs can often be enhanced to prolong their lifespan over several versions.

- Software is the ultimate intellectual property. Once it has been created, making as many copies as are wanted is easy and cheap; it has therefore a cost structure completely different from that of most goods and services.

- The barriers to entry are normally at the marketing, not the development level. This means that one first must find out if anyone really wants the product, and what advantage it has for any group or sector.

- In most industries there are standards. The world agrees on the layout of car pedals; North America accepts one electric plug and line voltage. Standards also exist for software, but as change happens so rapidly, most are determined by the market, before the official bodies can complete their work.

- Past losses and the amount of shareholders' equity have little importance on software companies' values; in general, these depend on future prospects.

- The major capital expenditure is on R&D, which is written off as incurred. For valuations, such amounts are capitalized to the extent that software assets have been created.

- Factors such as "distribution channels" and "installed base of users" are important intangible assets that do not normally appear in the financial records of a software company.

- Downloading from the Internet is having a profound effect on deployment rates and pricing policies of the whole industry.

- Some types of software, such as "search & retrieval engines", are becoming commodities available on the Internet, sometimes free.

Typical Software Economics

Most industries show declining economies of scale: the bigger an organization or plant gets, the more layers of management and infrastructure are needed. With software, the opposite is true. As manufacturing and distribution costs tend to be fixed and rather low once development is completed, it has increasing economies of scale. This is demonstrated by the following example based on a PC packaged product:

	Company M	**Company C**
Product R & D	$250 million	$200 million
Software Selling Price/Unit	$350.00	$350.00
Variable Costs/Unit	$50.00	$50.00
Share of Market	80%	10%
Units Sold	8 million	1 million
Revenue	$2.8 billion	$350 million
Gross Profit	$2.4 billion	$300 million
S G & A (40%)	$1.1 billion	$140 million
Operating Contribution	$1.3 billion	$160 million
Return on R&D	520%	64%

The result is that whoever is ahead tends to get further ahead, and temporary monopolies are quite normal.

PART II – TECHNOLOGY OUTLOOK SEPTEMBER 1998

Peering Into the Future

In the fall of 1998, it appeared that major changes were taking place in the whole high tech sector of the world's economy. These can be summarized in ten insights:
1. Electronic Commerce is the future of business and the beginning of a frictionless economy.
2. The Internet is generating tremendous opportunities as broad band connectivity becomes widely available.
3. Data has exceeded voice in telecommunications use.
4. Communications equipment is replacing PCs as the driver of semi-conductor growth.
5. "Information Appliances" will supplement and partly replace PCs as users shift from general purpose to specialized computers.
6. Most industry's "supply chains" are undergoing a revolutionary transformation to being demand rather than producer driven.
7. The management of businesses by computers is entering a new phase with Corporate Optimization & Execution Software.
8. Software markets are maturing, and profitability is harder to achieve, leading to much more consolidation.
9. As Software becomes more complicated, services will be the value added function in the information technology industry.
10. The "Millennium Bug" is going to cause an awful lot of problems.

Electronic Commerce

While there are various definitions of Electronic Commerce, we consider that there are the four basic categories set out below. The 1997 figures and 2002 projections come from: Merrill Lynch, Nielsen, First Data, Faukner & Gray, and Forrester Research.

$billion	1997	2002	CAGR %
Business to Business Sales	8.0	327	110
Catalogue	4.8	170	
Auction	1.9	39	
RFP Bidding	1.3	118	
Financial Payments	24.8	40	9.9
Bill Processes	0.2	2	n/a
Travel Arrangements	4.0	6	8.5
.	37.0	375	58%

Despite the apparent dissimilarities all economist's transactions are between computer applications and computer applications. They are business processors related in function, but independent of any particular Software hardware or type of communications. They increase efficiency by reducing the cost, time, errors and labour involved.

Once companies adopt electronic means for processing transactions, they have no reason to return to older methods. Their rapid growth will come from the increasingly available bandwidth of the Internet and availability of software that provides the communications and security for these transactions.

Business-to-business Electronic sales opens up new opportunities for companies to lower their costs through real time exchange of information. Producers can request bids for products and also auction portions of their inventory. Conversely, buyers can request bids to supply goods or services at established prices. As a result, trading may take place in certain standard items, like fasteners, auto parts, in a similar fashion to the traditional commodity markets.

The leading exponent is General Electric, which is handling some $1.5 billion (10%) of its purchases from about 1400 of its 10,000 suppliers. Eventually it plans to place about $5 billion of orders.

Internet Business

The Internet is one of the most astounding developments of recent time, with growth rates exceeding 100% a year for substantial periods; from 1997 to 2001, the number is expected to grow 37% a year to 175 million worldwide. By the year 2004, Merrill Lynch estimates that about 95% of the US population will have Internet access, just slightly less than the 97% with television and well above the 67% with cable TV, and 53% with PCs.

The Internet has tended to be a North American phenomenon; on a per capita basis, Canadians use the Internet, like the telephone, slightly more than Americans. This will change over the next five years with North America's share declining from about 67% to 45%.

Internet Business is made up of five parts:
- Software/Technology companies that provide applications for enabling technology.
- Access/Service Providers.
- Support Organizations involved in web page design, web base support, etc.
- Marketers including online retailers, bill payment, financial services, travel, etc.
- Content Providers/Portals, such as Pointcast, AOL, Yahoo!

The key to the growth is likely to be broad band access. While businesses can install a partial T-1, the consumer, in most cases, is limited to a dial-up connection. This situation is being addressed

by the cable industry, which is looking upon Internet access as a useful, high margin add-on service.

Forrester Research estimates that cable companies will have 13 million (23%) Internet subscribers in the United States, another 5% will have such services from the telephone companies or by satellite, with over 70% relying on slow speed, dial-up systems.

High speed consumer access will expand the use of Internet advertising, which now generates a greater part of total revenues. This is based on the concept that the Internet will evolve along similar lines as television, with Internet Portals acting as aggregators of content and commerce in similar manner as the traditional networks.

Data! The Future of the Telephone

The North American telephone system consists of switched circuits designed for voice traffic. This is growing between 8% and 10% a year while data is doubling each year. Some operators are reporting that data traffic has already exceeded voice and this will be true for all systems by the Year 2000. At these rates of growth 80% of all bandwidth will be needed for data by 2003.

This growth is being driven by three key factors:
- The explosion of Internet traffic.
- Build-out of corporate networks, intranet and extranets.
- Rapid rise in number and concentration of telecommuters.

In the past, the voice and data networks have operated separately, as shown in the diagram below. It is now becoming obvious that it is more cost efficient for organizations to converge their voice network onto their data network as these become more reliable. An April 1998 survey by Merrill Lynch of MIS (Management Information System) Managers at large organizations, one third indicated that they had plans to move voice and data onto a single infrastructure.
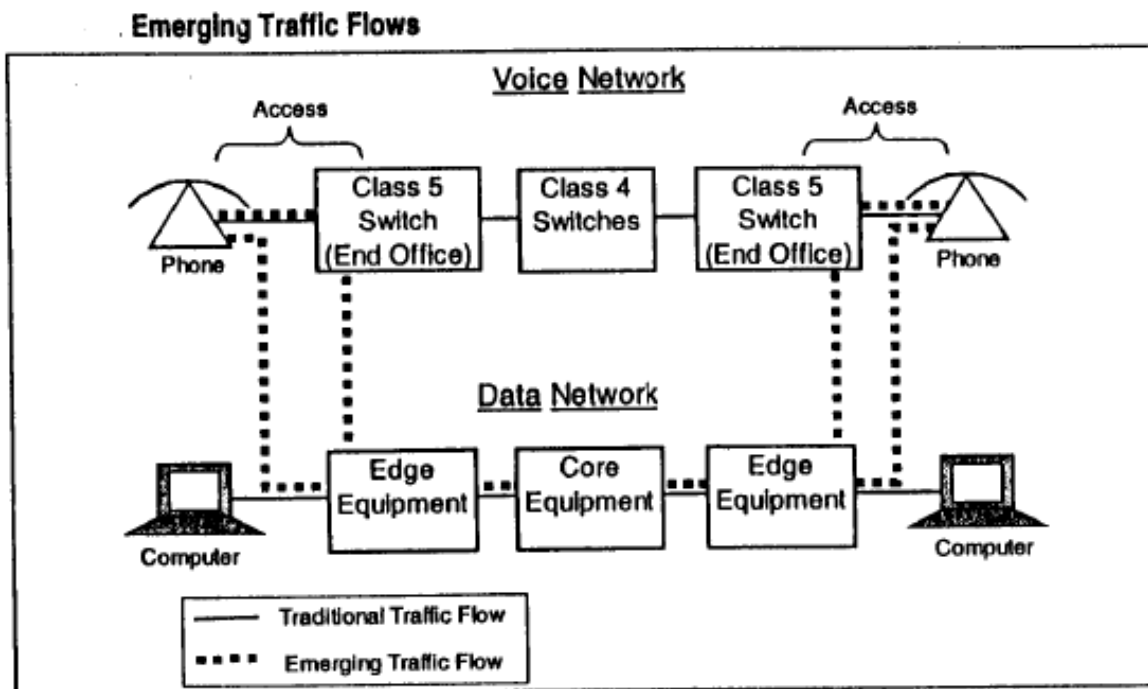
Source: Merrill Lynch

Chips with Everything

The semiconductor industry is in the midst of two major changes. A medium term over capacity and a long term and fundamental shift in demand. The medium term over capacity and the related price weakness was brought about by several years of industry over-spending. As few capacity increases are planned, a cyclical recovery is closer, although further adverse developments are likely, aggravated by the global economic slowdown.

The more important longer-term trend is the shift in demand from the PCs to telecommunications equipment. As the PC market matures, sales will be more cyclical and long term growth lower than in the past. This shift is similar to those that have taken place in past. When the chip industry was first established in the 1940s the key purchasers were aerospace and defense companies. After that came mainframe computer from IBM and Deck, minicomputers from companies like Hewlett-Packard and Data General, as well as Deck and IBM and, finally, for the past 15 years, PCs.

In each case, as market demand for cutting edge chips from older products slowed, so did semi-conductor sales to that market. At the same time, improving technology allowed the creation of chips for the new products that needed the best possible performance. Driving the transition is the need for communications bandwidth to satisfy the demand for data communications previously discussed.

For years, the PC market has lacked a "killer ap" capable of causing a renewed cycle of CPU upgrades. As a result, there has been a move towards lower-priced PCs and cost pressure on all suppliers. Unlike the PC, communications equipment has no need for a standard, highly sophisticated chip similar to the CPU. Its semi-conductor concept is highly specialized and the necessary skills vary widely depending on which segment of the market is being addressed.

The move towards a more fragmented chip industry is also being accelerated by the separation of semi-conducting development and manufacturing. As the cost of fabricating semi-conductors has increased, companies have searched for ways to alleviate the enormous costs of building and operating a "fab". The solution has been the fabless manufacturer, which allows a small company to design an integrated circuit and outsource the manufacturing to a foundry anywhere in the world. This approach has made it possible for many smaller companies to be successful in design intensive markets, such as telecommunications without having the size and economies of scale needed to be a manufacturer.

Information Appliances

The next wave of demand in the computer industry appears to be for information access and that the next important product category will be Appliances. These represent a major change in the evolution of computing, in that they are application specific devices designed to do one or a few things well rather than general purpose units. Appliances are likely to be reasonably intuitive and inexpensive compared with the complex PC; IDC (International Data Corporation) predicts that unit sales of Information Appliances will exceed those of PCs by 2005.

The Appliance, like the toaster, dishwasher and microwave, is based on the KISS (keep it simple, stupid) principal. Many of them will not be considered computers as their main function will not be number crunching but the storing of information. The problem with the PC is difficulty in use. The machine on my desk is more powerful than yesterday's mainframes and almost as hard to use.

An example of the Appliance is the "recipe device" that DIBA (since acquired by Sun Micro intended to market which would be stored underneath the kitchen counter and pull up recipes on demand. Another is the microwave recently demonstrated in Europe by NEC that also allows Internet access for the cook.

The consumer is increasingly driving the information technology industry. Over the next 15 years, the number of technology users is likely to rise from about 100 million today to over one billion. For this to occur, the complexity must be taken out of computing. While a large number of the expected 175 Internet users in 2001 will access it through the PCs and televisions, substantial numbers will be looking for something simple.

When new products are introduced, they do not directly replace existing items but take over the growth. The PC does not replace the mainframe which still sells 17 billion a year, but did capture the majority of new application development; this same is likely to have with the Appliance. The traits that create leaders in one wave tend to work against them in the next. IBM resisted many computers where Digital succeeded, but it, in turn, messed up in PCs. Now Intel and Microsoft must deal with Appliances which will attack the PC from below.

Appliance economics will differ from the PC in that nobody will be able to charge premium prices for the basic technology. Launching a consumer product is expensive and many Appliances are likely to be bundled as part of the service.

The New Supply Chain

Supply chains have been changing for the last twenty years. Originally, they were simple: Manufacturer-Distributor-Retailer. Then the manufacturers became more assemblers with major suppliers undertaking some of the development and delivering complete assemblies rather than individual parts. In the electronic industry it has moved to another stage when the "producer" (OEM) actually only designs, sources and markets the product with all the assembly being handled by sub-contractors.

Such contract manufacturers and specialized delivery organizations have rapidly grown to represent a vital part of many OEMs success. They have allowed: rapid time to-market and time to-volume for new products; lower capital expenditures; reduced inventories; improved material procurement; and rapid logistics. Some firms, such as Selectron Corporation, can handle the whole process from product design right through to order fulfilment.

As manufacturing has been separated from the other items in the production of goods, the major distributors have moved from being wholesalers to service organizations that are focussed on reducing the time and cost for the customer to get its products to market. At the same time, the largest distributors and component suppliers in many industries are establishing global arrangements to serve their OEM; they, too, are taking over significant portions of the supplying chain.

Although the OEM owns the brand name and the product designs, many of them are creating partnerships with the distributors, whereby the distributor obtains customers rather than orders by integrating more with the customers on the day-to-day materials management functions. Distributors and contract managers can both prosper in the New Supply Chain; contract manufacturers have an advantage in high volume products, while distributors can give better service for low volume, high mix products.

Traditionally, OEMs provide contract manufacturers with several months of production expectations and short term sales forecasts. These remain the most problematic part of the Supply Chain process because most OEMs have not demonstrated a consistent record of being able to forecast demand accurately. The contract manufacturer or distributor usually holds the inventory on a consignment basis, which means the OEM is financially responsible. Most contract manufacturers are focussing on increasing inventory turns by continuing improvements in the manufacturing process and increasing use of ERP (Enterprise Resource Planning) Systems.

Enterprise Resource Planning Systems

One of the great success stories of the last five years in the Software industry has been the growth of ERP systems. They promise one database, one application and common screens across an entire multinational organization. Achieving this is extremely difficult, putting all business processes into the same application means integrating everything from human resources, accounting and sales to manufacturing, distribution and purchasing.

The appeal of ERP systems is obvious. Once an order is entered, the transaction ripples through the company. Inventory lists and parts supplies are updated automatically; production schedules, employment records and financial statements reflect every change. Best of all, each employee has the information necessary to do his job efficiently. Sales people know what delivery dates they can promise and managers can see the effects of the day's activities almost immediately.

The origin of ERP goes back to the 1960s and 70s, based on the idea that computers would enable only the proper amount of materials to be purchased for orders on hand, with delivery when required, thus reducing inventory. Today all such systems offer:

Finance & Accounting	Material Management &
Sales & Distribution	Inventory Control
Budgeting & Planning	Master Scheduling
Human Resource & Personnel	Work Order Management
Capital Asset Management	Logistics & Warehouse
Purchasing & Sourcing	Management

Today's ERP adds features, such as: quality control, process operation management, regulatory reporting "available-to-promise", demand planning, supply network planning, production planning and detailed scheduling are being implemented, often using various optimization techniques.

Implementation of an ERP system may require the re-engineering of some of the company's business processes to take advantage of the capabilities of the software. Every ERP system is fully integrated and will not deliver the expected benefits if particular units say "you didn't involve me" and insist on continuing to operate as they did in the past. Many senior managers rebel at the idea

that how they carry on the business should be determined by the information system and require extensive stroking during implementation.

Corporate Optimization & Execution Systems

The ERP market has become very large; in 1997, 20,000 companies worldwide, paid about US $14.4 billion to ERP vendors. According to Advanced Manufacturing Research ("AMR"), a Boston management consultant, the total cost of the ERP was about US $42 billion in that year, including services, hardware, databases and networking. Revenue in 1997 had grown 40% from 1996, which had risen by 43% from 1995. The market is expected to have a CAGR of 36% and reach $52 billion in 2002.

The COES (Corporate Optimization & Execution Systems) segment includes: Supply Chain Planning & Optimization, Maintenance/ Repair/Overhaul (MRO) Management, Enterprise Asset Management, Warehouse Management Systems (WMS), Transportation Execution Systems (TES), Component & Supplier Management, Product Data Management and Customer Interaction Systems (CIS). ERP Automated Internal Business Processes, such as, Manufacturing, Financials and Human Resources; However, ERP systems were exclusively focussed on real time automation of these processes.

The latest trend is software (COES) focussed on more proactive, predictive manufacture and delivery of goods and services to the consumer. This software is outward looking in nature, leverages, core internet technologies and should add as much value as ERP. The rise of COES has been spurred by a fundamental shift in the global manufacture of goods and the delivery of services combined with increasingly savvy consumers.

Producers need to turn inventory more rapidly, deliver specialized products in increasing volumes and source supplies globally. At the same time consumers expect quicker delivery times, flexible choices and more responsive service and support. At present, most COES activity focusses on SCM (Supply Chain Management) software. The next wave of integration, which is being accelerated by the Year 2000 issue, will push SCM through many layers of suppliers.

While ERP handles internal transactions, COES is designed to synchronize external transactions and optimize deliveries from suppliers to the producer, and then to the consumer. It includes three types of systems: Planning/Decision Support, Execution and Management as shown in the table on the next page. This excludes the front end for ERP and COES, the Customer Interaction System. CIS software spans the entire sales cycle, from initial contact to Call Centre Administration. It combines contact management or sales force automation systems with product configuration management so that a firm has only one customer profile.

Enterprise Information Systems

Enterprise Information Systems have not yet arrived, but are expected to evolve and compliment the COES market by offering "complete information solutions" and interactive analytical applications specifically tailored for particular industries. They are expected to offer help to management ("what market should we be in?"), accountants ("what may happen") and line managers ("what has happened").
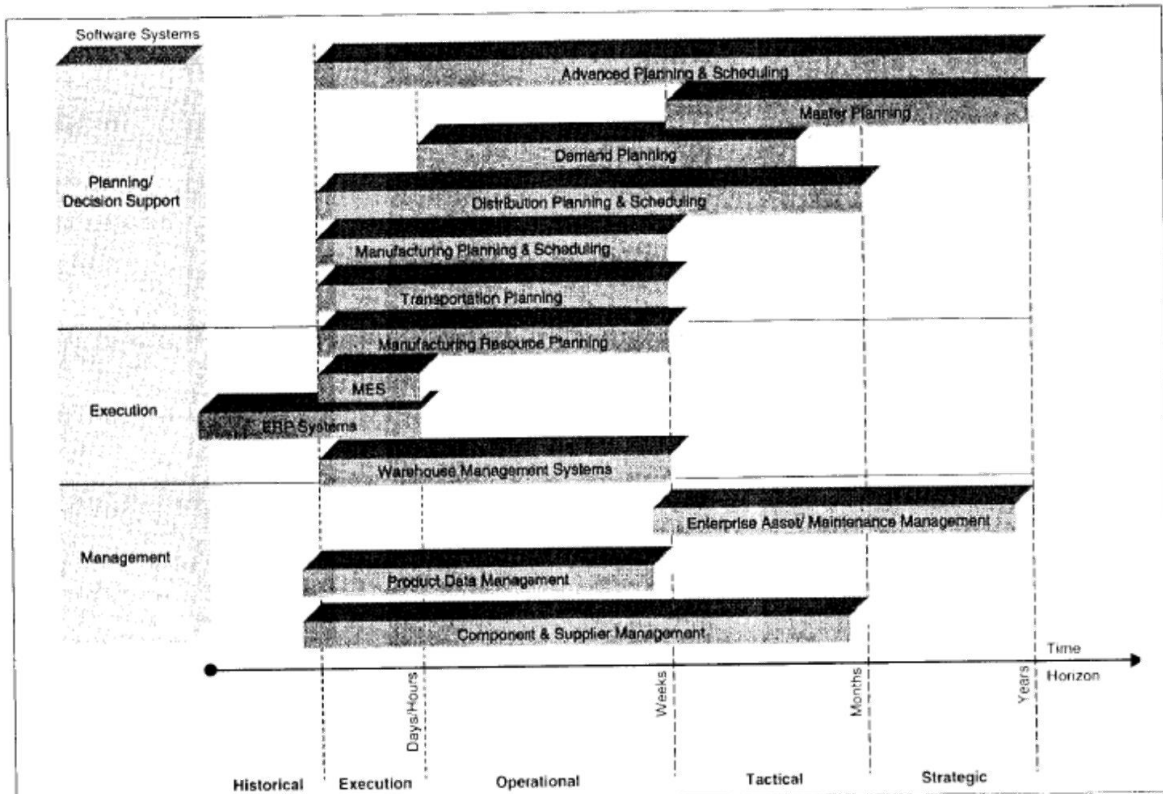
Source: Merrill Lynch

Software Markets Are Maturing

In all segments of the software market, other than packaged, the structure is slowly becoming one of up to a half dozen leading vendors accompanied by scores of smaller firms typically providing highly specialized products, many of which are integrated, or used in conjunction, with systems from the major suppliers. The exception, Packaged software, is dominated by Microsoft's "Office" suite which has over a 75% market share.

Overall the traditional software markets are growing more slowly (about 15% a year) than in the past with the notable exception of Internet/E-Commerce and the impact of online gaming and location-based entertainment on the Edutainment products. In addition to the obvious impact of the decline in the Asian economies on everybody but Microsoft, sales are being influenced by the

increasing importance of replacement/upgrade business (leading to maintained market shares) and the rise of "good enough, cheap enough" solutions, which are attracting cost conscious new buyers.

The major software producers have a history of acquiring small companies to improve or expand their technology base at complimentary products or extending their markets. This consolidation trend is likely to continue with purchases being made not only by the majors, as a company must achieve a critical mass if it is to remain independent. All purchasers seek to extend their market, integrate related product lines, expand distribution, increase their customer base and perhaps, most of all, add to market share.

Numerous products have relatively high shares of small markets in which they have in effect created a strong "brand presence". Most of these have revenues of less than $50 million and address specific functions or applications. Such companies are acquisition candidates, especially as "small cap" software companies, excluding those involved in the Internet, are no longer being given high multiples by the stock market.

In 1997, worldwide IT companies undertook 4,040 M&A transactions for consideration $243 billion; North American M&A increased 31% to 2,577 (64%) valued at $159 billion (65%). Software companies represented 1,287 transactions (32%) for $31.5 billion (13%); these figures were up 30% and 36% respectively from 1996. Activity, in 1997 and even more so in 1998, was accelerated by the slowdown of IPOs. More privately owned companies turned to M&A to avoid the uncertainty of the IPO market.

Services – The Value Added Function

Outsourcing of a firm's information technology operations is surging as organizations farm out the operations of their data centres and bring in outside help to assist an IT operations. This action, together with systems integrating, contract programming, and consulting form the elements needed to establish a leading edge data processing infrastructure. In this approach, hardware and software are interchangeable, upgradeable components, while services "make it happen".

This trend has been accelerated in recent years by five key factors.
- Shortage of technically skilled personnel.
- The challenge of reprogramming for the Year 2000 and the introduction of the Euro.
- Increasing rate of technology change leading to useful lives of two years or less for some software.
- The requirements of implementing ERP systems.
- Avoiding finger pointing by one stop shopping with "primer contractor" responsibility.

As business operations become more dependent on IT, the services have advanced to become more integrated with the installation and operation of hardware and software. Consulting has moved

from strategic IT planning to process re-engineering. Infrastructure building has transitioned from systems integration to COES implementations. Management needs to handle not only data centre operations but also "help desks", desktop PC administration, and network supervision.

Most computer hardware and software companies have realized that it is essential to be able to offer services as customers are increasingly seeking "end-to-end vendor solutions". IBM established its global services group which has been extremely successful in obtaining outsourcing contracts and in supplying services in support of IBM's hardware and software businesses. Compaq acquired Digital, partly to obtain its services capability which is expected to result in faster adoption of Compaq's hardware in major corporations.

The Millennium Bug

It has never happened before, and it will probably never happen again. No technical hitch has ever been so pervasive, so expensive or so potentially damaging as the failure of many of the world's computer systems to under-stand the difference between dates in this century and the next. Ludicrous in its banality but frightening in the unpredictability of its consequences, the "Year 2000 problem" is already the main preoccupation of I T departments around the world. As the millennium approaches, it will increasingly preoccupy policy makers and the public.

The Millennium bug arises because from the introduction of the computer in the late 1940s to about 1980 most computer programmers assumed the dates were 19XX so as to minimize the use of the then expensive memory. Now, because "00" is the two-digit code for the Year 2000, there are possibilities that a computer may interpret the date as 1900, and either generate totally erroneous output or cause the system to fail.

My partner and I made a presentation to the NACVA Annual Meeting in May of this year on the impact of the Millennium Bug on valuations in general. Our conclusion was that the Millennium Bug will reduce the value of most businesses because of:
*   Reductions in 1999 revenues due to an economic slowdown
*   One-time costs of Compliance, affecting profits 2001
*   Less sales to non-compliant customers and declines in Sustainable Net Income
*   Costs of replacing existing relationships if other members of your network fail to comply
*   Chances and dangers of not meeting the deadline
*   Possible 1999 recession, global or merely in your plant
*   Reduction or elimination of bank support
*   Significant potential for litigation

PART III – VALUATION OF SOFTWARE IN USE

Software In Use

It would take a several hundred page book to describe all the types of application software one might find in a corporation. Using our five categories, I have listed some of the software that you are likely to find and will then discuss the approach to valuating one type of Enterprise Software, ERP or SCM products; it will run on a wide variety of machines ranging from legacy mainframes to the latest desktop unit using a range of operating systems.

Enterprise

- Accounting/Databases
- E-Mail
- EDI (Electronic Data Interface)
- Business Intelligence/Data Warehouse
- ERP/SCM (Supply Chain Management)/COES
- SFA (Sales Force Automation)
- Customer Care/Call Centre

Packaged

- Word Processing
- Spreadsheet
- Presentation/Desktop Publishing
- Databases
- Text translation

Engineering

- CAD (Computer Assisted Design)/CAM (Computer Assisted Manufacturing)
- GIS (Geographical Information System)
- Visualization
- EDA (Electronic Design Automation)
- MDA (Mechanical Design Automation)

Edutainment

- Training

Internet/E-Commerce

- Browsers
- Servers
- Intranet

Valuation of an ERP System

Traditionally the Valuation Analyst uses three approaches: Cost, Income and Market. For the valuation of software in use, the Market approach can obviously not be applied and therefore we are limited to Cost and Income.

Cost

Unfortunately, a large number of the costs incurred in installing an ERP system are not easily identifiable. They include: the license and maintenance payments to the software vendor; the cost of consultants used in the implementation the staff time and overhead required for the planning and process re-engineering and the loss of production during the tune-up phase.

While rules of thumb don't normally apply in the software field, experience has shown that the additional external expenditures for an ERP system amount to between three and four times the initial cost of the license, and the total cost can be up to eight times that amount.

Income

As with costs, establishing the Income, or preferably cash flow benefits, of an ERP system is difficult. In most cases, this introduction results in things being done that otherwise would not have been done, resulting changes in the cost structure. To the extent that activity-based costing (ABC) is in place or management can identify specific savings, the income contribution of the ERP system can be ascertained. If this has not been done, CVS has found that looking at changes in cash flow margin covering the year before, the year of, and the year following its installation, give a measure of the profit impact.

Our approach is to establish the Discounted Cash Flow Value using a relatively short life of five years with no residual value. As virtually all the costs can be written off for tax purposes, very rapidly, we prepare the Valuation on a pre-tax basis, applying a pre-tax WACC (Weighted Average Cost of Capital).

In general we find that the income approach gives a lower value than the "full cost" and therefore adopt that; in the cases where the income approach gives a higher value, we prefer to be conservative and stay with the cost; i.e., lower of Cost or Income.

A Cautionary Tale

When FoxMeyer Drug Company decided in 1994 to replace its legacy mainframe systems in a $65 million ERP project, the firm's CIO (Chief Information Officer) said, "we are betting our company on this". Within three years, the system had failed to deliver the expected benefits, the pharmaceutical company filed for bankruptcy and had to sell off a major business unit to a competitor.

The real culprit in the story is not IT, ERP, or Client/Server technology, it's unrealistic, "magic bullet" thinking about IT and its benefits. Magic bullets are technologies and methodologies that people believe can do remarkable things with little or not human intervention. A belief in IT's magic powers is widespread and plays an important role not only in IT project problems, but also business failures.

In the middle of the ERP implementation, FoxMeyer had the bad luck to lose a customer that accounted for 15% of its sales, but the major problem was a series of risky bets.

- At the same time as the ERP implementation, the company embarked on an $18 million state-of-the art computerized warehouse; this encountered severe technical problems, resulting in $15 million of inventory losses.
- To regain lost sales, the managers signed a contract with a new customer at prices that assumed the projected $40 million annual benefits would be realized right away.
- To accommodate the new customer, the deadline for the ERP system going live was pushed forward by 90 days, which prevented the re-engineering of some business processes.

The results were predictable. The ERP started up on time and customer orders were filled; however, widespread data errors led to inaccurate sales histories limiting the ability to benefit from forecasting inventory requirements. Ultimately, the firm realized less than half the projected savings.

Build v Buy

Advantages of Building

- You get exactly what you want

Disadvantages of Building

- Cost over-runs
- Timing uncertainties
- Diversion of management and other resources

Advantages of Buying

- Cost is known and can be tied to performance
- Debugging will be substantially completed
- Speed

Disadvantages of Buying

- Procedures may have to be changed to suit the system
- May be more expensive
- Likely not exclusive

The Globe and Mail, of Toronto reported on September 16, 1997:

> "A software glitch led to the shutdown of a discount airline, Vistajet Inc., at midnight Friday, leaving a trail of angry passengers, unpaid bills and laid-off employees, according to Dave LeClair, president of Alliance Call Centre (London) Inc. [Ontario].

> "His firm operated Vistajet's reservations centre and he blamed Vistajet's self-written software for losing up to half of the airline's customer calls.

> "There was definitely demand [for their flights] out there, he said. They were getting 3,000 calls a day. But they made a decision to use their own company-owned reservations system. They developed it and did their own software. But it caused a lot of problems.

> "Ironically, he said, the London, Ontario company, which began service May 26, was getting ready to install a proven airline reservations system when it ceased operations."

Accounting for (Software) Twinkies

Peter Huber, Forbes February 24, 1997

> "A dollar spent on a toaster doesn't reduce your wealth in the same way as one spent on a Twinkie. One lasts, the other doesn't. But where do toasters end and Twinkies begin in the information economy?

> "Tax collectors and securities' regulators tell American corporations how to make that call. Washington's accounting rules insist that land values last forever, brick and metal for 10 to 30 years, and your typical silicon chip for 5 or 10. Windows 95, and the cost of training human wetware to use it, are all pure Twinkie. Officially, that is.

> "But suppose Washington has it backwards. Say that only half the value of buying Windows 95 for your office is to make your workers more productive this year. The other half is to keep your office moving with the rising tide of software - to prepare for Windows 97. Which you'll buy for the same, divided purposes. The useful life of the software may depend largely on how long you retain your Windows-trained employees, whose productivity may grow year after year, commensurately with the power of the software they have mastered.

> "Maybe learning how to use E-mail prepares you for even more productive use of the Web two years later. Maybe the painful cost of connecting up your first, slow office network not only pays for itself in a year or two, but slashes the cost of up-grading for the next fifty. Maybe productivity just keeps rising as one layer of software wisdom is spread over the next.

"If your accounts told that story, your P&L statement might look very different. When Disney pours millions into the next digital 'Hunchback', it's a good bet that this kind of software will gene-rate income for decades to come. The rest of America has made massive software investments of its own. Now playing on a desktop near you.

"Meanwhile, the once durable desks, computers and buildings are getting Twinkies. When you run out of disk space or processing power, which do you throw out, your software and files, or your old computer? When networking software lets a credit card company abandon expensive real estate in Manhattan for cheap quarters in Nebraska, the Twinkie is eating the toaster.

"Accountants understand the general problem, but they don't know what to do about it. Capitalizing anything that you can't drop on your foot - software, worker training, America Online's marketing expenses - can be hugely speculative. You never find out whether such things have real future value until the future arrives. So securities regulators insist on expensing them to prevent inflated valuations. Tax collectors go the other direction in order to maximize their revenue. If the Internal Revenue Service had its way, you would have to capitalize everything from airline engine maintenance to advertising.

"Should we trust the accounting directives that issue from either government agency? For years, Washington quietly and earnestly miscalculated the inflation rate. Suddenly we learn that decades of numbers on productivity, wages, tax rates and Social Security are all wrong. The deficit figures may be wrong too, because they don't track capital investment. The fact is, Washington is losing its grip on economic reality."

Year 2000 Risks

The Year 2000 will have an immense impact on every organization. Not only must computer code be modified, but also all embedded chips must be checked. I suggest that everybody read the paper we presented to the NACVA Annual Conference in May and think hard about the impact on any transaction that they are involved with.

If the business:
- Uses a computer, fax machine, telephone, cell phone, cash register or time clock;
- Has a computer network;
- Operates computerized production machinery or equipment;
- Relies on automated burglar or fire alarms, sprinkler or lighting systems or building access controls;

it may have a Year 2000 problem.

With respect to valuing the software used by a company, the status of the Year 2000 remediation and compliance program is probably the single most important factor creating or destroying value. The first thing that must be done is to identify which programs should be retained and fixed and which fall into the category "were better off just building a whole new one rather than trying to make it Year 2000 compliant."

In the case of one insurance company in Chicago that we valued in 1997, we concluded that the software for the underwriting and claims system had a substantial negative value; it was not year 2000 compliant, the Source Code was lost so modification was difficult and, although suitable for the state of Illinois, the fact that many portions were "hard wired", had, in our view, contributed to the underwriting losses incurred in two other states. Our negative value was reflected in the acquisition price.

The major risk that must always be considered with respect to the Year 2000 is that of litigation. Is the company liable to be sued because of interruption in delivery following delays by suppliers? Have all the necessary steps been taken to deal with the problem as set out on the next page.

Year 2000 Assessment

- Does the firm have a Year 2000 program, including a formal plan?
- Does the firm's President or owner conduct formal monthly reviews of total progress in addressing the Year 2000 problem?
- Has the organization committed or obtained all the necessary resources (internal staff, external consultants, test systems and required funding - cash or loans) for the Year 2000 project?
- Does the Year 2000 program cover all date-sensitive systems including, but not limited to computers, applications, manufacturing and production, materials process flow, data and voice communications, power distribution, facilities control and security?
- Has the organization developed a detailed Year 2000 project plan that includes a complete Year 2000 technology inventory, business risks, defined steps for correcting the problem, correction planned well in advance of the date when each system will fail if not corrected rigorous test plans and contingency plans in the event of failure?
- Have they identified and corrected any potential date problems with software applications that you have created, such as spreadsheets or database applications in addition to applications and software you have purchased?
- Are they taking steps to ensure that all applications and systems that are essential to running your business are currently Year 2000 ready or will be ready in time?
- Does the organization currently require proof of Year 2000 readiness for all technology and equipment purchases?

- Are they taking steps to ensure that all of their significant business partners (suppliers, customers and others) are currently Year 2000 ready or will be ready in time?
- Are they taking steps to ensure that all electronic information exchanges with your business partners (such as point-of-sale systems, credit card systems, and Electronic Data Interchange applications) are Year 2000 ready now or will be ready in time?

Year 2000 Scorecard

Failures

In July 1998, 40% of the 128 IT managers in Cap Gemini's quarterly survey reported year 2000-related operational failures, up from 37% in April

Among those reporting failures:
- 87% report processing disruptions
- 62% report financial miscalculations or losses
- 44% report logistics or supplying chain problems
- 38% report customer-service problems

Planning

- 87% say they underestimated year 2000 costs, compared with 82% in December
- 86% have detailed year 2000 plans in place, up from 33% in December
- 86% have also launched full-fledged year 2000 strategies, up from 20% in December
- 72% now focus on contingency planning, compared with 3% in April

A survey of the transportation industry carried out in August for a special Senate Committee found:
- Two-thirds of the companies that responded haven't finished assessing their systems
- None had completed contingency plans and only half were working on such plans
- Though 94% expect to complete their year 2000 projects in time, 50% anticipate being involved in year 2000 litigation

PART IV – VALUATION OF A SOFTWARE COMPANY

Value Drivers

Benefits

- Markets
- Technology
- Products
- Customer Base
- Positioning/Brand Names
- Delivery Mechanism
- Management/Staff
- R&D Team
- Growth

Risks

- Competition
- Technology
- Management
- Size
- Capitalization
- Product Range
- Dependence
- Location
- Environmental Impact
- Ease of Entry
- Margins & Variability
- Regulatory Situation
- Interest Rates
- Enthusiasm
- Measure of how investors perceive the industry or group.

In most businesses, selling prices are dictated by the market, with high margins coming from low costs. Software prices are set by what it can do for the customer; therefore, functionality and price, not cost, determine the margins and is one of the keys to value. A critical part of the valuation process is discovering if the firm, or its products, has a special edge that enables it to charge a premium price for a product in high demand.

There Are No Rules of Thumb

- In most industries, there are broad trends that are relatively easy for the valuation analyst to understand, as well as the long term effects that have a bearing on that sector of the economy. With numerous transactions, "Rules of Thumb" have become established.
- There are very few broad trends or long term effects in the software industry and certainly no such universally applicable rules. Nearly every situation is an exception in some way or other.
- There are lots of Software companies, but they usually don't have a high value, as shown by the statistics on Software Acquisitions for the last four and a half years:

$ million	Transactions	Median Size
1994	137	10.5
1995	253	8.6
1996	290	10.5
1997	359	7.4
1998 (to June 30)	212	9.2

Those statistics may not seem out of the ordinary until it comes to specifics, such as the position taken by the IRS; very often, loo-king to public comparables, they IRS assumes that a software company's value is too high, a fixation that can have rather disagreeable effects:

- The tax position of an employee granted an option;
- Discouraging investors and curtailing the ability to raise financing;
- In some States, adverse impact on divorce proceedings.

Products and Companies

The majority of software companies is small; therefore, in most cases,

The Product Is The Company!

This has advantages as well as disadvantages. Products can be very lucrative while they flourish, but they are generally short lived. That means that unless the company constantly updates, enhances and replaces the software, your client should not count on gains on the shares putting his children through college, or using them to set up trust funds for the grands.

For larger entities, the Value of the Company consists of:

- The Value of the Products, plus:
    - The Franchise Value of the organization
        - Skilled staff
        - Products under Development
        - Relationships with Customers,
        - Distributors, Suppliers, etc.
        - Opportunities for Innovation.

Moore's Law

The cost of computing power drops roughly 30% every year and microchips double in performance every 18 months.

Technology

The product life cycle is fundamental:
- May be driven by hardware capabilities or customer needs
- Economic lives have been decreasing
- Yet the "tail" is becoming longer
- Intranets within organizations and the Internet linking them are having a fundamental impact
- There is a shift from in-house creation (BUILD) to customization of packaged products (BUY)
- The Year 2000 will be here in 26 months

The degree of elegance of the solution is important:
- The choice of Operating System and language
- The suitability of the architecture
- The quality of the Source Code and completeness of its documentation and comments
- Ease of modification

The programming team:
- Number of people
- Their experience
- Purpose-oriented internal communications

The Platform/Operating System:
- A trend to move from mainframe to Client/Server
- The importance of networking
- Growth of NT v UNIX

The Market

- Size: Value increases with size due to increasing returns
- Growth: Value is enhanced by a rapidly growing market
- Usage: The more people use or might use a product, the more valuable it is

Market Cycle, based on "Crossing the Chasm" by Geoffrey Moore:
- Innovators
- Visionaries (early adopters)
- The CHASM
- Pragmatists
- The Second Gap
- Conservatives
- Laggards

The CHASM can be enormous; some companies/technologies are never able to cross it.

Visionaries	**Pragmatists**
Intuitive	Analytic
Support revolution	Support evolution
Contrarian	Conformist
Break away from the pack	Stay with the herd
Follow their own dictates	Consult with their colleagues
Take risks	Manage risks
Motivated by future opportunities	Motivated by present problems
Seek what is possible	Pursue what is probable

Once a product is starting to be bought by the Pragmatists, its value jumps.

Size and Growth of Market

- Every piece of Software uses a selected set of technologies; in this industry, technologies change very rapidly. When a new technology is introduced, it may allow a competitive product to offer better features. Depending on circumstances, the original product may not be able to take advantage of the new technology, because certain elements may be mutually exclusive. In this case, the potential market will be reduced and the value decreases

- The demonstrated size of the market for the competitive pro-duct and the penetration by a specific technology are a guide to the probable market share of the product being valued
- Rates of growth vary widely, depending on the maturity of the technology and the market. A new solution in a stagnant market can totally change growth rates

Competition

If there is no competition, there may be no market. On the other hand, enormous mass markets have been created for products nobody knew they wanted, such as hi-fi's, condos, cruises or health food stores. In 1950, Thomas J. Watson Jr., Executive Vice President of IBM, approved creation of their first general purpose scientific computer, as they thought they "could find customers for as many as 30 machines". At the time, there were probably only a dozen computers in existence.

Almost every piece of software is:
- Replacing an existing solution
- Competing head to head with alternatives
- Threatened by a novel approach

All three threats may occur simultaneously.

Positioning

Determines the place the software occupies within two interrelated systems:
- The customer's choices for purchase
- Companies interacting to make a market
- For valuation analysts, the second system is more important, as it determines the first

Market-Maker's View of the Marketplace

New Market	Imperialists v Natives	Explorers & Forty-niners
Established Market	Old Guard: • Gorillas • Chimpanzees • Monkey	Barbarians v Citizens
	Established Product	**New Product**

Understanding this situation is important to the valuation analyst, as a firm's future and the prospects for the product are influenced by Management's perception of itself. Each role implies different power relationships, alliances, and competitors.

A firm that does not recognize itself as one of the archetypes is likely to be considered just another 'no name' company, easily ignored by the market and not expected to be around for long. This can become a self-fulfilling prophecy, since survival requires a certain amount of industry support.

This and the next sections are based on "Crossing the Chasm" and "Inside the Tornado" by Geoffrey Moore, the best works I know on "Hi-Tech" marketing.

Software: The 'B' Movie

- The Old Guard - the Gorilla: The only question is whether it is a benevolent or cruel dictator; altruism rarely enters the picture
- The Old Guard - Chimpanzees: A threat to the Gorilla and a target for Monkeys, Chimpanzees must secure their power bases by retrenching into niche markets, building up sufficient product advantage to ward off attacks, and telling everyone they are not interested in expansion but prepared to defend their turf to the death
- The Old Guard - Monkeys: Their goal is to be the low-cost supplier who is easiest to do business with
- Imperialists: Members of the Old Guard who have extended established products into new markets, either geographically by deeper penetration, or through adoption of a new platform
- Natives: The mirror image of the Imperialist; instead of new technology, they have access to the customer through superb distribution and communications channels
- The Explorers: Oriented to new products and new markets, they are disquieting because they do not seek immediate profit and are in for the long haul
- Forty-Niners: The most different from other companies, they claim to have found gold and are recruiting partners to cross the CHASM and mine it
- Barbarians: They attack a contested piece of the market with pincer movements, the way UNIX gradually wrapped itself around mainframes
- Citizens: Related to the Old Guard, they fight a war of attrition and counter-attack with new technology to preserve their position

Delivery Mechanism

Marketing

- Nothing sells itself
- Does management understand the market and how to reach it?
- Marketing is rarely taught in Engineering, Science or Math Faculties

Distribution

- Is the distribution method geared to the needs of the sector

- Direct selling is effective, with good margins, but very expensive
- Channel marketing through Systems Integrators or VARs (Value Added Resellers) requires a totally different structure
- The Internet offers low-cost distribution, usually at reduced prices; it can be regarded as the software five-and-dime of the nineties

Sales Cycle

- Its length determines the appropriate selling method
- PC packaged products can be sold in a few minutes
- A sale of Enterprise software to a government agency can take as long as two years

Capital

- How much capital is needed to see the company through its product and sales cycles?

Management

Range of Talents

- A wide range of skills is of greater importance in a software company than in most businesses
- One-man shows don't fly

Track Records

- It is very difficult to analyze how much was due to the individual and how much to the team and circumstances
- A failure, or even two, do not necessarily mean bad management, but may become part of the learning curve

Enthusiasm and Tenacity

- Is everyone willing to put in the hours and accept the risks necessary to make a software company grow?

Realism

- Do the projections look like a hockey stick
- A $5 million company can grow by more than 100% for a   couple of years, but not a $100 million business; very few firms go from nothing to $50 million in two years

Ownership

- How much of the company does management own
- Outside ownership and directors are essential to avoid complacency and ensure responsiveness to the market

Avoid

- In this industry, beware of sharp dressers, and don't let bankers or lawyers make the decisions; "grunge is good"

Approaches to Valuation

Cost Based

- Original cost to create the product; this is usually very high as it may involve many blind alleys
- Reproduction Cost of Software; this is generally very low
- Replacement Cost of Software and Documentation, reflecting not only the expenditures to recreate, but also "time to market" and the cost of re-establishing the user/dealer base
- Net Worth/Goodwill Value

Income Based

- Capitalization of Net Income (Net Income Value)
- Capitalization of EBITDA (Earnings Before Interest, Taxes, Depreciation & Amortization)
- Discounted Cash Flow (Adjusted Present Value):
  o Use managerially relevant segments for the existing operations and value each of them separately
  o Segregate the tax shield
  o Identify potential opportunities

Transaction Based

- Multiple of Revenues
  o Trends
  o Substantial variations

Acquired in-Process R & D

Under Purchase Accounting Rules, in-process R & D is one asset to which part of the total purchase price allocated; substantial amounts are found in industries, such as software, electronics, computer hardware, semi-conductors, biotechnology, pharmaceuticals and medical devices. Under APB Opinions Nos. 16 and 17, SFAS No. 2 and FASB 86, such R & D can be written off at the time of the acquisition. The key is to:
- Describe the nature of the In-process R & D and determine the stage of development; the write-off is the largest, immediately before the "Project" becomes a "Product".
- Establish that at the acquisition date, its technological feasibility had not yet been established and no future alternative use was known.
- Value the projects.

The acquirer should apply the same policies in determining the stage of completion of the Acquired In-process R & D as to internally developed projects. Some of the factors to be considered are: the nature, amount, and timing of the remaining expenditures necessary to develop any In-process R & D Project into a commercially viable product.

The SEC has stated that In-process R & D cannot be valued as a "residual" amount similar to Goodwill; they reject the argument that the nature and stage of the acquired company's development implies all excess value beyond identifiable assets to be In-process R & D. They believe that there are many other Identifiable Intangible Items exist in business combinations that involve significant technology. While FASB Interpretation No. 4 suggests that the cost of In-process R & D is not a suitable approach to establish its value, the SEC may consider replacement costs of the project to the purchaser.

The preferred approach is the Adjusted Discounted Cash Flow Value; this uses projected cash flows segregated into current, pipeline (In-process R & D) and future products. These cash flows should be discounted at the WACC after being adjusted for specific risks of: successful completion of R & D projects; economic production of the products and their satisfactory market acceptance. The DCF Value must also reflect the tax shield from the deductibility of all costs; the DCF calculations should reflect an economic life that does not exceed seven years with no residual.

Market Comparables

A standard valuation technique is the use of public market comparables. For high tech companies, this is rather more complex than for the traditional "smoke stack" industry. On the following pages, we have listed a selection of software and computer service companies from the "Information Week 100 Index". They show very a range of plus XX% to minus XX% in the week from September 2 to September 9 and XX% to XX% in the year.

With such major swings, CVS does not consider that the price of a high tech stock at any particular moment directly represents the Fair Market Value of the underlying company. We prefer to use a moving average of perhaps the 20 or so trading days for those relatively stable and a longer term, 200-day moving average for those such as Forte Software with a high/low ratio of nearly six times.

INFORMATION WEEK 100

COMPANY	TICKER	PRICE		'52 WEEKS		CHANGE	
		SEPT. 9	SEPT. 2	HIGH	LOW	WEEK	YEAR
Adobe Systems	ADBE	28.00	25.00	53.13	23.63	12.0%	124.8%
Baan Co.	BAANF	30.75	30.44	55.50	28.38	1.0%	95.6%
BMC Software	BMCS	50.38	49.00	58.50	27.38	2.8%	113.7%
Check Point Software	CHKPF	18.25	21.50	50.50	17.13	-15.1%	194.8%
Computer Associates	CA	30.00	31.25	61.94	26.00	-4.0%	138.2%
Computer Sciences	CSC	65.44	63.44	70.00	33.63	3.2%	108.1%
CyberCash	CYCH	8.75	9.06	27.75	7.50	-3.4%	270.0%
Documentum	DCTM	38.50	38.84	59.63	26.00	-0.9%	129.3%
EDS	EDS	35.25	35.56	50.88	29.56	-0.9%	72.1%
Forte Software	FRTE	3.50	3.38	16.56	2.78	3.6%	495.7%
Hummingbird	HUMCF	18.88	19.06	54.25	18.00	-0.9%	201.4%
Hyperion Solutions	HYSL	26.88	27.38	48.63	23.50	-1.8%	106.9%
i2 Technologies	ITWO	14.44	13.94	42.25	12.63	3.6%	234.5%
Informix	IFMX	4.13	4.19	10.75	3.50	-1.4%	207.1%
JD Edwards	JDEC	42.25	42.97	46.25	24.88	-1.7%	85.9%
Kerne	KEA	45.88	44.13	60.94	24.00	4.0%	153.9%
Legato Systems	LGTO	48.94	44.00	51.00	14.81	11.2%	244.4%
Lernout & Hauspie	LHSPF	44.00	44.25	68.00	14.50	-0.6%	369.0%
Manugistics Group	MANU	12.50	15.06	66.38	13.50	-17.0%	391.7%
Microsoft	MSFT	102.25	100.56	119.63	59.00	1.7%	102.8%
Netscape	NSCP	21.88	22.63	44.63	14.88	-3.3%	199.9%
Novell	NOVL	10.75	10.50	13.63	6.81	2.4%	100.1%
Oracle	ORCL	21.81	20.31	40.06	17.63	7.4%	127.2%
PeopleSoft	PSFT	32.81	30.50	57.44	26.88	7.6%	113.7%
Platinum Technology	PLAT	21.00	20.94	34.31	17.00	0.3%	101.8%
Rational Software	RATL	14.44	13.31	23.13	7.06	8.5%	227.6%
SAP	SAP	50.75	48.50	62.25	19.75	4.6%	215.2%
Sterling Software	SSW	22.19	21.19	32.81	16.25	4.7%	101.9%
Sybase	SYBS	6.19	6.69	23.63	5.56	-7.5%	325.0%
Symantec	SYMC	18.50	20.31	32.63	16.38	-8.9%	99.2%
Veritas Software	VRTS	48.56	48.19	58.25	23.00	0.8%	153.3%
Versant Object Tech	VSNT	3.06	2.88	18.63	2.50	6.3%	645.2%
Wang Laboratories	WANG	19.63	18.94	32.25	18.25	3.6%	76.7%
Yahoo	YHOO	80.00	77.75	103.75	17.06	2.9%	508.1%

Build V Buy

Advantages of Building

- A company with proprietary products has a much greater value than one with similar revenues and profits, but without proprietary products, which only supplies services

Disadvantages of Building

- Requires sophisticated management skills
- Timing uncertainties
- Programmers have their own culture

Advantages of Buying

- Cost is known, as are margins
- Debugging is mainly somebody else's responsibility
- Speed

Disadvantages of Buying

- Can be locked into yesterday's technology

Median Revenue Multiples

According to Broadview Associates, a specialised investment banking firm located in Fort Lee, New Jersey, the Median Adjusted Price/ Revenue multiples for software company acquisitions in the last four years were:

	Q1	Q2	Q3	Q4
1995	1.57	2.00	2.91	2.77
1996	2.31	3.25	2.74	1.97
1997	3.36	2.65	n/a	n/a

For the Period	
1st Quarter Median	8.00 X
2nd Quarter Median	3.09 X
3rd Quarter Median	1.85 X
4th Quarter Median	0.79 X

Median Benchmarks from Public Companies

	Enterprise		Packaged	
	1996	**1997**	**1996**	**1997**
Operating				
Gross Margin	79.5%	81.4%	85.1%	86.3%
S G & A	58.1%	64.9%	68.1%	74.0%
R & D	17.6%	17.9%	21.1%	24.4%
Net Margin	3.8%	-1.4%	-4.1%	-12.1%
Financial				
Current Ratio	2.6	2.6	2.4	2.4
Receivables (days sales)	99.6	95.8	66.6	77.1
Payables (days)	59.8	52.6	76.6	67.9
Working Capital (days)	156.4	177.5	189.4	157.5
Activity				
Asset Turnover (times)	1.0	1.0	0.9	1.0
Sales/Employee ($'000)	160.2	136	146.7	146.6
Return on Assets	6.0%	8.0%	-0.7%	-1.7%
Return on Equity	7.4%	8.0%	-2.9%	-6.4%
Price Multiples				
Sales	2.0	2.8	1.7	2.0
Cash Flow	17.1	13.2	(0.8)	(1.2)
Net Income*	17.9	35.6	16.8	34.8
Book Value	2.7	4.0	2.5	3.2

excludes loss companies
Source: Deloitte + Touche

Median Benchmarks from Public Companies

	Engineering		Edutainment	
	1996	**1997**	**1996**	**1997**
Operating				
Gross Margin	88.9%	88.1%	71.4%	65.3%
S G & A	62.3%	64.7%	64.2%	60.7%
R & D	21.4%	19.9%	26.1%	27.4%
Net Margin	5.2%	3.5%	-18.9%	-22.8%
Financial				
Current Ratio	2.4	2.4	2.1	1.6
Receivables (days sales)	74	75.8	82.7	82
Payables (days)	46.1	59.6	70.5	66
Working Capital (days)	166.4	161	153.3	107.4
Activity				
Asset Turnover (times)	0.9	0.9	0.8	0.9
Sales/Employee ($'000)	174.3	173.0	152.0	141.2
Return on Assets	11.1%	7.3%	-6.8%	-25.9%
Return on Equity	8.0%	4.9%	-10.1%	-5.9%
Price Multiples				
Sales	2.2	2.0	2.0	2.0
Cash Flow	17.1	13.2	(0.8)	(1.2)
Net Income*	17.9	35.6	16.8	34.8
Book Value	2.7	4.0	2.5	3.1

* excludes loss companies
Source: Deloitte + Touche

Welcoming Change

Most people resist change; this can manifest itself in many forms, ranging from complete denial to open hostility. Sometimes the resistance proves effective and the status quo lives on; more often, the resisters become road kill.

The power to recognize change early and understand the forces be-hind the trend is one of life's greatest gift. Taking advantage of upcoming change before it permeates common knowledge has laid the foundation for many fortunes.

A Caution

If you are in the software industry, do not have a dominant market share, and Microsoft is entering your category, call a board meeting and consider drastic changes to your Business Plan.

Sources of Information

- Periodicals: PC Week, Computerworld, Information Week, PC Magazine, PC World, Windows magazine, etc.
- The Internet
- Industry consulting groups: Gartner, IDC, DataQuest
- Trade shows: Comdex, Supercomm, Networld+Interop, CEBIT (Hamburg)

Do IPOs Make Good Guidelines?

Some Valuation Analysts have looked to Initial Public Offerings to establish the value of private software companies. This is an enticing, but in our view, totally unsatisfactory approach. For a project in early 1998, a well-known valuation firm prepared a Study of 38 software IPOs in 1997. Based on statistical analysis, they concluded that software IPOs were priced at 8.4 times past revenues and that at December 31, 1997, a private software company was worth that multiple. While the correlation was strong, no causal relationship was demonstrated and the conclusion did not agree with my experience, as an investment banker, in the pricing of IPOs.

The period chosen was the whole of 1997, during which the stock market, as measured by the Standard & Poor's 500, increased 31%. During such a period of high "investor enthusiasm", one would expect revenue multiples of IPOs to rise, but this effect was not apparent as shown by the medians, which were:

1997	Companies	Price/Revenue
First Quarter	9	9.8X
Second Quarter	11	6.8X
Third Quarter	9	89.9X
Fourth Quarter	9	8.5X
Year	38	8.7X

This rather crude comparison suggests that the behaviour of the small software IPO market, as represented by the Study sample, differs from that of the traditional stock market. This should not be unexpected as investors purchase such IPOs in the expectation of very rapid growth in revenue and are willing to accept continued losses due to the expensing of R & D and high market entry costs.

Of the 38 companies used in the Study sample, only 19 (50%) had profits at the time of their IPO. In at least one case, Bea Systems, the loss amounted to 345% of revenue, and for eight of them exceeded 40% of revenue.

In valuing a business, even a software company, one must pay attention to the factors set out in Rev. Rul 59-60; the Study only took into account only three of them: (1) the nature of the business; (6) the existence of intangible value; and (8) the selling prices of comparable securities. It is hard to say whether the author felt that the others did not contribute to the value of a software company, or, whether he felt that they had no weight in his approach.

In our review of the Study, due to the rapid rise in stock markets during the year, we felt that only transactions in the second half were applicable to a December 31, 1997, valuation. As the private software company to which the conclusions of the Study are being applied had revenues of $12 million, we believe that the sample should be limited to companies with revenues between $6 and $19 million (approximately 50% above and below those of the subject).

These two adjustments reduced the sample to the following nine firms which completed their IPO between July and December 1997; the order in the table is that used in the Study, by date of filing with SEC.

Name	IPO Date
Omtool	08-Aug-97
Probusiness Services	19-Sep-97
Omega Research	30-Sep-97
TSI International Software	01-Jul-97
FlexInternational Software	12-Dec-97
UBICS	30-Oct-97
Made2Manage Systems	18-Dec-97
Information Advantage Software	17-Dec-97
Tier Technologies	17-Dec-97

My experience is that the stock market prices shares of technology companies on their future prospects. This is true for both initial public offerings and mature enterprises. The punishment given this year to shares of such companies that have failed to meet analysts' expectations supports this view. In particular, rapid growth is expected from small companies that are being brought to the market. It is extremely likely that for most of the Study's sample, the IPO pricing was not based on the historical Financial Statements, in the Prospectus, but rather on the Underwriter's expectations of the results for the next few years.

For most IPOs, at the time of offering, a "green sheet" is circulated within the investment community; while this is used to sell the issue, copies are not normally given to customers or the information included in standard databases. The green sheet gives the key attributes of the issue and, in most cases includes forecasts for revenues and profits or losses covering not only the current fiscal year but also the next one.

For the nine companies in the reduced sample, CVS recalculated the Price/Revenue Ratios using 1997 Revenues and the weighted number of shares outstanding for the year.

Omtool is a manufacturer and distributor of fax software (65%), hardware (21%) and services (14%). According to a press release in EDGAR Online, revenues in 1997 increased 131% to $19,368,000 from the 1996 figure of $8,401,000 used by the Study. Revenues amounted to $1.67 per share for a P/R multiple of 5.4X on the $9.00 IPO price, rather than the 12.3X quoted by the Study.

ProBusiness is a provider of employee administrative services for large firms; it offers payroll processing, tax filing, benefits administration and human resources Software. In the year to June 1997, revenues grew 97.6% to $27.4 million from the $13,863,000 for the year to June 1996 used by the Study. In the six months to December 1997, revenues increased 92% to $19,552,000. For the 12 months to December 31, 1997, revenues were $36.75 million or $3.79 per share. The Price/Revenue Ratio on the IPO price of $11.00 was 2.9X, compared with the 8.9X quoted by the Study.

Omega Research is a leading supplier of real time investment analysis software to individual investors. Its principal product "TRADESTATION", which provides a majority of revenues, has been sold to institutional investors by Dow Jones markets since January 1996. Revenues in 1997 grew by 64% to $29,226,000 from the $17,820,000 in 1996 used by the Study. Revenues were $1.40 a share, giving a P/R ratio of 7.9X on the $11.00 IPO price, compared with the 13.6X quoted by the Study.

TSI International is a supplier of software and related services that enable organizations to integrate business applications both internally and with external partners. Revenues in 1997 grew 40% to $26,670,000 from the 1996 figure of $19,004,000 used by the Study. Revenue per share was $4.50, giving a P/R ratio of 2.0X on the $9.00 IPO price, compared with the 4.3X quoted by the Study.

FlexInternational designs, develops markets & supports the Flexi family of financial and accounting software, designed for users with sophisticated requirements. For 1997, revenues grew 157% to $21,624,000 from the 1996 figure of $8,340,000 used by the Study. Revenue per share $1.57, giving a P/R ratio of 7.1X on the $11.00 IPO price compared with 21.6X quoted by the Study.

UBICS is a supplier of information technology professional services to large-mid sized organizations. It is a subsidiary of the $1.5 billion multinational conglomerate, The UB Group based in Bangalore, India, which employees over 65,000 people in more than 40 countries. Its activities include: pharmaceutical products, engineering, brewing & distilling, petro chemicals and information technology. For 1997, revenues grew 127% to $20,549,000 from the 1996 figure of

$9,072,000 used by the Study. Revenue per share was $3.90, giving a P/R ratio of 2.6X on the $10.00 IPO price compared with 7.1X quoted by the Study.

Made2Manage Systems makes software that helps small and medium sized manufacturers with sales analysis, order entry, delivery cycle responsiveness, quality assurance, accounts receivables, and financial reporting. In 1997, sales grew 72% to $16,167,000 from the 1996 figure of $9,379,000 used by the Study. Revenue per share was $6.63, giving a P/R ratio of 1.1X on the $7.50 IPO price, compared with 3.4X quoted by the Study.

Information Advantage produces online analytical processing software that helps organizations distribute information by allowing many users to access and analyze large amounts of data. In the year ended January 31, 1998, revenues grew by 118% to $25,590,000 from the January 1997 figure of $11,746,000 used by the Study. Revenue per share was $2.14, giving a P/R ratio of 2.8X on the $6.00 IPO price, compared with 7.6X quoted by the Study.

Tier Technologies helps companies "keep pace with the computer age" by providing information technology, consulting, application development and software engineering services. For the fiscal year ended September 30, 1997, revenue grew by 39.0% to $22.5 million from $16,200,000 the previous year; the Study used $11,790,000, an unsupported figure revenue. For the 12 months to December 31, 1997, revenue was $27,250,000, or $4.44 a share; this gives a P/R ratio of 1.9X on the $8.50 IPO price, compared with 5.6X quoted by the Study.

Our results are summarized in the table below which sets out for each company the growth in Revenues during 1997 and the Price/Revenue ratio calculated by CVS, as well as those quoted by the Study. The sample has been arranged by declining rate of growth to show a slight relationship with the CVS P/R ratio.

		P/R Ratio	
Name	**Sales Growth**	**CVS**	**Study**
FlexInternational	157%	7.1X	21.6X
Omtool	131	5.4	12.3
UBICS	127	2.6	7.1
Information Advantage	118	2.8	7.6
ProBusiness	92	2.9	8.9
Made2Manage Systems	72	1.1	3.4
Omega Research	64	7.9	13.6
TSI International	40	2.0	4.3
Tier Technologies	38	1.9	5.6
Mean	n/a	3.9	9.4
Median	92	2.8	7.6

These numbers should be compared with the median P/R ratios for selected SIC codes listed in Ibbotson's Cost of Capital Quarterly 1997 Year Book, and those for acquisitions in 1997 from Mergerstat.

	SIC Code	Ibbotson 1997	Ibbotson 5-yr Avg	Mergerstat 1997
Programming Services	7371	1.45	0.91	2.63
Packaged Software	7372	6.79	5.29	3.02
Integrated Design	7373	2.09	1.51	1.64
Processing Services	7374	3.38	3.20	na

Unfortunately, we were not able to get enough information about the various software products offered by each of the sample companies to establish where they were in the development cycle. Considering the rapid growth achieved by most of them, it seems likely that they were "crossing the Chasm". In addition to the lack of information about product life cycles, there was limited material on the dependence of the sample companies on one or two key managers. In general, however, technology IPOs are risky.

According to Red Herring magazine, April 1998, of "245 [technology] IPOs in 1996, 110 are now trading below their offering price; of 1997's 168 IPOs, 55 have declined in value. On average, 1996's IPOs gained 27 percent between their offering and this February, and 1997's IPOs gained 32 percent--well below the gain of the S&P 500 for both years."