1996 Executive Summary Report

Prepared Especially For

Dataquest Predicts

1996 and Beyond

February 20, 1996
Santa Clara Convention Center
Santa Clara, California

59

Dataquest
A Gartner Group Company

Published by Dataquest, a Gartner Group Company

GartnerGroup
Your Personal Information Technology Advisor

News Release

FOR IMMEDIATE RELEASE

Jennifer Schlueter, Gartner Group
(203) 316.6537

Paul Wheaton, Dataquest
(408) 468.8245

Reid Gearhart, Dun & Bradstreet
(203) 834.4275

Dee Anna McPherson
Edelman Worldwide
(212) 704.8133

GARTNER GROUP ANNOUNCES ACQUISITION OF DATAQUEST

Santa Clara, Calif. — November 27, 1995 — Gartner Group, Inc. (NASDAQ: GART) and The Dun & Bradstreet Corporation (NYSE: DNB) today announced that they had reached an agreement for Gartner Group to acquire Dataquest, Inc., a leading information technology (IT) market research and consulting firm.

Dataquest is a unit of the The Dun & Bradstreet Corporation, which also owns slightly over 50 percent of Gartner Group. Gartner Group will acquire Dataquest in a cash and stock transaction valued at approximately $75 million.

"This exciting acquisition will bring substantial benefits to our clients and to the IT marketplace," stated Manny Fernandez, chairman, president and CEO of Gartner Group. "Strategically, we believe that Dataquest's extensive coverage of the IT vendor market forms a perfect complement to our services which are targeted at users of IT. The enormous intellectual capital now under our umbrella further cements our position as the leader in IT advisory services."

"We believe this is an outstanding market segment with substantial future growth prospects, " added Robert E. Weisman, chairman and CEO of Dun & Bradstreet, "Gartner Group's acquisition of Dataquest creates a strategically stronger company that is ideally positioned to capitalize on the highly attractive opportunities in this marketplace."

56 Top Gallant Road
P.O. Box 10212
Stamford, CT 06904-2212
203.964.0096

Dataquest, headquartered in San Jose, Calif., publishes subscription-based research concentrating on quantitative market research, statistical analysis, growth projections and market share rankings of manufacturers and vendors of IT. The company's research provides worldwide market coverage on computer systems and peripherals, document management, semiconductors, services and support, online, multimedia and software, and telecommunications sectors of the IT industry. Dataquest has research centers in the United States, Europe and the Asia/Pacific region.

"The synergies between Dataquest and Gartner Group are significant," commented Judith Hamilton, president and CEO of Dataquest. "Dataquest will gain from Gartner Group's extensive global distribution network and Gartner Group will benefit from our solid presence in Europe, Japan and Asia/Pacific. The union of the two organizations will strengthen the value the individual products provide to clients."

Gartner Group, Inc., based in Stamford, Conn., is the leading provider of IT advisory and market research services. Founded in 1979, Gartner Group serves 5,500 client organizations worldwide. Additional corporate information is available on the World Wide Web at the following URL: http://www.gartner.com and http://www.dataquest.com

The Dun & Bradstreet Corporation is the world's leading marketer of information, software and services for business decision making, with worldwide revenue of $4.9 billion in 1994.

###

Table of Contents - Summaries

Note: The contents of this document are based on a verbatim transcription of tapes from the conference proceedings, including speeches, audience participation and panel discussions. A "best effort" was made to ensure the accuracy of names, acronyms, slang words, company and product names prior to the printing of the document.

Chapter 1: OVERVIEW

Adam Rin
Senior Vice President
Research and Advisory Services
The Gartner Group

Introduction by Gene Norrett: Vice President and Director, Worldwide Semiconductors, Dataquest Incorporated:

Good morning. I'd like to welcome you to our Third Annual Dataquest East Conference. We call it "Dataquest Predicts 1996 and Beyond." We have a lot of good predictions and a lot of good information exchange.

I'm also your Master of Ceremonies for this event and would like to thank you all for taking time out from your very busy schedules to come listen to our Dataquest analysts. They will give their predictions for their technologies, as well as their key products. They will talk about all of the exciting things that are going to take place in their industries this year and beyond.

Our first speaker this morning is Adam Rin. Adam is a Senior Vice President and Director of all research in The Gartner Group. Adam is an eight-year veteran of Gartner Group. He was the Director of the Applications Development and Management Service, which grew while he was directing it to the largest service in the Gartner Group. He has extensive experience in the independent software industry, having worked for companies such as Bachman Information Systems, Computer Corporation of America and Applied Data Resource. Adam has a Ph.D. from the University of Pennsylvania in Computer and Information Sciences. I'd like now to welcome Adam Rin.

Agenda: Gartner Group and Dataquest, The Industry,

Thanks very much, Gene. Good morning. My goal this morning is to spend a few minutes with you and talk about the union of two exciting entities: Gartner Group and Dataquest. We will discuss our strategy and our plans for the coming years with those two product lines. A few comments about the exciting IT industry that we're all in and a few comments about the program.

GARTNER GROUP AND DATAQUEST

As you know Gartner Group and Dataquest became one happy family at the end of November this past year. It is certainly our intent to maintain the vigor, the uniqueness and the strength that each of the two parties brings to the table. We plan to maintain the two product lines side-by-side, each with its unique value, methodology, research approach, deliverables and offerings to the IT community. Together, we think we cover the entire spectrum and aspects of the information technology industry.

Dataquest is a 24 year-old worldwide market research firm. It serves primarily the IT vendor community, although the deliverables and their services are of great interest to investors, financial institutions, government and other users of information technology but primarily oriented to the producers and to the vendors of IT. It is very much a market research organization issuing a quantitatively-based set of forecasts, predictions, trends and offerings to that community. With 125 researchers and analysts worldwide, Dataquest certainly has made its mark in this industry.

Gartner Group is a 17 year-old worldwide IT user advisory services company and consulting service. Gartner Group's orientation over the years has been largely to the users of information technology; mostly to the MIS departments of Fortune 1000 companies but also outside the glass house to business functions in various industries. The advice that Gartner Group provides to its user community is an interest to vendors as well. That interest is to keep track of what the users' trends are and what the users' buying needs are. Gartner Group offers 250 analysts worldwide.

I'm going to also take this opportunity to reassure all of you that there are two hats we wear as analysts at Gartner Group. One of those hats is as a researcher, as an analyst, in understanding the industry and publishing standard reports that are available to everyone. The other hat is to serve our clients. When vendors and users alike talk to us on a confidential basis, that information remains confidential.

As we expand internationally, we will cover markets and opportunities throughout the world. Our latest edition is in Latin America, *PC Quarterly Statistics*; and another edition, *PCs in the Home Market.*

Dataquest is also happy to be able to deliver and produce its reports and studies in many media and formats. We are moving along with the evolution from paper to electronic media, along with the rest of this industry. We have two offerings that we're excited about: The Dataquest interactive Web site that is there for accessibility to anyone who wants to hit the Home Page and move beyond that to content. We've also enhanced our Market View, that's our electronic deliverables that enables you to slice and segment and extract data from many different perspectives.

THE INDUSTRY

A quick glimpse of the dynamics from an advocate viewpoint of this exciting industry that we're in. You can see the breakdown of 1995 in billions of dollars the revenue volume of the various segments we cover: Semiconductors, telecoms, peripheral, IT services, software and computers.

With these groups you can get an aggregate big-picture viewpoint of where we were in 1995 and Dataquest's aggregate forecast on a compounded annual growth basis of how we see these segments growing. It's truly amazing that, within the next five years before the turn of the century, we will break the trillion-dollar mark in this exciting industry. It's dynamic, it's vibrant and it's certainly healthy, with lots of opportunity for everyone.

Note: Please refer to the companion "Verbatim Transcript Document" for the full in-depth discussions, detail, explanations, charts, graphs and the audience "Question and Answer" session.

This page is intentionally left blank

Chapter 2: THE STATE OF THE ECONOMY

Dr. Charles Lieberman
Chief Economist
Chase Manhattan Bank

Introduction by Gene Norrett: Vice President and Director, Worldwide Semiconductors, Dataquest Incorporated:

Our next speaker is Dr. Charles Lieberman. Chuck, as he is known at the bank, is Chief Economist of the Global Bank of Chase Manhattan. As head of Financial Markets Research, he oversees all economic research and forecasting. He directs the global market strategy for the capital markets and for the bank's corporate relationships. Before joining Chase, he held senior positions at Shearson Lehman and also Morgan Stanley. He has also been a Professor at Northwestern, as well as University of Maryland. Chuck has a BS from MIT and a Ph.D. from the University of Pennsylvania. And today he's going to give us his predictions on the global economy. Please welcome Dr. Lieberman.

Charles Lieberman

Agenda: The U.S. Economy, An Analogy, The Growth Rate of the U.S., Productivity Growth, Employment Growth, Capacity Utilization and Summary.

Thank you, Gene. I'm going to start off with a glass of water, not because I need it but because it's a very useful prop. Much of what I say this morning is going to contrast with what you, I'm sure, think of as the typical forecast of economists these days -- anticipating sluggish economic growth and declining interests rates. I'm going to present a very different perspective on the U.S. economy.

Our sense of the U.S. economy is that it's very close to full employment and therefore there's potential for inflation pressures and upward pressure on interest rates, unlike the consensus which believes that the economy is going to remain quite sluggish and interest rates will decline and decline substantially.

AN ANALOGY

How fast can I pour water into that glass? Seems like a very simple question. It's not. There are several variables you have to take into account. One of which is, how much water is already in the glass? That glass was empty so, as you noticed,

I poured water in quickly; it wasn't the problem. The glass now happens to be close to full, which suggests that if I pour water into the cup slowly it will quickly become a problem.

Apply that logic to the economy. How fast can an economy grow? That's the kind of question that one hears all the time. Well, the answer is not independent of the state of the economy. If the economy is close to full employment, then the economy does not have room for rapid growth. When the economy starts off from a recession base then unemployment is very high and there are lots of resources available to be hired. And so rapid growth is not only feasible but it's desirable.

GROWTH RATE OF THE U.S.

This chart is a very simple one; it shows growth rate of the U.S. economy in the post-World War II period. We took averages of growth rates and averages of averages to smooth it out to get rid of the real highs and lows. It doesn't kill off the recessions or the business cycle. So you can still see business cycles in the graph. You will also see that the growth rate of the economy has slowed down considerably.

In the post-World War II period there was tremendous opportunity for growth on a variety of fronts. First of all, there had been a lot of deferred spending and deferred investment during the war. A lot of new technology was produced during the war that could be applied to the private sector and new innovations, not the least of which was the semiconductor.

Things settled down over the course of twenty years and you can see that the economy has averaged to an average growth of approximately 2.5%.

Growth comes from two places. There are two ways to get more output. You can either become better, more efficient, more productive and so you produce more output with the same resources. Or you can add resources.

PRODUCTIVITY GROWTH

Another variable is productivity. This shows that productivity growth in the U.S. has slowed down. In the most recent decade, or more than a decade, we have actually averaged approximately 1.5% productivity growth on the old basis. This chart is actually on the new basis and it shows productivity gains of about 1%. In

fact, almost exactly 1.0%. Back in the 1960s, we did average 2.2%. But in the 1970s it slowed to 1.2%.

EMPLOYMENT GROWTH

This shows us growth in employment; it's payroll employment on a monthly basis. And in 1994, we averaged almost 300,000 workers per month. Again it needs to be put in context. We have a labor force of about 130 million people in the U.S. One percent of 130 million people is 1.3 million people. And 1.3 million people divided by 12 months is a little bit over 100,000 people per month. So the supply of labor in the U.S. is growing at the rate of about 110,000 people per month.

In 1994, we averaged 300,000 jobs per month. Absolutely unsustainable. Very simple math. Why was it possible? It was possible because there were plenty of people around who were unemployed.

Notice in 1995, the growth rate of employment slowed down. It slowed down quite sharply. This was not an accident. The Federal Reserve tightened monetary policy several times over the course of 1994 in order to slow it down. That was their objective. And they succeeded.

Notice that in 1982 when the economy came out of recession, that was an extremely deep recession. The unemployment rate peaked at almost 11%; tremendous room for both rapid growth and over an extended period of time.

In 1975, the U.S. economy started off with a very unfavorable combination of high inflation, almost 10% and high unemployment of about 8%. So lots of unemployment; therefore, we should be experiencing declining inflation, slowing inflation.

But from 1977 to 1978, the unemployment rate continued to fall but there was no further reduction in inflation. And from 1978 to 1979 there was only a modest improvement in the unemployment rate and a sharp acceleration in inflation.

CAPACITY UTILIZATION

There seems to be more capital stock available than labor stock. The real bottleneck in the U.S. economy today is not factories; the real bottleneck is labor. And in an interesting statement in the Federal Reserve's own publications, the

Federal Reserve itself describes the labor market as tight in that labor is scarce in certain markets, sometimes for skills, sometimes for unskilled workers.

That brings us to inflation on a broader scale. Why hasn't inflation picked up? Interestingly enough at the beginning of 1995, it looked like it was starting and then all of a sudden it petered out. But if you recall, the beginning of 1995 was a very weak one for the U.S. economy.

The net result is that we think that the economy is effectively at full employment. If we were to get even a small pick-up in activity, a small acceleration in activity, we would think that that would produce some significant inflation pressures. And therefore we're very concerned about the tendency of the Fed to ease monetary policy even slightly.

SUMMARY

What people have missed in this whole discussion is that the economy has slowed down its growth rate but the growth rate has not slowed down excessively. The growth rate of the economy is still sufficient, even with all the weakness of 1995, to keep the labor market tight.

In terms of specifics, we suspect that bond yields, which today are almost exactly 6%, by the end of this year will be in excess of 7%. We expect that short-term interest rates, overnight funds rate will be higher at the end of this year than they are today. So we would look for a tightening of policy, net, over the course of the year.

We acknowledge that there's a possibility the Fed could ease policy again -- they're meeting today. They've probably finished breakfast by now but it's a two-day meeting and if they do anything it'll be announced tomorrow. We suspect they will not ease policy tomorrow but certainly it's a possibility.

Our guess is that by the end of this year, we will see a tighter monetary policy and significantly higher long-term interest rates. So to the extent that companies require financing, we advise them to obtain that financing now.

Note: Please refer to the companion "Verbatim Transcript Document" for the full in-depth discussions, detail, explanations, charts, graphs, and the audience "Question & Answer" session.

Chapter 3: HIGH-TECH MARKETING AS WE APPROACH THE MILLENNIUM

Dr. Geoffrey Moore
President
The Chasm Group

Introduction by Gene Norrett: Vice President and Director, Worldwide Semiconductors, Dataquest Incorporated:

Our next speaker is Dr. Geoffrey Moore, President of the Chasm Group, a consulting practice in Palo Alto. The Chasm Group provides marketing strategy and organizational services to global companies such as AT&T and Hewlett Packard. Geoffrey has been a principal and a partner with Regis McKenna and has held senior management positions with three software companies prior to starting The Chasm Group. He has written two books, *Crossing the Chasm* and *Inside the Tornado.* These books are devoted to helping organizations understand market dynamics and developing strategies to capitalize on the hypergrowth of business today. Dr. Moore has a Bachelor's from Stanford and a Ph.D. from the University of Washington. Please welcome Dr. Geoffrey Moore.

Agenda: The Technology Adoption Life Cycle, Channel Choice, Price Points, The Chasm and Predictions.

I was delighted to speak at a conference called "Dataquest Predicts." Dataquest does predict; The Chasm Group guesses. We are engaged with companies that are making high-tech marketing decisions all the time and all marketing decisions have future implications and the whole idea is to get as good a grip as you can on the future. And there is nothing more humbling than actually doing the work. So this presentation is drawing from a quote from Paul in Corinthians about "seeing through a glass darkly" and kind of trying to make out what's going on.

THE TECHNOLOGY ADOPTION LIFE CYCLE

The equipment that we use to help us with that is a revised view of the technology adoption life-cycle. This is some work that got started in a book called *Crossing the Chasm* and completed in a book called *Inside the Tornado.*

Let me walk you through what the business strategies are as you play in these various phases of the market. When you're playing in the early market, all the

money is being put on the table by visionary customers. And they are the strategy which says "We want to separate ourselves from the herd. We are going to use technology innovation as a discontinuity, as a rupture with the past. We're going to break with the past; we're going to adopt a whole new paradigm and we are going to use that paradigm for competitive advantage against the other players in our sector."

When you play with a visionary, the whole thing from the point of view of vendor is, do the deal. Because you're introducing a new paradigm, the only people who will adopt that new paradigm at this point are the risk-takers. These are the visionaries but they definitely want to put their own stamp on things.

CHANNEL CHOICE

The channel choice in this market is a direct sales channel. Lots of interaction with the visionary, capturing their vision. And then a lot of systems integration capability behind it. If you're a large corporation, it'll come out of your own corporation; if you're not, it'll probably come from a systems integrator like an Andersen or an EDS, or that type of organization.

PRICE POINTS

Very high price points in the early market. The market is based on the value of early adoption. Visionaries perceive that as very high and therefore they pay premium prices to get into things very early. No matter how high the price is, it is not profitable. You will do more special work and incur more non-recurring engineering costs. If you amortize the support of the special modifications you have to make to adapt to the early market, the net of that market is, if you're in the product business, it's not profitable.

And the positioning is based entirely on technology leadership. And the way you promote yourself is entirely by presenting the elegance and the aesthetics of that technology paradigm. And it echoes with the technology enthusiasts and the technology enthusiasts help you educate the visionary as to the business potential or the economic potential in that deal. Right now, Java's a classic example of an early-market product.

From a pragmatist's point of view, this is looney tunes, this early-market stuff. Virtual reality, commerce on the Web. Commerce on the Web is another

example, driving the stock price of a whole lot of companies. It's not happening and will not happen for some time.

THE CHASM

When you move out of the early market, you move into a period where there's fundamentally a lull in technology adoption. We call it "the chasm." The deal is you're now a little bit late for the visionaries but you're still too early for the pragmatists. There's not enough competitive advantage now to jump on the bandwagon from the visionary's point of view but there's not enough stability and acceptance from the pragmatist's point of view. As a result, markets go into a downturn.

And what we see again and again in technology adoption life-cycles is what we're ending up calling a "double pulse." There's an early market, a surge of success; it gets everybody's expectations up. Then, bam! -- a downturn. And the downturn of the chasm has to do with the market.

So, Windows 95 in business, should it be adopted now? The early guys did. The pragmatists are patting themselves on the back for holding back. Because every time you wait, you increase the odds of not making a mistake. Pragmatists are not into making brilliant moves, they're into not making a lot of bad moves.

PREDICTIONS

Final Set of Predictions:
Often Wrong, Never in Doubt

- Java does not cross the chasm (places ad: "Thin client seeks fat pipe").
- Microsoft partners have ad next to it: "Win95 business applications—cheap!"
- Lotus Notes defies gravity and sails into the tornado.
- SAP defies gravity and continues to dominate client/server tornado.
- Oracle experiences gravity as all its strategy initiatives fall back to earth.
- Data warehousing collapses under its own weight.
- Netscape's stock price does not.
- Apple fails to capitalize on WWW tornado (despite all the advice it gets).
- HP continues its charmed existence, and nobody resents it.

Note: Refer to the companion "Verbatim Transcript Document" for the full in-depth discussions, detail, explanations, charts, graphs, and the audience "Question & Answer" session.

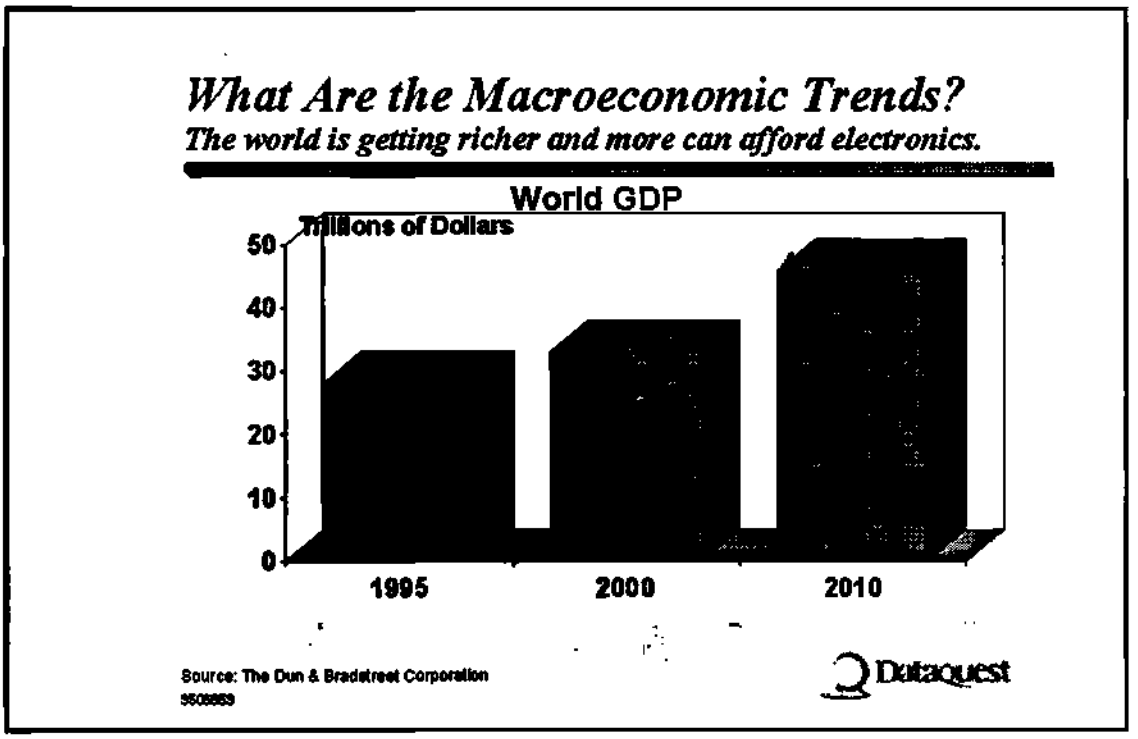
Chapter 4: KILLER CHIPS II: WHAT'S NEW?

Gene Norrett
Vice President and Director
Worldwide Semiconductors
Dataquest Incorporated

Agenda: Macroeconomic Trends, Electronics Production; Forecast and Drivers, Semiconductor Supplier Ranking and Forecast, Killer Chips and Summary.

MACROECONOMIC TRENDS

The macroeconomic picture is really an important factor driving the purchase and also the manufacturing decisions for high technology. Look at the global economy. Dun & Bradstreet, our former parent, is forecasting a 3.4% compound growth rate through the turn of the century.



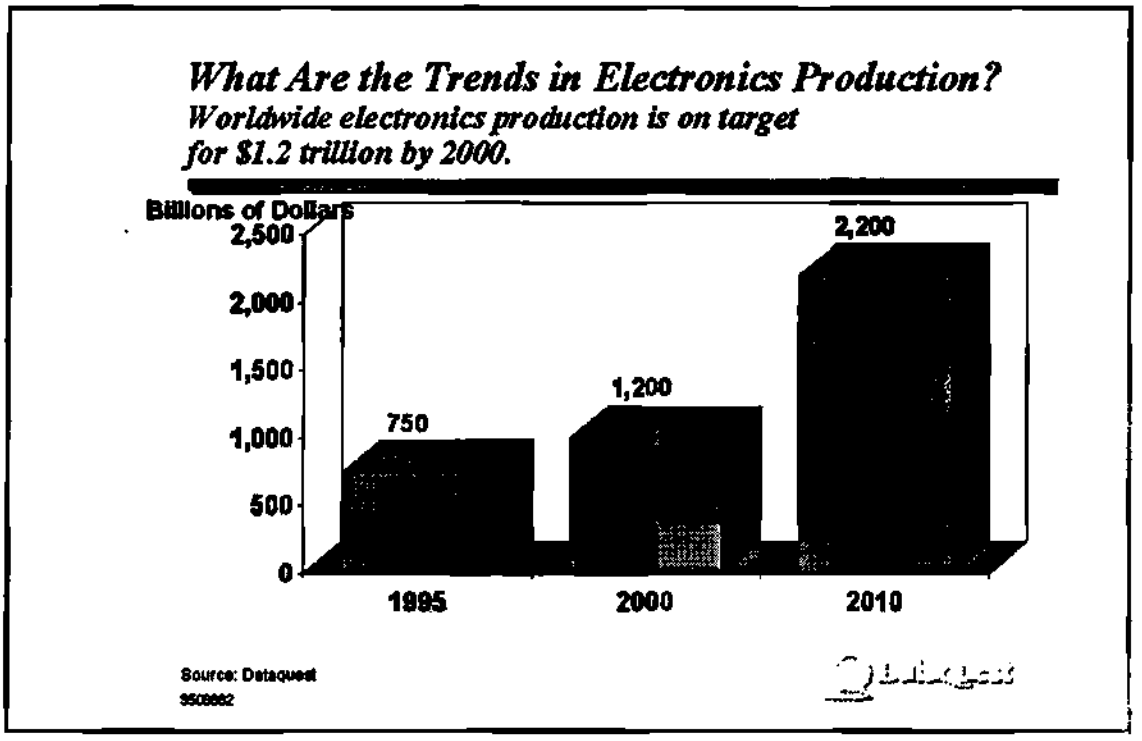
The countries that we think are going to be above average are the four tigers in Asia. We think that their growth rate is going to be in the neighborhood of 7%-

10%. It is these regions that will certainly impact electronic industries the most in the coming years.

What's another macroeconomic trend? Well, the globe is getting much more crowded. The United Nations estimates that the global population will reach 6.2 billion people by the year 2000. This is up from 1.6 billion people in the year 1900. By using the old math, that's just under four times growth in a hundred years.

Another macroeconomic trend that's really important: the Far East is getting richer faster. Though there are no statistics for the middle class population, McGraw Hill estimates that there are 1.2 billion people or roughly 20% of the world's population in the middle class. They also estimate that the middle class population will grow faster than the rest of the world's population and reach 1.4 billion people by the year 2000.

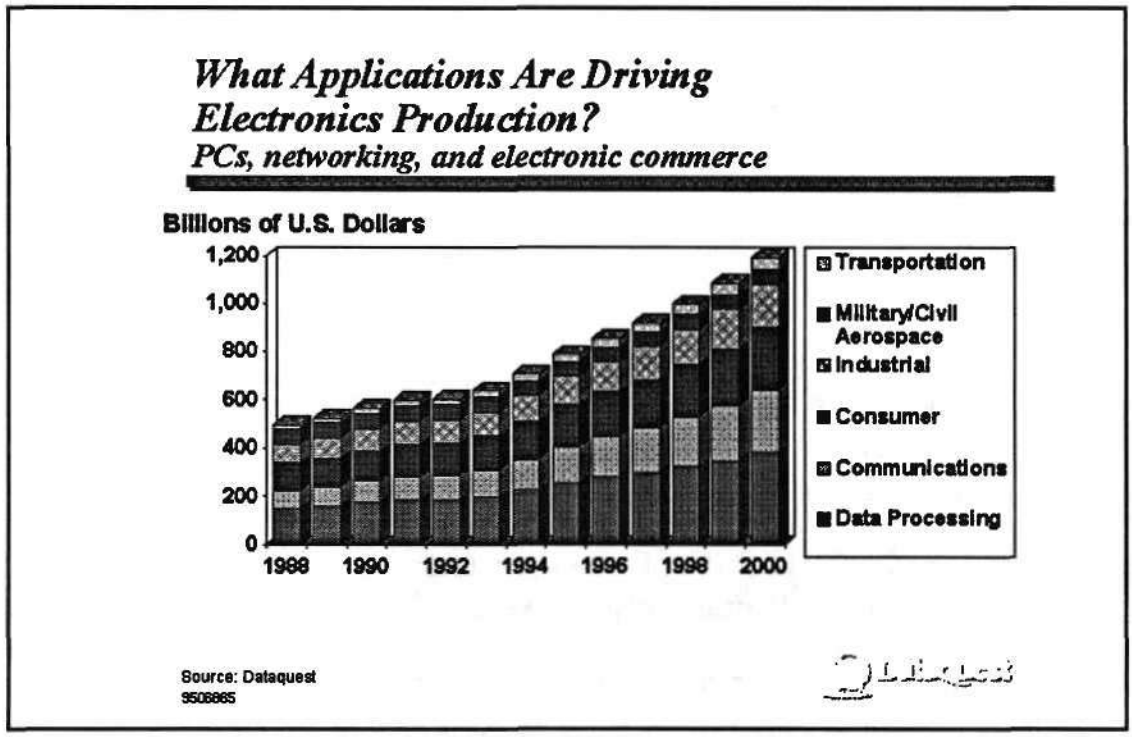
ELECTRONICS PRODUCTION and DRIVERS



The industry actually is self-generating. It is truly very difficult to accurately predict the actual market size in the year 2000 because of the variability with the penetration rates of several emerging applications. These emerging applications are: Personal Video Conferencing, Video on Demand and Full Digital Set-Top Boxes, Human Interface Electronics, ATM and Wireless Telephony, Multimedia Computers and PDAs and finally, Internet Appliances. Overall, we're expecting a compound growth rate of 9% for total electronics production out to the year 2000.

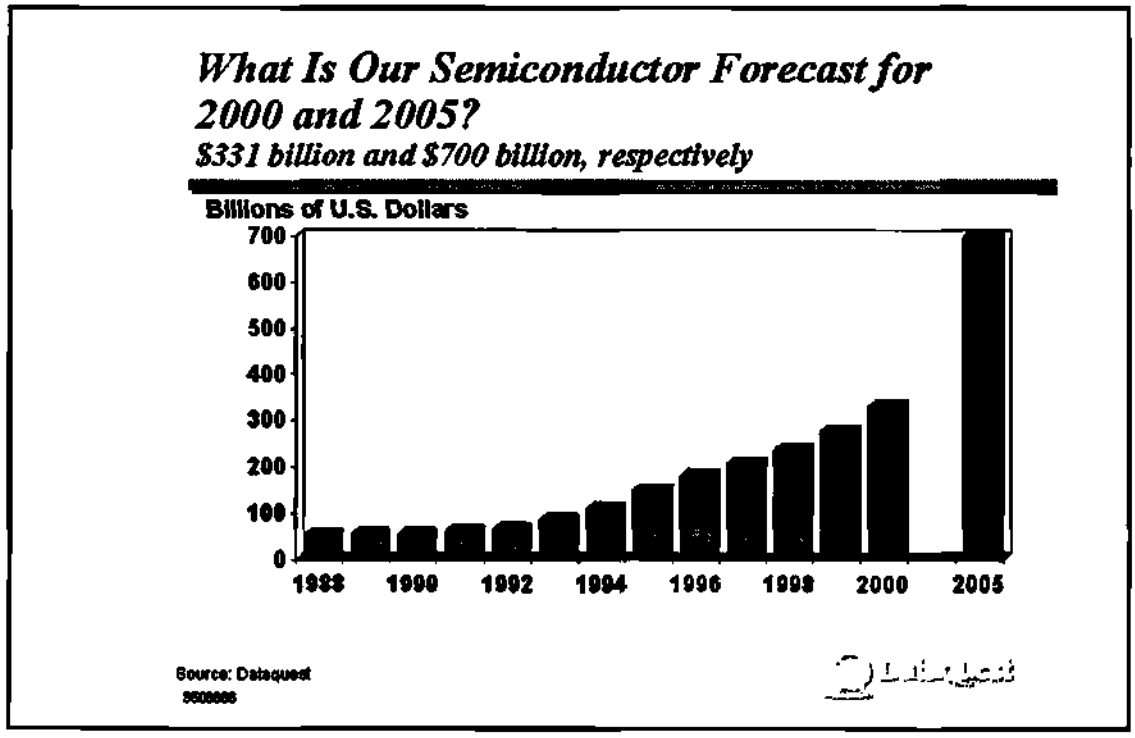
What's another trend in electronics production? Asia Pacific will be first in electronics production in the year 2000. The Asia Pacific region continues on its path to replace North America as a leading producer of electronics equipment by the year 2000.

We see an accelerating PC market in Asia over the next five years due to the explosive growth in the highly-populated countries such as China. We further predict that Australia, China and India will be one million PC-producing markets by that time.



KILLER CHIPS II: WHAT'S NEW?

As we look out over the next five years, we have made the following assumptions associated with the PC industry: First, we expect a new generation of the X86 processors every 18 months. The home market throughout the world will be the fastest-growing segment of the PC market. Asia Pacific will be the fastest growing region of the world. We expect a compound growth rate of 16% growth through the year 2000 and with a 14% growth through the year 2005.



This is our latest forecast of the semiconductor industry through the year 2005. We are now saying that the industry is going to double from 1995 to the year 2000. Our current estimate is $155 billion for 1995 and we're saying $330 billion in the year 2000. Looking out 10 years we were saying $700 billion for chips.

This growth to the year 2000 is about a 16% growth rate compounded, or seven percentage points slower than the previous five years.

Also, we are forecasting that the worldwide PC shipments will grow by 20%. We see the average PC memory content increasing from 8 megabytes to 12

megabytes in the next year to 18 months. Because certainly Windows 95 and the new Windows Office will demand a higher level of memory content.

Yes, a 66% growth for memories in 1995, one of their better years. Growing 32% in 1996. Not a bad year. Still, half the growth rate but not a bad year. Even though the current capacity shortage will be less in 1996 than in 1995, we still think that the impact of Windows 95 and the need to network computers will drive this industry very hard.

We're forecasting microcomponents to grow at 27%, driven by the Pentium and the Pentium Pro microprocessors. Also, microcontrollers will increase nicely due to the growth of wireless, cellular, automotive and digital consumer applications. We're estimating 22% growth for this segment.

For the microperipherals -- such as video processors, MPEG compression chips and core logic devices -- these will grow in excess of 25%. And programmable DSPs we think somewhere between 30% and 35%.

Today, for the most part, the video, sound and communications sub-systems remain distinct islands of chips on the motherboard. However, with technology moving to .35 microns and with the increased competition to integrate functions, we are seeing a rapid rush to produce multimedia engines. Chromatic Research, Philips, Micro Unity and NVidia are at the leading edge of this new revolution in the marketplace.

We also believe that RISC MPUs, like the Alpha and Power PC, are going to grow by 20%. They're also finding a lot of opportunities in embedded applications, such as computer telephony integration, digital set-top boxes, automotive video and hand-held games.

SEMICONDUCTOR RANKING and FORECAST

What Are the Semiconductor Worldwide Rankings for 1995?
Intel is still No. 1.

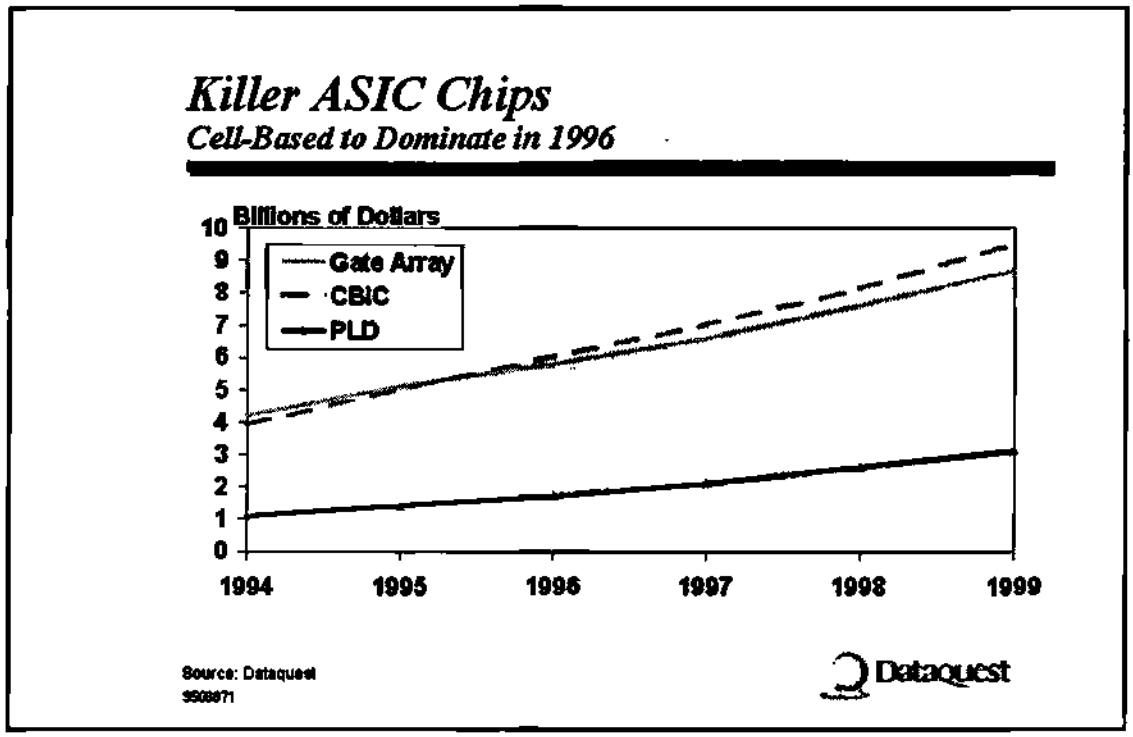
1995	1994		1994 Revenue (Millions of U.S. Dollars)	1995 Revenue (Millions of U.S. Dollars)	Percentage Change	1995 Market Share (%)
1	1	Intel	10,099	13,828	37	8.9
2	2	NEC	7,961	11,360	43	7.3
3	3	Toshiba	7,556	10,185	35	6.6
4	5	Hitachi	6,644	9,422	42	6.1
5	4	Motorola	7,238	9,173	27	5.9
6	7	Samsung	4,832	8,344	73	5.4
7	6	Texas Instruments	5,548	8,000	44	5.2
8	8	Fujitsu	3,969	5,511	42	3.6
9	9	Mitsubishi	3,772	5,164	37	3.3
10	11	Philips	2,920	4,040	39	2.6
		Others	50,137	69,667	39	45.0
		Total Revenue	110,676	154,694	40	100.0

Source: Dataquest
9508663

Dataquest

When you look at the totals for the manufacturers by location, we found that the Americans, the Japanese and the Europeans all lost share to the Asia Pacific companies, particularly the Koreans. Though not shown on the list, Hyundai grew 163% to $4 billion; and LG Semicon, formerly Goldstar, grew 114% to $3.6 billion. So it was a pretty good year.

KILLER CHIPS



Videogames, camcorders, disk drives, computers and high-definition TV are major applications for these products. In '95 we estimate that these products grew 28% and we're looking for 20% to 25% growth this year.

Embedded-arrays are a subset of our gate-array category. Our belief is that embedded-arrays will experience rapid growth over the next five years due to their reduced time-to-market and increased functionality relative to standard gate-arrays.

Another significant trend in this market is the forward integration to total systems level integration. We now have the design tools and the technology to do this integration. However, the biggest problem facing these manufacturers, are the intellectual property issues.

We believe that as the price per megabyte drops down under $20, we will see the price elasticity effect step in and demand should rise nicely. The price per megabyte has been flat and now we see it coming down and slowly approaching the learning curve but not dropping below.

SUMMARY

We expect production to rise by 9% compounded annually, to reach $1.2 trillion by the year 2000. My bet is we'll increase that forecast, not decrease it, as we go on in time.

GDP and wealth are rising as middle-class workers strive to reach parity with their western relatives, with whom they exchange faxes on a daily and sometimes weekly basis.

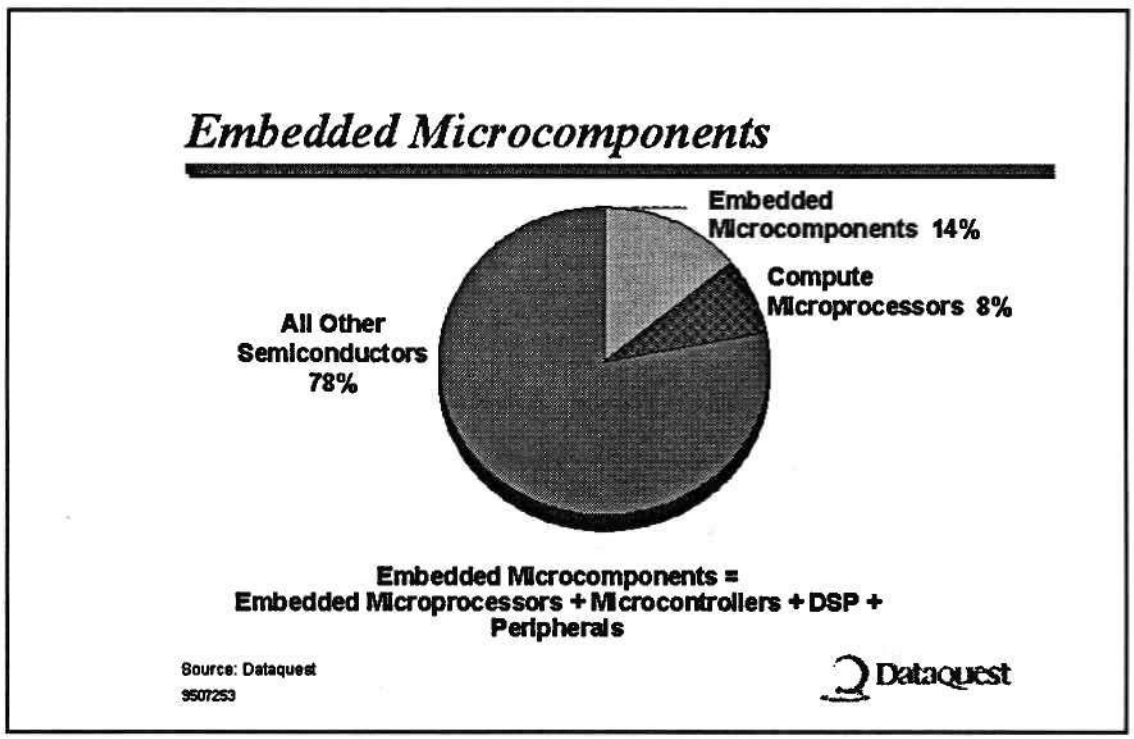
We predict that as memory cost comes down to $20 per megabyte, there will be a rapid movement to purchase more memory both at the OEM level and in the after-market. You just can't run Windows 95 and future applications using 8 megs.. You need 12 to 16 megs.

Note: Please refer to the companion "Verbatim Transcript Document" for the full in-depth discussions, detail, explanations, charts, graphs, and the audience "Question & Answer" session.

Chapter 5: THE FUTURE OF EMBEDDED CONTROLLERS AND PROCESSORS: WHO, WHAT AND WHERE

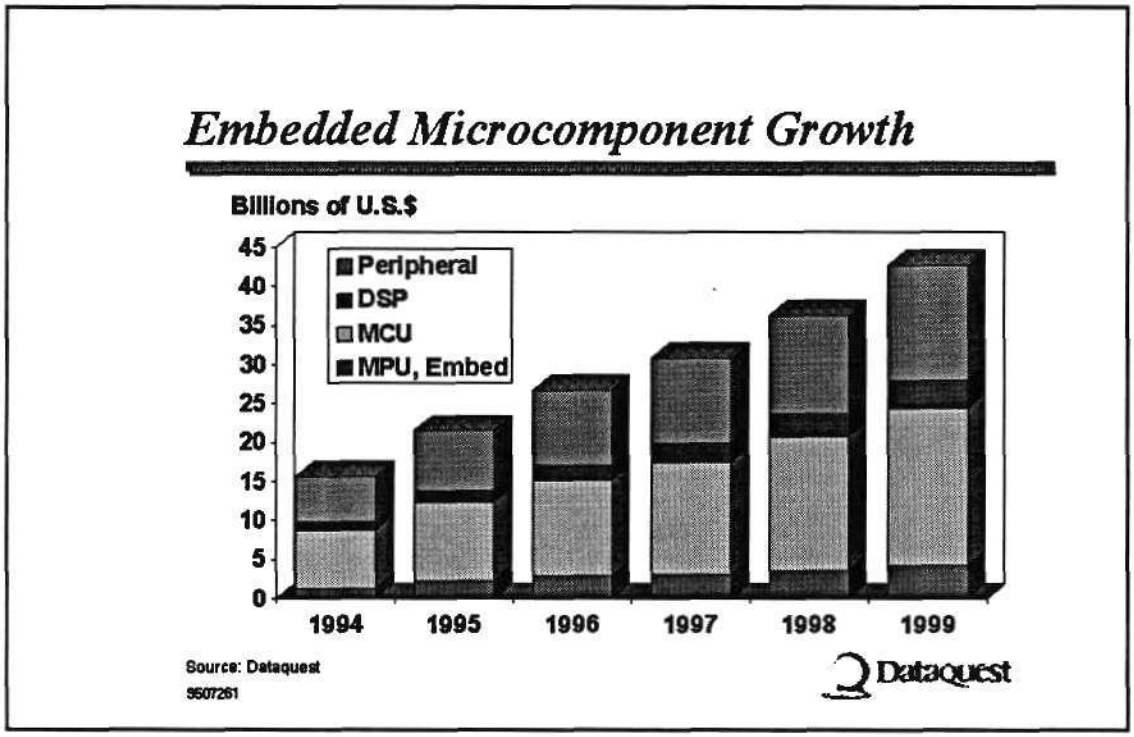
Tom Starnes
Principal Analyst, Microcomponents
Dataquest Incorporated

Agenda: Definition, Marketplace, Embedded Applications, Embedded Expectations, Pricing, Embedded Features, The Future Market, Players, Opportunity and Summary.



DEFINITION

Computational Microcomponents: The microprocessors that drive PCs, workstations, servers and enterprise computers. They tend to be the 486, Pentium type processors, Power PC in some instances and a variety of RISC processors in workstations. Besides microprocessors in embedded applications there are also microcontrollers, digital signal processors and peripheral services. All of those together form what we call the embedded microcomponent marketplace.



MARKETPLACE

There were $155 billion dollars' worth of semiconductors sold in 1995. Almost one dollar in every four went to microcomponents.

In 1995, $35 billion was spent on microcomponents. Microcomponents are made up of microprocessors, microcontrollers, DSPs and peripherals.

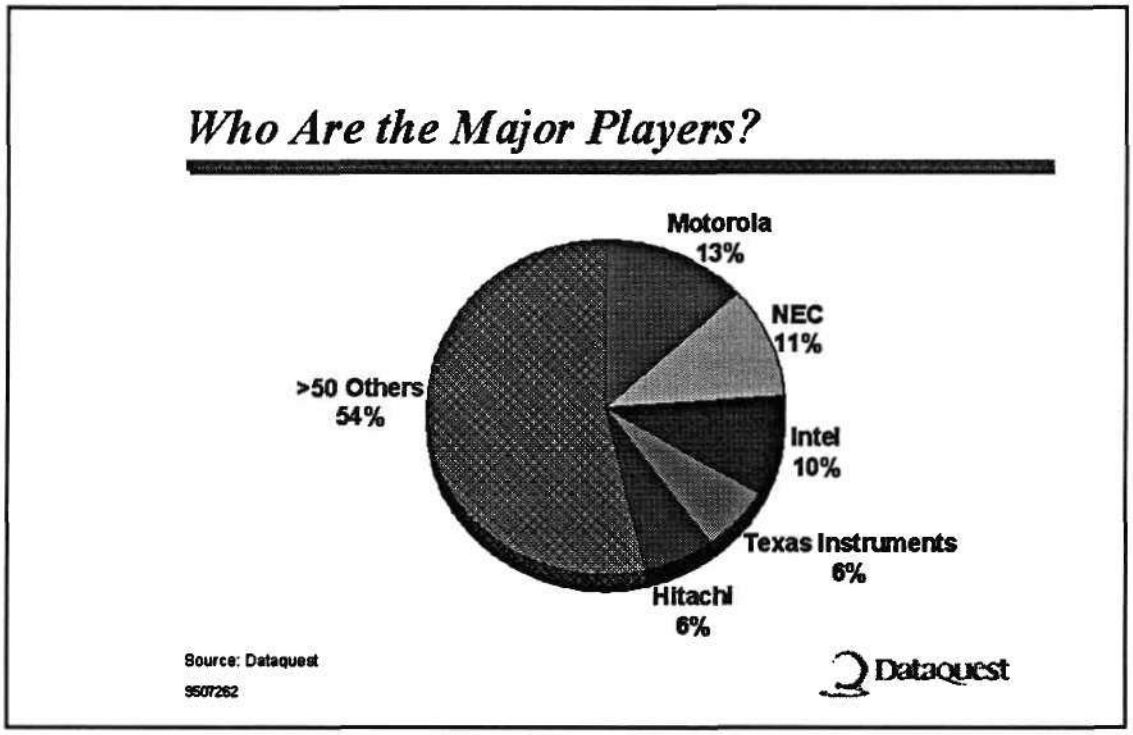
Twenty-two percent of all semiconductors, split into the computer microprocessors and all of the other embedded microcomponents and the computer microprocessors are a very healthy share. Eight percent of every dollar spent on semiconductors goes into this one area of computer microprocessors.

The revenue from embedded microcomponents was $21.5 billion in 1995, a large portion of that being in microcontrollers as well as the peripheral area.

EMBEDDED APPLICATIONS

What are some of the embedded applications? They range from remote controls, videogames to cellular phones. With automobiles there are a variety of

applications from engine control to climate control and convenience features. Medical instrumentation from MRI systems down to blood pressure checkers.



All of these have microcomponents in them performing the primary functions that these devices are designed for. Laser printers. Robotics. The larger systems such as telephone switches; there are a variety of embedded applications that are very large that you never see that are running the infrastructure behind a lot of the systems that we use day-in and day-out.

Expressly embedded applications are not those where the processor is the central processor in things like a personal computer.

EMBEDDED EXPECTATIONS

Over the next few years some of the more interesting applications are those involving the human interface. A lot of products have a programming looking interface to them these days and we have enough computational power available

in microprocessors, in digital signal processors, in the peripherals to make this interface a lot more human friendly.

We have seen progress in moving to still photographs and full video representations. Moving to full motion, full screen video. High definition television will make that image even larger and more realistic.

Motion tracking: There are camcorders available today that have an eye tracking device in them. When you look in the viewfinder, the camcorder will focus on the precise part of the image that you are looking at because it is tracking your eye and therefore it knows what you are looking at.

Air bags can be a safer device if they are deployed at a rate appropriate for the weight and the actual position of the seat's occupant. If you have a small child in the seat, you may want the rate at which that air bag deploys to be quite different than if you had a fairly large adult in that seat.

Some other areas that need human interface. We have seen, for instance, computers go from beeps to sounds. We are also transitioning over to more realistic sounds, not just human voice but music, stereo, multichannel sound systems, surround sound and things like THX.

Speech to text: Somebody wanted to transcribe that into text. Can that be done? Yes, it can. It's not real good right now. On the other hand, I'm not sure you really want to. Most people don't speak as well as they may write. On the other hand, it's a fast entry of the raw information to be able to take speech and directly turn it into ASCII text.

Why am I going over all of these things? We have the computer power today. We have a lot of the algorithms already developed that allow this human interface to be much more natural, to be easier to use systems. I think that this is an area where you will see a lot of new development. You've seen a lot of it already.

PRICING

What are the price ranges? Rather than say a $200 Pentium, with an embedded microprocessor or an embedded microcontroller or DSP, you have far more cost sensitivity. Typically these things range around $15 to $25 in cost. The cheapest microcontrollers run under $1. The DSPs are available for $5 to $10, up to $15 and $20. Microprocessors tend to be closer to the $15 to $30 range.

There are some embedded micros that cost as much as $75 and $100 but they are very high functionality and very high performance.

Typically what you are going to see is something around a $20 area.

EMBEDDED FEATURES

Embedded micros have to be very rich in features. Not only are they rich in features, they are focused towards applications. There is a wide variety of options there. It's not just, go to Intel and find out what the next X86 is going to look like. Depending on whether you are building a cellular phone, a microwave oven, a telephone switch or what-have-you, you are looking for the micro that has the right set of features, performance and price that fits your particular needs. That may have nothing to do whatsoever with the guy over here building an automobile engine control.

THE FUTURE MARKET

Microcontrollers, DSPs and peripherals. There were $21 billion dollars in 1995 in that market. It will be going up to about $43 billion dollars in 1999. The major part of this is dominated by microcontrollers from the programmable side and from the not so programmable side, the peripherals.

The DSPs are growing quite rapidly because the applications that I mentioned that have human interface and digital signal processing are coming of age. The vendors that have good DSP capabilities, have a good understanding of DSP and have something to offer will be able to rocket ahead in the near future. In the past that market was still in a very infant stage.

PLAYERS

The major player in the embedded marketplace is Motorola and Intel falls down to the number three position when you take out those X86s going into the PCs.

NEC shows up very high and they have very good coverage.

Texas Instruments on the other hand is interesting in that their strength is in digital signal processing. They show up here as MCUs as well, however, they have a very focused MCU effort. They primarily work in automotive applications.

OPPORTUNITY

Why do I believe that there is a lot of opportunity in embedded microcomponents? The answer is variety. You just can't list all of the applications. Every application has its own unique needs. They can be categorized somewhat in many ways. What's needed for a home theater system has nothing to do with what's needed in a pager or in a robotics system in a factory.

SUMMARY

Marketing is important. That would include; price, image and advertising. It also includes the guy at the top of the company believing in the company and the vendor.

Make sure you understand your applications. Standards change. Be positioned to win. The key points are to know the application that you think your product is best for. Work with a customer.

Note: Please refer to the companion "Verbatim Transcript Document" for the full in-depth discussions, detail, explanations, charts, graphs, and the audience "Question & Answer" session.

Chapter 6: CONSUMER MULTIMEDIA CHIP TECHNOLOGIES: READY FOR PRIME TIME

Dale Ford
Senior Industry Analyst
Semiconductor Applications Markets
Dataquest Incorporated

Agenda: Research Results, Set Top Box Market, Video Game Products, DVD Controllers and The Future of Television and Predictions.

RESEARCH RESULTS

Color televisions, personal portable stereos, video game cartridges and VCRs are many of the mature products that are shipping in high volumes now. The eight and 16 bit video game controllers of the SEGA Genesis and the other products in the market in the 16 bit category have been in a slump, declining for a couple of years.

In the high growth area, a number of new products that offer promising opportunities for manufacturers and semiconductor makers begin with the word digital. The era of digital consumer electronics is bursting upon us with digital cable and direct satellite converter boxes, 32 and 64 bit video game generation, digital VCRs and video camcorders. Other digital markets are the digital cameras and digital video disk which are all emerging and presenting exciting opportunities.

The overall market is poised and we are forecasting over 9% compound annual growth between 1995 and the year 2000, representing $13 billion dollars in electronics equipment manufacturing.

With the digital content, the semiconductor market is driven to an almost 18% growth rate for consumer electronics. We begin in 1995, with the total consumer electronics semiconductor market of a little over $22 billion. Of that, roughly $2 billion is in next generation electronics and another $2 billion in digitally enhanced consumer electronics.

By the time we reach the year 2000, if we put these two categories together, they represent over 50% of the consumer electronics market.

CONSUMER MULTIMEDIA CHIP TECHNOLOGIES: READY FOR PRIME TIME

We see strong growth opportunities going from a market that is slightly $2 billion dollars in 1995, growing at a 55% compound annual growth rate to $7.7 billion dollars by the year 2000, for semiconductors.

We see competition between fixed type media, such as the CDs, cartridges and the cassettes that are going into the televisions and the PCs. Those are going to be fighting for the home dollar against the electronic delivery, coming in the form of twisted pair to the home, coax and fiber, broadcast television, cable TV and direct broadcast satellite.

SET TOP BOX MARKET

Many of the hopes and expectations that the marketplace had for set top boxes have had a little bit of a shadow cast on them.

Thomson Consumer Electronics announced that they had shipped 1.8 million direct broadcast satellite boxes over an 18 month period. 1.2 million of those being shipped in 1995.

They also announced that their inventories were down to less than one week. They have now announced their second generation receiver and the first generation receivers have dropped down to below a $500.00 price point.

PrimeStar also claimed their 1 millionth subscriber 17 months after their launch. With the backing of TCI, cable operations and suppliers from General Instruments of set top boxes, they have achieved an over 40% market share in the U.S. market.

As we continue forward, we now have the ongoing auctions for additional satellite services in the U.S., as our government continues to sell air and make money off of it.

We also have had two new systems announced. In addition to the direct TV, the USB and the PrimeStar systems, we will now have those systems joined by Alpha Star, launched by T-Com and Dish Network by Echo Star.

The cable set top box market has been delayed by the disappointing trial results. It's driven the service providers and the equipment manufacturers to begin looking at alternative approaches for this market. We are now backing off from the promise of video on demand to near video on demand.

We are searching for the most cost effective and timely communications technologies. The competition in that arena ranges from hybrid fiber coax technology, fiber to the curb, wireless cable services, asymmetric digital subscriber line and ADSL.

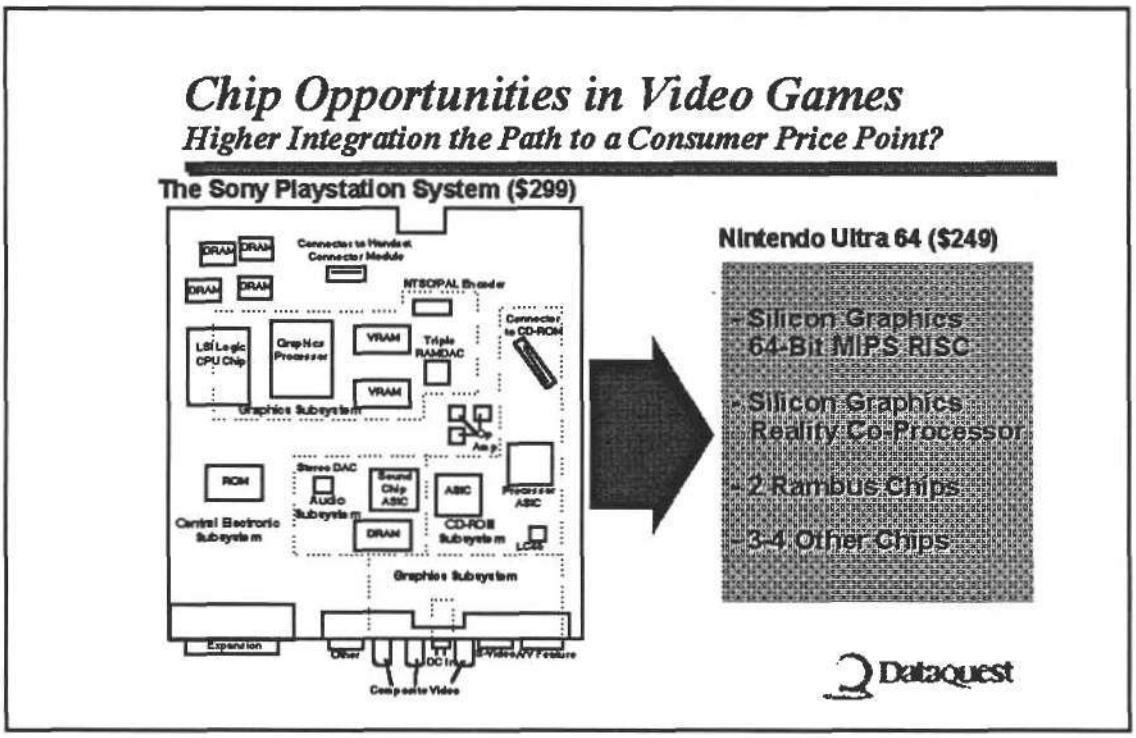
On the home front, there are concerns also about the costs of these boxes. There are concerns as to what the consumer will spend and concerns also as to what the equipment providers are willing to invest up front in order to make this happen.

The set top box draws on technologies from multiple disciplines. In fact, it's one of the few success stories of a successful application of military technology into a consumer application, as we look at the satellite communications products that have been developed.

As semiconductor manufacturers begin to compete in this realm, they will be called upon to bring their semiconductor economies that have worked so well in providing more bang for the buck in the PC world. They will be called upon to bring these same economies into the consumer products.

VIDEO GAME PRODUCTS

We have definitely seen the 32 and the 64 bit video game products move to a new level with the introductions over the past year. We have seen a third major player enter the market, in a market that had been dominated by SEGA and Nintendo in the past. We now have Sony, who has captured significant market share early on with their 32 bit PlayStation.



SEGA has also launched their next generation product with the SEGA Saturn and a new portable product, the Genesis Nomad. Both SEGA and Sony are now looking forward in early 1996, the introduction of Nintendo's new platform which is the Ultra 64.

Consumers are not willing to pay steeps prices for these video game controllers. As a result, it's put severe price pressure on the manufacturers to bring these platforms down into a consumer realm.

For non-Intel architectures, MIPs, for the Power PC and other microprocessor architectures, these consumer markets represent a golden opportunity to move into markets where Intel isn't and where Intel really isn't even showing evidence of competing to this point.

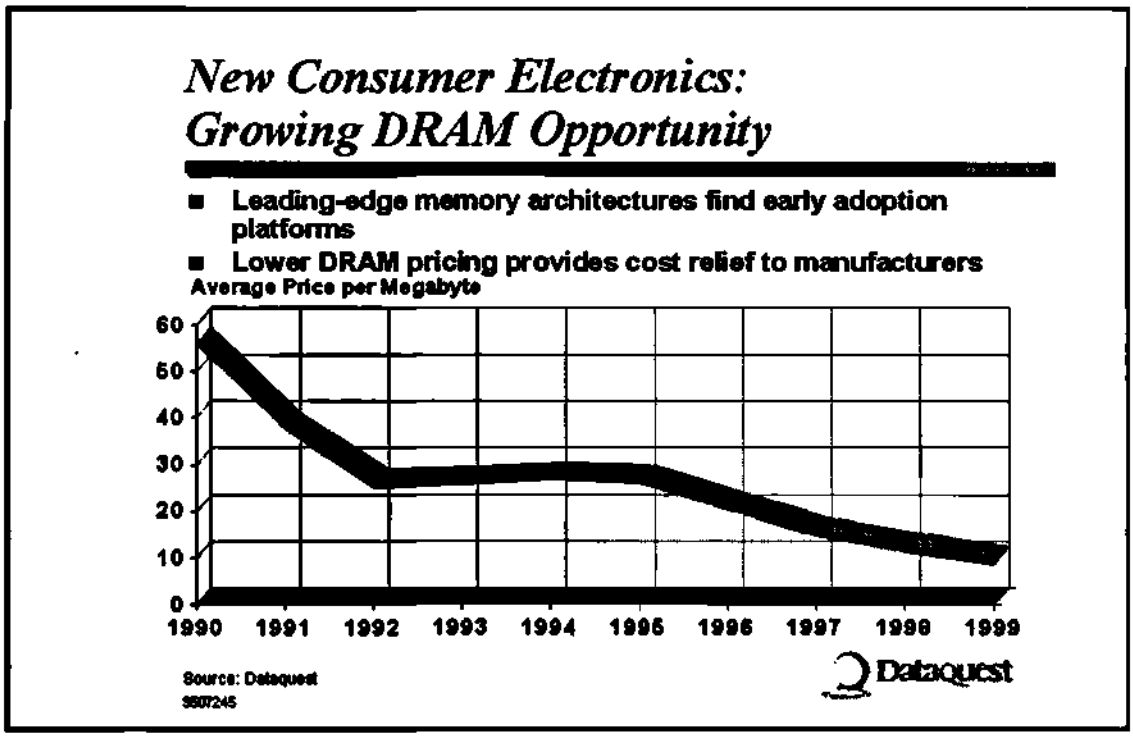
DVD CONTROLLERS AND THE FUTURE OF TELEVISION

Sony and Toshiba were both demonstrating DVD players and DVD technology a year ago. It was the announcement of this finalized standard that allowed almost

a dozen manufacturers to announce or demonstrate DVD players for 1996. Those players ranged from Toshiba, Sony, Phillips, Pioneer, Samsung, Algi Electronics, Onkyo, Zenith, and Mitsubishi.

Toshiba was leading out the pack introducing a $599 and a $699 product into this market. Thomson also said that they will introduce a DVD player in 1996 and they vowed that they will hit that original $499.00 price point.

Early on we were calling DVD, digital video disks. In the near term it's a read only medium. It will be applied in its earliest applications in the video playback arena. As the technologies are developed, it will begin to move towards a writable capability and eventually to an erasable/writable to make it a true RAM type of product for the PC.



PREDICTIONS

There are some wildly optimistic forecasts out there from Toshiba and Sharp that we could not support. We do expect it to be a highly successful product. We

forecast it will reach 60,000 unit shipments worldwide in 1996 and accelerate to 2.5 million shipments in 1998.

On the HDTV front, we have regional variations. We have HDTV in the U.S and news from Japan. For the high vision and analog systems, Japan had announced that they would move to a digital system.

In Europe, they've given up on the HDTV type of quality and moved more to a DVD, a digital video broadcast standard.

The U.S., even with the grand alliance, has admitted that they will probably not be able to roll their players out until 1998.

The government is looking at auctioning off more of the spectrum for these products and there are competing plans from the FCC and the White House.

There are key technologies in this that are being leveraged from other products, such as the MPEG-2, the AC3 compression schemes, Musicam, modulation schemes such as Quem and VSB and the encryption scheme, such as Digicyper.

We are going to see better participation of North American and European companies in the consumer market then we've ever had before. Traditionally the Japanese have been noted as the dominant players in this market. Now these players are turning to companies in the U.S.

Note: Please refer to the companion "Verbatim Transcript Document" for the full in-depth discussions, detail, explanations, charts, graphs, and the audience "Question & Answer" session.

Chapter 7: COMMUNICATIONS GROWTH FUELS GaAs EXPLOSION

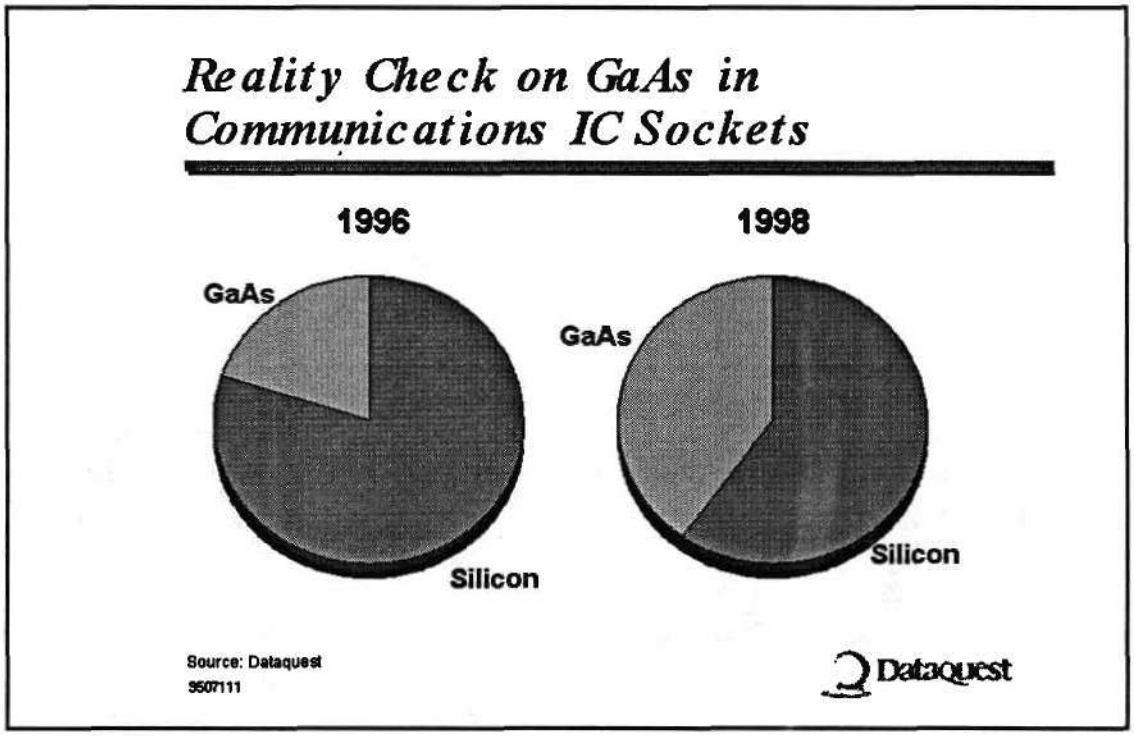
Earl J. Lum
Senior Industry Analyst
Semiconductors Worldwide Program
Semiconductors Group
Dataquest Incorporated

Agenda: The Market, Why GaAs as a Technology?, Economics, Technology Forecasts and Summary.

THE MARKET

Until recently most of the applications for GaAs has been limited primarily to military and space type applications.

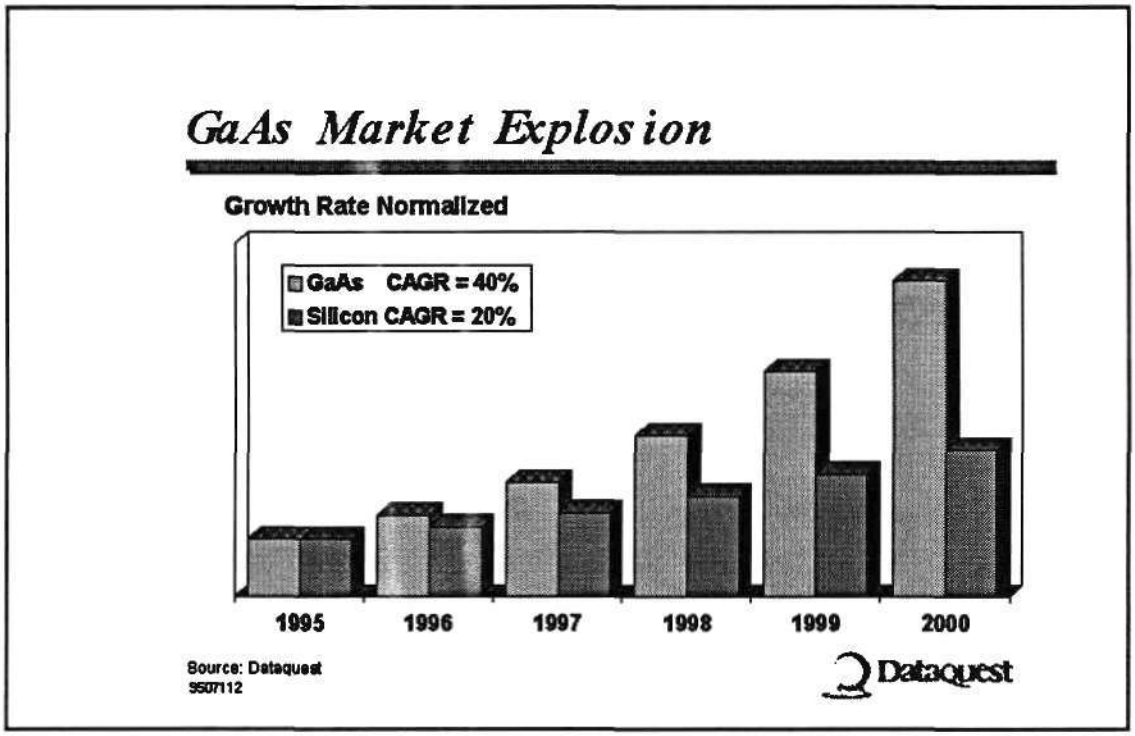
In the semiconductor market the use of GaAs compared to silicon, is less than two percent of the $150 billion market.



COMMUNICATIONS GROWTH FUELS GaAs EXPLOSION

In communications, integrated circuit applications are currently using about 25% GaAs.

Before 1998 that number is going to get close to the 35%-40% area. This is almost halfway between silicon and gallium arsenide technology being used for wireless communications. One of the reasons why we see the gallium arsenide increasing is the cost and performance of these particular components are starting to outperform their silicon counterparts.



Over the next five years we are going to see this technology take off at a rapid rate. Communication types of products will be feeling this growth. As the rest of the silicon industry grows at 20%, we're going to see GaAs grow at close to 40% compound annual growth rate.

The number one growth factor is personal communications systems, handheld subscriber units and cellular. As we get more integration and as these phones have longer talk times and longer battery life there will be a switch from using silicon discrete designs to GaAs chips. We have a 70% growth rate predicted for

PCS subscriber units. In the wireless local area networks we're predicting 113% compound annual growth.

WHY GALLIUM ARSENIDE AS A TECHNOLOGY?

The bottom line is we're getting better power performance at a higher frequency and at lower voltage.

Power gain is related to frequency and as some of these new applications are increasing in frequency, performance from gallium arsenide chips are starting to outperform their silicon counterparts.

Better noise performance: As we start using these chips to receive functions for signals, we want to make sure that the noise levels are as low as possible.

Applicable frequency of operation. GaAs clearly is a winner as we get into higher and higher frequency applications for the wireless communication industry.

Cost was a predominant factor in why the industry was not using GaAs technology for their components. We are now seeing that the cost relative to their silicon counterparts are about equal but you have added performance from the GaAs technology.

ECONOMICS

System circuit board savings: The ability of gallium arsenide chips to integrate passive components, circuit board savings would be realized. You can either shrink your existing design for your system or add additional features with that board space that you saved by integrating the passive components on a chip that was not able to deal with silicon devices.

Are there going to be any capacity constraints? What does their capacity look like? Nacom is buying out Cray Research's 4" GaAs in Colorado because they were at capacity in their Lowell facility. Depending on who you talk to, some companies are near capacity or at capacity. It's company to company dependent. Depending on what they're supplying to the marketplace, what type of components they have and what applications they are serving.

GaAs foundries, such as Texas Instruments, TriQuint, TRW, ITT, look like they still have enough capacity for 1996 and 1997 but, that is also dependent on how rapidly the market takes off.

The PCS industry has a mandate to deploy most of their systems by the end of 1996 and the beginning of 1997. That will mean there will be a humongous surge in two GHz PCS phones, probably in the latter half of 1996. That is going to cause an impact on the supply of gallium arsenide chips for these particular systems.

As we look to 1998, 1999, if the market continues to sustain its 40% compound annual growth, at some point in the future you are going to start seeing problems occurring within the GaAs industry.

What about the companies that are actually supplying the GaAs materials? The Japanese GaAs material suppliers grew at a rate of over 35% last year from the year before in supplying GaAs material.

TECHNOLOGY FORECASTS

The industry has already started to migrate to 100mm wafers. For some of the silicon people out there, you are thinking 100mm. That was decades ago. We're running 8" wafers and we are talking about 300mm wafers.

There are still some suppliers out there that are running 75mm wafers - 3" and as capacity starts to get tight on them they are probably going to a 4" conversion at some point in the future to be able to expand their capacity.

Just like silicon, GaAs components are migrating to a lower operating voltages to maintain system compatibility with their silicon components and to increase performance in communication applications where power is very limited and very critical.

A key leader in this technology is Oki Semiconductor. They are the leaders now in the three volt GaAs technology and their technology is being used extensively in the cellular phone industry.

What is going to happen to the GaAs chip manufacturers? With the way the industry currently looks you have a bunch of different foundries that emanated from a traditionally military type of industry, where they supplied only their

internal needs. Now you are looking at these companies converting over and becoming commercial foundries offering their capacity to whoever needs it. You are seeing a lot of players in the industry supplying to their competitors.

Look at the GaAs chip makers striking key license also with their strategic customers. In order for their players to really survive this market growth, these chip vendors will need to be able to secure design slots in future generations of products to secure their place in the industry.

SUMMARY

We're going to be seeing a 40% compound annual growth in 1999. Most of that's going to be driven through different technologies. PCS communication handsets and cellular will be the first point at which it will take off.

As direct broadcast satellite emerges and starts to become a hot market that will add to this growth as wireless LAN technology continues to grow. That will also fuel the 40% growth rate and as we get more and more reliant on bandwidth capabilities for fiber optic network systems, that will also add to the 40%.

GaAs will be the dominant technology for the RF portion of communication systems by 1998. Partly driven by the fact that, as we get higher and higher in frequency, this will be the only choice available to those system manufacturers.

We're going to see technology migrating towards three volts for some companies such as Oki. In 1997 we will start to see migration of some of the technologies to below 3.5 micron for their silicon counterparts.

We are going to see the entire GaAs industry pretty standardized at 100mm for the wafer diameters by 1997, if not sooner, depending on how quickly the markets and the applications increase.

Note: Please refer to the companion "Verbatim Transcript Document" for the full in-depth discussions, detail, explanations, charts, graphs, and the audience "Question & Answer" session.

This page is intentionally left blank

Chapter 8: SUPPLY AND DEMAND: WILL SILICON DO IT ALL?

Calvin Y. Chang, Ph.D.
Industry Analyst,
Semiconductor Equipment,
Manufacturing and Materials
Dataquest Incorporated

Agenda: Key Industry Drivers, Dataquests Forecast, Capital Investment, The Future of The New Fab Activities and Summary Outlook For Supply and Demand

KEY INDUSTRY DRIVERS

In the 1970s the miliary industry was a driver behind the technology events in semiconductors and was also one of its most important consumers.

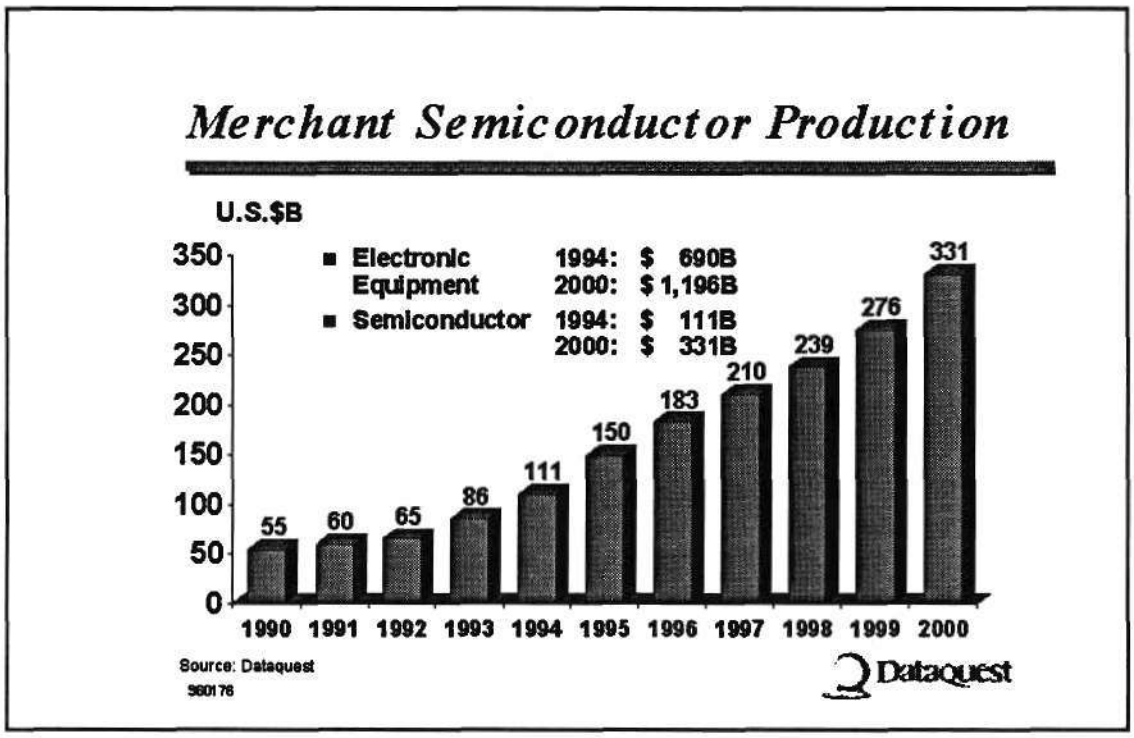
In the 1980s we saw the introduction of many consumer electronic inventions such as the video machine, video games, Walkman and Hi-Fi stereo. These new products helped developed a consumer electronic market that in turn drove the growth of semiconductor consumption.

In the 1990s the personal computer is a powerful engine that fueled the tremendous growth that we have seen the past few years. The estimation of all semiconductors zoomed by PC has risen from 14% in 1991 to about 27% in 1995 and to a projected 34% by the year 2000.

Five years from now the personal computer will consume more than $110 billion worth of semiconductors. That is bigger than the entire semiconductor market in 1994.

In the new millennium with the world becoming ever more global, with the information exchanged and with information becoming the most important commodity, the delivery and exchange of information will be the key driver for continued growth in semiconductors.

DATAQUEST'S FORECAST



Communication IC's will account for 20% of all semiconductors consumed by the year 2000 and will be the fastest semiconductor growing area, with a growth rate even faster than the PC in the years beyond 2000.

Data processing which includes PC and other computers is by far the largest. But the area of the fastest growth is in communications. The 25% compound annual growth rate in communication semiconductors will likely be carried over in the years beyond 2000.

Dataquest is projecting that the semiconductor industry will enjoy steady growth in that it will achieve $331 billion a year in revenue before the turn of the Century, which will result in a 17% compounded annual growth rate for 1995 through the year 2000.

About $330 billion worth of chips will be produced in the year 2000. There are four semiconductor producing regions and North America will become the largest. Asia Pacific will be the fastest growing region in IC manufacturing who's growth will come mostly at the expense of Japan.

With semiconductor consumption projected to triple in six years, the amount of chip manufacturing capacity has to double and the doubling of fab capacity means a lot more of semiconductor manufacturing equipment will be required.

The semiconductor production equipment market which includes companies like Apply Materials, LAM Research, Canon and other suppliers worldwide, has benefited from the chip industry's rush to build capacity in the recent years.

In the past three years, the semiconductor equipment market grew 2.6 times, which is a compounded annual growth rate of 60% a year. The equipment market is expected to reach $24 billion this year.

CAPITAL INVESTMENT

The demand for semiconductors is strong and it will triple in six years. One of the driving forces behind capital investment in the semiconductor industry is DRAM which is the single most important component in the chip industry's investment.

Seven of the top ten spenders in the chip industry for the next five years will likely be DRAM producers. The DRAM producer which includes the Korean, the Japanese, America's TI, Micron Technology and IBM as well as new DRAM companies in Asia, will contribute half of all of the industry's capital investment.

Other important capital spenders are the foundry companies in the microprocessor and logic producers. We also believe the European companies will invest heavily to fully capture the opportunity presented by the increasing PC consumption in Western Europe and the demand for consumer electronics in the growing economy there.

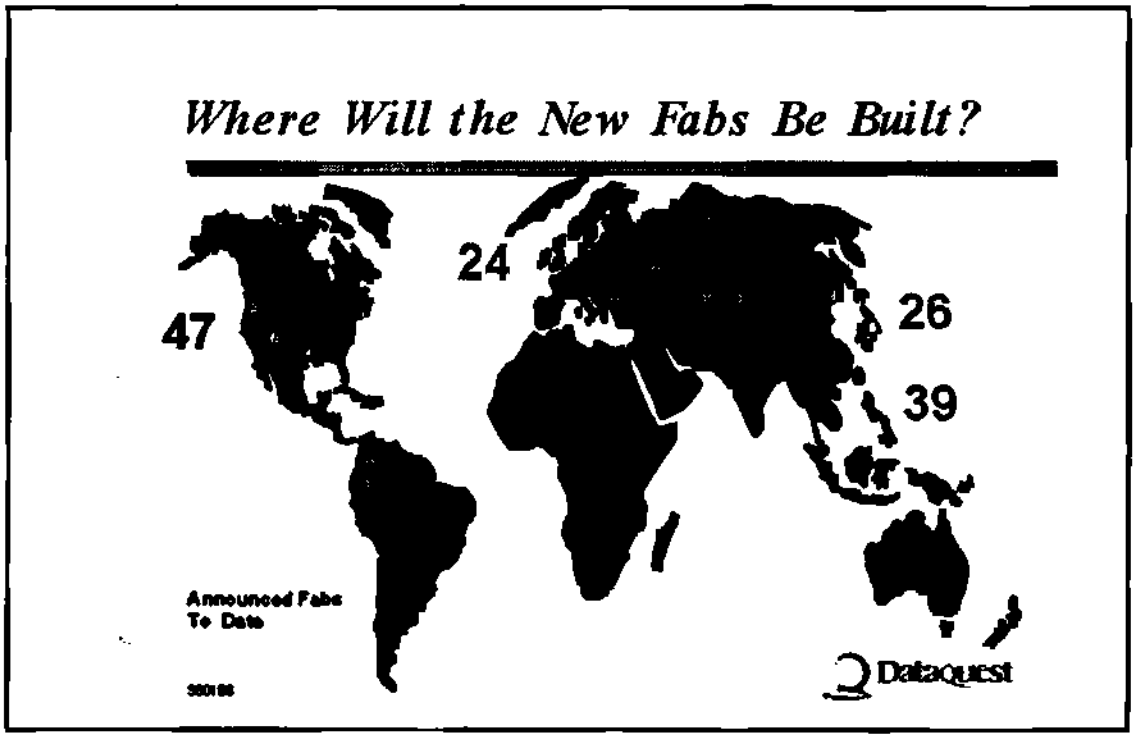
For the next five years, from 1996 to the year 2000, the semiconductor industry is expected to invest a total of $275 billion in capital expenditures. That is 2.7 times of the total investment of the previous five years and with this level of high-end investment, we believe the industry will be positioned to satisfy the growing chip demand.

Our surveys showed that for the next five to six years the industry will spend on an average 22% of its revenue on capital investment.

SUPPLY AND DEMAND: WILL SILICON DO IT ALL?

In the year 2000, $330 billion worth of chips will be manufactured on nearly five thousand million square inches of Silicon. This will be $66 per square inch which is a 40% increase in revenue productivity from the 1994 level.

Measuring new capacity in terms of the number of IC wafers produced a month, we find that almost 65% of the new fab capacity will be North America and Asia Pacific. About 20% of that will be in Japan and 15% in Europe.



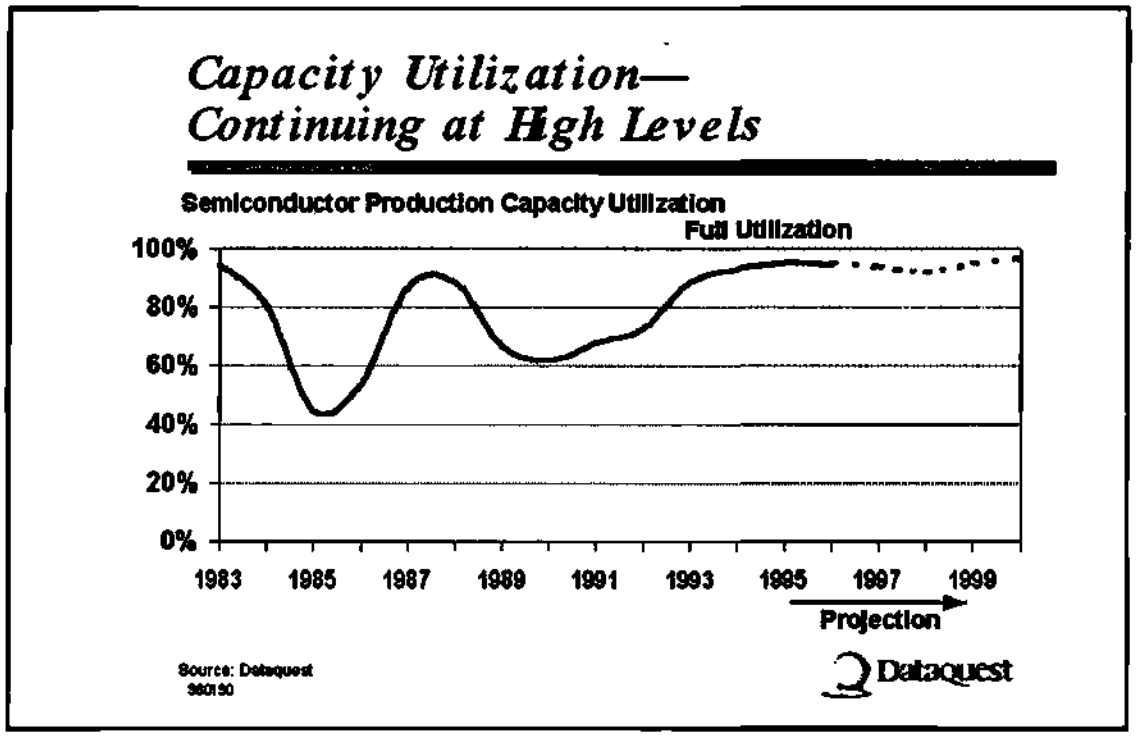
There are 136 new fabs that have been announced. In the U.S. there are 47, with 24 in Europe, 26 in Japan and 39 in Asia, mostly in Taiwan, Korea and Singapore.

The new U.S. fabs are concentrated in Oregon and Texas but also include states like Arizona, New Mexico, Idaho and others. The European new fabs will be located in Germany, France, the U.K. and Italy.

THE FUTURE OF THE NEW FAB ACTIVITIES

New fabs will be bigger and more expensive. Today a typical fab costs about a billion dollars, but by the year 2000, that could be 1.7 or 1.8 billion dollars.

There will be fewer companies building fewer new fabs. A company that can afford building fabs will be of two general types. One will be the integrated device manufacturers or the IDMs who can generate large revenue streams from either high volume products such as DRAM and SRAM and other memories or high margin devices such as microprocessor and advanced logic and A-6.



The other would be foundries which will provide manufacturing to the fabless companies as well as those companies that have fabs but either cannot afford or choose not to build new fabs to meet their continued growing demand or capacity demand.

The semiconductor contract manufacturing market is expected to grow from $6 billion in 1995 to nearly $18 in the year 2000. This is a compounded annual growth rate of 24%. By the year 2000 foundry is expected to contribute 16% of the manufacturing for the $330 billion worth of the semiconductor merchant market.

The tremendous growth of the past few years in the semiconductor industry has put considerable strength on the industry's production capacity. Many

companies have been reporting that they do not have or cannot buy enough capacity to meet their customer demands.

SUMMARY OUTLOOK FOR SUPPLY AND DEMAND

On the demand side we see strong growth in the application market such as data processing which will grow by 22% a year. Communication will grow 25%. At the same time there will be continued growth in demand from the consumer electronics, industrial and automotive sectors.

On the supply side, we believe the industry will invest sufficient capital to build the capacity necessary to meet the demand. But there will be fewer companies building fewer fabs. The new fabs will also be bigger and more efficient because larger fabs provide larger economy upscale.

There is also the emergence of foundry which can be thought of as a pooling of resources by those companies that do not want to build fabs.

Using foundries will also allow them to leverage the economy available to big fabs and also bring down their costs. While the demand for semiconductors is great, we believe the supply will also be there and be efficiently used. We believe, unlike in the 1980s, the industry will be able to maintain at a high level of utilization for the remainder of the decade.

In this healthy economic environment, we can expect strong growth in semiconductor demand. PC and other data processing equipment will continue to drive chip consumption.

Communication will introduce the next wave of huge semiconductor demand. These, along with other application markets will jointly produce a demand that will help the chip industry to achieve the $330 billion mark by the year 2000.

Foundry is an exciting new component in the supply equation and will become a key element in the industry's manufacturing.

The combination of big demand, sufficient investment and greater usage of foundry we believe will help the industry to run efficiently and in the process keep the supply and demand equation in balance.

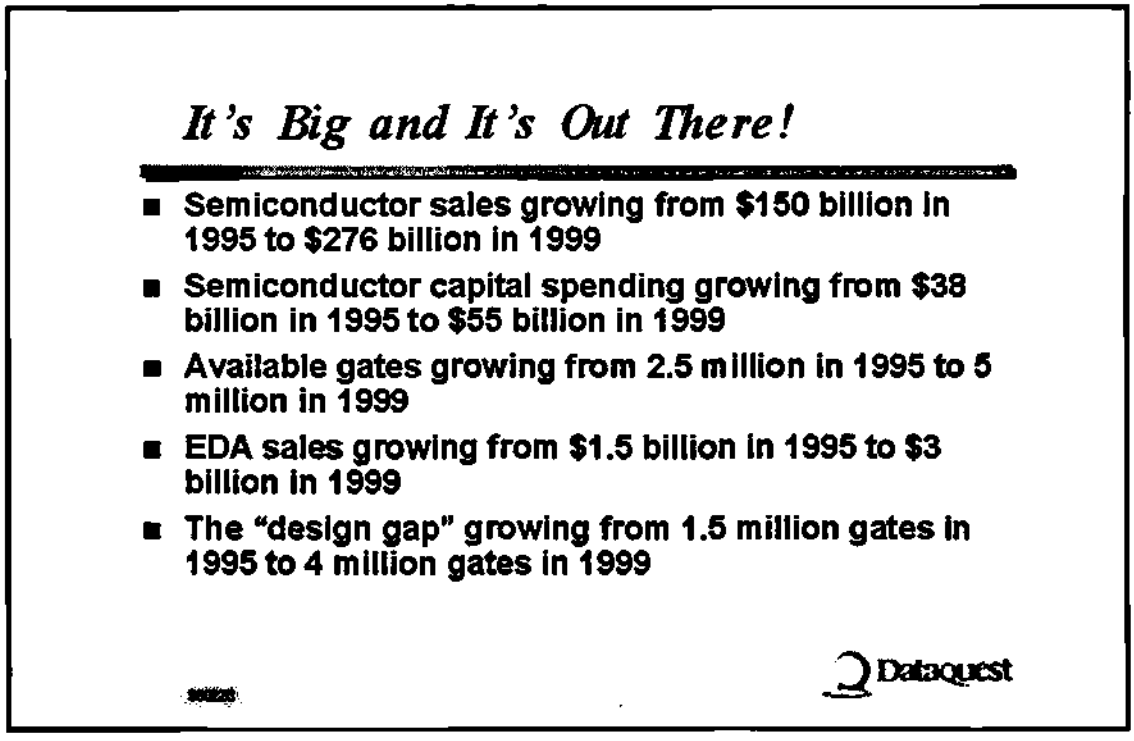
Note: Please refer to the companion "Verbatim Transcript Document" for the full in-depth discussions, detail, explanations, charts, graphs, and the audience "Question & Answer" session.

Chapter 9: THE DESIGN CHALLENGE: IS IT THE CRITICAL PATH?

Gary Smith
Director and Principal Analyst
Electronic Design Automation Program
Online, Multimedia and Software Worldwide
Dataquest Incorporated

Agenda: Sales, Good News, Methodologies, Market Forecasts, Design, EDA Today, Summary.

SALES



GOOD NEWS

There's going to be a dramatic increase in yield. Since you can't get any more gates out of it, the die art is going to become smaller. As the geometries decrease, die size shrinks; as die size shrinks, you get greater yield.

Packaging costs are going to decrease because since you're sort of plateaued, all the packaging guys don't have to worry about greater pin counts and they can work on costs.

Of course, marketing reigns supreme because the only differentiating factor is how good you can market a product rather than some of the designs.

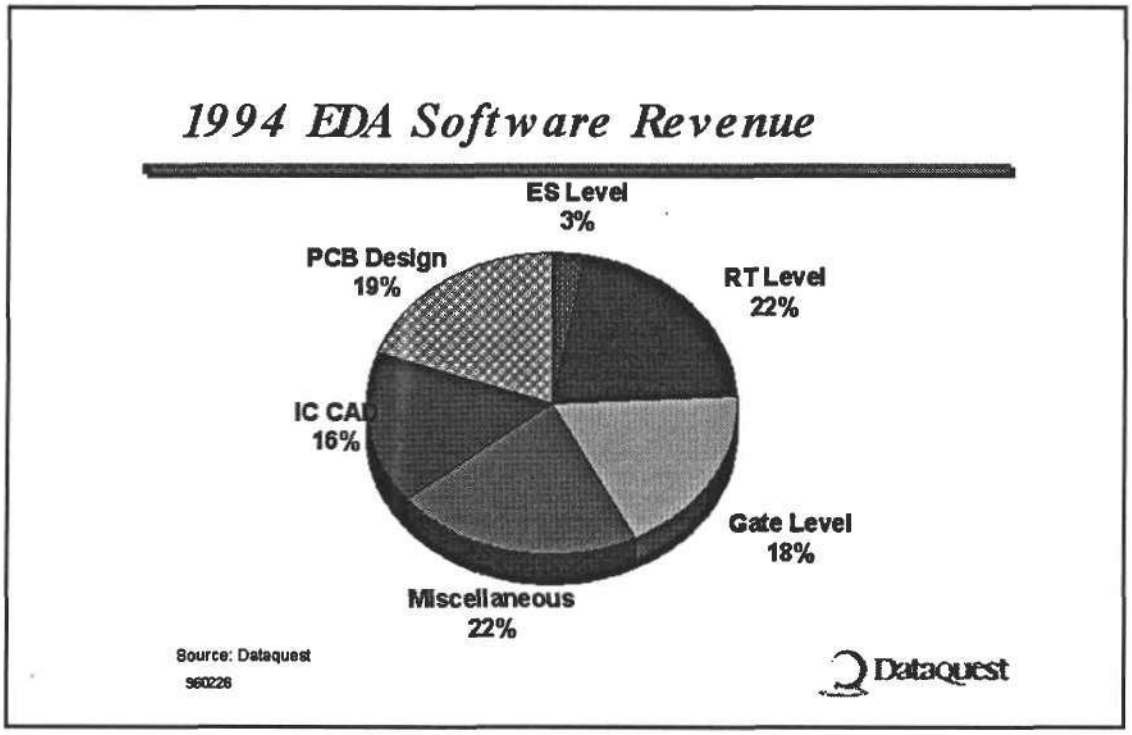
METHODOLOGIES

A design capability is determined by the methodology that's being used. Today, we're dealing at three levels of methodology. Back in the early 1980s, we were at the gate level. In the late 1980s we moved up to what's called the RT level, registered transfer level, design. And in 1994 we got out the first ES level designs, electronic system designs.

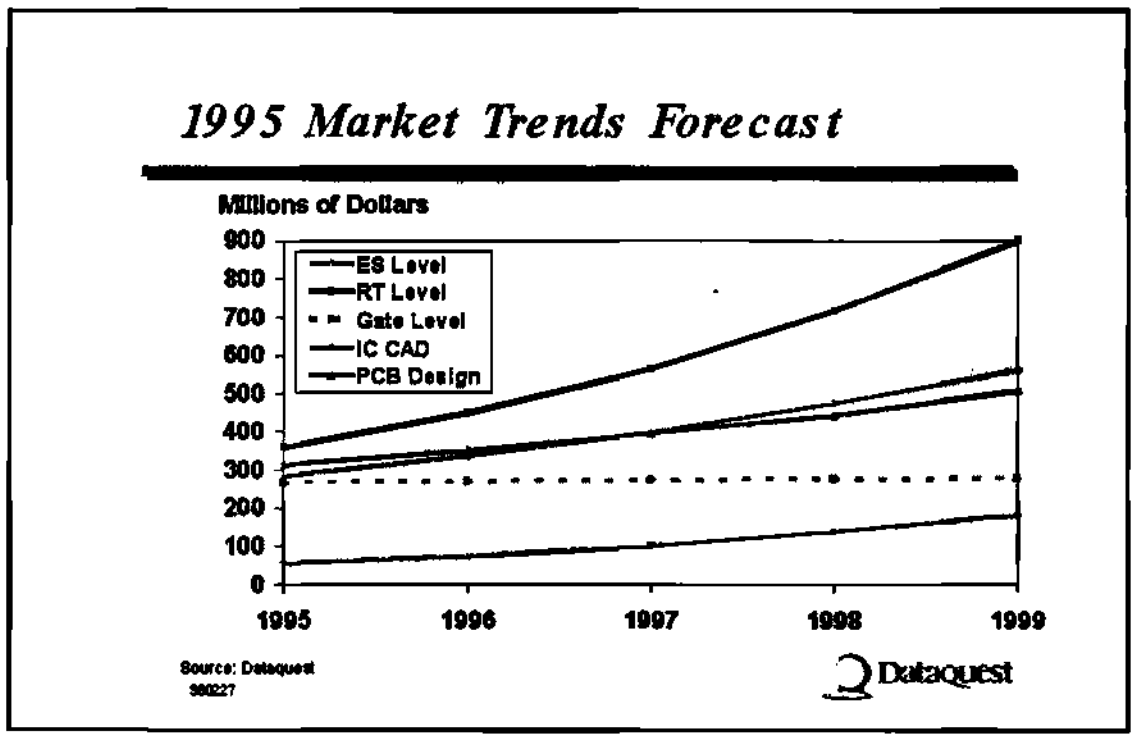
SDA is the next methodology that's coming up. That's a combination of mechanical and electronic design. There have been some semi-successful SDA designs -- the Boeing 777 was the one that was talked about a lot.

What we're talking about today is ESDA. I call it the ES level of methodology, because there are some people who call themselves ESDA vendors who aren't. So I avoid that. The big power here is the capability of designing software and hardware at the same time.

MARKET FORECASTS



What we saw in 1994 was ES level was about 3% of the sales. RT level really took over first place with 22% of the sales; gate level 18%. RT passed gate in tool sales back in 1993. IC CAD is the smallest with 16%, although this year it might not be. It's growing more rapidly than any of the others. PCB Design, 19%.

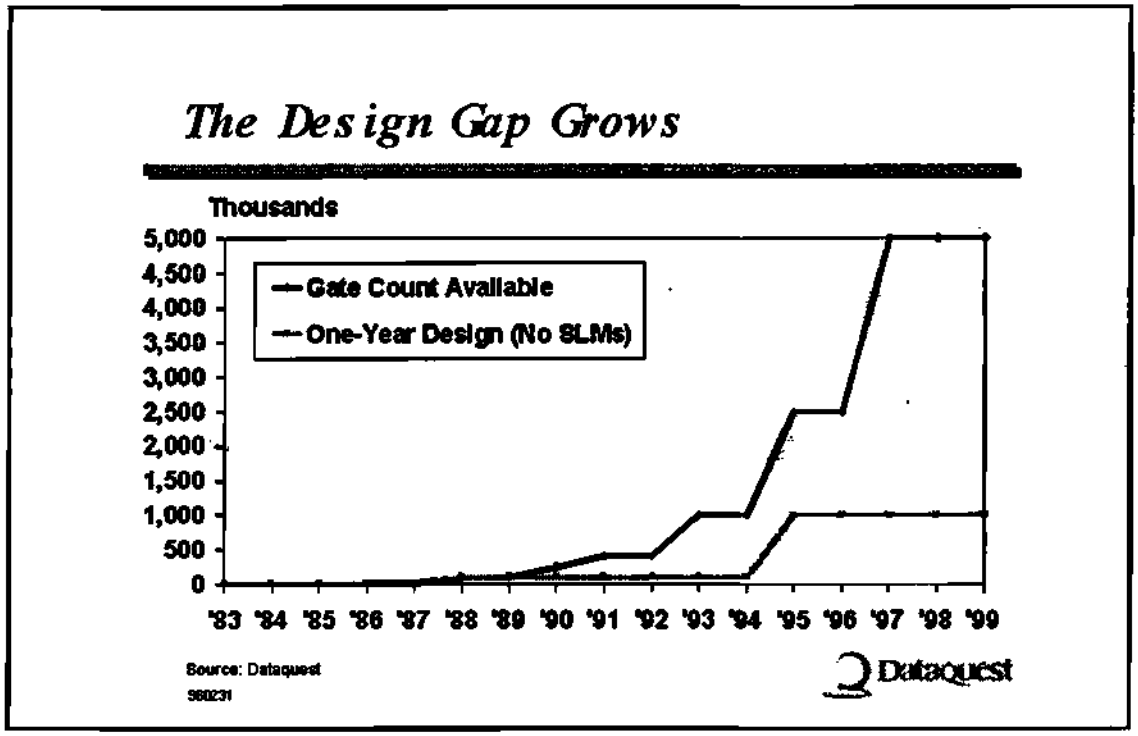


DESIGN

What's happened in the design methodology now is that the gate level is disappearing as a methodology. Tools from the RT level are taking over part of the design flow and the CAD really is moving up. And you're getting the siliconization of the design process at the RT level.

Most of these designs are becoming more and more silicon-intensive; so you have a large part of the design worried about what the silicon is going to do.

On the other hand, the system people are really taking the ES level to greater heights. Hardware/software co-design tool sets are being put together specifically for telecommunications.



The rule of thumb, if you're doing any planning and putting together any schedules, 100-200 gates is about all you can expect. We moved up to the RT level primarily because we could then design 1000-2000 gates a week. That is how the first 100,000-gate gate-arrays started coming out, when people started moving up to the RT level.

If you take the SLIs and SLMs out of the picture and just take a look at how many gates you're going to be able to do in a year, obviously the design gap looks pretty bad. We're plateauing out at about a million gates per year's design. We already have 2.5 million gates available to us, growing up to five million gates.

Unfortunately, black-box SLMs aren't working. There are almost no designs being completed today with a black-box approach. You need access to that box for verification of the designs, especially in some of the complex telecommunication flows, LAN flows where you have to really know what your data's doing. SLMs are of the size that they're generally modified.

THE DESIGN CHALLENGE: IS IT THE CRITICAL PATH?

EDA TODAY

If you look at the industry today, there's no company over half a billion. This year there will be half a dozen with over a $100 million in sales, but it looks a lot like semiconductor did in the 1970s.

If we cut a tool price in half, we're not going to get any increase in sales, we're just going to lose half of our revenue. The only thing that sets price is competition, among sub-applications even. So it's a very inelastic market. The best guess today is there's about 296,450 EDA seats. Seat growth is only growing somewhere between 2%-11%; I think it's probably around 4%.

SUMMARY

Your design methodology will determine the competitiveness of your company. One hardware vendor just went out of the hardware business based on the fact that he couldn't figure out how to move up the methodology ladder.

To win, you must address the hardware/software co-design issue before your competition does. Specifically, in the telecommunications market, there were six ES level designs done in 1994; Motorola did two of them. So if Motorola's your competition and you're not at the ES level, I'd worry a whole lot about what's going to go on in your market in the next five years.

Your EDA tools must be connected to silicon. There's a lot of the fabless companies who are all of a sudden finding out that this connection is key to getting designs out.

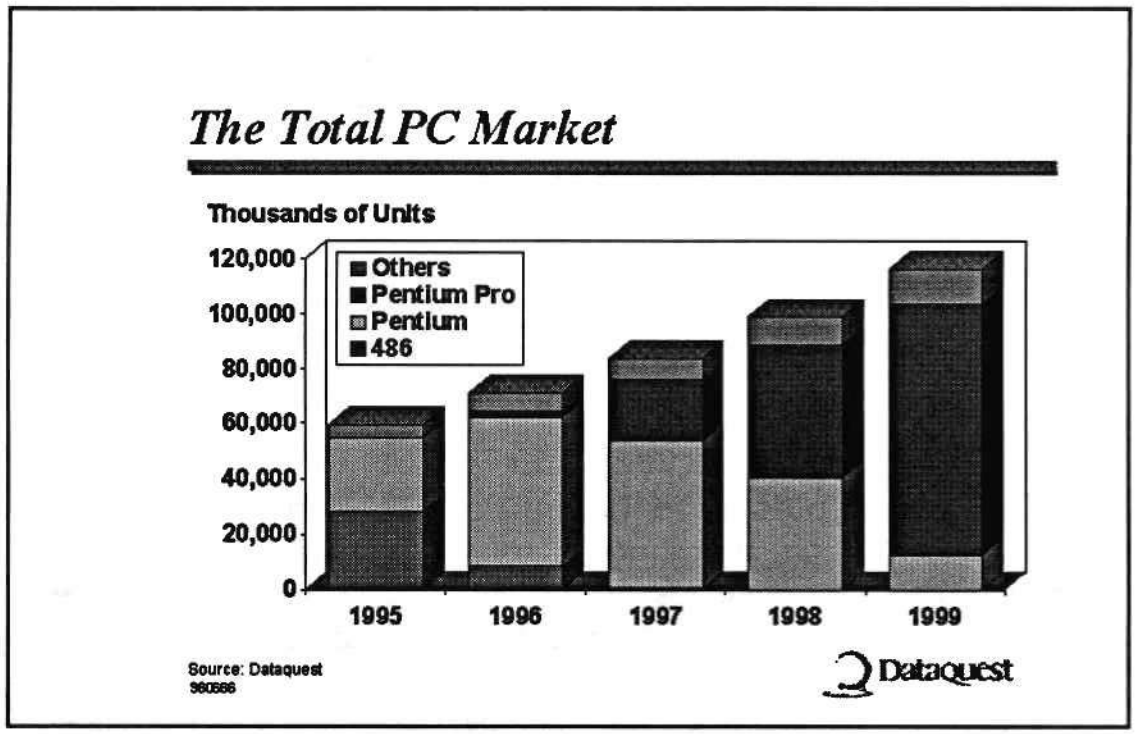
The winners will develop, protect and reuse intellectual property in the form of in-house system-level macros. The power users all have extremely strong CAD organizations that maintain libraries of their own in-house macros. And one of the major competitive advantages they have is this library. This intellectual property is extremely important to the box manufacturer.

Note: Please refer to the companion "Verbatim Transcript Document" for the full in-depth discussions, detail, explanations, charts, graphs, and the audience "Question & Answer" session.

Chapter 10: THE FORCES FUELING THE GROWTH OF THE PC MARKET

Martin Reynolds
Director and Principal Analyst
PC Technology Directions
Dataquest Incorporated

Agenda: Overview of the Market, Key Technologies, The Future of The Market and Predictions



AN OVERVIEW OF THE MARKET

We see strong ongoing growth worldwide, as businesses move toward more expensive Pentium and Pentium Pro systems, balanced by growth in Asia and Europe.

THE FORCES FUELING THE GROWTH OF THE PC MARKET

The Japanese market is expected to be very strong over the next few years with Windows 95 JX.

The technology cycle, new processes and new technologies will fuel ongoing replacement market in home and business and also the new generations of buyers of PC Smart. The PC is going to become as much of a necessity as a car to this generation over the next couple of decades.

We also think though on the down side that the PC market is going to become more sensitive to the economy. In the U.S. and in the other developed countries, we are going to be headed toward one and two desktop computers being purchased by consumers.

The most important thing is the flip from Pentium, from 486 to Pentium in 1995, followed essentially by a near total dominance of the market by Pentium in 1996.

At the same time in 1996, we have the beginning of the Pentium Pro cycle. We are estimating about two and a half million Pentium Pro systems in 1996, growing dramatically through 1997, 1998 and 1999. There is a really strong growth in the Pentium Pro displacing the Pentium a little more slowly than the Pentium displaced the 486.

KEY TECHNOLOGIES

Digital Video Disk, we think is one of the big technologies coming to the market for the next five years. We think it is going to be partly because it is shared by both consumer and computer electronics much like the CD ROM drive was. We think it will drive DVD video decompression and AC3 sound decoding into the PC. You need both of these features in order to be able to play the digital video disk content which is one of the reasons we think that DVD will succeed in the home. It does offer dramatically better sound quality for the home theater systems that are proliferating.

Digital Video Disks, we think, will also establish 5.25 inch optical media as the standard. Initially this will be read only with the capacity of about 4.7 gigabytes and increasing. Then we will see read and write hybrids, read write CDE and then read write DVD, earlier than the year 2000. That is about a 2.8 gigabyte per side writable disk. DVD has a future.

In the long term we think this will replace the floppy drive in five years or so. One of the implications from Notebooks is that they all must have the ability to incorporate a CD ROM drive internally. We think that the five and a quarter inch factor will be absolutely dominant in all the interchange standards which means notebooks have to support it.

Another critical key is the band width and sophistication. If you look at the growth processes of today, they bear no resemblance whatsoever to the growth processes of even five years ago. We will continue to see that kind of growth and something that could support that today could not support these new emerging applications over the next five years.

The $500 Internet device we see as being a very small segment of the market that is essentially unstable and not really something that is going to cause any kind of major growth.

THE FUTURE OF THE MARKET

One of the things we do extensively when we are trying to understand the future of the market is to look at what is going on on the Silicon. The first thing we do is we look at the architecture of a chip to understand if this is really bringing you features and new performance enhancements to the market that are going to matter.

Then we look at the die size and through a number of equations figure out just how many chips you could make on a single wafer. When we have that figured out, we can look for example, at Intel's factories and figure out how many of each different class of chip for Pentiums, Pentium Pros and 486s they make. Then we can look at the total system market size and figure out how Intel might balance its production capacity between these processes to make it all work out.

The Intel P55C has been much rumored. Our belief is we will see this device announced in the second quarter of 1996 and that the P55C will cut their current effective capacity by about 30%, so this drives their new capital expenditures.

We expect to see a 32K on board cache on this device to increase its performance and initially frequencies between 150 and 200 megahertz. It will be faster than the current Pentium because we think the design is going to be tweaked. Also,

the new process that Intel is developing, the .25 micron we think will give them another 30% performance boost over what they have today.

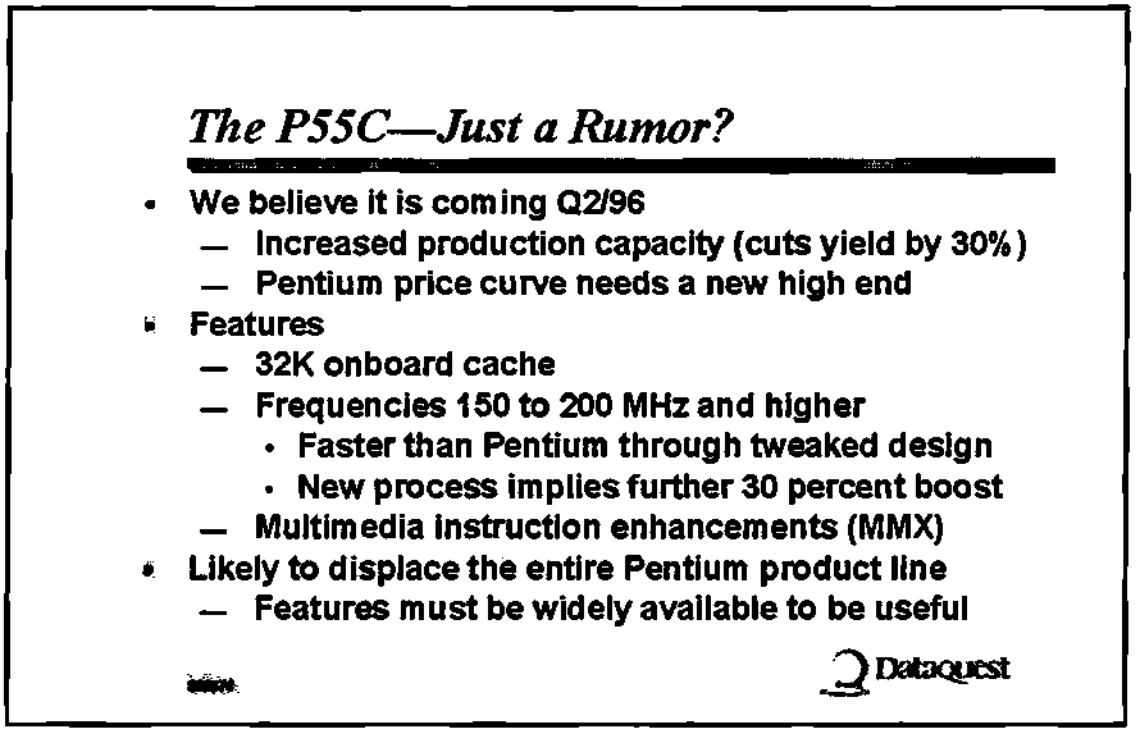
Probably the biggest thing is going to be the multimedia instruction enhancements. These are instructions that will enable the Pentium to deliver vastly better, richer multimedia performance on todays PC platforms.

Video compression, video decompression, sound and 3-D graphics, will become standard and better through the implementation of multimedia instructions.

The Pentium Pro has been widely reported as having disappointing 16 bit benchmark performance. A Pentium Pro running Windows 95 is not a cost effective solution compared to a Pentium 133 or 166.

It will better over time but it is not the best alternative for Windows 95 or Window 3.1. On the other hand though, it is very, very strong on NT. It is actually the fastest Intel processor shipping in a system. We have got Digital with its Alpha Chip and VIPS with their R10000 going past the Pentium Pro, but they are only just starting their shipment curve.

We expect the Pentium Pro to leap performance in 1997 at all levels. A modified architecture with an external cache plus will make this somewhat less expensive to build and a more attractive system.



We will start to see volume of Pentium Pro late in 1996, early in 1997. That is what will lead us to the turnover in the market in 1998 for the Pentium Pro. The only thing that perhaps could make it turn over faster is if the market grows a little more slowly because then Intel will shift capacity from the smaller Pentium parts to the larger Pentium Pro parts.

PREDICTIONS

The top prediction is 3-D Graphics in consumer machines for Christmas which we really expect to happen.

We expect to see MMX accelerators enter the market. We believe that there will be manufacturers and the chromatic part is an excellent example of this, that will actually build accelerators that work with MMX to deliver yet richer and more advanced performance from lower end systems.

We also believe that USB, ATX and possibly even 1394, firewall, to become standards this year.

THE FORCES FUELING THE GROWTH OF THE PC MARKET

We think Windows 95 will get fixed for the Pentium Pro to make it faster. We think that UMA will succeed only in the low-end markets and we think the $500 PC will succeed in words only.

This year we believe that we will see the Pentium Pro and NT together begin to succeed in business bringing two and a half million systems this year and maybe twenty million in 1997.

We think that Cyrix at last will succeed with the 6X86 and we would actually predict for them to have their best year ever.

We think ultra portables will continue to struggle and we believe that ISDN to the home will continue to grow.

Note: Please refer to the companion "Verbatim Transcript Document" for the full in-depth discussions, detail, explanations, charts, graphs, and the audience "Question & Answer" session.

Chapter 11: NEW MARKETS FOR MOBILE COMPUTING

Mike McGuire
Industry Analyst
Mobile Computing Program
Computer Systems and Peripherals Worldwide
Dataquest Incorporated

Agenda: Forecast for The Mobile Market, Handheld Computers and The PCMCIA Market

FORECAST FOR THE MOBILE MARKET

Toshiba is running away with the market and we look to them to probably finish again in the number one spot.

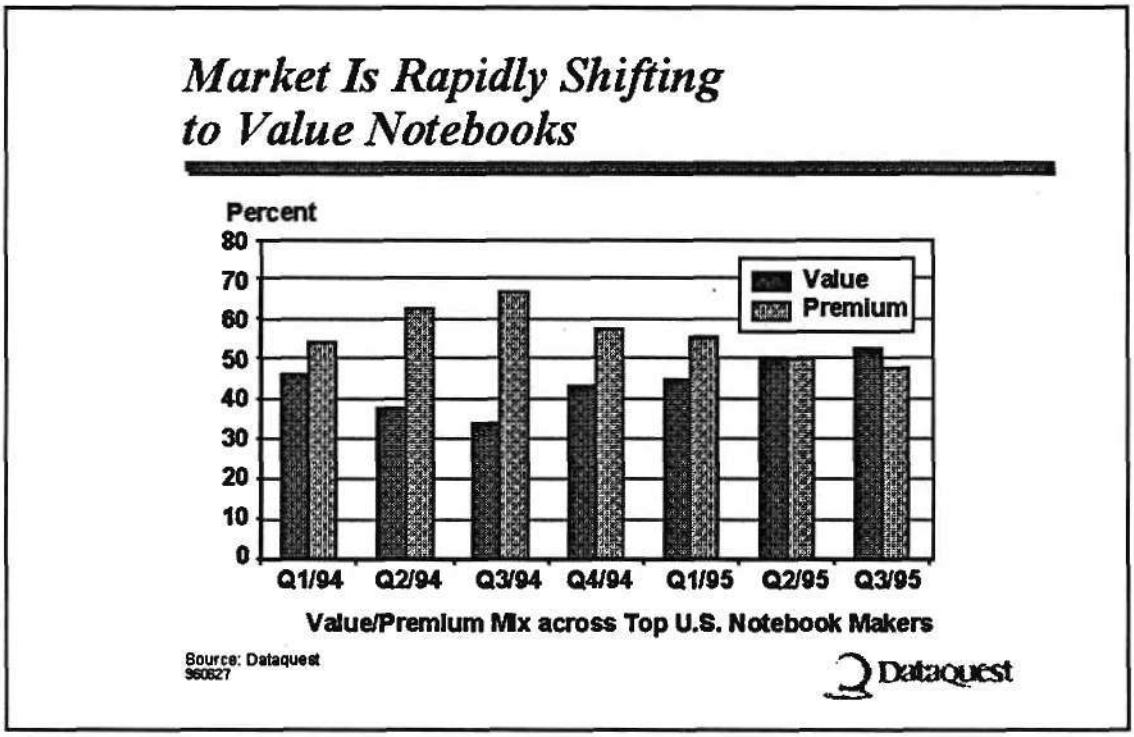
Mobile computing looks to be somewhere over 30% of the market and we are looking for mobile to really be about 20% of the market out to 1999.

One of the reasons is that there are a couple of built in negatives and some regional aspects to the mobile picture. The overall trend is what we see fueling a lot of the growth in the home market. That is not a place where we see the notebooks for mobile computing making a significant impact for reasons of the big price delta between a mobile computer, a desktop and some trends.

You will see some good penetration on mobile computing but in the main continent of Europe, mobile computing as we know it in the U.S. isn't quite applicable there. Traveling to another country in Europe can be a plane flight of an hour long, not to mention all of the different power connectors that must be used, so there is not necessarily the necessity to have a mobile computer all the time to be effective.

Another major issue is the kind of power management of notebook computers. We have not seen some of the great advances we thought we would see that would allow us to take one of these and keep it running all day long while we work.

We see the value segment of the market growing dramatically this year and the top 70% of those shipments are going to be for value notebooks.



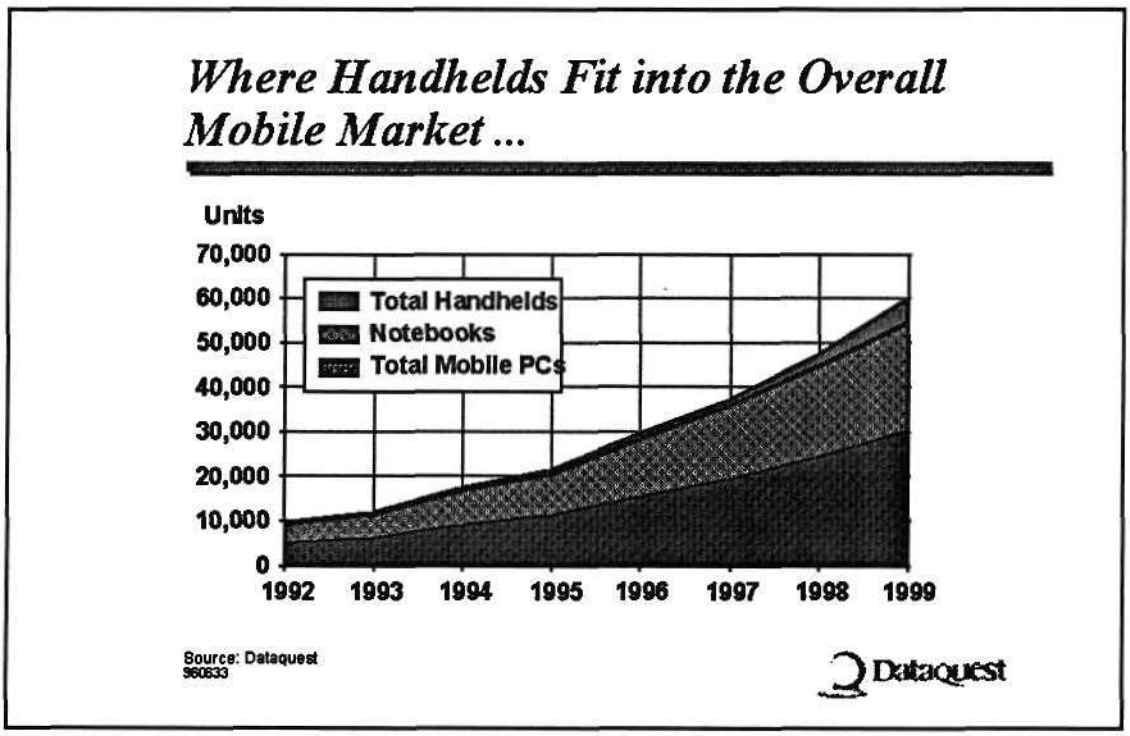
The 120 was supposed to ship in September and we are just now starting to get volumes in that product. Everybody is going to essentially have the same processor so it is going to be difficult to just simply put a faster processor out and differentiate on that.

The mobile Triton Chip Set from Intel is due out later this quarter which is going to commoditize that market and is going to force companies like Pico Power and Opti to get into that.

THE HANDHELD COMPUTER

The handheld computer has been a disappointment in terms of units sales but we are going to see some things this year that are going to turn around and give us some hope.

To date, the Apple Newton Message Pad which defined this marketplace has never really been able to dig itself out from under the hype that was generated around its introduction. No matter how good that technology was, it was never going to live up to the headlines that it generated.



The HP200LX, has done very well for HP. It is has been the number one product line in the standard handheld market for the last year and a half. They have brought out the Omni Gold 100 and classify it as an organizer. It is a good solid product with a $300 price point.

In the OS world, we are going to continue to see Magic Cap, the Newton operating system, the product from Geos and others struggle for a balance in terms of the operating systems. They are going to look at not only the kind of very robust deep architectures they have now but they are always going to look at other ways and going to come up with smaller, less bulky operating systems.

You can expect to see a number of handhelds running the one hundred plus megahertz products from Strongarm. This is the risk handheld chip that ARM and Digital have worked on.

The most exciting news so far in the handheld market is a product from Palm Computing. It is called the Pilot and it was introduced just yesterday. It weighs very few ounces and it actually fits in a shirt pocket.

We have had some progress in form factors but still the majority of the products we see on the market are too big, too heavy and the battery life is eight hours or less. So we are going to still need to see some more work in that area.

What we see at the end of the decade really kicking the growth in handheld computers will be proliferation of cheap ubiquitous wireless two-way networks. Networks like the Skytel two-way service which is based on the narrow band PCS transports. We see the ability to send and receive short messages anywhere on a wireless device such as this to be a real boon to these handhelds.

THE PCMCIA MARKET

The PCMCIA technology has really spawned to primary application groups, fax modems and network interface cards. Because of a couple trends we are seeing, which are DSP based modem and sound systems, chip sets and the move toward integrating more and more ether net chip sets on mother boards themselves. We have seen it in a couple of products so far from IBM. The 701 integrated a DSP-based solution on the system.

We see DSP and these mother board-based products really starting to suck a lot of the application types or the units away from PC cards. Windows 95 has gone a long way toward kind of hastening that because of the software and the drivers that they have built in there.

Zoom Video and card bus we think can really help push this market forward. Zoom Video is the new standard that came out. It essentially allows the PC and video signals to be rerouted to the LCD via the PC card. It essentially offloads that work from the system bus which allows the system to continue and deliver very good level of performance to the rest of the system while the Zoom Video card is out handling the video.

We are convinced and feel very strongly that these two technologies need to be integrated together. Otherwise one without the other is going to be pretty difficult. If not, it is probably better off just to stick with the old PCMCIA technology.

Note: Please refer to the companion "Verbatim Transcript Document" for the full in-depth discussions, detail, explanations, charts, graphs, and the audience "Question & Answer" session.

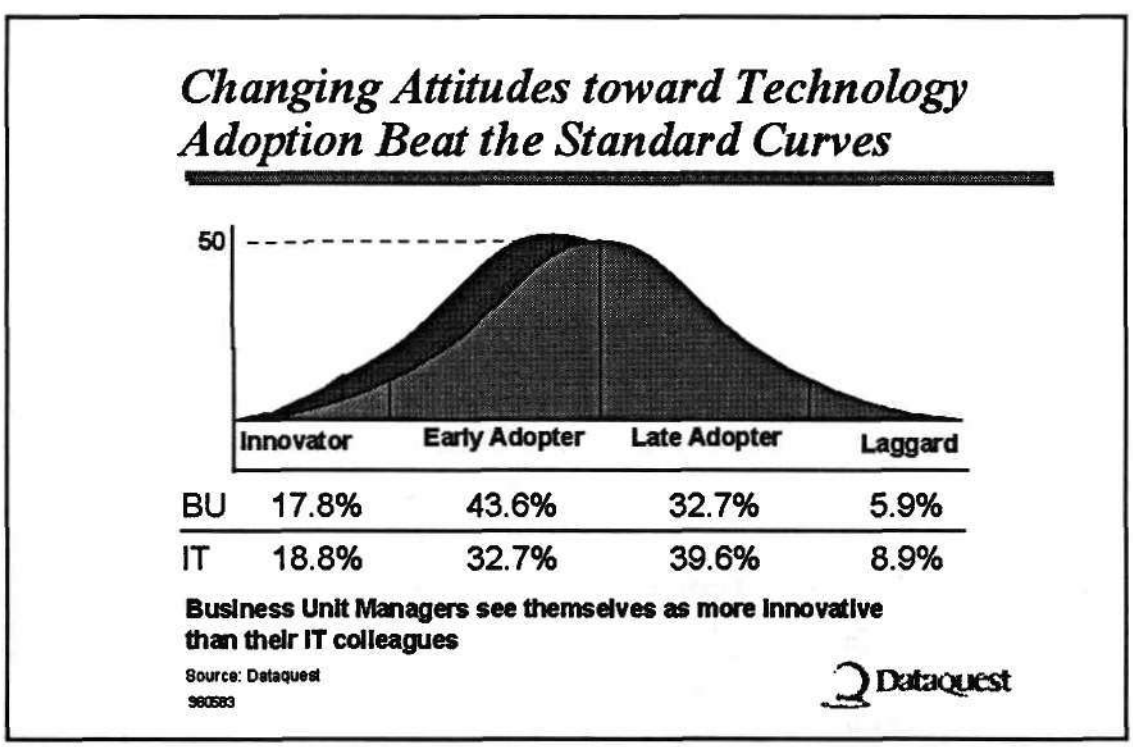
Chapter 12: SYSTEMS SERVICES: DEFINING THE NEW VALUE PROPOSITION

Stephen Clancy
Director & Principal Analyst,
Desktop Services
Worldwide Services Group
Dataquest Incorporated

Agenda: Elements Driving The Change, Fundamental Values and Key Issues

ELEMENTS DRIVING THE CHANGE

What we have been seeing now in this redefinition in the IT marketplace in general, is that there is more of a focus on core business value, which is the real values when people are investing in technologies and services.



There is a lot of change that is going on in this marketplace which means there is an awful lot of risk that is being managed. If these customers are going to take

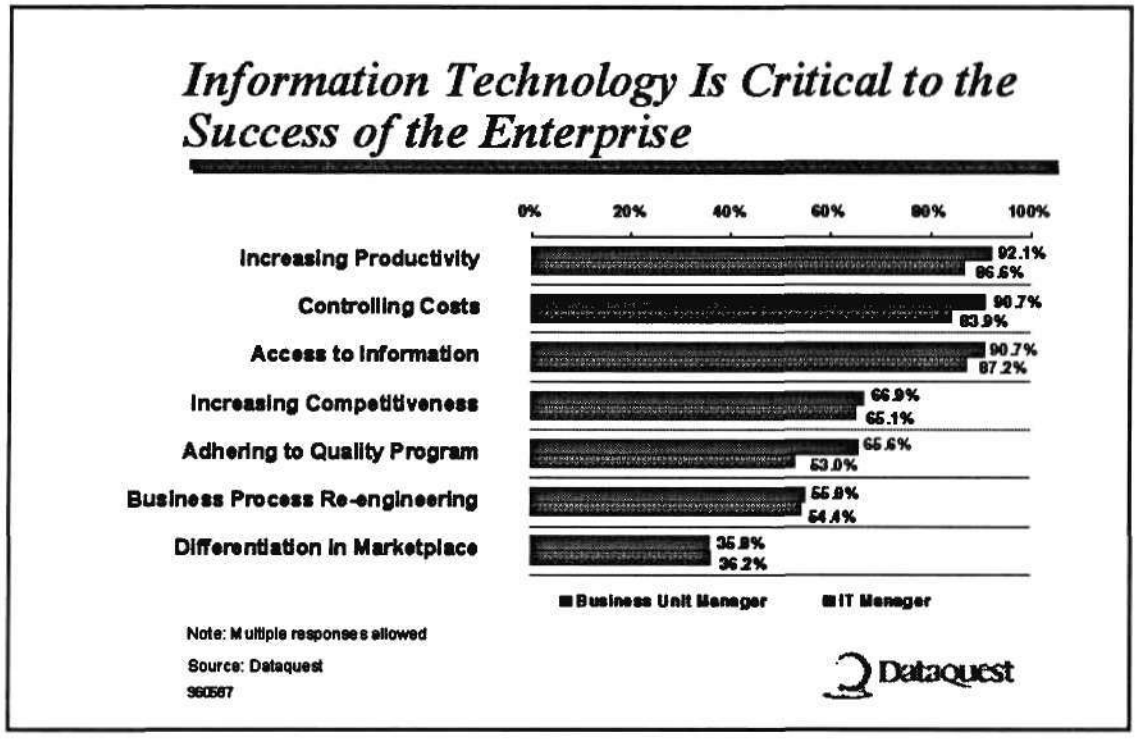
on this kind of risk then they are looking for certain kinds of business impact that this IT and IT services can actually deliver.

Right now we are hearing the word change too much. But unfortunately that is exactly what is fueling this business and what is making it such a very interesting place.

If you ask customers in any marketplace what kind of adopter of new technologies or new products, whether it is new ice cream flavor or underwear or whatever the case may be, they are able to position themselves as an early adopter, a late adopter or a laggard.

If there is one thing that is clear from the research, it is that IT services value and how it is being positioned in the marketplace is a moving target, moving with the technology.

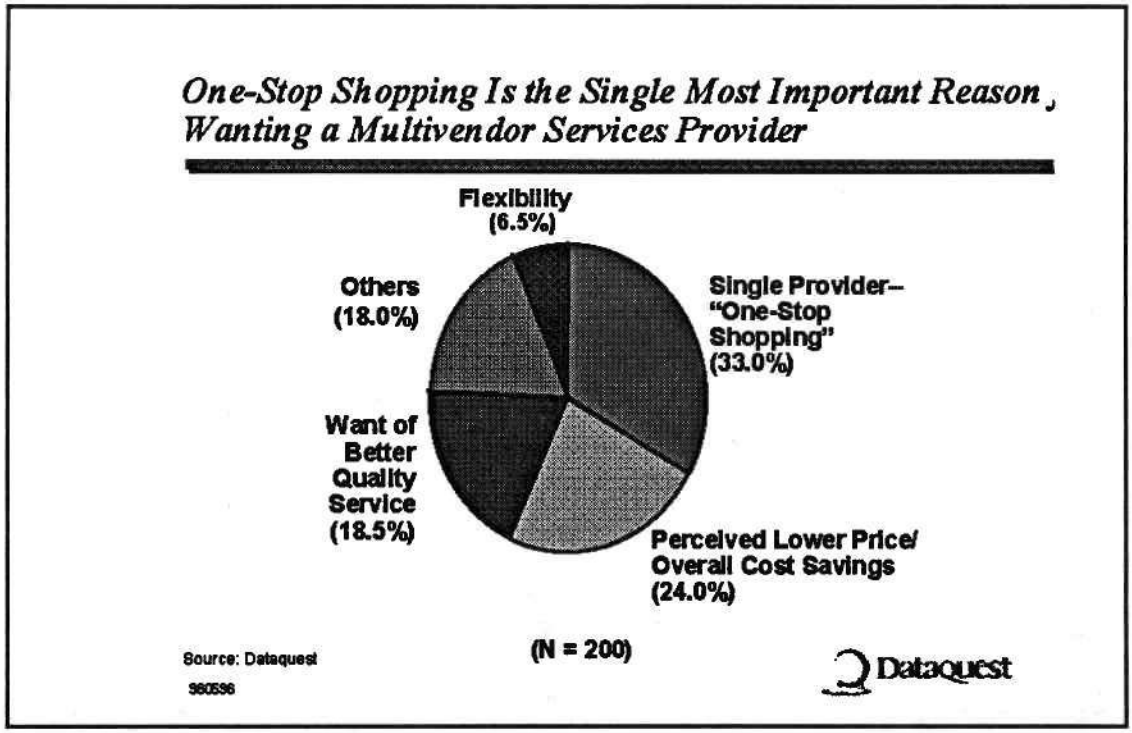
We are predicting that 25% of the workload power will only be in centralized, which a lot of people are comfortable with.



As these organizations and this customer-base accepts all of this change and takes on all of this risk, remember why are they doing it. It is because they see IT very critical to many values. The top three are productivity, controlling cost and access to formation. Delivering better knowledge throughout the whole organization so better competitive decisions can be made for their business is another reason.

FUNDAMENTAL VALUES

When we ask what are the fundamental values people want when they think about a multi-vendor service provider, whether that is at the desktop configuration level or across the network, they think that a multi-vendor service provider can deliver better cost and better quality. A single source provider is critical.



Unfortunately, when people consider client servers, what they did not consider is that they are going to buy 45,000 of these PC's and all of the different licenses involved with it.

So when you include the multiplier factor, the whole solution is still rising with support costs, product turnover, number of end-users, number of channels, source technology and the number of grants.

Everybody sees the actual initial costs, some support costs and the training involved. What they do not see is a lot of hidden costs which can represent about 56% of a five year cost of ownership if one really measured that carefully.

In this marketplace, especially for services, one of the things people are saying is that they need to get into life cycle management support and are also very concerned about end-user productivity.

The buyers are changing pretty significantly. One of the things we always get when we are talking about our end-user research is a lot of questions about the respondent base. Who did you survey, Fortune 1000, did you survey the unit managers, was it a real end-user, was it the IT manager, was it small business, was it a remote user or a business home users? Who is this?

One of the key things that we are seeing though up at the corporate level is a movement toward driving standards, because one of the things that they make clear is technology is moving very fast and is not going to stop. It is driving tremendous behavioral changes within these organizations, the customer base and the end-user itself.

So what we see people moving now is to implementing a need to drive standardization. They are going to use the network as a key tool to do that.

KEY ISSUES

We predict that in the year 2000, we are going to have a $300 billion service business which is going to grow over five years about 10.5%.

Traditional services like maintenance are going to be a small piece of that. The professional services and the added value services of this is where all of the high margin is going to be.

In 1994 we felt it was a $24 billion marketplace and in 1999 we are going to be at $46 billion. We have a flat maintenance and support. Services has really expanded its role that it plays in customer sites, from land support to consulting to development to systems management.

Another area of suggested change is in the help desk area. They are doing things like monitoring service usage and warranty policies. They are also doing things like evaluate new hardware and software products, purchase and disburse new hardware products, distribute new software, license and upgrades. There is a lot more value than we originally thought of for help desk services.

One key thing that we have seen in '95 is that a new contract and a new relationship needs to be set up. It is not about replacement cost. That is a tactical issue but that is not what is ultimately driving people. What is driving these people are controlling costs, productivity and access of information.

The number one key issue and key value of IT implementation in putting up with all of this change is going to deliver is productivity. If you are going to increase productivity and be the champion, not just be the service provider, then basically you will increase the business value.

Note: Please refer to the companion "Verbatim Transcript Document" for the full in-depth discussions, detail, explanations, charts, graphs, and the audience "Question & Answer" session.

This page is intentionally left blank

Chapter 13: GLOBAL PC MARKETS AND STRATEGIES

Kim Brown
Vice President
Mobile Computing, Computer Systems and Peripherals Worldwide
Dataquest Incorporated

Agenda: PC Market: The Home Market, The Internet and Predictions.

PC MARKET

Market share and overall market growth: We saw 24.7% worldwide growth last year in the PC market. A bit slower than that in the U.S. at 21%. It's 59.5 million units and growing. We expect that to grow to 71.2 next year and that's a growth rate of about 19.5% worldwide.

In the U.S. it will grow quite a bit slower than that, about 13.5% to 25.6 million and it continues to grow.

Regions around the world: We have different growth rates. In the U.S. the biggest market grew at a real healthy 21% clip. Japan exploded -- 58% growth last year. Europe did 27%. These were the hot spots last year in terms of growth.

In Japan there were some really key occurrences. Fujitsu decided to embark on a price war. They bought a lot of market share. They really cut the heck out of pricing in that whole market. Apple suffered; so did Compaq and the others pursuing that market.

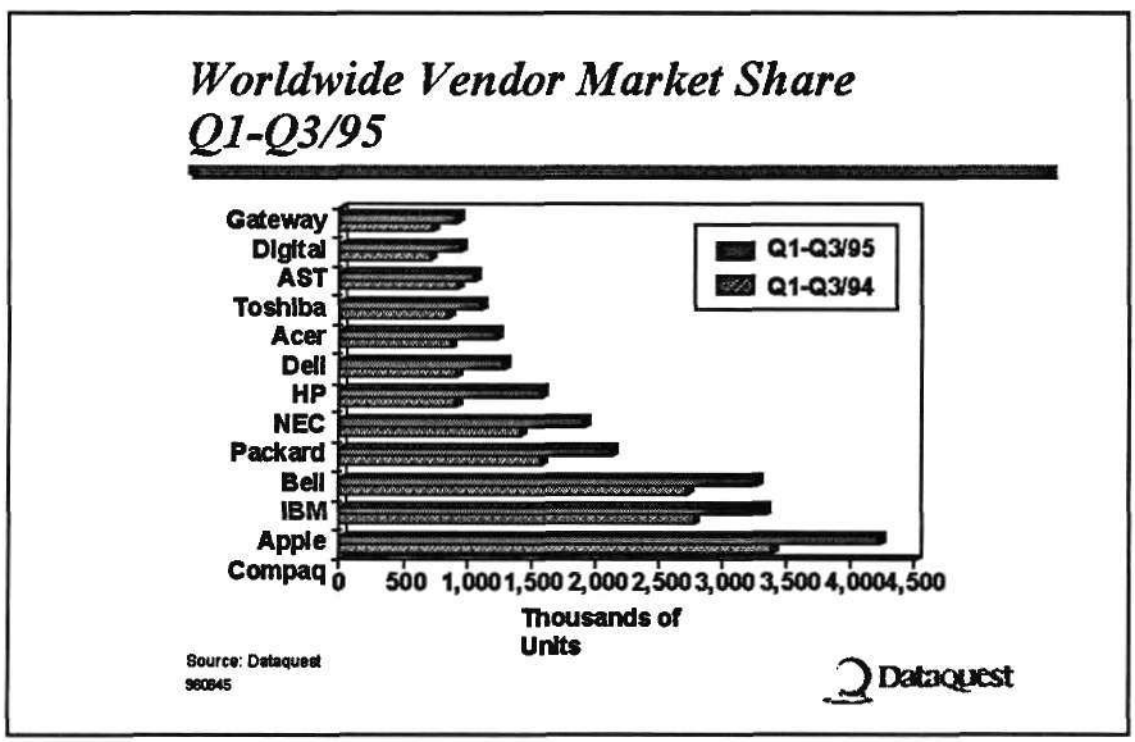
NEC has been affected by this shift in the Windows world; such that it minimized their proprietary position versus the DOS V world. Between those two factors, it has become a much more competitive market and should produce some tremendous growth coming on over the next few years.

In Western Europe: There is a growing bit of pessimism occurring in the Western European world. In Germany especially, the GDP looks like it has started to slow. Things are not looking quite as rosy as they were a year ago.

Germany does represent 23% or 24% of the GDP of Western Europe and a good quarter of the PC market itself. It tends to be the pacesetter for the Western European market.

Japan is about 9% of the total, the U.S. is about 38%, Western Europe about 25% of the market. The other Asia Pacific at 11% and the rest of the world at about 14%.

Apple Computer dropped from 8.3% to 7.8%. IBM dropped from 8.2% to 8.0. Packard Bell actually picked up a tad in the worldwide market but they did move out of the U.S. to some degree. NEC picked up share quite a bit, from about 4.3% to 4.8%. That has to do with that monstrous price war in Japan.



Virtually all of the top players lost shares this year. Compaq went from 12.6% to 12.2%. Apple went from 11.6% to 11.1%. Packard Bell slipped slightly 11.4% to 11.3%. IBM dropped from 9% to 8.3%. Consolidation is not occurring in this market.

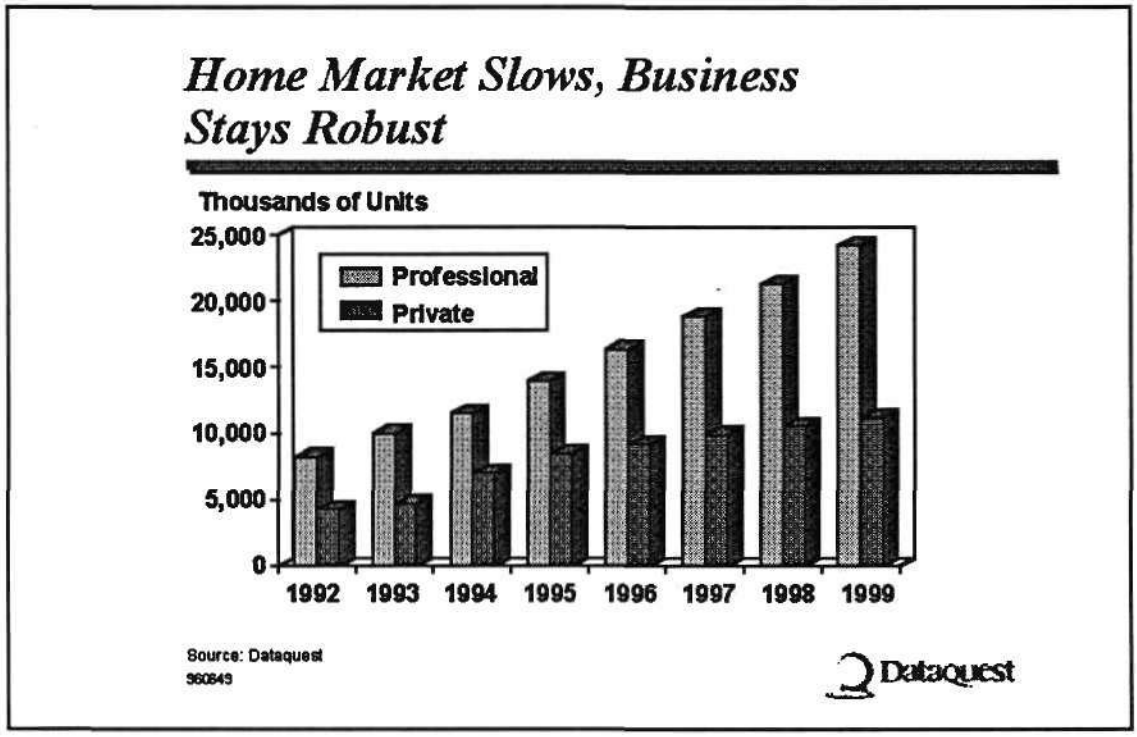
THE HOME MARKET

We are running out of new users to go after. There are fewer and fewer virgin PC users in the home. We have more PCs in the home definitely, but in my view we really only have one primary PC. Home growth will have to shift to other economies and it is happening. In Japan the all-in-one types of models, the Presario types of products are doing very well in the Japanese home market. Not so much portables. Portables have been the way in the business sectors in Japan. In the home market, it's looking much more like the desktop with an all-in-one type of a product.

In Europe the growth slows down a tad; we figure about 20% versus the mid 20s a year ago. The primary useage in Europe is to bring work home. That is the major reason. There is some degree of entertainment use, but it's an afterthought.

The home banking/electronic checkbook Quicken types are virtually non-existent in Europe. They just really haven't caught on at all. People will bring work home. Often times they are bringing home a PC from work that is their home PC.

In Malaysia, Thailand, Singapore, Hong Kong, Australia and New Zealand the usage is mainly entertainment in those areas, multimedia based. A lot of education.



Essentially the home market is going to slow. We think this is inevitable, especially the way these things are being sold today; one model fits every home. One model is perfect as the entertainment machine, it's perfect as the work home machine.

THE INTERNET

The effect of the Internet: The Internet is wonderful for three things. It's a worldwide electronic messaging switch.

The World Wide Web type of publishing. Essentially unless you have a high bandwidth pipe, you are dealing with text. Being able to download text is pretty efficient and pretty good.

Electronic commerce: In my mind, there is no question whatsoever. We will have electronic commerce. It is probably going to happen over the next 24 to 36 months in a major way.

Essentially, there is fear of the Internet in terms of buying and selling things across the Internet. Frankly, it is no less safe than buying something over the phone with your credit card.

Who is at risk when you buy stuff on the Net? It's not you. You are liable for $50. That's it. Is Visa or MasterCard liable? No. The bank, are they liable? Yes.

PREDICTIONS

Windows NT 4: This is the next upgrade to NT, finally. It is getting the Windows 95 interface. There is going to be some better emulation for X86 code running on Power PC.

We have a mainstream Windows platform that is going to run finally on Power PC and should run on this platform real nicely.

Different constituencies supplying or existing within the PC industry. Taiwan is getting pretty beat up on the motherboard side. Intel was a bit meek back in 1994. They did 3, 4, 5 million motherboards but they did a good 11 or 12 last year. That number should grow this year.

What's going on with the Macintosh? It's clearly responsible for 98% or more of the Power PC chips going out now. There doesn't seem to be any support from anybody else other than Apple and a couple of little start-ups.

Will Apple really license? For Apple to license under the current set of constraints, you have to have an engineering department. You have to design a motherboard. You have to work with Apple. Apple has to free up enough resources so that you can actually get this done. You have to work through the politics of Apple and deal with the people who do want to license, instead of the people who don't want to license.

If you compare that with the WinTel world, I could go start a PC company tomorrow and contract to buy motherboards from Intel or a number of companies from Taiwan. I could call Microsoft and say, just send me the software. I can get it any way I want to. I can piece together a system and be a computer manufacturer. You can't do that on the Mac side. Essentially the Macintosh doesn't play in well over half of the PC market.

We'll have to see really how aggressive Apple is. In talking to Michael Spindler last week, he was saying they can't even set the price of the OS. Microsoft has already done that. We'll have to be just as aggressive as Microsoft putting out the OS. What really makes this happen or not is the Mac OS and some real support by some major players and of course a massive opening up of this architecture for other folks to play.

What happens if Sun jumps in? If Sun jumps in, the real reason to buy this thing is to move this thing to Sparc.

Essentially the CHRP platform has a lot going for it if Apple opens up and if they get some support from some major players.

Note: Please refer to the companion "Verbatim Transcript Document" for the full in-depth discussions, detail, explanations, charts, graphs, and the audience "Question & Answer" session.

Chapter 14: PCs IN THE HOME: JUST HOW BIG IS THE OPPORTUNITY?

Van L. Baker
Director and Principal Analyst
Distribution Channels
Dataquest Incorporated

Agenda: Methodology, Defining The Home PC Market, Owners vs Intenders, Purchase Patterns, Consumer Values, Home PC Market and A Final Thought.

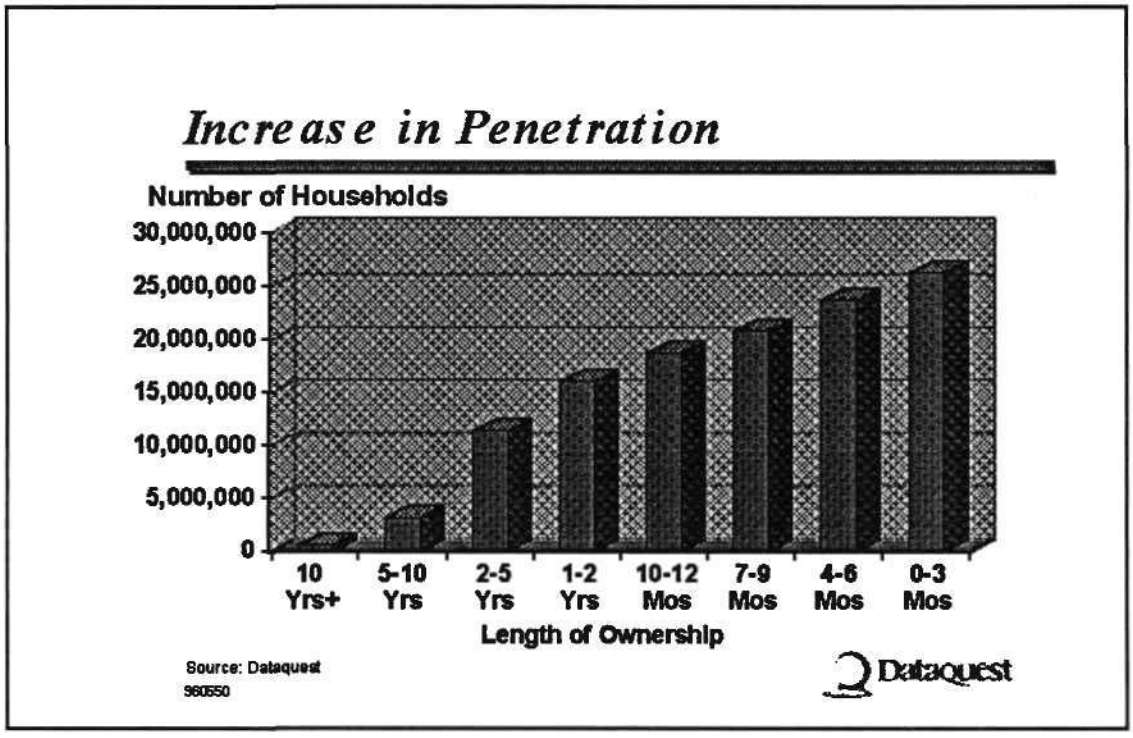
METHODOLOGY

From Yankelovich Partners, the primary research that they have is that 16,000 household panel and a 4,000 household panel. The reason why they keep those separate is the 4,000 panel goes back about 15 years. They have to keep that historical information set so that you can see trends. The 16,000 was to expand the panel and be able to add some additional information. They measured consumer attitudes, behaviors and values.

DEFINING THE HOME PC MARKET

We had a little hyper growth period in the 1983/1985 time frame, where it was growing very slowly and then turned up and then flattened again after that. We have a hyper growth period going on currently over the last couple of years. The question really is, is the past destined to repeat itself? Are we going to see a flattening of this growth rate on this installed base, or is it going to continue to grow at the new, steeper curve?

Another way to look at this is time of ownership. I tried to tie this back to the actual years. What you see is in 1993/1994 was a huge growth period. The first half of 1995, was a very strong growth period for us. The year end 1994 to mid-1995, we added over 5 million households who purchased either a new, additional or replacement PC.

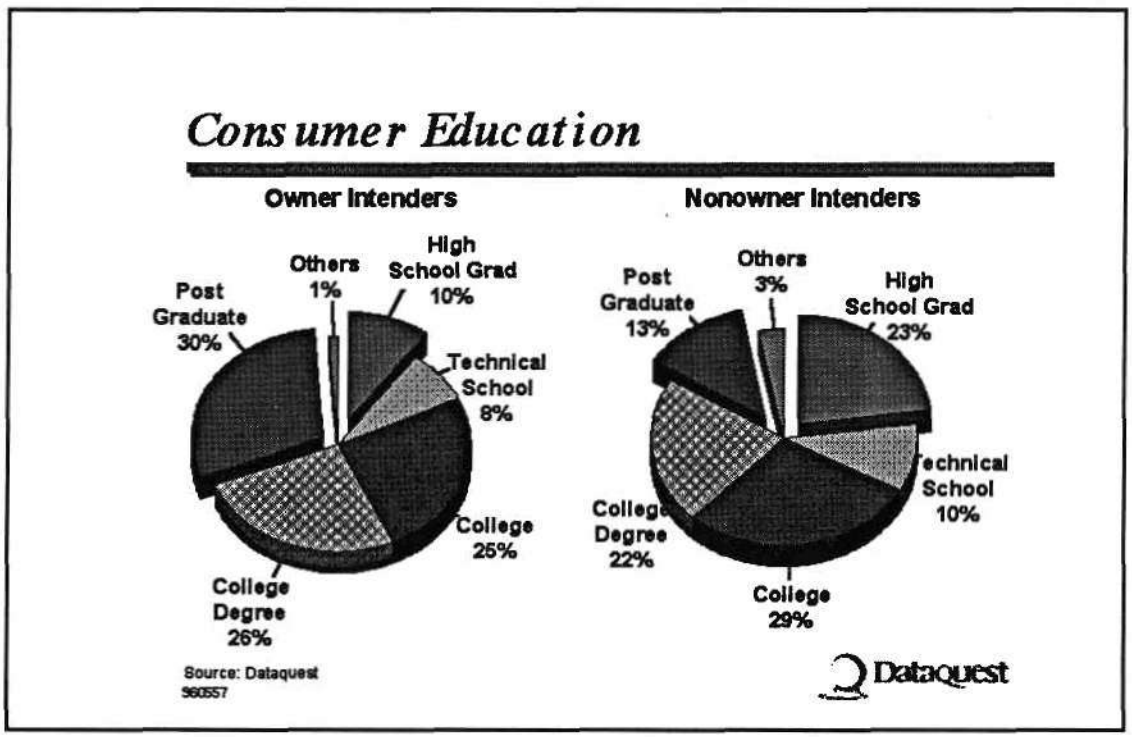


How does it break down in terms of PCs per household? Basically, our data shows that there is about 1.3 PCs per household, so there is an add on of a second PC or an additional PC phenomena going on in the marketplace. Roughly 35 million PCs installed.

Income levels: This is people with a PC that have intentions to purchase another one versus people who don't have a PC currently but have stated intentions to purchase. What you see is we have significant shifts between the high income households and the low income households. A very large percentage is in the less than $40,000 household income level.

When you look at the age level, a lot of people ask the question, are we seeing these lower income levels with purchase intent because it's students or people that are just entering the job market so the shift is away from the older segments of the population and more towards the younger segments of the population? The answer is it's not.

OWNER VS INTENDERS



When we get into figuring out how to sell to these folks, you see some pretty significant differences in their intention. Again, broken down by income, the lower income folks expect to pay on average about $400 less than the repeat buyers. As you move up in income, it gets up to about $800 less that they expect to pay. They are anticipating paying a dramatically lower price. The question is, how much can we get that penetration up potentially with an even lower priced product, which kind of flies in the face of some of the industry practices.

PURCHASE PATTERNS

Consumer purchase patterns: The source of purchase. This also indicates somewhat of a level of maturity amongst the repeat buyers or the buyers that are going to be buying multiple PCs.

The big gainers are the computer superstore folks, as well as the warehouse clubs. That tells us that there are two things that are driving these repeat purchases. First, selection drives the repeat purchase. Thus the big gain for computer superstores.

We also see that purchase price changes dramatically depending upon which channel you bought from. This is again history, as opposed to intention. What you see is that it varies pretty dramatically to the tune of almost $1,000 between the high-end channels and the low-end channels, with the direct response channel coming out very significantly on top in terms of the amount of value that gets spent through that channel, the mass merchants and the warehouse clubs on the bottom.

CONSUMER VALUES

Drivers and inhibitors in the consumer market: One of the things that the industry does and has a very bad habit on this, or a sustained bad habit on this, I should say, is that the industry tends to sell on speeds and feeds. It's always technology. It's always megahertz, megabytes, etc. The distribution channels have that disease but even worse.

When we ask, even the people that currently have PCs how familiar they are and we specified in this question how familiar are you with internal components of your PC such as hard disk, memory, processor? We come back with almost one third of them who say that they are not familiar at all or not very familiar with this. Yet another 40% of them say they are only somewhat familiar with these pretty simple components.

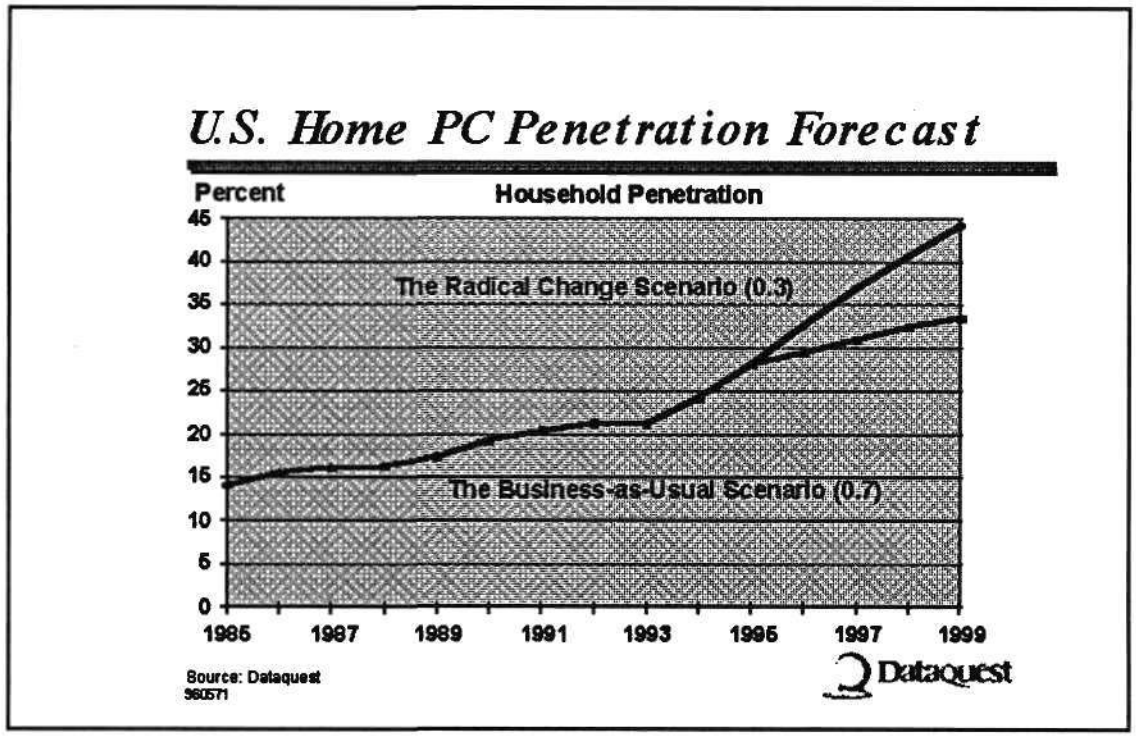
This is an issue that the industry faces. If you are going to sell to these people, you have to figure out how to get over this barrier of this speeds and feeds oriented marketing.

Technology is intimidating. Technology sometimes intimidates me as a user. We don't have the majority of people disagreeing with this in any of the groups except for the leaders. Even there, it's pretty balanced. It's about a 55/45 kind of split. The rest of the group agrees that technology is very intimidating for them. We have a long way to go in making people feel comfortable with these devices.

Another statement: When I buy a product, it doesn't matter to me whether it has the latest technology as long as it has the features I need. This flies completely in the face of the behavior of the industry. The industry is on the Intel escalator. You constantly need the latest, greatest, fastest, best processor that is in the market. The latest, greatest, fastest CD-ROM drive that's available. You need the 6X, the 8X, whatever. We are on this performance escalator that keeps the price up around $2,100, $2,200 for people coming into the market.

Are we creating an artificial barrier to entry by not having configurations that slide down that price scale and give opportunity to these people with these lower income brackets? I think there is a possibility there. It flies in the face of the behavior of the industry.

HOME PC PENETRATION FORECAST



We have two choices given recent history: We can take a choice with a curve that's going to follow the long term history and take us back down significantly below the level of growth that we have had over the last couple of years. We can

try and keep the slope of that curve going up at the rate that it's been going up over the last couple of years. Basically the radical departure segment would force the industry to make significant changes to the way that they market these products to the home audience today.

The business as usual basically goes along hoping that suddenly these people that have lower income levels and are intimidated by technology wake-up to the value of technology and begin buying PCs. I think that's relatively unlikely.

Some questions to ask yourself to support this a little bit: When was the last time that you heard a car company talking about cubic inches and the engine size. They don't do that anymore. Audio system vendors leading with watts per channel on their amplifier that they are trying to sell. Nobody knows anymore. VCR manufacturers promoting systems' programmable features as opposed to the fact that it's got VCR Plus.

Television manufacturers talking about screen resolutions available with video tape form. They don't do this. They talk about image, about look and feel, about how it's going to make you feel. About how it's going to look in your home; those kinds of things.

A FINAL THOUGHT

Change is a necessity and here is why. The radical change scenario has annual growth rates of 8.5% to 12% between now and 1999. The business as usual scenario has declining shipments in the near term. Absolute declines in unit volume quarter over quarter as we move towards a replacement market.

That's an ugly scenario. I don't think anybody in this room wants to see that happen. Another way to describe it, maybe I shouldn't say change, maybe I should say segmentation is the key. What Jeff Moore talked about this morning: Mass customization. I would call that segmentation. I think the industry better wake up and start paying attention on how to market to the consumer, otherwise we are going to see a home market that goes flat and a lot of blood letting as a result of it.

Note: Please refer to the companion "Verbatim Transcript Document" for the full in-depth discussions, detail, explanations, charts, graphs, and the audience "Question & Answer" session.

Chapter 15: IT OVERVIEW: THE BIG PICTURE

W. Ladd Bodem
Vice President and Worldwide Service Director
Services, Software, Online and Multimedia
Dataquest Incorporated

Agenda: Overview of The IT Market, Drivers of Change, What Is Happening Now, Future Trends, Winning Vendor Strategies and Winning Strategies For Users

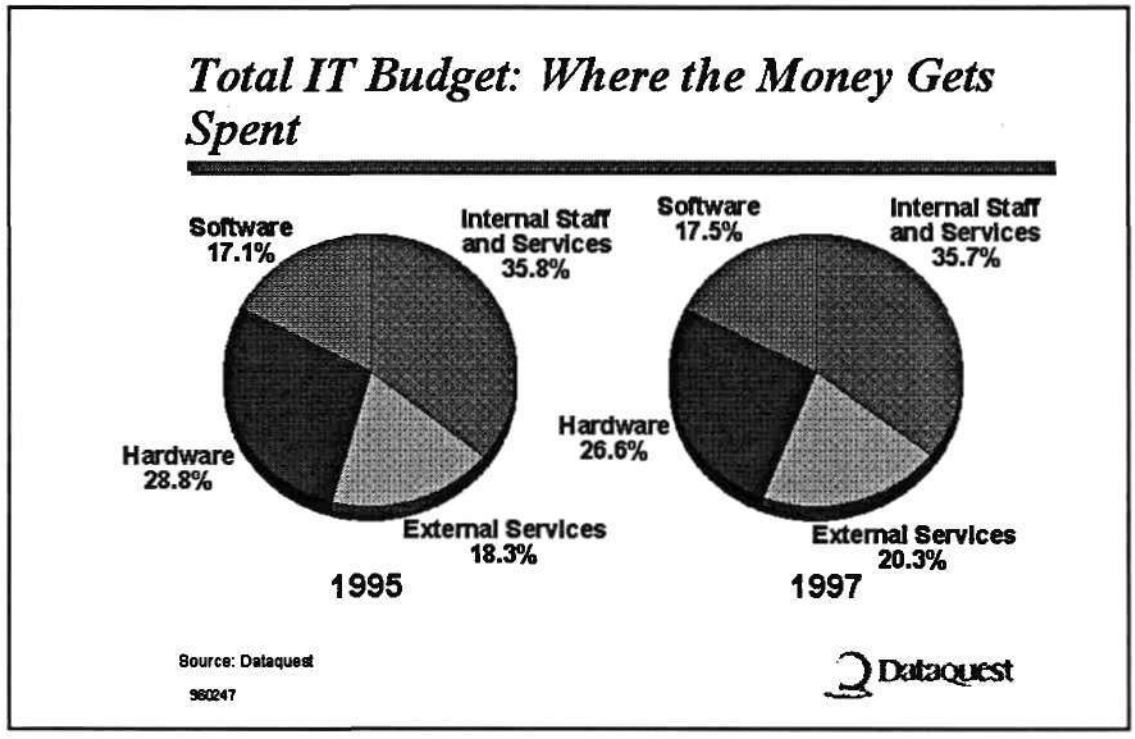
OVERVIEW OF THE IT MARKET

Information Technology continues to be a strong industry. Right now, the information technology industry is growing about 12%, which is one of the fastest growing industries that we track and record.

Food and beverage, apparel and construction, are all growing at 2% to 6% which is not unusual. In IT we seem to very strong, which far outpaces the U.S. GNP. The world GNP is quite high too because we have a lot of strengths going on that we see in Asia Pacific and in Japan.

In the estimated IT worldwide market, there is a very large orientation towards IT services, which is at 36%. We show the total IT market to be roughly $650 billion dollars, that includes some $155 billion of semiconductor content.

As far as the worldwide consumption goes, it was about $550 billion worldwide. North America is still dominant but the growth areas more than anywhere in the rest of the world is Asia Pacific.



Half of the Fortune 1000 companies that we interviewed tell us that their IT budgets are increasing for 1996 and a small amount, 12% or so, say it was decreasing. The remainder said it was unchanged. People are spending money but where and what they are spending it on, might be changing.

There is a lot of change going on in the structure of industry and a lot of companies are doing their re-engineering and are downsizing. They are looking at their business processes and they are using technology to facilitate that move towards new technology. In doing that, it creates an opportunity for IT, both in just buying of equipment and the purchasing of services such as telecommunications.

DRIVERS OF CHANGE

It's a total change. The technology is changing. The users are changing. The economics and who is doing the buying is also changing. From a vendor perspective, it's important that you understand exactly what the dynamics are that

are happening inside of your client base and what these changes are and how are they affecting them.

The number one driver of change that people have known about for the last couple of years have been things like moving to distributed client/server and moving to open systems. Those still are very predominant reasons why people are changing.

A lot of it happened because the MIS department was not in total control of all of the IT spending as they were ten years ago. The IT department is having to put together an architecture of how they go about managing this change and this move to client/server and how do they take advantage of the economics of open systems.

Another driver is really going to be the Internet. We have a lot of faith that the Internet will find its spot and is going to make a difference.

Distribution becomes a really key thing when you are looking for product. Another thing would just be software. There are still lots of concerns about the Internet, network management and application development tools. Those are still important and will be important. The whole movement toward object orientation is very real and it will definitely affect the way we do programming.

WHAT IS HAPPENING NOW

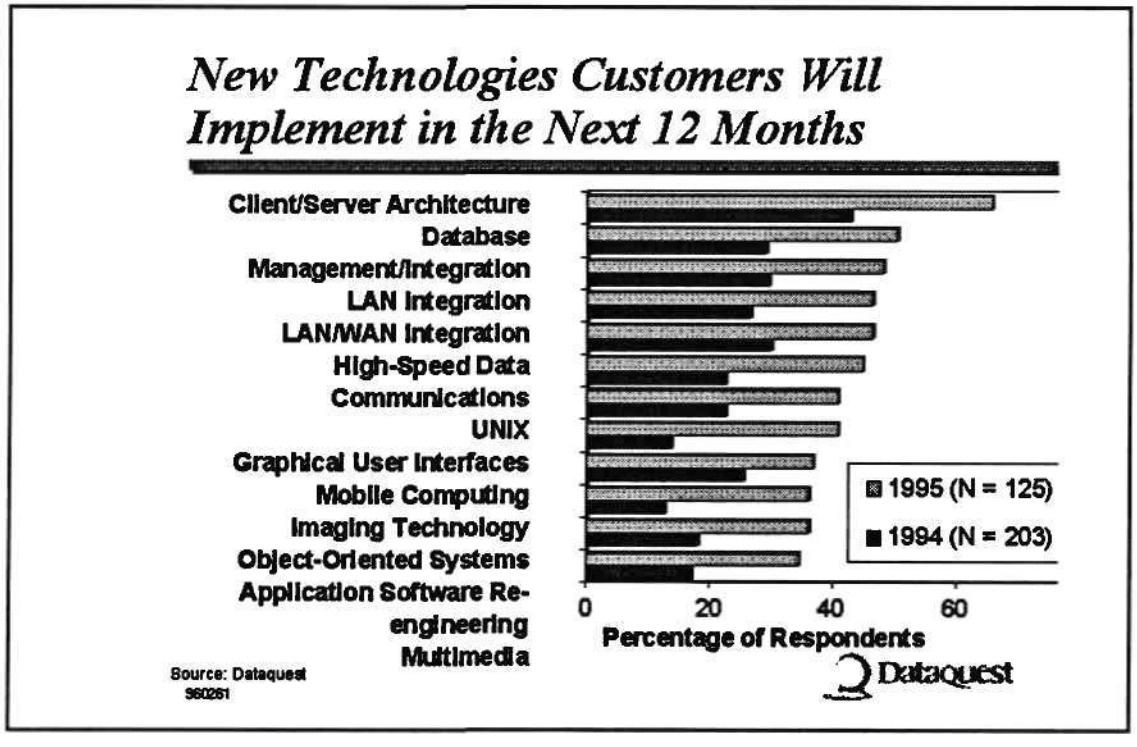
Technology is changing at a fairly rapid rate. What is happening now is we are into a very rapid rate of increasingly faster rates of technology change. Organizations can assimilate technology only so fast because of momentum. It could be prejudice against a new technology, people worrying about job security or not enough training in how to use the new technology.

The technology gap, although frustrating for the end users, is an opportunity for vendors. It's an opportunity for integrators and producers, even hardware manufacturers, to figure out how to close that gap. You close that gap by either making the technology easier to assimilate, or you do it by providing the resources that they need to close it. One other way to provide it would be to provide the training and education that they need.

What is really happening is that we are undergoing a solution. What we have undergone is really a technology revolution that allows us to take advantage of new technology or presents new technology to us.

It means that through the use of technology and channels, the vendors have an opportunity to provide a solution to their clients.

Everything is distributed and connected. In 1988, 1/3 of the machines were PCs and workstations. By the year 2000, over 3/4, or more will be. Right now we are showing about 94% of the business PCs are connected to LANs. Within a couple of years it will be virtually 100% connected.



FUTURE TRENDS

Channels are definitely key to the market. System integrators and the system management companies are very key to the channels, channel marketing and teaming with the vendors and with each other.

Services, both full and niche, will continue to play a major role in the industry. You do not have to be a full service provider to make it here.

Double digit growth will continue in the IT industry. For some, margins will in fact stabilize. Service providers are starting to use technology to stabilize their margins, where they have actually experienced problems in margins like everyone else has and they are using technology to make a difference.

WINNING VENDOR STRATEGIES

Because you are a vendor, you need to maintain your technology leadership. You need to focus on customer needs.

Willingness to partner is probably the number one factor right now, that the successful companies are doing. You need to add and create value for your clients and in the marketspace. A lot of times that means sharing the risk.

There are some service providers out there that already engage in risk-sharing types of arrangements, which we will see more of. One way to have zero risk is to have something that's completely well thought out and it's late in the game.

Another way to minimize the risk is to share. They are going to want measurable business impact.

WINNING STRATEGIES FOR USERS

One winning strategy for users is a willingness to partner. This is especially important for the DP departments and the MIS departments.

Users definitely need to be migration and change ready. Re-engineering doesn't always mean downsizing. It could very well mean retraining. It does mean as part of your plan for being migration ready you need to be prepared to re-engineer for growth.

The IT strategy absolutely must be linked with the business strategy. A good winning strategy also is to have an enterprise and beyond focus; meaning your IT strategy is not just how do we do our business best but how do we use information technology from our suppliers and to our clients.

You have the entire value chain and your information technology strategy takes advantage of that and has that in mind.

IT continues to be critical to corporate success. The pace and the rate of change continues to intensify. There are definitely lots of opportunities in this space, they are just different then maybe they were a while back.

Note: Please refer to the companion "Verbatim Transcript Document" for the full in-depth discussions, detail, explanations, charts, graphs, and the audience "Question & Answer" session.

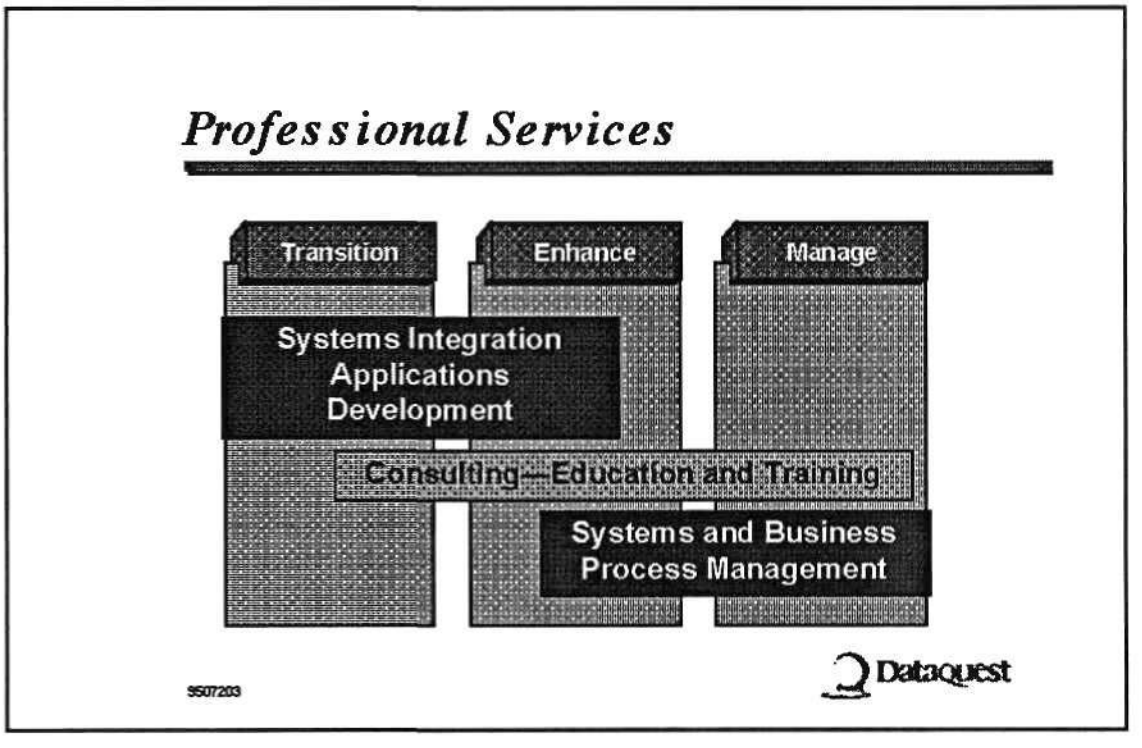
Chapter 16: REENGINEERING THE DELIVERY OF TODAY'S IT SERVICES

Dennis Wayson
Director and Principal Analyst
Professional Service Trends
Dataquest Incorporated

Agenda: Questions, Drivers, Professional Services, Technology, Trends and Predictions.

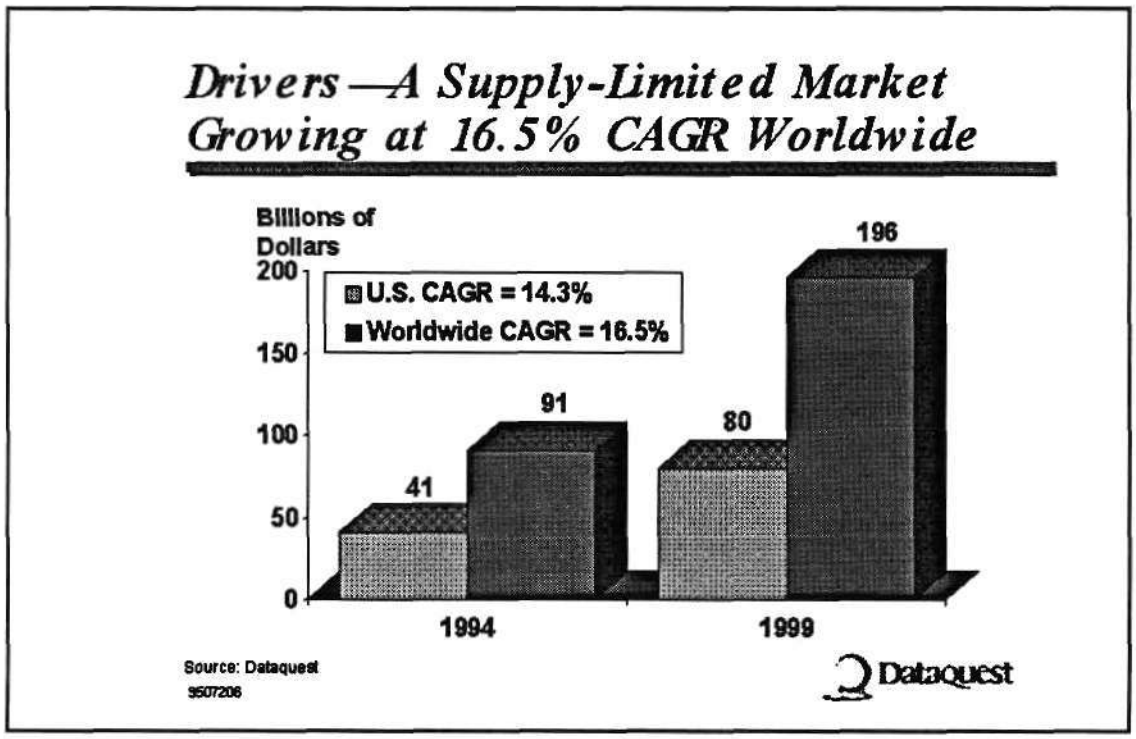
QUESTIONS

Some questions that this session is designed to answer: What's the role of technology in managing risk, if you are a professional services provider?



What is the impact of knowledge databases? Are they just a giant expense? Are they going to deliver more value to the client in the end? Will they increase the level of competitiveness the service provider can meet in the market?

What about all the groupware, all the Lotus Notes applications that are out there? People are experimenting with these kinds of technologies and we believe that they will significantly change how service providers deliver their wares.



PROFESSIONAL SERVICES

Dataquest looks at what kinds of services are provided to accomplish three things for a customer when it relates to IT:

Services that are delivered to provide a transition.

Services that are delivered to enhance existing technology investments.

Services that are bought to manage their existing technology environment.

Whether it's the high-end business of consulting or whether it's the systems management business, it has a number of characteristics that seem to be assumed. Labor intensive. Involves people. Involves skill levels. It involves matching those skill levels and also involves building custom solutions.

For delivery purposes it involves a management scheme on the part of the vendor that is highly controled and highly process oriented.

It involves dedicated resources. Typically, in these kinds of engagements, personnel are moved onto the client site. Sometimes it's hard to tell after several years who has been there longer, the vendor or the actual employees of the company.

Market forecast for the U.S. and worldwide for that entire collection of services from consulting to systems management or outsourcing; 41,000,000,00 to 91,000,000,000 over the next five years in the U.S. and a slightly higher growth rate for worldwide.

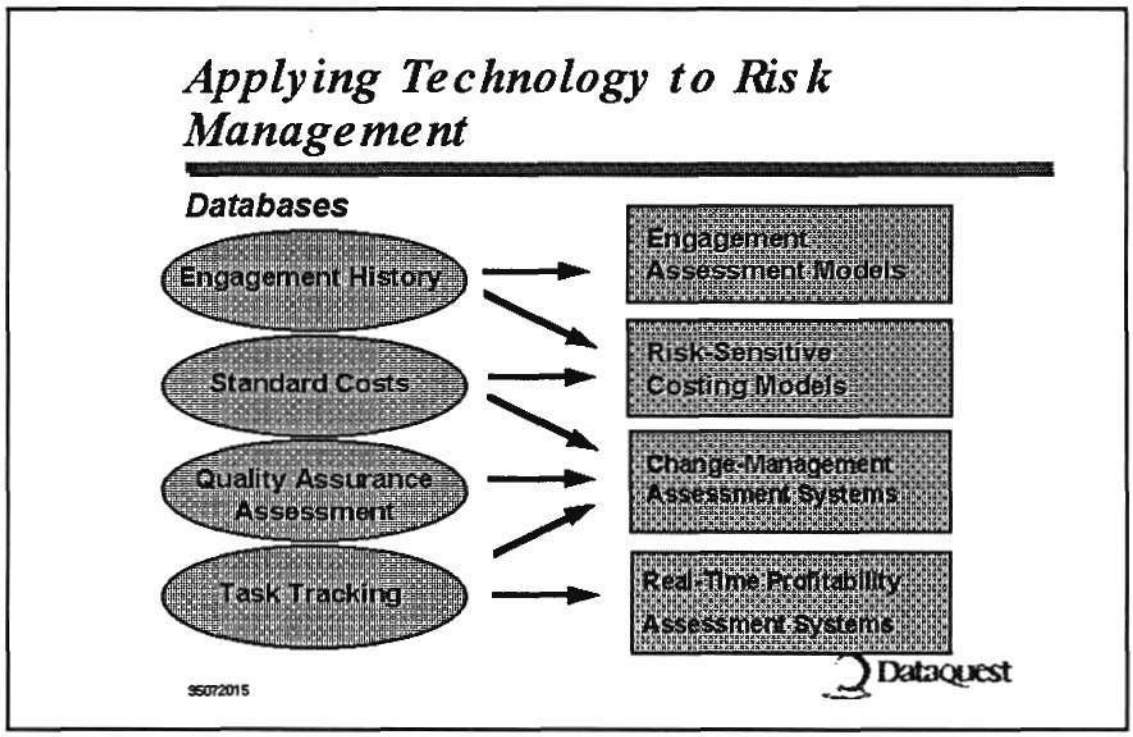
The supply limitation says there is plenty of opportunity, if we can figure out how to get more leverage out of service delivery capability.

Software product companies who didn't consider markets at all years ago, now see the channel opportunities to services.

Where it used to be a limited set of players with relatively comparable skills, we now see out there in the field anybody that has anything to do with IT, whether they started at the hardware end or they started at the consulting end, covering a broader spectrum of these services.

We asked Fortune 1000 companies what kind of relationship do you prefer to have with your vendor, contractor or contractee? Do you prefer to have a formal contract or an informal contract? About 60% of them say that want a partnership. Only a few years ago it was less than 30%.

TECHNOLOGY



New technologies are particularly relevant to the subject of how can technology change professional services delivery including groupware, new methodologies for rapid application development, object oriented programming tools, repositories, application shells and shorter technology life cycles. They create opportunities to attack new markets on the part of vendors doing applications that were never done before. They offer opportunities to improve the delivery, reduce the risk of being an integrator and reduce the cost.

TRENDS

The way people deliver their services is changing rather rapidly. Sometimes, we even look to the smaller companies in the industry who have no tradition of how they deliver services walk into the situation and say, "Well there's no reason to have to do it the way it's always been done" and they come up with some innovative approach.

The other thing that people are trying to do in a variety of different ways is leveraging the intellectual capitol of their firm, rather than having each individual own their experience. There seems to be a definite trend through the use of technology to have the firm own some collective intelligence drawn from everyone's experience.

Finally new and innovative ways of managing risk based on the kind of information and experience that has been present from the past is becoming a key guide to helping to change how services are delivered.

PREDICTIONS

It looks like the changes that are happening are making the major firms look at their process of creation and delivery of applications and enterprisewide solutions.

A lot of systems are being integrated inside the vendors to provide cross functional capability and sharing of knowledge.

Team empowerment is a large number of firms through the use of knowledge databases, shared experience, putting together teams. Not teams controlled by the managing partner in Chicago but teams dedicated to the assignment. Teams consisting of the right group of people tailored and matched with the right group of client people with more empowered decision making.

We see an evolution to continuous development, rather than project oriented or task oriented development strategies and finally, we think that combination of things will turn around not the pressure on profits but create the opportunity for renewed profit and profit growth.

We are seeing some companies starting to look at how databases can be merged with an integrative set of tools to apply technology to all these different kinds of phases of the usual life cycle of a professional services engagement.

On one side there's growing competition for people and a growing number of competitors in the services business and the results of that have been difficult for some companies profitability and for the industry in general.

The other side is it's not just technology but technology is one new level that professional services companies have as we see it to turn that situation around and

become not only more competitive but more responsive to what customers say they really would like to see in a vendor.

Note: Please refer to the companion "Verbatim Transcript Document" for the full in-depth discussions, detail, explanations, charts, graphs, and the audience "Question & Answer" session.

Chapter 17: DISINTERMEDIATION: HOW TECHNOLOGY IS ELIMINATING THE "MIDDLEMEN"

Cynthia Moore
Associate Director, Professional Services
Vertical Markets Program
Dataquest Incorporated.

Agenda: Definition, Strategies, Drivers, Market Opportunity and Summary.

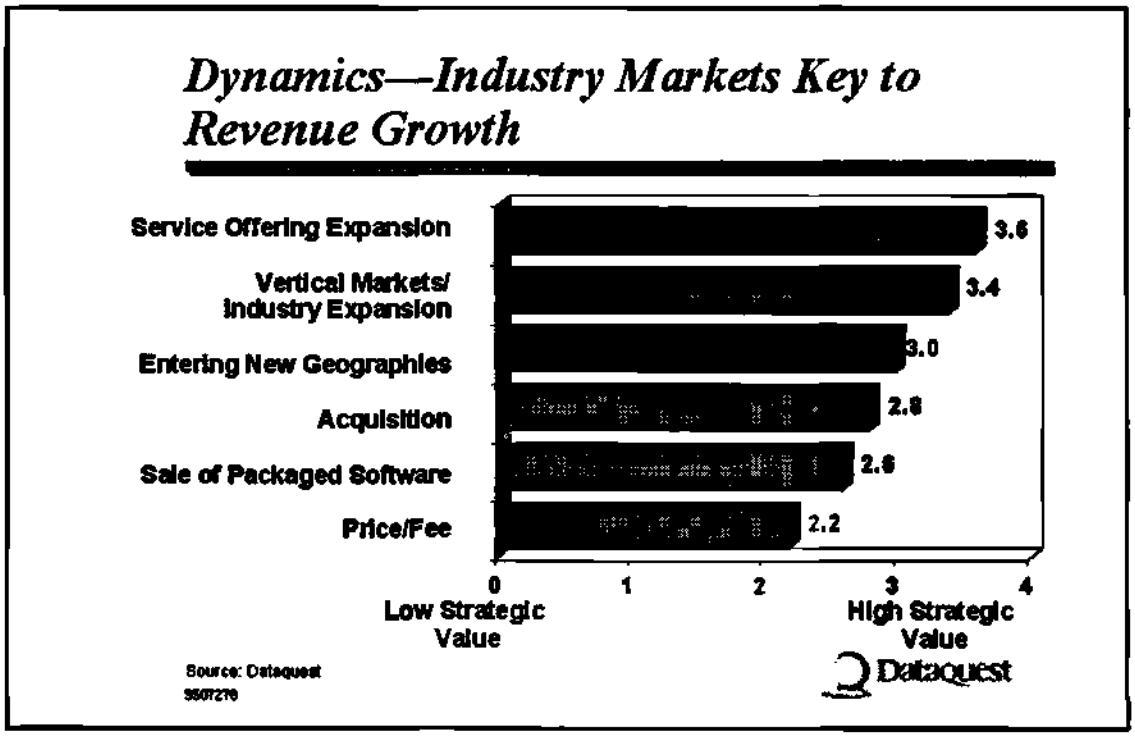
DEFINITION

Disintermediation is not simply the removal of one SIC group from the industry value chain. Rather, disintermediation is a technology-facilitated opportunity that opens up new areas of potential for companies that were previously not areas of opportunity.

For example: SIC group A could be a discreet manufacturer and disintermediation is removing, perhaps, SIC group B or C which could be the wholesale distribution segment in terms of delivery of the product to the customer.

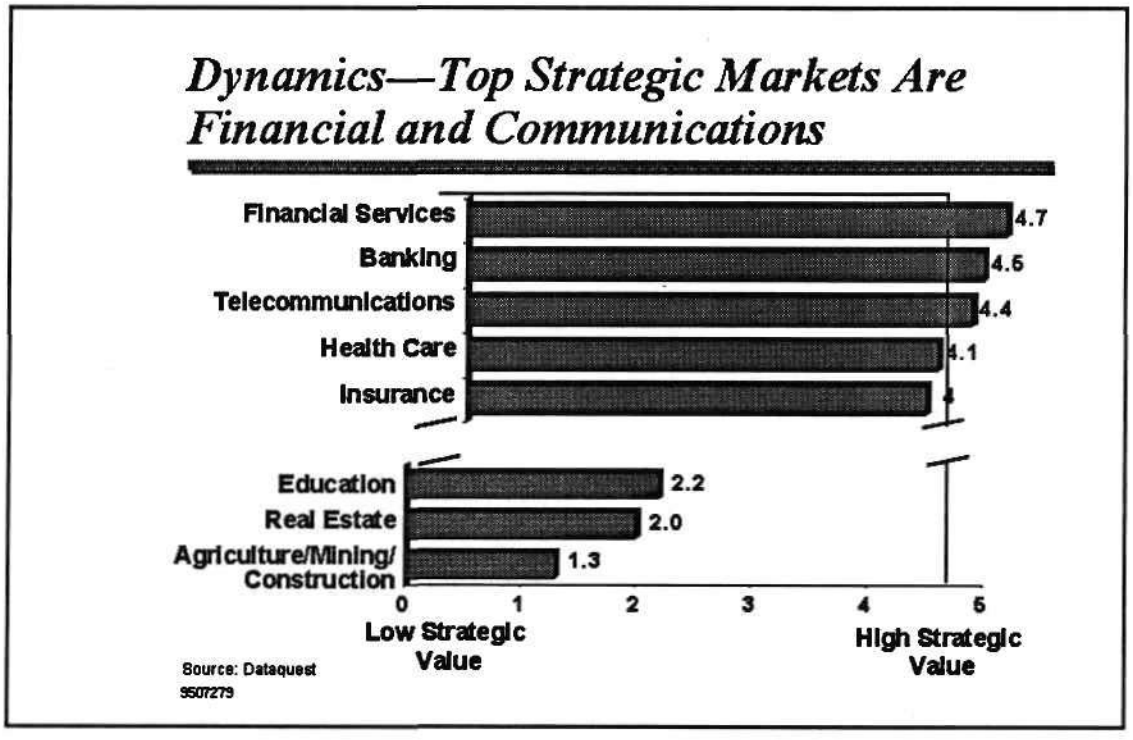
STRATEGIES

Why companies care about the phenomenon of disintermediation. Vertical industry strategies are important to companies in the IT world and clearly, companies that Dataquest interviews identify vertical industry strategies as being really critical to future revenue growth. Understanding disintermediation and its impact on the clients or the customers of IT products within specific vertical industries should help to support development of more effective marketing strategies or optimize marketing strategies.



These strategic industries are also investing in key technologies that are facilitating disintermediation and those technologies are communications technologies and PC based technologies.

The communications infrastructure is really key to the disintermediation's impact and potential. LAN to WAN integration and client/server architecture, distributed environments that allow for the ability to understand, to capture information about the market and then, through the use of analytical software and other types of distributive computing capabilities to be able to gather information about the market, learning or creating knowledge internally to allow these organizations to further penetrate related areas of opportunity.



Business process is the other area of focus that key industries like financial services are investing in and this is investment in the relationship to IT. Also customer service and accounting and billing are key areas of investment.

DRIVERS

Increasing competition. Increasing competition goes hand-in-hand with the ability of technology to provide specific capabilities. These are the two keys that are mainly driving disintermediation.

Globalization. A key trend in the marketplace that is helping to fuel disintermediation and globalization has been talked about for the last five to eight years but, it is happening in degrees in terms of which industries are facing global issues and what they are looking for, in terms of IT solutions that will help them be able to address the global market and global competition.

Business as usual is shrinking. Product and brand visibility is declining and it could be true for any industry. What we are seeing is that, increasingly, products

and services as industries are evolving are becoming more commoditized. The response on the part of those organizations in terms of being able to retain loyalty among customers and to grow into new market opportunities is to expand and enhance their core of business.

Continuous financial pressures. Companies have been focusing heavily on the fact that they have declining markets and that their growth has slowed. They have been dealing with M&A activity to help fuel growth and have been focused on showing that their internal operations and financial operations are optimized. That has resulted in elimination of marginal products, looking at reengineering to achieve real growth, which is one of the latest areas of focus. That is also resulting in the evolution of new marketing approaches on the part of companies that are looking at new ways of developing market opportunity.

Change and the application of technology to health organizations has moved from one of cost reduction, simplification and automation -- or literally a restructuring through business reengineering -- into for some industries looking at the next wave of reengineering. Clearly, with disintermediation, what technologies are helping to drive in terms of capabilities is really a revamp of the industry structure.

Technologies have helped organizations evolve through a marketing process where they were able to more effectively target local markets, utilize technology and go after mass market opportunities.

Given technology's role today and its contribution, how do we see the contribution of technology in the future? It has and continues to migrate from one that is of lower strategic value where it previously supported the business through doing the business and enhancing the business into in the latter part of the century, creating new opportunities.

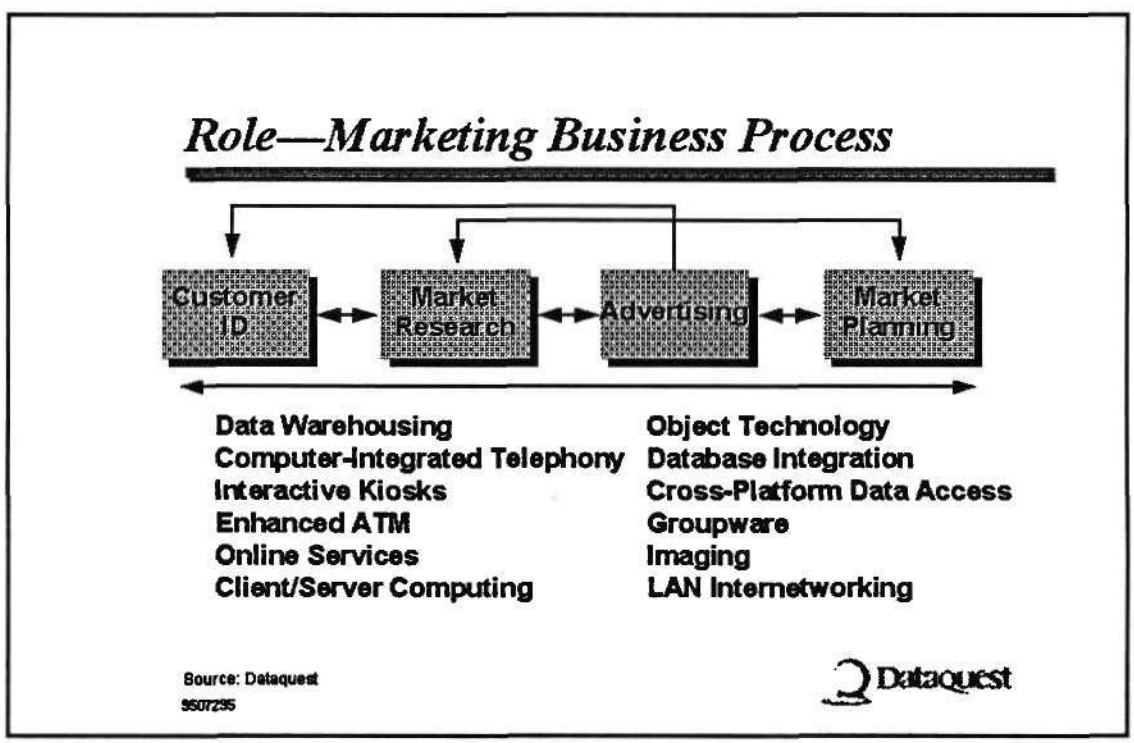
There are regulatory drivers and if you look at the movement or the migration that the technology is now allowing these organizations, in terms of the additional capabilities, we see movement on the part of organizations from the traditional area of play, in terms of the specific services that they have included in their portfolios because they are continuing to invest in some key business process areas.

Competition is becoming very multi-faceted, very different. We're talking everything from integrators to software developers to communications companies.

MARKET OPPORTUNITY

The traditional means of identifying market opportunity --

where opportunity and decision making has historically been functionally oriented -- was made or driven by the functional organization with the help of technology. Now technology is eliminating the barriers of organization and wiping out the lines of industry demarcation.



As the organization uses less intermediaries, the flexibility of that organization increases, in terms of its ability to adapt to and respond to and be proactive to new market opportunity. Process drivers and the processes themselves and the role of specific business processes becomes much more important but with increased flexibility. The framework with which to look at business processes becomes

ones of object-oriented technology, where the ability to compartmentalize a business process and be able to plug and play and go after new opportunity could be critical to the success of an organization in the future.

SUMMARY

The success levers. These are those aspects of looking at disintermediation that I had talked to earlier. Shifting from a process oriented to object oriented framework and mindset. Looking at the value, identifying the value first.

Uncouple yourself from a traditional product and services opportunity and look for specific value. Working back from the value with the use of technology will open up new areas of opportunity.

Leverage the market interface. The new and changing role in the value chain with technology as market interfaces. As that delivery mechanism changes, so do the market interfaces that are able to provide new opportunity. New and changing positioning along that value chain.

Market image and relationships are more critical than ever. And that's going to be increasingly true as market interfaces become much more diverse.

And then, clearly, business is not as usual.

Note: Please refer to the companion "Verbatim Transcript Document" for the full in-depth discussions, detail, explanations, charts, graphs, and the audience "Question & Answer" session.

Chapter 18: LATIN AND SOUTH AMERICA: MIGRATING SOUTH OF THE BORDER ON SILICON WINGS

John Fritz
Director
Dataquest Latin America
Dataquest Incorporated

Agenda: Events Going on In Latin America, The Boom In Manufacturing for Technology in Brazil, Hot Markets in Latin America and Mexico

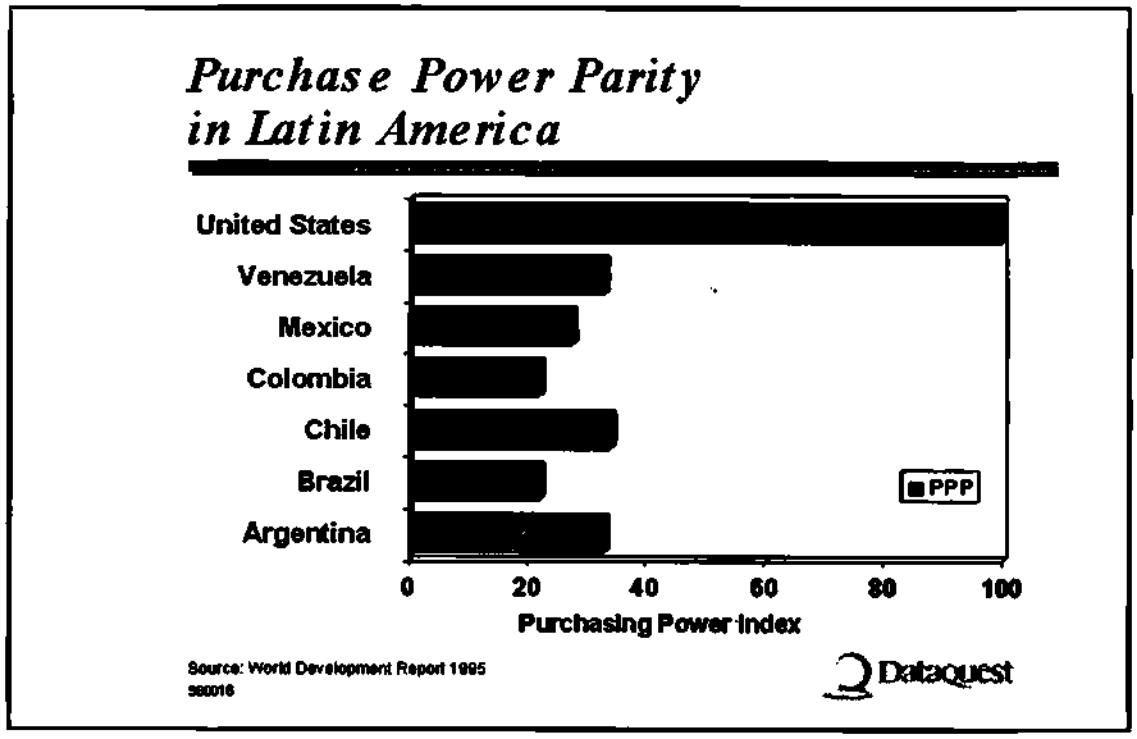
EVENTS GOING ON IN LATIN AMERICA

Last year was an incredible year for direct investment in Brazil. A lot of this went into capital improvements in the markets especially in the computer industry. A lot of major manufacturers either came in and developed their capabilities or amplify them.

Some of the big players that are really ramping up in Brazil right now are Compaq. They just finished their $15 million plant that is going to be on-line this year, really going after the desktops. Epson is going in this year, but at the same time the local players with the benefit of the booming economy this year in Brazil are able to reinvest.

Itautec has put in another million dollars into their plants. Alpha Digital has also increased their production volume in Brazil and there is a few other companies down the road that are really ramping up.

The other big winners last year were the auto industry in Brazil. We had the dissolution of a large joint venture in Brazil and Argentina of Auto Latino, which was a joint venture between Ford and Volkswagon. So between those two splitting up and starting up anew and the booming economy, they had an outrageous demand for new automobiles last year. People were importing so many cars that the Brazilian government had to put a tariff in to stop it because it was throwing their economy way out of line.



The retail sector is also picking up. Part of this has to do with the Real Plan that President Cardoza put into effect last year, which is overvalued. It has been trading at around 85 to 90 cents to a dollar. So they have had a very strong advantage into importing things from the U.S.

'96 is going to be an extremely exciting year especially in terms of privatization and what is going on in Brazil. Throughout Latin America there has been a huge trend toward privatization and this is happening partly because people recognize that it is the way that they can get a further step on the market. The other reason is that they have to. These countries are broke and they need to bring in extra money if they are going to maintain the development.

We are going to see Telebros relinquishing some of their control this year and a lot of the state-run companies like Telestay and the Telephone Company of Rio loosening up their grip and bringing in more foreign investment to fix their infrastructure.

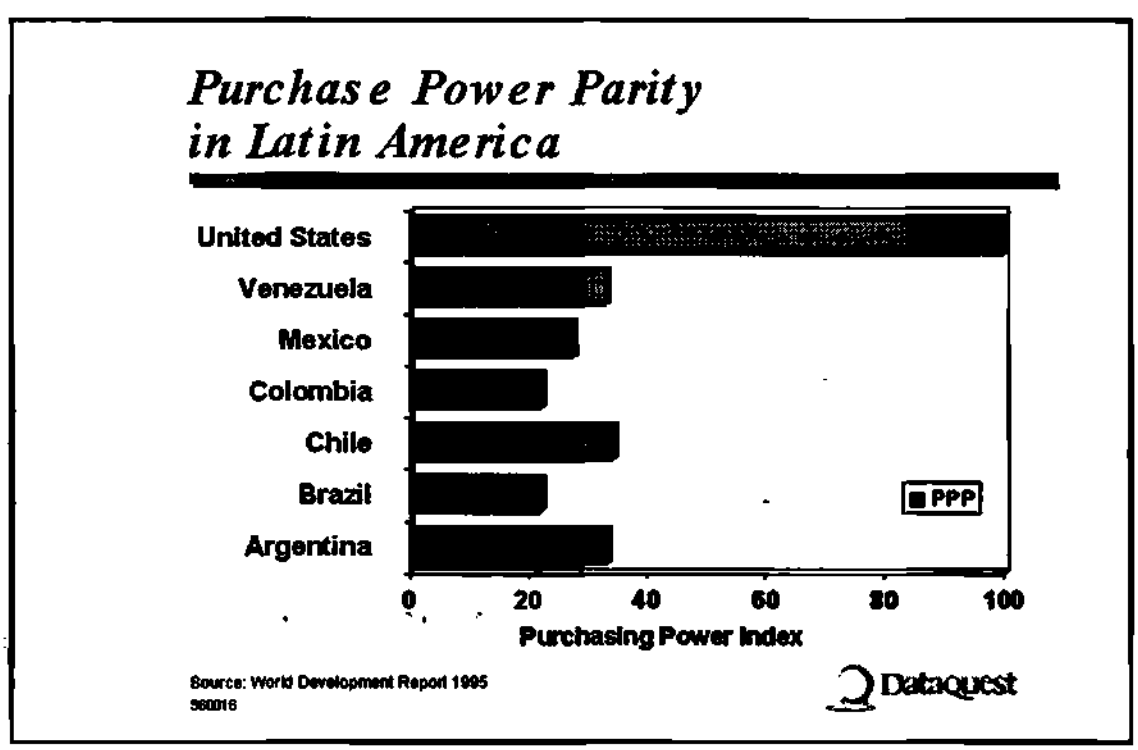
Telecom is especially exciting because there is about 70 lines per thousand inhabitants in Brazil. So they have an incredible growth curve that can take care of it. You are also going to see the mining sector privatized and the power sector which does not directly affect the IT markets, however, these of all three industries are going to revive. Any vendors that are down there are going to be in a favorable position.

THE BOOM IN MANUFACTURING FOR TECHNOLOGY IN BRAZIL

During the market reserve time they have got experts coming in from around the world to train Brazilians how to manufacture, how to do the logistics, how to do the proper assembly, how to distribute it and look forward.

Even during the market reserve time they were setting themselves up for the big boom that they are experiencing now in manufacturing.

The major benefactor of the market protection or market reserve laws in Brazil was the country Paraguay, which is a center for smuggling in Brazil.



LATIN AND SOUTH AMERICA: MIGRATING SOUTH OF THE BORDER ON SILICON WINGS

Paraguay right now is about a $4 billion a year electronics industry that is being hurt by Brazil's manufacturing boom. The protectionism from the market reserve has enabled them now to develop the infrastructure to where they can actually become a regional exporter and in some cases a global exporter of technology.

Uruguay, Paraguay, Argentina and Brazil represent about a trillion dollar market. The one place where they have enough intelligent labor to put the manufacturing in is Brazil. So Brazil is really going to be the heart, mind and soul of the Mercosur.

Manufacturing in Brazil will be dedicated toward exporting to these countries, especially Argentina and you will also see them branch that out into Chile as soon as that agreement comes through.

HOT MARKETS IN LATIN AMERICA

Telecom is the hottest market in Latin America right now. It is exceptionally competitive. It is cheaper right now to call the United States from Chile than it is to call Chile from the United States, just on the long distance side.

There is a huge race to get in and develop cellular networks. The cellular demand is almost impossible right now.

AT&T and two of their local partners will be investing a billion dollars over the next five years in developing their networks and also producing cellular phones.

Motorola is seeing the same thing. They are going down there to take care of the local demand. Ericsson is the kingpin in telecom in Brazil. Outside of the large monopolies, they own the market and Compaq just invested $15 million in a PC plant. NEC is working very closely with Telebros and their higher end telecommunication system. Acer is assembling PCs and Sharp has put in $8 million into an electronics division there. Digital has a sister company there that is also ramping up their PC delivery. So we have got people from all over the globe focusing in on Brazil and they are focusing in on the long run.

So the big prediction that we have is that Brazil will become the first Latin Jaguar.

MEXICO

One of the things seen in Mexico this year that is very new is that a lot of the middle class people are becoming a lot more politically active and outspoken. There are several demonstrations every week in Mexico where the middle class are blocking traffic.

'95 was a really tough year especially for IT companies in Mexico. A lot of loses on a worldwide basis affected revenue, mainly with Compaq.

But a few companies also used the economic fallout as an advantage. Digital went in and took a big chunk of market share within the first half of the year.

The key now is to keep that market share going. Acer was very strong there but mainly because they have got a very strong local presence and a very strong kind of a Mexican flavor to them.

For most of the other companies, it was survival mode all the way through. The local companies are the ones that hurt the most, whether the local telecom Telefono de Mexico or the local clone manufacturers. There is a company called Lonix that had their production cut by 75%.

The states in Mexico in a crisis time were abandoned by the government. They had no money to pay off their debts and they basically had to make do with their own. The northern tier states like Nova Leon, that have close ties to the U.S. are going to demand more of their power.

Now what that means for IT vendors is that you are going to have to look more, instead of being centralized in Mexico City, outside the region to increase your sales.

So the challenge for IT companies is going to be to figure out how to price it, get in and get the market and still make enough money where they can survive to continue in it.

The battle is for awareness and market share. This year is going to be a break even year. Last year we had losses, but if it is cellular, software, services or computer systems, it is an endurance event. You have got to hang in this year and lay the grounds for 1997 when the profits will start to come back up.

LATIN AND SOUTH AMERICA: MIGRATING SOUTH OF THE BORDER ON SILICON WINGS

The prediction for '96 is that it is going to be a very slow growth for the consumer market. If you are going into the consumer market, do not forget your corporate customers because that is going to subsidize your whole consumer market.

Note: Please refer to the companion "Verbatim Transcript Document" for the full in-depth discussions, detail, explanations, charts, graphs, and the audience "Question & Answer" session.

Chapter 19: EUROPE: THE NEW CONTINENT

Richard Mitchell
Director
European Communications Research Group
Dataquest Incorporated

Agenda: European Differences, European Economy, Computers, Services, Markets and Liberalization.

EUROPEAN DIFFERENCES

How is Europe different? Language is one difference but there are very different economies in the European market. Very different cultures. They have to be thought of as different markets.

If you are going to do a business in Europe, you need to have a European headquarters. You can't really run anything vertically driven from the States. You need to penetrate new countries by local activity in those countries and typically, if you do not have the budget to set up a headquarters in each particular country then, what you need to do is find out who's the very best agent in that country and do business with them. You need to do that because documentation needs to be in the local language and it needs to be not merely translated but written by an indigenous local person in the correct way.

Sales support and maintenance also needs to be carried out in the local language by people who have an affinity with the local people.

You need to do a little market research to figure out which countries you are going to go into. The other thing I would say about Europe is that there are new geographic markets to conquer in Europe.

EUROPEAN ECONOMY

Looking briefly at the economic activity in Europe, for 1995 and 1996 the overall view is it's in a pretty slow growth. Unemployment is running at an average of about 9 1/2%. Growth is typically about 2.2% forecast for 1996, which is slightly lower than 2.6% during 1995. This is growth in domestic product.

Economic Activity in Eur

- Major indications of the western European economy
  - Overall GDP growth last year 2.6 percent
  - Forecast 2.2 percent for 1996
  - Industrial production has weakened considerably
  - Consumer spending has been restrained
  - Strikes in France due to tough new social security measures
  - U.K. consumer spending looking brighter
- Conclusion: 1996 looks like a tough year ...
- ... but some areas of IT are growing VERY rapidly

Dataquest

1996 from an economic perspective looks like a pretty tough year but the good news is some areas of IT in particular are growing extremely rapidly, which is making up for some of the failures in other sectors.

COMPUTERS

Moving from traditional mainframe to client/server technologies, that transfer is beginning to occur slowly.

In France, Italy, the UK and Germany we found that some applications have actually been converted or are completely converted to client/server technologies. On average, about a third have made the change. About a third are kind of thinking about it and they are teetering on the brink and about one third haven't yet made that change.

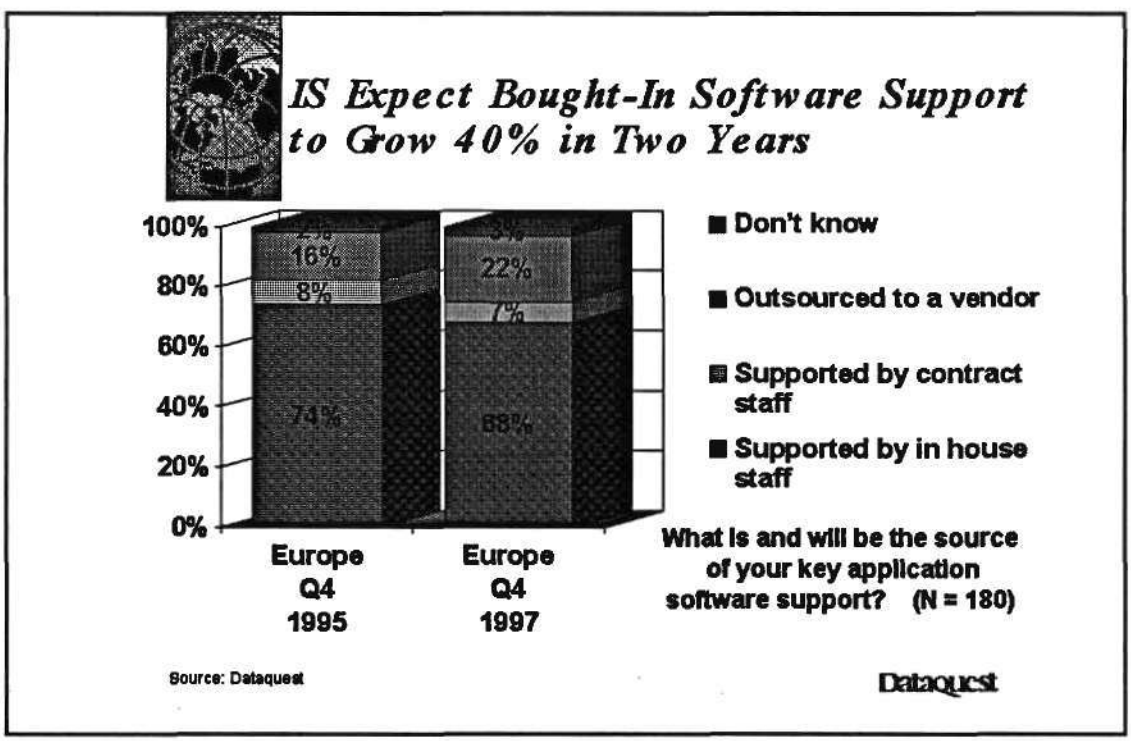
In terms of growth opportunities for client/server in Europe, our client/server analyst believes that we can expect to see something like 40% growth in 1997 over this year.

The most important vertical market opportunities are telecom applications, health care, transport, distribution and the European retail market. The people executing this change are Hewlett Packard, IBM, Siemens and Digital.

SERVICES

Ready-made prepackaged software markets are much less advanced in Europe than in the U.S. Why is that? Well, a lot of them are made by U.S. vendors and they typically need to be recultured to be able to be successful in the European market. Multiple language support is one of those reculturings that needs to take place. Multiple currencies support is another.

Software support which is actually outsourced to a vendor is set to grow from 16% up to 22% over the next couple of years.



If we want to make some predictions, then, for what's going to happen in the European services market, we might expect that ready-made software would reduce over applications development but actually seems to be happening is that

people are buying in ready made software but then they are customizing in order to get a further edge over their competition.

Forecasts for Major Change in European Services (1)

- Outtasking of application solutions stimulated by software products (customization)
- Legacy software management becomes the big vendor opportunity
- Systems management penetration grows from 6% to 15% by the year 2000
- Desktop, mobile, and network systems management fuel outsourcing growth

Dataquest

The big vendor opportunity now is managing legacy software and outsourcing or systems management is expected in Europe to grow in terms of penetration from 6% to 15% by the year 2000, so over the next five years.

Third party channels are becoming key to actual cost effective service delivery, so rather than just delivering products through the distribution channel, services as well are becoming packaged along with those products moving into the channel and becoming more and more channel sold.

THE MARKET

Don't look at central and eastern Europe as a single market. It consists of 27 different countries, 13 different time zones and there's an astonishing statistic that it covers 30% of the world's surface.

First of all, GDP growth. Gross Domestic Product is not always as bleak as it looks, except in the case of Russia, where I think we can say that's fairly bleak. Other countries like Bulgaria, the Czech Republic, Hungary, Poland, Romania and so on, are all actually in positive growth an looking reasonably good, some of them in the 5%-6% category.

The Belgium market is about the same as the Polish market. Portugal, generally regarded as tiny in Europe, about the same as the Czech Republic and Greece about the same as Hungary.

Cellular telephony is very popular in central Europe for those who have money. The reason for that is that the fixed network is still very poor. The fixed network in some countries in western Europe, such as Spain, is also still very poor.

The PBX and LAN markets are beginning to emerge in central and eastern Europe. LAN is driven slowly but surely by the fact that PC sales are beginning to ramp up and therefore, there's a need to actually interconnect.

Most of the companies, most of the countries, are open to a lot of different suppliers and we see Siemens the German company, Alcatel the French, Ericssons the Swedes, Nokia the Fins, AT&T, Motorola and Philips the Dutch all for example in Lithuania. Even though this is a small market.

Dataquest splits the market into four major sectors and one kind of minor. The public sector is 47% which is equipment supplied to the carriers.

The next largest segment is the voice market. Traditionally in Europe, that's been about 25%-27% but it's been edging down giving market share away to the networking segment, which has been edging up. The voice market is the PBX and the telephones market and also the new exciting stuff like call centers, computer telephony integration and voice messaging and voicemail.

Then we've got the networking market which continues to grow more rapidly than voice. The networking market is taking about 20% share and that's the local area networking market. Local area network interface cards and switches routers bridges and so on.

The personal communications market is coming in at about 11%. It used to be about 6% to 7% maybe two to three years ago and that's grown pretty rapidly.

Now, personal communications, in other words, mobile telephones and the infrastruacture which goes behind them.

LIBERALIZATION

In Europe it will be required by January 1, 1998 that everybody is supposed to open up their markets and remove the monopolies. That is causing a lot of dramatic change. There is increased competitive pressure now on behalf of the suppliers. The monopolies are having to break their stranglehold on the market and this is resulting in lower tariffs, more flexible service offerings and a much nicer service as far as the user is concerned. This is very evident, for example in the UK where there is now very dramatic competition.

Some countries, such as Belgium and Austria, will probably continue as today as long as they can. But what will happen is that traditional relationships between these lumbering giant PTOs on the one hand and the suppliers who have been charging high prices and locked in with those PTOs will be floored and we will see a lot of new operators coming in.

Note: Please refer to the companion "Verbatim Transcript Document" for the full in-depth discussions, detail, explanations, charts, graphs, and the audience "Question & Answer" session.

Chapter 20: MEETING THE NEEDS OF IT AND BUSINESS MANAGERS: WINDOWS 95 AND BEYOND

Ellen Kitzis
Vice President
Dataquest Consulting Group
Dataquest Incorporated

Agenda: Challenges, Standardization, The IT Managers and The Business Unit Managers, Windows 95, Remaining Challenges and Predictions

CHALLENGES

Challenges that face users in their organization: Users are trying to deal with the new organization complexity of IT managers and business unit managers. What role can outside providers play? What are the characteristics of the successful providers in this marketplace?

Two dynamics have happened: One is got rapid technology product life cycle. Companies have learned how to adopt and learn how to keep the the changes. They all know they have to put processes in place to deal with the rapid rate of change.

The second is they went to distributed computing. They reeingineered their IT structure. They had to get standardized. Companies have put real processes and committees in place so that they can achieve standardization.

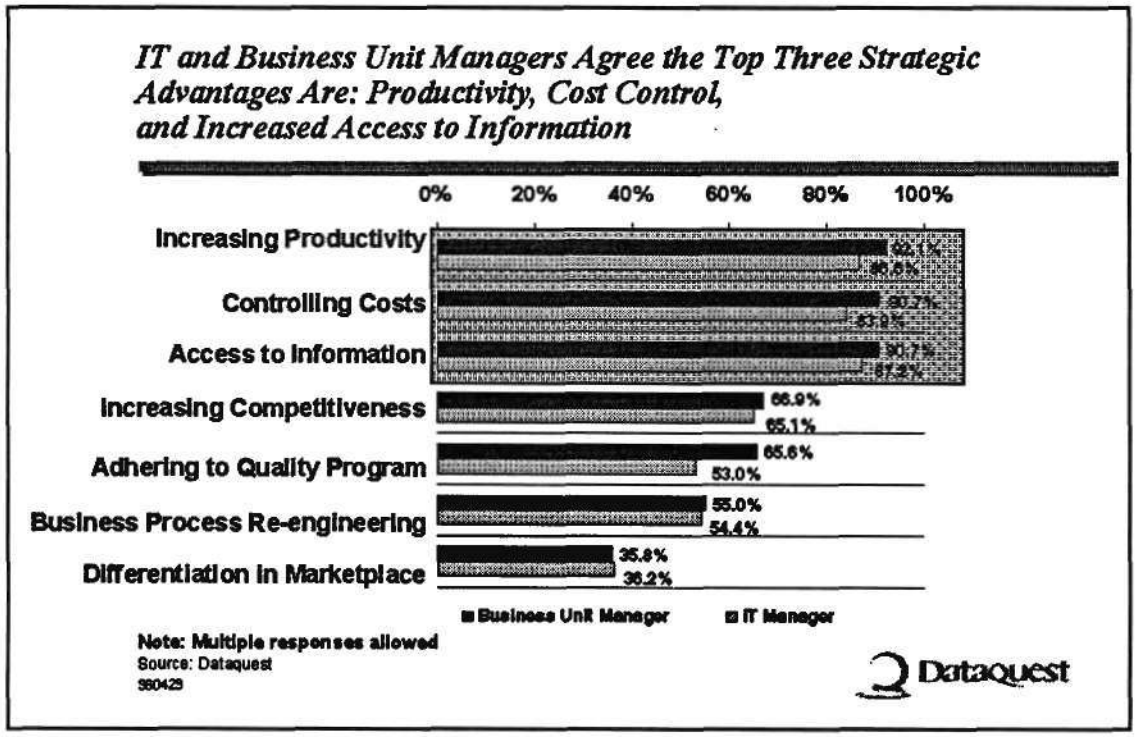
With standardization, you are able to move out much more rapidly from the workgroup to a department to an enterprise in terms of institutionalizing or implementing change.

STANDARDIZATION

Companies feel that standardization is one of the most important issues. We asked them how well they are doing in terms of enforcing those standards. They are telling us there is somewhat of a gap in terms of being able to reach the desired objective and in achieving standardization.

It's important to remain focused on what those three business objectives are:

Increase user productivity for the organization. We want to control our costs, so that we can increase our margins, the return on our assets and lastly we need access to information.



There's an opportunity there. Outside providers have an opportunity in terms of creating standard platforms, standard protocols and services that allow people to being able to implement a standard architecture. By the way, they are also trying to get a good return on their IT investment.

We asked IT and business unit managers a whole series of topical questions about how well they think the organization is doing in terms of achieving objectives. We asked how important are standards in terms of advancing or being able to implement your computing environment? This is a substantial shift.

THE IT MANAGERS AND THE BUSINESS UNIT MANAGERS

We did a lot of research with IT and business unit managers. We did focus groups, we did surveys. We really tried to get underneath this notion of how their

role is different than it was. More than just saying it's changed. Regardless of who we talked to, they came to the conclusion; IT no longer controls the whole information technology budget, the dollars, the objectives, the goals. They no longer control it all.

The IT manager said one of the things that's happened is they had to step back in many ways and get outside of the world that that data center has provided. They have to become part of what we consider to be this executive team.

They said is they have got to support the users. They can no longer turn to the end-user and say, "By the way, it really isn't working because that vendor screwed up."

What's happened to the business unit manager? They can no longer tell IT, "do this" or "tell me this." They have now taken on the responsibility of their own destinies in terms of a lot of the IT planning and processing.

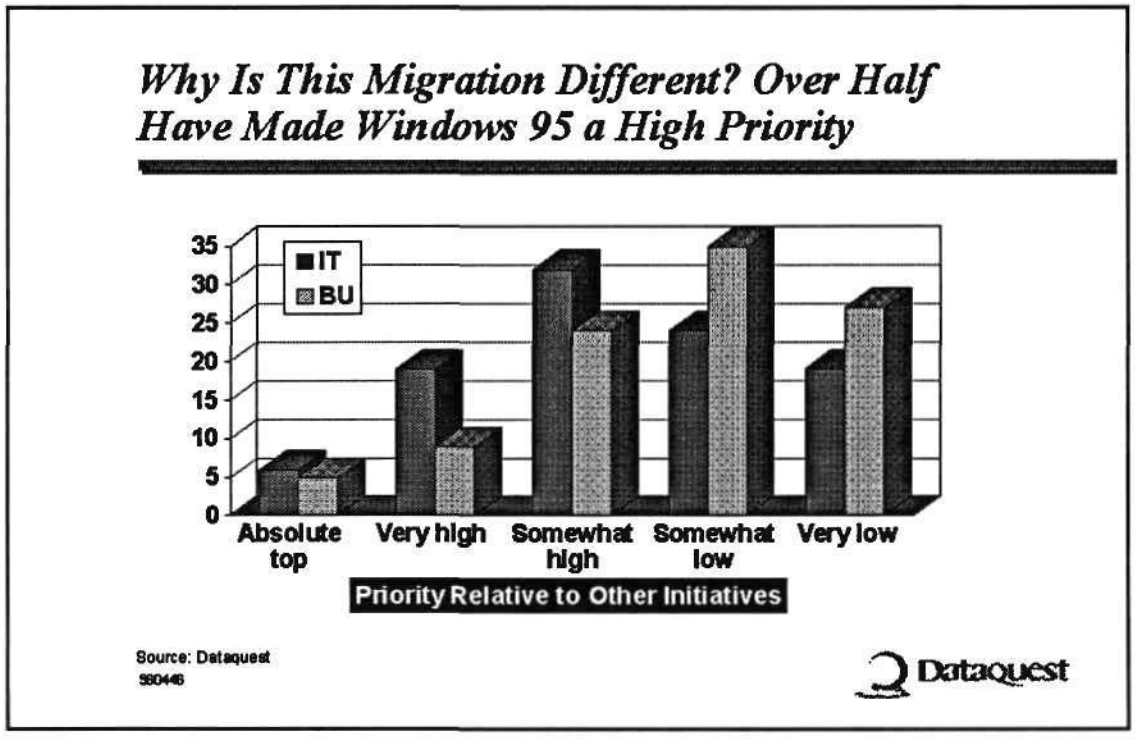
That means that they are assessing new products, right along with the IT managers. They are not simply taking recommendations, which means, when you talk about marketing, advertising, image development, your costs are going up.

They are also managing new product implementations. They are there right hand-in-hand with the IT manager, working through a migrations.

They know that their end-users aren't productive and they are concerned that the amount of time that they are spending solving end-user problems is increasing. It's not decreasing, it's getting worse and they are concerned.

WINDOWS 95

When we surveyed people about why this migration is different from others, about half of our respondents who were both business and IT users said this migration relative to others was a high priority. It was one of the highest priorities that they were doing in their own departments.



Let me preface this by saying these are people that we surveyed who said that they were going to migrate to Windows 95 within 24 months. So there is no other decision to make to technology migration.

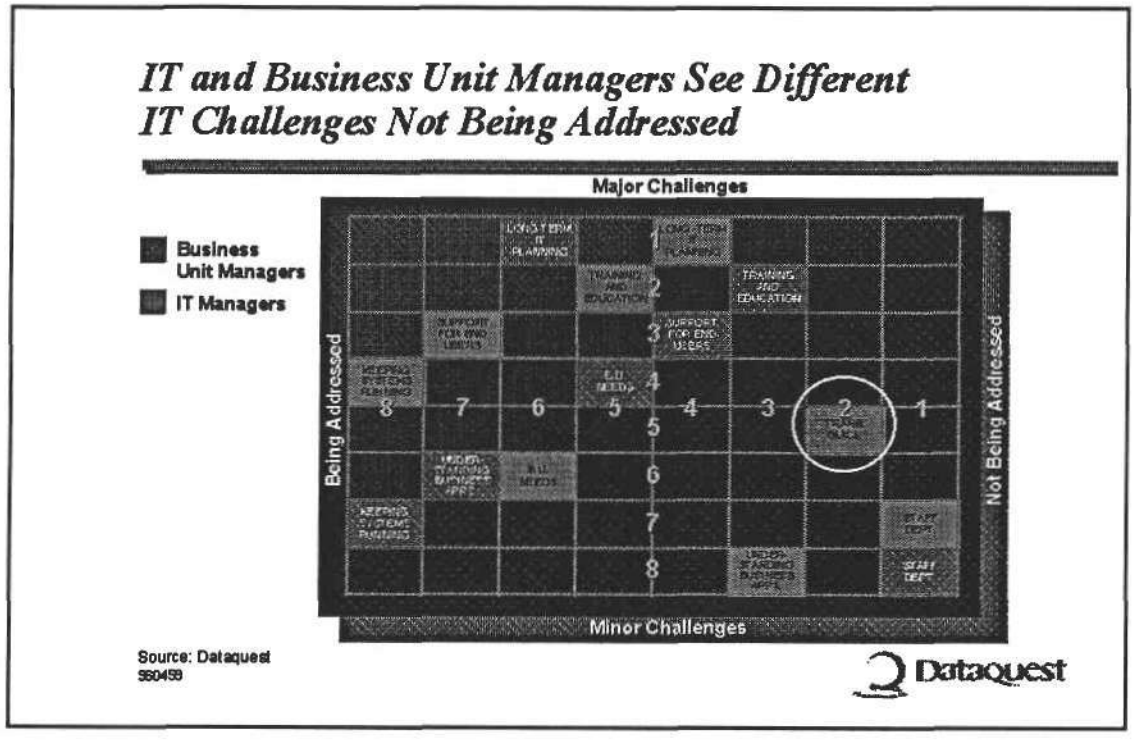
We've asked them whether or not do they expect this to be hard or difficult. Interestingly enough, most people expect this migration to be less disruptive and less difficult than migrations they have gone through before.

We also asked them, who is leading the charge around Windows 95 in your organization? Over half of the respondents said the users.

In order to be successful, it's got to be a team effort that goes between the IT managers and the business unit managers. And surprisingly they both shared common concerns and goals around the technology migration process.

REMAINING CHALLENGES

What are the key challenges whether it's Windows 95 or any other technology or migration that people still face?



The business unit managers still get much more focused on productivity, while the IT managers get much more focused on cost. So, there still are some differences, in terms of understanding where the organization is heading.

We asked them what are the major challenges? One of the top challenges not being addressed -- and they both agree -- is, the need to make these changes even faster than we are already making them. So even though changes are happening fast, it's still not fast enough.

The area where they split is not recognizing the end-user impact on this and if you see the research the IT managers who say, yes, training is a challenge and the business unit managers are far more concerned, in terms of making training and education a priority.

We've seen estimates in organizations range from how much do you think it will cost to migrate to Windows 95 from companies telling us it's $100 or less, which means they are going to get great discounted rates off of Windows 95.

To $10,000 per user, now why the $10,000 per user? Some people think they are going to need Pentium processors, they are going to have to upgrade all of their other applications, some people think they are going to have to throw out their 486's. There's great disparity around what these costs are really going to be. And it remains a challenge for them.

They want long term partners who are willing to invest in the relationship and they really mean invest.

PREDICTIONS

What will the successful providers look like in the marketplace? I think one of the companies who fundamentally understand this organizational reality has to be schizophrenic, a complex nature of an organization.

We really have to understand and come out with products and services that will help companies solve this productivity crisis or this productivity demand and that's the reason we went to a new technology in the first place.

Developing support and technology strategies that fit different organizational models. Some of them will have to be built around supporting business unit IT departments. Others will be supporting IT and network managers.

Come to the market with solutions. Whether it involves yourself, partners or others and pull together the technology and the service. Bring it together for the whole organization differently than it may have done in the past.

Note: Please refer to the companion "Verbatim Transcript Document" for the full in-depth discussions, detail, explanations, charts, graphs, and the audience "Question & Answer" session.

Chapter 21: WILL THE MULTIMEDIA PC REPLACE THE TV?

Bruce Ryon
Director & Principal Analyst, Multimedia Program
Online, Multimedia, and Software Worldwide
Dataquest Incorporated

Agenda: Current Trends, TV and PC Commonality, The $500.00 PC, Who Will Win the Battles and Summary

CURRENT TRENDS

We are seeing PC sales that far exceed TV sales in the consumer market. We are seeing that TV viewing is leveling off and a number of situations where cable subscription rates have either leveled off or have turned downward.

Home PC usage is increasing and one of the other elements in all of this is the huge explosion in the increase of the Internet and on-line services and the growth of the PC as a gaming device.

TV AND PC COMMONALITY

The two areas that TVs and PCs really share interest and use is in news and documentaries as an information source. We are seeing a lot of companies from a content standpoint that are putting out information and news but they are putting it out in both sources, TVs and PCs.

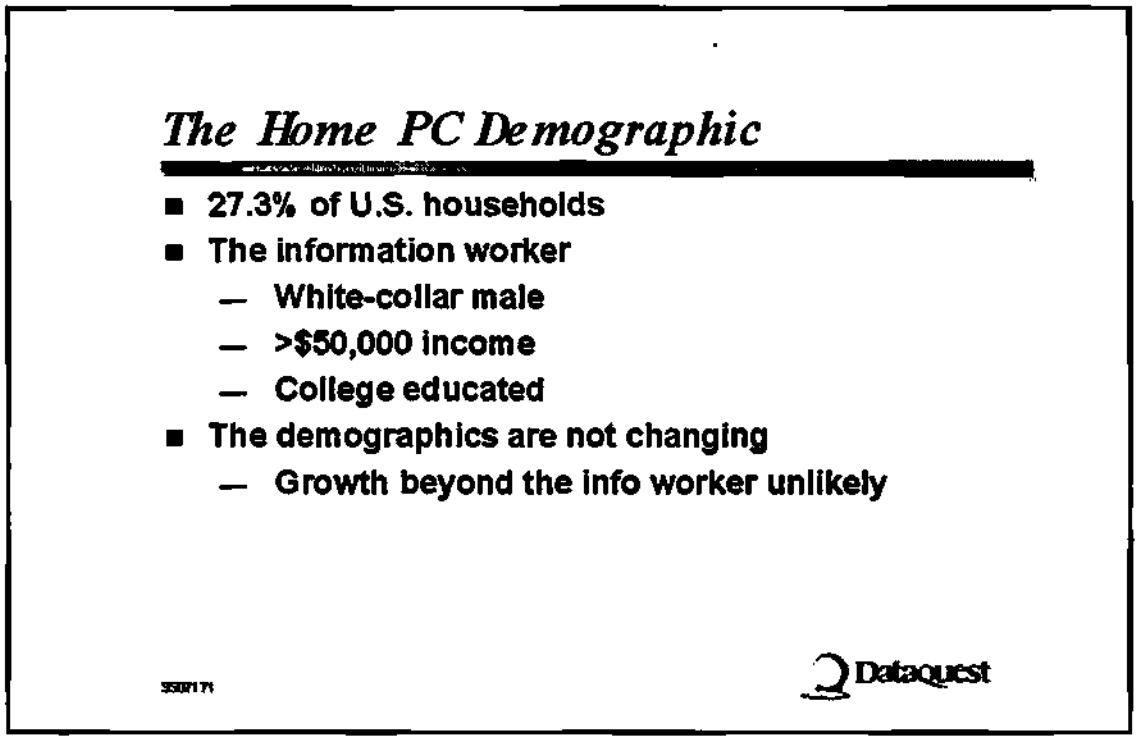
It is an entertainment source for both devices, games in particular, is one of the big areas.

You can also see home shopping in PCs and on TVs as well. The home shopping networks in the cable industry have topped out at about $2 billion dollars but that is a fairly sizable market. We are not seeing much more than about 100 million of the PC side but that is definitely an area that both of them share.

The two of the driving areas for the home PCs in the United States has been the downsizing. We are seeing a fairly large portion of middle managers that lost their jobs starting home businesses.

WILL THE MULTIMEDIA PC REPLACE THE TV?

What has really driven the market a lot over the last two or three years has been home education. This is one of the biggest driving forces for home multimedia PCs. People are perceived that they are going to be able to give their kids a better education or a quality of education by getting the multimedia PC and taking advantage of the entertainment titles.



The PC as a gaming device is a more interesting phenomenon. People are getting a 32 bit gaming device already in their PC and it has a lot of advantages over the Nintendos, SEGAs and the set top boxes that we are seeing. There is a lot of extra RAM, extra disk storage and a lot of extra CD-ROM storage, as secondary storage devices for very high density graphics and images and video. That is one of the advantages that the PC has over the game device.

We have seen a fairly high growth in gaming titles on the PC, about 75% compound growth over the last three years, which is expected to continue.

The PC as an education device is very much of a tool, not an education provider. Report writing is the dominant use of home PCs.

From an ownership standpoint, 98% of the people that own a PC had a TV, whereas in the general population, the TV ownership is about 92%. The PC owners tend to average three TVs, per PC household and the average in the United States for non-PC households is about one and a half to two.

The Internet factor has become a very strong usage of PCs, we are not seeing quite yet. It is an additional justification to purchase a PC but it does not tend to be the main justification. So the Internet has become a boom. What we are finding also is that Internet usage is largely a business or school usage. There are about 22 million users from businesses and about 5 million are from home.

The TV as a game machine is the largest part of the market. About 48% of the households use a video game device versus 27.3% of the U.S.

Costs are the primary factor in the purchase of TVs as gaming devices. If we compare that at ASP of a video game device compared to a PC, there is a $2,200 comparison. We believe that once these new video game devices come down to a $150 price point, we will probably see the video game market in about the 20 million unit range.

Where can TVs and PCs share the services and the capabilities? What we are seeing is on-line capability in terms of multiple pipes coming into the home. Both of them will be able to handle lower band width services, they will be able to handle the higher band width services and the cable modems going forward should come out within the next couple of years.

THE $500 PC

The $500 PC will have a market early as the fourth PC. This is going to be for the information worker that essentially has a home PC, a business PC or a lap top already and just needs a $500 device for checking e-mail or information sources that are very quick hit oriented.

It is a PDA in sheeps clothing, a very low cost device for the information worker that already has multiple PCs.

If you look at the devices that are being suggested from a technology standpoint, most of them are being built around fairly high speed processors that are not of the Intel variety.

WILL THE MULTIMEDIA PC REPLACE THE TV?

The $500 PC will be successful once virtual networks are more of a reality.

WHO WILL WIN THE BATTLES

The TV will win the install based battle. There is absolutely no question that TVs are a much higher installed base. TVs have over three times the installed base of PCs and this will be unlikely to change because of cost differentials and the value within information workers exclusively.

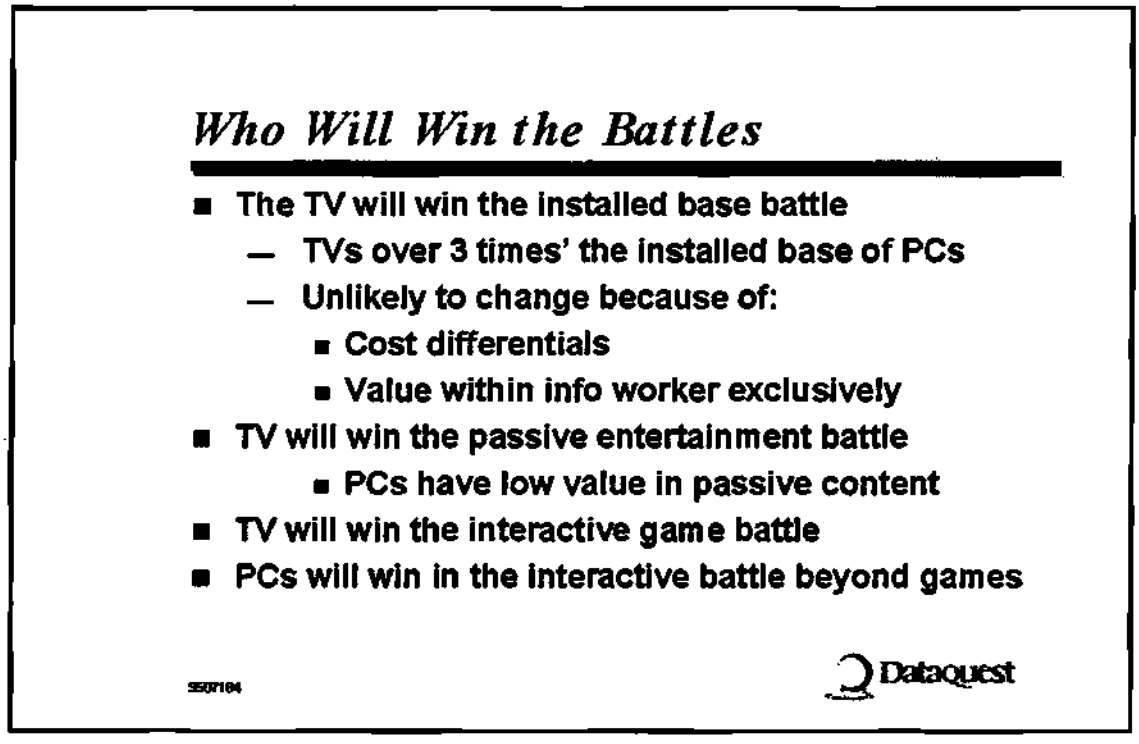
TVs will win the passive entertainment battle. PCs have low value in passive content. This can show through the lack of success for the MPEG playback capabilities within. Content and the boards themselves have not been big hits within the market.

PCs will definitely win the battle for interactive games because of the capability, the buffer gaming and video.

The PC will also definitely win the revenue battle having the ASP factor. The computer companies are the fastest growing and one of the largest of all of the consumer electronics type companies.

The one factor that will benefit the PC more over than the TV is the turnover battle. If you look at the turnover between PCs and TVs, generally the TVs have a turnover and are replaced about every ten years whereas the PC is replaced about every four years. So for the turnover aspect of it, the PC market is definitely a better market.

Those that can afford a PC will have the best value and be the biggest winners.



SUMMARY

The PC and the TV will essentially co-exist especially in the information worker households. The TV will definitely remain the king for passive use, interactive use for games and short info hits may be a play in the TV market. If you really look at the way TVs and PCs are used, the TV has a real opportunity and a fresh information source.

In the short term, many of these $500 PCs will be available over the next year. It is definitely going to be an elitist device. It will be for a home that can afford it for e-mail and so on. However, in the long term, the $500 PC has potential virtue as a device.

Note: Please refer to the companion "Verbatim Transcript Document" for the full in-depth discussions, detail, explanations, charts, graphs, and the audience "Question & Answer" session.

This page is intentionally left blank

Chapter 22: THE CHURNING GLOBAL SOFTWARE INDUSTRY

Chuck Stegman
Vice President
Software/Networking Consulting Group
Dataquest Incorporated

Agenda: What is Packaged Software?, Is The Market For Packaged Software Globalizing? and Summary

WHAT IS PACKAGED SOFTWARE?

Our preliminary estimates for 1995 are that the market for packaged software was just under a hundred billion dollars. It has been growing in the 14%-17% range over the last several years and we expect it to be about two hundred billion by the year 2000.

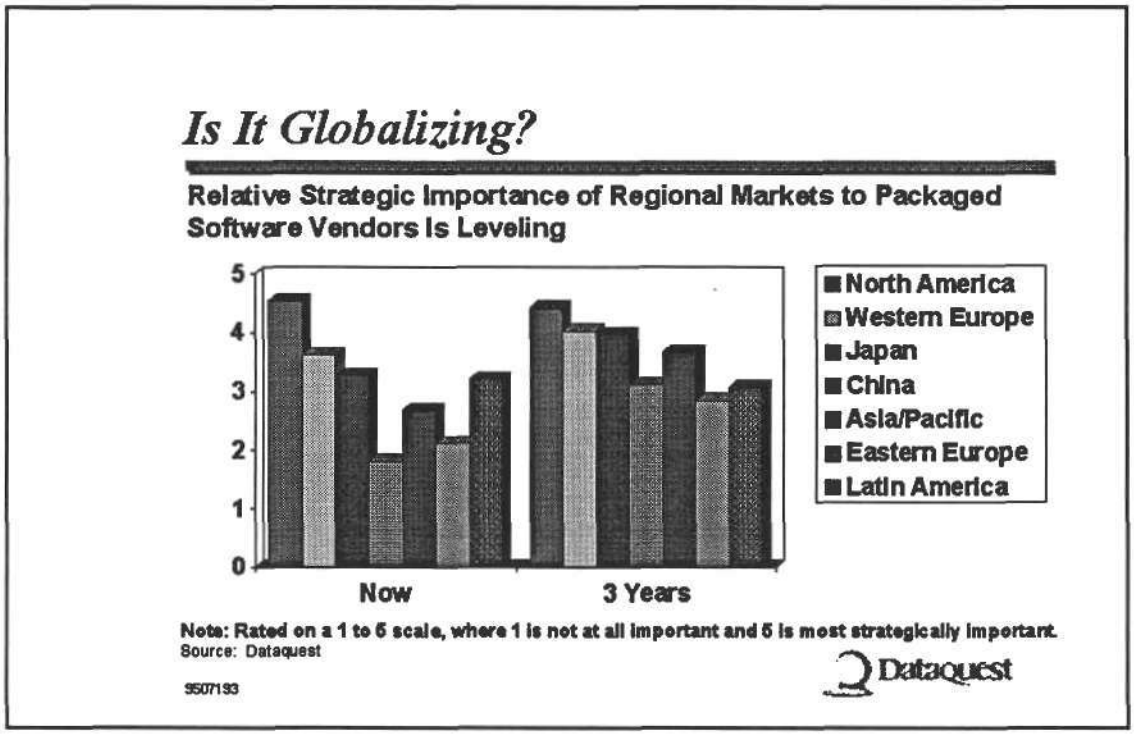
Packaged software is typically purchased off of a price list. Substantially similar products are in use by multiple customers. Sometimes packaged software is "shrink wrapped" and sometimes it's not and it may not be the main line of business of the company.

IS THE MARKET FOR PACKAGED SOFTWARE GLOBALIZING?

There are three major sources where we see the changes and the churn in the industry coming from. One is market demands. As an example of a market demand that is really leading us toward globalization, there is really the rise of multi-national corporations. These companies do not want to hear that they are going to upgrade the operating system or their key application in English and in Chinese three years from now.

If they are a multi-national corporation that needs to inter-operate, their market demand is for a more global offering.

A second area of change is technology. In terms of the globalization of the software industry, one of the first areas where this had an impact was actually CompuServe, who is one of the mostly widely used on-line services globally.

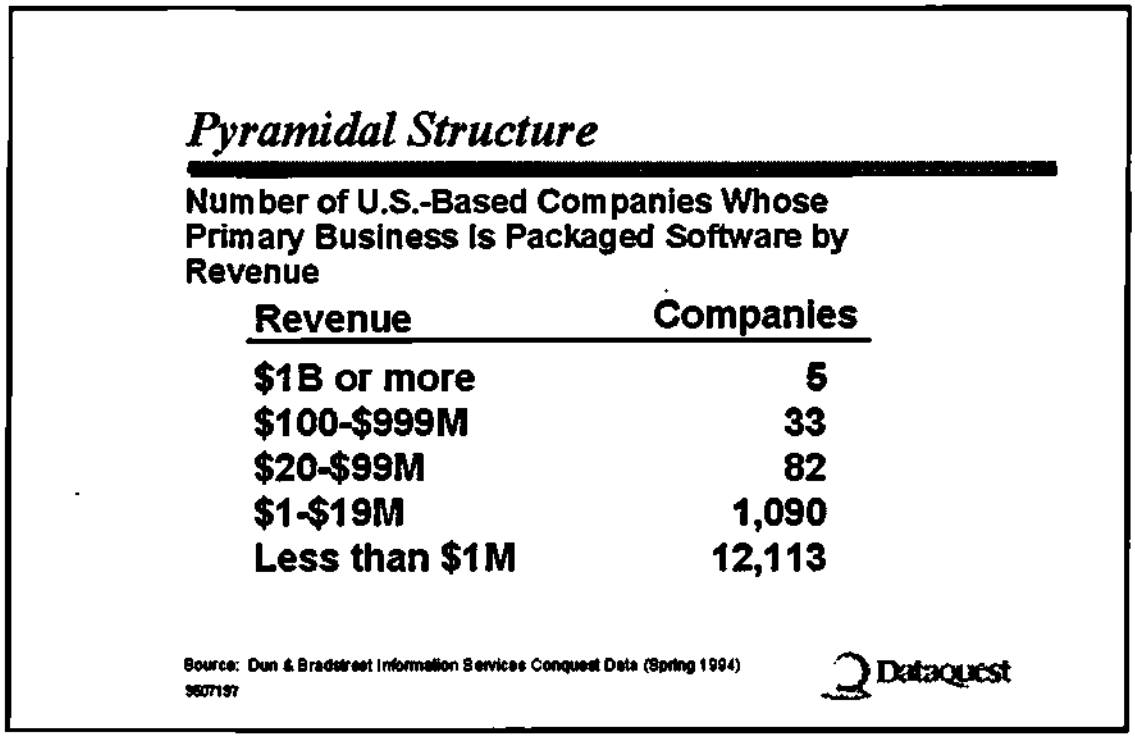


The Internet is accelerating that dramatically. Software companies are one of the most early and aggressive adopters. Many of them have had home pages up for a while.

The third area where there is a lot of change is competition. An example of a competitive trend forcing the market towards globalization, is when a new vendor announces that they are going to release their product in "X" languages simultaneously, that increases the pressure on others to do so.

With all of the software companies in the U.S. under $10 million, 75% had no overseas business. But if you looked at just those with $10 million or above, the number dropped to 35%.

This is the best objective evidence that the market is in fact globalizing.



In Korea the leading word processing product is not Microsoft Word or WordPerfect. It is a locally developed product called Hangul. In China it is a product called Founders WPS. In Thailand it is a product called CU Writer and in Taiwan it is a product called PE2.

What every single one of these products has in common is that in the recent past all of a sudden, products from Microsoft, Novell and Lotus have come into their markets and their local languages competing with products that are at a completely different stage.

In every case, the satisfaction of people who got the Word-type product is better than the people who have got the locally developed products.

Therein lies some opportunity for American software companies, to partner with some of the foreign companies who understand the local markets quite well and the whole cultural differences in the greater China market or in the Japanese market. That expertise could be beneficial to many American software companies.

There are some very, very strong differences country to country and region to region and they are not going to go away overnight. But the difference is, everybody seems to be migrating from a variety of different places to where the same kinds of platforms are throughout the world.

SUMMARY

The increasing size of the software industry is allowing for new niches to become categories in themselves and that is where a lot of the growth will come from.

One of these areas that kind of falls out of the interaction of these trends is that hybrids of software products that can grab things on-line, whether they are new development modules for a development tool or new scenarios for a game, by 1997 in some categories that will be required or you will start losing market share.

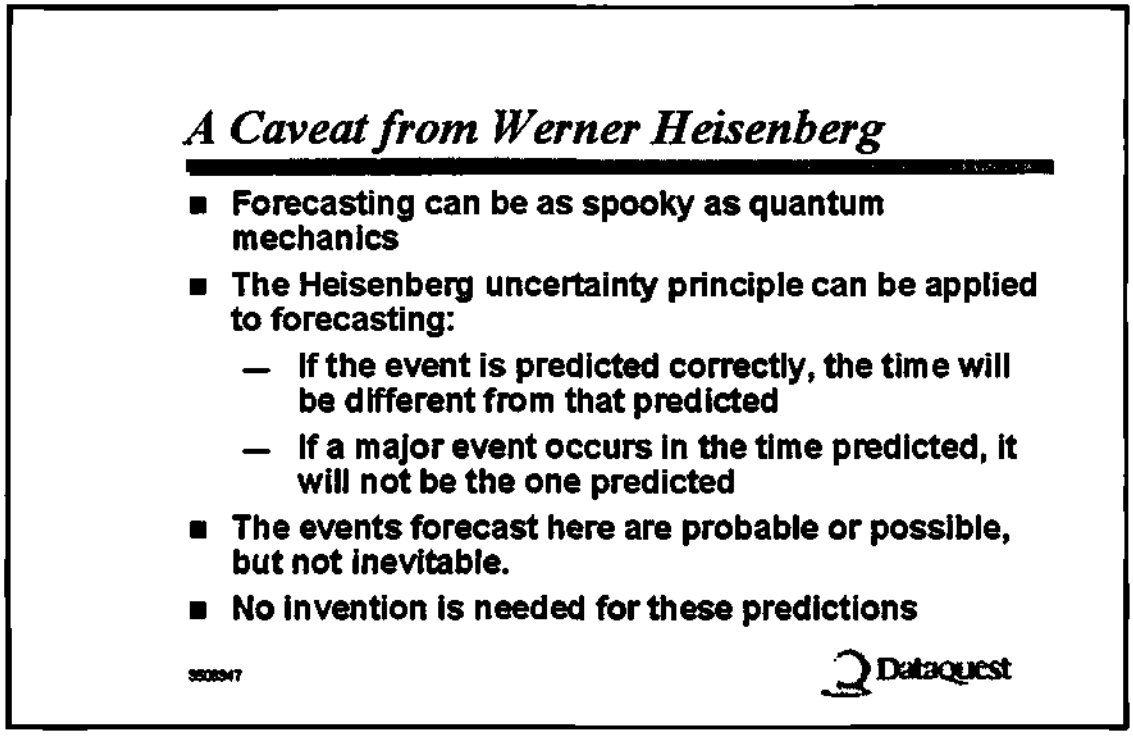
Nonstart-up companies with more than 75% domestic business are at high risk. North American packaged software vendor advantage erodes but only very slowly and the primary customers for objects are ISV's through the year 2000.

Note: Refer to the companion "Verbatim Transcript Document" for the full in-depth discussions, detail, explanations, charts, graphs, and the audience "Question & Answer" session.

Chapter 23: FIVE DISCONTINUITIES T0 THE THIRD MILLENNIUM

Paul V. Cubbage
Director and Principal Analyst
Client/Server Development Tools
Online, Multimedia and Software Worldwide
Dataquest Incorporated

Agenda: What is Sea Change?, What is Discontinuity?, IT Industry Discontinuties, Predictions and Combined Effects Of These Discontinuties.



WHAT IS SEA CHANGE?

There is a difference between a discontinuity and a Sea change. Sea changes are things that cause marked changes in the environment. In business they occur when a lot of individuals or organizations adopt a change over time. At some

point, the change becomes the norm and creates very different circumstances. Generally, a sea change lifts all boats.

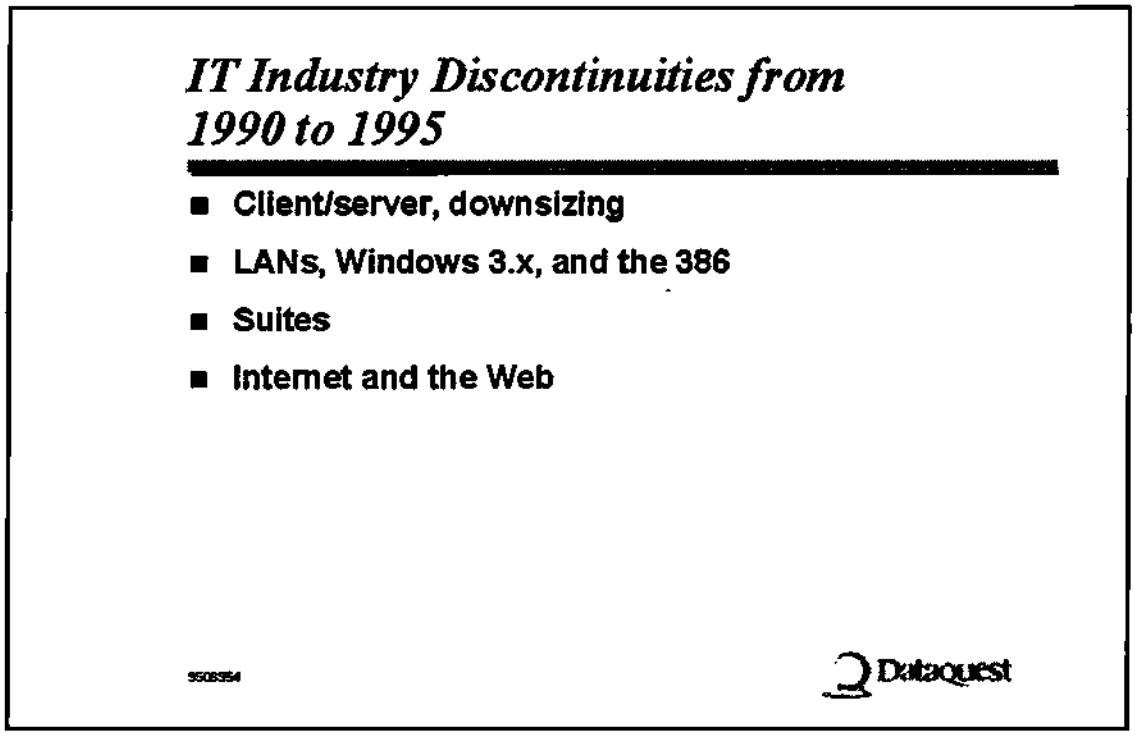
An example of a sea change going on in software right now is the adoption of object-oriented technology. Whereas the introduction of Microsoft Windows itself was a severe discontinuity. Only the unlucky, the slow, or the stupid lose out to a sea change.

WHAT IS A DISCONTINUITY?

It's some revolutionary change in the environment. It is sudden; it changes the whole landscape. It can be a theory, an invention, a product, a company, a way of doing business, or even an external event.

Sea changes are gradual; they disseminate evenly until the latter stages but you get abrupt state changes at the end of a sea change. For example, when people stop supporting a particular technology, it may disappear at the latter parts of a sea change.

A discontinuity is sudden; it disseminates unevenly until it takes hold, at which point it spreads unevenly. In our industry, it does one or more of the following: It will change the characteristics of a current market. Generally, you end up with new winners and new losers. There's an unknown player who comes from left field whenever there's a discontinuity to emerge. The most recent case, of course, would be Netscape. It'll change market size and market shares.



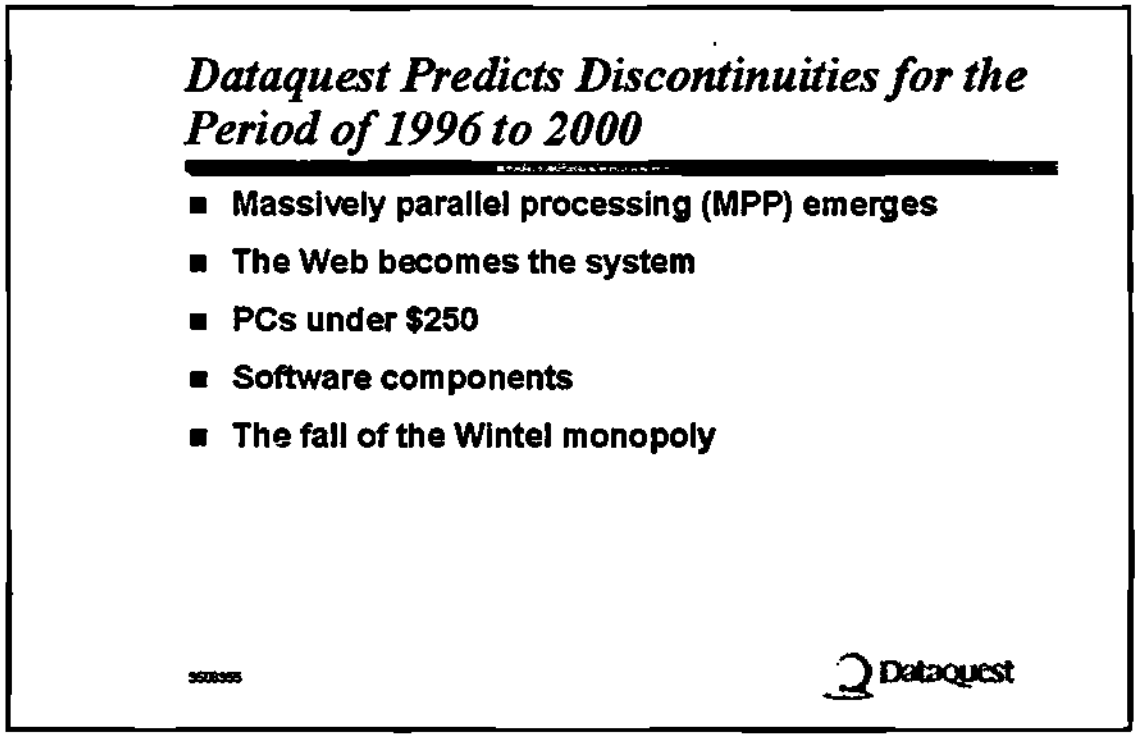
IT INDUSTRY DISCONTINUTIES

In 1964 to 1969, the IBM 360 came along and changed the rules. People don't remember but at that time, we had IBM and a lot of competitors. IBM introduced the 360; and it required, if you were going to be in the business, that you have a line of computers from the small to the very large, that you have all of the peripheral devices that go with it -- the printers, the disc drives, the tape drives, the card readers, all of that. Hard to think that card readers were a big item at one time.

In 1970 to 1985, we saw more IT industry discontinuities. We saw the mini-computer come along and the rise of Digital Equipment. Didn't so much displace the old mainframe makers as it created a new market.

A relational theory appeared in 1971 but it's the theory behind the databases and the leading databases that we see in the market today: DB2 from IBM, Oracle and Formix, Sybase, Ingress -- all those databases were based on relational theory as laid down by Ted Codd and expanded by Michael Stonebreaker and others. I tend to call relational theory "The Marxism of software." It's truly elegant and wonderful theory but it's absolute misery to live with, just like Communism.

The Internet itself and the Web is another discontinuity. Interestingly, both the Internet and these other phenomena happened because of a graphical user interface. Everything that you have on the Internet, you could pretty much do before the Web browser but it was the Web browser that made it simple, made it explode.



PREDICTIONS

Five discontinuities, five events which are going to create discontinuities. One of them is happening so fast that it's hard to keep up with it but that's the second one.

Massively parallel processing will emerge as a real technology. By "massively parallel" I mean 100 or more processors in a computer, up to perhaps 16,000. As opposed to symmetric multi-processing computers, which as processors get more powerful have more and more trouble adding processors.

The Web becomes the system. How does the Internet become the system? Well, what is a system? What is an operating system? What's a computer when you use it? Well, it's the user interface, it's a GUI, right? That's the Web browser.

Then you have some sort of file access and various applications -- that's the server and the Net itself acting as the operating system. Then we will probably see Java applets as the applications themselves.

PCs under $250. No one in the PC industry seems to like my ideas on this. I think that the current PC could be built for under $250. The problem is, it's an antique. It's this huge box with a motherboard and all these boards that you plug into it. The boards that you plug into it are getting smaller and smaller, because you need less silicon on there. It's getting to be an absurdity to plug boards into it. Why don't we just have a pizza-box style? What we do need to drive it is somebody to define a standard.

Software components -- not necessarily objects but component packaging; VBXs for Visual Basic or components. There are fine and coarse components. Fine components are the kind of objects you get to do industrial-strength programming. You would get those from your platform vendors. They're the kinds of things you use for file access, looking at a database, updating a screen. That will mostly be owned by people like Microsoft and IBM and Oracle.

The fall of the Wintel monopoly; that is, the dominance of Microsoft and Intel in the market. If the Web becomes the system, the monopolies are broken. What are the characteristics of the Web? Well, what do you need for a Web browser? Plan Nine from Bell Labs -- they named it that because there's elite discontinuity, just like the movie *Planet Nine from Outer Space* was. The guys who invented UNIX gave it the same name. UNIX was originally spelled with an "E" because it was a castrated Multics but Ma Bell didn't like the name.

COMBINED EFFECTS OF THESE DISCONTINUITIES

The CD and the Net will be the delivery mechanisms, reducing the cost of goods sold to somewhere between $0 and $2. The major thing people will pay for is the documentation.

Software piracy will become uneconomical, as it has in the book industry. They used to pirate books, actually copy them and publish them.

The large software companies will become more like publishers than developers. They will still develop product. The publishing companies commission books even today but principally look for other people to do it.

There will be a huge cottage industry for creating software components. The components I see being created will be sets of high-level components that will solve application problems. Somebody will create the perfect component for a jewelry store set of components. It will be like the old D-Base business writ large.

Major new publishers and distributors will appear on the Net. Software libraries and content libraries will start to have much more value. By the end of this century, we'll see people acquiring software publishers in huge media acquisitions, just as you see people acquiring movie libraries and other libraries like that now.

The Internet itself, just like TV and cable TV today, is a huge consumer of software. Anything that's ever been put on film at any time you can find now if you have a cable that has about 170 channels or a direct satellite or one of those.

Note: Please refer to the companion "Verbatim Transcript Document" for the full in-depth discussions, detail, explanations, charts, graphs and the audience "Question and Answer" session.

Chapter 24: GET OFF THE PHONE! THE REVOLUTION IN ELECTRONIC SOFTWARE SERVICES

Robert Johnson
Director and Principal Analyst
Software Services
Worldwide Services Group
Dataquest Incorporated

Agenda: The Hurting Truth, The Big Question, Electronic Services, The Worst Thing About Electronic Services, The Internet and Summary.

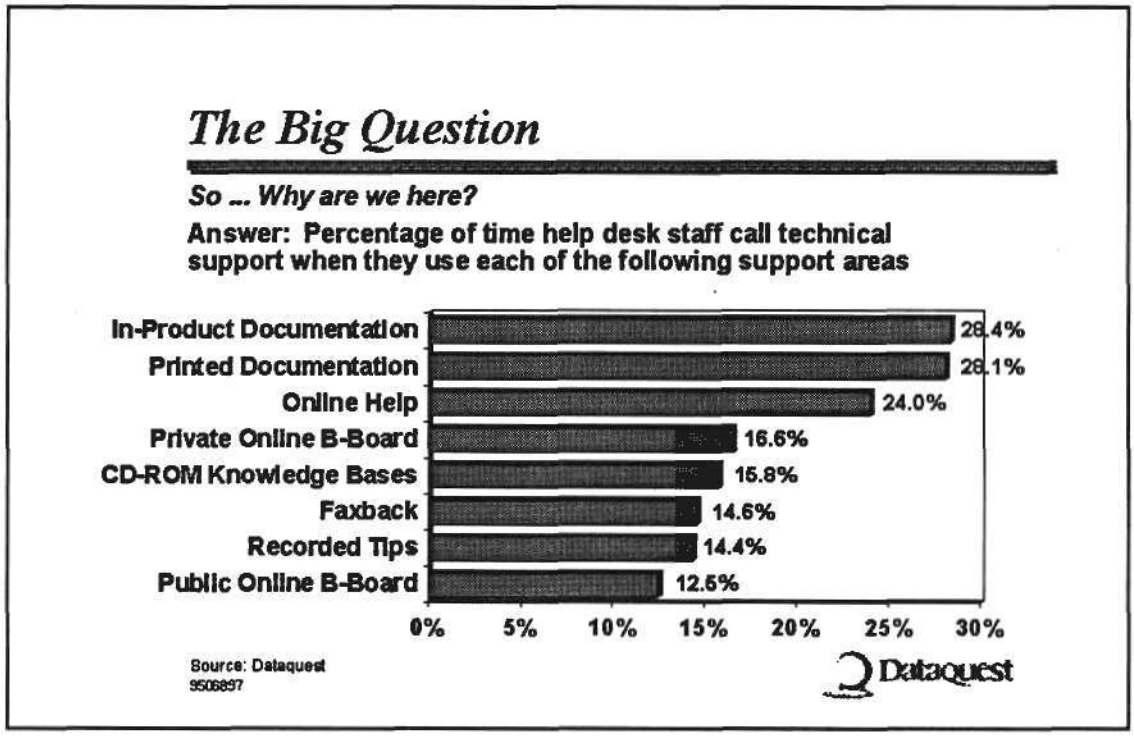
THE HURTING TRUTH

The hurting truth that we see with electronic services today is that a customer has as little chance of finding the answer using one of your or someone else's electronic services, as they do say using printed documentation or asking somebody else in the office. It's a bad situation from that standpoint. We thought that if we take it and make it electronic, people will be able to get at it; they'll be able to use it. The fact is, they're not.

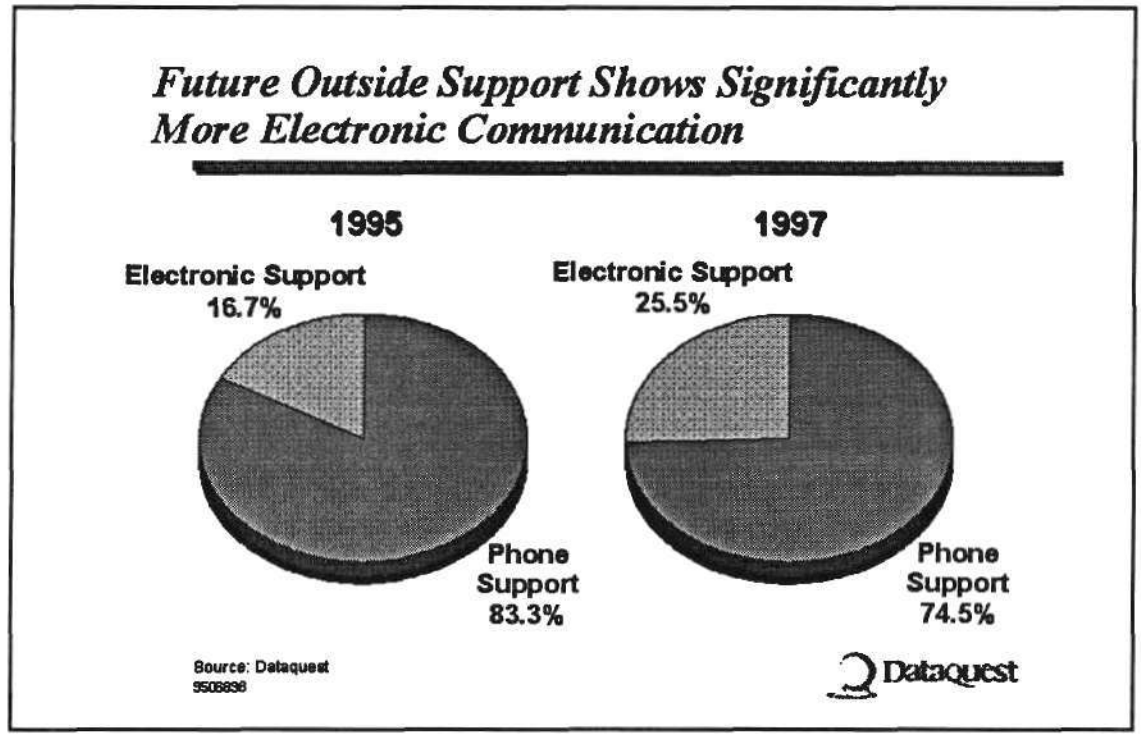
THE BIG QUESTION

The growth in electronic services has also flattened out. People continue to gravitate towards telephone. When we look at, why should we even consider using these services, in terms of electronic services is that helpdesk people and people in the home are in a quandary.

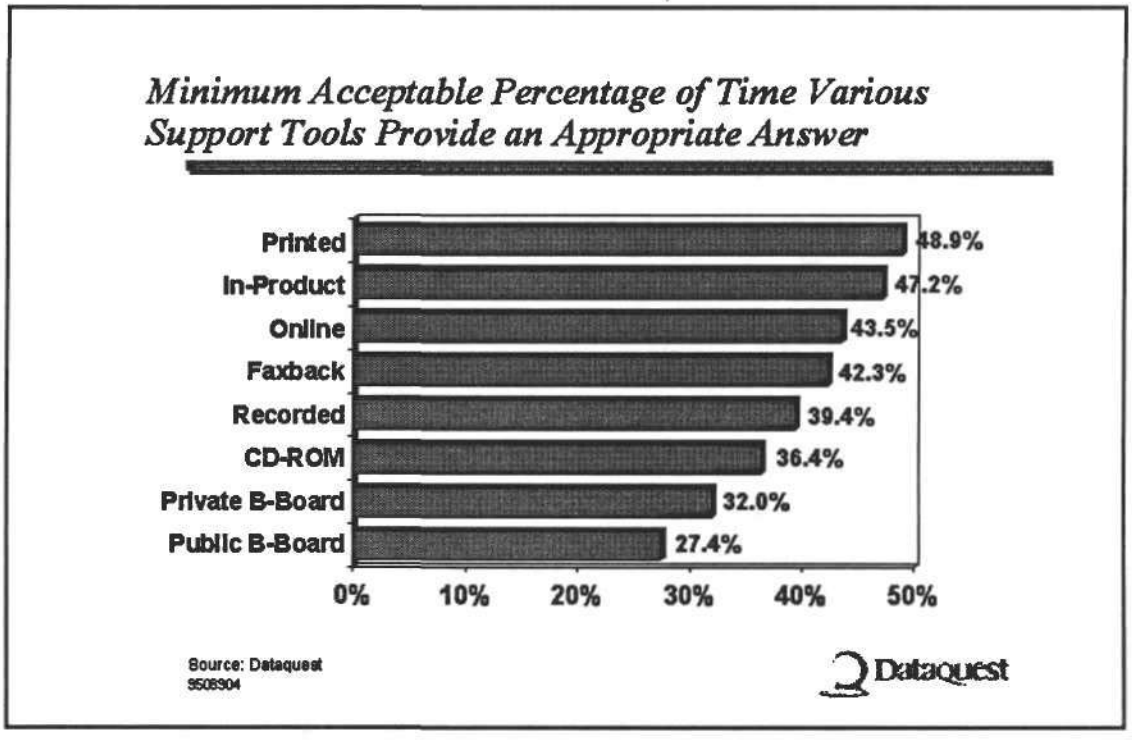
What you see is that one of the most frequently used is the documentation. But product electronic documentation has as little a chance of getting a person an answer as hard copy. So just because it's electronic does not mean in any way, shape, or form that people are getting the answers that they need.



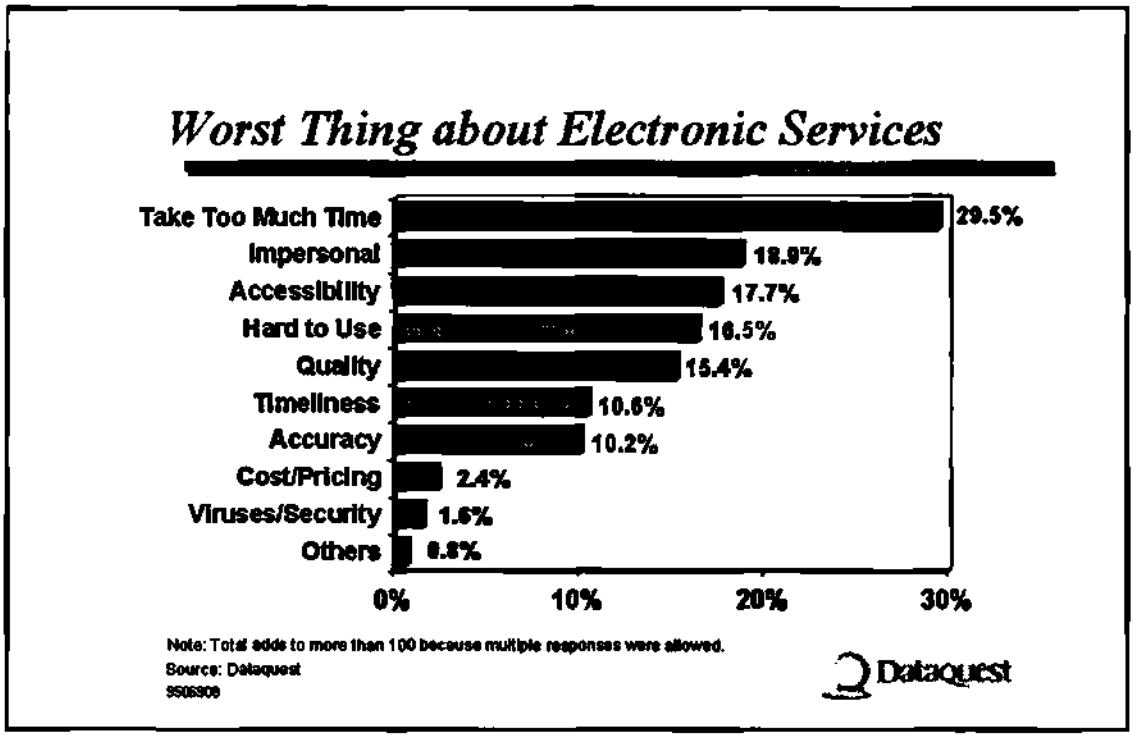
ELECTRONIC SERVICES



So you've got a job to do with your electronic services. You have to determine what your service fees are going to be for electronic services. For example. Will you emphasize timeliness, will it be availability, will it be personalization, will it be effectiveness, accuracy? Which of the key things that customers consider important are you going to emphasize over time? And are you going to stick with it?



Then we asked people, "What's the preferred percentage of time that you get an appropriate answer?"



Oftentimes, in terms of the information that's provided in the knowledge base versus the aptitude of the user. You have level two users oftentimes at corporate helpdesks using these tools. And you've got level one answers. It's a complete mis-hit; they don't have the information at the level that they want.

THE WORST THING ABOUT ELECTRONIC SERVICES

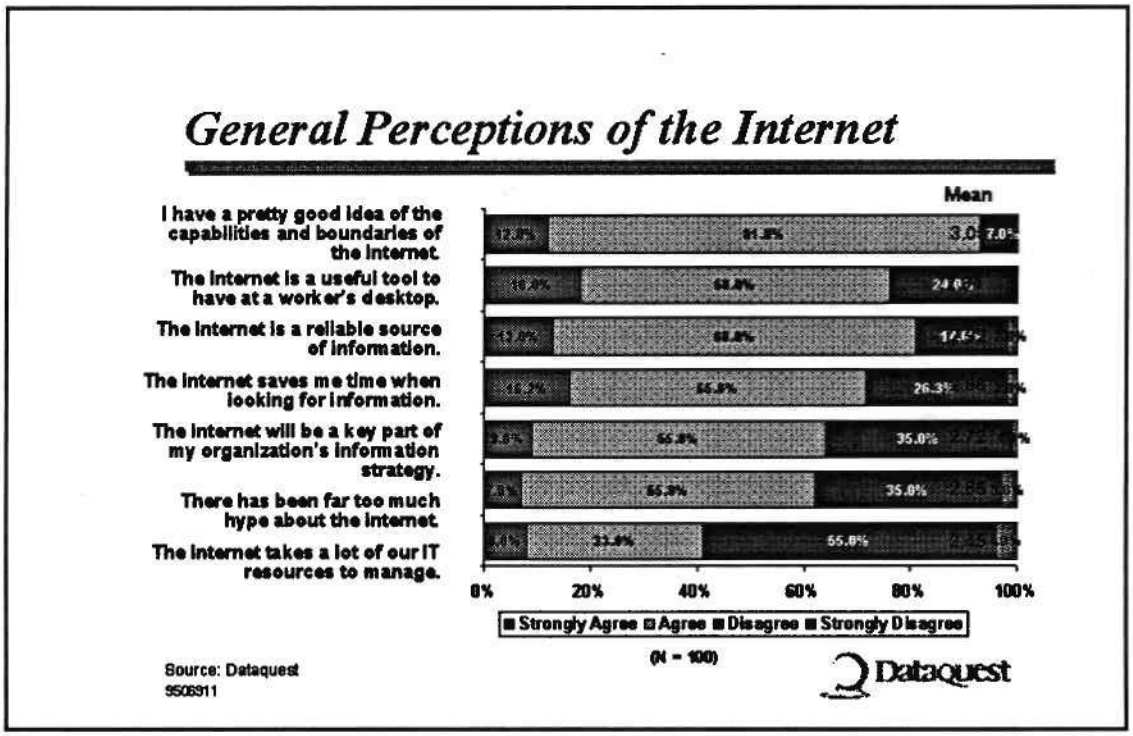
Personalization. Customers feel with electronic services that they're out there in the vast ocean. How can you, every time a person gets on with you, give them a sense that there's a personal touch?

Accessibility. That has to do with who in the organization you can get onto it, and how they can use it. The hours of availability. And is it accessible, for example, from within the program I'm in.

Quality of the information. Timeliness. The rule is, as you folks know better than I do, is that when a problem happens it happens a lot. Over and over and over

again. The point becomes one of what do you do with the timeliness of information?

The accuracy of the information. Customers don't want the wrong answer. And security is finally coming up. To certain customers, it's extremely important.



THE INTERNET

General perception of the Internet is what people are feeling in terms of whether they have a pretty good idea of the Internet, they feel it's a useful tool. They're not sure it's going to take an absolutely lot to manage, which is good news. And they feel somewhat there's been too much hype, but look at that, that's pretty strong in terms of the disagreement towards that.

When we look at specifically what people fear about the Internet use, security comes up strongest. Support, other people are just out there that have no fears.

When we asked customers with the Internet what the most likely thing they thought they would end up doing with the Internet, software support came up number one, 65%.

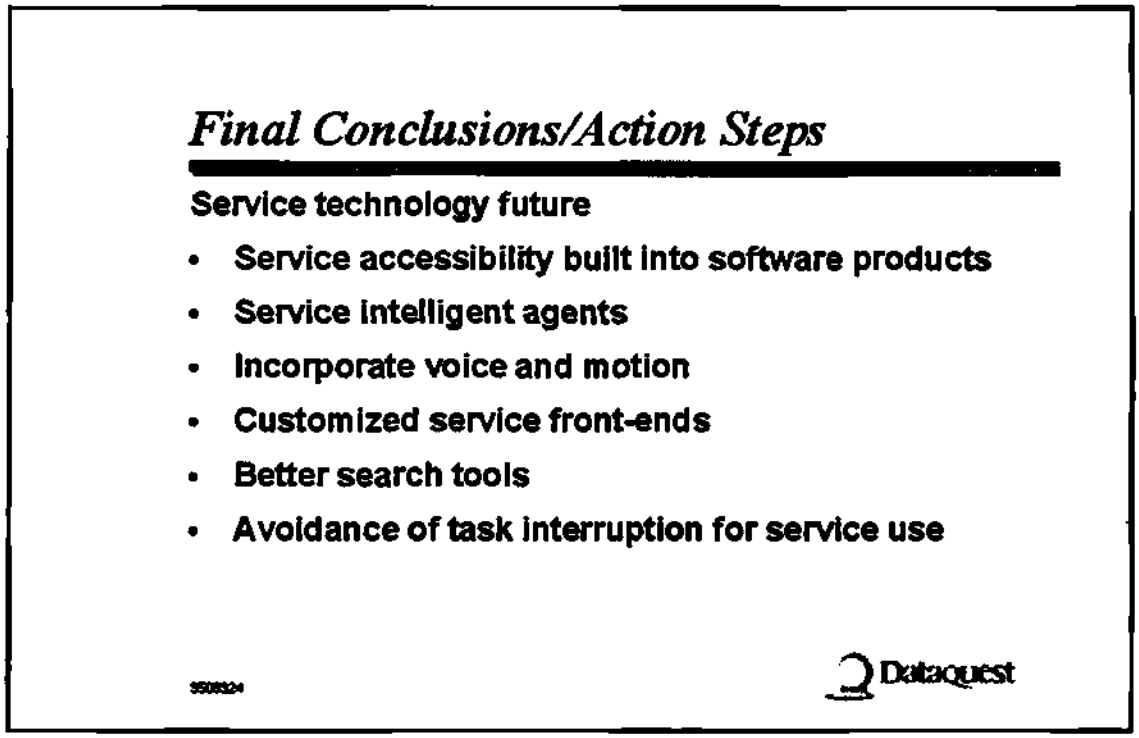
GET OFF THE PHONE! THE REVOLUTION IN ELECTRONIC SOFTWARE SERVICES

The idea of using the Internet to replace telephone support. As you see here, well over 50% are either neutral or very attracted.

Support and service, how it should be expensed. It's interesting to note the variability, depending on the type of information. Value-based pricing seems more apparent when we come into specific support.

What matters with the Internet and electronic services is not information, after all, it's knowledge. And that's what you have to strive for, the expertise to apply the information to specific situations that are faced by that individual.

My belief is that the way you're going to get at the customer is through the Internet access providers, that each of you should be really aggressively pursuing Internet access provider relationships with your services. Because they're the billing mechanism to bill for the services that you deliver.



Note: Please refer to the companion "Verbatim Transcript Document" for the full in-depth discussions, detail, explanations, charts, graphs and the audience "Question and Answer" session.

Chapter 25: THE U.S. WIRELESS WORLD IN 1996: TARGETING THE CONSUMER

John Ledahl
Director and Principal Analyst
Wireless Program
Telecommunications Group
Dataquest Incorporated

Agenda: The Race Is On In The U.S., The Conditions Of The Race, Players In The Wireless Services Race, Cellular, Paging and How We're Going To Market.

THE RACE IS ON IN THE U.S.

In 1995 we had the first introduction of PCS in Washington and Baltimore. Some companies have started building out their digital networks, primarily as an overlay to their analog networks; in some new areas they'll build out digital. PCS will be digital from the beginning, so they won't have to worry about the mix of analog cellular with digital.

The FCC released the spectrum. By the way, it's really important to understand that this industry has been largely driven by regulatory events for the last five years.

The mergers and partnerships. The one that is most appealing to me is the limited partnership with the cable companies, TCI, Comcast and Cox.

The prices are starting to lower. But the real lowering of the prices, eventually to the price point where I think it needs to be, which is about $40 total bill for reasonable use of the service. That means at least 60 minutes free per month, total bill. Isn't that approximately what you're paying for your wireline service today, taking long-distance out of the equation? That's where it needs to be.

In 1998 is going to be an explosive year. That's the year that all these networks that are being auctioned by the licensing process and are starting to build out for PCs, they'll be built by the end of this year, beginning of next. So 1997 will be the year that they'll be sharpening their marketing programs, targeting certain markets.

More spectrum will become available. The NTIA, the National Telecommunications and Information Association, which is part of the Commerce Department, will release more spectrum over the next year or so, working with the FCC. That's why spectrum won't be a problem. And in 1998 is when those four or five players will emerge.

What are we looking at in the year 2005? The vision service, which we'll probably be calling personal communication services not cellular will be service that is easy to buy, easy to use, wireline quality transmission as the standard. It will be low-battery, low-weight, small size.

With price and spectrum and coverage not expected to be barriers, what is out there that could possibly cause hitches in this marketplace? When I say that, by the way, price by the year 2000 won't be a differentiator in the marketplace. There'll be multiple-tiered pricing -- you get a basic service for a low cost and you get incremental value for incremental cost. Coverage will be a given from the beginning.

THE CONDITIONS OF THE RACE

We've got to get this telecom bill passed this year. Anything you can do to push that along would be appreciated. That's a barrier right now. People are waiting to fulfill their business plans as soon as that happens.

Health hazards. You may have heard some noise about health hazards with commercial wireless communications. And the most severe one, of course, is the rumor about causing brain tumors and cancer. We won't really find out about them for years.

There's another one that's more in the news and more of a problem but the solutions are readily there. GSM, the Global Systems for Mobile Communications -- the European standard -- actually interferes with one of their phones.

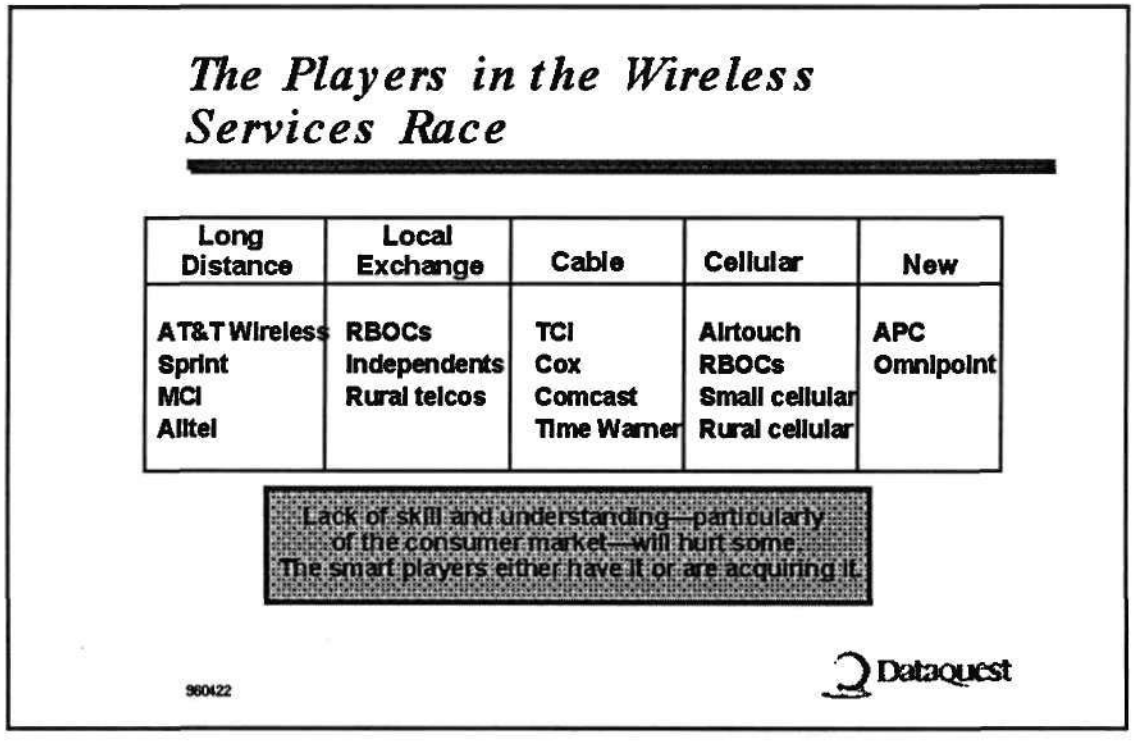
That'll work in Europe. It's not going to work here in the United States, with our strong consumer and health lobbies. Yet GSM is going to be a formidable standard here in the United States.

The new market structure: It is competitive; it's going to turn into a supply-side equation; it's going to be really interesting. But I believe that over time, the same

kind of consolidation -- the gorillas picking up some of the chimps will occur as it did with cellular.

The new products: Real solid voice transmission, data capabilities and eventually video. New customer segments; business workgroups being the first, as always.

THE PLAYERS IN THE WIRELESS SERVICES RACE



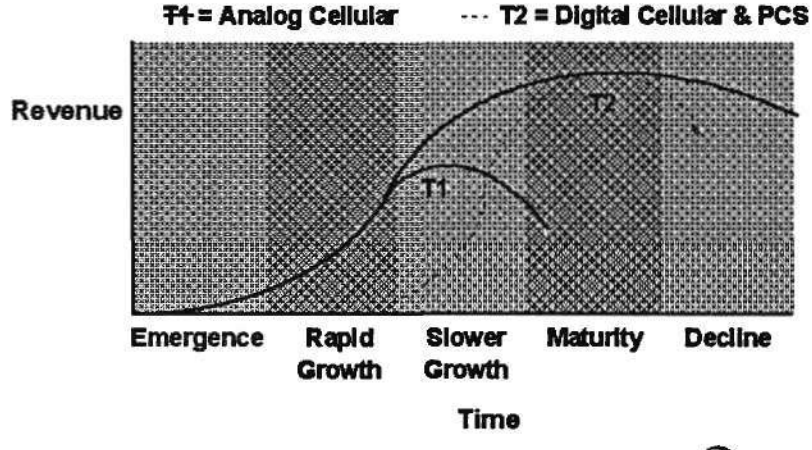
I'm not sure about the independents and the rural telcos. If they're going to survive this it'll make millionaires out of some of their Presidents but I don't know in the long run if they're going to survive.

CELLULAR

The real change here is that sales and marketing will always be strong, along with field service, as the key users of wireless. The use of cellular service and phone among end-users has grown.

My view is that analog cellular is really not past the chasm.

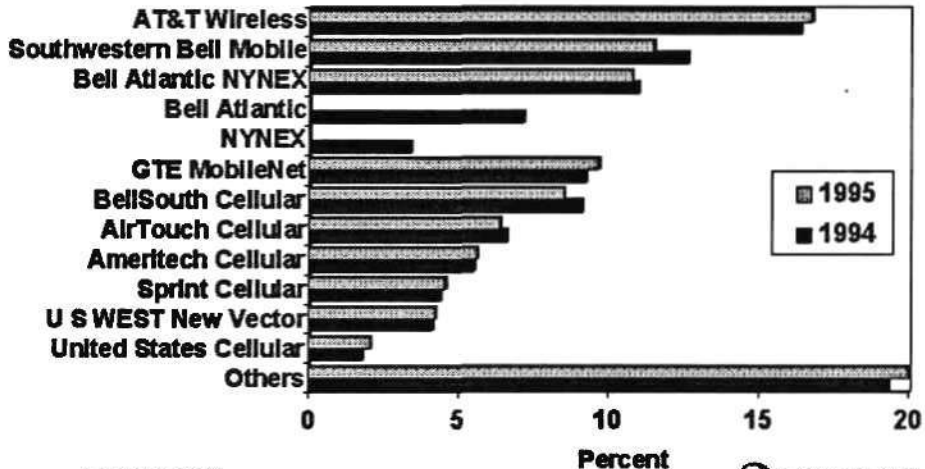
The Wireless Demand-Technology-Product Life-Cycle Concept



Source: Dataquest
960424

Dataquest

1995 Cellular Market Share—Preliminary Estimates



Source: Dataquest
960425

Dataquest

Sprint had 4% of the market last year; a little bit more this year. But without the Sprint push that it'll have -- they'll go out on their own for awhile but I think they will eventually merge with someone else. This is a 32-million subscriber market at the end of 1995. Which pretty much meets our forecast from last year. And it's about a $20 billion market in revenue.

George Patton said, "If everybody's thinking the same, then someone's not thinking." Well, there's a religious war going on with these standards in the United States. And the war is basically between our European friends with GSM versus the CDMA, the Code Division Multiple Access players, which is originating out of the U.S.

PAGING

In paging preliminary estimates are about 4.4 million subscribers. And not many changes except consolidations, a key part of this industry. MobileComm and MobileMedia have just merged. And SkyTel, which is the first two-way paging service, is just getting out there with that. They're going to move up the chain, simply because they'll be a year ahead of their competitors in two-way paging. PageNet has been the leader and really took the lead through some acquisitions in 1995.

The others like RAM and ARDIS, they've got problems with coverage, they've got problems with data rates, they've got problems with pricing. They haven't resolved them in the last year; I'm not sure they're going to do them in the next year. I have some real concerns about whether RAM and ARDIS are going to hit the marketplace.

The real growth is narrowband PCS or two-way paging. It's only two-way in the sense that it's acknowledgment-type response going back at this time. But in the next year or two, you're going to see an actual equivalent of e-mail-type messages going back and forth.

HOW WE'RE GOING TO MARKET IT

National is going to be the primary process in 1996-1997 as they start to merge. There will be some regional and local marketing but national ad and national packages will be the norm because they'll be packaged with other services, as we talked about earlier.

Brand names will prevail. In California, Pac Bell is going to do very well because they are the most recognized brand name in California. Product mixes will vary. Some will go for the low-cost very basic service; others will look for true incremental value and market it that way and go after certain markets with that. The distribution mix -- if you don't have direct and retailers and distributors and wholesalers all working together in this mix, then you're not going to hit all segments and reach all your population as well. Price and coverage will eventually become constants.

THE EMERGING TRENDS

The different services are really going to be the key. Price is not going to differentiate these service providers; it's going to be what they offer and how well they offer it that will. Digital, digital, digital. That's the future in wireless. Look for that.

Note: Refer to the companion "Verbatim Transcript Document" for the full in-depth discussions, detail, explanations, charts, graphs, and the audience "Question & Answer" session.

Chapter 26: THE BATTLE FOR THE LOCAL LOOP

Eileen Healy
Director and Principal Analyst
Public Network Equipment & Services
Telecommunications Group
Dataquest Incorporated

Agenda: The Changing Market, The Players and Predictions.

THE CHANGING MARKET

There are three aspects to this battle. There is the legislation and the regulation, or the deregulation of the telecommunications industry. There are the equipment aspects, which all translates into infrastructure. Who has the infrastructure, who has that final piece of equipment at the customer's home? And the service aspects: What kind of services can be offered?

Telephone and CATV services are viewed as one telecom market. Your cable company is going to be coming to you to try to sell you your second line. Remember that even though there is legislation, it's going to be minimized.

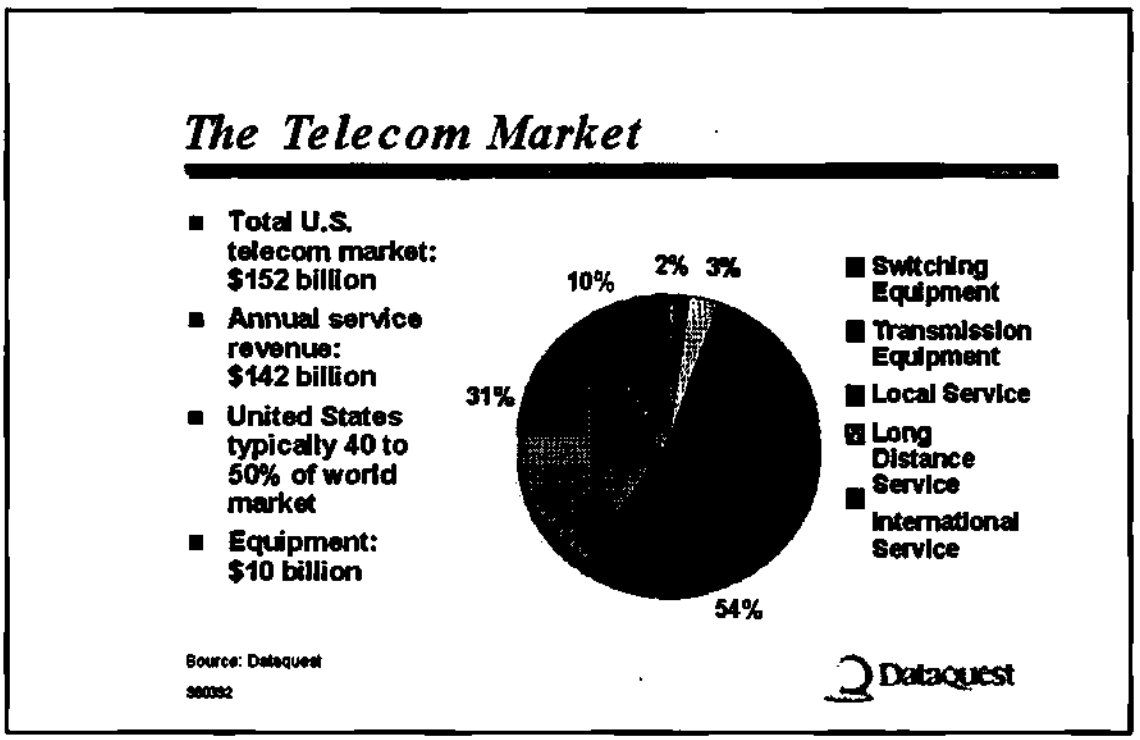
Cable companies don't want to provide universal service, they don't want to provide powering at all times for you. They want to get access to additional services -- that Web access that you want in your home, or the second line for your teenager. So you can expect the battle there to be over the second-line type services.

Data demands are on the rise. In 1996 you will see a lot more of, not just second line with a modem, higher-speed modems, you're going to find your cable company trying to market a cable modem to you.

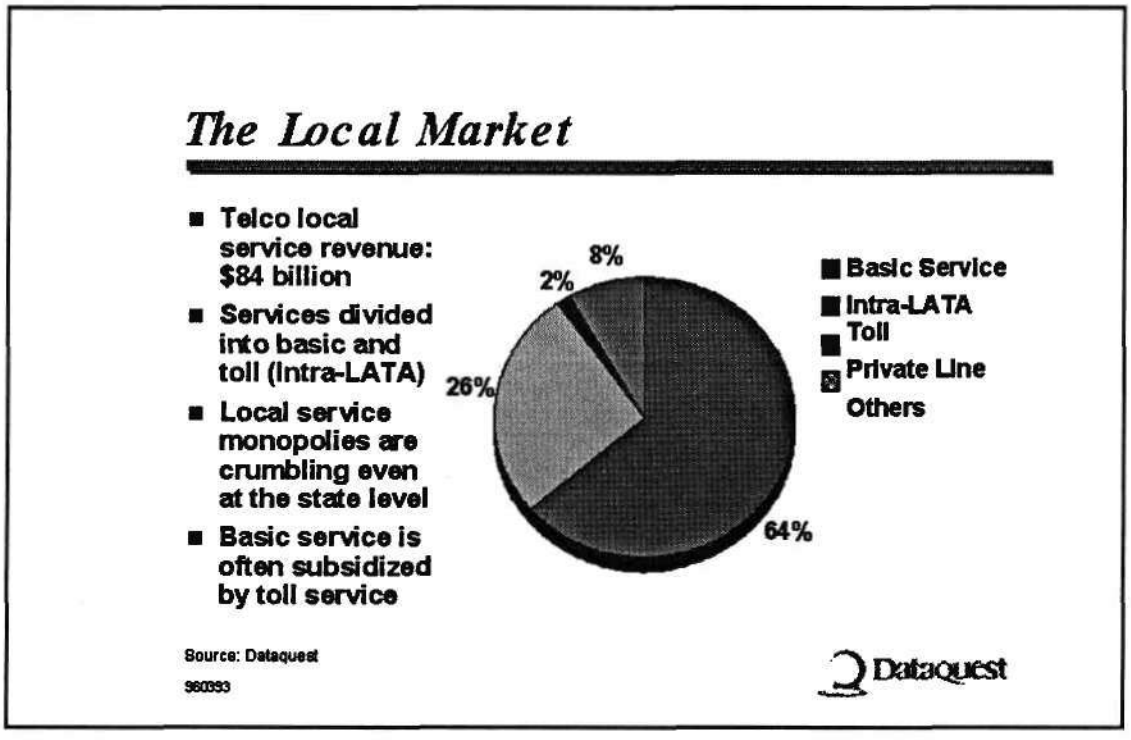
One-stop shopping preference, the bundling of services, all of these things are going to make this battle very fierce. Not only will these new carriers and existing carriers be vying for your business but they'll want to bundle services because people don't want six or seven different types of telecommunications bills from all these different carriers.

THE BATTLE FOR THE LOCAL LOOP

The Federal legislation will open many markets and it will allow the local carriers to also enter long-distance markets and long-distance carriers to enter local markets.



Now, basic service tends not to be a big money-maker; that's why you're going to find people going after second lines and going after the incremental services that we'll talk about in a few minutes. The name of the game will be services, infrastructure, in the context of regulation. There will continue to be fairly significant, at least state-level, regulation of these issues.



Some information on the CATV market. Looking at them both together, CATV market by revenue, $24 billion. Local, this is the local and long-distance markets by revenue, substantially bigger than CATV but all of it will become one large telecommunications marketplace. By households, 60% of the U.S. households have cable TV; virtually 97% of U.S. households have both local and long-distance services. So you've got the CATV market, which is about a quarter of the size of the telecom market, all merging together in what will now be an open competitive marketplace.

At Dataquest, we've looked at the incremental revenues that can be found to justify the building of broadband infrastructure. In looking at that, the types of incremental services, or interactive-type services, this is basically the market interest in various types of services, with movies on demand being very high. These kinds of incremental services need to fund the building of an infrastructure to wage this battle in the local loop.

THE BATTLE FOR THE LOCAL LOOP

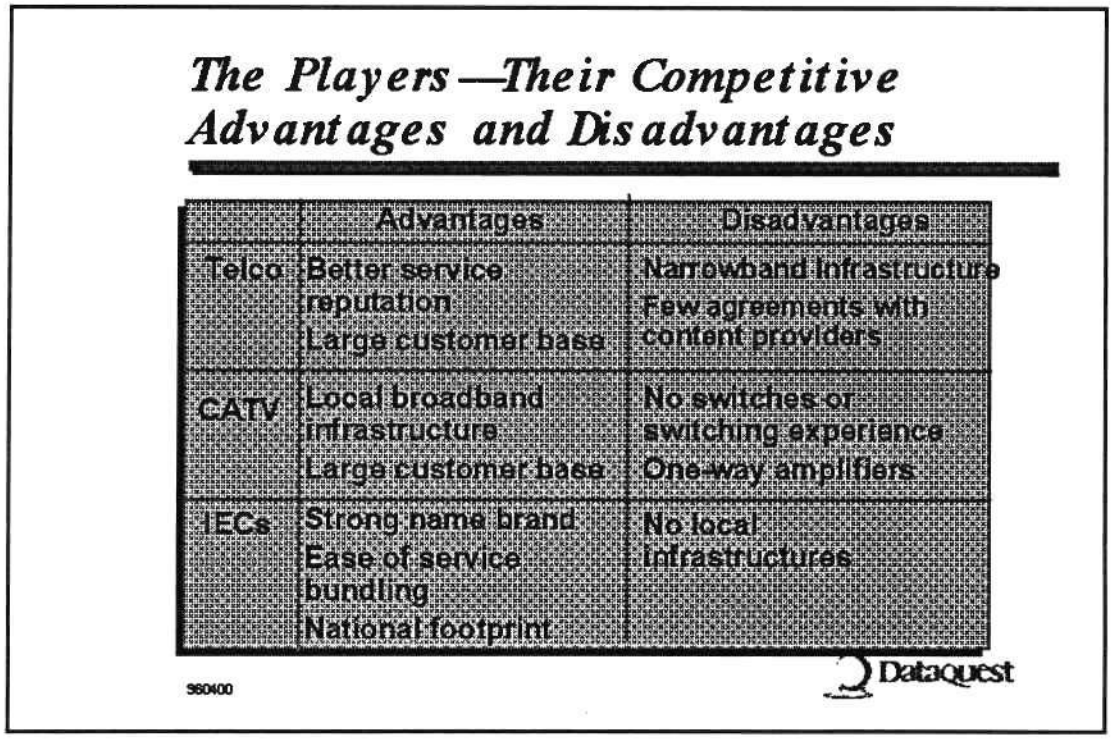
Infrastructure investments are huge maybe the offsetting revenue will there in the long run. In terms of companies investing the kind of money that they are looking at investing in infrastructure, the stakes are just incredible.

With the telcos you're going to find things like ADSL, where you can get high-speed data over a twisted-pair, are going to be looked at much more seriously as companies make decisions about where to make investments.

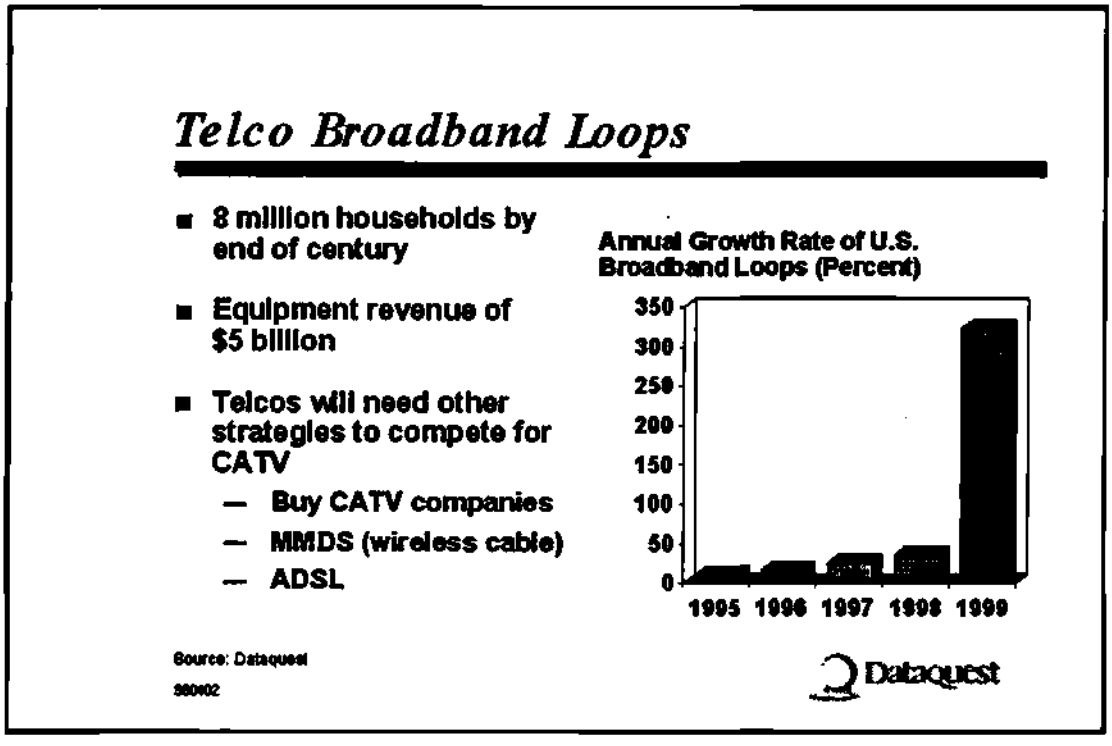
THE PLAYERS

The RBOCs, GTE, the long-distance carriers -- a lot of new market entrants. Folks that have focused on the business market but now are moving into the local residential markets. A lot of people are going to jump in the marketplace. There's going to be a lot of change and consolidation and merging and some of these small players may very well be the next MCI and Sprint of the local markets.

Also not to be forgotten, your local electric utility does have an infrastructure into the home. These guys are looking to see what they're doing but we feel at this point they're not going to be major players in this battle of the local loop.



ADVANTAGES AND DISADVANTAGES.



Does the owner of the local infrastructure win the game? Not necessarily. They can be forced into a wholesale position. You can have long-distance carriers coming in without a local infrastructure who have some very serious advantages.

PREDICTIONS

We predicted last June that the telecom legislation would pass. We didn't think it would quite go into 1996 but it is once again the same legislation that went through both houses and is slated for a vote this Thursday.

The local telecom service market is going to increase substantially. In your home, the highest growth rate area in the home is our second lines, used for data, used for voice. So the pie's going to be getting bigger.

However, if you look at what happened when the long-distance markets were opened and AT&T went from a monopoly position to a 60% market-share player, we're predicting that the RBOCs are going to lose 25% of their current retail

markets in the next 3 years. Now, the pie's going to get bigger. If they're smart, they're going to get part of the new incremental services. If they're not, they're going to be one of the casualties, or they're going to be merged with someone else, or something else is going to happen.

The RBOCs are going to be forced into wholesale positions. They have to satisfy their local regulators. If they're smart, they will do it to a minimum extent. Because what they're going to end up with is no direct customers, or at least at the wholesaler; low margins and very picky customers. If you get a big customer who buys tens of thousands of lines from you, they're going to be a very picky customer and force you to have a very high-quality lines and you're not going to get the incremental revenues from the customers to support that.

You're going to have cable TV companies and telcos, for that matter, going after the second lines, going after the easy stuff in the residential market. Hopefully they believe that they won't have the requirements, universal service or powering that you do with the local telephone service.

The telecommunications act is going to change the market forever. There is, obviously, a whole other side to the story on the business side. We focused here on the residential side and the impact on residential customers, the battle of the local loop that's going to take place with residential customers. There's going to be a whole other part of that battle with business customers.

By the end of the century, this local market is going to look dramatically different. Whole new sets of players, whole new companies and merged companies. Dataquest is going to be tracking this very carefully.

Note: Refer to the companion "Verbatim Transcript Document" for the full in-depth discussions, detail, explanations, charts, graphs, and the audience "Question & Answer" session.

Chapter 27: PROCESSING OVER THE INTERNET: IS IT HAPPENING?

Nancy Jamison
Senior Industry Analyst
Voice Communications Program
Telecommunications Group
Dataquest Incorporated

Agenda: Interactive Voice Response, Call Centers and IVR Vendors

INTERACTIVE VOICE RESPONSE

There is two areas of voice processing that are being done in the Internet and this has all occurred within the last year. The first one is interactive voice response.

Interactive voice response is the ability to allow someone to access data off a database and get information and make transactions by navigating through an application using touch tone telephone DTMF buttons.

The most standard one is the banking 24 hour a day where you can call into your bank and press one for checking and press two for savings. But we very quickly after that, went and enhanced these applications by adding different technologies to them.

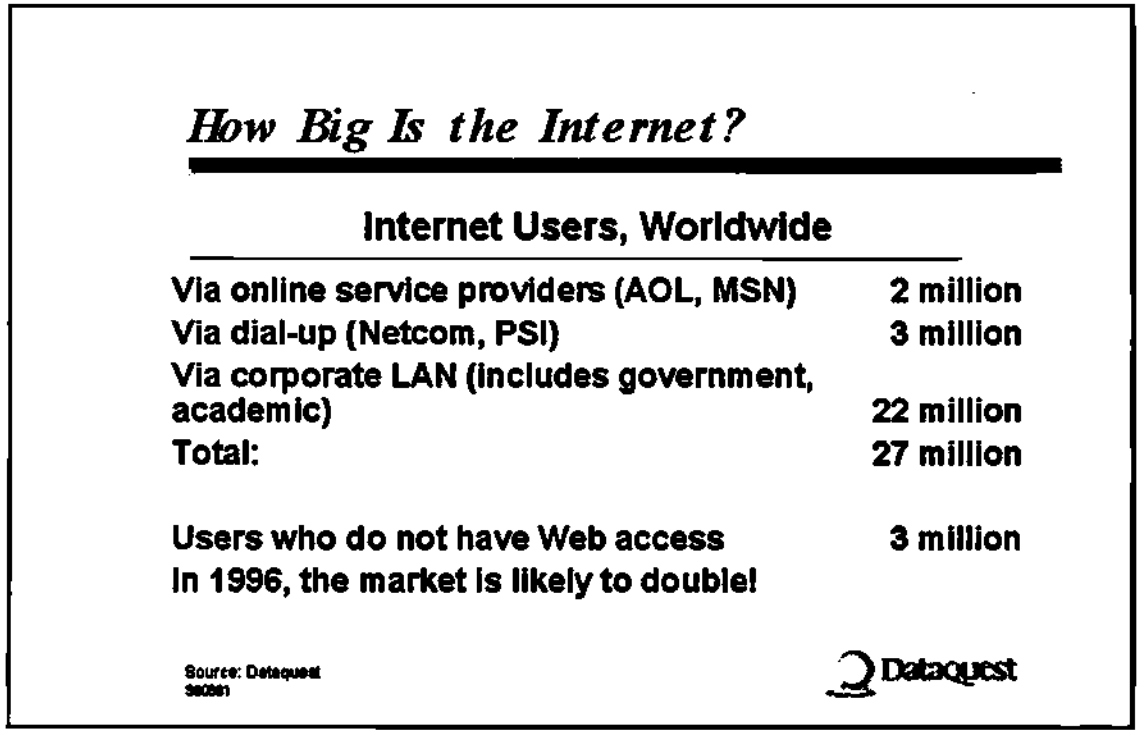
We added fax so you could do fax back of a confirmation. We also added things like speech recognition and text to speech. With speech recognition we have done a number of things. One is to eliminate the use of the DTMF tones because still in the U.S. and definitely worldwide DTMF penetration is rather low. We have a lot of areas where they still have rotary dials. So rather than cut off those potential users or customers, we have added speech recognition so that people can navigate through prompts and be able to do the application.

We have also done things like voice activated dialing. A lot of cellular networks are using voice activated dialing, so that you do not have to dial a phone while you are in the car, you can use voice to navigate and dial for you.

Soon after that we also added ADSIT. ADSIT is Analog Display Services Interface Telephones. They are a display telephone where you could actually watch the application as you are doing it and you can see your choices.

We also added groupware and workflow applications to IVR. This is where you can have an IVR system actually facilitate a workflow process from beginning to end. The applications are pretty endless by combining different forms of technology you could have something proactively or interactively do an application for you.

When you add IVR applications to the Internet, you provide significant value to both the customer and to the business that is developing this.



CALL CENTERS

There are in an excess of 66,000 call centers in the U.S. alone. The IVR is a gateway to call centers which is a small or large group of people. We call them either customer support reps or agents that are answering and fielding calls. It can be in any environment. It could be your airline reservations, catalog sales or it could be in health care doing scheduling of appointments.

There is every manner of application out there for call centers. So if you add IVR and call centers to Web applications, all of a sudden you have added another layer of tremendous value to both the call center and to the customer.

For the owner of that call center a number of things have happened. The call length has been greatly shortened because somebody has been going out on the Web and has had a lot of the information already taken care of so that call is shorter. In the call center industry, any time you can shave one second, two seconds or a minute off of a call, that translates into thousands or millions of dollars at the end of the year.

So you want to keep those people off the phone but you want to provide value. Now you have turned a Web hit into a sales lead and you have the opportunity to add more money onto that sale because you know what they have been doing.

Additionally we have something called Proactive Call Centers. In a help desk environment, if you can monitor what is happening on your Web site, you have the opportunity to go back and either put more of the frequently asked questions back out there, or if you are in a community of interest, you can put any application out onto the Web and then you are waiting for someone to surf the Web and find your Web site, turning a hit into a lead.

You want to provide value and you also want to save costs. Not only have you taken a part of that call and shortened it out of your call queue and saved money, if you can get an agent to call outbound on an 800 number, which the IVR system does, rather than have them look at catalogs, you have also saved a lot of money because inbound 800 numbers cost a lot more than outbound.

IVR VENDORS

AT&T is very into the call center business, they are one of the premiere players in this whole arena, they decided to do this to back up what our industry has been saying for a long time. That is that they want be able to provide information anytime, anyplace, anywhere by the access method of choice.

Edify is another software provider that does a lot of IVR, workflow and groupware applications. They were one of the first people to come out with an Internet package for IVR.

Inner Voice is another IVR vendor who now also has Web access. They start off with a product called Media Connect which was without the Internet. The premise behind this was to give visual access through the PC with full real-time multimedia directly into a business. Then they came out with Visual Connect which is the Internet portion of that. So now with whatever they can do with Media Connect directly into an organization, they can do over the Internet.

Talks is another IVR company that was one of the original ones to do the Internet. They started off by doing e-mail notification and also to allow people to call into the system and search for a message.

On the voice messaging side one of the companies is IBM, using their direct talk mail system. You can go in and record a voice mail and then go back in over the Internet and listen to your message.

Another company is Boston Technology who has just come out with Access Web to do unified messaging over the Internet. Most of these applications have been done for the CPE market where you buy your own voice mail system.

Boston is one of the premiere players in the enhanced services market. They sell their systems to large telcos and service bureau providers. So their focus is going to be on providing unified messaging to the mobile professional, Soho and Road Warrior.

Note: Please refer to the companion "Verbatim Transcript Document" for the full in-depth discussions, detail, explanations, charts, graphs and the audience "Question and Answer" session.

Chapter 28: TRENDS IN NETWORK INTEGRATION AND SUPPORT SERVICES

Arnie F. Tomaino
Senior Industry Analyst
Network/Communications Support Program
Worldwide Services Group
Dataquest Incorporated

Agenda: Key Market Drivers, Market Size and Forecast, Predictions for 1996, Hot Spots, Vendors to Watch and Winning Strategies

KEY MARKET DRIVERS

The network services marketplace sits in between three major drivers. These are a fast changing technology landscape, a customer behavior and an existing competitive landscape.

Networking technologies and methodologies do not justify all the technologies and methodologies that are out there. But without a service investment, these technologies and methodologies are a house of cards unless you have some kind of internal or external service investment.

Because of the incredible pace of technological change, those two combined make the technology and the methodology arena fast growing and volatile at times if you do not have a service infrastructure to take care of that.

The key networking issues were very important to watch. But the major and important things to watch are control, security, how to manage the network, how do you optimize the network and take your resources more productive.

Industry consolidation, competitive pressures, enterprise and networking are important customer behavior drivers. In addition to that you have inter-enterprise networking, the network, the commerce, the electronic commerce and turning the network inside out, that is also important.

There are also resource constraints. Doing it internally or buying it externally are very important issues to watch.

Who are the people addressing these customer issues and these customer demands are the major categories that we watch in telecommunications. They are voice CP vendors, the LAN vendors, Novell, Banyan, interexchange carriers, the RBOCs, the independent TPMs and the professional services and systems integrations companies.

In addition, there is the focus network integrators and resellers, so the player marketplace is certainly an amorphous mob of offerings.

The network of these players are building their strategy on the fact that the network is the heart and sole of peoples IT strategy. They have to deal with client server issues, distributed computing issues, the Internet, remote computing and the virtual IT structure.

These players will have to watch the customer support issues in the networking services and LAN scape. There is a skills mix imbalance both from the vendor side and the end-user side.

New services technologies, quality and customer satisfaction issues are coming into play. It is beyond break fixed. This is electronic offerings. They are professional services including post-implementation services.

The buyers are changing as well. It used to be an MIS buyer which some people call wire heads and now it is more of a business executive who might not understand all of the features involved with a multiplexer but they certainly understand how that technology can meet the needs of the enterprise instead of just seeing it from the wire head standpoint.

There is also the increased propensity to outsource or co-source. They want to focus on their core business, they want to emphasize strategic issues and they also want to be different. To be different they need to focus on their core competencies. So to outsource it, the non-essential strategic issues or managing the network is an example, which is certainly important.

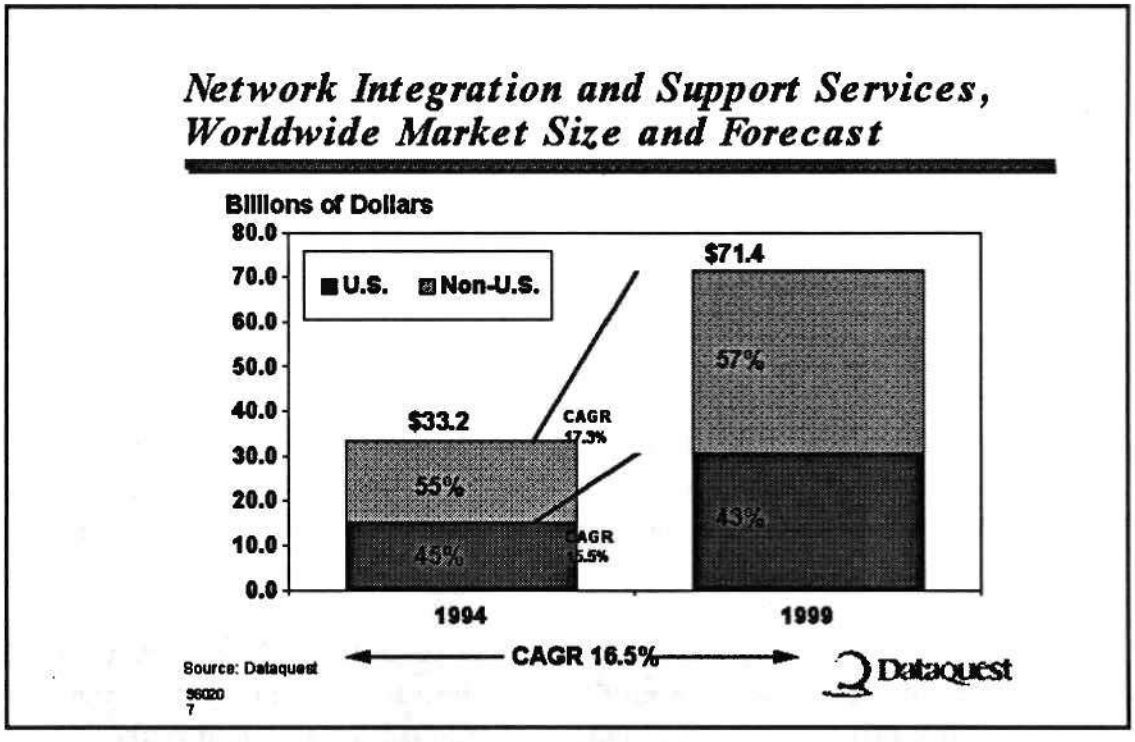
Technology is still skyrocketing but it is almost a commodity marketplace. Products are dropping but everything else seems to increase and a lot of those issues have to do with support and services. Support costs rise, product turnover rises, the number of end-users rise, distribution channels, lowered different

brands and the number of system and networking configurations are all important.

MARKET SIZE AND FORECAST

On a worldwide level, our predictions are that by 1999 it will be a 71.4 billion dollar marketplace. That is moving from 1994 where it was and we accurately depicted it as at 33.2%. The compounded annual growth rates are phenomenal or at least impressive.

The worldwide network integration and support services market size and forecast for '95 was $39.1 billion and the 1996 numbers were $46.2 billion. The U.S. is a large portion of it. But the rest of the world is taking over more significance.



PREDICTIONS FOR 1996

The U.S. marketplace, was pegged at $17.5 billion last year, moving to $20.4 billion this year and to a $30.7 billion marketplace by 1999.

TRENDS IN NETWORK INTEGRATION AND SUPPORT SERVICES

The integration and application development arena will grow at a 15.8% compounded annual growth rate from '94 to '99. Project management, application development, software integration and technology deployment are define as integration and application development.

Another section of the professional services arena which is growing even higher in terms of its compounded annual growth rate is operations management. That will grow at a 20% compound annual growth rate from '94 to '99. The '95 numbers for that we had at $5 billion. In 1996, the prediction is $6.084 billion.

From the product forecast side, we predict it to be a $458 million marketplace by 1999 or 1998. Now this has nothing to do with the services side of it so you can be at a fairly phenomenal marketplace because there is a lot of professional services around that that have to do with the design of the wireless network, the implementation of the wireless network and the post-implementation maintenance service.

HOT SPOTS

Beyond the core predictions, the hot spots are the professional services around, both worldwide and U.S.

They are wireless integration services, Internet related access services and computer telephone integration deployment.

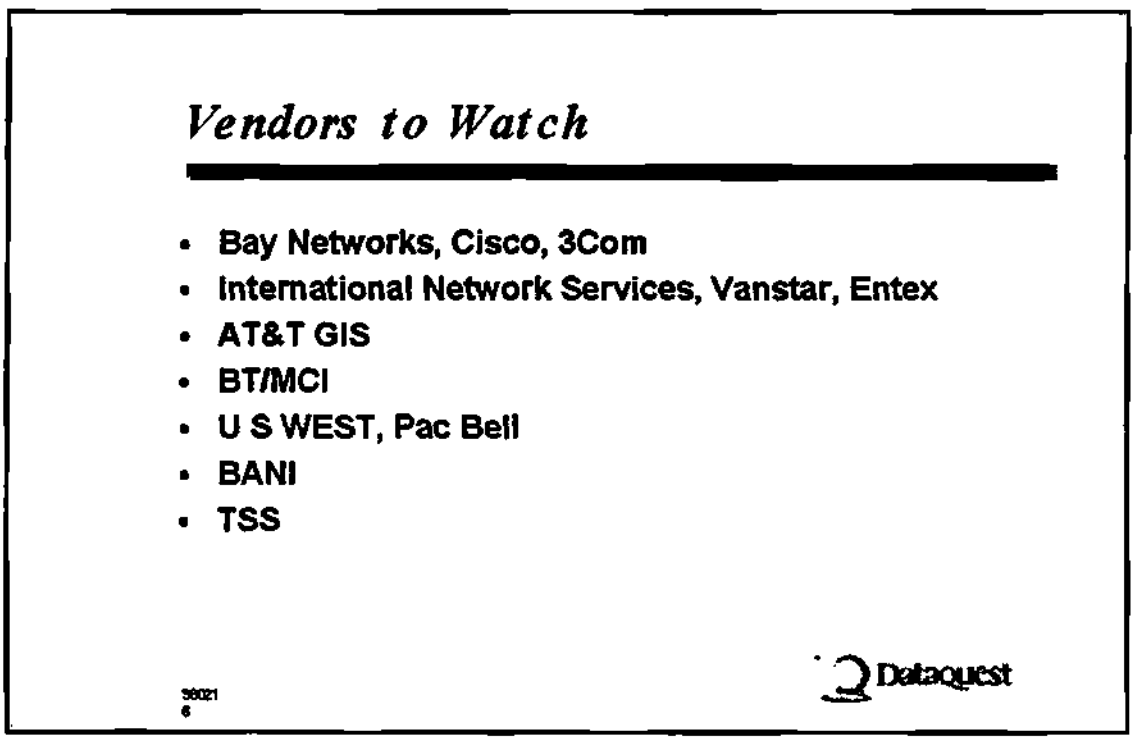
The Internet is here to stay, so that is a tremendous opportunity for the service providers to do four things. To help them plan and design the Internet access provision, to provide technology assessment and deployment services. Network security and fire walling services, if you do just that, that is an incredible feat and an incredible opportunity there.

This is the year for CTI. We have been talking about it for three or four years. Right now is the year for computer telephony and integration and on top of that we have the service opportunity that connects to that and how you can make money just deploying a technology and planning for it.

The information will be used to perform the following actions. When you converge voice and data, you can access information contained in local or remote databases and you can redirect calls and process within a telephone system.

To play pertinent recorded messages while callers are waiting and then retrieve information relevant to the calling party and then display that is very important.

We estimate that the total CTI consulting and integration market reached $188 million in 1995. In 1996 we estimate it to reach $302 million going up to $996 million by 1999.



VENDORS TO WATCH

If you look at the Internet working space, you are going to see Bay Networks, Cisco and 3Com continue to be leaders but they are going to do it in different ways. They will offer probably a fuller life cycle of services. Cisco will offer probably more on-line services to avoid dispatch and 3Com will probably do a similar combination of the two and just do what they do best, pull in a software integration services, the outlying service provision and the like.

AT&t, GIS and NC will become more of the core of AT&T in terms of offering services at least. Vertis Telecom and MC, will be seen in the wireless space more often and you will see a lot of the carriers offering that.

U.S. West, PacBell, Bell South, Ameritech, you will see them up and coming and offering more formalized services offerings. Bell LAN Network Integration and NTSS will also be leaders that you will hear a lot about.

WINNING STRATEGIES

From the vendor standpoint, there is always risk and reward. High risk, high reward will be those companies that offer a full life cycle of services so they need to prepare for full life cycle. The market this year we had pegged as a $750 million marketplace, so there is also that reward.

The low risk and low reward, provide the high volume low value LAN installation services but if you are doing that now, you are either doing it very well in a niche marketplace or you are going to go out of business in a couple of years.

From the user standpoint, the high risk and high reward is to out source the entire network operation. What you are seeing more often is how tasking service is occurring. They are focusing in on their core competencies and handing off as a supplemental service the services that can be out-tasked.

From the service provider standpoint, that is important because if the service, the client or the customer allows you to take over a small task and you do it well, then it turns into an evolutionary partnership.

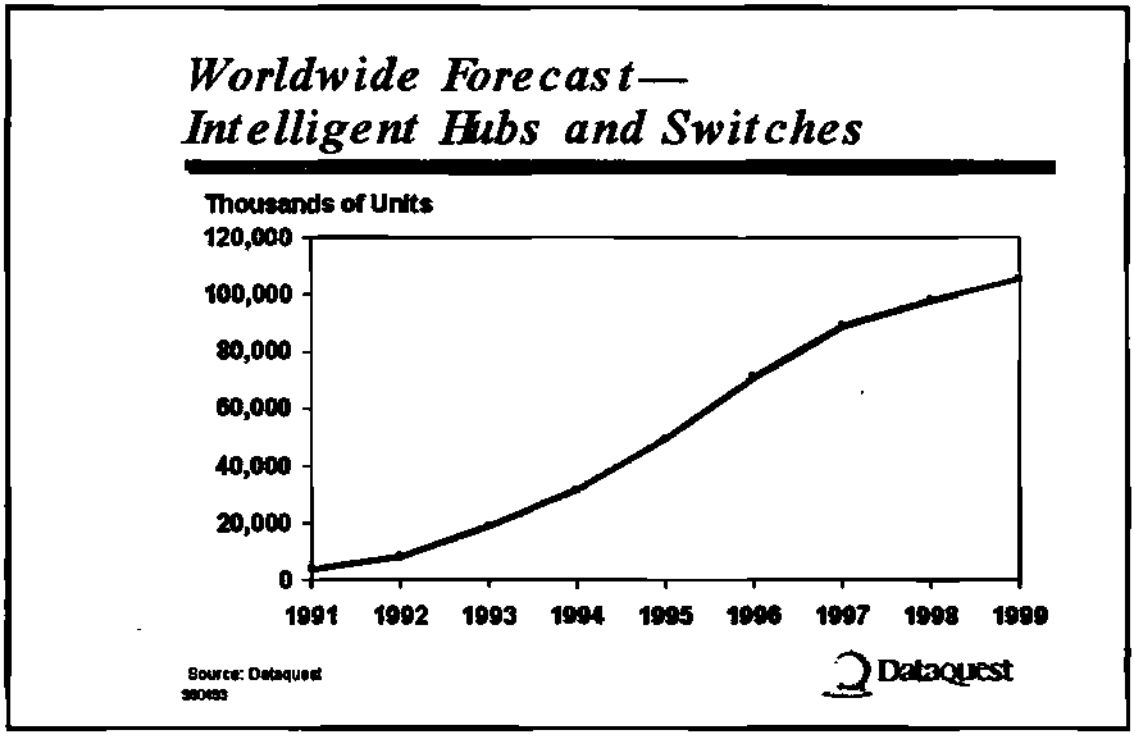
Note: Please refer to the companion "Verbatim Transcript Document" for the full in-depth discussions, detail, explanations, charts, graphs and the audience "Question and Answer" session.

Chapter 29: LOCAL AREA NETWORKING: WHAT'S HOT AND WHAT'S NOT

Trudy Barker
Director and Principal Analyst
Local Area Networking
Telecommunications Group
Dataquest Incorporated

Agenda: Worldwide Forecast, Profound Paradigm Shift in LANs, Who Are The market Leaders in This Area of Hubs and Switches? and What's Not Hot in This Market?

WORLDWIDE FORECAST



The market overall is seeing extremely solid growth going out past 1999 and into the year 2000. It's certainly the case that despite all the change, we're talking incredibly robust growth here. This is a 19% compound annual growth rate in

terms of revenue. What other market can you find that's this big with this kind of growth rate? By the time we hit 1999, we're talking a $12 billion market.

PROFOUND PARADIGM SHIFT IN LANS

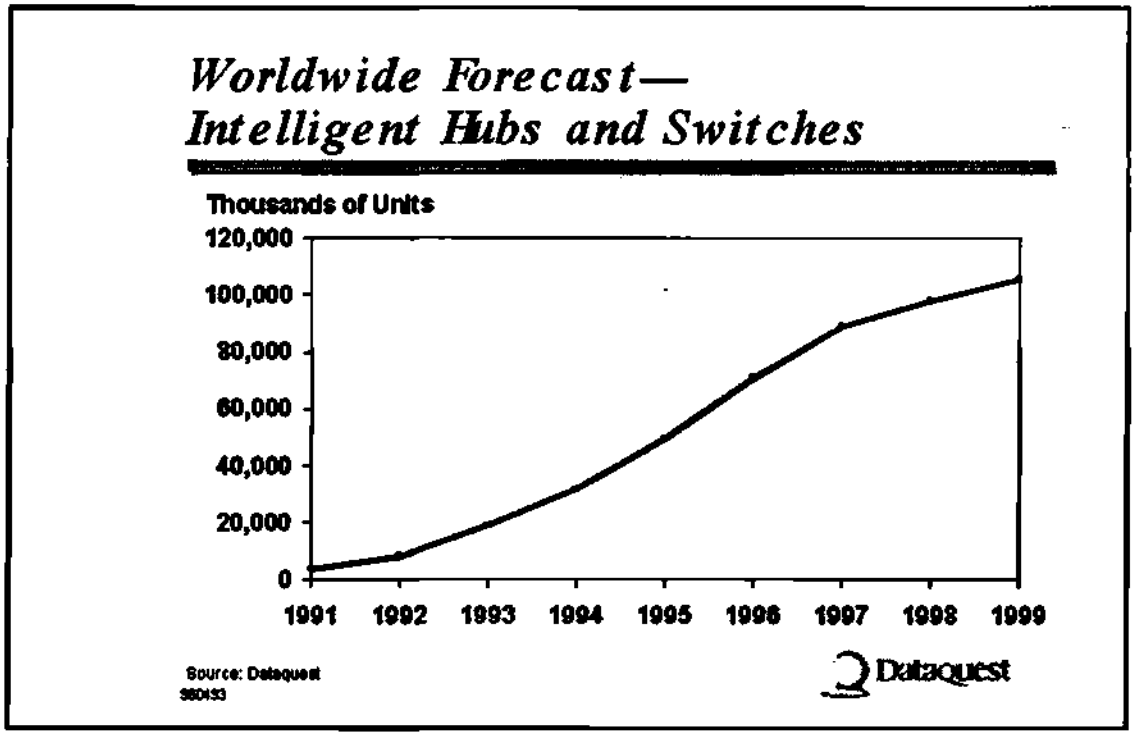
Underneath this is a very major shift in the basic paradigms of how networking's done. Going forward, it's going to be completely different than it is today.

Basically what we're doing is going from the paradigm of the shared media, which was in essence broadcast to a connection-oriented technology, which is ATM.

ATM switches really didn't start selling well into production networks until the last two to three months. Part of the reason that I believe there's been a shift is that second-generation products are available that have a lot more features at a better price point, etc.

The full promise of ATM where it's ubiquitous -- I mean, the truth is, MIS managers just do not go in and rip out existing networks. So you are not going to see ATM desktop through the wide area to desktop ubiquitously until well after the year 2000.

How fast is this whole shift really happening? Switches -- both traditional LAN switches and ATM switches -- make up on the order of 4% of the port shipments worldwide this year.



FDDI has been declared dead a number of times. Well, that just ain't gonna happen. If I were an MIS manager, I certainly would be relying on FDDI in the backbone right now. It's $1000 a port, but it goes in a backbone, and nobody ever got fired for putting that in.

The big players there, of course, are DEC and Bay. DEC had that giga-product that goes back a ways, and they've got product form factors that you can either put FDDI into a great big old hub, or you can take the same device and put it on a desktop.

ATM -- it's only been the last two quarters when we've seen things take off, and we have really seen them take off. Fore is still the market leader there. They had an early lead in the market.

100 Mb Ethernet -- very interesting marketplace in the shared area. Early part of the year, the only 100 Mb Ethernet available in essence was HP's 100 VG product. So obviously they were the market leader early in the year.

Standard Ethernet -- it's a $3.4 billion market in 1999. Still going to sell well. Some of the Asia / Pac players are really nibbling away at the low-end of that, and you can expect them to continue to be real successful, primarily in the unmanaged end and low-end of the managed market.

MARKET LEADERS -- HUBS AND SWITCHES

Who are the market leaders in this area of hubs and switches? You'll notice that it's pretty much the big three: We've got Bay Networks, Chipcom, 3Com. The big movement this year was when 3Com purchased Chipcom. They were originally more like in 4th place, and with that acquisition, it bumped them up in terms of total dollar volume and ports into second place. Cabletron right behind, and in terms of both revenue and ports, the big three.

If we did the same pie chart for the switching marketplace, Cisco has the lion's share of the market there. They bought it this year. Cisco bought the switching market this year. They're riding that tornado up.

What's happening with the other end of the wire? We've got the hubs and switches set up; what's happening on the NIC card side? Very robust growth in 1995. We saw a spike in the market due to some of the new platforms coming out -- Pentium machines -- and increase in the economy in certain sectors. We do not expect this remarkable growth to continue in 1996. It'll slow down to some really even pace. It's about a $4 billion market, a little under that.

WHAT'S NOT HOT IN THIS MARKET?

Token ring. Although it's maintaining its own in the shared media market, and in fact is seeing quite good growth in the switched marketplace, in the NIC card marketplace there aren't a lot of new computers going out that are being hooked up to token ring networks.

But this is not a hot market. There's not a lot of new installs going on. There's too much competition from 25-megabit ATM, oddly enough. About 90% of the sales of 25-megabit ATM are going into this space where token ring would have gone before. Ethernet migration to 100 Mb Ethernet. So it's very stagnant from a NIC card standpoint.

The Pacific Rim companies are a force to be reckoned with here, as they are in the low-end of, for example, the standard Ethernet market. D-Link Acton are

very aggressive. There's a new company, Light On, that just announced a PCI card for under $100. Very aggressive from the Pac Rim.

USER WANTS AND NEEDS

We did a UW&N survey in mid-1995 that focused on workgroups. Obviously workgroups are where the competitive landscape is this year. And in particular on Ethernet switching and looking at a lot about the client/server model in that space. We also, as a peripheral set of questions to that, asked a lot of questions about other types of LAN switching, and including ATM install switching. We talked to lots and lots of folks at all levels in organizations. We found that a very high percentage of the people that we surveyed -- which we believe is representative -- did indeed expect to use some LAN switching in their network in the next several years.

We focused on the hottest part of this market, which is small workgroup Ethernet switches, how many ports do the customers want on average -- turns out to be about 48.

One of the things that vendors have been wrestling with is which high-speed uplinks to provide. Now, we know from taking this survey that the end customer actually wants four optional slots for high-speed uplinks.

What's the nature of those? About 30% of the customers surveyed think 10 megabits this year is just great out to their server, or just great out to their backbone. That changes dramatically in 1997, where they're very positive on 100 Base-T fast Ethernet technology, and a little less so than they were previously on FDDI. But 155-megabit ATM shows up here again as a choice going out to a server.

I want to warn you about an anomaly in our survey, and that's the NETBIOS number. Don't take this to mean that there's an increase in NETBIOS usage. What this is is we surveyed slightly more manufacturing clients this year than we did the year before, and that caused a little bit of a spike here. It's a little bit of a misnomer. The rest of the verticals are pretty similar to our previous years.

About 75% of the MIS managers that we surveyed need to provide remote access in the next two years to either remote users who are mobile -- meaning on

business trips -- or to employees who are going to be working at home part of the week or the total part of the week.

WHAT'S HOT AND WHAT'S NOT?

Here's where we're going to name names. Triple-digit growth in switching, because of the paradigm shift. So like 220% growth this year in switching.

High-speed LAN technology is coming on like gangbusters, third quarter, fourth quarter we saw 100-megabit really coming into its own. Especially 100-megabit switching this last quarter. There are products available now that do 100-megabit switching.

Remote connections. It's not just an Ascend world any more. There's communications vendors and LAN vendors of other types descending on the remote-access, small office part of the world. Routing spreading out to that SOHO marketplace.

FDDI is emphatically not dead. It's not going to grow a whole lot beyond 1997, but you're going to see reasonable growth on an admittedly fairly small market up until 1997.

In terms of winners, the big winner's Ethernet switching. And every vendor on the face of the planet is now competing there. By the second quarter of this last year, we had over 30 vendors in that space, and the number keeps skyrocketing on me every quarter.

Fast Ethernet is two technologies. 100-megabit Ethernet is two technologies: There's fast Ethernet and 100 VG -AnyLAN. Fast Ethernet is where it's at.

Expect early point products over the course of the next year. A lot of announcements in this area; probably not till the end of the year when you see some products, but they'll be proprietary. Standards are probably going to be at least a year and a half to two years away.

Note: Please refer to the companion "Verbatim Transcript Document" for the full in-depth discussions, detail, explanations, charts, graphs and the audience "Question and Answer" session.

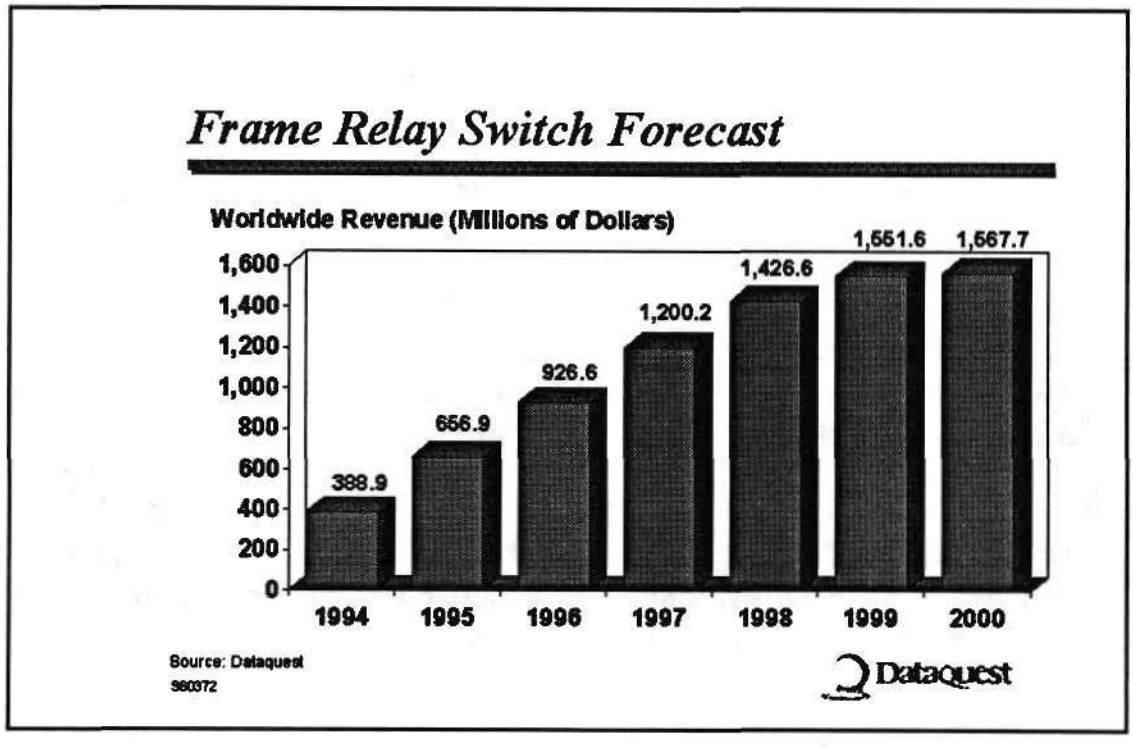
Chapter 30: ATM IN THE WIDE AREA NETWORK: HOW CLOSE ARE WE?

John Coons
Director and Principal Analyst
Wide Area Networking
Telecommunications Group
Dataquest Incorporated

Agenda: ATM Access, Frame Relay, WAN ATM Switch Types, Players, ATM Service Offerings and Predictions.

ATM ACCESS

ATM access is a brand new area. The first product came out in 1994. I think the first company was ADC Kentrox with a product that could take data traffic and constant bit-rate traffic like voice or video and multiplex that all into cells so it could be either sent to an ATM service provider or it could be sent between campuses in an enterprise-type network. There are still very few players in this market.



There's a couple of different price points for these devices. In the $4,000-$5,000 range you can get a T1E1 multiplexer today. In the T3E3 range you're looking at about a $20,000-$25,000 entry price. So the volumes don't have to be huge for these companies to be interested.

FRAME RELAY

Frame relay switch market in conjunction with ATM: The two are going to be interactive over the next few years. Right now, frame relay is going crazy. Last year we tripled the number of ports available in the U.S. Major players like AT&T and WorldCom, who used to be known as WilTel announced that they got behind in deploying ports.

AT&T got about two months behind in deploying ports; and at last count they were deploying two switches a day to keep up with the frame relay demand.

The frame relay switch forecast goes up for a little and then it starts to flatten off and go down. And that's not because frame relay's going to be any less popular; it's because these multi-service platforms are going to come in and start taking up the slack.

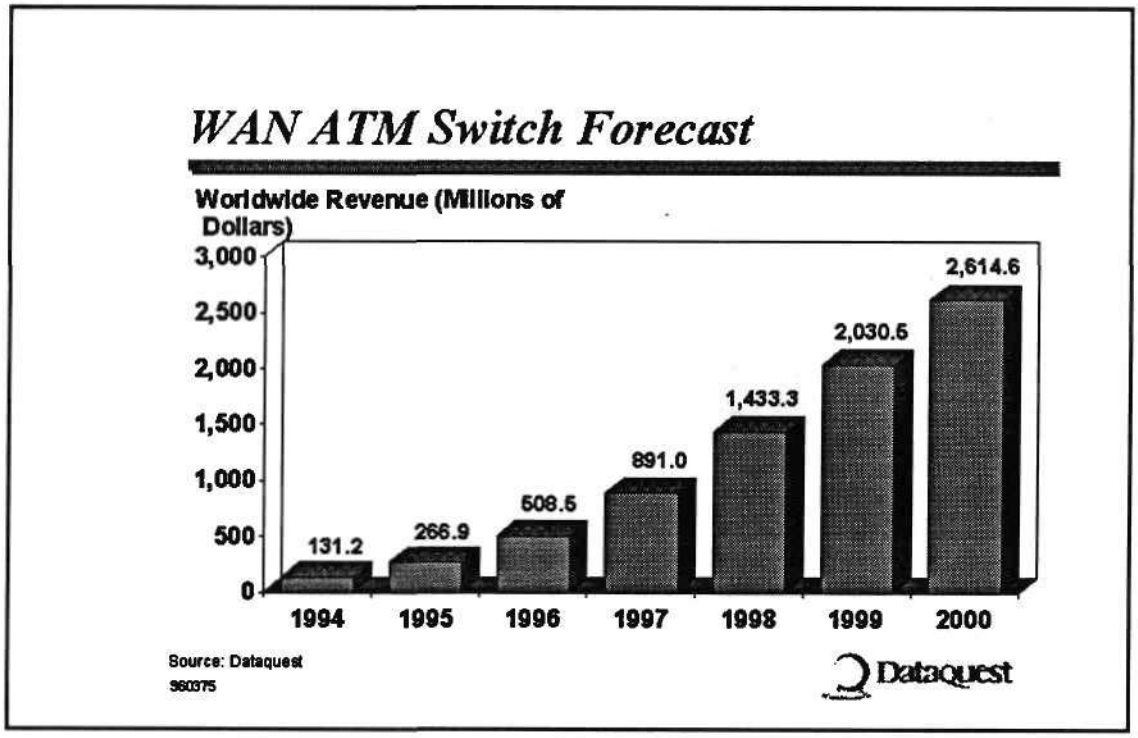
WAN ATM SWITCH TYPES

Enterprise: These are switches that are eventually going to take over the TDM multiplexer chores in enterprise backbones. Their distinguishing characteristics are their low to medium throughput. They handle legacy interfaces like IBM SNA, PBX interfaces, video conferencing, Codex, things like that, in addition to native ATM UNIs.

Carrier edge: Those are the switches that are around the periphery of the carrier network that actually have the ports connected to the lines that connect to the end users. Those are also low to medium throughput switches but those are characterized by having carrier-specific features.

Carrier core switches: And these we're categorizing as being over 10 gigabits, just as a rough benchmark. Many of them are as high as 160 gigabits today, you can get. Their place in the network is much like the tandem switches in the old voice network. They only connect to other switches.

WAN ATM SWITCH FORECAST



Sixty percent of switches that went out were edge switches. The other 40% were pretty evenly split between enterprise and carrier core. I would expect carrier core to shrink over the next few years and then grow again as video and voice services move to the large-scale networks. The problem right now for vendors that only have core switches is that the switches they currently have will be obsolete by the time that that curve picks back up.

PLAYERS

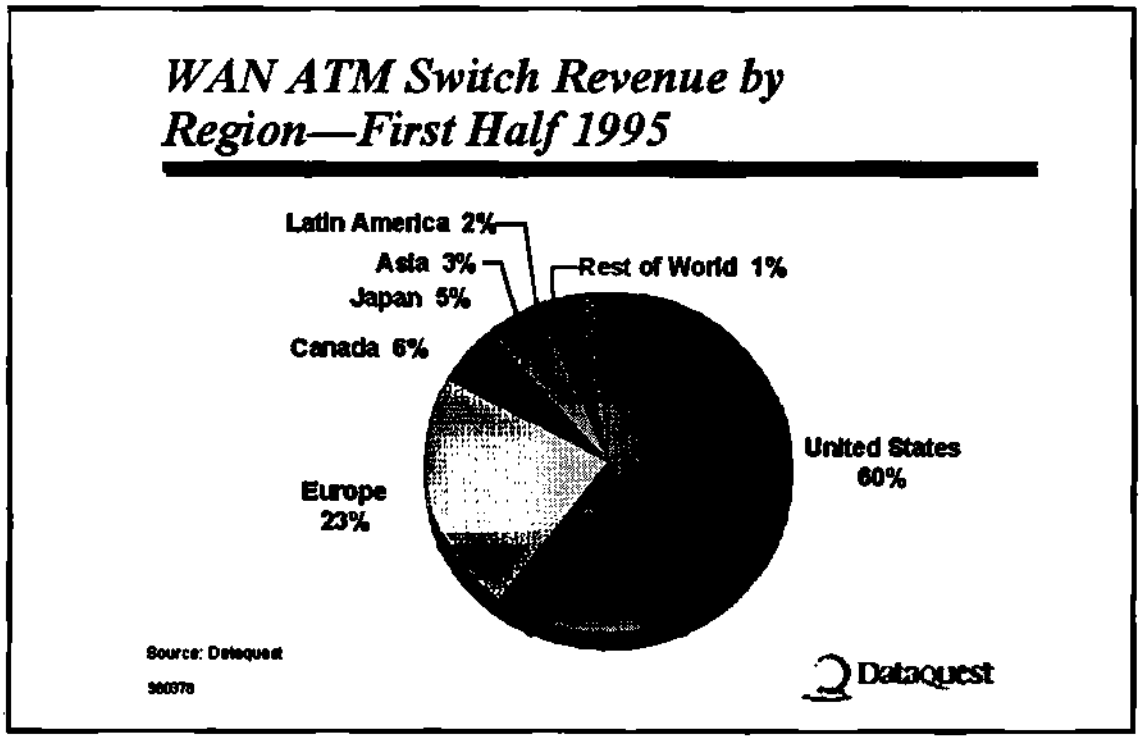
Newbridge miraculously maintained share even in the face of a lot of new entrants and a lot of older companies who introduced new products.

Stratacom probably the most surprising. However, they have 10 years of cell relay experience with a proprietary switch that they developed back in 1986.

AT&T, a core switch vendor; all they have is a core switch, the GCNS 2000. What they did, though, to plug that hole was they made an agreement with GDC

a couple of months ago. So General DataCom will now be providing AT&T with an edge switch to fill out their portfolio.

Alcatel same thing. But they've got some smaller switches out now. And they've got another division called Alcatel Data Networks which is a joint venture between Alcatel and Sprint. And they're building some smaller enterprise switches that'll help fill that in.



Cisco bought their market share by purchasing Lightstream, mainly. GDC had a rough first half of the year financially but it looks like their end-of-the-year numbers look better than expected. So I think GDC finally turned things around.

Cascade. Up till now, they've had essentially a frame relay switch, an SMDS switch, that has been very well received by carriers. They announced about mid-year that they'd have a new switch called the Cascade 500 that they would deliver in December.

Fujitsu. Mainly core switch. They sold a bunch of switches into the North Carolina information highway and instantly three different carriers take credit for that but they're holding steady.

NEC, of course, sold the A100 switches to Cisco; they have their own switch as well.

Other intra-company traffic can also be carried over ATM. Legacy data works very well; PBX tie lines over constant bit-rate type circuits -- anything that a circuit would carry can be emulated over ATM with circuit emulation capability.

ATM SERVICE OFFERINGS

In 1995 the trials ended in the U.S. There are some very simple service offerings today -- permanent virtual circuits, generally T3E3 rates that you buy from the carrier. They're early switches.

This year, there are going to be some regulatory changes. One of them that's going to be interesting is at the end of last year frame relay was classified as a basic service by the FCC. It previously was an enhanced service, which meant that when a carrier delivered that, there were two components to the charge: There was an underlying transport charge for a T1 line or a 56k private line and on top of that transport charge was a port charge and maybe a usage charge for the actual frame relay. Now, with it classified as a basic service, one of the definitions of a basic service is there is no underlying service. So carriers could get very aggressive with pricing on frame relay.

And so too with ATM. If they don't have to tariff the underlying T3 line or OC3 line at the full tariff rate, rather bundle it all together and go to their Public Utilities Commissions and say, the customer's not using this T3 line full-rate. Statistically, they're only using 10% of it. So let's give it to them for 10% of the T3 rate. That could happen.

You're going to see some more interesting services, too. SVC, switched virtual circuits, which are useful for LAN, also useful for telecommuters and remote offices who want to connect into the corporate networks for short periods of time and then disconnect.

Probably even more important in Europe and Asia Pac, where you can't get E3 lines at all. Basically, they're only used by carriers between central offices. So

if you wanted more than 2 megabits in Europe, this is probably the only way you're going to get it in the short term.

How ATM will be strategic. Most large sites today have a whole lot of lines coming in from a whole lot of carriers. I've done some case studies to back this up. They're buying inward WATS from Sprint; they're buying outward WATS from AT&T. They've got some LAN interconnect. They've got video conferencing on switch 384 from MCI. They've just got all of these little narrow pipes coming in.

The important thing is going to be justifying it, getting it in there and pricing it right. But once it's in there, you've got that plum account, because nobody else can come in and offer those services for the same price, because they've got costs in provisioning those little narrow wires that they're going to try to compete with.

PREDICTIONS

In closing, the carrier who gets the fat pipe into a plum account first, wins. This is my bold prediction. And we're going to watch over the next year or two and see whether the carriers use this as a tactic for gaining and maintaining account control.

Note: Please refer to the companion "Verbatim Transcript Document" for the full in-depth discussions, detail, explanations, charts, graphs and the audience "Question and Answer" session.

Chapter 31: RIGID DISK DRIVES: ARE WE LOOKING AT A MATURE INDUSTRY?

Phil Devin
Vice President and Chief Analyst
Rigid Disk Drives
Dataquest Incorporated

Agenda: OEMs, Windows 95, Product Cycles, Pricing, Sales and Revenue, 1995 Market Share Results, Technology, Forecasts, Predictions and Conclusion.

OEMS's

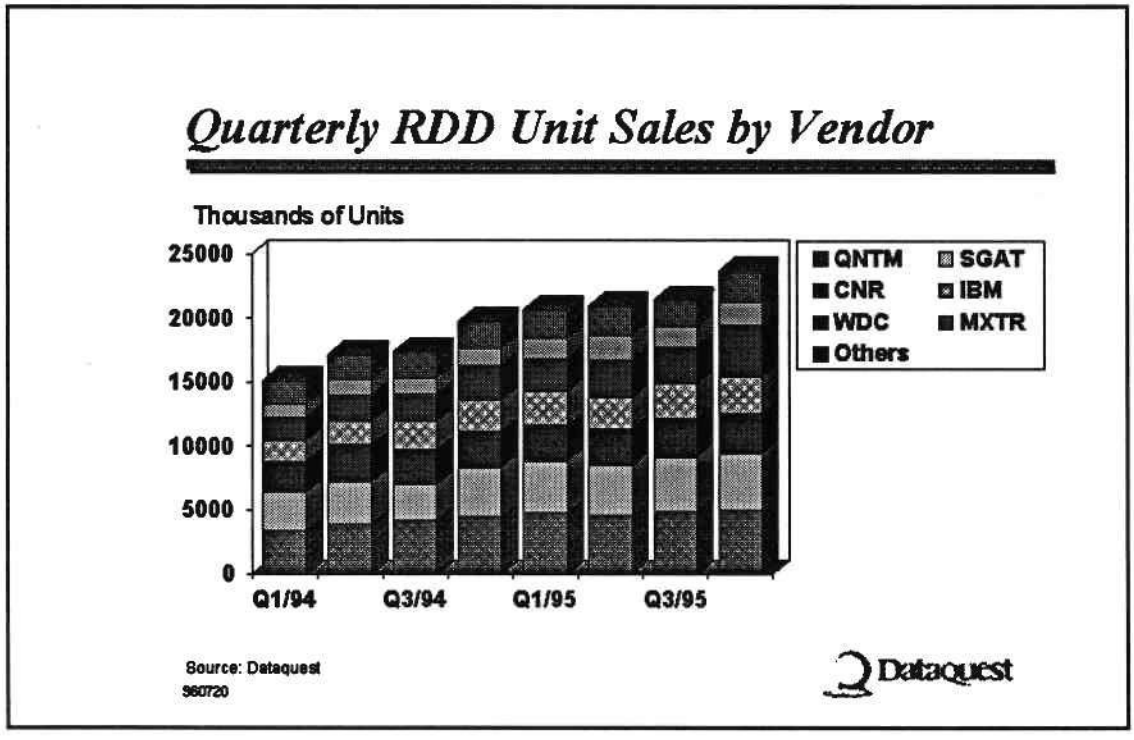
Something happened at the end of last quarter and that is typically what happens in the fourth quarter of the year. We get a lot of stuffing of channels. This year it also happened to be a substantial increase in sales to OEMs and a number of the PC companies - we understand to be Intel, AT&T and Micron.

Fourth quarter sales were the best of all quarters of history, with 24.7 million disk drives total sold to first point of sale on a worldwide basis. We continue to see all of the vendors ramping very actively to potentially gain market share, or to take advantage of the big pop in PC sales.

WINDOWS 95

The corporate revision from Windows 3.1 and Netware would be the big thing into a Windows 95 environment, or possibly even a Windows NT environment, I think is going to happen this year. We feel that Microsoft has been very open in saying that Windows 95 is not as reliable as NT and this may have put a dent in the possibility of Windows 95 and Netware becoming pervasive early on in the year.

The corporate buyers have not extended into Windows 95 yet to any extent. When they do, there will be a tremendous increase in sales in both networked PCs and in low capacity disk drives.



PRODUCT CYCLES

The product cycles for disk drives continue to increase a bit because of the degree in difficulty in actually building these things. Generally I am talking about the desktop which is using proximity recording or near contact recording.

Generally you are seeing the nine month product life cycle instead of continuing to fall closer to six months. It is stabilizing at nine months and getting longer. What this does is tend to increase the price of products.

PRICING

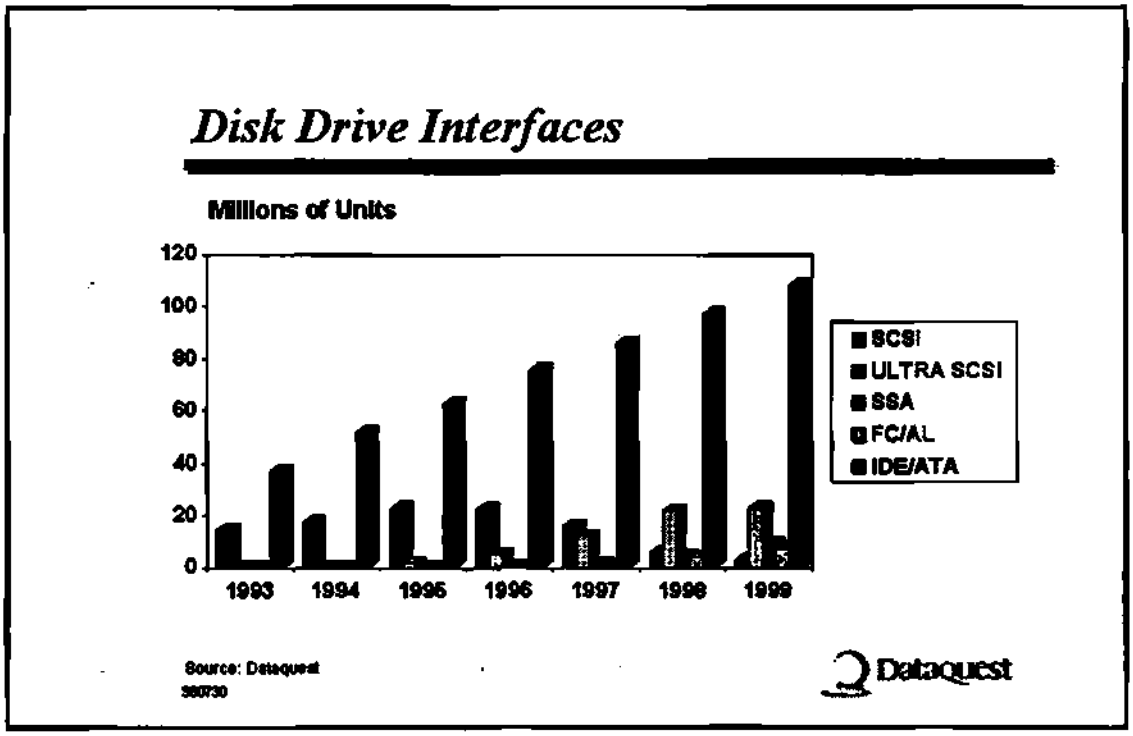
I think pricing pressure is reduced somewhat. Going from December to January, at least the high-end pricing stabilized very nicely. The desktop was slower to increase in January but because of this gray market issue, we are seeing a fair amount of softness in the one and 1.2 gigabyte pricing levels. 1.2 gigs is about what you need to buy if you are going into a multimedia computer these days.

A big factor in the disk drive industry is the OEM prices. Not to be forcing pricing on the world but generally you can see things falling down to an asymptotic $150, $160 point. The rate at which they fall is that in question.

SALES AND REVENUE

This is from the six public disk drive companies - or what used to be the six public disk drive companies: Connor, Quantum, Seagate, Maxstor, Micropolis and Western Digital. We have lost three of those as far as reporting public entities in the last few months.

What we are seeing now is sales continue to rise quickly. Production is on a fairly decent ramp here. I don't really think that we are in an overproduction situation at all. It's a pretty healthy curve these days.



1995 MARKET SHARE

Seagate is 19%, the same as they were in 1994. Connor is at 14%, falling two percentage points from the previous year. Generally everybody was pretty healthy, with Connor going down and others going down. Everyone else seemed

to either go up or stay pretty stable. If you look at combining Seagate and Connor, here is the big impact for 1996.

Some of the big jumps: Primarily Western Digital's big jump here was very significant. I think the Quantum jump up to $5.8 million was also something to watch for the quarter.

There is a 26.3% increase from year to year between 1994 to 1995, unit volume increase. 12.6% quarter to quarter here unit volume increase. A good year and a good quarter.

TECHNOLOGY

Technology is what's driving the industry and is what makes it exciting and takes up all of that money from R&D.

Seagate contends that they have shipped a lot of proximity heads. Whether they have shipped close flying height disk drives might be a question but generally the industry is finding it difficult to transition to very, very low close flying and all of the technologies that have to be solved or understood.

Spinning disk drives at 7200 RPM is an art. Increasing above 7200 RPM is a black art at this point. No one seems to have solved that. We don't see any production shipments of disk drives greater than 7200 RPM.

I think the biggest problem is read channels. Currently the fastest read channels we have are in the 120 megabits per second range. There are those that are about to announce products of disk drives that will be a little bit faster. State of the art is about 120 megabits per second today. Going beyond that is going to be difficult at a reasonable price that a disk drive can afford.

Here is a channel rate forecast: 120 megabits today; 200 by the end of the year as far as the requirement goes. The year 2000 at 930 megabits per second. Go home and tell your IC provider about that one.

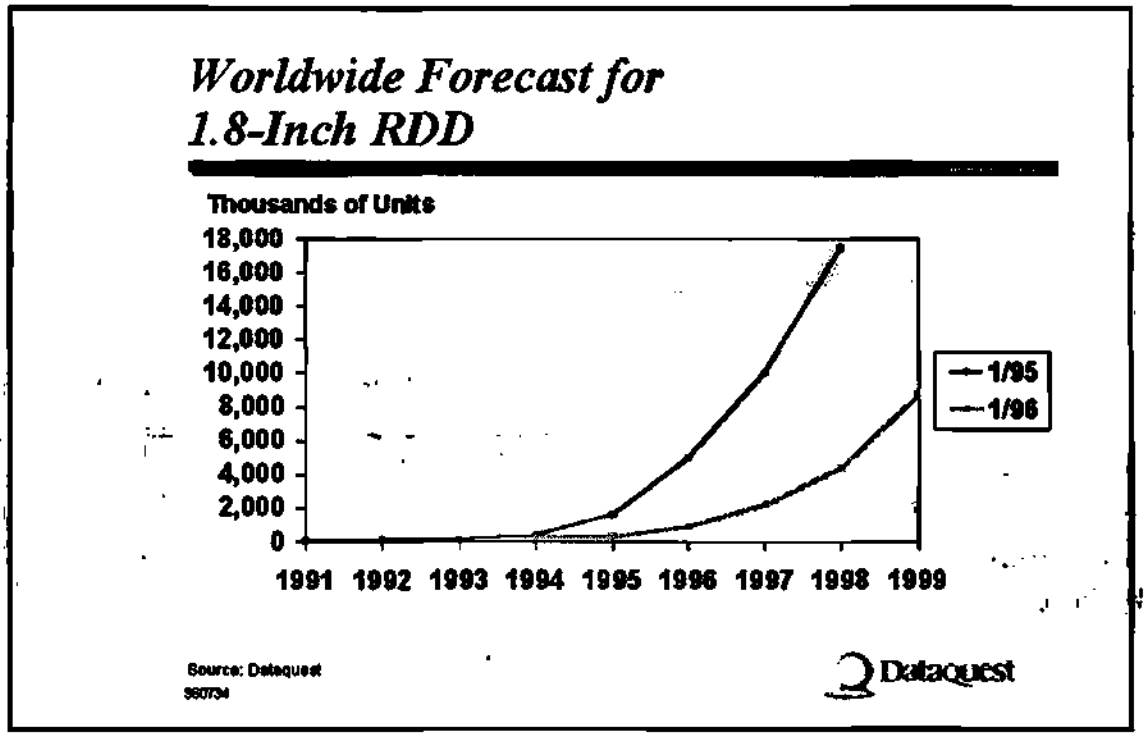
RPM forecast: Desktop we are looking at 5400 being pretty much the standard for desktops going out into the future. We do have some 4500 RPM products that are still around and we will see some announced as time goes on.

HP has made some good progress. I think you will see each one of these companies jumping things up a bit as the days go on.

Some of the hopeful news, just getting back from Europe and hearing more and more about Silmag and the things that they are doing with their planar technology heads; several companies now are very dedicated to this technology. They are predicting 1.5 gigabits per square inch coming out of this inductive head within the next two years.

Another bit of good news: The Seagate and Headway expectations of 800 megabits per square inch production from dual stripe technology this year. HP is the only one shipping this technology at this point in disk drives.

Now you have IBM and Micropolis, which is now Singapore Technologies, as the only two SSA disk drive providers. This is a problem for that interface. However, IBM is shipping pretty good quantities of disk drives into midrange arrays and workstation subsystem array servers that utilize SSA. They have good experience and it will be really interesting to see what happens with all of this. It is too early to tell.

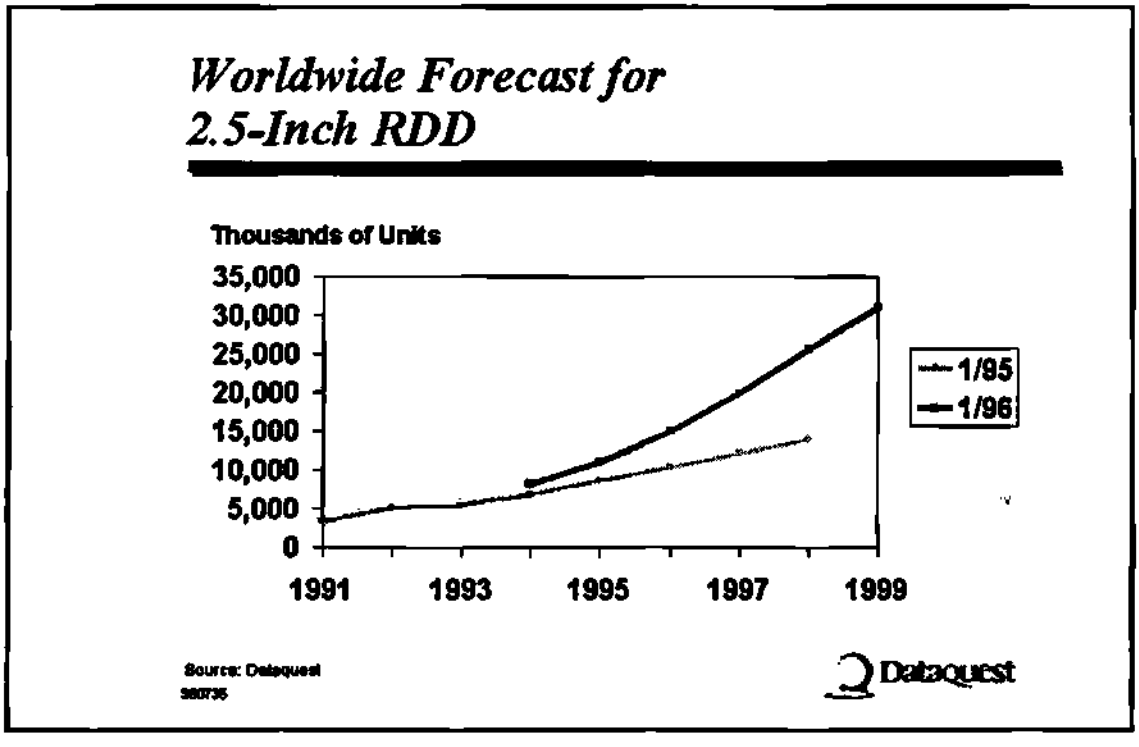


FORECASTS

In 1996 I am anticipating 115.8 million disk drives. In 1997, 137.7. Out in 1999, 182.5 million drives.

The only company that's producing any kind of quantities of 1.8 inch disk drives is Integral Peripherals.

The most interesting increase here is in the 2.5 inch world. You can see that we've made a very major adjustment here from our thinking in 1995, in January. Some of the reasoning here is that Intel is now producing motherboards. Intel is going to produce notebook motherboards.



Consolidation is another topic. Connor has finished its merger into Seagate. What will happen there we will know more in detail in the next few days as far as what products survive. Generally I can tell you that it will be the desktop products of Connor that will continue. Maxstor is now 100% owned by Hyundai.

Micropolis not only is selling its disk drive unit and all of its technologies for disk drives but also its name to Singapore Technology. That's not a done deal yet but it's going to happen.

A real interesting merger of companies at Phase Metrics with test and equipment companies. A lot of the bits and pieces it takes to make disk drives comes out of this new Phase Metrics. I think it's going to be a very successful marriage of technologies. I tend to think we are going to see a lot more of that as the days go on.

Some of the impact then of consolidation obviously will be better profits for bigger companies. If you take the Seagate model of the past two or three years since Dow has taken over, that will help bring a lot more commonality and sense to the industry.

PREDICTIONS

I think the consolidation, as I said, will continue. Quantum and MKE will continue to strengthen this relationship. I can't tell you how or when or why but I believe that you will see stronger and stronger ties between those two companies. Maybe even MKE getting involved in Quantum's head business.

Time for IBM to make it's move. Will they have the capital available to go out and buy a substitute disk drive company? Will they care? Will they become a 2.5 inch producer and forget about the rest of this stuff? Can they be successful in the next generation of MR products?

It is even more appropriate that Hewlett Packard make a final decision: Do they want to be a disk drive producer or not? I think that this decision will be made this year.

You have Western Digital - as I said - all shined up and sitting there as a disk drive company pure play. It is the only one that has not been consolidated into something; certainly a candidate.

I think the component companies are the next fatality. You will see disk drive companies probably buying up a number of the head companies and maybe even seeing some of the head media and chip providers consolidate into stronger and larger entities.

I think really we're going to see a good year with higher sales and higher profits than normal. The over production risk is still there and watch the second quarter for a glut, depending on how these inventories come out by the end of this quarter.

New product cycles continue to be hard and reasonably slow. MR heads will not be pervasive in the marketplace until 1997. You will see more and more companies announcing MR head products in the next few weeks. The availability of these heads and the ability to build these disk drives is still very questionable.

CONCLUSION

I really think that our two year boom and bust cycles are over, unless we get some renegade in there that really is going to fight for market share. It's time for a modicum of sense and big profits for everyone. Seagate is clearly the short term winner and I can't help but believe that they are going to be a long term winner too.

We basically have Seagate, Quantum, Western Digital and Korea as the major producers these days. Japan controls the magneto resistive head merchant output. What will the impact of that be? It will be real fascinating to see.

Note: Please refer to the companion "Verbatim Transcript Document" for the full in-depth discussions, detail, explanations, charts, graphs and the audience "Question and Answer" session.

Chapter 32: GROWTH IN THE EUROPEAN COMPUTER STORAGE MARKET

Joe Jura
Senior Industry Analyst
Storage Devices
Dataquest Incorporated

Agenda: Emerging Trends, Storage Distribution Channels, Impact of BTO PC's, PC's In The Home, Retail and Distribution.

TRENDS

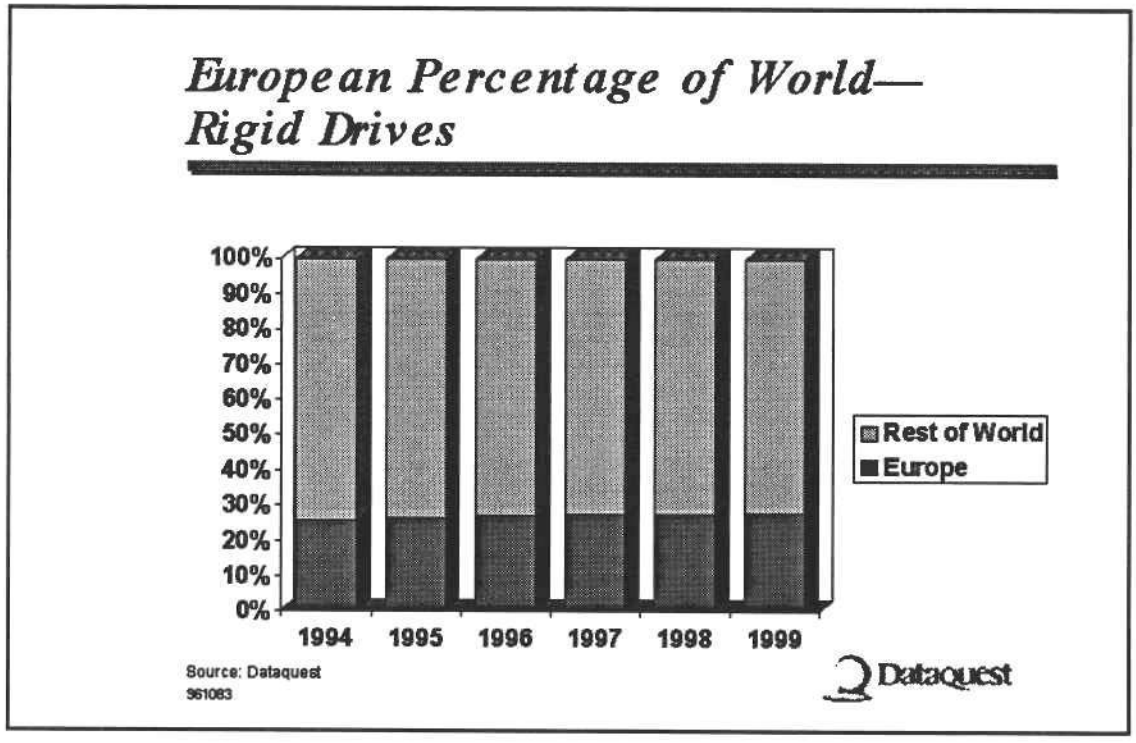
Opportunities are the same in America and in the Pacific Rim. The only differences, compared to America, is that our opportunities are typically maybe two quarters to five quarters behind the American market in terms of large volume uptake.

The point that I would like to make is that in the world most of the central office manufacturers, i.e. the exchanges for telecommunications, those companies are actually based in Europe. If you want to get a high penetration into capital expenditure of telecommunication companies, you should have people working in Europe. That would really be the one single difference versus world.

In terms of the profile of storage products across Europe, that it's going to accelerate faster than the norm. The reason that is, is because of the aftermarket uptake. What it's going to do is compress the percentage of other products, especially floppy drives.

If at the end of 1999, some of the cultural influences of Western Europe carry into Eastern Europe, then the total European market in 1999 may actually be two to three points higher than is shown here. This is a very difficult cultural issue.

The direct shipments we have now closed our counting is 23.4 million drives. That was a factory revenue of $5.3 billion dollars.



Quantum Corporation: We have an estimate of 6 million units for the year and 25.7%. Seagate Technology came second at 18.8. Seagate actually was the number one revenue earner in Europe, with $1.49 billion dollars, or 28% revenue share. Western Digital; a really super performance, 16.5% as the European share of world - where typically world for most manufacturers is about 28% - Western Digital, their European versus world was 31%. Western Digital did very well in Europe.

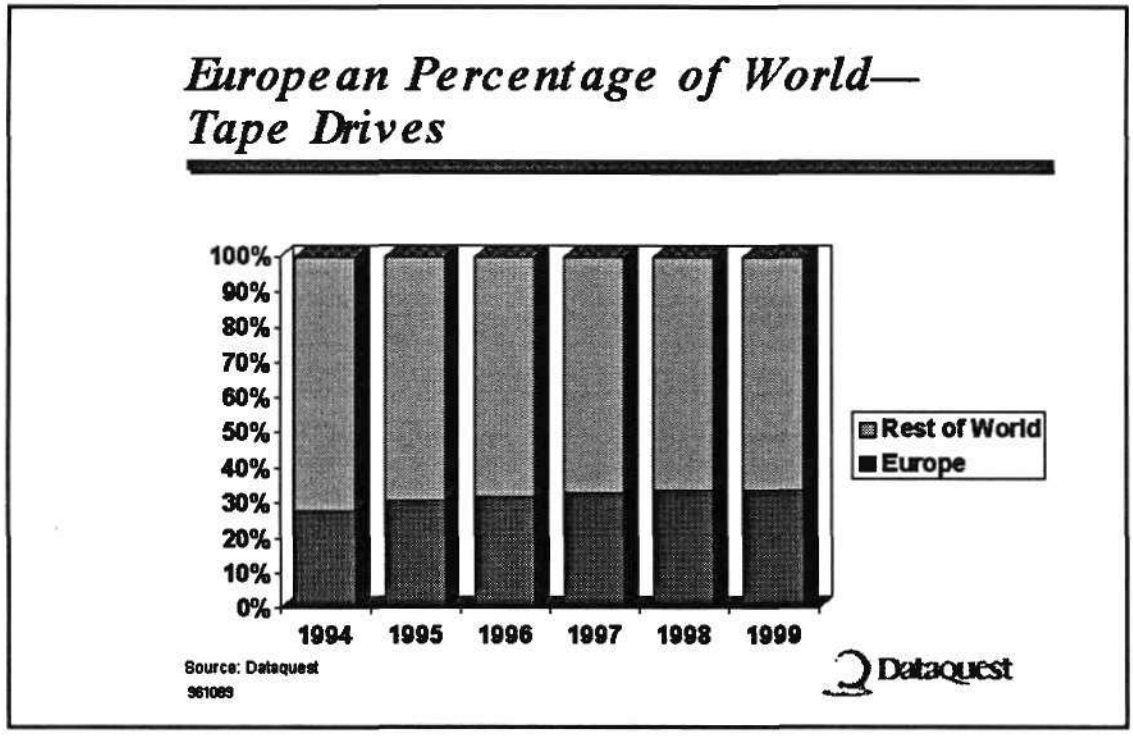
In the total market prices went up. In 1994, the average ASP of a 3.5 inch drive was $213 and a 3.5 inch drive in 1995 was $226. Constraints supply and higher value products push up the total value of the market.

Typically Europe storage represents around 27% of world. For tape, we actually have a higher uptake and that is because there is a higher recognition or a higher value of data and data protection. There is a higher incidence of use of tape on the European basis versus world. That's because Europe is a little more cautious with their data.

In terms of this market, again like the rigid market, it's U.S. focused vendors. The optical market is Japanese focused vendors. The real focus for 1996 and 1997 will be two areas: There will be a battle between Hewlett Packard, Iomega and Seagate in the mini cartridge market, which is the Travan TR1, TR3, TR4 markets. You are going to see very strong brand messages come to the market.

In the wings for perhaps 1996, 1997, 1998, is Travan TR5, TR6 products. We are going to see quite a large battle for that midrange market.

There is very little I can say about floppy drives. The only thing that I would say is that the role of the floppy will become unclear. The issue there is when writable CD-ROM drives will be available at a cost which will allow the floppy to be actually put away from the PC.



STORAGE DISTRIBUTION CHANNELS

Manufacturers, from their end of the business, actually want to reduce their cost of sale. Distributors want to make a profit because they have to do things like logistics, act as a bank and take bad debt from their customers.

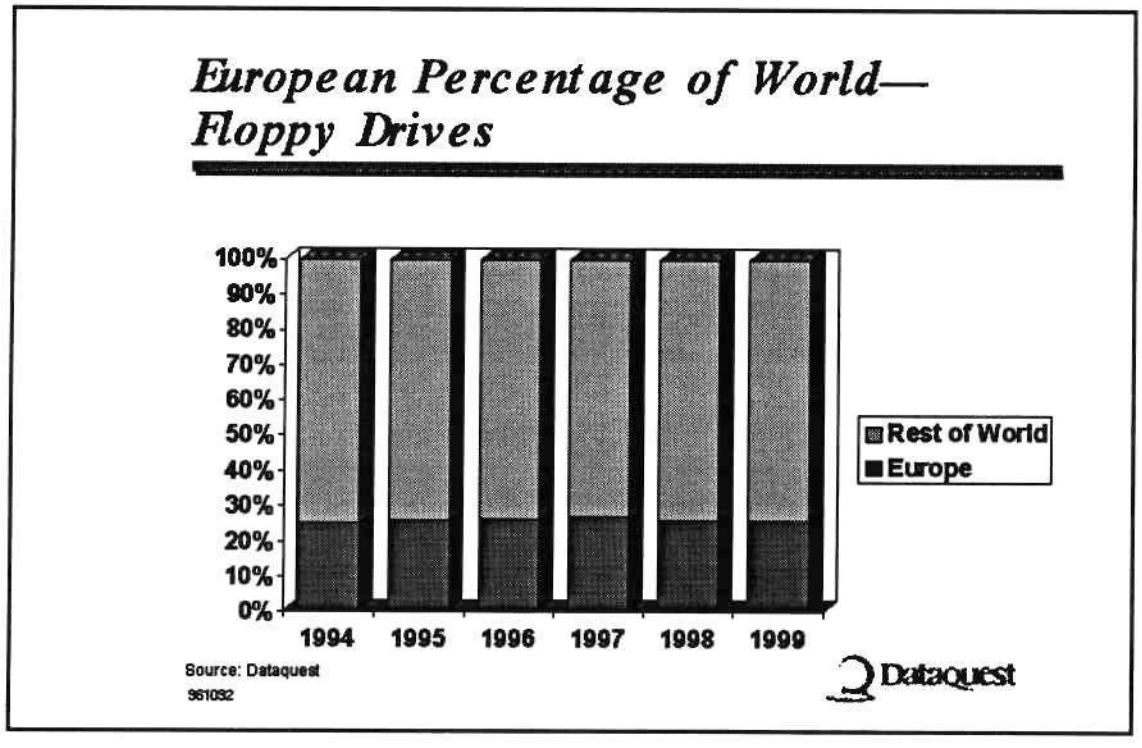
GROWTH IN THE EUROPEAN COMPUTER STORAGE MARKET

We track the sale of PCs, printers, communication products through these ten channels across 13 European countries.

For PCs we now have eight quarters of data. We have real data about how products are really sold. We can actually quantify the value of different channels across Europe and why they are important.

For instance: In Europe, as a whole the most important sales channel is the local dealer and the dealer chain. In Germany, it's the local dealer and retail. In the UK, it's the local dealer and fax phone.

The distributor, besides supplying product into OEMs, actually supplies product elsewhere. They have about 21% of the product to put into integrators in the aftermarket. We estimate that of the product going through, about 12% goes into integration, i.e. VARs, integrators, etc.



Europe retail has a very specific customer base. That is typically home and SOHO, i.e. very small office/home office. Retail here you have common

products, etc. A small company may actually go and buy products from effectively a retail outlet. That doesn't occur in Europe.

Why do people or how do people purchase PCs? For a business, when they have maybe 5,000 seats to fill, they are looking to fill with the most cost effective solution for the widest number of people. Whereas somebody who is in maybe in the training department wants multimedia because they are doing presentations, they are doing training; or somebody in the corporate office wants to do the corporate logo and distribute it to maybe 50 offices. Their requirements across the company are going to be quite specific.

Consumers, however, are typically what we call info rich. They have a large disposable income. They typically are not overly concerned about their expenditure.

The only down side is consumer sentiment. How do they feel about the economy? How do they feel about their jobs? Are they one of this 26% that responded that they are a little bit uneasy about their job security? That may defer their purchase. There is a lot of criteria about why a private person will buy something.

In terms of the professional market, about 15% of PCs shipped in 1995 had a CD-ROM; whereas for the private market in 1995, it was 71%, our current estimates for 1995. You can see that the perceptions and the values are quite different across the different purchasing groups.

Let's look at what formats are bought in Europe. The major format is deskbound, i.e. deskside, desktop. Mobile computers is quite small. In fact, in 1995, the total number of mobile computers sold were about 2 million. The number of 2.5 inch disk drives old was about 1.4 million.

What we can see is that mobile computers are not wholly made in Europe. They are mainly made in the Pacific Rim. What we are seeing is that there is an aftermarket or other applications which require 2.5 inch.

When we looked at desk bound products, we looked at about 14.5 million desk bound products being sold. In terms of 3.5 inch disk drives, about 22 million drives were sold.

BUILD TO ORDER PC's

This is a different issue to different people. Across Europe, we have looked at six discreet logistics build models for PC manufacturers. Build to order can be - for a very large multinational company, who has EDI links to all of their dealers - taking that phase incoming from orders and actually making to that order out of a stock item.

Build to order can also be a company which specializes in building small numbers of anything you want. There is a wide range of build to order.

Build to order has an added dimension. As of January 1st in Europe, there is something which is called CE approval. This means that PC manufacturers or manufacturers or sellers of all sorts of equipment have to comply with legal and safety requirements and also susceptibility requirements.

In the future, when you are looking at the aftermarket, you are going to be selling a product or subsystem which is going to be attached to something else. There will be a gray area of compliance by virtue of the sale.

PC's IN THE HOME

In Europe, there is a very strong sentiment for this private market. What we are looking here at is a mixture of new sales, replacement sales and additional sales. Some of these people don't have a PC today, their income is larger, or they may have reasons to work from home for a number of days.

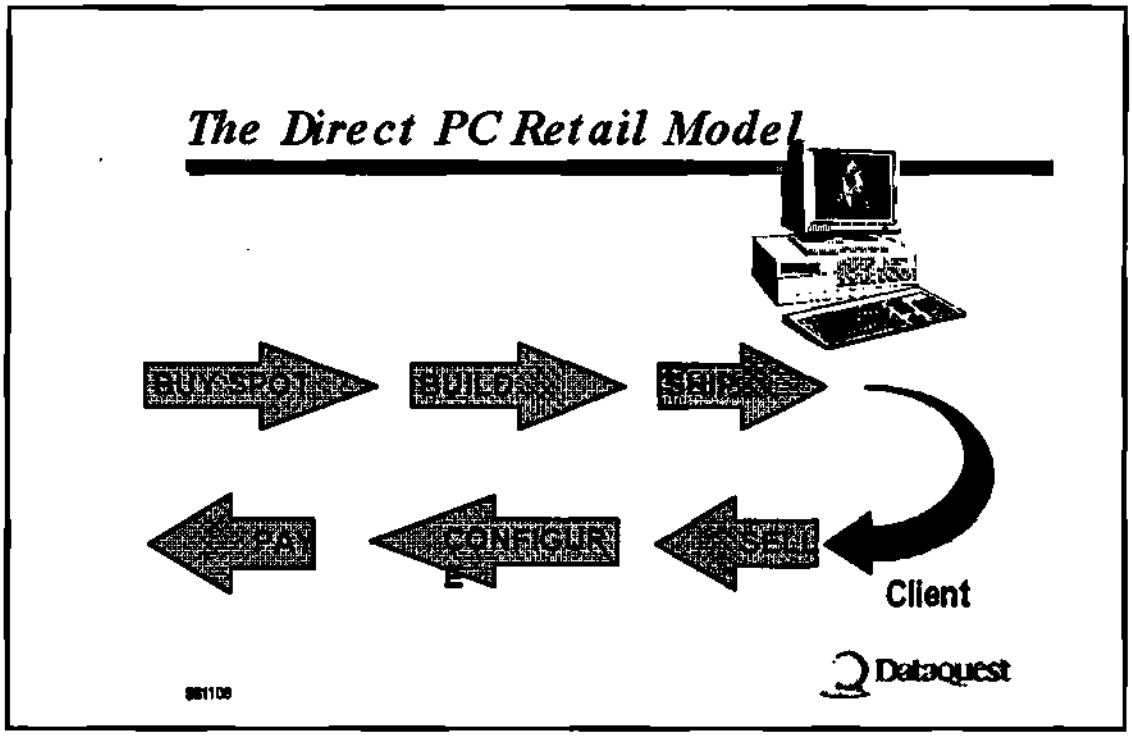
Some people may have maybe a 386 or a 486 and the work that they are doing requires maybe a Pentium. Other people actually may want or have found that to support their children who now have a very fast machine with games, etc., they don't have enough time to work at home on their PC. They need an additional one.

The thing to remember is that the typical purchaser, such as these info rich that have above average disposable income but typically below average disposable time.

RETAIL

The retail type PC model is very much like the fast food model. They might not be able to buy smart but they definitely build and ship. What they are doing is pretty much like the garment industry. They are actually buying or building consignments.

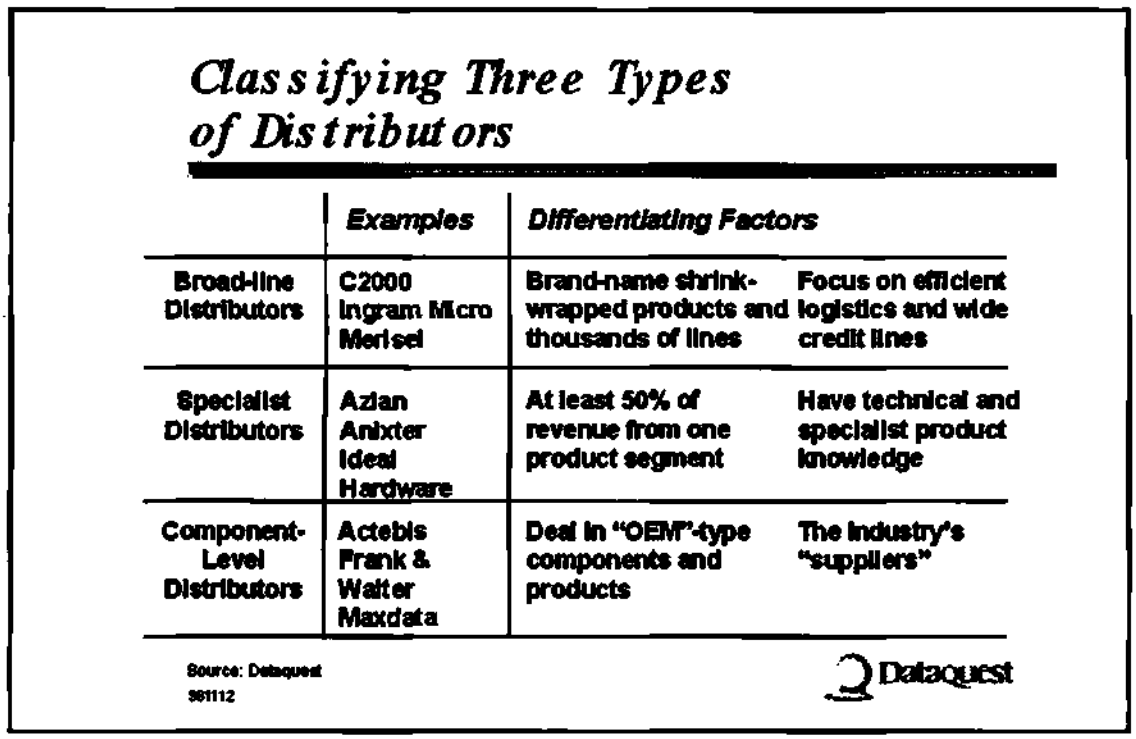
In the retail market, these retailers may run four or six fashions a year. They will decide what is going to be their hot product for the next two months and go and build it. They will then change it for the next two or three months.



In the end of 1994, when most of the major big brand companies were just introducing Pentium type products, these people already had a higher rate of Pentium sales. These people already had a higher rate of CD-ROM sales, or multimedia sales.

The interesting thing is because they have their own shops, they can actually configure the products. Even though they have a short list of products in their basket to sell, they can actually configure within their shop.

They are close to their customers. They configure at point of sale. Because they configure at point of sale for new products, these people are the ideal candidates to take these customers who come back who don't have enough time to upgrade their own PC. They can bring their PC back and it will be upgraded for them. This is also an interesting way of putting product into the aftermarket in an easy way for an info rich customer.



DISTRIBUTION

We look at basically three different types of distributors. A specialist distributor is a company which gets 50% of its revenue from a particular technology. They are a storage distributor. They are a network distributor. They are something else but a specialist. Typically they are running in the 14%, 18%.

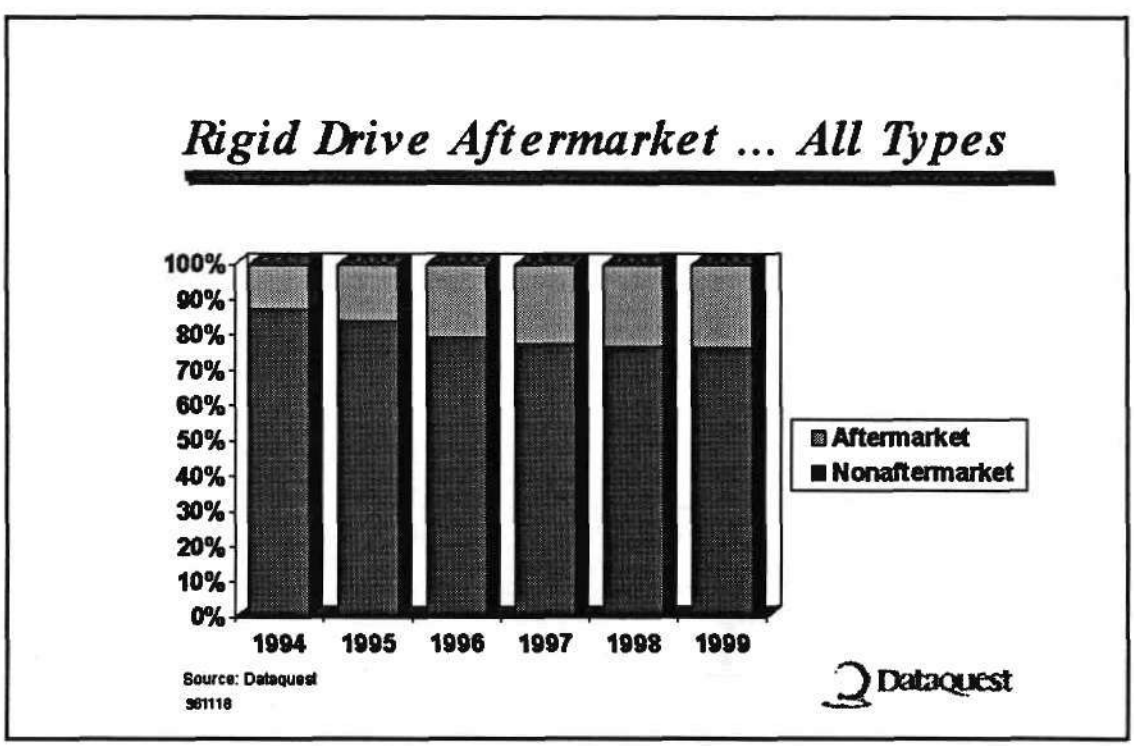
We have some component companies, which can actually run at a profit at around a 3% margin. Such a company can actually turn maybe 2 million drives per year.

The broadlines may not give you the highest volume of products. The specialists are very interesting because they give you a lot of brand loyalty. What they offer is a lot of technical support. Getting to a dealer is very important.

Pan European distribution is a good idea. The people that you deal with are financially stable. They have good logistics. You have something called marketing synergy. If you have a lot of Pan European resellers, they are ideal partners. The bad news is that there are not many Pan European resellers. Most resellers are small organizations and typically national.

In Europe, most of the retailers are very large. If you took the top 200 companies in Europe, you would find that the majority of manufacturers will be retailers. Retailers are very powerful. They have a lot of economic clout.

AFTERMARKET



If you looking at going into an aftermarket, the proportion of which is retail; you actually need a set of skills. You may already deal with an OEM who you have an EDI link with. You have an EDI package which relates to that and connects to that. In matching, you now have to have an EDI link with maybe five retailers in each country.

Each of these retailers have a totally different EDI link, front end, etc. How are you actually going to respond to that? In fact, you may not even be given the option of responding to the retailer. You may actually be told that this retailer has a specific distributor that you put a product into and the distributor actually passes the logistics. It's a totally different way of working.

The most important thing that performance is not about is how many disk drives you sell. It's store related. It's a performance measurement on sales out. It's the profits per square foot. It's the sales per store.

The most important thing: You need to actually excite the end-user with loyalty and he also needs to be satisfied.

Note: Please refer to the companion "Verbatim Transcript Document" for the full in-depth discussions, detail, explanations, charts, graphs and the audience "Question and Answer" session.

Chapter 33: OPTICAL DISK DRIVE INDUSTRY: WHAT IS THE MIGRATION PATH?

Mary Bourdon
Senior Industry Analyst
Optical Disk Drives
Dataquest Incorporated

Agenda: CD Technology, Significant Events, 1995 Review, Issues; CD Recordable, CD erasable or DVD ROM?, What is the Future of MO, Power Drives and the PC Side.

CD TECHNOLOGY

The CD technology finally -by 1984 gone through its right of passage. It has now finally come into its own. Of course, it was the year for the establishment of new standards.

In the optical drive industry, in the preliminary look, the worldwide optical market; now this includes everything: Magneto optical, 12 inch WORM drives, 5.25 inch, MO and all of the CD technology. These came to about 29.2 million units that were shipped from the factories. That represented $3.5 billion dollars of factory revenue.

Of that, CD-ROMs are really the only devices that are considered mass market. They comprise 97% of the 1995 worldwide optical shipments. That represented $2.9 billion dollars of factory revenue.

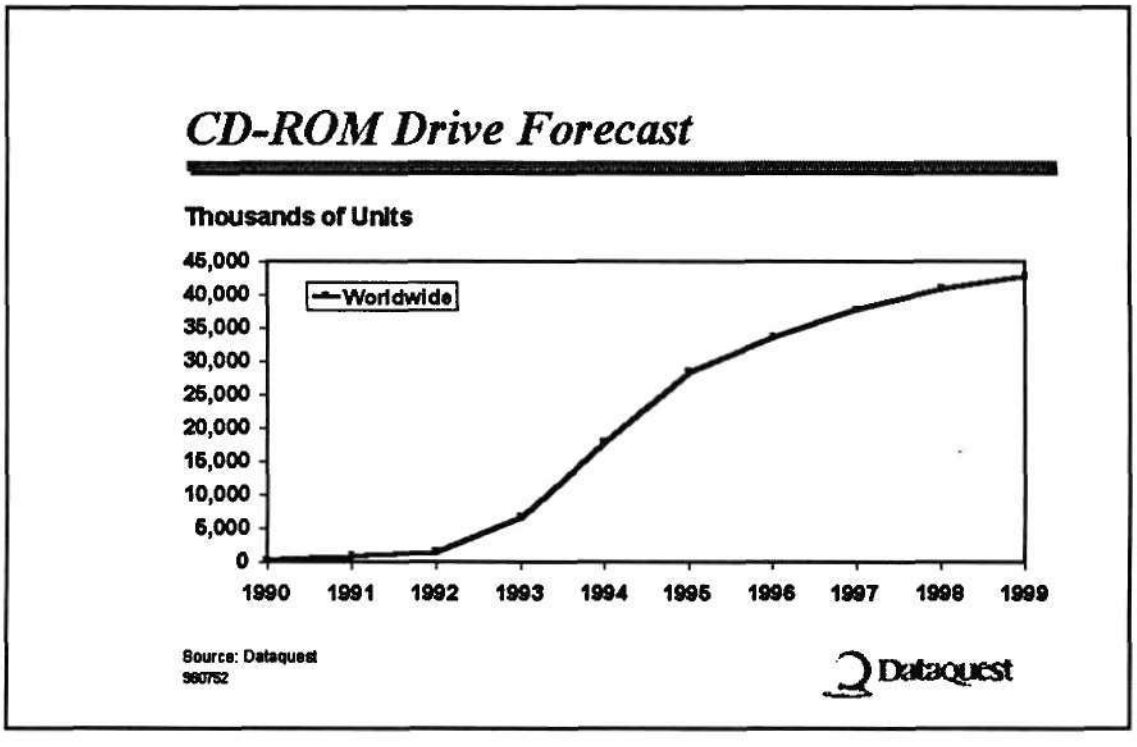
SIGNIFICANT EVENTS

The six, eight and 8x CD-ROM were either announced or delivered. We saw that happen in the second half of 1995. Certainly there were announcements and showings of 6x and 8x at COMDEX.

The mentality in this particular market seems to be the first to market will be the winner. As we know, this is not necessarily so. Evidenced by the fact that there was an announcement of an 8x CD-ROM drive, it hit the shelf but we are aware that the quality is not extremely high.

Certainly the 6x CD-ROM, a high quality one; the first one to come out was by Plextor. They have a very good reputation for producing high quality drives.

We saw for the first time that CD recordable fell below the $1,000 street price. A very significant event. It took a long time for this to happen. I believe that the success of CD recordable will be due in part to the fact that HP, Hewlett Packard, has endorsed the product.



1995 REVIEW

The top three suppliers - Panasonic, Mitsumi but Sony - shipped more than 75% of the total units shipped. Certainly the 4x speed drives were in the mainstream products. Street prices started to hit below $100. OEM prices were well below that but so they were designed into the PC systems and shipped with the systems.

The 6x and 8x speed drives were announced. We saw some appear on the shelves but I do believe that this year - 1996 - we are going to see a much higher quality 8x drive hit the market.

Right now these are very preliminary numbers, as far as the attach rates. We think that on the PC attach rates, the new consumer of PCs that were shipped, 75% of them had a CD-ROM drive attached. The installed base of PCs will account for 25% of the aftermarket CD-ROM drives.

We believe it will flatten out in the coming years due to several factors. As we approach the saturation rate on PCs but of course when DVD ROM enters the market and starts to ramp up in the 1997 time frame.

Turning now to the 3.5 inch re-writable; undoubtably this technology is successful in Japan. Not as much so in the rest of the world. One of the main reasons is that the PCs in Japan are not networked. This is like advanced Sneaker Net.

As for the preliminary 1995 results: Approximately 550,000 units were shipped worldwide, representing $250 million dollars in factory revenue. We are fairly conservative in the life of the 3.5 inch MO, because we do believe that other technologies can out-perform the drive for lower prices to accomplish the same things, such as back up of files.

As far as 1995 goes, we do expect to see approximately 160,000 units shipped worldwide, representing $268 million dollars in factory revenue.

Another interesting thing that has happened this past year also is that Pinnacle Micro made an announcement of their APEX drive of 4.6 gigabytes. There was a lot of excitement about that but we do believe that it has brought new attention to the MO technology.

As for optical libraries, HP and Plasma IDE did introduce their 2.6 capacity versions, the drives within the libraries. HP clearly remains the leader with over 60% market share, although they didn't announce the 2.6 until last month.

The other players do not have a significant market share, as far as we can tell from 1995. It's not a clear indicator yet as to whether or not the market is growing, or if there is a wait and see attitude to see what is going to be happening.

In fact, in 1995, we saw very little change in factory shipments over 1994. It looks like it's about the same. It could have been caused by a couple of players exiting the market. There was a slowdown perhaps in the anticipation of 2.6 media drives.

ISSUES

There are four major issues:

CD Recordable

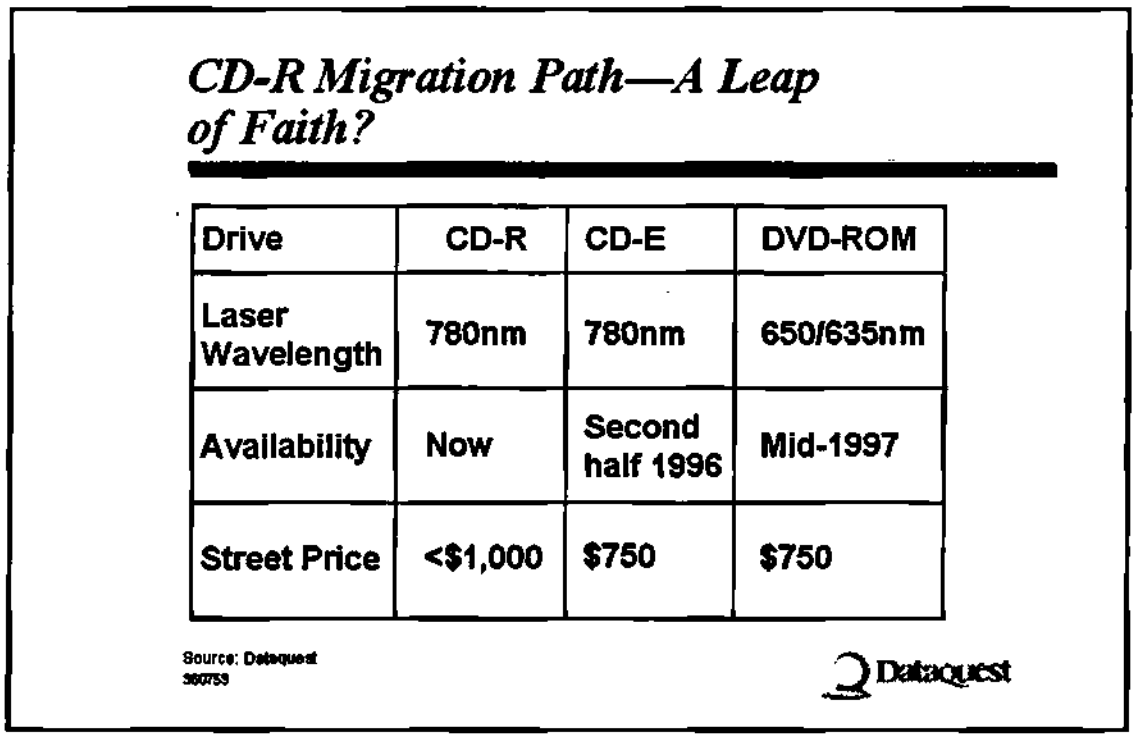
Where does it fit in the big picture? One reason it's a very hot issue is because if you record a piece of CDR media today, it cannot be read in a DVD ROM drive. The issue is the reflectivity. On just a lay person's kind of analogy, it's dye based. It's blue, bluish green dye. When it's being read by a red laser, it has a tendency to absorb the light; therefore, we can't get the reflectivity out of it. It's a major issue but there is awareness in the industry about it. I am being told that this is being addressed. Companies need to be aware of it.

CD erasable or DVD ROM?

As far as CD erasable, there are a few companies behind developing the CD erasable drive. We are told that whatever is recorded in the CDR drive will play on but can be read by a CD erasable drive. There is no problem there.

Today CD recordable drives have hit now below the $1,000 street price. By the time CD erasable makes its appearance in the market, this price will certainly have come down to maybe by the end of the year $500. My theory is that CD erasable will be no more than 50% higher than a CD recordable drive.

The media for CD recordable will probably be on the average of a $5 street price in 1996, by the end of the year. This means that the storage on this media is extremely inexpensive. That's the inexpensive part. If you have to convert your files, or whatever you have stored on there, it's like having a disposable disk. That's not where the expense will be in if you have to convert your data to another medium. The expense will be involved in copying it off and re-creating it and the resources that will be required.



DVD ROM: We are expecting for it to ramp up in mid 1997. There is a lot of talk now that it will be ready by the end of 1996. Realistically we believe that it will be a little bit later. I think everybody is trying to figure out where is the sweet spot to introduce these drive prices.

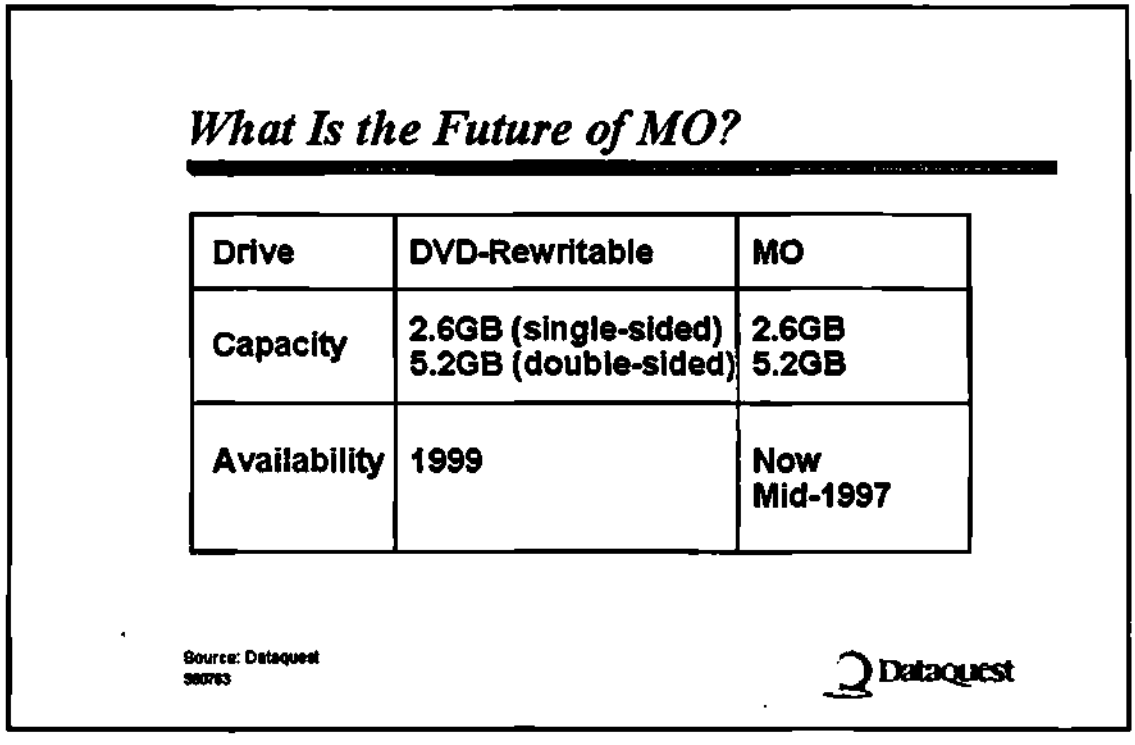
We just published a preliminary forecast for CD recordable drives. and I want to share with you the assumptions first as far as what we see. It's a very fine technology. By the end of 1996, we are expecting to see OEM pricing drop to the $250 to $300 level. We are also expecting to see that drive be a 2x record and between a 6x and 8x read. That is the reason why our projections for the CD erasable drive would be about 50% above that as far as the street price level.

The next assumption is that a 4x speed CDR will maintain an average price of twice that of a 2x speed CDR. We already have witnessed that: Yamaha in the last week dropped their 4x record CDR price to $1,499. If everything is true to form, CDR will probably be at that $750 price in the next few months; so they are right on target, twice that as the 2x drive.

We believe that CD erasable will impact CD recordable but not adversely. In other words, when CDE is here, it will not replace CD recordable. There is a

place for CD recordable. The media is inexpensive. CDE fills a separate application altogether but that is more in the area of back up. CD recordable is in the archiving kinds of applications.

We also believe that the shipments will start to flatten out when the recordable DVD ROM version comes out, or a combination recordable/re-writable DVD drives ships by the end of 1999.



WHAT IS THE FUTURE OF MO

The next issue involves a technology which I am not prepared to forecast as seeing its demise by the year 2000 but I certainly have questions about the future of MO. I know it isn't fair to compare MO technology with DVD re-writable. There are too many differences.

The first, however, kind of like comparison is in the capacity area. We have 2.6 gigabytes today. By the time DVD re-writable is ready - or as far as we know - at best you will get 5.2 gigabytes double sided. Not until the year approximately 1998, 1999. We do believe we are seeing that the increased capacity on MO, if

everything goes well and the standards are accepted, that 5.2 could be here in 1997. It would have a so called leg up on the capacity race.

The performance issue MO drives are certainly transfer rate wise much faster than what we believe that DVD will be. Of course, we have to contend with the capacity race but of course the one major issue will obviously be price at that point in time.

For MO, in my opinion, to really compete effectively we are going to need to see a major breakthrough in price performance. It may have to take on 12 inch technology to really gain a large presence as a storage device in the future. We will be tracking that - obviously - very closely. If nothing else, it could but perhaps will remain a niche market.

POWER DRIVES

The last issue is what is the future of PD, the power drive. Right now it's fact face change is not a commonly accepted standard in the 5.25 inch optical community. The OEM price is still too high. I do understand that it has been declining to make it more attractive for more PC manufacturers to design the drive in. The media, street price wise, is still hovering around the $59 price, which is our opinion is still too high. We have not seen a drop in the media price.

It's a good product. If they come out with a more economical interface, meaning IDE versus SCSI - for instance - and faster CD-ROM speeds, namely 6x or 8x, then the product may be something to contend with. I believe that this will be a very telling year.

I believe that CDR will not be a mainstream product for a lot of the issues that I already mentioned but one is certainly the re-writable issue; and some the other issues that need to be resolved that are facing the industry right now.

CD erasable - I believe - could be; and I will go and say it will be the ultimate floppy. The reason that I say this is it will have to have the following parameters, however. The factors in the equation will have to be that the OEM price is $50 or less, so that it can be designed into a PC. When will we see that? Maybe not until 1998 or 1999.

This isn't really a prediction but it's more of a statement of DVD being hyped. We have the consumer side. We have the DVD ROM side of it. We are hearing a lot

of projections - mainly by the manufacturers who are driving this. When you really stop to think about it, the first claims were that the set top players would be $500 or less by Christmas.

We have to keep in mind that it is not recordable. We firmly believe that for a consumer electronic device to be readily accepted in the marketplace and bought in great volume would have to be at least at the $150 price point.

THE PC SIDE

On the PC side of it, we are going to be facing the issues of what are you going to do with all of the capacity? They say that nature abhors a vacuum. I am sure that that capacity will be filled up but I am not convinced yet that there will be practical applications for that capacity on a PC just yet; other than a multimedia application, which is not as far reaching as what you can possibly do in the PC environment.

Then all roads ultimately lead to ROM, DVD ROM, DVD. When will that happen? Not until 2000 and beyond. If you keep in mind that it is based on a CD standard that is widely accepted, evidenced by the fact that CD-ROM drives; every kid now knows when they are growing up what a CD is. There is too much money backing up this new technology that I believe that it is going to be a widespread mass market peripheral, probably after the year 2000 but certainly into the 21st century.

Note: Please refer to the companion "Verbatim Transcript Document" for the full in-depth discussions, detail, explanations, charts, graphs and the audience "Question and Answer" session.

3

A

B

C

D

Index Table

L

M

N

O

P

Q

R

S

T

U

V

W

TO ORDER...

- **Additional copies**
- **Bulk reprints**
- **Electronic versions**
- **Company internal network site licenses**
- **...Or transmittal by other forms or means**

CALL (800) 457-8233 or (805) 298-3262

Dataquest Transcript Services
26524 Golden Valley Road, Suite #401
Santa Clarita, CA 91350

Produced and edited by Market Makers