



THE GREATER PHILADELPHIA INFORMATION TECHNOLOGY REPORT

CREATING WEALTH
AND OPPORTUNITY
IN THE REGION

AUTHOR

Paul Morin

SPONSORS

Bank of America Private Bank
Sol C. Snider Entrepreneurial
Research Center of
The Wharton School

ABOUT THE AUTHOR

Paul Morin is a principal of Vector Strategic Management Group, LLC. The firm provides strategic advisory services on corporate venturing, mergers and acquisitions and corporate private equity initiatives. Paul has worked with numerous companies ranging from emerging growth stage to Fortune 100, with a particular focus in information technology. He holds undergraduate and MBA degrees from the Wharton School of the University of Pennsylvania.

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Bank of America Private Bank
Two Radnor Corporate Center
Suite 120
Radnor, PA 19087
610/902-6125

Sol C. Snider Entrepreneurial Research Center
3733 Spruce Street
4th Floor Vance Hall
Philadelphia, PA 19104
215/898-4856

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MESSAGE FROM THE SPONSORS

The Bank of America and the Sol C. Snider Entrepreneurial Research Center of the University of Pennsylvania's Wharton School are pleased to present this report on the current status and future growth potential of the Greater Philadelphia region's Information Technology ("IT") industry.


This research collaboration was born from a desire to explore Greater Philadelphia's strengths in information technology while also identifying challenges to growth, and to compare the region to others that are recognized as leaders in this quickly evolving industry. We hope that this study will advance understanding of the region's IT sector and will encourage investors, entrepreneurs, and knowledge workers to explore the opportunities this region has to offer.


As the home of The Wharton School and an important market for the Bank of America, Greater Philadelphia's success in this sector is both desirable and essential. Both the Bank and the School began this study with a feeling that Greater Philadelphia's IT sector is bigger than most people realize and is poised for even more growth.


This study supports our hunch and highlights a number of regional strengths and positive trends in information technology. The region has supported the growth of a critical mass of large and small IT companies with particular competencies in software, information and communications. Because these companies' primary strengths are in "business-to-business" applications rather than consumer-oriented services, many of the larger and more successful companies are not well known in the public realm — but are fierce and profitable competitors within their IT niches. The region's exceptional talent base, strategic mid-Atlantic location, developing reputation as a leading scientific research center, access to capital markets, critical mass of technology companies, and strengths in financial and health services can all help to support the growth of competitive, world-class IT companies in the new millennium.

As Greater Philadelphia hosts dramatic success stories like VerticalNet and CDNow, and as new incubators foster more innovation and entrepreneurship — including startups from our area's great universities — Greater Philadelphia is poised to enter a new era of growth in e-commerce and information technology.

We are pleased to support this important study, and we encourage the nation's information technology community to take a closer look at today's "Route 202 Corridor" and at Greater Philadelphia. And be sure to look again tomorrow — for Greater Philadelphia's information technology sector is on the rise.


Mark Dane Fraga
Managing Director
Sol C. Snider Entrepreneurial
Research Center
The Wharton School,
University of Pennsylvania


Deborah L. Chimento
Senior Vice President
Bank of America Private Bank


Ian C. MacMillan
Academic Director
Sol C. Snider Entrepreneurial
Research Center
The Wharton School,
University of Pennsylvania

SUMMARY OF KEY FINDINGS

- Information Technology has become the largest industry in the United States, both in terms of manufacturing employment and total revenues. In one indication of the Greater Philadelphia region's contribution to this overall national picture, the regional IT company database built for this study contains 165 such companies. Since that database focuses on established and rapidly growing IT companies, it is fair to assume that there is a large volume of startup and early-stage companies that is not captured there.
- According to the PricewaterhouseCoopers MoneyTree™ Survey, venture capital (VC) investments in the United States reached an all-time high of more than \$14 billion in 1998. Investments in IT companies in 1998 represented 66% of this total, up from 60% in 1997. Anecdotal evidence also indicates that this trend toward increased investment in IT is accelerating.
- The number of Greater Philadelphia IT deals funded by venture capitalists in 1998 (46 deals) was 44% higher than it was in 1995. Although it is agreed by most that there is still a gap in capital availability for seed stage IT ventures in the region, the growth in the total number of IT deals is consistent with anecdotal evidence from this study's interviews. Many interviewees suggested that the volume of regional IT venture investment activity has grown significantly over the last several years and continues to gain momentum.
- The strength and continued importance of the healthcare sector in Greater Philadelphia is reflected in the fact that during the period 1995 to 1998, 42% of all VC dollars invested in the region were in healthcare. That compares to 37% invested in IT during the same period. The prominence of healthcare VC investment in this region compares to just 14% and 22% of VC dollars being invested in healthcare in the Silicon Valley and Washington, DC regions, respectively, during the same period. In those regions, the focus on IT is apparent, with 81% and 66% of VC dollars being invested in the Valley and the DC regions, respectively, during the same period. In those two regions, there also has been an increasing tendency toward focus on IT investment, whereas in Greater Philadelphia, the gravitation toward IT investment and away from healthcare has not been as apparent from the data.
- The IPO (initial public offering) market for venture-backed companies decreased significantly in 1998 relative to the two previous years. The public market appetite for all but Internet and "brand name" offerings essentially dried up according to the data and according to many of the interviewees for this study. This reality has left many promising IPO-ready Greater Philadelphia IT companies in dire need of growth capital.
- While volume of business startup activity in the region is important, it alone does not determine a region's reputation or standing as a "hotbed" of entrepreneurial activity. This is illustrated by the fact that over the last decade, Massachusetts with its Route 128 corridor, long known as a mecca for entrepreneurs, has had less total startup activity *every year* than either New Jersey or Pennsylvania.
- This region is not lacking in wealthy individuals, many of whom are part of "angel" investor groups. Although there are notable exceptions in the angel community, according to most interviewees, the number of such investors in this region that understand IT

deals is very limited. Given that most institutional investors do not invest in seed and early stage IT deals, for many IT CEOs this has led to a frustrating case of, as one interviewee put it, “water everywhere, but not a drop to drink.” There are several specialized IT incubator and angel initiatives currently underway in the region that should help address this capital availability issue and the further issue of “value-added capital.” For many early-stage IT companies, access to industry knowledge and contacts are as important as the dollars invested.

- The diversified nature of industry in Greater Philadelphia makes it more difficult to understand and “value,” and thus less likely to be recognized for the significant contribution many would argue the region makes to the national and global economy. In the Information Technology area, this effect is compounded by the fact that many of the IT industry sectors in which the region excels sell into “business-to-business” markets, which by definition are not as well known to the average consumer.
- This study included the construction of a sample of 165 IT companies in the Greater Philadelphia region. Although the sample contains 11 companies with more than \$1 billion in revenues and 27 with more than \$100 million, it has only one of this size – Comcast – that provides “self-branded” consumer products or services. So, it is not surprising that most people (even many IT executives interviewed for this study) are not aware of the significant volume of IT activity taking place in this region.
- News reports and primary and secondary data gathered during the course of this study suggest that many companies in the region are taking “Netification” steps to increase their real and perceived value in the market. In a move taking direct advantage of the “Internet company” valuation phenomenon, one regional sample company, Sanchez Computer Associates, recently announced its e-PROFILE.com strategy for Internet banking. Sanchez is an established software company with more than \$40 million in revenues, yet this acknowledgement of the Internet in its strategy helped its valuation triple in just two months. This is testimony to the potential power of embracing the rapid changes taking place in the IT sector.
- Based on sheer number of companies uncovered for the sample database and on relative market capitalization, Software, Information and Communications category companies seem to play a disproportionately important role in the IT sector in this region. A closer look reveals that many of the companies in the sample database are focused on serving two key vertical markets: Financial Services and Healthcare. Further, it appears that many of the IT companies in the region, particularly in the Software category, have specialized in developing applications to facilitate and optimize such key business functions as sales force and customer relationship management. Not coincidentally it seems, such functions are of particular importance in financial services and in some segments of the healthcare market, such as Pharmaceuticals.
- Some challenges such as traffic, taxes, “tech-savvy” angel capital and the availability of technology employees were cited by interviewees (see Appendix 1) as issues impeding the growth of the IT sector in the region. These are common afflictions in many successful IT regions, and few interviewees felt that these issues were of a sufficient magnitude to stop the momentum being created in Greater Philadelphia’s IT sector.

INTRODUCTION

OBJECTIVE OF THE STUDY

The main objective of this study is to describe the current status and growth opportunities of the Information Technology (“IT”) sector in the Greater Philadelphia region (“the region”).

OVERVIEW OF THE METHODOLOGY

This study is based on a multifaceted approach to finding “answers” about the state of the region’s IT sector. Extensive personal interviews were conducted over several months with 70 regional IT CEOs, senior managers, venture capitalists and service providers. Hundreds of IT industry articles, studies and publications about Greater Philadelphia and beyond were reviewed. In addition, a database of more than 150 key Greater Philadelphia public and private IT companies was compiled and analyzed. Finally, an index of regional public IT company stocks (“Greater Philadelphia IT Index”) was created and compared to well known stock indices.

This story is not yet complete. There is a lot more research and analysis to be done. But this document synthesizes a great deal of data and, through analysis, adds a few fresh insights to the collective understanding of the IT sector in Greater Philadelphia.

DESCRIPTION OF THE GEOGRAPHIC AREA OF FOCUS

Although an argument can be made that the region could be expanded, this study defines the Greater Philadelphia region as that area roughly bounded by Princeton to the north and east, Wilmington to the south, and West Chester to the west of Philadelphia. According to Bureau of Census estimates, the population of this area is approximately 6 million persons¹.

Philadelphia, one of the five most populated metropolitan areas in the country, is located near the center of this, one of the most densely populated regions in the country. In a slightly expanded definition of the region, which would include Washington DC and Manhattan, more than 35 million people are located within a two-hour drive of the City of Philadelphia. To the extent geographic proximity is still an asset, Greater Philadelphia is extremely well positioned.



DESCRIPTION OF THE INDUSTRY FOCUS

There are many potential ways to define “IT.” The American Electronics Association (AEA), an oft-cited reference source on IT, has a definition for what it calls “high-tech”. Its definition includes three broad categories – manufacturing, software and computer services, and telecommunications services – then a number of subcategories within each. The aggregated categories are comprised of 45 SIC codes chosen by the AEA to be the most complete and trackable representation of the “high-tech” industry.²

Although AEA’s definition is sound and comprehensive, this study uses an alternative definition of “IT” based on the industry segments tracked by the venture capital research survey conducted by PricewaterhouseCoopers (PwC) – the “MoneyTree Survey.” This definition was chosen because it is straightforward and covers much of the same ground as the AEA definition. The PwC survey divides IT into five categories:

- **COMMUNICATIONS (COMM)**
Cable, telecommunications and some Internet companies are included in this category. An example of a regional company in this category is WorldGate Communications – with its WorldGate Service, it enables cable television subscribers to access the Internet through their televisions.
- **COMPUTERS & PERIPHERALS (HDWR)**
This group includes manufacturers, retailers and distributors of computers, components and peripherals. A regional company that fits into this category is Divicore (formerly Quadrant International) – a maker of digital video cards for PCs.
- **ELECTRONICS & INSTRUMENTATION (ELEC)**
Includes manufacturers of electronics and instrumentation – about 90% of which are IT related. An example of a company in this category is Technitrol, Inc., a manufacturer of electronic components.
- **SEMICONDUCTORS AND EQUIPMENT (SEMI)**
Included here are manufacturers of chips, semiconductors and related equipment. An example is inTest Corporation, which designs and makes docking hardware and test head manipulators used by semiconductor manufacturers.
- **SOFTWARE & INFORMATION (SOFT AND INTG)**
Software developers and custom solution providers are included in this category. Some examples in this category include Ripple Technologies, a network management software developer; Bentley Systems, an engineering software developer; and Sanchez Computer Associates, a developer of software for large financial institutions. For analysis of the IT company database later in this report, this category has been segmented into two sub-categories: Software and Services (SOFT) and Integrators (INTG).

This approach to defining the IT sector was selected because it is easy to understand and relatively current with the rapid changes taking place in the industry. Because venture capital investment typically is made toward the beginning of a venture, rather than later in its life, venture industry classification schema tend to need to change more rapidly just to stay up with current industry terminology. Such has not been the case in the past with the SIC code system. For analysis of some data, particularly data about jobs sourced from AEA publications, the AEA definition will be used, but as stated above, it covers virtually the same ground. The use of the term “IT” in this report corresponds closely to AEA’s use of the term “high-tech”.

NATIONAL TRENDS

INFORMATION TECHNOLOGY

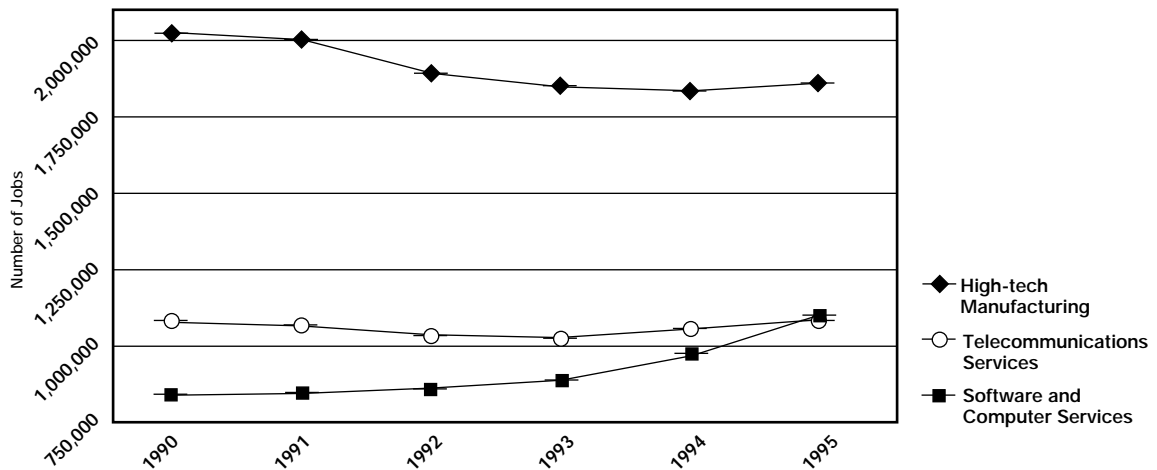
“If the automobile had followed the same development cycle as the computer, a Rolls-Royce would today cost \$100, get one million miles to the gallon, and explode once a year, killing everyone inside.”

Robert Cringely

IT has become an increasingly important element of the national economy. According to the American Electronics Association, the United States IT industry employed more than 4 million workers (in all segments) in 1995. Equally important, IT jobs pay well – in 1995, IT workers earned on average \$46,986, which was a full 71% more than the overall average wage of \$27,440 for U.S. private sector workers.³

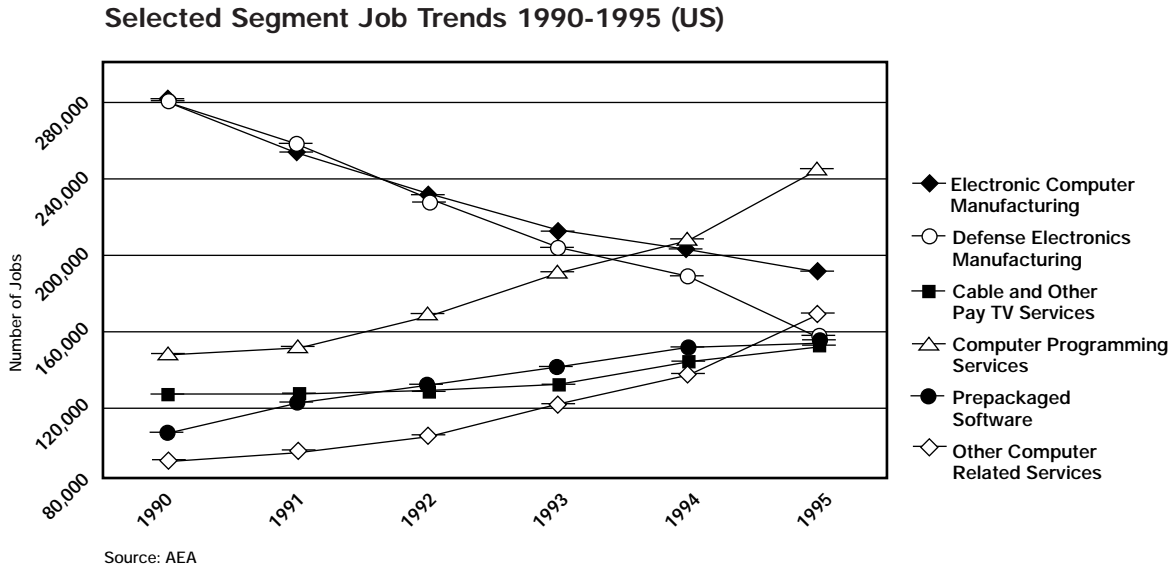
Although it is clear that the IT sector plays an extremely important role in the United States economy, it is also clear from the following chart that there has not been much growth nationally in the first six years of the 1990's, from a jobs perspective. What was lost in manufacturing, was made up for in software and computer services, but in aggregate, the number of IT jobs changed very little over the period, from 3.97 million in 1990, to 4.01 million in 1996.⁴

High-tech Job Trends 1990-1995 (US)



Source: AEA

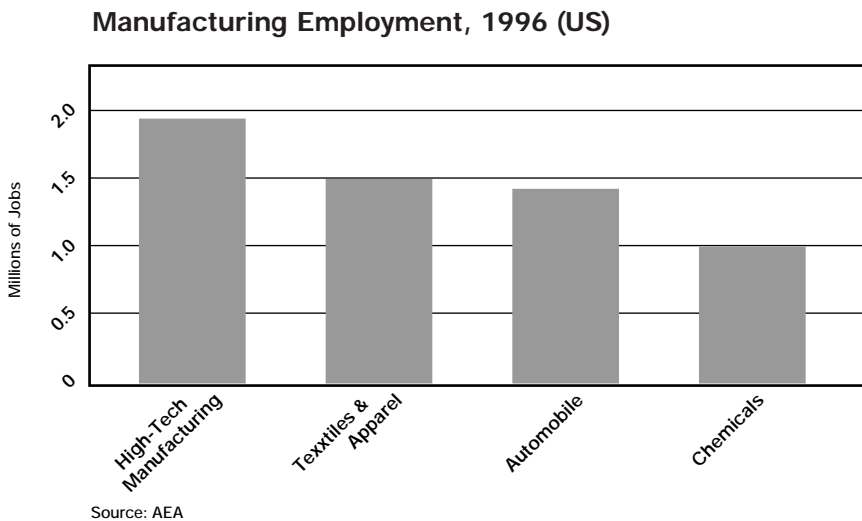
The key subsegment outliers that explain these broader trends are highlighted below. It can be seen from this chart that while there were some dramatic negative changes during the period, there were also some very promising gains.⁵



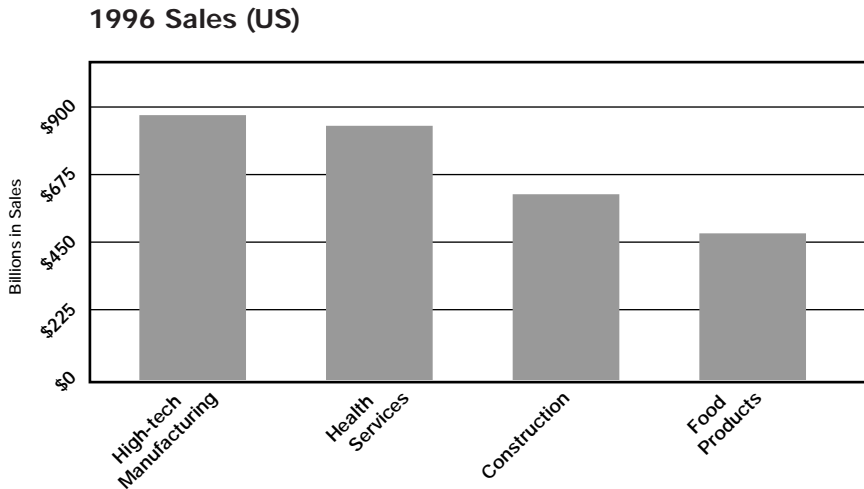
Although the last couple of years are not on this chart, news reports indicate that the manufacturing losses continue, but to a lesser extent than in the early 1990's, and the positive trends in software and computer services seem to be continuing apace, particularly with the ascendancy of the Internet. So what has happened in IT is in line with the broader shift in the economy toward more efficient manufacturing and value-added services. The growth in the "Other Computer Related Services" category above also highlights the challenges with classification schema in such a dynamic industry – they very quickly become outdated. Many of the jobs falling into the "other" category most likely are related to various IT jobs created by the growth of the Internet.

Further facts from AEA's Cybernation report put into perspective the importance of the IT sector:⁶

- As of 1996, IT or "high-tech" was the largest manufacturing employer in the United States.



- The IT industry was the single largest industry in the United States in 1996, based on factory shipments and services revenues. The industry generated over three-quarters of a trillion dollars in sales and revenues and exported over \$150 billion in electronics products to the world.



Source: AEA

VENTURE CAPITAL

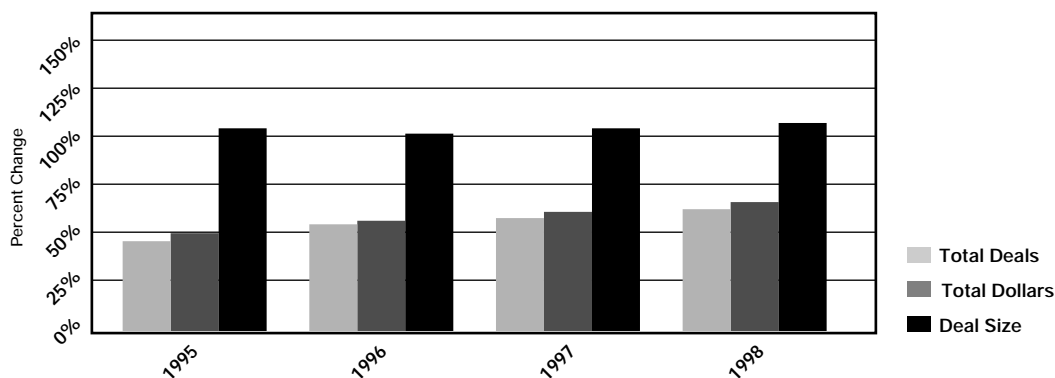
“As catalysts and risk takers, these firms [venture capitalists] have played a unique role in the formation and commercialization of entirely new industries: personal computers, cellular communications, microcomputer software, biotechnology, and overnight delivery, to name a few.”⁷

Bygrave and Timmons

Investments by venture capital firms nationally reached an all-time high of \$14.27 billion in 1998.⁸ This represents a 24% increase over 1997’s \$11.48 billion investment and as the chart on the following page illustrates, IT investments represented 66% of the 1998 total venture capital investment, up from 60% in 1997. It can also be seen from this chart that IT venture

deal size tended to be slightly larger than non-IT venture deal size. This trend is beginning to increase, in large part due to the unusually large dollar size of Communications deals, which have increased in popularity lately.⁹

IT Share of Venture Investments (US) and Deal Size Comparison (IT Deals Versus Non IT Deals)



Source: PwC MoneyTree™ Survey

Despite the phenomenal success of a few high-profile Internet IPOs in 1998, the extraordinary returns that the venture capital industry has experienced over roughly the last 5-7 years came down to a more modest level in 1998. Based on data from the National Venture Capital Association, the following table shows that one-year annualized returns for the period ended September 30th, 1998 were just 9.6%, as compared to 26.7% over the five-year period ending on the same date.¹⁰

Annualized Pooled Return for Period Ending September 30, 1998

Fund type	1-Year	3-Year	5-Year	10-Year	20-Year
Early/Seed Venture	18.6	43.4	31.4	19.0	16.6
Diversified Venture	5.3	28.5	24.5	15.4	14.0
Later Stage Venture	9.4	25.3	28.1	21.6	17.2
All Venture	9.6	32.2	26.7	16.8	14.9
All Buyouts	16.4	18.1	19.1	17.0	19.9
Mezzanine	5.1	9.7	11.1	10.0	10.5
All Private Equity	14.3	22.4	21.7	16.9	17.2
S&P 500	7.4	20.3	17.2	14.1	12.1

As the return data in the previous table indicate, there have been periods of time in recent years when venture returns were truly exceptional, but clearly, investing in the launch of early-stage firms is no guarantee of extraordinary financial returns. There is a great deal of

risk inherent in the endeavor and over the long term, investors must take a close look to determine whether the increased risk is commensurate with the increased reward. Fortunately for the birth and growth of IT firms in this country, a large number of venture firms (more than 1,000 nationally) have decided they are willing to take the risk.

IPOs for venture-backed companies decreased in 1998 by 43 percent from 1997. Only 77 such companies went public in 1998, versus 134 in 1997. In 1996, the number was significantly higher, with 272 venture-backed company IPOs.¹¹ The IPO market, which along with mergers and acquisitions is one of the most common venture investor exit strategies, was essentially closed to anything but Internet companies and major brand name offerings in 1998.

This myopia and limited appetite for non-Internet or non-brand name IPOs on the part of public market investors has led to a liquidity challenge for many early-stage non-Internet companies. Many healthy companies, including a great many serving IT segments with large markets and strong growth prospects, have been virtually locked out of the public equity capital markets. As a result, many such companies are looking to strategic alliances and mergers as ways to access the cash they need to grow their businesses. As will be discussed below, this issue is particularly important for many companies in this region, as Greater Philadelphia's IT strengths are not typically in brand-name businesses.

On a cautionary note, the highly-respected Wharton finance professor Jeremy Siegel said in a recent Wall Street Journal article, "I have no doubt that the Web will revolutionize the way goods and services are marketed. The Internet will deliver many billions of dollars of savings to consumers. But this in no way guarantees those billions will be handed over to the suppliers of this new form of communication."¹² Earnings and growth potential will continue to be important factors in the sustained success of IT companies of the future. This is good news for the many established and early-stage Greater Philadelphia IT companies that have already achieved profitability or appear to be within range of doing so.

INDICATORS OF REGIONAL INNOVATION AND ENTREPRENEURSHIP

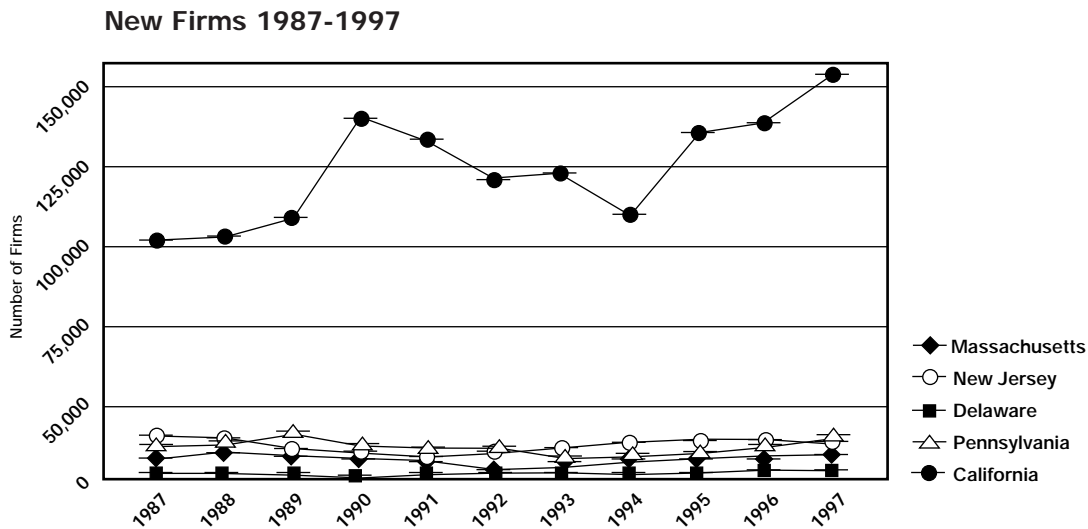
BUSINESS STARTS AND FAILURES

Reggie Jackson – “Mr. October” – is one of baseball’s top 10 all-time career home run hitters, with 563. He is also far and away the number one all-time leader in another category – strikeouts – with 2,597.

Baseball fact.¹³

Most of the business start and failure data that are available are aggregated at the state level, making it difficult to draw inferences about how Greater Philadelphia compares to other regions. The data likewise are not available specifically for the IT sector. For these reasons, this report does not spend a great deal of time describing and analyzing the startup and failure situation. It will however offer the following two charts to pose a theory that the reader might consider: perhaps hitting “home runs” has a lot to do with having a sufficient number of “at-bats” and being willing to “swing for the wall.” This theory was generated during the course of several of the CEO and VC interviews conducted for this study.

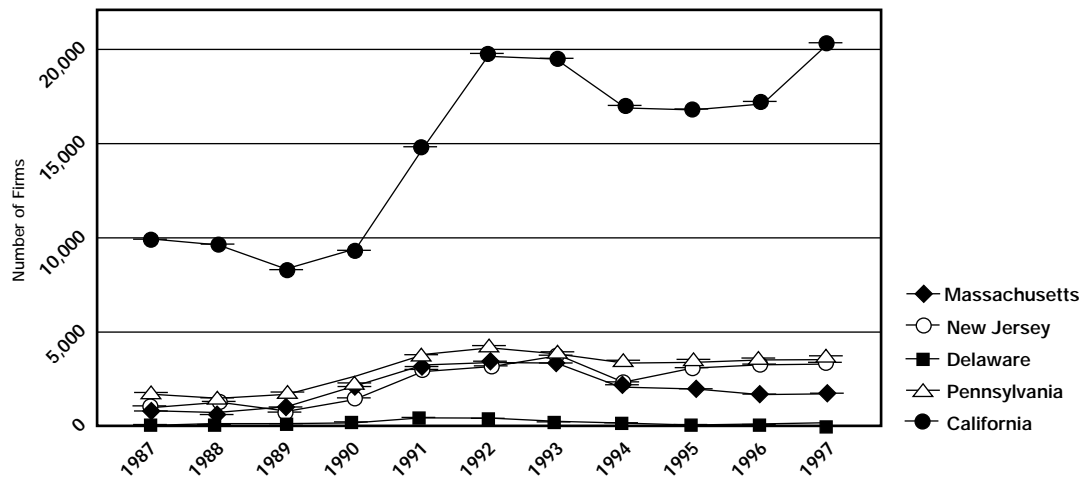
Consider the following charts on business starts and failures over the period 1987 to 1997, for Massachusetts, New Jersey, Delaware, Pennsylvania and California.¹⁴



Source: SBA Office of Advocacy

It is clear from this graph that not only is the number of new firms started in California during this period larger than the total of those started in the other featured states [but population size is also greater], but it is also on the increase, whereas it is flat in the other states. While this alone is worth noting, it is even more noteworthy that an area like Massachusetts, with its Route 128 Corridor fabled for its entrepreneurial culture and standing as an IT mecca second only to California, appears quite lackluster both in volume and trend of activity, relative to its west coast counterpart. In fact, according to these data, both New Jersey and Pennsylvania had a higher volume of startup activity than Massachusetts, during *every* year in this period. It is clear that start up activity alone cannot explain a region's reputation or standing as a good place for entrepreneurship, IT or otherwise. Interviewees and other researchers contend that many other factors such as history, public relations and marketing have a strong impact on perception, if not reality.

Business Failures 1987-1997



Source: SBA Office of Advocacy

The business failure graph above shows much the same picture as the business startup graph – California has a considerably higher volume of business failures than the other states pictured, with more variability and an upward trend. Given California's reputation and the reality of its success in turning out a large number of extraordinarily successful firms, particularly in the IT sector, one could interpret this picture as indicating that, at least at an aggregate level, failure may not necessarily be a bad thing. It is difficult to make too tight of an inference from these data, but one thing certainly is clear: to paraphrase Ian MacMillan, Professor of Management and Entrepreneurship at the Wharton School, “the rate of failure is not the problem, in fact ‘fast failures’ that get you closer to success are good things.”

It is worth noting that overall volume of activity (including failures) can be interpreted to be an important factor in ultimate “success” and as analysis later in this report indicates, there appears to be more IT activity in this region than these aggregated figures would indicate. As many interviewees pointed out, the rate of IT startups in the region seems to be increasing steadily, as “critical mass” in this sector continues to build.

SOURCES OF CAPITAL

SEED STAGE CAPITAL

Interviewees agreed that there is no shortage of wealth in this region. They also agreed that there is a dearth of “angel” capital that understands and invests in IT deals. While there are a couple of notable exceptions to this general statement, the lack of an organized angel network that focuses on IT in this region is an impediment to the initiation and incubation of growth IT firms. One entrepreneur related a story of how he had to personally go around to over 100 angel investors, most of whom had little or no understanding of technology, in an effort to raise just \$500,000. That is not an efficient “system.” Of course, complaints such as this are heard from entrepreneurs in many regions of the country.

Angel groups are beginning to proliferate nationwide, but very few have a focus on IT — most operate on an opportunistic basis. Entrepreneurs both want and need “smart money” invested in their deals at the seed and early stage. They need more than just money; they need solid, experience-based advice and perhaps just as importantly, access to industry contacts. Unfortunately, until recently in this region, there was not a “critical mass” of individuals that both had a strong understanding of IT and had sufficient personal net worth to make “angel” investing feasible. With time and with the exceptional valuations many regional IT firms have achieved, that situation has begun to change and continues to improve.

One existing bright spot in the regional seed stage capital picture is the State of Pennsylvania-funded Ben Franklin Technology Partners of Southeastern Pennsylvania (BFTP). Although BFTP’s funding amounts are somewhat limited (typically \$50-150K), it is widely agreed that many important regional technology companies would never have “gotten out of the gate”, if not for early funding support from BFTP.

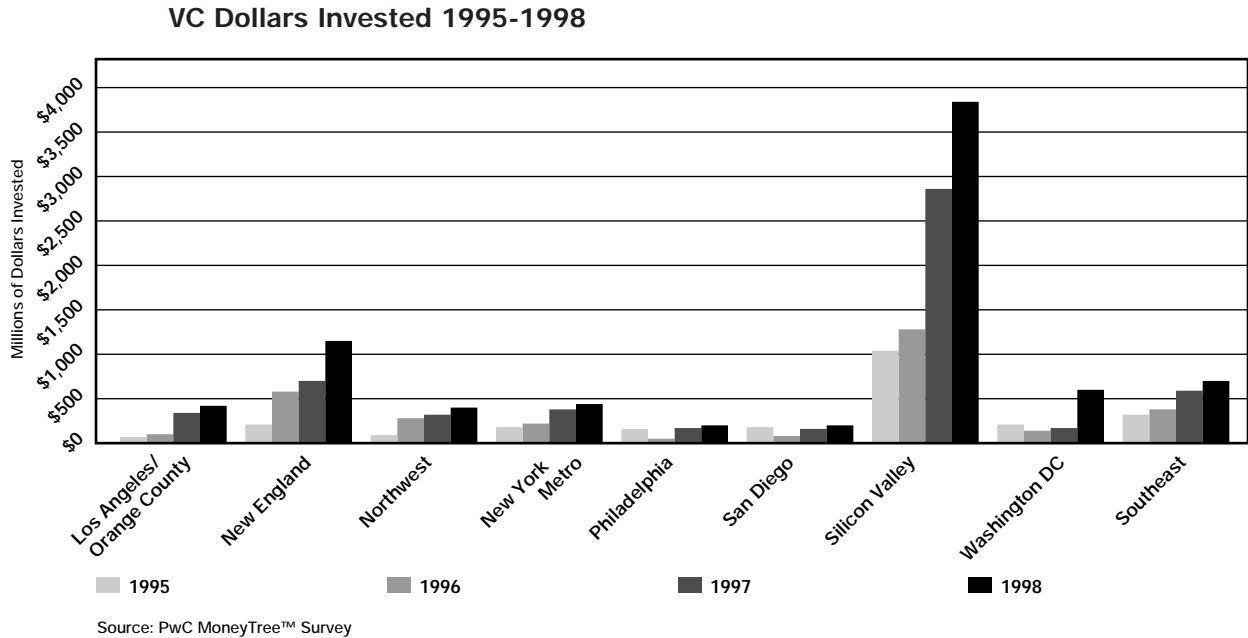
As one venture capitalist explained, “The leverage of specialization (in IT or otherwise) for due diligence, strategic alliances, and management networking is key.” Availability of such “smart money” is a key to the success of IT companies in the region.

VENTURE CAPITAL

REGIONAL COMPARISON

As covered in the Venture Capital – National Trends section of the report, it is clear that the amount of dollars flowing from institutional investors through venture capitalists and into new and existing ventures has enjoyed enormous growth across the country in recent years. This section of the report looks at how the Greater Philadelphia IT venture market compares with other regions and national trends; the next section focuses specifically on IT deals on a segment-by-segment basis.

The following chart, based on PricewaterhouseCoopers MoneyTree Survey data,¹⁵ compares the number of dollars invested in IT companies, by region.



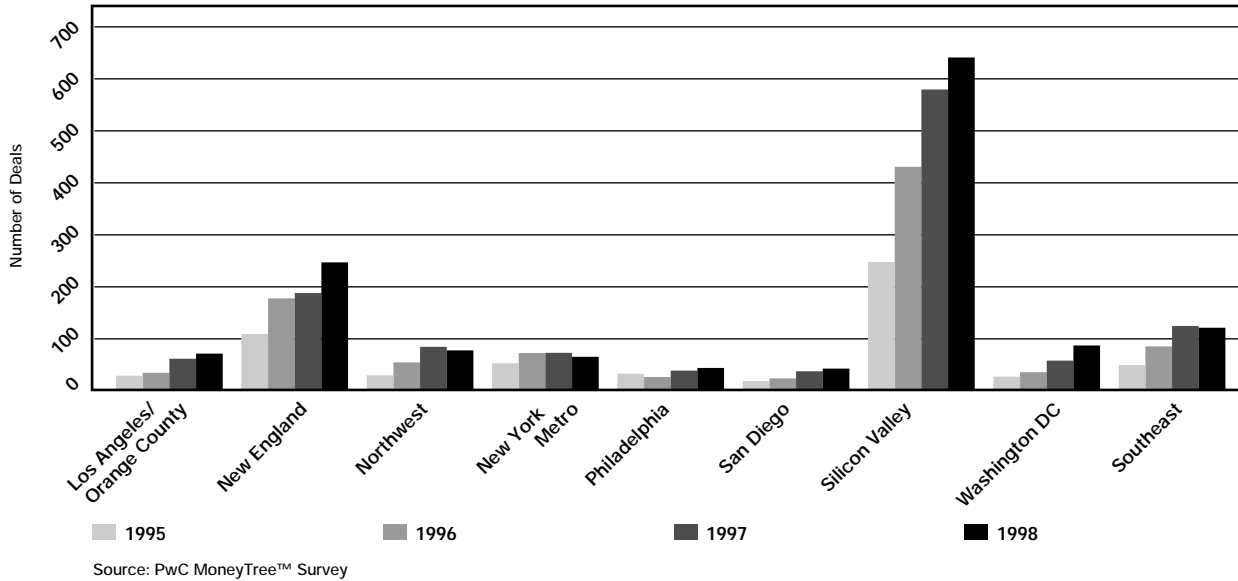
It can be seen from this chart that Silicon Valley is more than triple the size of its nearest competitor, New England. The roughly \$4 billion that was invested in IT deals in “The Valley” in 1998 is an order of magnitude larger than that invested in most other regions, and cumulatively over the four years covered by the PwC MoneyTree Survey, more than \$9.5 billion was invested by venture capitalists in IT companies in the Valley. By contrast, during the same period roughly \$2.7 billion (a little more than one-quarter as much) was invested in IT deals in New England. Other regions struggled to reach \$1 billion in venture capital invested in IT, and during the same period, the Greater Philadelphia region managed just over \$400 million. Almost 25 times more venture capital dollars are being invested into IT companies in Silicon Valley than into IT firms in Greater Philadelphia. This same observation is true of many other regions as well; Silicon Valley has become a magnet for venture capital IT investments and entrepreneurs.

The above chart also validates what was stated in many of the interviews conducted for this study – the Washington DC and New England metro areas are particularly “hot.” The data indicate that venture capital IT investments in the DC and New England regions grew by 177% and 83% respectively, from 1997 to 1998 – by far the greatest growth experienced by any region, including Silicon Valley (33%). Of course once an area reaches the scale of Silicon Valley, it gets harder to continue growing at such a breakneck pace – there simply are not enough good places to put the money.



The following chart compares the number of IT deals venture capitalists invested in over the period 1995-1998, by region.

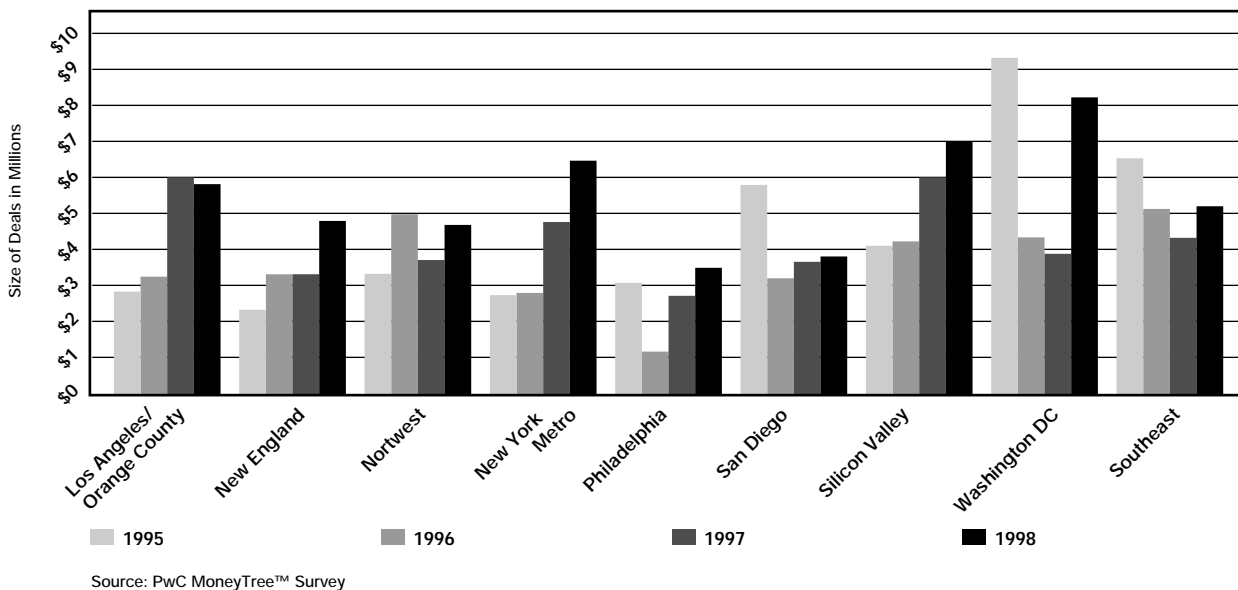
Number of IT VC Deals 1995-1998



Growth in the number of IT deals by region is not as dramatic year over year, as is the growth in dollars invested. For example, the DC region had 177% growth in dollars invested, but “just” 32% growth in the number of deals invested in over the period 1997-1998. The Greater Philadelphia region had 33% growth in dollars invested during the same period, but just 5% growth in the number of IT deals.

The regional comparison of IT venture capital investment and number of deals is further illustrated by the following chart, which analyzes average deal size by region over the period 1995-98.

IT VC Deal Size 1995-1998



As can be seen from this chart, there is more variability in the average deal size than in either of the other measures covered thus far. There is also no particularly steady growth trend, as there were in the number of deals and dollars invested. On the other hand, it can be seen that in 1998 deals in most regions did tend to be larger in terms of dollars invested per deal, than they were in most years in the past. It can also be seen that in New England, Silicon Valley and NY Metro, where far more dollars than ever in history have been poured into deals, the tendency for deal size to increase has been steady.

This deal size growth can be attributed to several noteworthy trends. First, there is a lot more money being funneled into venture capital funds by pension funds and other institutional investors. This additional capital has meant that the size of venture funds has grown significantly in recent years. With more money to invest in roughly the same period of time and not as rapid growth in the number of attractive available deals, the increase in deal size was inevitable. Nearly all venture capitalists interviewed for this study mentioned this tendency. Second, there has been an increase in the number of communications and “infrastructure” deals, which tend to be larger in size. This can be seen in the movement of the average IT deal size in the DC area, where Communications deals are common. Third, there is an increasing pressure to “get to scale” quickly, given how rapidly most IT market segments are changing. Getting to scale quickly costs money, so that too has tended to push deal size up. Finally, the extraordinary valuations achieved by many Internet firms post-IPO has tended to push pre-IPO valuations up as well, particularly for Internet companies. Given that Internet companies have received an increasing share (roughly 25% in 1998) of total venture capital investments in IT, this has also tended to push up the average overall deal size. As one regional venture capitalist interviewee said, “If we find an Internet deal that is less than \$10 million (valuation) “pre-money” (venture money) and there is anything at all there, we tend to take it. Finding such deals is increasingly difficult.” Another interviewee commented that such a perspective would have been unheard of in Greater Philadelphia, as recently as just one year ago.

Also noteworthy from the last chart is the fact that in all years except 1995 (in which there was an aberrant \$33 million deal in the region), the IT deal size in Greater Philadelphia was lower than that of all other eight regions tracked on this graph. This can be attributable to several factors.

First, it could be an indication that more early stage deals are being done in Greater Philadelphia than elsewhere, as those deals tend to be smaller in size. Most early/seed stage venture capitalists interviewed indicated that they had not done deals in this region in at least a couple of years, while they had done several deals in other regions, so this does not appear to be the cause (with the exception of BFTP deals).

It could also be an indication that the types of deals that get high valuations (such as Internet) are not as prevalent in this region as in other regions – there appears to be some validity to that interpretation, although there are a growing number of such deals being done here.

It may also be an indication that venture capitalists here typically do not put up as much money and do not take as large an equity stake in the companies they invest in, as compared to other regions. Several interviewees, CEOs, venture capitalists and service providers alike, indicated that that is an accurate statement. Venture capitalists in many other regions tend to put in more money and take a larger stake in a company up front. This “invest heavy early” model has become particularly prevalent in Silicon Valley. Many attribute this

to the large amount of dollars available for investment there and to the desire on the part of Valley venture capitalists, given intense competition among investors, to lock up as much equity as possible early in promising ventures.

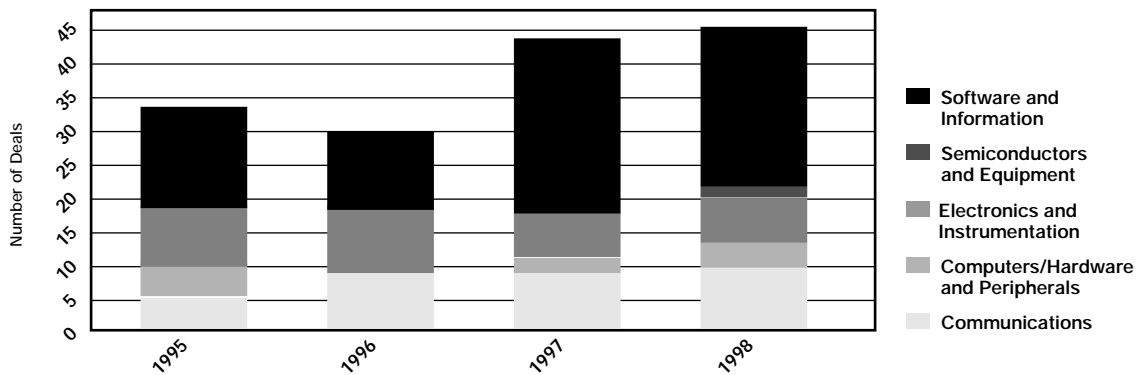
Finally, it may also mean that venture capitalists here, true to the oft-cited conservative nature of the region and to the banking heritage of many venture capital principals in the region, are not willing to place the extraordinary valuations on companies that venture capitalists in other regions do. As one CEO put it, “VCs in this region are using last year’s calendar [when they are doing valuations].” Another perspective on this valuation issue, voiced by one regional venture capitalist interviewed for this study, is that there simply is not as much money in most venture funds in this region, so it is not easy to make a big bet on an early-stage concept. The total dollars invested and deal size data indicate that there is at least some validity to this interpretation.

So, based on the secondary and primary data studied, a mixture of factors seems to push Philadelphia IT venture deal sizes below those of other regions. Of course, the activity in the region is not dictated entirely by investors located in the region. Greater Philadelphia’s venture capitalists are sometimes criticized for following onto others’ syndicated deals, rather than leading and bringing in other sources of capital. But according to many interviewees, there has been an increasing tendency for outside investors to look to Greater Philadelphia for possible deals, especially as competition for deals becomes hypercompetitive in some other regions. Yet according to the data, increased investment by outside VCs has not tended to increase the average Greater Philadelphia region deal size.

GREATER PHILADELPHIA IT SEGMENT VENTURE CAPITAL TRENDS

The following chart depicts the number of deals done in the Greater Philadelphia region in five different IT segments over the period 1995-1998.

Number of IT VC Deals by Category — Greater Philadelphia 1995-1998

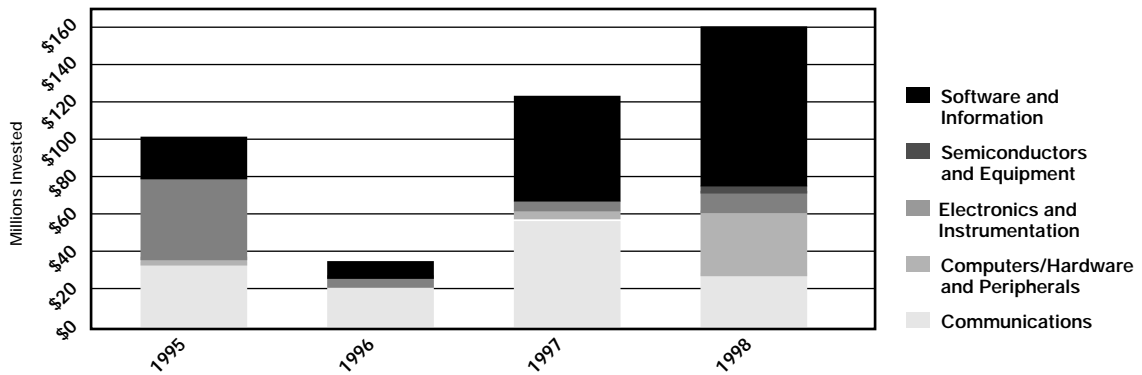


Source: PwC MoneyTree™ Survey

It can be seen from the chart above that the number of IT deals in the region has grown from a low of 30 in 1996, to a high of 46 in 1998. The number of regional IT deals funded by venture capitalists was 44% higher in 1998 than it was in 1995. This certainly is a positive trend and based on anecdotal evidence gathered during the interviews for this report, it is one that is expected to continue. The capital is available as long as “good” deals are. Venture capital is very mobile, so it is not uncommon for venture capitalists from the West Coast to invest in IT deals here, and vice versa. The competition for good deals has become national and in some cases international, as the amount of money poured into venture capital funds by pension funds and other institutional investors has increased significantly in recent years. Local, national and international venture capital exists to invest in regional deals. This chart indicates that over the last few years, more Greater Philadelphia regional deals have been perceived as “good” by the venture capital community.

The region’s strength in Software and Information has continued to grow in importance, representing roughly half of all VC deals done in the region over the last couple of years. Software developers and custom solution providers have thrived in this region and continue to do so, as the next section of the report will illustrate. The other area receiving more attention in the last several years is Communications. This is consistent with the national trend and is encouraging as it represents an opportunity to further develop another core strength of the region, similar to Software and Information, and therefore reduce the risk of overdependence on one segment.

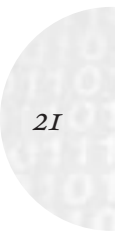
VC Dollars Invested in IT Deals in Greater Philadelphia 1995-1998



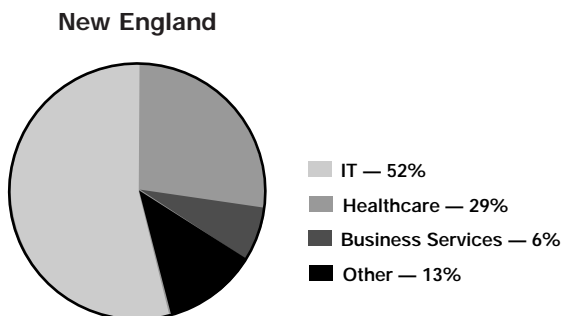
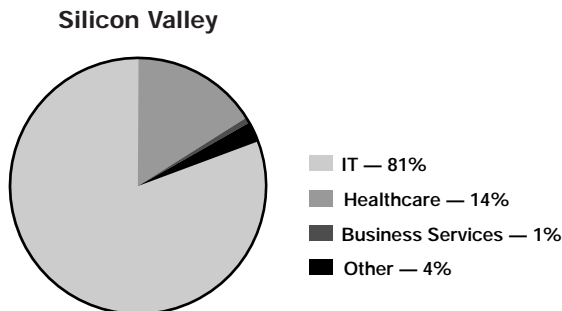
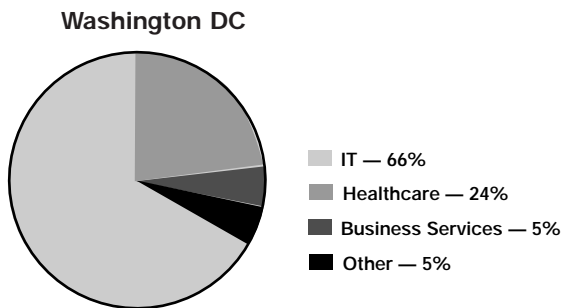
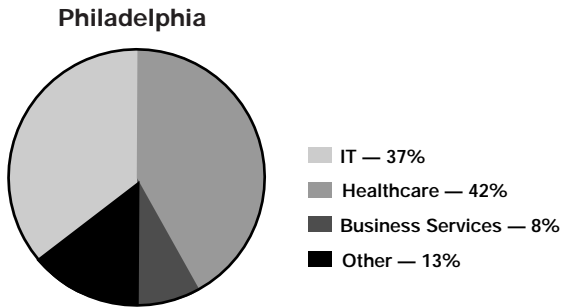
Source: PwC MoneyTree™ Survey

The amount of venture capital invested in regional IT deals likewise has been on a healthy upward trend. Again Software and Information category companies have been receiving a major share of the dollars. Communications and Hardware companies have also come in strong in some years, but with higher variability and less of a recent positive trend.

While this study focuses on IT deals, it is important to bear in mind the strength and activity of the region in other areas as well. As the following charts show, the Greater Philadelphia region has a much higher percentage of venture capital investment activity focused on healthcare than do the three other key regions pictured.



VC Dollars Invested 1995-1998



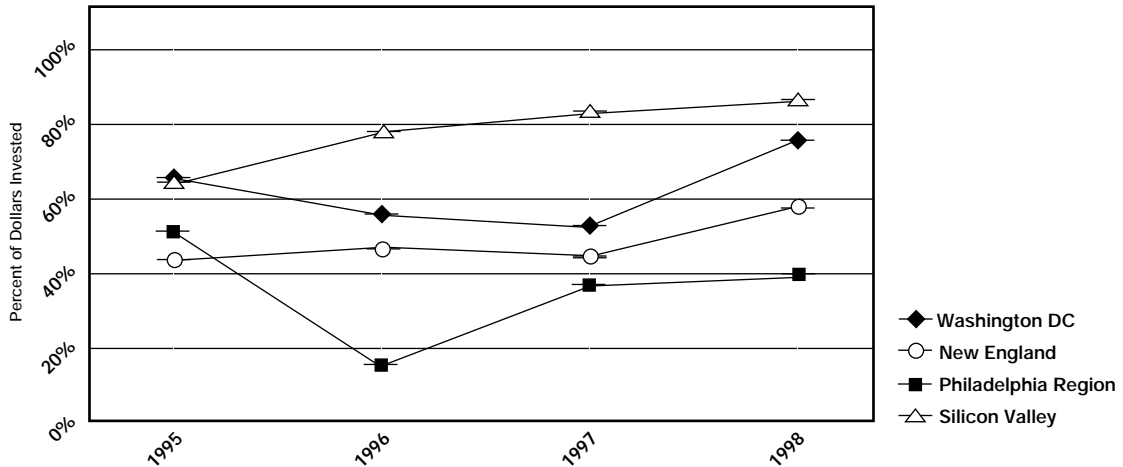
The charts to the left compare the percentage of VC dollars invested in several industry sectors for Greater Philadelphia and three other key IT regions. Although Boston and Silicon Valley are also well known for their strength in health products and biosciences, in recent years, only the Greater Philadelphia region has invested a greater percentage of VC dollars in healthcare than in IT. Of course, total VC investment in this region across all industry sectors is less than in these other three regions depicted, but this data suggests that even at a time when life sciences valuations are out of favor, much of this region's applied innovation occurs and is funded in healthcare fields. This comparative strength and commitment to investment in health-related technologies helps to explain why many of Greater Philadelphia's leading IT companies are either in the healthcare field or have developed practice areas and competitive strengths in healthcare applications.

Such investment trends move in cycles, of course, usually in tandem with how the public markets are valuing companies in particular markets and market segments. But as a matter of perspective, it is important to note that the competition for venture capital dollars is not simply among IT segments; particularly in this region, it is with healthcare and other markets as well. It is also interesting to note that true to its reputation, Silicon Valley is highly focused on IT deals. The Washington DC area, identified by many interviewees as "hot," also has had a strong focus in IT over the last several years, particularly in the Communications sector.

Source: PwC MoneyTree™ Survey

As the following graph shows, Silicon Valley VC investment has only tended to become more focused on IT, which helps to explain why it is known as such a magnet for IT entrepreneurs, venture capitalists and service providers. In 1998, a similarly strong trend toward increased focus in IT is apparent in the VC investment data for the Washington DC area.

Percent of VC Dollars Invested in IT Deals in Four Key Regions



Source: PWC MoneyTree™ Survey

Based on these data, venture capital investment in Greater Philadelphia has been slower to jump onto the IT “bandwagon”, which is true to the anecdotal evidence gathered during the interviews conducted for this study. The opinion of most was that the region is slower to change because of strongly entrenched interests and competencies in other areas such as healthcare. This “legacy effect”, though not optimal during low healthcare valuation cycles such as that currently being experienced, reduces the region’s dependence on a single industry.

The flip side of that coin of course is the fact that the region cannot be looked at as a “pure play.” Just as equity analysts find it more difficult to value conglomerates, the diversified nature of industry in Greater Philadelphia makes it more difficult to understand and “value,” and thus less likely to be recognized for the significant contribution many would argue the region makes to the national and global economy. In IT specifically, this effect is compounded by the fact that many of the industry sectors in which the region excels sell into “business-to-business” markets, which by definition, are not as well known by the average consumer.

This region is stronger in IT than many would think, but it is not as well known as some “IT regions,” because the economy in Greater Philadelphia is highly diversified and because the vast majority of the key IT companies in this region are focused on business-to-business markets.

THE REGION'S IT COMPANIES

THE SAMPLE OF COMPANIES

As part of this study, a database of 165 key regional public and privately held IT companies (see Appendix 4) was assembled and analyzed in order to provide insight into important characteristics of the Greater Philadelphia IT sector. All of these companies are either head-quartered or have significant operations in this region.

The database includes the company name, IT category, business description, headquarters location (at time data source published the information), recent fiscal year sales, estimated worldwide employees and sales per employee. For public companies, the database also includes the ticker symbol and the market capitalization as of May 28, 1999. The data were gathered from sources such as lists of fast growing companies, technology council membership directory information, stock price listings, and public company records filed with the Securities and Exchange Commission (SEC).¹⁶

The database was constructed to provide some insight into the scope and breadth of the region's IT industry. It consists mainly of the largest and fastest-growing companies in the region and thus provides a window into where the industry is today and where it is headed. It was not designed to be a scientific or representative sample of the IT sector in the region, but it can be useful for identifying trends and broad observations about the makeup of IT productivity and growth in Greater Philadelphia. It also makes a strong statement about how significant the IT sector is in the region. For reasons discussed throughout this report, many people (even those involved in IT) would not have imagined that Greater Philadelphia's IT sector was on this scale, and this database represents just a reasonable cross-section of the industry.

Given the inherently secretive nature of privately held companies and the desire for accurate information for the study, data on such companies was gleaned from published lists of fast growing companies and from technology council membership directory information. In a few cases, revenues and employees had to be estimated from a published range. Given the nature of the sources of this private company information, the data for a few such companies is a year or two out of date and thus, given a fairly safe assumption of growth in the IT sector, under-reports revenues and job data.

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The data availability for the public companies in the sample was much better, as a result of Securities and Exchange Commission (SEC) mandated public reporting of such information. Share price information, job and revenue data were all obtained from public sources, including 10-K (annual statement) and other company filings with the SEC.

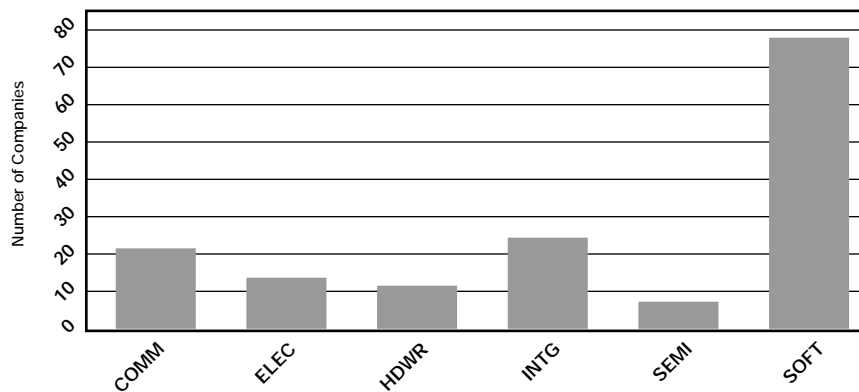
Drawing on the definition of information technology discussed earlier in this report, the sample of companies reflects current approaches to thinking about the IT industry. Thus the sample includes internet-based retailers such as CDNow because the core business of these companies is directly based upon cutting-edge e-commerce technology. The sample does not include other companies in more mature industries that also depend heavily on IT, such as Advanta or CIGNA in financial services or insurance.

While the overall sample size is reasonably large, the sample size by segment in many cases is fairly small. It is important therefore not to infer too much at the segment level, but rather make broader observations that may be useful in characterizing the region's IT sector. It should be noted that the number of companies in each segment of the sample is merely a function of the data availability from the above-mentioned sources. So, if there are far more Software companies represented in the sample, it is probably a reasonably good indication of strong regional activity in that IT category.

OBSERVATIONS ABOUT THE REGION'S IT SECTOR

For the purposes of this analysis, the IT category of Software and Services was broken into two subcategories: Software (SOFT) and Integrators (INTG). This was done because of the large number of companies in the two subcategories and the relative importance of these categories to the region's IT sector. It should be noted that categorizing sample companies, especially large diversified companies, was not a straightforward task. For the purpose of this analysis, any company that focuses on selling its own prepackaged or customized software or provides custom programming development and services is categorized as a Software company. Any company that focuses on providing integrated hardware and software system solutions and services is categorized as an Integrator. In several cases, the distinction is quite blurred. The other categories are reasonably self-apparent, with a few exceptions. An example of a more complicated categorization problem would be DecisionOne, a major provider of hardware maintenance and support services; for this analysis, the company was included in the Hardware (HDWR) category, but could also easily have been included in the Software and Information category.

Greater Philadelphia IT Sector Sample Size by Segment



Sources: Various — see Endnote 16

As can be seen from the above graph, more than half of the companies in this sample fall into the Software or Integrator categories, which as stated earlier, are just subsegments of the Software and Services category. Based on sheer number of companies, these categories are extremely important to the region. Further, it was found that many of the companies in these categories focused on providing products and services to one or both of two key regional vertical markets: Financial Services and Healthcare. Given the strength of the region (or just beyond the region) in these vertical markets, it is not surprising that many IT product and service companies have made serving them their focus. It was also found that several sample companies (Astea International, Naviant Technology Solutions, Ashton

Technology Group) provide software and services related to customer management, which is a critical task in Financial Services and in some segments of Healthcare such as Pharmaceuticals. It is also noteworthy that SAP, the world largest ERP (Enterprise Resource Planning) software vendor chose to locate its North American headquarters in the region.

In the Integrator category, most of the sample companies provide a wide range of services and serve a diverse set of industry verticals. Companies in this category seem more focused on providing a comprehensive set of integration services than they do on specializing in particular industry verticals. The notable exceptions are Shared Medical Systems (SMS) and Sungard Data Systems. SMS and Sungard both have revenues in excess of one billion dollars and focus on the healthcare and financial information verticals, respectively. SMS is one of the largest providers of healthcare information systems in the world, with more than 5,000 clients in 20 countries. Sungard has grown by acquisition and now provides an extensive suite of financial and risk management products to companies around the world. Unisys, which provides IT products and services to a wider range of verticals, but also works extensively in the healthcare and financial services sectors, is the largest (revenues) IT company in the region, with more than \$7 billion in revenues in 1998. It has been the “comeback kid” on Wall Street recently, with its stock price increasing more than five-fold from mid-1997 to mid-1999.

The region also includes companies like SEI – a leading service provider in the mutual fund industry that also develops IT products and services for its field. SEI is not included in the database because it is now primarily a financial services company, but it is worth noting that the company’s CEO, Al West, is somewhat of a “folk hero” in the region’s IT sector. He played an important early role in the region’s IT picture, leaving his doctoral studies at Wharton to start SEI (Simulated Environments Inc.) in 1968, based on a computer simulation he had developed to train bank loan officers.¹⁷

Not surprisingly, in the Software category the tendency toward vertical specialization is more common. More regional software companies in this sample specialize in developing and marketing applications for financial institutions than for any other vertical market. Notable companies in this area are Sanchez Computer Associates, mentioned elsewhere in this report as an example of an established software company that has successfully embraced the Internet, and FNX Limited, a fast growing company that markets its derivative risk management products to large financial institutions throughout the world. While not selling primarily to financial institu-

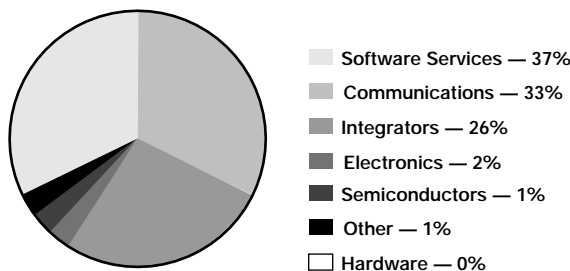
tions, XRT, a developer of treasury management software solutions that just merged with a larger Paris-based software firm called Cerg Finance, is another example of a regional company that is a player in software solutions related to corporate financial management.

The chart on the left illustrates the importance of each of the IT categories to the overall market capitalization of regional IT companies.

Market Capitalization of IT Categories

Greater Philadelphia Sample Companies

As of 5/28/99, Total Market Cap \$129.8 Billion



Sources: Various — see Endnote 16

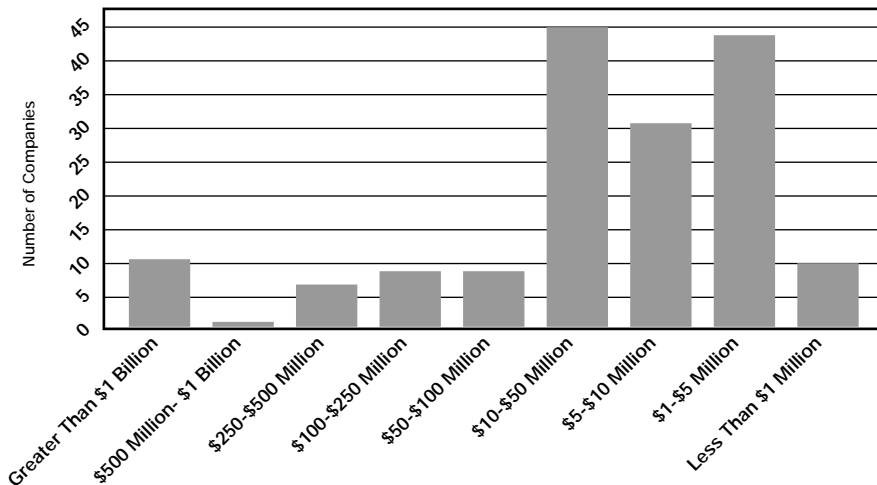
From a market capitalization perspective, it can be seen that Communications, Software and Integrators category companies are extremely important to the region. In fact, companies in these three categories comprise over 95% of the market capitalization of all regional public companies in this study's IT sector sample.

The sample company data also highlight the importance of these segments from a revenues and employment perspective, but the data on these issues are less reliable for a couple of reasons. First, for reasons mentioned above, the sample of private companies is not nearly as complete as the sample of public companies, so to the extent that any segment is more or less dominated by public companies, it will be more or less complete in this sample. Such under or overrepresentation of a particular segment could have a significant effect on overall and segment level revenues and jobs data. Second, the revenues and employee figures are worldwide (just as market capitalization is in most cases) and for employee figures in particular, this can be misleading. Some companies, particularly those in manufacturing, have many if not most of their jobs overseas. So to use these data to infer regional jobs importance would be misleading.

Nonetheless, it is clear that the combined Software and Integrator categories, with roughly 60% and 47% of the total revenues and jobs in this sample respectively, are extremely important to the region. The Communications category, with 20% and 12% of the revenues and jobs respectively, likewise is very important to the region. Based on this sample, the other categories, though important, do not have the same level of scale in the region on these measures as do Software, Integrators and Communications. The exception to this is jobs in the Electronics category, which represent 19% of the total in this sample, but as previously stated, include a large proportion of overseas manufacturing labor.

The distribution of sample company revenue size provides insight into one of the important characteristics of regional IT companies.

**Greater Philadelphia IT Sector
Sample Public and Private Company Revenues**



Sources: Various — see Endnote 16



In contrast to public perception, there are eleven companies with revenues in excess of \$1 billion in this study's regional IT company sample. There are 27 companies with revenues in excess of \$100 million. The interviews performed for this study did not reveal recognition of such a wealth of significant IT companies in the region. Many interviewees found it difficult to name three or four "billion dollar" (revenues) regional IT companies and most could name just a few more that had revenues in excess of \$100 million. This points to an important fact about the IT companies in this region. As can be seen from the sample list in Appendix 4 and from the lack of recognition of the many important IT companies in the region, this is not a region of "big brand" IT companies.

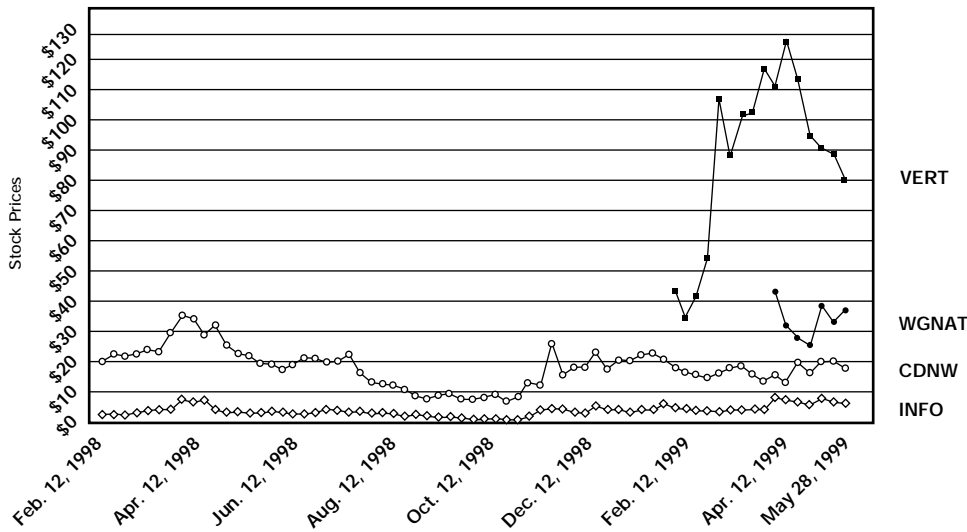
Most of the IT companies in the sample (and in the region) supply "business to business" products and services. Although this database of regional IT companies has 27 with more than \$100 million in revenues, with the exception of one company (Comcast), it does not have any of this size that provide "self-branded" consumer products or services. So, it is not surprising that people (even many IT executives interviewed for this study) are not aware of the significant volume of IT activity taking place in this region.

By far the largest number of companies in the sample have less than \$50 million in revenues and most companies have less than \$10 million (and due to the data sources used, the number of smaller companies – especially startups – is under-reported here). In these groups too, the great majority of companies are selling business-to-business, not business-to-consumer products and services, so any person not involved in the market to which they sell is unlikely to have heard their names. One notable exception (now a much larger company with its merger with N2K) is CDNow, which is more a retailer using technology than it is an IT company.

REGIONAL PUBLIC INTERNET COMPANIES

Internet companies have received a great deal of attention recently, both for their extraordinary valuations and for the volatility of their stock prices. As the graph on the following page shows, four regional Internet stocks are not immune to the challenges of volatility. As one venture capitalist that invests in Internet companies said when interviewed, "such volatility is unavoidable shortly after the IPO, but in the long run, the stock price finds its equilibrium level." In the short term, it is very difficult to manage a company with such sharp variation in valuation. As one CEO interviewee said, "the productivity and morale of employees can move up and down day-to-day with the value of their stock options."

Greater Philadelphia Internet Stocks in the Age of Volatility



Sources: Various — Endnote 16

The chart above shows the extraordinary volatility being experienced by some Internet stocks in today's market and the following table illustrates how, for the same four sample regional Internet companies, the range of minimum and maximum stock price can be quite wide and tends to increase with time since IPO. This means that employees and entrepreneurs in this industry must become accustomed to watching their fortunes rise and fall daily with the market.

Regional Public Internet Companies' Valuation Variability Over Time

Ticker Symbol	Date IPO	Open IPO Price	Min/Max 2/12/98 (or IPO date if later) to 5/29/99		Min/Max Multiple	Close Price 5/29/99	Years Since IPO	Market Cap (\$M) 5/28/99	FY98 Revenues (\$M)
CDNW	2/10/98	22.0	7.50	35.5	4.73	17.94	1.29	528.9	56.4
WGAT	4/15/99	30.75	25.75	43.75	1.70	37.00	0.12	756.0	1.0
VERT	2/11/99	41.00	35.25	128.50	3.65	80.00	0.29	1,314.0	3.1
INFO	5/1/96	13.25	1.38	7.72	5.61	6.16	3.07	59.4	14.9

Sources: Various — see Endnote 16

This table also shows the exceptional valuations (Market Cap) that many young regional Internet companies have achieved. VerticalNet is the most extraordinary example in this sample — a company that, with just \$3.1 million in 1998 revenues, has managed to reach a market capitalization of \$1.3 billion. Clearly, the market is expecting great things from this company. In contrast, sample companies Vishay Intertechnology and Shared Medical Systems, both with revenues in excess of \$1 billion, have market capitalizations just slightly higher than that of VerticalNet. The valuation stories for the other three sample Internet companies also are quite remarkable, though they tend to become somewhat less so, as time passes after the IPO.



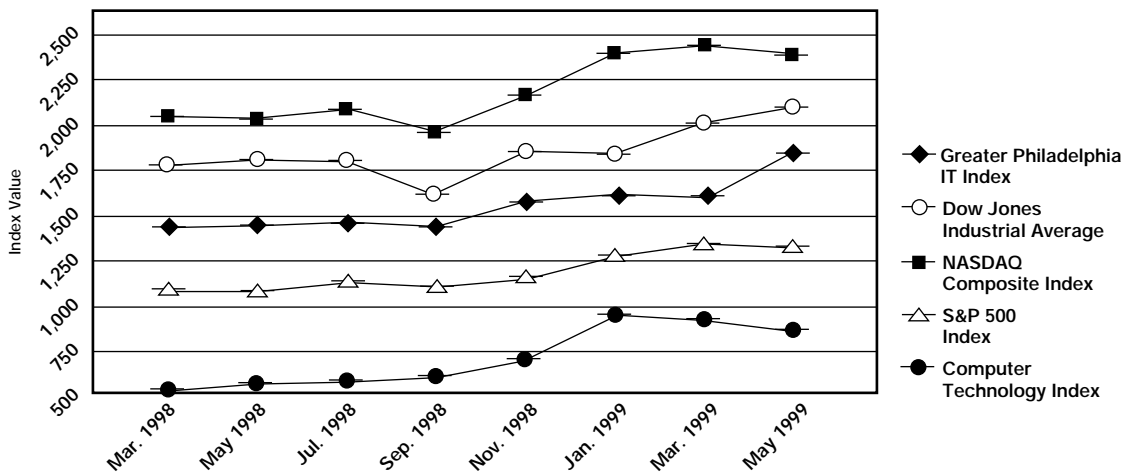
Many of the IT CEOs interviewed for this study indicated that they would be undertaking initiatives to “Netify” to boost the real and perceived value of their companies. Whether the company is public or private, as one CEO said, “If you don’t have a ‘.com’ angle to at least part of your business, you’re dead in the water. Customers wonder if you know what you’re doing, suppliers and investors become less convinced of your future growth prospects, and potential partners question your ability to move quickly and adapt to change. An ‘e-Business’ strategy is essential.” In a move taking direct advantage of this “Internet company” valuation phenomenon, another company from the sample, Sanchez Computer Associates, recently announced its e-PROFILE.com strategy for Internet banking. Sanchez is an established software company with more than \$40 million in revenues, yet this acknowledgement of the Internet in its strategy helped its valuation triple in just two months.

Venture capitalists echoed the perspective of the CEOs interviewed. One venture capitalist stated that “until a few years ago, very few VCs in the region were looking at IT deals, never mind Internet deals...now everyone will at least look at ‘.com’ deals.” Over the last several months Safeguard Scientifics, the largest venture capital firm in the region, has reinvented its image (and business approach) to very much embrace the Internet. Based on this reinvented image and business approach, as of May 1999, Safeguard’s stock price more than doubled since the beginning of the year and more than tripled since fall 1998. Much of the ascent of Comcast’s share prices can likewise be attributed to the market’s perception of the company as a “player” in the Internet space. Comcast’s recently foiled takeover of major cable competitor MediaOne and subsequent \$1.5 billion “termination fee” and deal with AT&T further established the company as an important participant in the growing fight for bandwidth. It is now perceived as an even more important player in a key market for the future.

It is clear that many regional companies in the Software and Communications categories are making strong moves to establish themselves as key players in the Internet and what many perceive as the business model of the future.

THE GREATER PHILADELPHIA IT INDEX

Greater Philadelphia IT Index (40 Stocks)



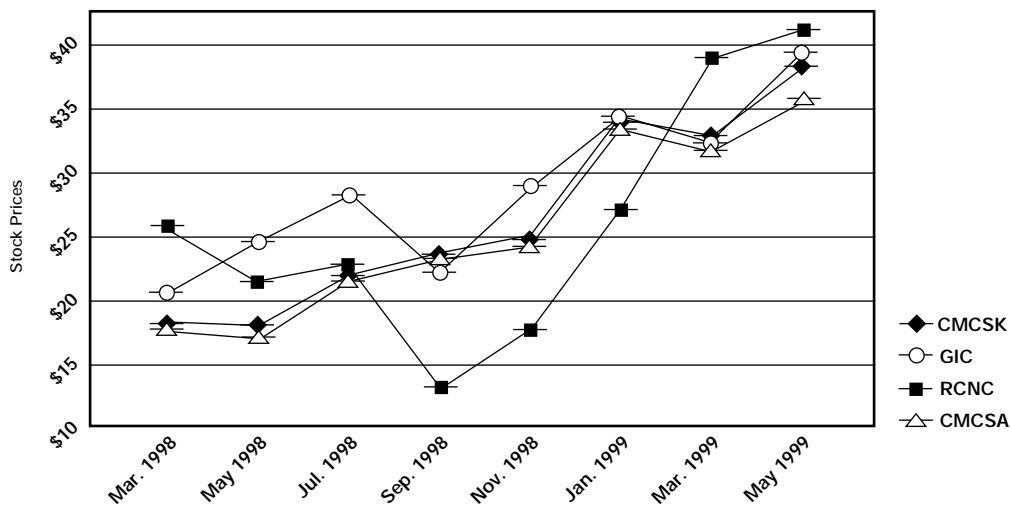
Sources: Various — see Endnote 16

Note: DJIA is scaled down and the Greater Philadelphia IT Index is scaled up to provide a meaningful visual comparison.

As part of this study, an index of regional public IT company stocks (“Greater Philadelphia IT Index”) was created. The Index is comprised of 40 Greater Philadelphia IT company stocks (see Appendix 3). It is market-value (capitalization) weighted, based on the aggregate market value of the 40 component stocks as of May 28, 1999.

As can be seen from the previous chart, the region’s public IT companies have done well when compared with the broader market indices and with the Computer Technology Index (CTI), an established IT index. The least familiar index of this group, the CTI, is also market capitalization weighted and is comprised of 26 component stocks including Microsoft, Cisco Systems, Hewlett-Packard, Oracle, Sun Microsystems, Dell, Apple Computer, Computer Associates, 3Com and Computer Sciences Corporation.

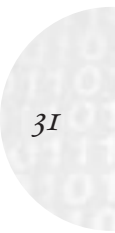
Philadelphia Region “Communications” Public IT Companies



Source: Various — Endnote 16

Particularly during the first several months of 1999, the Greater Philadelphia IT Index is showing a very positive trend. Much of this recent lift can be attributed to the strong performance [see chart above] of such large capitalization Communications companies as Comcast (CMCSK/A), General Instrument (set-top boxes), and RCN (Erols – Internet service provider). As previously mentioned, these and other regional companies, establishing themselves as key factors in the growth of the Internet, are having a strong positive effect on the regional IT outlook. The performance of regional Integrator stocks has been mixed of late, roughly a net neutral on the Index, but given their relatively large market capitalization as a group, their results will continue to play an important role in the performance of the Index. Other sectors likewise have achieved mixed performance recently, with a couple of key positive outliers, such as Sanchez Computer Associates and Ashton Technology Group in the Software sector.

This Index provides a barometer for how the Greater Philadelphia public IT companies are doing relative to the rest of the equity market. Presently, the trend is quite positive.



SUMMARY

There is an exceptional amount of activity in the IT sector in Greater Philadelphia and the trends, particularly in the Software, Integrator and Communications categories, are quite positive. The region must continue to leverage the history and tremendous wealth of knowledge of its IT sector leaders. In the current age of business and information technology, being “fleet afoot” is an extremely important attribute and as many of the IT companies included in this study prove, this region can very well keep up with and, in many cases, lead the market. While some challenges such as traffic, taxes, “tech-savvy” angel capital and the availability of technology employees were cited (see Appendix 2), these are common in many successful IT regions, and few interviewees felt that these issues were of a sufficient magnitude to stop the momentum being created in Greater Philadelphia’s IT sector.

APPENDIX 1
INTERVIEWS

VENTURE CAPITALISTS

Interviewee	Firm	Title
Frederick Beste, III	Mid-Atlantic Venture Funds	President & CEO
Mike Bolton	PA Early Stage Partners	Managing Partner
Walter Buckley, III	Internet Capital Group	President & CEO
Don Caldwell	Safeguard Scientifics	President
Gregory Case	Patricof & Co. Ventures	Managing Director
Terry Collison	Blue Rock Capital	Partner
J. B. Doherty	TDH	Managing Director
Curtis A. Glovier	Nassau Capital, LLC	Principal
Karen Griffith-Gryga	Philadelphia Ventures	Managing Director
Terry Hicks	Ben Franklin Technology Partners	Vice President Entrepreneurial Services
Bob Keith	TL Ventures	Managing Director
Joe Killackey	Delaware Valley Community Reinvestment Fund	Managing Director
Peter Ligeti	Keystone Venture Capital	General Partner
Bernard Markey	Meridian Venture Partners	General Partner
John Martinson	Edison Venture Fund	Managing Partner
Thomas Morse	Philadelphia Ventures	Managing Director
Michael Mufson	Penn Janney Opportunities Fund	Managing Partner
Glenn Rieger	Safeguard Scientifics	Senior Vice President
Steve Sammut	SMS Access	Managing Director
Sam Schwartz	Comcast Interactive Capital Group	Managing Partner
Frank Slattery	LORE (Angel Investor Group)	Private investor

IT CEOS AND SENIOR EXECUTIVES

Interviewee	Company	Title*
Jim Alonso	ASI, Inc	CEO
Ty Austin	M-Cubed	Chairman & CEO
Ed Beaumont	CoreTech Consulting Group, Inc.	CEO
Brian Boruff	Microsoft	General Manager
Bill Broderick	Analytical Graphics, Inc.	CFO
Marvin Cadwell	Shared Medical Systems (SMS)	CEO
John Carrow	Unisys	CIO
Dave Crocker	Ripple Technologies, Inc.	CEO
James Dixon	BroadReach Consulting	CEO
Lucinda Duncalfe	Destiny Software	CEO
Greg Garnick	Quadrant International	Chairman of the Board
Thomas Gravina	ATX Telecommunications Svcs.	Co-CEO
Paul Graziani	Analytical Graphics, Inc.	CEO
Bryn Kaufman	CMPEXpress.com	President
Joel Koppelman	Primavera Systems	CEO
Mike Krupit	CDNow	VP, Tech. & Creative Svcs.
David Lipson	ISCG (now FCG)	Former CEO
Shawn Marcell	Prima Facie, Inc.	CEO
Peter Martino	XRT, Inc.	CEO
Sean Marzola	Datacom	CEO
Rich Masterson	USInteractive	President
Dr. David Pensack	Dupont	Principal Consultant
Mike Sanchez	Sanchez Computer Associates	CEO
Vince Schiavone	4Anything.com	CEO
Jim Sheward	Fiberlink Communications	CEO
Glenn Soltis	XRT, Inc.	CFO
Rick Spinogatti	Analytical Graphics, Inc.	Controller
Ellen Thompson	Know-it-all	CEO
Anne VanLent	Sarnoff	Vice President, Ventures
Mark Walsh	Vertical Net	CEO

**At time of interview.*

SERVICE PROVIDERS

Interviewee	Service Provider	Title**
Lou Berneman	PENN Center for Technology Transfer	Managing Director
J. Michael Bowman	Delaware Technology Park	Chairman
Vince di Felice	PENN Center for Technology Transfer	Director, Start-up Business Development
Jill Felix	University City Science Center	President and CEO
Valerie Gaydos	Capital Growth	Publisher
Bruce Goldberg	PricewaterhouseCoopers	Partner
Steve Goodman	Morgan Lewis & Bockius LLP	Partner
Mark Gorman	Hamilton Lane Advisors	Vice President
Karen Griffith-Gryga*	Greater Philadelphia Venture Group	President
Leo Helmers	Hamilton Lane Advisors	Managing Director
Alan Kaplan	Kaplan & Associates, Inc.	President
Ash Lilani	Silicon Valley Bank	Senior Vice President
Jerry Maginnis	KPMG Peat Marwick	Partner
John Martinson*	National Venture Capital Association	President
Rob McCord	Eastern Technology Council	President and CEO
Charlie Pizzi	Greater Philadelphia Chamber of Commerce	President
Mike Purcell	Deloitte & Touche	Partner
Howard Ross	Arthur Andersen	Partner
Melissa Stepanis	Silicon Valley Bank	AVP
David Thornburgh	Pennsylvania Economy League	Executive Director
Bill Zebrowski	Greater Philadelphia Chamber of Commerce	Director, Information Technology

**Included in venture capitalist category as well.*

***At time of interview.*

APPENDIX 2

FACTORS AFFECTING THE IT SECTOR IN THIS REGION

<i>Issue</i>	“Crowding”
<i>Description</i>	The public market appetite for all but Internet and big brand name deals all but dried up in 1998.
<i>Interviewee Quote</i>	The Internet craze has caused problems for non-Internet IT companies. VCs and public investors are getting used to looking for the Grand Slam, rather than something short of that, but solid. This is an issue for many firms in the region, since not too many are Internet.

<i>Issue</i>	Early-stage Dollars
<i>Description</i>	It was widely, though not universally, believed that there is a dearth of Greater Philadelphia early-stage capital that understands IT.
<i>Interviewee Quote</i>	This region is chock full of old money made in real estate or smoke stack businesses — not ideal for investing in tech companies. [Note: this is changing; many more regional entrepreneurs are making their fortunes in IT businesses than ever before.]

<i>Issue</i>	Education
<i>Description</i>	Many interviewees remarked that there should be a closer relationship between the outstanding educational institutions in the region and IT companies (and the business community in general).
<i>Interviewee Quote</i>	There’s a genuine rift between the education and business communities. We have to do more to build a bridge between the two groups.

<i>Issue</i>	Geography
<i>Description</i>	There were many interviewees on both sides of this issue. Many felt that the region was ideally located and one could not ask for anything more. Many also stated that the region’s nearby amenities and weather could not “hold a candle” to those of many of the other hot IT regions.
<i>Interviewee Quote</i>	<i>Pro:</i> This region is close to everything. I would not want to live anywhere else. <i>Con:</i> It’s hard to get a young person excited about living in Malvern or Blue Bell. Unfortunately there’s a disconnect between the activities enjoyed by many “techies” and what’s available in the region’s technology center in the western suburbs of Philadelphia.

<i>Issue</i>	Human Capital
<i>Description</i>	Most interviewees mentioned difficulty in getting talented managers and entrepreneurs to move into the area. Though many such entrepreneurs and managers live in the region already, the consensus is that the area needs to attract more.
<i>Interviewee Quote</i>	The region is tough to attract people to — the area needs to be explained to outsiders. PA’s image is farm country and the outsider’s image of the City of Philadelphia typically isn’t very positive.

<i>Issue Description</i>	Identity Many interviewees cited that region's lack of identity as an IT center is a challenge. This issue is related to the point that the region's economy is so diversified – it's not a "pure play" – that it has no clear, simple identity (particularly related to IT).
<i>Interviewee Quote</i>	This region is not well known anymore for any industry sector, except maybe healthcare. And that sector has been out of favor in recent years. Most outsiders have no idea that Philadelphia has such a wealth of IT activity.
<i>Issue Description</i>	Mindset Many interviewees expressed a belief that this region was slow to change and not very entrepreneurial. The abundance of old money and the legacy of heavy manufacturing in the region were often cited as major contributors to this "mindset."
<i>Interviewee Quote</i>	In S.F. or Boston, entrepreneurial activities are a major part of their economy — here, that's not the case. The climate is a little too staid.
<i>Issue Description</i>	Retention Compared to other areas such as San Francisco and Boston, Greater Philadelphia (particularly Philadelphia and immediate suburbs) does not retain nearly as high a percentage of graduates from top institutions such as the Wharton School. This issue has been studied extensively and it came up in most of the interviews performed for this study.
<i>Interviewee Quote</i>	Stanford and Harvard retain five times as many students as Wharton in the local economy. We need to create opportunities that excite the graduates and give them a place in this region.
<i>Issue Description</i>	Startups The issue of whether there are "enough" startups is a difficult one. As with the point about geography, there were interviewees on both sides of this issue.
<i>Interviewee Quote</i>	<i>Pro:</i> We have found more deals than we have money to invest in this region. Most of these deals have been in the IT sector. <i>Con:</i> Good ideas and management teams are both low probability undertakings; the challenge is compounded because they need to intersect. We have not found many such intersections in this region
<i>Issue Description</i>	Taxes Many interviewees mentioned taxes as an impediment to growth in the region, particularly in Philadelphia.
<i>Interviewee Quote</i>	If I had my druthers, we'd be in downtown Philly next to 30th street station. But it's too expensive. The taxes would kill us. At the city level, taxes are still too high — corporate tax, gross business receipts tax and city wage tax add up to a potent punch. We drive them [startups] away with taxes and make the cross-fertilization harder.
<i>Issue Description</i>	"Tech-savvy" There was a sentiment among several CEO and VC interviewees that there is a lack of entrepreneurs and managers in the region that understand IT.
<i>Interviewee Quote</i>	It's hard to find tech-savvy business people who understand the technology well enough to sell. It's not so hard to find true "techies."

APPENDIX 3

DESCRIPTION OF INDEX

The Greater Philadelphia IT Index represents a cross section of the region's IT companies. For the purpose of this report, the Index is market-value (capitalization) weighted, based on the aggregate market value of its 40 component stocks on 5/28/99.

Ticker	Company	City	State
CDI	CDI Corporation	Philadelphia	PA
CDNW	CDNow, Inc.	Jenkintown	PA
RCMT	RCM Technologies	Pennsauken	NJ
NEWH	New Horizons Worldwide	Morganville	NJ
JUDG	Judge Group	Bala Cynwyd	PA
CMCSK (3)	Comcast CL 'A' Spl (non-vtg)	Philadelphia	PA
GIC	General Instrument Corporation	Horsham	PA
RCNC (4)	RCN Corporation	Princeton	NJ
CMCSA (3)	Comcast CL 'A'	Philadelphia	PA
PGTV	Pegasus Communications 'A'	Radnor	PA
TALK	Tel-Save Holdings, Inc	New Hope	PA
IDC	Interdigital Communications	King of Prussia	PA
ICTG	ICT Group, Inc.	Langhorne	PA
NMRX	NumereX Corp	West Conshohocken	PA
USWI	US WATS, Inc.	Bala Cynwyd	PA
ACRO	Acrodyne Communications	Blue Bell	PA
VSH (5)	Vishay Intertechnology, Inc	Malvern	PA
AME	Ametek, Inc.	Paoli	PA
TNL	Technitrol Inc.	Trevose	PA
ADSP	Ariel Corporation	Cranbury	NJ
QSYS	Quad Systems Corp	Willow Grove	PA
MTLG	Metrologic Instruments	Blackwood	NJ
DOCI	DecisionOne Corporation	Frazer	PA
PANL	Universal Display Corporation	Bala Cynwyd	PA
LMT (6)	Lockhead Martin	Bethesda	MD
UIS	Unisys Corporation	Blue Bell	PA

Ticker	Company	City	State
IKN	IKON Office Solutions	Malvern	PA
SDS	Sungard Data Systems	Wayne	PA
SMS	Shared Medical Systems Corp	Malvern	PA
SCTC (7)	Systems & Computer Tech. Corp.	Malvern	PA
KLIC	Kulicke & Soffa Industries	Willow Grove	PA
CFMT	CFM Technologies, Inc	West Chester	PA
INTT	inTest Corporation	Cherry Hill	NJ
SCAI	Sanchez Computer Associates, Inc.	Malvern	PA
ASTN	Ashton Technology Group	Philadelphia	PA
INFO	Infonautics Inc. 'A'	Wayne	PA
PVII	Princeton Video Image	Lawrenceville	NJ
ATEA	Astea International	Horsham	PA
PXXI	Prophet 21	Yardley	PA
VOXW	Voxware Inc.	Princeton	NJ

NOTES

- (1) The following Greater Philadelphia IT stocks did not have a long enough history or had some unavailable information, so were not included in INDEX: WGAT; SDNA; AMKR; SAP; VERT; EGAM; CITI; TLSI; AMCM; ICST (see note 2); BASEA
- (2) Management-led buyout as of 5/1/99, together with affiliates of Bain Capital and Bear, Stearns
- (3) Adjusted for 2-for-1 stock split 5/6/99
- (4) Adjusted for 2-for-1 stock split 4/6/98
- (5) Adjusted for 5% stock dividend paid 6/1/98
- (6) Adjusted for 2-for-1 stock split 1/4/99; Lockheed Martin's headquarters are located outside the region but it maintains significant (several thousand employees) IT operations in King of Prussia, PA and is therefore included in the Index; over the last year or so, particularly with LMT's large market cap and its stock performance, it has not helped the Index trend.
- (7) Adjusted for 2-for-1 stock split 5/18/98

APPENDIX 4

DATABASE OF PHILADELPHIA REGION IT COMPANIES

SEE PAGE 24 FOR A DESCRIPTION OF THIS DATABASE

INTEGRATORS (INTG)

Ticker	Company	City	State	Market Cap (\$B)	Sales (a)	Worldwide Employees EE	Estimated Sales/EE
LMT	Lockhead Martin (2)	Bethesda	MD	15,908.7	5,212,000,000	6,000	868,667
UIS	Unisys Corporation	Blue Bell	PA	9,887.5	7,208,400,000	33,200	217,120
IKN	IKON Office Solutions	Malvern	PA	2,081.8	5,628,700,000	42,600	132,129
SDS	Sungard Data Systems	Wayne	PA	4,022.9	1,159,748,000	5,300	218,820
SMS	Shared Medical Systems Corp	Malvern	PA	1,750.8	1,135,393,000	7,657	148,282
SCTC	Systems & Computer Technology Corp	Malvern	PA	537.5	403,000,000	3,400	118,529
SDNA	Sedona Corporation	Limerick	PA	40.6	4,827,000	79	61,101
	Actium, a modis Solutions Company	Conshohocken	PA	-	64,000,000	380	168,421
	Stornet Inc.	West Chester	PA	-	41,943,000	55	762,600
	Info Systems, Inc.	Wilmington	DE	-	37,500,000	190	197,368
	Cybertech International	Trevoze	PA	-	25,567,159	350	73,049
	Avetel, Inc.	King of Prussia	PA	-	17,500,000	60	291,667
	Sintaks Unlimited B.I.S., Inc.	Bridgeport	PA	-	12,170,000	50	243,400
	Shepard-Patterson & Associates, Inc	Conshohocken	PA	-	10,082,114	102	98,844
	M-Cubed Information Systems	Wilmington	DE	-	9,004,000	70	128,629
	Omicron Systems, Inc.	Philadelphia	PA	-	8,666,191	5	1,733,238
	Advansys	King of Prussia	PA	-	7,500,000	20	375,000
	Open Systems Solutions, Inc.	Yardley	PA	-	7,500,000	8	937,500
	Synergis Technologies, Inc.	Quakertown	PA	-	6,347,427	35	181,355
	American Technology Corporation	Media	PA	-	5,970,584	30	199,019
	Strategic Link Consulting, Inc.	West Chester	PA	-	5,651,922	33	171,270
	NovaSoft Information Technology, Inc.	Princeton	NJ	-	5,026,000	130	38,662
	Networking Plus, Inc.	Cherry Hill	NJ	-	4,926,953	18	273,720
	Convergent Solutions, Inc.	King of Prussia	PA	-	4,506,517	50	90,130
	International Distribution & Consulting	Audubon	NJ	-	2,255,000	15	150,333
	FutureNet	Philadelphia	PA	-	261,137	9	29,015
				34,230	21,028,446,004	99,846	
					808,786,385	3,840	304,149
					9,543,057	65	176,313
							26

ELECTRONICS & INSTRUMENTATION (ELECT)

Ticker	Company	City	State	Market Cap (\$B)	Sales (a)	Worldwide Employees EE	Estimated Sales/EE
ICST	Integrated Circuit Systems (b)	Norristown	PA	NA	160,000,000	259	617,761
VSH	Vishay Intertechnology, Inc	Malvern	PA	1,408.3	1,572,745,000	21,522	73,076
AME	Ametek, Inc.	Paoli	PA	739.7	373,000,000	2,700	-
TNL	Technitrol Inc.	Trevoze	PA	481.1	448,539,000	21,400	20,960
CKP	Checkpoint Systems	Thorofare	NJ	278.0	362,407,000	3,044	119,056
ADSP	Ariel Corporation	Cranbury	NJ	29.3	17,446,000	106	164,585
QSYS	Quad Systems Corp	Willow Grove	PA	8.0	74,859,000	327	228,927
	Numonics Corporation	Montgomeryville	PA	-	17,500,000	85	205,882
	SMX Corporation	Kennett Square	PA	-	16,069,000	85	189,047
	Security, Services & Technologies	King of Prussia	PA	-	3,981,259	38	104,770
	Datacom International, Inc.	Telford	PA	-	3,750,000	10	375,000
	TJM Electronic Associates	Bristol	PA	-	3,600,000	30	120,000
	Aurora Instruments Inc	Blue Bell	PA	-	2,103,000	14	150,000
	Surveillance Systems, Inc.	Pottstown	PA	-	568,903	5	113,781
	Mars Electronics International	West Chester	PA	-	165,000,000	1,100	150,000
				2,944	3,221,568,162	50,725	
					214,771,211	3,382	175,523
					17,500,000	106	150,000

Notes	Firm Description
1	Manufactures and sells integrated advanced technology products and services.
5,6	Provides information services, technology, software and customer support to clients worldwide.
5,6	Document management and networking solutions
5,6	Provides computer services and software, including healthcare information systems.
5,6	Systems development and integration for healthcare market worldwide
5,6	Information technology services and software
20,21	Designs, manufactures and sells imaging products and software.
4,7,14	Computer Integrated Systems Design
15	Systems Integration
2	Systems Integration, Network Services, Telecomm.
15	Information technology consulting services
2	Design and management of complex networks and management information systems
4,7	Systems Integration
16	Systems & technology firm
25	Provides system integration services
15	Systems & technology firm
2	Systems integration, especially accounting and financial solutions
2	Storage management solutions
15	Computer aided design systems integrator
4,7	Systems Integration
15	Information technology consulting and systems integration
25	Software development and system integration
15	Systems Integration
4,7	Management & Technology Consulting
16	Data communications integrator and high-end internet services provider
15	Installs & support computer networks & personal computers

Average

Median

Number of Companies

Notes	Firm Description
5,6	Designs, manufactures and markets integrated circuits for the personal computer industry
5,6,8	Electronic resistors
5,6,26	Manufactures and sells monitoring, calibration and display instruments (in Electronic Instruments Group)_
5,6	Electronic Components
5,6	Surveillance, point of sale and access control systems
5,6	Provides digital signal processing (DSP) products and services to technology markets.
5,6	Electrical machinery
2	Data input and precision measurement devices
15	Manufactures laser-based portable coordinate measuring devices
16	Design, sell, install, and service electronic security systems.
2	Developer of innovative technology and communications/telephony products
16	Robotic Electronic Contract Manufacturing
12	Fiber Optic Fusion Splicers
16	Customized video surveillance systems
2	Subsidiary of M&M/Mars, Inc. Applies electronics to unattended points-of-sale.

Average

Median

Number of Companies

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COMMUNICATIONS (COMM)

Ticker	Company	City	State	Market Cap (\$B)	Sales (a)	Worldwide Employees EE	Estimated Sales/EE
AMCM	AM Communications, Inc.	Quakertown	PA	NA	16,854,000	74	227,757
CMCSK	Comcast CL 'A' Spl (non-vtg)	Philadelphia	PA	28,506.4	5,145,000,000	17,000	302,647
GIC	General Instrument Corporation	Horsham	PA	6,678.0	1,988,000,000	7,800	254,872
RCNC	RCN Corporation	Princeton	NJ	3,096.4	210,940,000	2,150	98,112
CMCSA	Comcast CL 'A'	Philadelphia	PA	2,279.8	see above	-	
WGAT	Worldgate Communications 'A'	Bensalem	PA	756.0	1,022,000	131	7,802
PGTV	Pegasus Communications 'A'	Radnor	PA	751.2	195,221,000	800	244,026
TALK	Tel-Save Holdings, Inc	New Hope	PA	507.4	448,600,000	525	854,476
IDC	Interdigital Communications	King of Prussia	PA	224.2	99,221,000	215	461,493
ICTG	ICT Group, Inc.	Langhorne	PA	59.7	120,000,000	3,000	40,000
NMRX	NumereX Corp	West Conshohocken	PA	38.1	25,129,000	121	207,678
USWI	US WATS, Inc.	Bala Cynwyd	PA	33.2	44,679,000	70	638,271
ACRO	Acrodyne Communications	Blue Bell	PA	22.8	11,727,000	96	122,156
	ATX Telecommunications Services	Bala Cynwyd	PA	-	175,000,000	300	583,333
	TeleQ	King of Prussia	PA	-	26,986,304	25	1,079,452
	Reliable Telcom, Inc.	Upper Darby	PA	-	11,330,801	125	90,646
	Pinnacle Cable Services, Inc.	Marlton	NJ	-	6,490,274	255	25,452
	Fiberlink Communications Corporation	Blue Bell	PA	-	5,120,000	14	365,714
	V-Span, Inc.	Wayne	PA	-	4,274,000	30	142,467
	Chorus Communications, Inc.	King of Prussia	PA	-	4,046,597	50	80,932
	Telcom Solutions, Inc.	Philadelphia	PA	-	344,725	4	86,181
				42,953	8,539,985,701	32,785	
					426,999,285	1,561	295,673
					26,057,652	125	217,717
							21

SEMICONDUCTORS (SEMI)

Ticker	Company	City	State	Market Cap (\$B)	Sales (a)	Worldwide Employees EE	Estimated Sales/EE
AMKR	Amkor Technology	West Chester	PA	1,090.2	1,568,000,000	10,300	152,233
KLIC	Kulicke & Soffa Industries	Willow Grove	PA	494.4	411,040,000	2,057	199,825
CFMT	CFM Technologies, Inc	West Chester	PA	72.4	33,155,000	280	118,411
INTT	inTest Corporation	Cherry Hill	NJ	44.1	19,075,000	111	171,847
	GMT Microelectronics Corporation	Norristown	PA	-	17,500,000	140	125,000
	Maintech Inc.	Huntingdon Valley	PA	-	8,590,036	20	429,502
	R&E International, Inc.	King of Prussia	PA	-	5,000,000	10	500,000
	Sensors Unlimited, Inc.	Princeton	NJ	-	3,343,000	22	151,955
				1,701	2,065,703,036	12,940	
					258,212,880	1,618	231,096
					18,287,500	126	162,040
							8

COMPUTERS & PERIPHERALS (HDWR)

Ticker	Company	City	State	Market Cap (\$B)	Sales (a)	Worldwide Employees EE	Estimated Sales/EE
MTLG	Metrologic Instruments	Blackwood	NJ	63.2	65,641,000	534	122,923
DOCI	DecisionOne Corporation	Frazer	PA	38.9	800,000,000	6,000	133,333
PANL	Universal Display Corporation	Bala Cynwyd	PA	38.9	369,000	12	30,750
	Datavision Inc.	Warminster	PA	-	26,000,000	50	520,000
	Quadrant International	Malvern	PA	-	17,500,000	50	350,000
	R & D Data Products, Inc.	Princeton	NJ	-	6,183,000	6	1,030,500
	Development Concepts Inc	Lansdale	PA	-	6,000,000	40	150,000
	Market Point	Exton	PA	-	3,893,932	9	432,659
	Ribbons Express, Inc.	Pennsauken	NJ	-	3,414,675	13	262,667
	International Laser, Limited	Runnemede	NJ	-	1,006,000	10	100,600
	QLC Technologies	Philadelphia	PA	-	818,075	6	136,346
	Bellstar Services, Inc.	Moorestown	NJ	-	670,050	10	67,005
				141	931,495,732	6,740	
					77,624,644	562	278,065
					4,946,966	13	143,173

Notes	Firm Description
5,6	Network monitoring systems primarily for cable TV market
5,6	Operates cable TV systems; facilitates E-Commerce and the convergence of digital media.
5,6	Mfgs and sells broadband access solutions including digital and analog set-top terminals
5,6	Develops fiber optic networks to provide telecommunications services, including high speed Internet access.
-	Operates cable TV systems; facilitates E-Commerce and the convergence of digital media
23	Provides a new television-based Internet access service called WorldGate Service.
5,6	Provides direct broadcast satellite television and cable services.
5,6	Telephone communications
5,6	Develops and sells digital wireless telecommunications systems for voice and data communications.
5,6,10	Teleservices
5,6	Information transport products and services
5,6	Telephone communications
5,6	Makes and sells TV broadcast transmitters and translators.
2	Full range of telecommunications services
16	New & used telecommunications equipment and network solutions consulting
4,7	Communications Cabling
15	Telecommunications services
16	Telecommunications services
15	Video conferencing network management
15	Full range of telecommunications services
15	Telecommunications project management, consulting, & sales

Average

Median

Number of Companies

Notes	Firm Description
5,6	Develops and sells semiconductor packaging and test services technology.
5,6	Designs, manufactures and sells equipment used to assemble semiconductor devices.
5,6	Designs, manufactures and markets advanced wet processing equipment for the semiconductor and flat panel display industries
5,6	Designs and makes docking hardware and test head manipulators used by semiconductor manufacturers.
2	Manufactures and sells semiconductor integrated circuits on silicon wafers
4,7	Semiconductor Equipment
4,7	Semiconductor Equipment
24	Provides compound semiconductor tech services

Average

Median

Number of Companies

Notes	Firm Description
5,6	Designs, manufactures and markets bar code scanning equipment.
3,9	Computer maintenance and support services
5,6	Researching and developing organic light emitting diode (OLED) technology for computer displays.
4,7	Computers/Peripherals
2	Digital video technology and solutions. Name changed to Divicore in 1999.
24	Resells computers and accessories
12	Terminal emulator adaptors
15	Printer distributor specializes in Lexmark printers
16	Distributing Computer Supplies
16	Re-manufacturer of laser toner and OPC cartridges
15	Remanufacture toner cartridges and repair laser printers
16	Remanufacture toner cartridges, laser printer service and maintenance, sale of computer supplies

Average

Median

Number of Companies

THE GREATER PHILADELPHIA IT REPORT

SOFTWARE (SOFT)

Ticker	Company	City	State	Market Cap (\$B)	Sales (a)	Worldwide Employees EE	Estimated Sales/EE
BASEA	Base Ten Systems CL 'A'	Trenton	NJ	NA	7,550,000	133	56,767
SAP	SAP America, Inc.	Newtown Square	PA	43,758.4	3,360,000,000	17,000	197,647
VERT	VerticalNet	Horsham	PA	1,314.0	3,135,000	220	14,250
SCAI	Sanchez Computer Associates, Inc.	Malvern	PA	806.5	44,059,000	307	143,515
ASTN	Ashton Technology Group	Philadelphia	PA	231.3	4,938,000	25	197,520
INFO	Infonautics Inc. 'A'	Wayne	PA	59.4	14,925,000	170	87,794
PVII	Princeton Video Image	Lawrenceville	NJ	51.7	696,000	46	15,130
ATEA	Astea International	Horsham	PA	40.9	28,941,000	317	91,297
PXXI	Prophet 21	Yardley	PA	32.7	46,614,000	305	152,833
EGAM	eGames, Inc.	Langhorne	PA	31.8	9,276,000	26	356,769
VOXW	Voxware Inc.	Princeton	NJ	14.2	5,882,000	43	136,791
CITI	Canterbury Information Technology	Medford	NJ	12.9	12,112,000	125	96,896
TLSI	Telesciences Inc.	Mount Laurel	NJ	7.8	30,700,000	205	150,000
	Bentley Systems, Inc.	Exton	PA	-	175,000,000	958	182,672
	SEMCOR, Inc	Mount Laurel	NJ	-	80,900,000	539	150,000
	PDC Solutions	King of Prussia	PA	-	55,000,000	55	1,000,000
	Integrated Systems Consulting Group	Wayne	PA	-	43,178,000	650	66,428
	Primavera Systems, Inc.	Bala Cynwyd	PA	-	42,472,000	200	212,360
	CoreTech Consulting Group Inc	King of Prussia	PA	-	29,745,494	250	118,982
	Xenotechnix Inc	Bensalem	PA	-	21,895,316	146	150,000
	Bluestone, Inc.	Mount Laurel	NJ	-	21,445,968	261	82,168
	Devon Consulting Inc	Wayne	PA	-	20,518,000	137	150,000
	ICON Solutions, Inc.	Conshohocken	PA	-	20,100,000	155	129,677
	FNX Limited	Wayne	PA	-	17,600,000	165	106,667
	Data Systems Analysts, Inc.	Pennsauken	NJ	-	17,500,000	150	116,667
	Funds Associates Ltd.	Berwyn	PA	-	17,500,000	88	198,864
	Navian Technology Solutions	Newtown Square	PA	-	17,500,000	105	166,667
	PDS	Blue Bell	PA	-	14,484,000	171	84,702
	Commtech Corporation	Cranbury	NJ	-	14,148,000	100	141,480
	Analytical Graphics Inc	Malvern	PA	-	12,862,041	130	98,939
	Sabre Systems, Inc.	Warminster	PA	-	12,803,171	275	46,557
	J & B Software, Inc.	Blue Bell	PA	-	11,581,537	90	128,684
	Innovative Solutions & Support, Inc	Malvern	PA	-	11,404,204	78	146,208
	Systems/Link Corporation	Cranbury	NJ	-	10,602,000	52	203,885
	Delphi Partners, Inc.	Marlton	NJ	-	9,168,000	67	136,836
	JVC Technologies Inc	Wayne	PA	-	8,888,641	59	150,000
	Neptune Systems Inc.	Eddystone	PA	-	8,414,168	58	145,072
	Aston Brooke Corporation	Plymouth Meeting	PA	-	8,360,000	79	105,823
	XRT, Inc.	Wayne	PA	-	8,005,051	82	97,623
	Software Consulting Group Inc	Media	PA	-	6,943,160	78	89,015
	Sensar, Inc.	Moorestown	NJ	-	6,670,000	26	256,538
	US Interactive, Inc.	Malvern	PA	-	6,500,000	183	35,519
	Syngy Inc	Bala Cynwyd	PA	-	6,431,154	67	95,987
	CB Technologies, Inc.	Malvern	PA	-	6,241,876	115	54,277
	Syncro Development Corp	Langhorne	PA	-	5,900,000	39	150,000
	MEDecision, Inc.	Wayne	PA	-	5,780,000	39	150,000
	Progressive Software Computing	Wilmington	DE	-	5,754,936	71	81,055
	Frontier Media Group, Inc.	Malvern	PA	-	5,344,041	60	89,067
	BCI	Moorestown	NJ	-	5,178,000	72	71,917
	Managing Editor Inc	Jenkintown	PA	-	5,000,000	33	150,000
	KSM Associates	Yardley	PA	-	4,808,353	74	64,978
	Protech Systems, Inc.	Medford	NJ	-	4,795,859	45	106,575
	Innovative Consulting, Inc.	Malvern	PA	-	4,788,120	49	97,717
	CHI Systems Inc.	Lower Gwynedd	PA	-	4,432,298	47	94,304
	Envirometrics Software, Inc.	New Castle	DE	-	4,164,000	35	118,971
	Genesis Development Corporation	West Chester	PA	-	3,614,163	35	103,262
	Datamatix, Inc.	King of Prussia	PA	-	3,570,000	23	155,217
	DataZed Software Services, Inc.	Collegeville	PA	-	3,500,000	22	159,091
	Impac Technology Inc	Exton	PA	-	3,071,731	35	87,764
	Solutions Through Data-Processing	Fort Washington	PA	-	2,776,702	30	92,557
	OKS Limited	Haverford	PA	-	2,680,000	3	893,333

Notes	Firm Description
5,6	Designs, develops and sells software solutions for pharmaceutical and medical device manufacturers.
4,7	ERP software / services
5,6	Operates vertical trade communities on the Internet.
5,6	Software for large financial institutions
4,7	Develops and sells customer management software.
5,6	Develops and sells Internet-based reference services for the educational and consumer markets.
5,6	Video insertion system, for placing advertising images into television broadcasts.
5,6	Develops and sells customer service software.
5,6	Develops on-line business management systems exclusively for distributors and wholesalers.
5,6	Develops and sells personal computer software.
5,6	Develops and sells speech recognition solutions for the warehousing and manufacturing inspection markets.
5,6	Develops and sells software and provides computer software training and management training.
5,c	Develops, markets and supports billing data solutions local and long-distance providers.
2	Engineering software and user services
12	Systems Engineering
4,7	Computer Integrated Systems Design
4,7,13	Information Technology Consulting
4,7	Software for management of large-scale projects
4,7	Information Technology Consulting
12	Engineering Services
16	Computer Services—application, development and deployment solution, Training, and Products
12	Custom Software Development
4,7,17	E-business solutions
4,7	Financial risk management software
2	Information technology solutions
2	Software and services for financial services industry
2	Customer Relationship Marketing solutions
4,7	Software for HR and Payroll
25	Develops and sells telecommunications software
4,7	Software to track satellites
4,7	Software & Systems services
15	Image-based remittance processing software and services
4,7	Custom Computer Programming
25	Develops and sell software for wireless telephone industry
16	HR and Financial systems implementations
12	Custom Computer Programming
16	Software and Support services for warehouse and distribution industry
4,7	Custom software development
4,7,18	Treasury Management Software
4,7	Software & Systems services
16	Supplies “iris identification” products to the banking industry
4,7	Enable E-business
4,7	Software & Information Services
4,7	Custom Software Development
12	Prepackaged Software including Internet communications
7,c	Software solutions for healthcare
15	Custom software development & systems integration
4,7	Internet consulting firm
25	System and software engineering services
12	Custom Computer Programming
4,7	Information Technology Services
15	Computer software solutions
15	Computer application management consulting and training services
15	Interactive computer software engineering & development
24	Develops and sells environmental and crisis management software
4,7	Software development and consulting
2	Information services and software
2	Information management consulting
4,7	E-business solutions
16	Software & Systems services
4,7	Outsourcing Data Processing Services

SOFTWARE (SOFT) CONTINUED

Ticker	Company	City	State	Market Cap (\$B)	Sales (a)	Worldwide Employees EE	Estimated Sales/EE
	CONTEQ Corporation	Drexel Hill	PA	-	2,586,000	3	862,000
	IriScan, Inc.	Mount Laurel	NJ	-	2,297,106	12	191,426
	LegalEdge Software, Inc.	Radnor	PA	-	1,992,000	30	66,400
	Audiocare Systems	Wayne	PA	-	1,800,000	12	150,000
	Computer Resources & Training	Philadelphia	PA	-	1,800,000	12	150,000
	WPL Laboratories Inc.	Haverford	PA	-	1,558,363	19	82,019
	Mirco E.D.S., Inc.	Narberth	PA	-	1,550,000	16	96,875
	Stelix, Inc.	Feasterville	PA	-	1,400,000	11	127,273
	Polaris Consulting & Information	Philadelphia	PA	-	1,179,686	9	131,076
	S.G.C. Consulting, Inc.	Woodbury	NJ	-	1,171,761	14	83,697
	FXpress Corporation	Bala Cynwyd	PA	-	1,060,903	8	132,613
	e-Tech Solutions	Eagle	PA	-	1,044,652	11	94,968
	Group Cortex, Inc.	Philadelphia	PA	-	1,015,298	16	63,456
	I/S Computer Services, Inc.	Richboro	PA	-	841,721	6	150,000
	Know It All	Philadelphia	PA	-	578,805	13	44,523
	CompuPros	Philadelphia	PA	-	430,288	2	215,144
				46,362	4,410,154,567	25,397	
					57,274,735	330	153,932
					6,431,154	60	127,273
							77

OTHER

Ticker	Company	City	State	Market Cap (\$B)	Sales (a)	Worldwide Employees EE	Estimated Sales/EE
	CDI Corporation	Philadelphia	PA	617.7	1,540,000,000	31,000	49,677
	CDNW	Jenkintown	PA	528.9	56,395,000	200	281,975
	RCMT	Pennsauken	NJ	153.9	252,413,000	3,500	72,118
	NEWH	New Horizons Worldwide	Morganville	147.6	72,600,000	762	95,276
	JUDG	Judge Group	Bala Cynwyd	24.0	114,498,000	1,300	88,075
		CMP Express.Com	Broomall		20,970,468	29	723,120
				1,472	2,056,876,468	36,791	
					342,812,745	6,132	218,373
					93,549,000	1,031	91,675
							6
				GRAND TOTALS	\$129,803	\$42,254,229,670	265,224

NOTES

- (a) Market Capitalization data is as of market close on 5/28/99.
- (b) Management-led buyout as of 5/19/99, together with affiliates of Bain Capital and Bear, Stearns
- (c) Estimate based on known sales divided by average annual sales/employee estimate of \$150,000
- (1) Number of employees is from Eastern Technology Council 1998-1999 membership directory, for Lockheed Martin Management and Data Systems Unit only; overall employment 165,000. The revenue estimate is from form 10-K filed with the SEC, for Information & Systems segment only.
- (2) Number of employees and/or revenue figures estimated from Eastern Technology Council 1998-1999 membership directory
- (3) Number of employees from company Web page 5/99
- (4) Number of employees from 1998 Fast 50 List
- (5) Revenue figures from the company's 1998 10-K filed with the SEC
- (6) Employee figures from the company's 1998 10-K filed with the SEC
- (7) Revenue figures from 1998 Fast 50 List
- (8) 16,066 of Vishay's employees located outside the U.S. (1998 10-K)
- (9) Revenue figures from company Web page 5/99
- (10) Over 90% of their 5,346 employees are part-time; estimated 3,000 full-time equivalents
- (11) About 367 permanent staff; 4,000 FT contract personnel; about 10,200 temp personnel (data from 1998 10-K); Roughly estimated to be 3,500 FT equivalents, given estimated contract length of 3 months
- (12) Revenue figures from 1997 Fast 50, so 1996 data; number of employees estimated based on \$150,000 per employee
- (13) Merged with First Consulting Group, 1998 (Nasdaq: FCGI)
- (14) Acquired in 1998 by Modis, Inc., which is owned by Accustaff — a \$1.2 billion (revenues) IT services firm
- (15) Revenue figures and number of employees from the 1998 Philadelphia 100 list, so 1997 data

Notes	Firm Description
16	Computerized systems for construction management
15	Biometric identification technology based on the recognition of patterns in the human iris.
16	Develops and sells software and services for legal industry
7,c	Custom Computer Programming and Services
12	Computer Related Services
15	Custom Computer Programming and Services
4,7	Software & Internet
16	Custom Computer Programming and Services
15	Systems & technology firm
15	Systems & technology firm
15	Financial risk management software
15	Client/server & internet/intranet software applications
15,17	Internet consulting firm
7,c	Software Services
15	Software for testing the skill levels of job applicants
15	Full-service computer consulting firm

Average
Median
Number of Companies

Notes	Firm Description
5,6	Engineering and technical staffing, outsourcing and consulting services. Also provides similar services in non-technology areas.
5,6,22	Sells music and entertainment products on-line
11,5,6	Provides temporary and contract personnel (mainly IT).
5,6	Company-owned and franchised computer training facilities.
5,6	Provides IT and engineering personnel on a contract or permanent basis. Also provides IT training services.
15	Internet sales of computer software & hardware

Average
Median
Number of Companies

- 16) Revenue figures and number of employees from the 1997 Philadelphia 100 list, so 1996 data
- 17) Acquired by AnswerThink Consulting Group
- 18) Merged with Cerg (a Paris exchange-listed French company) in \$25 million deal, to form XRT CERG FINANCE, INC.
- 19) Acquired by Qwest (a \$2 billion communications company); Frontier now called Qwest Internet Solutions
- 20) Revenue figures from the company's 1997 10-K filed with the SEC
- 21) Employee figures from the company's 1997 10-K filed with the SEC
- 22) Announced merger with major competitor N2K on October 23, 1998.
- 23) Revenue and employee figures from the company's S-1 filed with the SEC 2/99
- 24) Revenue figures and number of employees from the 1997 Inc. 500 list, so 1996 data

- (25) Revenue figures and number of employees from the 1998 Inc. 500 list, so 1997 data
- (26) Ametek revenue and employee figures are for three product lines in the Electronic Instruments Group only — Process and Analytical Instruments; Aerospace; Heavy-Vehicle — approximately 90% of EIG total revenues (Estimated base on 1998 10-K filed with SEC.)

DATA SOURCES

1997, 1998 Philadelphia 100 and Deloitte and Touche Fast 50, published by the *Philadelphia Business Journal*; 1997, 1998 Inc. 500, published by *Inc. Magazine*; 1998-1999 Membership Directory published by the Eastern Technology Council; Public company data from the NASDAQ/AMEX and New York Stock Exchange (NYSE); 10-K Annual report data filed with the Securities and Exchange Commission (SEC) by sample public companies; Sample company Web pages and other publicly available documents.

FOOTNOTES

- ¹ [Http://www.census.gov/population/estimates/metro-city/ma_96-08.txt](http://www.census.gov/population/estimates/metro-city/ma_96-08.txt), 4-30-99.
- ² “Cyberstates: A State-by-State Overview of the High-Technology Industry”, *American Electronics Association*, 1997, pages 98-99
- ³ “Cyberstates...”, pages 4-5.
- ⁴ “Cyberstates...”, page 105, from Bureau of Labor Statistics Data.
- ⁵ “Cyberstates...”, page 105, from Bureau of Labor Statistics Data.
- ⁶ Cybernation Key Findings, American Electronics Association, <http://sc-notes1.aeanet.org/www/ResearchStatistics.nsf/homepage/index.html>
- ⁷ William B. Bygrave, Jeffrey A. Timmons, “Venture Capital at the Crossroads,” *Harvard Business School Press*, 1992, page 2.
- ⁸ “PricewaterhouseCoopers: Global: Insights & Solutions: MoneyTree™ Survey Report,” <http://204.198.129.80/definitions.asp>, 4-30-99.
- ⁹ *PricewaterhouseCoopers MoneyTree™ Survey Report*, and data provided by PwC — Philadelphia.
- ¹⁰ Venture return data from “Steady Growth for Venture Capital in Midst of a Turbulent Market”, National Venture Capital Association, <http://www.nvca.org/stat3.html>, 4-19-99; S&P 500 return data calculated based on S&P 500 Index value for relevant dates.
- ¹¹ Stephanie Gates, “Venture-backed IPOs had lean year”, *Red Herring Online*, January 7, 1999.
- ¹² Jeremy J. Siegel, “Are Internet Stocks Overvalued? Are They Ever.”, *Wall Street Journal*, April 19, 1999, Section A, Manager’s Journal column.
- ¹³ [Http://www.totalbaseball.com/history/event/record/lifetime](http://www.totalbaseball.com/history/event/record/lifetime), 5-1-99.
- ¹⁴ “Small Business Economic Indicators”, 1997, Tables 6.3 and 6.7, Office of Advocacy, U.S. Small Business Administration, adapted from data provided by the U.S. Department of Labor, Employment and Training Administration.
- ¹⁵ All data for the analysis in this section were graciously provided by the Philadelphia office of PricewaterhouseCoopers, based on the last four years of their national quarterly MoneyTree™ venture capital survey.
- ¹⁶ Data sources included: 1997, 1998 Philadelphia 100 and Deloitte and Touche Fast 50 lists, published by the *Philadelphia Business Journal*; 1997, 1998 Inc. 500, published by *Inc. Magazine*; 1998-1999 Membership Directory published by the Eastern Technology Council; Public company data from the NASDAQ/AMEX and New York Stock Exchange (NYSE); 10-K Annual report data filed with the Securities and Exchange Commission (SEC) by sample public companies; sample company Web pages and other publicly available documents.
- ¹⁷ Claudia Furia Smith, “After the Revolution at SEI”, *PhillyTech Magazine*, May 1999, page 15.