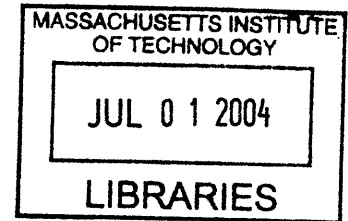


# Finding Growth in a Maturing Market: Strategic Implications for the Software Industry

By

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Submitted to the Sloan School of Management  
in Partial Fulfillment to the Requirements for the Degree of

**Masters in Business Administration**

at the

**Massachusetts Institute of Technology**

June 2004

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**FINDING GROWTH IN A MATURING MARKET:  
STRATEGIC IMPLICATIONS FOR THE SOFTWARE INDUSTRY**

By

Scott H. Crenshaw

Submitted to the M.I.T. Sloan School of Management on May 7, 2004 in partial fulfillment of the requirements for the degree of Masters of Business Administration.

**ABSTRACT**

This thesis explores the changes occurring in the software industry and the strategic implications thereof. The software industry has historically benefited from the rapid introduction of new platforms and applications, an increasing user base and nearly contiguous cycles of growth. However, this process may have stopped or become sufficiently protracted to shift the industry to the mature phase of its life cycle.

This thesis seeks a definition of industry maturity, discusses trends in the software industry and assesses the extent to which these trends are cyclical or structural. It then analyzes the maturity of the industry in aggregate and suggests strategies for firms. Finally, it segments the industry into clusters and makes observations regarding the maturity of each cluster.

Thesis Supervisor: Arnoldo C. Hax, Alfred P. Sloan Professor of Management

## **Acknowledgements**

I leave my experience at Sloan a more capable leader and manager than when I entered. I could not ask for more.

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Professor John Van Maanen and Professor Diane Burton each taught me vital links between strategy and leadership, providing invaluable tools to better lead, motivate and manage the most precious resource of any organization: its people.

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## Introduction

The software industry – like the high-technology fields in general – attracted thousands of entrepreneurs, investors, engineers, marketers and the like because it was a booming *growth* industry. The boom times started in the 1960s, as entrepreneurs identified common features and functions needed across the growing user base of mainframe computers,<sup>1</sup> thus finding the basis on which to build standalone software companies. Waves of technology adoption during the following decades – the minicomputer in the 1970s, the personal computer during the 80s, enterprise applications and the Internet in the 1990s – fueled cycle after cycle of growth. To be sure, many companies fell as well as rose. But the trend was clear: during the thirty one years from 1965 through 1996 – before the height of the Internet bubble – the industry grew at a compound annual growth rate of 24%<sup>2</sup>.

However, there are signs that growth is slowing. This thesis investigates if the slowdown is a normal cyclical decline due to temporary factors such as widespread over consumption during the late 1990s and broader economic decline which followed, or if the industry has permanently left its growth stage and begun an exorable transition into maturity. If it has become a mature industry, many of the assumptions, expectations, habits, and strategies which were successful during the growth years may no longer apply. Yet lessons appropriate for the new environment may be learned from the experience of industries that previously made this transition. This research seeks to identify if the market is maturing, and if so, discuss the strategic implications thereof.

## **From Growth to Maturity**

### ***Definition of Maturity***

What are the conditions which define industry maturity? Harrigan<sup>3</sup> specifies several characteristics of a market which has transitioned from growth to maturity:

1. A high degree of market saturation
2. Fewer significant product innovations
3. Previous characteristics of the market
  - a. High product prices
  - b. Widespread customer acceptance
4. Experienced buyers, with increasing leverage choosing from multiple vendors
5. Increased leverage on the part of the channel
6. Customers' consumption is primarily for replacement

Christensen and Raynor describe characteristics including stalled growth<sup>4</sup> and the erosion of margins to minimum sustainable levels<sup>5</sup>. Chandler<sup>6</sup> supports and extends this view when describing the maturation of the U.S. railroad industry in the late 1800s, citing the market saturation, the creation of oligopolies, and the reduced profitability of the industry.

It should be noted there is a marked difference between a mature *industry* and a mature *firm*. Mature industries may contain growing and profitable firms<sup>7</sup>; Southwest Airlines is but one example of a thriving firm in a seemingly dying industry. Indeed, the identification of profitable growth opportunities in mature industries is a primary goal of corporate strategy development.

Christensen and Raynor support this view: “It is important never to conclude that an industry ... is inherently unprofitable, whereas others ... are inherently profitable. ‘Industry’ is usually a faulty categorization scheme.”<sup>8</sup> They go farther, suggesting that when one part of an industry’s value chain becomes unprofitable, another part of the same value chain becomes profitable; they refer to this as the Law of Conservation of Attractive Profits.<sup>9</sup>

Some authors generalize the point, stating that the notion of mature industries is a psychological artifact that affects managerial behavior and stifles innovation, rather than a structural phenomenon. For example, Baden Fuller and Stopford write, “...we consider that maturity is, in effect a state of mind....”<sup>10</sup> After studying a group of European businesses whose growth has stalled, they concluded that widely-held beliefs of maturity prevented managers from seeking growth strategies. “Mature businesses are those whose managers believe they are imprisoned by their environments and are unable to succeed.”<sup>11</sup>

While Harrigan suggests a declining rate of product innovation may signal a transition from growth to maturity, Christensen and Raynor point out that what is important for growth is not the rate of product innovation, but rather the rate of innovations which customers are willing to pay for.<sup>12</sup> This distinction is particularly relevant in the software industry, which has a long history of releasing products and product enhancements with increasing technical innovation but decreasing marginal utility.

Is assessing maturity so complicated? Fortunately not. Hax and Majluf present a comprehensive framework using the Arthur D. Little, Inc. industry life cycle matrix<sup>13</sup> for assessing an industry's state of maturity. It suggests the following dimensions for assessment:

Descriptors	Development Stage			
	Embryonic	Growth	Mature	Aging
Market Growth Rate	Accelerating; meaningful rate cannot be calculated because the base is too small	Faster than GNP, but constant or decelerating	Equal to or slower than GNP, cyclical	Industry volume cycles but declines over long term
Industry Potential	Usually difficult to determine	Substantially exceeds the industry volume, but is subject to unforeseen developments	Well-known; primary markets approach saturation industry volume	Saturation is reached; no potential remains

Breadth of Product Lines	Basic product line established	Rapid proliferation as product lines are extended	Product turnover, but little or no change in breadth	Shrinking
Number of Competitors	Increasing rapidly	Increasing to peak; followed by shake-out and consolidation	Stable	Declines; but businesses may break up into many small regional suppliers
Market Share Stability	Volatile	A few firms have major shares; rankings can change, but those with minor shares are unlikely to gain major shares	Firms with major shares are entrenched	Concentration increases as marginal firms drop out; or shares are dispersed among small local firms
Purchasing Patterns	Little or none	Some; buyers are aggressive	Suppliers are well known; buying patterns are established	Strong; number of alternatives decreases
Ease of Entry	Usually easy, but opportunity may not be apparent	Usually easy, the presence of competitors is offset by vigorous growth	Difficult; competitors are entrenched, and growth is slowing	Difficult; little incentive
Technology	Concept development and product engineering	Product line refinement and extension	Process and materials refinement; new product line development to renew growth	Role is minimal

The model further presents generic strategies appropriate for the state of the industry and the particular competitive position of a business.

A key question is whether maturity is a permanent state or is cyclical. In other words, does an industry move from a growth phase into maturity, and languish there in perpetuity? Or, over time, does an industry rejuvenate itself and move back to growth? If an industry's development stage is cyclical rather than a steady state, given the fast "clockspeed"<sup>14</sup> of the software industry, it may be particularly difficult to distinguish cyclical factors from permanent industry shifts.

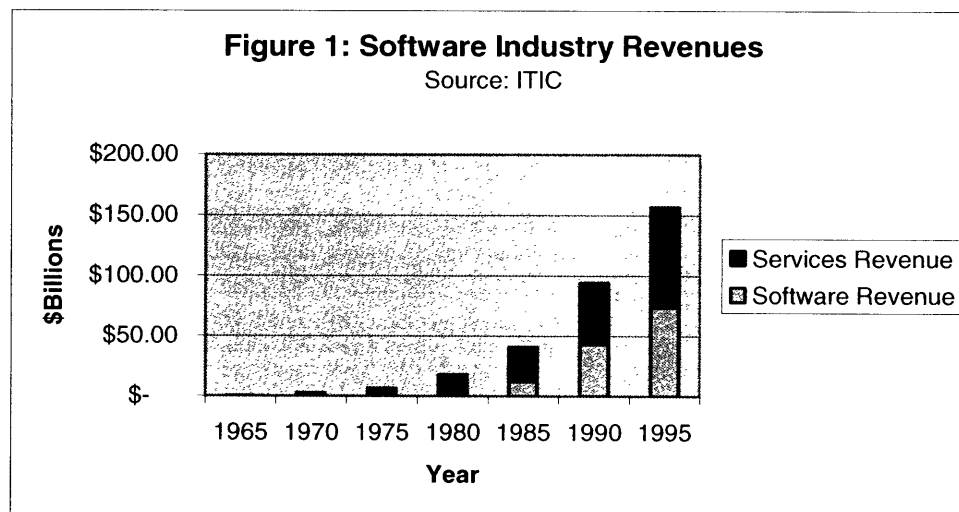
This thesis presents a view of the industry in aggregate, discusses the strategic implications, and then observes the industry by market segments.

# The Software Industry in Aggregate

## *Demand*

### Consistent Growth

The software industry has realized substantial growth throughout its history. As Figure 1 shows, the mix of services and software licenses has varied, but over the period from 1965 – 1997, the industry enjoyed a 24% CAGR<sup>15</sup>.

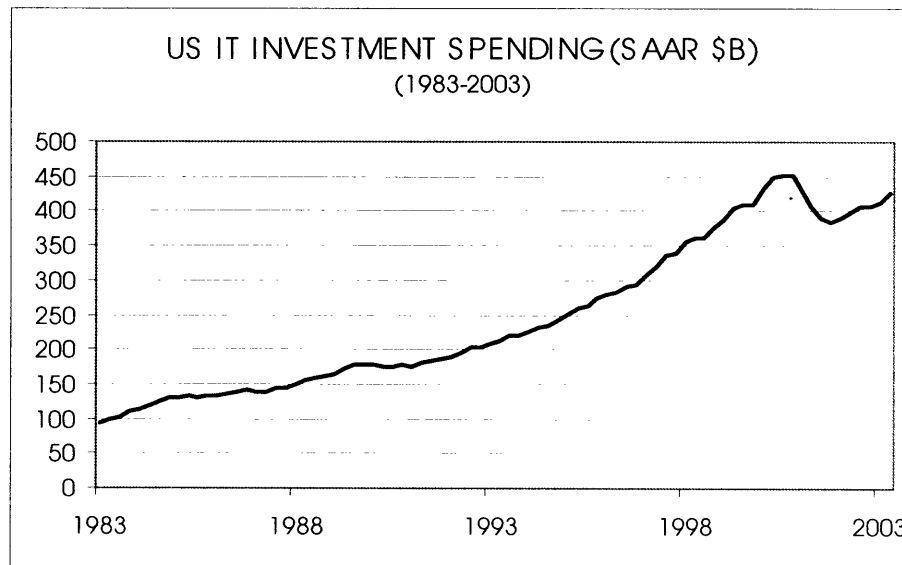


### Cyclical Factors

The cyclical decline in information technology (IT) growth after the burst of the dot-com bubble can be attributed primarily to two factors: the response to unfavorable economic conditions, and over consumption in the prior years. Over consumption was caused as corporations spent heavily – some would argue recklessly – to automate enterprise

processes, meet the perceived demand for internet-enabled enterprises, and retrofit their computer systems for Year 2000 remediation. In many, perhaps most, cases, these initiatives yielded relatively little immediate return on investment, although some argue those investments are fueling the current U.S. productivity boom, indicating a lag of two to three years. As Figure 2 shows, the cyclical decline in demand may be over.

**Figure 2: US IT Investment Spending**



Source: SG Cowen<sup>16</sup>

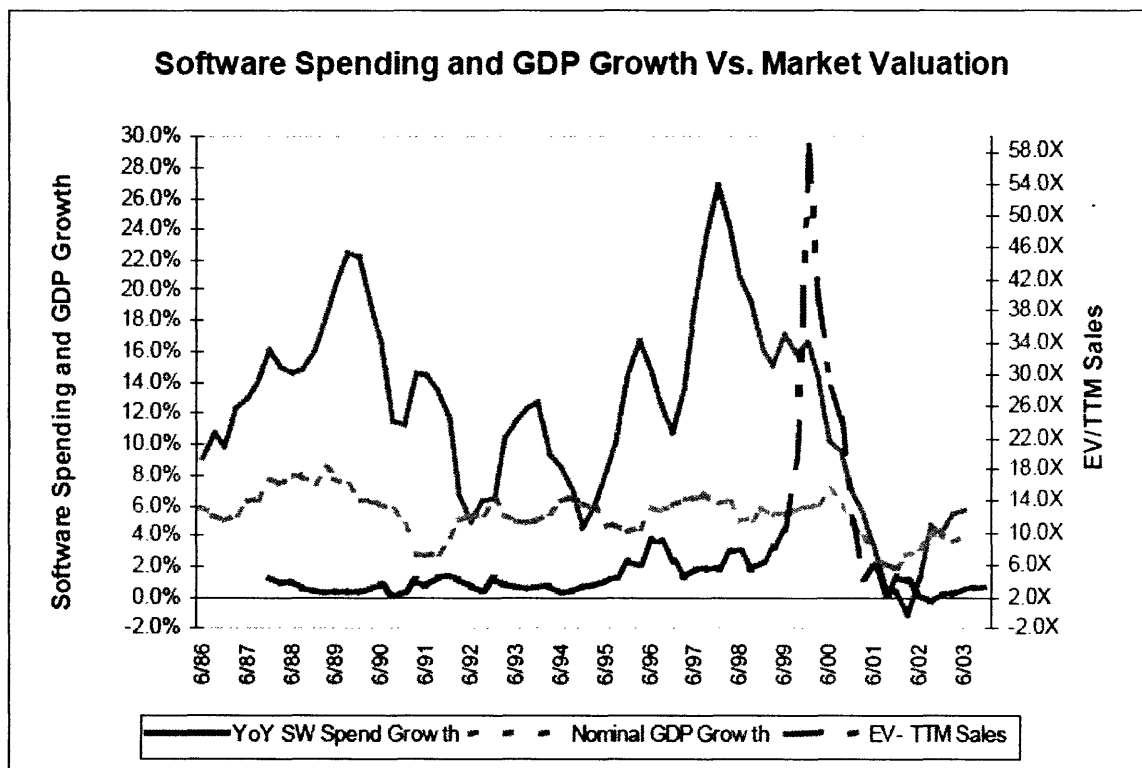
### **Increasing Component of CapEx**

Cyclical factors aside, there are fundamental reasons why demand growth must slow. As Figure 3 shows, over the past two decades, the IT industry has generally grown at a rate of 5% or more above GDP, to a peak of \$450 Billion in 2000. And the proportion of that growth attributable to software has been increasing, reaching 60% of overall IT spending,



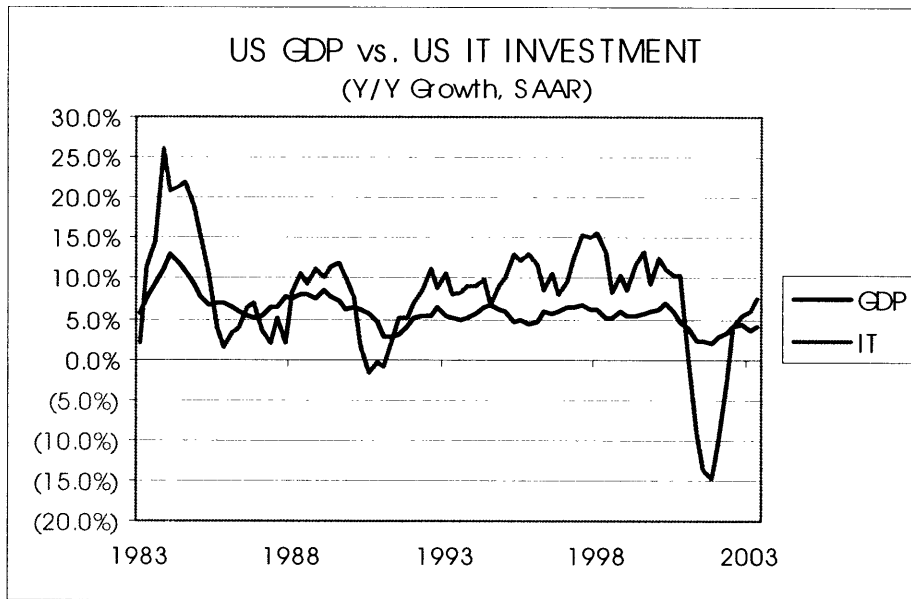
according to one source<sup>17</sup>. IT investment declined dramatically in 2002, but has largely recovered. However, as IT spending becomes a larger part of fixed investment (see Figure 6), its growth rate must necessarily converge toward the capital expenditure growth rate. As Figure 7 illustrates, IT eventually becomes simply another component of PP&E.

**Figure 3: Software Spending vs. GDP Growth<sup>18</sup>**



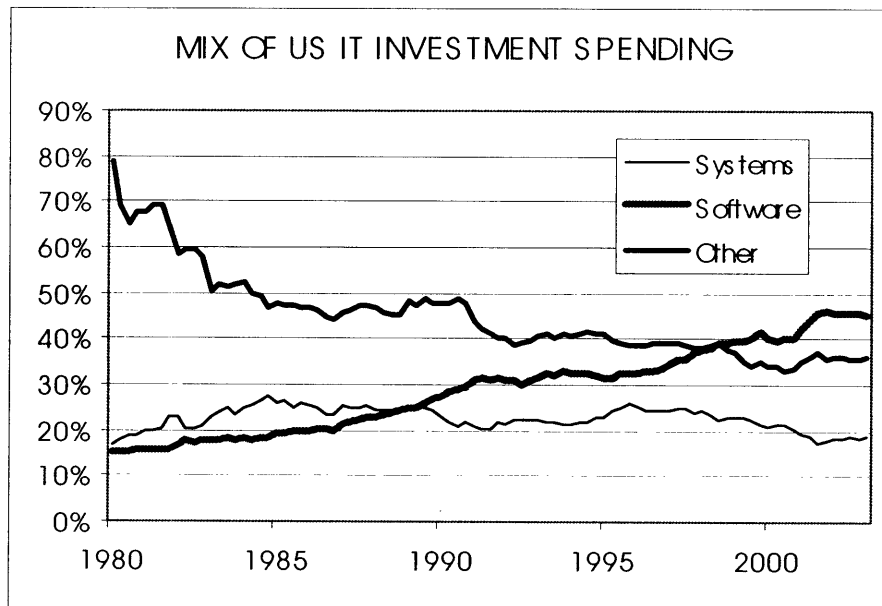
Source: Bureau of Economic Analysis; Fact Set; Company Financials; CIBC World Markets Corp.

**Figure 4: US GDP vs. IT Investment**



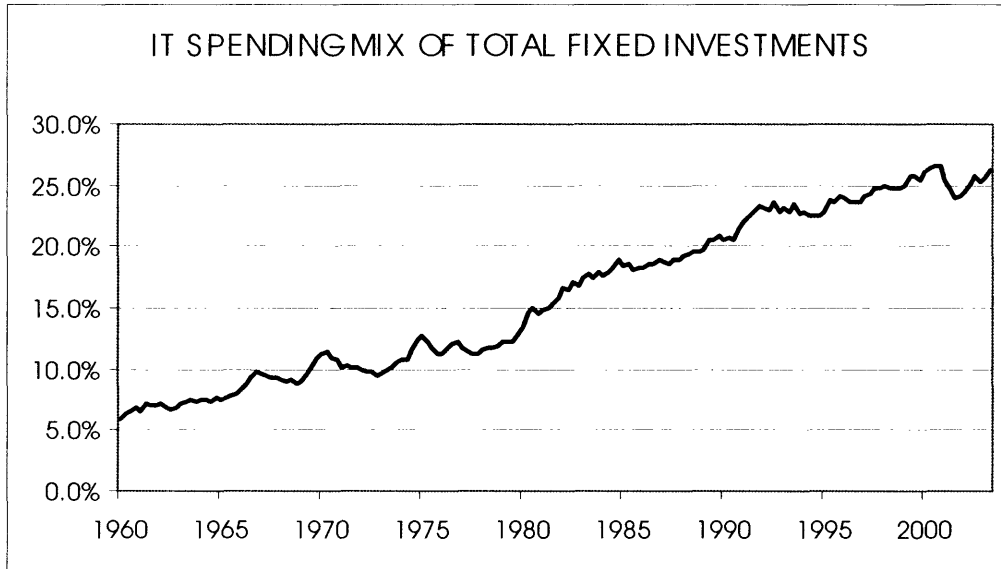
Source: SG Cowen<sup>19</sup>

**Figure 5: Mix of US IT Investment Spending**



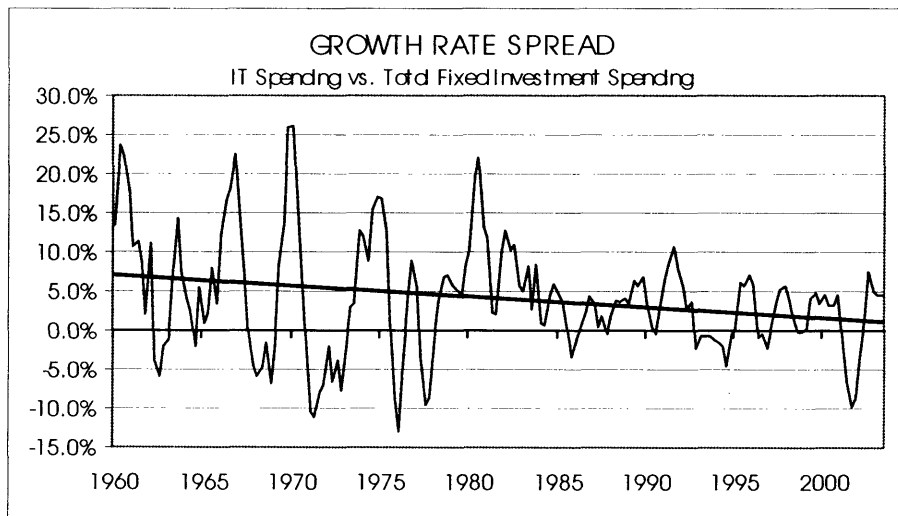
Source: SG Cowen<sup>20</sup>

**Figure 6: IT Spending Mix of Total Fixed Investments**



Source: SG Cowen<sup>21</sup>

**Figure 7: IT Spending vs. Total Fixed Investment Spending**



Source: SG Cowen<sup>22</sup>

## **Demand Drivers**

Software demand growth has traditionally been driven by three factors: new users, new platforms and new applications<sup>23</sup>. The industry has undergone a regular series of technology platform shifts which have expanded the addressable user base. The mainframes of the 1960s and 1970s were used by a small portion of corporate employees and virtually no home users. The rise of the minicomputer in the 1970s brought the computer out of the MIS glass house and onto the departmental office floor, increasing the number of users. With the introduction of the personal computer, the addressable market grew dramatically, to include virtually every employee and household.

At the same time, these platform shifts accelerated obsolescence cycles. Essentially, one “S” curve immediately followed another, giving at least the illusion of constant growth. One of the difficulties distinguishing cyclical and permanent shifts is that software is a “fast clockspeed” industry<sup>24</sup>, where cycles which take decades in slower industries occur in just a few years. The pace of these shifts is most readily apparent in the 1990s, when PC penetration increased dramatically, followed by the Internet revolution and the Year 2000 growth wave. In each case, older products were viewed – correctly or not – as obsolete, customers felt pressure to purchase new generations of products, driving demand. Furthermore, platform shifts have traditionally fostered the emergence of new vendors in a now predictable cycle of disruption: in the early days of a new platform, established vendors are oblivious to the threat, while new entrants gain adoption –

initially at the margins of the market, but eventually moving to the mainstream and capturing the bulk of the profits.<sup>25</sup> When the period between technology renewal cycles is just two to four years, the industry can appear immune to the maturation that other sectors inevitably encountered.

The range of applications has grown, too, increasing the addressable user base. With the rise of each platform, demand was generated for a new set of productivity and management tools. An excellent example is Enterprise Application Software (EAS). Software vendors studied enterprise organizational charts and developed software automating the operations of each functional area of a company: PeopleSoft in human resources management software, Siebel with sales force automation, SAP in enterprise resource planning, i2 with supply chain management, and so on. These investments created companies with multi-billion dollar market capitalizations, and fueled the growth of the industry.

## **User Base Saturation**

So what are the broader demand trends? The fundamental determinant of demand is the number of computer users. As Figure 8 shows, 62% of the U.S. population are PC users. The U.S. PC market is widely viewed as near saturation, with most sales for replacement. Thus, 62% approximates an upper bound for the industry in the U.S.. These data suggest that further growth is possible in the E.U and likely in Japan; however, other factors, such as wealth distribution within each region, the cost and demand for broadband in the home

and the availability of wireless telephones as substitutes for email communication and internet access, may preclude significant expansion. In any event, these data reflect a market approaching saturation into the workplace in the U.S., E.U. and Japan, given current applications and demand. The major untapped market appears to be China.

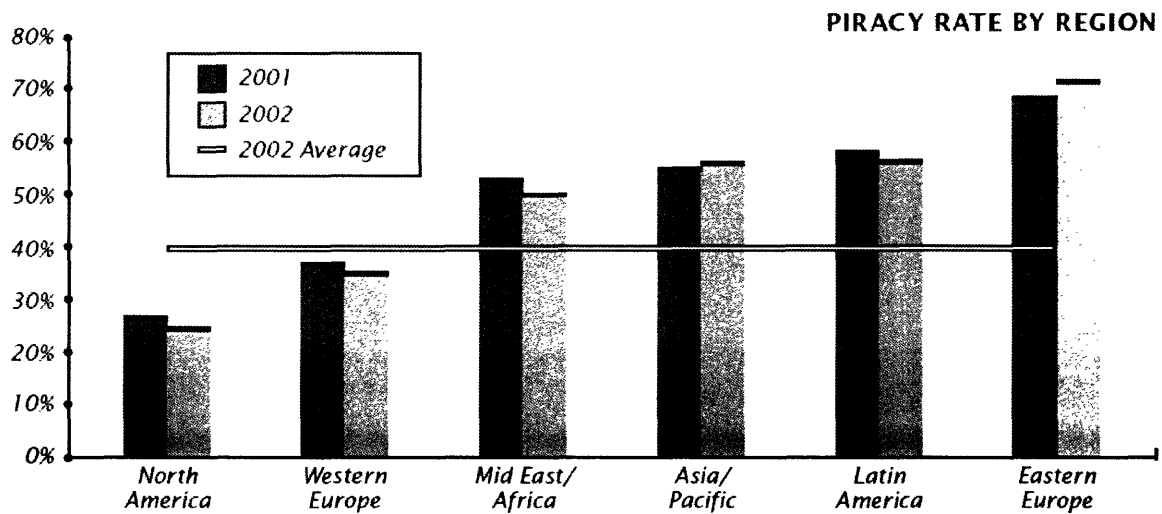
<b>Figure 8: Penetration of Personal Computers<sup>26</sup> (2003)</b>			
<b>Region</b>	<b>Population</b>		<b>Penetration</b>
	<b>(million)</b>	<b>PC Users (million)</b>	
US	288	178	62%
EU	378	160	42%
Japan	128	44	34%
China	1300	25	2%

PC penetration in China is small and growing fast. Desktop and notebook PC sales in China are expected to rise by nearly 2 million units per quarter<sup>27</sup>. The software industry would be expected to see a commensurate rise in revenues, but it does not. The reason is piracy. As Figure 9 shows, the piracy rate in China is estimated at 92%. The apparent systemic aversion in China – and many other emerging markets – to pay for software dramatically changes the weight of software in the IT investment mix. Indeed, one study showed a 10:1 ratio of Chinese hardware to software expenditure in 1999<sup>28</sup>, compared to the U.S. ratio of approximately 2:5. As Figure 10 shows, the piracy risk extends to much of the world where PC penetration is low, limiting the ability of these markets to fuel dramatic software demand growth.

**Figure 9: Software Piracy vs. Penetration of Personal Computers<sup>29</sup>**

Region	Population (2003, mil)	PC Users (mil)	Penetration	Piracy Rate
US	288	178	62%	23%
EU	378	160	42%	35%
Japan	128	44	34%	35%
China	1300	25	2%	92%

**Figure 10: Piracy Rate by Region**



Source: BSA<sup>30</sup>

## **New Platforms**

If demand growth is not going to come from new users, what about new platforms?

Cusumano and Gawer describe a platform as “an evolving system made of interdependent pieces that can each be innovated upon.”<sup>31</sup> Examples of current leading platforms include the PC architecture, Windows, and the Internet. Platform shifts are especially beneficial for new market entrants, which historically have been able to gain market share by quickly recognizing and exploiting these shifts – if not as the platform leader, then as one of a rich network of complementors. Many, perhaps all, platform shifts have also increased the size of the user base, by reducing costs or increasing functionality to make products more attractive and available to a wider range of users. Figure 11 illustrates some of these shifts.



<b>Figure 11: Platform Shifts: Evolution in Computing and Software</b> (Source: SG Cowen <sup>32</sup> )				
	<b>Host Based 1960-1985</b>	<b>Personal 1980 – 1990</b>	<b>Client Server 1985 – 1995</b>	<b>Web 1995+</b>
<b>Technology:</b>				
Platform	Mainframe/Mini	PC	Unix	Internet
Semiconductor Technology	Discrete/IC	LSI	VLSI	System on a Chip
Basic Software Unit	Variable	File	Record	Object
<b>Application:</b>				
User	MIS	Individual	Management	Employees / Customers
Application	Record Keeping	Productivity	Automation / DSS	Content / Commerce
Organizational Scope	Centralized	Departmental	Enterprise	Market
Scale	10-100s	1-100	100-1,000s	1,000s – 1MMs
<b>Business Model:</b>				
Packaging / Delivery	Hardware	Packaged	Software	Service
Licensing / Pricing	Term	Upgrade	Perpetual	Subscription

Predicting new platform adoption is difficult. One of the problems with new platforms is they usually aren't recognized as such until they are already established. Consider the two technologies most likely to be the major upcoming platforms shifts: web services and wireless devices.

Web services describe a technical architecture enabling modular distributed applications. Theoretically, a customer can purchase and deploy components of an application, selecting different parts from different vendors, and easily, perhaps automatically,

integrate them. The purported advantages are several: elimination of data silos (data which is accessible to one application in an company, but not to another), greater scalability, shorter response times, better fault tolerance and redundancy, and the ability to choose best-of-breed features irrespective of manufacturer. The two competing architectures for web services are J2EE, which is promoted by many companies, including IBM and Sun, and Microsoft's .NET.

If widely adopted, web services could represent a fundamental platform shift. Current applications software would need to be rewritten to work with the architecture, much as software had to be redeveloped for compatibility with client server or the Internet. Thus, it seems that this new platform is likely to generate new revenues as enterprises migrate their software. However, unlike previous platform shifts, web services seem unlikely to favor new entrants. The pace of adoption is sufficiently slow – a result of the cyclical downturn – to enable the dominant vendors to keep their products current, thereby removing the opportunity for technology arbitrage by which start-ups generate much of their value. As Gartner states, “The current economic climate and the evolutionary nature of web services technology development continue to restrict web services investment opportunities. Importantly, the rate of change is giving incumbents in affected markets time to revise their offerings to keep pace with technology development and limiting startup opportunities.”<sup>33</sup>

Furthermore, the rise of the oligopolies, particularly in IT services, places adoption decisions for a large portion of the prospective market in the hands of a very few companies. This channel consolidation makes entry much more difficult than is traditionally the case with new platforms. This is exacerbated by the fact that the largest service provider, IBM, has its own Web Services products.

Could wireless devices be the new platform to drive software industry growth? At first glance, this seems probable. Not only are phones a new platform for software, but the potential scale is much greater than with computers. Each computer user is a prospective owner of at least one wireless device, and the user base may extend even farther. But, as is typical in the early stages of new platforms, the demand and business models are not yet clear. Of the 500 Million handsets sold in 2003<sup>34</sup>, less than 10 Million were equipped to run standardized software. This penetration would have to increase for wireless to become a viable platform. Furthermore, for wireless to drive substantial software growth, consumers would have to be willing to use telephones for more than just voice communications, and to pay substantial amounts for those applications. These factors seem unlikely in the near or medium term and uncertain in the long term. Furthermore, even if these changes occur, the benefits may not accrue to the software industry. The wireless carriers control the critical distribution and communications channels, and may appropriate the bulk of the rents. Or, as with embedded software, the device manufacturers, who face huge cost pressure, may drive the prices for software to nearly

zero. These are all risks characteristic of a nascent platform, and while it is unlikely to drive new growth in the near or medium term, the sector should be watched.

<b>Figure 12: 2003 Smart-Phone Shipments, by Software Platform</b> (Source: International Data Corp.; WSJ research <sup>35</sup> )		
<b>OEM</b>	<b>Software</b>	<b>Phones Shipped (in millions)</b>
<b>Nokia</b>	Symbian	5.45
<b>Sony Ericsson</b>	Symbian	0.82
<b>Motorola</b>	Symbian, Microsoft, Linux	0.78
<b>RIM</b>	RIM	0.49
<b>Samsung</b>	Symbian, Microsoft, Palm	0.28

Thus, while historically the industry has benefited from regular adoption of new platforms – minicomputers in the 1970s, PCs in the 1980s, client/server and the Internet in the 1990s – no similar platform seems poised to generate a renewing wave of demand.

## **New Applications**

What about new applications? Enterprise Application Software drove much of the industry’s growth in the 1990s. As a result of that success, there are no major EAS greenfield opportunities left: software has been developed to automate all major functional activities of the modern corporation. Thus, future EAS revenues will come from three sources: a) maintenance revenue from existing customers, b) additional

capacity or new functionality sold to existing customers, and, to a much smaller degree, c) new customers. For established vendors, the result has been declining revenues and earnings. Such a market means little opportunity for new entrants, with two exceptions: those that can introduce a disruptive business model, and those content to add value around the edges.

## **Disruptive Business Models**

Disruptive business models may also generate new growth, or at least shift the distribution of growth. Open Source, described later, is one such wide ranging shift. The other example is Salesforce.com, a vendor of customer relationship management (CRM) tools with revenues of approximately \$50 Million. The company competes with two of the most successful enterprise software companies, Siebel and Oracle. Their basis of competition is a classic low-end disruption. Salesforce.com introduced a CRM product with little functionality; for example, it could not be configured nor customized to the degree necessary to compete with mainstream CRM applications. Thus, it was ignored by Siebel and its peers. The product was marketed not to Chief Information Officers, but to individual users, and was priced on a subscription basis, at approximately \$50 per user per month, a level well within the discretionary budget of an individual or workgroup head. Importantly, the product was easy to get running quickly, without IT support; it ran inside a web browser, and all a customer had to do to begin using the product was launch the browser and log in. Marketing was viral: once one user or workgroup tried the product, they told colleagues, who in turn tried it. It became the poor man's CRM, for

organizations without the \$100,000+ budget and IT department support a traditional CRM product required.

Continuing with the low-end disruption model, subsequent versions provided greater and greater functionality. Those users who had the resources to perform integration found the product had very effective and simple modular interfaces, based on web services. And managers discovered network effects when all their staff used the product. The result was the prototypical hockey stick growth pattern (see Figure 13). Revenues grew fast, and the company has filed for an initial public offering. The larger competitors began to feel threatened. In early 2004, Siebel and IBM together released a hosted subscription CRM service which competes directly with Salesforce.com. However, Siebel's higher cost structure makes it unlikely they can compete on price, so they are competing on features. By trying to compete within their existing organization, Siebel runs the classic risks: its low-end competitor continues to encroach on features, and those features begin to have sharply decreasing marginal utility to customers.

<b>Figure 13: Salesforce.com Revenues</b> (\$1,000s; Source: Company S-1)			
	Fiscal Year Ending January 31		
	2001	2002	2003
Revenues	\$5,435	\$22,409	\$50,991

How widely can this low-end disruption be applied? If broadly, it would fuel a new cycle where entrepreneurs study the enterprise organization charts yet again, and build applications to service each department in the firm, offering a compelling low price from

a cost structure incumbents can't match. Unfortunately for new entrants (and comfortingly for incumbents), there appear to be serious limitations on the scope of the Salesforce.com model, caused by the following dependencies:

1. The application must have value to a standalone user, irrespective of network effects. CRM software is useful to a salesperson, even if he or she is the *only* user. This is unlikely to be the case with enterprise resource planning (ERP) software, for example, where different departments must user or interface to the software for it to have any value.
2. The required application data must be accessible and extractable without IT support, and useful without frequent synchronization. Sales contact lists are easy for end users to extract from legacy systems, the extraction can be infrequent, and updates are rarely needed. Synchronization of responses, such as sales forecasts, is infrequent and can be performed manually. Much of the data enabling the "real time enterprise" is stored, updated and transformed in real time, making this model unattractive.
3. The data must have low confidentiality and integrity requirements. While contact lists and forecasts are both valuable and confidential, the implications of compromise are limited. If Human Resources data were accidentally released into the public domain, the firm could be subject to litigation or regulatory sanction. If the integrity of supply chain data were compromised, company operations could be disrupted.

4. Perhaps most importantly, it is doubtful whether the low cost model scales as the performance gap closes. Mainstream customers need to customize the application and integrate it with other applications and data sources. This typically requires consulting services, which add to deployment costs and significantly erode the low-cost position Salesforce.com enjoys.

Furthermore, it is unclear how far Salesforce.com can penetrate an enterprise. There may be limits to the penetration of its viral marketing model which limit future growth.

Because of these limitations, the Salesforce.com model seems unlikely to reinvigorate demand across broad sectors of the industry<sup>36</sup>.

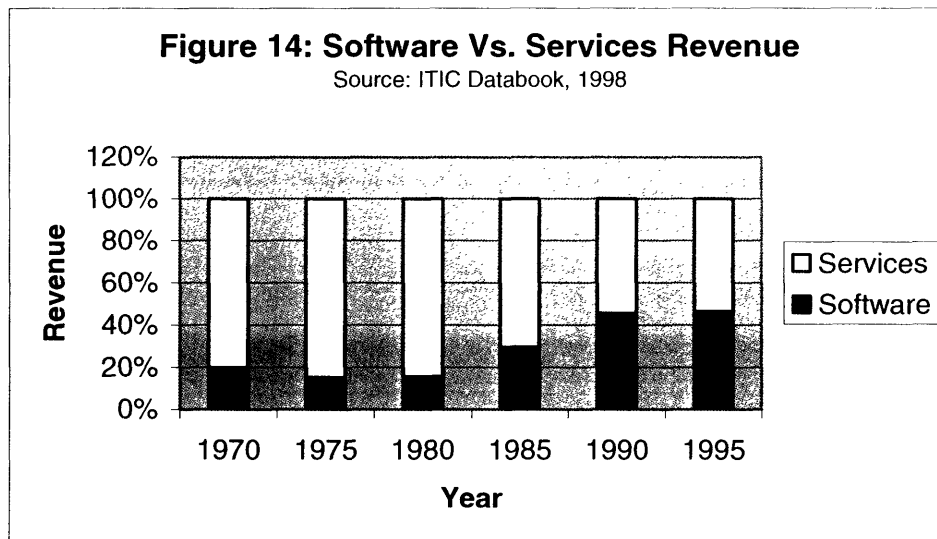
## **Regulatory Factors**

Regulation has contributed to industry growth spurts. In the United Kingdom, the switch to a decimal currency in the 1970s generated a wave of applications upgrades and integration business<sup>37</sup>. In the 1990s, the shift to the Euro currency promoted similar activity throughout the European Union. Paranoia about Year 2000 liability prompted massive overspending globally in the late 1990s. While Sarbanes-Oxley is generating some demand in niche applications, there are no broad regulatory factors which seem likely to cause a significant demand upswing.



## The Shift to Services

Many commentators point to the recent rise in the proportion of services in software industry revenues as a sign of impending demise. However, this argument seems fallacious, because services have always been a strong component of the industry revenues. As ITIC data in Figure 14 shows, product licenses were the predominate revenue source only for a brief period in the 1990s. According to Cusumano, “software companies selling to large enterprise customers can generally expect to receive up to a dollar in service revenues for every new dollar in software license fees ... over the lifetime of many enterprise software products, 70 percent or more of the total cost to a customer may come from service and maintenance fees....”<sup>38</sup>.



## ***Rise of Oligopolies***

The software industry today is dominated by a small number of very large companies. According to ABN Amro, 45% of packaged software licenses come from two companies, IBM and Microsoft<sup>39</sup>. Of 2003 total industry revenues (software and services) of \$290 billion, the top five companies generate \$170 billion, or 43%<sup>40</sup>. Viewed in purely quantitative terms, this may not seem to be a dominant position, but these companies – IBM, Microsoft EDS, Lockheed Martin and Accenture – exert significant influence over their customers' software purchasing decisions. In many cases, they provide the channel by which customer's select, integrate, deploy and manage software. Thus, they can be considered the dominant channel in the market, and they typically have or are approaching customer lock-in. Although one must be careful about asserting a trend on just two years of data, their dominance does seem to be growing: in 2002, the top five companies generated 39% of industry revenues.

Furthermore, several of these companies have significant power as platform vendors. By using their influence with customers to deploy their platform products, they gain control of the customers' technical interfaces. This represents a system lock-in, and as their market share grows, so does the size of the system they control. This creates a reinforcing cycle which increases the value of their network effects.

As Gartner states, "The realities of the weakened economy have shifted the competitive advantage from pure plays to titans. Software titans have deeper pockets and are

withstanding the economic challenges much easier than many pure-play vendors, which have smaller revenue streams and cash reserves.”<sup>41</sup>

As Figure 15 illustrates, consolidation is greater in some clusters than others. In desktop software, for example, the primary vendor, Microsoft, generates 86% of the cluster’s revenues with its Office family of products. In enterprise applications, the consolidation appears significantly smaller, with the five leaders controlling an aggregate of just 37% of cluster revenues. This reflects the fragmented nature of the segment. However, a more granular analysis of enterprise applications (see Figure 16) shows that in 11 out of 12 application categories within this cluster, the three leading firms control 58% or more of the market, and in eight categories, the top two firms generate over half the revenues.

**Figure 15: Revenues of Leaders, by Cluster**

Cluster	Cluster Revenues	Count	Rev. Top 1	% Rev Top 1	Rev. Top 2	% Rev. Top 2	Rev. Top 5	% Rev. Top 5
BI	\$ 4,691	40	\$ 1,180	25%	\$1,671	36%	\$2,819	60%
DESK	\$ 10,746	8	\$9,229	86%	\$10,394	97%	\$10,721	100%
DEVT	\$ 3,621	32	\$1,446	40%	\$1,837	51%	\$2,538	70%
EAP	\$ 43,209	205	\$7,687	18%	\$10,281	24%	\$16,151	37%
INF	\$ 65,603	59	\$19,136	29%	\$33,392	51%	\$55,271	84%
MGT	\$ 15,370	76	\$ 2,964	19%	\$ 4,292	28%	\$ 7,447	48%
SPT	\$ 402	7	\$208	52%	\$ 291	72%	\$385	96%
SVC	\$148,812	50	\$2,768	29%	\$64,270	43%	\$100,027	67%

<b>Figure 16: Revenue of Leaders, EAP Cluster: Analysis by Category</b>								
Category	Rev Cat.	Count	Top 1	% Rev Top 1	Top 2	% Rev Top 2	Top 3	% Rev Top 3
Vertical Industry	\$1,490	9	\$999	67%	\$1,332	89%	\$1,403	94%
Application								
Supply Chain	\$2,669	28	\$908	34%	\$1,236	46%	\$1,556	58%
Enterprise Resource								
Planning/Human	\$13,558	31	\$7,687	57%	\$9,636	71%	\$10,541	78%
Resource								
CRM/Sales Force	\$6,380	35	\$1,635	26%	\$3,166	50%	\$4,124	65%
Automation/Mkting Auto								
Retail	\$233	3	\$220	94%	\$227	97%	\$233	100%
Healthcare	\$1,897	8	\$617	33%	\$971	51%	\$1,314	69%
Financial Applications	\$10,840	32	\$2,593	24%	\$4,879	45%	\$6,398	59%
GIS/Mapping	\$2,248	6	\$825	37%	\$1,298	58%	\$1,298	58%
Enterprise Application	\$1,058	14	\$273	26%	\$469	44%	\$620	59%
Integration								
E-Learning	\$408	7	\$238	58%	\$288	71%	\$318	78%
Collaboration/Project	\$1,790	27	\$339	19%	\$566	32%	\$747	42%
Management								
BPM	\$641	5	\$502	78%	\$599	94%	\$622	97%

## ***Power of Buyers***

The recent decline in software spending has shifted power to buyers. Enterprises are purchasing few new applications, and most spending is to leverage existing investments<sup>42</sup>. Steady supply and less demand leads to negotiated price reductions for purchasers. Because software has virtually no variable costs, pricing is nearly infinitely negotiable. The inevitable result is lower prices and profits.

Furthermore, buyers are smart. More than 50% of software revenues are closed within the last weeks of each quarter<sup>43</sup>. Buyers know they can obtain significant discounts by waiting, and few software purchases are urgent. The leverage is in the hands of the buyers.

There are only two ways to restore equilibrium: an increase in demand or a reduction in the number of suppliers. As discussed earlier, cyclical factors may be increasing demand somewhat, but there is no apparent driver for significant new demand growth of the magnitude the industry has enjoyed in the past.

Reducing the number of suppliers takes time. Established companies with an installed base receive annual maintenance revenues – typically 15-20% of license fees – for as long as customers use their products. High switching costs encourage customers to retain existing software for substantial periods, especially with enterprise software. Absent a fundamental demand change, for example due to a platform shift or regulatory

requirement, maintenance revenues can keep a company in business for a decade or more after their last software license has been sold. In the words of one analyst, maintenance is why it is so difficult to “kill a software company.”<sup>44</sup>

Consolidation is more likely to reduce the number of firms. This is particularly true as the public markets become inaccessible as a liquidity event for a growing number of software companies. According to Gartner, “Of the more than 2,300 software companies active today, up to 60 percent will cease to exist by year-end 2005, either by being acquired or going out of business.”<sup>45</sup> Over time, this trend may shift negotiating leverage back to vendors and increase both revenues and profits.

## ***Open Source***

The software industry is different from most industries, because there are virtually no variable costs of production. All of the investment is front-loaded; the cost to produce one unit is virtually the same as to produce one million. Thus, if development costs are eliminated, there is no impediment to free dissemination of software (absent, of course, a desire for profit). To exploit this characteristic for the benefit of society, the Free Software Foundation (FSF) was founded in 1984 to make software free for everyone. Their definition of “free” is wide ranging:

- “The freedom to run the program, for any purpose (freedom 0).
- The freedom to study how the program works, and adapt it to your needs (freedom 1).  
Access to the source code is a precondition for this.
- The freedom to redistribute copies so you can help your neighbor (freedom 2).
- The freedom to improve the program, and release your improvements to the public, so that the whole community benefits (freedom 3). Access to the source code is a precondition for this.”<sup>46</sup>

From these roots, the Open Source community developed. Programmers, motivated by ego or social concerns rather than profits, contribute their software to the community under a license structure that generally allows free use – provided, however, that any improvements to the software are similarly distributed. Two “killer” applications were developed: the Apache web server and the Linux operating system. These applications have achieved widespread adoption; according to Forrester Research, free Apache

software now hosts over 64% of public web sites<sup>47</sup>. And 25% of server operating systems “sold” in 2001 were Linux, making it second in market share<sup>48</sup>. Large enterprises are deploying Open Source software, not just aficionados.

Clearly, then, Open Source is having an impact. Why? According to Forrester<sup>49</sup>, not because of cost. Indeed, open source is not viewed as less expensive than commercial software, because enterprises must pay more for integration, testing and maintenance. Rather, it is because Open Source addresses significant side-effects of current commercial software business models. As Forrester’s Schadler explains:

1. **“Open development *methods* create high-quality software.** Open source software is built using the scientific method – including published results and peer review. Doing so avoids falling into the commercial software trap of shipping products with known bugs to gain time-to-market advantage.
2. **“The Internet-connected developer *community* works efficiently and globally.** Internet technologies and connectivity lower the cost of communication and enable new ways of working. For example, participants collaborate globally using email, newsgroups, Wikis, and the Web and have immediate access to the most current thinking, planning, and deliverables. And it works: Linux has hundreds of projects and thousands of contributors from more than 100 countries.



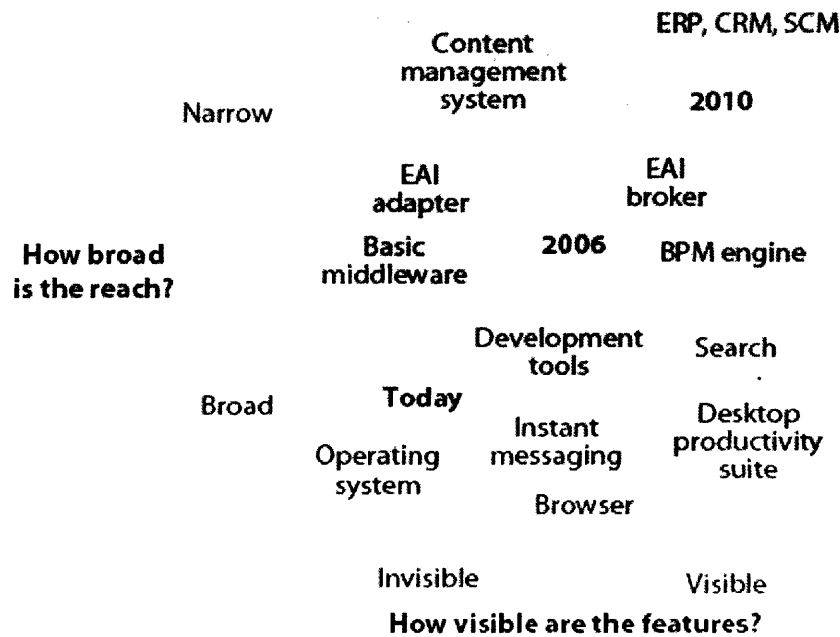
3. “**Open source licenses reward users more than vendors.** Open source licenses include powerful coercive forces that motivate everyone to create high-quality, freely available software – which benefits users. The GNU General Public License, for example, keeps projects like the Linux kernel on track. Why? Because anybody can use and redistribute the software, and all changes must be given back to the community.”<sup>50</sup>

Though Open Source isn't purchased because of its low cost, from a software vendor's perspective, the free license is a vitally important factor. Competing with free products is never easy. Even hardware vendors have been impacted. Sun Microsystems found its ability to sell its high-priced servers eroding because Linux provides most of the functionality on less expensive commodity hardware. IBM, on the other hand, has embraced Linux, using it as a vehicle to stimulate sales of its servers and even mainframe computers. By one count, IBM had 7,500 employees allocated to Linux. It is now the leading provider of Linux hardware, software and services solutions.

What market clusters are most vulnerable to erosion by Open Source? According to one model<sup>51</sup>, the key parameters are the breadth of the application's impact and the visibility of the features (see Figure 17). Impact is important, because Open Source developers prefer to target interesting applications that matter. Feature visibility is important in the opposite sense; if the features are “hidden” from the users (for example, a back-office application), the program is more likely to be stable, and thus well suited to the slow

distributed and uncoordinated nature of community development. More visible features are more likely to require rapid changes, and are thus more suited to the capabilities of a commercial software development organization.

**Figure 17: Timing of Open Source Threats**



Source: Forrester Research, Inc.

Open Source is an excellent example of Christensen’s model of low-end disruption<sup>52</sup>. Initial releases of Open Source software are not “good enough” for general use, while new releases of commercial server operating systems typically have decreasing marginal utility. As time passes, the Open Source “products” meet the “good enough” criteria, and gain adoption at the expense of the commercial incumbents. The fundamental requirement for Open Source to expand in new applications is a community of skilled developers sufficiently interested to allocate their time to development and testing.

Perhaps this will prove a substantial barrier to the use of Open Source software in new applications; it is too early to gauge the scalability of the model.

What is the impact of Open Source? In markets where it competes, it should drive a flight to quality. Undifferentiated commercial products will have little appeal to buyers. Companies in markets where existing products are “good enough” – that is, where there is little demand for new functionality – will have difficulty defending against Open Source competitors. In markets with unsatisfied technology needs, companies able to allocate more resources to R&D should be able to compete successfully with Open Source, although they should expect some price decline as competition progresses. Furthermore, these companies may have the surprising opportunity to offload costs to the Open Source community by transferring undifferentiated components of products to the community for maintenance and development while focusing their internal development resources on value added components (although many firms will face a challenge developing an effective developer community). Weaker companies will find themselves squeezed, unable to invest in the R&D needed to maintain demand for their products.<sup>53</sup>

The benefits will thus tend to go to larger companies, reinforcing the power of the oligopolies and making many small and mid-sized companies less viable.

## **Overseas Outsourcing**

The software industry has embraced overseas outsourcing in a big way. Vendors outsource development and support; customers outsource custom development, integration and maintenance. Estimates of the magnitude vary; Gartner suggests \$6.9 Billion in 2002, growing to \$12.5 Billion in 2004. IDC's numbers are \$9 Billion in 2002, growing to \$17.7 Billion in 2005<sup>54</sup>. More than 70% of this market is captured by one country, India<sup>55</sup>.

This has interesting effects across the value chain. For software vendors and customers alike, outsourcing offers the opportunity for cost reductions. Salary costs in India range from 10-30% of those in the U.S. For U.S. service providers, India represents competition, unless they too embrace the opportunities of an offshore cost structure.

Figure 18 illustrates the range of companies using this model.

<b>Figure 18: Top 20 MNC Software Exporters from India</b>		
Rank	Company	No. Employees
1	IBM Global Services	3,100
2	Cognizant Technology	2,712
3	Oracle	2,000
4	Hughes Software Systems	1,500
5	HP Software	1,489
6	Digital GlobalSoft	1,480
7	Syntel	1,464
8	Covansys	1,449
9	PWC	1,200
10	ObiTech	1,191
11	Siemens	1,187
12	Xansa	892
13	Motorola	800
14	ST Micro	800

15	Texas Instruments	741
16	Intel	700
17	i2	700
18	Cisco	670
19	Robert Bosch	629
20	Huawei	500

Source: Mihalos<sup>56</sup>

On the surface, this trend has two important medium-term implications: First, advantages would seem likely to accrue to those companies who have the resources to establish operations in India and manage the coordination between the Indian and other operating organizations. This tends to favor size, but not exclusively so. Many start-up companies are using Indian outsourcing as a way to reduce development costs; when done at the early stages of a company, the benefit of the costs savings are greater to a start-up than for a larger company because a start-up has a higher cost of capital. This assumes, of course, that the smaller company can manage the process effectively. This is a more difficult task with the nascent products and markets of a start-up than with those of a more established company.

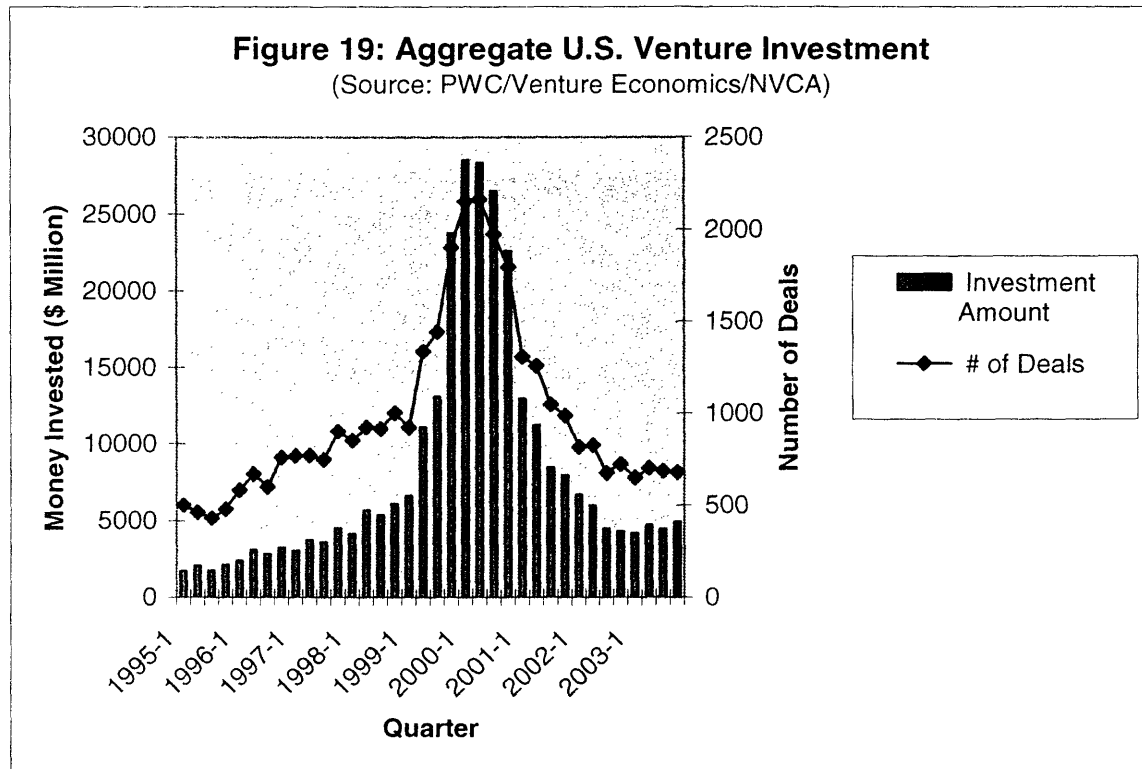
The second implications is greater competition leading to additional downward price pressure, especially on service firms.

In the long term, the real risk of outsourcing is that innovation moves offshore, away from its current centers. This phenomenon was predicted in 1992 by Edward Yourdon in his Decline and Fall of the American Programmer<sup>57</sup>. He retracted the prediction four years later in the Rise and Resurrection of the American Programmer<sup>58</sup>. However, the

concern has not died, and could have an enormous effect on the software industry. No less an authority than Andy Grove stated recently that the high cost of American programmers and declining post-graduation education in the U.S. are inexorably moving innovation offshore.<sup>59</sup>

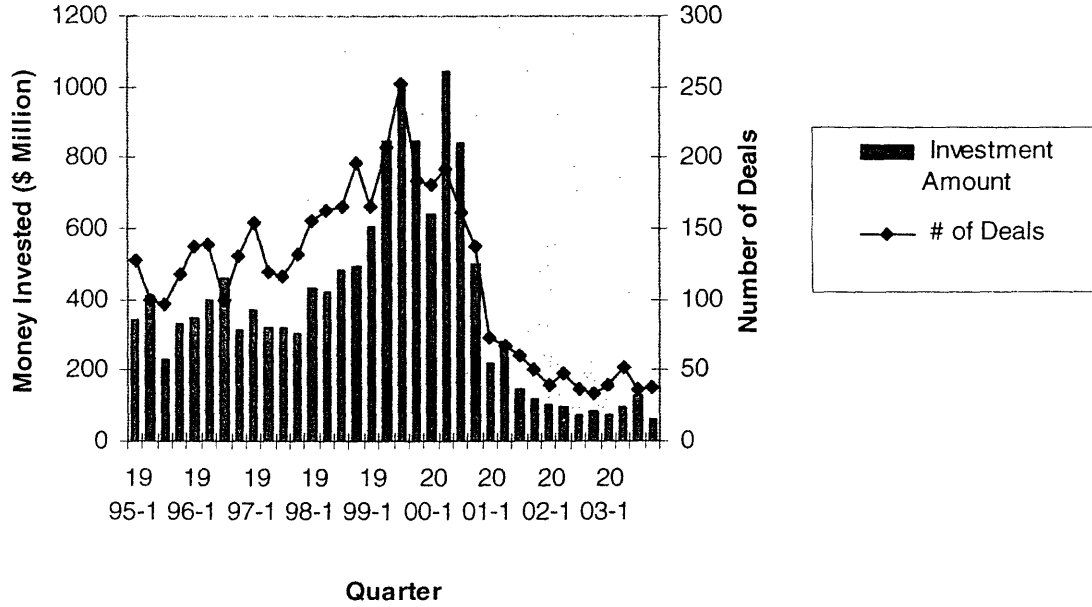
## Capital Market Changes

One of the characteristics of the software industry was easy access to capital. Figure 19 shows that venture capital remains available, at levels equal to or greater than the period before the dot-com bubble<sup>60</sup>.

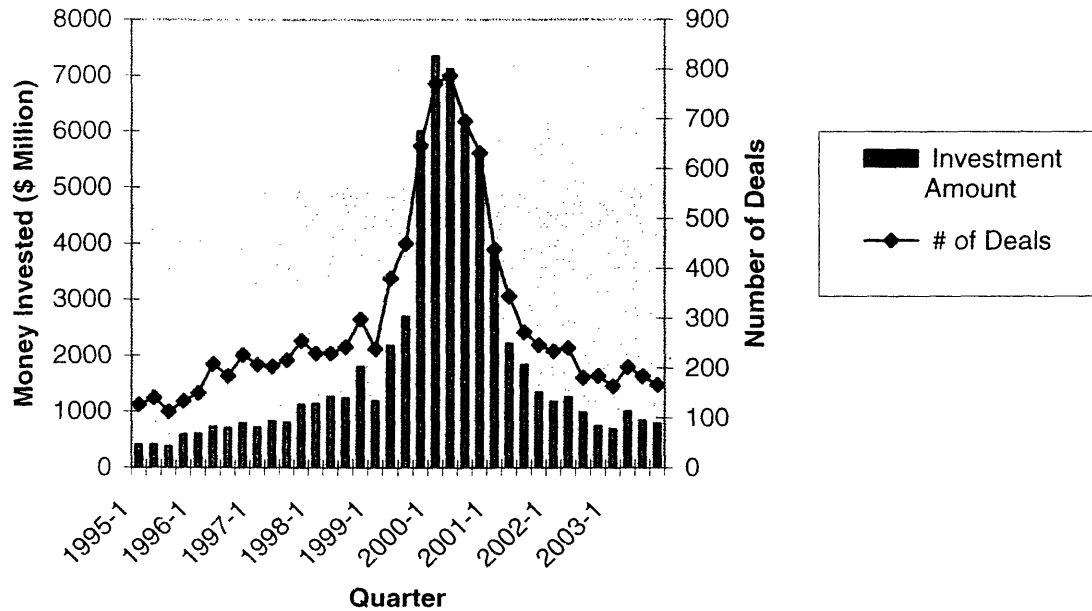


However, a more granular analysis shows a shift in the type of venture funding available. Disaggregating venture funding by company stage indicates a decline in seed and early stage funding, stability in expansion funding, and marked growth in late stage funding (see Figures 20 to 23). This shift is attributable to several factors, including very favorable valuations for later stage companies.

**Figure 20: U.S. Venture Investment -- Startup/Seed Stage**  
 (Source: PWC/Venture Economics/NVCA)

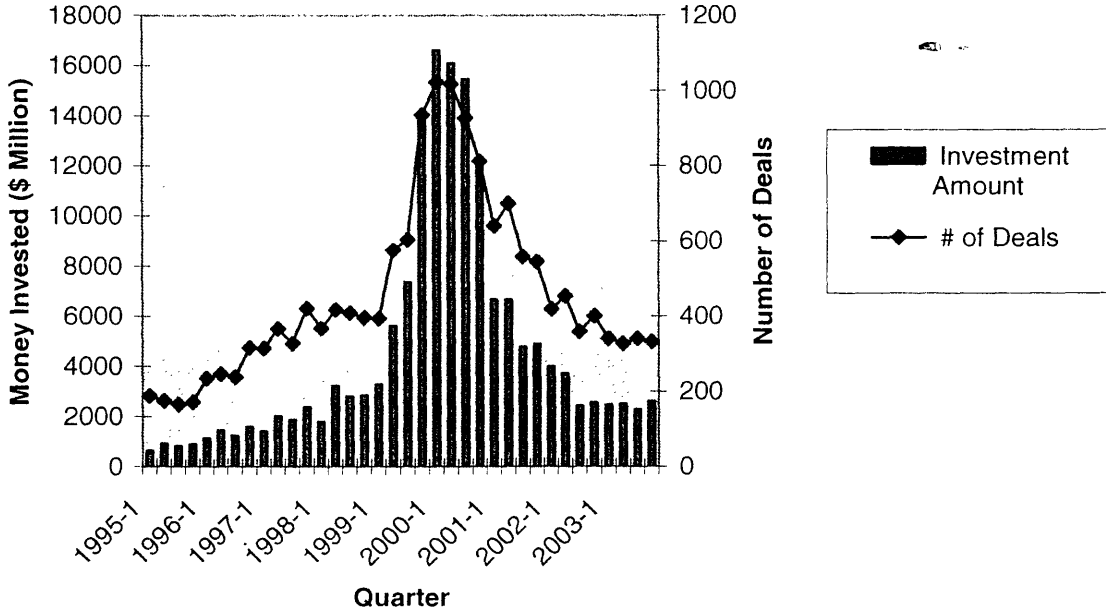


**Figure 21: U.S. Venture Investment -- Early Stage**  
 (Source: PWC/Venture Economics/NVCA)

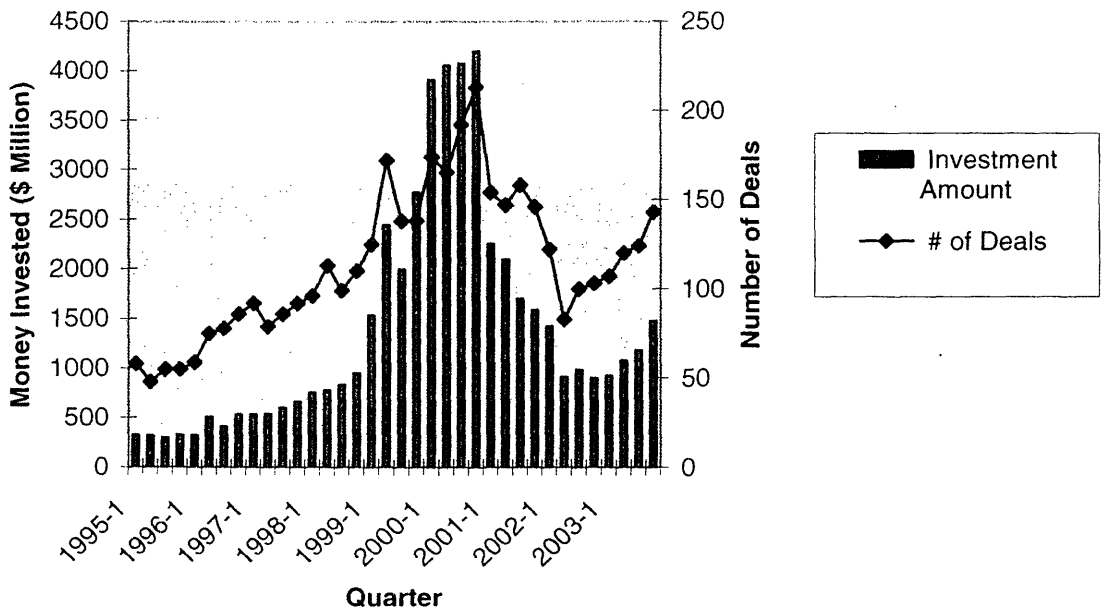




**Figure 22: U.S. Venture Investment -- Expansion Stage**  
 (Source: PWC/Venture Economics/NVCA)



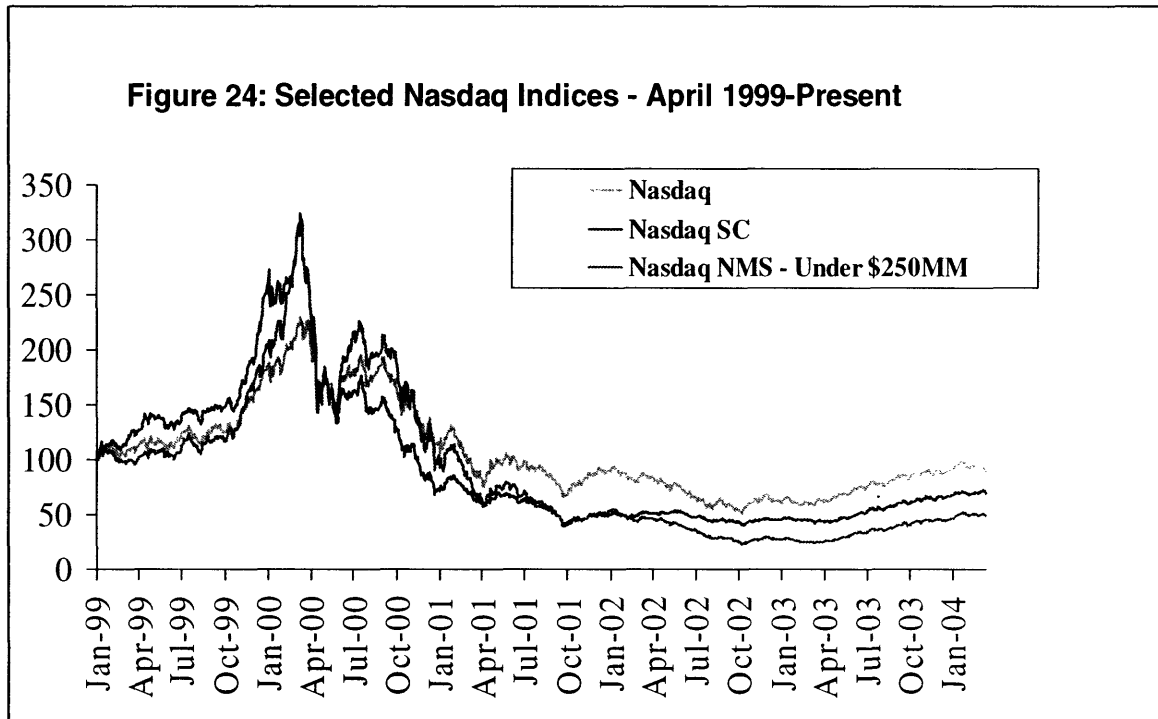
**Figure 23: U.S. Venture Investment -- Later Stage**  
 (Source: PWC/Venture Economics/NVCA)



Among of the factors influencing the changes in the venture capital market are the changes in the IPO market. Access to public equity markets have been an important factor in the software industry. The market provided relatively affordable access to capital for both current and future needs, liquidity for investors, incentives for employees, a currency for acquisitions, and a degree of prestige and market credibility<sup>61</sup>. As a result, by 2000, 4734 companies were listed on Nasdaq<sup>62</sup>.

In recent years, both the benefits and accessibility of the public markets have eroded for smaller software companies. The indexed stock price performance of Nasdaq NMS companies that are currently trading at less than \$250MM in market value is down 85% from its March 2000 high<sup>63</sup>. As a result, for most software companies, the public markets afford limited access to capital, little (or no) liquidity for large owners, stock option programs which are well underwater, valuations too low to realistically use stock as currency, questionable prestige or credibility, while they add legal and expense complications due to Sarbanes – Oxley<sup>64</sup>. According to the investment bank Adams, Harkness and Hill, the annual cost of being a public company – with dramatically growing legal, accounting and insurance fees – is now approximately \$1.5 Million to \$2.0 Million, an increase of between \$1.2 Million and \$1.5 Million compared to three years ago<sup>65</sup>. The bank estimates that only companies with revenues of \$64 Million (less than half of the Software Magazine 500) and highly probable earnings growth of at least 35% over the six quarters following an offering (probably a tiny fraction of all software

companies today) are candidates for an IPO<sup>66</sup>. Given the structural changes discussed earlier, this threshold closes the public markets to most software companies.



Source: Adams, Harkness and Hill<sup>67</sup>

Small and mid-sized software companies must eventually provide shareholders liquidity, to meet the needs of both investors and employees. Furthermore, private equity markets are a very expensive source to fund growth. Without access to public markets, small and mid-sized software companies have only one avenue: acquisition. The closure of the public markets to all but the most promising software companies may increase the negotiating power of acquiring companies, who are likely to be the large oligopolies, and thus reduce valuations. The reduction in valuations is likely to further limit the supply of

early stage venture capital, which in turn will make market entry harder for new companies. This cycle reinforces the power of the leaders, while reducing the incentive for innovation from small companies, which has historically been the fuel driving industry growth.

## ***Assessing Industry Maturity***

To assess the maturity of the software industry, consider the following parameters of the ADL industry life cycle matrix:

### **Market Growth Rate**

The growth stage is defined as, “Faster than GNP, but constant or decelerating.”

Maturity is defined as, “equal to or slower than GNP, cyclical.” The software industry is growing faster than GNP, but is decelerating. Therefore, by this criteria, it still appears to be in the growth stage.

### **Industry Potential**

The growth stage is defined as, “Substantially exceeds the industry volume, but is subject to unforeseen developments .” Maturity is defined as, “Well-known; primary markets approach saturation industry volume.” Since the primary markets are approaching saturation, the industry appears to be in the mature stage.

### **Breadth of Product Lines**

The growth stage is defined as, “Rapid proliferation as product lines are extended.”

Maturity is defined as, “Product turnover, but little or no change in breadth.” Product lines are growing much more slowly than in the past. The reduction in early stage capital investment reinforces this trends. The key question is whether this is due to the cyclical downturn or more permanent changes. If permanent, it reinforces the conclusion that the industry has moved into the mature stage.

## **Number of Competitors**

The growth stage is defined as, “Increasing to peak; followed by shake-out and consolidation.” Maturity is defined as, “Stable.” The industry is undergoing a shake-out and consolidation, thus suggesting it is in the latter part of the growth stage.

## **Market Share Stability**

The growth stage is defined as, “A few firms have major shares; rankings can change, but those with minor shares are unlikely to gain major shares.” Maturity is defined as, “Firms with major shares are entrenched.” The barriers to entry to the top of the market are strong, and some major firms may still fall. This suggests the growth stage.

## **Purchasing Patterns**

The growth stage is defined as, “Some; buyers are aggressive.” Maturity is defined as, “Suppliers are well know; buying patterns are established.” For this criterion, we should also consider the final development stage, Aging, which is defined as “Strong; number of alternatives decreases.” This behavior strongly suggests a mature industry.

## **Ease of Entry**

The growth stage is defined as, “Usually easy, the presence of competitors is offset by vigorous growth.” Maturity is defined as, “Difficult; competitors are entrenched and growth is slowing.” The analysis varies significantly by cluster. In a few areas, the market is responsive to new technologies developed by new entrants. In other clusters,

the climate is consistent with an Aging industry: “Difficult; little incentive.” However, in aggregate, under this criterion the industry as a whole is mature.

## **Technology**

The growth stage is defined as, “Product line refinement and extension.” Maturity is defined as, “Process and materials refinement; new product line development to renew growth.” Again, the industry runs the gamut depending on the niche observed. But in general, product development is to renew growth, and focus is placed on cost reduction, suggesting maturity.

## **Summary**

Three factors, Market Growth Rate, Number of Competitors and Market Share Stability, suggest the industry is in the growth phase. Five, Industry Potential, Breadth of Product Lines, Purchasing Patterns, Ease of Entry and Technology, suggest maturity. Regardless of the semantics, it is clear is that the industry is maturing, and the rate of maturity depends on the market segment under consideration.

## ***Strategic Implications***

Given the maturation of the industry, what implications can be drawn for corporate strategy? A range of generic strategies emerge, depending on the competitive position of a particular firm or business. Strategy is of course very individualized; each firm must consider its particular circumstances when developing its plans. The generic strategies provide a framework for analysis and discussion. Hax and Majluf presents the following classification of a firm's competitive position in the ADL model<sup>68</sup>:

1. **Dominant:** Dominant competitors are very rare. Dominance often results from a quasimonopoly or from a strongly protected technological leadership.
2. **Strong:** Not all industries have dominant or strong competitors. Strong competitors can usually follow strategies of their choice, irrespective of their competitors' moves.
3. **Favorable:** When industries are fragmented, with no competitor clearly standing out, the leaders tend to be in a favorable position.
4. **Tenable:** A tenable position can usually be maintained profitably through specialization in a narrow or protected market niche. This can be a geographic specialization or a product specialization.
5. **Weak:** Weak competitors can be intrinsically too small to survive independently and profitably in the long term, given the competitive economics of their industry, or they can be larger and potentially stronger competitors, but suffering from costly past mistakes or from a critical weakness.



6. Nonviable: Represents the final recognition that the firm really has no strength whatsoever, now or in the future, in that particular business. Therefore, existing is the only strategic response.

With the industry state and competitive position as inputs, the model presents generic strategies along three dimensions: market share thrust, investment requirements, and profitability and cash flow. It also suggests a choice of broad programs – natural development, selective development, prove viability, and out – based on the position of a business.<sup>69</sup> The resulting strategies are necessarily firm-specific. However, a few remarks about the implications on the industry as a whole are appropriate.

It is clear that the industry is maturing, with some segments progressing faster than others. There are few leadership positions available for contention. Network effects plus the scale and scope advantages of sales and distribution channels favor the leaders. Current competitors who are not leaders must carefully consider both their growth expectations and the defensibility of their niches. In a mature industry, firms and their shareholders should expect sales growth close to GDP, and in the case of non-leading firms, decline in market share. Furthermore, with the strong negotiating position of buyers and competition from Open Source, profit margins should be expected to continue to fall. Most firms have already restructured their expense levels, so net margins will suffer.

Large firms have the advantages of scale and scope. They can leverage product development across multiple product lines, and are best equipped to take advantage of the cost benefits of offshore development. They also have greater channel leverage than smaller companies. In particular, large firms can bundle products to reduce revenue erosion, by giving customers additional products as a concession rather than reducing price. Furthermore, those firms which have large services organizations have great latitude to create an environment where their products are chosen over competitors'.

Some strategies large firms should consider include:

1. Expanding their services organization, to lock-in customers and lock-out competitors.
2. Increase the breadth and depth of their product lines, by both low-cost development and acquisition at bargain prices.
3. Increase the network effects between product lines, to increase customers' incentive to purchase multiple products from the same vendor, and to increase the value of bundled pricing negotiations.
4. Consider transferring commodity platforms to the Open Source community, offloading maintenance costs, while refocusing resources on value-added components.

The position of mid-sized companies is particularly uncomfortable; they must protect their niches from above, while simultaneously investing to avoid disruption from below.

Several strategies to be considered by such firms include:

1. Positioning for acquisition by a leader, which may require: forging new alliances, building interfaces to transform the product line into a natural complementor, or forging very tight bonds with desirable customers or market niches. The risks are several, including: the limited number of acquisitions which are likely in each segment, the risk of accelerating incursion by the leaders into a company's niche, and the difficulties of forming bonds strong enough to fend off market leaders.
2. Attempting customer lock-in, which may require changing the scope of the product offering to conform more closely to the needs of specific customers or well-defined niches, and expanding the range of services offered. The key is to understand the targeted customers better than the leading firms, and use that knowledge to deliver better value. This may prove very difficult for many companies, given the resources larger firms can allocate developing products for and marketing to application niches. The challenge is exacerbated in areas where a leader's platform confers valuable network effects to users.
3. Shifting position in the value chain, focusing resources on components or services which complement the leader but which have defensible economic value. This strategy is a natural consequence of the prior two options, and

takes advantage of a firm's superior knowledge of their niche. It is particularly appealing when commoditization of the core platform has occurred (most strikingly in the case where the platform has moved to Open Source). The primary risks are that the leader provides most of the value – real or perceived – required by the customers, and the marginal utility of the firm's component or service is small.

New entrants face a very different environment than they did three years ago. The large markets are nearing saturation, while large companies own the channels, making entry difficult and virtually eliminating the chances of building a large company. The slow pace of new technology purchasing (admittedly, a cyclical factor) reduces the probability a small company can arbitrage technology development into substantial value – the behemoths appear to be keeping pace with demand for new technology with relative ease. And while the sales cycles become protracted, increasing the need for capital, changes in capital markets make raising early stage capital more difficult and reduce exit valuations.

Nonetheless, opportunities still exist for start-ups. Significant differences in strategy may be necessary, however, including:

1. Reassessing financing strategies. The reduced likelihood of expanding beyond the initial niche and lower terminal valuations make traditional venture capital investment less appealing for a broader range of companies. Alternatives,

including customer financing, money from non-institutional sources, and consulting income, should be strongly considered, even at the expense of slowing growth.

2. Reducing cost structures. Lower investment valuations and longer sales cycles demand even greater attention to expense reduction. Since the primary cost for most start-ups is labor, two options to consider are: increasing the equity component of employee compensation to reduce salaries, and the use of offshore development early in the companies' lifecycle.
3. Narrowing the product scope. Focus on niches, to increase the chances of establishing a defensible product or service offering.
4. Choosing a staged product release cycle, allowing earlier releases and therefore quicker time to revenues, sacrificing functionality for timely delivery.
5. Considering service or hybrid business models, rather than building a product company. This allows greater and earlier bonding with the customer to better discover a niche and provides a degree of self-funding. The primary risks are the lower valuations associated with services companies, and establishing organizational structures that are difficult to later transition to a product-led company.
6. Considering new channel strategies. After the dot-com crash, customers are more reluctant to have start-ups as suppliers, due to the inherent business and technology risks. Therefore, many companies will need to use the leading software companies – especially the service providers – as channels. In most

cases, this lengthens the sales cycle and reduces the start-up's proportion of the revenue. Note that service providers are likely to be a poor channel for significant innovations, because it introduces risk to the provider's service levels without any commensurate gain (the benefits are presumably enjoyed by the customer, not the service provider); start-ups offering such products should approach the customers directly.

## **Conclusions – Aggregate Analysis**

Absent the appearance of a major new platform, the software industry, in the aggregate, will likely follow the pattern seen in older industries. Growth will continue to slow.

Many niches will disappear. The leaders will increase their dominance, start-ups will continue to innovate, though at a reduced tempo and scope, and mid-sized companies will either be acquired, find defensible niches or, in many cases, see their revenues consistently decline to unprofitable levels.

Managers in the software industry can therefore learn from the analysis performed on other industries to better prepare for the challenges of maturity. ADL presents the following characterization of management activities, by industry stage:

**Figure 25: Management Characteristics by Stage of Industry Maturity** (Source: ADL<sup>70</sup>)

<b>Management Activity or Function</b>	<b>Embryonic Industry</b>	<b>Growth Industry</b>	<b>Mature Industry</b>	<b>Aging Industry</b>
Managerial Role	Entrepreneur	Sophisticated Market Manager	Critical Administrator	“Opportunistic Milker”
Planning Time Frame	Long enough to draw tentative life cycle	Long-range investment payout	Intermediate	Short-range
Planning Content	By product/customer	By product and program	By product/market/function	By plant
Planning Style	Flexible	Less flexible	Fixed	Fixed
Organizational Structure	Free-form or task force	Semi-permanent task force, product or market division	Business division plus task force for renewal	Pared-down division

Managerial Compensation	High variable/low fixed, fluctuating with performance	Balanced variable and fixed, individual and group rewards	Low variable/high fixed/group rewards	Fixed only
Policies	Few	More	Many	Many
Procedures	None	Few	Many	Many
Communications System	Informal/tailor-made	Formal/tailor-made	Formal/uniform	Little or none, by direction
Managerial Style	Participation	Leadership	Guidance/loyalty	Loyalty
Content of Reporting System	Qualitative, marketing, unwritten	Qualitative and quantitative, early warning system, all functions	Quantitative, written, production oriented	Numerical, oriented to written balance sheet
Measures Used	Few Fixed	Multiple/adjustable	Multiple/adjustable	Few/fixed
Frequency of Measuring	Often	Relatively often	Traditionally periodic	Less often
Detail of Measurement	Less	More	Great	Less
Corporate Departmental Emphasis	Market research; new product development	Operations research; organization development	Value analysis, Data processing, Taxes and insurance	Purchasing

Application of these characteristics is clearly specific to each firm. The ADL framework provides an important basis for discussion and analysis as companies perform a comprehensive reassessment their management activities in light of the changes in the industry and in their sector. By learning from the experience of companies in industries which have already matured, managers can anticipate the changes they will need to undergo, and perhaps implement these changes proactively rather than reactively.



This is not to suggest that the industry will stagnate. One of the industry's greatest assets is its competency in developing and commercializing innovation. The capital, managerial and technical resources necessary to do this are readily available and well-honed. Despite declining aggregate demand, innovation will continue to drive new growth opportunities. Identifying and capitalizing on these niches will become more challenging as the market matures, because they are fewer in number and competition is more concentrated. Such an environment emphasizes the advantages of superior managerial and technical competence, and firms should carefully evaluate their investment in these areas.

## **Analysis by Segment**

The aggregate analysis presented above provides the context essential to understand the changing environment in which software companies operate. But to truly understand the strategic challenges and opportunities facing individual firms, a more granular view is required. This demands detailed segmentation and analysis by market cluster. The scope and time constraints of this thesis preclude anything more than a very cursory analysis of industry segments. Despite this limitation, the exercise provides insight which should further enrich the reader's understanding of the industry.

The first order segmentation chosen is around the market sector each company is targeting. This allows direct competitors to be compared. Further segmentation, perhaps categorizing companies within a cluster by their methods of competition, would be desirable for further analysis.

For the purposes of this analysis, the companies were grouped into seven clusters:

Business Intelligence (BI), Desktop Applications (DESK), Development tools (DEVT), Enterprise Applications (EAP), Infrastructure (INF), Management Tools (MGT), Search and Portal Tools (SPT) and Services (SVC).

## ***Data Sources***

The Software Magazine 500 database was chosen as the data source for this analysis. It places companies in 37 categories based on their primary source of revenue. The fundamental limitation of this database is a lack of historical information, so trends cannot be determined. Furthermore, limited financial data is available. The significant advantage it has over other sources is that both private and public companies are listed.

Dividing the companies into clusters presents certain problems. For example, IBM has a \$42 Billion services business, ranked first on the list. It also has a \$14 Billion software business, which on its own would merit a ranking of fourth. Identifying and separating these components is easy. Separating Microsoft's revenues into its primary constituents is similarly straightforward.

Categorizing a company such as Oracle is more difficult. The company breaks down its new license revenues into databases (\$1 Billion) and applications (\$325 Million), but these new licenses are but a small component of its \$9.5 Billion revenues. The \$325 Million applications business is a substantial player in the enterprise applications sector, but it is difficult to accurately determine how to appropriately rank Oracle in the sector, for two reasons. First, it is difficult to assess the proportion of the company's \$4 Billion updates and product support revenues generated by applications. Furthermore, the company has substantial latitude in allocating revenue from bundling deals. It is difficult to know what portion of the reported application revenue is for software the customers

intended to purchase, rather than had thrown into a package deal for database software.

So Oracle is categorized by its primary business, databases, and put into the Infrastructure (INF) cluster.

Search and Portal tools would ordinarily be placed under either application development or infrastructure clusters. However, Yahoo's presence in this category would significantly skew analysis, so the category was preserved intact as a cluster.

Discrepancies have been noted between the Software Magazine 500 database and reported data. Companies that should be on the list are not; for example, Datawatch Corporation, a \$17 Million U.S. software company, should be positioned in approximately 360<sup>th</sup> place on the list, but is not listed. This suggests the data, while helpful, should be used with caution.

Finally, Software Magazine's categories at times seem incorrect or arbitrary. For example, Valicert is listed as a Content Management company (and therefore falls into the Business Intelligence cluster), when in fact it is a security products vendor. For this analysis, category changes were made for a few of the larger companies, but not the small or mid-sized companies.

## Clusters Overview

The clusters were chosen based on perceived similarities in the targeted markets.

<b>Figure 26: Cluster – Software Magazine 500 Category Mapping</b>	
<b>Cluster</b>	<b>Software Magazine 500 Categories Included</b>
<b>BI – Business Intelligence</b>	Business Intelligence Content/Document Management/Doc Conversion  Data Warehouse/Query Tools/OLAP
<b>DESK – Desktop Applications</b>	Publishing/Graphics (Also includes Microsoft Information Worker applications, such as Microsoft Office)
<b>DEVT – Development tools</b>	Application Development/Testing/Lifecycle Tools
<b>EAP – Enterprise Applications</b>	Business Process Management Collaboration/Project Management Customer Relationship Management E-Learning Enterprise Application Integration Enterprise Resource Planning Financial Applications GIS/Mapping Healthcare Human Resource Management Applications  Marketing Automation Retail Sales Force Automation Supply Chain Vertical Industry Application (plus SAP)
<b>INF – Infrastructure Software</b>	Database E-Business Applications/Services/Tools Middleware/Application Server/Web Server  Operating Systems (includes Microsoft's Server business) Storage Management Wireless/Mobile
<b>MGT – Management and Security Software</b>	Asset/Technology Management  Data Recovery Disaster Recovery Infrastructure/Network Management/Performance  Security Tools/Systems

<b>SPT – Search and Portal</b>	Search/Portal Tools
<b>SVC – Services</b>	Application Service Provider/Managed SP
	IT Sourcing
	Legacy System Renewal/Integration
	System Integration Services
	Telecommunications Services
<b>Not Placed in a Cluster</b>	Other

IBM’s services business is placed in the SVC cluster. Its software business is in INF, because IBM exited the applications software business in 1997 and its software revenues primarily come from middleware tools. It does have substantial resources allocated to Linux – over 7,500 employees according to its web site – but, as with all open source products, these generate no direct revenues; the return on this investment is presumably captured in their services and hardware revenues.

Microsoft’s desktop applications business (Word, Excel, and the like) – what it terms its Information Worker business – is placed in the DESK cluster. The remainder of its business is placed in the INF cluster. This overstates the revenues of infrastructure by some \$5 Billion, primarily because it includes their MSN and Xbox revenues.

Software Magazine’s “Other” category is not placed in any cluster and is thus ignored in this analysis. It represents about 1% of the overall industry revenues. The placement of Vertical Industry Applications into the EAP cluster is questionable; the largest company in the category is Synopsis, a \$1 Billion vendor of semiconductor design tools, not traditionally thought of as an enterprise application. Similarly, Qualcomm is in the

magazine's Wireless & Mobile category, which is placed in the Infrastructure cluster. It would be more appropriate to separate it into an embedded software cluster.

SAP is listed in the magazine's E-Business category; however, it is placed in the EAP cluster, since the company is the industry's largest ERP vendor.

<b>Figure 27: Industry Revenues by Cluster (2003, \$ Millions)</b>				
Cluster	Revenues	%total	# companies	% companies
BI	\$ 4,691	2%	40	8%
DESK	\$ 10,746	4%	8	2%
DEVT	\$ 3,621	1%	32	7%
EAP	\$ 43,209	15%	205	43%
INF	\$ 65,603	22%	59	12%
MGT	\$ 15,370	5%	76	16%
SPT	\$ 402	0%	7	1%
SVC	\$148,812	51%	50	10%
Total	\$292,454	100%	477	100%

## **BI – Business Intelligence Cluster**

### **Components**

This cluster contains companies whose products present and analyze data for decision making. Total cluster revenues are \$5 Billion.

<b>Figure 28: BI Cluster Components</b>					
<b>Cluster</b>	<b>Company</b>	<b>Software / Services Revenue (\$Million)</b>	<b>Software / Services Revenue Growth</b>	<b>Employees</b>	<b>Software 500 Category</b>
BI	Cognos	\$ 491	-0.009	2900	Business Intelligence
BI	Business Objects	\$ 455	0.094	2162	Business Intelligence
BI	Fair Isaac Corporation	\$ 392	0.192	2300	Business Intelligence
BI	Information Builders, Inc.	\$ 300	-0.032	1800	Business Intelligence
BI	Crystal Decisions, Inc.	\$ 254	0.336	1646	Business Intelligence
BI	SPSS Inc.	\$ 209	0.185	1263	Business Intelligence
BI	MicroStrategy Inc.	\$ 148	-0.181	809	Business Intelligence
BI	Brio Technology	\$ 111	-0.262	537	Business Intelligence
BI	MapInfo Corporation	\$ 91	-0.147	668	Business Intelligence
BI	Greenbrier and Russel	\$ 65	-0.168	611	Business Intelligence
BI	Applix	\$ 37	-0.071	210	Business Intelligence
BI	Insightful Corporation	\$ 16	-0.058	102	Business Intelligence
BI	CorVu Corporation	\$ 16	0.326	100	Business Intelligence
BI	ProClarity Corporation	\$ 14	0.36	130	Business Intelligence
BI	SRC Software	\$ 14	0.096	67	Business Intelligence
BI	Silvon Software, Inc.	\$ 11	0.18	83	Business Intelligence
BI	Clarity Systems	\$ 7	0.015	75	Business Intelligence
BI	Continental Computer	\$ 3	0	37	Business Intelligence



BI	Corporation Infoglide Software Corporation	\$ 1	1.83	34	Business Intelligence
BI	Webex Communications	\$ 140	0.723	639	Content/Document Management/Doc Conversion
BI	MatrixOne	\$ 124	-0.106	475	Content/Document Management/Doc Conversion
BI	Primavera Systems	\$ 78	-0.032	385	Content/Document Management/Doc Conversion
BI	Liberate Technologies	\$ 71	0.769	0	Content/Document Management/Doc Conversion
BI	Artemis International Solutions Company	\$ 69	0.016	437	Content/Document Management/Doc Conversion
BI	PlaceWare, Inc., a Microsoft company	\$ 51	0.417	350	Content/Document Management/Doc Conversion
BI	Niku Corporation	\$ 48	-0.282	200	Content/Document Management/Doc Conversion
BI	Forgent Networks	\$ 34	32.77	200	Content/Document Management/Doc Conversion
BI	Valicert, Inc.	\$ 12	-0.57	114	Content/Document Management/Doc Conversion
BI	Serviceware Technologies	\$ 10	-0.146	67	Content/Document Management/Doc Conversion
BI	Mindjet	\$ 8	0.093	80	Content/Document Management/Doc Conversion
BI	Smith Micro Software	\$ 7	-0.248	56	Content/Document Management/Doc Conversion
BI	Arel Communications and Software	\$ 6	-0.369	51	Content/Document Management/Doc Conversion
BI	Artisoft, Inc.	\$ 6	-0.216	0	Content/Document Management/Doc Conversion
BI	Cysive, Inc.	\$ 4	-0.713	60	Content/Document Management/Doc Conversion
BI	CommTouch Software Limited	\$ 3	-0.778	22	Content/Document Management/Doc Conversion
BI	Tenrox	\$ 3	0.383	100	Content/Document

BI	VCON, Inc.	\$ 2	0.215	140	Management/Doc Conversion
BI	SAS	\$ 1,180	0.044	8891	Content/Document Management/Doc Conversion
BI	Informatica Corporation	\$ 195	-0.024	838	Data Warehouse/Query Tools/OLAP
BI	Kalido Ltd	\$ 6	-0.323	73	Data Warehouse/Query Tools/OLAP
BI	SAS	\$ 1,180	0.044	8891	Data Warehouse/Query Tools/OLAP
BI	Informatica Corporation	\$ 195	-0.024	838	Data Warehouse/Query Tools/OLAP
BI	Kalido Ltd	\$ 6	-0.323	73	Data Warehouse/Query Tools/OLAP

### Market Growth Rate

This segment is predicted to grow at 7%<sup>71</sup>. The growth stage is defined as, “Faster than GNP, but constant or decelerating.” Maturity is defined as, “equal to or slower than GNP, cyclical.” Therefore, this cluster is in the growth stage.

### Industry Potential

BI could conceivably be deployed to many more users; the user base seems to be expanding<sup>72</sup>, so the cluster appears to be in the growth stage.

### Breadth of Product Lines

Key growth drivers are the ability to cross-sell multiple products to a customer and the ability of larger vendors to sell vertical market solutions<sup>73</sup>. The growth stage is defined

as, “Rapid proliferation as product lines are extended.” Maturity is defined as, “Product turnover, but little or no change in breadth.” This sector is in the growth stage.

### **Number of Competitors**

Consolidation is occurring; for example, Business Objects purchased Crystal and Brio purchased Hyperion, this suggests the cluster is in the latter part of the growth stage.

### **Market Share Stability**

The major firms are established, but face new competition from large outsiders, such as Siebel. The growth stage is defined as, “A few firms have major shares; rankings can change, but those with minor shares are unlikely to gain major shares.” The cluster is clearly past the Embryonic stage, suggesting it is instead in the growth stage.

### **Purchasing Patterns**

This follows the patterns of the software industry as a whole, although pricing pressure may not be quite as strong as in other clusters<sup>74</sup>; this suggests a mature cluster.

### **Ease of Entry**

Entry is still possible, though expansion beyond niches for small firms is unlikely.

Rather, the entry is coming from established firms expanding their product lines into the BI space. This suggests the cluster is in the early stages of maturity.

## Technology

Real-time Business Intelligence seems to be a source of growth, and technology will need to be developed to supply it. The growth stage is defined as, “Product line refinement and extension.” On this dimension, the cluster is growing.

## Summary

Six factors suggest the industry is in the growth phase, and two suggest maturity. The cluster therefore appears to be in the growth phase.

## Strategies

The generic strategies suggested by the ADL mode for a growth industry are:<sup>75</sup>

Firm Position	Market Share Thrust	Investment	Profitability + C/F
Dominant	Hold position, Hold share	Invest to sustain growth rate and preempt new competitors	Profitable, Probably net cash producer
Strong	Attempt to improve position, Push for share	Invest to increase growth rate and improve position	Probably profitable, Probably net cash borrower
Favorable	Attempt to improve position, Selective push for share	Selective investment to improve position	Marginally profitable, Net cash borrower
Tenable	Find niche and protect it	Selective investment	Unprofitable, Net cash borrower or C/F balance
Weak	Turnaround, or Abandon	Invest, or divest	Unprofitable, Net cash borrower or C/F balance

The cluster does not appear to have a dominant firm, but the leaders – the twelve firms with revenues exceeding \$100 Million – may be viewed as strong or favorable. It appears to have a number of weak and tenable firms. Many of these are single-market companies. A weak firm should turnaround or abandon the market. Given the nature of competition and technology lead, turnarounds may prove elusive. Yet it seems difficult for a single product firm to abandon the market. Tenable firms should have an enormous urgency to find a viable and protectable niche.

## **DESK – Desktop Software Cluster**

### **Components**

This cluster contains companies whose products are standalone desktop computer applications. This is a relatively diverse group of companies, dominated by Microsoft's Office business. The others, including the second-largest company, Adobe, have very specific product lines, and in general don't directly compete with one another. Total cluster revenues are \$11 Billion.

**Figure 29: DESK Cluster Components**

<b>Cluster</b>	<b>Company</b>	<b>Software / Services Revenue (\$Million)</b>	<b>Software / Services Revenue Growth</b>	<b>Employees</b>	<b>Software 500 Category</b>
DESK	Adobe Systems Inc.	\$ 1,165	-0.053	3319	Publishing/Graphics
DESK	RealNetworks Inc.	\$ 176	-0.03	696	Publishing/Graphics
DESK	Corel Corporation	\$ 127	-0.057	750	Publishing/Graphics
DESK	Insignia Systems, Inc.	\$ 25	0.245	140	Publishing/Graphics
DESK	ACD Systems	\$ 14	0.378	108	Publishing/Graphics
DESK	Bitstream, Inc.	\$ 9	0.063	72	Publishing/Graphics
DESK	SealedMedia	\$ 2	-0.333	50	Publishing/Graphics
DESK	Microsoft – desktop applications (information worker)	\$ 9,229	0.121	50621	Operating Systems

### **Market Growth Rate**

The growth stage is defined as, “Faster than GNP, but constant or decelerating.”

Maturity is defined as, “equal to or slower than GNP, cyclical.” Microsoft's applications

business has achieved approximately 90% market penetration; growth is expected at less than 10%, driven by upgrade cycles. Adobe is realizing 11% growth<sup>76</sup>. Therefore, by this criteria, the cluster appears to be in the latter part of the growth stage.

### **Industry Potential**

Microsoft's near-complete penetration leaves little room for industry expansion. Adobe seems to have tapped increasing demand for intelligent documents, suggesting the potential is greater than current volume. The growth stage is defined as, "Substantially exceeds the industry volume, but is subject to unforeseen developments ." Maturity is defined as, "Well-known; primary markets approach saturation industry volume." The cluster thus appears to be in the mature stage.

### **Breadth of Product Lines**

Microsoft is expanding its product line in an attempt to encourage upgrades. Adobe's product line has expanded. The growth stage is defined as, "Rapid proliferation as product lines are extended." Maturity is defined as, "Product turnover, but little or no change in breadth." This suggests the cluster has moved into the mature stage.

### **Number of Competitors**

There are few competitors. The growth stage is defined as, "Increasing to peak; followed by shake-out and consolidation." Maturity is defined as, "Stable." The industry is undergoing a shake-out and consolidation, thus suggesting it is in the latter part of the mature stage.

## **Market Share Stability**

Shares are stable and unlikely to change. The growth stage is defined as, “A few firms have major shares; rankings can change, but those with minor shares are unlikely to gain major shares.” Maturity is defined as, “Firms with major shares are entrenched.” This suggests the mature stage.

## **Purchasing Patterns**

Buying patterns are established. The growth stage is defined as, “Some; buyers are aggressive.” Maturity is defined as, “Suppliers are well know; buying patterns are established.” This behavior strongly suggests a mature industry.

## **Ease of Entry**

There is little possibility of entry into the market; the barriers – network effects based on the widespread use of Microsoft and Adobe’s software – are huge. The growth stage is defined as, “Usually easy, the presence of competitors is offset by vigorous growth.” Maturity is defined as, “Difficult; competitors are entrenched and growth is slowing,” while Aging is, “Difficult; little incentive.” This suggests the cluster is mature.

## **Technology**

The product line’s are being developed to renew growth, suggesting maturity.



## Summary

Six factors suggest the cluster is mature and one suggests growth. The cluster is therefore mature.

## Strategies

The generic strategies suggested by the ADL mode for a mature industry are:<sup>77</sup>

Firm Position	Market Share Thrust	Investment	Profitability + C/F
Dominant	Hold position, Grow with industry	Reinvest as necessary	Profitable, Net cash producer
Strong	Hold position, Grow with industry	Reinvest as necessary	Profitable, Net cash producer
Favorable	Custodial or maintenance, Find niche and attempt to protect it	Minimum and/or selective reinvestment	Profitable, Net cash producer
Tenable	Find niche and hang on, or Phased withdrawal	Minimum reinvestment or disinvest	Minimally profitable, Cash flow balance
Weak	Turnaround, or Phased withdrawal	Invest selectively, or disinvest	Unprofitable, Possibly net cash borrower or net cash producer

Because of network effects, this is a winner take all cluster. Microsoft and Adobe are dominant; their strategies should primarily be concerned with developing functionality users will value to purchase upgrades. The other firms either need to find protectable niches – a difficult challenge – or expect to exit the market.

## ***DEVT – Development Tools Cluster***

### **Components**

This cluster includes companies whose primary source of revenues are tools which enable the development of software applications. The cluster is dominated by IBM and Microsoft, who don't appear in the cluster list because development tools are not their major products. In December, 2002, IBM acquired Rational, a leading vendor of application development tools, for \$2.1 Billion. There are two dominant frameworks in the industry, Microsoft's .NET, and J2EE, which is sponsored by IBM and other companies. These dominant frameworks have the potential to support a number of complementors.

Total cluster revenues, excluding IBM and Microsoft, are \$3.6 Billion.

<b>Figure 30: DEVT Cluster Components</b>					
<b>Cluster</b>	<b>Company</b>	<b>Software / Services Revenue (\$Million)</b>	<b>Software / Services Revenue Growth</b>	<b>Employees</b>	<b>Software 500 Category</b>
DEVT	Compuware Corp	\$ 1,446	- 0.219	9418	Application Development/Testing/Lifecycle Tools
DEVT	National Instruments	\$ 391	0.014	3000	Application Development/Testing/Lifecycle Tools
DEVT	Intel Corp.	\$ 284	0.01	78700	Application Development/Testing/Lifecycle Tools
DEVT	Borland Software Corporation	\$ 245	0.103	1608	Application Development/Testing/Lifecycle Tools
DEVT	Merant	\$ 172	- 0.072	701	Application Development/Testing/Lifecycle Tools
DEVT	ASG	\$ 157	0.229	750	Application Development/Testing/Lifecycle Tools
DEVT	Silverline Technologies	\$ 143	0.006	1729	Application Development/Testing/Lifecycle

DEVT	Telelogic AB	\$	116	-	768	Tools Application Development/Testing/Lifecycle Tools
				0.189		
DEVT	Blackbaud, Inc.	\$	103	0.17	702	Application Development/Testing/Lifecycle Tools
DEVT	ILOG	\$	83	0.038	590	Application Development/Testing/Lifecycle Tools
DEVT	Precise Software Solutions	\$	76	0.367	462	Application Development/Testing/Lifecycle Tools
DEVT	Magic Software Enterprises	\$	60	-	700	Application Development/Testing/Lifecycle Tools
				0.216		
DEVT	Serena Software	\$	50	-	0	Application Development/Testing/Lifecycle Tools
				0.147		
DEVT	Select Business Solutions, Inc.	\$	37	0.151	300	Application Development/Testing/Lifecycle Tools
DEVT	Segue Software	\$	31	-0.2	200	Application Development/Testing/Lifecycle Tools
DEVT	MKS Inc.	\$	28	0.028	246	Application Development/Testing/Lifecycle Tools
DEVT	Diversified Software	\$	27	-	164	Application Development/Testing/Lifecycle Tools
				0.004		
DEVT	Catapult Communications Corporation	\$	25	-	264	Application Development/Testing/Lifecycle Tools
				0.028		
DEVT	Foliage Software Systems	\$	22	-	105	Application Development/Testing/Lifecycle Tools
				0.207		
DEVT	Alogent Corporation	\$	20	0.347	122	Application Development/Testing/Lifecycle Tools
DEVT	Wise Solutions	\$	19	0.583	94	Application Development/Testing/Lifecycle Tools
DEVT	Unify Corporation	\$	13	-	73	Application Development/Testing/Lifecycle Tools
				0.088		
DEVT	Tenfold Corporation	\$	13	-	73	Application Development/Testing/Lifecycle Tools
				0.766		
DEVT	Four J's Development Tools	\$	11	0.087	102	Application Development/Testing/Lifecycle Tools
DEVT	Persistent	\$	10	0.241	450	Application

DEVT	Systems Private Limited Teamstudio	\$	10	- 0.004	65	Development/Testing/Lifecycle Tools Application Development/Testing/Lifecycle Tools
DEVT	Aladdin Systems Holdings, Inc.	\$	8	- 0.022	48	Application Development/Testing/Lifecycle Tools
DEVT	Insignia Solutions plc	\$	7	- 0.291	77	Application Development/Testing/Lifecycle Tools
DEVT	Athens Group Inc	\$	6	0.065	47	Application Development/Testing/Lifecycle Tools
DEVT	Statera	\$	5	1	60	Application Development/Testing/Lifecycle Tools
DEVT	BZ Media LLC	\$	3	0.39	14	Application Development/Testing/Lifecycle Tools
DEVT	iemployee	\$	1	2.39	45	Application Development/Testing/Lifecycle Tools

### Market Growth Rate

Growth is declining, due to reductions in IT expenditure and the adoption of low-cost .NET tools. The growth stage is defined as, “Faster than GNP, but constant or decelerating.” Maturity is defined as, “equal to or slower than GNP, cyclical.” The software industry is growing faster than GNP, but is decelerating. Therefore, by this criteria, it still appears to be in the growth stage.

### Industry Potential

The industry has few major untapped opportunities. Since the primary markets are approaching saturation, the industry appears to be in the mature stage.

## **Breadth of Product Lines**

New web services framework are driving additional product functionality, but not new lines. The growth stage is defined as, “Rapid proliferation as product lines are extended.” Maturity is defined as, “Product turnover, but little or no change in breadth.” This suggests the cluster is in the mature stage.

## **Number of Competitors**

The growth stage is defined as, “Increasing to peak; followed by shake-out and consolidation.” Maturity is defined as, “Stable.” The industry is undergoing a shake-out and consolidation, thus suggesting it is in the latter part of the growth stage.

## **Market Share Stability**

Consolidation is making the large firms larger. The major winners have been established. But the battle of .NET and J2EE is far from over, so the resulting rankings between the two winners is unclear. The growth stage is defined as, “A few firms have major shares; rankings can change, but those with minor shares are unlikely to gain major shares.” Maturity is defined as, “Firms with major shares are entrenched.” The barriers to entry to the top of the market are strong, and some major firms may still fall. This suggests the mature stage.

## Purchasing Patterns

The growth stage is defined as, “Some; buyers are aggressive.” Maturity is defined as, “Suppliers are well known; buying patterns are established.” This behavior strongly suggests a mature cluster.

## Ease of Entry

New entrants face huge barriers of scale, scope and network effects. The growth stage is defined as, “Usually easy, the presence of competitors is offset by vigorous growth.”

Maturity is defined as, “Difficult; competitors are entrenched and growth is slowing.”

The cluster is mature.

## Technology

The vendors have placed their primary technology bets, suggesting maturity.

## Summary

Five factors suggest maturity, two suggest growth. The cluster is mature.

## Strategies

The generic strategies suggested by the ADL mode for a mature industry are:<sup>78</sup>

Firm Position	Market Share Thrust	Investment	Profitability + C/F
Dominant	Hold position, Grow with industry	Reinvest as necessary	Profitable, Net cash producer
Strong	Hold position, Grow with industry	Reinvest as necessary	Profitable, Net cash producer

Favorable	Custodial or maintenance, Find niche and attempt to protect it	Minimum and/or selective reinvestment	Profitable, Net cash producer
Tenable	Find niche and hang on, or Phased withdrawal	Minimum reinvestment or disinvest	Minimally profitable, Cash flow balance
Weak	Turnaround, or Phased withdrawal	Invest selectively, or disinvest	Unprofitable, Possibly net cash borrower or net cash producer

The dominant players, Microsoft and IBM, have agendas extending beyond this cluster; success in the development tools space gives them advantages in their other (larger) business lines. Few niches seem protectable in the long term. Thus, firms should pursue a partnership strategy with one of the leaders, and/or seek to become acquired.

## **EAP – Enterprise Applications**

### **Components**

This very broad cluster consists of companies which develop software to run business processes and functions. Total cluster revenues are \$43 Billion.

<b>Figure 31: EAP Cluster Components</b>					
<b>Cluster</b>	<b>Company</b>	<b>Software / Services Revenue (\$Million)</b>	<b>Software / Services Revenue Growth</b>	<b>Employees</b>	<b>Software 500 Category</b>
EAP	Hyperion Solutions Corporation	\$ 502	0.14	2206	Business Process Management
EAP	Pegasystems Inc.	\$ 97	0.22	412	Business Process Management
EAP	CommerceQuest, Inc.	\$ 23	0.18	140	Business Process Management
EAP	Webplan Corporation	\$ 16	0.24	132	Business Process Management
EAP	Logical Apps	\$ 3	0.12	25	Business Process Management
EAP	FileNET Corporation	\$ 339	0.21	1704	Collaboration/Project Management
EAP	Documentum	\$ 227	0.17	1100	Collaboration/Project Management
EAP	Hummingbird Ltd.	\$ 180	0.19	1312	Collaboration/Project Management
EAP	Open Text Corporation	\$ 159	0.16	1100	Collaboration/Project Management
EAP	Vignette Corp	\$ 155	0.33	870	Collaboration/Project Management
EAP	Interwoven	\$ 127	0.21	750	Collaboration/Project Management
EAP	ScanSoft, Inc.	\$ 107	0.26	600	Collaboration/Project Management
EAP	Mobius Management Systems, Inc.	\$ 76	0.22	412	Collaboration/Project Management
EAP	Stellent, Inc.	\$ 63	0.27	326	Collaboration/Project Management
EAP	Docucorp International, Inc.	\$ 52	0.17	430	Collaboration/Project Management
EAP	Captiva Software Corporation	\$ 46	0.16	275	Collaboration/Project Management



EAP	iManage, Inc.	\$ 41	0.21	215	Collaboration/Project Management
EAP	Innodata Corporation	\$ 33	0	7070	Collaboration/Project Management
EAP	Kofax	\$ 29	0.19	285	Collaboration/Project Management
EAP	Optio Software	\$ 29	0.15	150	Collaboration/Project Management
EAP	Hyland Software, Inc.	\$ 28	0.16	214	Collaboration/Project Management
EAP	Cardiff Software, Inc.	\$ 25	0.15	192	Collaboration/Project Management
EAP	Optika Inc.	\$ 18	0.29	130	Collaboration/Project Management
EAP	Omtool, Ltd.	\$ 12	0.19	89	Collaboration/Project Management
EAP	FormScape	\$ 11	0.1	120	Collaboration/Project Management
EAP	QUMAS	\$ 10	0.6	100	Collaboration/Project Management
EAP	Cypress Corporation	\$ 8	0.17	40	Collaboration/Project Management
EAP	Comsquared Systems, Inc.	\$ 5	0	0	Collaboration/Project Management
EAP	activePDF	\$ 4	0.21	15	Collaboration/Project Management
EAP	Communication Intelligence Corporation	\$ 3	0	55	Collaboration/Project Management
EAP	1mage Software, Inc.	\$ 2	0.13	22	Collaboration/Project Management
EAP	Paperclip Software	\$ 1	0	12	Collaboration/Project Management
EAP	Siebel Systems	\$ 1,635	0	5900	Customer Relationship Management
EAP	Amdocs Management Ltd.	\$ 1,530	0.08	9050	Customer Relationship Management
EAP	Acxiom Corporation	\$ 958	0	0	Customer Relationship Management
EAP	Harte-Hanks, Inc.	\$ 574	0	7000	Customer Relationship Management
EAP	Aspect Communications Corp.	\$ 330	0.14	1391	Customer Relationship Management
EAP	Concerto Software, Inc.	\$ 100	0	460	Customer Relationship Management
EAP	Group 1 Software	\$ 99	0.19	470	Customer Relationship Management
EAP	Epiphany	\$ 84	0.41	520	Customer Relationship Management
EAP	KANA	\$ 79	0.33	350	Customer Relationship Management

EAP	FrontRange Solutions	\$ 79	0.17	463	Customer Relationship Management
EAP	Chordiant Software	\$ 74	0.3	328	Customer Relationship Management
EAP	Onyx Software	\$ 69	0.22	403	Customer Relationship Management
EAP	Witness Systems	\$ 68	0.22	311	Customer Relationship Management
EAP	Pivotal Corporation	\$ 65	0.24	521	Customer Relationship Management
EAP	salesforce.com	\$ 52	0	0	Customer Relationship Management
EAP	Interactive Intelligence Inc.	\$ 48	0.32	347	Customer Relationship Management
EAP	SupportSoft	\$ 41	0.21	165	Customer Relationship Management
EAP	Blue Martini Software, Inc.	\$ 34	0	255	Customer Relationship Management
EAP	Alorica Inc.	\$ 25	0.1	875	Customer Relationship Management
EAP	TMA Resources	\$ 22	0.22	159	Customer Relationship Management
EAP	FirePond, Inc	\$ 22	0	128	Customer Relationship Management
EAP	Primus Knowledge Solutions	\$ 21	0.38	148	Customer Relationship Management
EAP	Apropos Technology Inc.	\$ 20	0.38	163	Customer Relationship Management
EAP	Interface Software, Inc.	\$ 18	0.31	115	Customer Relationship Management
EAP	Astea International Inc.	\$ 17	0.11	137	Customer Relationship Management
EAP	Firstwave Technologies, Inc.	\$ 13	0.15	75	Customer Relationship Management
EAP	Valassis	\$ 11	0.01	56	Customer Relationship Management
EAP	Maximizer Software Inc.	\$ 11	0	161	Customer Relationship Management
EAP	Net Perceptions	\$ 5	0	52	Customer Relationship Management
EAP	PreVision Marketing, LLC	\$ 5	0.01	115	Customer Relationship Management
EAP	Systems & Computer Technology Corp. (SCT)	\$ 238	0	1600	E-Learning
EAP	Saba	\$ 50	0.25	300	E-Learning
EAP	DigitalThink	\$ 43	0.17	300	E-Learning
EAP	Click2learn Inc.	\$ 31	0.28	243	E-Learning
EAP	Docent,	\$ 28	0	166	E-Learning

	Incorporated					
EAP	Knowlagent	\$ 10	0.2	61	E-Learning	
EAP	The American Education Corp.	\$ 9 %		72	E-Learning	
EAP	TIBCO SOFTWARE INC.	\$ 273	0.26	1030	Enterprise Application Integration	
EAP	webMethods, Inc.	\$ 196	0.24	888	Enterprise Application Integration	
EAP	SeeBeyond Technology Corporation	\$ 151	0.23	780	Enterprise Application Integration	
EAP	Mercator Software Inc.	\$ 112	0.1	441	Enterprise Application Integration	
EAP	Vitria	\$ 97	0.32	450	Enterprise Application Integration	
EAP	NetManage, Inc.	\$ 66	0	350	Enterprise Application Integration	
EAP	Sapiens International Corporation N.V.	\$ 65	0.1	541	Enterprise Application Integration	
EAP	Rogue Wave Software	\$ 41	0.27	194	Enterprise Application Integration	
EAP	Sierra Atlantic, Inc.	\$ 20	0.05	350	Enterprise Application Integration	
EAP	Persistence Software	\$ 15	0	68	Enterprise Application Integration	
EAP	Intrinsyc Software International, Inc.	\$ 9	0.27	110	Enterprise Application Integration	
EAP	OMD Corporation	\$ 5	0.13	60	Enterprise Application Integration	
EAP	Aalayance, Inc	\$ 5	0.1	110	Enterprise Application Integration	
EAP	NEON Systems	\$ 4	0	0	Enterprise Application Integration	
EAP	PeopleSoft	\$ 1,949	0	8293	Enterprise Resource Planning	
EAP	J.D. EDWARDS	\$ 905	0	0	Enterprise Resource Planning	
EAP	The Reynolds and Reynolds Company	\$ 500	0.08	4642	Enterprise Resource Planning	
EAP	Lawson Software	\$ 428	0	0	Enterprise Resource Planning	
EAP	Intentia International AB	\$ 370	0	3370	Enterprise Resource Planning	
EAP	Unit 4 Agresso	\$ 251	0.17	1413	Enterprise Resource Planning	
EAP	SCT Corp.	\$ 245	0	1700	Enterprise Resource Planning	

EAP	Epicor Software Corporation	\$ 141	0.13	800	Enterprise Resource Planning
EAP	MAPICS, Inc.	\$ 126	0.11	454	Enterprise Resource Planning
EAP	Cincom Systems	\$ 121	0.13	723	Enterprise Resource Planning
EAP	SSA Global	\$ 106	0.14	1500	Enterprise Resource Planning
EAP	Deltek Systems, Inc.	\$ 92	0.24	650	Enterprise Resource Planning
EAP	Adonix	\$ 79	0.2	700	Enterprise Resource Planning
EAP	SYSPRO	\$ 46	0	350	Enterprise Resource Planning
EAP	Lilly Software Associates	\$ 38	0.25	185	Enterprise Resource Planning
EAP	Exact Software	\$ 32	0.22	2000	Enterprise Resource Planning
EAP	Made2Manage Systems	\$ 30	0.17	211	Enterprise Resource Planning
EAP	Ross Systems	\$ 28	0.14	260	Enterprise Resource Planning
EAP	ROI Systems, Inc.	\$ 22	0	158	Enterprise Resource Planning
EAP	Maconomy A/S	\$ 21	0.22	238	Enterprise Resource Planning
EAP	gomembers, inc	\$ 14	0.23	90	Enterprise Resource Planning
EAP	Global Shop Solutions, Inc.	\$ 7	0.21	68	Enterprise Resource Planning
EAP	SunGard Data Systems Inc.	\$ 2,593	0	8800	Financial Applications
EAP	Convergys Corp.	\$ 2,286	0	48800	Financial Applications
EAP	Misys plc	\$ 1,518	0	6000	Financial Applications
EAP	Intuit Inc.	\$ 1,383	0	0	Financial Applications
EAP	The Sage Group plc	\$ 861	0	5637	Financial Applications
EAP	Geac Computer Corporation	\$ 387	0.11	2506	Financial Applications
EAP	Jack Henry & Associates Inc.	\$ 302	0.04	2093	Financial Applications
EAP	S1 Corporation	\$ 291	0.18	1500	Financial Applications
EAP	Advent Software	\$ 141	0.25	0	Financial Applications
EAP	Portal Software, Inc.	\$ 121	0.3	583	Financial Applications
EAP	Actuate Corporation	\$ 109	0.17	510	Financial Applications
EAP	Inet Technologies	\$ 102	0.29	470	Financial Applications
EAP	RoyalBlue Group plc	\$ 91	0	498	Financial Applications

EAP	London Bridge Software Holdings	\$ 81	0	792	Financial Applications
EAP	Systems Union Group plc	\$ 69	0.14	769	Financial Applications
EAP	SS&C Technologies, Inc.	\$ 62	0.19	340	Financial Applications
EAP	Ulticom	\$ 58	0	245	Financial Applications
EAP	Imany Inc.	\$ 55	0.32	358	Financial Applications
EAP	Bottomline Technologies	\$ 52	0.19	425	Financial Applications
EAP	Concur Technologies	\$ 45	0.23	340	Financial Applications
EAP	Verso Technologies	\$ 45	0.1	382	Financial Applications
EAP	XRT, Inc.	\$ 40	0.21	350	Financial Applications
EAP	AXS-One Inc.	\$ 37	0.2	250	Financial Applications
EAP	Longview Solutions	\$ 22	0.11	202	Financial Applications
EAP	Transcentive, Inc.	\$ 21	0.27	150	Financial Applications
EAP	724 Solutions	\$ 21	0.5	151	Financial Applications
EAP	California Software	\$ 11	0.15	80	Financial Applications
EAP	MindBox	\$ 10	0.12	55	Financial Applications
EAP	EISI / NaviPlan	\$ 8	0.36	172	Financial Applications
EAP	Global Software, Inc.	\$ 7	0.12	40	Financial Applications
EAP	Necho Systems Corp.	\$ 6	0.35	121	Financial Applications
EAP	Burr Wolff, L.P.	\$ 4	0.05	168	Financial Applications
EAP	Autodesk, Inc.	\$ 825	0.21	3498	GIS/Mapping
EAP	Intergraph Corporation	\$ 473	0.1	3820	GIS/Mapping
EAP	ESRI	\$ 469	0.2	2750	GIS/Mapping
EAP	Environmental Systems Research Institute	\$ 469	0	0	GIS/Mapping
EAP	Enghouse Systems Ltd.	\$ 9	0	0	GIS/Mapping
EAP	MapFrame Corporation	\$ 3	0.1	18	GIS/Mapping
EAP	Cerner Corporation	\$ 617	0.2	4800	Healthcare
EAP	Per-Se Technologies Inc.	\$ 354	0.04	5000	Healthcare
EAP	IDX Systems Corp.	\$ 343	0	4971	Healthcare
EAP	The Trizetto Group Inc.	\$ 265	0.08	1941	Healthcare

EAP	Eclipsys Corporation	\$ 203	0.21	1511	Healthcare
EAP	iSOFT Group plc	\$ 88	0	430	Healthcare
EAP	Landacorp	\$ 18	0	153	Healthcare
EAP	A.D.A.M. Inc.	\$ 9	%	38	Healthcare
EAP	Kronos Incorporated	\$ 260	0.11	2220	Human Resource Management Applications
EAP	Authoria, Inc.	\$ 24	0.36	118	Human Resource Management Applications
EAP	Unicru Inc.	\$ 19	0.09	136	Human Resource Management Applications
EAP	ViryaNet Ltd.	\$ 9	0	75	Human Resource Management Applications
EAP	Halogen Software Inc.	\$ 3	0.4	37	Human Resource Management Applications
EAP	Datamatics Management Services, Inc.	\$ 3	0.08	24	Human Resource Management Applications
EAP	NuView Systems, Inc.	\$ 2	0.45	23	Human Resource Management Applications
EAP	iCIMS, Inc.	\$ 0	0	25	Human Resource Management Applications
EAP	Unica Corporation	\$ 23	0.14	119	Marketing Automation
EAP	Vocus, Inc.	\$ 12	0.13	105	Marketing Automation
EAP	SmartPath, Inc.	\$ 2	0.62	20	Marketing Automation
EAP	JDA Software Group, Inc.	\$ 220	0	1235	Retail
EAP	360Commerce	\$ 7	0.56	100	Retail
EAP	CAM Commerce Solutions	\$ 6	0	200	Retail
EAP	Dendrite International, Inc.	\$ 226	0.05	1579	Sales Force Automation
EAP	Pragmatech Software, Inc.	\$ 9	0.26	71	Sales Force Automation
EAP	i2 Technologies Inc.	\$ 908	0	2600	Supply Chain
EAP	Aspen Technology, Inc.	\$ 328	0.22	1850	Supply Chain
EAP	Manugistics	\$ 320	0	1401	Supply Chain
EAP	QAD, Inc.	\$ 195	0.17	1200	Supply Chain
EAP	Manhattan Associates	\$ 151	0.15	955	Supply Chain
EAP	Tecnomatix Technologies Ltd.	\$ 82	0.17	700	Supply Chain
EAP	Descartes Systems Group	\$ 80	0	500	Supply Chain
EAP	Agile Software	\$ 78	0	0	Supply Chain
EAP	Vastera Inc	\$ 76	0.22	591	Supply Chain

EAP	Kewill Systems PLC	\$ 69	0	588	Supply Chain
EAP	American Software Inc.	\$ 65	0.14	331	Supply Chain
EAP	Agilisys	\$ 51	0	0	Supply Chain
EAP	Verticalnet Software	\$ 44	0.21	65	Supply Chain
EAP	Demand Management, Inc.	\$ 29	0.07	102	Supply Chain
EAP	Catalyst International, Inc.	\$ 25	0.14	200	Supply Chain
EAP	Logility, Inc.	\$ 25	0.22	150	Supply Chain
EAP	TECSYS INC.	\$ 24	0.18	220	Supply Chain
EAP	Camstar Systems, Inc.	\$ 22	0.25	110	Supply Chain
EAP	HighJump Software	\$ 19	0.12	163	Supply Chain
EAP	Click Commerce Incorporated	\$ 18	0	74	Supply Chain
EAP	Gensym	\$ 18	0.18	93	Supply Chain
EAP	AquiTec International	\$ 11	0	90	Supply Chain
EAP	USDATA Corporation	\$ 10	0.23	65	Supply Chain
EAP	Clarus Corporation	\$ 9	0	20	Supply Chain
EAP	Viewlocity, Inc.	\$ 5	0.35	160	Supply Chain
EAP	Avexus	\$ 5	0.54	49	Supply Chain
EAP	EntComm, Inc.	\$ 3	0.53	43	Supply Chain
EAP	Profile Systems	\$ 1	0.25	35	Supply Chain
EAP	Synopsys, Inc.	\$ 999	0.24	4161	Vertical Industry Application
EAP	ADC	\$ 333	0	7600	Vertical Industry Application
EAP	CoCreate Software	\$ 71	0.25	400	Vertical Industry Application
EAP	Peace Software	\$ 40	0.23	447	Vertical Industry Application
EAP	Inter-American Data, llc	\$ 18	0.18	161	Vertical Industry Application
EAP	Command Alkon Incorporated	\$ 17	0.14	256	Vertical Industry Application
EAP	T2 Systems, Inc.	\$ 4	0.13	45	Vertical Industry Application
EAP	Brandt Information Services, Inc.	\$ 4	0.24	44	Vertical Industry Application
EAP	Merrick Systems, Inc.	\$ 3	0.25	31	Vertical Industry Application
EAP	SAP	\$ 7,687	0.11	29374	E-Business Applications/Services/Tools

## **Market Growth Rate**

This sector has found all the low-hanging fruit. Growth predictions are for 7.5% CAGR or so, with some components declining and others growing. The growth stage is defined as, “Faster than GNP, but constant or decelerating.” Maturity is defined as, “equal to or slower than GNP, cyclical.” This cluster is growing faster than GNP, but is decelerating. Therefore, by this criteria, it still appears to be in the growth stage.

## **Industry Potential**

ERP’s potential seems to be consistent with the volume, the cluster appears to be in the mature stage.

## **Breadth of Product Lines**

Some vendors, for example, Siebel, have moved into complementary markets, such as Business Intelligence, in an attempt to find growth. But breadth in this space is growing slowly, if at all. The growth stage is defined as, “Rapid proliferation as product lines are extended.” Maturity is defined as, “Product turnover, but little or no change in breadth.” This suggests the cluster has moved into the mature stage.

## **Number of Competitors**

The cluster has a stable mix of competitors. The recent acquisition of J.D. Edwards by PeopleSoft, and Oracle’s apparently failed bid for PeopleSoft may be the last wave of consolidation. Microsoft’s entry into CRM is consistent with their strategy of



introducing mid-market applications and moving upward. Notwithstanding the possibility they will enter ERP or a similar segment in future years, there is likely to be little change in the competitive makeup of the industry. The growth stage is defined as, “Increasing to peak; followed by shake-out and consolidation.” Maturity is defined as, “Stable.” While some further loss of small players is expected, for the companies representing the bulk of the cluster, stability has been achieved, suggesting the cluster is in the mature stage.

### **Market Share Stability**

The growth stage is defined as, “A few firms have major shares; rankings can change, but those with minor shares are unlikely to gain major shares.” Maturity is defined as, “Firms with major shares are entrenched.” Oracle and Microsoft are still expanding in this space, although their gains will likely come at the expense of already marginal players. Otherwise, market share in each segment is likely to remain stable. This suggests the mature phase.

Note that Salesforce.com has introduced a disruptive business model. As earlier analysis suggested, this model might introduce another “S-Curve,” creating a new wave of growth in the cluster, although this is unlikely.

### **Purchasing Patterns**

Buyers rule this cluster; pricing pressure is intense and buyers are well-practiced at exploiting their leverage. The growth stage is defined as, “Some; buyers are aggressive.”

Maturity is defined as, “Suppliers are well know; buying patterns are established.” For this criterion, we should also consider the final development stage, Aging, which is defined as “Strong; number of alternatives decreases.” This behavior strongly suggests a mature industry.

### **Ease of Entry**

Entry is difficult in this cluster. Under this criterion the cluster is mature.

### **Technology**

This dimension suggests maturity.

### **Summary**

Seven factors suggest maturity, one suggests the later phases of the growth stage.

### **Strategies**

The generic strategies suggested by the ADL mode for a mature industry are:<sup>79</sup>

Firm Position	Market Share Thrust	Investment	Profitability + C/F
Dominant	Hold position, Grow with industry	Reinvest as necessary	Profitable, Net cash producer
Strong	Hold position, Grow with industry	Reinvest as necessary	Profitable, Net cash producer
Favorable	Custodial or maintenance, Find niche and attempt to protect it	Minimum and/or selective reinvestment	Profitable, Net cash producer
Tenable	Find niche and hang on, or Phased withdrawal	Minimum reinvestment or disinvest	Minimally profitable, Cash flow balance

Weak	Turnaround, or Phased withdrawal	Invest selectively, or disinvest	Unprofitable, Possibly net cash borrower or net cash producer
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Once again, the position of the leaders will improve. Those firms which are not leaders must seek to carve out defensible niches, pursue partnership with the leaders or seek to be acquired.

## **INF – Infrastructure and Management**

### **Components**

This cluster consists of application and database servers, storage management, middleware, e-business tools, wireless access and operating systems. Cluster revenues are \$65 Billion. As the following analysis shows, this cluster is insufficiently similar, and a more granular segmentation is required for effective analysis.

<b>Figure 32: INF Cluster Components</b>					
<b>Cluster</b>	<b>Company</b>	<b>Software / Services Revenue (\$Million)</b>	<b>Software / Services Revenue Growth</b>	<b>Employees</b>	<b>Software 500 Category</b>
INF	Oracle Corp.	\$ 9,673	0.13	42006	Database
INF	Sybase, Inc.	\$ 830	0.14	3868	Database
INF	Progress Software Corporation	\$ 138	0.16	1291	Database
INF	FileMaker, Inc.	\$ 85	0.18	250	Database
INF	Embarcadero Technologies, Inc.	\$ 49	0.3	290	Database
INF	DataDirect Technologies	\$ 44	0.15	200	Database
INF	Pervasive Software	\$ 38	0.19	154	Database
INF	Bakbone Software Incorporated	\$ 10	0	0	Database
INF	Alterian PLC	\$ 7	0	127	Database
INF	Quaero Corp	\$ 5	0.01	32	Database
INF	Software AG, Inc.	\$ 555	0	3013	E-Business
INF	Macromedia	\$ 330	0.29	1101	E-Business
INF	Ariba	\$ 230	0.28	836	E-Business
INF	BroadVision Inc.	\$ 116	0.36	449	E-Business
INF	Commerce One Inc.	\$ 106	0	779	E-Business
INF	SBI and Company	\$ 88	0	753	E-Business
INF	Idea Integration	\$ 85	0	510	E-Business
					Applications/Services/Tools

INF	Digital River, Inc.	\$ 78	0.15	477	E-Business Applications/Services/Tools
INF	Intershop Communications	\$ 75	0.2	479	E-Business Applications/Services/Tools
INF	Apar Infotech Corporation	\$ 52	0.02	1100	E-Business Applications/Services/Tools
INF	LANSA	\$ 27	0.2	215	E-Business Applications/Services/Tools
INF	CyberSource Corporation	\$ 8	0.29	167	E-Business Applications/Services/Tools
INF	EXTOL International, Inc.	\$ 8	0.22	58	E-Business Applications/Services/Tools
INF	Opera Software ASA	\$ 7	0	125	E-Business Applications/Services/Tools
INF	eMeta Corporation	\$ 5	0.27	36	E-Business Applications/Services/Tools
INF	DataCert, Inc.	\$ 5	0.51	65	E-Business Applications/Services/Tools
INF	AgilQuest Corporation	\$ 3	0.26	14	E-Business Applications/Services/Tools
INF	Microsoft – other	\$ 19,136	0	50621	Operating Systems
INF	Sun Microsystems Inc.	\$ 3,999	0	0	Operating Systems
INF	Apple Computer Inc.	\$ 1,206	0	10211	Operating Systems
INF	CSG Systems	\$ 611	0.12	2785	Operating Systems
INF	Wind River Systems	\$ 249	0.3	1507	Operating Systems
INF	Phoenix Technologies, Inc.	\$ 93	0.3	500	Operating Systems
INF	Red Hat, Inc.	\$ 91	0.25	575	Operating Systems
INF	The SCO Group, Inc.	\$ 62	0.28	400	Operating Systems
INF	BSquare Corporation	\$ 38	0.45	204	Operating Systems
INF	Versata, Inc.	\$ 20	0	120	Operating Systems
INF	VA Software Corporation	\$ 17	0	0	Operating Systems
INF	Touchstone Software Corporation	\$ 2	0	17	Operating Systems
INF	EMC Corporation	\$ 2,312	0.14	17400	Storage Management
INF	Legato Systems Inc.	\$ 262	0.26	1577	Storage Management
INF	Bradmark Technologies, Inc.	\$ 13	0.3	50	Storage Management
INF	FalconStor Software	\$ 11	0	138	Storage Management
INF	Columbia Data Products, Inc.	\$ 9	0	0	Storage Management
INF	Luminex Software, Inc.	\$ 4	0.21	41	Storage Management
INF	IBM Corp. -	\$ 14,256	0.06	315889	Middleware/Application

INF	Software Hitachi, Ltd.	\$ 8,208	0.46	339572	Server/Web Server Middleware/Application Server/Web Server
INF	BEA Systems Inc.	\$ 934	0.14	0	Middleware/Application Server/Web Server
INF	Transaction Systems Architects, Inc.	\$ 199	0.12	1500	Middleware/Application Server/Web Server
INF	IONA Technologies PLC	\$ 123	0.3	628	Middleware/Application Server/Web Server
INF	Captaris, Inc.	\$ 95	0	450	Middleware/Application Server/Web Server
INF	PassGo Technologies	\$ 12	0.25	46	Middleware/Application Server/Web Server
INF	OpenLink Software, Inc.	\$ 3	0.4	68	Middleware/Application Server/Web Server
INF	QUALCOMM Inc.	\$ 608	0	0	Wireless/Mobile
INF	Openwave Systems	\$ 291	0.42	1400	Wireless/Mobile
INF	Telecommunication Systems Inc.	\$ 27	0.18	480	Wireless/Mobile
INF	Extended Systems Incorporated	\$ 24	0	221	Wireless/Mobile
INF	Pumatech, Inc.	\$ 21	0.4	91	Wireless/Mobile
INF	Parthus Ceva	\$ 15	0.4	0	Wireless/Mobile

## Market Growth Rate

This cluster needs further segmentation for effective analysis. Estimates for annual growth in the Operating Systems segment vary from 0 – 5%<sup>80</sup> to 15%<sup>81</sup>, making any assessment difficult. Regardless of the actual growth rate, Microsoft has 90% share, and will have difficulty growing more. Linux may increase its share of the server segment, which will further slow the growth in this segment. Estimates for database sales are more consistent, between -1.5% to +2%<sup>82</sup>. Storage Management appears more promising, with growth expected in the 20% range<sup>83</sup>, which is also likely for Application Middleware and some segments of E-Business tools. The wireless segment is too diverse to predict. Thus, components of this cluster are in growth and others are in mature stages.

## **Industry Potential**

The growth stage is defined as, “Substantially exceeds the industry volume, but is subject to unforeseen developments .” Maturity is defined as, “Well-known; primary markets approach saturation industry volume.” Thus, components of this cluster are in growth and others are in mature stages.

## **Breadth of Product Lines**

The growth stage is defined as, “Rapid proliferation as product lines are extended.” Maturity is defined as, “Product turnover, but little or no change in breadth.” Thus, components of this cluster are in growth and others are in mature stages.

## **Number of Competitors**

The growth stage is defined as, “Increasing to peak; followed by shake-out and consolidation.” Maturity is defined as, “Stable.” Most of the cluster is undergoing a shake-out and consolidation, thus suggesting it is in the latter part of the growth stage.

## **Market Share Stability**

The growth stage is defined as, “A few firms have major shares; rankings can change, but those with minor shares are unlikely to gain major shares.” Maturity is defined as, “Firms with major shares are entrenched.” Thus, components of this cluster are in growth and others are in mature stages.

## **Purchasing Patterns**

The growth stage is defined as, “Some; buyers are aggressive.” Maturity is defined as, “Suppliers are well know; buying patterns are established.” For this criterion, we should also consider the final development stage, Aging, which is defined as “Strong; number of alternatives decreases.” This behavior strongly suggests a mature industry.

## **Ease of Entry**

The growth stage is defined as, “Usually easy, the presence of competitors is offset by vigorous growth.” Maturity is defined as, “Difficult; competitors are entrenched and growth is slowing.” This suggests the cluster as a whole is mature.

## **Technology**

The growth stage is defined as, “Product line refinement and extension.” Maturity is defined as, “Process and materials refinement; new product line development to renew growth.” Thus, components of this cluster are in growth and others are in mature stages.

## **Summary**

This cluster must be further segmented to perform useful analysis. Some clusters are growth and others are mature.

## **Strategies**

The generic strategy matrices for growth and mature industries apply to this cluster, depending on the segment being considered.



## MGT – Management and Security Software

### Components

This cluster consists of network, software and IT infrastructure management tools and security applications. Total cluster revenues are \$15.3 Billion.

Cluster	Company	Software / Services Revenue (\$Million)	Software / Services Revenue Growth	Employees	Software 500 Category
MGT	Peregrine Systems, Inc.	\$ 191	-0.089	704	Asset/Technology Management
MGT	MRO Software, Inc.	\$ 169	-0.111	975	Asset/Technology Management
MGT	Indus International Inc.	\$ 117	-0.334	650	Asset/Technology Management
MGT	Datastream Systems, Inc.	\$ 90	0.005	703	Asset/Technology Management
MGT	Altiris, Inc.	\$ 63	0.825	424	Asset/Technology Management
MGT	Marimba, Inc.	\$ 35	-0.2	175	Asset/Technology Management
MGT	RightNow Technologies, Inc.	\$ 20	-0.048	260	Asset/Technology Management
MGT	Tangram Enterprise Solutions, Inc.	\$ 12	-0.258	57	Asset/Technology Management
MGT	Vision Solutions	\$ 30	0.18	167	Disaster Recovery
MGT	UltraBac Software	\$ 5	0.051	35	Disaster Recovery
MGT	CYA Technologies, Inc	\$ 3	0.202	53	Disaster Recovery
MGT	Computer Associates International Inc	\$ 2,964	-0.294	16000	Infrastructure/Network Management/Performance
MGT	VeriSign, Inc.	\$ 1,222	0.302	3100	Infrastructure/Network Management/Performance
MGT	Novell, Inc.	\$ 992	-0.025	6227	Infrastructure/Network Management/Performance
MGT	BMC Software	\$ 713	-0.271	6423	Infrastructure/Network Management/Performance
MGT	Citrix Systems, Inc.	\$ 513	-0.07	1700	Infrastructure/Network Management/Performance

MGT	Mercury Interactive	\$ 400	0.108	1822	Infrastructure/Network Management/Performance
MGT	NetIQ Corp.	\$ 308	0.374	1526	Infrastructure/Network Management/Performance
MGT	Candle Corporation	\$ 271	-0.153	1193	Infrastructure/Network Management/Performance
MGT	Quest Software	\$ 258	0.048	1813	Infrastructure/Network Management/Performance
MGT	Akamai Technologies Inc.	\$ 145	-0.106	567	Infrastructure/Network Management/Performance
MGT	Micromuse	\$ 125	-0.386	600	Infrastructure/Network Management/Performance
MGT	F5 Networks	\$ 108	0.008	0	Infrastructure/Network Management/Performance
MGT	Concord Communications	\$ 94	0.067	454	Infrastructure/Network Management/Performance
MGT	MetaSolv Software, Inc.	\$ 91	-0.233	655	Infrastructure/Network Management/Performance
MGT	Critical Path	\$ 87	-0.164	420	Infrastructure/Network Management/Performance
MGT	Macro 4, Inc.	\$ 64	-0.163	349	Infrastructure/Network Management/Performance
MGT	Novadigm Inc.	\$ 63	0.24	302	Infrastructure/Network Management/Performance
MGT	Secure Computing Corporation	\$ 62	0.281	348	Infrastructure/Network Management/Performance
MGT	Opnet Technologies, Inc.	\$ 45	0.359	0	Infrastructure/Network Management/Performance
MGT	Platform Computing Inc.	\$ 44	-0.038	296	Infrastructure/Network Management/Performance
MGT	Aprisma Management Technologies	\$ 43	-0.464	190	Infrastructure/Network Management/Performance
MGT	SMARTS (System Management ARTS, Inc.)	\$ 41	0.801	200	Infrastructure/Network Management/Performance
MGT	Keynote Systems	\$ 38	-0.169	227	Infrastructure/Network Management/Performance
MGT	ON Technology	\$ 33	0.494	184	Infrastructure/Network Management/Performance
MGT	NetScout Systems, Inc.	\$ 30	-0.029	354	Infrastructure/Network Management/Performance
MGT	InfoVISTA SA	\$ 29	0.234	227	Infrastructure/Network Management/Performance
MGT	TeamQuest Corporation	\$ 19	0.05	112	Infrastructure/Network Management/Performance
MGT	Tarantella, Inc.	\$ 16	-0.64	120	Infrastructure/Network Management/Performance
MGT	Heroix	\$ 11	-0.096	101	Infrastructure/Network

	Corporation				Management/Performance
MGT	NetPro	\$ 10	0.204	55	Infrastructure/Network
	Computing Inc.				Management/Performance
MGT	ILC	\$ 5	0.94	45	Infrastructure/Network
					Management/Performance
MGT	IntelliReach	\$ 4	0.984	41	Infrastructure/Network
	Corporation				Management/Performance
MGT	VFA, Inc	\$ 2	0.428	85	Infrastructure/Network
					Management/Performance
MGT	Symantec Corp	\$ 1,328	0.313	4205	Security Tools/Systems
MGT	Network	\$ 942	0.129	3758	Security Tools/Systems
	Associates				
MGT	Gemplus	\$ 827	-0.093	0	Security Tools/Systems
	International SA				
MGT	Raytheon Co.	\$ 670	-0.111	76400	Security Tools/Systems
MGT	Check Point	\$ 427	-0.191	1203	Security Tools/Systems
	Software				
	Technologies				
MGT	Trend Micro	\$ 362	0.031	1837	Security Tools/Systems
MGT	Internet Security	\$ 243	0.088	1215	Security Tools/Systems
	Systems Inc.				
MGT	RSA Security	\$ 232	-0.179	1218	Security Tools/Systems
MGT	Entrust Inc	\$ 103	-0.129	705	Security Tools/Systems
MGT	BindView	\$ 67	-0.055	525	Security Tools/Systems
	Corporation				
MGT	Netegrity	\$ 66	-0.216	341	Security Tools/Systems
MGT	SurfControl	\$ 64	0.391	400	Security Tools/Systems
MGT	Sophos, Inc.	\$ 50	0	0	Security Tools/Systems
MGT	Aladdin	\$ 50	0.062	354	Security Tools/Systems
	Knowledge				
	Systems Ltd.				
MGT	Rainbow	\$ 49	-0.087	472	Security Tools/Systems
	Technologies				
MGT	Baltimore	\$ 49	-0.525	507	Security Tools/Systems
	Technology				
MGT	F-Secure	\$ 40	0.092	306	Security Tools/Systems
	Corporation				
MGT	NetScreen	\$ 36	0.601	493	Security Tools/Systems
MGT	Sybari Software	\$ 29	0.532	200	Security Tools/Systems
MGT	ActivCard Corp	\$ 27	0.779	297	Security Tools/Systems
MGT	Tumbleweed	\$ 26	-0.121	133	Security Tools/Systems
	Communications				
MGT	CyberGuard	\$ 22	-0.086	0	Security Tools/Systems
	Corporation				
MGT	ImageWare	\$ 18	0.123	130	Security Tools/Systems
	Systems, Inc.				
MGT	OpenNetwork	\$ 13	0.3	0	Security Tools/Systems
	Technologies				
	Inc.				
MGT	SafeNet, Inc.	\$ 11	0.582	140	Security Tools/Systems
MGT	Symark	\$ 10	0.155	50	Security Tools/Systems
MGT	Guidance	\$ 9	0.232	100	Security Tools/Systems

	Software					
MGT	Proginet Corp.	\$	7	0.179	48	Security Tools/Systems
MGT	V-One Corporation	\$	5	0.404	31	Security Tools/Systems
MGT	VanDyke Software, Inc.	\$	5	0	27	Security Tools/Systems
MGT	Citadel Security Software Inc.	\$	1	1.16	38	Security Tools/Systems
MGT	Diversinet Corp.	\$	1	-0.125	66	Security Tools/Systems

### **Market Growth Rate**

This is a growing market. Demand for security is strong, as is demand for tools to better manage IT infrastructure. This cluster is clearly in the growth stage.

### **Industry Potential**

The growth stage is defined as, “Substantially exceeds the industry volume, but is subject to unforeseen developments .” This cluster is in the growth stage.

### **Breadth of Product Lines**

This cluster is in the growth stage.

### **Number of Competitors**

The growth stage is defined as, “Increasing to peak; followed by shake-out and consolidation.” The cluster is in the growth stage.

### **Market Share Stability**

The growth stage is defined as, “A few firms have major shares; rankings can change, but those with minor shares are unlikely to gain major shares.” This suggests the cluster is growth stage.

## Purchasing Patterns

The growth stage is defined as, “Some; buyers are aggressive.” Buyers are aggressive, but security, especially, is confusing to customers, giving vendors leverage. This behavior strongly suggests a growth cluster.

## Ease of Entry

The growth stage is defined as, “Usually easy, the presence of competitors is offset by vigorous growth.” Innovations appear on the market regularly; the cluster is growing.

## Technology

The cluster is experiencing, “Product line refinement and extension.” suggesting growth.

## Summary

This is clearly a growth cluster.

## Strategies

The generic strategies suggested by the ADL mode for a growth industry are:<sup>84</sup>

Firm Position	Market Share Thrust	Investment	Profitability + C/F
Dominant	Hold position, Hold share	Invest to sustain growth rate and preempt new competitors	Profitable, Probably net cash producer
Strong	Attempt to improve position, Push for share	Invest to increase growth rate and improve position	Probably profitable, Probably net cash borrower
Favorable	Attempt to improve position, Selective push for share	Selective investment to improve position	Marginally profitable, Net cash borrower
Tenable	Find niche and	Selective investment	Unprofitable, Net

	protect it		cash borrower or C/F balance
Weak	Turnaround, or Abandon	Invest, or divest	Unprofitable, Net cash borrower or C/F balance

In the management sector, there are strong firms approaching dominance: Computer Associates, HP and IBM. There are also many favorable firms, concentrating on niches. However, consolidation is inevitable and over time, the defensibility of the niches is in doubt. The move to new technologies, such as blade computing and web services, will create opportunities for new entrants, who should focus on a niche and plan on being acquired.

In the security sector, there are no dominant firms, but many strong and favorable firms. There is ample opportunity for new entrants, because the market still desires best of breed products rather than comprehensive suites.

## ***SPT – Search Engines and Portals***

### **Components**

This cluster is a catch-all of information search services and tools. It is dominated by Yahoo. Total cluster revenue is \$402 Million. Yahoo is a public portal run as a service, but other companies in this category are products sold for portal development. For some reason, MSN and Google were not included in the Software Magazine list.

<b>Figure 34: SPT Cluster Components</b>					
<b>Cluster</b>	<b>Company</b>	<b>Software / Services Revenue (\$Million)</b>	<b>Software / Services Revenue Growth</b>	<b>Employees</b>	<b>Software 500 Category</b>
SPT	Yahoo! Inc.	\$ 208	0.317	3600	Search/Portal Tools
SPT	Plumtree Software Inc.	\$ 83	0.034	294	Search/Portal Tools
SPT	Autonomy Corporation	\$ 51	-0.031	211	Search/Portal Tools
SPT	Convera	\$ 24	-0.29	215	Search/Portal Tools
SPT	eGain Communications Corp.	\$ 20	-0.469	350	Search/Portal Tools
SPT	Inxight Software, Inc.	\$ 12	-0.04	100	Search/Portal Tools
SPT	ISYS Search Software	\$ 5	0.013	28	Search/Portal Tools

### **Market Growth Rate**

Analysts predict Yahoo's businesses will grow substantially in excess of GDP<sup>85</sup>, and with the potential of acceleration. This suggests a cluster in the embryonic stage.

## **Industry Potential**

The embryonic stage is defined as, “Usually difficult to determine.” The growth stage is defined as, “Substantially exceeds the industry volume, but is subject to unforeseen developments .” The potential can be reasonably estimated, albeit with a high risk of error, suggesting the cluster has moved into the growth stage.

## **Breadth of Product Lines**

The embryonic stage is defined as “Basic product line established.” The growth stage is defined as, “Rapid proliferation as product lines are extended.” Maturity is defined as, “Product turnover, but little or no change in breadth.” Product lines are being extended rapidly, suggesting the growth stage.

## **Number of Competitors**

The embryonic stage is characterized by, “Increasingly rapid.” The growth stage is defined as, “Increasing to peak; followed by shake-out and consolidation.” Maturity is defined as, “Stable.” New entrants are still possible, but the leaders have been established, suggesting the growth stage.

## **Market Share Stability**

The growth stage is defined as, “A few firms have major shares; rankings can change, but those with minor shares are unlikely to gain major shares.” Maturity is defined as, “Firms with major shares are entrenched.” This suggests the growth stage.



## Purchasing Patterns

The growth stage is defined as, “Some; buyers are aggressive.” Maturity is defined as, “Suppliers are well know; buying patterns are established.” This behavior suggests a growth or mature cluster.

## Ease of Entry

The growth stage is defined as, “Usually easy, the presence of competitors is offset by vigorous growth.” Maturity is defined as, “Difficult; competitors are entrenched and growth is slowing.” Entry is difficult, suggesting maturity.

## Technology

The growth stage is defined as, “Product line refinement and extension,” suggesting growth.

## Summary

This cluster, as defined by Yahoo, is in the growth phase.

## Strategies

The generic strategies suggested by the ADL mode for a growth industry are:<sup>86</sup>

Firm Position	Market Share Thrust	Investment	Profitability + C/F
Dominant	Hold position, Hold share	Invest to sustain growth rate and preempt new competitors	Profitable, Probably net cash producer

Strong	Attempt to improve position, Push for share	Invest to increase growth rate and improve position	Probably profitable, Probably net cash borrower
Favorable	Attempt to improve position, Selective push for share	Selective investment to improve position	Marginally profitable, Net cash borrower
Tenable	Find niche and protect it	Selective investment	Unprofitable, Net cash borrower or C/F balance
Weak	Turnaround, or Abandon	Invest, or divest	Unprofitable, Net cash borrower or C/F balance

## SVC – Services

### Components

These are firms whose primary business is the provision of services. Cluster revenues are \$149 Billion.

<b>Figure 35: SVC Cluster Components</b>					
<b>Cluster</b>	<b>Company</b>	<b>Software / Services Revenue (\$Million)</b>	<b>Software / Services Revenue Growth</b>	<b>Employees</b>	<b>Software 500 Category</b>
SVC	Fiserv, Inc.	\$ 2,569	0.359	19000	Application Service Provider/Managed SP
SVC	CCC Information Services	\$ 185	0.041	834	Application Service Provider/Managed SP
SVC	iBasis Inc.	\$ 165	0.232	209	Application Service Provider/Managed SP
SVC	Inforonics	\$ 22	-0.197	120	Application Service Provider/Managed SP
SVC	LD I ASSOCIATS S.A. DE C.V.	\$ 5	0.211	37	Application Service Provider/Managed SP
SVC	Valiant	\$ 4	0.464	41	Application Service Provider/Managed SP
SVC	WebSurveyor Corp.	\$ 3	1.04	26	Application Service Provider/Managed SP
SVC	EDS	\$ 21,502	0.017	137000	IT Sourcing
SVC	Perot Systems Corporation	\$ 1,332	0.106	10000	IT Sourcing
SVC	Keane, Inc.	\$ 873	0.121	7331	IT Sourcing
SVC	Collaborative Consulting	\$ 16	0.395	113	IT Sourcing
SVC	Prelude Systems, Inc.	\$ 1	0.107	30	IT Sourcing
SVC	Sanchez Computer Associates Inc.	\$ 74	-0.063	620	Legacy System Renewal/Integration
SVC	DataMirror	\$ 40	0.093	276	Legacy System Renewal/Integration
SVC	Quovadx, Inc.	\$ 34	-0.016	455	Legacy System Renewal/Integration
SVC	SEAGULL	\$ 28	-0.048	190	Legacy System Renewal/Integration
SVC	Jacada Inc.	\$ 21	-0.16	156	Legacy System Renewal/Integration
SVC	IBM Corp. - Services	\$ 42,768	0.032	315889	System Integration Services

SVC	Lockheed Martin	\$ 12,757	0.108	125000	System Integration Services
SVC	Accenture Ltd.	\$ 11,574	0.011	75000	System Integration Services
SVC	Computer Sciences Corp.	\$ 11,426	0.086	67000	System Integration Services
SVC	Hewlett-Packard Co.	\$ 10,186	0.251	141000	System Integration Services
SVC	Cap Gemini Ernst & Young	\$ 7,389	-0.163	52683	System Integration Services
SVC	NTT Data Corp.	\$ 6,041	-0.246	7550	System Integration Services
SVC	Unisys Corp.	\$ 4,285	-0.075	36400	System Integration Services
SVC	Atos Origin	\$ 3,189	0.185	28602	System Integration Services
SVC	Affiliated Computer Services Inc.	\$ 3,063	0.484	40000	System Integration Services
SVC	CSK Corporation	\$ 2,512	-0.059	4743	System Integration Services
SVC	Level 3 Communications, Inc.	\$ 1,920	1.02	0	System Integration Services
SVC	LogicaCMG plc	\$ 1,689	0.054	23097	System Integration Services
SVC	Wipro Ltd	\$ 626	0.11	0	System Integration Services
SVC	Infosys Technologies Ltd	\$ 545	0.317	0	System Integration Services
SVC	Anteon Corporation	\$ 470	0.153	5799	System Integration Services
SVC	Computer Horizons Corp.	\$ 297	-0.259	3000	System Integration Services
SVC	Cognizant Technology Solutions Corp.	\$ 229	0.289	6165	System Integration Services
SVC	Sapient Corp.	\$ 174	-0.473	1491	System Integration Services
SVC	OAO Technology Solutions Inc.	\$ 167	0.025	2500	System Integration Services
SVC	Integic Corporation	\$ 97	0.078	600	System Integration Services
SVC	Kanbay Incorporated	\$ 83	0.193	1457	System Integration Services
SVC	Icon Medialab International AB	\$ 75	-0.335	956	System Integration Services
SVC	Clarkston Consulting	\$ 39	-0.255	205	System Integration Services
SVC	ePresence	\$ 32	-0.38	161	System Integration Services
SVC	Changepoint Corporation	\$ 20	0.062	185	System Integration Services

SVC	Edgewater Technology, Inc.	\$	19	-0.298	149	System Integration Services
SVC	netNumina	\$	17	-0.146	90	System Integration Services
SVC	Interlink Group, LLC	\$	13	-0.555	106	System Integration Services
SVC	Pinnacle Decision Systems, Inc.	\$	3	-0.014	22	System Integration Services
SVC	SeaChange International	\$	134	0.153	450	Telecommunications Services
SVC	Aether Systems, Inc	\$	94	0.16	542	Telecommunications Services
SVC	IntelliNet technologies ,Inc.	\$	4	-0.256	28	Telecommunications Services

### Market Growth Rate

The growth stage is defined as, “Faster than GNP, but constant or decelerating.”

Maturity is defined as, “equal to or slower than GNP, cyclical.” The services cluster faces pricing pressure, primarily due to the availability of low-cost offshore consultants<sup>87</sup>.

Furthermore, the rise of the large services firms increases the frequency of bundling, which reduces effective prices. The result is declining, or at best, slowly rising demand.

These factors do not seem cyclical. Therefore, by this criteria, the cluster is in the mature stage.

### Industry Potential

The growth stage is defined as, “Substantially exceeds the industry volume, but is subject to unforeseen developments .” Maturity is defined as, “Well-known; primary markets approach saturation industry volume.” Since the primary markets are approaching saturation, the cluster appears to be in the mature stage.

## **Breadth of Product Lines**

The growth stage is defined as, “Rapid proliferation as product lines are extended.”

Maturity is defined as, “Product turnover, but little or no change in breadth.” Product lines are expanding, with moves into areas such as business process outsourcing. This suggests the growth stage.

## **Number of Competitors**

The growth stage is defined as, “Increasing to peak; followed by shake-out and consolidation.” Maturity is defined as, “Stable.” The industry is undergoing a shake-out and consolidation, thus suggesting it is in the latter part of the growth stage.

## **Market Share Stability**

The growth stage is defined as, “A few firms have major shares; rankings can change, but those with minor shares are unlikely to gain major shares.” Maturity is defined as, “Firms with major shares are entrenched.” The barriers to entry to the top of the market are strong, and most major firms are indeed entrenched. This suggests the mature stage.

## **Purchasing Patterns**

The growth stage is defined as, “Some; buyers are aggressive.” Maturity is defined as, “Suppliers are well know; buying patterns are established.” Buyers are effectively using offshore alternatives to negotiate lower prices. This behavior strongly suggests a mature cluster.

## Ease of Entry

The growth stage is defined as, “Usually easy, the presence of competitors is offset by vigorous growth.” Maturity is defined as, “Difficult; competitors are entrenched and growth is slowing.” The cluster is mature.

## Technology

The growth stage is defined as, “Product line refinement and extension.” Maturity is defined as, “Process and materials refinement; new product line development to renew growth.” This suggests maturity.

## Summary

The services cluster is mature.

## Strategies

The generic strategies suggested by the ADL mode for a mature industry are:<sup>88</sup>

Firm Position	Market Share Thrust	Investment	Profitability + C/F
Dominant	Hold position, Grow with industry	Reinvest as necessary	Profitable, Net cash producer
Strong	Hold position, Grow with industry	Reinvest as necessary	Profitable, Net cash producer
Favorable	Custodial or maintenance, Find niche and attempt to protect it	Minimum and/or selective reinvestment	Profitable, Net cash producer
Tenable	Find niche and hang on, or Phased withdrawal	Minimum reinvestment or disinvest	Minimally profitable, Cash flow balance
Weak	Turnaround, or Phased withdrawal	Invest selectively, or disinvest	Unprofitable, Possibly net cash borrower or net cash producer

## ***Conclusions – Granular Analysis***

As noted earlier, this granular analysis is necessarily cursory. Nonetheless, it provides a useful view into the vast differences between clusters. While the industry as a whole is clearly maturing, some clusters, for example Management and Security Software, still present lucrative growth opportunities for incumbents and new entrants. Understanding the granular dynamics of a cluster is an essential step in the development of appropriate business and corporate strategies.

Pure play firms – those which participate in only one cluster – face a reasonably straightforward process of assessing the alignment of their strategy with the development stage of their sector. The challenge for these firms is finding ways to defend their niches from encroachment by larger firms. But the process is significantly more complicated for diversified firms whose businesses span clusters, because parts of their business may be mature or aging, while other business lines are early stage or growing. These firms are well served by the use of traditional corporate strategic frameworks, with an emphasis on product and technology portfolio management.



## Conclusions

The industry is undergoing profound changes. Competition will further intensify as firms concentrate their attention on a smaller set of growth opportunities. This demands managers consider new strategies and tactics than those which served them well in the past.

High-technology industries have historically been known for their nimble management, characterized by executives adept at anticipating, generating and thriving on rapid disruptive technological shifts. With the maturation of the software industry, companies must accommodate the demands of slow or no growth businesses while maintaining a culture which is sufficiently proactive and agile to continue effective innovation. Such balance is essential, because growth opportunities still exist and those firms which identify, invest in and manage them correctly will continue to thrive.

Executives must focus greater attention on effectively balancing deliberate and emergent strategies. As a company's growth slows, it risks developing structures which emphasize deliberate strategy development and ignore the importance of emergent strategies. This retards the firm's ability to capitalize on new opportunities and cedes initiative to competitors. On the other hand, failure to establish a deliberate strategy in a stable business hinders achievement of the efficiencies necessary for profitability. Successful managers must understand which process should be dominant in particular circumstances .

The industry must also address the changing role of technical innovation. In the industry today, most innovation has decreasing marginal utility. To cope with this, executives must emphasize development of competencies which increase customer bonding<sup>89</sup>, because now more than ever, innovation must be concentrated on areas of significant value delivery for vendor and customer alike. Bonding focuses innovation, provides vital intelligence, and yields lasting competitive advantages.

Industry maturation does not mean the end of growth nor successful new entrants. Executives and entrepreneurs can find ample encouragement from experiences in other industries. Examples such as Southwest Airlines and FedEx show that even the most mature markets are susceptible to the power of disruptive innovation. And however mature the software industry has become, it is not as slow as the transportation industry. Its clockspeed and susceptibility to innovations are still greater than most sectors. Entrepreneurs can find ample capital to support new ventures, innovation is adopted rapidly and valued highly in some industry segments, and companies big and small continue to invest a large portion of their revenues on research and development.

Yet industry maturity is a fact that must be faced; it is not, as some authors suggest, merely a state of mind. Above all else, it means declining growth of aggregate demand. Achieving growth in such an environment requires increased focus on managerial excellence, and a willingness to revisit strategies and assumptions. For those executives capable and confident enough to do so, the software industry should lose none of its

luster.

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