Developing Factory-based System Integration Services for a Computer Manufacturer

by

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Bachelor of Science in Computer Engineering, Xian Jiaotong University, 1989

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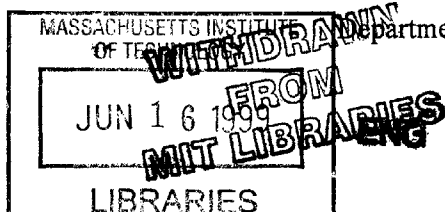**Massachusetts Institute of Technology**
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Abstract

Compaq Computer's Value-added Implementation Services (VIS) offers hardware integration, system testing, and staging services to enterprise customers on customer specific projects. To better serve shareholders, VIS is contemplating increasing and expanding its current service offerings. Traditionally, VIS projects have been mostly customized and positioned around Digital's middle- to high-end hardware platforms. Should VIS continue operating under its current business model? Or, should it develop a new set of businesses such as installation and configuration of prepackaged enterprise solutions? Which of the market segments offer the most promising opportunity? How will VIS set its priorities?

This thesis project will answer these questions and study the target market, role, and operation of factory integration services in a computer hardware company. The outcome of this research is to recommend strategic directions for VIS, and to improve its market development activities. The research involves interviews, sales data analysis, financial, competitive and industry analysis, theoretical readings, and survey of analyst reports. These aspects are summarized and the findings are presented along with recommendations regarding the business and marketing strategy for VIS.

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1 Introduction

The competitive and dynamic nature of the computer industry in the 90's requires corporations serving this market to be nimble and responsive to the marketplace. As a result, corporations have decentralized their decision making process. Many lower level business units now have profit and loss (P&L) responsibilities.

Strategy formulation is critical for the long-term success of a business. Traditionally, business strategies are formulated primarily at the corporate and higher business unit levels. As corporations decentralize, lower level business units carry more and more responsibilities for strategy formulation. However, managers in those positions might not have the resources required to carry out the tasks due to their daily operational responsibilities.

Strategy at the business unit level is different from that at the corporate level. A P&L business unit not only needs to maximize its own profit, but it also has to align its strategy with that of the corporation. In other words, a business unit has to formulate its strategy within the context of the marketplace and the corporation. On the other hand, the scope of the strategy at the business unit level is more focused and therefore limited.

The study was performed during a six-month internship, started in June 1999, with Compaq Computer Corporation's Value-added Implementation Services (VIS) unit in Salem, New Hampshire. My internship was to fill the strategic decision gap for VIS. This thesis analyzes and presents strategies for continuing the growth of VIS.

As a part of its planning process, the VIS management would like to explore business opportunities that VIS needed to pursue in the next three years. How could VIS continue its growth, reaching the revenue goal of $50M at a combined annual growth rate (CAGR) of 38% in three years? Which customer segment would generate the best growth opportunity for VIS? What services should VIS offer? How would its marketing strategy be? In other words, how should VIS align its service offering, the marketing

message, pricing, sales, distribution channels, internal organizations, and relations with software vendors and IT[i] consulting firms with its target market?

The start of my internship coincided with the culmination of Compaq's acquisition of Digital. The management also would like to know how VIS could contribute to the corporate objective of becoming a leading supplier in the enterprise computing market. In light of the organizational restructure in the newly combined Compaq and Digital, what capabilities should VIS develop to support the long-term business objectives of the corporation?

A team of three was formed to facilitate the project. Besides the intern, the team consisted of one person in business development, another in project management and engineering. Periodic team meetings were held to review progress and decide further actions. Milestone review meetings with the management and academic advisors were also conducted for higher level project reporting and decision making.

Chapter 2 describes the VIS business model in detail. This chapter reviews VIS performance and organizational structure. It provides the reader a sense of VIS service offerings, the customer profile and benefits. The chapter concludes by presenting the managerial decision challenges that VIS faces as it continues its growth.

Chapter 3 provides a brief background and current trends of the enterprise computing and computer service market. In addition, it gives an overview of Compaq's offerings in the IT service market.

Chapter 4 discusses the decision frameworks and processes that were utilized in analyzing VIS business opportunities. This chapter intends to summarize strategic decision guidelines for VIS. The frameworks used in this study could be applicable in similar business situations.

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[i] IT - information technology.

Chapter 5 analyzes various business VIS opportunities. It concludes with a set of strategic and implementation recommendations for VIS to ensure its short-term profitability and long-term growth.

Chapter 6 concludes with recommendations of VIS strategy to maximize the benefits of its services for the corporation.

2 Value-added Implementation Services

This chapter looks at VIS and its service offerings in details.

2.1 VIS Business Review

2.1.1 Organizational Structure

At the highest level, Compaq is divided into four major groups: Products, Services, Sales and Marketing, and Manufacturing and Quality. Organizationally, VIS belongs to *Custom*Systems (CSS), which belongs to IndustrySolutions, which in turn belongs to Enterprise Computing Group, one of the Product groups. *Custom*Systems is to custom design and manufacture high-end computer systems to fit customer's unique computing requirements. IndustrySolutions is to develop and deliver IT solutions for Compaq's strategically targeted industries. Enterprise Computing is to deliver products targeting the enterprise computing market. The incentive for the product groups is to sell as many hardware products - boxes - as possible. See Exhibit 1 - Compaq's Organization Chart for the positioning of *Custom*Systems within Compaq.

2.1.2 Business Performance

For the four quarters ended July 1998, VIS had an average headcount of 49, including 43 direct project personnel, and 6 business development and administration personnel. VIS has P&L (Profit and Loss) responsibility to the corporation. The following table highlights VIS FY'98 financial performance[17].

VIS FY'98 Performance	($ 000's)
Net Operating Revenue[i] (NOR)	$ 18,743
Total Service Cost[ii]	8,387
Operating Profit	$ 10,356
Operating Profit Margin	55 %
Average Number of Staff	49
Average Revenue/Person	$ 386
Average Operating Profit/Person	$ 214

Figure 2-1: VIS FY'98 Financial Highlights.

From FY'95 to FY'98, VIS net operating revenue was growing at a CAGR of 24%. According to IDC (International Data Corporation), the system integration market is growing and is expected to grow at a CAGR of 12.4% between 1996 to 2002. VIS has produced an above average growth rate. However, the picture is mixed when compared with Digital's revenue growth in the midrange server market. Digital achieved a CAGR of 38% worldwide, and 12% in the US from FY'95 to FY'97. The comparison is applicable because implementation service revenue should approximately be proportional to the hardware sales revenue. In the VIS/Digital case, since most of the services are targeted at the midrange server market, the comparison with midrange server sales is appropriate.

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[i] Net operating revenue is defined as revenue subtracting such direct project delivery expense as travel expenses, excluding direct labor cost.
[ii] Total Service Cost includes salary and benefits for VIS personnel, rents, equipment cost, and manufacturing operation cost.

The following graph shows the historical VIS financial performance over FY'94-98.

VIS Historical Performance
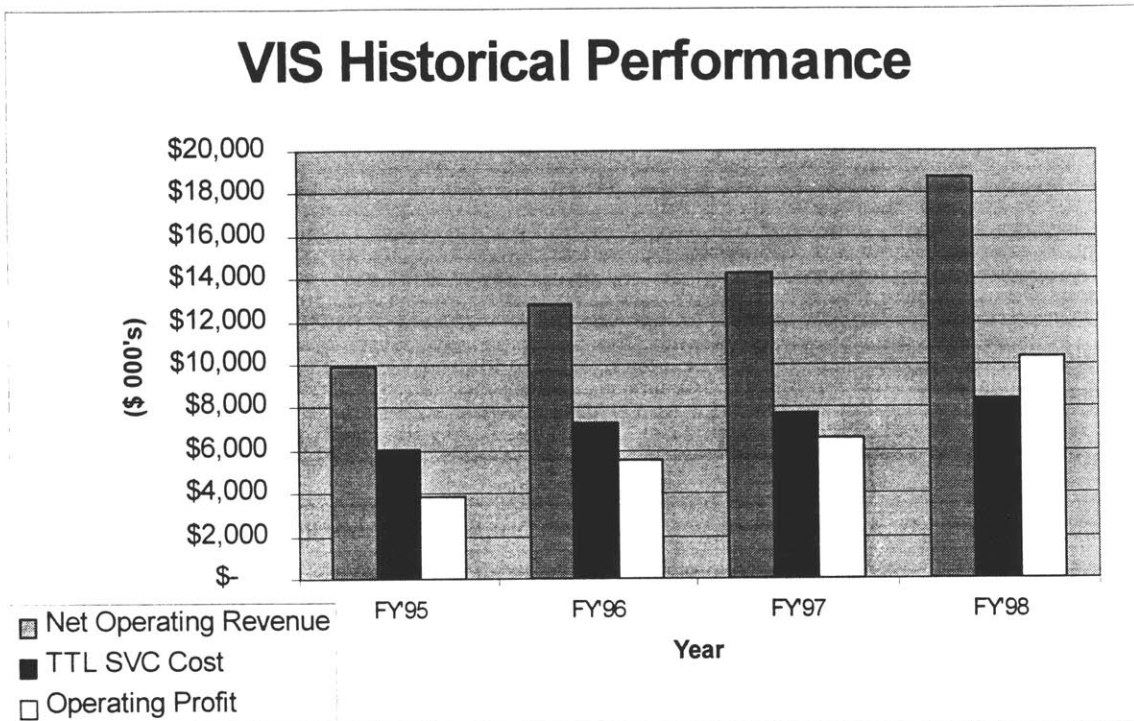
Figure 2-2: VIS Financial Performance, FY'95-98

From FY'95 to FY'98, VIS enjoyed increasing operating margin. In light of concerns about its high service price, VIS might be able to be less aggressive in pursuing operating margin so that it could extend its services to customers that are more price-sensitive. Increased customer satisfaction from the service and the resulting future product and service revenue could pay for the reduction in VIS operating margin.
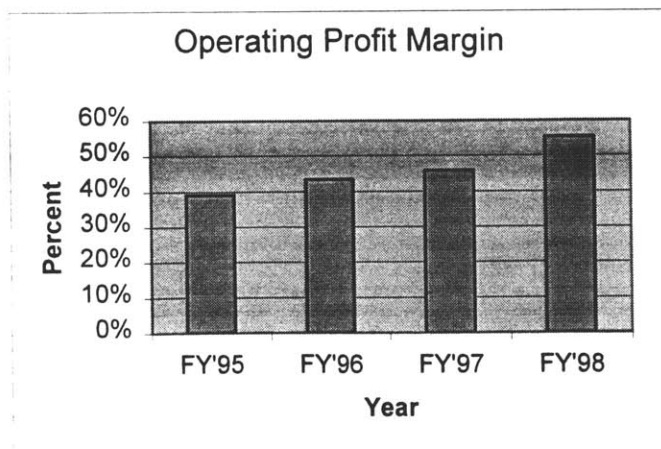
Figure 2-3: VIS Operating Profit Margin, FY'95-98.

2.1.3 Revenue Distribution

VIS revenue comes primarily from on a few large customers. For FY'98, the largest customer contributed 46% of revenue, compared to 37% during FY'97. Many VIS customers are in the telecommunication service industry. Reasons for such concentration include: 1) Computer operation is critical to the customer's business; 2) VIS offers valuable technical expertise and quick customer response; 3) VIS has established good reputation and relation with its existing customers; and 4) The customers have been expanding their computer operations in recent years. The strong presence in the telecom industry may be attributed to similar operating requirements across the industry. On the other hand, VIS needs to recruit new customers to increase its revenue and to diversify its revenue risk.

2.2 VIS Offerings

VIS has its origin from Digital's system manufacturing operation. It was formerly the final assembly and testing operation where systems are tested before they were shipped out. As the market became more competitive, Digital could not afford to offer this service to all of its customers. On the other hand, engineering efforts have made standard off-the-shelf products easier to configure and integrate. As a result, this extra step of testing was eliminated from the volume manufacturing operation.

However, many enterprise customers require custom designed high-end systems to meet their complex computing requirements. Uniquely designed products mandate dedicated testing to ensure their functionality and performance. The widely touted "Plug-and-Play" feature that components built to open-standards integrate seamlessly often does not work in the high-end hardware market. VIS offers the testing, integration and implementation service to handle the complexity and uniqueness of custom-built systems. At the same time, customers pay a premium price for the service. See Exhibit 2 for the positioning of VIS within Compaq's manufacturing services.

2.2.1 Customer Profile

A typical VIS customer needs to utilize the latest technology to gain competitive advantage in its core business. Technology requirements might be so new and unique that no standard product exists to satisfy the needs. The customer turns to various system makers for the best possible solution. The manufacturer designs and implements systems that best fit the customer's unique situation. To achieve the best result, the end product may consist of sub-systems from multiple vendors.

The flip side of leading-edge technological products is the associated risk. The product may not have been fully tested for the customer's environment, or it might not readily integrate with other components in the system. On the other hand, due to the impact of the project, the customer cannot afford much risk. System failure could disrupt customer's mission critical operation and derail its larger business objectives. To mitigate risks, the customer needs to ensure successful operation of the system prior to production level deployment.

2.2.2 Implementation Problems

Once the system is designed and passes preliminary tests, the project enters the implementation phase. However, implementing complex, multi-vendor systems can be difficult. System complexity and uniqueness increase variability in the manufacturing and delivery process. Unforeseen problems occur to delay the project completion. To name a few, mismatched components are shipped, physical parts do not fit the customer's operating environment, incorrect versions of software are installed, all cables are not correctly connected, and components are mis-configured. The problem is aggravated by the need to source and integrate components from multiple vendors.

When those problems occur at the customer site, the disruption could be substantial due to communication difficulties, parts shortages, and shipping and handling delay. Besides, the customer might not possess all the necessary technical and project management

expertise. The task could be especially challenging in the presence of critical business deadlines. The customer has to divert its valuable technical people from their daily jobs to fight the crisis situation. Schedules and, in the worst situation, critical business objectives are missed. In summary, the manufacturer fails to deliver the solution.

2.2.3 VIS Offerings

VIS solves the above problem by offering implementation services, carried out primarily in Digital's central manufacturing facility. Instead of integrating all the system components at the customer site, VIS builds and tests the final system in the factory. The operation is carried out in the same facility as the manufacturing operation. Physical components and software are configured to user specifications. Custom-developed software and user data are loaded. The customer's operating environment is simulated in a controlled laboratory. Production-level data flows through the system. Problems uncovered in the process are quickly solved because of the availability of on-site technical people and the close vicinity of spare components. Once the system is proven to be functioning as specified, VIS produces a detailed setup guide. The system is then disassembled to get it ready for shipping. Cables and components that need to be reconnected at the customer site are clearly marked in accordance to the setup guide.

The majority of computers that VIS delivers belong to Digital's AlphaServer family of products. Those computers are powered by Digital's Alpha-based CPUs and operate under the 64-bit Digital Unix operating system. The systems may be configured as balanced systems, SMP (Symmetric Multi-Processors), clusters, or memory channel clusters. Multi-processor systems offer scalability and greater availability. However, the configuration is more complex than the configuration of single-processor systems.

System deployment at the customer site is expedited as a result of preparations at the manufacturing site. The system is quickly restored to its desired state once it arrives at the customer site. Because of up-front integration and thorough testing, risks associated with the implementation of a new system are greatly reduced. In many cases, the

reassembled system plug-and-plays in the production environment. For example, VIS rolled out a live system for a telecommunication service provider over a 24-hour period between midnight Friday and midnight Saturday. The system came into production the next morning. It would almost be impossible had the integration and testing been initially performed at the customer site. As a comparison, new system implementation in the industry typically takes two to four weeks.

In summary, VIS offers the following services[18] to facilitate the implementation of complex systems:

- Factory Staging and Integration

- Business Critical Installation

- Custom Configuration Documentation

Besides providing implementation services, VIS also acts as the focal point for IT consulting projects of technology planning and solutions testing. The services include Solutions Modeling, Proof of Concept, System Characterization and Optimization, and Application Specific Integrated Systems. Solutions Modeling provides a detailed architectural and design plan for the customer's specific IT requirements. Proof of Concept validates system configuration before implementing a complex solution. System Characterization and Optimization gives the customer a clear understanding of the required configuration for the desired performance. Application Specific Integrated Systems gives the customer a set of turkey packages to fit various usage profiles. *This thesis focuses on the implementation services.*

2.2.4 Customer Benefits

The customers benefit from reduced risk of complexity and increased speed of deployment. Specifically, the service:

- Compresses implementation time

- Minimizes risks and re-work at system deployment
- Reduces implementation costs
- Provides access to critical technical and project management expertise
- Maximizes customer staff productivity

The implementation service is especially valuable for time-critical, complex projects. In such situations, customers are willing to pay a premium for the service. How the service could be extended to more customers remains a question. Obstacles of reaching more customers include the initial service cost to the customer, the delivery time, customer expectations, and the incentive structure of the internal sales force.

2.2.5 Operational Advantages

Completing integration work prior to shipment also offers operational benefits. IT research firm IDC refers this style of integration work as the "Solutions Lab" Concept[19]. In this model, instead of consultants going on site, they work on client engagements off-site in a well-equipped laboratory-like environment. The VIS testing and staging lab is capable of simulating computing environments of a variety of demanding IT operations. For example, the lab supported NASDAQ's trading system, executing over one trillion stock trades over six hours. Advantages of the solutions lab arrangement are the following:

- The same experienced group of people is used for all projects, increasing the learning and expertise of these people. Unexpected events hindering smooth implementation can be solved quickly because of the concentrated talent pool.

- Limited traveling is required for employees because they work in a permanent center. This model is good employee for retention and offers an attractive life-style for those do not wish to travel very much. For customers, it is a lower-cost alternative because project travel expenses are limited.

- A well-equipped laboratory-like environment with tangible pre-built solutions and prototypes helps envisioning and testing. Customers can be shown what is possible in a live setting.

- Missing or dysfunctional components could be quickly replenished or replaced because of close vicinity of the parts inventory.

The operation offers the last chance to catch any system errors before products are shipped to the customer site. For problems that are costly to be solved through product engineering, the service offers a good tradeoff between capital and labor.

This is also a better arrangement than having the work completed by a third-party integrator for the following reasons:

- Components do not have to be shipped to a third-party location, reducing the overall inventory level, handling costs and delivery delays.

- Lessons learned from customer-specific projects could be quickly fed back to product development and manufacturing, enabling the company to produce repeatable, complex systems with off-the-shelf simplicity.

- System engineers from the computer manufacturer are in the best position to solve the most challenging system-level problems. They are more knowledgeable and skillful with the vendor's products.

2.3 Project Context

To identify business opportunities that VIS could successfully pursue, I explored services that VIS was offering or contemplating to offer. It was expected that in the process of examining the offerings and speaking with customers, new service concepts might

surface. This section summarizes the potential directions and competitive offerings identified through the process.

2.3.1 Potential Directions

As the project progressed, several other services came my attention. They were somewhat related to what VIS would be pursing. VIS might bundle its implementation services with any one of those initiatives. They are important to understand the decision making process and the perspective of the project.

2.3.1.1 System Engineering Integration Service

System Engineering (SE) is a core of highly capable engineers who are Digital's experts in hardware, operating systems, networks, and application engineering. They had been utilized to leverage sales of systems for years but were also trying to develop marketable services at the inception of my internship. SE services could be categorized as custom system development. The customer needs to solve a particular problem, yet no standard off-the-shelf product exists. SE evaluates customer requirements, and then architect, design, and implement a solution for the customer. VIS had been partnering with SE in project implementation.

2.3.1.2 CSS Solutions

CSS marketing was developing a set of solutions for running packaged enterprise applications[20]. The solutions would offer enterprise customers a set of pre-tested hardware and software configurations optimized for certain pre-defined usage profiles. VIS would implement the solution for CSS customers by installing and configuring a selected set of packaged software applications.

The goal of this initiative is to facilitate deployment of packaged enterprise applications on Digital's AlphaServer product lines. This is an attempt to catch up with the competition in the midrange server market. Leading IT consulting firm Gartner Group[21] reported: "One of the most frequent client requests we receive regarding Unix and

midrange strategies is for assistance with the selection of an appropriate server platform for running mission-critical applications such as SAP R/3, PeopleSoft, Oracle applications or Baan."

2.3.1.3 *Volume Manufacturing FIS Program*

To ease the task of installing and configuring application software over Digital Unix platforms, Compaq Manufacturing Engineering was exploring opportunities to install and configure software packages on Alpha system volume manufacturing lines. This program is also known as the Factory-Installed-Software (MFG-FIS) program. The FIS program would target the engineering and design community that runs CAD or high-end graphics packages on Alpha workstations.

If the infrastructure of the FIS program would prove to be effective, VIS would be able to have software packages installed at the FIS manufacturing line. That would be a more economical solution than the manual installation process currently used in VIS. Furthermore, the FIS capability would enable Volume Manufacturing to offer value added services to more customers at lower costs.

2.3.2 Competitive Offerings

Dell Computer, a major competitor of Compaq in the PC-based computer market, offers a factory-based server integration service, DellPlus Services[22,23]. This presents a serious threat to Compaq manufacturing services.

To summarize, there are three levels of DellPlus Server Integration services available:

- Order Ready: Dell can bundle popular software applications - including special

    Internet, Exchange and database packages - with PowerEdge servers at customer

    request.

- Quick Set: Dell can provide multiple NIC[i] installations, RAID[ii] setup, special video

  and sound card configurations, and the installation of many other peripherals.

- Extended Set-Up: Dell can provide highly customized integration services for

  customers requiring multi-party integration, pilot systems and advanced engineering

  support throughout the manufacturing and testing process.

DellPlus Extended Set-Up provides similar service to the offerings from VIS and SE, whereas Order Ready is similar to the MFG-FIS program.

Sun Microsystems offers an ERP Integration Service[24] that is similar to the CSS Solution program.

Value-added resellers (VAR) and IT consultants also offer system integration services. VARs such as Avnet[25] and Wyle[26] offer integration and installation services for multiple hardware and software platforms. Services offered directly by computer manufacturers could potentially compete with services from VARs. VIS competes in the middle- to high-end market while VARs operate in the middle- to low-end market. Systems that VIS services are of higher computing performance, storage capacity, network bandwidth, and scalability. The nature of services from VARs and VIS is similar. VARs offer a broader range of services and products from a variety of vendors.

IT consultants such as Anderson Consulting and Ernst & Young specialize in customizing application software to end user's particular business environments. Their focus is application and business process development comparing with VIS' focus of technical platform implementation.

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[i] NIC - Network Interface Card.
[ii] Redundant Array of Independent Disks.

2.3.3   VIS Positioning Relative to Competition

To put the positioning of VIS services in perspective, it helps to compare VIS offerings with other related offerings. The following graph sketches VIS service along volume and complexity. Note that since Dell's product offerings do not compete in the midrange server market, where this research focused, the comparison of volumes is relative in the respective markets. The purpose is to illustrate the relation between volume and complexity only.
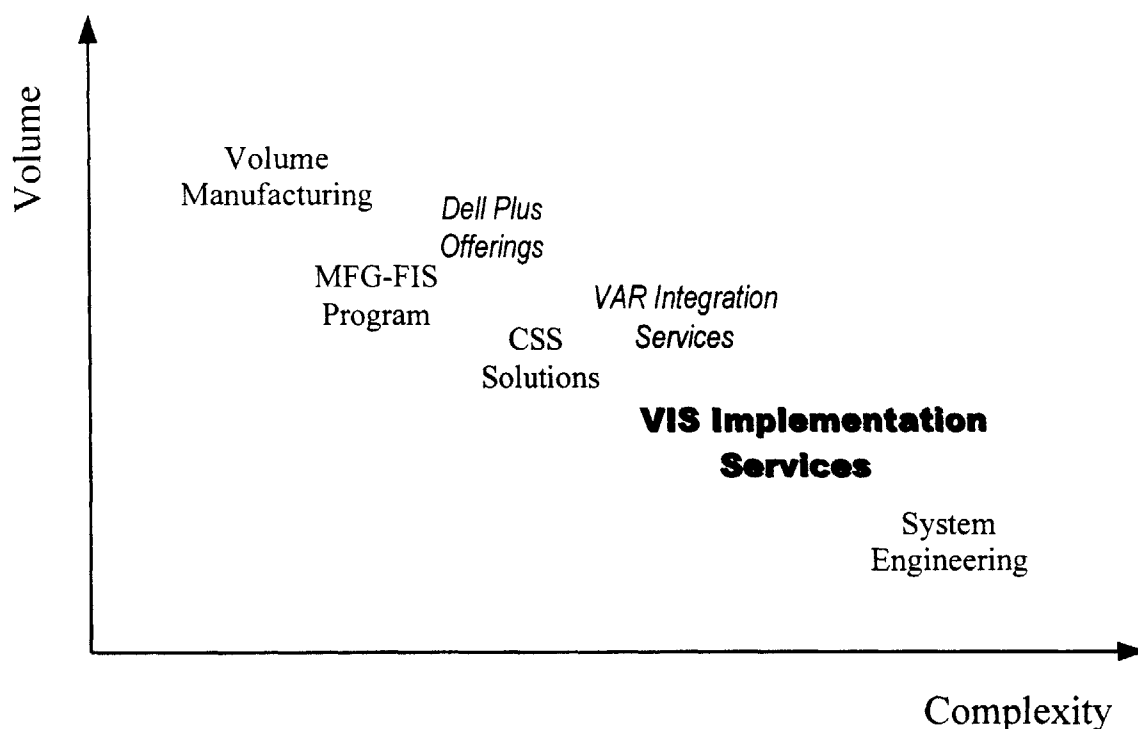
Figure 2-4: Positioning Comparison of Various Service Offerings[i].

2.4 Decision Challenge

In the business world, information could be a treasure or a burden. On one hand, information is the base of sound decision making. On the other hand, managers could be strained by information overload. Various information sources often provide conflicting suggestions. There are more potential opportunities than the organization could manage.

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[i] Competitive offerings shown in *italics*.

Uncertainties in marketplace and technology present challenges in strategic decision-making.

To limit the project to a manageable scale, I focused my efforts on two approaches of revenue growth: selling the same services to new customers and selling new services to the same customers. Services of similar applications and benefits are considered as the same, whereas customers of similar demand profiles are defined as the same. As the project progressed, three strategic directions appeared to be most promising for VIS. They are Implementation Services, Global Multiple-platform Implementation Services, and Packaged Application Solution Services. The project goal was then set to assess those opportunities and to recommend implementation strategies.

How should the management decide which business opportunity to pursue? Where does VIS have the most leverage in the profitability equation (Profit = Price * Quantity - Cost)? How does VIS' profitability goal align with the corporation's interest? Are the best opportunities in existing service offerings or new ones, existing customers or new ones? What new service offerings can VIS pursue? How should VIS set its priorities? What are the characteristics of new customers? How does VIS market its services to new customers? Does it have enough information to perform a thorough analysis of the situation? If not, where could the information be obtained? How should the decision-making process be structured?

Before getting into the details of evaluating various VIS strategic options, the next chapter exams VIS services in the context of the computer industry and Compaq's offerings in the IT service market.

3 Enterprise Computing Market

This chapter gives a brief background of the enterprise computing market and Compaq's positioning in this market.

3.1 Market Environment

The worldwide computer market in 1998 can be segmented in terms of product usage and capacity. At the highest level, the market could be segmented into server, workstation, and PC markets. Exhibit 1 lists the customers, primary use of the products, distribution methods, and price ranges of current market segments. In general, high-end or low-volume products are sold directly, low-end products indirectly, while the middle market is served through a mix of direct and indirect distribution methods.

The business computer market is dominated by a few multinationals, with different market positions in different segments. Exhibit 4 lists the major companies serving those segments, and their relative positions. Not all the major computer companies compete in every segment of the market. While companies such as IBM provide a full product line ranging from PCs to high-end servers, other companies such as Dell choose to serve only a few selected segments.

This research and thesis focus on the enterprise computing segment. This segment is also referred to as the midrange (server) market.

3.2 Enterprise Computing Market

3.2.1 Applications and Products

Businesses, institutions and government agencies deploy high capacity computers to perform complex computing tasks. Since the early days of the information revolution, institutions have been the early adopters of the latest computer technologies. Due to

rapidly failing computing costs, businesses are increasing the use of computers and information technologies to modernize their operations. The trend is expected to continue over the next five years. This situation offers tremendous business opportunities for computer manufacturers.

Applications in the enterprise computing market operate at firm-wide basis, and are critical to a company's delivery of products or services. Major tasks include business processing and decision-support. For example, an Internet Service Provider (ISP) builds its entire business on computers. Computers control communications, relay messages, and conduct accounting functions. To succeed, the firm needs to deploy systems that operate efficiently, reliably and economically. Other examples of typical enterprise applications include Enterprise Resource Planning (ERP), Online Transaction Processing (OLTP), Database applications such as Data Warehousing and Data Mining, and Enterprise Messaging.

Currently, computers supporting the above applications primarily fall into the midrange server category. According to IDC, 1997 worldwide midrange server factory revenue was $16,850 million[27], with the US revenue of $6,280 million. The market grows at a modest rate of 2% each year. The dominant operating system was Unix, with about 65% of the market share. The selling price of systems in this category ranges from $100,000 to $1,000,000. Configurations of midrange systems vary widely. A typical system may have 1-gigabyte memory, consisting of several servers with 2-4 processors, and disk storage space of over 128 gigabytes. The main advantage of midrange servers is performance and scalability, but RAS features (reliability, availability, and serviceability) also figure prominently. However, entry level servers that cost less than $100,000 and running NT operating system are gaining market share with systems running less demanding applications.

The following table lists the product families from the major companies serving the midrange server market.

	IBM	HP	Sun	Digital
Product Family	RS/6000	HP 9000	Sun Enterprise	AlphaServer
CPU/Architecture	PowerPC	PA-RISC	UltraSparc	Alpha
O.S.	AIX	HP-UX	Solaris	Digital Unix

3.2.2 Customers

Customers in this segment range from Fortune-500 corporations with revenues of multi-billion dollars to mid-size companies with revenues of over $100 million. Typically, an IT (information technology) or business technology department in the company is responsible for the procurement, implementation and maintenance of computer systems. Experience and relationship with a computer manufacturer from past products and services play a key role in the purchase decision making process. Purchases of enterprise computing systems are typically of large ticket, worth over $1 million in a year. As a result, enterprise customers often possess considerable buyer power over computer system vendors.

3.2.3 Competition

Competition in this market is intense. Major companies include IBM, Hewlett-Packard (HP), Sun Microsystems, Digital and SGI, and they occupied 65.4% of the total 1997 market revenue. IBM, the market share leader, had 27.5% the market, whereas Digital had 5.7%. HP and Sun significantly increased their market share at the expense of IBM, while Digital's midrange business held steady. On the lower end, cost-effective systems running Microsoft NT operating system on Intel microprocessors are closing the performance gap rapidly. As a result, incumbents compete fiercely for the market. To break into a new account, companies offer generous price discounts and services in hope of future business. Over this decade, gross profit margin on hardware sales has been falling. In the low-end segments, margins are being characterized as razor-thin.

3.2.4 Software Vendors

Independent Software Vendors (ISV) supply software applications that companies use to run their businesses. As suppliers of these complements to computer hardware, ISVs may have significant supplier power. Omnipotent as computers are, they are useless without software applications. Software drives hardware sales. Since the architecture and structure of computers from hardware different vendors are often incompatible, one type of software binaries can only be executed on a specific class of computers, also known as a platform. One popular application software package often brings in significant hardware sales for a computer manufacturer. ISVs also influence the end user's choice of computer hardware. Midrange computer makers often subsidize ISVs to port popular applications to their platforms.

Moreover, ISVs may dictate the terms of servicing their software packages. For example, PeopleSoft, a provider of the Human Resource Management software, offers its software on all major hardware platforms. To capture the service revenue, it offers its customers an option to have the software pre-installed on their computer systems. However, PeopleSoft insisted on installing the software only by itself, precluding services from computer makers.

3.3 Computer Service Market

Conventional wisdom might conclude that hardware speed and capacity are the key competitive differentiators in this market. However, a closer analysis of the market reveals that performance is only half of the story. Incremental performance advantage is hardly sustainable. As the industry progresses at a pace of doubling the performance every eighteen-month (Moore's Law), a speed lead of 20% is usually surpassed by the competition in less than four months. Given the time required for decision-making and implementation of an enterprise applications, which ranges from several months to a couple of years, the temporary speed advantage is often not a meaningful differentiator. Therefore, as the performance has increased industry-wide, competition is shifting toward

software availability, usability, compatibility, and system RAS features (reliability, availability, and serviceability).

On the end-user side, as businesses focus more on their core capabilities, their IT staff faces increased challenges of developing and running firm specific applications. As a result, the IT staff relies more on its external vendors to provide product specific expertise. By outsourcing their none-core IT functions, customers expect to expedite time to market and to access critical skills while achieving organizational agility. Due to the critical nature of their computer systems, enterprise customers demand sufficient services with their hardware purchase. To serve customers well, system makers need to offer advice and support in order to ease the adoption of their products.

In the computer service market, open standards used in modern computers have lowered barriers to entry. Besides the service operations of the system manufacturers, the market is increasingly served by such pure service companies as IT consulting firms, system integrators, value-added resellers (VAR), computer distributors, and outsourcing service providers. Those companies provide services ranging from system integration, system maintenance and support to IT outsourcing. From a value chain perspective, service providers are a part of the system maker's downstream distribution channel. They play a key role in advising and helping end users with various computer products.

3.4 Service Function of Computer Companies

Having realized limits of the advantage hardware performance, computer makers are exploring other dimensions of their product offerings to differentiate themselves in the marketplace. Besides raw performance, end users' purchasing decisions also depend on RAS features, software availability, system interoperability, price, performance/price ratio, ease of implementation, and services. Here, "services" refers to product delivery and support, and systems integration.

Although many of the above-mentioned features could be engineered into the product, it is still a challenge to build complex products that do not require services. Due to the

complexity of user requirements and rapid product obsolescence, many features could not be cost effectively built into the product. Customization is often required to fit customer's unique computing environment. Furthermore, manufacturers have to make tradeoffs between product versatility and time-to-market. Services play a key role in closing the gap between user requirements and what the physical product offers. Faced with those challenges and lack of internal expertise, businesses are turning outside for help.

The outsourcing trend has provided new business opportunities for computer manufacturers. Computer makers have expanded their business by entering the service market. IBM, for example, is transforming itself into a solution provider. It generated $19.3 billon revenue from services, 25% of its total revenue in 1997. From 1991 to 1996, IBM service revenue increased from 8.6% to 20.9% of the total revenue whereas hardware revenue decreased from 57.3% to 47.8%. IBM gross margin[i] on services increased from 18.8% to 20.3%, whereas gross margin on hardware sales decreased from 49.9% to 35.6%. Because service operations have lower fixed costs, the profit margin[ii] on services is higher than the margin on hardware sales. Besides increased sales, service operations also increase a computer maker's ongoing account presence and loyalty, improve customer retention.

Expected higher growth potential in services has also contributed to the increased attention on services. Market analysts have echoed the importance of IT service operations for computer manufacturers. My survey of analyst reports revealed the following market trend: 1) The system integration market is growing fast at a rate of 19%; 2) The software service market is growing much faster than the hardware service market; 3) Growth in the hardware service market is faster in the lower end of the hardware market; and 4) Application software drives the demand for hardware. Exhibit 6 summarizes some of the reports.

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[i] Gross Profit = Revenue - Cost of Goods Sold
[ii] Profit = Gross Profit - SGA/Overhead - Capital Equipment Depreciation - Interest Expense.

On the other hand, service divisions of the computer makers are facing increased competition from their channels that offer services. As the market converges, conflicts with service providers could hurt computer makers in product sales. Service providers might deflect away from serving a particular product due to competition with the system maker in the service market. Computer maker's service divisions are also challenged by their internal incentive structures. Reward systems are often designed to favor product sales over service sales.

3.5 Compaq In Enterprise Computing Market

3.5.1 History of Compaq

Compaq was founded in 1982 to manufacture and sell portable IBM-compatible computers. Since then, the company has grown into a multi-billion company making and marketing IBM PC-compatible computers based upon the Intel microprocessor architecture and the Microsoft operating system. In 1997, it is the leader in the PC market with a worldwide market share of 12%. Before 1997, Compaq products included desktop and notebook PCs for commercial and home use, and PC-based servers.

3.5.2 Compaq's Entry into the Enterprise Computing Market

To enter the enterprise computing market, Compaq acquired Tandem in 1997. Tandem brought Compaq high-end hardware depth with its fault-tolerant computer product line. To further the entry, Compaq purchased Digital in 1998. The merger created the second largest company in the computer industry, just behind IBM.

The Digital merger marked Compaq's transition from a PC centric company to a full-fledged computer company. It now offers products and services in both the PC market and the high-end enterprise market. The addition of Digital gives Compaq a first-class global service organization, more high-end computing products, and a bigger customer base.

As discussed earlier, services play a key role in the enterprise market. Complex user requirements of large enterprises mandate services from computer makers. To become a major force in enterprise computing, Compaq is following IBM's approach of selling services such as installing, testing, and maintaining computer systems. Digital's service organization considerably boosts Compaq's often-criticized service prowess.

3.5.3 Compaq Service Offerings

The Compaq service organization after the Compaq-Digital merger is organized around three service areas: support, consulting and outsourcing. Their 97-98 revenues were $4 billion, $1.9 billion and $700 million, respectively. See Exhibit 5 for the breakdown of Compaq services.

Support services include product warranty, maintenance, installation, and software support. Those services are an integral part of the deployment and operation of the company's products. Without those services, the company's physical product offerings are incomplete.

Consulting services include planning, design, and implementation of specific IT solutions that fit customer's unique requirements. Those services expand the reach of the company and help generate product sales. However, to provide customer the best solution, the service provider needs to stay platform neutral and not just push a particular type of systems.

Outsourcing services help manage such IT functions as data center, help desk, system and network management, and application operations for the customers. Those services help customers with their daily IT operation. It offers Compaq the benefit of staying close to the customers.

The following chapter examines the information collection process, and the decision framework used in this research. The hope is to develop a process and framework that could be applied in similar situations.

4 Analytical Frameworks

It behooves us to examine the key factors behind successful service strategies, and the process of developing such strategies in the computer service industry. A set of issues specific to VIS is presented to assess various VIS business opportunities.

4.1 Service Strategy

What makes a successful service strategy? Research by Davidow and Uttal[28] suggested carefully targeted segments and optimized operations. They pointed out that, since different customers have different service needs, using the same organization to serve different market segments seldom works. Without a focused service strategy, meeting the challenge of exceeding the customer's expectation would be impossible. They also pointed out the importance of thorough research of customer needs, both by formal programs and by paying close attention to what the customer was saying. They cautioned setting the customer's expectation at the right level so that the service provider could under-promise and over-deliver.

Research by Heskett[29] emphasized the need to organize marketing and operations as one integrated function leading to a strategic service vision. The vision consists of identification of a target market segment, development of a service concept to address targeted customer's needs, codification of an operation strategy to support the service concept, and design of a service delivery system to support the operating strategy. Furthermore, the vision should be turned inward to focus on vital employee groups. In this model, employees subscribe to share a common set of values, and are motivated by the company's service activities.

There are four basic elements in an externally oriented strategic service vision: Target Market Segment, Service Concept, Operating Strategy, and Service Delivery System. The basic elements are linked by three integrative elements, Positioning, Value-Cost Leveraging, and Strategy-System Integration, as shown in the following graph.

| Target Market Segment | Service Concept | Operating Strategy | Service Delivery System |

| Positioning | Value-Cost Leveraging | Strategy-System Integration |
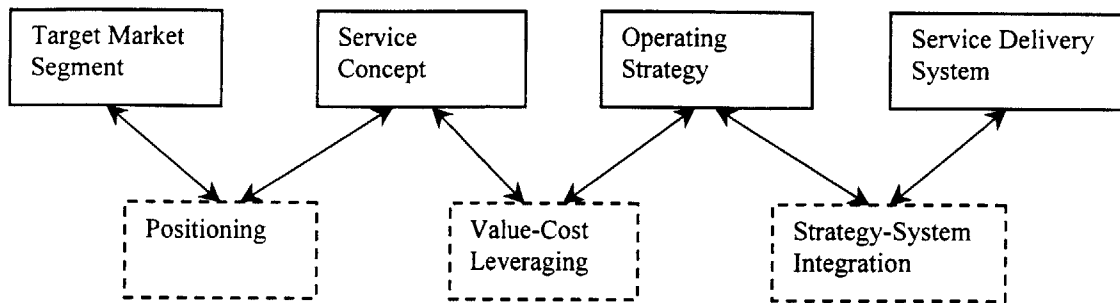
Figure 4-1: Strategic Service Vision Elements.

Exhibit 7 summarizes the major questions to be answered for, and the intent of each element of a strategic service vision.

4.2 Strategic Formation

To make an objective assessment of the potential business opportunities, it is important to examine a set of parameters that makes a business successful. Following is a list of factors examined in the research:

- Customer: targeted segments, customer requirements

- Service: service design, value proposition, quality assurance

- Price: price customers would pay for the service

- Realizable volume

- Company: service cost, employee satisfaction

- Competitive offerings

- Sales: market accessibility

- Channel: delivery partners

- Promotion: marketing message to sales, channel and customers

- Strategic fit within the company

In my research, those factors were examined under the frameworks of Strategic Service Vision, Profitability Equation, and Strategic Marketing Matrix [i,30]. These frameworks provide a systematic approach for examining critical decision drivers, and guidelines for decision making.

4.2.1 Market Research

My research started with top-down secondary literature research. To identify areas of potential, I surveyed analyst reports about the hardware service, software service and system integration markets. See Exhibit 6 for a summary of the data. Those reports provide a general sense of the market trend.

While those reports provide insights about the future market, they do not offer guides for practical actions. This is the fallacy of market forecasts. Analyst market reports only give a high level overview. Yet since data are aggregated and averaged, they are not specific enough to guide managers toward an actionable direction. They are useful for financial managers dealing on macro level with the markets, yet not of much help in developing micro-level business and marketing strategies. Furthermore, in the ever-changing high-tech market, forecasting is always a challenge due to market uncertainties[31]. The management needed to work with something that gives more clues about how to proceed.

Micro-level market research techniques do not offer satisfactory answers either. They are most effective under specific questions about a product/service. For example, a survey generates reasonably accurate data about sales volume, whereas conjoint analysis helps decide tradeoffs between different features of an offering. On the other hand, micro-level techniques limit the scope of the research to a specific product/service concept. They are not suitable for concept formulation during the early stages of developing a market

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[i] Elements of Strategic Marketing Mix: product/service, price, communication, and distribution.

strategy. Decision-makers need to identify the market segment to pursue before getting into the detailed product/service design.

4.2.2 Voice of the Customer

Modern management literatures[32] suggested that listening to the customer is an effective way of identifying potential product/service concepts. Geoffrey Moore argued[33] that informed intuition, developed from customer image, rather than analytical reasoning, is the most trust-worthy decision-making tool to use. Informed intuition involves conclusions based upon isolating a few high-quality customer images, or data fragments, that it takes to be archetypes of the broader and more complex reality. The key to developing representative images[34] is diversity in customer selection. Moore suggested the following steps of developing customer target segments:

1. Develop a library of target-customer scenarios. Keep adding until new additions are nothing more than minor variations on existing scenarios.

2. Group these scenarios into customer and application types.

3. Rate the compelling reason to buy at each customer-application intersection.

4. Define potential market segments around areas of the customer-application matrix where there is at least one must-have rating accompanied by a cluster of should-haves, either in the same row (same customer), or same column (same application).

5. Apply traditional macro- and micro-level market research techniques to evaluate each of these candidate market segments.

6. Use the market research to impose a final priority order on the candidate segments.

A target-customer scenario consist of the following elements:
- Customer profile

- Supporting infrastructure

- A day in life (before the solution)

- Customer problem

- A day in life (after the purchase)

The best segments to target are the ones that have "must-have" compelling reason to buy, and are surrounded by clustered "should-have"s.

4.3 Data Collection

Unbiased market research data provides the foundation for successful strategic analyses. To obtain a balanced perspective of the market dynamics, I interviewed people in different functional positions: account managers(7), product marketing managers(15), field sales representatives(5), sales support representatives(3), project managers(3), system engineers(4), and senior business managers(4). Interviewees were drawn from a variety of organizations: Account Management(9), Software Vendor Management(7), Product Marketing(7), Application Systems Engineering(6), Enterprise Systems Lab(2), CSS(3) and VIS(8). The total number of people interviewed exceeded forty-two. Besides interviews, I attended management review meetings and sales & marketing training sessions. Conversations with meeting attendees also revealed customer needs in the marketplace.

Ideally, a large portion of the data should be collected from the end user. However, due to various restrictions, the study was unable to reach a significant number of outside customers. Since interviewees in this research had diverse backgrounds and interests, I believe that perspectives drawn from the interviews reliably reflect the market reality.

Interviews were complemented by examining Digital internal sales database and VIS management reports, and by conducting such secondary researches as analyst literature research, competitive benchmarking, and the examination of industry market research data, news and reviews.

The following chapter analyzes the major opportunities identified during the research, and presents recommendations for the management.

5 Opportunity Assessment and Recommendations

As discussed in Section 2.4, three strategic VIS directions were identified during the study. They are Implementation Services, Global Multiple-platform Implementation Services, and Packaged Application Solution Services. A service offering was selected as a candidate if it satisfied the following criteria: 1) it would satisfy a compelling customer need, 2) it is what VIS was or could be good at, and 3) it matches expected industry trends. The following sections analyze each offering and recommends implementation strategies.

5.1 Implementation Services

Implementation Services is a major part of the traditional VIS service portfolio. This set of services includes Factory Staging and Integration, Business-Critical Installation and Custom Configuration Documentation. VIS has identified a market with great potential, and should continue to devote resources to increase its customer base.

This section will discuss target customers, VIS value proposition to internal sales and end customers, strategic fit of VIS services within Compaq, proposed marketing strategy, competition and challenges of VIS Implementation Services.

5.1.1 Market Opportunities

VIS needs to increase internal marketing efforts toward the traditional Digital global accounts. Digital has about forty global accounts. They are multinational companies with the characteristics of, 1) complex computing environment, 2) annual purchases from Digital in excess of $40M, and 3) in Digital's strategic industry sectors. Those companies would value the implementation service offerings from VIS. However, VIS has very little presence in those companies. There is great market potential for VIS to grow in those accounts. Global account managers play a key role in managing the relationship with those companies. The key for VIS is to cooperate with account managers to bring the best products and services to those strategically valuable customers.

IT outsourcing and integration companies promise great opportunities for VIS Implementation Services too. EDS, for example, takes over and manages IT operations for businesses. It frequently purchases computer systems to beef up client IT infrastructure. Last year, EDS generated revenue of $17 billion. 10% of that is estimated to be hardware cost. EDS is also a major customer of Compaq and the former Digital, with respective hardware sales to EDS totals $300 million and $10 million per year. Platform, that is, hardware and operating system, integration is not considered the core competence of EDS. Due to a tight IT labor-market, EDS is always short of technical personnel. Companies like EDS are likely willing to have an external vendor to provide platform integration services. Some analysts observed that a greater percentage of integrators are focusing on services that are more closely linked with business functions. Conversely, fewer provide hardware-centric services such as break/fix and installation[35].

5.1.2 Value Proposition

Main selling points for Implementation Services in the global accounts are to reduce implementation risks and to speed up system deployment. Target decision-makers are typically conservative, yet they need to utilize leading-edge technologies to enable competitive advantages. Failing to deliver the system on time could cause career embarrassment for those people. They are therefore willing to pay a "premium" for services that assure systems would work as designed. Business benefits from the "insurance" well deserve the service. The overall cost of the product and service bundle would be much less than the cost of a product-only purchase, should disruptions occur at deployment.

Another benefit of the service is to save customers the need to acquire platform level skills that would only be used once upon system deployment. Setup and installation work rarely needs to be performed again once the system is in place. A half-day's work for a skilled technician might take several days for an engineer in unfamiliar territory. The customer's valuable technical talents could instead be focused on the company's core business.

5.1.3 Strategic Fit

Targeting global accounts aligns VIS with the corporate strategy. Digital's strategic industries include telecommunication, financial services, manufacturing, and government. VIS has strong presence in telecommunication and financial services. It understands the operation and needs of those industries. Experience of serving its current customers is applicable in the same sector. Furthermore, since the company is committed to be a major player in those accounts, VIS efforts to increase customer experiences would more likely to receive rapport from the entire organization. As more and more organizations have discovered, service is an integral part of the total product experience. VIS will increasingly play a key role in serving the most valuable customers of the company.

Since the market in telecommunication and financial services sectors is still under-penetrated by VIS, it needs to focus on those industries to create a stronger customer base. The strength of the VIS customer base and its credibility in the market constitute a positive reinforcing loop. It is critical to build up the positive feedback.

5.1.4 Customer Service Pyramid

Besides being a good business, VIS-style services also fill the gap in customer service. The concept needs to be offered to more customers to improve their product experiences. As depicted in the following graph, service elements such as testing and staging belong to the higher level of the customer service pyramid. They could be leveraged to gain competitive advantage and market share. On the other hand, such service elements as order completeness and order-cycle time are essential to maintaining the market share. Elements belonging to the "reliability" segment should be available to all customers through the manufacturing operation. If price is the barrier for purchase, then the company needs to experiment offering the service at cost, and to explore ways to achieve cost effectiveness in the manufacturing operation. Furthermore, achieving order-completeness at the initial product shipment alleviates the burden of product support.

Customer Service Elements

Financial and Market Share Impact

- Consulting
- System design
- Testing/Staging

- Emergency coverage
- Problem recovery
- Response to inquiry

- Order completeness
- On-time delivery
- Order-cycle time

Creativity

Resilience

Reliability

Gain

Maintain

Lose
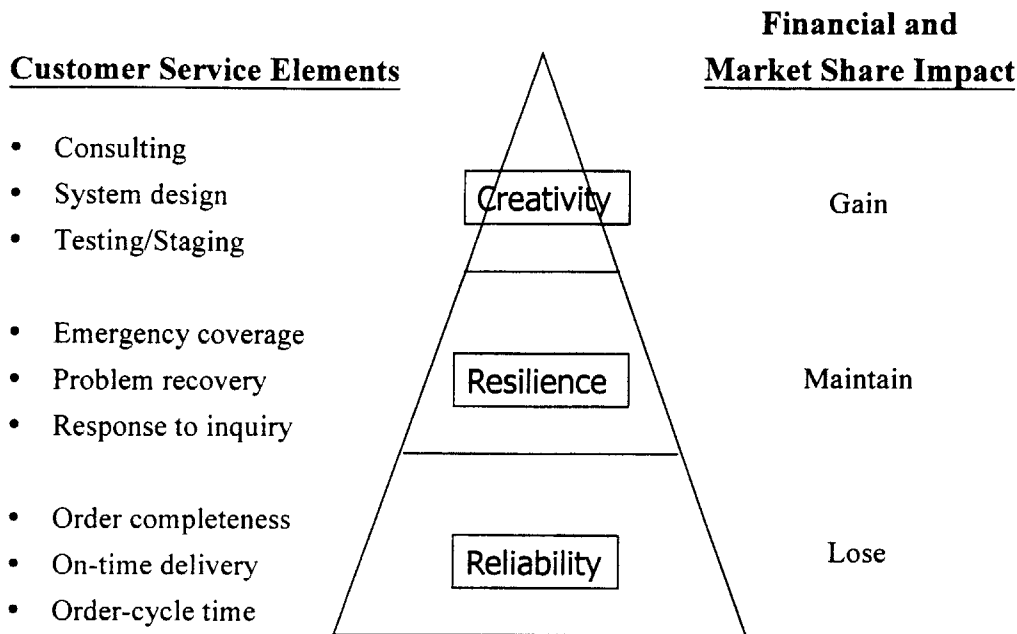
Figure 5-1: Customer Service Pyramid[36].

5.1.5 Marketing Strategy

Marketing of the service needs to address two audiences: the global account managers, and then end customers. For both, communication is the key marketing element. VIS needs to create awareness of its services with account managers and their perception of VIS benefits.

Account managers are the corporation's primary contacts with global accounts. They represent the company to bring the best products and services to the customer. All interactions with customers should flow through those people. They are knowledgeable about the customer's operations and computing needs. A good account manager has gained the trust from the customer and is able to influence customer's decisions. To sell its services to the global accounts, VIS needs to first gain support from the account managers. Marketing directly to end customers would require time and efforts that cannot be supported by VIS' revenue. Account managers are in fact the best distribution channels that VIS could leverage. The interests of account management and VIS are aligned under the overall corporate performance goal.

VIS needs to communicate to account managers problems the customer might incur when implementing complex computer systems, and how those problems could affect the customer's business objective and damage the customer's perception of Compaq products and services. Once account managers understand the negative effects of not using the service, they are likely willing to recommend VIS services. In fact, some account managers familiar with VIS would even subsidize VIS services when selling into mission critical projects.

For the global managers, the benefits of the service are increased customer satisfaction and the resulting additional sales from their accounts. The company needs to position itself as providing the best products as well as services to help use the products. As we can see from the following graph, the generic product - computers - does not constitute the whole picture. The generic product needs to be augmented by additional products and services to fulfill the customer's requirements. Customer's needs are better served with the whole product. Account manager's compensation is largely based upon sales commissions. For the account manager, complements such as VIS services may not contribute as much sales revenue as the hardware in a particular transaction. However, the additional product sales that would be generated from better fulfillment of customer needs in the long term could be quite rewarding. Well-delivered services augment relationships that the vendor has established with its customers through products.
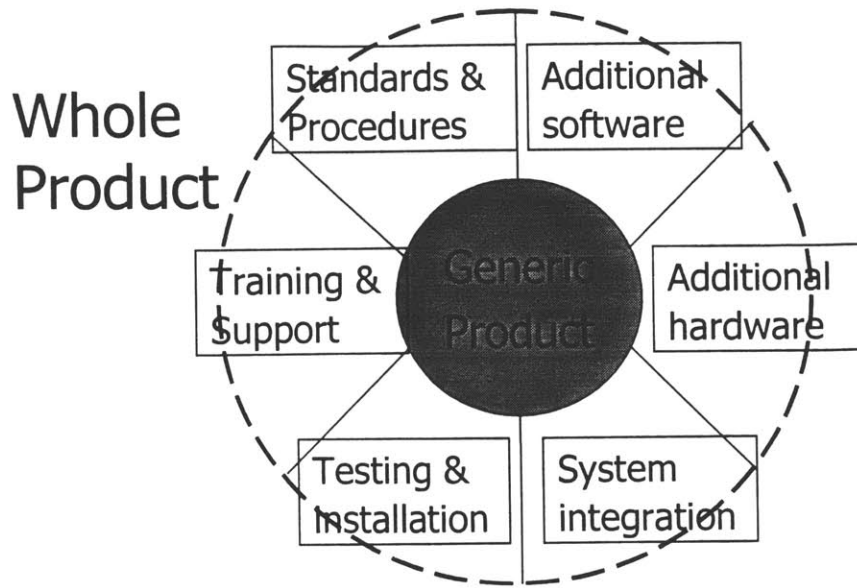
Figure 5-2: Whole Product Model[i].

VIS messages will be best delivered by face-to-face communications. The Whole Product concept is new and unintuitive in a hardware company where the mentality is to sell as many "boxes" as possible. Other forms of communication for a small ticket service item such as VIS services will be buried by the marketing materials of hundreds of Compaq products. Nether do other forms provide any opportunity for the required clarification and interaction. Once the Whole Product concept is conveyed, face-to-face communication needs to be supplemented by customer testimonials, case studies, and service specifications. Those materials are to reinforce the concept and to substantiate VIS benefits.

Deeper customer relationship established through services also enables Compaq to better understand customer needs. Implementing computer systems for enterprise customers provides opportunities to better understand customer operations and computing needs. The information could be used to design and sell additional products and services. Enhanced account relationship also raises barriers to entry.

For end customers who have experienced the difficulties of implementing complex computer systems, the comparison of the different experiences would generate strong interests for the service. Experienced customers understand the complexities of implementing enterprise-level

systems. Once customers have used the services and experienced the difference that VIS services have made, they are likely to engage VIS again in the future. This is evidenced by the high rate of repeat businesses from its existing customers. Given the high stack and value of the purchase, customers would like to have the assurance of trouble-free implementation but needs to be convinced of VIS promises first. Therefore, initial trials are critical to attracting new accounts.

VIS state-of-the-art testing and staging laboratory is a powerful marketing tool. Most customers would be impressed with the capabilities of the VIS integration lab. The fact that NASDAQ once ran its trading system out of the lab is a convincing testimony of VIS capability with mission critical projects. VIS could have potential customers tour the facility and emphasize its vicinity with the AlphaServer manufacturing operation.

Another way of encouraging initial trials is to utilize positive word of mouth. VIS needs to leverage its strong presence in telecommunications and financial services industries. Its current customer base is a convincing peer reference group for the potential customers in the same industry. Customer testimonials and case studies are powerful references. My research revealed that publishable customer testimonials and case studies yet remain to be developed. Those written marketing communication materials need be of high priority in VIS marketing program.

Besides communicating the value propositions discussed earlier, VIS might experiment with lower initial prices to encourage trials of the services. To broaden its customer base, VIS does not have to be overly concerned about its operating profit margin as it develops new accounts. As discussed in Section 2.1.2, since VIS is enjoying increased profit margin, it has the financial resource to invest in its future revenue. Management may experiment changing VIS performance metrics to increase the weight on revenue.

Different decision-makers in customer organizations may response to prices differently. High-level managers in customer organizations such as CIOs could better understand the business benefits. They are therefore less price-sensitive on small ticket items such as VIS services. As

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[i] *Crossing the Chasm*, by Geoffrey Moore, P. 115.

one CIO commented about the price of VIS service, "Are you concerned about the fifty-thousand dollar service price? Are you kidding? My career depends on this!"

For middle-level decision-makers that are more price-conscious, VIS could offer substantial new customer discount to encourage initial trials. Once customers have tried VIS services and experienced the difference, they are likely to understand the benefits of the service. Then, price would be a secondary consideration. Ideally, VIS should drive its new business through high-level business managers. However, in many situations, senior managers such as CIOs are not accessible. Therefore, initial price discount is a way of encouraging trial, getting service benefits heard and establishing customer contacts.

Business development managers need to be staffed with those who understand the intricacies of complex projects and can explain the details of specific implementations. To plan and manage system deployment, customers need to discuss with VIS their implementation details. VIS could advise the customer on deployment activities. Detailed action plan and service options are to be developed through the discussions.

5.1.6 Competition

On a higher level, system manufacturers such as IBM and HP could be considered as competition. However, since computer makers tend to focus on their own platform, they are not counted as competitors of implementation services to Digital platforms. When purchasing a computer system, the customer first decides which vendor and platform to choose. The decision about implementation services happens well after the system vendor has been chosen. IBM or HP service is unlikely to compete with VIS once the customer has decided adopting Compaq platforms. Although not a first-order decision factor, VIS services could help differentiating from the competition by creating a better whole-product. This will help set Compaq apart from competitions that cannot deliver the same type of augmented products.

Distributors of Digital's products such as Avnet and Wyle offer similar services. Wyle, for example, operates a System Enhancement Center (SEC). At SEC, Wyle provides such implementation services as operating system and high-level language installation and set-up,

proprietary application software installation and set-up, and hard drive test and configuration. They promote the concept of eliminating in-house integration to improve the customer's bottom line through economies of scale. VIS needs to avoid competition with its distributors by serving different customers.

At the time of my research, Compaq channel strategy was still in discussion. I believe the market will be segmented that the distributors serve medium to small enterprises, while VIS serve medium to large enterprises. The segmentation will be driven by customer demands and operational efficiency. Recently, more and more large IT spenders are demanding to purchase directly from computer manufacturers. They want to consolidate their purchasing to obtain volume discount and reduce transaction costs. One-stop shopping also forces more integration responsibility on system suppliers. For smaller companies, Compaq channels still better deliver better values. Channels aggregate smaller orders from different companies to obtain volume discounts. They also have closer relationships with the smaller customers and can provide better-customized solutions. VIS needs to position itself to serve the larger, direct customers.

5.1.7 Challenges

VIS faces challenges in providing implementation services. However, those challenges and associated risks could be carefully managed.

First, VIS service revenue depends on hardware sales. Hardware and service revenue is loosely related through leverage ratio, defined as the ratio of hardware sales to the associated VIS service revenue. The leverage ratio of quarter one through five[i] of FY'98 averaged 8.5, and has been declining from above 10 to below 6. While the trend signifies an increased service component for VIS engagements, it is unlikely to be sustained in the long run. The drop in hardware sales might come from the uncertainties about the Alpha platform due to the acquisition of Digital by Compaq. Now that the new company is committed to Digital AlphaServer product line, sales should recover.

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[i] Due to the acquisition of Digital by Compaq, Digital's 1997-98 fiscal year did not close after four quarters by July 1998. Digital FY'98 was extended by two more quarters until December 1998.

Because VIS service is correlated with new system purchases, it is important for VIS to recruit new customers to avoid market saturation with its existing customers. If VIS only relies on a few existing customers, its revenue would drop significantly if any of its major customers slows down new system deployment. With a larger customer base, VIS has more potential to increase revenue and can reduce business risks.

Second, factory service revenue depends on direct sale. The customer is unlikely to use VIS implementation services if the hardware goes indirectly through channel distribution where systems are assembled. In this case, parts and systems would first go to the channel's assembly site, assembled, then delivered back to the Salem manufacturing plant. Cost and delays associated with the extra shipping and handling would put VIS in disadvantage to the VARs. However, in sell-through cases where a VAR only places an order on behalf of a customer, VIS would deliver its service the same way as for a direct customer. VARs probably would only utilize VIS services when they cannot handle the order due to technical or capacity constrains.

Direct hardware revenue from July 1997 to August 1998 was 38% of the total sales. It will be challenging for VIS to capture service opportunities through channels, since VIS would be in direct competition with the VARs. However, in recent years, major customers with high volumes are asking the company to sell direct. This trend would open up opportunities for VIS with larger Compaq customers. VIS needs to identify those customers to start marketing its services to the account managers. It needs to target its services at Compaq's major customers and avoid competing for the smaller accounts with channels. VIS position will have to be clearly communicated to VARs.

Of the 38% direct sales, CSS contributes 45%. The majority of VIS sales go through CSS. It might be that most high-end custom systems are sold through CSS, and therefore the rest of the 55% direct sales would not generate as many leads as the CSS ones. However, it is still worth exploring opportunities beyond CSS. VIS needs to find out to whom and what products are sold in the 55% non-CSS direct sales. What are the operating characteristics of those accounts? Would VIS service be valuable to those customers? If so, VIS needs to identify the account managers in charge to start targeting the accounts with internal marketing.

Third, the company needs to overcome the hardware-only mentality. Hardware generates higher revenue than services, which translates into higher commissions for the sales organization. However, as discussed earlier, VIS needs to educate sales about the concept of whole product offering. It will be a win-win situation for the account managers, VIS, and ultimately the corporation.

Forth, the selling cycle of VIS services could be prolonged. Services for business critical operations require trust and relationship, which are difficult to build overnight. To gain trusts, VIS needs to leverage its earlier projects as references and demonstrate a good understanding of the customer's operation. However, VIS cannot afford alienating its existing customers in favor of acquiring new ones. Due to high customer acquisition costs, it is more profitable for VIS to serve existing customers than to serve new ones.

Fifth, VIS services are considered expensive. Hourly service rate ranges from $100 to $180, depending on the level of expertise required. Those rates are high for manufacturing services, but close to the industry norm for IT consulting services. High service rate inhibits VIS market penetration and lowers profits than what VIS could potentially achieve. However, as discussed earlier, business benefits are worthwhile of the service cost for mission critical projects. Its existing customers are willing to pay for the business assurance. VIS needs to present the service value from the perspective of business benefits and to encourage potential customers to try out the service at lower initial trial rates.

5.2   Global Multiple-platform Implementation

The combination of Compaq, Digital and Tandem makes the company a full product line supplier for business computing needs. Service and manufacturing organizations need to take this opportunity to offer multinational companies product implementation services over multiple platforms, and on a worldwide basis. VIS has the responsibility to take the lead to develop such capability to differentiate the company from its competitors. This provides medium to long term growth opportunities for VIS.

This service is an extension in scope of the traditional VIS Implementation Services in terms of more hardware platforms and wider geographical coverage. Issues that are common to both service offerings have been addressed in the previous section. This section will only cover issues unique for this offering. It will discuss the unique value proposition, strategic fit, marketing strategy, implementation requirements, and challenges of VIS Global Multiple-platform Implementation Services.

5.2.1 Value Proposition

Compaq could leverage its product synergy to offer one-stop shopping for enterprise customers. Customers benefit from reduced transaction cost and heightened vendor responsibility. The new Compaq offers a full product line for enterprise computing: desktop PCs and NT-based servers from Compaq, midrange Unix servers and high-performance workstations from Digital, and fault-tolerant systems from Tandem. Only IBM and HP possess similar capabilities. Compaq intends to be a major vendor in this market.

Multi-platform implementation service creates a competitive advantage for Compaq. An increasing number of large businesses seek to purchase their computer systems directly from the manufacturer. The market is likely to segment into large businesses that are served directly and smaller ones served indirectly through the channel. When a large business purchases systems from Compaq, it also needs to have associated services to deploy the systems. Since Compaq sells multi-platform systems, it needs to be able to implement them. As a matter of fact, VIS has already been asked to roll out a multi-platform project for a major enterprise. Requests like this would only increase as Compaq positions itself as a soup-to-nuts IT product provider. This capability would differentiate the company from such single platform providers as Dell and Sun. It would increase customer retention and raise barriers to entry.

On a global basis, Compaq could leverage its presence, relations and experiences in different countries to help customers deploy system globally. Compaq service organizations are located worldwide. They provide local services in various countries. VIS could help manage export

clearance and import permits. Only a handful of companies possess such capability. It will be a competitive differentiator for Compaq.

5.2.2 Implementation

Dedicated service units responsible for each platform are necessary so that platform-specific expertise could be better developed. VIS takes the lead for Digital products, while its counterparts for Compaq and Tandem products are still to be identified or developed. Furthermore, each unit needs to understand the intricacies of integrating a multi-platform system.

To deliver the benefits of the service, one single contact for the customer is required to manage client projects and coordinate activities between all three units. A common business process will be necessary to have the service delivered consistently.

VIS needs to undertake pilot projects to develop such capability and test the market whenever possible. Those projects will be complex and profitability drivers in this market are unknown at this time. Pilot projects will be a good market research tool for VIS to identify customer profiles and better understand customer needs. The information would be used to adjust VIS service offerings and develop marketing messages.

5.2.3 Marketing Strategy

Target audiences will be similar to those of the traditional implementation services: the global accounts, major IT outsourcing companies and system integrators. They are a part of the combined customer base of the former Compaq, Digital and Tandem. Note that the marketing strategy for Implementation Services is applicable here. VIS needs to evangelize the whole product concept, leverage the company's account management structure, and emphasize its global delivery capability.

Once the capability is in place and the operation fairly understood, the company needs to create awareness of this capability by announcing it as soon as possible. A press release at the corporate level, from the Services and Manufacturing group to emphasize the scope of the

service is preferred. This is a new concept in the corporation and needs to be supported by close integration between the former Compaq, Digital and Tandem. A message at the corporate level presents the image of a coordinated effort and will be more credible. The message should emphasize the ability to manage the complexity of multiple platforms over a wide geographical area.

5.2.4 Challenges

Compaq's reliance on its distribution network would create channel conflicts. Traditionally, services are performed in the channel. However, as discussed in Section 5.1.6, the market will be segmented into large businesses that are served directly and smaller ones served indirectly through the channel. The global multi-platform service will be positioned to serve the first segment. Furthermore, only a handful of computer manufacturers are recognized globally. The VARs and distributors are primarily single-country focused, and therefore cannot compete with Compaq globally.

Due to complexities in technology and coordination, it will be a challenge for VIS and the company to develop a seamless operation. It is reasonable to expect initial learning and hiccups. The company needs to embark continuous improvement tasks to improve the quality and reduce the cost of the service. For example, VIS needs to actively seek customer feedback about its services. Which service does the customer value? What else could VIS help with? How is the customer satisfied with VIS services? Which area causes problems? What are the causes of the problems? What are the cost drivers? How could the service be performed more efficiently? Survey data needs to be tallied to search for patterns and trends. Once problems are identified, VIS needs to solve the ones of highest impacts. Proven solutions have to be documented and instituted. The process never ends and iterates continuously. Increased volume will accelerate learning. It will take some trial and error to develop a robust capability.

5.3   Packaged Application Installation

This service is to install large-scale software applications for the customer, and to implement package application solutions developed by CSS. It will be a good marketing tactic to expand VIS customer base for its core implementation services. However, due to limited volume, I do not believe that it will provide significant incremental revenue for VIS. Moreover, this service requires a different operational setup, and therefore will probably disrupt current VIS operations. It does not seem to fit the strategic position of VIS.

This section will discuss the value proposition, target customers, market size, strategic, organizational and operational concerns, and challenges facing this service offering.

5.3.1 Value Proposition

Installing large-scale application software packages saves the customer time and effort and increases the reliability of implementations. Installing enterprise level software applications such as Oracle database and SAP R/3 is not a trivial task. The installation involves determining system layout, entering configuration information, and monitoring system test. For example, Oracle database installation takes about two days, and requires human interaction every two to four hours and intermediate level of familiarity with the underlying hardware and operating system. The installation instruction book runs about 100 pages. For those new to the software, the process could be filled with trial and error. The service saves customers the need to acquire a one-time installation skill. For experienced users, it is a tedious process. Installing the software directly by the computer manufacturer solves the dilemma. Feedback from customers shows that they would indeed like to have the software installed by the manufacturer. In contrast, VIS could be more efficient than the customer. One technician could install software on multiple systems at the same time. Experience developed from repeated installations also enables VIS to better understand the process to do a better job.

Note that the service only provides a technical platform for the application. Customizing the application to fit the client's business is a different task, and has been primarily performed by consultants and system integrators.

5.3.2 Target Segment

Customers in this market can be segmented into end customers and system integrators. Infrastructure applications such as database packages could be used to target end customers, while enterprise applications such as ERP packages would be better to target system integrators. Again, distributors and VARs probably will not welcome the service due to potential competition with their existing business. This will be a challenge and could be one of the inhibitors for VIS to significantly develop this service.

Other than a few popular database packages, applications purchased by business customers varies greatly. VIS does not have apparent efficiency advantage over the customer if it has to learn a new application for just one customer. On the revenue side, the customer will unlikely to pay a premium for VIS to install the software. System integrators and software vendors are better positioned to provide the service. They have more experience due to their higher volumes. However, since database packages are a part of the infrastructure for many applications, VIS would have the scale and expertise advantage installing those software packages.

Major system integrators, in particular, the Big Six[i] consulting firms, implement the majority of ERP applications for large and medium size businesses. Although the end customer is different in each project, the Big Six are involved in a large number of ERP implementations. However, end customers typically make the decision about the hardware platform, although consulting firms may influence the choice. Most ERP practices of consulting firms are short of consultants. As a result, they are keen to offload as much non-core activities as possible so that their consultants could be placed to billable hours at higher rates. They would like to speed up infrastructure deployment so that fee-generating consulting activities could start as soon as

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[i] Andersen Consulting, Coopers & Lybrand, Deloitte & Touche, KPMG Peat Marwick, Price Waterhouse, and Ernst & Young.

possible. Therefore, the package application installation service will be appealing to consulting firms. However, since installation skills are widely available, premium pricing is unlikely to sustain.

5.3.3 Market Sizing

Although the enterprise software market is growing at a rapid rate, the market that VIS can reach is limited. The enterprise software market grew 20.2% over 1996-97, and is predicted to grow at a CAGR of 18.4% until year 2002[37]. However, the growth will be mostly coming from smaller enterprises. As the midrange server market will likely be segmented, large businesses will be served directly, while medium to small enterprises served indirectly by channels. It will be difficult for a factory based service provider to compete with the channel for businesses going indirectly. Furthermore, most of the Fortune-500 businesses have by now implemented such enterprise applications as ERP systems. New installations from large enterprises, and thus opportunities for VIS, will be limited.

On the surface, revenue from enterprise applications is very attractive. Project costs go as high as over $100 million. However, the revenue from hardware services is only a small portion of the ERP market. From conversations with people experienced in this market, typical ERP costs are broken into 70% implementation consulting fee, 20% software license fee, and 10% hardware cost. Hardware service revenue is likely to be 10% of the hardware, and thus 1% of the ERP project cost. The actual potential market for VIS services is small.

My survey of the Big Six indicates that as low as 20-30% of their FY'98 total sales from Digital went directly. The total number of Alpha servers sold directly or through the consulting firms to end customers was approximately 130. If we assume an additional service revenue of $5000 per server, the incremental revenue for the Packaged Application Installation service to the consulting firms would be $650K. Compared with VIS revenue of $18.7M, this service is unlikely to contribute significant revenue growth.

5.3.4   Strategic Concern

Compaq's hardware service has three delivery mechanisms: consulting and services professionals, resellers, and automated software and systems. As Summit Strategies[38] commented, Compaq intends to leverage its custom service capabilities into replicable, low-cost solutions. It will use the consulting and services professionals to address the most demanding enterprise requirements, and then "package" processes and services to allow them to be delivered through resellers (for departmental and small to midsize customers), in systems and software (as in SmartStart[i, 39]) and, ideally, over the Internet (as with ActiveAnswers[ii, 40]).

Since software installation is a fairly standard process, specified by the software vendor in installation instructions, the installation service probably would not generate the same margin as professional services. It is therefore best fit with the resellers or automated software solutions in the long run. VIS will not be able to position it as a premium service.

However, since software applications drive hardware sales, the company needs to ease the adoption of software applications on its enterprise platforms. The installation service could be a temporary solution, priced attractively, to accelerate the adoption. The business software industry is experiencing rapid growth. Compaq would risk being left out if it would choose not to participate in the software-system service industry. One day, even enterprise software might come Ready-to-Run from the computer manufacturer. As a matter of fact, software vendors are leading the "Ready-to-Run" initiatives[41]. The company needs to explore opportunities of offering this service from the manufacturing operation.

Finally, the incremental cost of developing the capability and running the operation will be probably lower than the incremental revenue, which would be up to $650K for fiscal year 1998. Therefore, it would not be a losing proposition for VIS to offer such service at this time.

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[i] SmartStart is the Compaq server integration tool, delivered on CD-ROM to optimize platform configuration and simplify the setup of tested and reliable servers in the distributed enterprise environment.
[ii] Compaq ActiveAnswers provides online tools and technical information to plan, deploy and operate business solutions.

5.3.5 Organizational Concerns

Traditional VIS work has been fairly engineering intensive. Every engagement is different. Engineers spend time learning the system, figuring out the solution, and then implementing the system. This kind of problem solving environment makes the job interesting and motivates the technical staff.

Loading application software is not as challenging as implementing customized systems. VIS might have difficulties retaining its talent pool. Problem solving is expected to decline in software loading activities. Software vendors provide installation and configuration instructions. At the beginning, significant learning is required to become knowledgeable of an application package. For example, SAP requires technicians to be SAP-trained and certified to install SAP software. However, as one becomes familiar with the software, learning declines. Although different installations have different options, the installation process could be repetitive and tedious. The technical staff will not find the work as challenging as their traditional work. Besides, once someone is SAP-certified, the person becomes a sought-after talent in the tight IT job market. Retaining VIS talent pool VIS will be a challenge.

To alleviate the talent pressure, VIS needs to be creative in maintaining a rewarding work environment. Opportunities for continuing learning keep the work interesting and challenging for technical people. VIS could rotate people on projects requiring knowledge of different computer systems. Diversified workforce skill also reduces reliance on critical personnel. A team-oriented culture creates group identity and could make the people want to stay with the group. Many VIS engineers enjoy working there because they value the working relationships with their colleagues. Periodic chances of traveling to customer sites and seeing the operation first hand also an engineer's routine, sometime dull, work schedule.

5.3.6 Operation

VIS needs to enhance its web site to give customers more flexibility and increase its operation efficiency. For example, VIS could utilize SmartStart Configuration tools to have customers

configure their systems and generate the bill of materials (BOM). Currently, custom quotes and requirements are collected over the telephone. Tracking down people and taking quotes over the phone causes communication delays. With a web-based interface, the customers could specify the requirements as soon as possible, and experiment with different configurations. Intelligence behind the interface could check the validity of the configuration. In the delivery and implementation phase, customers could track the progress over the web. The system would be more suitable with repeatable implementations and for customers familiar with the operation. Database installation is a good candidate to start with.

5.3.7 Obstacles

Some technical issues could hinder the program. For example, to configure a Lotus Notes server, the system has to establish a live connection with the customer's NT network to obtain security information. Many customers would be reluctant to open up access to their internal corporate networks. Furthermore, the complexity of the application could significantly increase the communication cost associated with requirement specification. The customer might find the service not worthwhile.

Software vendors may also hinder the program. They might not allow a third-party vendor to install their software, or they would not give the required software authorization code to a third party. If VIS could not obtain a re-licensing agreement, the customer would have to ship the software to VIS, causing delays.

5.3.8 Implementation

In light of the strategic, organizational and operational concerns and the implementation obstacles, this service does not provide attractive near term prospective for VIS. However, CSS might consider continuing the program to serve CSS strategic interests by easing the adoption of software applications on Compaq enterprise platforms.

If the program were to continue, the best opportunity lays in database installation. Database packages such as Oracle have become a part of the platform layer for many applications.

Installation requirements could be well specified in a one to two page questionnaire. Database installation promises volume and operational simplicity.

VIS should also develop automated installation programs to increase its operation efficiency. Currently, software packages are manually installed. Technicians swap the installation CD-ROM to load the software, and frequent interactions are required. State-of-art operations install software over high-speed computer networks. Configuration options are specified in installation scripts. The entire process requires minimal manual intervention. Automation is necessary if the program attains significant volume.

5.4 Time frame

From the above analyses, we can map the timeframe for implementing the programs and the relative growth potential of each program in the following graph.
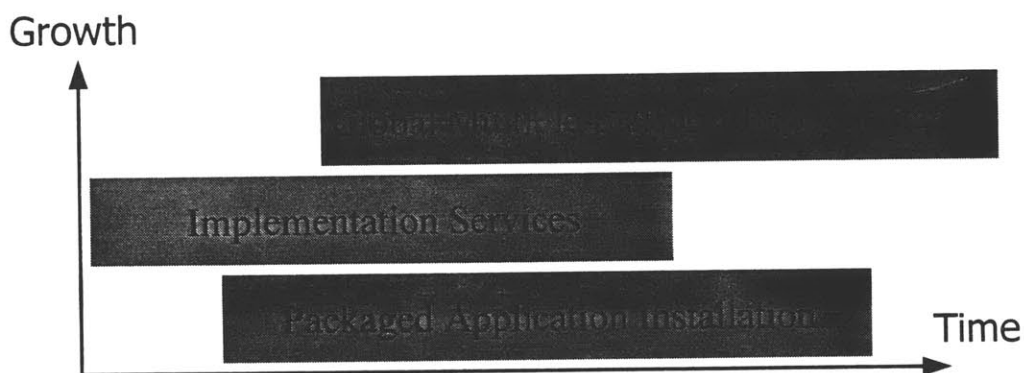
Figure 5-3: Timeframe & Growth Potential of VIS Opportunities.

Implementation Services offers good growth potential and the benefits could be realized in the near future. Global Multiple-platform Implementation has the greatest potential. However, due to the technical and organizational complexity, the benefits would not come in the near future. Benefits from Packaged Application Installation might come in-between of the previous two. However, its growth potential will not be as great due to its limited volume and the likely migration into distribution channels.

VIS needs to concentrate its marketing efforts on Implementation Services in the next twelve months, while developing intra-company capabilities for Global Multiple-platform Implementation. Within a year, the demand for Packaged Application Installation should become clearer, and VIS will be able to make a decision on whether to aggressively pursue the opportunity. Eighteen months from now, as the new Compaq becomes more integrated, VIS will be able to launch a coordinated marketing campaign for Global Multiple-platform Implementation.

6 Conclusion

This chapter summarizes the findings from my research and presents strategic recommendations for VIS.

A service strategy consists of identification of a target market segment, development of a service concept to address targeted customer's needs, codification of an operation strategy to support the service concept, and design of a service delivery system to support the operating strategy. My analysis of the market and VIS offerings has resulted in the following service strategy for VIS.

Large enterprises seek assured success in deploying mission- and time-critical computer systems. VIS offers premium implementation services to help business critical projects achieving their objectives. The service greatly reduces system implementation risks by staging, integrating, testing, documenting and delivering computer systems worldwide under strict time restrictions. Integrating complex systems at the same facility as the manufacturing operation allows VIS to concentrate its technical talents and to recover quickly from unexpected implementation errors. The result is problem-free deployment at the customer site. Its high capacity testing and staging laboratory enables VIS to simulate customers' diverse computing environments. VIS has attained success in a concentrated customer base. It needs to focus at these segments to deliver the best implementation services and to maximize its operational and organizational efficiency.

To grow, VIS should continue to focus its service on business critical implementations. Digital's existing global accounts offer untapped potential. VIS should leverage its current customer base to increase its market presence in the telecommunications and financial services sectors. To reach more enterprise customers, VIS needs to mobilize global account managers by evangelizing the whole product concept. Faced with fierce competition in the hardware market, computer makers need to differentiate on superior service and software interoperability. In the long term, hardware sales would increase because of improved customer experiences fulfilled by superb implementation services.

To broaden its customer base, VIS needs to increase its marketing efforts. It needs to leverage Compaq internal account managers as a sales channel to attract more enterprise customers. In

my estimate, VIS would need one person dedicated to develop marketing communication materials - case studies and customer testimonies, one person for market research - identify prospects and research customer needs, and one person dedicated to business development through Compaq account management.

The merger of Compaq, Digital and Tandem has created opportunities to broaden the scope of VIS services in hardware platforms and geographical coverage. VIS needs to take the responsibility to provide customers global implementation support over Compaq's full product line. Technical complexity and cross-divisional collaboration present the greatest challenges.

Besides the above lower volume, higher premium services, VIS service concepts could also be applied in higher volume, lower margin offerings. System order completeness and short order-cycle time are essential components of superb customer services. VIS needs to collaborate with the manufacturing to explore ways of delivering the services more cost-effectively or offering basic manufacturing services at cost. Furthermore, Compaq manufacturing and service organizations need to explore ways to lower the barrier of implementing software applications on the company's enterprise platforms. The operational process of those high volume services will be disruptive to the current VIS operation. A separate organization from VIS will be more effective. Software, services and partnerships will be the leverage to expanding hardware sales into new markets.

Exhibits

Exhibit 1.   *Custom Systems (VIS) in Compaq Organization Chart*
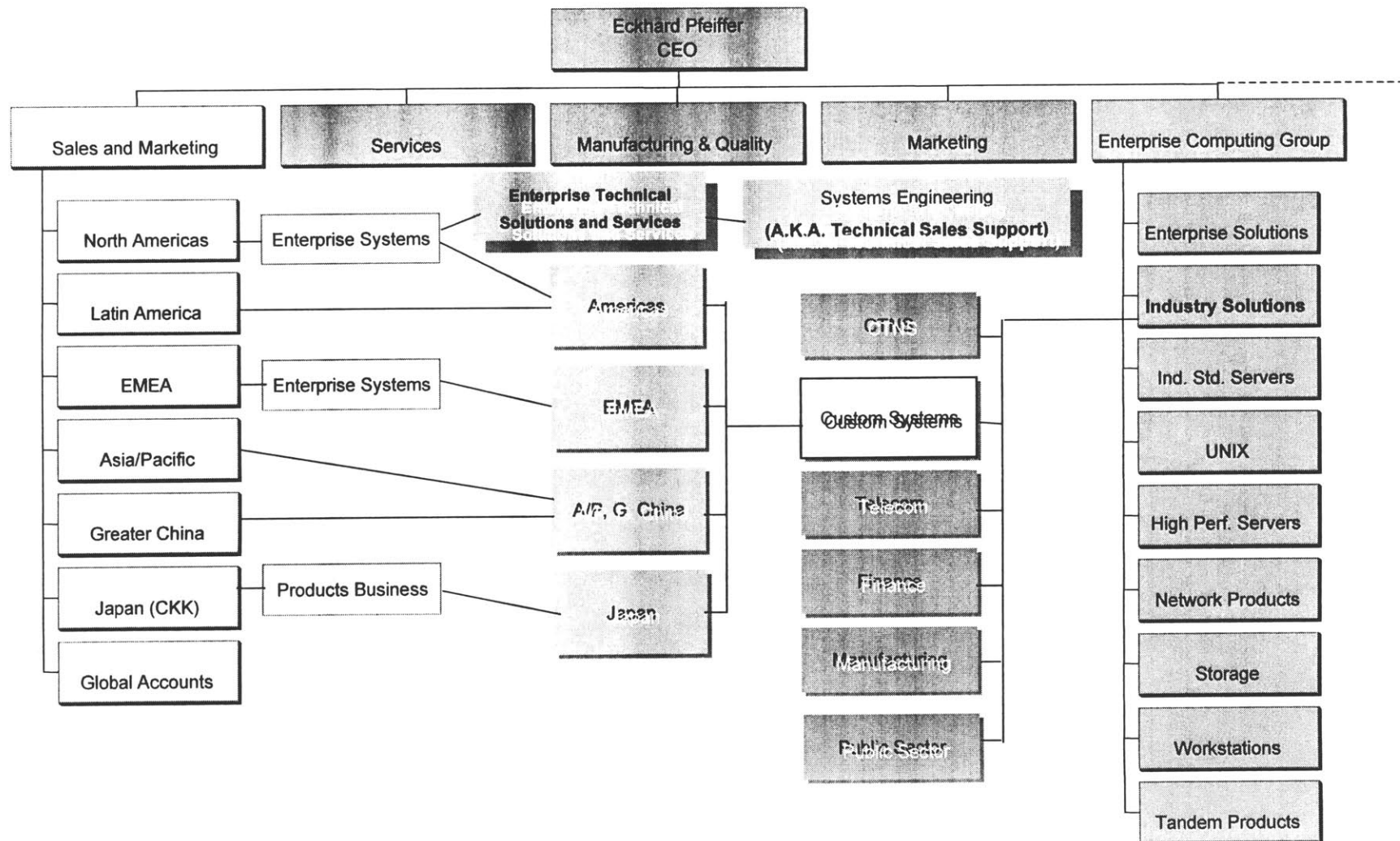
Exhibit 2. **Compaq Manufacturing Services**

Indirect	**Ultimate**	**Direct**
60%	**Customer**	**40%**

Order placed with Channel Partner (CP)

CP Places order w/Compaq

Compaq VMfg. builds system to order

Compaq ships system to CP

CP performs value-added services

Compaq VMfg Performs *some* VAS (Value-added Services)

Order placed with Compaq

Compaq VMfg. builds system to order

Compaq VMfg Performs VAS, e.g. by VIS

Shipment to Customer

VMfg = Volume Manufacturing

Courtesy of Earl Jones, MIT LFM Knowledge Review, January 1999, Cambridge, MA.

Exhibit 3. Computer Market Segments

	1997 Worldwide Computer Market Characteristics				
Segments	Customer	Primary Use	Distribution	Revenue	Price
High-performance Computing	Computer centers	Heavy load data processing	Direct	$17.7B	Above $1M
Enterprise Computing	Medium-large businesses, enterprise MIS	Business processing, decision-support	Direct, indirect[i]	$16.9B	$100K - $1M
High-performance Workstation	Engineering, design staff	Product development, CAD, CAE, data manipulation	Direct, indirect		$6K - 249K
Departmental / Workgroup Computing	Small-medium business units, divisional IT	Local servers of client-server applications	Direct, indirect	$25.8B	$5K - $99K
Business Desktop and Mobile Computing	Individual business users	Business productivity: word processing, information access	Direct, indirect		$3K - $9.9
Personal Computing	Individual consumers	Home computer use, internet access, entertainment.	Retail, mail order.		Below $3K

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[i] Indirect distribution channels include distributors, value-added resellers (VARs), system integrators, and consulting firms.

Exhibit 4. Market Positions of Major Computer Companies

Segments	Relative Market Positions of the Major Computer Companies						
	IBM	FUJITSU	HP	SUN	Digital	Compaq	DELL
High-Performance Computing	+++	++		+			
Enterprise Computing	+++		++	++	+		
High-Performance Workstation	++		++	++	++		
Departmental /Workgroup Computing	++		++	+	+	+++	+
Business Desktop and Mobile Computing	++		++			++	++
Personal Computing	++		++			++	

Exhibit 5.   Compaq Services

Lifecycle Services Portfolio Summary

Increasing Customization ⟶

⟵ Increasing Volume

FutureSourcing SM

Customer Services

Warranty
Warranty extensions and upgrades
Maintenance (H/W & S/W)
Installation
Software Support
Help Desk
Client Services Cards - User Support
Network Support
Standard desktop migration
System performance tuning
Capacity planning
High availability solutions
Guaranteed Uptime/Non-Stop Computing

Network & Systems Integration Services

Architecture & Application Integration
    NT Integration & Migration
    Exchange Integration
    Internet Commerce
    Data Warehouse/Data Mart
    sY2K on Digital Platforms
Internet & Networks Infrastructure
    Network Design & Integration
    Internet Design & Integration
    Enterprise Management Design
    & Deployment
Enterprise Applications Implementation
    and Infrastructure
Industry Solutions
    Telecommunications: Network &
    Service Management, Intelligent
    Networks, Business Support
    Systems
    Finance: Retail & Wholesale
    Banking, Capital Markets
    Manufacturing: Semiconductor
    Automation, Supply Chain

Operations Management Services

Global Enterprise Help Desk
Desktop Outsourcing/PC Utility
Business Continuity Solutions
Network & Systems Management
Internet Infrastructure Operations
Enterprise Messaging
Enterprise Application Operations
Software Publishing Services
Electronic Commerce

Exhibit 6.   Computer Service Market Forecast

U.S. IT Service Market Forecast, Dataquest, 1997		
	1999-2001 CAGR	2000 Market Size (millions)
Total	12.7%	$190,994M
Development & Integration	18.0%	$56,129M
Software Maintenance & Support	17.8%	$15,666M
Hardware Maintenance & Support	6.7%	$27,218M

U.S. Hardware Services Market Forecast, Dataquest, 1997		
	1999-2001 CAGR	2000 Market Size (millions)
Total	6.7%	$27,218M
Mainframe	-15.3%	$571M
Midrange	3.8%	$4,464M
Workstation	4.8%	$1,690M
PC	12.5%	$5,070M
Network	8.5%	$8,953M

N. America Software and Services Market, INPUT, 1998		
	1999-2001 CAGR	2000 Market Size (millions)
Total	16%	$436,879M
System Integration	19%	$34,199M
Application Software	19%	$73,430M
Outsourcing	21%	$62,144M
Equipment Services	0%	$31,622M

Exhibit 7.   Strategic Service Vision Elements

Strategic Elements	Questions to Be Answered	Intent
Target Market Segment	• What are common characteristics of important market segments? • What needs does each have? • How well are these needs being served?	To narrow the market and identify the needs to be served
Positioning	• How does the service concept propose to meet customer needs? • How is the proposed service differentiated from competition?	
Service Concept	• What are important elements of the service to be provided, stated in terms of results produced for customers? • How do customers perceive the service concept?	To define the service that will be highly valued by the customers
Value-Cost Leveraging	• To what extent are differences between perceived value and cost of service maximized by: standardization, customization? • Control of Quality through - job satisfaction, peer group control, involving the customer?	
Operating Strategy	• What are important elements of the strategy, operations, marketing, organization, or human resources? • How will quality and cost be controlled?	To identify strategic leverage points
Strategy-System Integration	• Can the needs of the strategy be met by the delivery system? • To what extent does the coordination of the operating strategy and delivery system ensure: high quality, high productivity, low cost, and high morale and loyalty of employees?	
Service Delivery System	• What are important features of the service delivery system, including: people, technology, process, and tools? • How would customer requirement information be communicated? • To what extend does it help ensure quality, and differentiate the service from competition?	To organize the delivery infrastructure

Excerpt from *Service Companies: Focus or Falter*, William H. Davidow, Bro Uttal, Harvard Business Review, July-August 1989.

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