Market Sizing and Growth Analysis for Multimedia Software

Final Report

Prepared for
GENUS SOFTWARE

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INPUT®

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Table of Contents

* **VISIONARY** is a registered trademark of Genus Software

List of Exhibits

Introduction

A
Background

Genus Software has developed a client/server based software product, **VISIONARY**, which permits the creation of multimedia database applications in multiple industries.

The target market for the initial applications set is the health care industry with specific focus on large hospitals. A completed application would consist of four components.

- Platform server software for database access, retrieval and control functions
- Application server software to provide information to client and to interface with a specific application set
- Platform client software for document digitizing and managing multimedia data types and to provide an application development tool
- Application client software to provide a graphic user interface

The first release of the platform client software will reside in a DOS/Windows environment. The first release of the platform server software is being developed for a fault-tolerant Tandem system offering on-line transaction processing. A demonstration system currently exists and has generated significant interest in the product's potential.

INPUT, a leading market research and consulting firm serving the information services industry, was engaged by Genus to provide an

independent assessment of the product's market potential and competitive environment in the U.S. market.

Although the Genus offering has applicability across many industries the INPUT study focused on assessing the market opportunity for **VISIONARY** in the health care industry (the target market for the initial release). In addition, the study examined the insurance industry as a secondary potential market.

B
Methodology

The following section describes the approach taken by INPUT in assessing market size and growth potential, product functionality, and competitive market structure.

1. Market Forecasts

- INPUT used its existing market forecasts for applications and systems software products as well as industry sector reports to develop the base line market sizing and forecast for both the health care and insurance industries.

- Research from INPUT's client server study was utilized to supplement the information gathered above.

2. Survey Approach

Structured telephone and personal interviews were used as the primary method of gathering detailed information on product functionality and acceptance for the health care product currently under development by Genus. These interviews were completed on November 20, 1991. The interviews were targeted toward top tier hospitals with 500 beds or more.

- INPUT developed an interview guide in conjunction with Genus Software for practitioners and hospital information systems staff pertinent to the study objectives. (A copy of the questionnaire is available in Appendix A.)

- Twenty target (prospect) hospitals were interviewed. In general, respondents were selected on the basis of their knowledge of patient information systems and patient information data base. To the extent

possible, respondents were selected on the basis of their knowledge of multimedia applications in the hospital. Only high level contacts were interviewed, including heads of information management departments and project managers for patient information system.

- Analysis of the survey results was used to prepare the special chapters in this report which focus on the health care offering.

3. Literature Review

Information was drawn from a literature search of INPUT's library and research data bases concerning potential competitors, channels, and driving and inhibiting forces on the potential market.

C
Structure of This Report

This report was intended to capture key findings and recommendations in preparation for a meeting with investors in December 1992. The following topics are covered:

- Market Size and Opportunities
- Key Issues Driving Growth in Patient Information Systems
- Functional Characteristics of the Product
- Barriers to Market Entry and Suggested Strategies
- Competition
- Conclusions and Recommendations
- A Copy of Survey Questions

Executive Summary

Genus Software engaged INPUT to conduct a study based on primary and secondary research to obtain information on the potential market sizes, competition, features and functional requirements of potential buyers and potential barriers to market entry for its **VISIONARY** offering, a client/server based software offering that will permit the development of multimedia data base applications in multiple industries.

The focus of this study was the health care sector where Genus has already developed a detailed product specification addressing hospital needs on an enterprise-wide basis. Although no detailed functional product specification exists at this point in time, INPUT also sized the market for a **VISIONARY** applications offering in the insurance industry in anticipation that it might be a logical industry to target after establishing a sound position in health care.

The results, as summarized in this chapter and further developed in the remainder of this report, are very encouraging. Reaction to the health care specific product was extremely positive and market potential is strong in the two industries analyzed. Furthermore, the window for market entry into health care is good from a timing standpoint.

The remainder of the this chapter summarizes the project objectives, approach, principal findings and INPUT's recommendations.

A
Project Objectives

- Develop an estimate of the current market size and five-year growth potential for the Genus Software product offering derived from existing INPUT data and validated by field research.

- Identify potential competitors who may target Genus Software's target market and offer comments on product positioning.
- Provide recommendations to Genus Software on how to overcome potential barriers to market entry.
- Prepare an objective evaluation of the product and prospects for adoption by target market segments.
- Prepare an objective assessment of how the selection of Tandem as the initial server platform may impact the product's acceptance in the marketplace.
- Obtain potential customer reaction to the product, its features, and functionality.

B
Principal Findings

The findings are organized along the lines of the objectives of the study as presented in Section A. Some additional findings of significant interest are presented at the end of this section.

- ***Market Size and Growth*** - INPUT estimates that the potential market for the Genus' offering in 1992 in the health care industry is **$555** million, and is growing at a compound annual growth rate of approximately 20%. Similar estimates for the insurance industry indicate a market potential of **$535** million in 1992, and a compound annual growth rate of approximately 18%.

  The market for application software products in the health care market is growing at a healthy compound annual growth rate (CAGR) of 13% over the next five years. And an exciting opportunity exists for software products to access the huge installed base of hybrid patient information data bases and deliver access to the endusers via a graphical user interface (GUI).

- ***Competition*** - Genus Software's product **VISIONARY** appears to be very well positioned to take advantage of a clear market opportunity in the hospital environment in the area of patient information systems, and market potential for other industries is quite good based on a market sizing for the insurance sector.

  Although INPUT could identify no direct competitors offering a product with comparable functionality, there are four important categories of potential market entrants that are positioned to offer a product like the one under development by Genus Software. They are equipment manufacturers, professional services firms offering consulting on systems integration and design, software firms offering applications tailored to the hospital environment, and companies offering image management solutions.

- ***Barriers to Market Entry*** - INPUT could identify only three potential barriers to market entry. They are discussed in more detail in Chapter VII. They are as follows: (1) size of the installed base for the Tandem platform, (2) being first on the market with the proposed offering; (3) the ability to provide the professional services necessary to integrate the VISIONARY product with existing in-house systems. INPUT does not believe that any of these poses a significant barrier.

- ***Prospects for the Product*** - Survey results indicate considerable interest in **VISIONARY**'s ability to integrate multiplatform data bases and manage multimedia objects. Several survey respondents expressed interest in receiving more information on the product or seeing a product demonstration. A complete discussion of the survey results, indicating a high level of acceptance of the product's functionality is contained in Chapter VI.

- ***Selection of Tandem*** - Tandem does have a significant installed base in the hospital environment, approximately 225 customers. However, IBM is currently the dominant architecture. INPUT believes, however, that IBM's dominant position is under attack by the shift to client/server environments.

- ***Customer Reaction*** - The reaction of potential customers contacted through the interview process was very positive. As mentioned above, several of the interview respondents indicated an interest in seeing a demonstration of the system. A detailed discussion of the customer response is contained in Chapter VI.

In addition to the finding related directly to the study's objectives, INPUT believes that there are a number of other findings that warrant highlighting in this executive overview.

- Hospital information systems tend to be hybrid systems that are currently shifting from a departmental view of hospital information to a patient-oriented interdepartmental view of information. Current product development in hospitals is focused on patient, management, clinical results, and end-user access to patient records.

- Current market offerings tend to provide single data base software solutions or a hardware systems integration solution solely designed to deliver independent data bases of multimedia information. INPUT believes that there is a window of market opportunity for a product that offers a platform-independent data access tool to integrate patient information systems in hospitals.

- This compelling need for integrated patient information systems appears to be driven in part by efforts to reduce costs and in part by the desire to provide superior service that can act as a differentiator in a competitive market and increase staff efficiency and focus on the patient.

C
INPUT Recommendations

- Market/promote unique product features such as the ability to integrate multiplatform data bases, the ability to integrate multimedia data types, and the use of the client/server model. The field survey indicates that these are all strong selling points that differentiate the Genus offering from anything else currently on the market.

- Have several key hospitals with Tandem machines participate in an alpha test of the **VISIONARY** product.

- Position the product to take advantage of any system integration efforts underway in hospitals.

- Consider marketing **VISIONARY** through professional service firms such as Andersen or outsourcers such as EDS who are increasingly involved in systems projects in hospitals.

- Focus on providing a platform-independent release after the initial target market of Tandem sites has been addressed.

- Conduct additional research on porting the **VISIONARY** server software to alternate platforms, e.g., to Digital Equipment machines because of their installed base in clinical laboratories.

Market Sizing

This chapter analyzes the market size and growth rates for software product offerings with functional characteristics similar to those of the Genus product **VISIONARY**. Specific market sizings were developed for both the healthcare and insurance industry utilizing information and data published as part of INPUT's U.S. Information Services Market Analysis Program. The specific publications from which data were derived are:

- *Industry Sector Markets 1992 - 1997, Insurance Sector*
- *Industry Sector Markets 1992 - 1997, Medical Sector*
- *U.S. Applications Solutions, 1991 - 1996*
- *U.S. Systems Software Products Market, 1991-1996*

Section A presents the results of the analysis for both the health care and insurance industries. Sections B through F show how that market size was determined using the information from INPUT's U.S. Information Servies Market Analysis Program.

A
Market Potential for VISIONARY

INPUT estimates that the total market potential for products with functionality similar to **VISIONARY**'s in the U.S. health care and insurance markets was just over $1 billion dollars in 1992. Furthermore, growth rates for the combined market should approximate 18% to 20 % over the next four years, taking the potential market to above $2 billion by 1996.

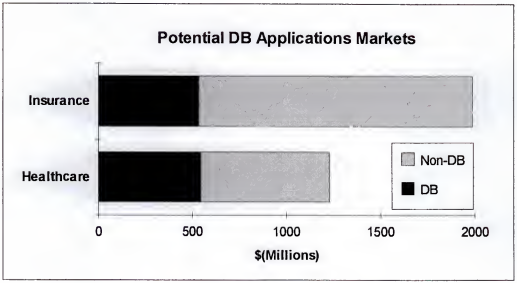
It should be emphasized that market potential is not equivalent to market share or penetration. The estimates presented below, and in the remainder of this chapter, deal with market potential not market share. Market share will be a function of how quickly and effectively Genus is capable of establishing a leadership postion in each industry. Nevertheless, INPUT believes that the market prospects are very good for the **VISIONARY** product.

- For the health care market, INPUT estimates the potential market size of $555 million represents 44% of the total expenditures on data base and related applications software for 1992.

- For the insurance industry the comparable figures are $535 million, representing 27% of the potential market.

Exhibit III-1 shows the portion of the total market for data base and related applications software products in the U.S. for both health care and insurance that the **VISIONARY** product could penetrate.

Exhibit III - 1



B
Market Sizing Methodology

To determine potential market sizes (levels of user expenditure) for **VISIONARY** for both health care and insurance markets, a top-down approach was used.

- Starting with the total market for U.S. software products, the market size for all industries was factored down to the class of products having functional capabilities similar to those of **VISIONARY**.

- Once the market size was established for the Genus product, the market size was adjusted by industry to obtain the specific sizes and forecasts for health care and insurance.

C
U.S. Software Products Markets

The total user expenditures for applications and systems software products in the U.S. in 1992 are estimated by INPUT to be $42.3 billion. Of that total, an estimated $19.9 billion will be spent this year by users of systems software products, the remainder, $22.3 billion, on applications software products..

Under INPUT's market segmentation scheme, some components of the Genus product would be classified as a systems software product, and other portions as an applications software product. In the analysis that follows, both markets are taken into consideration.

- The underlying data base platform for both the client and server portions of the product falls into the System Software Products segment.

- The applications functions associated with the health care-specific and insurance-specific software fall into the Applications Software Products segment.

To provide a context for understanding the market potential of the product Exhibit III-2 shows the 1992 estimated user expenditures for both classes of software products across major platforms and all industry segments.

EXHIBIT III-2

Systems Software Products 1992 Market Estimates (U.S.)

Market Segment	1992 Market $(Millions)	Market Sub-Segment	1992 Market $(Millions)
Systems Software Products	19,960	Mainframe	9,140
		Minicomputer	6,520
		Workstation/PC	4,300
Applications Software Products	22,350	Mainframe	5,630
		Minicomputer	6,290
		Workstation/PC	10,430
TOTAL	42,310		42,310

(To ensure consistent interpretation of the numbers, INPUT's definitions of each of these markets, segments, and subsegments has been provided as a separate document.)

INPUT further breaks down the major category of Systems Software products by the type of functionality provided. Three categories are tracked on an on-going basis. They are systems control products (operating systems, etc.), operations management tools (data center, network management, etc.) and applications development tools.

The data base management portion of the Genus product falls into the last category, of applications development tools. A segmentation of the systems software products market indicating the sizes of the various subsegments by platform for 1992 is shown in Exhibit III-3. The shaded cells in the exhibit indicate the 1992 estimates of market sizes for products of the same general class as Genus' across all industry groups. They total $4.4 billion.

EXHIBIT III-3

Systems Software Products 1992 Market Estimates (U.S.)

Market SubSegment	1992 Market $(Millions)	Platform Segment	1992 Market $(Millions)
Systems Control Products	7,500	Mainframe	3,240
		Minicomputer	2,420
		Workstation/PC	1,840
Operations Management	4,570	Mainframe	2,440
		Minicomputer	1,510
		Workstation/PC	620
Applications Development Tools	7,890	Mainframe	3,460
		Minicomputer	2,590
		Workstation/PC	1,840
TOTAL	19,960		19,960

D

U.S. Market for Database Software

The $4.4 billion market calculated in the previous section *(applications development tools)* includes data base, CASE, fourth generation languages, compilers and other software products used to generate applications. **VISIONARY** falls into the data base category.

INPUT's market research indicates that approximately 47% of all user expenditures for applications development tools fall into the category of data base products across all industry sectors. This would indicate a total potential market for products similar to the **VISIONARY** data base platform of approximately **$2.1** billion.

E

1992 Market Size for VISIONARY - Health care

Thus far we have discussed market sizes for data base offerings across all industries; i.e., nothing has been said about the specific opportunities in health care or insurance. To obtain an estimate of the potential market in 1992 for a health care specific offering of the Genus product it is necessary to consider the potential for both the data base platform component and the health care applications component of the market.

1. Data base Expenditures for Health care

- INPUT's research indicates that the health care industry expenditures for software products are approximately 5% of the total market.

- As indicated in Section D the total expenditures across all industry for database-related systems software will approximate $2.1 billion for 1992.

Thus INPUT estimates that the potential market for the data base component of **VISIONARY** for the health care product to be 5% of the $2.1 billion or approximately $105 million in 1992.

2. Applications Software Expenditures for Health care

As indicated in Exhibit III-2 the total market for all industries for applications software products is estimated to be $22.3 billion in 1992. Of this total $1.125 billion will be spent by the health care industry. INPUT's research indicates that approximately 40% will be spent on applications of the type under development for the **VISIONARY** offering. Thus, INPUT anticipates a potential market for the applications software product component of the Genus offering to be approximately $450 million.

3. Total 1992 Market for VISIONARY - Health care

Based on the above analysis, INPUT estimates that the potential market for the Genus' offering in 1992 in the health care industry is the sum of the applications and systems software component markets, or **$555** million.

F

1992 Market Size for VISIONARY - Insurance

Calculation of the market size for the insurance sector can be made using the same approach.

1. Data base Expenditures for Insurance

- INPUT's research indicates that the insurance industry expenditures for software products are approximately 8% of the total market.

- As indicated above the total expenditures across all industry sectors for data base-related systems software will approximate $2.1 billion for 1992.

Using the same calculation as in Section E, INPUT estimates the potential market for the data base component of a **VISIONARY** insurance product to be 8% of the $2.1 billion, or approximately $170 million for 1992.

2. Applications Software Expenditures for Insurance

Of the $22.3 billion spend on applications software products in 1992 INPUT estimates that $1.819 billion was spent by the insurance industry. INPUT's research indicates that approximate 20% of these expenditures will be spent on applications that would be best built using a multimedia data base approach. Therefore, INPUT estimates that a potential market for a set of insurance applications products comparable to those under development for health care would have had a market potential in 1992 of approximately $365 million.

3. Total 1992 Market for VISIONARY - Insurance

Based on this analysis, INPUT estimates that the potential market for the Genus' offering in 1992 in the insurance industry is the sum of the applications and systems software component markets, or **$535** million.

G

Potential Market Growth

In addition to both industries having a large market potential in 1992, the prospects for growth over the next four years are good.

- INPUT forecasts that overall user expenditures by the health care industry for software products will grow at an average compound annual growth rate of 16% between now and 1996.
- The comparable growth rate for insurance will run at a compound annual growth rate of approximate 15%.
- The client/server components (Mini/PC/Workstation subsegments) of the software products market in both industries will likely grow at a compound annual growth rate of 20% or greater.

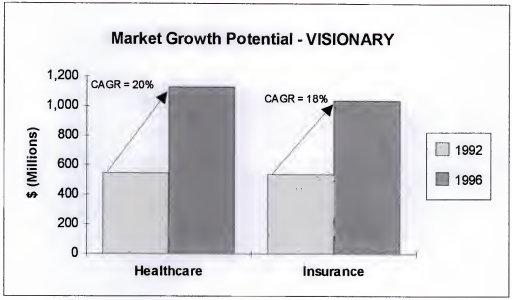
For the next several years it is likely that the adoption of client/server platform by health care industry will proceed at a faster rate than in the insurance industry. INPUT estimates the growth potential for health care to be in the 20% range and approximately 18% for the insurance industry. If these estimates are correct, the current combined market of $1,080 million will grow as follows:

- Healthcare from $555 million to $1,151 million (20%).
- Insurance from $535 million to $1,037 million (18%).
- Combined insurance and healthcare from $1.09 billion to $2.19 billion.

Clearly the market potential for applications in these two industries with the capability to integrate multiple data bases in the multimedia environments is substantial.

Exhibit III-4 shows the potential market growth for both industries over the four-year period.

EXHIBIT III - 4



Key Issues Driving Growth For Patient Information Systems

It is the consensus of survey respondents that the development of an integrated multimedia patient information system must take place in the next two years to support long-term real-time patient care. The demand for patient information is being driven by the need to control medical costs and to improve patient care. Improvement in patient care is imperative for hospitals to respond to competition in the market. Patient management and patient insurance information are of no less interest or importance to practitioners than chartings and clinical diagnostic results. In short, hospital information systems are shifting from primarily providing a departmental text-based view of information to focusing on developing a patient-oriented view of hospital information.

A
Drives to Control Medical Costs

By far the most significant factor affecting today's health care industry overall is the multifront drive to control the rising costs of medical care. The major drivers of rising medical costs are the increasing use of sophisticated medical technologies for diagnosis and treatment and the addition of costly procedures such as organ transplants.

The one-year increase in medical expenditures from 1990 to 1991 will be 11.9%, far outstripping the inflation rate. Total health care spending approaching two-thirds of a trillion dollars today represents over 12% of the 1991 U.S. gross national product. National health care expenditures will cross the trillion dollar mark by 1995, growing to approximately $1.4 trillion in 1997 according to Department of Commerce figures.

Surprisingly, some industry observers believe that as much as 30% of all medical care in the United States is unneeded. This percentage explains the observation that the most effective action an employer can take to control costs is to require precertification for nonemergency medical treatment. In addition, there is a growing trend toward medical cost management, whereby the insurer works with the hospital to manage the employee's treatment, shorten the stay and minimize tests and treatment. Thus, increasing operational efficiency is a key competitive issue for the hospital.

B

Nationwide Movement to Manage Patient Information Systems

The use of information technology to improve the quality and delivery of patient care is spurring a movement to develop industry-wide standards for computerized patient records. Health organizations need to provide caregivers with bedside and remote integrated access to patient's records, and to allow for communication of patient information (including image transfer) between health care departments, facilities, and treatment sites.

C

System Integration of Patient Information

INPUT's research indicates that the systems integration required for patient information management poses a significant development challenge for hospitals and a significant opportunity for hardware and software vendors because:

- Internal hospital information systems functions are usually underbudgeted and understaffed.
- There is an established tradition to look outside for packaged solutions whenever possible.

The survey results indicate that virtually every institution was focusing on the integration of systems supporting patient care in the next 12 months. Two of the survey respondents indicated that they believed that the solution to their integration problems concerning patient information systems might be best handled by a consortium of hardware, software, and system integrators.

Opportunities in Patient Care Information Systems

INPUT's research indicates that the implementation and interconnection of effective and efficient patient care systems is a key issue and challenge facing most of today's hospital administration and information systems organizations. The key opportunities for vendors in patient information systems relate to the ability to provide integration (through a combination of hardware and software) of multimedia data bases of patient information. Putting the complexity of this task aside, the second biggest challenge is to make the interface between the enduser and the system graphical and intuitive to use.

A
Electronic Charting

Charting, the recording of a patient's vital signs, care plan, and treatment records, has always been a problematic issue for most health care professionals. Illegible writing, lapses in chart information, and the time and attention required to manually record information are problems associated with charting on paper.

Electronic charting would solve some of these problems. The electronic capture of sensor readouts to produce data for a computerized chart and the capability to integrate these with other records is key. Advanced display systems would permit viewing of clinical results or patient records.

In 1989, Medicare started requiring full documentation of physician-provided care, accelerating the demand for electronic charting systems. This requirement has driven the need for integrated patient treatment information.

B

Systems Use of Electronic Patient Information Systems

As in many industries there has been some resistance by professionals (doctors are notorious) to accept the use of some types of information systems. Though there is a ready acceptance of accounting and billing performed by administrative staffers, physicians are resistant to using the systems to do the data entry themselves. Nurses, however, gain major efficiency benefits as the tedious task of end-of-shift documentation gets shifted to electronic systems.

Factors likely to be key to the physician's acceptance of new patient care information systems include remote access to medical records and consistent demonstration that the technology provides fast response time.

C

Flexible Distributed Access Across Networks

There is an increasing demand for distributed access to patient information; enabling physicians to check a patient's status or to fine tune care instructions from a remote location. Typical applications enable a professional or doctor to :

- review clinical results for a patient diagnosis without leaving the care unit;
- change care from a bedside unit rather than from a phone at the nursing station.

Hospitals are currently installing networks to connect multiple, independently developed systems. Patient care systems will be most effective when they connect clinical results from departmental systems such as pharmacy and radiology systems to the bedside for physician use in making diagnoses.

D

Mixing Data, Charts, and Images

Mixing wave form, image, and text/data records, such as standard forms, is a key objective of distributed patient information systems.

Another issue for patient care information systems is the extent to which they will support the access to, and integration of, images and multimedia data types including X-rays or CAT scans, wave form records of vital signs, scanned images of text records, and voice annotations.

Although radiology technologies that record, store, and display images digitally are becoming common, it is unclear how this information will be integrated with other patient information and delivered across networks and to the bedside.

E

VISIONARY's Positioning Regarding the Opportunities

INPUT believes that the functional capabilities of the **VISIONARY** product are extremely well positioned to leverage all the opportunity areas discussed above. The underlying technology is clearly capable of assembling and integrating information from the installed base of text and multimedia systems; and is well positioned to deal with future requirements including the management of voice annotation, etc.

Analysis of Survey Results

The user survey of hospital management was focused on addressing two key questions.

- What were hospital's information systems plans for dealing with patient information systems?
- Did the **VISIONARY** software product address market needs?

A
Development Plans for Patient Information Systems

The following findings highlight key points from the hospital survey responses concerning hospital information systems development plans.

- Hospital systems were primarily described as hybrid systems, which meant a mixture of platforms for server and client stations.
- Hitachi Data Systems And DEC VAX were two systems primarily mentioned in relation to clinical results.
- Tandem Computers were in approximately 45% of hospitals surveyed.
- 100% of hospitals had LANs or WANs.
- 60% of survey respondents were planning or had implemented fiber optic networks.
- Integrated results reporting was planned by 80% of the respondents for patient information systems planned in the next 12 months.

- Patient care issues strongly affect information technology planning for 85% of survey respondents.
- For several hospitals dual data centers were managed to give the effectiveness of on-line transaction processing environment.
- Large hospitals can have up to 13,000 terminals/PCs served on their networks.
- Typically in the past information systems were developed for "back office" functions and on a departmental basis (for example the clinical lab system separate from the patient management system).

B
VISIONARY Product Functionality

This section offers some overall responses and reactions to the Genus product offering for enterprise-wide patient information systems.

- The product description was right on target, addressing respondents key concerns for interactive access to distributed databases.
- All respondents in hospital information systems departments had the integration of images and text scheduled to be under way in the next 12 months.
- Patient information systems allowing end-user access to all patient information were at the top of the development list for all respondents.
- The client/server approach was very important to majority of respondents.
- Some reservations were expressed in terms of physician acceptance of greater interaction with the computer ("clerical work").
- One respondent mentioned that terminal technology was not currently sophisticated enough for bedside patient care systems, a minimal issue since **VISIONARY** addresses enterprise-wide information systems requirements.

C
Desired Product Specifications

The following specifications were derived from interviewee responses to the Genus product description.

1. Configuration

- Multiple platforms must be supported.
- All departments must be linked on a network, including clinical results pharmacy, etc.
- Off-site access is important for physicians.
- Multiple types of servers; including Apple, IBM PCs, and Sun Workstations must be supported over time.
- A solid interface to all patient information systems is necessary.
- The capability to handle new voice and wireless transmission technologies should be built in.
- Data encryption and other security features should be built in to protect patient confidentiality.
- Must support HL-7 standards.

2. Applications Features

- All patient information should be seamlessly linked.
- The offering should support the reduction of duplicate tests.
- Patient data accuracy and integrity is extremely important.
- The ability to link with existing applications is imperative.
- Modularity and expandability are critical.

3. Interfaces

- A graphical user interface is imperative.
- The product must be intuitive enough so that it is easily operable by nonsophisticated users.
- Provisions should be built in to accommodate alternative input devices; including light pens or voice activation, etc.

4. Ease of Use

- End-user training requirements should be minimal.
- As mentioned in Section C-3, multiple methods of input and control should be available in the long term (light pens, voice, mouse, etc.).

INPUT believes that the field survey data confirms the fact the **VISIONARY** definition of product functionality is in congruence with current and longterm user requirements.

Barriers to Entry

Entry barriers exist for all new software products. Platform selection, market strategy including alliances and channels, timing, packaging and, of course, functional capabilities all make a difference. This chapter gives INPUT's views on key barriers to entry for Genus' proposed offering, and recommends approaches to minimize the risks.

The primary barriers to entry for the **VISIONARY** product offering are as follows:

- Initial platform selection (Tandem)
- Timing and potential competitive offerings
- Systems integration capabilities

A
Initial Platform Selection

The selection of Tandem as an initial platform for the implementation of the client side of the **VISIONARY** product has both advantages and disadvantages. Some of the advantages are discussed below.

- Tandem has differentiated itself in the market on the basis of its "non-stop" on-line transaction processing and is known as a quality provider of hardware and operating systems.

- In addition, Tandem's industry marketing organization can support field sales of the **VISIONARY** offering in a number of vertical industries including health care and insurance.

- As discussed earlier, Tandem has approximately 225 installations worldwide and 125 in U.S. medical institutions, creating a logical target for an initial marketing thrust.

However, even though Tandem has over 225 hospital installations, it is not the dominant player in the hospital and laboratory systems environment. IBM and DEC both have strong footholds. Hewlett-Packard has a strong position in the area of critical care applications.

INPUT believes that the selection of Tandem does not provide a significant barrier. The **VISIONARY** product is designed to interface with virtually all dominant hardware architectures, including HP, DEC and IBM. Promoting this interfacing capability and focusing initially on institutions that already have Tandem installed should more than buy enough time for Genus to port the product to one of the other dominant architectures. As pointed out in the next chapter, Hewlett-Packard and/or IBM may be high potential partners, not just a competitive threat.

Finally, the big systems integrators and outsourcers may have an interest in funding the porting of **VISIONARY** to other platforms to support their individual systems integration strategies.

B

Timing and Competitive Offerings

As pointed out earlier, INPUT was unable to identify an offering currently on the market that would directly compete with **VISIONARY**. Pieces are there, but nothing offers the level of integration or has the potential for enterprise-wide solutions that can be provided through **VISIONARY**. However, the demand for a product of this type in health care is significant (as documented through the interviewing process). The industry is a primary target for major vendors of hardware, software, and systems integration services. EDS, Andersen, other consulting firms, and most major hardware manufacturers are, or are planning to, develop products to address the kind of functionality that **VISIONARY** will provide.

The potential barrier for Genus is simply whether the firm can beat some of these bigger organizations to the market. INPUT believes that with adequate funding and some proper alliances Genus is excellently positioned to get to the market *first* with a truly first class product. However, timing delays due to funding, or other development delays that result in significant

postponement of market entry could give potential competitors the lead time they need. The "window of opportunity" is **now**.

C
Systems Integration Capabilities

INPUT's research shows that users want to buy total solutions to their applications needs, i.e., they are looking for a turnkey approach to solving their particular applications requirements. This trend is stronger in some industries than others. In health care, in particular, the trend is very pronounced due to lack of in-house capabilities to develop customized solutions and a lack of general interest in technology for technology's sake.

One of **VISIONARY**'s unique features is its ability to integrate multimedia data from existing installed systems to provide meaningful information management for patient care. However, in order to be able to do this, some customization of the product will be required for each installation. At present, Genus does not have the professional services staff required to deal with these custom efforts while continuing to expand its market penetration.

This potential barrier is easily overcome through appropriate alliances with systems integrators and/or professional services firms. Over time, Genus may elect to build its own in-house professional services organization to respond to systems integration requirements. But in the meantime, a strong alliance with either a hardware vendor, systems integrator or professional services firm that has a focus in health care (or insurance) would be ideal.

Competitors

It should be emphasized that INPUT did not find any entries into the health care market with products comparable to **VISIONARY**. However, there are four important categories of potential market entrants that are positioned to offer a product like the one under development by Genus.

- Computer equipment manufacturers
- Consulting firms offering design and systems integration services
- Applications software products vendors
- Providers of image management equipment and solutions

Each of these classes is discussed below.

A
Equipment Manufacturers

1. Digital Equipment Corporation

DEC is positioning itself to allow distributed multimedia applications to operate on its networked machines. DEC hopes to wrest market share from rivals IBM and Apple in the next generation of multimedia systems by developing systems that leverage a company's installed resources. These new systems would contribute to organizational productivity by delivering multimedia information across a network. DEC has also allied itself with several multimedia start-ups, like Fluent Technology, to develop and market multimedia products.

2. Hewlett-Packard Corporation Medical Products Group

Hospitals are implementing Hewlett-Packards Carevue 9000, an integrated client/server system to monitor patient vital signs and automatically maintain records. This bedside point-of-care system, links nurses, physicians, pharmacists, and other caregivers to each patient in the ICU unit. The system utilizes a graphical user interface that allows nursing staff to enter vital signs and freeform comments. The Carevue 9000 operates on HP 9000 reduced-instruction-set computing (RISC) workstations, connected via ethernet LAN to two HP 9000 730 file servers. The system utilizes the HP-UX operating system. The dual servers offer system redundancy. HP has implemented the HL-7 standard to facilitate communication with non-ICU hospital systems.

HP clearly has a leading edge with regard to critical care applications, but is not nearly so strongly positioned in patient management systems on an enterprise-wide basis. If they develop this capability on their own, they could be a strong competitor to Genus. On the other hand, there may be an opportunity for Genus to ally with HP in this area.

B
Professional Services Firms

1. Bell Atlantic Systems Group

This division of Bell Atlantic offers software and systems integration services. Bell Atlantic Systems Group recently designed and installed a dedicated fiber optic network for the Group Health Association, an HMO in Washington, D.C. The network enabled their radiologists at their main facility to view ultrasound examinations at their remote clinics. This entailed sending full-motion video images to be viewed on high-resolution monitors. Bell Atlantic is also an imaging VAR (value added reseller) for Filenet Corporation.

Though strong in managing the distribution of images across networks, Bell Atlantic has not yet exhibited the ability to address integrated access to multimedia or multiplatform databases. Without these capabilities in place, Bell Atlantic is not currently a direct competitor.

2. IBM Integrated Systems Solutions Corp. (ISSC)

ISSC has signed a long-term agreement to run a shared data center for Health Dimensions Inc. (HDI) of San Jose, CA. Five hospitals are involved. ISSC will manage the data center operations, network operations, and handle a help desk for end-users.

In addition ISSC has teamed up with Policy Management Systems and Blue Cross/Blue Shield of New Jersey to offer health care systems services that deploy image processing workstations, high-speed scanners, and optical storage.

3. Humana Information Systems Services Firm

In August 1992, health care giant Humana created a new service company by spinning off its internal information systems management function. The new company will target hospitals for management of clinical information systems, quality assurance, and technology assessment. The company will begin with contracts from Humana, but will not be prohibited from seeking contracts with competing health care firms.

Humana offers competition to Genus in both the health care and insurance sectors. Humana plans to implement a UNIX-based document imaging systems with Image Business Systems Corporation in 1993.

4. Nynex Corporation

Nynex has announced that in the 1990s the company will move into outsourcing and systems integration projects, focusing on applications maintenance. The company also plans to forge alliances to develop multimedia applications for hospitals and government and educational institutions.

C

Application Software Firms

1. TDS Healthcare Systems

TDS develops and markets the TDS 7000 Series Hospital Information System, which includes software applications for patient administration and care, medical records, accounting, and decision support. TDS is operating the new hybrid medical information system for the Veteran's Administration hospitals, combining a commercial system with the DHCP system developed internally at the Veterans Administration.

2. Medic Computer Systems, Inc.

Medic addresses the physician practice management market of approximately 190,000 group practices, which will spend approximately $1.5 billion in 1992 on information systems. Medic is well positioned in a competitive market where the growing sophistication of the larger group practices is shrinking the field to just a few vendors.

The company's newest product is a medical records system that will allow physicians to record information observed and noted during patient visits and to link it to the other patient information systems.

3. Oracle Corp.

Version 7.0 of the Oracle RDBMS operates in a client/server environment. A MPP (massively parallel processing) license is available, offering extremely high on-line transaction processing rates on MPP machines. The software also acts as a cooperative server, providing transparent access to distributed data. Applications in the medical field are undoubtedly forthcoming.

4. Shared Medical Systems

Shared Medical Systems (SMS) was one of the 1992 Datamation 100 Companies with revenues up 8.8% . SMS is the leader in medical information systems with 1991 information system revenues approaching $440 million. SMS is positioning itself to lead the industry in three key technologies in the 1990's.

- LAN communication technologies to integrate existing departmental computer systems and newly installed systems
- The application of image processing technology in clinic diagnostic departments.
- Finally, SMS is committed to the use of RDBMS systems to promote interdepartmental use of information.

D
Image Management Companies

1. Siemens Gamasonics Inc. Hoffman Estates, IL, and Loral Corp.'s Western Development Labs

This partnership will install diagnostic image management and storage systems, known as Medical Diagnostic Imaging Support (MDIS), in military hospitals. MDIS will digitize, process, store, and distribute in electronic form radiology images, such as X-rays, currently stored on film. MDIS will also help hospitals communicate this data to other hospitals and institutions over a variety of available communications channels.

2. Filenet Corporation

Filenet is building a network of value-added resellers to penetrate the health care marketplace. This company is one of the market leaders in document imaging systems for both health care and insurance. Several Blue Cross/Blue Shield companies and Memorial Sloan Kettering Hospital are already capturing at admission all document-based patient billing and collection information via Filenet systems and software.

3. Phillips

In 1992, Phillips devoted considerable attention and resources to the development of new systems in digital imaging. These systems are designed to support the integration of patient diagnosis and treatment data.

4. Conclusions - Image Management Companies

In general image management firms play a second tier in the market. They cannot deliver the integration necessary to provide the enterprise-wide solutions of the Genus offering. However, they could, through alliances with other firms, have an influence on the standards, hardware, and technology in the market.

Conclusions and Recommendations

Conclusions and recommendations have been presented throughout the report. This chapter summarizes and in some cases expands upon the material presented earlier.

A
Conclusions

The conclusions presented in Chapter II- Executive Summary, are summarized below. These are followed by some additional conclusions developed as a result of the field survey work in health care.

- ***Market Size and Growth*** - INPUT estimates that the potential market for products in the class of the Genus' offering in 1992 in the health care and insurance industries to be just over $1 billion. That market can be expected to grow at a rate of between 18% and 20%. Furthermore, field research focused on the health care industry indicates that an exciting opportunity exists for software products to access the huge installed base of hybrid patient information data bases.

- ***Competition*** - **VISIONARY** appears to be very well positioned to take advantage of a clear market opportunity in the hospital environment in the area of patient information systems, and market potential for other industries is quite good based on a market sizing for the insurance sector. INPUT could find no direct competitors for the market but believes that other firms are positioning themselves with various types of offerings to tape the market potential.

- ***Barriers to Market Entry*** - The barriers to market entry, discussed in Chapter VII do not pose a significant obstacle provided Genus gets proper funding and moves quickly to market entry with appropriate alliances.

- ***Prospects for the Product*** - Survey results indicate considerable interest in **VISIONARY**'s ability to integrate multiplatform data bases and manage multimedia objects.

- ***Selection of Tandem*** - Tandem has a significant installed base in the hospital environment, approximately 225 customers. However, IBM is currently the dominant architecture. INPUT believes, however, that IBM's dominant position is under attack by the shift to client/server environments.

- ***Customer Reaction*** - The reaction of potential health care customers contacted through the field survey was extremely positive.

Other conclusions drawn from the interview process are as follows:

- The majority of interview respondents from hospitals had the development of integrated patient information systems at the top of their applications development list for 1993.

- The majority of hospitals must deal with multiplatform patient information systems.

- All respondents are planning or developing ways to integrate multimedia data types.

- **VISIONARY** product specifications seem well designed to meet patient information systems needs in medical centers.

B
Recommendations

- Market/promote unique product features such as the ability to integrate multiplatform data bases, the ability to integrate multimedia data types, and the use of the client/server model. The field survey indicates that these are all strong selling points that differentiate the Genus offering from anything else currently on the market.

- Have several key hospitals with Tandem machines participate in an alpha test of the **VISIONARY** product.
- Position to take advantage of any system integration efforts under way in hospitals.
- Consider marketing **VISIONARY** through professional service firms, such as Andersen or outsourcers such as EDS, who are increasingly involved in systems projects in hospitals.
- Focus on providing a platform-independent release after the initial target market of Tandem sites has been addressed.
- Conduct additional research on porting the **VISIONARY** server software to alternate platforms; e.g., to Digital Equipment machines because of their installed base in clinical laboratories.

Survey Information

Appendix A contains:

- Company Name List of Survey Respondents
- Copy of the Genus Software Survey

Survey Respondent Names

1. Kaiser Foundation Health Care Plan - *Walnut Creek, CA*
2. Rush Presbyterian St. Lukes Medical Center - *Chicago, IL*
3. Department of Veterans Affairs Washington Information Systems Center - *Silver Springs, MD*
4. Mayo Clinic - *Rochester, MN*
5. Cedar Sinai Medical Center - *Los Angeles, CA*
6. Alta Bates Hospital - *Berkeley, CA*
7. Center for Medical Informatics at Columbia Presbyterian Medical Center - *New York, NY*
8. UCLA Medical Center - *Los Angeles, CA*
9. Kaiser Hospitals - *Walnut Creek, CA*
10. Sharon Regional Health Systems - *Sharon, PA*
11. Yale University Hospital - *New Haven, CT*
12. UCSF Medical Center - *San Francisco, CA*
13. Washington University Barnes Hospital - *St. Louis, MO*
14. Vanderbilt University Medical Center - *Nashville, TN*
15. Massachusetts General Hospital - *Boston, MA*
16. University of Colorado Medical Center - *Denver, CO*
17. Shands Hospital - *Gainesville, FL*
18. LDS Hospital - *Salt Lake City, UT*
19. Intermountain Healthcare - *Salt Lake City, UT*
20. Rex Hospital - *Raleigh, NC*

GENUS SOFTWARE SURVEY
for Hospital Interviews

October 1992

1) Professional Position

Nurse _____ Doctor _____

Information Systems
CIO
IS Manager ___

OTHER: _____

2) Number of Beds in the Hospital (Circle One)

0-199

200-499

500-999

> 1000

3) Multiple Site Facility

YES_____ NO_____

4) Ownership of Hospital

Religious _____

Voluntary/Public _____

Non-Profit _____

Investor _____

5) How do you perceive your organizations use of IT?

Trendsetter_____

Average_____

Follower_____

6) How do patient care issues affect your IT planning?

Strongly _____

Somewhat _____

Not at All _____

7) **What is your primary information systems strategy?**

Single Vendor_____

Open systems_____

Hybrid_____

Other_____

8) **Is there a network is use?**

WAN or a LAN? _____ Fiber optics? _____

Is it internal only?

How many servers _____ Client terminals/PCs _____

How many terminals/PCs per server on average? _____

9) **Are there any network transactions done with vendors?**

_____
_____
_____

10) **Which platforms need to be supported in your organization?**

Server:		Client:	
DEC	_____	Apple	_____
Tandem	_____	Macintosh	_____
IBM	_____	IBM PC	_____
HP	_____	SUN	_____
Hitachi	_____		

Others:_____

11) **What applications development will be developed in the next 12 months?**

a-Currently under development (UD)
b-Planned
c-Specifications underway
b-Testing Stage

Patient scheduling_____

Clinical Results_____

Case Management_____

Ad Hoc Querying_____

Charting_____

Care Planning_____

Medication Administration_____

Orders Management_____

Results reporting_____

Patient profiles_____

12) How would you rate the importance of distributed database access for internal database? (1-5, 1 is most important)

1(Very Important) 2 3 4 5(not important)

Why/Why Not?

13) Does your organization plan to offer multiple database access for patient information in the next two years?

No Yes

If NO, why not, or when will it be offered?

14) Do end-users currently have access to patient information of all kinds?

Clinical?_____

Patient Records_____

Insurance Info._____

Medication_____

Other:_____

15) What is the best way to access information for the end-users in your organization?

Mouse_____

Touch Screen_____

Pen_____

Voice_____

Not sure yet_____

16) Are you planning for the use of multimedia data?
(Multimedia would include images, text, and voice)

If yes, what are the plans and when?

_____
_____

17) What kind of data will you need to store and retrieve in addition to text?

IMAGES:

VOICE:

OTHER:

18) Are you aware of any products that offer platform independent database access for hospitals?

19) Are you aware of any database tools that allow access and retrieval of multiple types of data?

**20) A description of the Genus Solution has been faxed to you,
please describe your opinion of the importance of the product specification on the second page.**

Background/U.S. Hospital Services

The following information is provided to give a brief background on the size and structure of U.S. hospital services.

In 1991, there were 6,821 hospitals in the U.S. with a total of 1,282,800 beds. Hospital-based medical services in the U.S. are provided in one of four organizational settings. Investor-owned or proprietary hospitals generally are affiliated with a major national chain or regional chain of hospitals, operate as businesses on a profit-and-loss basis, and show widely ranging levels of central or decentralized control of operations.

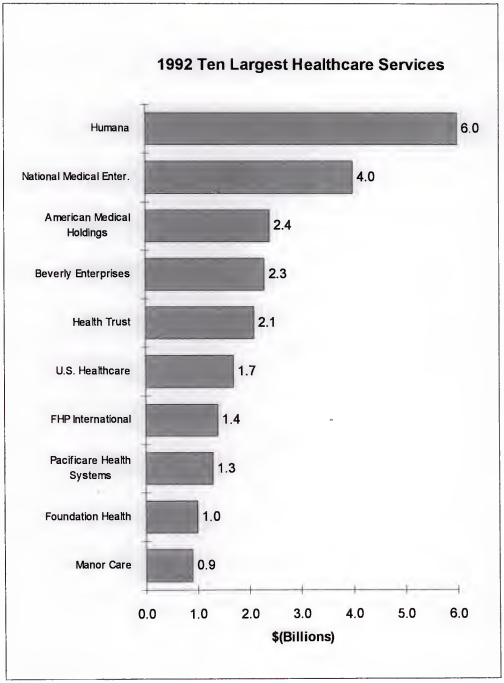
Secular not-for-profit hospitals most often are independent and local nonprofit community service institutions. Catholic and other religious hospitals are also nonprofit institutions and operate with church affiliations that may impact services offered.

Public hospitals are most often city- or county-based and generally operate as nonprofit institutions within the city or county governmental structure. About 50% of the United States 6,821 hospitals are nongovernmental nonprofit hospitals, over 15% are proprietary, and the rest are public hospitals, many in rural locations.

To provide some measure of the growing importance and size of the medical sector of the economy Exhibit B - 1 (following page) identifies the ten largest U.S. health care services industry participants.

It is immediately obvious that health care on the provider level is now big business, with 9 of the top 10 health care service providers earning annual revenues in excess of $1 billion. Additionally, their needs for patient information systems are growing at a dramatic rate.

EXHIBIT B- 1


1992 Ten Largest Healthcare Services
Humana
6.0
National Medical Enter.
4.0
American Medical Holdings
2.4
Beverly Enterprises
2.3
Health Trust
2.1
U.S. Healthcare
1.7
FHP International
1.4
Pacificare Health Systems
1.3
Foundation Health
1.0
Manor Care
0.9
0.0
1.0
2.0
3.0
4.0
5.0
6.0
$(Billions)

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