STRATEGY STATEMENT
AND
BUSINESS PLAN
FOR
RELATIONAL TECHNOLOGY INC.

FY1983 - FY1987

STRATEGY STATEMENT
AND
BUSINESS PLAN
FOR
RELATIONAL TECHNOLOGY, INC.

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EXECUTIVE SUMMARY

This document is divided into two main sections: a Strategy Statement and a Business Plan. The Strategy Statement is essentially qualitative in nature and outlines critical Relational Technology, Inc. (RTI) policies, product developments, and marketing plans and the strategy behind them. The Business Plan -- to be completed later — is more quantitative in nature and defines specific programs to implement policies given in the Strategy Statement.

SYNOPSIS OF THE STRATEGY STATEMENT

STRATEGY STATEMENT

1.0 MISSION AND FOCUS OF RELATIONAL TECHNOLOGY INC.

1.1 MISSION

Relational Technology, Inc. (RTI) is in the business of marketing relational database systems and associated user interface software in the VAX marketplace. Our mission is to become the dominant vendor of DBMS systems in the VAX, UNIX, and small systems markets and the leading independent vendor of database systems generally. As resources permit, we will enter other markets in a timely fashion to be discussed.

1.2 FOCUS

RTI's strategic focus is to position ourselves to attain the strongest long-term competitive posture. To this end, we will seek to dominate the VAX, UNIX, small systems and selected other markets through leadership in technology, product and service quality, and aggressive marketing and sales. Once market share is attained, RTI will seek to erect long-term barriers to competition in chosen markets through heavy investment in technology and dominance of distribution channels.

2.0 OBJECTIVES

RTI has four objectives through 1987:

1) Revenues exceeding $75 million for FY 1987,
2) Pre-tax profits exceeding 25% of revenues,
3) Market shares exceeding 25% of VAX DBMS sales and 20% of MC68000 DBMS sales,
4) Technological superiority among vendors of database management systems.

3.0 THE ENVIRONMENT

The markets where RTI will sell products through 1987 will be characterized by dramatic growth, the entry of major new competitors, and the emergence of important new technologies.

The market for relational DBMS will increase dramatically through FY1987. Relational database systems will displace other DBMS architectures due to the maturing of relational product offerings and the inherent productivity advantages of their greater ease of use. Relational systems will likewise increasingly displace file systems for application development as maturing technology continues to improve performance, functionality, and ease of use. Finally, ongoing hardware price/performance advances will open large new desktop workstation and personal computer markets for DBMS. A goal of RTI's strategy is to develop products and marketing approaches which allow RTI to benefit maximally from these underlying trends.

By 1987, several major new competitors can be expected to enter the market for relational database systems. IBM and DEC are known to be working on new relational DBMS products and will likely introduce these products for sale on their hardware during 1983. Other significant vendors, possibly including AT&T, may offer relational products during this period. This document anticipates these competitors' product offerings and the timing of their market entry and outlines RTI's strategy for competing against them.

Finally, several important new technologies will emerge by 1987. Foremost among these will be local networks, bit-mapped displays and color graphics. DBMS vendors will be forced to integrate these new technologies into their product offerings to remain competitive. For a discussion of how these technologies will affect RTI product development, see Appendix A. It is our goal to prepare for these technologies in advance so as to be ideally positioned as they mature.

3.1 Overall DBMS Market Characteristics

The overall market for DBMS divides broadly into end users and application developers. End users buy DBMS products for general data management and reporting requirements and for simple applications development without involving the data processing department. Application developers further divide into data processing departments and systems builders/marketers. Both groups buy DBMS as a productivity tool for application development and as a basis for building applications which access shared data.

3.2 Structure of the VAX Market

3.2.1 General

Currently DEC offers 11/780, 11/750 and 11/730 machines. We fully expect an 11/790 in mid 1983 and a lower end machine in late 1983 or early 1984. Over the course of this plan we expect to see VAXes ranging from a VAX on a chip (to compete with the Motorola MC68000) to large machines in the 10-30 mip range. It is obvious that DEC will market lower end systems; however, it is equally obvious that they will continue to sell high end systems.

We expect DEC to produce a range of VAX machines configured into systems ranging from $5000. to $250,000. (For a discussion of why DEC will continue to market high end systems see Appendix B.) RTI expects to price our software for this range of machines as discussed in Section 5.

The VAX market consists predominantly of engineering and scientific users with a significant educational and military component. Commercial data processing users are a small but growing minority (Figure 3). To date, the market for DBMS on VAX has reflected the VAX market as a whole.

3.2.2 Engineering and Scientific Users

Engineering and scientific users are by far the largest segment of the VAX marketplace, accounting for perhaps 40% of the total VAX installed base. Among engineering and scientific users, energy services (particularly oilfield services), CAD/CAM, and aerospace sectors predominate. Engineering and scientific customers for VAXes are generally end users

rather than the data processing departments within their organizations. As such, they are more interested in productivity tools for building applications and less interested in transaction processing than conventional DP departments. Due to their technical orientation, they are generally confident of their own technical judgment and willing to assume the risks associated with a new product and technology. Engineering and scientific users are most concerned with 1) overall function (including database services and productivity interfaces), 2) ease of use, 3) performance, and 4) interface support for scientific programming languages (principally FORTRAN and PASCAL). RTI's strategy in marketing to this key sector is to maintain product leadership in each of the key areas above.

3.2.2 Government and Military

Government and military users account for approximately 15% of the total VAX population. Whereas military users are willing to accept higher risk to gain the benefit of new technology, government agencies are similar to commercial accounts in their buying patterns and are largely risk averse. Both groups require a specialized sales force and marketing approach to gain significant penetration. RTI's strategy is to target both groups from a centrally organized and coordinated federal marketing effort based from its eastern regional offices in Washington, D.C.

3.2.3 Educational Users

Educational institutions account for another 20% of the VAX installed base. Users at these institutions are generally unable and/or unwilling to spend substantial amounts of money for DBMS software. RTI's policy in this sector of the VAX market is to discount INGRES incrementally (20%) for administrative users and heavily (80%) for research and instructional users. The strategy behind this policy is to sacrifice margins in these accounts to build long-term demand for INGRES from the base of graduating students who leave to join industry. This same strategy has been very effective in creating long-term demand for UNIX from the base of graduating UNIX programmers.

3.2.4 Commercial Data Processing Users

Commercial data processing customers account for less than 10% of the VAX market — definitely a minority of Digital's users. Although INGRES's ease of use makes it attractive to end users in these large corporations, its lack of performance and proper transaction facilities have made it generally unsaleable to their DP departments. Recent Digital product releases — including an enhanced COBOL, a CODASYL DBMS, office automation software, and better terminal support — make it clear that DEC intends to challenge IBM for this customer base. As such, we expect the percentage of the commercial DP accounts in DEC's installed VAX base to grow significantly during the next few years. Although commercial customers have been slow to accept relational DBMS, it seems likely that a higher percentage of them will ultimately acquire such systems. RTI's strategy for end users in this market is to continue providing the most complete and easiest to use interfaces. For commercial DP departments, RTI will upgrade its transaction management facilities during 1983 while continuing to maintain its lead in raw performance.

3.2.5 Independent Sales Organizations

Although numerous system integrators and independent sales organizations exist in the domestic VAX market, RTI's policy is to market its products only directly in this market. The reasons for this are as follows:

1) Product margins are more than adequate to support a direct sales effort,

2) The VAX market is sufficiently limited that RTI can build and manage a direct sales force in time to respond to the opportunity,

3) Sales through ISOs will be less profitable since RTI will be required to provide the end user support which ISOs will be unable to provide, and

4) We wish to avoid having our sales force compete with our own product at a discount through an ISO in the market.

Therefore, RTI's strategy with respect to ISOs is to explore cooperative marketing programs based on modest "finder's fees" and other mechanisms to encourage referrals from these firms.

3.2.6 International Business

Nearly half the potential DBMS market for VAX is overseas. Much of this is concentrated in a few countries in Europe, plus Japan and Australia. We have taken a long term view of these markets, and deliberately delayed active marketing of INGRES in these areas until adequate support could be provided. RTI's international marketing strategy will be to pursue a mix of direct sales subsidiaries, joint venture partnerships, and marketing representative relationships which maximize the long term potential of each local market. International sales and support will be organized as a separate profit and loss center managed by an International Sales Manager who reports to the Vice President of Marketing. Direct sales subsidiaries will be considered primarily in markets which are English speaking and have common business practices with the U.S. In countries where we do not market directly, we will seek relationships with strong local firms which are committed and able to market and support INGRES effectively. Given the high initial costs of training and supporting such firms, RTI only conclude distributor agreements which we expect to last at least three years.

3.2.7 OEMs

To date, RTI has received very little revenue from royalties based on product sales by OEMs. We are convinced, however, that significant long term potential exists for such revenues. To date, OEMs have not built systems using INGRES primarily because they perceived it as lacking performance and sophisticated transaction management. Given forthcoming improvements in these areas and the applications power of enhancements like abstract data types, this situation should improve by the end of 1983. RTI's strategy for the OEM market is to:

1) Establish a specialized sales force based out of eastern and western regional headquarters,

2) Target "design wins" into applications being built by large OEMs like GE, Applicon, SDRC, and Calma, since 80% of the OEM revenues will likely come from 20% of the accounts, and

3) Use references from the key accounts above to assist in selling to other OEMs,

4) Use the media to promote the concept of building OEM products using DBMS generally.

In any event, OEM lead times for product development are lengthy and significant revenues cannot be expected for at least two years.

3.3 Competition in the VAX Marketplace

There are three competitors who we feel may be significant over the course of this plan, namely DEC, RSI and Britton-Lee. We discuss each in turn.

3.3.1 Digital Equipment Corporation

DEC will unquestionably offer a relational database system sooner or later. Rumors swirl about exactly when; our latest information is that DEC's Colorado Springs facility has developed a relational DBMS for VAX/VMS to be announced in spring 1983. We speculate that this offering will consist of a "vanilla" relational system and will be unveiled at DECUS in St. Louis this May -- with first customer delivery to begin this summer. We anticipate that DEC will offer the same function as our basic system plus very good performance in processing "short queries" for transaction-oriented applications. We will counter by substantially improving INGRES's "short query" performance this year so that we are able to execute these queries at least as fast as DEC's product. Moreover, we currently have (and will almost certainly maintain) superiority in the performance of other queries.

We expect to compete favorably against DEC's offering because:

1) our application development tools are far superior,

2) we will offer distributed processing,

3) we will have superior internal function, such as abstract data types and portals, and

4) we offer superior performance on complex query processing.

A relational DBMS product entry by DEC will significantly increase competition in the VAX market. The sheer size of DEC's sales force and its ability to sell their DBMS along with the hardware will make it more difficult for RTI to close business. To compete effectively, RTI will have to produce a more "mature" product: future versions of INGRES will need to be better tuned, better tested, and better documented. DEC's standards in these areas are considerably higher than our competition to date. Moreover, RTI must assume a much more aggressive marketing posture. We will need to increase both our visibility in the market and our credibility as an organization with prospective customers. Advertising and promotional programs to accomplish these objectives will be put together during the next 2-3 months.

3.3.2 Relational Software, Inc.

The second competitor is RSI which offers Oracle. We are not particularly concerned about them given their past track record of failing to offer good support or new features in a timely fashion. These failures have resulted in RTI's current high "win ratio" in accounts where we compete directly. Our strategy versus RSI is to:

1) Expand RTI's sales coverage domestically and internationally and press our product advantage so as to

deprive RSI of revenues in the critical VAX and MC68000 markets,

2) Develop transaction facilities for INGRES by 3Q83 to nullify RSI's only significant functional advantage, and

3) Be prepared to implement an SQL interface to INGRES should IBM's market power cause SQL to become a de facto standard.

In summary, we expect that RSI's mismanagement and diffusion of technical efforts across multiple product developments will cause them to continue to lose ground relative to RTI.

3.3.3 Britton-Lee, Inc.

The last competitor is Britton-Lee. At the moment we never see them in the marketplace. However, we are somewhat concerned about them for the following reasons. They have very good software running on specialized hardware. Their current posture is to offer their hardware as a backend to a VAX and their current pricing is to charge about $60,000-$90,000 for this package. There are a couple of ways that they could become a serious competitor. First, they could begin to offer their system as "software-only" on a VAX and offer competitive pricing to RTI. If they did that they would instantly become at least as serious a competitor as RSI. Second, they could elect to cut their prices to come closer to those of RTI. Our competitive position with respect to Britton-Lee is the following:

1) We are far ahead of them in user level software. It is not clear that they can overcome our lead. This will be a dramatic advantage in the end-user marketplace.

2) One of our distributed architectures to be discussed in Section 4 closely mimics their back end architecture. As such we can offer an MC68000 back end with superior user software and attractive price-performance. We expect to be able to offer at least 1/3 to 1/2 of their performance at 1/3 of their prices or less. More on this discussion will follow in Section 4.

3.4 The Small Systems Marketplace

We expect the MC68000 to dominate the small systems market over the course of this plan. It should be noted that, with the significant exception of the IBM PC, the 8086 is definitely out of favor at the moment. For example, the exhibitors at COMDEX were about 80 percent oriented toward the MC68000. The MC68000 is faster with a larger address space and is clearly the superior machine in 1983.

There are, however, two new products which might change this situation. First the National Semiconductor NS16000 is due out in 1983. This 32 bit machine may be an attractive competitor to the MC68000. Second, the Intel 286 machine should be out in late 1983. This machine is faster by about 40

percent than the 10 Mhz MC68000; however, it does not appear to solve the infamous 64K address space problem. If a 20 Mhz MC68000 appears at a comparable time to the 286, we expect the success of the 286 to be limited to supplying a follow-on processor to companies irrevocably committed to the 8086. On the other hand, it may offer attractive price-performance characteristics compared to the MC68000 for those users who are not concerned by address space limitations.

The great unknown is the choice of processor to be made by IBM for its next personal computer product. Current rumors focus on an MC68000 offering, but we will keep our ear to the ground.

3.4.1 Classes of Small Systems

We expect the small systems market to split into three broad classes. The first class, typified by the APPLE II, is a minimal machine to be sold through computer stores for rock bottom dollars. Currently, this system sells for about $2000 and should decline in price over the course of this plan to under $500. The current customers in this market are "mom and pop" companies and hobbyists gaining entry level computing as cheaply as possible.

The second level of this market is typified by the Fortune Systems 32:16 and Apple Lisa. They are small business computers and expect to sell for about $6000-$10000. These are hard disk systems and are often time-shared among several users. One should think of these machines as entry level computer systems for users with insufficient funds to afford a VAX.

The third class of machines in this market are the "Cadillac" offerings. Apollo, CCI, Sequoia Systems, Synapse, Stratus and Tolerant Transaction Systems all plan or currently offer an MC68000 based system selling for $20,000 or more that offers either high resolution graphics, multiprocessing or a sophisticated I/O system.

Only the IBM personal computer fails to fit this paradigm as it is somewhere between the first and second class. It should be noted that the first class of users will remain floppy disk oriented for the foreseeable future; hence, INGRES with its current architecture is inappropriate for such users. The second and third classes constitute our potential market, and we indicate in a later section how we plan to address it.

3.5 Structure of the Small Systems Market

3.5.1 System Integrators / Hardware Manufacturers

There are approximately 100 companies building small computer systems at present. These companies typically market to distributors, dealers, vertical market systems integrators, and retail outlets. Because their market is moving rapidly and lead times to develop software are long, few of these systems integrators are attempting to develop their own proprietary line of software. Rather, most of them seek to license existing software products to sell with their hardware. Their strategies range from pure hardware sales (where their software OEMs are expected to locate and acquire their own software) to exclusive remarketing agreements for outside vendors' software. Typically, systems integrators will conclude remarketing agreements with one to three vendors for each category

of product they wish to sell with their hardware.

RTI's strategy is to target "Class III" (and selected "Class II") system integrators for "wholesale" remarketing of INGRES licenses. Under this arrangement, system integrators acquire and inventory INGRES licensed materials (including documentation and media) according to a sliding scale of discounts based on volume.

3.5.2 Distributors / Independent Sales Organizations

Numerous software wholesalers, dealer organizations, and mail order houses exist in the microcomputer software market. RTI's policy with respect to these groups is to service them only via referral to system integrators which remarket INGRES.

3.5.3 Software OEMs

Due to minimal costs of market entry, a cottage industry consisting of hundreds of microcomputer software manufacturers has arisen. Because most of these software firms are poorly financed yet require significant amounts of technical support, RTI will service them only via referral to system integrators which remarket INGRES.

3.6 Competition in the Small Systems Marketplace

There are a collection of systems offering limited functionality that compete in the small systems market including Sequitur, Unify, Dbase II, Datamaster, Informix, etc. Such systems typically offer minimal function compared to INGRES but run on floppy disk based systems and require much less main memory.

There are no systems currently in that market which offer the functionality of INGRES. In particular, RSI has not yet met its early commitments to deliver versions of ORACLE for MC68000 systems running UNIX and 8086-based systems running MS/DOS and UNIX lookalikes.

Two conclusions should be drawn from the this discussion. First, in the "Cadillac" portion of this market (i.e., class 3 and part of class 2), we offer "Cadillac" function without serious competition. Second, in the lower end of this market our product either will not run at all or consumes an unacceptable level of resources. We require a new offering to address this marketplace.

3.7 The IBM Marketplace

3.7.1 General

At the moment the IBM marketplace is characterized by the following three points. First, it has a very heavy emphasis on "transaction processing". There appear to be a large number of banking and insurance applications which require multi-statement transactions and bullet-proofed crash recovery. At the moment RTI offers unacceptable services in this area to such customers. Second, the IBM market is characterized by a heavy emphasis on performance. Most potential customers wish to drive 20 or more on-line

terminals doing access and update to a shared database. The IBM sale is oriented toward competitive benchmarking. Finally, the IBM market is application programmer oriented rather than end-user oriented. The typical IBM machine is located in a central computer center with a staff of programming specialists. By contrast, the VAX market is characterized by machines being located in an end-user's organization and directly staffed by end-users. The sale to a computer center is oriented more toward performance and less toward ease of use and functionality.

3.7.2 Large Corporate DP Users

3.7.3 Other End Users

3.7.4 Independent Sales Organizations

3.7.6 OEMs

3.8 Competition in the IBM Marketplace

There are a large collection of entrenched competitors in the IBM market, including IBM (IMS and SQL/DS), Cullinane (IDMS), CCA (Model 204), ADR (Datacom DB/DC), Software Ag (Adabas), NCSS (Nomad), Information Builders (Focus), Intel (System 2000), Infodata (Inquire), and Mathematica (Ramis). At the moment INGRES offers superior ease of use and functionality compared to all non-relational offerings that we know about but offers inferior performance and transaction management.

3.9 Competitive Position of Relational Technology, Inc.

Compared to SQL/DS we appear to offer comparable performance, inferior transaction management and much better user level software. It should be clearly noted that an entry into the IBM marketplace requires better transaction management as a precondition. Better performance would also help dramatically.

4.0 PRODUCT DEVELOPMENT STRATEGIES

4.1 General

A critical reading of Section 3 yields the following conclusions:

1) We should continue to spend a large fraction of our resources on innovative software development. We should fix our transaction facilities ASAP and concentrate on improving performance. Moreover, we should continue to stress user level software and innovative internal functions.

2) We require a distributed database system and support for bit-mapped displays to protect our VAX customer base. This will also reinforce our position of technological leadership. A distributed database system will also protect our flank against Britton-Lee.

3) We require a small system oriented offering to compete

effective in the lower end of class 2 and perhaps class 1 of the MC68000 market.

4) Entry into the IBM market should not commence until we have better performance and better transaction facilities.

4.2 Overall Product Goals

To win sales from competition in the above markets, RTI must offer a higher quality product with greater function at equal or better performance. We must release reliable code, provide excellent technical support, and consistently improve the quality of our documentation. We expect to gain considerable advantage relative to our competitors in two key areas:

1) Distributed databases, and
2) "User friendly" front end software.

It goes without saying that we will continue to tune the code and provide back-end database support for functionality which the user sees. The main areas that we expect to pursue concerning 2) above include application generators, browsing tools, database design aids, spread sheet programs, support for documents, support for mail and an interface to a statistics package. There seems no shortage of desirable functions or bright people to work out the design details. We expect to dominate any market which we choose to enter by the scope and quality of our tools. Specific database enhancements and subsystem development plans can be found in Appendix F. However, because distributed databases are the key to choice of markets, we will focus our discussion of product development plans around this topic.

4.2.1 Planned Product Offerings

We first treat distributed architectures as a mechanism to discuss our future product offerings. Figure 1 indicates the current INGRES architecture on a single machine. A user communicates with a front-end process (e.g. QBF, VIFRED, etc.) which in turn requests database services from a back-end INGRES process. Internal communication is via an (operating system) specific interprocess message system. This system will be termed ONE MACHINE INGRES (OMI). It currently runs on VAX/VMS configurations and will soon run on VAX/UNIX and MC68000/UNIX configurations. One fundamental strategic question is what other machines to extend this system to.

Figure 2 indicates a second INGRES configuration that has much appeal. The user process runs on one machine while the back-end INGRES process executes on a different machine. These processes communicate via an inter-machine network protocol. There are four ways that this configuration makes technical sense; the last three are the more important.

1) Machines 1 and 2 are main frame computers

In this case a user on one machine is given access to a database on a second machine. This user will be provided much better response time and consume fewer resources than if both processes execute on the remote machine. Customers (such as Schlumberger) with multiple INGRES sites have already requested this capability.

2) Machine 1 is a personal computer and machine 2 is a main frame

A user with a personal computer (say an MC68000) can access a database on a remote main frame (say a VAX) using this facility. Although such a user can also access an INGRES database with both processes executing on the VAX, this alternate configuration will provide better response time. We expect customers to obtain small computers for word processing and then wish to connect them to other main frames. We also expect that customers can justify personal computers without higher level approval. In this case RTI can "hook" such users and then obtain greater revenues from them as their needs grow toward their own larger machines.

3) Machine 1 is a main frame and machine 2 is a personal computer

A loaded main frame (say a VAX) can offload database activity onto a back-end machine (say an MC68000) and (possibly) provide better throughput. Both Britton-Lee's IDM and Intel's iDBP exploit this architecture. If the back-end database machine market blossoms (and this is speculative), then RTI can effectively compete in it with a judiciously equipped MC68000 as a backend.

4) Machines 1 and 2 are personal computers

This is essentially the architecture of several computer companies (e.g. Apollo, CCI, TTS, Sequoia, etc.). Two or more small computers are connected by a high speed communication system. INGRES, configured as in Figure 2, is appropriate for such customers.

We call Figure 2 the DUAL INGRES (DI) configuration. This configuration currently runs for VAXes communicating over DECNET. A second underlying strategic decision is what other machines to extend this system to.

A third architecture, which is a variant of that of Figure 2, is shown in Figure 3. In this case a foreign DBMS is substituted for the INGRES backend process. A user can then run RTI front-end programs against data stored in another database system (say IMS or SQL/DS). Of course, RTI front-ends would have to be appropriately modified to make appropriate calls on a foreign system. The reason that we deal with this configuration is two-fold. First, we can effectively compete for business in environments where the database system is "totally entrenched" -- commonly true of IMS facilities. Second, this configuration is technically cheap to build because much of the work must be done to support DI configurations. A third strategic decision is what foreign DBMS to support.

Lastly, Figure 4 shows a true distributed database system, DISTRIBUTED INGRES (DSI). Here, a user communicates with a front end process as before. This process, in turn, communicates with a coordinating process. This software module arranges to answer an INGRES command for data which spans multiple sites. The figure illustrates two such sites; however, in practice, there is no limit to the number of machines which can have data relevant to a command. This configuration offers 3 crucial long-term advantages:

1) incremental growth

As a customers' workload increases, he can purchase more VAXes and then allocate his database over a larger collection of machines. No reprogramming of his application is required to support sharing his workload among a larger collection of machines. Although DI can help such users with growth problems, it requires reprogramming on the users' part as machines are added.

2) distributed data

A customer who has machines and data at multiple geographically dispersed sites can use such software to show a unified database to all users.

3) resiliency

Such a configuration allows access to the database even though some machines in the network are not currently operational. Moreover, if DSI can be made to manage replicated data, it has the advantage of potentially providing access to all of a user's database in the face of certain kinds of hardware failures. Tandem (and others) make a big deal of this "non-stop" capability.

The fourth strategic question is the hardware configurations on which we will support DSI.

The last strategic question is motivated by the inability of the current INGRES code to penetrate into very small systems. Systems with either a limited amount of real main memory (e.g. the Radio Shack MC68000) or a limited amount of address space (e.g. any 8086 machine) cannot be supported by OMI. Hence, to rectify the situation we can create a version of INGRES called SMALL INGRES (SI) to run effectively in this environment. The last strategic question is whether to pursue this market.

The next section discusses our current thinking on these 5 questions. Then, in Section 5.3 we discuss the pricing concepts which we will strive for. Lastly, Section 5.4 indicates our revenue forcasts for RTI for the planning period.

5.2 The Alternatives in Detail

We expect to develop OMI, DI, DSI and SI for a variety of markets. Our current plan is illustrated by the following table. After presenting the table, we make a variety of comments.

Table 1
INGRES Product Development Schedule

	1982	1983	1984	1985	1986	1987
VAX/VMS	OMI	———	———	———	———	———
		DI	———	———	———	———
			DSI	———	———	———
VAX/UNIX		OMI	———	———	———	———
		DI	———	———	———	———
			DSI	———	———	———
MC68000/UNIX		OMI	———	———	———	———
		DI	———	———	———	———
			S-OMI	———	———	———
			S-DI	———	———	———
			S-DSI	———	———	———
PRIME			OMI	———	———	———
			DI	———	———	———
			DSI	———	———	———
8086/UNIX			S-OMI	———	———	———
or MS-DOS			S-DI	———	———	———
			S-DSI(?)	———	———	———
IBM		SQL/DS	———	———	———	———
			IMS	———	———	———
				OMI / VM	———	———
				DI / VM	———	———
					OMI / MVS	———
UNIX Versions		OMI	———	———	———	———
Perkin Elmer		DI	———	———	———	———
NCR			DSI	———	———	———
HP, etc.						

NOTES to Table 1

VAX Marketplace

VMS

DI — 2nd quarter 1983
DSI — mid 1984

UNIX

OMI — 2nd quarter 1983
DI — depends on availability of networking OS software
DSI — mid 1984

UNIX Marketplace

MC68000

OMI — 2nd quarter 1983
DI — depends on availability of networking OS software
DSI — mid 1984

Perkin-Elmer UNIX (see note below)

OMI — 2nd quarter 1983
DI — depends on availability of networking OS software
DSI — mid 1984

Prime marketplace (see note below)

OMI — mid-late 1984
DI — mid-late 1984
DSI — mid-late 1984

8086/UNIX and 8086 CPM

SI — mid-late 1984

IBM Marketplace

DOS

Support for SQL/DS as a foreign DBMS — Dec 1983

VM/370

OMI — 1985
DI — 1985

MVS

support for IMS as a foreign DBMS — 1984
OMI — 1986

This table is motivated by several factors which are discussed in turn.

1) Perkin-Elmer marketplace

Besides the 68000 marketplace there appear to be other environments which are committed to UNIX. Perkin-Elmer is one such market. This part of the table uses PE as an example. More recently NCR and Gould/SEL have contacted us concerning porting INGRES to 32 bit processors not based on the 68000. We expect more examples to surface over time. It is our posture to examine each potential market in turn and make a business decision concerning desirability.

2) Prime Marketplace

We expect to enter the Prime market as noted above. Although Prime is not considering running UNIX they have an architecture and operating system which will make a port straightforward. Prime serves as an example of markets in this category including Data General, Burroughs 1700, and perhaps CDC. We will investigate each market in turn; however Prime is the

only one at the moment which looks appealing.

3) Small Systems marketplace

We expect to commence development on SI during 1983, if possible. We hope to have a product available in mid 1984. It is relatively difficult to move these dates forward without slipping other areas of the short term plan. SI will run RTI front-end programs but will not offer the functionality of OMI. It will not be a subset of OMI but rather a new system written from scratch.

4) IBM marketplace

We expect to begin development of an IBM system when OMI has competitive performance and adequate transaction management. We expect these features in early 1984. We expect the VM/370 conversion to be hard for a variety of technical reasons centering around missing features in the operating system. Hence, we do not expect to have a runnable product until 1985. In the MVS marketplace we expect the conversion to be very hard because of the characteristics of MVS. Hence we do not expect to have a product until 1986. It should be clearly recognized that the MVS product will be functionally identical to OMI but will be incompatible software. ALL FUTURE DEVELOPMENT OF INTERNAL INGRES FUNCTIONS WILL HAVE TO BE DONE TWICE, ONCE FOR OMI AND ONCE FOR IBM-OMI. Consequently, internal INGRES functions can be expected at 1/2 of the rate they would be accomplished otherwise. We will try very hard not to have a third version for VM/370; however, THERE IS A DEFINITE RISK OF A THIRD INCOMPATIBLE VERSION OF THE CODE. Because IBM hardware is half-duplex oriented, the VM/370 and MVS versions of INGRES will require different versions of all front-end programs. HENCE, ALL FUTURE FRONT-END PROGRAMS WILL HAVE TO BE WRITTEN TWICE.

Our conclusion is to incur this overhead only when the internals of INGRES and major front end programs (e.g. QBF) are more stabilized. Also, this decision may depend on how threatening a DEC relational DBMS is. Hence, we will enter MVS and VM markets in a timely fashion; however, conditions may dictate that this decision be delayed beyond early 1984.

5.3 Pricing Concepts

The following objectives apply to Figure 1 configurations:

1) RTI will attempt to price INGRES at 10% of a medium hardware configuration in any target marketplace. This is straighforward to achieve in all markets except low end systems. We expect to achieve this goal in low end markets by a combination of the following tactics.

a) unbundle support, updates, and front-ends
b) provide separate pricing for SI and OMI
c) charge high prices for accounting packages, mail systems, editors and any other application systems that RTI might produce
d) charge a substantial fraction of the

original price for an updated version of the system

2) On computer families (e.g. VAX) we will price separately for separate machines when marketplace considerations or O1) dictates.

3) We will market to end users directly for those machines above a certain dollar threshold. Below that threshold we will market only through OEMs.

4) We will continue to assess the bundle vs. unbundle decision for each environment. This provides an independent tuning variable for us.

5) We will attempt to get renewal fees of about 10-15% of the original INGRES price.

The following objectives apply to Figure 2 configurations.

6) There will be a separately priced feature (called network-1) for DI environments. Network-1 is a tuning parameter which we will use to ensure that O1) is met for a system consisting of both (or all) processors. For example, for CCI we are faced with an MC68000 price of about $1000. Their multiprocessor MC68000 system sells for much more than $10,000 times the number of processors. We can use network-1 to achieve 10% of their system price even though our basic MC68000 price may be very low. (Note that DI is much more efficient than OMI in their environment; hence, there is every incentive for them to swallow the extra price).

7) We will attempt to recover 10% of total system price even though only a subset of the processors in the system are used for database activity.

The following objective applies to Figure 3 configurations.

8) We will follow O6) and attempt to achieve 10% of the total system price, including the hardware of the foreign DBMS.

The following objectives apply to Figure 4 configurations.

9) All considerations from Figure 2 apply. We will call this option "network-2" and charge 2-4 times the cost of network-1.

APPENDIX A
Emerging Technologies — 1983-1987

1.0 Bit Mapped Displays

We expect bit mapped display terminals to become an important force in the VAX marketplace. Clearly, the focus of the Xerox Star, the Three Rivers PERQ, the Apple Lisa, and the Apollo Domain are on high resolution graphics. We expect the price of such displays to tumble from their current price of $10,000-$20000 to the $2000-$5000 range. At such prices they become viable as a "Cadillac terminal" for the masses. For example, RTI would probably use them internally in place of current VT100s. Even at current prices, some of our customers are heavily investing in bit mapped displays for so-called "engineering work stations". For example, Schlumberger has purchased 40 PERQs for this purpose.

We expect virtually all bit mapped display terminals to come with a substantial processor in their cabinet. The reasoning is that a substantial processor is required to drive the display and it can be time-shared with general user computation. Notice that this allows the migration of computation away from a host computer and into the terminal processor.

2.0 Distributed Processing

An extension of the concept in Section 3.2 is an expected noticeable move toward distributed processing. Moving computation toward a user terminal is one way of performing distributed computing. However, there are at least two other concepts which are likely to become attractive.

First, we expect local networks to appear in all major companies during the years of this plan. Both Schlumberger and Fairchild are moving as fast as possible in this direction. The great interest in Ethernet technology and the apparent success of Apollo confirm this point of view. The fact that local networking is planned for the Lisa machine is another example. It is imperative that we think in terms of VAXes on local networks in the marketplace which we address. First, we must expect users to want to set up database servers. A database server is a single machine dedicated to database support which is accessed by users on (many) other machines. In this way a company can run a large shared database on a dedicated processor but serve the needs of the organization over a local network. The second point to be noted is the desirability of distributed databases. Users will want to have easy access to data on multiple machines.

The second concept which we view as important is long haul networks. The apparent success of the Arpanet, Telenet, and Tymnet and the heavy investments by IBM, AT&T, Tandem and DEC in long haul networking technology support this view. We expect increasingly to be asked to support VAXes networked over large distances. There are two consequences of this technology. First, users will want distributed databases as discussed in the previous paragraph. Second, it is likely that we will be increasingly asked to interface with foreign database systems on foreign hardware. It is imperative that we think in terms of being the "glue" that bonds a distributed collection of computers and affords users easy access to geographically dispersed data.

APPENDIX B
Analysis of Minicomputer Purchasing Projections

If one considers a reasonable complement of peripherals to consist of 20 terminals, 1-2 billion bytes of disk space, a tape drive, quality printer and appropriate asynchronous multiplexors, one has a system costing about $150,000. in peripherals. We fully expect over the five years of this plan that the needs of organizations for disk space will escalate at about the rate that disk drives become cheaper. Moreover, the other components are not decreasing rapidly in price. Consequently, one expects to pay perhaps $100,000. for a CPU to drive this quantity of peripherals. Put differently, it appears that users are content to spend about 40 percent of their hardware budget on CPU and memory, and we see no reason for this to change.

We fully expect customers who currently have 11/780 configurations with a large complement of peripherals will upgrade over the course of this plan to larger complements of peripherals and a faster CPU. We expect the high end of the VAX market to continue to be systems in the range of $250,000 as exists today.

Appendix B
VAX/VMS Revenue Projections

	Comment	FY1983	FY1984	FY1985	FY1986	FY1987
# VAXes	<Estimate>	12000	20000	30000	45000	70000
Avg Price (000)	<Estimate>	200	180	160	130	110
RTI Avg Price	<Objective 1>	20000	18000	16000	13000	11000
Penetration (%)	<Estimate>	1.5	2.5	3.5	5	6
Total Installed		180	500	1050	2250	4200
OMI Sales (000)	<w/o Renewals>	3600	5760	8800	15600	21450
Renewal Fee	<8% Cum. Revenu	0	288	749	1453	2701
Net1 Installed	< % Cum. Sales>	0	10	17	24	30
# Net1 Sites		0	50	179	540	1260
Revenue	@ 1/3 Lic. Fee	0	300	688	1564	2640
Net2 Installed	< % Cum. Sales>	0	0	2	6	10
# Net2 Sites		0	0	21	135	420
Revenue	@ 2/3 Lic. Fee	0	0	224	988	2090
TOTAL		3600	6348	10461	19605	28881

Appendix C
PRIME Computer Revenue Projections

	Comment	FY1983	FY1984	FY1985	FY1986	FY1987
# Primes	<Estimate>	2500	4000	6000	8000	10000
Avg Price (000)	<Estimate>	275	260	250	240	200
RTI Avg Price	<Objective 1>	27500	26000	25000	24000	20000
Penetration (%)	<Estimate>	0	0	1	2.5	5
Total Installed		0	0	60	200	500
OMI Sales (000)	<w/o Renewals>	0	0	1500	3360	6000
Renewal Fee	<8% Cum. Revenu	0	0	0	120	389
Net1 Installed	< % Cum. Sales>	0	0	10	17	24
# Net1 Sites		0	0	6	34	120
Revenue	@ 1/3 Lic. Fee	0	0	50	224	573
Net2 Installed	< % Cum. Sales>	0	0	2	6	10
# Net2 Sites		0	0	1	12	50
Revenue	@ 2/3 Lic. Fee	0	0	17	176	507
TOTAL		0	0	1567	3880	7469

Appendix D
MC68000 UNIX Revenue Projections

	Comment	FY1983	FY1984	FY1985	FY1986	FY1987
# MC68000s	<Estimate>	20000	200000	500000	1000000	1500000
Avg Price (000)	<Estimate>	0	15	13	11	9
RTI Avg Price	<Objective 1>	0	1500	1300	1100	900
Penetration (%)	<Estimate>	0	1	2	3	4
Total Installed		0	2000	10000	30000	60000
OMI Sales (000)	<w/o Renewals>	0	3000	10400	22000	27000
Renewal Fee	<8% Cum. Revenu	0	0	240	1072	2832
Net1 Installed	< % Cum. Sales>	0	0	10	17	24
# Net1 Sites		0	0	1000	5100	14400
Revenue	@ 1/3 Lic. Fee	0	0	433	1503	2790
Net2 Installed	< % Cum. Sales>	0	0	2	6	10
# Net2 Sites		0	0	200	1800	6000
Revenue	@ 2/3 Lic. Fee	0	0	173	1173	2520
TOTAL		0	3000	11246	25748	35142

Appendix E
TOTAL REVENUE PROJECTIONS — FY1983 - FY1987

($Million)

	Comment	FY1983	FY1984	FY1985	FY1986	FY1987
VAX/VMS	<Appendix C>	3.6	6.35	10.4	19.6	28.9
Prime	<Appendix D>	0	0	1.6	3.9	7.5
MC68000/UNIX	<Appendix E>	0	3	11.2	25.7	35.1
VAX/UNIX	<5% of VAX/VMS>	.18	.31	.52	.98	1.44
PerkinElmer UNX	<5% of VAX/VMS>	0.00	.31	.52	.98	1.44
8086	<25% * MC68000>	0.00	.75	2.80	6.42	8.77
TOTAL		3.78	10.735	27.04	57.585	83.165

APPENDIX F
VAX Installed Base

VAX Annual Shipments	FY1980	FY1981	FY1982	FY1983
VAX 11/780-2	1000	2000	2800	3800
VAX 11/750	0	800	2000	2800
VAX 11/730	0	0	0	7000
Annual Total	1000	2800	4800	13600

VAX Cumulative Units				
VAX 11/780-2	1000	3000	5800	9600
VAX 11/750	0	800	2800	5600
VAX 11/730	0	0	0	7000
Cumulative Total	1000	3800	8600	22200

VAX Avg Sale Price	FY1980	FY1981	FY1982	FY1983
VAX 11/780-2	250	270	250	250
VAX 11/750	0	95	95	95
VAX 11/730	0	0	0	30

APPENDIX F
RELATIONAL TECHNOLOGY, INC.
PRODUCT DEVELOPMENT PLANS — 1983-1987

Version 2.1 in fall '83: - Transactions - Forms management enhancements - Kernel/performance - ABF enhancements - Color graphics - Additional datatypes - B-Trees - DECnet support

Version 3.0 in 1Q84: - Relational shell - VISIclone - Text management - IBM gateway - Additional performance - Networked INGRES

Version 3.1 (tentative) in 3Q84: - Full distributed database - - Database design aid - - Statistics package - - Graphics extensions -

RELATIONAL TECHNOLOGY, INC.
OPERATIONAL PLANS — 1983-1987

4.5.2 Lead Generation

RTI sales leads will be drawn from every available source into a centrally managed INGRES database. For the VAX market, the primary source for sales leads is, and will continue to be, computer user lists from mailing list firms such as Computer Intelligence, International Data Corporation (IDC), Mini Micro Systems, Focus Research, and others. Advertising and trade shows will be used to generate prospects. Promotional activities such as the publication of news releases, new product announcements and customer success stories will be geared toward the generation of new prospects. RTI will seek to get its products listed in all product directories of any significance. Local Users Groups (LUGs) for VAX will be used to generate leads where possible. Recruiting ads in computer trade magazines will be reviewed for reference to VAX installations. RTI salespersons will solicit customers and prospects for references to other potential prospects.

Within individual segments of the VAX market, additional sources will be used. Government computer installations are listed on the "GSA Inventory" tape. Government computer procurements are listed in the Commerce Business Daily. In the educational market, lists of sites are published by the Association for Computing Machinery (ACM) and others.

MC68000 — listings of manufacturers, systems houses, articles published about new startups, etc. 4.2 The RTI Position Statement

RTI's strategy is to

4.3 Pricing 4.4 Target Market 4.4.1 Target Market in Mkt Segment 1 4.4.2 Target Market in Mkt Segment 2 4.5 Sales Strategy 4.5.1 Distribution 4.5.2 Lead Generation 4.5.3 Prospect Qualification

From the centrally managed database of prospects, ... either at customer site or at RTI ... Trial license plan ... 60 day acceptance plan ... VAX customers (11/780 & 11/750) are prequalified for creditworthiness (since they have purchased a computer at from 3 to 5 times the expense) ... VAX:

Strategic Plan Update — DEC VAX Market

The following notes modify information contained in RTI's Strategic Plan (January, 1983) document regarding RTI's strategy in the DEC VAX market.

Current Range of VAXes:

Date Introduced	Machine	CPU Price	Performance
1982	11/730	$ 28,000	.3 MIPS
1980	11/750	$ 55,000	.6 MIPS
1978	11/780	$ 100,000	1.0 MIPS

During 1983 and subsequent calendar years, we project the most likely DEC VAX cpu introductions as follows:

Projected Range of VAXes:

Date Introduced	Machine	CPU Price	Performance
1983	11/810*	$ 125,000	3.0 MIPS
1984	11/760**	$ 60,000	1.75 MIPS
1985	11/740***	$ 30,000	1.0 MIPS
	11/720****	$ 10,000	.5 MIPS
1986	11/820	$ 150,000	9.0 MIPS

* VAX 11/780 withdrawn from production
** VAX 11/750 withdrawn from production
*** VAX 11/730 withdrawn from production
**** VAX on a single chip

Assumptions:

The product characteristics and introduction dates projected above are based on the following assumptions:

1) DEC views IBM as its primary long-term competitor. DEC will gradually raise the performance and price of its high end CPU to provide better coverage of the range of performance offered by the IBM 4300 series.

2) DEC will offer two other lower priced machines — one priced about 1/2 of the high end system and one priced about 1/4 of the high end system. These price points and product offerings are consistent with DEC's long-term policies with PDP-11's.

3) It may or may not be feasible for DEC to introduce a one chip VAX. The considerations are the following:

    a) It would have to be competitive with the MC68020 and iAPX286. This will be no small technical achievement.

    b) Such a chip may erode the market for their low end machine. Hence, the 11/740 may not sell well.

Table 1 projects the volume of shipments of the three machines for 1983-1987. We assume that each machine is scheduled for delivery in June so it impacts sales only during the following fiscal year.

Table 2 projects INGRES penetration in the VAX market and RTI's resulting revenues.

5) Pressure from low end systems (e.g., MC68000's) may force their prices lower on VAX 11/730's and VAX 11/740's. However, it would be foolish for them to adopt across the board deep discounts. Hence, they would probably generate a 2-tier pricing schedule much like ours. This would only marginally cut into RTI's revenues,

6) It is unlikely that IBM will be sufficiently price aggressive to force DEC to cut prices of their relational DBMS on high end systems.

Worst Case Tactics for RTI:

In the event that the above assessment proves incorrect, RTI still has the following options for continued sales into the VAX market:

1) RTI could develop and market versions of its front end subsystems which would run on top of DEC's relational DBMS,

2) RTI could focus marketing efforts on those accounts which are sensitive to INGRES's unique functional advantages (e.g., abstract data types, distributed database support, and ABF),

3) RTI could also focus on those accounts which are sensitive to INGRES's advantages in multi-vendor and multi-OS environments.

Table 1
Yearly & Cumulati ve VAX Sales

VAX Annual Shipments	FY1983	FY1984	FY1985	FY1986	FY1987
High End VAX	2500	3500	4000	5000	7000
Medium VAX	2500	2500	5000	6000	8000
Low End VAX	3000	6000	9000	16000	25000
Annual Total	8000	12000	18000	27000	40000

VAX Cumulative Units					
High End VAX	8000	11500	15500	20500	27500
Medium VAX	5000	7500	12500	18500	26500
Low End VAX	3000	9000	18000	34000	59000
Cumulative Total	16000	28000	46000	73000	113000

VAX Avg CPU Price	FY1983	FY1984	FY1985	FY1986	FY1987
High End VAX	125000	125000	125000	137500	137500
Medium VAX	55000	55000	60000	60000	60000
Low End VAX	28000	28000	30000	30000	30000
VAX on a chip	N/A	N/A	N/A	10000	10000

Relational Technology Inc. February 23, 1983

DEC's Strategic Threat:

The potential for a DEC relational DBMS offering poses a strategic threat to RTI because of DEC's:

1) ability to price on a bundled basis,
2) much larger sales force and intrinsically better sales coverage, and
3) greater organizational resources.

Assessment of DEC's Strategic Threat:

Further examination of DEC's potential strategic threat leads RTI to the following conclusions:

1) DEC could potentially take moves which would prove severely damaging to RTI's profitability in the VAX market,

2) There is little likelihood DEC will take such moves.

The most damaging action which DEC could take would be to introduce its own relational DBMS and market it bundled with hardware in such a way as to make the DBMS itself "free". We view this prospect as highly unlikely for the following reasons:

1) Currently DEC generally bundles only software that is essential (VMS). This scenario is not likely unless nearly 100% of DEC's customers want a relational DBMS,

2) DEC would almost certainly need to bundle language processors (e.g., COBOL) first,

3) Such bundling is not consistent with DEC's long-term attempt to raise software prices. The computer industry as a whole is also moving to raise software prices,

4) Even if DEC chose to bundle a relational DBMS, they are not likely to make it "free". DEC's current package discounting algorithms result in a 10% to 30% effective discount for the bundled software packages. Even with a 30% effective discount for DEC's relational DBMS, we are likely to be competitive with their price,

Preliminary

Table2 (VAX/VMS)

	Comment	FY1983	FY1984	FY1985	FY1986	FY1987
#High End VAXes	<Estimate>	8000	11500	15500	20500	27500
Supportd License						
Avg Lic Price	<Objective 1>	25000	28000	28000	30000	32000
Penetration	<Estimated %>	1	1.75	2.5	3.4	4.4
Cum Installed	<Supported>	80	201	388	697	1210
Revenues	<Supportd*1000>	2000	3388	5236	9270	16416
Unsupportd Licns						
Avg Lic Price		7000	7000	7000	7000	7000
Penetration	<Estimated %>	.6	1	1.5	2	2.6
Cum Installed	<Unsupported>	48	115	233	410	715
Revenues	<UnSuptd *1000>	336	469	826	1239	2135
Renewal Fees	<8% Cum. Revenu	0	160	431	850	1592
# Medium VAXes	<Estimate>	5000	7500	12500	18500	26500
Supportd License						
Avg Lic Price	<Objective 1>	25000	25000	22000	22000	22000
Penetration	<Estimated %>	.8	1.3	1.7	2.4	3.2
Cum Installed	<Supported>	40	98	213	444	848
Revenues	<Supportd*1000>	1000	1450	2530	5082	8888
Unsupportd Licns						
Avg Lic Price		7000	7000	7000	7000	7000
Penetration	<Estimated %>	.5	.8	1	1.5	1.9
Cum Installed	<Unsupported>	25	60	125	278	504
Revenues	<UnSuptd *1000>	175	245	455	1071	1582
Renewal Fees	<8% Cum. Revenu	0	80	196	398	805
# Low End VAXes	<Estimate>	3000	9000	18000	34000	59000
Supportd License						
Avg Lic Price	<Objective 1>	17000	17000	17000	17000	17000
Penetration	<Estimate>	.4	.6	.8	1.1	1.4
Cum Installed		12	54	144	374	826
Revenues	<w/o Renewals>	204	714	1530	3910	7684
Unsupportd Licns						
Avg Lic Price		7000	7000	7000	7000	7000
Penetration	<Estimated %>	.25	.4	.5	.65	.9
Cum Installed	<Unsupported>	8	36	90	221	531
Revenues	<UnSuptd *1000>	56	196	378	917	2170
Renewal Fee	<8% Cum. Revenu	0	16	73	196	509
Net1 Installed	< % Cum. Sales>	0	10	17	24	30
# Net1 Sites		0	20	66	167	363
Revenue	@ 1/3 Lic. Fee	0	187	429	1010	2091
Net2 Installed	< % Cum. Sales>	0	0	2	6	10
# Net2 Sites		0	0	8	42	121
Revenue	@ 2/3 Lic. Fee	0	0	149	680	1685
TOTAL		3771	6905	12233	24623	45557

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