

# MID-RANGE COMPUTER MARKET

*CRS 0196*

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**CUSTOMIZED RESEARCH SERVICE**

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ANALYSTS' VIEWS OF THE MID-RANGE COMPUTER MARKET, 1993

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Background:

The computer industry press and some market analysts have been decrying the fate of the mid-range computer market for a couple of years. CRS investigated the rumors of the mid-range's death, found them highly exaggerated, and determined the future trends and user requirements recognized by major market research firms. For the period 1992/1993 analysts emphasized different industry trends, but there was a remarkable amount of consensus as to the broad strategic changes underway. While the analysts recognize the phenomenon of "mid-range squeeze", the assault upon the mid-range's traditional markets by low-end PCs and high-end networks of mainframes, they believe that the mid-range can compete successfully well into the 1990s. Most analysts expect an industry consolidation around those mid-range suppliers who, like DEC and IBM, can exploit their existing customer base and mature systems technology.

**METHODOLOGY**

Interviews consisted of an unstructured qualitative evaluation of major trends in the computer industry and a questionnaire. The questionnaire concerned the period 1992/1993 and required the analysts to rate the importance as a competitive advantage of a variety of computer system attributes. The results of the questionnaire are displayed in Exhibits #1 and #2 (pages 5 and 6).

In addition to the interviews the most important of these firm's publications on the subject were reviewed.

The following mid-range specialists were interviewed:

**Infocorp**

Jeanette Sill-Holeman  
Sandy Gant  
Joyce Vincent

**Gartner Group**

Myron Kerstetter  
Karen De Bruyn

**Dataquest**

Alia Fairchild  
Gregg Marus  
Julie Williams

**Publications reviewed included:**

**Infocorp**

Segment Analysis Service: Mid-Range Systems, Vols. #1 and #2, 1988

"The Multi-User Microsystems Market", Update Report, December 15, 1988

**Gartner Group**

"Small Computer Systems Scenario", Information Industry Scenario Conference, September 26-28, 1988, Conference Notes

"Industry Scenario Conference", January 21-22, 1988, Conference Notes

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**The Ledgeway Group**

"Trends and Forecasts in the Customer Service Industry, 1988 Annual Edition", September, 1988

"Scrambling for Dollars, Ledgeway's 1988 Service Industry Forecast", January, 1988

"Redefining Customer Service", December, 1988

"Professional Services and Systems", December, 1988

**Dataquest**

"Business Computer Systems Industry Service: Industry Analysis", Vols. #1 and #2, 1988

"Technical Computer Systems Industry Conference", Conference Notes, October, 1988.

"Dataquest Consolidated Data Base, U.S. Markets, 1983-1992", May, 1988

**IDC**

"What Will Emerge From the Molten Mid-Range?", The Gray Sheet, Computer Industry Report, Vol. #24, #11-12, December 9, 1988

"Mid-Range Market Dynamics: Another Dip on the Roller Coaster?", IDC Processors, Vol. #1, December 1988

**Customized Research Service**

"Low-End Product and Service Market", CRS 0191, Richard D. Buchanan, January 25, 1988

"Computer Market Segments: External Views", CRS 0181, Nancy Korber, November, 1988

# MID-RANGE COMPUTER MARKET

## EXHIBIT #1

Analysts' Rating of Mid-Range Systems Attributes as a Function of Importance for Competitive Advantage in 1993

Ratings: 1=Least Important 5=Most Important

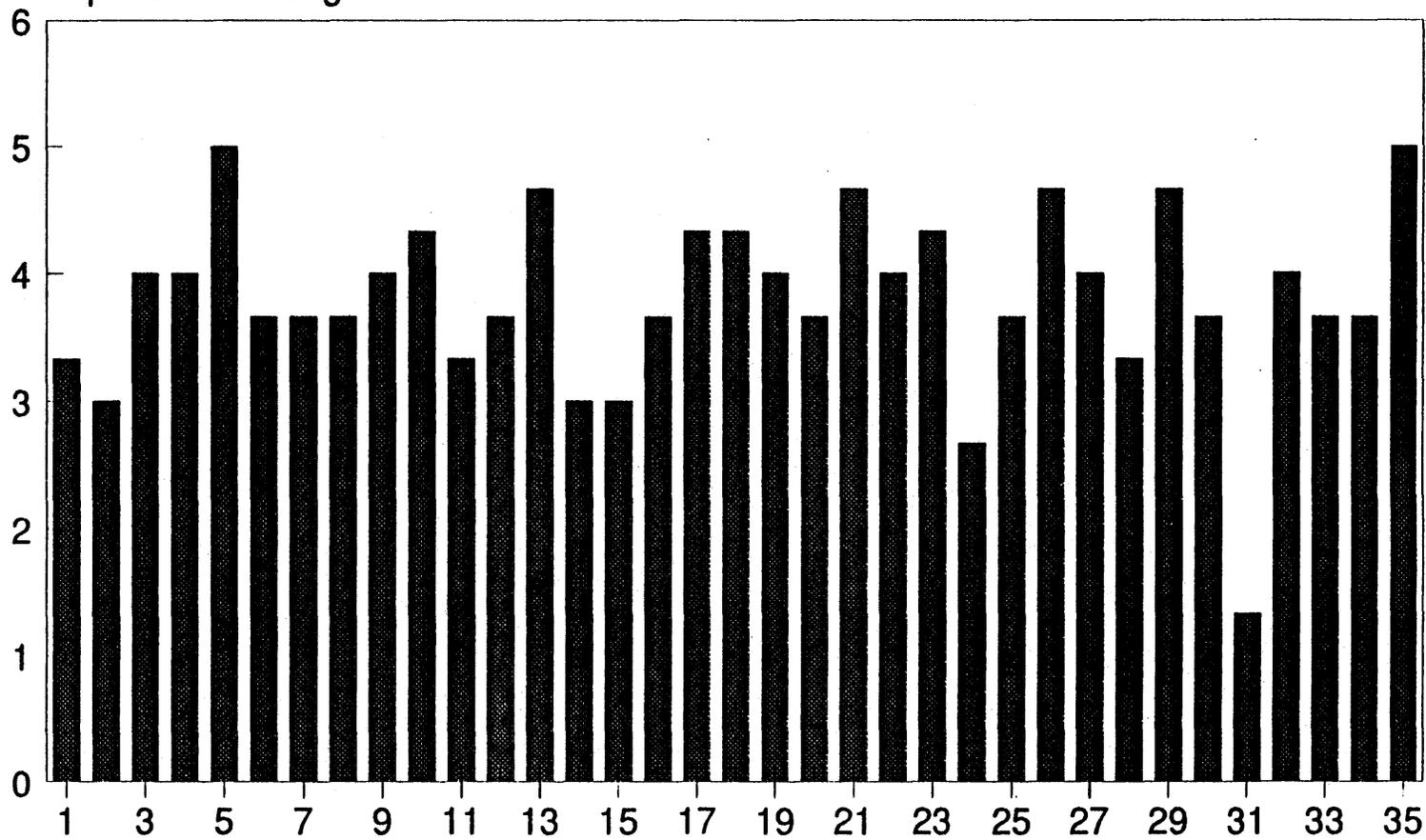
Number	Attribute	Ratings			AVG
		Dataquest	Gartner	Infocorp	
1	Total System Price	3	4	3	3.33
2	Hardware Price	3	3	3	3.00
3	Software Price	4	4	4	4.00
4	Service Price	4	4	4	4.00
5	Overall System Perfranc	5	5	5	5.00
6	MIPS	5	3	3	3.67
7	MFLOPS	4	4	3	3.67
8	Volatile Memory	3	4	4	3.67
9	Secondary Memory	4	4	4	4.00
10	Overall Service	4	4	5	4.33
11	Hardware Maintenance	4	3	3	3.33
12	Software Maintenance	3	4	4	3.67
13	Systems Integration	4	5	5	4.67
14	Customized Programming	3	3	3	3.00
15	Database Capabilities	2	4	3	3.00
16	Graphics Capabilities	3	5	3	3.67
17	Communic Capabilities	4	4	5	4.33
18	Overall Vendor Reputation	3	5	5	4.33
19	Hardware Reliability	4	4	4	4.00
20	Software Reliability	3	4	4	3.67
21	Vendor Commitment	4	5	5	4.67
22	Strong R&D Reputation	3	5	4	4.00
23	Commitment to standards	4	4	5	4.33
24	Hardware Standardization	2	3	3	2.67
25	Software Standardization	3	4	4	3.67
26	Application Portability	4	5	5	4.67
27	User-Interface Standards	4	4	4	4.00
28	Proprietary OS	3	4	3	3.33
29	Overall Market Opportunit	4	5	5	4.67
30	Manufacturing Mrkt Opport	2	4	5	3.67
31	Education Mrkt Opport	1	1	2	1.33
32	Scient/Research Opport	4	4	4	4.00
33	Financial Services Opport	4	3	4	3.67
34	Office/Business Opport	4	4	3	3.67
35	Government/Def Opport	5	5	5	5.00

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# Mid-Range Analysts' Ratings: Importance of 35 Attributes for Competitive Advant

Importance Rating 1 to 5



Attributes: See Accompanying Table

MID-RANGE COMPUTER MARKET

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SUMMARY OF TRENDS

The analysts' interviewed take issue with the view that the mid-range segment is significantly threatened by PCs and networked, low-end systems. Decreasing price performance characteristics of the mid-range allow them to compete head-to-head with low-end systems and their basic design and performance make them especially suited for the role as file servers in a LAN populated by low-end PCs.

The analysts' interviewed expect the trend toward distributed computing to continue for technical reasons and for reasons connected with the increasing reliance on international expansion by major businesses and by lowered barriers to international trade and investment.

The analysts' interviewed believe that mid-range systems will emerge as an alternative to PC LANS. Mid-range systems provide performance superior to PC LANS in the following areas:

1. Availability
2. Reliability
3. Serviceability
4. Scalability
5. Performance
6. Data Security
7. Application software availability

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1. See Also: "Information Technology and Tomorrow's Manager", Applegate, Cash and Mills, Harvard Business Review, Nov-Dec, 1988, pp.128.

## MID-RANGE COMPUTER MARKET

### ATTRIBUTES OF MID-RANGE SYSTEMS WHICH CONTRIBUTE TO THEIR LONG-TERM STRATEGIC VIABILITY INCLUDE:

1. The mid-range's extended rather than the PC LAN's proprietary Directory Services.
2. High rather than low degrees of integration of the overall business enterprise.
3. A level of networking that can achieve strategic range rather than the fragmented networking of the PC LAN.
4. Broad and flexible network management capabilities.

INDUSTRY TRENDS OF STRATEGIC SIGNIFICANCE: A CONSENSUS VIEW

The analysts' interviewed foresee a consolidation of the mid-range segment which will leave three major "centers of gravity" by 1993. IBM/proprietary, DEC/VAX proprietary, and UNIX oriented. A major test for the UNIX committed vendors is to quickly introduce and integrate their UNIX based products while maintaining differentiation and profitability.<sup>2,3</sup> A critical success factor for those faced by this task will be worldwide distribution and service/support operations.

The introduction of the 32 bit microprocessor has had the most important effect on the evolution of mid-range systems. VLSI RISC-based systems are forecast to achieve very high rates of growth and a<sup>4</sup> dramatic lowering of price/performance characteristics. These two developments in combination with the emergence of standards for operating systems, interfaces, networking, and data access will combine to make possible true distributed processing by 1993. This includes transparent data access regardless of geography and integrated data and network management as if it were a single database on a centralized platform.

Multi-processing systems made possible by VLSI RISC-based platforms may run at up to 50 MIPS per processor with multiple board systems containing up to 100 processors for aggregate performance of 5000 MIPS on common memory backplanes.<sup>5</sup>

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2. See Also: "Fast-Cycle Capability for Competitive Power", Bower and Hout, Harvard Business Review, November-December, 1988, pp.110

3. See Also: "Time the Next Source of Competitive Advantage", George Stalk, Jr., Harvard Business Review, July-August, 1988

4. Gartner Group, Industry Scenario Conference, Conference Notes

5. "Small Computer Systems Scenario", Information Industry Scenario Conference, September 26-28, 1988, Conference Notes; Gartner Group.

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The focus for future standards will shift from hardware architecture to user interfaces for Data Management, Graphics, Networking Services, Programming Languages and Operating Systems. The role that OSF will play in standards development is critical. The analysts' interviewed believe that OSF's emphasis on product development rather than research will allow the consortium to succeed in manufacturing software components capable of becoming de facto standards, thus creating an SAA for the entire industry. The success of OSF will force SUN and AT&T to join OSF sometime during 1989-1990.

DEC's network application system (NAS) will compete effectively with IBM's SAA insofar as NAS is designed to integrate a variety of desktop platforms while SAA is focused on its own environment especially OS/2 and IBM's mainframes.

IBM is consolidating its mid-range line and will most likely restrict it to the S/400, 9370 and IBM RT by 1993. IBM will probably seek to enhance each of these platforms over the next five years as a means of competing on purely technical merits but will also attempt to "buy" market share through aggressive pricing.

DEC and IBM are likely to be the only mid-range vendors capable of growing from their own base of proprietary technology. Other mid-range vendors will find their opportunities to be inextricably linked to the growth of UNIX and its associated standards.

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6. "Open Systems, Facts and Fallacies", Marc G. Schulman, Salomon Brothers, Inc., Stock Research Note, July 25, 1988

7. See Also: "Digital Equipment Corporation; Taking the Lead in Truly Open Systems", Marc G. Schulman, Union Bank of Switzerland, Equity Research Note, January 31, 1989

## MID-RANGE COMPUTER MARKET

### ANALYSTS' OBSERVATIONS ON MID-RANGE SYSTEMS ATTRIBUTES

#### PRICE

Price has always been of some importance but the real issue for price sensitivity in the late 80s and early 90s will be overall cost of ownership for systems. Dataquest expects prices of Business Unit computer systems to show a decline between 1988 and 1992 with an expected Average Price CAGR of -2.4% from \$575k to \$521.5k. Dataquest defines Business Unit Computer systems as costing between \$250k and \$1.5m, supporting 65 to 150 concurrent users and including the segment commonly referred to as super mini-computers.

With the exception of the super mini-computer market, there is moderate price sensitivity in the mid-range especially when compared to the low-end computer market. Downward<sup>10</sup> pressure on prices is a function of supply, not demand factors.

#### Hardware Price

Hardware prices are a declining portion of the overall systems price. Customers are increasingly aware of the high costs of overall systems including systems integration, training of personnel and systems service.

#### Software Price

As with hardware, customers are viewing software prices as only one portion of the overall cost of a system. However, software prices are not declining as quickly as hardware prices.

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8. Interview: Jeanette Sill-Holeman, February 3, 1989.

9. Dataquest Consolidated Data Base, U.S. Markets, 1983-1992, May, 1988, pp. 15

10. Interview: Gregg Marus, February 6, 1989.

Service Price

Service pricing will become more of an issue as competition for the mid-range increases. Service costs are declining slowly for basic maintenance but have increased in areas requiring custom applications. <sup>11</sup> Service costs are increasing as a proportion of cost of ownership, and are becoming more important in the eyes of customers. Service costs are variable costs which can exert an unpredictable influence on DP budgets, thus increasing perceived risks. <sup>12</sup>

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11."Scrambling for Dollars, Ledgeway's 1988 Service Industry Forecast", The Ledgeway Group, January, 1988

12."Trends and Forecasts in the Customer Service Industry, 1988 Annual Edition", September 1988.

## MID-RANGE COMPUTER MARKET

### PERFORMANCE

The mid-range market is more performance than price driven. Overall performance can be a significant competitive advantage for hardware vendors particularly when competing for the demanding technical user. Overall performance is measured by these users in terms of the speed with which their systems can complete the full series of processes required for typical projects. Thus, pure speed of computation is valued less highly than the totality of all required systems functions including data input, computation, communication, and/or data output. Analysts pointed out the danger of relying upon performance benchmarks which do not take account of the work flow experienced by different types of users.

### MIPS

There is a wide range of MIPS performance between different types of systems. Dataquest believes<sup>13</sup> that for technical systems, this is an important sales factor, while Infocorp feels that MIPS is meaningless as a performance benchmark<sup>14</sup> when taken out of the context of overall system performance.

### MFLOPS

MFLOPS performance is most important for scientific/technical and graphics applications. Infocorp reiterated their skepticism regarding<sup>15</sup> the use of MFLOPS as a performance benchmark out of context.

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13. Interview: Alia Fairchild, February 7, 1989

14. Interview Sandy Gant, February 10, 1989

15. Interview Sandy Gant, op cit

TECHNICAL ATTRIBUTES

Volatile Memory

User requirements for increased amounts of volatile memory are application driven. Newer applications require more RAM as graphical interfaces become more popular in computation intensive environments. <sup>16</sup>

Secondary Memory

User demands for increased amounts of secondary memory are prevalent in the commercial segment where large databases are used. Many analysts expect increasing use of optical and magneto-optical storage devices in both the commercial and technical segments increasing the number of <sup>17</sup> media types used for secondary and tertiary (archival) storage.

Application Portability

This will be most important for the commercial segment due to costs of retraining office workers and due to the wide range of systems employed. <sup>18</sup>

User-Interface Standardization

Like application portability the costs of retraining encourage commercial customers to seek standard user-interface standards.

Proprietary Operating Systems

Analysts agree that for the industry as a whole the importance of a proprietary operating system will decline unless there is a major industry consolidation around the market leaders. The quality and flexibility of the operating system will still be important for IBM and DEC but the degree of importance depends on the success of UNIX, and Open Systems in general. <sup>19</sup>

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16. Interview: Jeanette Sill-Holeman, op cit

17. Interview: Joyce Vincent, February 1, 1989

18. Interview: Sandy Gant, op cit

19. Interview: Alia Fairchild, op cit

SYSTEM CAPABILITIES

Database Capabilities

More important for the commercial segment than the technical segment, with some exceptions; computational chemistry, meteorology and oceanography are examples of technical fields witnessing the creation of large numbers of scientific databases. <sup>20</sup> Business enterprises will find that the ability to draw data from common databases will be an important competitive advantage and they will demand this capability from their systems vendors.

Graphics Capabilities

This is more important for technical workstations than for the mid-range. More advanced business applications programs will require graphical capabilities by 1992, though their complexity will not be as great as that required for technical analysis. <sup>21</sup>

Communications Capabilities

Of increasing importance for systems vendors and linked to the emergence of a variety of standards. <sup>22</sup> Infocorp expects this to be a major growth segment for the 1990s.

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20. Interview: Jeanette Sill-Holeman, op cit

21. Interview: Myron Kerstetter, January 26, 1989

22. Interview: Joyce Vincent, February 9, 1989

SERVICE

End-users' definition of service requirements is expanding. Perceptions of the nature and quality of vendor supplied service will encompass more systems integration functions in years to come. Third party providers will become more technically and price competitive if standardization<sup>23</sup> leads to relatively undifferentiated hardware and software.

Hardware Maintenance

Reliable and responsive hardware maintenance is a very important competitive advantage<sup>24</sup> for manufacturers because it is hardware vendor dependent. Infocorp and Gartner Group expect hardware maintenance costs to decline as hardware systems become more reliable and standardized.

Software Maintenance

Important as a competitive advantage, but third party vendors can fill the gap if hardware vendors are not competitive or not responsive. Infocorp believes that software maintenance costs are likely to rise as applications become more complex, though this may be mitigated by increasing availability<sup>25</sup> of standardized applications and operating systems.

Systems Integration

Very important, especially at the high end of the market and where specialized applications are required. As for the lower range of the market, the next five years will see more small businesses adopting computerized systems and niche marketers will provide a proliferation of hardware<sup>26</sup> and software products that end-users will seek to modularize.

Customized Programming

Will become less important as standards emerge and modular products proliferate.<sup>27</sup>

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23. "Redefining Customer Service", and "Professional Services and Systems", The Ledgeway Group, December 1988.

24. Interview: Jeanette Sill-Holeman, op cit

25. Interview: Jeanette Sill-Holeman, op cit

26. Interview: Myron Kerstetter, op cit

27. Interview: Myron Kerstetter, op cit

NON-PRICE VENDOR ATTRIBUTES

Overall Vendor Reputation

Can be an important source of vendor differentiation as competition increases, but as standardization progresses the vendor's reputation<sub>28</sub> for delivery, service and implementation will gain in importance.

Hardware Reliability

Must be assumed to exist if vendor is to be competitive. It is viewed by customers as part and parcel of overall system reliability.

Software Reliability

The same observations apply here as for hardware reliability but software reliability may prove easier to accomplish if standardization goes<sub>29</sub> hand-in-hand with decreasing amounts of custom programming.

Perceived Vendor Commitment to Products

An important source of competitive advantage in an age of increased competition and short product life cycles. As investments in computer systems come to be viewed as strategic, the customer's perceived risk of buying a system that may become an orphan becomes more of an issue.<sub>30</sub>

Strong R&D Reputation

Of less importance if standardization proceeds, but this is more likely to be true of the commercial than the technical segment of the mid-range market.<sub>31</sub>

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28. Interview: Jeanette Sill-Holeman, op cit

29. Interview: Jeanette Sill-Holeman, op cit

30. Interview: Alia Fairchild, op cit

31. Interview: Jeanette Sill-Holeman, op cit

Overall Commitment to Standardization

The importance of a particular vendor's perceived commitment to standardization will depend on the industry's success in managing hardware and software standards. Information dependent companies will be making strategic decisions regarding their systems investment which may be predicated on an increasing standardization of industry-wide and even global systems. For these customers, a vendor's perceived commitment to standardization will be very important. <sup>32</sup>

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32. Interview: Alia Fairchild, op cit

## MID-RANGE COMPUTER MARKET

### MID-RANGE MARKET ATTRACTIVENESS: AREAS OF OPPORTUNITY

#### Overall Market Opportunity

The mid-range is still a very healthy segment. Dataquest, whose Business Unit segment parallels the mid-range definition employed in this report, expects a Unit Shipment CAGR of 15% between 1988 and 1992, and a Revenue CAGR of 12.3% for the same time period.<sup>33</sup> The role of the mid-range computer will change to that of file-server for net worked PCs and will both benefit and suffer from the faster growth of this low-end segment.

#### Manufacturing

This traditionally attractive market for the mid-range is being attacked by lower priced computers and by skepticism that increasing automation leads to more effective manufacturing practices. Mid-range vendors must take a proactive role in designing comprehensive solutions to problems of manufacturing productivity and quality if they are to compete in this area.<sup>34</sup>

#### Education

The instructional education market is PC dominated at the elementary, high school and undergraduate teaching level. This portion of the education industry is relatively unimportant for the mid-range except where scientific/technical computing overlaps the education market. The decrease in funds for research is putting a crimp in the investment in mid-range systems here. The administrative segment of the education market is still an attractive market for the mid-range, however budgetary restraints and a decline in real dollar funding of education programs by the federal government is likely to increase the price sensitivity of the administrative segment. As is the case in manufacturing, mid-range vendors should sell computing solutions to the education market, not just iron.<sup>35</sup>

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33.Dataquest Consolidated Database, op cit.

34.Interview: Myron Kerstetter, op cit

35.Interview: Jeanette Sill-Holeman, op cit

Scientific/Research

Very important for mid-range but a real dollar decrease in federal grants is affecting the investment in systems as in the case of the education market. Within this industry area technical expertise and power are still the critical success factors. <sup>36</sup>

Financial Services

Increasingly important for the mid-range but currently many technically sophisticated analytical applications are being run on networked technical workstations rather than mid-range minicomputers. Coordinated trading strategies and global trading networks will place a premium on the ability of systems to network successfully. This requirement is likely to stem the penetration of technical workstations unless more sophisticated networking architectures can be devised. <sup>37</sup>

Office/Business

Still important but threatened by low-end workstations and PCs. The end-users are becoming increasingly sophisticated, demanding and powerful. They are having more influence upon the buying decisions made by MIS managers. Many mid-range vendors are ignoring this critical change in the sales environment and they do so at their peril. <sup>38</sup>

Government/Defense

A very important market for the mid-range but difficult to penetrate successfully without a strong installed base and intimate knowledge of the purchasing cycle. Government edicts concerning technical standards, communications protocols and acceptable applications demand a very well financed marketing effort with a long term orientation. <sup>39</sup> These factors are likely to continue to be emphasized during the next five years and will favor strong, established vendors over new entrants. <sup>40</sup>

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36. Interview: Jeanette Sill-Holeman, op cit

37. Interview: Gregg Marus, op cit

38. Interview: Sandy Gant, op cit

39. Interview: Joyce Vincent, op cit

40. Interview: Myron Kerstetter, op cit

ADDITIONAL OBSERVATIONS

Most analysts pointed out the increasing importance of good distribution networks as a competitive advantage for the 90s. Good distribution can provide differentiation in the face of hardware/software standardization, higher margins in the face of increased price competition and recognized business assets which can support stock prices in the face of hostile takeovers. For systems at the low end of the mid-range price band it is difficult to sell direct and achieve adequate margins.<sup>41</sup> Cooperative distribution can help to solve this dilemma.

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41. Interview: Jeanette Sill-Holeman, op cit