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ANALYSIS OF LARGE-SYSTEMS SERVICE

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Customer Service Program (CSP)

Analysis of Large-Systems Service

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Abstract

This report analyzes the performance of leading large-systems vendors in the areas of hardware maintenance, software support, and professional services. A total of 381 users of large systems from Amdahl, CDC, Honeywell, IBM, NAS, NCR, and Unisys were surveyed concerning their requirements for service and support, versus the perceived level received from their service provider. Third-party maintenance issues and opportunities were also identified since this subject has become an item of key interest to most major large-systems vendors.

Particular attention is paid to system availability, a subject that has been identified as of greatest importance to large-systems users. Currently, 53% of the total sample require a system availability of 99.5% or higher, yet only 39% of these users are getting the availability they say they require. However, the results are not even among vendors, since some vendors have been able to achieve higher availability through improved system design and sophisticated support programs for both hardware and software.

The report also analyzes the key elements of service and support, such as response time, repair time, parts availability, quality of documentation, and remote support.

The report contains 129 pages, including 125 exhibits.

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I

Introduction

I

Introduction

This report is the first deliverable of the large-systems modules of the 1988 Customer Service Program. It is based on a survey of 381 large-system users done in the spring of 1988, and it provides comparative data from a 1987 survey of 350 users.

The report deals with large-system user attitudes and perceptions regarding the service and support that they receive from large-system hardware vendors. Exhibit I-1 provides a display of the large-system survey sample by vendor and major product.

After this introduction, the report continues with an Executive Overview (Chapter II), which provides the key research findings in presentation as well as narrative format.

Immediately following the Executive Overview, in Chapter III, is an analysis of the entire large-system sample. This analysis provides bench-mark data to compare with the individual vendor/ product analyses found in Chapter IV.

Chapter IV provides an analysis of the individual requirements and perceived performance for each of the nine major large-system types covered in the survey.

Chapter V provides summary comparative exhibits by major system of data not displayed in previous chapters.

The appendix includes a copy of the survey questionnaire and a list of definitions of the service terminology used in this report.

EXHIBIT I-1

LARGE-SYSTEMS USER BREAKDOWN

Manufacturer	Model	Number of Interviews
Amdahl	58XX	40
CDC	CYBER	40
Honeywell	DPS	41
IBM	309X	42
IBM	308X	40
NAS	ASXXX	55
NCR	9XXX	40
UNISYS (Burroughs)	AXX	40
UNISYS (Sperry)	1100/XX	43
Total		381

II

Executive Overview

II

Executive Overview

This Executive Overview is designed to help the busy reader quickly review the key findings in the report. The information is summarized in presentation format, with each key point summarized as an exhibit with accompanying script on the facing page.

INPUT has been tracking large-systems user service and support since 1983. During this period of time, large-systems users have identified several key service needs that still are not being met by the providers of service. The most important need is high system availability. In 1987 and 1988, 39% of the users surveyed required 100% availability. In 1988, 28% of those requiring 100% availability were satisfied, versus 22% in 1987. Vendors are making some progress in satisfying user requirements. In 1987, 56% of the users were satisfied with system availability. In 1988, 62% of the users were satisfied. NAS, with 85% of their users satisfied, and Amdahl, with 78% satisfied, were clearly the leaders in satisfying users' system availability requirements.

Of the key high-priority services provided by vendors, users are very dissatisfied with software documentation (72% dissatisfied) and software support overall (57% dissatisfied). Parts availability is next in line with 55% dissatisfied.

A

Availability Still a Key Concern for Most Vendors

Exhibit II-1 presents the user perception of systems availability performance versus the requirements for the nine major systems surveyed. These systems are ranked in order of their success in satisfying the system availability needs of the users. This exhibit displays the ability of the various vendors to identify and then meet the needs of the various users.

EXHIBIT II-1

SYSTEMS AVAILABILITY OVERVIEW

RANK	Vendor	System Availability (Percent) Required	System Availability (Percent) Received	Users (Percent Satisfied)
1	NAS	98.8	99.0	85
2	Amdahl	99.0	98.2	78
3	NCR	97.1	97.1	61
4	IBM 309X	98.3	98.1	58
4	IBM 308X	99.4	98.6	58
5	UNISYS (Sperry)	97.9	97.4	57
6	UNISYS (Burroughs)	98.1	97.5	56
7	CDC	97.8	97.5	53
8	Honeywell	97.8	97.1	49
	ALL	98.3	97.9	62

- NAS and Amdahl have been particularly successful in meeting the system availability needs of their users. Honeywell has been the least successful—more than half (51%) of the users surveyed were dissatisfied.

- IBM 308X users have the highest system availability requirements (99.4%), while NCR users have the lowest requirements (97.1%).
- NAS users received the highest system availability (99%), while Honeywell and NCR users received the lowest (97.1%).

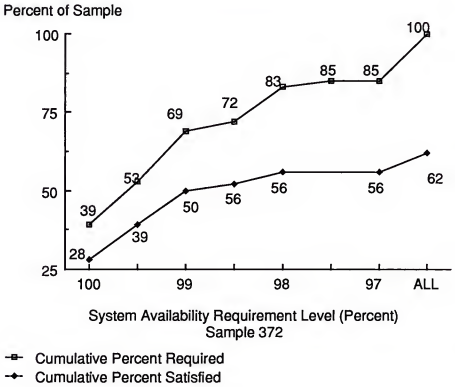
B

Vendor Performance Falls Off after 99%

Exhibit II-2 provides a breakdown of user satisfaction with their system availability at each requirement level. For example, at the 97% requirement level, 85% of the sample required 97% or higher availability and 56% of those users received what they required or higher.

EXHIBIT II-2

SYSTEM AVAILABILITY SATISFACTION AT SPECIFIC REQUIREMENT LEVELS



- In the large-systems arena, system availability requirements are high. Eighty-three percent of the users require 98% or higher system availability, and 39% require 100% system availability. The large-systems vendors have managed to satisfy 62% of the sample's requirements, but the percent satisfied falls off rapidly above the 99% requirement level. At the 99.5% requirement level only 39% of the users are satisfied, and at the 100% level only 28% are satisfied.

- Clearly the small percentage of users satisfied above the 99% level indicates an area that should be focused on. It presents an opportunity for vendors that are delivering high system availability and is a problem area for those that are not.

C
System Reliability

As large-system availability requirements approach 100%, large-system vendors can realistically only achieve these requirements through system design and reliability improvements in both hardware and software. A good measurement of how well vendors are doing in this area is the number of systems interruptions per month reported by the sample.

- NAS clearly is the leader in this effort, with a reported 0.4 systems interruptions per month (Exhibit II-3).

EXHIBIT II-3

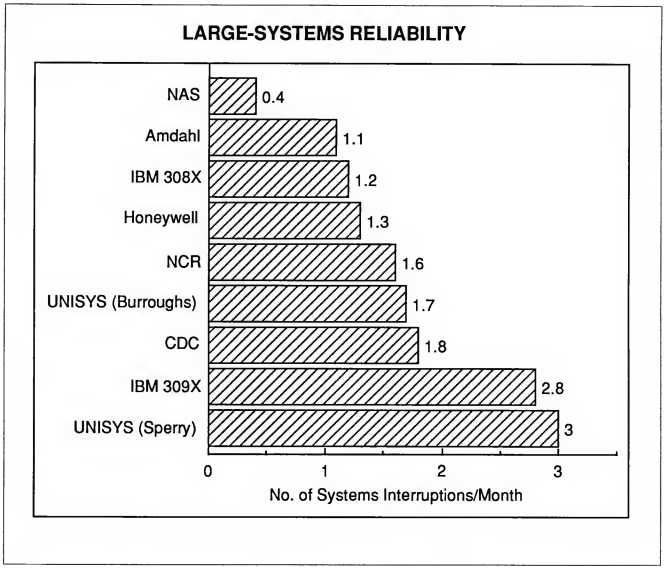
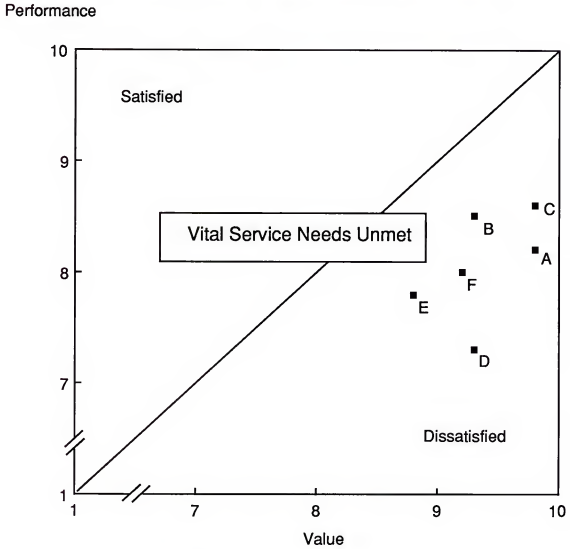


EXHIBIT II-4a

LARGE-SYSTEMS USER NEEDS STILL UNMET



A=Parts Availability
B=Hardware Engineering Skill Level
C=Overall Hardware Support
D=Software Documentation
E=Software Engineering Skill Level
F=Overall Software Support

D

Large-Systems User Needs Still Unmet

In 1986, INPUT identified six specific service needs that were of greatest importance to users of large systems. Those six (three hardware and three software) criteria were the following: parts availability, hardware engineer skill level, overall hardware support, software documentation, software engineer skill level, and overall software support.

Exhibit II-4 plots the mean value that users place on each of these needs and the performance that the users perceive they are getting from the vendors. The users' vital service needs are still not being met!

Software documentation continues to be the prime concern of large-system users, and users have increased again the value they place on it. Since software documentation is not always supplied by the system vendor, the responsibility may lie with a software vendor's product.

EXHIBIT II-4b

LARGE-SYSTEMS USER NEEDS STILL UNMET

		Means	
		Required	Received
A	Parts Availability	9.3	8.1
B	Hardware Eng. Skill Level	9.1	8.6
C	Overall Hardware Support	9.3	8.7
D	Software Documentation	9.1	7.2
E	Software Eng. Skill Level	8.7	7.7
F	Overall Software Support	9.0	8.0

E

Software Support and Parts Availability Needs Outstrip Vendor Performance

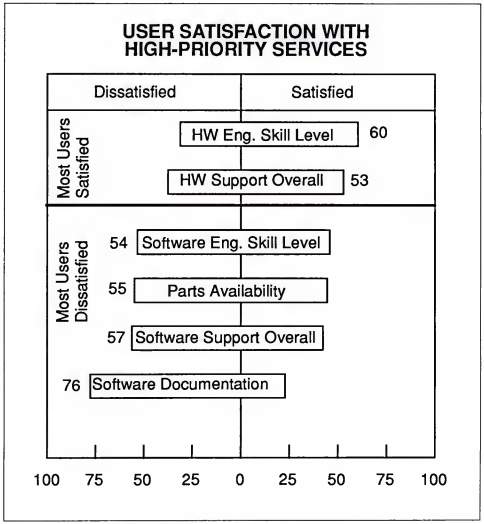
Software documentation continues to be a growing problem area for large-systems users—76% of the users are dissatisfied. In 1987, 59% of the users were dissatisfied. (See Exhibit II-5.)

Other software support items and parts availability also remain a problem since over 50% of the users are dissatisfied.

Amdahl is the only vendor that is satisfying most user needs for software support. Eighty percent of its users are satisfied with software support, and 59% are satisfied with software documentation.

NAS, Amdahl, and IBM (with its 308X) are the only vendors satisfying more than 50% of their users with regard to parts availability.

EXHIBIT II-5



F

Customer Willingness to Perform Service Tasks

Users were asked to rate their willingness to perform service tasks in return for a discount on their maintenance charges. Willingness ratings were on a scale of 1 to 10, with 1 being not very willing and 10 being very willing. (See Exhibit II-6.)

- In general, most large-system users are not very willing to perform service tasks. This is not surprising since most users do not have the technical skills required to perform these tasks. They also are looking for very high discounts if they do undertake these tasks.

EXHIBIT II-6

CUSTOMER WILLINGNESS TO PERFORM SERVICE TASKS

Tasks	Willingness to Perform* (Percent)					Mean
	1 - 2	3 - 4	5 - 6	7 - 8	9 - 10	1 - 10
Board Swaps	49.1	5.6	13.9	18.4	13.1	4.2
Component Replacement	59.2	9.4	13.7	9.4	8.3	3.4
Diagnosis	42.0	5.3	18.1	17.5	17.0	4.6
Depot (Mail/Carry-In)	61.3	8.0	12.5	10.4	7.6	3.2
Support Mgt./Control Functions	51.3	4.2	16.4	14.3	13.8	4.0

Tasks	Mean Discount Expected (Percent)
Board Swaps	33
Component Replacement	38
Diagnosis	28
Depot (Mail/Carry-In)	35
Support Mgt./Control Functions	29

* Scale: 1 = Not very willing 10 = Very willing

III

Large-System User Service Requirements—All Vendors

III

Large-System User Service Requirements—All Vendors

In this chapter, the changes between 1987 and 1988 will be examined in the key areas of service contract coverage, service performance, user satisfaction with service performance, and user satisfaction with system availability. In addition, the distribution of user requirements of systems availability versus the distribution of system availability obtained will be displayed and examined.

Exhibit III-1 presents the contract coverage of the entire large-systems sample. A significant shift has occurred in the percentage of customers that have Monday-through-Sunday coverage (from 38% to 52%) and in the percentage of customers that have 17-24-hour coverage (from 40% to 55%). This shift was led by IBM, which announced 7-day, 3-shift coverage as part of the standard maintenance agreement, the CSA and the MRSA, in 1987. These percentages are probably understated since some users in the survey reported less than full coverage even though there is no charge for full coverage (i.e., by IBM and Amdahl).

- In the past, large-system users selected hours of coverage to optimize service costs and arrange system preventive maintenance at hours causing them less disruption. With the new move by IBM, other vendors will probably have to follow suit in order to remain competitive and to be easier to do business with. Users don't like discrete bills for service outside hours.

EXHIBIT III-1

SERVICE CONTRACT COVERAGE ALL LARGE-SYSTEM USERS

Contract Component	Sample Responding (Percent)	
	1987	1988
• Days of coverage		
- Monday – Friday	55	46
- Monday – Saturday	7	2
- Monday – Sunday	38	52
• Hours of coverage		
- 1 to 9 hours	39	34
- 10 to 16 hours	21	11
- 17 to 24 hours	40	55

Exhibit III-2 presents the key elements of service performance for 1987 and 1988.

- System interruptions per month decreased from 1.7 in 1987 to 1.6 in 1988. The percent caused by hardware dropped significantly from 60% to 49%. Other causes increased significantly from 10% to 19%.

- The average (mean) system availability increased slightly from 97.6% to 97.9%.

- The response time remained the same at 1.7 hours, but the repair time showed a significant increase (from 2.4 to 4.2 hours). This was caused primarily by significant increases in repair times for Unisys (Burroughs) (3.0 to 7.1 hours), Unisys (Sperry) (2.4 to 5.6 hours), and CDC (3.9 to 8.8 hours).

EXHIBIT III-2

SERVICE PERFORMANCE
ALL LARGE-SYSTEM USERS

Performance Criteria	Actual Performance	
	1987	1988
• Systems Interruptions		
- Mean number per month	1.7	1.6
- Hardware caused (Percent)	60.0	49.0
- System Software caused (Percent)	22.0	21.0
- Application Software caused (Percent)	8.0	11.0
- Other causes (Percent)	10.0	19.0
• Mean System Availability (Percent)	97.6	97.9
• Mean Response Time (Hours)	1.7	1.7
• Mean Repair Time (Hours)	2.4	4.2

Exhibit III-3 presents changes between 1987 and 1988 in user expectation and the percent of the sample satisfied with system availability, response time, and repair time.

- The mean system availability requirement remained the same at 98.3%. The percent of the total sample satisfied with systems availability increased from 56% in 1987 to 62% in 1988.

- The mean response time requirement increased to 1.8 hours from 1.7 hours in 1987. Ninety three percent of the sample were satisfied with response time in 1988 as compared to 89% in 1987.

- The percent satisfied with repair time dropped to 88% in 1988 from 93% in 1987. Significant drops in percent satisfied with Unisys (Sperry) (from 99% to 69%) and Honeywell (from 100% to 85%) were the primary causes. The user expectation for repair time also increased from 2.4 hours in 1987 to 4.2 hours in 1988.

EXHIBIT III-3

USER SATISFACTION WITH SERVICE PERFORMANCE ALL LARGE-SYSTEM USERS

Performance Criteria	User Expectation 1987	User Expectation 1988	Sample Satisfied (Percent) 1988	Sample Satisfied (Percent) 1987
System Availability (Percent)	98.3	98.3	62	56
Response Time (Hours)	1.7	1.8	93	89
Repair Time (Hours)	2.4	4.2	88	93

0 50 100

1988
1987

User satisfaction with system availability increased at all requirement levels (see Exhibit III-4). The percent satisfied drops sharply above the 99% requirement level, where less than half the users are satisfied.

EXHIBIT III-4

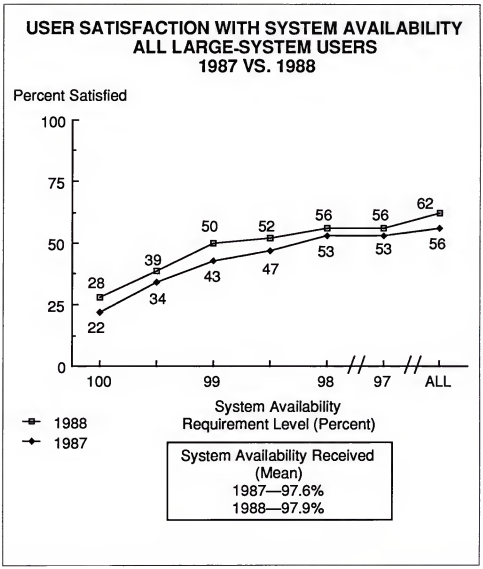
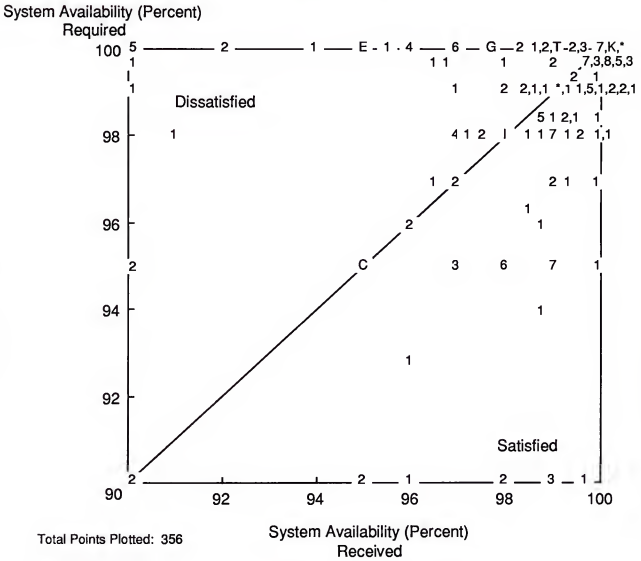


Exhibit III-5 provides a scatter plot of the large-systems sample's systems availability requirements versus the actual availability received. The concentration of system availability requirements at 98% and above has increased from 73% of the sample in 1987 to 83% in 1988.

EXHIBIT III-5

USER SATISFACTION WITH SYSTEM AVAILABILITY
ALL LARGE-SYSTEM USERS



Total Points Plotted: 356

Key C=12 K=20
E=14 T=29
G=16 *=40
I=18

IV

Vendor Performance Analyses

IV

Vendor Performance Analyses

In this chapter, INPUT analyzes large-system user service on a product-by-product basis. Each analysis begins by examining the contract coverage between the users and the vendor. Next system availability received as perceived by the user is presented and the key elements that impact system availability (i.e., system interruptions, response time) are examined in detail. A comparison of 1987 versus 1988 user expectations and user satisfaction with system availability, response time, and repair time is then presented. The trend (1987/1988) in user satisfaction at various requirement levels follows as well as a scattergram that graphically depicts the large number of users with high system availability requirements.

The major elements of hardware and software support are then examined in terms of the value users place on each of them, the perceived vendor performance on each element, and the percent of users satisfied. A comparison (1987 vs. 1988) of the key elements of hardware and software support is examined next to identify problem trends and positive results.

The next presentation critiques the users' perception of software's impact on system performance, followed by the users' value/performance perception of the major professional services areas. Third-party maintenance is then examined from both an issue and an opportunity standpoint. In closing, the customers' willingness to perform service tasks in return for a discount is examined.

A

Amdahl

In 1988, INPUT surveyed 40 users of Amdahl's large systems. As usual, INPUT targeted information system (IS) and operations managers within each company. The sample included a good cross section of government, industry, service, and finance users. It included 18 users of the model 5860 and 7 users of the model 5880.

Exhibit IV-1 presents the service contract coverage reported by the sample for 1987 and 1988. Amdahl has historically offered 24-hour/7-day-a-week coverage as its standard contract offering. Therefore, there was almost no change in the coverage reported. It is apparent, however, that some of these users still do not understand the coverage they are entitled to receive under the contract, since they report less than 24-hour coverage.

Service performance in 1988 is compared with performance in 1987 in Exhibit IV-2. The number of system interruptions dropped to 1.1 per month in 1988 from 1.2 per month in 1987. The percent caused by hardware took a very significant drop (71% to 34.7%), indicating an increase in reliability. The mean response time also dropped significantly from 1.9 hours in 1987 to 1.4 hours in 1988.

Exhibit IV-3 presents a very positive increase in user satisfaction with system availability (from 52% to 78%). This indicates Amdahl was more successful in 1988 in meeting a key user need. User satisfaction with response time also showed improvement, while user satisfaction with repair time decreased slightly.

EXHIBIT IV-1

SERVICE CONTRACT COVERAGE
AMDAHL

Contract Component	Sample Responding (Percent)	
	1987	1988
• Days of coverage		
- Monday – Friday	19	20
- Monday – Saturday	3	3
- Monday – Sunday	78	77
• Hours of coverage		
- 1 to 9 hours	13	10
- 10 to 16 hours	3	3
- 17 to 24 hours	84	87

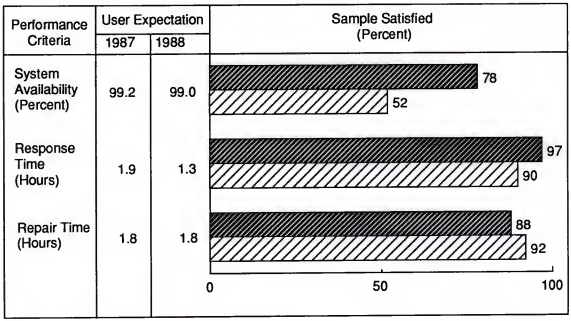
EXHIBIT IV-2

SERVICE PERFORMANCE
AMDAHL

Performance Criteria	Actual Performance 1987	Actual Performance 1988
• Systems Interruptions		
- Mean number per month	1.2	1.1
- Hardware caused (Percent)	71.0	34.7
- System Software caused (Percent)	17.0	24.7
- Application Software caused (Percent)	7.0	20.6
- Other caused (Percent)	5.0	18.6
• Mean System Availability (Percent)	98.9	98.2
• Mean Response Time (Hours)	1.9	1.4
• Mean Repair Time (Hours)	1.7	1.7

EXHIBIT IV-3

USER SATISFACTION WITH
SERVICE PERFORMANCE
AMDAHL 58XX



User satisfaction with system availability increased significantly at each requirement level (Exhibit IV-4) between 1987 and 1988. Amdahl meets the needs of its users that require 99% availability 75% of the time. This compares very favorably with the average across all large-system users of 50% satisfied. Users reported that the average system availability dropped slightly in 1988 to 98.2% from 98.9% in 1987.

EXHIBIT IV-4

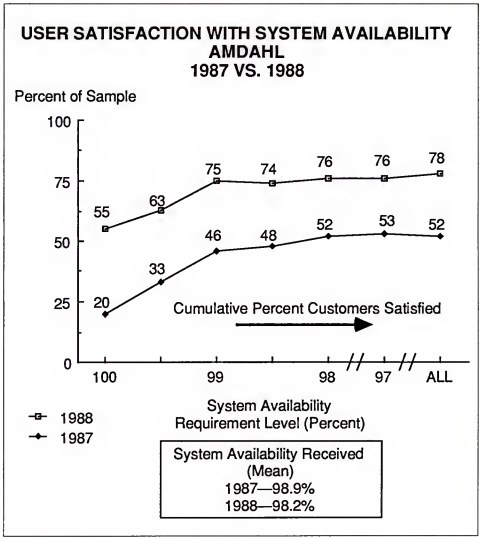


Exhibit IV-5 provides a graphic representation of the Amdahl sample's system availability requirements versus what they receive. Amdahl has done a good job of meeting very high system availability requirements.

In the hardware support area (Exhibit IV-6), Amdahl has a high percentage of user satisfaction (above 70%) in all areas except parts availability, which has 60% of the users satisfied.

EXHIBIT IV-5

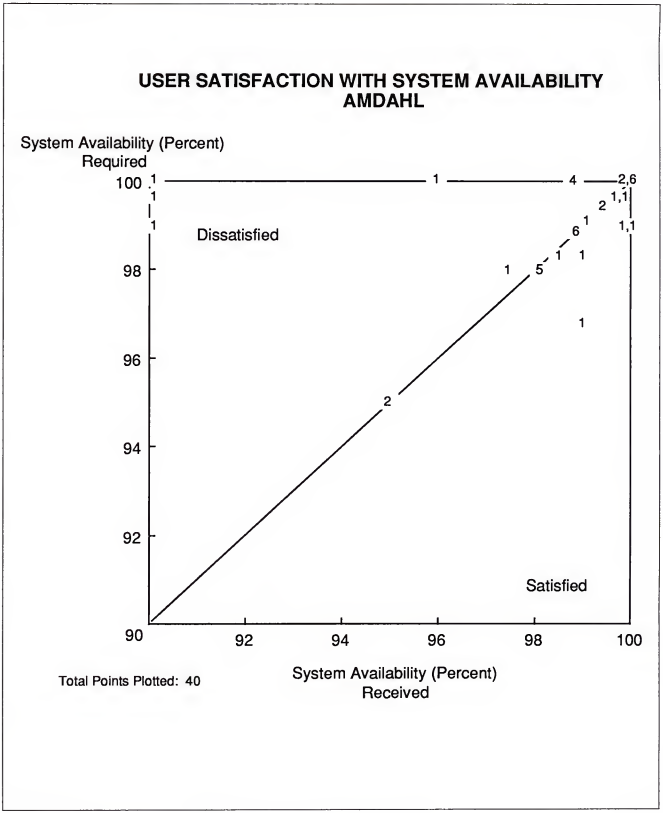


EXHIBIT IV-6

HARDWARE SUPPORT VALUE/PERFORMANCE LEVELS—AMDAHL

Service Category	1988 Average User Rating*		Percent Satisfied
	Value	Performance	
Hardware Engineer Skill	8.9	9.0	81
Hardware Phone Support Staff	8.1	8.6	89
Hardware Dispatch	8.7	8.9	72
Parts Availability	9.1	8.5	60
Overall Hardware Maintenance	9.3	9.2	76
Hardware User Documentation	8.2	8.0	72

* Scale: 1 = Low 10 = High

Software support overall (Exhibit IV-7) has a high percent of satisfied users (80%). Software user documentation has the lowest percent of satisfied users (59%).

EXHIBIT IV-7

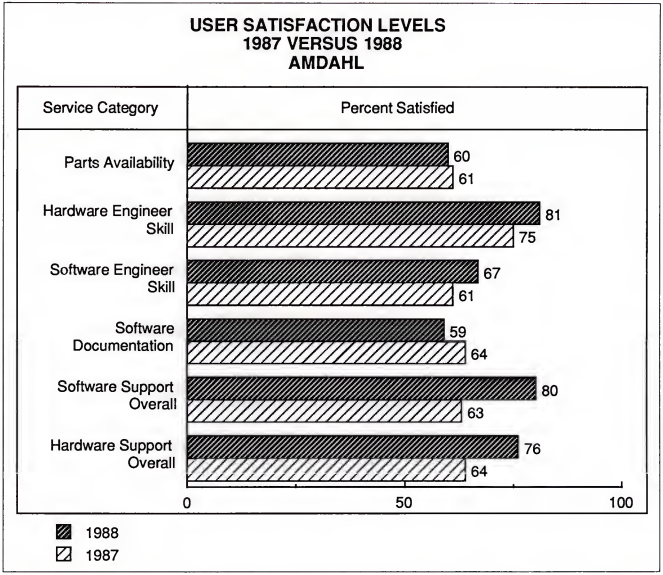
SOFTWARE SUPPORT VALUE/PERFORMANCE LEVELS—AMDAHL

Service Category	1988 Average User Rating*		Percent Satisfied
	Value	Performance	
On-Site Support	8.0	8.4	78
Telephone Hotline	8.4	8.3	76
Remote Support	8.2	8.0	86
Problems Data Base	8.0	7.6	63
SW Engineer Skill	8.9	8.5	67
SW Product Reliability	9.5	9.0	65
Software Support Overall	9.0	8.9	80
Software User Documentation	8.4	7.9	59

* Scale: 1 = Low 10 = High

Exhibit IV-8 presents the trends in user satisfaction (1987 versus 1988) for six key areas of support. Amdahl was successful in increasing satisfaction in four of six, with only software documentation and parts availability showing slight decreases.

EXHIBIT IV-8



- Software had a significant impact on systems interruptions for Amdahl users (Exhibit IV-9). These users reported 0.55 major software problems per month, thus accounting for half of the system interruptions. Minor software problems (i.e., those not causing systems interruptions) were reported to be 0.86 per month.

Exhibit IV-10 presents the value established by the users for each major catagory of professional service, as well as the users' perception of Amdahl's performance. Amdahl has a high level of satisfaction in all areas.

EXHIBIT IV-9

SOFTWARE IMPACT ON SYSTEMS PERFORMANCE AMDAHL

Description	Range (No./year)	Mean (No./month)
Major Problems*		
# Reported to vendor/mo.	0 - 25	.38
# Resolved/mo.	1 - 25	.55
Turnaround time to resolve (Hrs)	1 - 48	7.4
Minor Problems**		
# Reported to vendor/mo.	0 - 24	.53
# Resolved/mo.	1 - 40	.86
Turnaround time to resolve (Hrs)	.3 - 48	11.9

* Major problems are those that do not allow processing to continue.

** Minor problems are those that allow processing to continue with minor degradation.

Amdahl apparently offers very little third-party maintenance to its users, yet 58.3% of the users surveyed stated that they would use the service if it were available (Exhibit IV-11). This could be a busineess opportunity for Amdahl.

- Sixty-three percent of Amdahl users have been contacted by third parties, and 59% already use third-party service for some products. Eighty percent stated that they planned to use third-party service in the future.

Exhibit IV-12 makes it clear that only a small percent of Amdahl's customers are willing to perform service tasks in return for a discount and that the discount expected for those very willing ranges from 22.0% to 31.7%, depending on the type of activity performed.

EXHIBIT IV-10

PROFESSIONAL SERVICES SATISFACTION
AMDAHL 58XX

Service Category	1988 Average User Rating*		Percent Satisfied
	Value	Performance	
Planning			
Installation Planning	8.7	8.8	69
Needs Assessment Planning	7.9	8.2	73
Capacity Planning	8.2	7.9	69
Network Design Planning	7.7	8.1	77
Overall Planning Services	7.8	8.1	80
Consulting			
Site/Facility Mgt.	6.6	7.9	79
Network Mgt.	6.9	7.9	82
Systems Integration	6.9	8.2	79
Disaster Recovery	7.3	7.1	67
Overall Consulting Services	7.3	7.7	78
Other			
Installation/Moves	8.6	8.7	74
Changes/Upgrades	8.6	8.9	88

* Scale: 1 = Low 10 = High

EXHIBIT IV-11

THIRD-PARTY ISSUES/OPPORTUNITIES AMDAHL

Description	Percent Responding	
	Yes	No
Does hardware vendor supply service to any other brands of equipment in your system?	2.5	97.5
If available, would you use hardware vendor to service other brands?	58.3	41.7
Have Third-Party Maintenance companies approached you about service?	63.0	37.0
Have you considered Third-Party Service for:		
A. Hardware	63.0	37.0
B. Software	13.0	87.0
C. Education and Training	48.0	52.0
D. Planning and Consulting	33.0	67.0
Do you currently use Third-Party Service?	59.0	41.0
Do you plan to use Third-Party Service in the future?	80.0	20.0

EXHIBIT IV-12

CUSTOMER WILLINGNESS TO PERFORM SERVICE TASKS
AMDAHL

Tasks	Willingness to Perform* (Percent)					Mean
	1 - 2	3 - 4	5 - 6	7 - 8	9 - 10	1 - 10
Board Swaps	65.7	5.7	2.9	8.6	17.2	3.3
Component Replacement	66.7	13.9	11.1	0	8.3	2.6
Diagnosis	50.0	15.4	11.5	3.8	19.2	3.9
Depot (Mail/Carry-In)	71.0	6.5	6.5	6.4	9.7	2.7
Support Mgt./Control Functions	63.0	11.1	11.1	3.7	11.1	3.0

Tasks	Mean Discount Expected (Percent)
Board Swaps	29.6
Component Replacement	31.7
Diagnosis	22.5
Depot (Mail/Carry-In)	22.0
Support Mgt./Control Functions	30.8

* Scale: 1 = Not very willing 10 = Very willing

B

Unisys (Burroughs)

In 1988, INPUT contacted 40 users of Unisys (Burroughs) large systems. As usual, INPUT contacted ranking information systems officials regarding the survey. Eighteen users of the model A3 and twelve users of the model A9 were included in the survey sample.

Exhibit IV-13 indicates there has been a decrease in Monday-through-Sunday and Monday-through-Saturday coverage with a corresponding increase (from 55% to 62%) in Monday-through-Friday coverage. Users also increased the 10-16 hours of coverage from 10% in 1987 to 18% in 1988.

EXHIBIT IV-13

SERVICE CONTRACT COVERAGE
UNISYS (BURROUGHS)

Contract Component	Sample Responding (Percent)	
	1987	1988
• Days of coverage		
- Monday – Friday	55	62
- Monday – Saturday	5	3
- Monday – Sunday	40	35
• Hours of coverage		
- 1 to 9 hours	50	42
- 10 to 16 hours	10	18
- 17 to 24 hours	40	40

EXHIBIT IV-14

SERVICE PERFORMANCE
UNISYS (BURROUGHS)

Performance Criteria	Actual Performance	
	1987	1988
• Systems Interruptions		
- Mean number per month	1.6	1.7
- Hardware caused (Percent)	60.0	55.0
- System Software caused (Percent)	32.0	16.0
- Application Software caused (Percent)	5.0	7.0
- Other caused (Percent)	3.0	22.0
• Mean System Availability (Percent)	96.9	97.5
• Mean Response Time (Hours)	1.6	1.6
• Mean Repair Time (Hours)	3.0	7.1

Service Performance is presented in Exhibit IV-14. Systems interruptions per month increased from 1.6 in 1987 to 1.7 in 1988. Apparently this was due to causes other than hardware and systems software since both of these items decreased as a cause of system interruptions. The average mean system availability increased from 96.9% in 1987 to 97.5% in 1988. The mean repair time as perceived by the users more than doubled (from 3.0 hours to 7.1 hours) from 1987 to 1988.

Users apparently were expecting the increase in repair time since user expectation of repair time increased from 2.9 hours in 1987 to 8.3 hours in 1988 (Exhibit IV-15). User satisfaction increased in 1988 over 1987 for repair time, response time, and system availability.

EXHIBIT IV-15

USER SATISFACTION WITH SERVICE PERFORMANCE UNISYS (BURROUGHS)

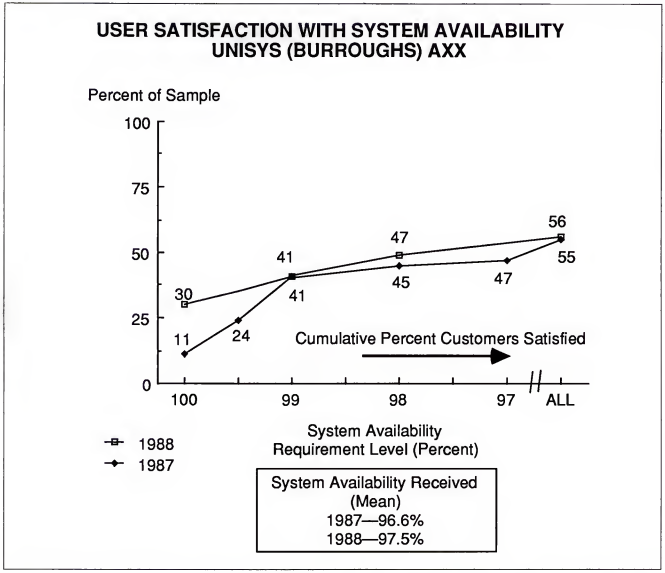
Performance Criteria	User Expectation 1987	User Expectation 1988	Sample Satisfied (Percent) 1988	Sample Satisfied (Percent) 1987
System Availability (Percent)	98.2	98.1	56	54
Response Time (Hours)	1.5	1.8	88	86
Repair Time (Hours)	2.9	8.3	100	94

0 50 100

1988
1987

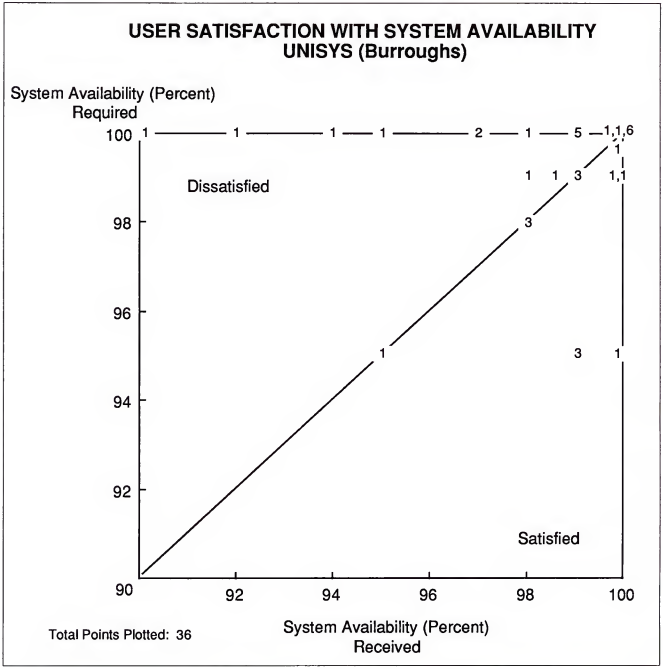
Exhibit IV-16 displays the percent of users satisfied at various requirement levels. There has been little change since 1987, except above the 99% requirement level, where some improvement was achieved.

EXHIBIT IV-16



A scattergram of system availability required versus system availability received (Exhibit IV-17) makes it clear that a significant number of users that required 99% or higher availability remain dissatisfied and fall quite some distance from the (diagonal) required line.

EXHIBIT IV-17



Hardware support value/performance levels are displayed in Exhibit IV-18. The percent of satisfied users is very low in the areas of hardware user documentation (35%), parts availability (40%), and overall hardware maintenance (43%).

EXHIBIT IV-18

HARDWARE SUPPORT VALUE/PERFORMANCE LEVELS—UNISYS (BURROUGHS)

Service Category	1988 Average User Rating*		Percent Satisfied
	Value	Performance	
Hardware Engineer Skill	9.2	8.3	58
Hardware Phone Support Staff	8.1	8.1	76
Hardware Dispatch	8.9	8.3	63
Parts Availability	9.1	7.7	40
Overall Hardware Maintenance	9.4	8.5	43
Hardware User Documentation	8.1	6.9	35

* Scale: 1 = Low 10 = High

Software support value/performance levels in Exhibit IV-19 indicate some significant problems with user satisfaction. User satisfaction with software documentation is very low, with only 17% of the users satisfied. Software product reliability (32% satisfied) and software support overall (35% satisfied) are other problem areas.

EXHIBIT IV-19

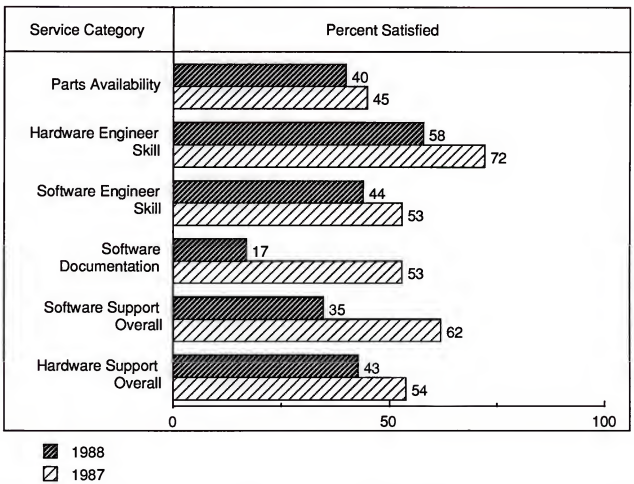
SOFTWARE SUPPORT VALUE/PERFORMANCE LEVELS—UNISYS (BURROUGHS)

Service Category	1988 Average User Rating*		Percent Satisfied
	Value	Performance	
On-Site Support	6.1	6.8	74
Telephone Hotline	8.1	7.6	56
Remote Support	6.2	6.2	71
Problems Data Base	7.5	7.2	44
SW Engineer Skill	8.6	7.6	44
SW Product Reliability	9.5	7.9	32
Software Support Overall	8.9	7.6	35
Software User Documentation	9.1	7.0	17

* Scale: 1 = Low 10 = High

Exhibit IV-20 displays changes in user satisfaction between 1987 and 1988 for six key service and support items. Unisys (Burroughs) recorded a negative trend for all six.

EXHIBIT IV-20



Major software problems average 0.43 per month, which amounts to about 25% of the system interruptions per month (Exhibit IV-21). Minor software problems occur at the rate of 0.82 per month.

Exhibit IV-22 presents the value/performance levels and the user satisfaction ratings for the professional services area.

EXHIBIT IV-21

SOFTWARE IMPACT ON SYSTEMS PERFORMANCE UNISYS (BURROUGHS)

Description	Range (No./Year)	Mean (No./Month)
Major Problems*		
# Reported to vendor/mo.	0 - 20	.33
# Resolved/mo.	1 - 20	.43
Turnaround time to resolve (Hrs)	1 - 64	15.5
Minor Problems**		
# Reported to vendor/mo.	0 - 35	.78
# Resolved/mo.	2 - 35	.82
Turnaround time to resolve (Hrs)	.5 - 72	18.1

* Major problems are those that do not allow processing to continue.

** Minor problems are those that allow processing to continue with minor degradation.

The following areas indicate a user satisfaction below 50% and probably deserve management focus:

- Needs assessment planning 43%
- Capacity planning 42%
- Network design planning 41%
- Network management 32%
- Disaster recovery 38%

Although Unisys offers third-party service, only 12.8% of the users surveyed indicated that they were using this service (Exhibit IV-23). Fifty-four and one-half percent of the users stated they would use the service if available. This would indicate that Unisys might want to broaden its third-party service to include products installed at these user sites.

EXHIBIT IV-22

PROFESSIONAL SERVICES SATISFACTION UNISYS (BURROUGHS)

Service Category	1988 Average User Rating*		Percent Satisfied
	Value	Performance	
Planning			
Installation Planning	7.8	6.9	51
Needs Assessment Planning	7.7	6.8	43
Capacity Planning	8.3	6.9	42
Network Design Planning	8.0	6.8	41
Overall Planning Services	7.9	7.0	57
Consulting			
Site/Facility Mgt.	6.3	5.7	50
Network Mgt.	7.7	5.9	32
Systems Integration	7.3	6.6	60
Disaster Recovery	8.8	6.7	38
Overall Consulting Services	7.3	6.7	59
Other			
Installation/Moves	8.2	7.6	68
Changes/Upgrades	8.3	7.6	62

* Scale: 1 = Low 10 = High

- Seventy percent of the users surveyed indicated that they had been contacted by third-party vendors, and 64.7% stated that they planned to use third-party service in the future. This is a significant increase over the 40.9% of the users who use third-party service today.

EXHIBIT IV-23

THIRD-PARTY ISSUES/OPPORTUNITIES UNISYS (BURROUGHS)

Description	Percent Responding	
	Yes	No
Does hardware vendor supply service to any other brands of equipment in your system?	12.8	87.2
If available, would you use hardware vendor to service other brands?	54.5	45.5
Have Third-Party Maintenance companies approached you about service?	70.0	30.0
Have you considered Third-Party Service for:		
A. Hardware	41.0	59.0
B. Software	7.7	92.3
C. Education and Training	37.5	62.5
D. Planning and Consulting	27.5	72.5
Do you currently use Third-Party Service?	40.9	59.1
Do you plan to use Third-Party Service in the future?	64.7	35.3

Exhibit IV-24 displays users' willingness to perform service tasks in return for a discount. Only a small percentage of users appear very willing to perform these tasks at discounts ranging from 15.0% to 35.1% depending on the type of task performed.

EXHIBIT IV-24

CUSTOMER WILLINGNESS TO PERFORM SERVICE TASKS UNISYS (BURROUGHS)

Tasks	Willingness to Perform* (Percent)					Mean
	1 - 2	3 - 4	5 - 6	7 - 8	9 - 10	1 - 10
Board Swaps	54.8	3.2	12.9	16.2	12.9	3.9
Component Replacement	59.4	6.3	9.4	9.4	15.6	3.7
Diagnosis	63.0	3.7	14.8	11.1	7.4	3.3
Depot (Mail/Carry-In)	66.7	6.6	10.0	13.3	3.3	3.0
Support Mgt./Control Functions	61.5	3.8	19.2	0	15.4	3.3

Tasks	Mean Discount Expected (Percent)
Board Swaps	23.3
Component Replacement	35.1
Diagnosis	17.1
Depot (Mail/Carry-In)	31.4
Support Mgt./Control Functions	15.0

* Scale: 1 = Not very willing 10 = Very willing

C

CDC

In 1988, INPUT surveyed 40 CDC large-system users. The following information presents the results of their responses. Twelve of the users were from education, and the rest represented a good cross section of business users. The sample included 39 users of the CDC Cyber 180 and 1 user of the Cyber 170.

Exhibit IV-25 shows a continuing dominance of Monday-through-Friday, single-shift contract coverage. In fact, single-shift coverage has increased from 40% in 1987 to 59% in 1988. This is quite different from the

EXHIBIT IV-25

SERVICE CONTRACT COVERAGE
CDC

Contract Component	Sample Responding (Percent)	
	1987	1988
• Days of coverage		
- Monday – Friday	90	87
- Monday – Saturday	2	3
- Monday – Sunday	8	10
• Hours of coverage		
- 1 to 9 hours	40	59
- 10 to 16 hours	48	31
- 17 to 24 hours	12	10

EXHIBIT IV-26

SERVICE PERFORMANCE
CDC

Performance Criteria	Actual Performance	
	1987	1988
• Systems Interruptions		
- Mean number per month	2.3	1.8
- Hardware caused (Percent)	63.0	62.0
- System Software caused (Percent)	14.0	16.0
- Application Software caused (Percent)	7.0	2.0
- Other caused (Percent)	15.0	20.0
• Mean System Availability (Percent)	97.7	97.5
• Mean Response Time (Hours)	2.6	3.1
• Mean Repair Time (Hours)	3.9	8.8

average of all large-system users—52% have Monday-through-Sunday coverage and 66% have 24-hour coverage.

Service performance (Exhibit IV-26) has decreased (from 1987 to 1988) in terms of response time and repair time. The system availability has remained about the same, and the number of systems interruptions has decreased from 2.3 per month in 1987 to 1.8 per month in 1988.

Exhibit IV-27 displays a significant improvement in user satisfaction with response time and repair time from 1987 to 1988. This exhibit also reveals the fact that those users expected a longer response time and a longer repair time. CDC was therefore able to improve user satisfaction during a period when response time and repair time were increasing. User satisfaction with system availability decreased from 58% in 1987 to 53% in 1988.

EXHIBIT IV-27

USER SATISFACTION WITH SERVICE PERFORMANCE CDC

Performance Criteria	User Expectation 1987	User Expectation 1988	Sample Satisfied (Percent) 1988	Sample Satisfied (Percent) 1987
System Availability (Percent)	98.4	97.8	53	58
Response Time (Hours)	2.2	3.0	97	80
Repair Time (Hours)	3.2	8.3	91	88

0 50 100

1988
1987

User satisfaction with system availability (Exhibit IV-28) drops very rapidily after the 98.5% availability requirement level. The percent satisfied at various requirement levels in 1988 is very similiar to the pattern in 1987, except at the 100% requirement level, where the percent satisfied dropped from 25% in 1987 to 7% in 1988.

EXHIBIT IV-28

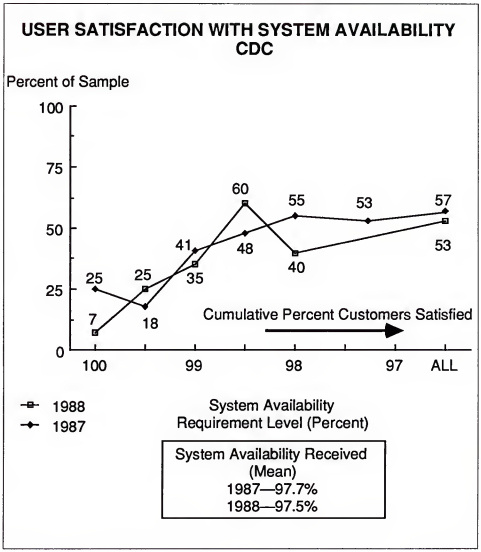
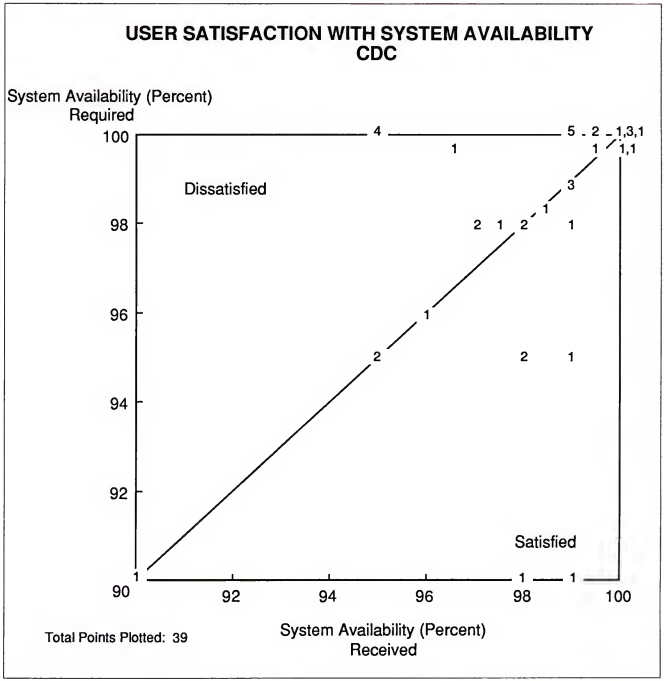


Exhibit IV-29 presents a scattergram of user requirements for system availability versus the perceived system availability received. CDC is somewhat different from other vendors in that a large percentage of its users (40%) require system availability of 98% or less. The chart indicates, however, that CDC is not always successful in meeting the user needs even at lower availability requirements.

EXHIBIT IV-29



Hardware support value/performance levels and the percent of users satisfied is presented in Exhibit IV-30. CDC users are very satisfied (82%) with the hardware telephone support they are receiving and with the hardware dispatch service (67%). Parts availability is rated the lowest with only 42% satisfied. Fifty percent of the users are satisfied with the overall hardware maintenance they are receiving.

EXHIBIT IV-30

HARDWARE SUPPORT VALUE/PERFORMANCE LEVELS—CDC

Service Category	1988 Average User Rating*		Percent Satisfied
	Value	Performance	
Hardware Engineer Skill	8.9	8.4	55
Hardware Phone Support Staff	7.5	8.0	82
Hardware Dispatch	8.8	8.5	67
Parts Availability	9.0	8.0	42
Overall Hardware Maintenance	9.2	8.5	50
Hardware User Documentation	7.4	6.7	59

* Scale: 1 = Low 10 = High

Exhibit IV-31 displays the software support value performance levels and the percent of users satisfied with the various components of software service. Seventy-one percent of the users are satisfied with the software engineers' skill and with the problems data base. Software user documentation has the lowest percent of user satisfaction (27%), followed by software product reliability at 33% satisfied.

User satisfaction trends from 1987 to 1988 on six key support items are presented in Exhibit IV-32. Software engineer skill showed the best improvement (from 18% to 71% satisfied), followed by parts availability

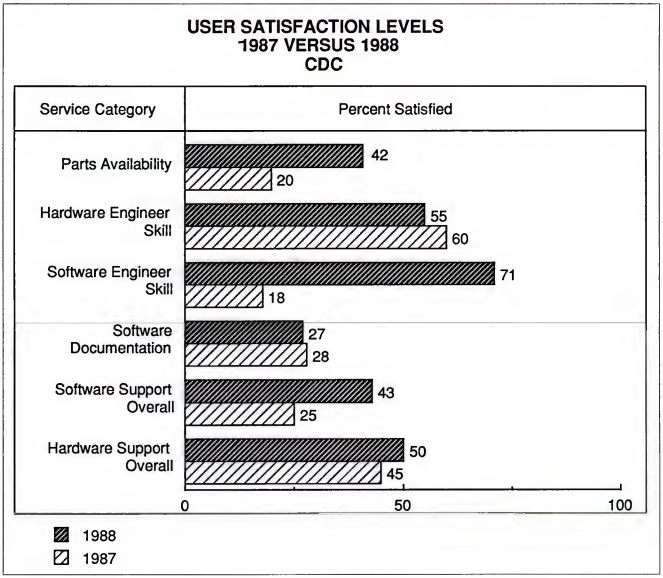
EXHIBIT IV-31

SOFTWARE SUPPORT VALUE/PERFORMANCE LEVELS—CDC

Service Category	1988 Average User Rating*		Percent Satisfied
	Value	Performance	
On-Site Support	6.7	6.7	56
Telephone Hotline	8.0	8.0	52
Remote Support	7.9	7.3	57
Problems Data Base	6.7	6.4	71
SW Engineer Skill	8.0	7.6	71
SW Product Reliability	9.3	7.8	33
Software Support Overall	9.0	7.7	43
Software User Documentation	9.0	7.2	27

* Scale: 1 = Low 10 = High

EXHIBIT IV-32



(from 20% to 42% satisfied). Software support overall increased from 25% to 43% satisfied, and hardware support showed a 5% improvement to 50% satisfied.

Exhibit IV-33 displays the impact of software on systems performance. Major software problems for CDC users accounted for only 0.2 of the 1.8 system interruptions per month. This is low compared to other vendors.

User value/performance ratings and user satisfaction with professional services are presented in Exhibit IV-34. CDC users rate the areas of needs assessment planning (44% satisfied) and capacity planning (35% satisfied) the lowest among the various professional service areas. Installation/moves (77% satisfied) and site/facility management (73% satisfied) are rated the highest.

EXHIBIT IV-33

SOFTWARE IMPACT ON SYSTEMS PERFORMANCE CDC

Description	Range (No./year)	Mean (No./month)
Major Problems*		
# Reported to vendor/mo.	0 - 10	.10
# Resolved/mo.	1 - 6	.21
Turnaround time to resolve (Hrs)	1 - 60	24.3
Minor Problems**		
# Reported to vendor/mo.	0 - 20	.45
# Resolved/mo.	1 - 38	.63
Turnaround time to resolve (Hrs)	.5 - 72	18.5

* Major problems are those that do not allow processing to continue.

** Minor problems are those that allow processing to continue with minor degradation.

EXHIBIT IV-34

PROFESSIONAL SERVICES SATISFACTION CDC

Service Category	1988 Average User Rating*		Percent Satisfied
	Value	Performance	
Planning			
Installation Planning	8.3	7.9	67
Needs Assessment Planning	7.2	6.4	44
Capacity Planning	7.8	6.5	35
Network Design Planning	7.3	6.6	50
Overall Planning Services	7.8	7.0	50
Consulting			
Site/Facility Mgt.	7.3	7.4	73
Network Mgt.	6.9	6.1	47
Systems Integration	7.0	6.4	57
Disaster Recovery	7.2	5.7	57
Overall Consulting Services	7.6	7.2	55
Other			
Installation/Moves	7.7	7.6	77
Changes/Upgrades	8.2	7.5	62

*Scale: 1 = Low 10 - High

Exhibit IV-35 presents the third-party environment and identifies the issues and the opportunities. Thirty percent of the CDC users are using CDC to service other vendors' products. Forty-one percent indicated that they would use CDC for service of other vendors products if such service were available. Fifty-eight percent of these users had been contacted by third-party maintenance companies soliciting service, and 55% had considered third-party service.

EXHIBIT IV-35

THIRD-PARTY ISSUES/OPPORTUNITIES CDC

Description	Percent Responding	
	Yes	No
Does hardware vendor supply service to any other brands of equipment in your system?	30.0	70.0
If available, would you use hardware vendor to service other brands?	41.0	59.0
Have Third-Party Maintenance companies approached you about service?	58.0	42.0
Have you considered Third-Party Service for:		
A. Hardware	55.0	45.0
B. Software	23.0	77.0
C. Education and Training	42.0	58.0
D. Planning and Consulting	32.0	68.0
Do you currently use Third-Party Service?	38.0	62.0
Do you plan to use Third-Party Service in the future?	38.0	62.0

User willingness to perform certain maintenance tasks in return for a discount is displayed in Exhibit IV-36. A high number of CDC users are willing (rating of 7 to 10) to perform board swaps (57.6%) and component replacement (35%). This is a higher percentage than other vendors and may be associated with the fact that CDC has a high number of educational institutions with high technical skills as customers. Discounts expected range from 30.5% to 40.0% depending on the service task involved.

EXHIBIT IV-36

CUSTOMER WILLINGNESS TO PERFORM SERVICE TASKS CDC

Tasks	Willingness to Perform* (Percent)					Mean
	1 - 2	3 - 4	5 - 6	7 - 8	9 - 10	1 - 10
Board Swaps	26.9	0	15.3	34.6	23.0	6.0
Component Replacement	50.0	10.0	5.0	20.0	15.0	4.1
Diagnosis	26.7	0	20.0	23.3	20.0	5.9
Depot (Mail/Carry-In)	60.0	8.0	8.0	16.0	10.0	3.4
Support Mgt./Control Functions	58.8	0	11.8	17.7	11.8	3.7

Tasks	Mean Discount Expected (Percent)
Board Swaps	35.3
Component Replacement	30.5
Diagnosis	34.8
Depot (Mail/Carry-In)	40.0
Support Mgt./Control Functions	36.3

* Scale: 1 = Not very willing 10 = Very willing

D

Honeywell

In 1988, INPUT surveyed 41 Honeywell large-system users. Users were from a cross section of government and industry and also included 5 users from education. These were all users of the DPS 8 system.

Service contract coverage for Honeywell's users is displayed in Exhibit IV-37. Users contracting for Monday-through-Friday coverage have increased from 66% in 1987 to 77% in 1988. Prime-shift-only coverage has increased from 44% in 1987 to 58% in 1988.

EXHIBIT IV-37

SERVICE CONTRACT COVERAGE HONEYWELL

Contract Component	Sample Responding (Percent)	
	1987	1988
• Days of coverage		
- Monday – Friday	66	77
- Monday – Saturday	7	5
- Monday – Sunday	27	18
• Hours of coverage		
- 1 to 9 hours	44	58
- 10 to 16 hours	22	15
- 17 to 24 hours	34	27

Exhibit IV-38 presents the trends in key service performance criteria between 1987 and 1988. Systems interruptions per month increased from 1.2 in 1987 to 1.3 in 1988. The percent of interruptions caused by hardware decreased from 73% to 59.4%, while other causes increased from 10% to 22.5%. Response time improved significantly from 2.1 hours to 1.4 hours, while repair time increased from 3.4 hours to 4.1 hours. System availability showed a slight decrease (from 97.8% to 97.1%).

EXHIBIT IV-38

SERVICE PERFORMANCE
HONEYWELL

Performance Criteria	Actual Performance	
	1987	1988
• Systems Interruptions		
- Mean number per month	1.2	1.3
- Hardware caused (Percent)	73.0	59.4
- System Software caused (Percent)	13.0	13.8
- Application Software caused (Percent)	4.0	5.9
- Other caused (Percent)	10.0	22.5
• Mean System Availability (Percent)	97.8	97.1
• Mean Response Time (Hours)	2.1	1.4
• Mean Repair Time (Hours)	3.4	4.1

User satisfaction with service performance (Exhibit IV-39) was mixed. System availability satisfaction improved from 38% satisfied in 1987 to 49% satisfied in 1988. On the other hand, the percent of users satisfied with response time and repair time both decreased in 1988.

Exhibit IV-40 displays user satisfaction at various requirement levels. User satisfaction above the 99% requirement level actually decreased, while satisfaction below the 99% requirement level showed a significant increase.

A scattergram of user requirements for system availability versus system availability received is presented in Exhibit IV-41. Seventy-five percent of the sample require 98% availability or higher, and half of the sample require a system availability of 100%. Only one user reported obtaining 100%.

Exhibit IV-42 presents the hardware support value/performance levels and the percent of users satisfied with these items. Parts availability, with only 32% satisfied, appears to be the main factor contributing to a low 37% satisfied with overall hardware maintenance. The hardware phone support staff is rated high with 67% of the users satisfied.

EXHIBIT IV-39

USER SATISFACTION WITH SERVICE PERFORMANCE HONEYWELL

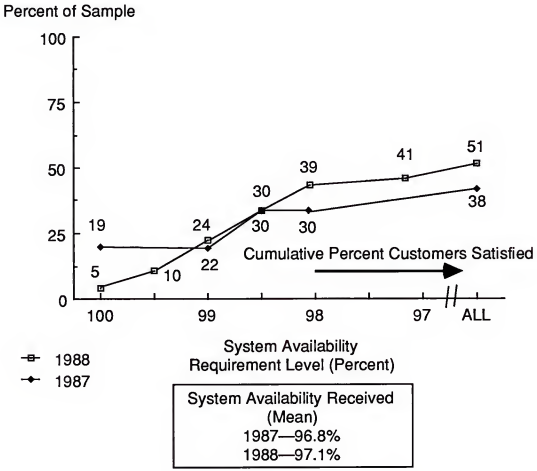
Performance Criteria	User Expectation 1987	User Expectation 1988	Sample Satisfied (Percent)
System Availability (Percent)	98.7	97.8	49 / 38
Response Time (Hours)	2.4	1.7	92 / 95
Repair Time (Hours)	3.6	4.3	85 / 100

0 50 100

1988
1987

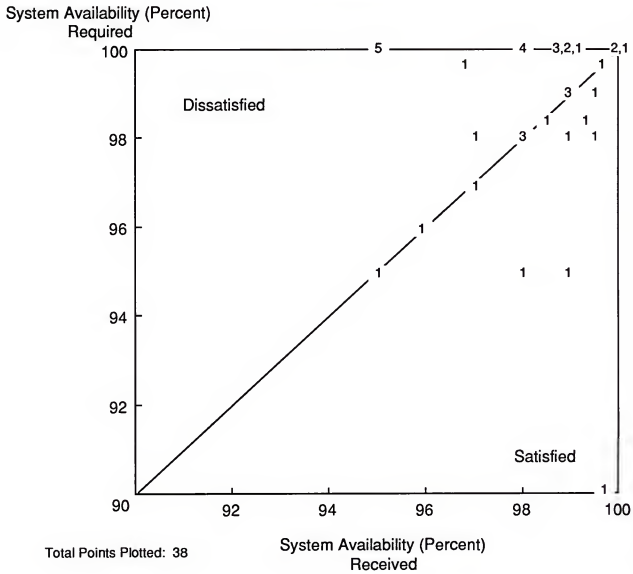
EXHIBIT IV-40

USER SATISFACTION WITH SYSTEM AVAILABILITY HONEYWELL



System Availability Received
(Mean)
1987—96.8%
1988—97.1%

EXHIBIT IV-41



Total Points Plotted: 38

EXHIBIT IV-42

HARDWARE SUPPORT VALUE/PERFORMANCE LEVELS—HONEYWELL

Service Category	1988 Average User Rating*		Percent Satisfied
	Value	Performance	
Hardware Engineer Skill	9.0	8.0	44
Hardware Phone Support Staff	7.7	7.6	67
Hardware Dispatch	8.8	8.0	42
Parts Availability	9.2	7.4	32
Overall Hardware Maintenance	9.2	8.0	37
Hardware User Documentation	7.8	6.8	53

* Scale: 1 = Low 10 = High

Software support value/performance levels and the percent of users satisfied are displayed in Exhibit IV-43. Software documentation is rated very low with only 23% of the users satisfied. The telephone hotline (66%), remote support (68%), and problems data base (71%) all received relatively high ratings.

EXHIBIT IV-43

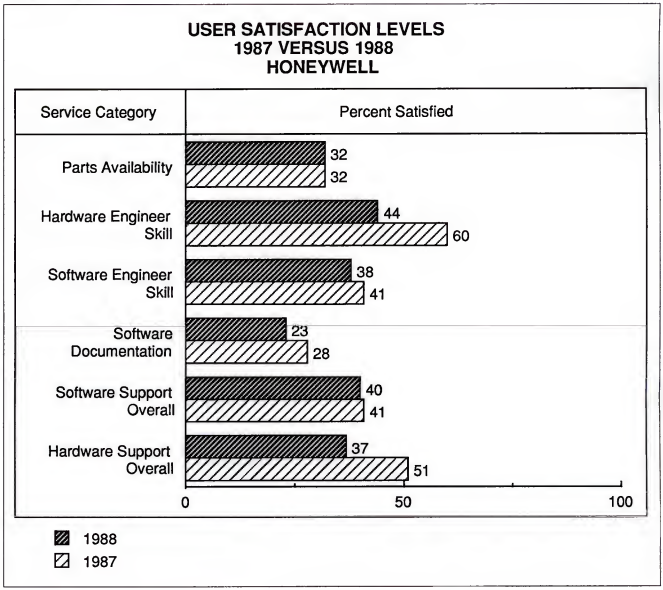
SOFTWARE SUPPORT VALUE/PERFORMANCE LEVELS—HONEYWELL

Service Category	1988 Average User Rating*		Percent Satisfied
	Value	Performance	
On-Site Support	8.0	7.4	54
Telephone Hotline	8.5	7.8	66
Remote Support	7.6	7.0	68
Problems Data Base	6.8	7.0	71
SW Engineer Skill	9.1	7.8	38
SW Product Reliability	9.3	7.9	26
Software Support Overall	8.9	7.8	40
Software User Documentation	8.8	6.9	23

* Scale: 1 = Low 10 = High

Exhibit IV-44 presents 1987/1988 trends in user satisfaction for six key support items. Only one of the six remained constant (parts availability—32%). All the others trended in the wrong direction, with hardware support overall and hardware engineering skill dropping significantly from 1987 levels.

EXHIBIT IV-44



Software impact on system performance is presented in Exhibit IV-45. Major software problems accounted for 0.38 of the 1.3 system interruptions per month. Minor problems are about twice that rate at 0.64 per month.

Exhibit IV-46 presents the value/performance levels and the percent of users satisfied with the key professional service items. Honeywell has a very high percent satisfied with installation planning (75%) and installation/moves (78%). The lowest percent satisfied ratings are for network management (27%) and disaster recovery (31%).

EXHIBIT IV-45

SOFTWARE IMPACT ON SYSTEMS PERFORMANCE HONEYWELL

Description	Range (No./year)	Mean (No./month)
Major Problems*		
# Reported to vendor/mo.	0 - 12	.26
# Resolved/mo.	1 - 12	.38
Turnaround time to resolve (Hrs)	2 - 48	21.1
Minor Problems**		
# Reported to vendor/mo.	0 - 40	.53
# Resolved/mo.	.2 - 35	.64
Turnaround time to resolve (Hrs)	.5 - 64	18.4

* Major problems are those that do not allow processing to continue.

** Minor problems are those that allow processing to continue with minor degradation.

EXHIBIT IV-46

PROFESSIONAL SERVICES SATISFACTION HONEYWELL

Service Category	1988 Average User Rating*		Percent Satisfied
	Value	Performance	
Planning			
Installation Planning	8.4	8.1	75
Needs Assessment Planning	7.7	7.0	63
Capacity Planning	8.1	6.9	50
Network Design Planning	8.0	6.8	41
Overall Planning Services	7.7	6.9	44
Consulting			
Site/Facility Mgt.	8.1	8.2	60
Network Mgt.	7.8	7.0	27
Systems Integration	7.9	6.9	42
Disaster Recovery	8.3	6.1	31
Overall Consulting Services	7.7	7.1	47
Other			
Installation/Moves	7.6	8.2	78
Changes/Upgrades	8.6	7.9	57

* Scale: 1 = Low 10 = High

Third-party issues and opportunities are presented in Exhibit IV-47. Twenty-two percent of Honeywell users state that Honeywell provides service to them on other vendors' products. Apparently Honeywell is doing a good job, because 74.2% of the users state that they would use Honeywell on other products if the service were offered. Fifty-two and one-half percent of the customers have been contacted by third-party vendors, and fifty-nine percent state they plan to use third-party maintenance in the future.

EXHIBIT IV-47

THIRD-PARTY ISSUES/OPPORTUNITIES HONEYWELL

Description	Percent Responding	
	Yes	No
Does hardware vendor supply service to any other brands of equipment in your system?	22.0	78.0
If available, would you use hardware vendor to service other brands?	74.2	25.8
Have Third-Party Maintenance companies approached you about service?	52.5	47.5
Have you considered Third-Party Service for:		
A. Hardware	40.0	60.0
B. Software	12.8	87.2
C. Education and Training	37.5	62.5
D. Planning and Consulting	17.9	82.1
Do you currently use Third-Party Service?	31.8	68.2
Do you plan to use Third-Party Service in the future?	59.1	40.9

Exhibit IV-48 presents the users' willingness to perform certain service tasks in return for a discount and the discount expected. With the exception of diagnosis and management control functions, Honeywell's users are not very willing to perform these tasks. The discount users expect ranges from 25.6% to 40%, depending on the type of task performed.

EXHIBIT IV-48

CUSTOMER WILLINGNESS TO PERFORM SERVICE TASKS HONEYWELL

Tasks	Willingness to Perform* (Percent)					Mean
	1 - 2	3 - 4	5 - 6	7 - 8	9 - 10	1 - 10
Board Swaps	52.9	5.9	23.6	17.6	0	3.5
Component Replacement	52.9	17.6	11.8	17.6	0	3.2
Diagnosis	30.8	0	30.8	30.8	7.7	5.0
Depot (Mail/Carry-In)	53.3	13.3	13.4	21.0	0	3.1
Support Mgt./Control Functions	50.0	0	18.8	25.0	6.3	4.0

Tasks	Mean Discount Expected (Percent)
Board Swaps	27.2
Component Replacement	40.0
Diagnosis	25.6
Depot (Mail/Carry-In)	35.8
Support Mgt./Control Functions	28.8

* Scale: 1 = Not very willing 10 = Very willing

E

IBM 309X

INPUT surveyed 42 users of the IBM 309X system concerning their satisfaction with the service they received, the number of system interruptions they had, and the system availability they achieved. Among the users surveyed were 11 from banking and finance, 9 from the services industry, and 5 from manufacturing.

Exhibit IV-49 presents the changes in contract coverage between 1987 and 1988. Significant increases in Monday-through-Sunday coverage (i.e., from 40% to 88%) and in 17-24-hour coverage (i.e., from 40% to 91%) were due to the fact that IBM announced 24-hour, 7-day-per-week coverage at no additional charge in 1987. Apparently some of the users surveyed were not aware of this and still reported less coverage.

Service performance is displayed in Exhibit IV-50. System interruptions increased from 1.4 per month in 1987 to 2.8 per month in 1988, with the apparent cause being applications software. This is not unusual when users begin to transfer applications to new systems. The mean repair time increased from 1.6 hours in 1987 to 2.9 hours in 1988. System availability dropped slightly to 98.1% from 98.5% in 1987. Response time improved from 1.1 hours in 1987 to 1.0 hours in 1988.

EXHIBIT IV-49

SERVICE CONTRACT COVERAGE
IBM 309X

Contract Component	Sample Responding (Percent)	
	1987	1988
• Days of coverage		
- Monday – Friday	55	12
- Monday – Saturday	5	0
- Monday – Sunday	40	88*
• Hours of coverage		
- 1 to 9 hours	50	2
- 10 to 16 hours	10	7
- 17 to 24 hours	40	91*

* In 1988, IBM offers only 24 hr/day, 7 day/week contract coverage. Apparently, some customers in survey were not aware of this.

EXHIBIT IV-50

SERVICE PERFORMANCE
IBM 309X

Performance Criteria	Actual Performance	
	1987	1988
• Systems Interruptions		
- Mean number per month	1.4	2.8
- Hardware caused (Percent)	42.0	39.0
- System Software caused (Percent)	35.0	36.2
- Application Software caused (Percent)	7.0	16.5
- Other caused (Percent)	16.0	8.3
• Mean System Availability (Percent)	98.5	98.1
• Mean Response Time (Hours)	1.1	1.0
• Mean Repair Time (Hours)	1.6	2.9

Exhibit IV-51 presents a very positive picture of improvement in user satisfaction with service performance. Systems availability, response time, and repair time all improved. System availability, with 58% satisfied in 1988, is still below the average of all large-system users (which is 63.4% satisfied).

User satisfaction with system availability at various requirement levels has changed very little between 1987 and 1988 (Exhibit IV-52). There is a significant drop in the percent of users satisfied above the 98% availability requirement level.

EXHIBIT IV-51

USER SATISFACTION WITH SERVICE PERFORMANCE IBM 309X

Performance Criteria	User Expectation 1987	User Expectation 1988	Sample Satisfied (Percent)
System Availability (Percent)	99.3	98.3	58 / 57
Response Time (Hours)	1.1	1.4	100 / 90
Repair Time (Hours)	1.5	2.8	96 / 93

0 50 100

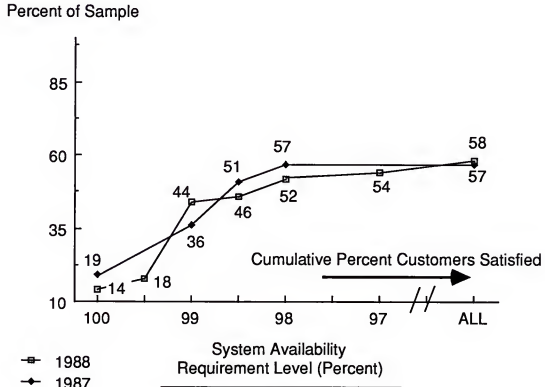
1988
1987

Exhibit IV-53 displays a scattergram of user requirements for system availability versus the system availability they received. The scattergram makes it very clear that most users require very high system availability (i.e., above 98%) and that many of them are still not achieving it.

Hardware support value/performance levels and the percent of users satisfied are presented in Exhibit IV-54. Hardware engineer skill (71% satisfied) and hardware phone support staff (60% satisfied) are rated the highest in terms of percent satisfied. Parts availability (43% satisfied) and hardware user documentation (40% satisfied) are rated the lowest. Overall hardware maintenance is rated the highest (9.3) in terms of importance to the user.

EXHIBIT IV-52

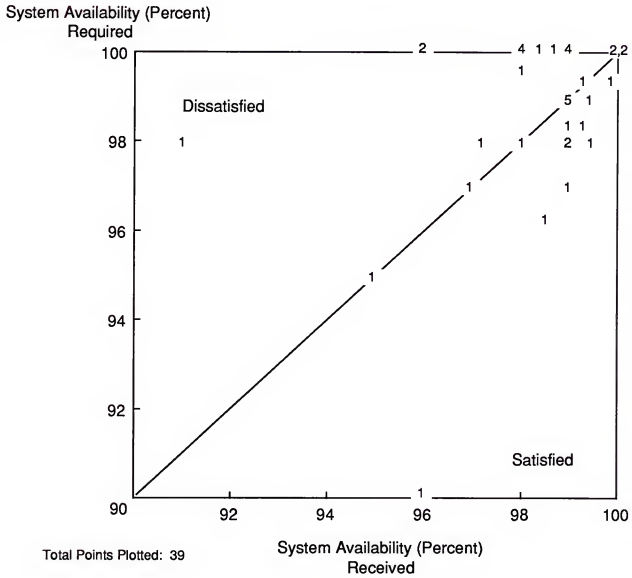
USER SATISFACTION WITH SYSTEM AVAILABILITY
IBM 309X



System Availability Received
(Mean)
1987—98.5%
1988—98.1%

EXHIBIT IV-53

USER SATISFACTION WITH SYSTEM AVAILABILITY
IBM 309X



Total Points Plotted: 39

EXHIBIT IV-54

HARDWARE SUPPORT VALUE/PERFORMANCE LEVELS—IBM 309X

Service Category	1988 Average User Rating*		Percent Satisfied
	Value	Performance	
Hardware Engineer Skill	9.0	8.8	71
Hardware Phone Support Staff	8.2	7.9	60
Hardware Dispatch	8.8	8.3	55
Parts Availability	9.2	8.2	43
Overall Hardware Maintenance	9.3	8.9	50
Hardware User Documentation	8.6	7.7	40

* Scale: 1 = Low 10 = High

Exhibit IV-55 displays the value/performance levels of the key software support items. The percent of users satisfied with each item is also shown. IBM received the highest percent satisfied for its problems data base (67%) and its remote support (66%). The lowest percent satisfied were for software user documentation (16%) and software product reliability (31%). Both of the above contributed to a user satisfaction with software support overall of only 40% satisfied.

EXHIBIT IV-55

SOFTWARE SUPPORT VALUE/PERFORMANCE LEVELS—IBM 309X

Service Category	1988 Average User Rating*		Percent Satisfied
	Value	Performance	
On-Site Support	8.1	7.9	56
Telephone Hotline	8.5	8.2	47
Remote Support	7.8	7.8	66
Problems Data Base	8.1	7.7	67
SW Engineer Skill	8.8	7.7	48
SW Product Reliability	9.6	8.2	31
Software Support Overall	9.2	8.0	40
Software User Documentation	9.2	7.3	16

* Scale: 1 = Low 10 = High

User satisfaction levels for the six key elements of service are presented in Exhibit IV-56. Hardware engineer skill showed a significant increase in percent satisfied (from 49% in 1987 to 71% in 1988). Software engineer skill also improved, from 43% in 1987 to 48% in 1988. All other elements decreased in terms of percent satisfied, with software documentation decreasing the most (from 28% satisfied to 16% satisfied).

EXHIBIT IV-56

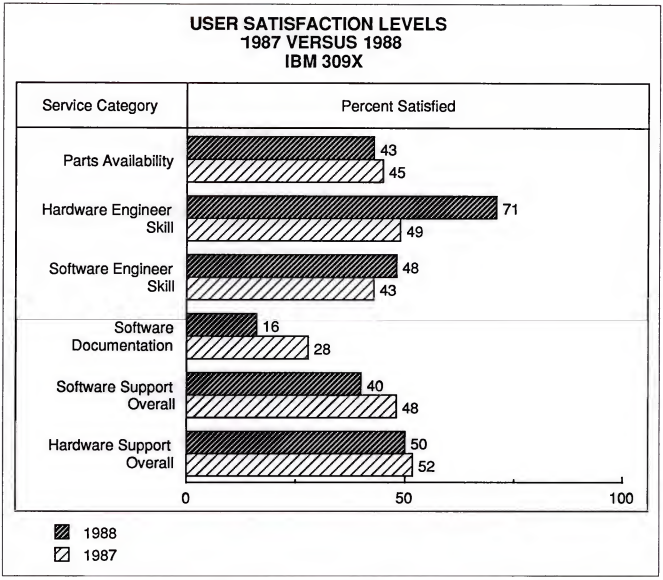


Exhibit IV-57 provides information on the impact of software on systems performance. Major software problems accounted for 0.64 of the 2.8 system interruptions per month reported.

EXHIBIT IV-57

SOFTWARE IMPACT ON SYSTEMS PERFORMANCE
IBM 309X

Description	Range (No./year)	Mean (No./month)
Major Problems*		
# Reported to vendor/mo.	0 - 35	.54
# Resolved/mo.	1 - 32	.64
Turnaround time to resolve (Hrs)	1 - 48	13.7
Minor Problems**		
# Reported to vendor/mo.	0 - 40	1.58
# Resolved/mo.	3 - 40	1.59
Turnaround time to resolve (Hrs)	.5 - 72	32.3

* Major problems are those that do not allow processing to continue.

** Minor problems are those that allow processing to continue with minor degradation.

The value/performance ratings and the percent of users satisfied for the key professional service areas are presented in Exhibit IV-58. IBM users rate installation planning as the most important area, and this area also has the highest percent of satisfied users (68%). Systems integration is also rated high, with 65% of the users satisfied. Network design planning has the lowest percent of satisfied users at 28%.

Exhibit IV-59 describes the users' posture relative to third-party service. Fifty-one and one-half percent of the users state that IBM supplies service to other brands of equipment in the the system. Ninety and one-half percent state that they would use IBM to service other brands if the service were offered. This may represent a business opportunity for IBM. Third-party service is already being used by 17.1% of the users, and 25.8% state that they plan to use third-party service in the future.

Customer willingness to perform service tasks in return for a discount is displayed in Exhibit IV-60. With the exception of diagnosis and support/management control functions, IBM users are not very willing (7-10 rating) to perform these functions. In the case of diagnosis, 24.3% of the users were very willing to do diagnosis.

EXHIBIT IV-58

PROFESSIONAL SERVICES SATISFACTION
IBM 309X

Service Category	1988 Average User Rating*		Percent Satisfied
	Value	Performance	
Planning			
Installation Planning	8.9	8.6	68
Needs Assessment Planning	8.2	7.4	51
Capacity Planning	8.6	6.7	37
Network Design Planning	8.7	6.8	28
Overall Planning Services	8.7	7.4	39
Consulting			
Site/Facility Mgt.	7.3	6.7	58
Network Mgt.	8.3	7.4	37
Systems Integration	7.4	6.6	65
Disaster Recovery	8.3	7.0	39
Overall Consulting Services	7.8	7.3	51
Other			
Installation/Moves	8.3	8.0	59
Changes/Upgrades	8.6	8.0	55

* Scale: 1 = Low 10 = High

EXHIBIT IV-59

THIRD-PARTY ISSUES/OPPORTUNITIES
IBM 309X

Description	Percent Responding	
	Yes	No
Does hardware vendor supply service to any other brands of equipment in your system?	51.5	48.5
If available, would you use hardware vendor to service other brands?	90.5	9.5
Have Third-Party Maintenance companies approached you about service?	46.2	53.8
Have you considered Third-Party Service for:		
A. Hardware	46.2	53.8
B. Software	13.2	86.8
C. Education and Training	71.1	28.9
D. Planning and Consulting	50.0	50.0
Do you currently use Third-Party Service?	17.1	82.9
Do you plan to use Third-Party Service in the future?	25.8	74.2

EXHIBIT IV-60

CUSTOMER WILLINGNESS TO PERFORM SERVICE TASKS IBM 309X

Tasks	Willingness to Perform* (Percent)					Mean
	1 - 2	3 - 4	5 - 6	7 - 8	9 - 10	1-10
Board Swaps	41.7	25.0	20.8	12.5	0	3.6
Component Replacement	55.0	15.0	20.0	10.0	0	3.1
Diagnosis	33.3	16.7	25.0	16.0	8.3	4.3
Depot (Mail/Carry-In)	47.8	26.0	21.7	4.3	0	3.0
Support Mgt./Control Functions	18.2	18.2	18.2	36.4	9.1	5.5

Tasks	Mean Discount Expected (Percent)
Board Swaps	36.0
Component Replacement	43.8
Diagnosis	34.2
Depot (Mail/Carry-In)	36.8
Support Mgt./Control Functions	27.4

* Scale: 1 = Not very willing 10 = Very willing

F

IBM 308X

INPUT surveyed 40 IBM 308X users concerning their experience with IBM-supplied maintenance and support, as well as the system performance they required versus what they received. Users were selected from a good cross section of industry, government, and finance, and they included 19 users of the 3081, 12 users of the 3083, and 8 users of the 3084.

Exhibit IV-61 presents the changes in contract coverage between 1987 and 1988. IBM announced 7-day-per-week, 24-hour coverage at no

additional charge in 1987. As a result, users reported a significant increase in Monday-through-Sunday and 17-24-hour coverage.

EXHIBIT IV-61

SERVICE CONTRACT COVERAGE
IBM 308X

Contract Component	Sample Responding (Percent)	
	1987	1988
• Days of coverage		
- Monday – Friday	56	7
- Monday – Saturday	8	0
- Monday – Sunday	36	93*
• Hours of coverage		
- 1 to 9 hours	42	2
- 10 to 16 hours	22	3
- 17 to 24 hours	36	95*

* In 1988, IBM offers only 24 hr/day, 7 day/week contract coverage. Apparently, some customers in survey were not aware of this.

Service performance is displayed in Exhibit IV-62. System interruptions decreased from 2.0 per month in 1987 to 1.2 per month in 1988. This was apparently caused by a significant increase in hardware reliability. Response time improved from 1.7 hours in 1987 to 1.3 hours in 1988. Repair time increased slightly to 2.3 hours. The net result was an improvement in system availability (from 98.0% to 98.6%).

Exhibit IV-63 focuses on changes in user satisfaction with service performance between 1987 and 1988. There was a decrease in the percent of users satisfied with repair time and systems availability, while response time improved (from 94% to 97%).

Changes in user satisfaction with system availability at various requirement levels (1987/1988) are displayed in Exhibit IV-64. IBM was able to improve the percent satisfied at the 98.5% and above required level between 1987 and 1988.

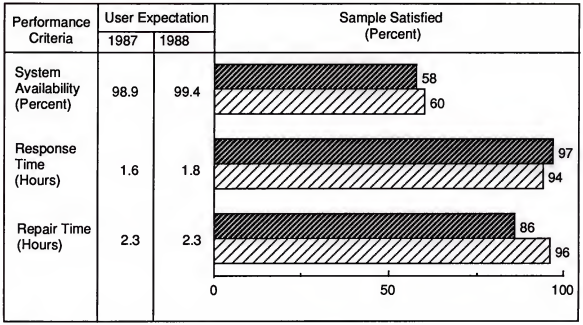
EXHIBIT IV-62

SERVICE PERFORMANCE
IBM 308X

Performance Criteria	Actual Performance 1987	Actual Performance 1988
• Systems Interruptions		
- Mean number per month	2.0	1.2
- Hardware caused (Percent)	59.0	40.5
- System Software caused (Percent)	28.0	25.4
- Application Software caused (Percent)	6.0	13.1
- Other caused (Percent)	7.0	21.0
• Mean System Availability (Percent)	98.0	98.6
• Mean Response Time (Hours)	1.7	1.3
• Mean Repair Time (Hours)	2.2	2.3

EXHIBIT IV-63

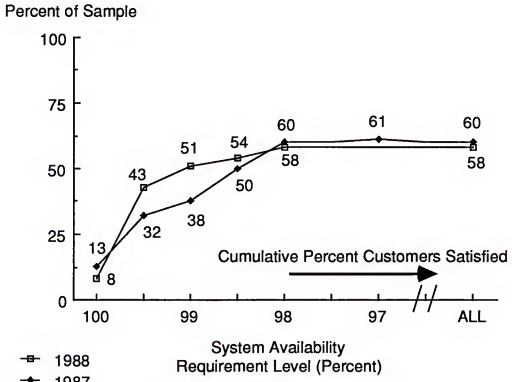
USER SATISFACTION WITH SERVICE PERFORMANCE
IBM 308X



1988
1987

EXHIBIT IV-64

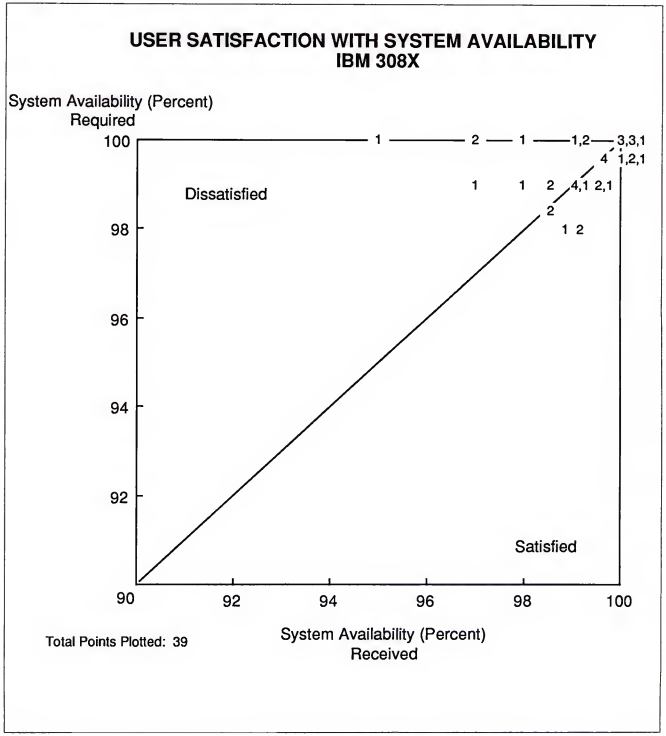
USER SATISFACTION WITH SYSTEM AVAILABILITY
IBM 308X



System Availability Received (Mean)
1987—98.0%
1988—98.6%

Exhibit IV-65 presents a scattergram of user requirements for system availability versus the system availability received. This makes it clear that most users require very high system availability (i.e., above 98.5%) and that a large number are still not getting what they require.

EXHIBIT IV-65



Hardware support value/performance levels and the percent of satisfied users for the key elements of hardware support are presented in Exhibit IV-66. Users rate the value of parts availabilty the most important at 9.5, and 53% of the users are satisfied with this item. The hardware phone support staff is highest in terms of customer satisfaction, with 65% satisfied, and hardware user documentation the lowest, with 42% satisfied.

EXHIBIT IV-66

HARDWARE SUPPORT VALUE/PERFORMANCE LEVELS—IBM 308X

Service Category	1988 Average User Rating*		Percent Satisfied
	Value	Performance	
Hardware Engineer Skill	8.9	8.8	63
Hardware Phone Support Staff	7.2	7.6	65
Hardware Dispatch	9.1	8.6	63
Parts Availability	9.5	8.6	53
Overall Hardware Maintenance	9.3	8.8	55
Hardware User Documentation	8.7	7.9	42

* Scale: 1 = Low 10 = High

Exhibit IV-67 presents the software support value/performance levels and the percent satisfied with each element of software support. Users rate software product reliability as the most important item, yet only 27%

EXHIBIT IV-67

SOFTWARE SUPPORT VALUE/PERFORMANCE LEVELS—IBM 308X

Service Category	1988 Average User Rating*		Percent Satisfied
	Value	Performance	
On-Site Support	6.9	7.6	76
Telephone Hotline	8.7	7.2	44
Remote Support	8.1	7.7	70
Problems Data Base	7.9	7.3	62
SW Engineer Skill	8.8	7.5	39
SW Product Reliability	9.8	8.4	27
Software Support Overall	9.4	8.2	32
Software User Documentation	9.3	7.4	23

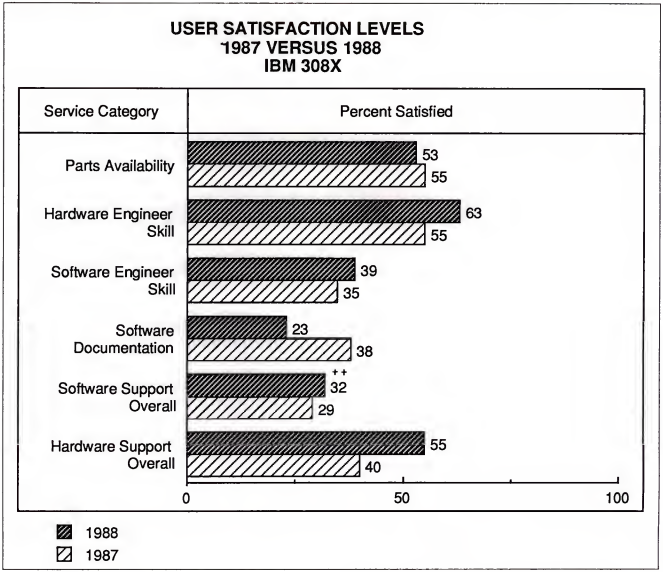
* Scale: 1 = Low 10 = High

of the users are satisfied with this item. On-site support (76% satisfied) and remote support (70% satisfied) have the highest percent of user satisfaction. Software user documentation, with 23% of the users satisfied, is the key problem area in addition to software product reliability.

User satisfaction trends between 1987 and 1988 for the six key areas are displayed in Exhibit IV-68. Hardware engineer skill, with 63% of the users satisfied, contributed to an increase in hardware support overall from 40% in 1987 to 55% in 1988. Software documentation dropped from 38% satisfied in 1987 to 23% satisfied in 1988.

Exhibit IV-69 presents the impact of software on system performance. Major software problems accounted for 0.29 system interruptions per

EXHIBIT IV-68



month out of the total interruptions of 1.2 per month. Minor problems with software average 1.02 per month.

EXHIBIT IV-69

SOFTWARE IMPACT ON SYSTEMS PERFORMANCE
IBM 308X

Description	Range (No./year)	Mean (No./month)
Major Problems*		
# Reported to vendor/mo.	0 - 10	.23
# Resolved/mo.	1 - 10	.29
Turnaround time to resolve (Hrs)	.8 - 48	10.3
Minor Problems**		
# Reported to vendor/mo.	0 - 36	.98
# Resolved/mo.	2 - 36	1.02
Turnaround time to resolve (Hrs)	.3 - 72	31.5

* Major problems are those that do not allow processing to continue.

** Minor problems are those that allow processing to continue with minor degradation.

IBM user satisfaction with the key professional services is displayed in Exhibit IV-70. IBM has a high percent of user satisfaction for site/facility management (60%), installation planning (58%), installation/moves (58%), and changes/upgrades (58%). Disaster recovery (29%) and overall planning services (33%) have the lowest percent of user satisfaction.

Exhibit IV-71 displays the users' posture regarding third-party service. Only 2.5% of the IBM 308X users state that IBM is servicing other vendor products on their system. Fifty-eight percent state, however, that if offered they would use IBM to service other vendors' products. A very large number of users (87.5%) have been contacted by third-party vendors, and 46.4% state that they plan to use third-party service in the future.

The customer willingness to perform service tasks in return for a discount is displayed in Exhibit IV-72. A large percent of IBM users are very willing (7-10 rating) to perform diagnosis (52.7%) and support/management control functions (42.2%). The discount expected ranges from 29.4% to 41.7%, depending on the type of service task performed.

EXHIBIT IV-70

PROFESSIONAL SERVICES SATISFACTION
IBM 308X

Service Category	1988 Average User Rating*		Percent Satisfied
	Value	Performance	
Planning			
Installation Planning	8.8	8.4	58
Needs Assessment Planning	7.7	6.8	51
Capacity Planning	8.2	6.5	37
Network Design Planning	7.8	5.5	36
Overall Planning Services	8.2	6.8	31
Consulting			
Site/Facility Mgt.	6.2	6.1	60
Network Mgt.	7.8	6.0	33
Systems Integration	7.0	5.7	46
Disaster Recovery	7.3	4.2	29
Overall Consulting Services	7.1	6.1	47
Other			
Installation/Moves	8.6	7.9	58
Changes/Upgrades	8.3	7.8	58

* Scale: 1 = Low 10 = High

EXHIBIT IV-71

THIRD-PARTY ISSUES/OPPORTUNITIES
IBM 308X

Description	Percent Responding	
	Yes	No
Does hardware vendor supply service to any other brands of equipment in your system?	2.5	97.5
If available, would you use hardware vendor to service other brands?	58.3	41.7
Have Third-Party Maintenance companies approached you about service?	87.5	12.5
Have you considered Third-Party Service for:		
A. Hardware	50.0	50.0
B. Software	2.5	97.5
C. Education and Training	65.0	35.0
D. Planning and Consulting	42.5	57.5
Do you currently use Third-Party Service?	38.7	61.3
Do you plan to use Third-Party Service in the future?	46.4	53.6

EXHIBIT IV-72

CUSTOMER WILLINGNESS TO PERFORM SERVICE TASKS
IBM 308X

Tasks	Willingness to Perform* (Percent)					Mean
	1 - 2	3 - 4	5 - 6	7 - 8	9 - 10	1 - 10
Board Swaps	53.3	3.3	16.7	23.3	3.3	3.8
Component Replacement	55.2	10.3	17.2	13.8	3.4	3.3
Diagnosis	26.3	5.3	15.8	21.1	31.6	6.1
Depot (Mail/Carry-In)	41.9	9.7	29.1	12.9	6.4	3.9
Support Mgt./Control Functions	38.5	0	19.2	23.0	19.2	5.1

Tasks	Mean Discount Expected (Percent)
Board Swaps	34.5
Component Replacement	41.7
Diagnosis	29.4
Depot (Mail/Carry-In)	32.2
Support Mgt./Control Functions	31.1

* Scale: 1 = Not very willing 10 = Very willing

G

NAS

In 1988, INPUT surveyed 55 users of NAS large systems concerning their requirements for service and the satisfaction with the service that they received. System availability required and system availability received were also determined. The sample was selected from various industries and included 26 users of the AS 8XXX, 15 users of the AS 9XXX, 8 users of the ASXL, and 1 user of the ASVL.

Exhibit IV-73 presents the trends in contract coverage between 1987 and 1988. NAS, as did IBM, has changed its contract offering to include 7-day-per-week, 24-hour service as standard. The percent of users with Monday-through-Sunday coverage therefore increased from 54% in 1987 to 85% in 1988. Similiarly, the percent of customers with 17-24-hour coverage increased from 23% in 1987 to 83% in 1988. These percentages are probably understated, since some users may not have been aware of the change in coverage.

EXHIBIT IV-73

SERVICE CONTRACT COVERAGE
NAS

Contract Component	Sample Responding (Percent)	
	1987	1988
• Days of coverage		
- Monday – Friday	43	13
- Monday – Saturday	3	2
- Monday – Sunday	54	85
• Hours of coverage		
- 1 to 9 hours	27	9
- 10 to 16 hours	50	8
- 17 to 24 hours	23	83

Service performance trends (1987/1988) are displayed in Exhibit IV-74. System interruptions decreased by 50% (from 0.8 per month to 0.4 per month), apparently due to a significant improvement in hardware reliability. Response time increased slightly (1.4 to 1.5 hours), and repair time also increased (1.8 to 1.9 hours). The mean system availability decreased slightly from 99.3% to 99.0%. NAS, however, leads all vendors in system availability received.

Exhibit IV-75 displays trends (1987/1988) in user satisfaction with service performance. Satisfaction with system availability increased from 79% in 1987 to 85% in 1988. NAS has the highest percent satisfied of all vendors. Satisfaction with response time and repair time dropped slightly in 1988 but still remains at the 90% level, which is very good.

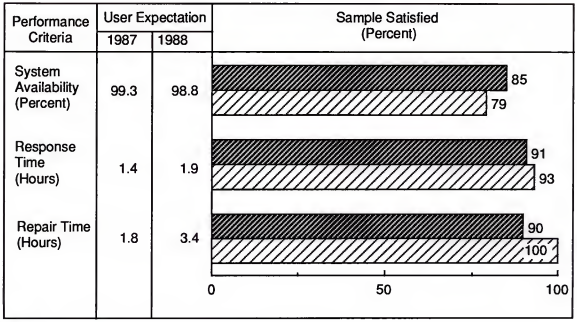
EXHIBIT IV-74

SERVICE PERFORMANCE
NAS

Performance Criteria	Actual Performance 1987	Actual Performance 1988
• Systems Interruptions		
- Mean number per month	0.8	0.4
- Hardware caused (Percent)	55.0	35.5
- System Software caused (Percent)	25.0	24.7
- Application Software caused (Percent)	10.0	28.2
- Other caused (Percent)	10.0	11.6
• Mean System Availability (Percent)	99.3	99.0
• Mean Response Time (Hours)	1.4	1.5
• Mean Repair Time (Hours)	1.8	1.9

EXHIBIT IV-75

USER SATISFACTION WITH SERVICE PERFORMANCE
NAS



User satisfaction with system availability at various system availability requirement levels is presented inExhibit IV-76. A fairly uniform improvement in user satisfaction has been made at each requirement level, indicating a good understanding of user needs and a good program to meet the needs.

Exhibit IV-77 presents a scattergram of user requirements for system availability versus system availability received. Seventeen NAS users that required 100% availability received it. This represents 71% of the users that required 100%. NAS users require very high system availability, and most are receiving it.

EXHIBIT IV-76

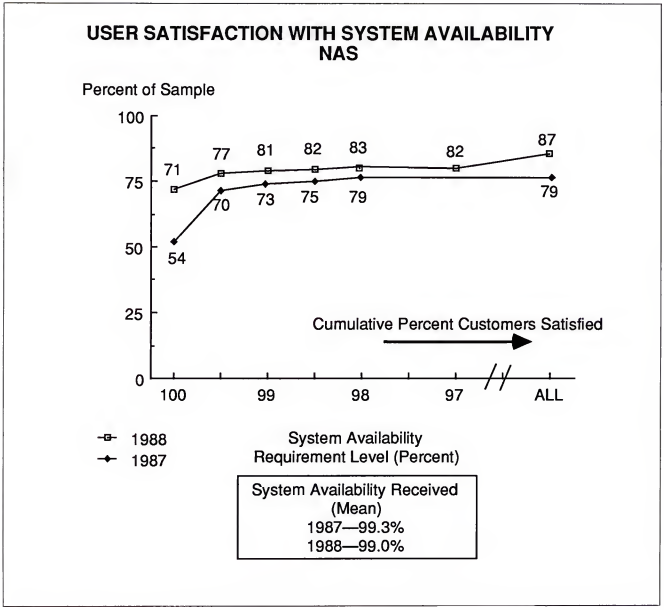
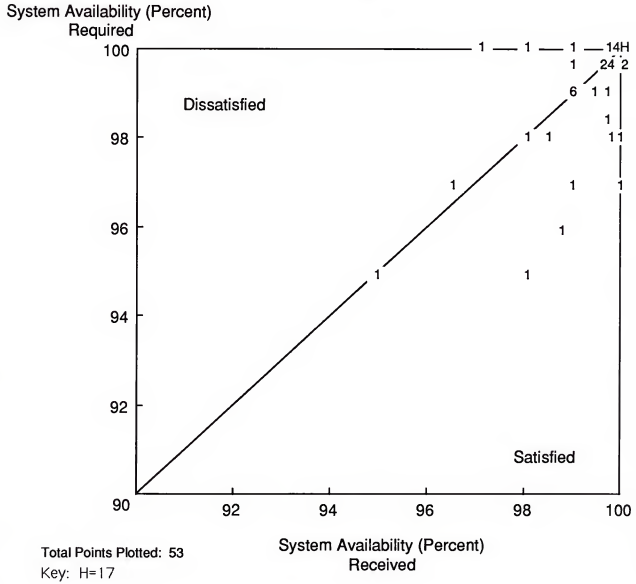


EXHIBIT IV-77

USER SATISFACTION WITH SYSTEM AVAILABILITY
NAS



Total Points Plotted: 53
Key: H=17

Hardware support value/performance levels and the percent of users satisfied are presented in Exhibit IV-78 for the key elements of hardware support. Users rate the value of most hardware support items very high (i.e., above 9), and NAS has a high percent of satisfied users on all hardware support items.

EXHIBIT IV-78

HARDWARE SUPPORT VALUE/PERFORMANCE LEVELS—NAS

Service Category	1988 Average User Rating*		Percent Satisfied
	Value	Performance	
Hardware Engineer Skill	9.3	9.1	74
Hardware Phone Support Staff	8.2	8.5	79
Hardware Dispatch	9.4	9.0	69
Parts Availability	9.4	8.8	63
Overall Hardware Maintenance	9.6	9.3	74
Hardware User Documentation	8.1	7.9	77

* Scale: 1 = Low 10 = High

Exhibit IV-79 displays the value/performance levels and the percent of satisfied users for the major catagories of software support. Software product reliability is rated the highest in value by the users (9.8), but only 40% of the users are satisfied with it. Software user documentation also has a low percentage of satisfied users (31%). Remote support (70%) and problems data base (68%) have the highest percentage of users satisfied.

EXHIBIT IV-79

SOFTWARE SUPPORT VALUE/PERFORMANCE LEVELS—NAS

Service Category	1988 Average User Rating*		Percent Satisfied
	Value	Performance	
On-Site Support	7.8	7.8	56
Telephone Hotline	8.5	7.6	65
Remote Support	7.1	7.4	70
Problems Data Base	7.1	6.6	68
SW Engineer Skill	8.8	7.5	44
SW Product Reliability	9.8	8.4	40
Software Support Overall	8.6	7.9	48
Software User Documentation	8.9	7.6	31

* Scale: 1 = Low 10 = High

The trends in user satisfaction levels (1987/1988) for the key service and support items are presented in Exhibit IV-80. Improvement was made in the area of parts availability (60% to 63%), hardware engineer skill (63% to 74%), and hardware support overall (70% to 74%). The percent satisfied for software documentation (48% to 31%) and software engineer skill (56% to 44%) both declined.

EXHIBIT IV-80

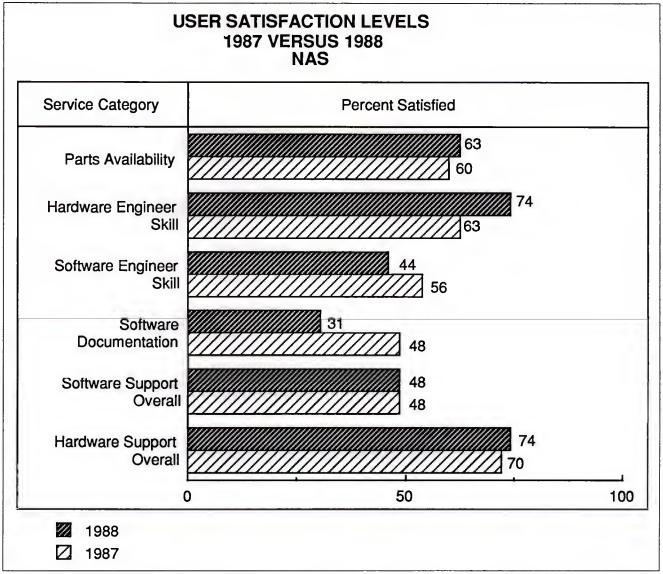


Exhibit IV-81 provides key information on the impact of software on system performance. Major software problems were reported to be 0.54 per month. This compares to a reported 0.4 total system interruptions per month, indicating that probably almost all of the system interruptions were caused by software problems.

EXHIBIT IV-81

SOFTWARE IMPACT ON SYSTEMS PERFORMANCE NAS

Description	Range (No./year)	Mean (No./month)
Major Problems*		
# Reported to vendor/mo.	0 - 24	.27
# Resolved/mo.	1 - 24	.54
Turnaround time to resolve (Hrs)	1 - 72	12 - 5
Minor Problems**		
# Reported to vendor/mo.	0 - 30	.45
# Resolved/mo.	1 - 25	.65
Turnaround time to resolve (Hrs)	.5 - 48	19.4

* Major problems are those that do not allow processing to continue.

** Minor problems are those that allow processing to continue with minor degradation.

The value/performance ratings and the percent of satisfied users for the major elements of professional services are displayed in Exhibit IV-82. NAS users are most satisfied with needs assessment planning (78%), site/facility management (74%), and installation/moves (70%). They are least satisfied with disaster recovery (41%) and overall planning services (42%).

Exhibit IV-83 provides information on third-party service issues and opportunities at NAS large-system accounts. NAS supplies service on third-party equipment at 23.6% of the users. 43.9% of users would be willing to use NAS service on other products if available. Third-party maintenance companies have been very active in contacting NAS users (70.4% have been contacted), and 59.3% of the users state that they plan to use third-party service in the future.

The customers' willingness to perform service tasks in return for a discount on service is displayed in Exhibit IV-84. Most NAS customers are not very willing to perform these tasks, although about 25% are very willing (7-10 rating) to do board swaps and diagnosis. NAS users would require discounts ranging from 37.6% to 50.3%, depending on the type of task performed.

EXHIBIT IV-82

PROFESSIONAL SERVICES SATISFACTION
NAS

Service Category	1988 Average User Rating*		Percent Satisfied
	Value	Performance	
Planning			
Installation Planning	8.9	8.4	67
Needs Assessment Planning	8.0	7.3	78
Capacity Planning	8.3	7.6	51
Network Design Planning	7.7	6.8	50
Overall Planning Services	8.5	7.3	42
Consulting			
Site/Facility Mgt.	6.5	6.6	74
Network Mgt.	7.1	6.4	50
Systems Integration	8.2	7.1	49
Disaster Recovery	8.4	6.6	41
Overall Consulting Services	7.8	6.9	57
Other			
Installation/Moves	8.5	8.4	70
Changes/Upgrades	8.7	8.4	61

* Scale: 1 = Low 10 = High

EXHIBIT IV-83

THIRD-PARTY ISSUES/OPPORTUNITIES NAS

Description	Percent Responding	
	Yes	No
Does hardware vendor supply service to any other brands of equipment in your system?	23.6	76.4
If available, would you use hardware vendor to service other brands?	43.9	56.1
Have Third-Party Maintenance companies approached you about service?	70.4	29.6
Have you considered Third-Party Service for:		
A. Hardware	51.1	49.9
B. Software	15.7	84.3
C. Education and Training	41.2	58.8
D. Planning and Consulting	33.3	66.7
Do you currently use Third-Party Service?	48.4	51.6
Do you plan to use Third-Party Service in the future?	59.3	40.7

EXHIBIT IV-84

CUSTOMER WILLINGNESS TO PERFORM SERVICE TASKS NAS

Tasks	Willingness to Perform* (Percent)					Mean
	1 - 2	3 - 4	5 - 6	7 - 8	9 - 10	1 - 10
Board Swaps	61.7	4.3	8.5	12.7	12.7	3.4
Component Replacement	64.6	4.2	12.5	10.5	8.3	3.1
Diagnosis	67.9	0	7.1	10.7	14.3	3.4
Depot (Mail/Carry-In)	76.7	4.6	9.3	0	9.3	2.4
Support Mgt./Control Functions	62.5	8.4	8.3	8.3	12.5	3.3

Tasks	Mean Discount Expected (Percent)
Board Swaps	45.4
Component Replacement	50.3
Diagnosis	39.5
Depot (Mail/Carry-In)	46.3
Support Mgt./Control Functions	37.6

* Scale: 1 = Not very willing 10 = Very willing

H

NCR

In 1988, INPUT surveyed 40 users of large NCR systems concerning their satisfaction with service and support and their system availability requirements and results. Users included 12 from the process/manufacturing industry, 7 from the medical industry, and others from government, education, and finance. There were 18 users of the model 9000 and 12 users of the model 9300 included in the survey.

Exhibit IV-85 displays the trends (1987/1988) in contract coverage for NCR's large-system users. NCR users continue to buck the trend of most large-system users, which are moving toward 7-day-per-week, 24-hour

coverage. Monday-through-Friday coverage increased from 68% of the users in the 1987 sample to 75% of the users in the 1988 sample. Similarly, the percentage of users taking the 0-9-hour coverage increased from 44% in 1987 to 60% in 1988.

EXHIBIT IV-85

SERVICE CONTRACT COVERAGE
NCR

Contract Component	Sample Responding (Percent)	
	1987	1988
• Days of coverage		
- Monday – Friday	68	75
- Monday – Saturday	28	5
- Monday – Sunday	4	20
• Hours of coverage		
- 1 to 9 hours	44	60
- 10 to 16 hours	48	28
- 17 to 24 hours	8	12

Service performance and the resulting system availability trends are displayed in Exhibit IV-86.

System interruptions per month remained the same at 1.6, while response time and repair time both increased over 1987 levels. The percent of system interruptions caused by hardware decreased from 68% in 1987 to 55.6% in 1988. This improvement in reliability was probably the key reason that system availability increased from 93.6% in 1987 to 97.1% in 1988.

Exhibit IV-87 presents the changes in user expectation and in the percent of users satisfied with system availability, response time, and repair time. It is interesting to note that while actual response time and repair time increased, so did the user expectations. The resulting user satisfaction also showed significant improvement, indicating NCR has done a good job of communicating to customers what to expect. Satisfaction with system availability improved from 48% satisfied in 1987 to 61% satisfied in 1988.

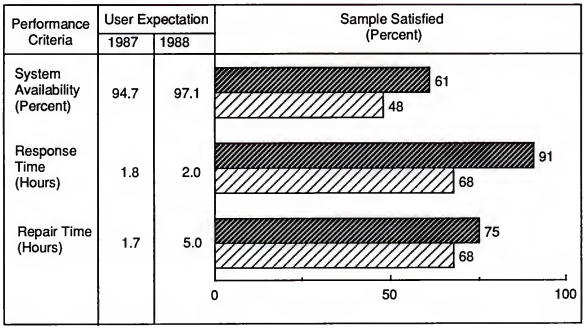
EXHIBIT IV-86

SERVICE PERFORMANCE
NCR

Performance Criteria	Actual Performance 1987	Actual Performance 1988
• Systems Interruptions		
- Mean number per month	1.6	1.6
- Hardware caused (Percent)	68.0	55.6
- System Software caused (Percent)	9.0	14.8
- Application Software caused (Percent)	10.0	9.1
- Other caused (Percent)	13.0	20.5
• Mean System Availability (Percent)	93.6	97.1
• Mean Response Time (Hours)	1.8	2.0
• Mean Repair Time (Hours)	1.8	3.0

EXHIBIT IV-87

USER SATISFACTION WITH
SERVICE PERFORMANCE
NCR



1988
1987

User satisfaction with system availability at various requirement levels is presented in Exhibit IV-88. The percent of users satisfied increased at all requirement levels through 99%. There was a decrease from 35% satisfied in 1987 to 27% satisfied in 1988 at the 100% requirement level.

Exhibit IV-89 is a scattergram that displays system availability required versus system availability received for each user surveyed. NCR users are not as clustered toward the upper right as are most other vendors. Although 15 of the 40 respondents required 100% availability, the range of availability was from 90% to 100% for those 15.

EXHIBIT IV-88

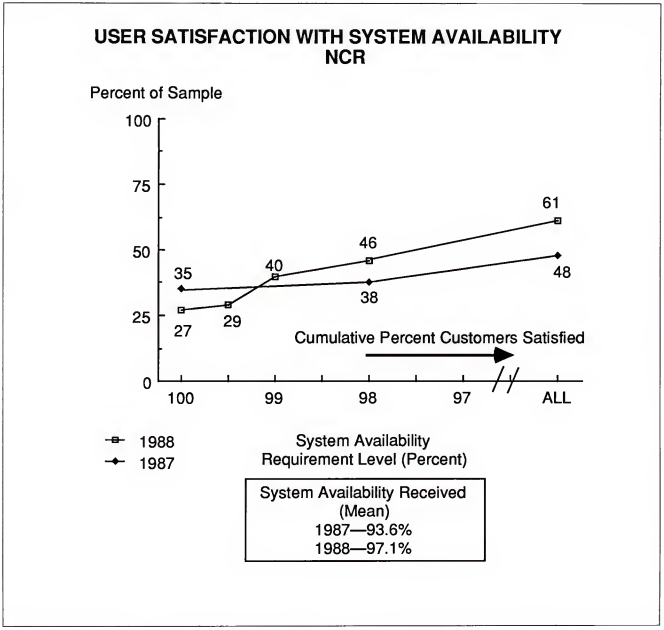
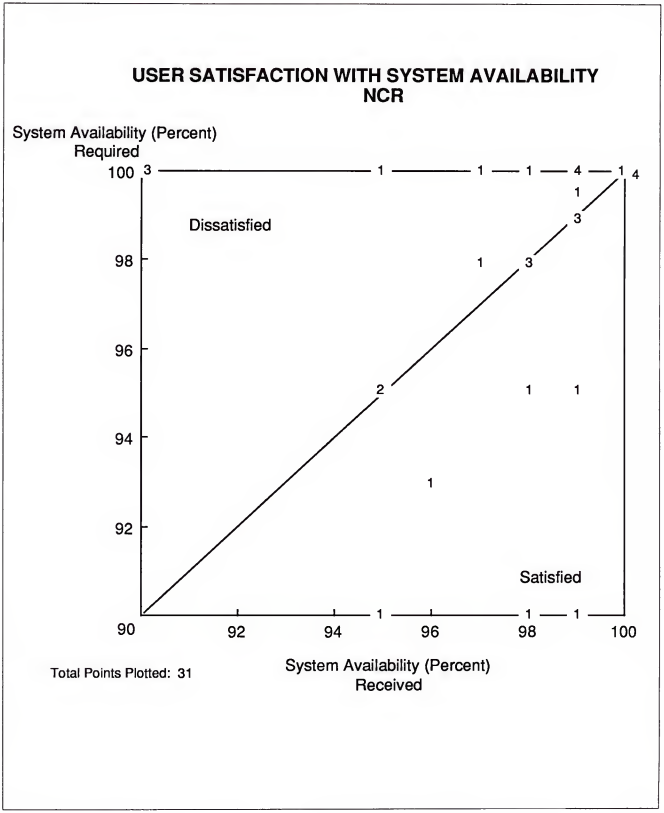


EXHIBIT IV-89



Value/performance levels for hardware support items and the percent of satisfied users are displayed in Exhibit IV-90. Hardware dispatch is the item rated with the highest value (9.5), yet it has the lowest percent of satisfied users (44%). This indicates that some action may be needed on this item. Parts availability is also rated high in value at 9.3, but only 46% of the users are satisfied. The hardware phone support staff is rated the lowest in value (7.7), and it has the highest percent of satisfied users of any item.

EXHIBIT IV-90

HARDWARE SUPPORT VALUE/PERFORMANCE LEVELS—NCR

Service Category	1988 Average User Rating*		Percent Satisfied
	Value	Performance	
Hardware Engineer Skill	9.4	8.9	63
Hardware Phone Support Staff	7.7	7.6	74
Hardware Dispatch	9.5	8.1	44
Parts Availability	9.3	8.2	46
Overall Hardware Maintenance	9.3	8.7	51
Hardware User Documentation	7.9	7.4	49

* Scale: 1 = Low 10 = High

Exhibit IV-91 displays the value/performance levels for software support items and the percent of satisfied users for each item.

EXHIBIT IV-91

SOFTWARE SUPPORT VALUE/PERFORMANCE LEVELS—NCR

Service Category	1988 Average User Rating*		Percent Satisfied
	Value	Performance	
On-Site Support	6.4	7.6	64
Telephone Hotline	8.9	8.1	43
Remote Support	7.8	7.8	67
Problems Data Base	7.9	7.8	50
SW Engineer Skill	8.9	7.7	39
SW Product Reliability	9.7	8.4	38
Software Support Overall	9.3	8.0	41
Software User Documentation	9.4	6.8	14

* Scale: 1 = Low 10 = High

Software product reliability is rated as having the most value (9.7), but only 38% of the users are satisfied. Next in value is software user documentation (9.4), but only 14% of the users are satisfied. Clearly some action is required on software documentation if user satisfaction is to be improved. The highest percent of satisfied users are for remote support (67%) and on-site support (64%).

The trends in user satisfaction (1987/1988) for the key elements of service and support are displayed in Exhibit IV-92. The trend is negative (i.e., a lower percent satisfied) for all items. The largest decrease in user satisfaction is for software documentation (72% satisfied in 1987 to 14% in 1988).

EXHIBIT IV-92

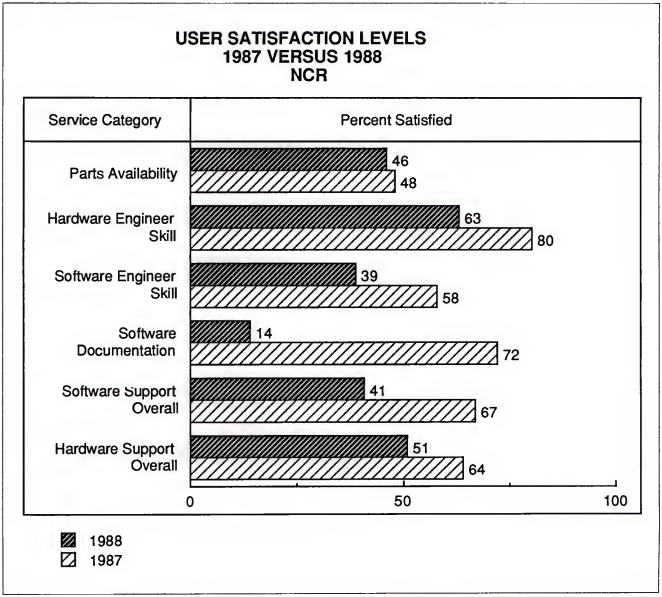


Exhibit IV-93 presents information on the impact of software on systems performance. Major software problems accounted for 0.52 of the 1.6 system interruptions per month. Minor problems averaged 0.67 per month. These are problems that allow processing to continue with minor degradation of system performance.

The value/performance levels and the percent of satisfied users for the major professional service items are shown in Exhibit IV-94. NCR users rate capacity planning and changes/upgrades as the items of most value (8.6). Site/facility management is rated as having the lowest value (6.9). The highest percent of satisfied customers is for installation/moves (72%).

Exhibit IV-95 presents the third-party environment at NCR large-system users. NCR provides service on other vendor products to 32.5% of the large-system users surveyed. Seventy-four percent of the users stated that they would use NCR to service other vendor products if the service were available. At the present time, 44.4% of the users surveyed are using third-party service and 72.2% stated that they plan to use third-party service in the future.

EXHIBIT IV-93

SOFTWARE IMPACT ON SYSTEMS PERFORMANCE
NCR

Description	Range	Mean
Major Problems*		
# Reported to vendor/mo.	0 - 36	.28
# Resolved/mo.	1 - 36	.52
Turnaround time to resolve (Hrs)	1 - 12	4.8
Minor Problems**		
# Reported to vendor/mo.	0 - 30	.58
# Resolved/mo.	.3 - 30	.67
Turnaround time to resolve (Hrs)	1 - 48	15.5

* Major problems are those that do not allow processing to continue.

** Minor problems are those that allow processing to continue with minor degradation.

EXHIBIT IV-94

PROFESSIONAL SERVICES SATISFACTION
NCR

Service Category	1988 Average User Rating*		Percent Satisfied
	Value	Performance	
Planning			
Installation Planning	8.4	7.7	54
Needs Assessment Planning	7.8	6.6	39
Capacity Planning	8.6	6.8	44
Network Design Planning	8.2	7.0	50
Overall Planning Services	7.8	6.9	45
Consulting			
Site/Facility Mgt.	6.9	7.0	60
Network Mgt.	7.3	6.9	63
Systems Integration	8.3	7.0	35
Disaster Recovery	7.8	7.1	57
Overall Consulting Services	7.9	7.4	40
Other			
Installation/Moves	7.5	8.1	72
Changes/Upgrades	8.6	7.9	58

* Scale: 1 = Low 10 = High

EXHIBIT IV-95

THIRD-PARTY ISSUES/OPPORTUNITIES NCR

Description	Percent Responding	
	Yes	No
Does hardware vendor supply service to any other brands of equipment in your system?	32.5	67.5
If available, would you use hardware vendor to service other brands?	74.1	25.9
Have Third-Party Maintenance companies approached you about service?	32.5	67.5
Have you considered Third-Party Service for:		
A. Hardware	17.9	82.1
B. Software	23.1	76.9
C. Education and Training	15.4	84.6
D. Planning and Consulting	28.2	71.8
Do you currently use Third-Party Service?	44.4	55.6
Do you plan to use Third-Party Service in the future?	72.2	27.8

Customer willingness to perform service tasks in return for a discount on service is presented in Exhibit IV-96. Over 40% of the users are very willing (rating of 7-10) to perform board swaps, and 28% of the users were very willing to perform diagnosis. Fifty percent or more of the users are not too willing (rating of 1-4) to do component replacement, depot, or support management/control functions. The discounts expected range from 27.9% to 33.9%, depending on the type of service task performed.

EXHIBIT IV-96

CUSTOMER WILLINGNESS TO PERFORM SERVICE TASKS NCR

Tasks	Willingness to Perform* (Percent)					Mean
	1 - 2	3 - 4	5 - 6	7 - 8	9 - 10	1 - 10
Board Swaps	43.8	3.1	12.5	21.9	18.7	4.8
Component Replacement	55.6	11.1	18.5	3.7	11.1	3.4
Diagnosis	34.6	7.6	19.2	15.3	23.1	5.1
Depot (Mail/Carry-In)	53.8	0	15.4	15.3	15.3	4.1
Support Mgt./Control Functions	50.0	0	22.7	13.6	13.6	4.1

Tasks	Mean Discount Expected (Percent)
Board Swaps	29.3
Component Replacement	33.9
Diagnosis	27.9
Depot (Mail/Carry-In)	33.2
Support Mgt./Control Functions	30.0

* Scale: 1 = Not very willing 10 = Very willing

I

Unisys (Sperry)

INPUT interviewed 43 UNISYS (Sperry) large-system users concerning their service and support requirements versus what they were receiving. Data was also gathered on system availability requirements versus system availability received. Fourteen of the users were from government, and nine were from manufacturing. The rest represented a good cross section of finance, services, education, and distribution industries. Twenty-one

Service contract coverage trends (1987/1988) are presented in Exhibit IV-97. Monday-through-Friday coverage increased from 60% of the users in 1987 to 72% in 1988. The percent of users with a single shift of coverage (1-9 hours) also increased, from 53% in 1987 to 60% in 1988.

EXHIBIT IV-97

SERVICE CONTRACT COVERAGE
UNISYS (SPERRY)

Contract Component	Sample Responding (Percent)	
	1987	1988
• Days of coverage		
- Monday – Friday	60	72
- Monday – Saturday	2	0
- Monday – Sunday	38	28
• Hours of coverage		
- 1 to 9 hours	53	60
- 10 to 16 hours	9	9
- 17 to 24 hours	38	31

Exhibit IV-98 presents a summary of service performance trends for UNISYS (Sperry). Systems interruptions increased slightly from 2.9 per month in 1987 to 3.0 per month in 1988. Response time increased from 1.1 hours in 1987 to 1.5 hours in 1988. Repair time more than doubled (from 2.4 hours in 1987 to 5.6 hours in 1988). System availability increased 1% (from 96.4% to 97.4%).

User satisfaction with service performance is displayed in Exhibit IV-99. Satisfaction with system availability remained the same, while there was a decrease in satisfaction with response time (91% to 79%) and repair time (93% to 69%).

Exhibit IV-100 displays the trends in user satisfaction with system availability at various requirement levels. Improvement has been in the percent of users satisfied at the 99.5% and 100% requirement levels. There is little change between 1987 and 1988 at the 99% requirement level and below.

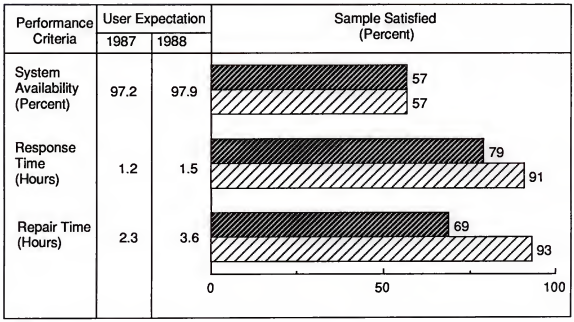
EXHIBIT IV-98

SERVICE PERFORMANCE
UNISYS (SPERRY)

Performance Criteria	Actual Performance 1987	Actual Performance 1988
• Systems Interruptions		
- Mean number per month	2.9	3.0
- Hardware caused (Percent)	61.0	53.0
- System Software caused (Percent)	19.0	16.0
- Application Software caused (Percent)	13.0	10.0
- Other caused (Percent)	7.0	21.0
• Mean System Availability (Percent)	96.4	97.4
• Mean Response Time (Hours)	1.1	1.5
• Mean Repair Time (Hours)	2.4	5.6

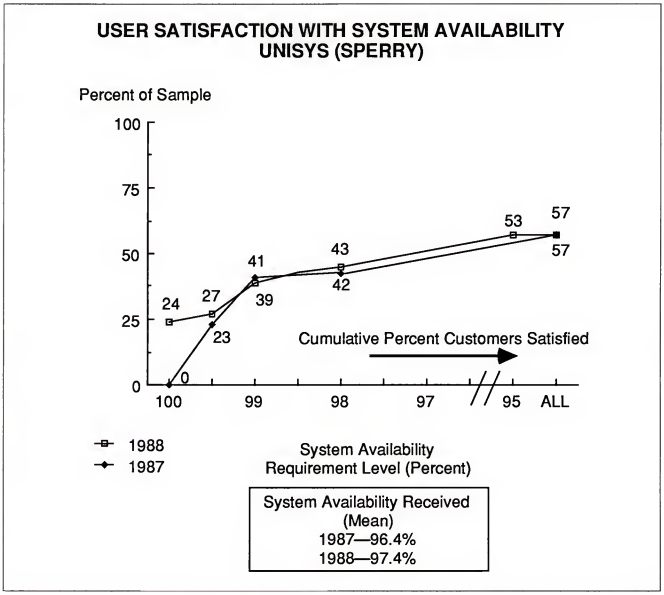
EXHIBIT IV-99

USER SATISFACTION WITH
SERVICE PERFORMANCE
UNISYS (SPERRY)



1988
1987

EXHIBIT IV-100



A scattergram of user requirements for system availability versus system availability received is presented in Exhibit IV-101. UNISYS (Sperry) had only one user in the survey that required less than 95% availability. Twenty of the forty-three users surveyed required 100% availability, but only five achieved 100%.

EXHIBIT IV-101

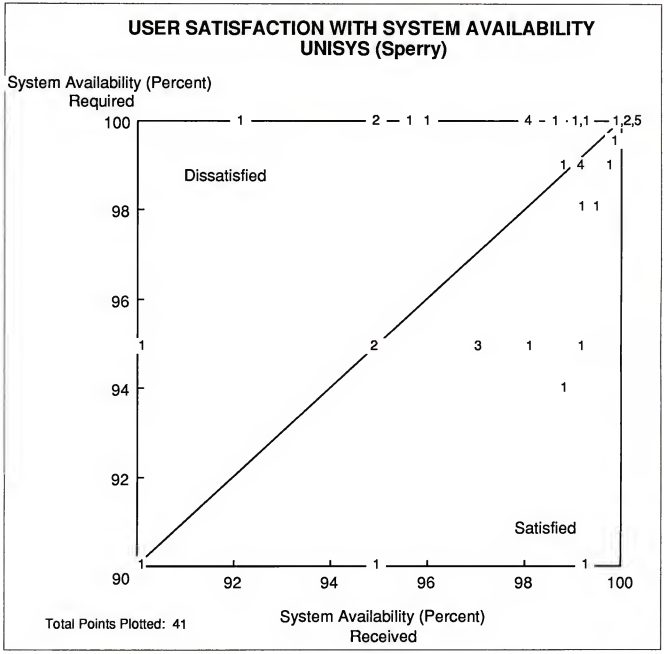


Exhibit IV-102 presents value/performance levels and the percent of satisfied users for the key areas of hardware support. Parts availability is rated the most important item of hardware support (9.6), but only 28% of the users are satisfied with this item. Hardware dispatch also has a very low percent of users satisfied (24%). Hardware maintenance overall, with 35% satisfied, is very low compared with the average of all vendors—53% satisfied.

EXHIBIT IV-102

HARDWARE SUPPORT VALUE/PERFORMANCE LEVELS—UNISYS (SPERRY)

Service Category	1988 Average User Rating*		Percent Satisfied
	Value	Performance	
Hardware Engineer Skill	9.3	8.0	35
Hardware Phone Support Staff	7.8	7.4	64
Hardware Dispatch	9.0	7.8	24
Parts Availability	9.6	7.1	28
Overall Hardware Maintenance	9.5	8.1	35
Hardware User Documentation	8.3	7.0	45

* Scale: 1 = Low 10 = High

Software support value/performance levels and the percent of satisfied users are displayed in Exhibit IV-103. Software product reliability is rated the most important item (9.7), followed by software documentation, which is rated 9.3. Only 18% of the users are satisfied with software documentation, and only 27% of the users are satisfied with software reliability. The problems data base, on the other hand, received very high marks with 79% of the users satisfied.

EXHIBIT IV-103

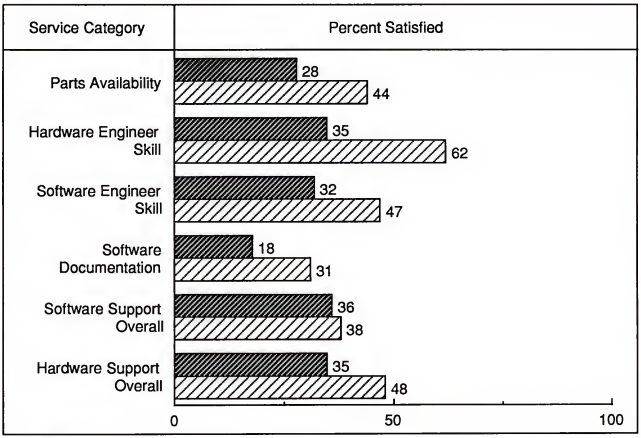
SOFTWARE SUPPORT VALUE/PERFORMANCE LEVELS—UNISYS (SPERRY)

Service Category	1988 Average User Rating*		Percent Satisfied
	Value	Performance	
On-Site Support	7.5	7.5	64
Telephone Hotline	8.6	7.4	36
Remote Support	7.9	7.1	53
Problems Data Base	7.3	7.3	79
SW Engineer Skill	8.7	7.2	32
SW Product Reliability	9.7	7.8	27
Software Support Overall	9.0	7.7	36
Software User Documentation	9.3	6.8	18

* Scale: 1 = Low 10 = High

Exhibit IV-104 presents the trends in user satisfaction for the six most important service and support items. The percent of users satisfied dropped between 1987 and 1988 for all six items. The largest drop occurred for the hardware engineer skill item (from 62% to 35%).

EXHIBIT IV-104



The impact of software on system performance is presented in Exhibit IV-105. Major software problems account for 0.43 of the 3.0 system interruptions per month. Minor software problems average 0.86 per month.

EXHIBIT IV-105

SOFTWARE IMPACT ON SYSTEMS PERFORMANCE UNISYS (SPERRY)

Description	Range (No./year)	Mean (No./month)
Major Problems*		
# Reported to vendor/mo.	0 - 25	.32
# Resolved/mo.	1 - 25	.43
Turnaround time to resolve (Hrs)	2 - 72	16.7
Minor Problems**		
# Reported to vendor/mo.	0 - 35	.87
# Resolved/mo.	2 - 35	.86
Turnaround time to resolve (Hrs)	.3 - 72	25.2

* Major problems are those that do not allow processing to continue.

** Minor problems are those that allow processing to continue with minor degradation.

Exhibit IV-106 presents the value/performance levels and the percent of satisfied users for the major catagories of professional services. UNISYS (Sperry) users rate changes/upgrades as the most important professional service item (8.9). Installation/moves and installation planning are next in order of importance with a rating of 8.8. Installation/moves has the highest percent satisfied (58%), and network design planning has the lowest percent of satisfied users (30%).

The third-party environment is displayed in Exhibit IV-107. Forty-two percent of the users surveyed stated that UNISYS was servicing other brands of equipment on their system. Twenty-three percent are using third-party service companies, and 67% state that they plan to use third parties in the future. This seems high and could represent a significant business exposure.

Exhibit IV-108 presents information on users' willingness to perform certain service tasks in return for a discount. Forty percent or more of the UNISYS (Sperry) users surveyed are very willing (7-10 rating) to perform diagnosis, board swaps, and support/management control functions in return for a discount. Component replacement and depot (mail/carry-in) are the least popular items.

EXHIBIT IV-106

PROFESSIONAL SERVICES SATISFACTION
UNISYS (SPERRY)

Service Category	1988 Average User Rating*		Percent Satisfied
	Value	Performance	
Planning			
Installation Planning	8.8	7.5	44
Needs Assessment Planning	8.5	6.5	32
Capacity Planning	8.4	5.9	31
Network Design Planning	8.2	5.4	30
Overall Planning Services	8.4	6.4	34
Consulting			
Site/Facility Mgt.	7.4	6.3	52
Network Mgt.	7.1	5.9	41
Systems Integration	7.9	5.7	39
Disaster Recovery	7.9	6.0	40
Overall Consulting Services	7.6	6.2	47
Other			
Installation/Moves	8.8	7.6	58
Changes/Upgrades	8.9	7.2	42

* Scale: 1 = Low 10 = High

EXHIBIT IV-107

THIRD-PARTY ISSUES/OPPORTUNITIES UNISYS (SPERRY)

Description	Percent Responding	
	Yes	No
Does hardware vendor supply service to any other brands of equipment in your system?	42.0	58.0
If available, would you use hardware vendor to service other brands?	48.0	52.0
Have Third-Party Maintenance companies approached you about service?	52.0	48.0
Have you considered Third-Party Service for:		
A. Hardware	41.0	59.0
B. Software	7.0	93.0
C. Education and Training	43.0	57.0
D. Planning and Consulting	22.0	78.0
Do you currently use Third-Party Service?	23.0	77.0
Do you plan to use Third-Party Service in the future?	67.0	33.0

EXHIBIT IV-108

CUSTOMER WILLINGNESS TO PERFORM SERVICE TASKS UNISYS (SPERRY)

Tasks	Willingness to Perform* (Percent)					Mean
	1 - 2	3 - 4	5 - 6	7 - 8	9 - 10	1 - 10
Board Swaps	24.0	4.0	24.0	24.0	24.0	5.9
Component Replacement	61.5	3.8	19.2	7.6	7.7	3.3
Diagnosis	18.2	0	31.8	31.8	18.1	6.1
Depot (Mail/Carry-In)	66.7	4.2	0	20.8	8.3	3.3
Support Mgt./Control Functions	40.0	0	20.0	20.0	20.0	5.0

Tasks	Mean Discount Expected (Percent)
Board Swaps	23.5
Component Replacement	24.6
Diagnosis	24.2
Depot (Mail/Carry-In)	31.4
Support Mgt./Control Functions	27.3

* Scale: 1 = Not very willing 10 = Very willing

V

Large-Systems Summary Data

V

Large-Systems Summary Data

In this chapter INPUT presents selected data from the 1988 large-systems user service requirements analysis in summary charts, allowing the comparision of service performance on a vendor-by-vendor basis. INPUT believes that the key to this comparison should always be the ability of each vendor to satisfy the needs of its particular users, rather than the achievement of the "best" individual performance mark, since the "best" mark may still be lacking if the user requirements exceed it.

- Exhibits V-1 through V-4 provide summarized service performance data as a source of comparision between vendors.

- Exhibit V-5 provides the summary results of the questions to users on what type discounts they are receiving for service on large systems.

EXHIBIT V-1

RESPONSE TIME OVERVIEW

RANK	Vendor	Response Time (Hours) Required	Response Time (Hours) Received	Users (Percent Satisfied)
1	IBM 309X	1.9	1.5	100
2	Amdahl	1.3	1.4	97
2	CDC	3.0	3.1	97
2	IBM 308X	1.8	1.3	97
3	Honeywell	1.7	1.4	92
4	NAS	1.9	1.5	91
4	NCR	2.0	2.0	91
5	UNISYS (Burroughs)	1.8	1.6	88
6	UNISYS (Sperry)	1.5	1.5	79
	ALL	1.8	1.7	93

EXHIBIT V-2

REPAIR TIME OVERVIEW

RANK	Vendor	Repair Time (Hours) Required	Repair Time (Hours) Received	Users (Percent Satisfied)
1	UNISYS (Burroughs)	8.3	7.1	100
2	IBM 309X	2.8	2.9	96
3	CDC	8.3	8.8	91
4	NAS	3.4	1.9	90
5	Amdahl	1.8	1.7	88
6	IBM 308X	2.3	2.3	86
7	Honeywell	4.3	4.1	85
8	NCR	5.0	3.0	75
9	UNISYS (Sperry)	3.6	5.6	69
	ALL	4.2	4.2	88

EXHIBIT V-3

HARDWARE MAINTENANCE OVERVIEW

RANK	Vendor	Hardware Maintenance		Users (Percent Satisfied)
		Importance	Satisfaction	50 100
1	Amdahl	9.3	9.2	76
2	NAS	9.6	9.3	74
3	IBM 308X	9.3	8.8	55
4	NCR	9.3	8.7	51
5	CDC	9.2	8.5	50
5	IBM 309X	9.3	8.9	50
6	UNISYS (Burroughs)	9.4	8.5	43
7	Honeywell	9.2	8.0	37
8	UNISYS (Sperry)	9.5	8.1	35
	ALL	9.3	8.7	53

EXHIBIT V-4

SOFTWARE SUPPORT OVERVIEW

RANK	Vendor	Software Support		Users (Percent Satisfied)
		Importance	Satisfaction	50 — 100
1	Amdahl	9.0	8.9	80
2	NAS	8.6	7.9	48
3	CDC	9.0	7.7	43
4	NCR	9.3	8.0	41
5	Honeywell	8.9	7.8	40
5	IBM 309X	9.2	8.0	40
6	UNISYS (Sperry)	9.0	7.7	36
7	UNISYS (Burroughs)	8.9	7.6	35
8	IBM 308X	9.4	8.2	32
	ALL	9.0	8.0	43

EXHIBIT V-5

DISCOUNTING OVERVIEW

Vendor	Percent of Users Receiving Discount			Explanation of Other Discount
	Reduced Coverage	Sched. Maint.	Other	
Amdahl	8	3	18	Volume (5), GSA (1), Education (1)
CDC	25	23	28	Education (7), Other (2), Prepayment (1)
Honeywell	7	5	27	Education (3), Volume (2), GSA (2), Other (2), Prepayment (1)
IBM 309X	33	35	60	CSH (18), Other (2), Volume (1), Multivendor (1)
IBM 308X	21	26	38	CSA (10), Other (2), Multisite (1)
NAS	24	18	11	Volume (2), Prepayment (1)
NCR	28	13	15	Hardware Purchase (2), Education (1), Other (1)
UNISYS (Burroughs)	30	23	10	Education (2), Parts Available (1), State Government (1)
UNISYS (Sperry)	19	14	21	CSA (2), Other (2), Volume (1), Hardware Purchase (1), Education (1)
ALL	22	18	25	

A

Appendix: Questionnaire

A

Appendix: Questionnaire

A. Background

1 manufacturer/model: _____

2 service vendor: ❑ a. manufacturer
❑ b. TPM (go to TPM questionnaire)

3 service coverage: _____ a. days
_____ b. hours

B. Hardware Maintenance

4 a. How many system interruptions (on average) do you experience per month?
_____/mo.

b. What percent of these are:

1. hardware related?	%HW	_____
2. systems software related?	%sys SW	_____
3. applications software related?	%app SW	_____
4. other (user, power source, etc.)	%other	_____

5 On average over the past year:

	a. required	vs.	b. received
1. system availability	_____.__%		_____.__%
2. response time	_____.__ hrs.		_____.__ hrs.
3. repair time	_____.__ hrs.		_____.__ hrs.

6 a. Please rate on a scale of 1 to 10 (1 low, 10 high) the importance of each of the following aspects of support.

b. Then, on the same scale, please rate your current level of satisfaction with the support you're receiving from your vendor in that area.

	a. imptce vs. (1-10)	b. sat.
1. HW engineer skill	_____	_____
2. HW phone-support staff	_____	_____
3. HW dispatch	_____	_____
4. spare parts availability	_____	_____
5. overall HW maintenance	_____	_____

7 a. Are you currently involved in the service of your system by performing any of the following tasks?

b. If no: On a scale of 1 to 10, how willing would you be perform these tasks for a discount on your systems service contract? _____

c. If yes: Do you receive a discount currently? (Yes/No) _____

If no: what discount would you expect to receive? (Q c.)

	a. involved now? (y/n)	b. willing (1-10)	c. percent discount (%)
1. board swaps	_____	_____	_____
2. component replacement	_____	_____	_____
3. diagnosis	_____	_____	_____
4. depot (mail/carry-in)	_____	_____	_____
5. support mgmt/control ("help desk") functions	_____	_____	_____

C. Software Support

8 a. Are you currently receiving operating software support from your system vendor? (Yes/No) _____

b. What percent of license fee do you pay for support? _____ %

9 a. Are you receiving support from your system vendor on any application software packages? (Yes/No) _____

b. What percentage (or range) of license fee(s) do you pay for support? _____ %

If no on both 8 and 9, proceed to question 13.
If yes on either 8 or 9:

10 Which of the following software services do you receive from your system vendor on a contract basis, and/or an ad-hoc basis? (check all that apply)

	a. contract	vs.	b. ad-hoc
1. on-site support	❑		❑
2. telephone hotline	❑		❑
3. remote support	❑		❑
4. problems database	❑		❑

11 a. Please rate on a scale of 1 to 10 (1 low, 10 high) the importance of each of the following aspects of software support.

b. Then, on the same scale, please rate your current level of satisfaction with the support you're receiving from your system vendor.

	a. imptce	vs. (1-10)	b. sat.
1. on-site support	_____		_____
2. telephone hotline	_____		_____
3. remote support	_____		_____
4. problems data base	_____		_____
5. SW engineer skill	_____		_____
6. SW product reliability	_____		_____
7. software support overall	_____		_____

12 For the following questions, a "major software problem" can be defined as one in which processing cannot be continued, while a "minor software problem" allows processing to be performed with minor degradation. All questions refer to an average number of problems over the past 12 months.

a. average number of major problems reported _____
b. average number of major problems resolved _____
c. turnaround time of major problem resolution _____ hrs.

d. average number of minor problems reported _____
e. average number of minor problems resolved _____
f. turnaround time of minor problem resolution _____ hrs.

D. Educational Services

13 a. Which of the following types of education or training services do you receive from your system vendor? (Qs 1.-3.)

b. If yes: Do you receive that training on-site?
c. At a training center?
d. Through interactive video?

e. As computer-based training?
(check all that apply)

a.		b.	c.	d.	e.
y/n	education training service	on-site	training center	inter-active video	computer-based training
1.	operational training				
2.	maintenance training				
3.	other				

14 Please rate your current level of satisfaction with the training/education support you're receiving from your system vendor.

	satisfaction (1-10)
1. subject matter	_____
2. amount of training	_____
3. training methods	_____

15 Are there areas in which you feel more courses should be offered? _____

_____

E. Documentation

16 a. Please rate on a scale of 1 to 10 (1 low, 10 high) the importance of each of the following aspects of systems documentation.

b. Then, on the same scale, please rate your current level of satisfaction with the documentation and manuals you're receiving from your vendor.

	a. imptce	vs.	b. sat.
		(1-10)	
1. HW user documentation	_____		_____
2. SW user documentation	_____		_____
3. training manuals	_____		_____

17 Please rate your system vendor's documentation in terms of the following qualities:

	(1-10)
a. accuracy	_____
b. usability	_____
c. clarity	_____
d. completeness	_____

18 a. How do you receive updates to your systems documentation? (check all that apply)

1. on-line _____
2. mail _____
3. other? _____

b. How often do you receive updates? _____

c. 1. Please rate your satisfaction with the update information (1 low, 10 high) _____

2. With the update process? (1 low, 10 high) _____

19 a. Does your vendor provide an avenue for feedback on documentation? (Yes/No) _____

b. On a scale of 1 to 10, how effective is it? _____

20 Which aspect of documentation do you feel needs most improvement? _____

_____

_____

F. Professional Services

21 a. Please rate the importance of planning and consulting services in each of the following areas (1-10).

b. Then rate your satisfaction with the service you've received from your vendor in each area (1-10).

	a. imptce	vs. (1-10)	b. sat
planning:			
1. installation planning (environmental/site)	_____		_____
2. needs assessment planning	_____		_____
3. capacity planning	_____		_____

4. network design planning _____ _____
5. overall planning services _____ _____
consulting:
6. site/facility management _____ _____
7. network management _____ _____
8. systems integration _____ _____
9. disaster recovery _____ _____
10. overall consulting services _____ _____

other:
11. installation/moves _____ _____
12. changes/upgrades _____ _____

22 Please rate on a scale of 1 to 10 (1 low, 10 high) your current level of satisfaction with the support you've received from your vendor in each area of planning/consulting.

	satisfaction (1-10)
a. expertise of staff	_____
b. offerings suitable to needs	_____
c. results of plng/consulting	_____

23 In what areas do you foresee a need for planning/consulting in the future? _____

_____

G. Pricing

24 Please rate your level of satisfaction with the price of the following services:

	(1-10)
a. hardware service	_____
b. software support	_____
c. education/training	_____
d. planning/consulting	_____

25 Do you receive a discount for any of the following reasons?

	(Yes/No)
a. reduced service coverage	_____
b. scheduled maintenance visits	_____
c. other (specify) _____	_____

H. TPM Related Issues

26 a. Does your HW vendor supply service to any other brands of equipment in your system? (Yes/No) _____

b. if yes: how satisfied? (1-10) _____

c. if no: if available, would you use HW vendor to support other brands of equipment? (Yes/No) _____

27 a. Have TPM companies approached you about your system service? Yes/No _____

b. Which ones? _____

28 Have you considered TPM:

	(Yes/No)
a. for HW	_____
b. for SW	_____
c. for education and training	_____
d. for planning and consulting	_____

if yes:

	(Yes/No)
1. currently use TPM?	_____
2. plan to use in future?	_____

3. reasons for attraction: _____

_____

_____

THANK YOU!

B

Appendix: Definitions

B

Appendix: Definitions

Applications Software - Software that performs processing to service user functions.

Artificial Intelligence - The academic discipline involving the study of the processes by which humans perceive and assimilate data (and use reasoning to process this data) for the purpose of duplicating these processes within computer systems. Also, this term refers to the computer systems that accomplish these duplicated processes.

BOC - Bell Operating Company.

Consulting - Includes analysis of user requirements and the development of a specific action plan to meet user service and support needs.

Dispatching - The process of allocating service resources to solve a support-related problem.

Divestiture - The action, stemming from antitrust lawsuits by the Department of Justice, which led to the breakup of AT&T and its previously owned local operating companies.

Documentation - All manuals, newsletters, and text designed to serve as reference material for the ongoing operation or repair of hardware or software.

End User - May buy a system from the hardware supplier(s) and do own programming, interfacing, and installation. Alternatively, may buy a turnkey system from a systems house or hardware integrator.

Expert Systems Applications - Applications for expert systems—a computer system based on a data base created by human authorities on a particular subject. The computer system supporting this data base contains software that permits inferences based on inquiries against the

information contained in the data base. Expert systems is often used synonymously with "knowledge-based systems," although this latter term is considered to be broader and to include expert systems within its scope.

Engineering Change Notice (ECN) - Product changes to improve the product after it has been released to production.

Engineering Change Order (ECO) - The follow-up to ECNs that include parts and a bill of material to effect the change in hardware.

Escalation - The process of increasing the level of support when and if the field engineer cannot correct a hardware or software problem within a prescribed amount of time, usually two to four hours for hardware.

Fiber Optics - A transmission medium which uses light waves.

Field Engineer (FE) - For the purpose of this study, field engineer, customer engineer, service person, and maintenance person were used interchangeably and refer to the individual who responds to a user's service call to repair a device or system.

Field Service Management System (FSMS) - A specialized application program that automates some (if not all) of the following activities of a field service organization: call handling, dispatching, parts inventory and tracking, billing, efficiency reporting, and other functions. Ideally, the system accesses one data base from which each function can use and modify data.

Hardware Integrator - Develops system interface electronics and controllers for the CPU, sensors, peripherals, and all other ancillary hardware components. May also develop control system software in addition to installing the entire system at the end-user site.

ISDN - Integrated Services Digital Network. A proposed standard for digital networks providing transport of voice, data, and image using a standard interface and twisted pair wiring.

LADT - Local Area Data Transport. Data communications provided by the BOCs within local access transport areas (LATA).

Large System - Refers to traditional mainframes including at the low end IBM 4300-like machines and at the high end IBM 308X-like machines. Large systems have a maximum word length of 32 bits and a standard configuration price of $350,000 and higher.

Mean Time Between Failures (MTBF) - The elapsed time between hardware failures on a device or a system.

Mean Time to Repair - The elapsed time from the arrival of the field engineer on the user's site until the device is repaired and returned to the user for his utilization.

Mean Time to Respond - The elapsed time between the user placement of a service call and the arrival at the user's location of a field engineer.

Microcomputer - A microprocessor-based single- or multi-user computer system typically priced less than $15,000. A typical configuration includes an 8- or 16-bit CPU, monitor, keyboard, two floppy disk drives, and all required cards and cables.

Minicomputer - See Small System.

Operating System Software (Systems Software) - Software that enables the computer system to perform basic functions. Systems Software, for the purposes of this report, does not include utilities or program development tools.

PBX - Private Branch Exchange. A customer premises telephone switch.

Peripherals - Includes all input, output, and storage devices, other than main memory, which are locally connected to the main processor and are not generally included in other categories, such as terminals.

Planning - Includes the development of procedures, distribution, organization, and configuration of support services. For example, capacity planning, "installation" planning.

Plug-Compatible Mainframe (PCM) - Mainframe computers that are compatible with and can execute programs on an equivalent IBM mainframe. The two major PCM vendors at this time are Amdahl and National Advanced Systems.

Professional Services - A category services including system design, custom programming, consulting, education, and facilities management.

RBOC - Regional Bell Operating Company. One of seven holding companies coordinating the activities of the BOCs.

Remote Diagnostics - Gaining access to a computer from a point physically distant from the computer in order to perform problem determination activities.

Remote Support Implementation - An extension of remote diagnostics where some level of support delivery is performed from a point physically distant from the computer. Currently, this capability is more common to software support where problems can be solved or circumvented through downline loading of new code (fixes).

Reseller - A marketing organization which buys long-distance capacity for others at wholesale rates, selling services at retail but discounted prices and profiting on the difference.

Small Business Computer - For the purpose of this study, a system which is built around a Central Processing Unit (CPU), has the ability to utilize at least 20M bytes of disk capacity, provides multiple CRT workstations, and offers business-oriented systems software support.

Small System - Refers to traditional minicomputer and superminicomputer systems ranging from a small multi-user, 16-bit system at the low end to sophisticated 32-bit machine at the high end.

Software-Defined Network - A private network which uses public network facilities and which is configurable on an as-needed basis by the user (see Virtual Private Network).

Software Engineer (SE) - The individual who responds (either on-site or via remote support) to a user's service call to repair or patch operating systems and/or applications software.

Software Products - Systems and applications packages which are sold to computer users by equipment manufacturers, independent vendors, and others. Also included are fees for work performed by the vendor to implement a package at the user's site.

Superminicomputer - See Small System.

Systems Integration - The action of a single service vendor's design, development, and implementation of a system or subsystem including integration of hardware, software, and communications facilities for a customer.

System Interruption - Any system downtime requiring an Initial Program Lod (IPL).

Systems House - Integrates hardware and software into a total turnkey system to satisfy the data processing requirement of the end user. May also develop systems software products for license to end users.

T-1 - Refers to a standard I.544 megabit per second digital channel used between telephone company central offices and now used for microwave, satellite, fiber optics, or other bypass applications.

Third-Party Maintenance (TPM) - Any service provider other than the original equipment vendor.

Training - All audio, visual, and computer-based documentation, materials, and live instruction designed to educate users and support personnel in the ongoing operation or repair of hardware and software.

Turnkey System - Composed of hardware and software integrated into a total system designed to completely fulfill the processing requirements of a single application.

VSAT - Very Small Aperture Terminal. A small satellite dish system, usually using Ku-band frequencies.

Virtual Private Network - A portion of a public network dedicated to a single user.