

REMOTE DIAGNOSTICS IN
EUROPEAN CUSTOMER SERVICE

JULY 1986



REMOTE DIAGNOSTICS IN EUROPEAN CUSTOMER SERVICE

ABSTRACT

The sources of vendor maintenance revenues continue to be under threat from a number of factors, namely increased competition from third-party maintenance, lower hardware costs, and higher user demands for improved service. At the same time, personnel-related expenses such as the cost of engineers' travel are increasing.

Vendors of customer services are therefore looking for ways of increasing their profit margins. Remote diagnostics is an area of service that has gained an increasing degree of vendor interest as a cost-effective and innovative method for maintenance.

This report examines and analyses current vendor offerings of remote diagnostics, focusing on vendor objectives, service coverage, pricing, and marketing of the service. The report also looks at user requirements of remote diagnostics and the importance they attach to this service.

This report contains 58 pages, including 12 exhibits.



Published by
INPUT
1943 Landings Drive
Mountain View, CA 94043
U.S.A.

Research produced by
INPUT
41 Dover Street
London W1X 3RB
England
01-493-9335

Customer Service Programme - Europe (CSP-E)

Remote Diagnostics in European Customer Service

Copyright ©1986 by INPUT. All rights reserved.
No part of this publication may be reproduced or
distributed in any form or by any means, or stored
in a data base or retrieval system, without the prior
written permission of the publisher.



REMOTE DIAGNOSTICS IN EUROPEAN CUSTOMER SERVICE

CONTENTS

	<u>Page</u>
I INTRODUCTION.....	1
A. Objectives and Scope	1
B. Methodology	2
C. Report Structure	3
II EXECUTIVE SUMMARY	5
A. The Remote Diagnostic Challenge	6
B. Remote Diagnostic Risks	8
C. Key User Factors	10
D. Key Vendor Objectives for Remote Diagnostics	12
E. Recommendations	14
III VENDOR PERSPECTIVES	17
A. Vendor Objectives	17
B. Service Coverage	21
C. Remote Diagnostic Approaches	23
1. Amdahl	25
2. NCR	26
3. Digital Equipment Corporation	27
IV REMOTE DIAGNOSTIC CENTRE RESOURCES.....	29
A. Remote Diagnostic Centre Personnel	29
B. Remote Diagnostic Facilities	32
1. Remote Diagnostic Centres	32
2. User Requirements	34
3. Data Security	34
C. Vendor Investment Considerations	35
V MARKETING REMOTE DIAGNOSTICS	37
A. Pricing Approaches	37
B. Marketing Methods	39
VI USER ATTITUDES TOWARDS REMOTE DIAGNOSTICS	41
A. Relative Importance of Remote Diagnostics	41
B. User Satisfaction Ratings	42
C. User Comments	45
VII CONCLUSIONS AND RECOMMENDATIONS	47
A. Conclusions	47
B. Recommendations	51
APPENDIX: QUESTIONNAIRE	53



REMOTE DIAGNOSTICS IN EUROPEAN CUSTOMER SERVICE

EXHIBITS

		<u>Page</u>	
II	-1	The Remote Diagnostic Challenge	7
	-2	Remote Diagnostic Risks	9
	-3	Key User Factors	11
	-4	Key Vendor Objectives for Remote Diagnostics	13
	-5	Recommendations	15
III	-1	Remote Diagnostics--Vendor Objectives	18
	-2	Remote Diagnostic Service Coverage	22
	-3	Range of Equipment Covered By Remote Diagnostics	24
IV	-1	Expected Changes in the Distribution of Engineering Quality and Expertise	31
VI	-1	Hardware Remote Support--User Importance/Satisfaction Ratings	43
	-2	Software Remote Support--User Importance/Satisfaction Ratings	44
VII	-1	Usage of Remote Diagnostics	48



I INTRODUCTION

A. OBJECTIVES AND SCOPE

- This report, part of INPUT's 1986 Customer Service Programme - Europe, looks at the current status, techniques, and trends of remote diagnostics within European field service organisations.
- The issues addressed in this report include:
 - User views about the importance of remote diagnostics.
 - Vendor objectives and range of services offered.
 - Remote diagnostics organisational issues.
 - Pricing and promotion methods.
 - Conclusions and recommendations.



B. METHODOLOGY

- This report is based on 13 interviews conducted with major equipment vendors in Europe, three of which were conducted face-to-face, five by telephone, and the remainder by self-completion questionnaire.
 - On-site interviews lasted up to two hours, while telephone interviews averaged 45 minutes in length.
 - Vendor respondents were all senior customer service executives in leading companies, namely Nixdorf, Bull, ICL, Burroughs (France), GEISCO, Sperry, Tandem, NCR, Honeywell, Hewlett-Packard, Wang, Amdahl, and one other vendor who wished not to be identified.
- Of the 13 vendors interviewed, six started offering remote diagnostic services in the 1970s and the others in the 1980s. Two vendors have had remote diagnostic services since 1973, and the most recent entrant was a vendor who implemented the service in January 1986.
- User information included in this report was obtained from the results of INPUT's 1985 and 1986 Customer Service Survey in France, Italy, the U.K., and West Germany.
- A copy of the questionnaire used for the purpose of this report is provided in the Appendix.
- U.S. dollar conversion rate assumptions used in this report were: \$1 = 0.65 pounds sterling; \$1 = 6.99 French francs.



C. REPORT STRUCTURE

- The remaining chapters of this report are organised as follows:
 - Chapter II is an executive overview providing a summary of the contents of the report.
 - Chapter III describes the vendor objectives for offering remote diagnostics and looks at the types of services offered and the range of equipment supported.
 - Chapter IV examines the resources available at remote diagnostic centres with reference to personnel, facilities, and investment.
 - Chapter V analyses vendor approaches to the marketing of remote diagnostics.
 - Chapter VI describes user attitudes towards remote diagnostics.
 - Chapter VII provides conclusions and recommendations.





II EXECUTIVE SUMMARY

- This executive summary is designed in a presentation format in order to:
 - Help the busy reader quickly review key research findings.
 - Provide a ready-to-go executive presentation, complete with a script, to facilitate group communications.
- The key points of the entire report are summarised in Exhibits II-1 through II-5. On the right-hand page facing each exhibit is a script explaining its contents.



A. THE REMOTE DIAGNOSTIC CHALLENGE

- Increased competition from third-party maintenance (TPM) companies and increasing costs associated with field engineers' travel to customer sites has prompted hardware manufacturers to look into alternative methods of maintenance.
- Remote diagnostics is a cost-effective tool that has gained increasing popularity among vendors wishing to improve service whilst increasing customer service revenues and profits.
- The high costs related to setting up remote support centres have been an inhibiting factor for third-party maintenance companies to offer such a service.
- Vendors with remote diagnostic centre facilities, therefore, have a competitive advantage over TPMs.
- As an innovative service offering, remote diagnostics is an effective marketing tool for maintaining existing customers' loyalty and attracting new clients.



THE REMOTE DIAGNOSTIC CHALLENGE

- **Competition**
 - **Improved Customer Service**
 - **Service Innovation/Customer Loyalty**
-



B. REMOTE DIAGNOSTIC RISKS

- Data security is a concern to users of remote diagnostics about the potential of:
 - Vendors' unauthorised access to confidential data.
 - Loss and/or corruption of stored data.
- Mechanical lock-out procedures ensure that the risks of unauthorised access and data corruption are reduced to a minimum.
- Vendors should make the advantages of remote diagnostics more apparent to users who believe that personal contact will be lost without the field or on-site engineer's presence.
- Another potential risk factor in the general user acceptance of remote diagnostics is the high telecommunications and data transmission costs. This can in part be overcome with the provision of 'free phone' facilities.



REMOTE DIAGNOSTIC RISKS

- Security
 - Loss of Personal Contact
 - Telecomms Cost
-

1870

24th Annual Report

The following table shows the results of the operations of the company during the year ending 31st December 1870.

Particulars	1870	1869
Revenue	£100,000	£95,000
Expenses	£80,000	£75,000
Profit	£20,000	£20,000

The above results show that the company has maintained its position as a leading enterprise in the industry, and has achieved a steady increase in its revenue and profit over the past few years.

The following table shows the results of the operations of the company during the year ending 31st December 1871.

Particulars	1871	1870
Revenue	£110,000	£100,000
Expenses	£90,000	£80,000
Profit	£20,000	£20,000

The above results show that the company has continued to grow and has achieved a steady increase in its revenue and profit over the past few years.

C. KEY USER FACTORS

- Increased hardware reliability has also led to an increase in system availability. With the higher levels of system availability, user requirements for turnaround times have also increased.
- Users consider the most important elements of service to be:
 - Equipment reliability.
 - System availability.
 - Response time.
 - Repair time.
- Users with a positive attitude towards remote diagnostics consider the advantages of the service to include:
 - Higher system availability.
 - Time and cost savings.
 - A high level of service with geographic independence.
- Results of the user research indicate a willingness on the part of users to consider remote diagnostics as an alternative method of maintenance.



KEY USER FACTORS

- **Importance of Service Quality**

 - **User Benefits**
 - **System Availability**
 - **Time/Cost Savings**
 - **Geographic Independence**
-



D. KEY VENDOR OBJECTIVES FOR REMOTE DIAGNOSTICS

- The principal vendor objectives in offering remote diagnostic services are:
 - Customer satisfaction.
 - Reduced cost of maintenance.
 - Improved turnaround times.
 - Improved customer service profits and efficiency.
- Remote diagnostic services are used for the detection of both hardware and software faults. In the case of software, most vendors have the resources to offer the service on systems as well as applications software.
- Remote diagnostics can considerably improve average response and repair times. One vendor, for example, can successfully handle 40% of all calls received by the support centre without the involvement of a field or on-site engineer.
- Currently, remote support services are still restricted by some factors, namely:
 - Speed of data communications equipment.
 - Lack of memory space on user machine for 'total system dumps'.
 - Range of products supported.



**KEY VENDOR OBJECTIVES
(For Remote Diagnostics)**

- **Customer Satisfaction**
 - **Fast Response/Repair**
 - **Improved Margins**
-



E. RECOMMENDATIONS

- Marketing the benefits of remote diagnostics is an effective means of increasing usage of the service and achieving the objectives of offering an improved service.
- Pricing is an important marketing tool used by vendors. Bundling remote diagnostics services with the standard maintenance contract and the use of discounts are two of the vendor approaches to pricing.
- Users are, in principle, not opposed to remote diagnostics. User awareness to the benefits of the service should be increased, in particular with regards to higher system availability and shorter response time.
- With the increasing use of remote diagnostics, vendors should be aware of the need to maintain personal contact with users.
- Vendors must continue to implement new technological solutions to customer services. The pursuit of new techniques such as the use of 'expert systems' can lead to the gain of a competitive advantage.

1. The first part of the document discusses the importance of maintaining accurate records of all transactions.

2. It is essential to ensure that all entries are supported by proper documentation and receipts.

3. Regular audits should be conducted to verify the accuracy of the records and identify any discrepancies.

4. The second part of the document outlines the procedures for handling disputes and resolving conflicts.

5. It is important to establish clear communication channels and protocols for addressing any issues that arise.

6. The document also provides guidance on how to maintain confidentiality and protect sensitive information.

7. Finally, it emphasizes the need for ongoing training and education for all staff involved in the process.

8. The document concludes with a summary of the key points and a call to action for all stakeholders.

RECOMMENDATIONS

- **Market the Service**
 - **Bundle Services**
 - **Increase User Awareness - - Users Not Against Remote Diagnostics**
 - **Keep Personal Contact**
 - **Implement New Technologies to Gain Competitive Advantage**
-

1870

Received of the Treasurer of the
County of ... the sum of ...
for ...

Witness my hand and seal this ... day of ...
1870



III **VENDOR PERSPECTIVES**

- A key challenge for customer services management is labour productivity, and one of the major potential contributors towards this is the use of automation for diagnostics and, in particular, the use of remote diagnostic techniques.
- This chapter analyses the objectives of vendors for offering remote diagnostic services and looks at the type of services covered and the range of equipment supported.

A. **VENDOR OBJECTIVES**

- In approaching the use of remote diagnostic techniques, vendors are subject to both market-driven as well as cost-driven pressures.
- Exhibit III-1 lists the most frequently mentioned objectives put forward by respondents to this survey for remote diagnostics.
- Improved response time and overall customer satisfaction were the two user-oriented factors mentioned most frequently.
- User research conducted by INPUT indicates that response time is generally ranked by users in third place, behind equipment and system reliability, in an overall assessment of the importance of various elements of customer service.



EXHIBIT III-1

REMOTE DIAGNOSTICS - VENDOR OBJECTIVES

OBJECTIVES	NUMBER OF* MENTIONS
Improved Response Time	5
Customer Satisfaction	5
Reduced Cost of Maintenance	5
Better Use of Engineers' Time	3
Higher Service Efficiency	2
Improved Repair Time	2
Increased Customer Service Profit	2

* Total exceeds vendor sample due to multiple responses.

- Vendors viewed improved response time as an important benefit to users. Remote diagnostics allows the possibility of an immediate response to a problem without waiting for an engineer.

- In general, existing response times for service are relatively high. INPUT's 1985 customer service survey in Europe indicated response times of over three to five hours respectively for large and small systems. Clearly, remote diagnostics can contribute to their reduction.

- Vendors viewed overall customer satisfaction as being met through a number of other service factors:
 - Increased system availability.
 - Higher levels of service.
 - Increased incidence of first-time repair.
 - Increased customer confidence in hardware reliability.
 - More effective phone-in service.

- High levels of system availability are generally ranked of second highest importance as a service factor by users after equipment reliability. Remote diagnostics can clearly contribute to reducing service turnaround times.

- Remote diagnostics can also contribute to higher levels of service through the provision of direct access for customers to highly qualified specialists at the remote support centre.

- Reduced cost of maintenance was mentioned as frequently as customer satisfaction, and improved response time as a key objective of using remote diagnostics.



- An issue of concern to all vendor organisations has always been the high costs associated with the engineers' travel to and from customer sites.
 - With remote diagnostics, engineers do not necessarily have to be dispatched to a customer site. One vendor, for example, pointed out that 40% of calls received by the remote diagnostics centre were resolved without the intervention of a field engineer.
- Reduced costs, as well as the other most frequently mentioned objectives such as better use of the engineers' time and improved repair time, can all be clearly identified as cost/efficiency factors.
- All of these objectives are concerned with either being able to increase profit margins on service and thus make a greater contribution to the bottom line, or with the possibility of offering lower prices to improve competitiveness.
- Both of these goals are important considerations in an increasingly competitive market environment where retaining existing as well as attracting new customers are of major importance.
- The overall service provided to users is also aided by improved service management. The close monitoring of maintenance activities that is possible using the remote diagnostic database of error logs and the improved management reporting capabilities enhance this capability.
- Some other objectives mentioned by vendors for the use of remote diagnostic techniques, in addition to those listed in Exhibit III-1, were:
 - The need to remain competitive in the market.
 - The elimination of site visits for fault diagnosis.



- Reducing the number of repeat calls.
 - Reduction of engineers' time on-site.
 - Fast response regardless of the customers' geographic location.
- These objectives reinforce the observation that vendor motivation towards the adoption of remote diagnostic techniques is strongly influenced by cost factors.

B. SERVICE COVERAGE

- The service coverage of remote diagnostic methods used by the sample of vendors interviewed by INPUT is summarised in Exhibit III-2.
- One vendor offered the service only on hardware; the remaining 11 offered software remote diagnostic services. Of these:
 - Nine offer remote diagnostics both for applications and systems software as well as hardware, although one vendor does so on one product range only.
 - Two have remote diagnostics for systems software only.
- One vendor uses its remote diagnostics centre for the detection of hardware faults only, as it has a separate software support organisation.
- Another noted that although they have the technical ability to offer remote diagnostics on applications software, they are not currently doing so.



EXHIBIT III-2

REMOTE DIAGNOSTIC SERVICE COVERAGE

Hardware			
Systems Software			
Applications Software			
Number of Vendors	9 Vendors	2	1



- Although the majority of vendors do offer remote diagnostics on software, one vendor noted that there are limitations because of system dump procedures and lack of memory space available on the customers' machines.
- Another practical limitation mentioned by one other vendor was the low speed of modems used, in this case a maximum of 2,400 baud.
- Exhibit III-3 illustrates the range of equipment covered by remote diagnostic vendors. Only one vendor reported the use of remote diagnostic facilities for all user product categories from large systems to personal computers.
- Three vendors are in the process of expanding their remote diagnostic services to include a wider range of equipment.
- Two of the vendors interviewed considered that remote diagnostics was not worthwhile for systems costing less than \$40,000 and \$75,000, respectively.
- Other vendors did not see a relation between system price and the value of the service, but pointed out that unless the equipment has the correct built-in channels for remote diagnostics, it is impossible to offer the service regardless of the value of the system.

C. REMOTE DIAGNOSTIC APPROACHES

- This section provides a brief summary of the remote diagnostic services provided by three vendors in Europe:
 - Amdahl.
 - NCR.
 - Digital.

1870

...

...

...

...

...

...

...

...

...

...

EXHIBIT III-3

RANGE OF EQUIPMENT COVERED BY REMOTE DIAGNOSTICS

PRODUCT CATEGORY	NUMBER OF MENTIONS*	
	AT PRESENT	PLANNED IN THE FUTURE
Large Systems	5	-
Small Systems	6	1
Terminals	2	-
Workstations	2	1
Personal Computers	1	2

* Total exceeds vendor sample due to multiple responses.



I. Amdahl

- Amdahl, the pioneer of remote diagnostic support, introduced its service in 1975. Today, part of every Amdahl computer is a console processor designed primarily as a service tool.
- This console processor monitors over 17,000 latches during normal use and is also a remote diagnostic aid. This feature allows each Amdahl system to be remotely serviced at an Amdahl Diagnostic Assistance Centre (AMDAC).
- The AMDAC service links to the system via a telephone line or satellite network to one of three AMDAC locations in the U.S. and Europe.
- Each location is manned with both software and hardware experts who monitor customers' systems and provide local field engineers with recovery and diagnostic assistance. All the AMDAC facilities are available 24 hours a day, 7 days per week providing round-the-clock support.
- In 1982, Amdahl started 12 additional local support centres in the majority of European markets where it operates. These centres operate in a similar manner to the main AMDAC centres, but also provide a service to the field support staff in their local language.
- The aim of Amdahl's remote diagnostic service is to allow high level technical specialists to take an active role in helping field staff diagnose and solve problems.
- In 1981, the AMDAC service in Columbia, U.S.A., was expanded to provide both hardware and software support directly to the customer. This facility was extended two years ago to France and the U.K.
- Amdahl's direct support service resolves more than one-third of calls received without the on-site assistance of local field engineers.



2. NCR

- NCR first made remote diagnostic services available to its U.K. clients in January 1986. The Remote Product Centre is responsible for the organisational set-up of the service as well as the development of NCR's Expert System for Preventive Maintenance (ESPM) software tool.
- The ESPM is being designed to act as a system health check device, monitoring component functions of user equipment.
- The Remote Product Centre is equipped with a mainframe and two connected lines, capable of serving 200 systems. In order to link the centre's processor, users need to have modems, cables, and switches. These are sold at a one-off cost with no additional charges for the service itself.
- For the future, NCR will include the cost of the communications equipment in the price of the new systems sold.
- NCR's primary objectives for offering remote support services were customer satisfaction in terms of improved service turnaround times and better use of the engineers' time in terms of customer service efficiency.
- NCR does not anticipate security to be a major obstacle given that the service is a highly visible operation to the user who has complete control over all diagnostic procedures.
- NCR's 27 service centres around the U.K. act as the initial point of contact with customers. The service centre staff makes the decision as to whether to dispatch an engineer directly or transfer the call to the remote support centre.

The first part of the document discusses the importance of maintaining accurate records of all transactions. It emphasizes that proper record-keeping is essential for the integrity of the financial system and for the ability to detect and prevent fraud.

It is noted that the system should be designed to ensure that all data is entered accurately and that any discrepancies are identified and corrected promptly. This requires a high level of attention to detail and a commitment to transparency.

The document also highlights the need for regular audits and reviews to ensure that the system is operating effectively and that all procedures are being followed correctly. This helps to identify any weaknesses or areas for improvement and ensures that the system remains up-to-date and secure.

In conclusion, the document stresses that a robust and reliable financial system is crucial for the success of any organization. By implementing the principles outlined here, organizations can ensure that their financial data is accurate, secure, and accessible to all who need it.

The following sections provide a detailed overview of the system's architecture and the specific components that make up the financial management framework. This includes a description of the data flow, the roles of different departments, and the integration of various software tools.

It is important to note that the system is designed to be flexible and scalable, allowing it to adapt to changing requirements and to support a growing number of users and transactions. This ensures that the system remains a valuable asset for the organization in the long term.

The document concludes by reiterating the commitment to excellence in financial management and the ongoing effort to improve the system and the processes it supports. It encourages all staff to take ownership of their roles and to work together to ensure the highest standards of accuracy and efficiency.

- The same pattern is being repeated throughout NCR's European offices with several centres already in existence. NCR will therefore be operating a remote support centre in each European country market in the near future.
- The first range of equipment to be covered by remote support services is the NCR 9300 series, with plans to expand the facility to include NCR 9400 and 9500 series in the first year of remote services operation.
- Remote software support makes use of the same communications facilities.

3. DIGITAL EQUIPMENT CORPORATION

- In Europe, Digital's Remote Computerised Service provides maintenance services to its PDP-11 and VAX-11 users from two Customer Service Centres, one in France and one in the U.K.
- DEC's objective in offering remote diagnostic services is to increase user systems availability by means of fast response and repair times.
- The company is aiming at reducing system downtime by 35% with the use of remote diagnostics.
- The service centres operate 24 hours a day, 7 days per week. Diagnostic tests carried out from the customer service centres can be initiated within 10 minutes of receiving a call.
- As with other vendors, DEC customers have full control over the diagnostic procedures with the facility to disconnect the link at any stage. Data security is therefore not considered a problem.
- Users of DEC's remote diagnostic service are required to have the necessary telecommunications equipment and must also have an on-site maintenance agreement with DEC.



- DEC's current remote support service is being expanded to include software remote support facilities. Initially, these will be remote software updates installation, software fault isolation, and general remote software assistance.
- In addition, all future large and small system ranges will be developed with built-in remote diagnostic capability.
- The DEC remote support service also includes a remote monitoring programme designed to locate potential faults before they occur. Remote Hardware Monitoring (RHM) is run at a prearranged time with the customer and does not interfere with the day-to-day activities of the customer.
- Results obtained from the RHM service are analysed by specialised engineers. RHM is at present only available to DEC VAX system users. The service is bundled with the DEC Field Service Contract.



IV REMOTE DIAGNOSTIC CENTRE RESOURCES

- The introduction of remote diagnostic techniques has a number of implications for equipment suppliers. These are analysed in this chapter under the headings:
 - Personnel.
 - Facilities.
 - Investment.

A. REMOTE DIAGNOSTIC CENTRE PERSONNEL

- As equipment vendors move towards the development of remote diagnostic techniques, they must address the organisational and staffing implications.
- Fundamentally, these relate to the need to create remote diagnostic centres where diagnostic expertise can be concentrated.
- There is typically a need for a number of different types of specialists to be based at the remote diagnostic centre. Vendors mentioned:
 - Specialist hardware and software engineers.
 - Dedicated remote diagnostic support engineers.

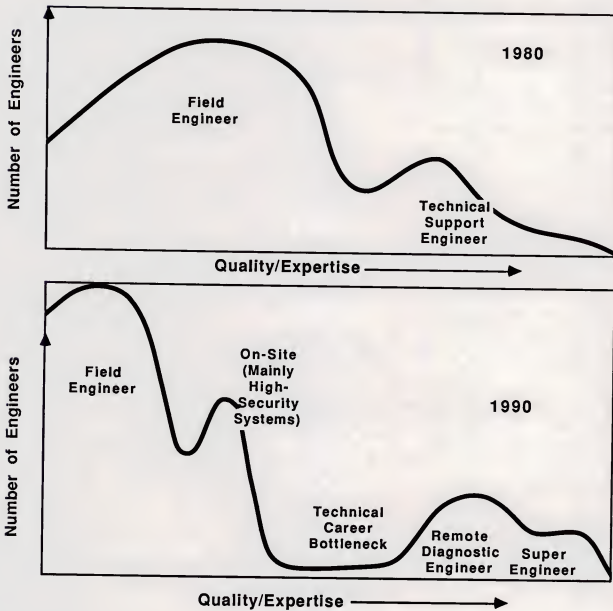


- Specialists on particular types of systems.
 - Data communications specialists.
- Thus, a continuing shift in the quality and expertise of customer service engineers can be expected, and this is illustrated schematically in Exhibit IV-1.
 - This schematic shows the perceived polarisation developing between the so-called 'super' engineer on the one hand and the much lower skilled field engineer on the other.
 - INPUT estimates that whilst today something like 86% of customer services personnel are employed in the field engineer role, as opposed to central support or other functions, this proportion is likely to fall to around two-thirds within the next three years.
 - The introduction of new technology in general, including the use of remote diagnostic methods, is the driving force behind the development of a field engineer who is much more concerned with customer interface responsibilities.
 - The changing role of the support engineer is more fully discussed in INPUT's 1986 report The Role of the Engineer Outside of Maintenance.
 - These changes will continue to affect the development of the customer service organisation structure. INPUT observes that the remote diagnostic centres, as well as conducting their prime service function, also provide an organisational focus for other customer services personnel.
 - For example, vendors reported that other personnel based at the remote diagnostics centre included the following types:



EXHIBIT IV-1

EXPECTED CHANGES IN THE DISTRIBUTION OF
ENGINEERING QUALITY AND EXPERTISE





- Product support group.
- National support group.
- Development manager.
- District manager.
- Consequently, staffing levels at remote diagnostic centres can reach relatively high levels. Some instances provided by vendors were:
 - A centre with 66 engineers.
 - A centre with 49 engineers.
 - A centre with 22 permanent staff, including the support centre supervisor and specialist hardware and software engineers.
 - A centre with 5 permanent staff, including the development manager, remote services manager, two engineers, and one programmer. (This centre was, however, in an early stage of development, having been set up in January 1986.)

B. REMOTE DIAGNOSTIC FACILITIES

I. REMOTE DIAGNOSTIC CENTRES

- The adoption of remote diagnostic methods involves a considerable commitment in terms of the hardware and software facilities that must be provided.



- For example, Digital's marketing literature emphasises the commitment in terms not only of the office premises at which their centres are based (Basingstoke in the U.K. and Valbonne in France), but of the types and variety of equipment and the software systems that are used.
- Equipment located at remote diagnostic centres encompasses the full range from mainframes through small systems, personal computer terminals, communications, and specialist test equipment.
- The commitment to software development for remote diagnostics can also be considerable, with the need to develop specialised software diagnostic tools and other proprietary software support techniques. The investment considerations are discussed separately in Section C below.
- All the vendors interviewed by INPUT developed their own diagnostic software tools used as databases for problem tracking and access to information on customer sites detailing clients' system configuration and service history.
- Another important equipment consideration is that of voice communication between the remote diagnostic centre and the customer services engineer in the field.
- This is clearly a vital link in the overall commitment to customer service, and increasingly vendors are seeking to utilise new technology to aid this task. For example, vendors report using such equipment as:
 - Cellular radio car phones.
 - Radiopaging and beepers.
- One vendor interviewed by INPUT is equipping customer service engineers with lap-top personal computers in order that they can receive electronic mail messages.



- In some cases the remote diagnostic centres do not have direct contact with engineers in the field. Two vendors reported to INPUT that local service centres were used as intermediaries in the support chain and were responsible for dispatching an engineer to the customers' site.

2. USER REQUIREMENTS

- Another important consideration is the equipment requirements of the users' site in order to participate in remote diagnosis.
- The main requirement is naturally a modem to provide the essential communications link.
- Vendors reported that modem speeds are currently a restrictive element of the service, typical speeds being used varying from 1,200 to 2,400 bauds.
- One vendor did, however, provide users with a 9,200 baud link.
- The only other technical requirement is that of direct line access through the public switched network for initiating the service call.
- One vendor quoted a figure of \$800 as the necessary capital cost of connecting the customer to the remote diagnostic centre.

3. DATA SECURITY

- Vendors do not, in general, consider data security as being a problem and have overcome initial user resistance by:
 - Giving users control over remote diagnostic procedures, allowing them to disconnect the operation at any time.



- Providing procedures that ensure all user data are either removed or write-protected during the diagnostic test.
 - Making the diagnostic procedures visible to the user using typed messages on the user terminal screens.
 - Requiring some degree of user participation requesting permission to continue the diagnostic test.
- However, the management of high security sites remain strongly opposed to remote diagnostics and are considered unlikely to change their view.
 - One further aspect of data security concerns data privacy legislation. It is interesting to note that in the U.K. vendors report that the Data Protection Act that came into effect in April 1986 has had no impact on remote diagnostic methods, although all vendors have registered under the Act.
 - One vendor's attitude towards the Data Protection Act was 'Let's wait for the first test case and see what happens!'

C. VENDOR INVESTMENT CONSIDERATIONS

- A major consideration for vendors implementing or extending their remote diagnostic capabilities is the level of investment that must be committed.
- The total investment can be considerable. Vendors interviewed by INPUT quoted the following levels of financial investment:
 - Two vendors estimated the cost of their initial investment in remote diagnostics to be well above \$1 million.



- One vendor had invested \$5.3 million in the development of diagnostic tools alone. This vendor is still expanding the service which will in the future include all purely electronic equipment components.
- Another vendor did not have to set-up a special remote diagnostics centre as it merely expanded its service desk.
- Two other vendors quoted costs of remote diagnostic centres as:
 - . \$45,000 cost of initial development.
 - . \$1.4 million per annum, including \$140,000 for telephone charges.
- Levels of investment are of considerable concern to equipment vendors as they must be offset by equivalent cost savings in providing conventional support for the overall exercise to represent a lowering of costs.
- As was pointed out in Chapter III, a key motivating factor for vendors in adopting remote diagnostics was to reduce the overall cost of providing maintenance and to thus increase customer service profit.
- Vendors must, therefore, pay considerable attention to not only the overall presentation of the provision of effective support services, but also to balance costs and revenues to ensure meeting the necessary profit goals.

V **MARKETING REMOTE DIAGNOSTICS**

A. **PRICING APPROACHES**

- Pricing can be considered as one of the most important marketing considerations. This is particularly important for remote diagnostic services since it is transparent to users that a key vendor motivation for the introduction of remote diagnostics is a reduction in maintenance costs.
- In any event, the substantial savings that vendors can make in the reduction of field engineer time encourage attractive pricing schemes designed to increase usage.
- Vendors' approach to the pricing of remote diagnostics varies from those offering the service as part of their standard maintenance agreements to those giving users discounts or charging premiums.
- Ten vendors interviewed by INPUT have bundled their remote diagnostics service as part of the standard maintenance contracts. Of these:
 - Five vendors leave the use of the service as optional.
 - Two vendors encourage users by offering discounts.



- Two vendors charge those customers who decline to use the service a premium.
- Those vendors who have an unbundled approach to remote diagnostics pricing are in the minority. Two vendors contacted by INPUT had adopted this approach.
 - One of these vendors gives users of remote diagnostics a discount of \$200 per month. Customers purchasing a new system and declining to use the service, however, will be charged a premium of 30% over the base maintenance price.
 - The other vendor encourages the use of remote diagnostics by giving discounts to all customers who use the service.
- The discounts given and premiums charged differ from one vendor to another and may depend on the type of equipment installed.
- The schedule of discounts given by the vendors interviewed was as follows:
 - Up to 28%, depending on the type of equipment.
 - 5% on a particular range of equipment.
 - \$200 discount on the monthly maintenance charges.
- Premiums charged to users for non-use of remote diagnostics varied amongst those vendors interviewed by INPUT from between 5% and 30%. For example:
 - One vendor charged 30% on all new systems.
 - Another charged 5-10% on some systems.



- Yet another charged 30% if remote diagnostics was available and not used.

B. MARKETING METHODS

- Customer services management have had to become much more concerned about the marketing of their services as the operation has moved from a cost centre to a profit centre approach.
- User perception that the push towards usage of remote diagnostic techniques was motivated more for cost-driven than market demand factors, as discussed in Chapter III, has made it necessary to aggressively market this particular type of service.
- Consequently, consideration and selection of appropriate and effective marketing methods for remote diagnostics is an important concern for customer services management.
- Not all vendor representatives interviewed by INPUT agreed with this view. One particular vendor put forward the view that there is no need to actively promote remote diagnostic services as they are simply an option within the customer's maintenance contract.
- However, this was a minority view. Most vendors were active in the promotion of their remote diagnostic services. Methods mentioned by vendors contacted by INPUT included:
 - Organising customer visits to the remote diagnostic centre to show the facilities and explain the advantages offered by the service.



- Vendor presentations at user group meetings to communicate the benefits of the remote diagnostics approach.
 - Using pricing incentives (as described in Section A above).
 - Including marketing material on remote diagnostics in product brochures.
 - Producing specific remote diagnostic brochures.
- A promotional method used by one vendor was the provision of modems to all new customers for a period of one year. After the 12 month trial, the vendor found that all users agreed to pay for the modems and continue using the service. This, of course, is the classic 'puppy dog' approach.
 - A problem faced by one vendor resulted from the lack of communication between activities of the sales and service departments. Although the company brochures advertise the availability and benefits of remote diagnostics, because the sales personnel do not promote it to potential customers, there are currently no users of the service.
 - This instances the need for internal marketing of the benefits of remote diagnostics both to the company and to the user. In the latter case, a better understanding of user benefits by sales personnel can lead to increased sales.
 - Customer services management may have to also consider the introduction of special internal promotion and incentive schemes to motivate further interest and drive behind such a programme.
 - A marketing tactic employed by one vendor was to make the use of remote diagnostics a condition of higher levels of service. This is an interesting approach as it associates remote diagnostics with high service levels, thus enhancing customer appeal.



VI USER ATTITUDES TOWARDS REMOTE DIAGNOSTICS

- This chapter describes the results of INPUT's user research, examining user attitudes towards:
 - Remote diagnostics compared against a number of other service issues.
 - User satisfaction and importance ratings for remote diagnostics.
 - User comments about remote diagnostics.

A. RELATIVE IMPORTANCE OF REMOTE DIAGNOSTICS

- One of the key issues for service managers is the importance of the various elements of service in relation to the overall service.
- Results of INPUT's user research revealed that the majority of users rank these various factors of service in the following order of importance:
 - Equipment reliability.
 - System availability.



- Response time.
 - Repair time.
 - Price.
 - Software maintenance.
 - Preventive maintenance.
 - Up-time guarantee.
 - Engineer continuity.
 - Remote diagnostics.
 - Choice of service.
- Remote diagnostics can offer users shorter response and repair times, thus increasing system availability. If these benefits were made more apparent to users, remote diagnostics would probably be given a higher importance ranking.

B. USER SATISFACTION RATINGS

- Exhibits VI-1 and VI-2 represent comparisons of European users' mean ratings of the importance and satisfaction with hardware and software remote support. The ratings are on a scale of 1 to 10, 1 being low and 10 being high.
- Exhibit VI-1 shows that users in West Germany appear to rate the importance of hardware remote support higher than other European users—9.2 against 8.0 in France, 7.0 in Italy, and 7.5 in the U.K.



EXHIBIT VI-1

HARDWARE REMOTE SUPPORT
USER IMPORTANCE/SATISFACTION RATINGS

COUNTRY	SAMPLE SIZE	MEAN RATING (1-10)		STANDARD ERROR
		Importance	Satisfaction	
A. France	37	8.0	7.9	0.49
B. Italy	95	7.0	6.4	0.26
C. United Kingdom	120	7.5	7.3	0.22
D. West Germany	154	9.2	8.3	0.11

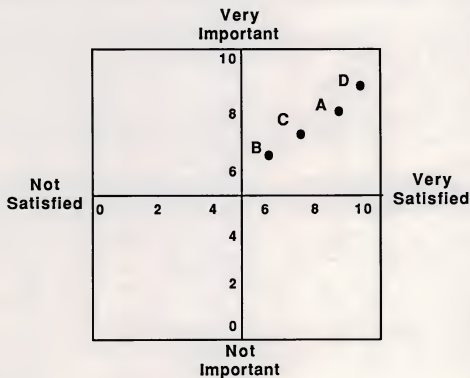
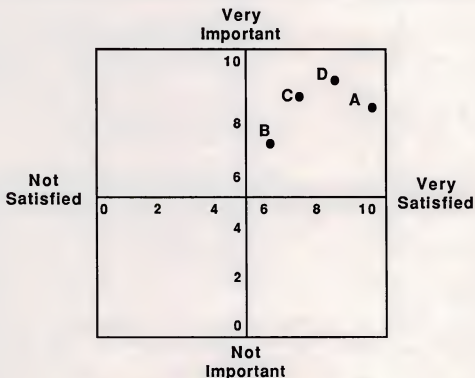




EXHIBIT VI-2

SOFTWARE REMOTE SUPPORT
USER IMPORTANCE/SATISFACTION RATINGS

COUNTRY	SAMPLE SIZE	MEAN RATING (1-10)		STANDARD ERROR
		Importance	Satisfaction	
A. France	31	8.6	8.1	0.48
B. Italy	100	8.0	6.0	0.21
C. United Kingdom	105	8.3	6.9	0.22
D. West Germany	148	9.0	7.6	0.15





- This exhibit also illustrates that the gap between user satisfaction and importance ratings is at a minimum in France and the U.K.
- As can be noted from Exhibit VI-2, French users are more satisfied with software remote support, according to the importance they give to this service, than other European users.
- Exhibit VI-2 also illustrates that as with hardware remote support, German users view software remote support as being more important than users in France, Italy, and the U.K.
- In general, users rate the importance of remote diagnostics higher than their satisfaction with the service. Vendors should therefore address this issue in order to improve the quality of the remote diagnostic services they offer.

C. USER COMMENTS

- Users who have a positive attitude towards remote diagnostics believe the advantages of the service provides them with:
 - Higher levels of system availability reflected by shorter turnaround times.
 - Immediate attention from the vendor regardless of geographic location.
 - Time and cost savings.
- On the other hand, users who are not in favour of remote diagnostics services give the following reasons for their attitude:



- Preference for on-site help.
- High costs of data transmission.
- Finding the telephone too impersonal.
- Doubts on the degree of usefulness of the service, i.e., they end up with an engineer anyway.



VII CONCLUSIONS AND RECOMMENDATIONS

A. CONCLUSIONS

- The user ratings described in Chapter VI indicate a high level of interest in remote diagnostics. User priorities for service, however, place remote diagnostics behind other elements such as system availability and response time.
- With increasing user awareness of the benefits, INPUT believes that users will attach a higher degree of priority to remote diagnostics in the future.
- According to vendor data, as shown in Exhibit VII-1, five vendors have more than 60% of their customer base currently using remote diagnostics. Five other vendors reported that between 5% and 60% of their customers are currently using remote diagnostics.
- Vendors reported that the lowest usage in terms of customer base was amongst high security sites.
- Where usage of remote diagnostics is low, this can to some extent be attributed to:
 - Old equipment or equipment on which remote diagnostics is not offered.

1. The first part of the document discusses the importance of maintaining accurate records of all transactions and activities. It emphasizes that this is essential for ensuring transparency and accountability in the organization's operations.

2. The second part of the document outlines the various methods and tools used to collect and analyze data. It highlights the need for consistent and reliable data collection processes to support effective decision-making.

3. The third part of the document focuses on the role of technology in data management and analysis. It discusses how modern software solutions can streamline data collection, storage, and reporting, thereby improving efficiency and accuracy.

4. The fourth part of the document addresses the challenges associated with data management, such as data quality, security, and privacy. It provides strategies to mitigate these risks and ensure that data is used responsibly and ethically.

5. The final part of the document concludes by summarizing the key findings and recommendations. It stresses the importance of ongoing monitoring and evaluation to ensure that data management practices remain effective and aligned with the organization's goals.

EXHIBIT VII-1

USAGE OF REMOTE DIAGNOSTICS

PERCENT CUSTOMERS	NUMBER OF* VENDORS
0-20	3
21-40	1
41-60	1
61-80	2
81-100	3

* Vendor Sample: 13



- Lack of user awareness of the service.
- Vendors see the usage of remote diagnostics increasing in the next five years reaching 90-100% of their customer base.
- The two market sectors where vendors see continuing resistance to remote diagnostics are banking and government clients.
- Vendors' optimism on the future use of remote diagnostics is based on two factors:
 - More new equipment which will have the built-in capabilities for remote diagnostics.
 - Users becoming more concerned with an increased requirement for system availability, encouraging a greater acceptance of alternative methods of maintenance such as remote diagnostics.
- It is, therefore, important that vendors should promote remote diagnostics as a major element of service. The benefits that vendors can derive from promoting the service include:
 - Using remote diagnostics in order to gain competitive advantage over third-party maintenance companies.
 - Improved customer service with the higher quality of service offered.
 - Maintenance and encouragement of customer loyalty through innovative service offerings.
 - Reduced service costs with lower personnel overheads.



- Factors that have driven the user towards the acceptance and use of remote diagnostics are:
 - The ability to receive higher levels of system availability achieved by lower response and repair times.
 - Cost savings related to discounts obtained for using the service or, on the other hand, premiums charged for non-use.
- Although there are considerable advantages in using and offering remote diagnostics, certain market inhibitors still remain:
 - Security--vendors have a difficult task of convincing all users that remote diagnostics will not affect their data integrity.
 - Personal contact--established working relationships between users and field engineers are hard to break. Added to this is the psychological element of the telephone being impersonal and the negative connotations of calling a service 'remote' diagnostics.
 - Cost of telecommunications and low speed of data transmission--more vendors will have to consider the possibilities of giving users 'free phone' or similar facilities as a way to promote use of the service.
 - Lack of awareness--more users have to be informed of alternative maintenance methods.
- The market for service and maintenance is moving towards lower user thresholds for fault tolerance. To this end, vendors are developing the use of technological aids like remote diagnostics techniques and will be introducing new methods such as expert system support.



B. RECOMMENDATIONS

- A number of recommendations for consideration and action by vendors emerge from this study.
 - Increase the range of hardware and software systems supported by remote diagnostics in order to attract the interest of the largest possible user base, in particular those with network installations.
 - Increase user awareness of the availability and advantage of remote diagnostics through active marketing of the service.
 - Stress user benefits; for example, the quality of the service, increased system availability, etc., in marketing literature.
 - Sell the idea of remote diagnostics actively within the organisation to the sales force and other personnel with a high user contact profile.
 - Use public relations techniques to allay users' fears concerning remote diagnostics in respect to privacy and security issues.
- Vendors can also consider market segmentation techniques in order to identify those users most susceptible to the use of remote diagnostics. Whilst high security sites are noted for resistance to remote diagnostics, customers with very high needs and dependence on system availability would represent an area for targeting the remote diagnostics sales message, for example to:
 - Customers offering 24-hour availability services like hotels, airlines, etc.
 - User systems with a high profile to their own customers, e.g., retailers using EFT-POS systems.



- Vendors will need to ensure that the marketing of remote diagnostics emphasises and presses home the message of a high level and high quality of service.
- Vendors must continue to develop innovative pricing techniques to underline the competitive advantage of 'lowest cost maintainer' wherever possible.
- The declining price of hardware has exerted considerable pressure on the traditional method of pricing maintenance as a percentage of the hardware cost. One pricing option would be the development of variable cost-based tariffs for maintenance.
- Other pricing approaches discussed in this report are:
 - Bundling remote diagnostics into the standard maintenance contract, giving vendors a competitive edge over third-party maintenance companies.
 - The use of discounts and 'non-user' premiums as effective ways of encouraging the use of remote diagnostics.
 - Introducing 'puppy dog' type marketing techniques to promote increased acceptance of remote diagnostics.
- Vendors must also be careful to fully consider the 'personal contact' aspect of the field maintenance engineer. As more and more services are provided remotely, and apparently automatically, so increasing emphasis must be paid to maintaining customer contact and good will in other ways.
- Overall, vendors must continue to evaluate and implement new technological solutions to customer service requirements. Those vendors who aggressively pursue new techniques such as the use of 'expert systems' can reap competitive advantage rewards in the field.



QUESTIONNAIRE

REMOTE DIAGNOSTICS IN EUROPEAN CUSTOMER SERVICE

Name _____

Title _____

Company _____

Address _____

Telephone _____

Appointment Time for Interview:

Date: _____

Time: _____

Telephone Interview ____ Face to Face Interview ____

STANDARD OPERATING PROCEDURES

FOR THE

OPERATION OF THE

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

...

1. How long have you been offering Remote Diagnostics service to your clients?

2a. How many diagnosis centres does your company have?

2b. Where are these centres located?

3. How many users can be handled from each centre?

4. Is the service limited to a certain range of equipment?

Yes ____ No ____

If YES: What is the product range on which the service is offered?

5. Is there a value of a system below which Remote Diagnostics is not worthwhile?

Yes ____ No ____

If YES:

What is this value? _____

6. Is the service used both for hardware and software faults?

Yes ____ No ____

Hardware Only ____
Software Only ____

In the case of software:

Is the service offered both for Applications and Systems Software?

Yes ____ Applications Software Only ____ Systems Software Only ____



REMOTE DIAGNOSTICS CENTRE ORGANISATION

7. What is available at the centre? (In terms of equipment)

8. What does the user need to have?

9. Is there a charge to the user for the necessary Remote Diagnostics tools?

Yes _____ No _____

If YES: What does this charge consist of?

10. Who is based at the Remote Diagnostics centre?

11. What is the link between the Remote Diagnostics centre and the Engineer?



12. How does the service operate? Is there a "freephone" number, is it a direct machine link, etc.?

PRICING

13. What is the charge to the customer using Remote Diagnostics? Is it part of a special/standard maintenance contract? Is it an optional service?

14. Do you encourage clients to use this service by offering them a discount on their maintenance? If so, how much is this discount?

15. What, if any, have the effects of this service been on your pricing strategy? Has this service had any effect on Customer Service profits?



16. What were your company's Customer Service objectives for providing Remote Diagnostics to the users?

17. What, in your opinion, is the net result of Remote Diagnostics to the user?

18. What is the net result of Remote Diagnostics to you? (i.e. fewer parts need to be carried by the engineer, better use of the engineers' time, etc.)



19. What was the cost of your initial investment for providing this service?

20. How do you perceive user resistance to Remote Diagnostics (i.e. users cannot see what is happening, they prefer to speak to the engineer, etc.)

21. What promotional methods are you using to overcome user resistance?

22. What have the implications of the Data Protection Act been? What means do you use to convince users that data integrity is maintained?

23. What percentage of your customer base is currently using Remote Diagnostics?

_____ %

What, in your opinion, will this percentage be in five years' time?

_____ %

