

INPUT

RESEARCH REPORT

Impact of NCs on Selection of Internet/Intranet Platforms Europe

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Perchstätten 16
D-35428 Langgöns
Germany
Tel: +49 (0) 6403 911420
Fax: +49 (0) 6403 911413

London

Cornwall House
55-77 High Street
Slough, Berkshire
SL1 1DZ UK
Tel: +44 (0) 1753 530444
Fax: +44 (0) 1753 577311

New York

400 Frank W. Burr Blvd.
Teaneck, NJ 07666
U.S.A.
Tel: +1 (201) 801-0050
Fax: +1 (201) 801-0441

Paris

24, avenue du Recteur
Poincaré
75016 Paris
France
Tel: +33 (1) 46 47 65 65
Fax: +33 (1) 46 47 69 50

San Francisco

1881 Landings Drive
Mountain View
CA 94043-0848
U.S.A.
Tel: +1 (650) 961-3900
Fax: +1 (650) 961-3966

Tokyo

Saida Building, 4-6,
Kanda Sakuma-cho
Chiyoda-ku, Tokyo 101
Japan
Tel: +81 3 3864-0531
Fax: +81 3 3864-4114

Washington, D.C.

1921 Gallows Road
Suite 250
Vienna, VA 22182 3900
U.S.A.
Tel: +1 (703) 847-6870
Fax: +1 (703) 847-6872

Abstract

Since their inception, network computers (NCs) have been lauded by many proponents as replacements for PCs. INPUT's view has always been that NCs will replace PCs only in situations where PCs have been deployed inappropriately due to lack of a viable alternative.

Instead, NCs will be used largely to replace existing mainframe/mini/X terminals, and also to convert some existing PC users operating in a localized environment to a network-centric environment.

Despite the attention given to NCs, their takeup to date has been low. INPUT believes that the market will accelerate as NCs become increasingly capable of front-ending server-based Windows applications, as Microsoft's Windows Terminal Server provides the infrastructure for redeploying existing applications in a thin client model, and as Java stabilizes and Java applications increase in availability and quality.

The NC market will be represented mostly by Windows terminals, or general-purpose NCs capable of running Windows as well as legacy terminal-based applications. The dedicated Java NC will not offer sufficient benefits to prompt a change in users' Windows-based environments.

This report examines users' use of and attitudes to NCs, including related server, database, network and object platforms, support costs, and comparisons between PCs and NCs.

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***Impact of NCs on Selection of
Internet/Intranet Platforms, Europe***

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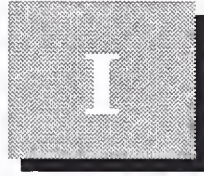
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Introduction

A

Objectives and Scope

The network computer (NC) concept has failed to attract large numbers of users away from PCs, as many of its proponents have argued over the past two years that it would. However, INPUT has always viewed the classic NC as a replacement for terminals and an appropriate device for users with low computing needs.

The NC market is highly dynamic—the nature of NCs is changing, from the Java-centric terminals proposed in 1996 to terminals designed to access server-based Windows and legacy applications.

This report examines users' use of and attitudes to NCs, including related server, database, network and object platforms, support costs, and comparisons between PCs and NCs.

B**Research Methodology**

INPUT interviewed 90 large UK, French and German companies during November 1997 (Exhibit I-1). Exhibit I-2 shows the industry sector breakdown. The questionnaire used for this survey appears at the end of this report (Appendix A).

Exhibit I-1

Sample Breakdown by Country

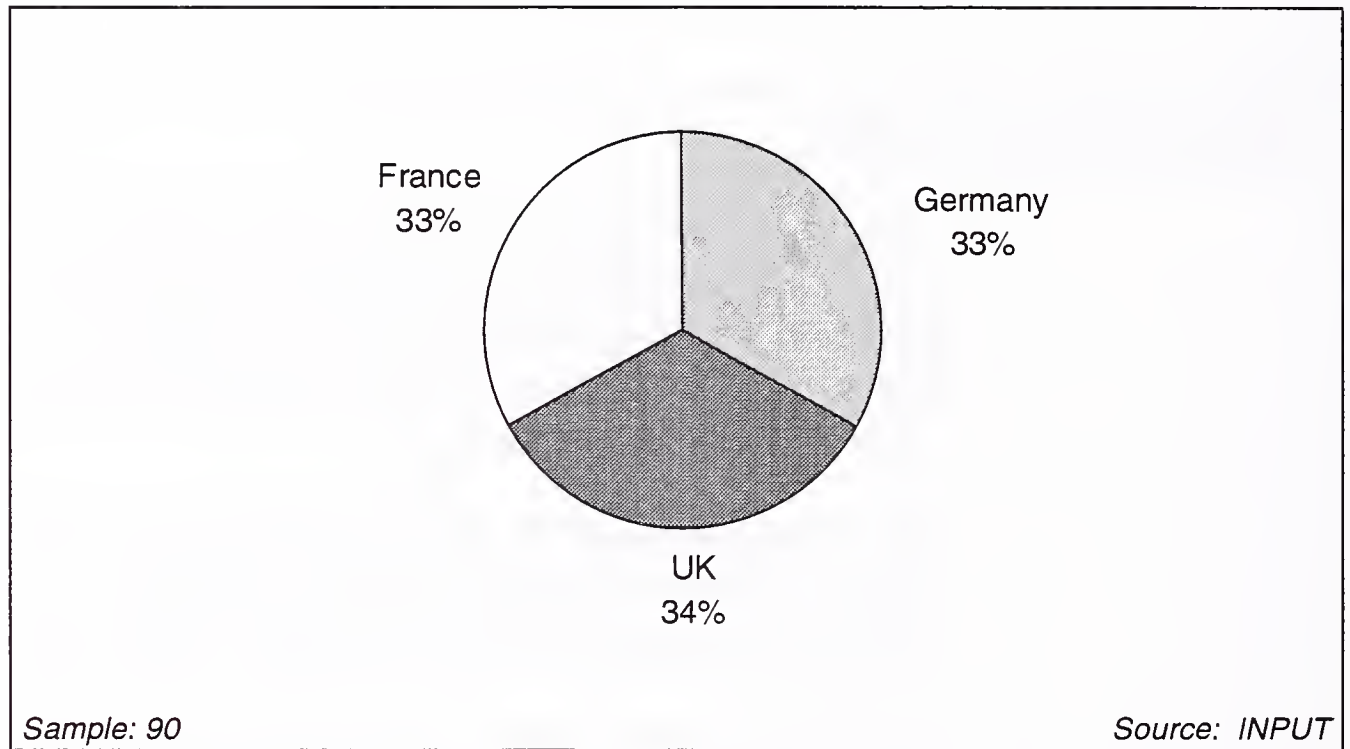
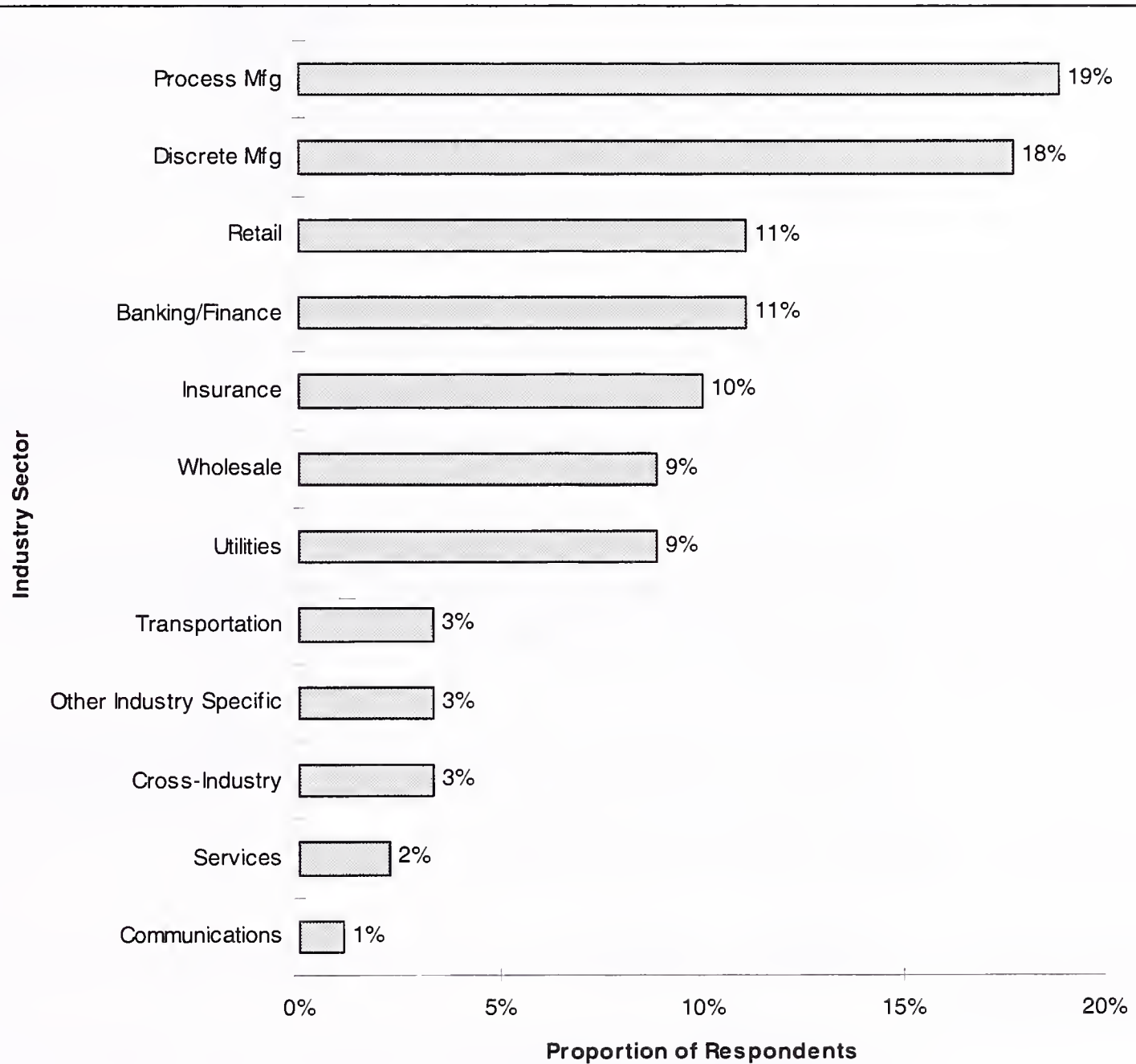


Exhibit I-2

Sample Breakdown by Industry

Sample: 90

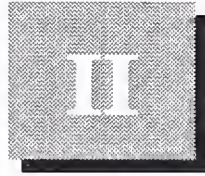
Source: INPUT

C**Report Structure**

- Chapter II—Executive Summary—presents a summary of the key findings of this report, plus market forecasts
- Chapter III—Current Platform and NC Usage—shows patterns of NC and other platform and network use
- Chapter IV—Suitability of NCs and Related Platforms for Enterprise Computing—shows suitability of server, database and network platforms for NC use, NCs for individual applications and functions, NCs by architecture type, Java, and importance/satisfaction of client platform characteristics.
- Chapter V—Future NC and Related Platform Usage and Requirements—presents anticipated future takeup of NCs, future object use and NC scenarios, and future requirements of server platforms
- Chapter VI—Budgets and Costs—shows a breakdown of IT budgets and expected affect of NC deployment on all IT support costs

D**Related Reports**

- *Use of Internet Appliances in the Corporation, U.S., 1996*
- *Use of Internet Appliances in the Corporation, Europe, 1996*



Executive Summary

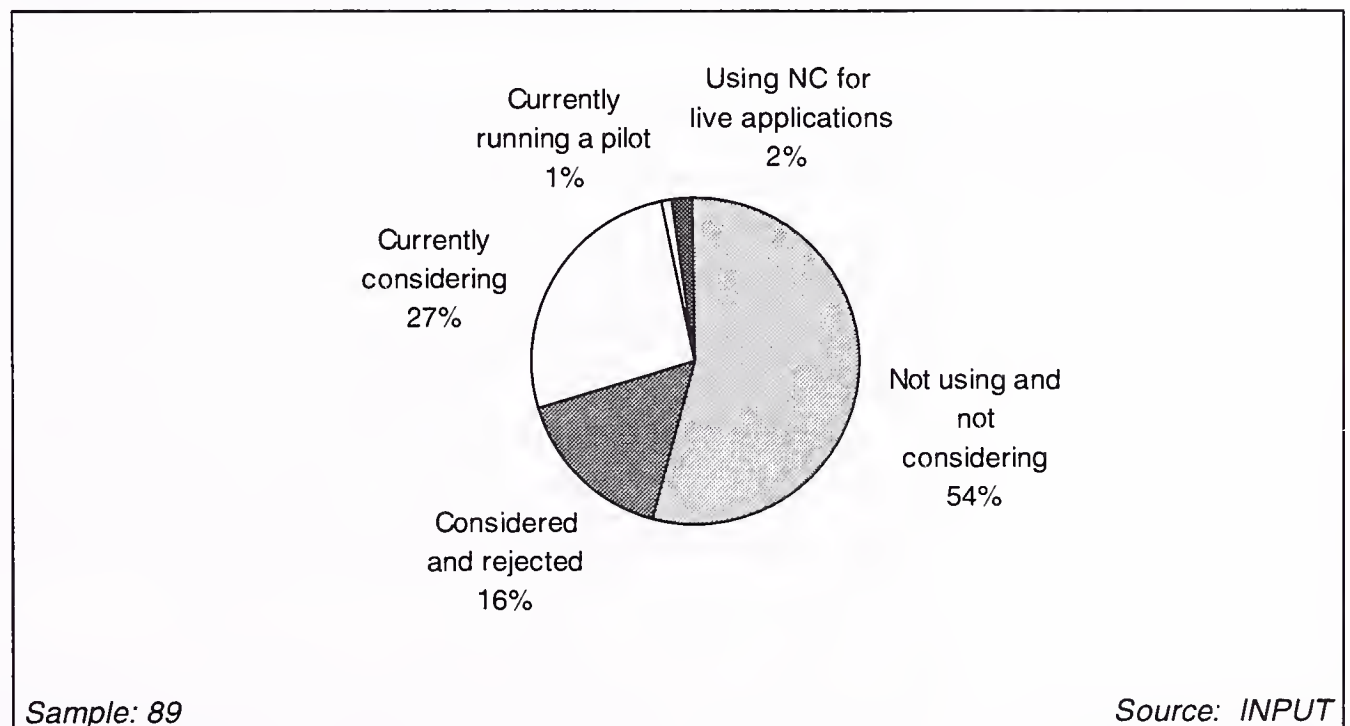
A

NC Usage Currently Low, But Set to Rise Dramatically

As of mid- to late-1997, only a small proportion of organisations were using NCs (Java terminals, hybrid terminals and Windows terminals), either in trials or for live applications. Only 3% of survey respondents were using NCs at the time of interviewing, with a further quarter considering their use. Exhibit II-1 shows the state of NC usage as of mid-1997.

Exhibit II-1

State of NC Usage—Europe



Overall, respondents did not consider it likely that they would be using NCs for live applications (as opposed to pilot schemes) by mid-1998. Most respondents rated the possibility at only 1 or 2 out of 5.

Despite this negative response, the NC market is changing extremely rapidly, due primarily to the convergence of NCs and Windows—NCs are increasingly being used to access host-based Windows applications, and NC-like features are being built into PCs. INPUT expects the actual uptake of thin clients (not delineated by strict architectural definitions, and including NCs, Windows terminals, and NC-like PCs) to be considerably higher than the current takeup rate of NCs might suggest; shipments will rise from 300,000 in 1997 to 18 million in 2002.

B

Client Devices Will Diversify, But Windows Will Remain the Default Environment

Much of the drive behind NCs has been their role in not only displacing PCs but also in creating a new application environment, based on Java. This has yet to occur, and INPUT forecasts that, while client platforms will diversify in terms of underlying technology and architecture, the application environment of users will remain mostly Windows-based.

Most users looking to reduce client support costs and administrative overhead have not moved to an NC environment. The changes required in application architecture and partitioning, and the level of application availability are unknown to many users, prompting a “do nothing” response. The release of Windows Terminal Server, however, following Microsoft’s licensing of Citrix’ NT multi-user technology and ICA (intelligent console architecture) protocol will change that situation drastically. Users will be able to, with a degree of comfort, replace clients with Windows terminals while retaining their existing applications, running on the server instead of the client.

NC vendors will achieve greatest success in providing low-cost, low-support front ends to server-based Windows and legacy applications. For this reason, hybrid NCs and Windows terminals will account for more NC sales than will Java devices. NC vendors have recognized this: Wyse, NCD, Neoware, and Tektronix all target Windows as well as terminal users in their offerings.

This is backed up by the findings of this survey. There is a correlation between the proportions of client platforms in current use and users' perceptions of the best-suited NC type for their organisation. Exhibit II-2 shows client platform use by respondents.

Exhibit II-2

Client Platforms in Current Use—Europe

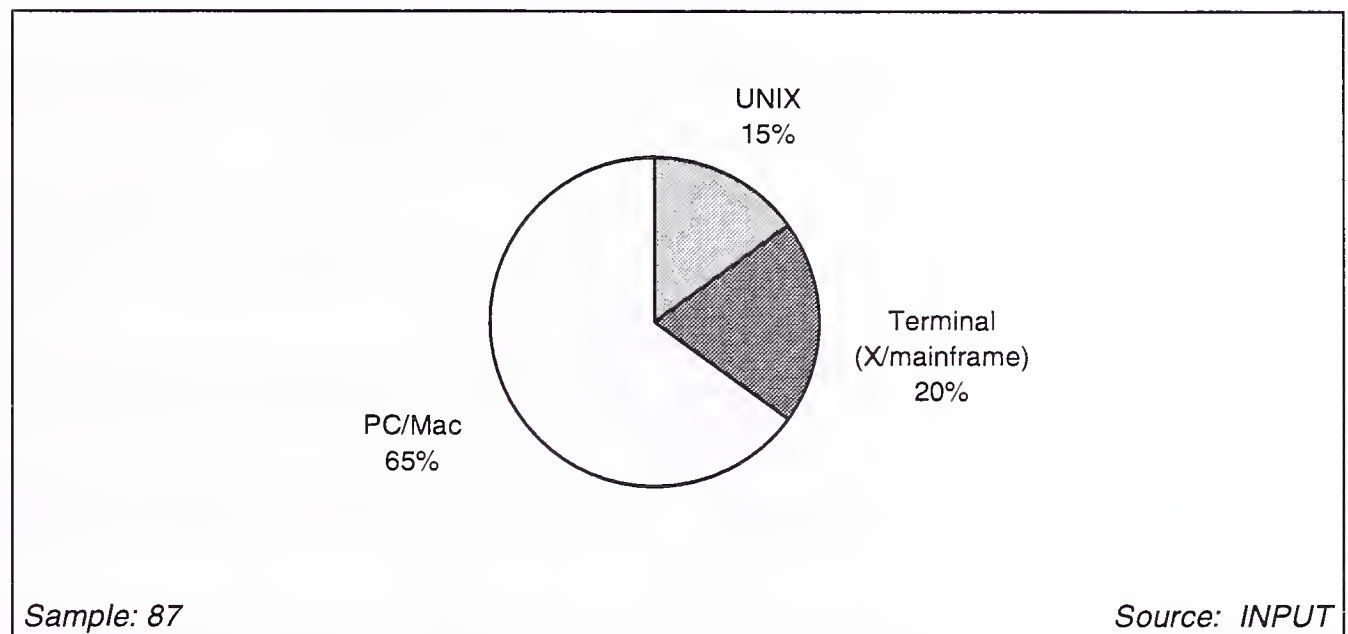
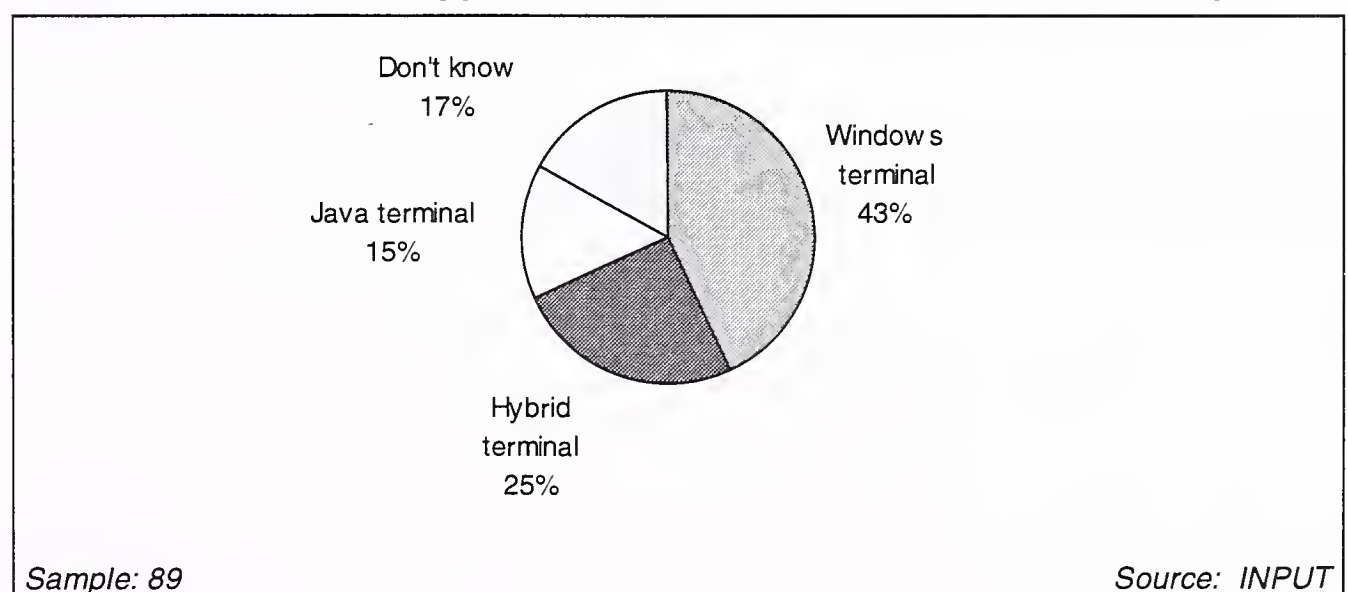


Exhibit II-3 shows the proportions of respondents that considered each of the three types of NC most suitable to their existing environments.

Exhibit II-3

Best Suited NC Type for Current IT Environments—Europe



The proportions of users stating each NC type are similar to the existing breakdown of client platforms. Fifteen percent of client platforms across the sample organisations run UNIX, and 15% of respondents considered Java terminals best suited to their existing environment.

Similarly, 20% of clients are mainframe/X terminals, and 25% of users regarded hybrid terminals as most suitable.

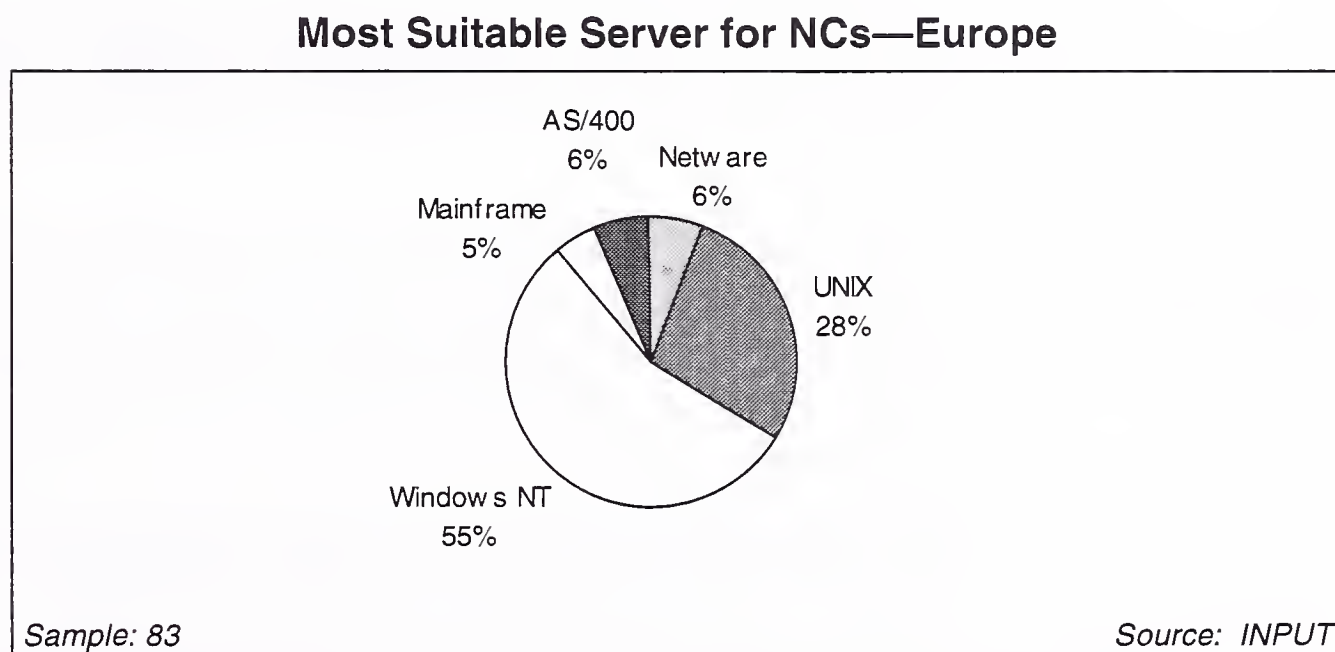
INPUT attributes this correlation to the likelihood that NCs will be deployed along architectural lines:

- Java terminals will tend to be placed in UNIX (particularly Sun) environments, despite Java's ability to run on most platforms.
- Hybrid terminals will tend to be placed in environments of mixed servers (mainframe, mini, Windows and UNIX).
- Windows terminals, naturally, will tend to be placed in Windows environments.

An indication of this architectural pattern of NC deployment was given by the survey. Among respondents who stated that the hybrid terminal would be most suitable, current usage of X/mainframe terminals is more than twice that of organisations who stated another type of NC would be most suitable.

In addition, users consider Windows NT to be the most suitable server operating system for supporting NCs. While UNIX and NT received similarly high ratings for suitability in an NC environment, when asked to select the single most suitable operating system, NT was stated by half of respondents and UNIX by a quarter (Exhibit II-4).

Exhibit II-4



INPUT concludes that the most common NC environment will be hybrid terminals capable of fronting Windows and legacy applications, or dedicated Windows terminals, sharing a Windows NT or Windows Terminal server.

By 2002, NCs with a Windows presentation capability will represent 70% of NC shipments, the remaining 30% comprising legacy-only or Java-only NCs.

C**Network Upgrades Are Required For Widespread NC Deployment**

PCs are not, fundamentally, network devices, and only relatively recently have PCs been sold with pre-installed network cards and networking capabilities built into the operating system.

Throughout much of its history, the PC has been a standalone device, and most application software has assumed the model of a standalone, or at least heavily localized client. Application software is becoming network-based, but much network traffic is still simple file transfer and print spooling.

The centralised, server-based NC model puts the network at the heart of IT infrastructure, by design, and so demands a robust, scaleable, high-performance network architecture. For NCs of all types to be deployed on a large scale, network infrastructure must be upgraded in most organisations.

Standard 10Mbps Ethernet is the most widespread network architecture, used as a primary corporate network by two thirds of respondents, and Token Ring still retains a large installed base, used by one third of respondents. Fast Ethernet (100Mbps) is used as a primary network by only 18% of respondents.

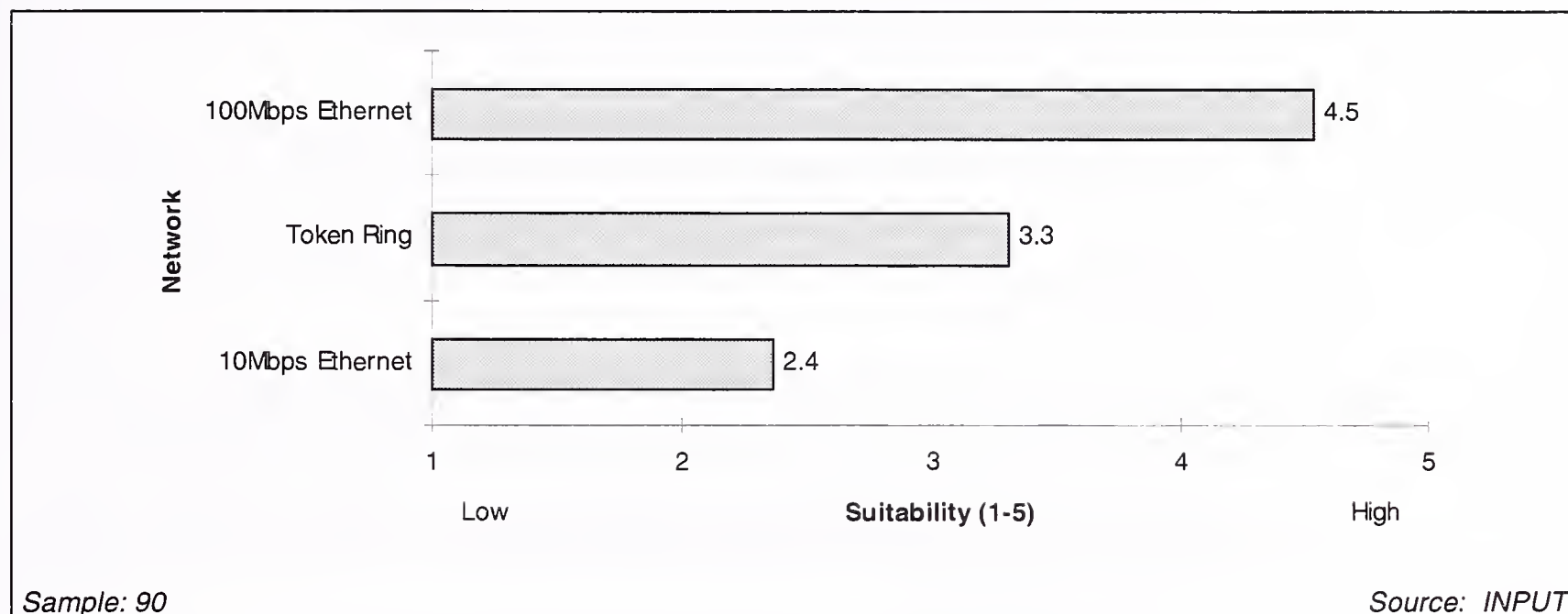
However, 10Mbps Ethernet and, to a lesser extent, Token Ring are not regarded as properly suited to the demands of an NC environment, as Exhibit II-5 shows. Only network types with low penetration (Fast Ethernet and ATM) are regarded as suitable (only seven percent of respondents operated an large-scale ATM network, but they rated its suitability for NCs highly).

In addition, when asked to select the network most suitable to an NC environment, 100Mbps Ethernet was the favored choice, with 49% of respondents. ATM followed, chosen by 32%.

The disparity between Fast Ethernet's and ATM's perceived ability to support the requirements of NC users and their current penetration indicates the need for widespread changes in network infrastructure to take place for NCs to achieve their potential.

Users recognise the need for such upgrades, and the associated support requirements: 82% of users expect NCs to increase network and communications costs.

Exhibit II-5

Suitability of Network Platforms for NCs—Europe**D****NCs Address PC Shortcomings, But PCs Are Responding**

From their inception, NCs were promoted as a solution to long-standing problems with the PC model, those problems being: high degree of localization, high complexity, and resultant high support costs. The NC solution results in lower localization (greater centralization), less complexity for user and administrator, and subsequent lower support costs.

In highlighting these issues, NC proponents have prompted PC vendors to respond. Examples include:

- Microsoft—first issued the NetPC reference specification, followed by the “Zero Administration” initiative. Microsoft’s current thin client strategy, Windows Terminal Server, will boost the NC market considerably and in addition will enable Microsoft to compete in the multi-user server market against UNIX vendors.
- Intel—acquired 4.4% of NCD and licensed technology to NCD so that the latter may manufacture Intel-specified thin clients. NCD also manufactures IBM’s Network Station range of NCs and develops and markets its own range of Explora thin clients, based on the company’s previous X terminals.

- SNI—among the first vendors to release a PC based on the NetPC specification, including a sealed unit, no floppy disk drive, and smartcard access security.

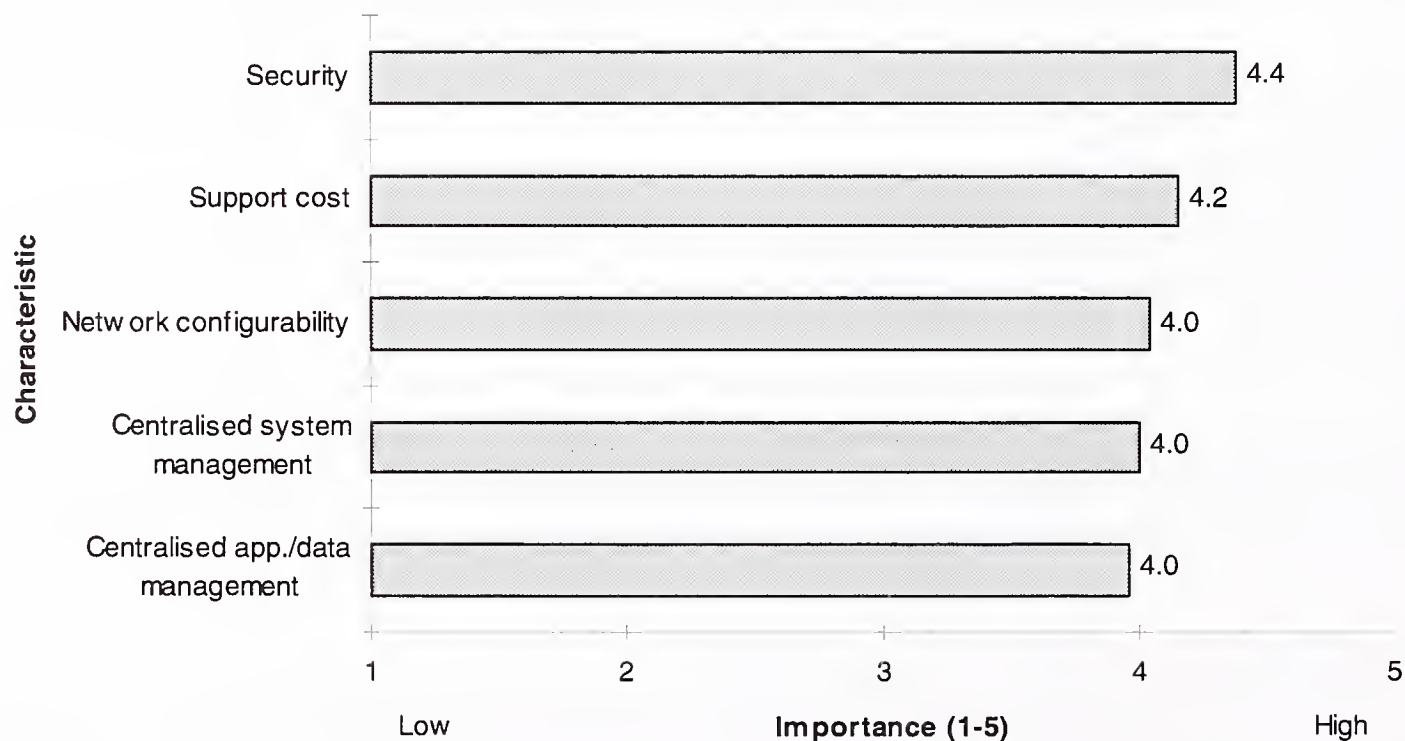
As stated previously, NCs able to present Windows applications running on an NT server will represent most of the NC market. With the final release of Windows Terminal Server (due second quarter of 1998), PC vendors will enter the NC market currently held by IBM, Neoware, Wyse, NCD, and others.

Despite the shape of the future client platform market, most of the current PC installed base is suffering from the existing, long-standing problems. Exhibit II-6 shows the characteristics of client platforms (not specifically PCs or NCs, but all client platforms) that respondents rated as most important.

All of the characteristics shown are those which INPUT identifies as fundamental strengths of NCs.

Exhibit II-6

Most Important Client Platform Characteristics—Europe



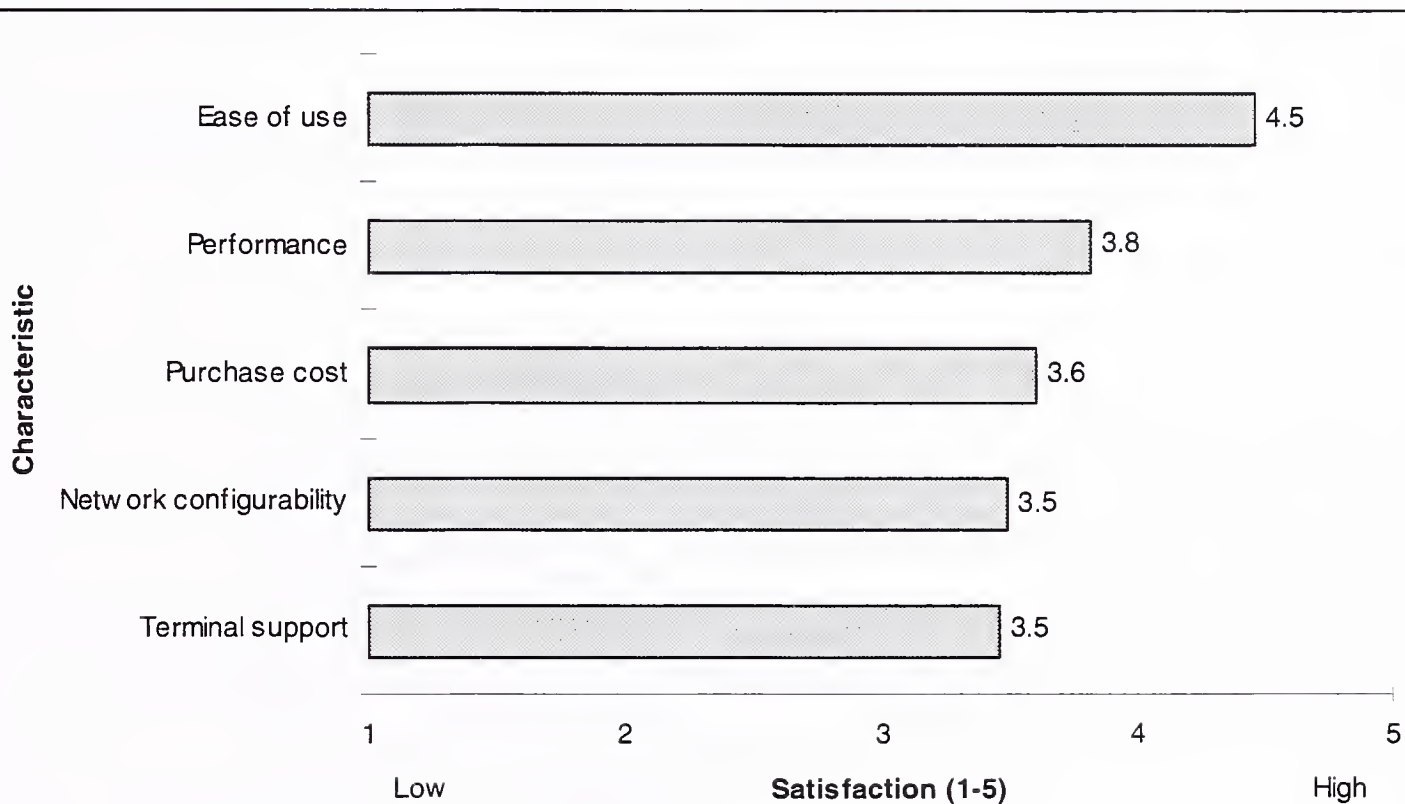
Sample: 71

Source: INPUT

Exhibit II-7 shows the characteristics of PCs that respondents rated most highly for satisfaction. The top three characteristics are not fundamental NC strengths. There is a tendency for NCs to be strong in those areas where PCs are rated lowest. For example, PCs were rated poorly for centralised application and data management, but NCs are inherently strong in this area.

Exhibit II-7

PC Characteristics Receiving High Satisfaction Ratings—Europe



Sample: 72

Source: INPUT

As a further illustration, Exhibit II-8 shows the importance of client platform characteristics plotted against satisfaction with PCs for the same characteristics. The categories which INPUT identifies as NC strengths are marked with a white cross.

The only category in which PCs perform noticeably well compared with its importance is ease of use. The categories in which PCs perform worst are all basic strengths of NCs (support costs, centralised application and data management, and centralised system management).

Exhibit II-8

PC Characteristics: Importance vs Satisfaction—Europe

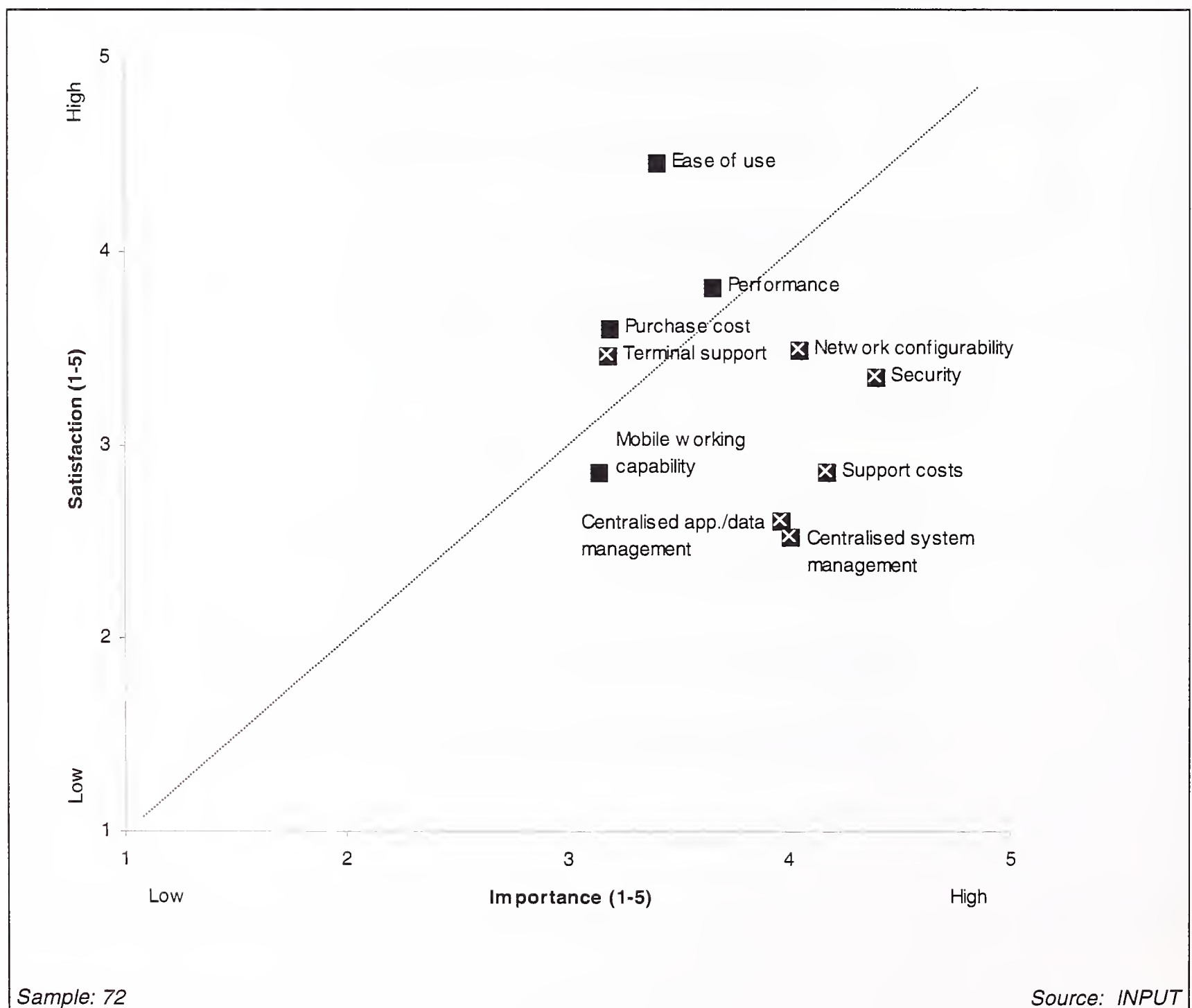


Exhibit II-9 summarizes the major strengths and weaknesses identified by users of PCs and NCs.

Exhibit II-9

PC/NC Strengths and Weaknesses

Platform	Main Strengths	Main Weaknesses
PC	De facto standard User autonomy	Administration overhead and cost
NC	Centralised environment Low administration overhead and costs	Unproven concept and technology Dependence on network and server

Source: INPUT

The introduction of a Windows-based thin client framework backed by Windows Terminal Server goes a long way to addressing current PC shortcomings. Windows terminals gain the strengths of NCs while tackling the administration problems of PCs. In doing so, they also gain a perceived weakness of NCs, dependence on a back-end server and network. INPUT does not view this dependence as a fundamental weakness or limitation, but as an architectural shift that is a prerequisite for network computing.

E

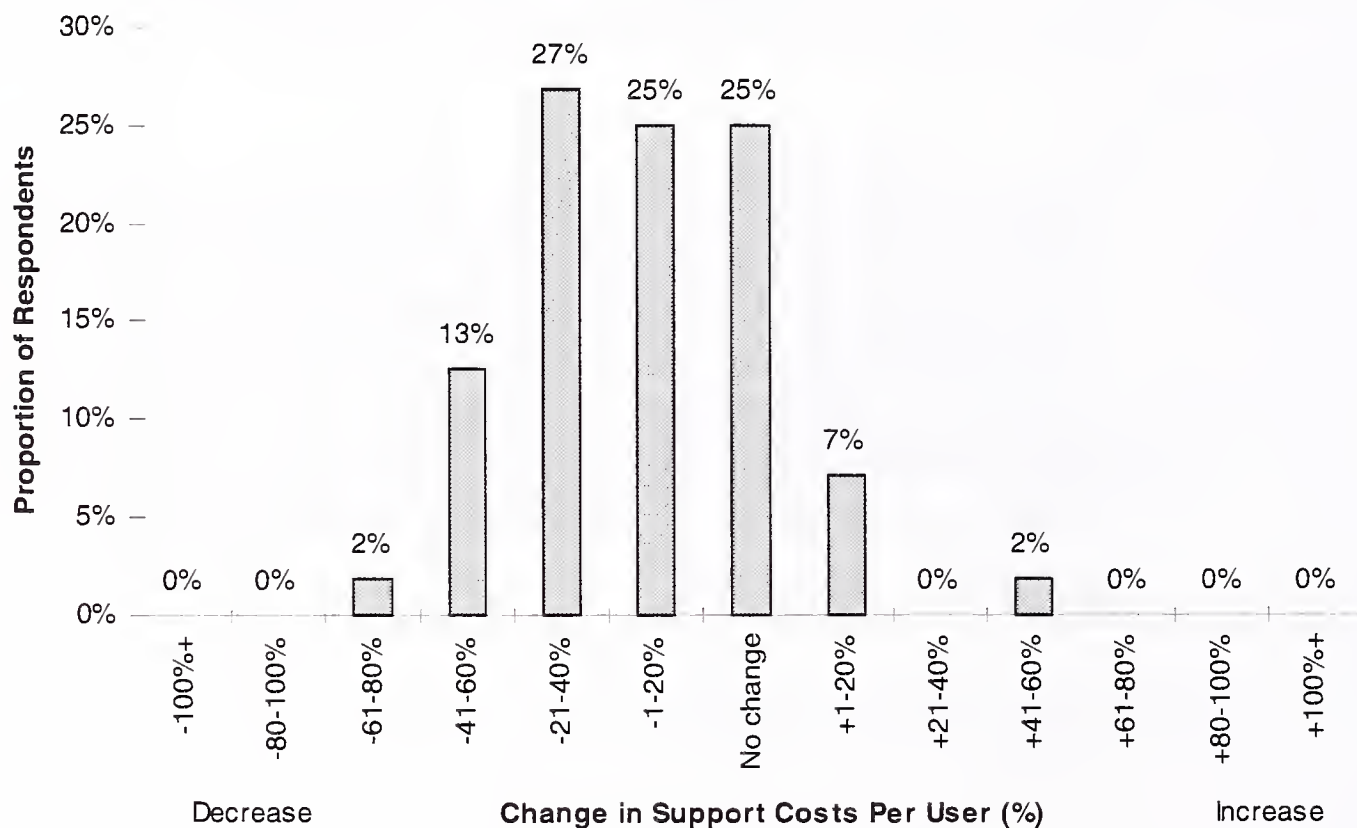
NCs Will Shift Support Costs From End User to Server and Network

NCs will reduce client support costs, but the changes in support costs vary widely across the spectrum of IT, from desktop-level end-user support to server and network support.

Exhibit II-10 details of the amount of change in end-user support costs expected by respondents—a decrease of up to 40% overall.

Exhibit II-10

Expected Detailed Change in End User Support Costs With NCs



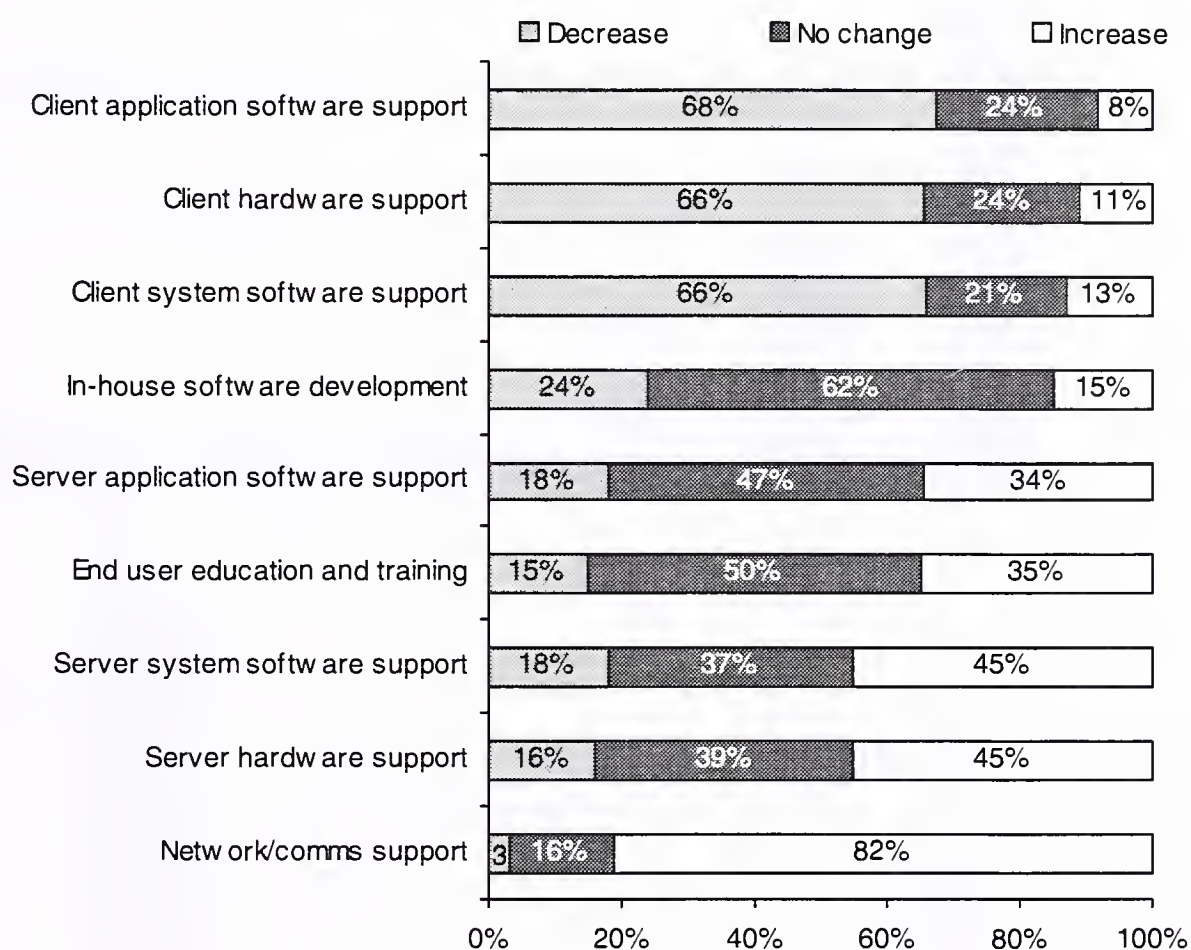
Sample: 56

Source: INPUT

Users do not view NCs as cost saving devices when the whole IT infrastructure is considered, however. Around 40% expect server-related support spending to increase in an NC environment, and 80% anticipate cost increases in network and communications-related support.

Exhibit II-11

Expected Change in All Support Costs With NCs



Sample: 38

Source: INPUT

F

Market Forecasts

The market for NCs—Java, hybrid, and Windows—will grow at an extremely high rate between 1997 and 2002. Exhibit II-12 shows unit shipments for 1997 and 2002 for all NC types combined. Exhibit II-13 shows unit shipments by year between 1997 and 2002 for Windows-based NCs and other, non-Windows NCs (terminal replacements and Java-based devices).

Exhibits II-14 and II-15 show market value for NCs combined and for NCs by type.

Exhibits II-16 and II-17 show shipments and market value by region.

Exhibit II-12

Overall NC Shipments, 1997 and 2002—Worldwide

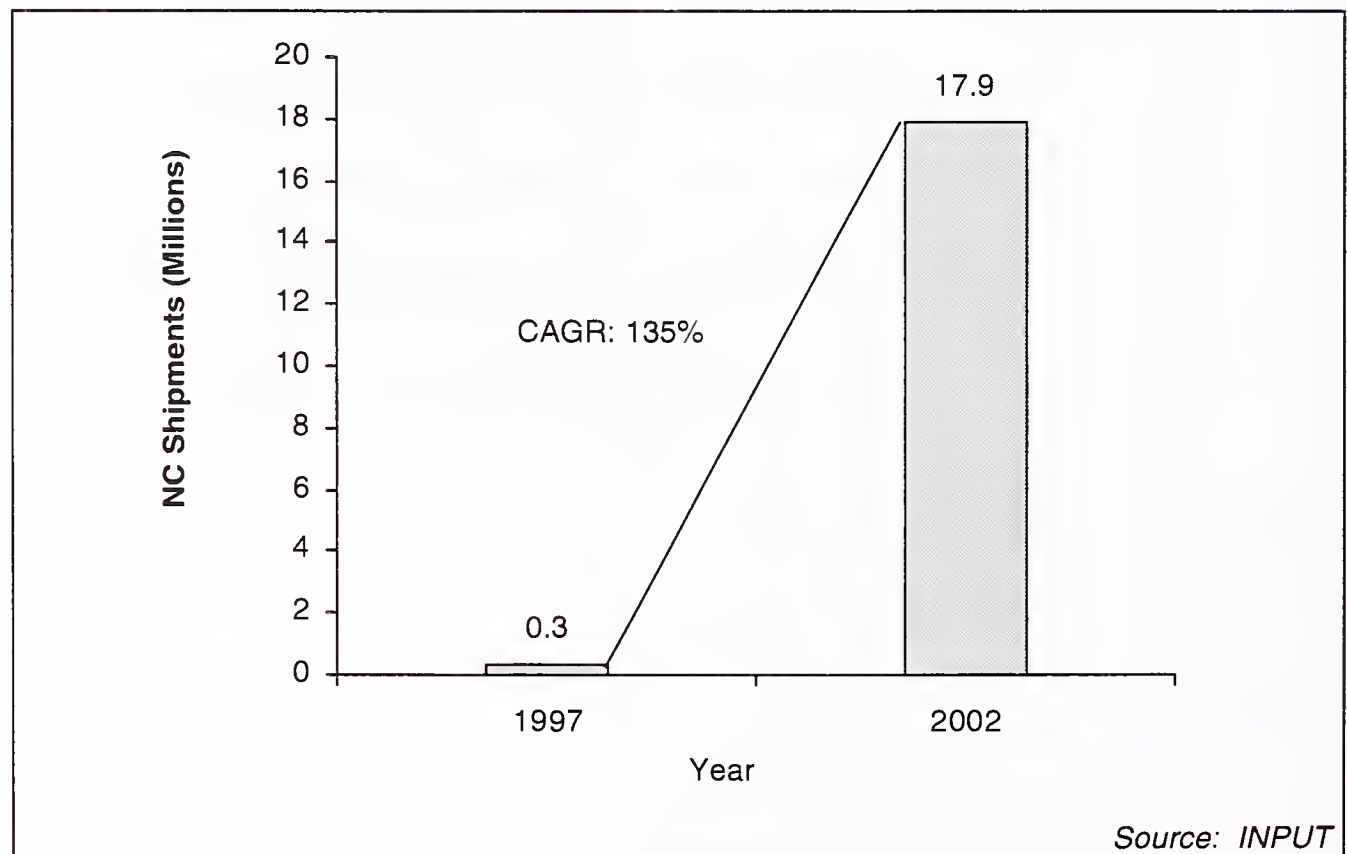


Exhibit II-13

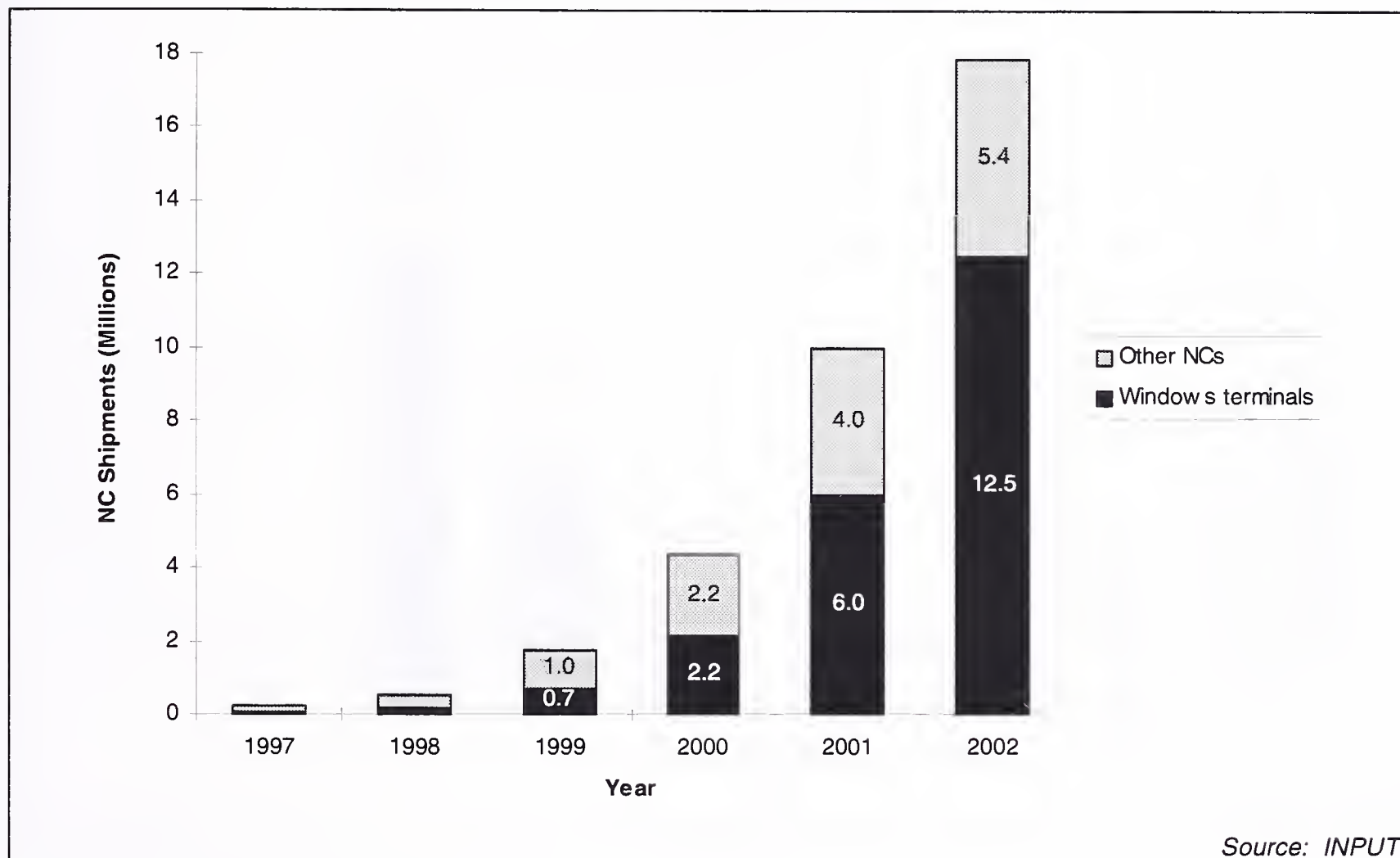
NC Shipments by Type, 1997-2002—Worldwide

Exhibit II-14

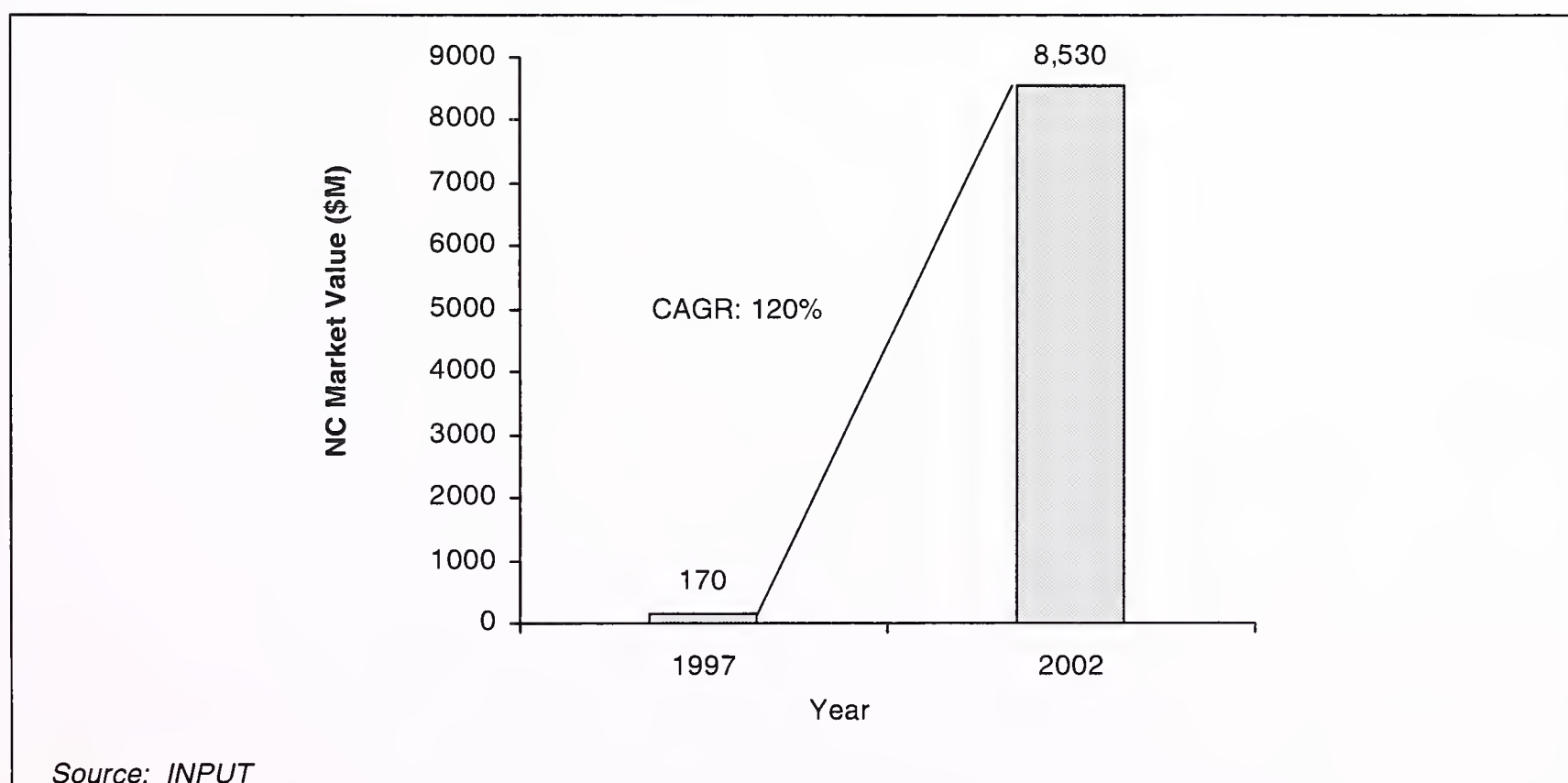
Overall NC Market Value, 1997 and 2002—Worldwide

Exhibit II-15

NC Market Value by Type, 1997-2002—Worldwide

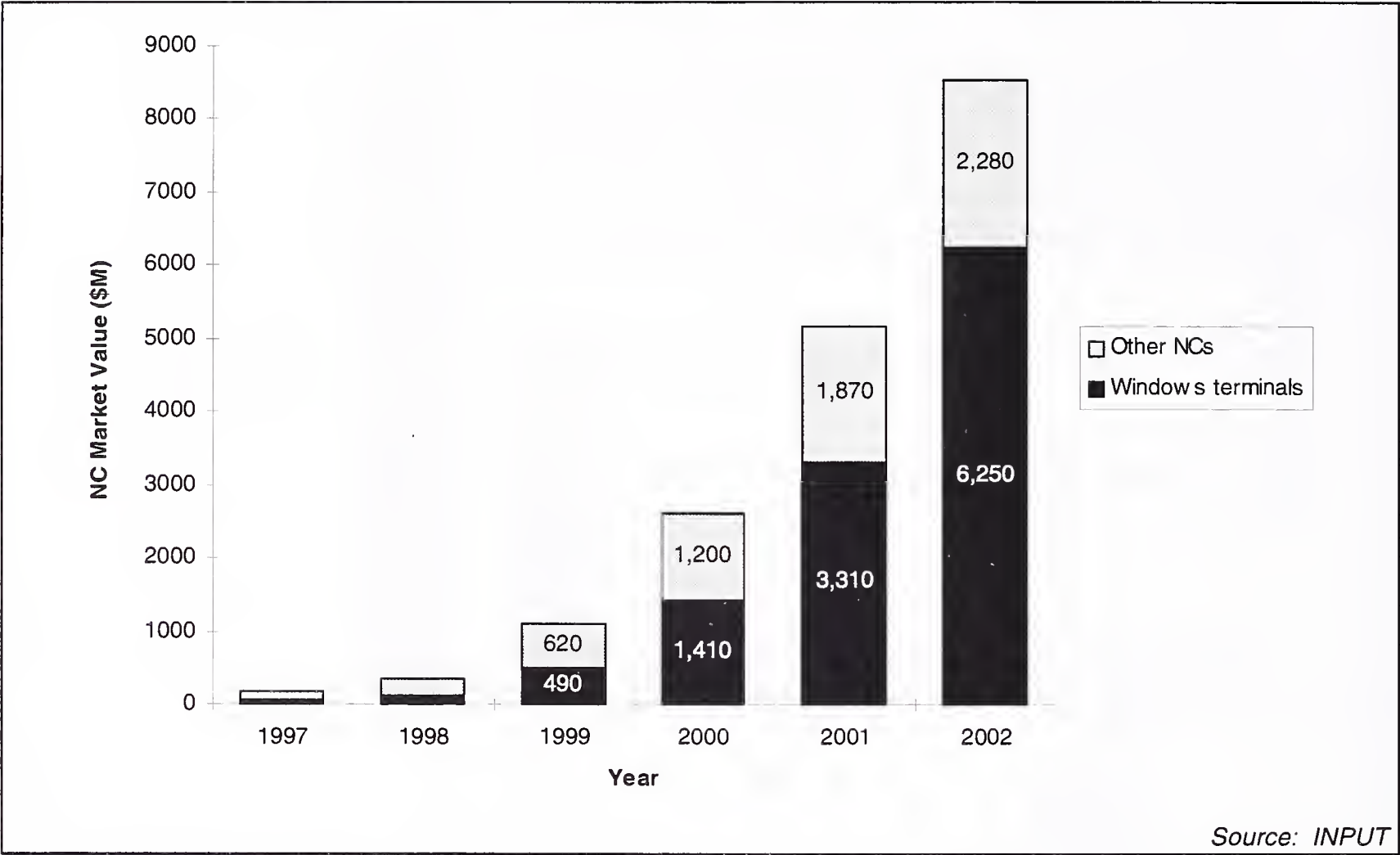


Exhibit II-16

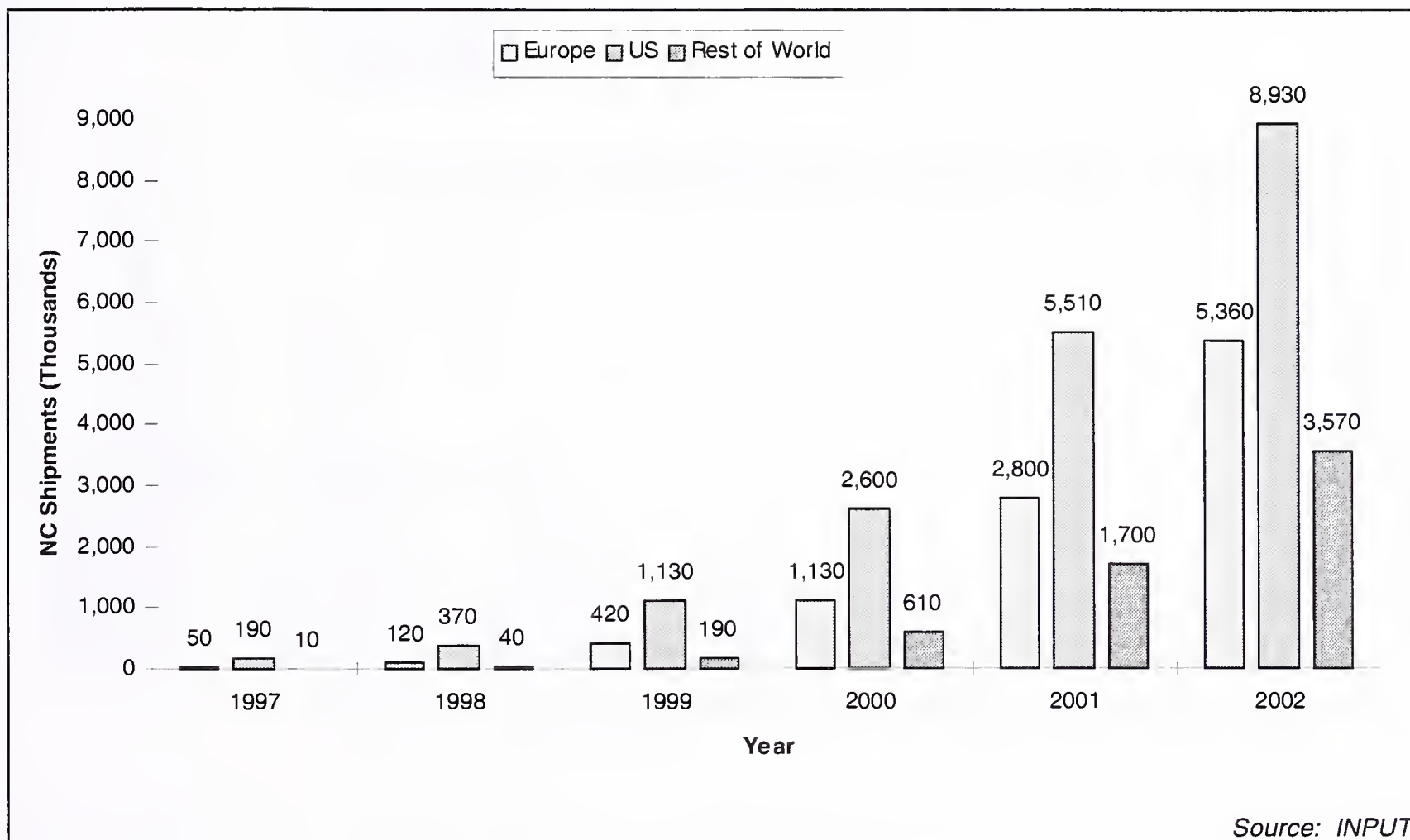
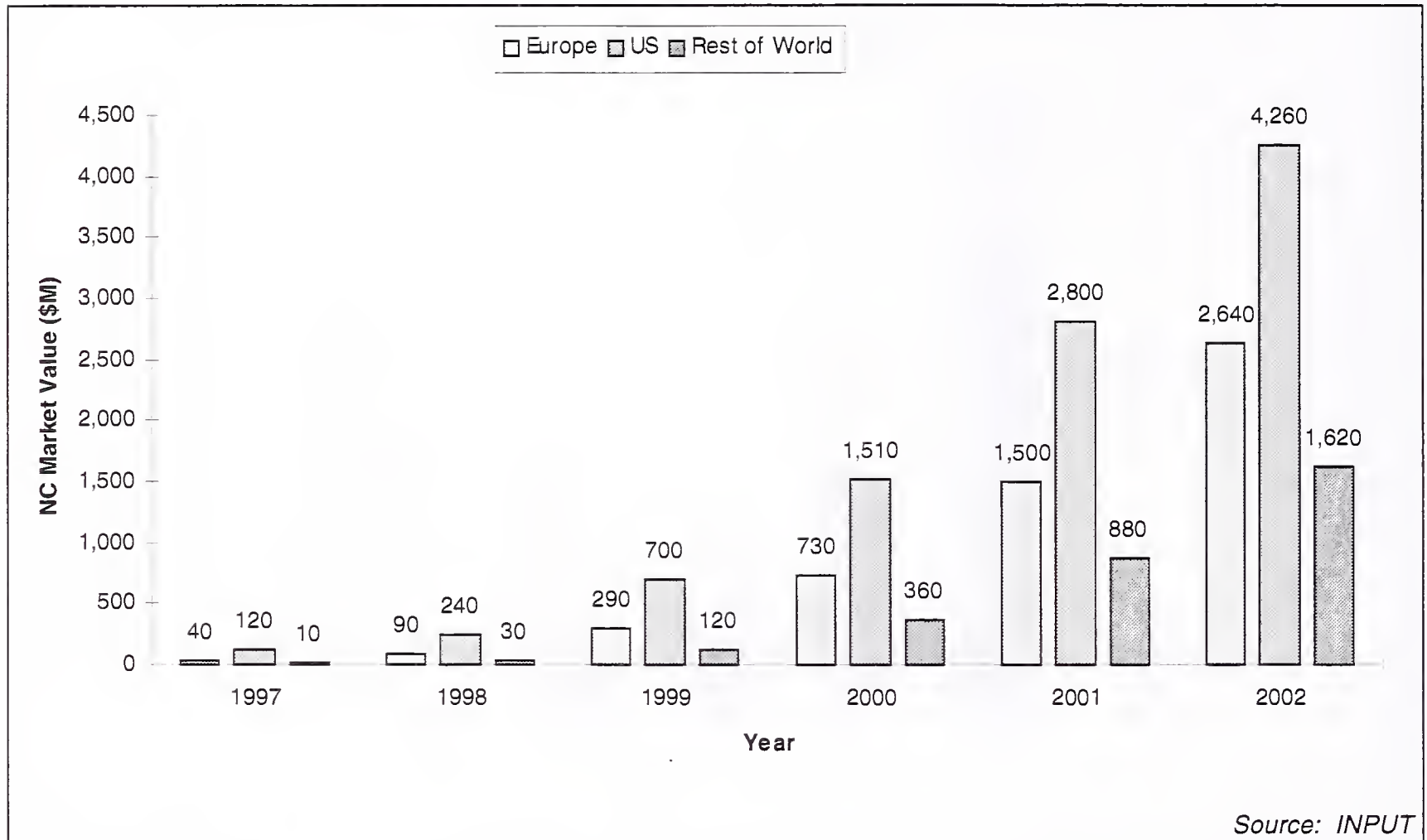
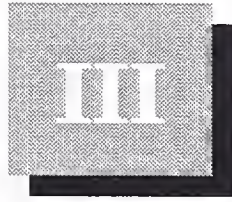
NC Shipments, 1997-2002—by Region

Exhibit II-17

NC Market Value, 1997-2002—by Region



Current Platform and NC Usage

A

Current State of NC Usage

NCs are in use in only around 3% of organisations surveyed. A quarter of respondents are currently considering their use, and half have not yet evaluated NC use. Exhibit III-1 shows the state of NC usage as of mid-1997; Exhibits III-2 to III-4 show the breakdown for the UK, France, and Germany; Exhibits III-5 to III-11 show responses by industry sector.

Exhibit III-1

State of NC Usage—Europe

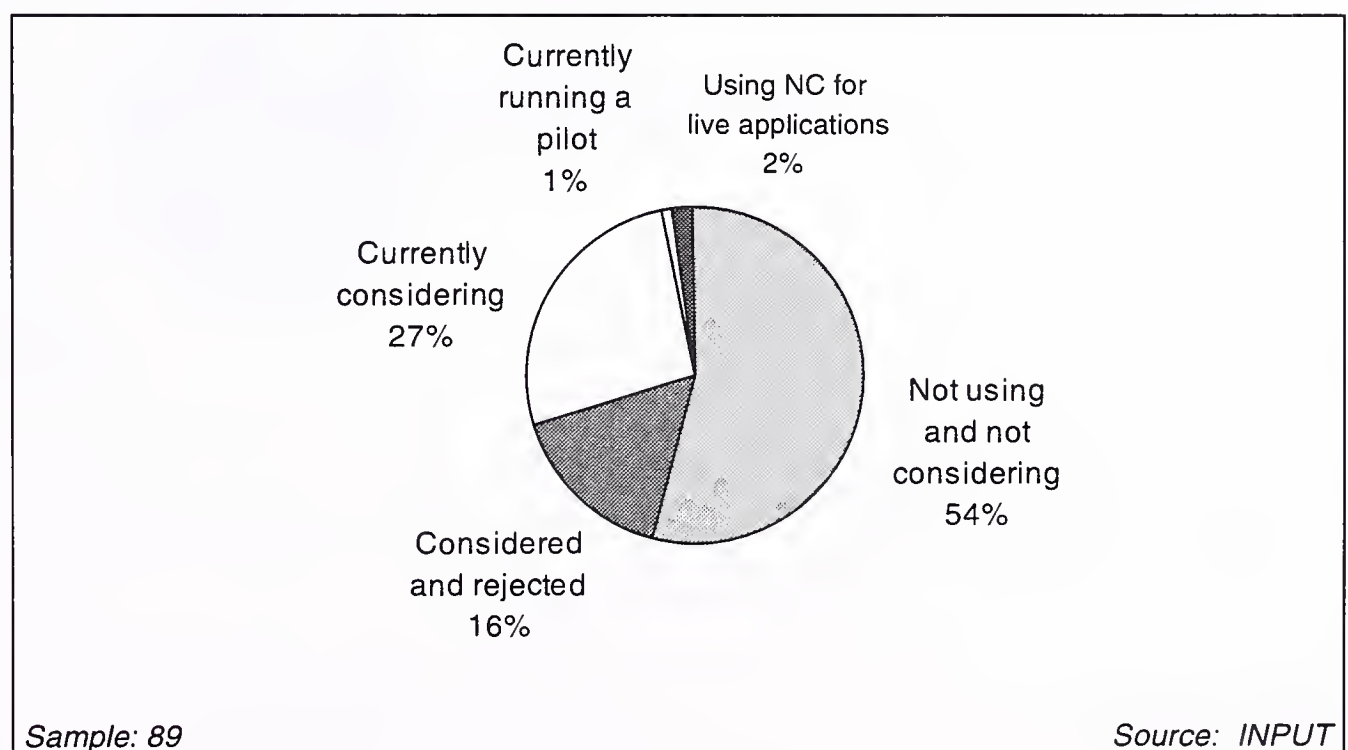


Exhibit III-2

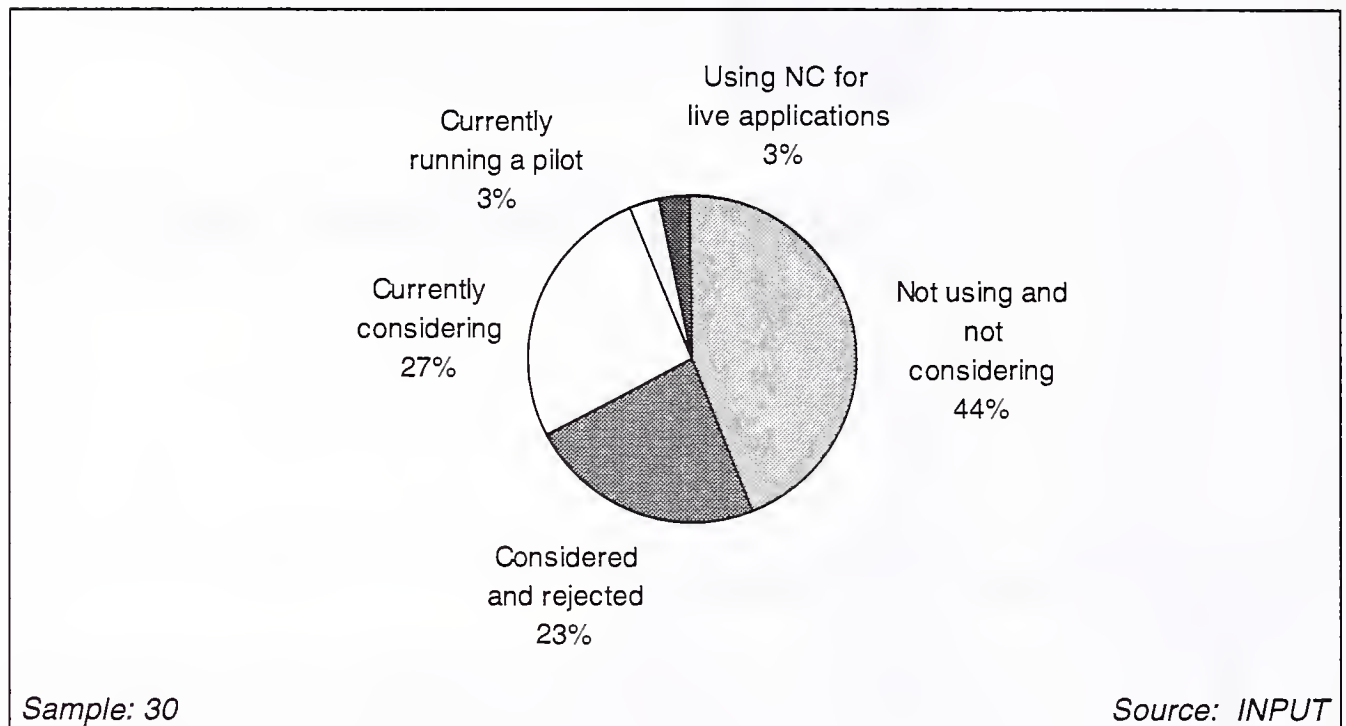
State of NC Usage—UK

Exhibit III-3

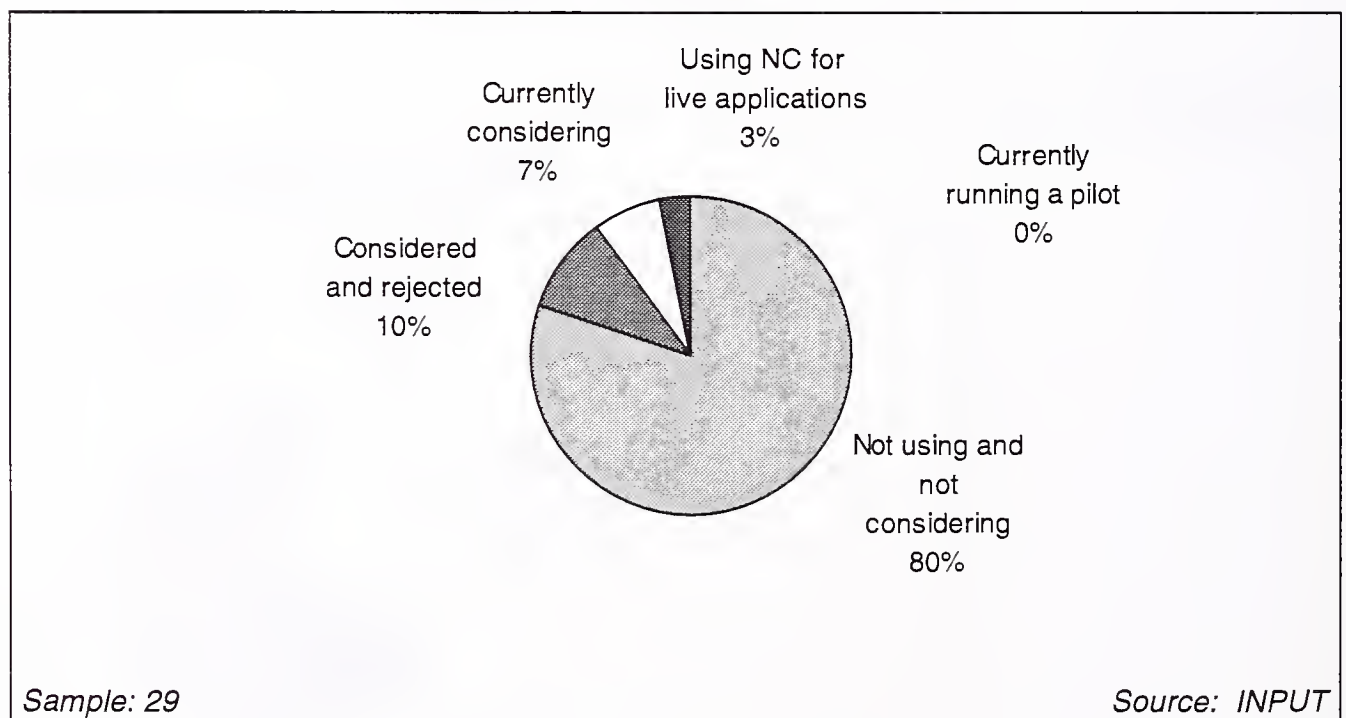
State of NC Usage—France

Exhibit III-4

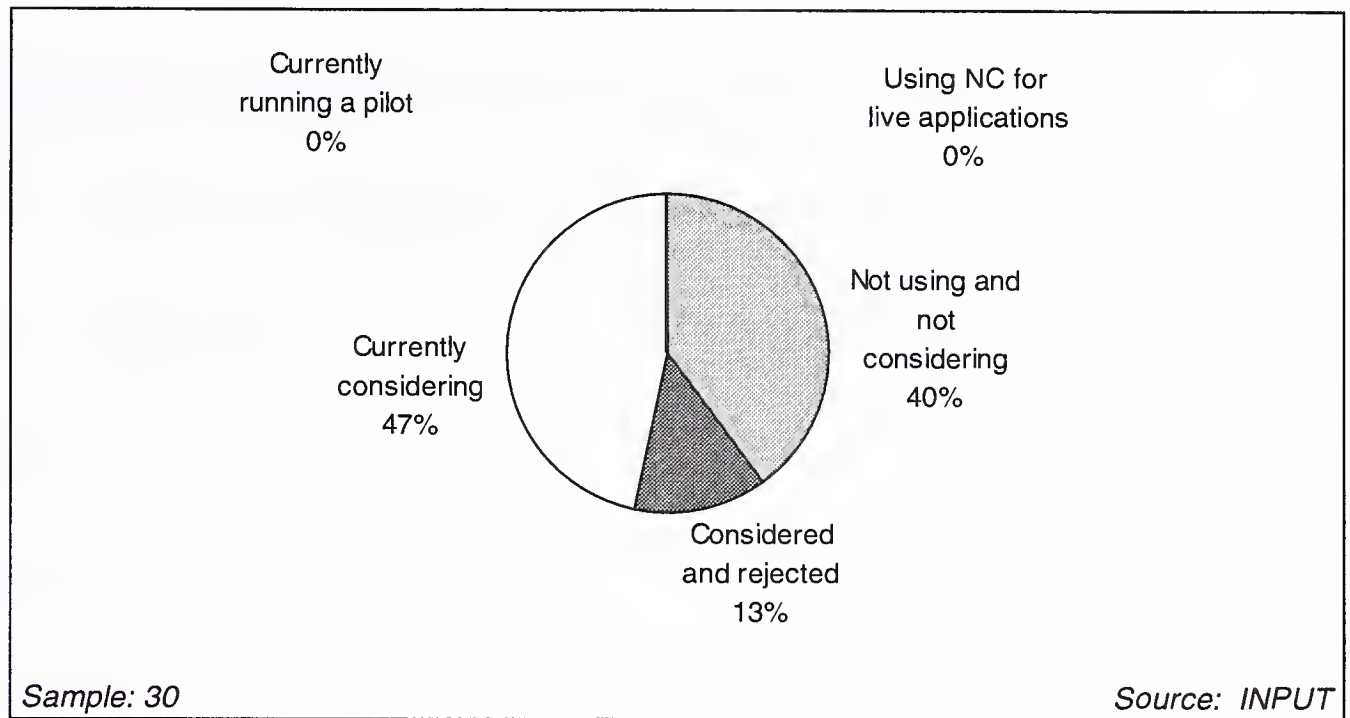
State of NC Usage—Germany

Exhibit III-5

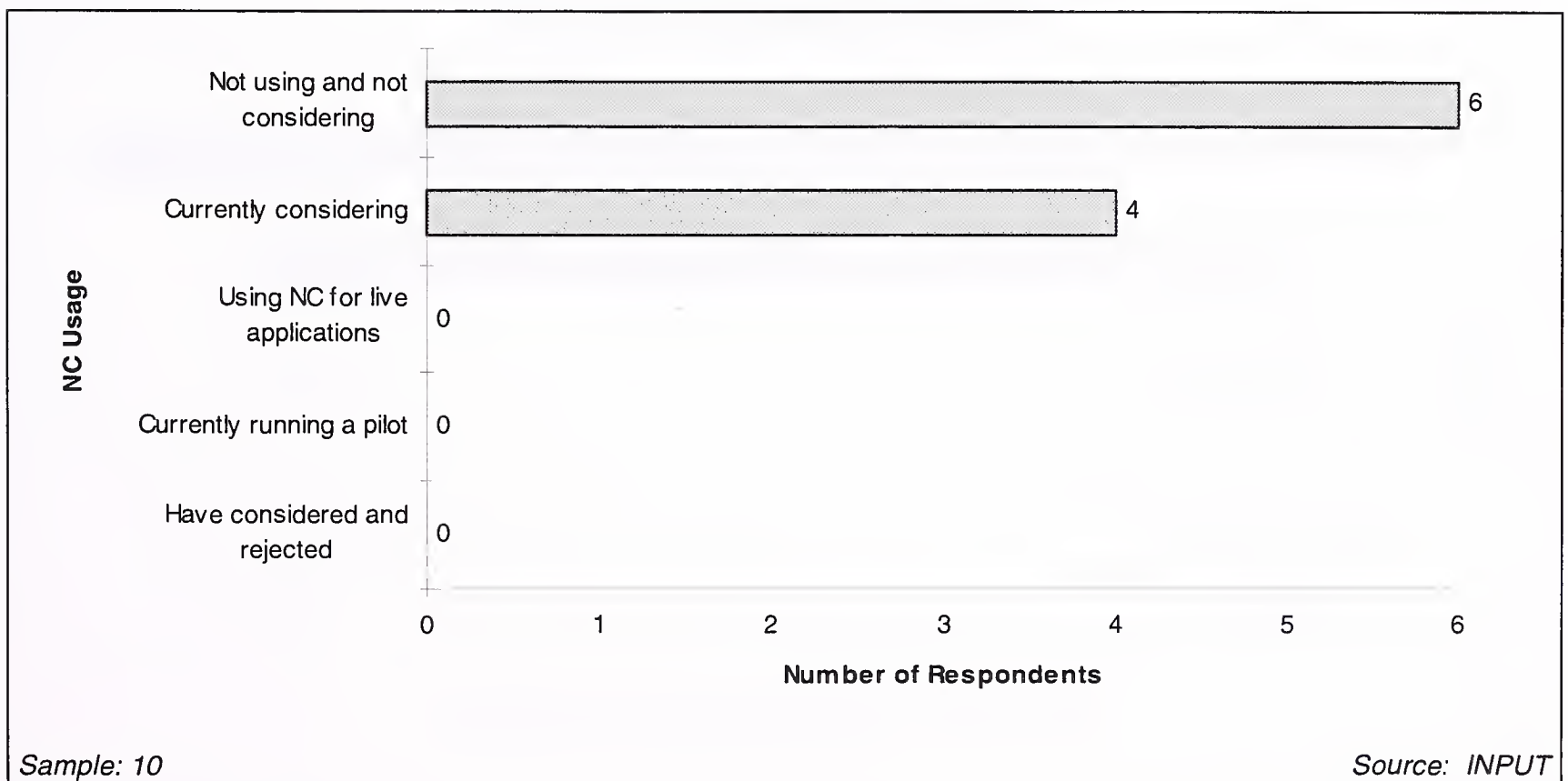
State of NC Usage—Banking/Finance

Exhibit III-6

State of NC Usage—Discrete Manufacturing

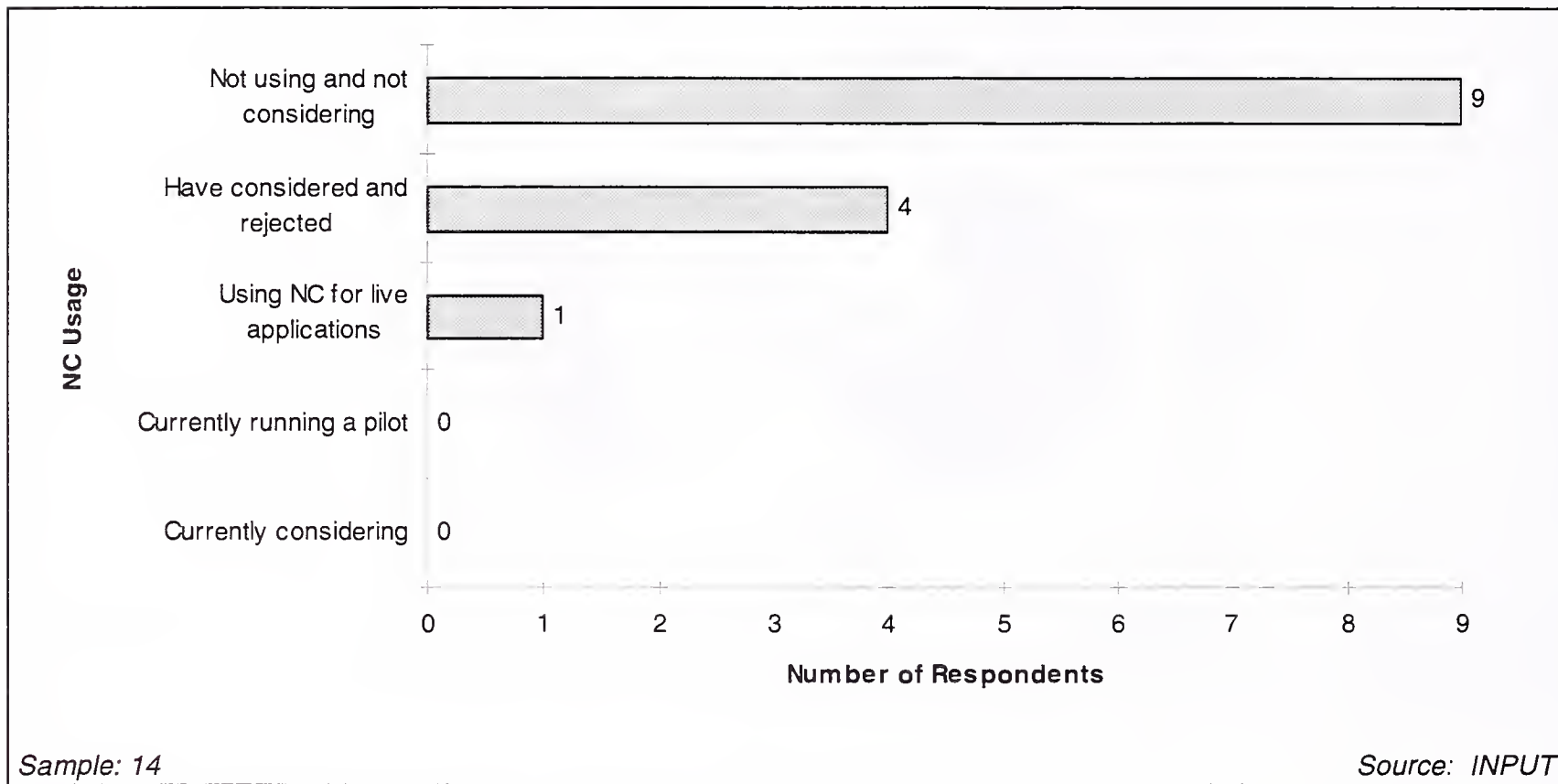


Exhibit III-7

State of NC Usage—Insurance

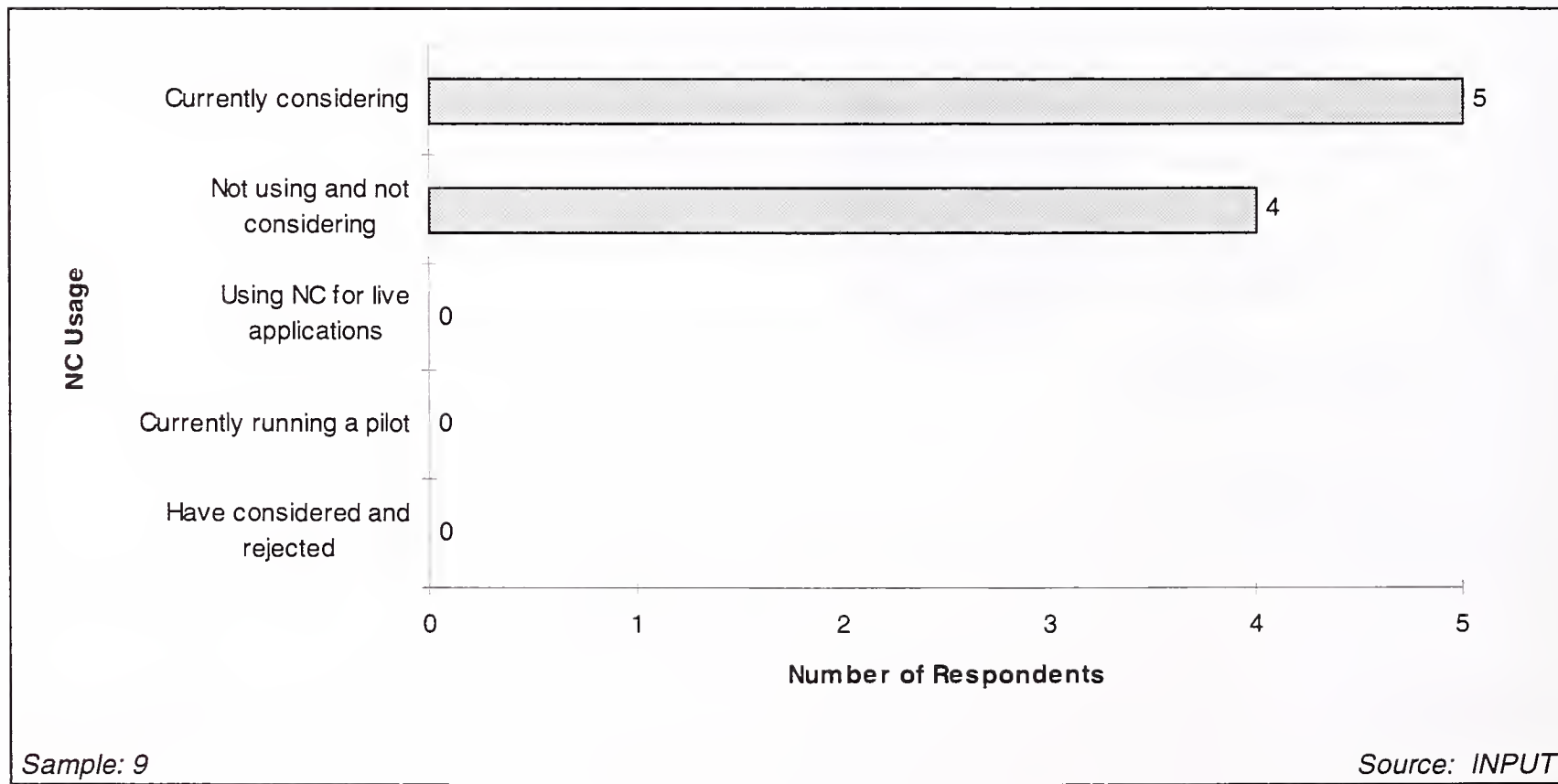


Exhibit III-8

State of NC Usage—Process Manufacturing

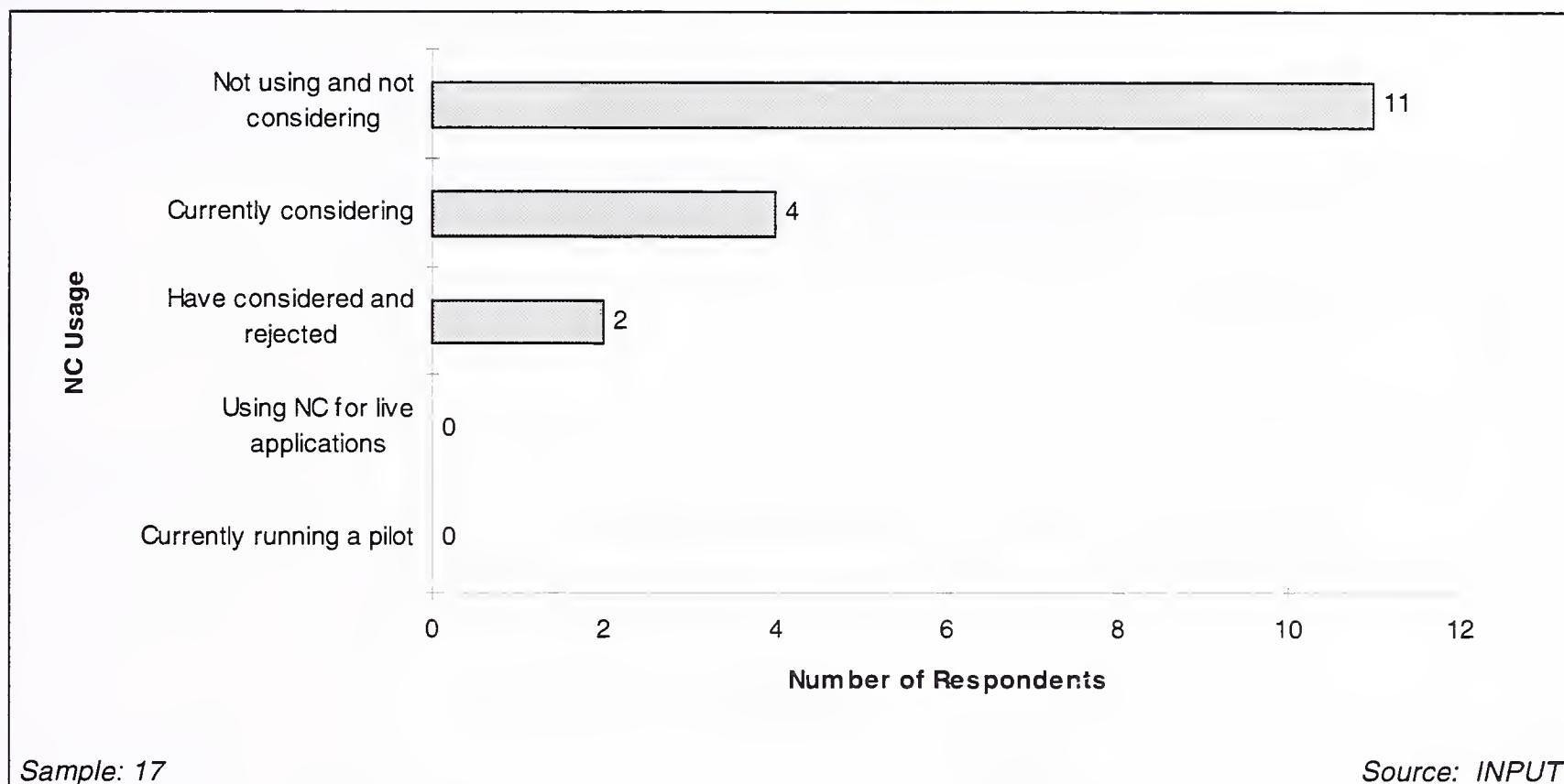


Exhibit III-9

State of NC Usage—Retail

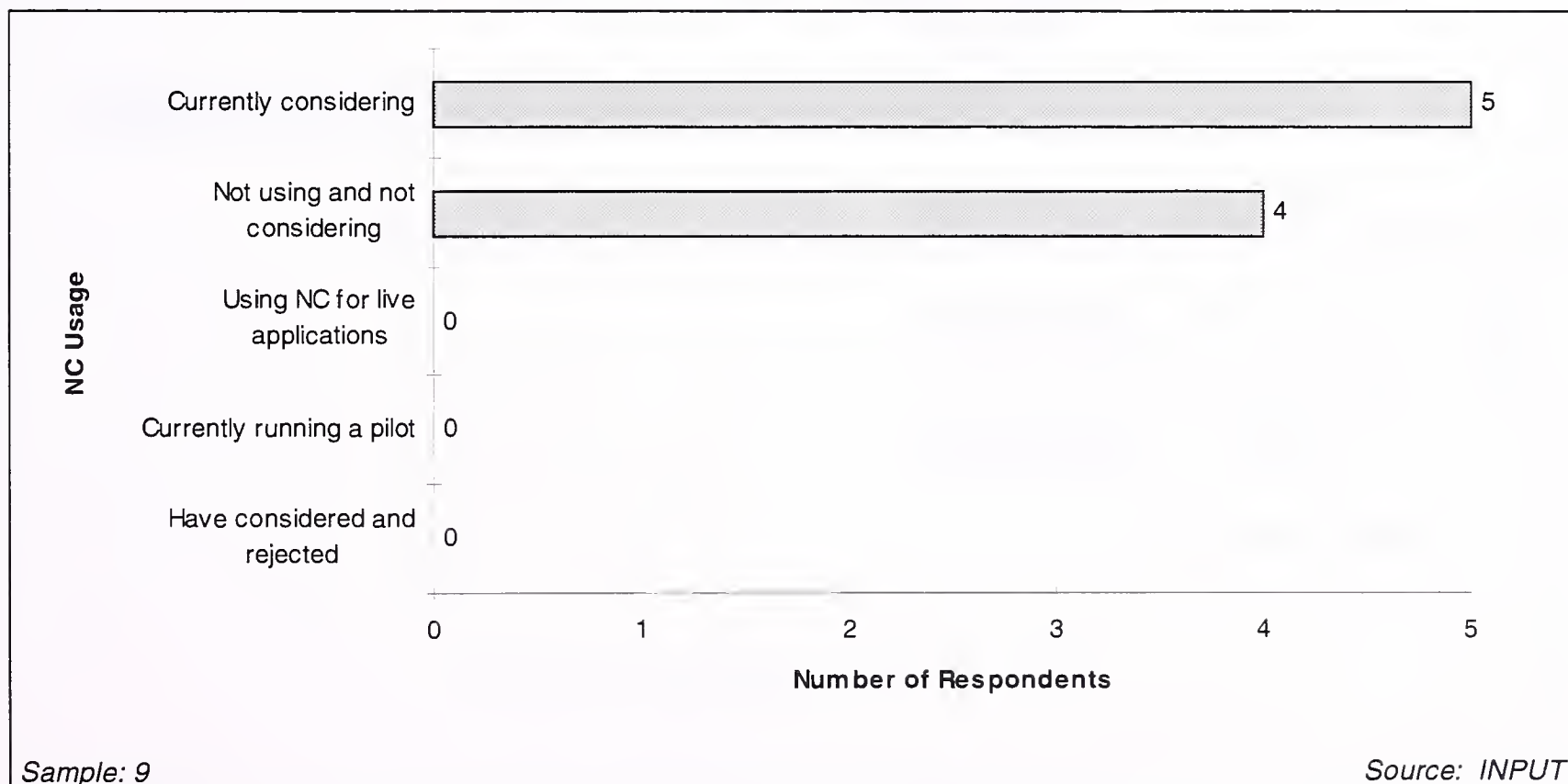


Exhibit III-10

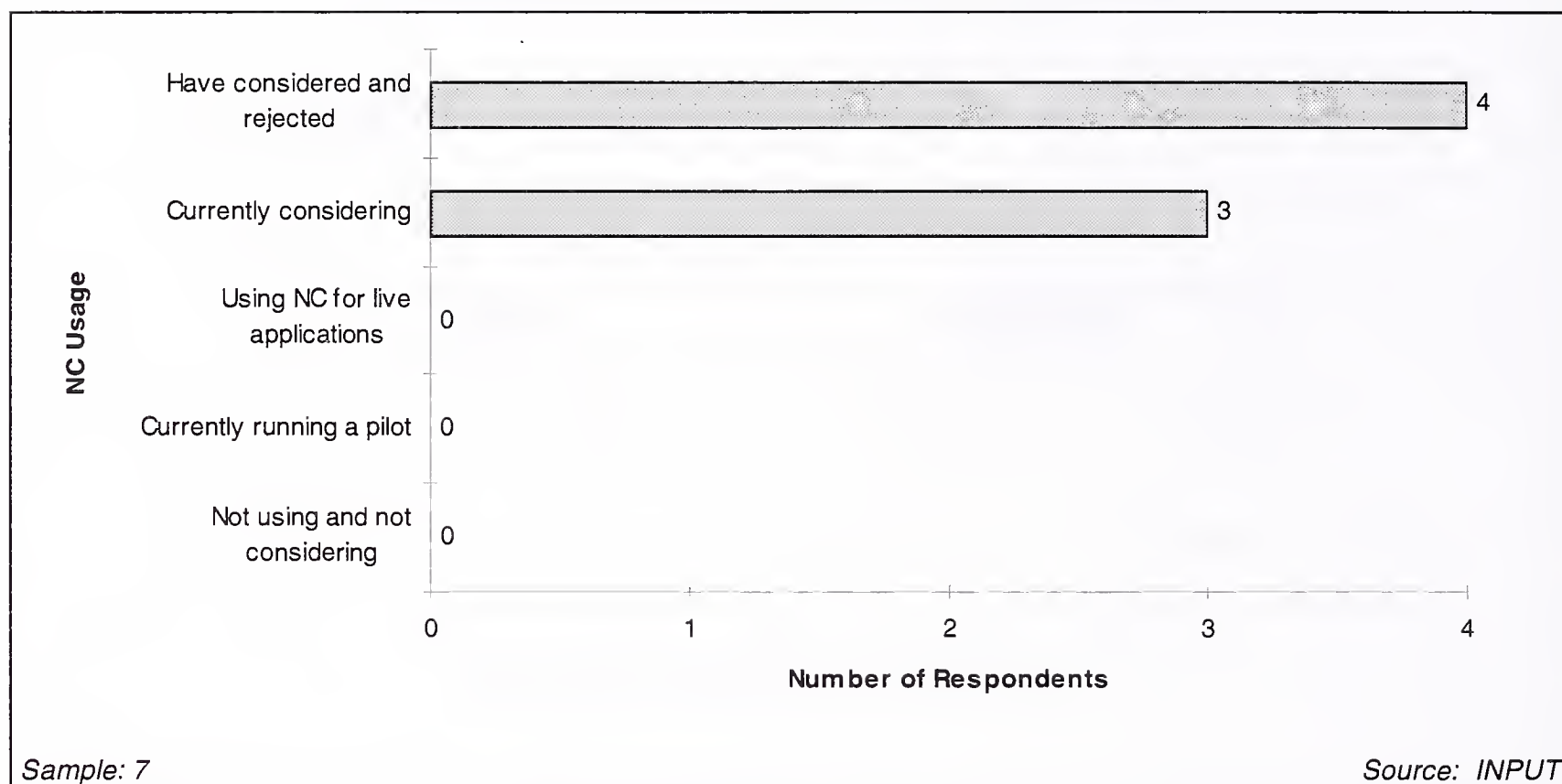
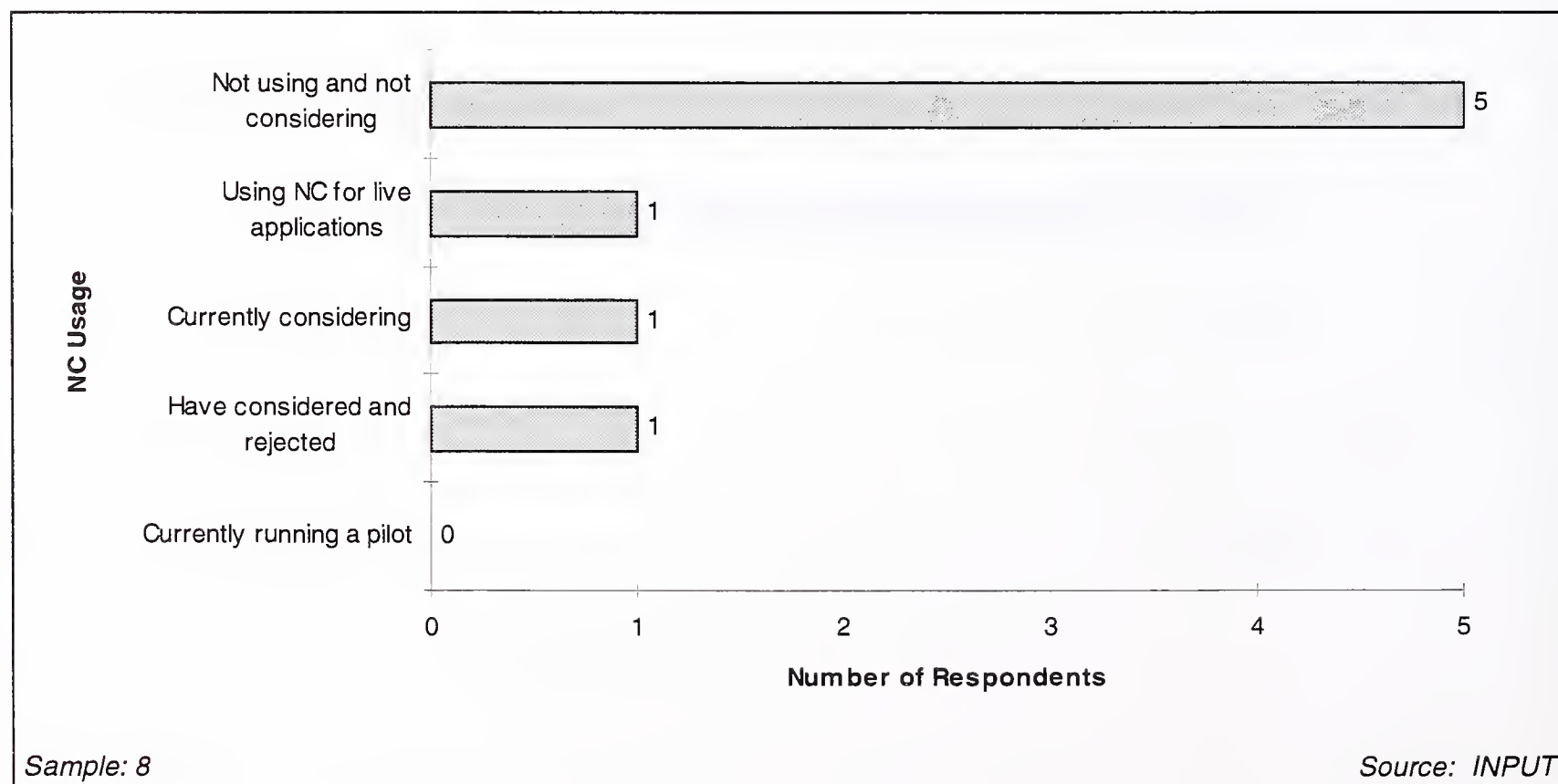
State of NC Usage—Utilities

Exhibit III-11

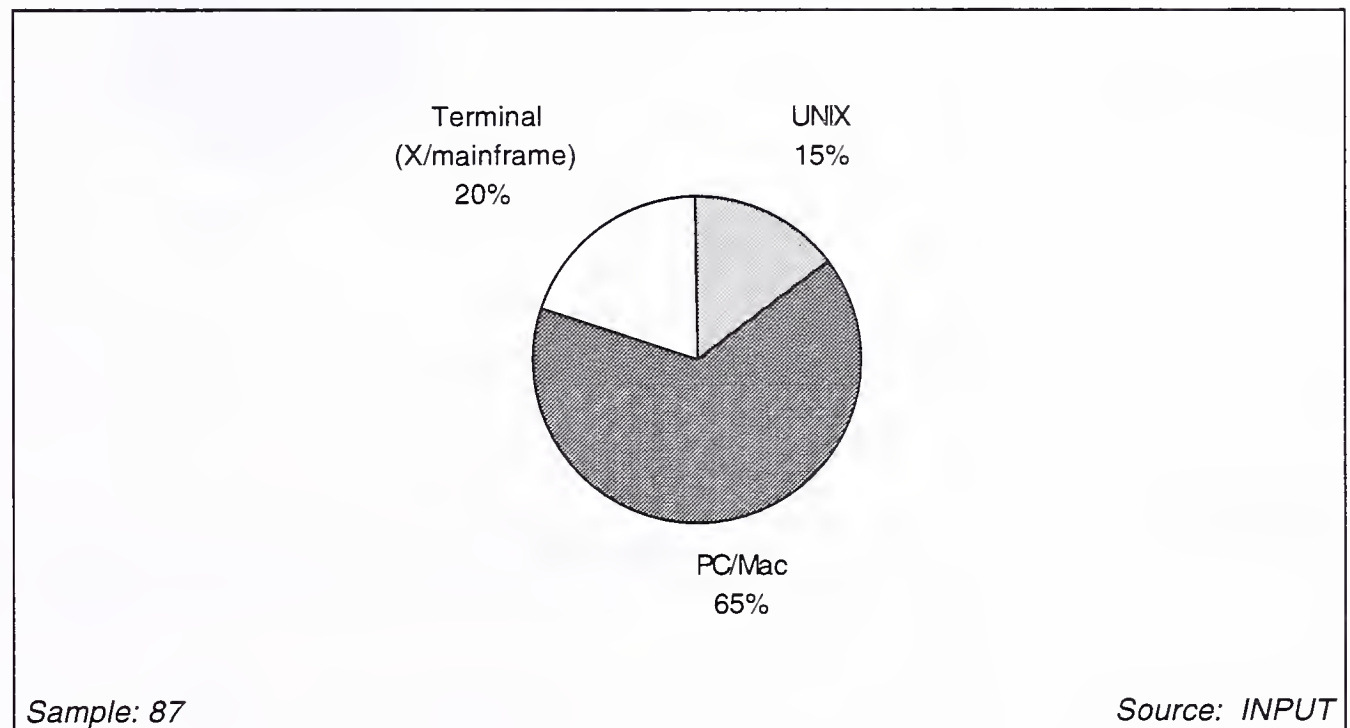
State of NC Usage—Wholesale

B**Platforms in Current Use****1. Client Platforms**

Exhibit III-12 breaks down current client platforms in use across the surveyed organisations. Most client platforms are PCs (most running MS Windows, but also including other PC operating systems and Apple Macintoshes).

Exhibit III-12

Client Platforms in Current Use—Europe



PC usage is similar across the UK, France and Germany, but UNIX is rather more common in Germany than in France, and mainframe and X terminals are more common in France than in Germany (Exhibits III-13 to III-15).

Exhibit III-13

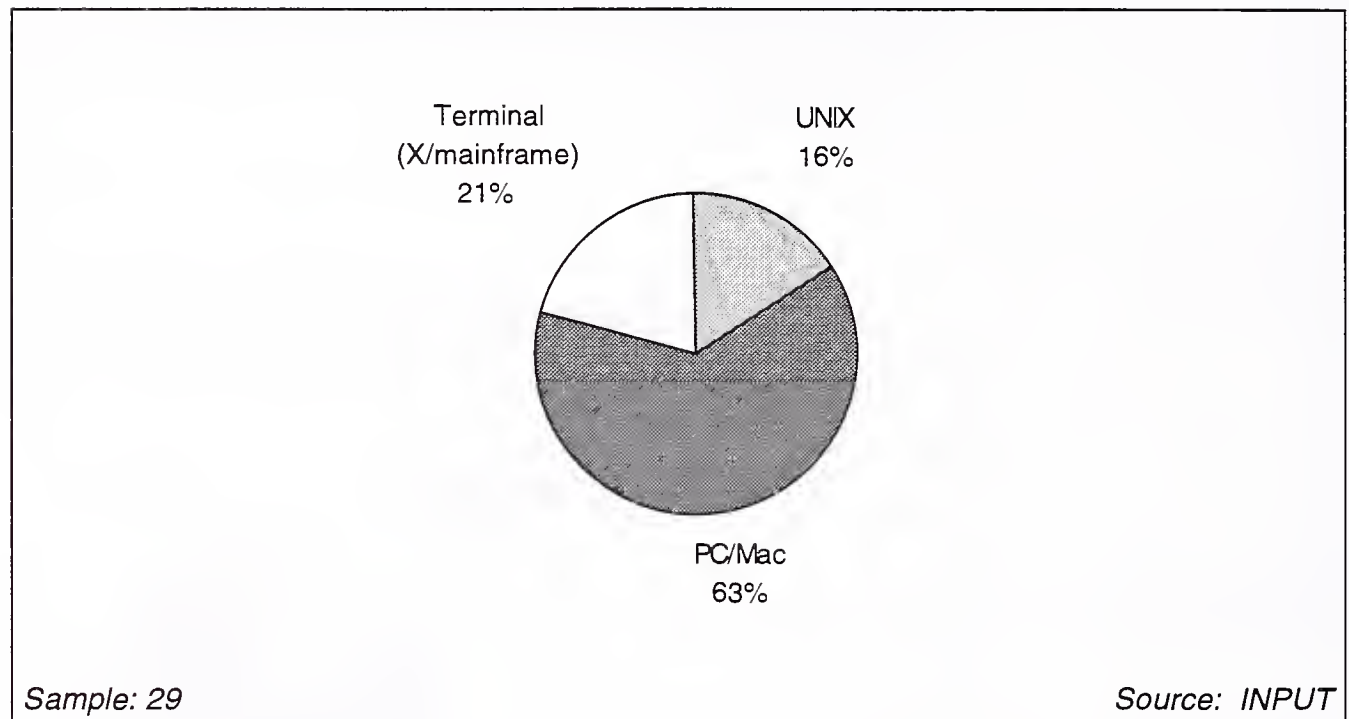
Client Platforms in Current Use—UK

Exhibit III-14

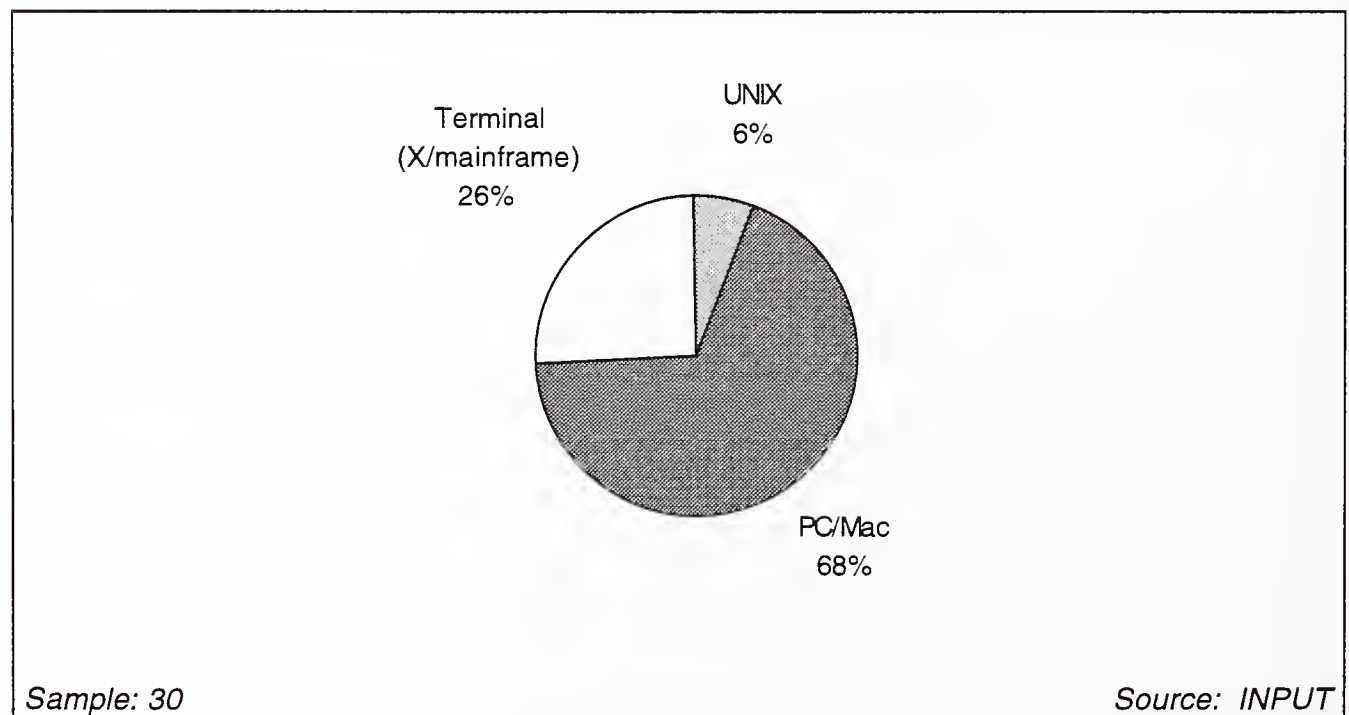
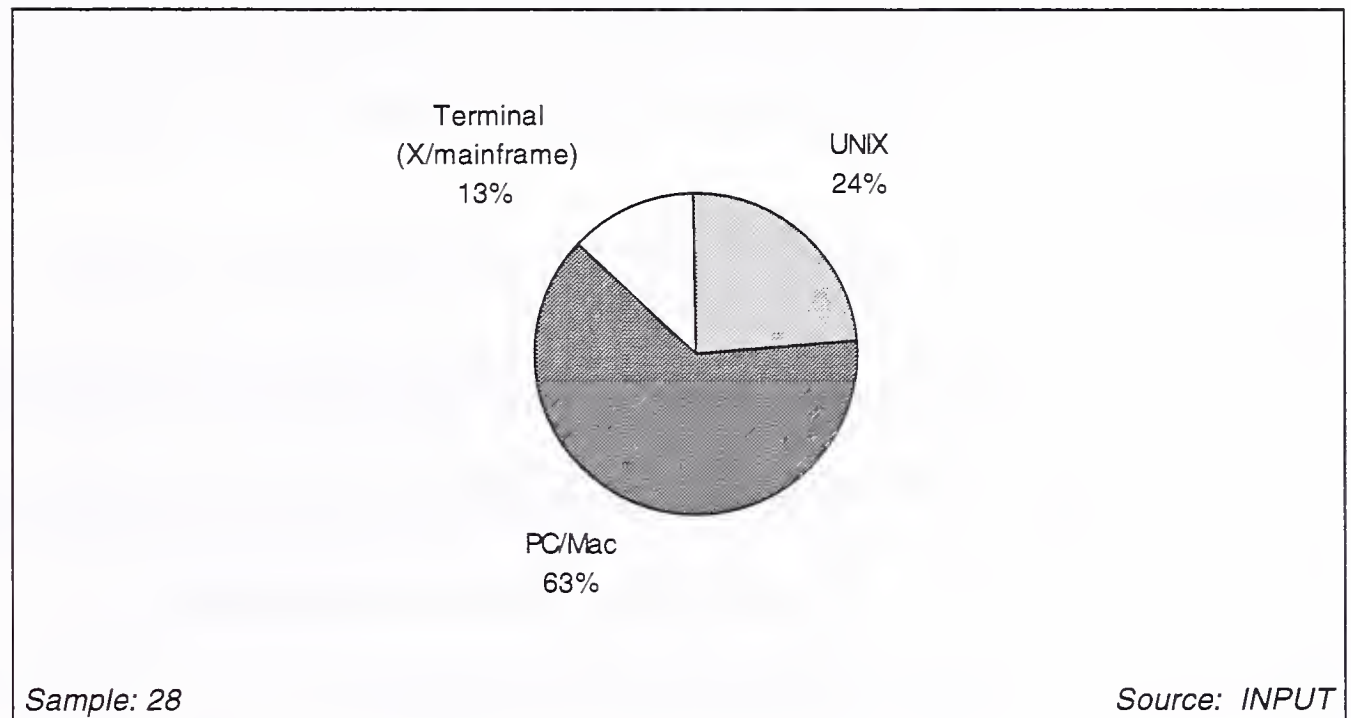
Client Platforms in Current Use—France

Exhibit III-15

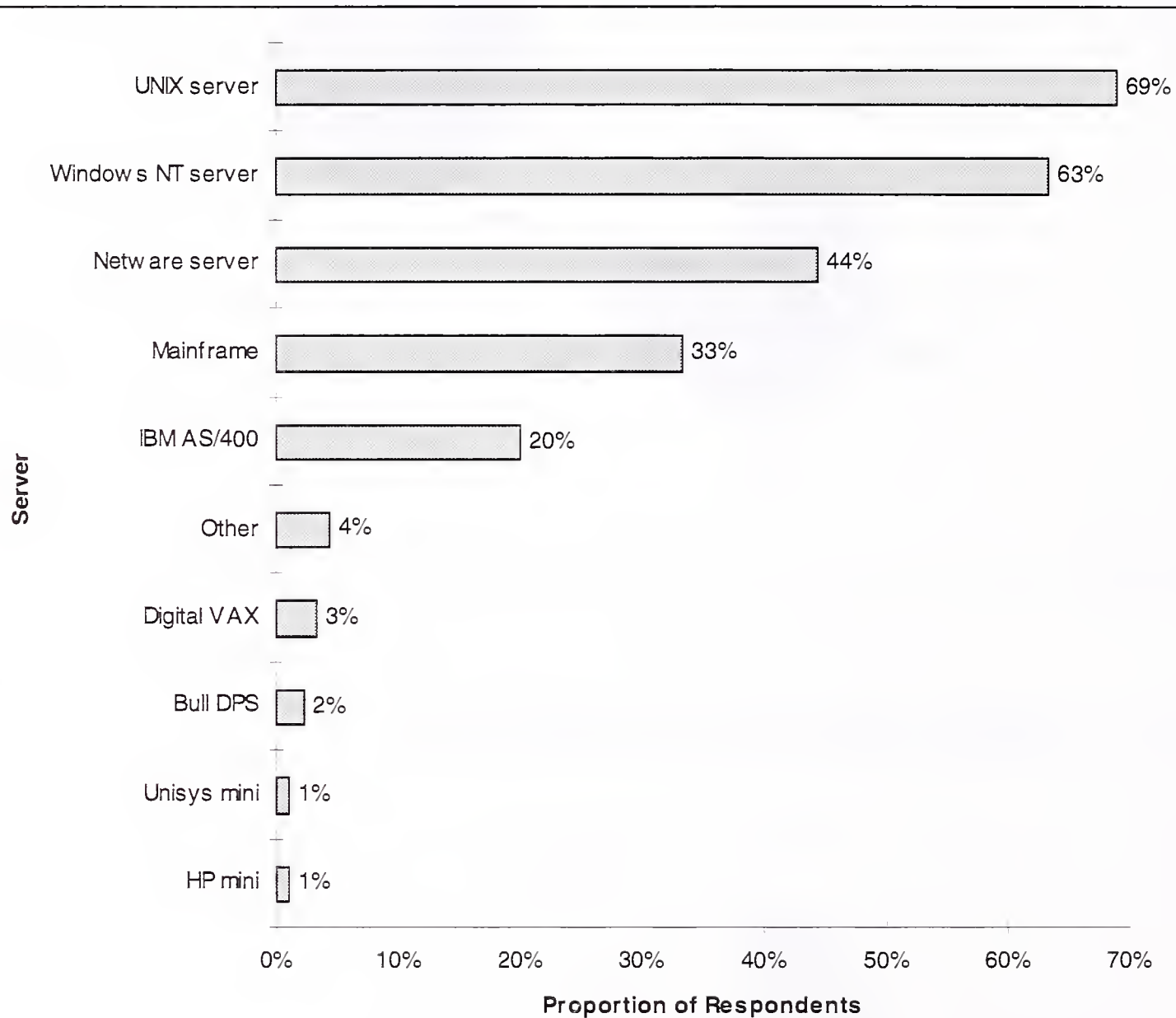
Client Platforms in Current Use—Germany

2. Server Platforms

Exhibit III-16 shows the primary server platforms currently in use. Windows NT continues to encroach into UNIX' installed base, and the use of Netware as a primary platform continues to decline.

Exhibit III-16

Server Platforms in Current Use—Europe



Sample: 90

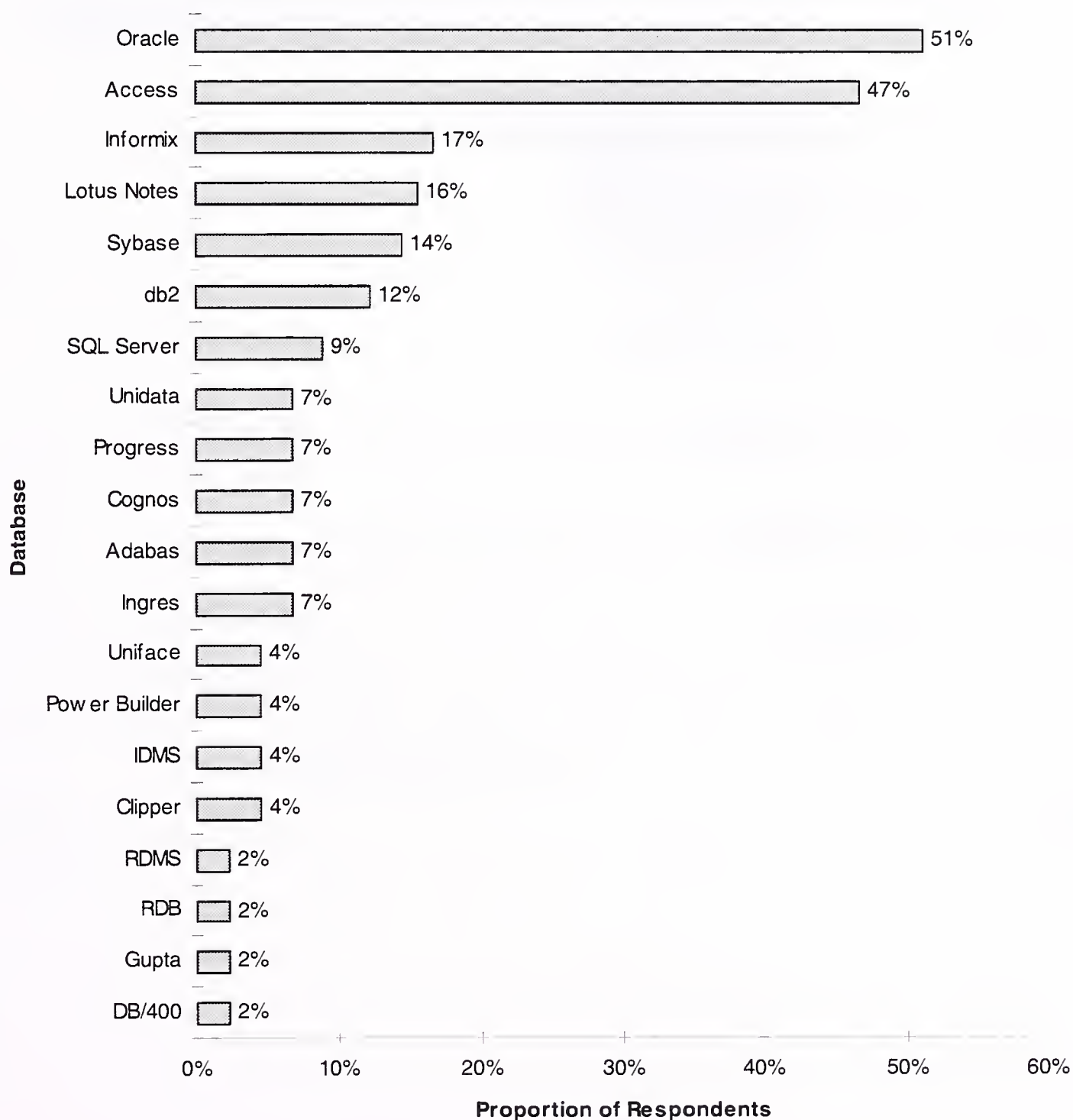
Source: INPUT

3. Databases

Exhibit III-17 shows the database platforms most commonly in current use. Oracle retains its strong position in the database market, yet Access is as widely used, and will increase in use as deployment of Windows NT increases.

Exhibit III-17

Database Platforms in Current Use—Europe



Sample: 90

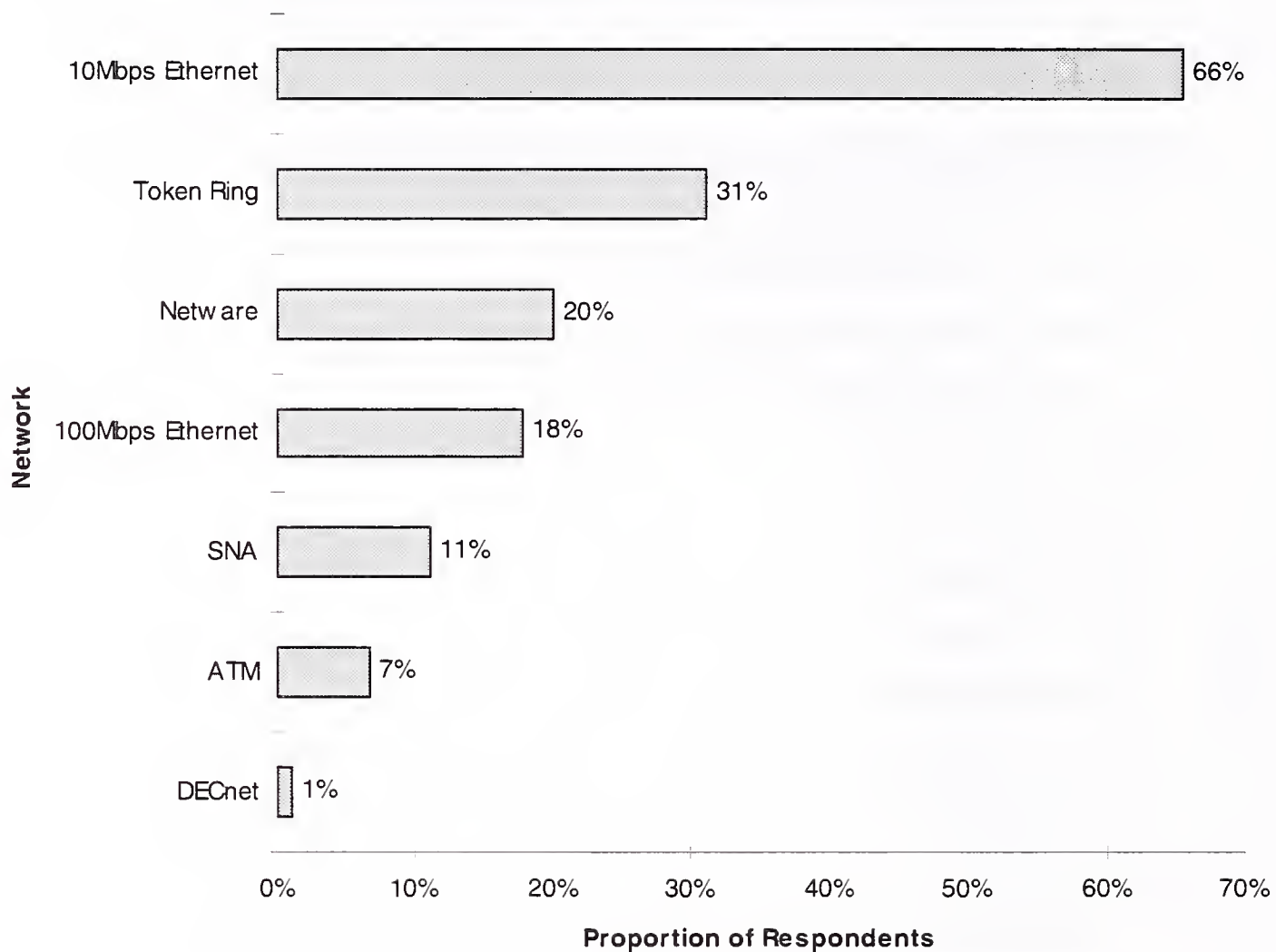
Source: INPUT

4. Networks

Exhibit III-18 shows the networks most commonly in current use. Standard Ethernet (10Mbps) is still by far the most common architecture, with Fast Ethernet (100Mbps) yet to achieve significant penetration.

Exhibit III-18

Network Platforms in Current Use—Europe



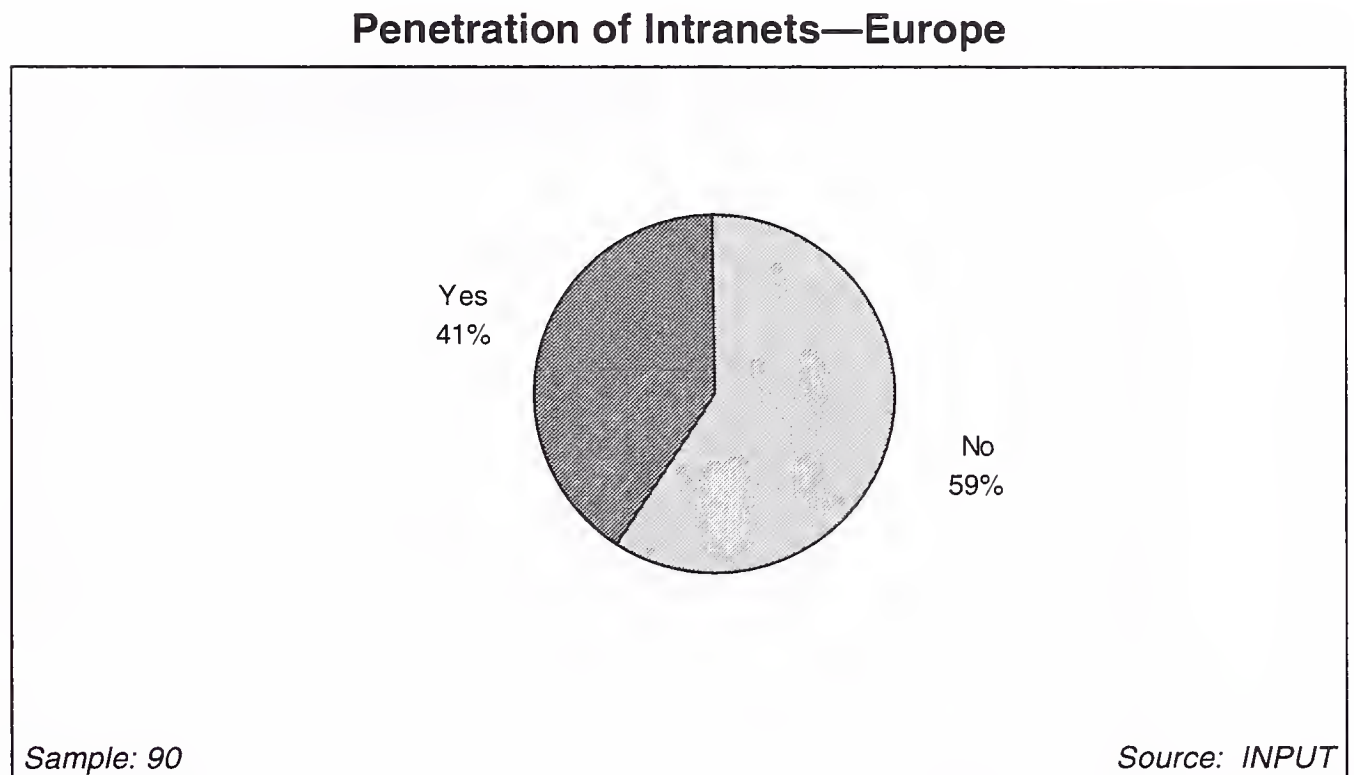
Sample: 90

Source: INPUT

5. Intranets

Around 40% of users across Europe are operating or developing an Intranet (Exhibit III-19).

Exhibit III-19



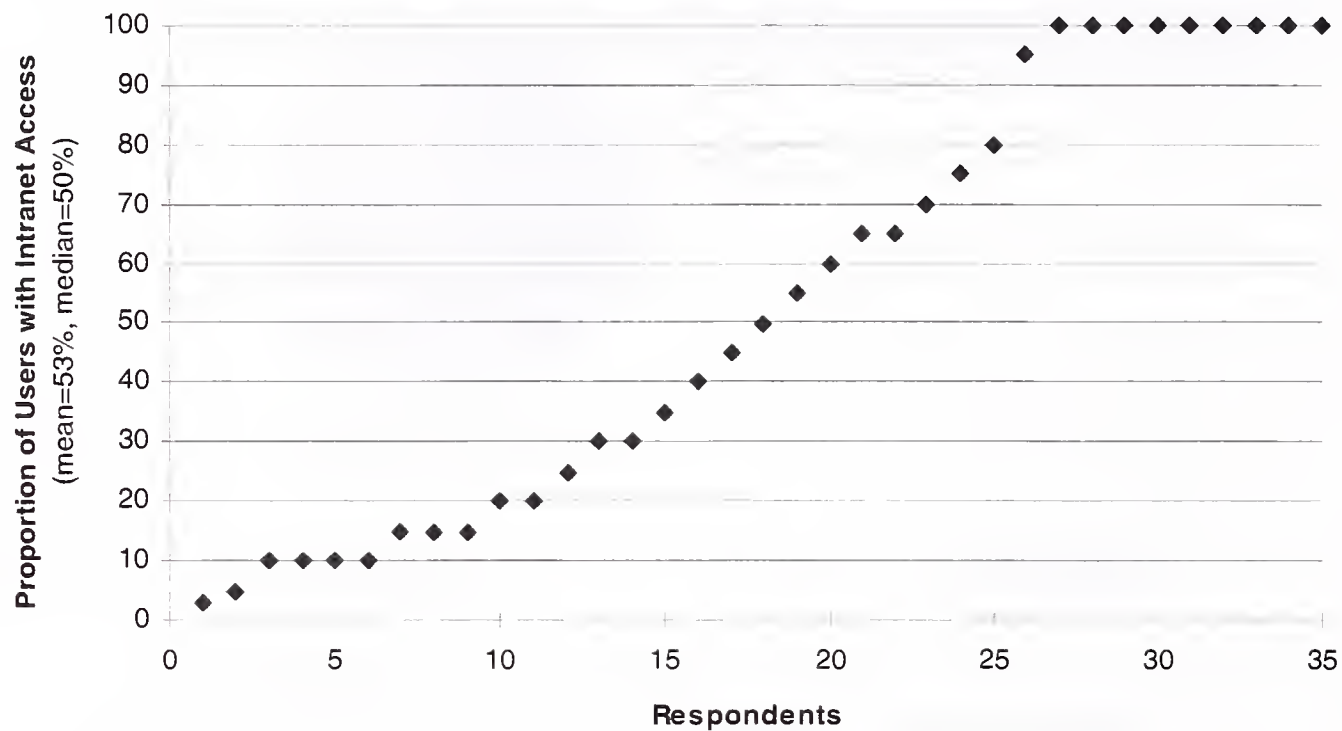
The proportions of users with Intranets across the countries surveyed are:

- UK: 40%
- France: 37%
- Germany: 47%

Within those organisations, Intranets are accessible by, on average, half the user population, although accessibility varies from negligible to 100% (see Exhibit III-20).

Exhibit III-20

Intranet Accessibility—Europe



Sample: 35

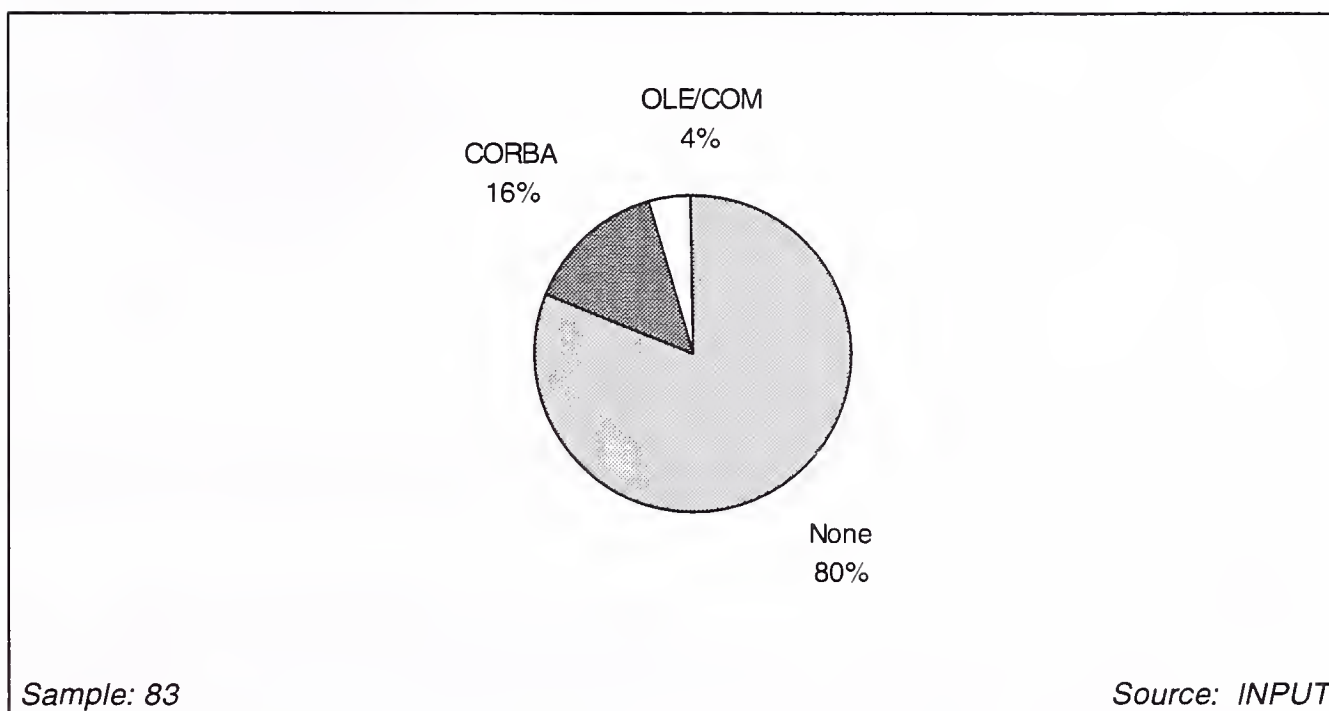
Source: INPUT

6. Object Models

Most organisations do not have an enterprise-wide object model in place. Just 16% use CORBA and 4% use OLE/COM, with 80% using nothing currently.

Exhibit III-21

Object Models in Current Use—Europe



UK and French respondents indicated very similar levels of usage of the CORBA and OLE/COM frameworks, but CORBA was more prevalent among German respondents (Exhibits III-22 to III-24)

Exhibit III-22

Object Models in Current Use—UK

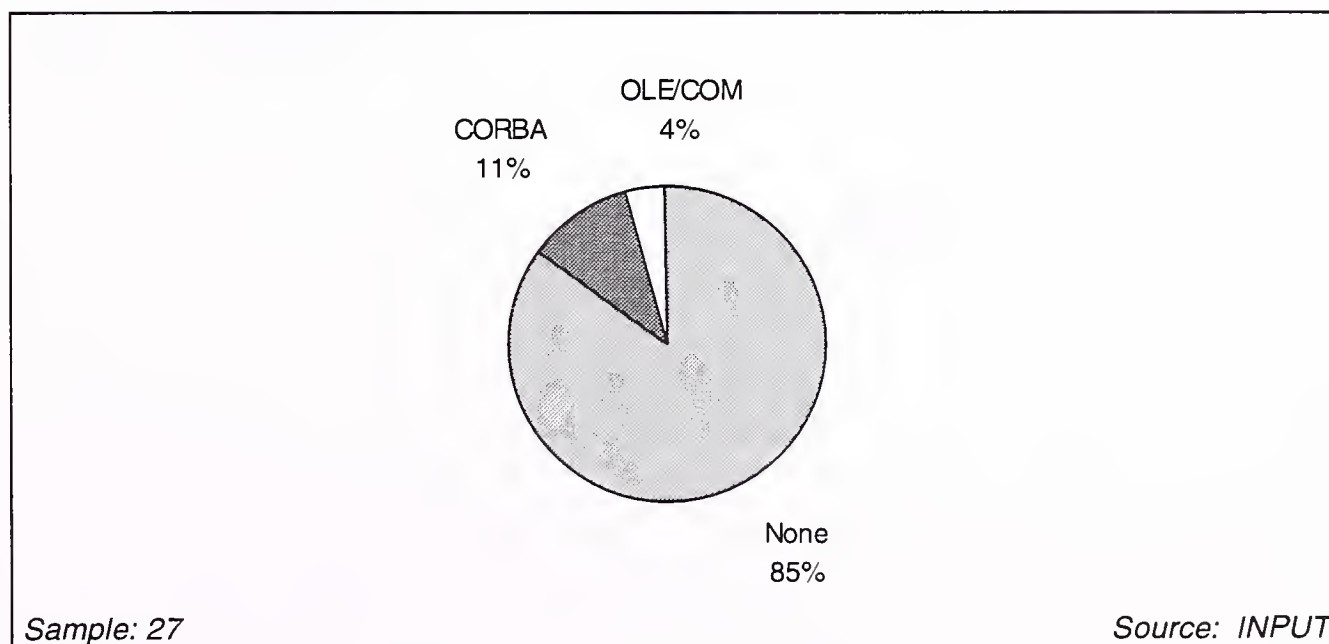


Exhibit III-23

Object Models in Current Use—France

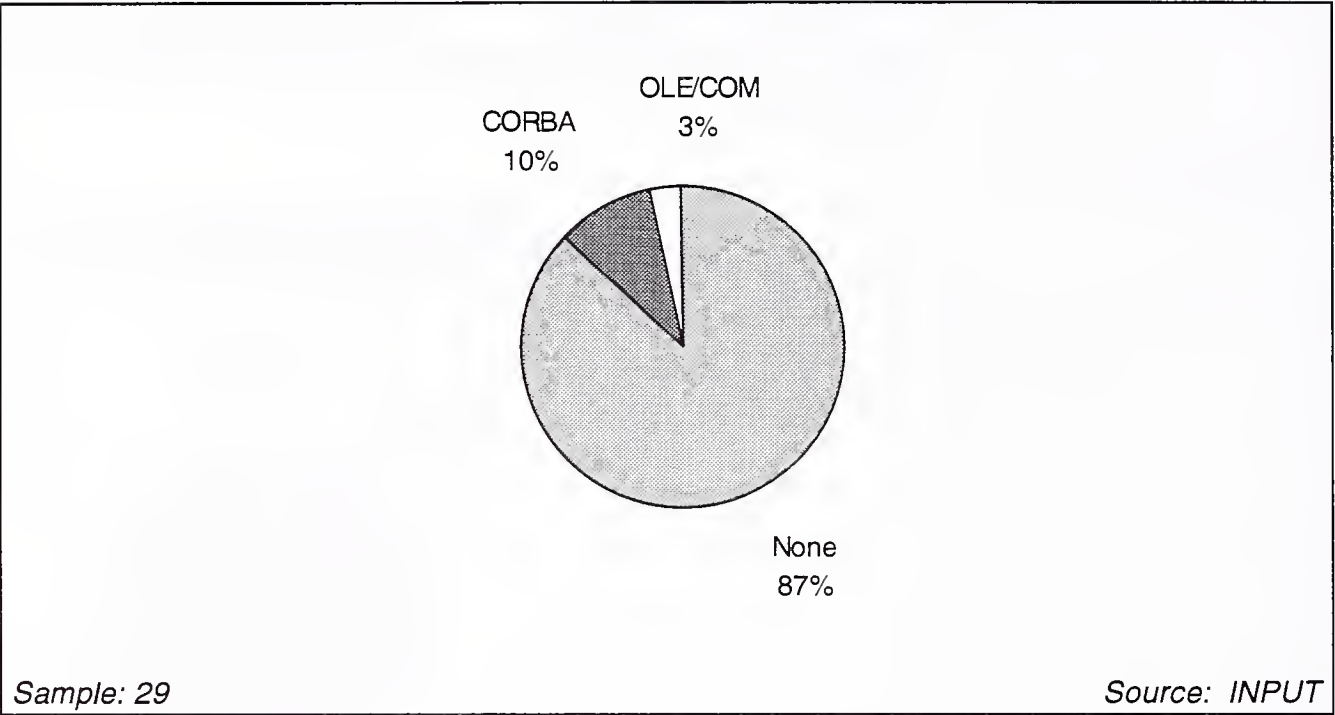
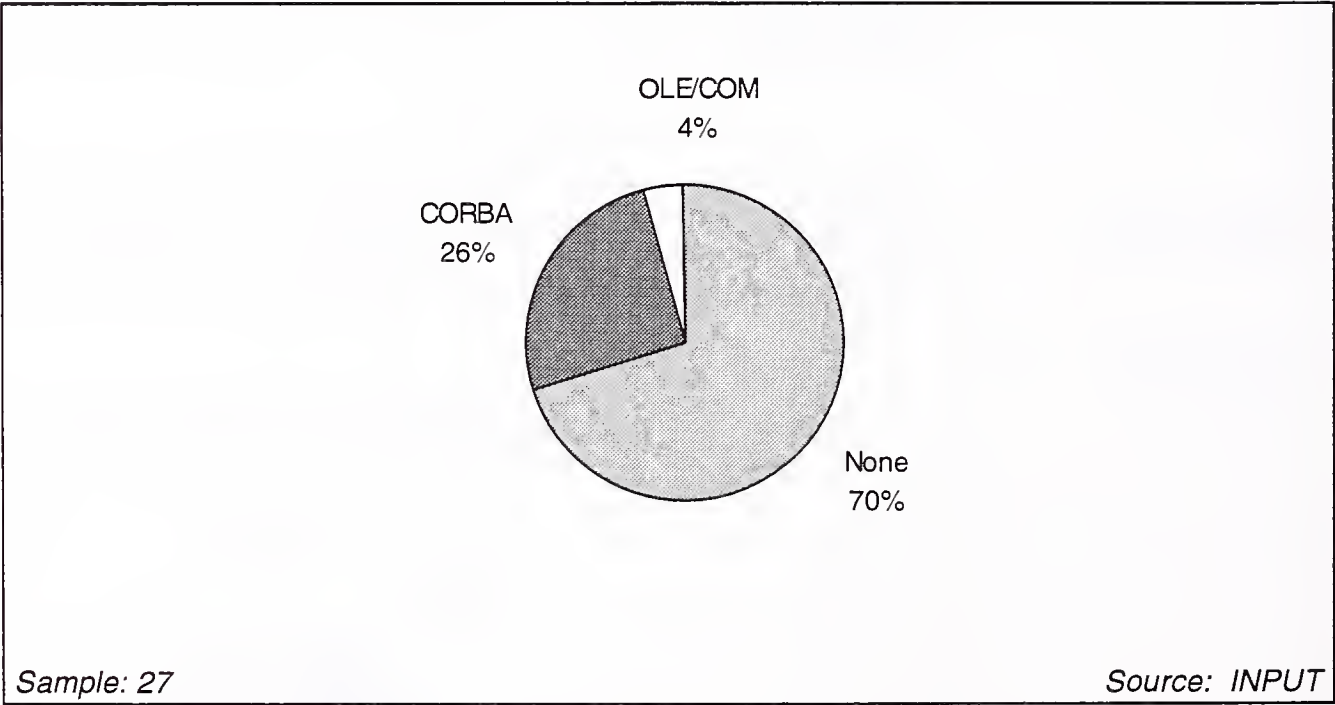
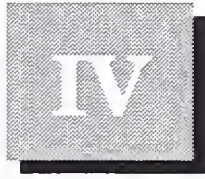


Exhibit III-24

Object Models in Current Use—Germany





Suitability of NCs and Related Platforms for Enterprise Computing

A

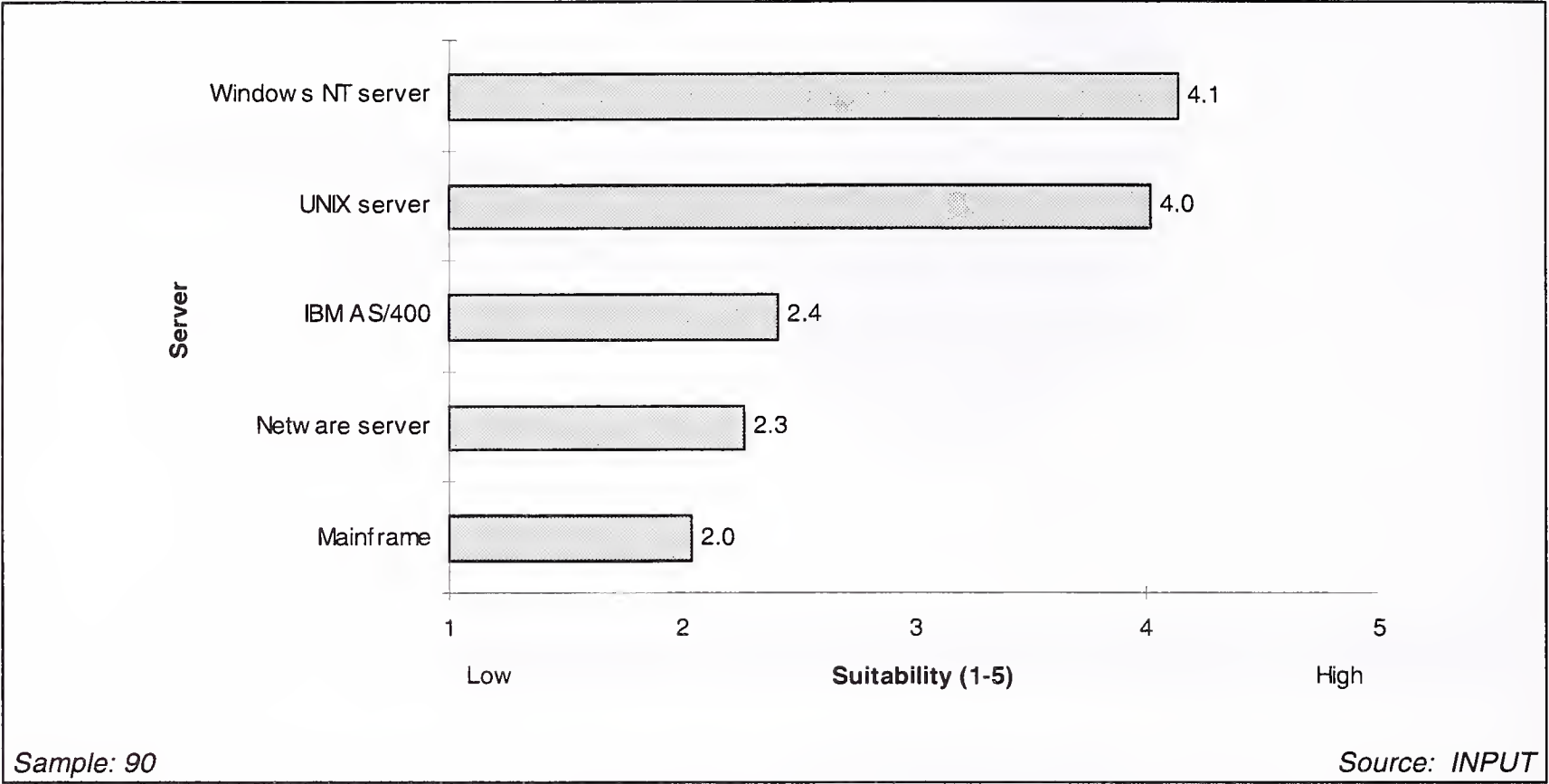
Suitability of Existing Infrastructure for NC Support

1. Server Platforms

Exhibit IV-1 shows the perceived suitability of server platforms for supporting NC users. NT and UNIX are both considered highly suited to NC environments, but the other platforms in common usage are regarded emphatically as unsuitable.

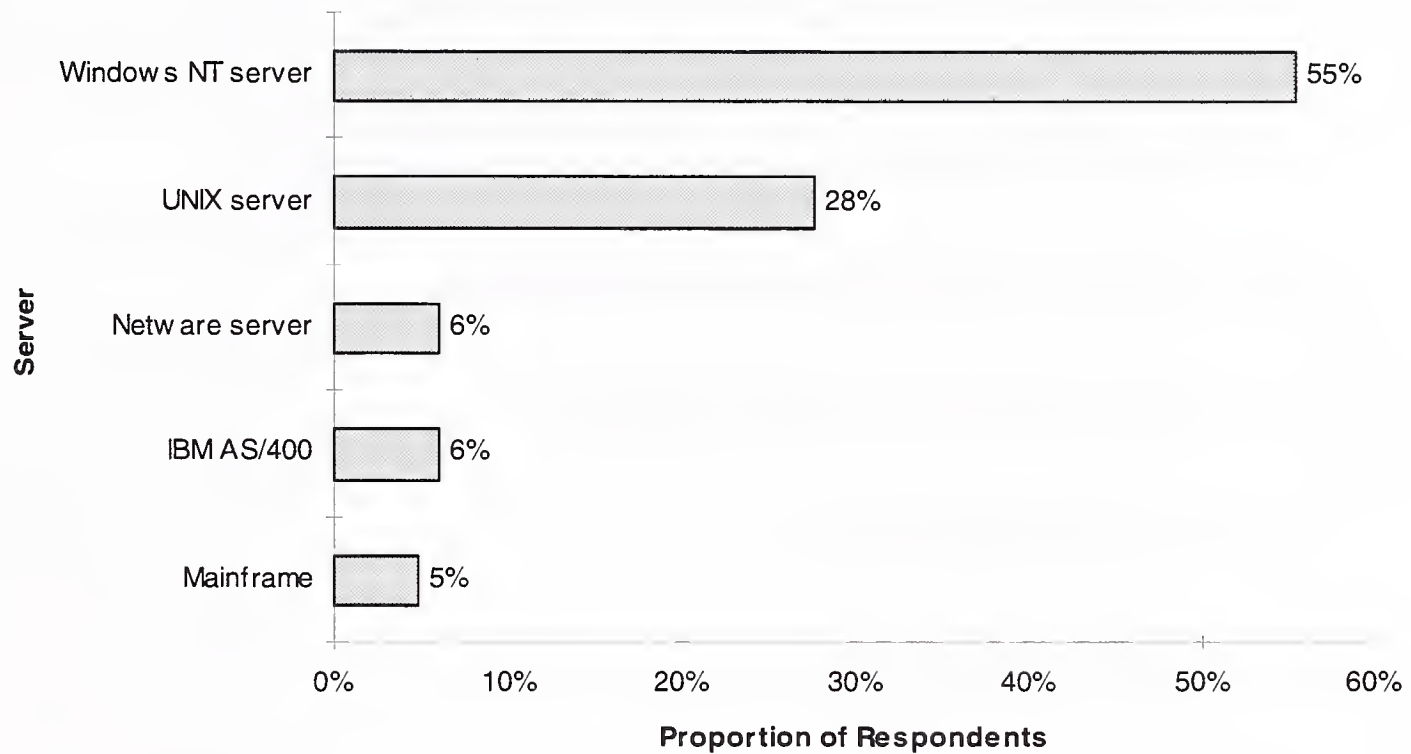
Exhibit IV-1

Suitability of Server Platforms for NCs—Europe



UNIX and NT received very similar responses for usage and suitability for NC support. However, when asked to select the one most suitable platform, Windows NT was the clear choice: 55% of respondents selected NT compared with 28% for UNIX, and only very small proportions for other platforms (Exhibit IV-2)

Exhibit IV-2

Most Suitable Server Platform for NCs—Europe

Sample: 83

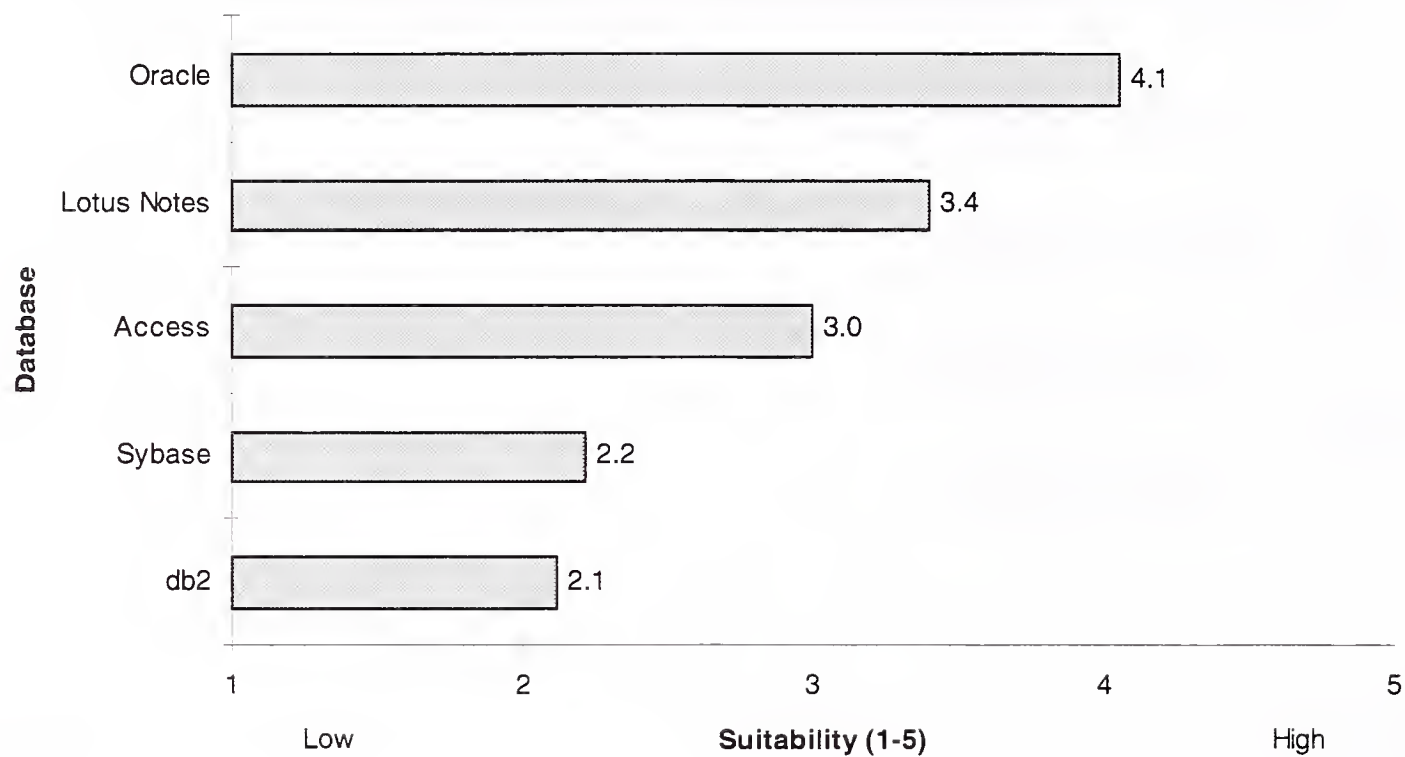
Source: INPUT

2. Database Platforms

Exhibit IV-3 shows the perceived suitability of database platforms for supporting NCs. Only Oracle can be said to be considered "very suitable", rated at 4.1 out of 5, while Access must be regarded as only moderately suitable. Lotus Notes, with its rich Internet/Intranet functionality is a better fit for NCs currently.

Exhibit IV-3

Suitability of Database Platforms for NCs—Europe



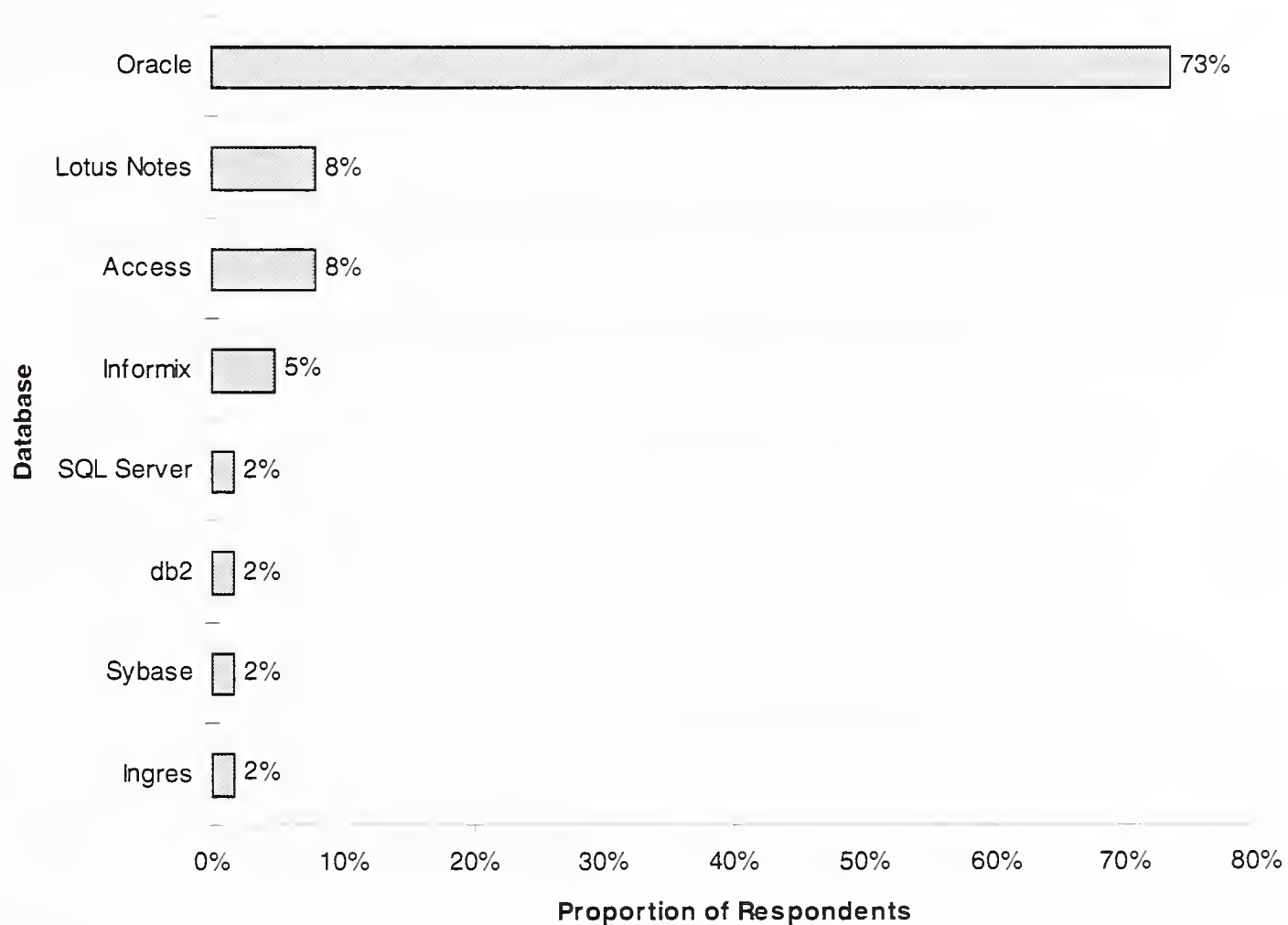
Sample: 90

Source: INPUT

When asked to select the most suitable database, Oracle was the overwhelmingly popular choice, selected by 73% of respondents (Exhibit IV-4). Lotus Notes and Access were each chosen by only eight percent of respondents, and other databases by even fewer. While Lotus Notes is considered reasonably well matched to NCs, Oracle is the clear choice of users, given the scenario of a single-database environment.

Exhibit IV-4

Most Suitable Database Platform for NCs—Europe



Sample: 64

Source: INPUT

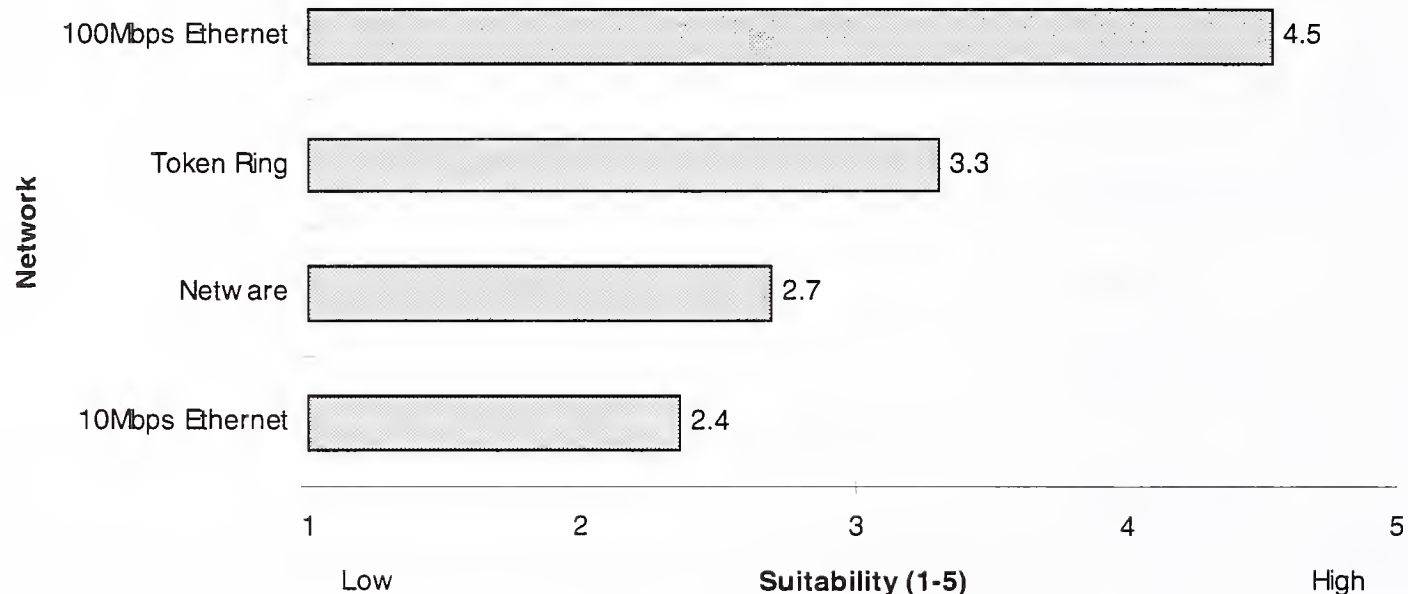
3. Network Platforms

Exhibit IV-5 shows the perceived suitability of network platforms for supporting NCs. Fast Ethernet (100Mbps Ethernet) is considered to be very highly suitable, rated at 4.5 out of 5, while standard 10Mbps Ethernet, still the most widespread network architecture, is considered unsuitable.

Only seven percent of users claimed to operate an ATM network as a primary network. Few of those users rated ATM's suitability for supporting an NC environment, hence ATM's absence from the Exhibit below, but those ratings received were high.

Exhibit IV-5

Suitability of Network Platforms for NCs—Europe



Sample: 90

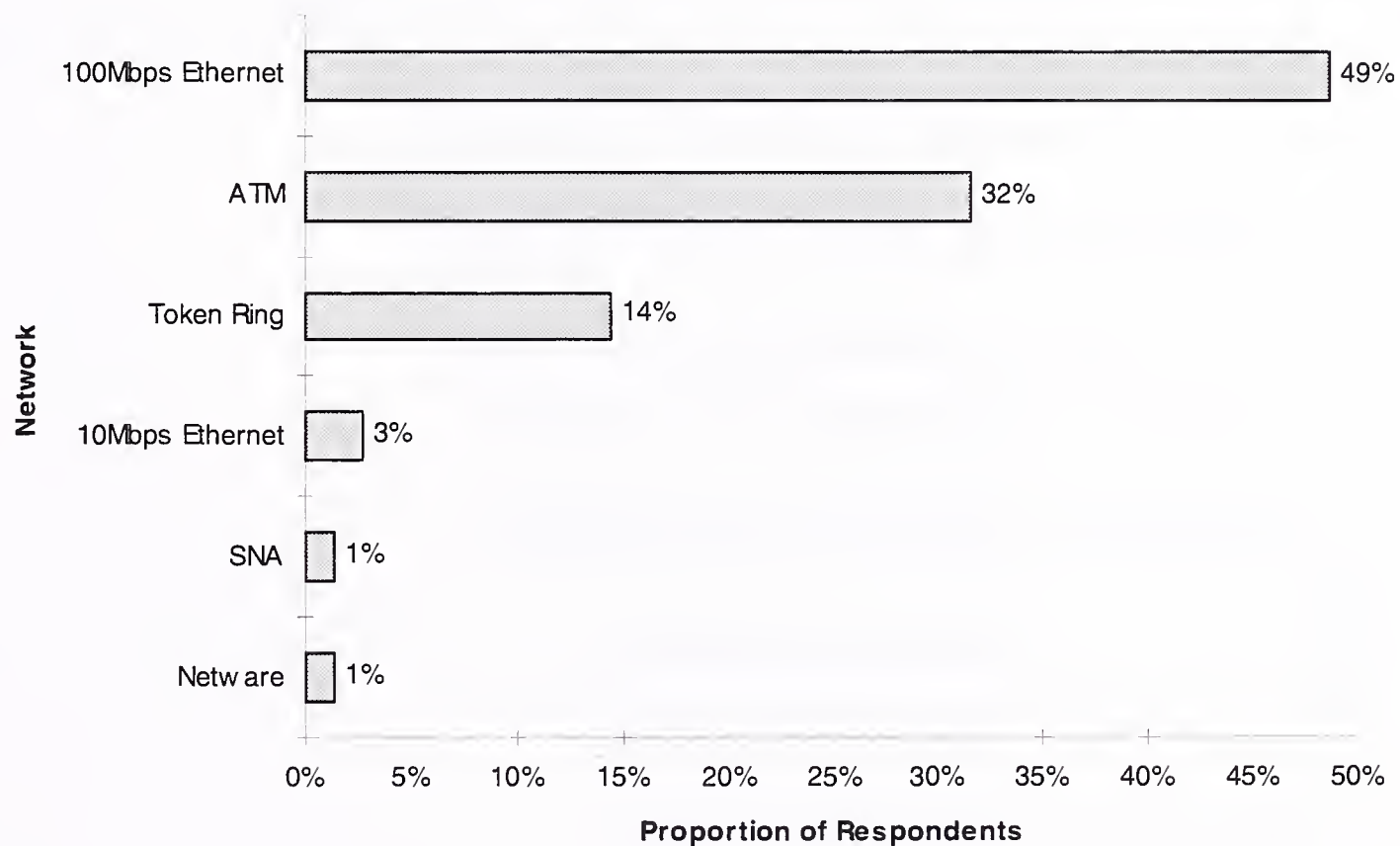
Source: INPUT

When asked to select the most suitable network for an NC environment, 100Mbps Ethernet was the favored choice, with 49% of respondents. ATM followed, chosen by 32% (Exhibit IV-6).

The disparity between Fast Ethernet's and ATM's perceived ability to support the requirements of NC users and their current penetration indicates the need for widespread changes in network infrastructure to take place for NCs to operate on a large scale.

Exhibit IV-6

Most Suitable Network Platform for NCs—Europe



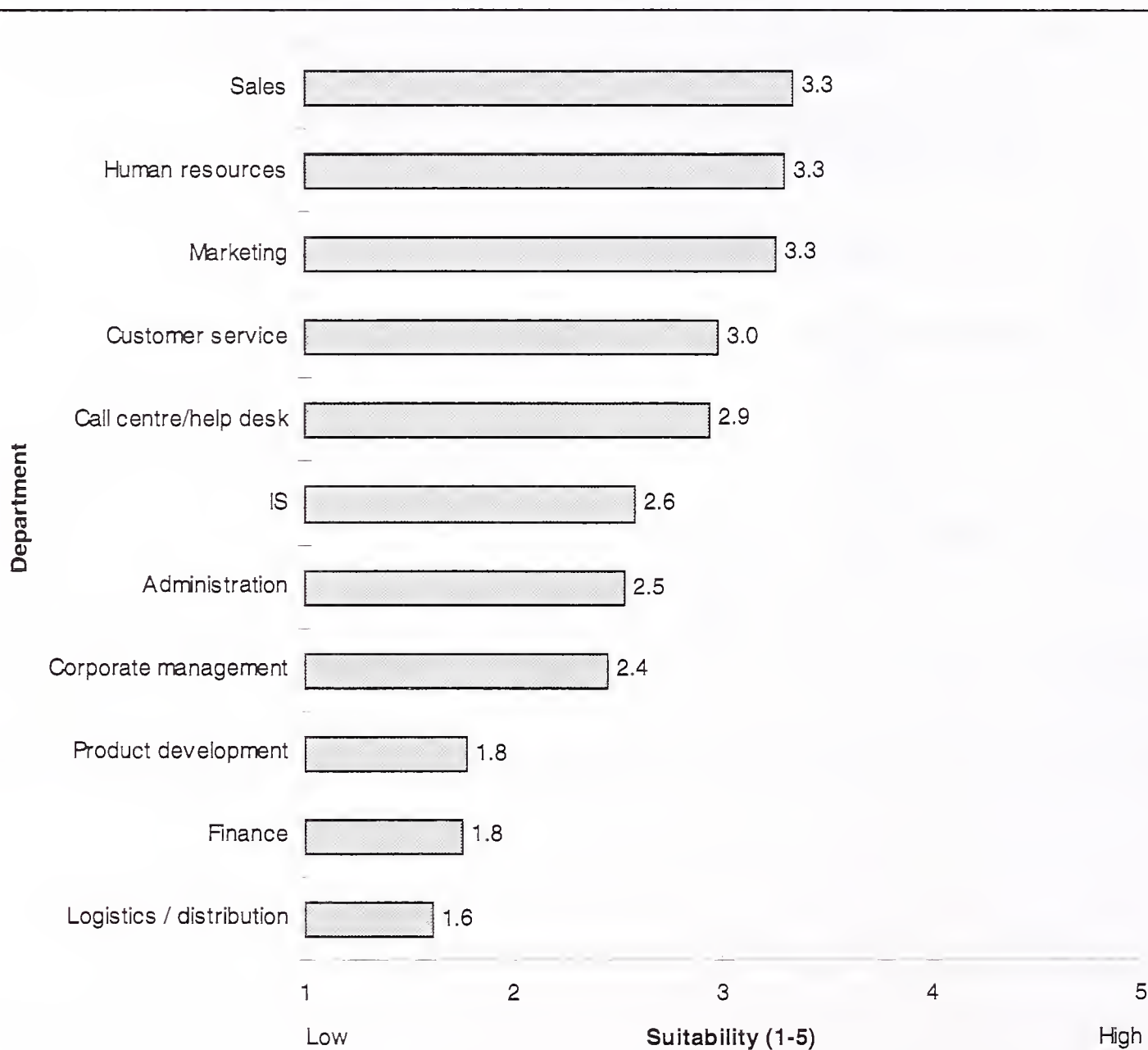
Sample: 76

Source: INPUT

B**Suitability of NCs to Department and Application**

Exhibit IV-7 shows the suitability of NCs to individual departments as perceived by respondents. Sales, HR, and marketing are considered moderately suitable for NC deployment, and departments typically populated by power users are rated as less suitable: IS, corporate management, product development, and finance form most of the lowest rated departments.

Exhibit IV-7

Suitability of NCs by Department—Europe

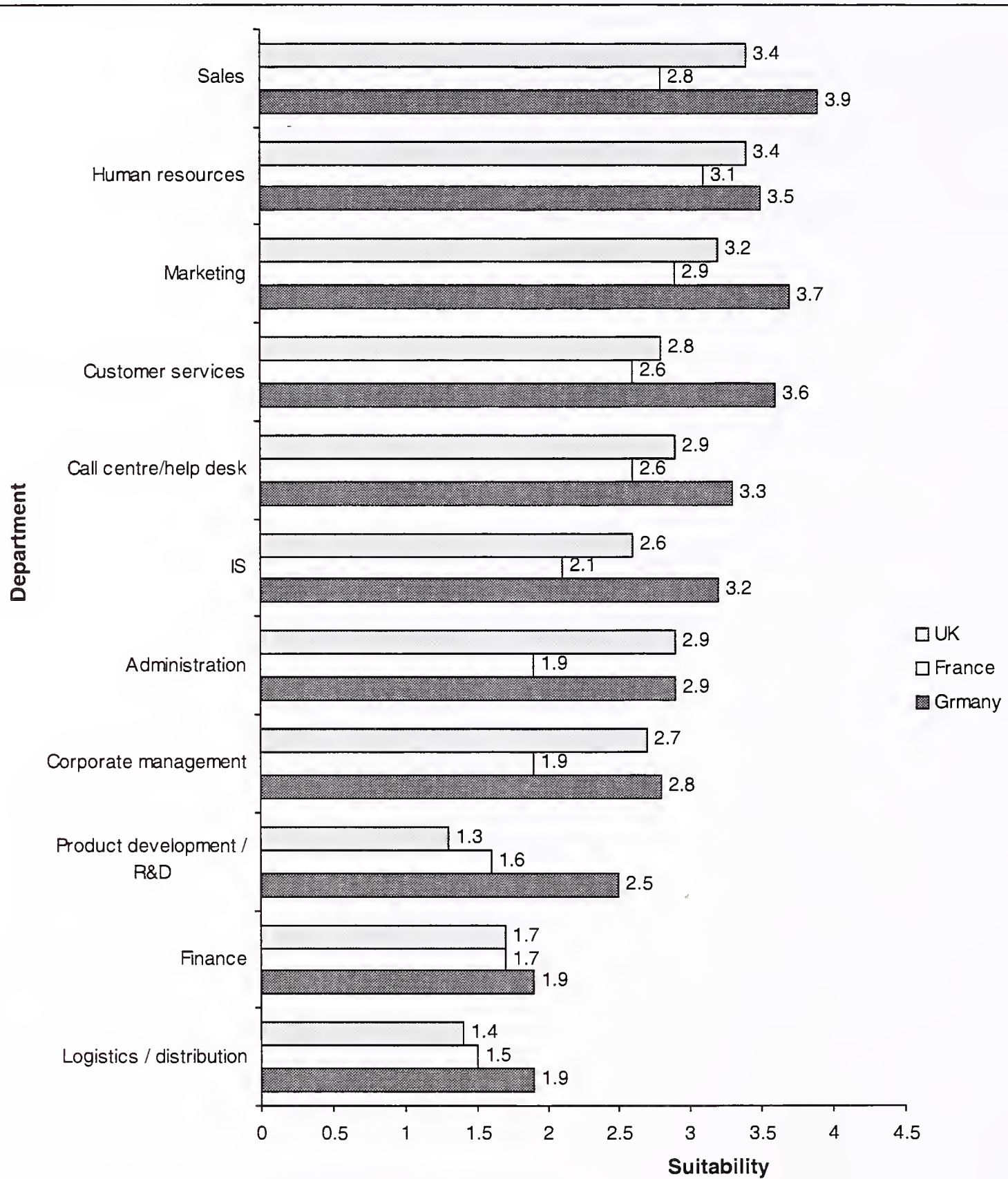
Sample: 48

Source: INPUT

Exhibit IV-8 shows how suitable respondents in each country considered NCs to be for individual departments. For each country, the three most suited departments (listed in order) were:

- UK—sales, HR, marketing
- France—HR, marketing, and sales
- Germany—sales, marketing, customer service

Exhibit IV-8

Suitability of NCs by Department—by Country

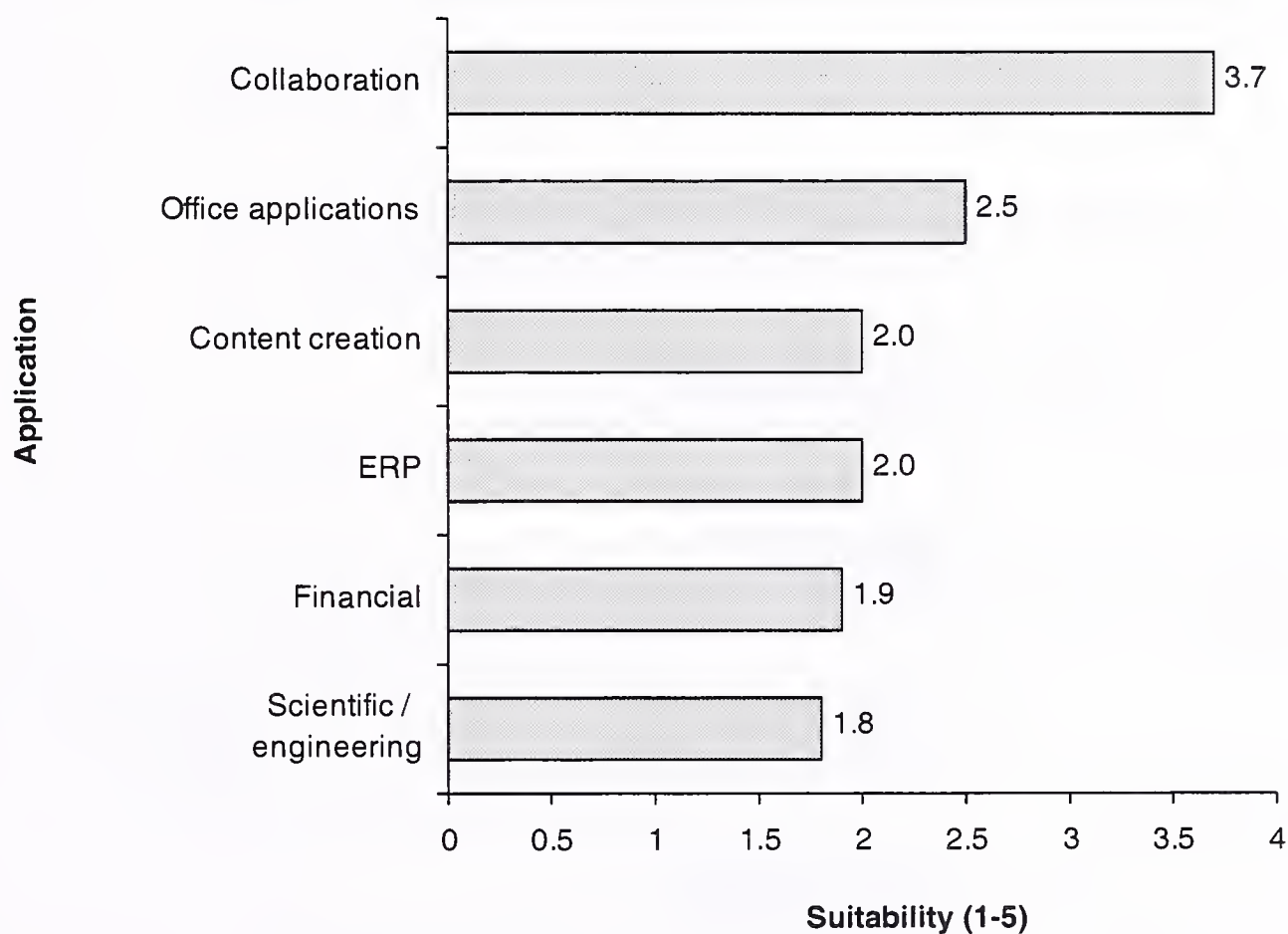
Sample: 48

Source: INPUT

Collaborative applications (primarily messaging and groupware) are considered reasonably highly suitable for NCs. Unlike the other applications listed (with the exception of ERP), collaborative applications are inherently network-centric, to the extent that their operation relies totally on an underlying network infrastructure. It is no surprise, therefore, to find their suitability for NCs to be perceived as significantly above average. Once again, power user applications (financial and scientific/engineering) are considered to be unsuitable for NCs.

Exhibit IV-9

Suitability of NCs by Application—Europe



Sample: 55

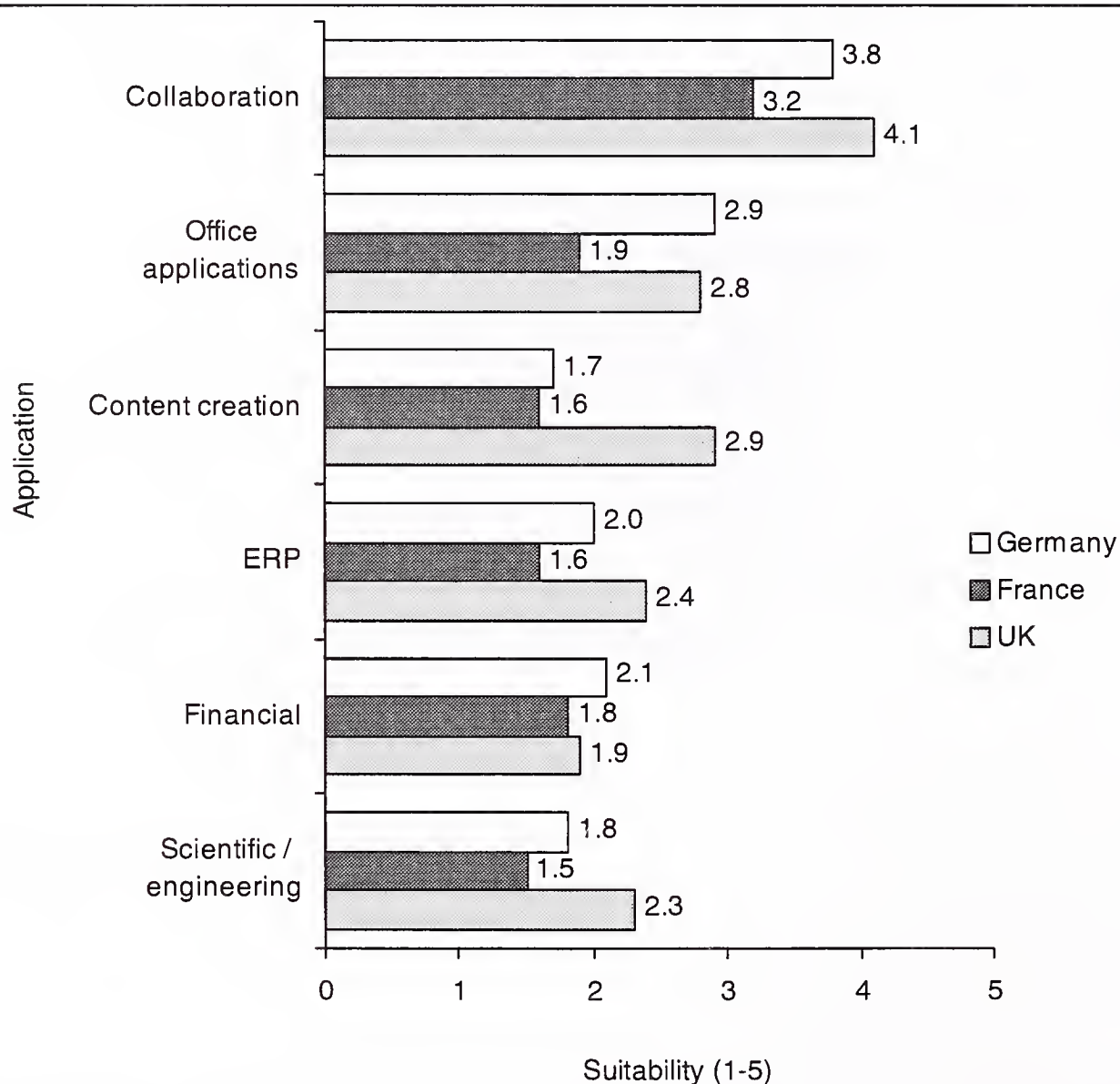
Source: INPUT

Exhibit IV-10 shows how suitable respondents in each country considered NCs to be for individual applications. For each country, the three most suited applications (listed in order) were:

- UK—collaboration, office applications, financial
- France—collaboration, office applications, financial
- Germany—collaboration, content creation, office applications

Exhibit IV-10

Suitability of NCs by Application—by Country



Sample: 55

Source: INPUT

C

Suitability of NC Architecture

INPUT defines three types of NC:

- Java terminal
- Hybrid terminal
- Windows terminal

Exhibit IV-11 shows the proportions of respondents that considered each of these three types of NC above to be most suitable to their existing environments.

The proportions of users stating each NC type are similar to the existing breakdown of client platforms. Fifteen percent of client platforms across the sample organisations run UNIX, and 15% of respondents considered Java terminals best suited to their existing environment.

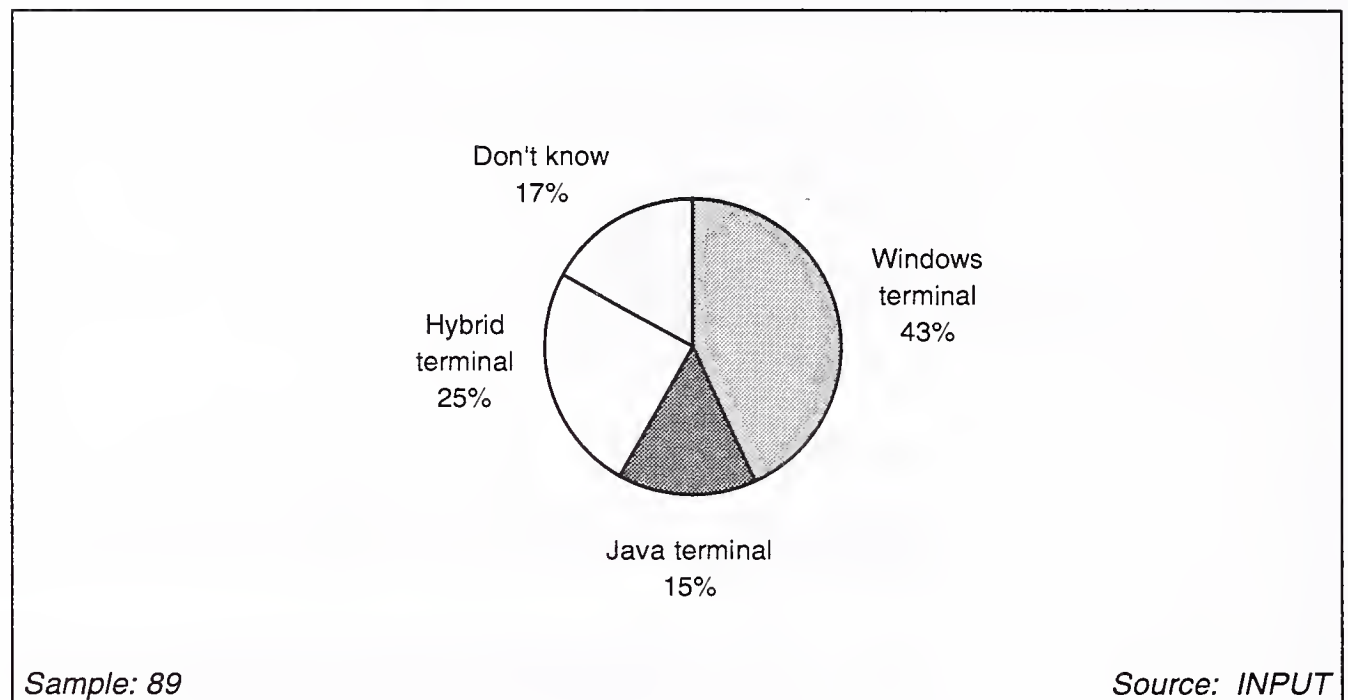
Similarly, 20% of clients are mainframe/X terminals, and 25% of users regarded hybrid terminals as most suitable.

While most NCs are not specialized for a particular environment, INPUT attributes this correlation to the likelihood that NCs will be deployed along architectural lines:

- Java terminals will tend to be placed in UNIX (particularly Sun) environments, despite Java's ability to run on most platforms.
- Hybrid terminals will tend to be placed in environments of mixed servers (mainframe, mini, Windows and UNIX).
- Windows terminals, as expected, will tend to be placed in Windows environments.

An indication of this architectural pattern of NC deployment was given by the survey. Among respondents who stated that the hybrid terminal would be most suitable, current usage of X/mainframe terminals is more than twice that of organisations who stated another type of NC would be most suitable.

Exhibit IV-11

Best Suited NC Type for Current IT Environments—Europe**D****Suitability of Java for Enterprise Use**

A critical issue for several NC vendors, particularly Sun, is the viability of Java for enterprise-wide use. Of the three types of NC—Java terminal, hybrid terminal, and Windows terminal—the success of Java terminals such as Sun's JavaStation depends largely on the ability of organizations to deploy Java applets and applications that meet requirements of performance, security, and functionality. To date, Java has not met all of these requirements.

As a result, users do not currently consider Java to be suitable for enterprise use. Exhibit IV-12 shows how suitable respondents consider the Java programming language to be. Exhibit IV-13 shows the individual 1-5 ratings given. While most users rated the suitability of Java as a programming language as 3 or lower for mid-1997, most gave it a rating of 4 or 5 for its expected suitability by mid-1999.

Exhibit IV-12

Suitability of Java as Programming Language for Enterprise Use—Europe

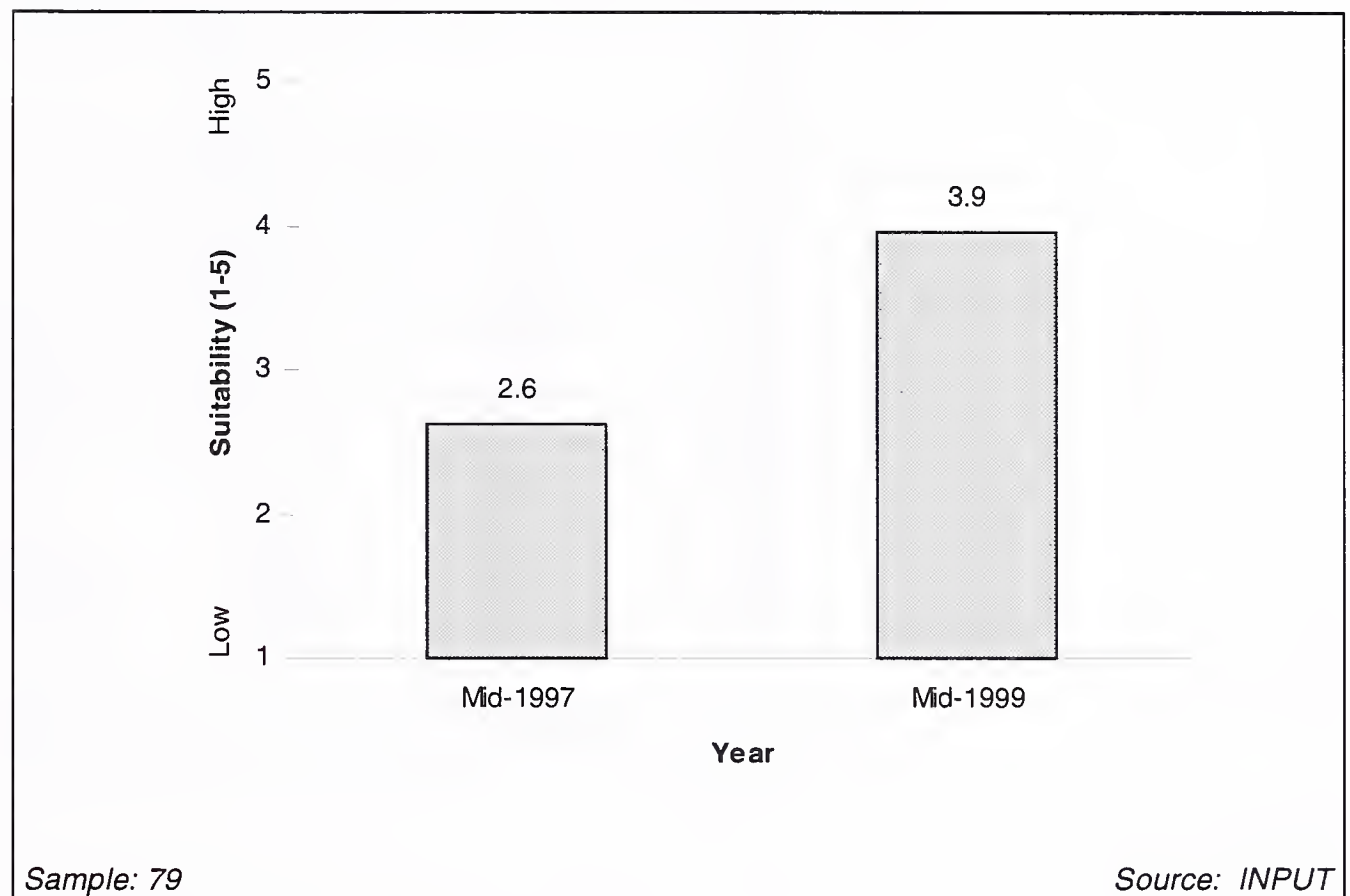


Exhibit IV-13

Suitability of Java as Programming Language for Enterprise Use, by Rating—Europe

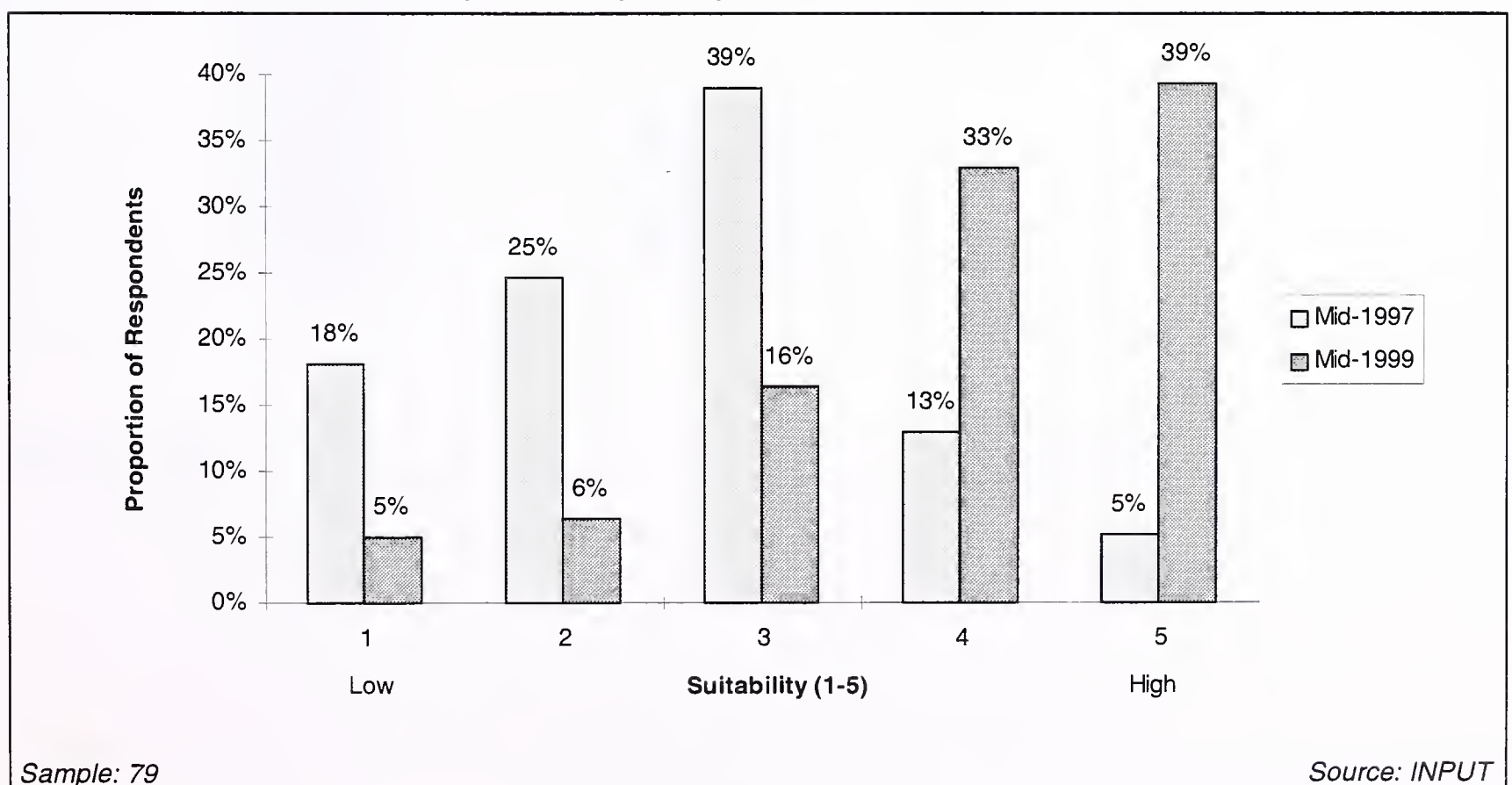


Exhibit IV-14 shows how suitable respondents consider the Java Virtual Machine (JVM) environment to be. (A JVM is the “sandbox” on a host machine that provides the environment in which Java code is executed.) Exhibit IV-15 shows the individual 1-5 ratings given.

Similarly to Java as programming language, users expect the JVM platform to become more suitable for enterprise-wide use by mid-1999. This means, primarily, higher performance and increased stability and robustness. INPUT also expects JVMs to become more relaxed in terms of their restrictions on native communication with the underlying operating system. This will increase functionality and performance at the expense of Java application portability, but this will be perceived as a necessary tradeoff.

Exhibit IV-14

Suitability of JVM as Environment for Enterprise Use—Europe

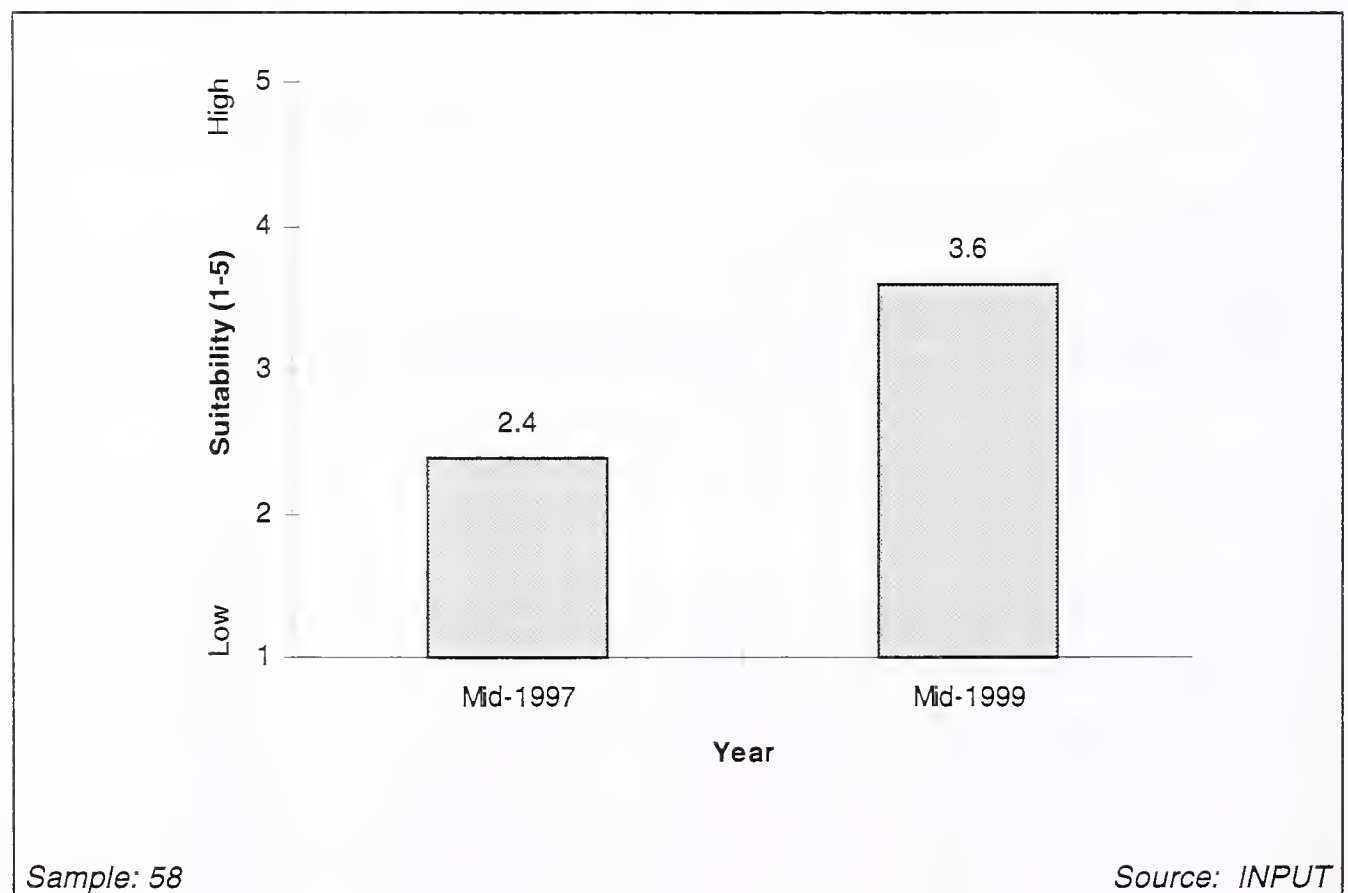
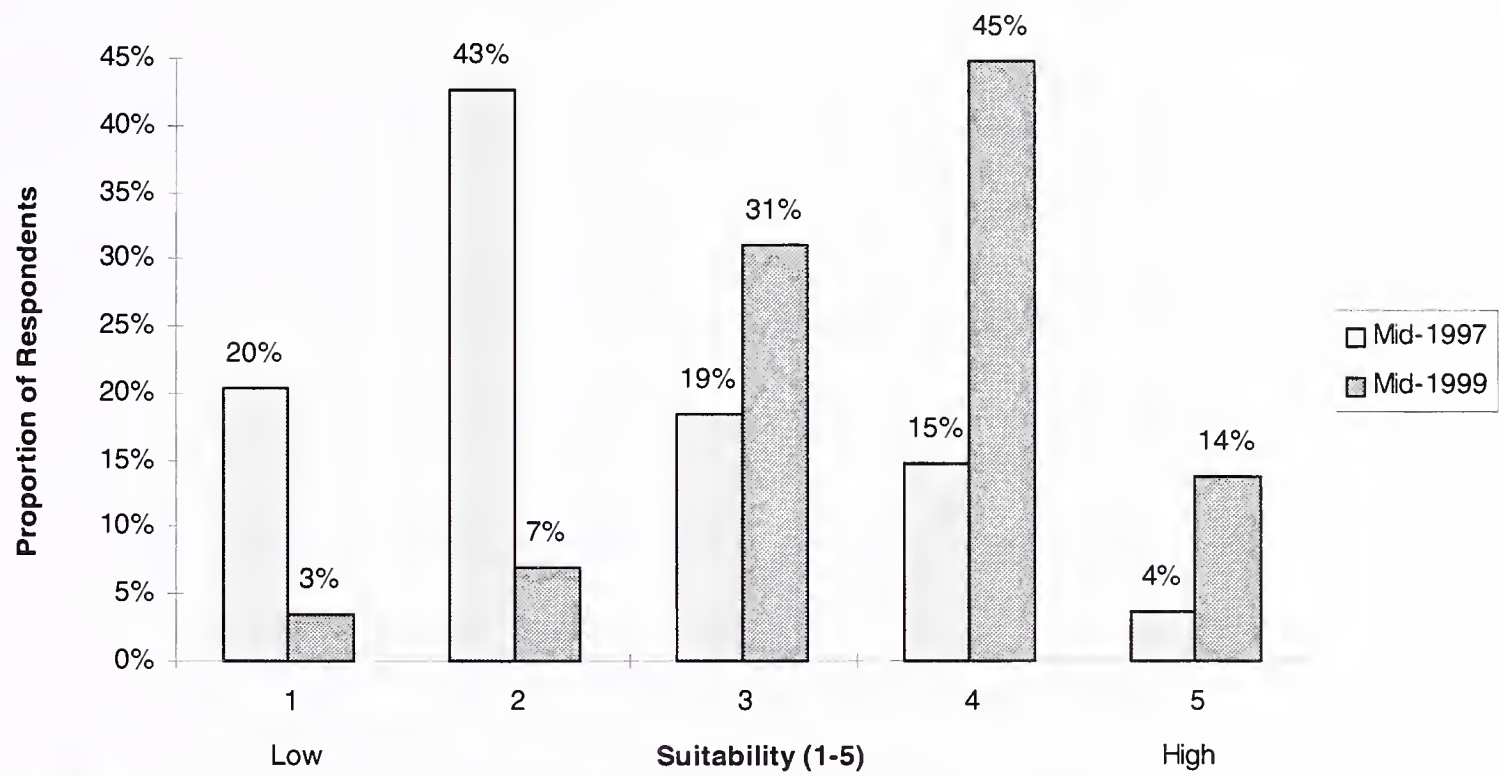


Exhibit IV-15

Suitability of JVM as Environment for Enterprise Use, by Rating—Europe

Sample: 58

Source: INPUT

E

Client Characteristics

Exhibit IV-16 shows the importance respondents attached to several characteristics of client platforms (not specifically PCs or NCs, but all client platforms).

Characteristics marked with "(*)" are those which INPUT identifies as fundamental strengths of NCs:

- Security
- Support cost
- Network configurability
- Centralised system management
- Centralised application and data management
- Terminal support

For example, NCs are strong in centralised application and data management, due to the design principle underlying them—their lack of local storage necessitates a centralised approach to software and data, as opposed to a localized client, such as a PC, which typically relies on local storage.

Purchase cost is not included in the list of NC strengths. Much attention has been paid to the supposedly lower purchase price of NCs, but INPUT does not consider this an overwhelming strength. The \$500 price tag frequently referred to in the early days of NCs has yet to be realized; in addition, purchase cost is a relatively small proportion of total cost of ownership.

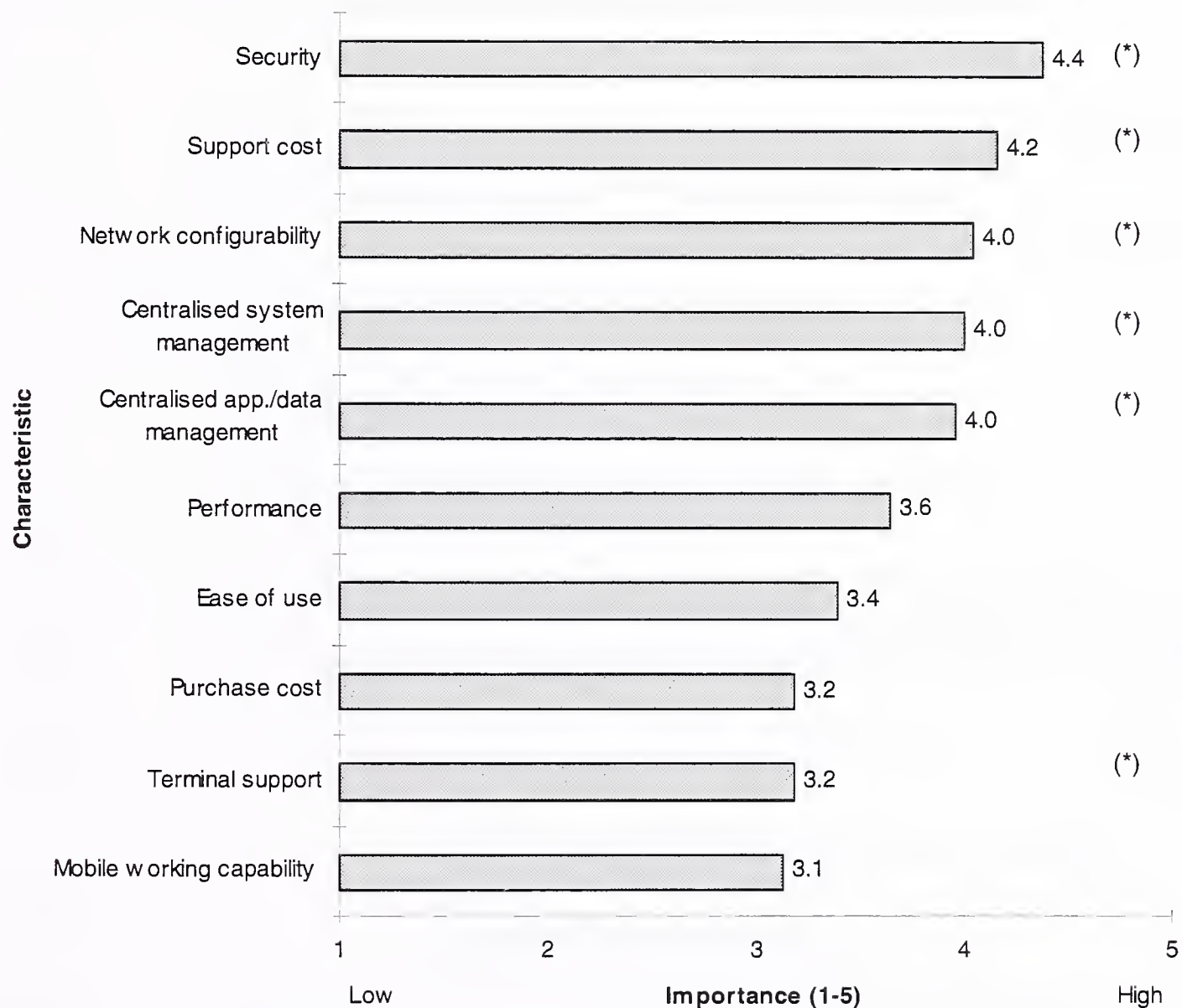
Ease of use, too, is not identified as a fundamental strength of NCs. While their lack of end-user configurability removes much of the complexity of PCs, and therefore enhances their ease of use, most user interaction is with application software, the quality of which is variable and not inherent to the NC itself.

As Exhibit IV-16 shows, NCs are strong in all the most important characteristics of client platforms. Rated at 4.0 out of 5 and above, these "most important" characteristics are the only ones which INPUT

evaluates as "very important". A rating of 3.6 for performance, for example, is considered to be of only medium importance.

Exhibit IV-16

Importance of Client Platform Characteristics—Europe



Sample: 71

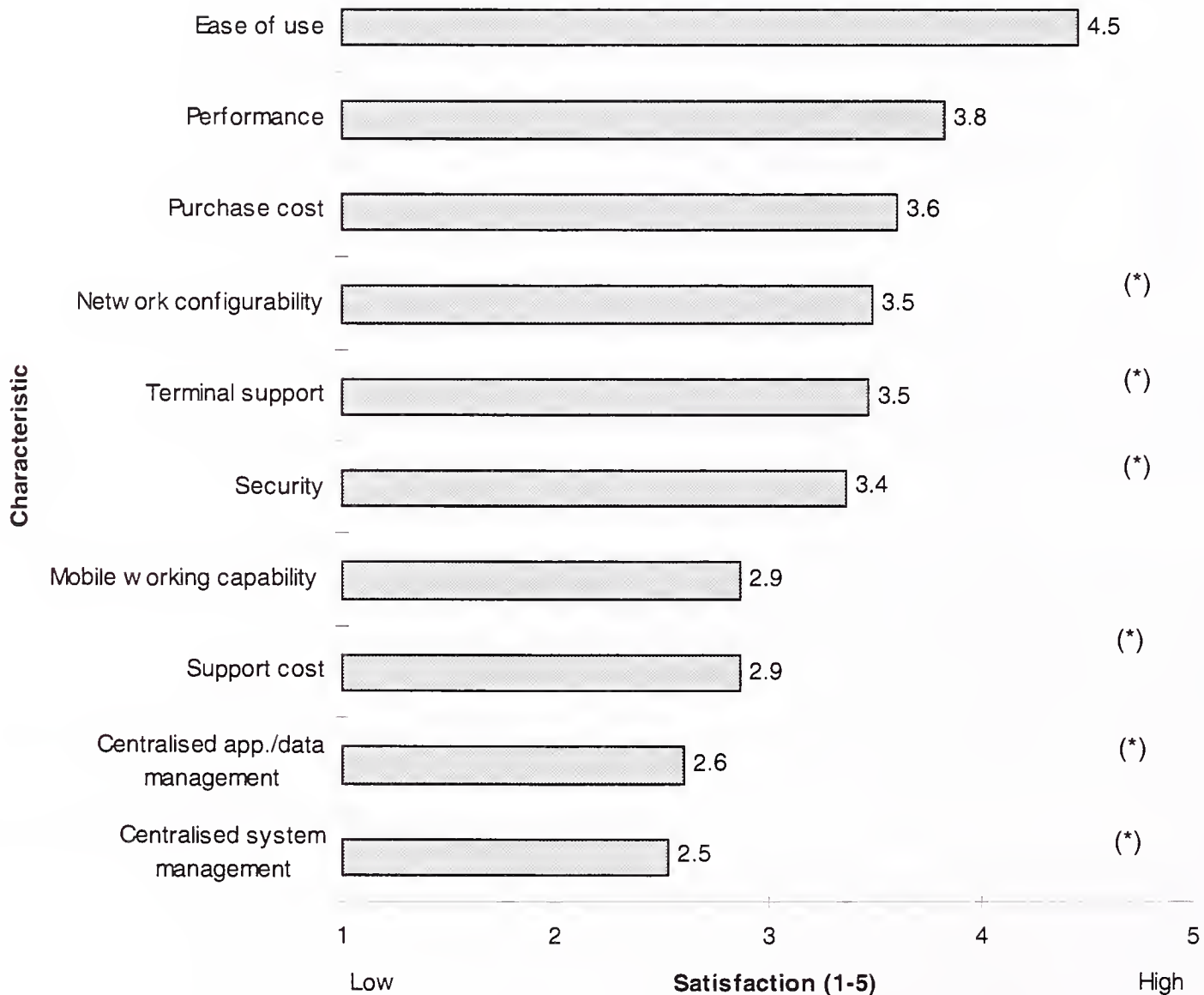
Source: INPUT

Exhibit IV-17 shows how satisfied respondents are with their PCs for the same set of characteristics. As before, characteristics marked with "(*)" are those which INPUT identifies as NC strengths.

There is a tendency for NCs to be strong in those areas where PCs are rated lowest. For example, PCs are rated poorly for centralised application and data management, at 2.6 out of 5, but NCs are strong in this area for the reasons give above.

Exhibit IV-17

Satisfaction with PC Characteristics—Europe



Sample: 72

Source: INPUT

To further illustrate the difference in strengths between PCs and NCs, Exhibit IV-18 shows the importance of client platform characteristics plotted against satisfaction with PCs for the same characteristics. The categories which INPUT identifies as NC strengths are marked with a white cross.

Items below the dotted line are rated poorly compared with the importance attached to them; items above the dotted line, conversely, are rated highly.

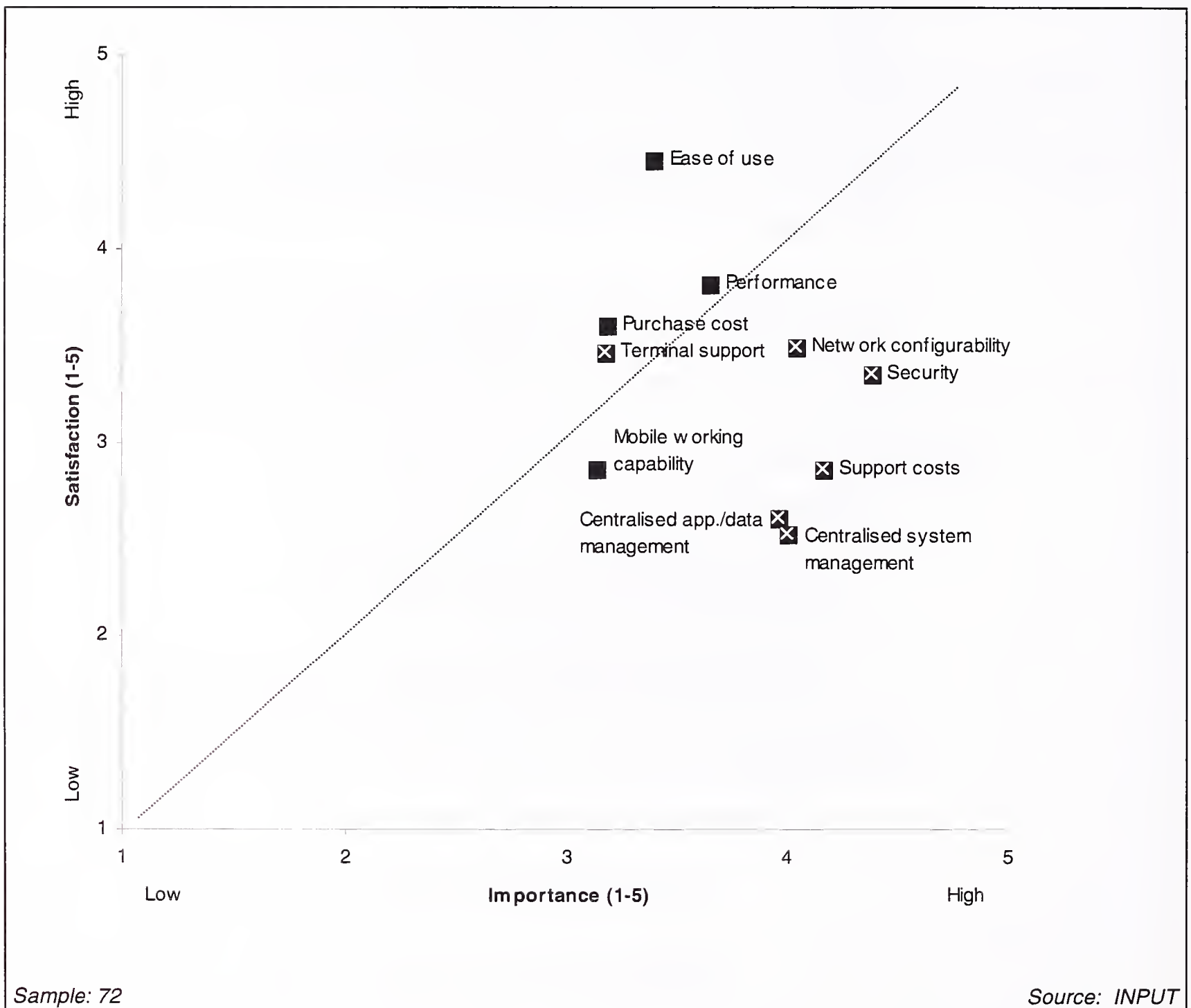
The only category in which PCs perform noticeably well compared with its importance (furthest above the dotted line) is ease of use.

The categories in which PCs perform worst (furthest below the dotted line) are:

- Support costs
- Centralised application and data management
- Centralised system management

As noted above, NCs are strong in the areas in which PCs perform poorly, and not strong (although not necessarily weak) in the areas in which PCs perform well.

Exhibit IV-18

PC Characteristics: Importance vs Satisfaction—Europe

F**PC and NC Strengths and Weaknesses**

Respondents were asked to describe which aspects of PCs and NCs they considered strengths and weaknesses. Exhibits IV-20 to IV-31 show the responses given in each country.

The major strengths and weaknesses are summarized in Exhibit IV-19. It is evident that PCs are not under immediate widespread threat from NCs by the strength most consistently associated with them—the PC is so widely accepted (“entrenched” according to one respondent), that it has become seen as a *de facto* standard, even though much of PC hardware and software architecture remains essentially proprietary.

NCs suffer the opposite—being an “unknown quantity” according to many respondents, they have to gain acceptance not just in technological terms, but against the backdrop of PC dominance. In order to challenge the PC, they must resolve the consistently reported shortcomings of PCs: administration overhead and cost, and lack of centralised management. However, both of these problem areas are rapidly being addressed by PC hardware and software vendors, including Intel and Microsoft. As PCs adopt the beneficial features of NCs, so NCs lose much of their advantage.

INPUT maintains its view that NCs will not replace PCs, except in situations where over-functional PCs have been deployed in the absence of a viable alternative.

Exhibit IV-19

PC/NC Strengths and Weaknesses

Platform	Main Strengths	Main Weaknesses
PC	De facto standard	Administration overhead and cost
	User autonomy	
NC	Centralised environment	Unproven concept and technology
	Low administration overhead and costs	Dependence on network and server

Source: INPUT

1. PC Strengths

Exhibit IV-20

PC Strengths—UK

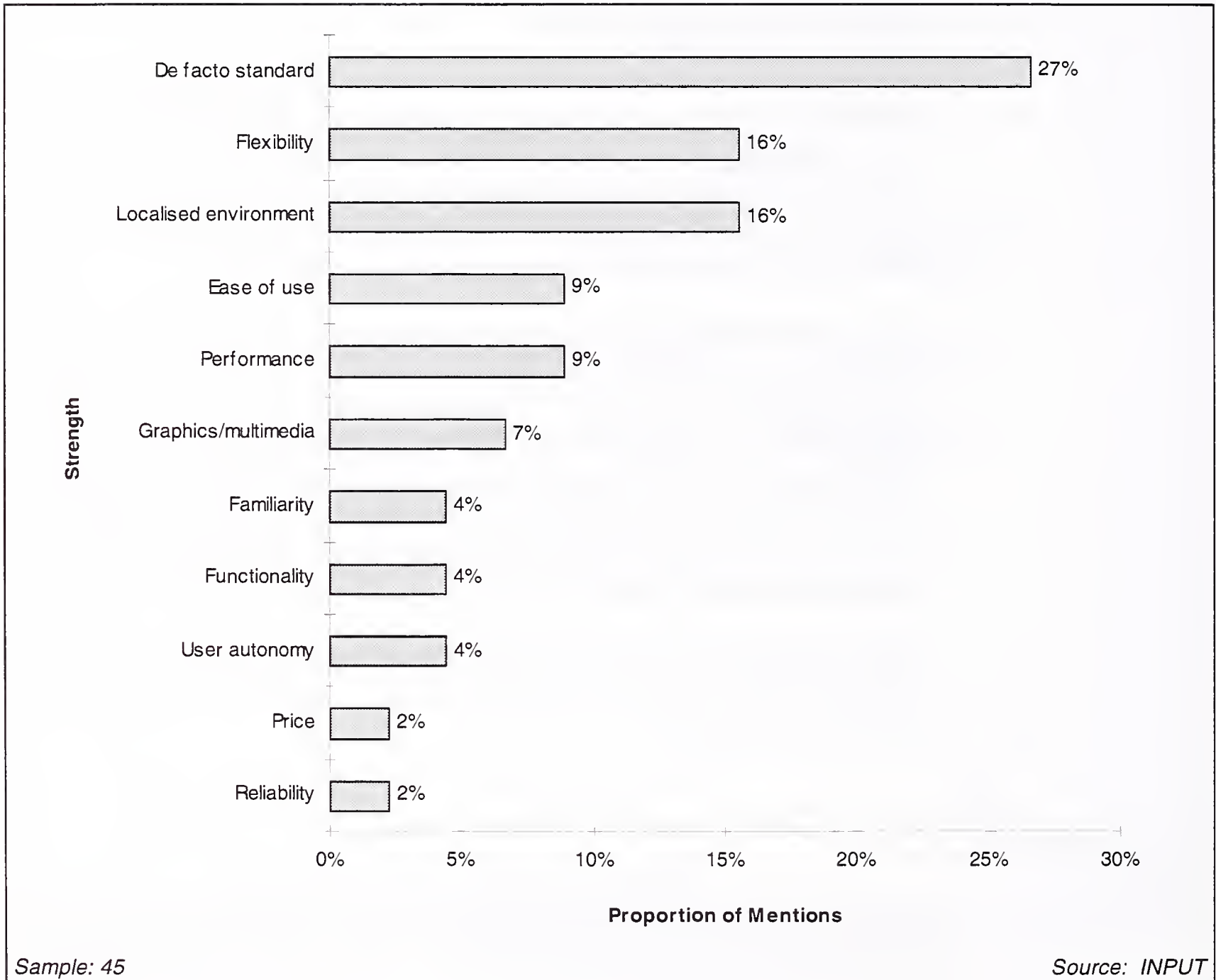


Exhibit IV-21

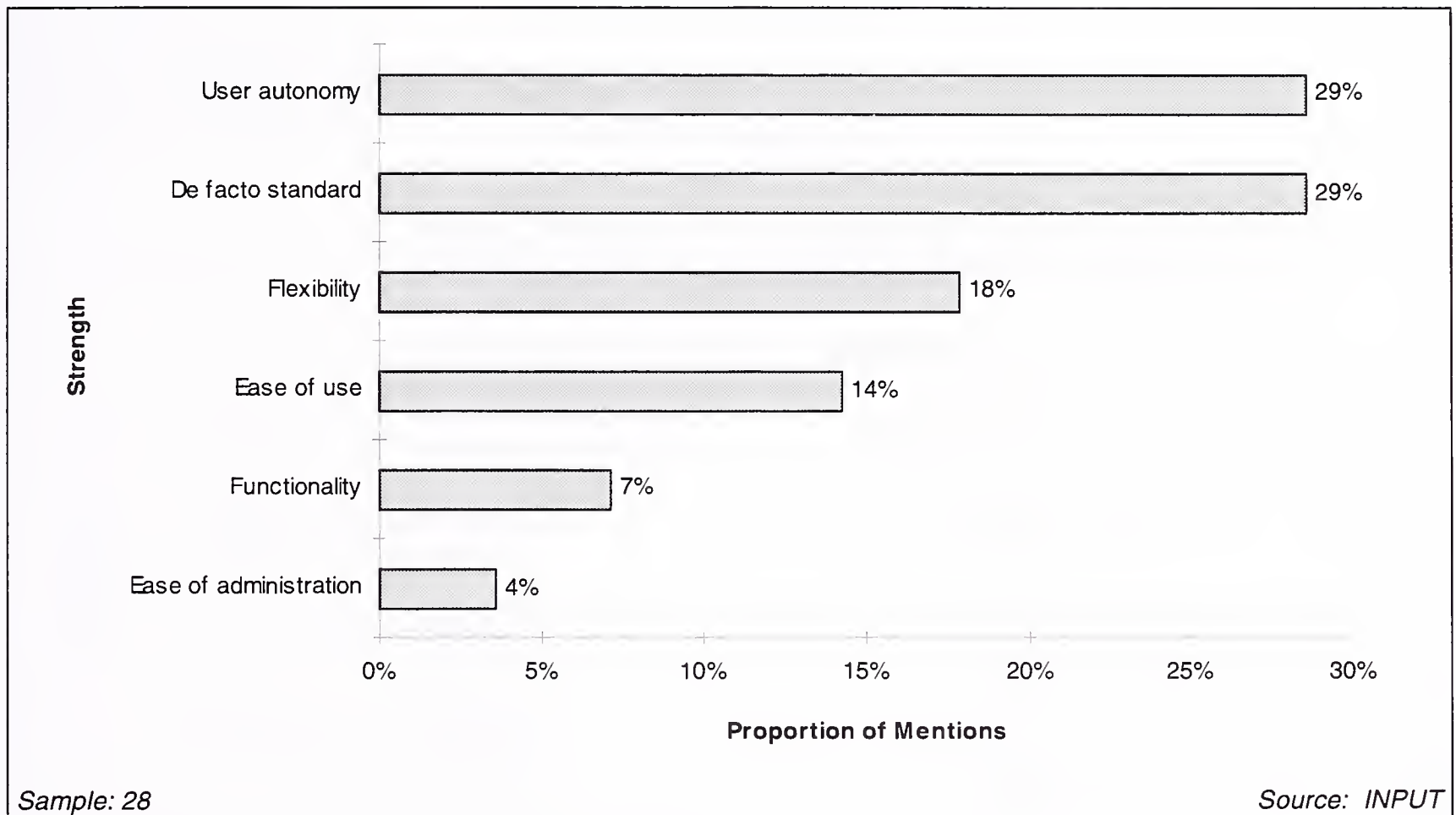
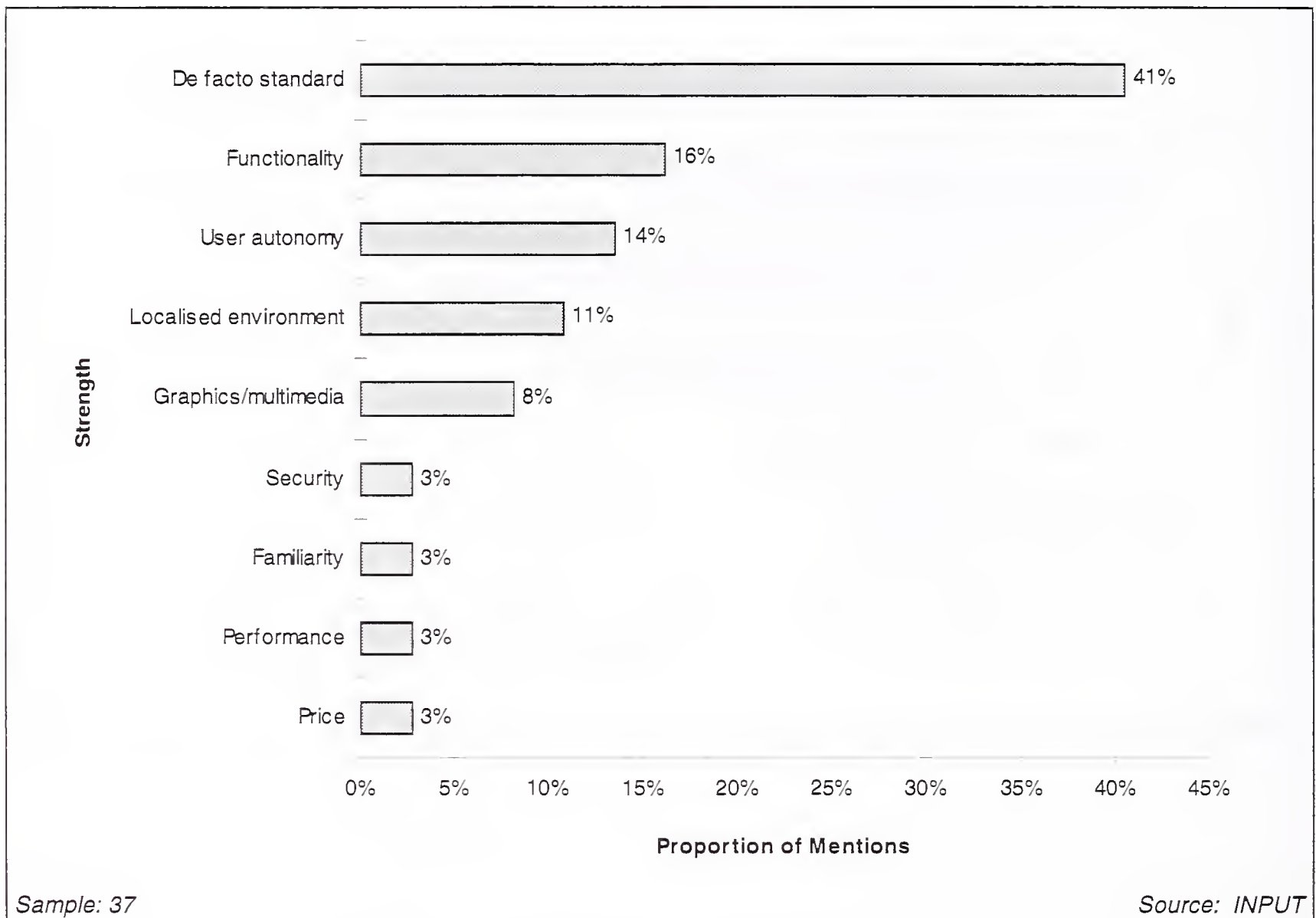
PC Strengths—France

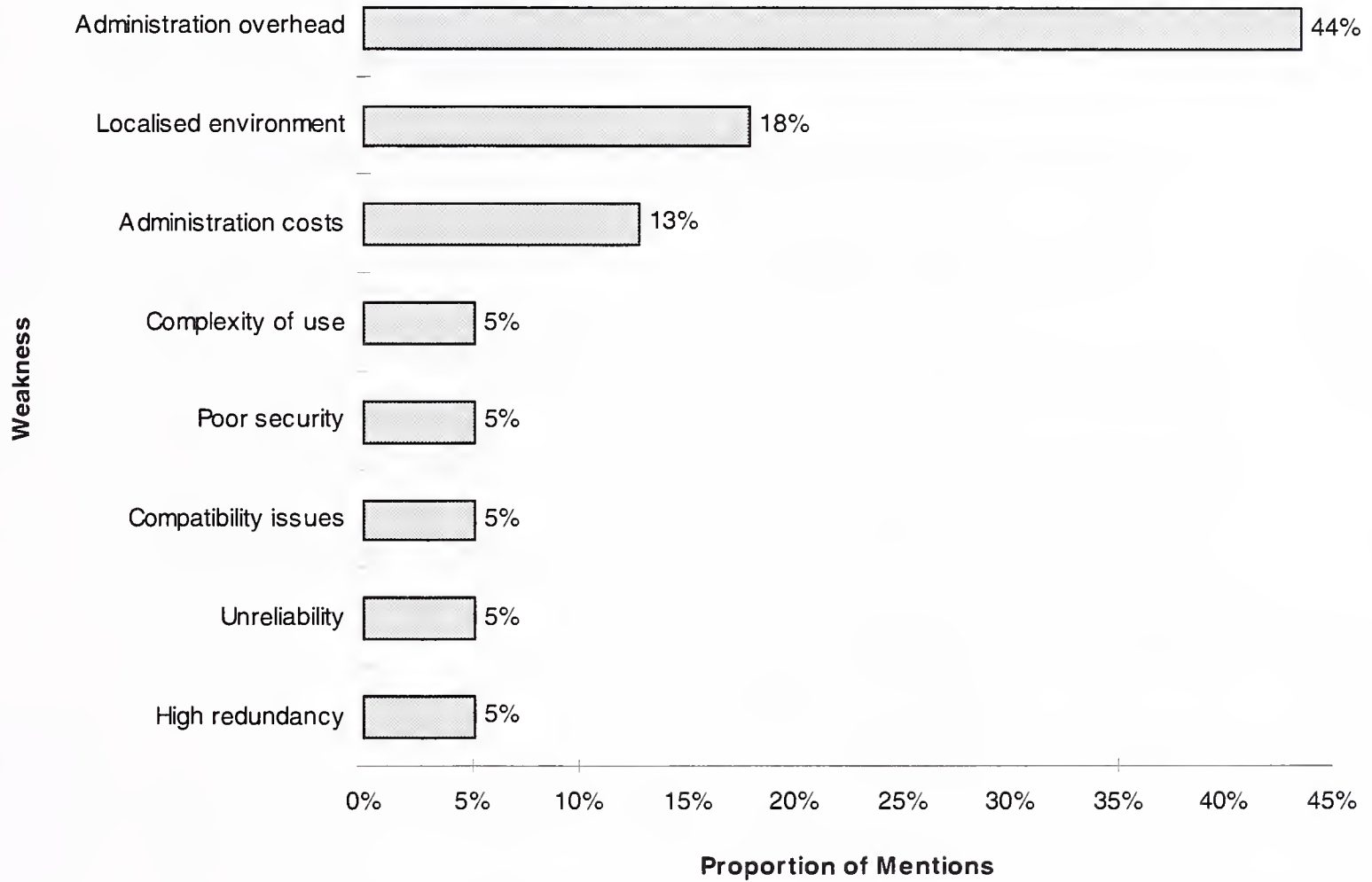
Exhibit IV-22

PC Strengths—Germany

2. PC Weaknesses

Exhibit IV-23

PC Weaknesses—UK



Sample: 39

Source: INPUT

Exhibit IV-24

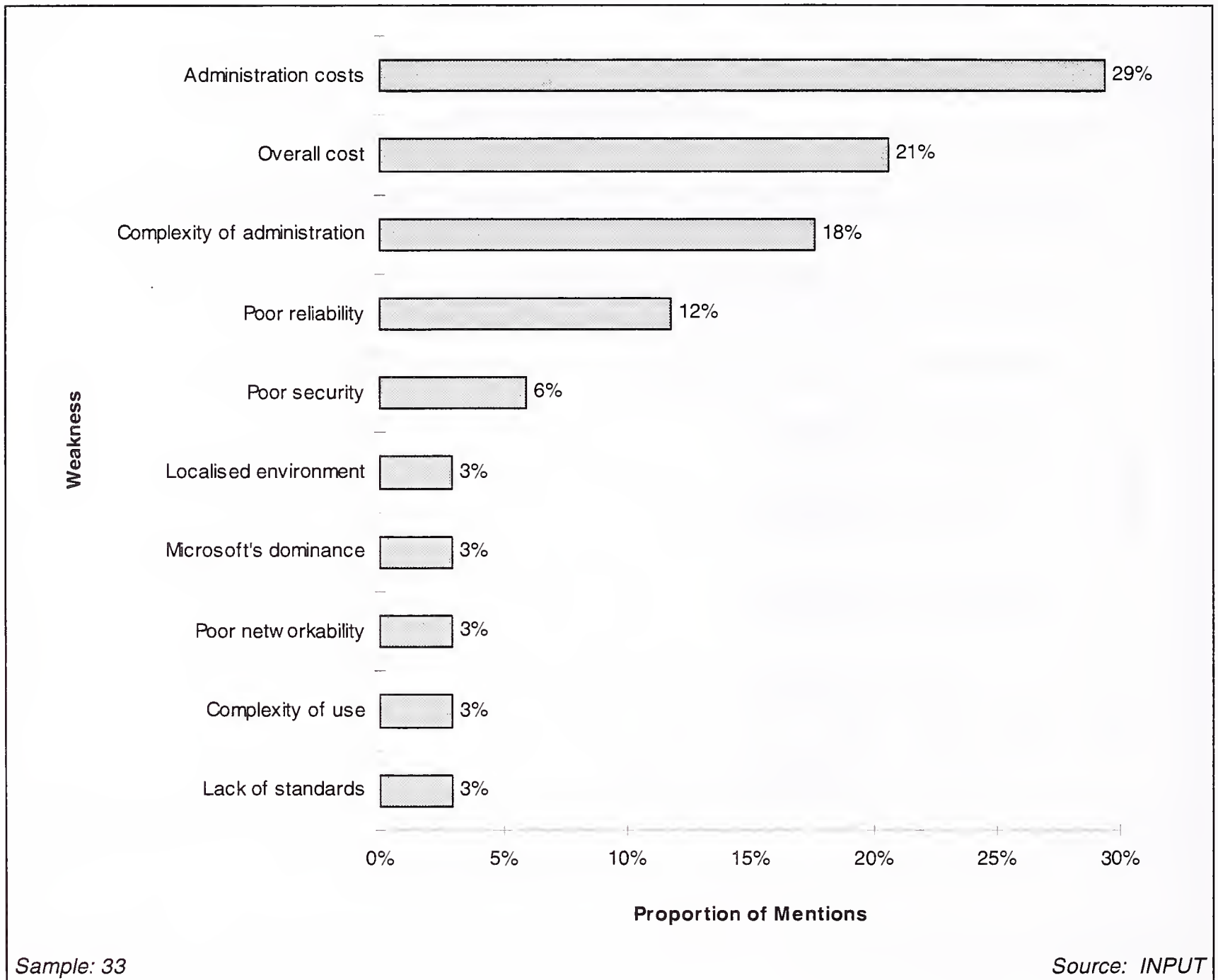
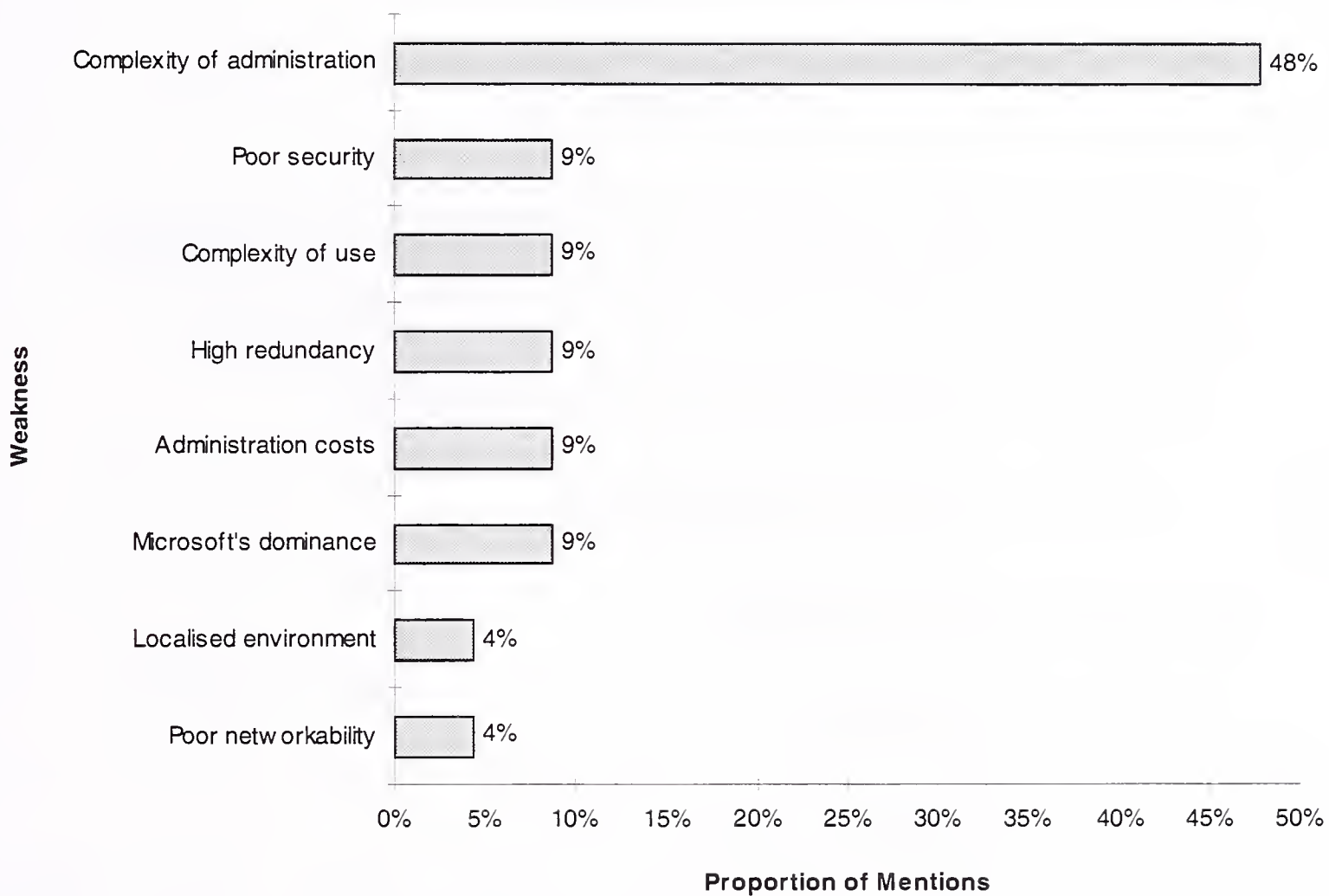
PC Weaknesses—France

Exhibit IV-25

PC Weaknesses—Germany

Sample: 23

Source: INPUT

3. NC Strengths

Exhibit IV-26

NC Strengths—UK

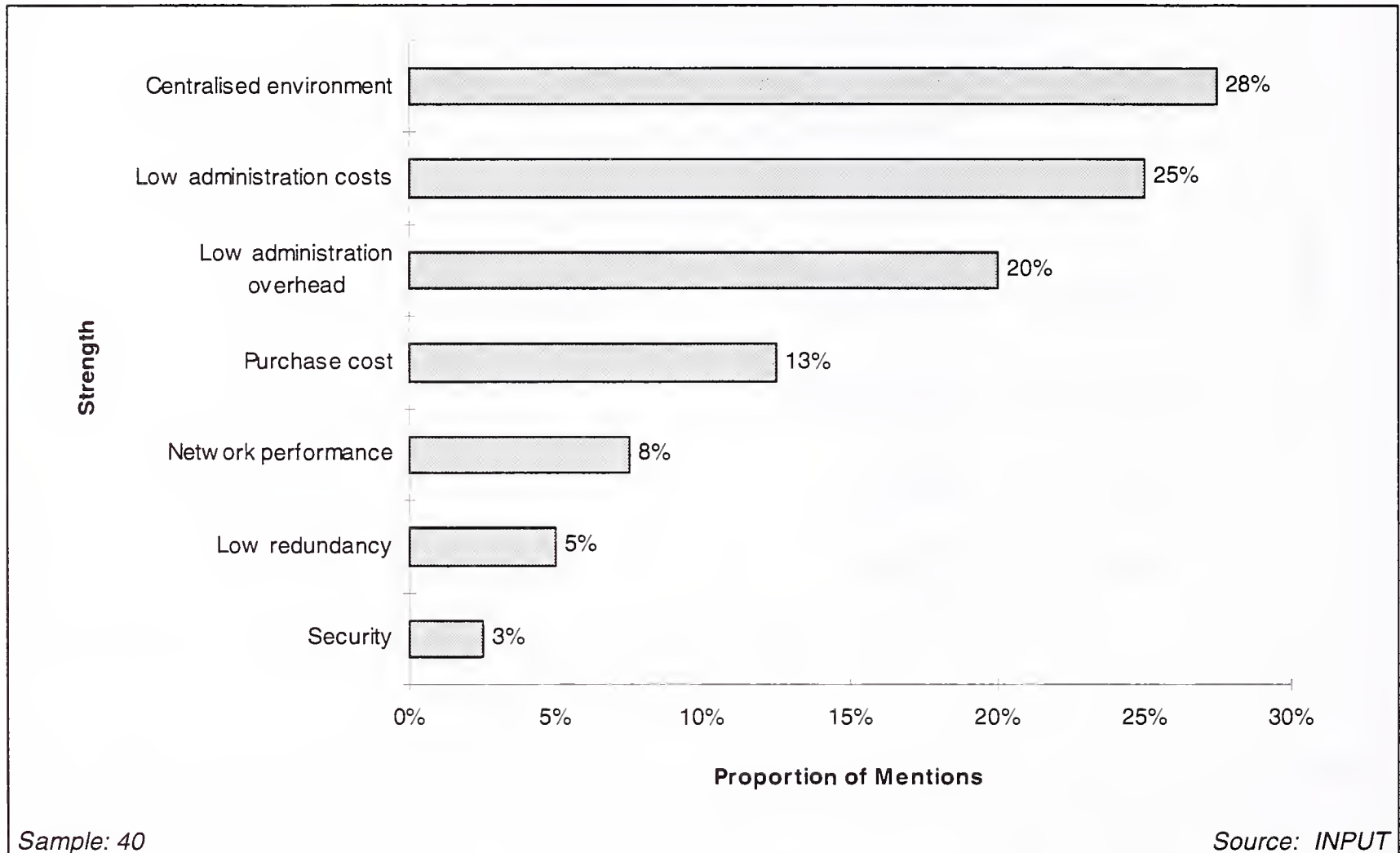


Exhibit IV-27

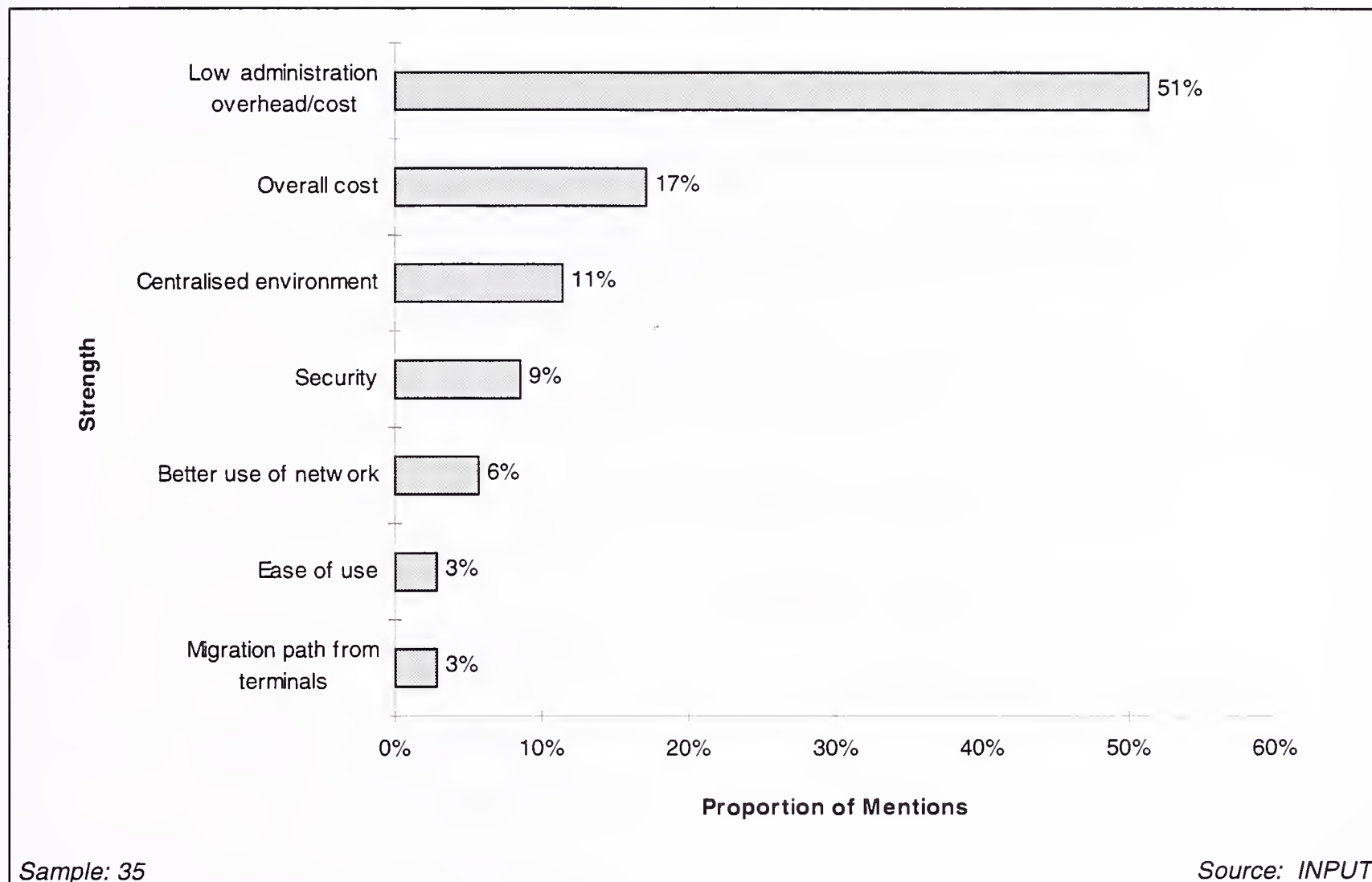
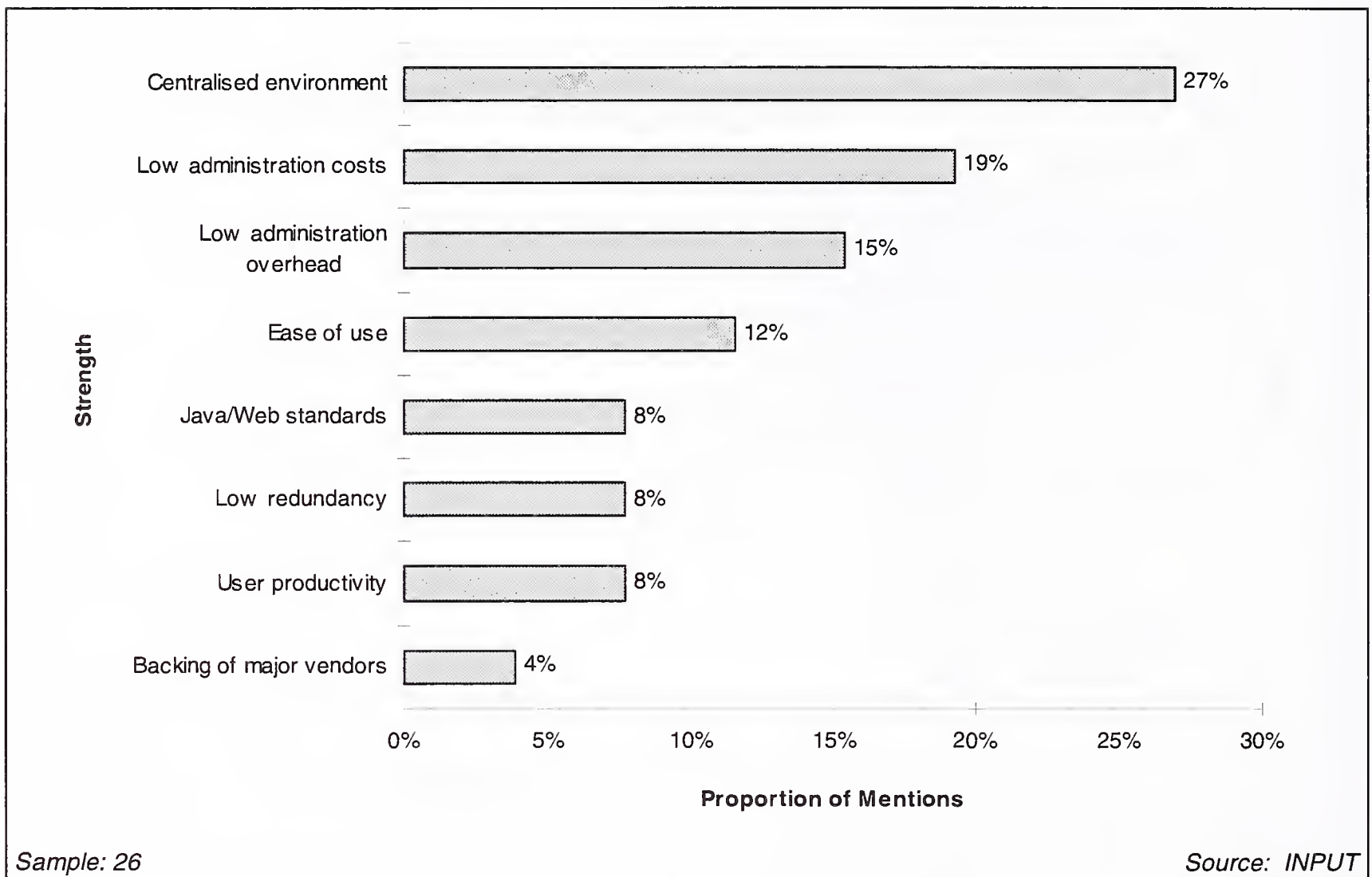
NC Strengths—France

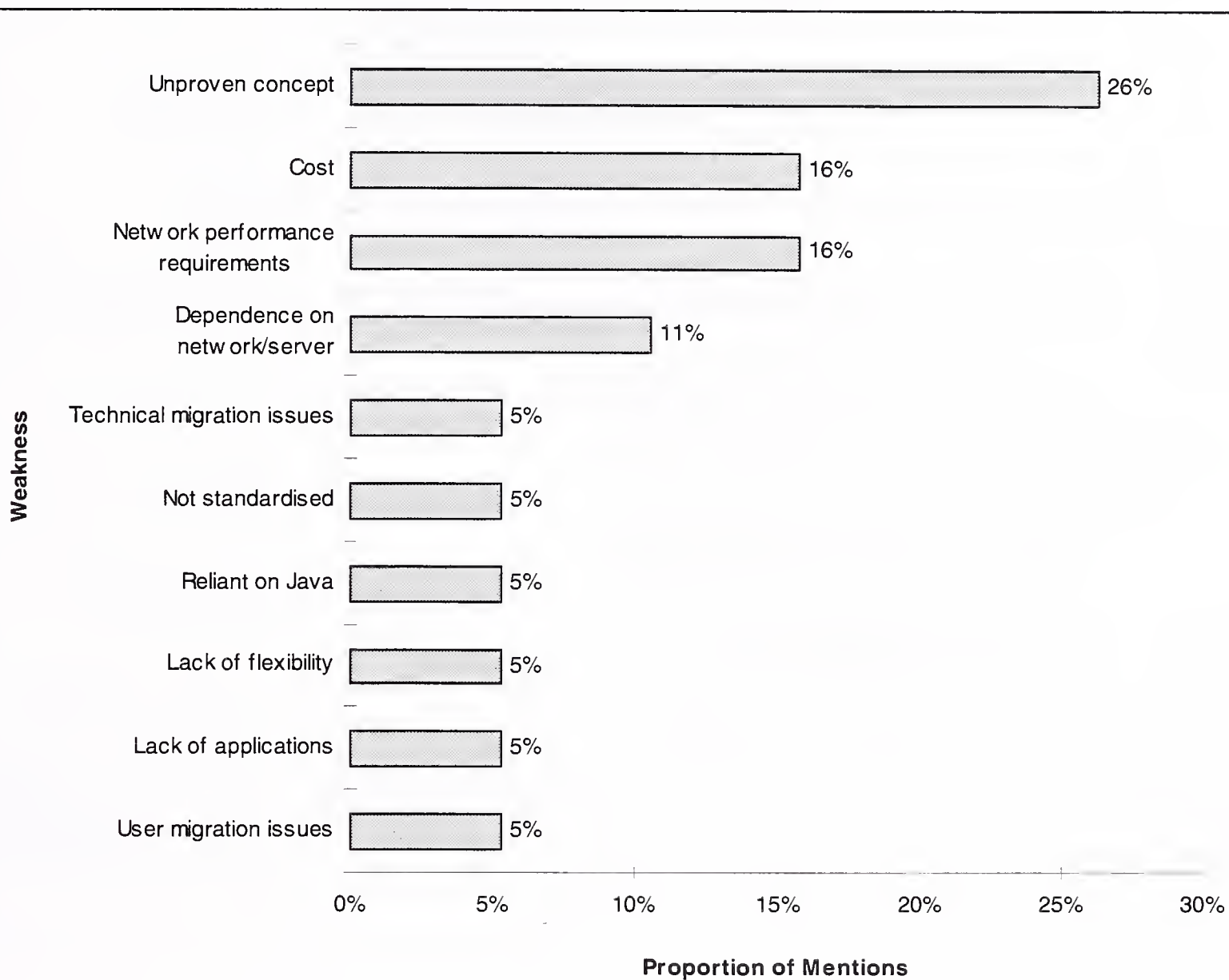
Exhibit IV-28

NC Strengths—Germany

4. NC Weaknesses

Exhibit IV-29

NC Weaknesses—UK



Sample: 19

Source: INPUT

Exhibit IV-30

NC Weaknesses—France

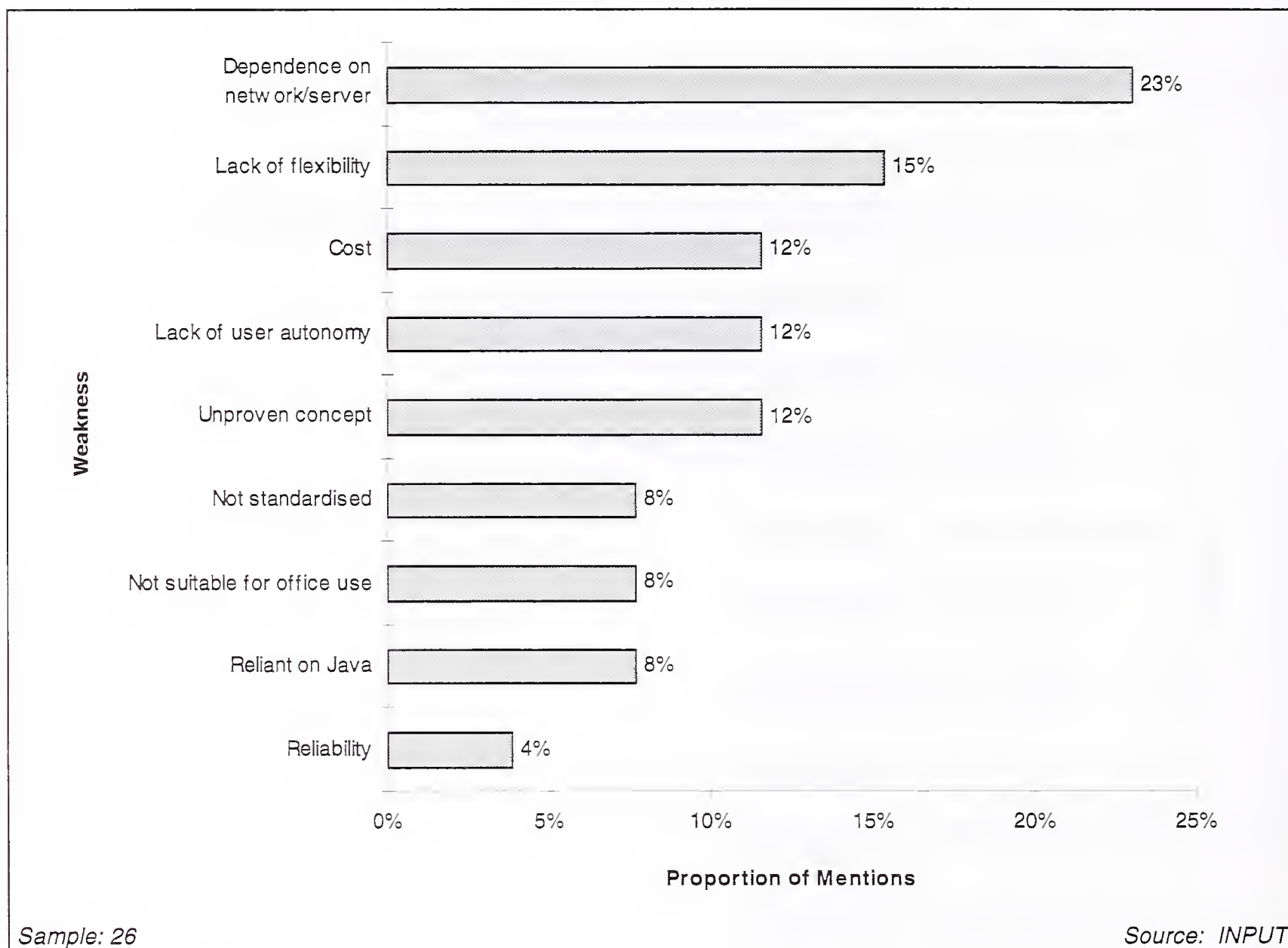
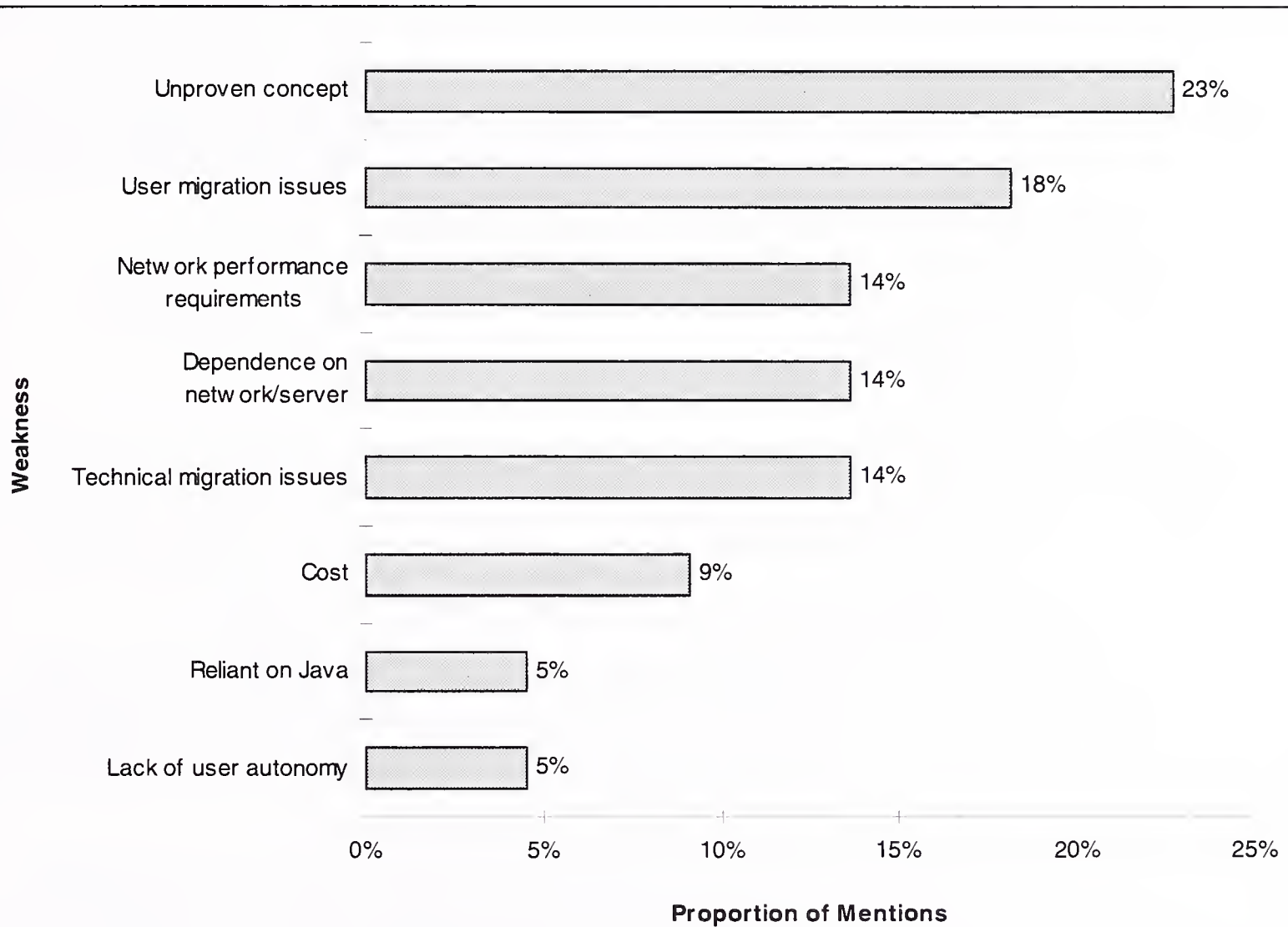


Exhibit IV-31

NC Weaknesses—Germany

Sample: 22

Source: INPUT

G

Intranet Server Characteristics

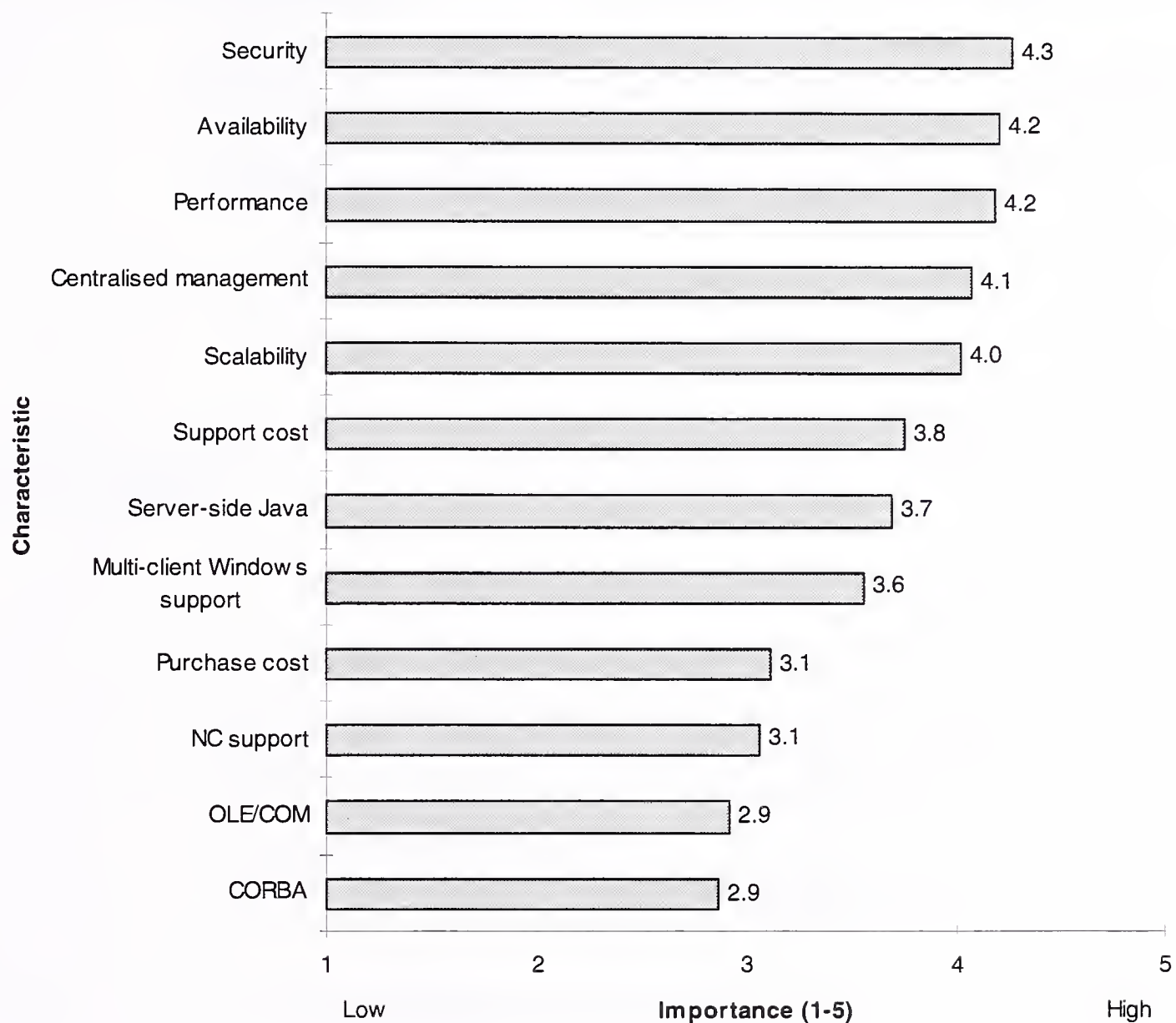
Exhibit IV-32 shows the importance that respondents attached to characteristics of a Intranet server. The characteristics considered most important are not of direct relevance to thin client computing. Those rated at 4.0 or higher were:

- Security
- Availability
- Performance
- Centralised management
- Scalability

These characteristics are applicable to all types of server—file, print, application, and network—which indicates that users are concerned less with their client requirements than they are with ensuring a stable server platform.

The characteristics of particular relevance to thin client computing—server-side Java, multi-client Windows support, and NC support—are considered to be less important to an Intranet server. NC support, rated at 3.1 out of 5, is not considered highly important overall. Although most respondents within the sample do not yet use NCs, the low rating given to NC support suggests that NCs are not a high priority for many users.

Exhibit IV-32

Importance of Intranet Server Characteristics—Europe

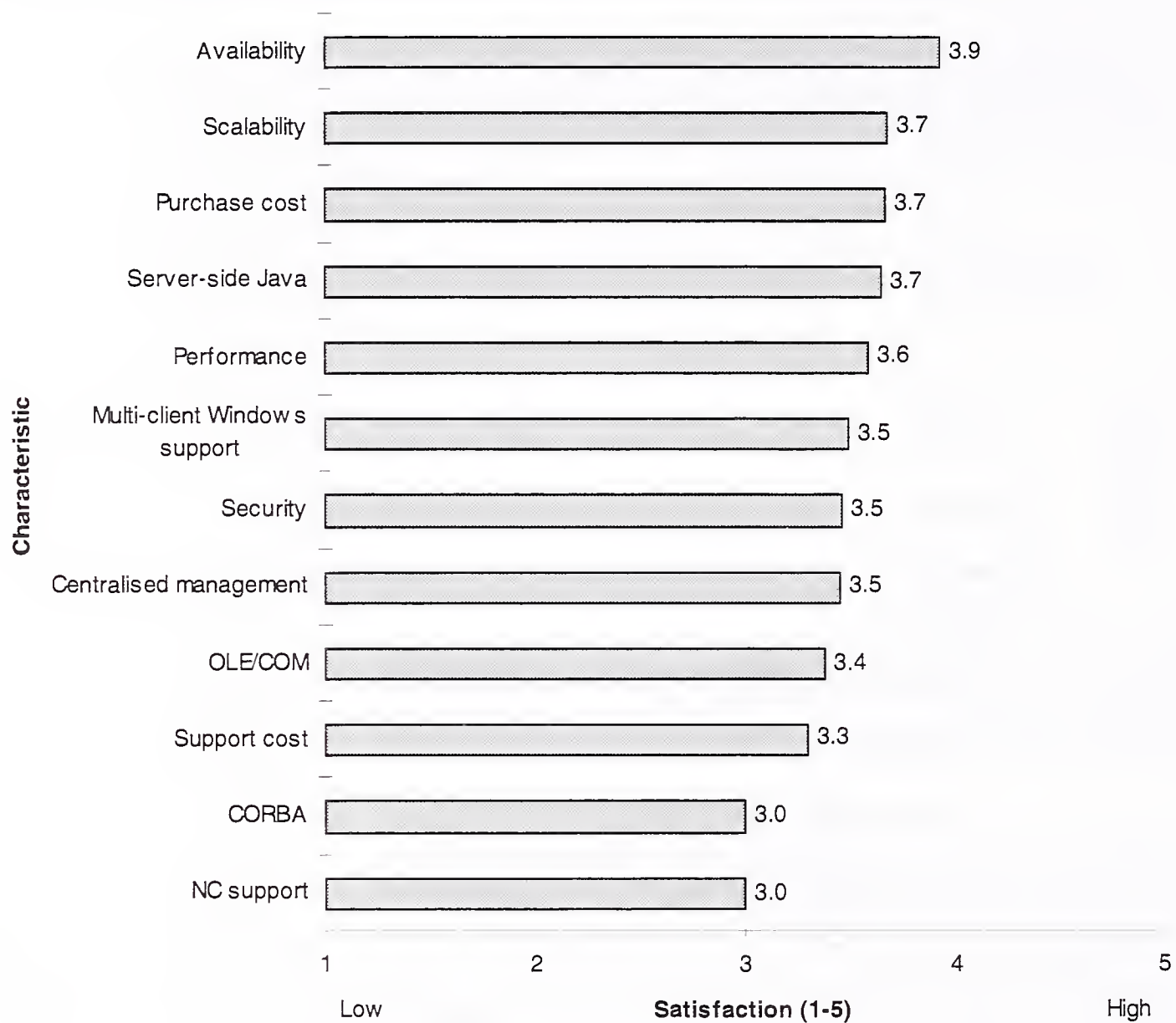
Sample: 80

Source: INPUT

Exhibit IV-33 shows how satisfied users who currently have an Intranet are with the same set of Intranet server characteristics. Users are relatively dissatisfied with the most important characteristics—security, performance, centralised management, and support costs are all important aspects, yet are rated poorly in terms of satisfaction (see Exhibit IV-34).

NC support is rated relatively poorly by Intranet users (although most users do not yet have an extensive NC user population), but server-side Java and multi-client Windows support, both significant factors of an NC environment, are rated comparatively well.

Exhibit IV-33

Satisfaction with Intranet Server Characteristics—Europe

Sample: 32

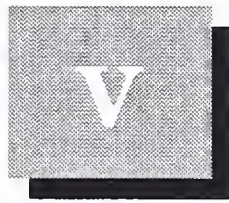
Source: INPUT

Exhibit IV-34

Intranet Server Characteristics in Need of Improvement

Characteristic	Importance	Satisfaction	Difference
Security	4.3	3.5	-0.8
Performance	4.2	3.6	-0.6
Centralised management	4.1	3.5	-0.6
Support costs	3.8	3.3	-0.5

Source: INPUT



Future NC and Related Platform Usage and Requirements

A

Future NC Usage

1. Expected NC Use by Mid-1998

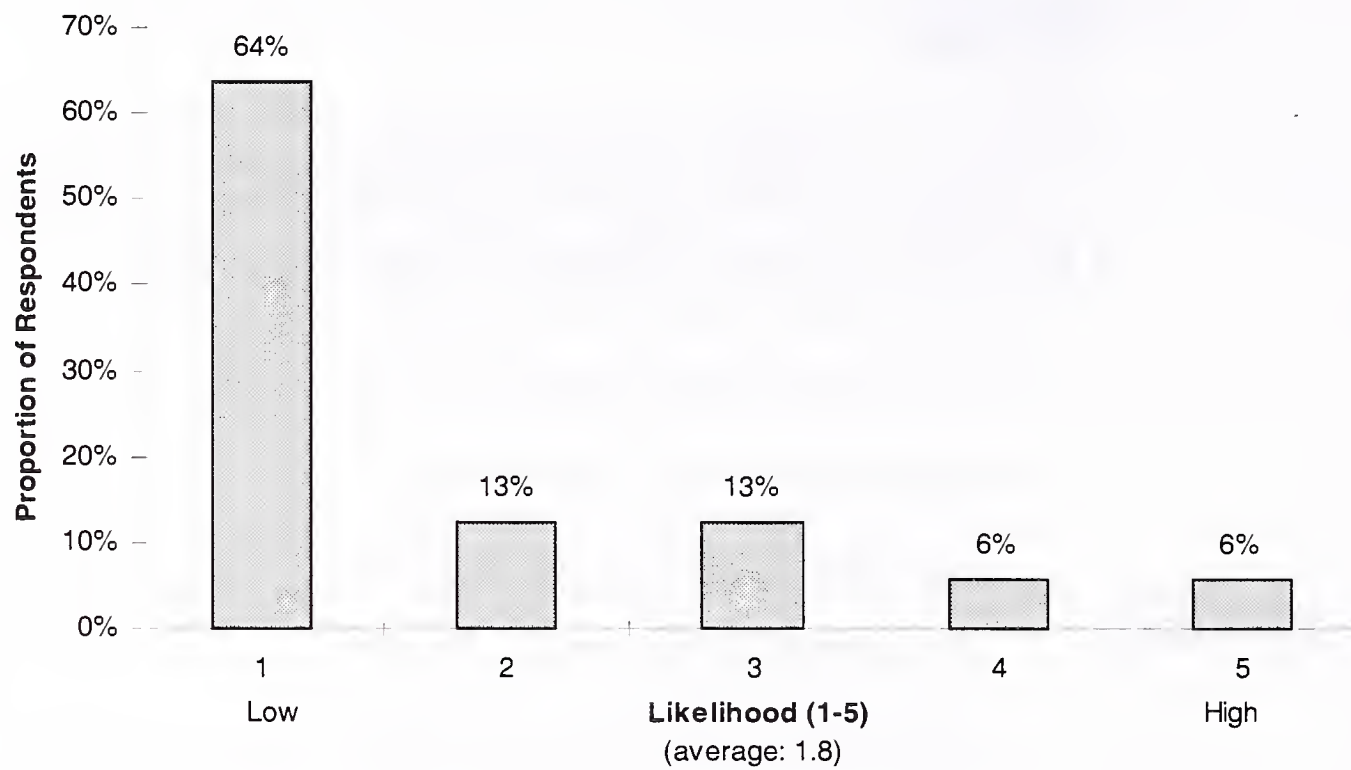
As presented earlier in this report, the state of current and expected NC usage as of mid-1997 was as follows:

- Currently considering—27%
- Currently using for live applications—2%
- Currently using in a pilot scheme—1%

There appears to be very low likelihood of NCs being used for live applications (as opposed to pilot schemes) by mid-1998. Exhibit V-1 shows responses by rating. Two thirds of respondents gave the lowest likelihood to using NCs for live applications. There was little difference between respondent expectations in the UK, France, or Germany.

Despite this negative response, the NC market is changing extremely rapidly, due primarily to the NC-like features being built into PCs. INPUT expects the actual uptake of thin clients (not delineated by strict architectural definitions, and including NCs, Windows terminals, and NC-like PCs) to be considerably higher than this Exhibit suggests.

Exhibit V-1

Likelihood of NC Use in Live Applications by Mid-1998—Europe

Sample: 88

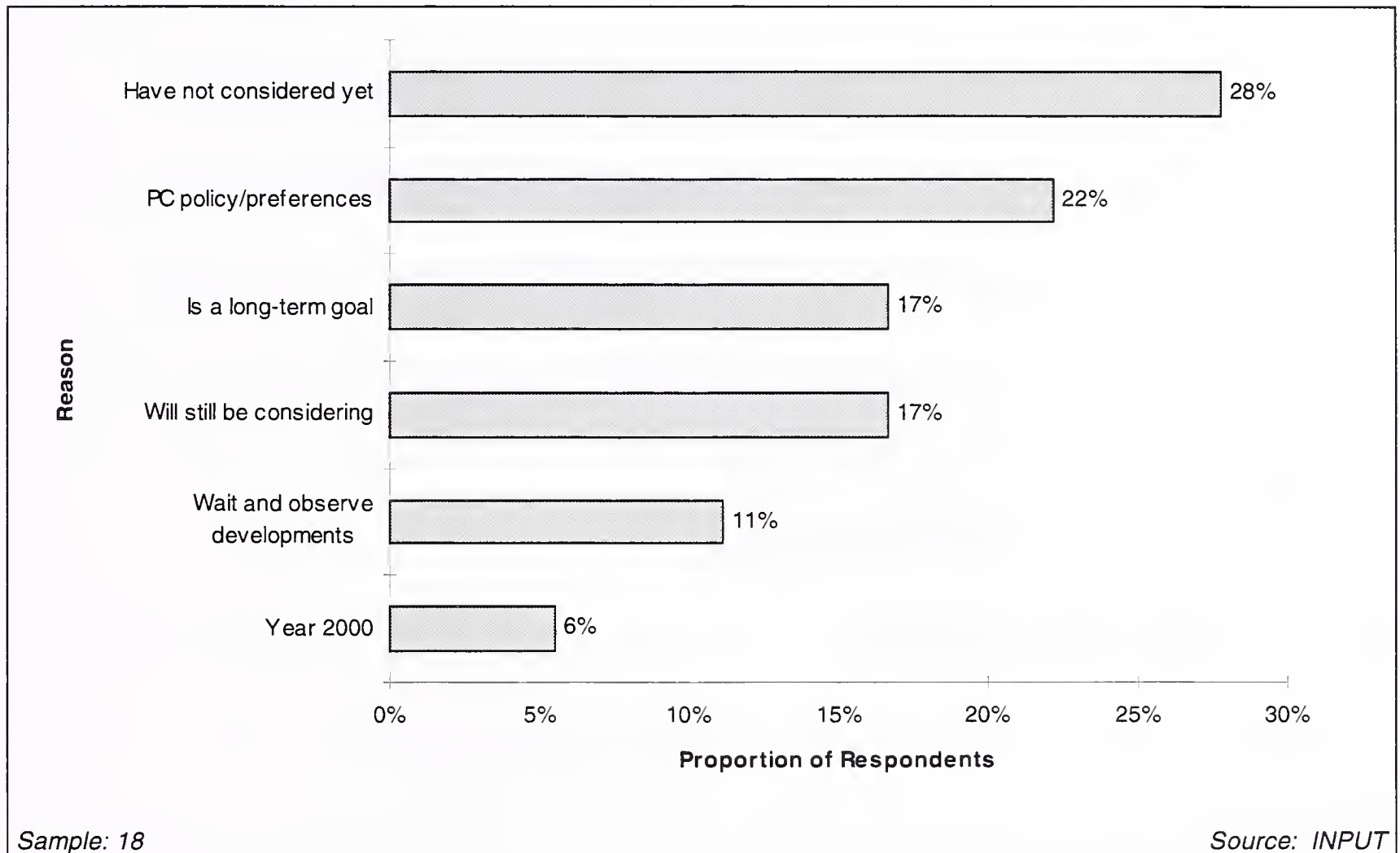
Source: INPUT

1. Reasons for NC Deployment Decision by Mid-1998

Exhibits V-2 to V-4 illustrate the reasons that respondents in each country gave for not deploying NCs during the period mid-1997 to mid-1998.

Exhibit V-2

Reasons for Not Deploying NCs by Mid-1998—UK



Four UK respondents gave reasons *for* deploying NCs by mid-1998:

- The ease with which NCs can be deployed through their outsourcing contract.
- Pilot scheme already underway (stated by two respondents).
- The need to keep up to date with new technology.

A UK respondent (a Scottish discrete manufacturing company) was already using NCs for SAP R/3 access, email, and personnel applications.

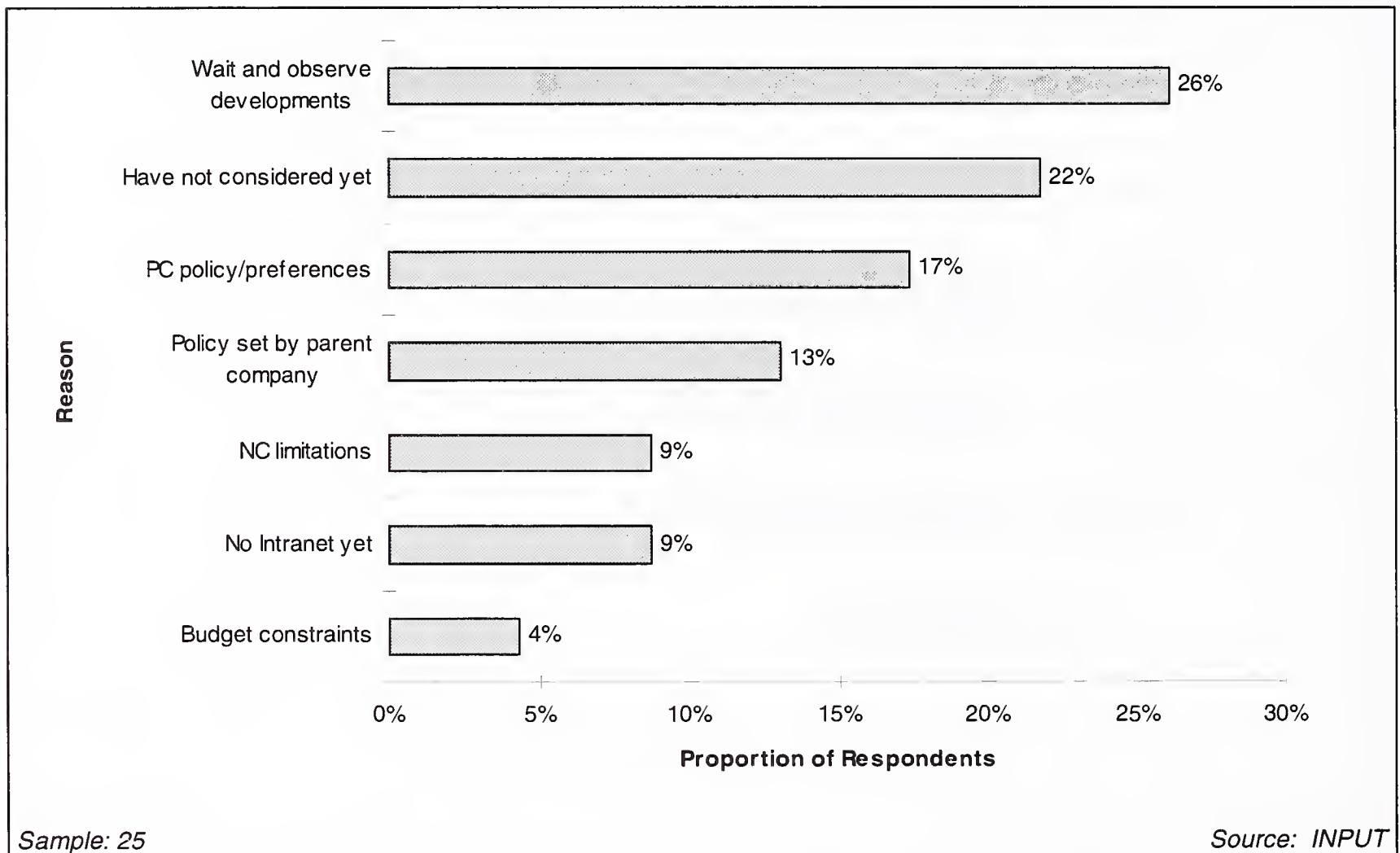
Three other UK respondents described their expected uses of NCs by mid-1998:

- Administration and sales.

- Sales and marketing.
- Front desk staff, email, and sales and marketing.

Exhibit V-3

Reasons for Not Deploying NCs by Mid-1998—France

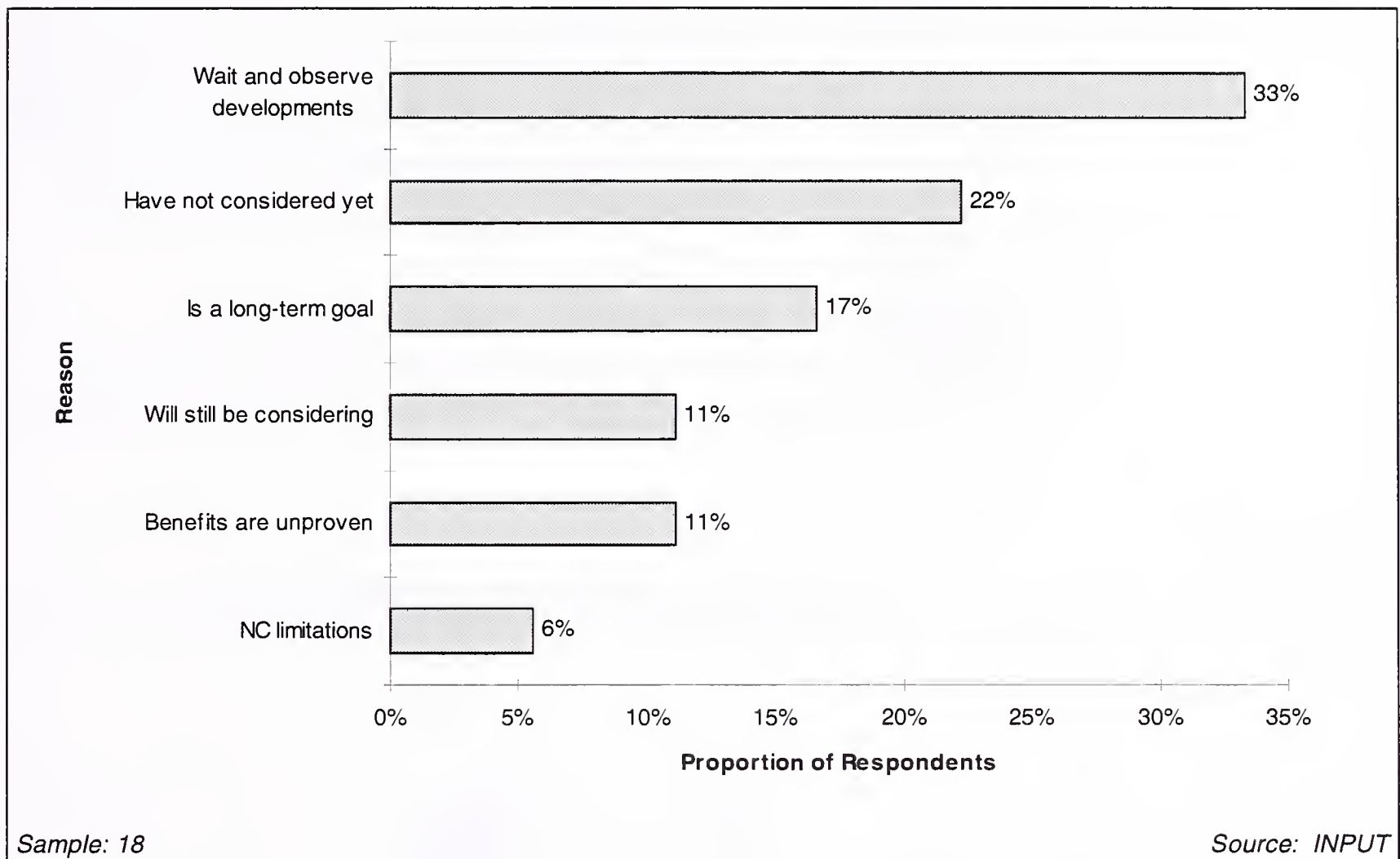


One French respondent gave a reason for deploying NCs by mid-1998:

- The need to install and promote the latest technology due to the nature of the business (telecommunications company)

This user expected NCs to be deployed for factory operations. The other French respondent who stated expected use named internal information access as the expected NC application.

Exhibit V-4

Reasons for Not Deploying NCs by Mid-1998—Germany

Two German respondents gave reasons for deploying NCs by mid-1998:

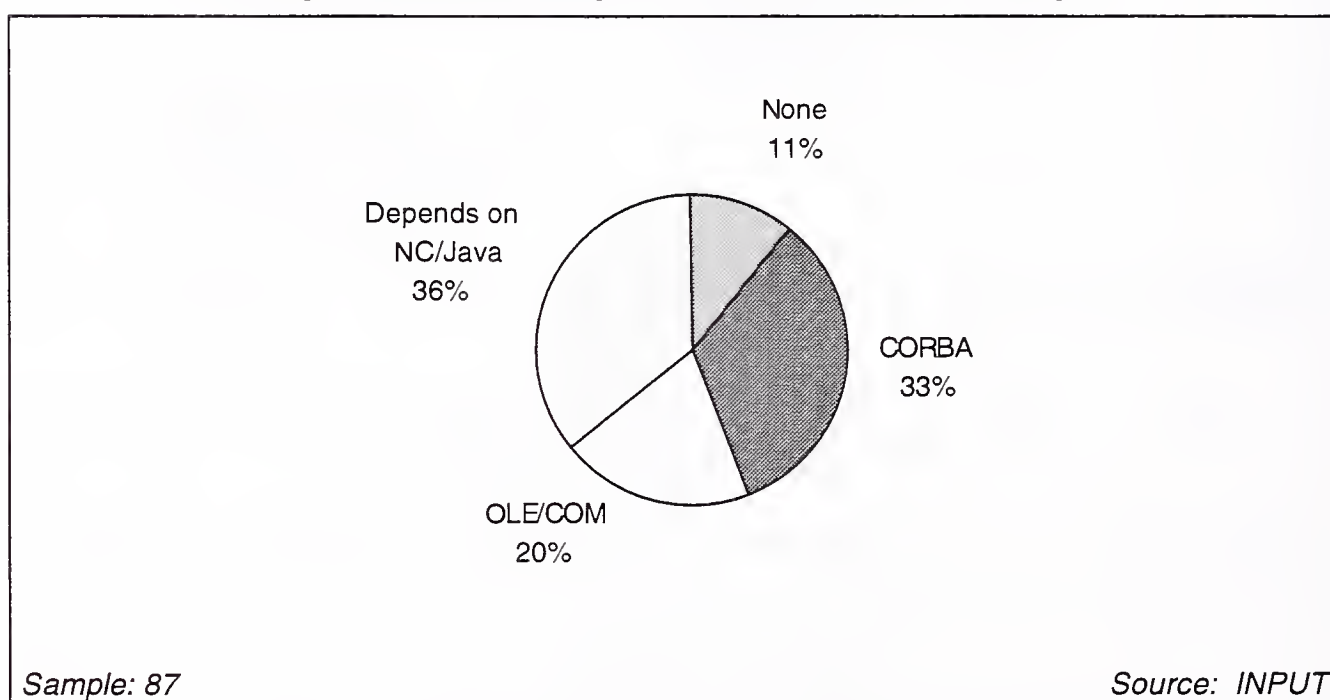
- Currently starting an NC trial project, expected to go live during 1998
- NCs would fit well into the company's IT infrastructure and distributed topology

B**Future Object Model Usage**

Despite the low usage of enterprise-wide object models in mid-1997 (80% of respondents claimed not to have implemented a corporate-wide model), users clearly have high expectations of their adoption in the short term. Exhibit V-5 shows the expected use of the major architectures by mid-1999.

CORBA use is expected to increase by 100%, and COM use by significantly more. A third of users, however, are delaying widespread object deployment until the shape of the NC and Java markets solidifies.

Exhibit V-5

Object Models Expected Mid-1999—Europe

Exhibits V-6 to V-8 show expected object model use by mid-1998 for each country. UK respondents were most cautious, with around half waiting to see the results of NC and Java developments. German respondents were the most emphatic, with around half aiming for a CORBA deployment, equal numbers expecting to use COM or waiting to observe NC/Java developments, and none expecting to ignore the issue of objects.

Exhibit V-6

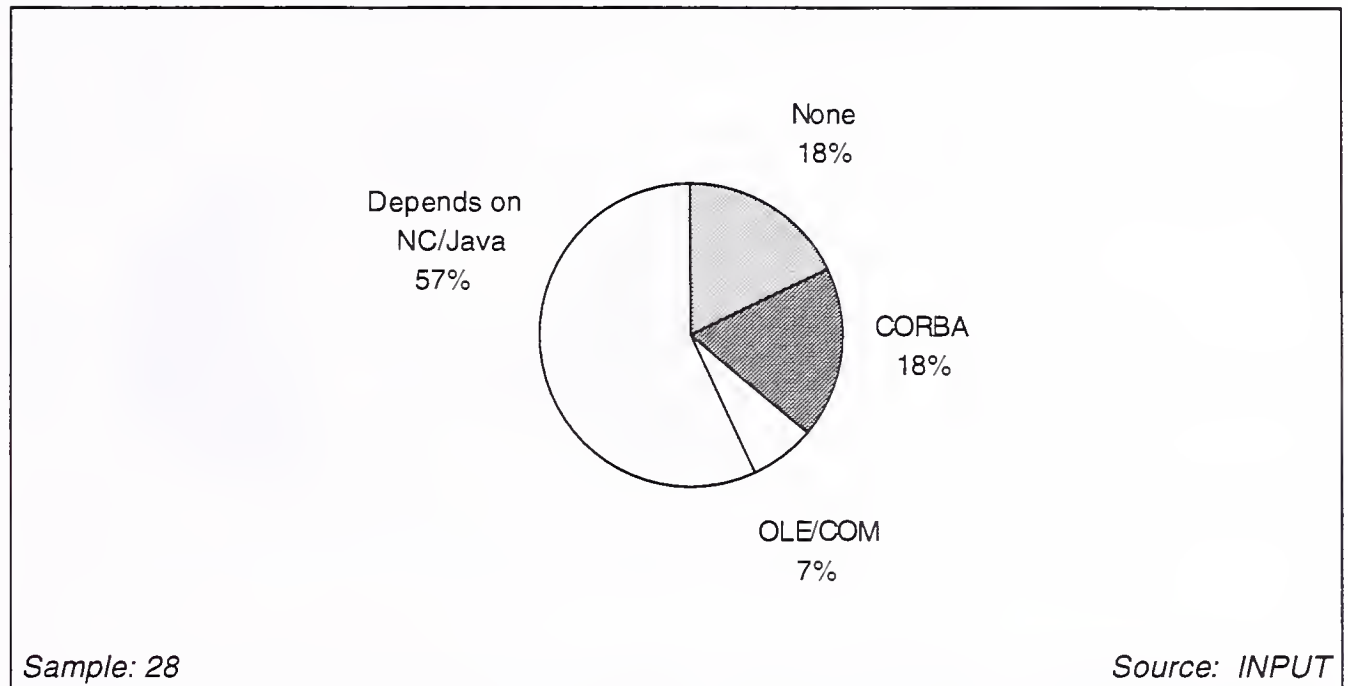
Object Models Expected Mid-1999—UK

Exhibit V-7

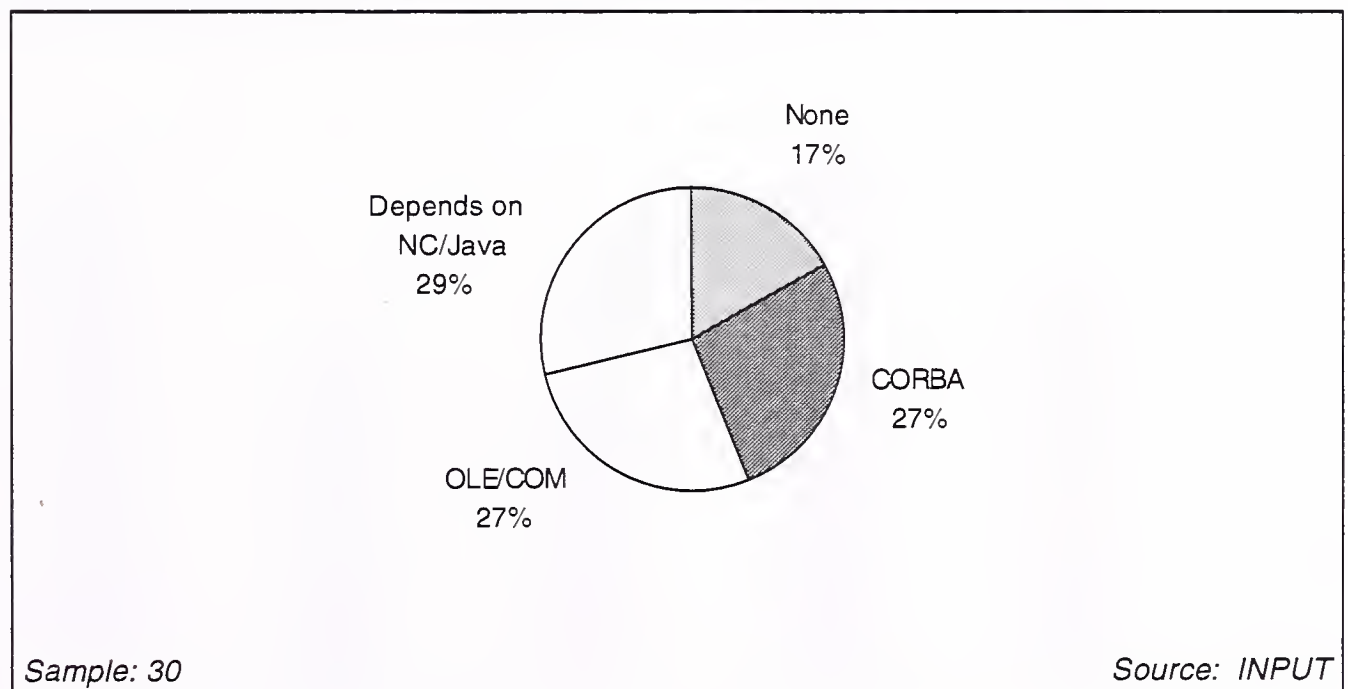
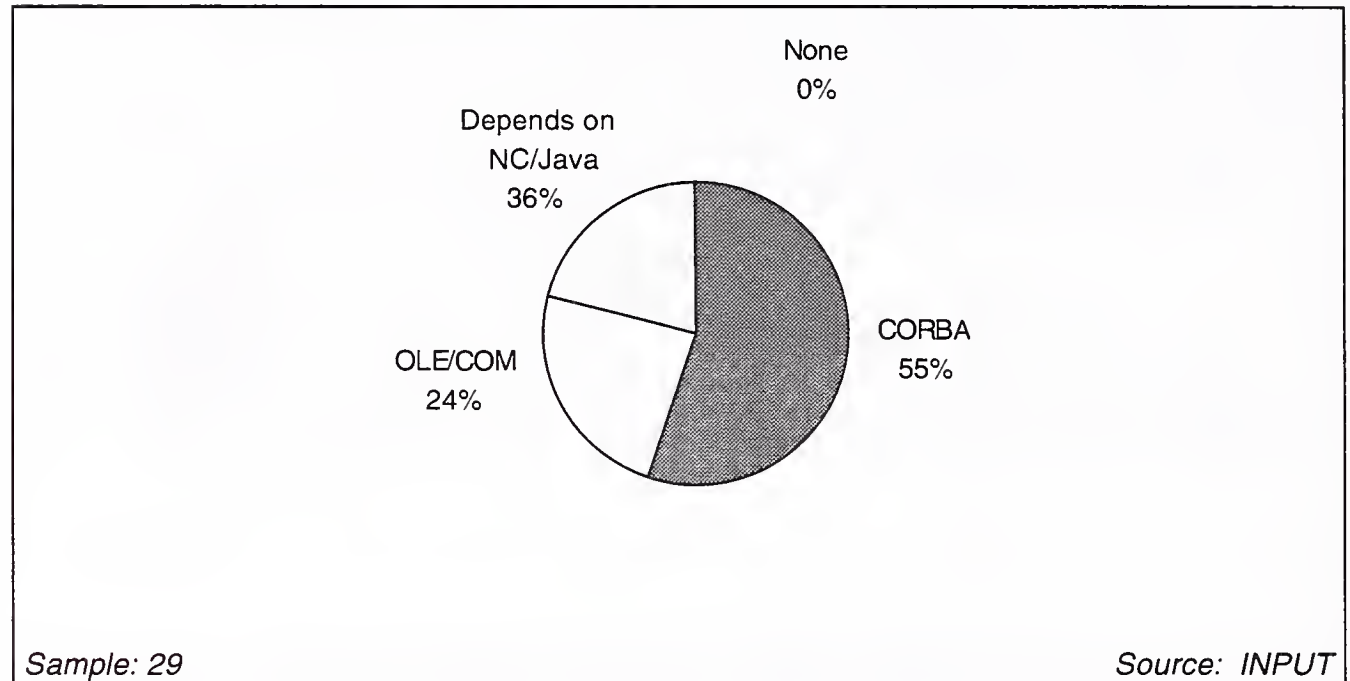
Object Models Expected Mid-1999—France

Exhibit V-8**Object Models Expected Mid-1999—Germany**

C

Influence of Intranet on NC Purchase Decisions

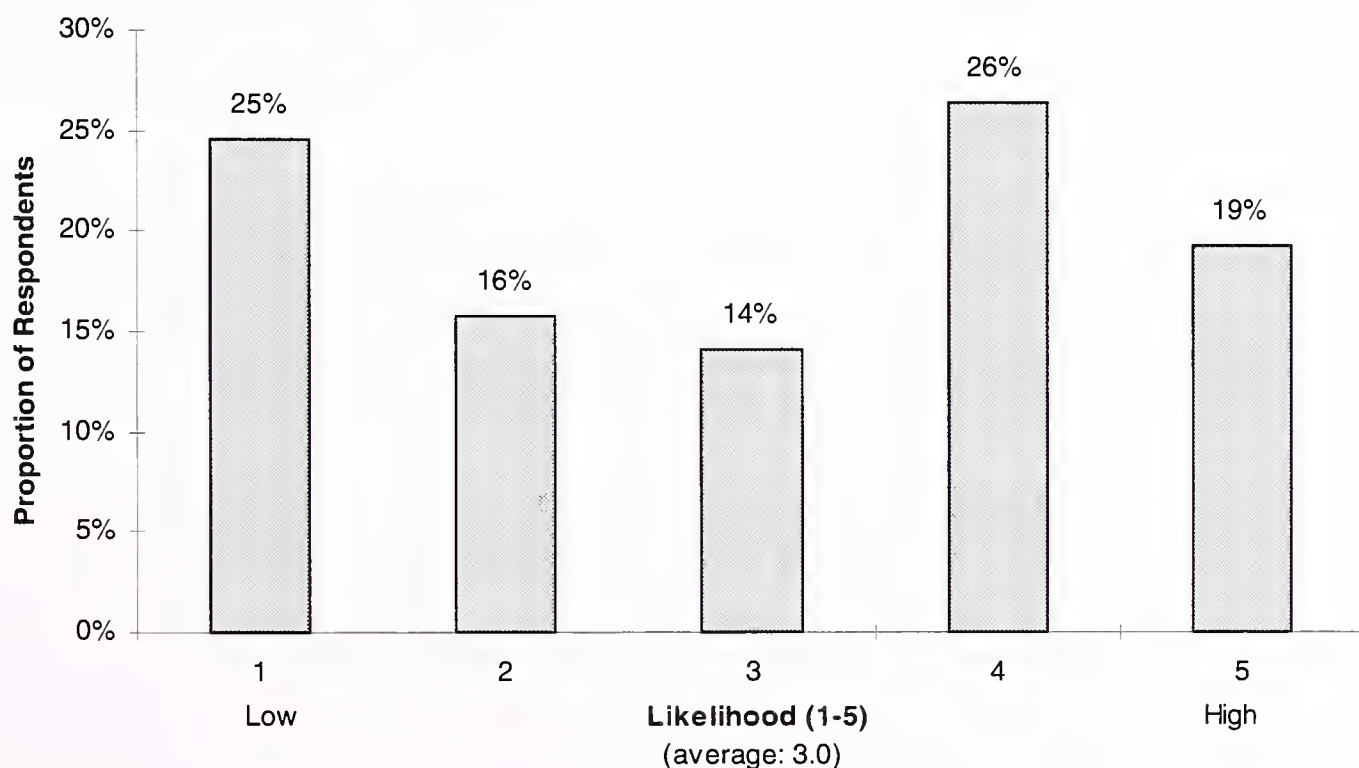
Respondents were asked how much more likely they would be to use NCs if they had an Intranet as opposed to a non-Intranet environment. Responses were mixed—as many respondents gave a high rating (4/5) to the positive influence of an Intranet on their NC purchase decisions as did a low rating (1/2). Exhibit V-9 shows the responses by rating.

INPUT expects the influence that Intranet ownership has on NC purchase decisions to decrease over time, due to the NC-like direction being taken by PCs. This expectation is despite the increasing development of Intranets. While the correlation of NC deployment with Intranet use will rise, this is due to the increase in use of both technologies, not the dependence of one on the other.

This statement is reinforced by respondents' views on the effect NC deployment would have on their IT. As shown in Exhibit V-10, the future scenario of accelerating Intranet use in an NC environment was given a likelihood rating of 3 out of 5. This is middling, as is the finding just discussed.

Exhibit V-9

Influence of Intranet on Future NC Purchases—Europe



Sample: 57

Source: INPUT

D**Likelihood of Future NC Scenarios**

Respondents were presented with five potential scenarios and asked to rate the expected likelihood of each occurring were NCs to be deployed within their organisation. The scenarios presented were:

- Development and use of Intranets would accelerate
- IT costs overall would increase due to the extra server and network resources required outweighing the lower initial cost of NCs
- You would source hardware and software from a more diverse mix of suppliers
- Use of proprietary platforms (e.g. Windows, AS/400) would decrease in favor of open platforms (e.g. UNIX, Java)
- Your IT environment and its support requirements would become more complex, not less

There is a low perceived likelihood of an increase in IT spending or a change in sourcing due to NCs. Although, in a theoretical Java-based IT environment, client platforms can be technologically diverse, in practice users are most likely to purchase NCs from one source, or through one channel such as an outsourcing contract, due to non-technological, business benefits such as single point of contact for support and service, and high-volume discounting.

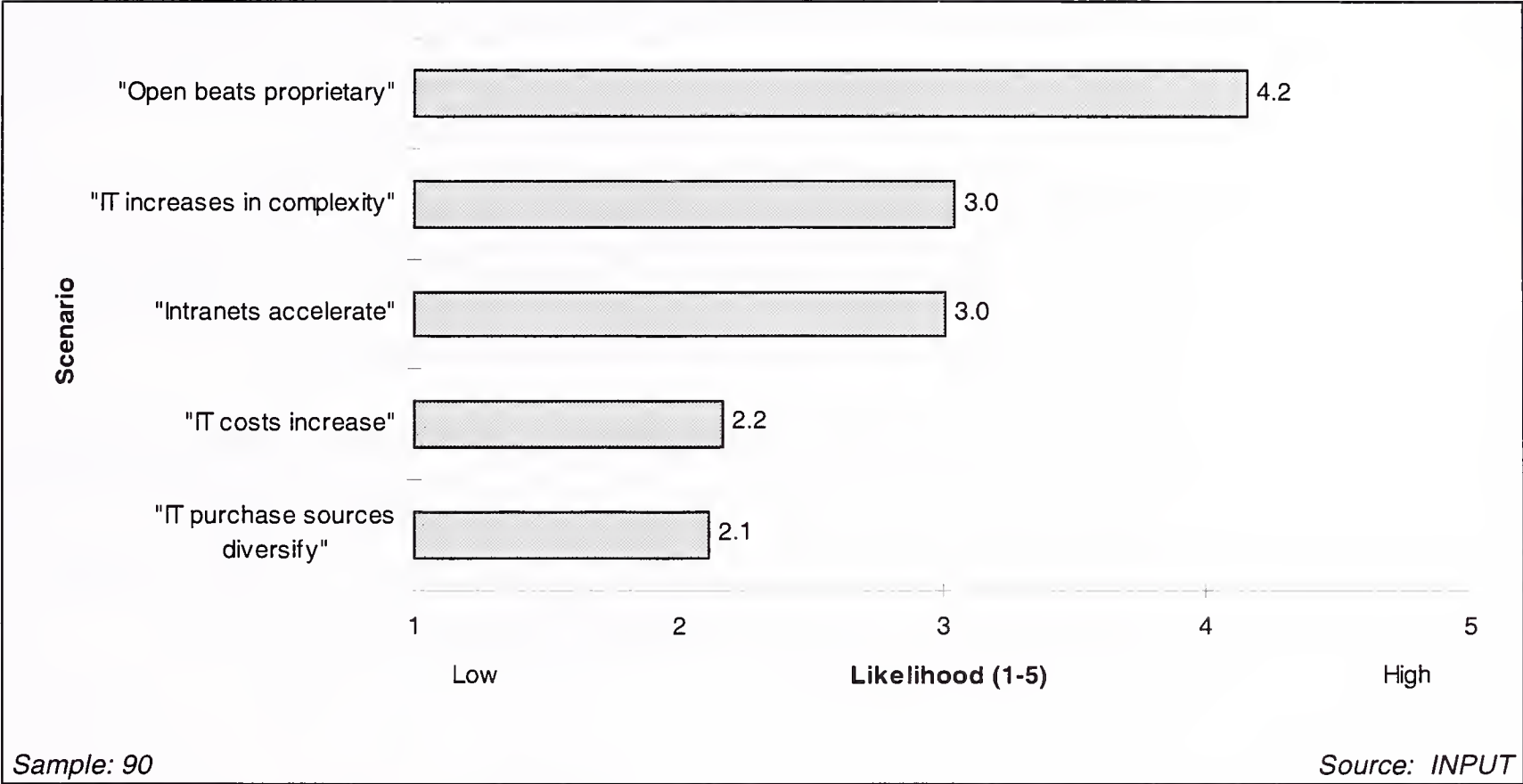
The possibilities of acceleration in Intranet use and IT complexity have a medium perceived chance of transpiring. As the previous section shows, the existence of an Intranet has only a medium influence in determining likelihood of purchasing NCs. The same effect in reverse is seen here; NCs and Intranets appear not to be interdependent.

Respondents were considerably more assured of the likelihood of proprietary system usage decreasing in favor of open systems ("open" in this context meaning cross-platform technologies such as UNIX and Java, rather than only technologies controlled by formal standards bodies). All of the vendors controlling the platforms most under threat from this scenario are Internet- and Intranet-enabling their platforms in response, notably Microsoft Windows, Novell Netware, and IBM AS/400.

There was no significant difference between the perceptions of respondents in the UK, France, and Germany and the European average.

Exhibit V-10

Perceived Likelihood of Future NC Scenarios—Europe



E

Future Important Server Characteristics

INPUT asked respondents to describe the technological characteristics which they believed would be most important to their organisation over the next two years. Exhibit V-11 shows the response across all countries; Exhibits V-12 to V-14 show responses for each country.

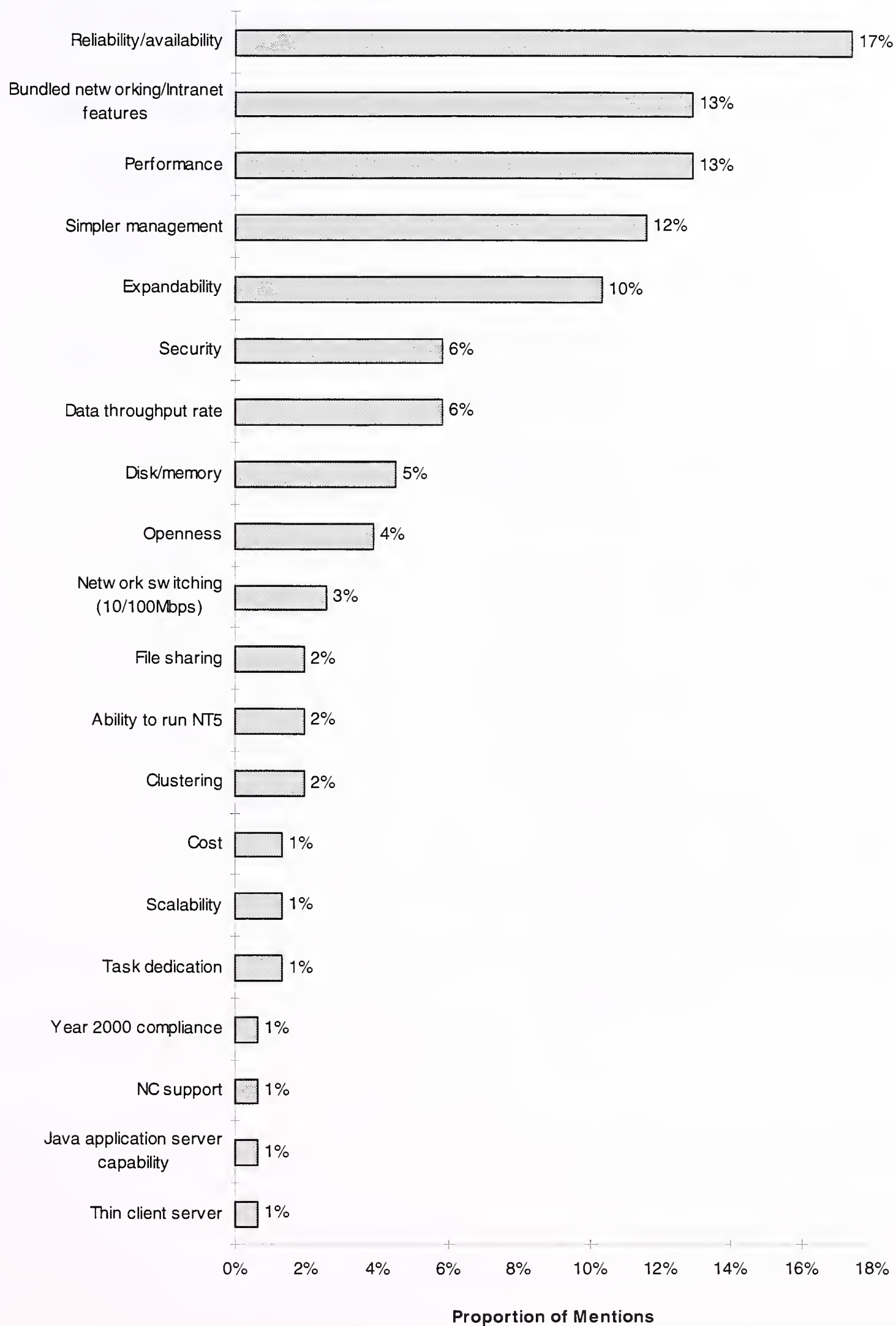
Most of the top features are operational, not functional—IT managers expect to be able to operate a stable, expandable server platform that is simple to manage, simple to connect to the corporate network/Intranet and the Internet, and that has in-built recovery facilities.

NC support was considered important by only one respondent. However, ten out of 88 respondents rated the likelihood of their using NCs by mid-1998 as high or very high (4 or 5 out of 5 respectively), and 11 respondents rated the likelihood as medium (3 out of 5). This indicates that respondents do not consider server-based NC support as a prerequisite for using NCs.

Exhibit V-11

Server Characteristics of Most Importance By Mid-1999—Europe

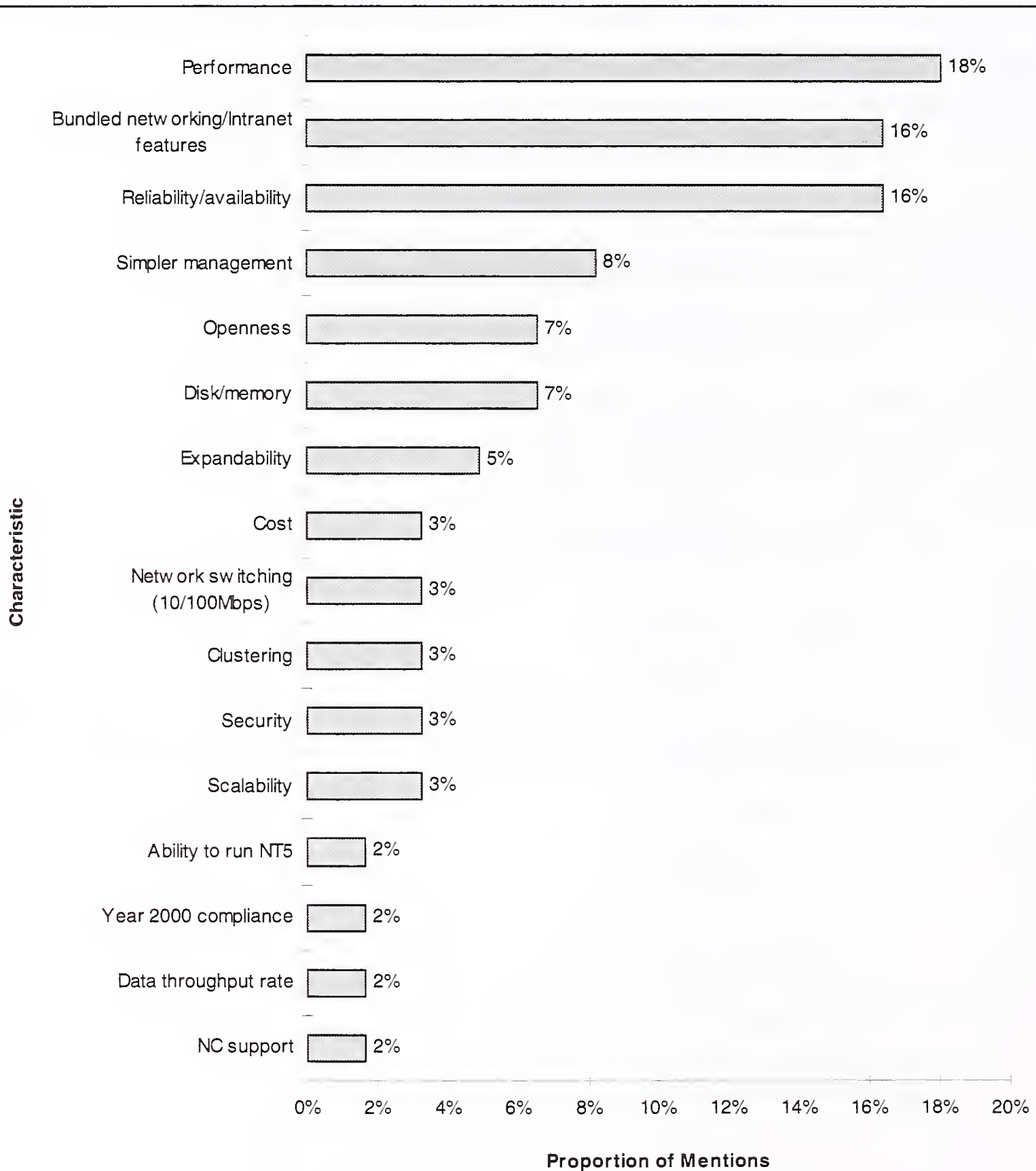
Characteristic



Sample: 155

Source: INPUT

Exhibit V-12

Server Characteristics of Most Importance By Mid-1999—UK

Sample: 61

Source: INPUT

Exhibit V-13

Server Characteristics of Most Importance By Mid-1999—France

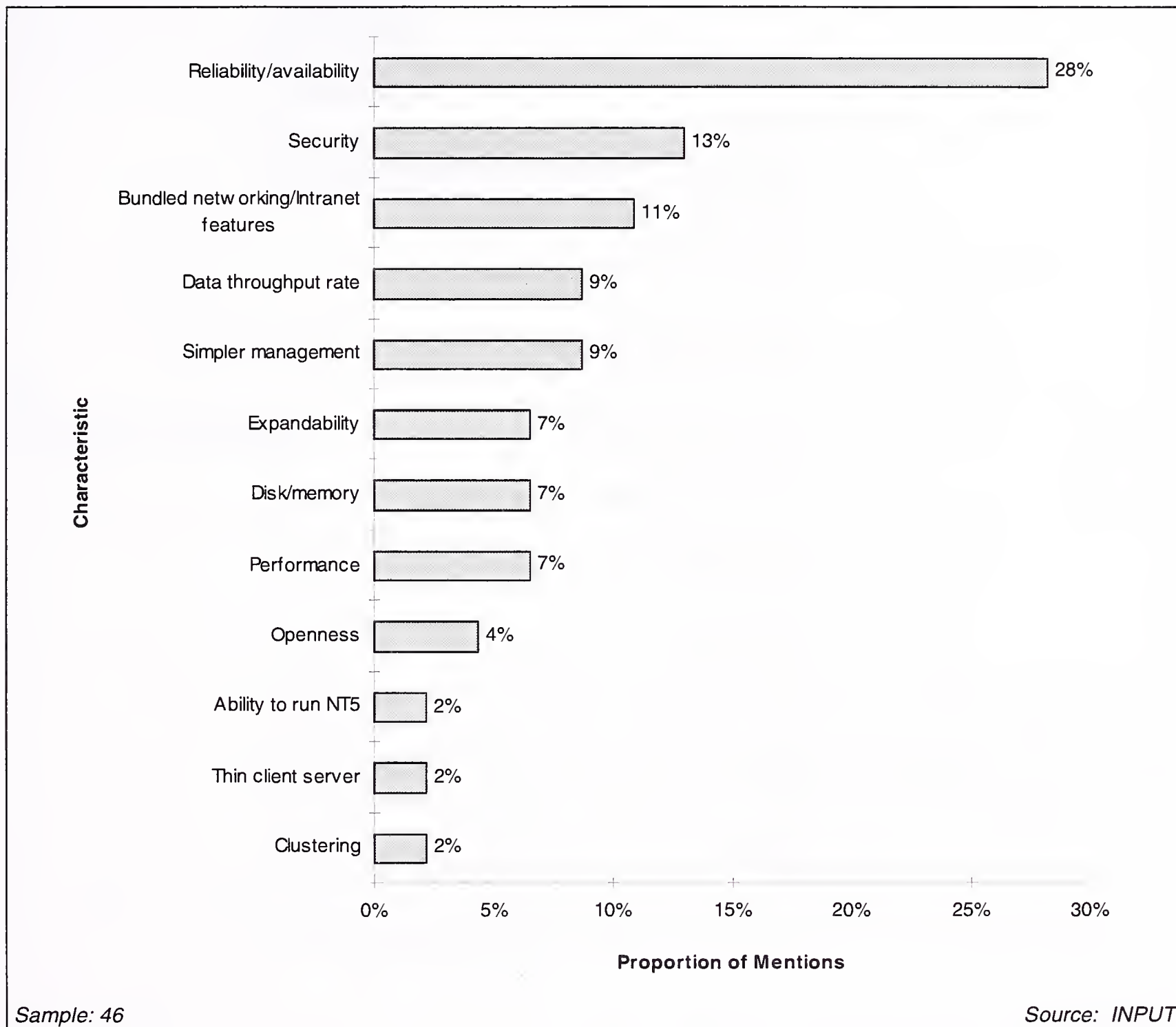
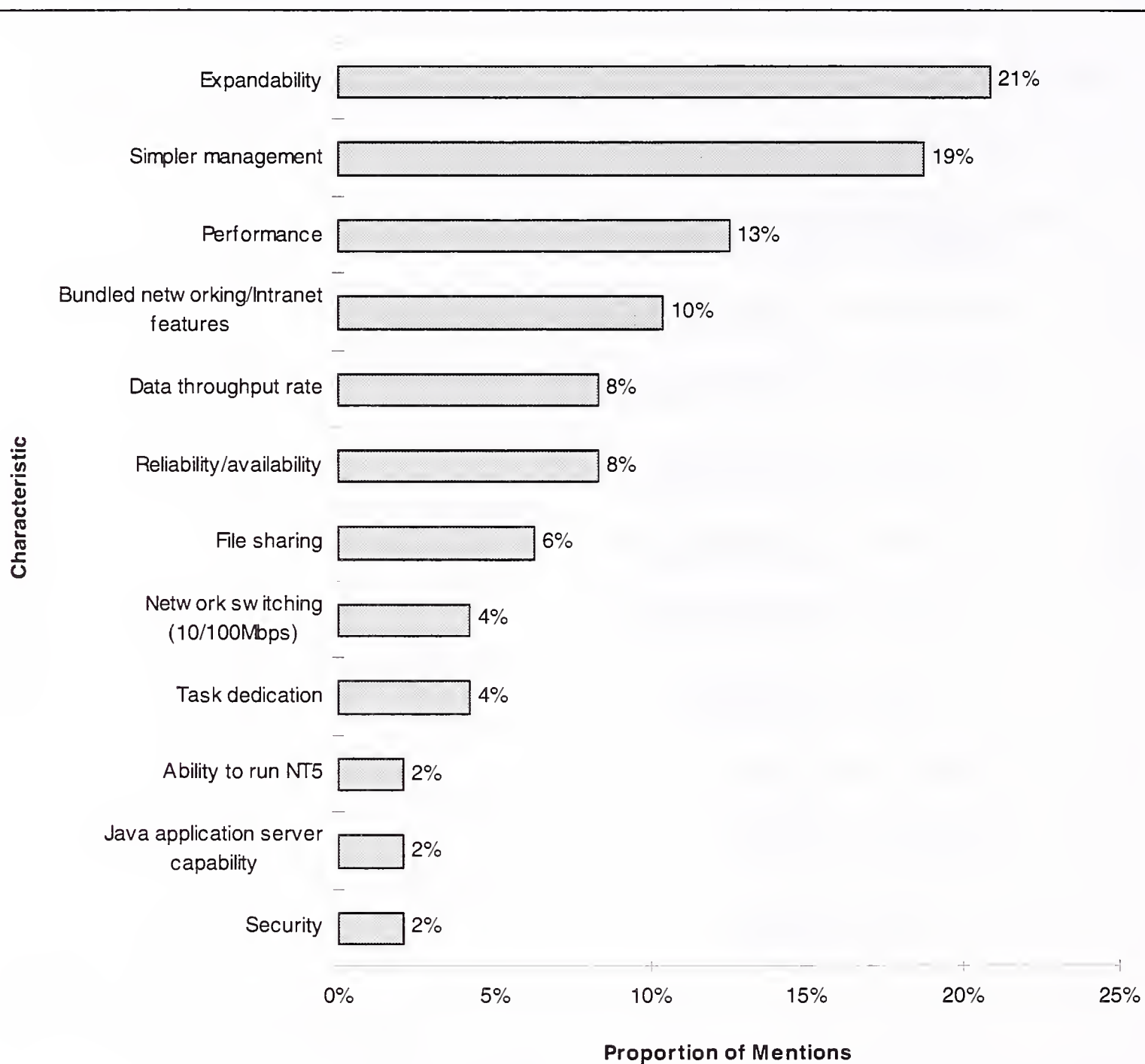
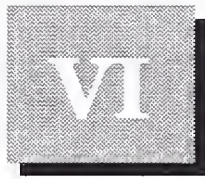


Exhibit V-14

Server Characteristics of Most Importance By Mid-1999—Germany

Sample: 48

Source: INPUT



Budgets and Costs

A

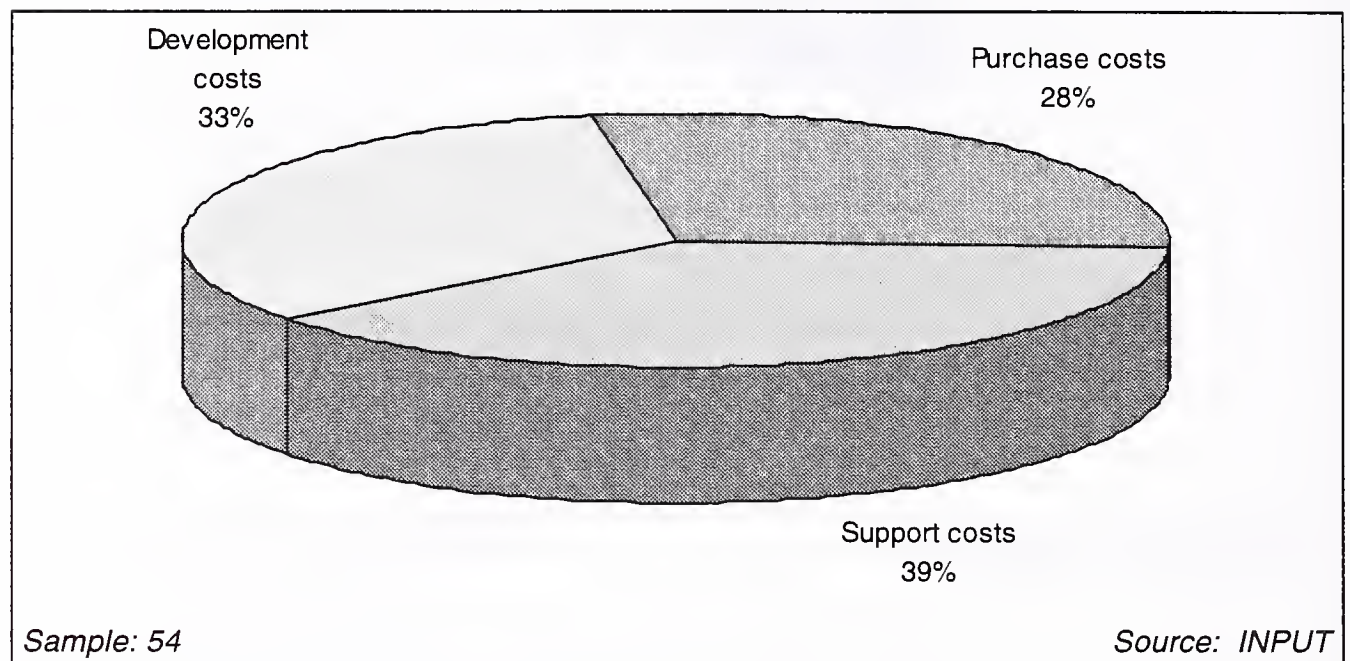
Overall IT Budgets

According to the survey, respondents across Europe spend:

- 2.2% of their annual revenues on IT
- US\$3,300 per user per year on IT support

Within IT budgets, the split between purchase costs, support costs and development costs is shown in Exhibit VI-1. NCs have the potential to lower purchase costs, although the decreasing price of PCs is making NCs less attractive in terms of capital investment savings. Where they are installed on a large scale throughout an organization (over 20% of a company's desktop platforms), NCs will affect support costs—end user support costs will decrease, but other aspects of IT support will require greater resources and spending, as discussed in the following sections.

Exhibit VI-1

Breakdown of IT Budgets—Europe

B**Effect of NC Deployment on IT Costs****1. End-User Support Costs**

NCs are commonly expected to reduce support costs, but the changes in support costs vary widely across the spectrum of IT, from desktop-level end-user support to server and network support.

Exhibit VI-2 shows the proportions of respondents who would expect end-user support costs to increase, decrease and stay the same where NCs are used. As might be expected, most users expect end-user support costs to decrease in NC environments.

Exhibit VI-2

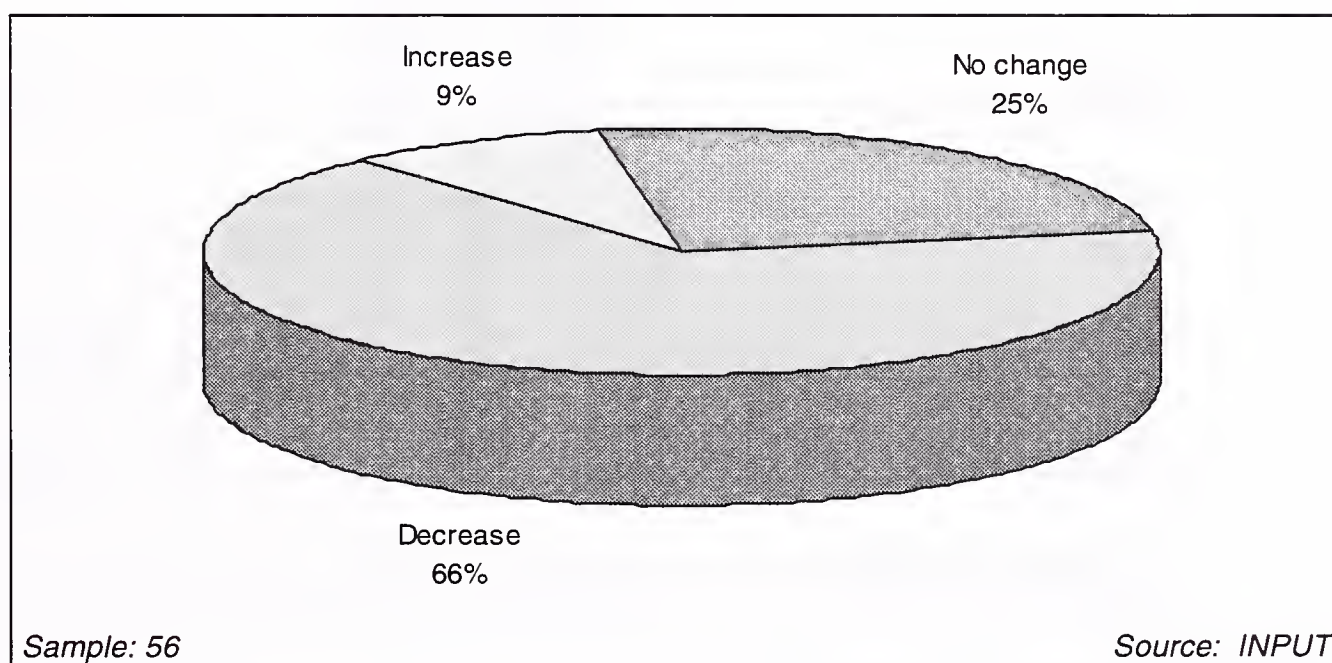
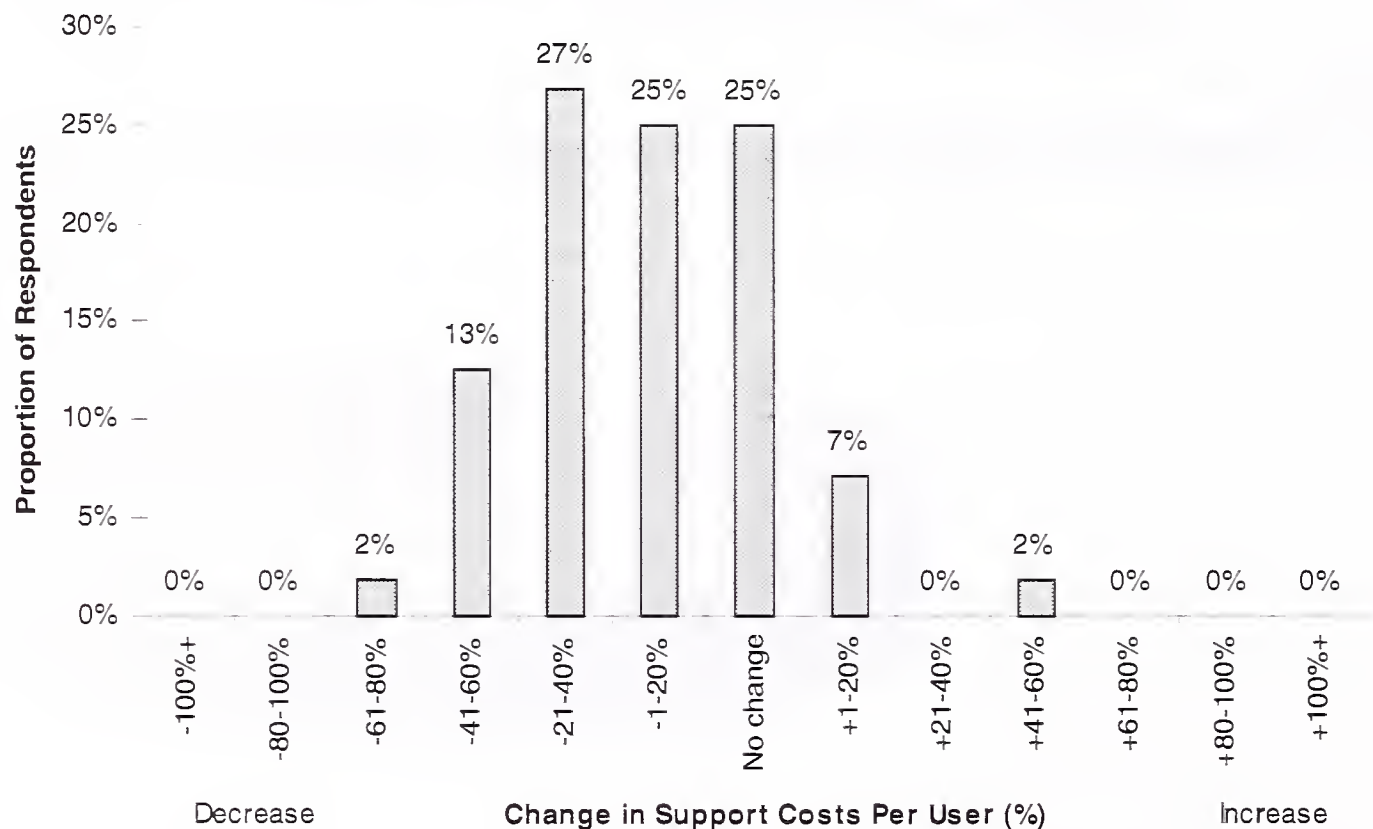
Expected Net Effect on End User Support Costs With NCs—Europe

Exhibit VI-3 shows details of the amount of change respondents would expect. The most commonly anticipated scenario is that end-user support costs would decrease by up to 40%, with a small number of respondents expecting even greater cost savings.

Exhibit VI-3

Expected Detailed Change in End User Support Costs With NCs



Sample: 56

Source: INPUT

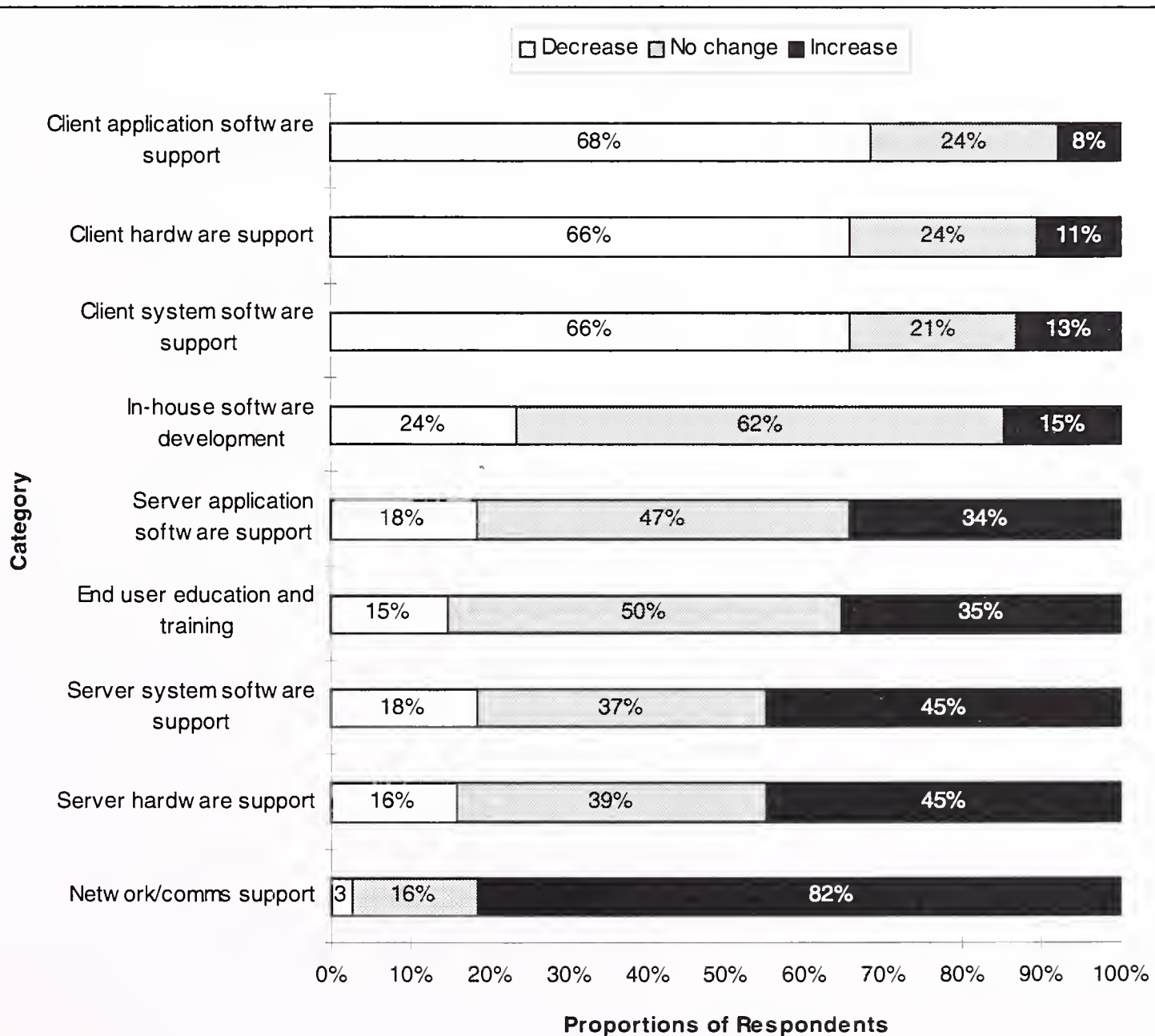
2. Total IT Support Costs

End-user support is the area in which NCs are most commonly expected to lower support costs. The picture is different for other areas of support. Exhibit VI-4 shows the expected change in support costs for all categories of IT from end-user to server and network support.

The Exhibit shows that support costs beyond the desktop are expected, overall, to stay the same or increase. The most striking example of this is in network and communications support: 82% of users expect NCs to increase such costs.

Exhibit VI-4

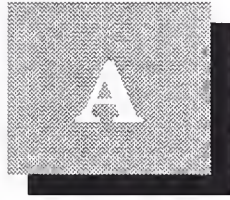
Expected Change in All Support Costs With NCs



Sample: 38

Source: INPUT

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Buyer Questionnaire

A

Infrastructure

1. Characteristics

1. How many of the following clients does your organisation have

	No. of users
a. Terminals (mainframe, mini or X)	_____
b. PCs or Apple Macs	_____
c. UNIX workstations	_____
d. Other (NAME) _____	_____

2. Currently, do you have an Intranet? If so, what proportion of your users have access to it?

Yes ☐

No ☐

Proportion of users _____ %

3. What is the primary object model in your organisation?

a. CORBA ☐

b. OLE/COM/DCOM ☐

c. No object framework ☐

d. Other (NAME) _____ ☐

4. How important are the following characteristics of an Intranet server platform (1=not important, 5=very important)? If you currently have an Intranet, how satisfied are you with each characteristic (1=not satisfied, 5=very satisfied)?

	Imp.	Sat.
a. Performance	_____	_____
b. Operating system security	_____	_____
c. Scalability	_____	_____
d. Availability	_____	_____
e. Purchase cost	_____	_____
f. Support cost	_____	_____
g. Ability to support NCs	_____	_____
h. Ability to serve Windows applications to non-Windows clients (eg using Citrix ICA)	_____	_____
i. OLE/COM/DCOM support	_____	_____
j. CORBA support	_____	_____
k. Server-side Java support	_____	_____
l. Centralised application/data management	_____	_____

5. How important to your organisation are the following characteristics of client platforms in general, and how satisfied are you with your PCs for each characteristic

	Imp.	Sat.
a. Performance	_____	_____
b. Security	_____	_____
c. Purchase cost	_____	_____
d. Support cost	_____	_____
e. Centralised system management	_____	_____
f. Centralised application software/data management	_____	_____
g. Terminal support (e.g. X and 3270)	_____	_____
h. Mobile working capability	_____	_____
i. Ease of connection/configuration to network	_____	_____
j. Ease of use (for end user)	_____	_____

2. Suitability

6. What are your organisation's primary servers? How suitable do you think they are to supporting NCs (1=not suitable, 5=very suitable)? Which do you think is most suitable for NCs, regardless of your usage (TICK ONLY ONE)?

Rotate list	Primaries	Suitability	Most suitable
a. IBM AS/400	<input type="checkbox"/>	_____	<input type="checkbox"/>
b. UNIX server	<input type="checkbox"/>	_____	<input type="checkbox"/>
c. Windows NT server	<input type="checkbox"/>	_____	<input type="checkbox"/>
d. Mainframe	<input type="checkbox"/>	_____	<input type="checkbox"/>
e. Netware server	<input type="checkbox"/>	_____	<input type="checkbox"/>
f. Other (NAME)	<input type="checkbox"/>	_____	<input type="checkbox"/>
_____	<input type="checkbox"/>	_____	<input type="checkbox"/>

7. What are your organisation's primary databases? How suitable do you think they are to supporting NCs (1=not suitable, 5=very suitable)? Which do you think is most suitable for NCs, regardless of your usage (TICK ONLY ONE)?

Rotate list	Primaries	Suitability	Most suitable
a. Oracle	<input type="checkbox"/>	_____	<input type="checkbox"/>
b. Informix	<input type="checkbox"/>	_____	<input type="checkbox"/>
c. Ingres	<input type="checkbox"/>	_____	<input type="checkbox"/>
d. Sybase	<input type="checkbox"/>	_____	<input type="checkbox"/>
e. db2	<input type="checkbox"/>	_____	<input type="checkbox"/>
f. Access	<input type="checkbox"/>	_____	<input type="checkbox"/>
g. Lotus Notes	<input type="checkbox"/>	_____	<input type="checkbox"/>
h. Other (NAME)	<input type="checkbox"/>	_____	<input type="checkbox"/>
_____	<input type="checkbox"/>	_____	<input type="checkbox"/>

8. What are your organisation's primary networks (LANs and enterprise networks, not WANs)? How suitable do you think they are to supporting NCs (1=not suitable, 5=very suitable)? Which do you think is most suitable for NCs, regardless of your usage (TICK ONLY ONE)?

Rotate list	Primaries	Suitability	Most suitable
a. 10Mbps Ethernet	<input type="checkbox"/>	_____	<input type="checkbox"/>
b. 100Mbps Ethernet	<input type="checkbox"/>	_____	<input type="checkbox"/>
c. ATM	<input type="checkbox"/>	_____	<input type="checkbox"/>
d. Token Ring	<input type="checkbox"/>	_____	<input type="checkbox"/>
e. Netware	<input type="checkbox"/>	_____	<input type="checkbox"/>
f. SNA	<input type="checkbox"/>	_____	<input type="checkbox"/>
g. Other (NAME)	<input type="checkbox"/>	_____	<input type="checkbox"/>
_____	<input type="checkbox"/>	_____	<input type="checkbox"/>

9. Which type of NC do you think would fit best into your IT environment (regardless of your intent to purchase NCs)? (TICK ONLY ONE)

- | | |
|------------------------------------|--------------------------|
| a. Java terminal | <input type="checkbox"/> |
| b. Hybrid general-purpose terminal | <input type="checkbox"/> |
| c. Windows terminal | <input type="checkbox"/> |
| d. Don't know | <input type="checkbox"/> |

Why?

10. How much more likely would you be to use NCs if you had an Intranet as opposed to a non-Intranet environment (1=no more likely, 5=much more likely)?

11. How suitable do you consider Java as a programming language for corporate use currently (1=not suitable, 5=highly suitable)? How confident are you that it will be suitable two years from now (1=not confident, 5=very confident)?
- a. Currently: _____
- b. In two years _____
12. How suitable do you consider the Java Virtual Machine (JVM) as an platform for deploying and executing corporate applications currently (1=not suitable, 5=highly suitable)? How confident are you that it will be suitable two years from now (1=not confident, 5=very confident)?
- a. Currently _____
- b. In two years _____
13. What do you see as the strengths and weaknesses of PCs for corporate use?
- _____
- _____
- _____
14. What do you see as the strengths and weaknesses of NCs for corporate use?
- _____
- _____
- _____

3. Future

15. What do you expect to be your primary object model in two years time?

a. CORBA []

b. OLE/COM/DCOM []

c. No object framework []

d. Depends on development of NCs/Java/Intranets []

e. Other (NAME) _____ []

16. How likely do you think each of the following scenarios would be if you introduced NCs into your organisation (1=not at all likely, 5=very likely)

a. Development and use of Intranets would accelerate

b. IT costs overall would increase due to the extra server and network resources required outweighing the lower initial cost of NCs

c. You would source hardware and software from a more diverse mix of suppliers

d. Use of proprietary platforms (eg Windows, AS/400) would decrease in favour of open platforms (eg UNIX, Java)

e. Your IT environment and its support requirements would become more complex, not less

17. What technological characteristics of servers do you expect to be most important to your organisation over the next two years?

B**Support**

18. How many full-time (or full-time equivalent) support personnel do you have in order to support all your IT users (eg, two half-time = one full-time)?
- _____
19. Please estimate how much you spend on IT support per user per year
- [currency] _____
20. If NCs were to be introduced into your organisation, by how much do you think your IT support cost per end user would change (in %)?
- _____ %
21. How do you think widespread NC usage in your organisation would change costs in the following support areas (state as % of cost per user for each item. Eg: -10% = 10% saving on that cost per end user):
- a. Client hardware support +/- _____ %
 - b. Client system software support +/- _____ %
 - c. Client application software support +/- _____ %
 - d. Server hardware support +/- _____ %
 - e. Server system software support (not database) +/- _____ %
 - f. Server application software support (e.g. database) +/- _____ %
 - g. Network/comms support +/- _____ %
 - h. End user education and training +/- _____ %
 - i. In-house software development +/- _____ %

C**Usage**

22. What is the current state of NC use within your organisation? (TICK ONLY ONE)
- a. Not using and not considering using or piloting NCs ☐
 - b. Have considered and rejected using or piloting NCs ☐
 - c. Currently considering using or piloting NCs ☐
 - d. Currently running an NC pilot ☐
 - e. Already using NCs for live applications ☐ No of NC users _____
23. How many IT users are there in your organisation (in total)? How many of these do you think could be converted in theory to NCs due to the nature of their work?
- a. IT users: _____
 - b. Could be NC users: _____
24. How likely is your organisation to use NCs for live applications (not just pilots) one year from now? (1=not likely, 5=very likely)
- _____

What are the main reasons for this?

IF RESPONDENT STATED 3, 4 OR 5 — what department and application is most likely to use NCs?. E.g. call center, or sales database users

25. How suited are the following departments to using NCs (1=not suited, 5=highly suited)?

- a. Sales _____
- b. Marketing _____
- c. Customer service _____
- d. Call centre/help desk _____
- e. Product development / R&D _____
- f. Human resources _____
- g. Administration _____
- h. Corporate management _____
- i. Finance _____
- j. IS _____
- k. Logistics / distribution _____
- l. Other (NAME) _____

26. How suitable do you think the following applications are to NCs (1=not suited, 5=highly suited)?

- a. Collaboration (eg groupware, messaging, workflow) _____
- b. Office applications (eg wp, spreadsheet) _____
- c. ERP (e.g. SAP, Baan) _____
- d. Content creation / design (eg publishing, graphics) _____
- e. Financial (eg analysis, accounting, modelling) _____
- f. Scientific / engineering _____
- g. Other (NAME) _____
- h. Other (NAME) _____

27. What is your typical annual IT budget for 1) purchase costs, 2) support costs, and 3) development costs. (TOTAL MUST ADD UP TO 100%)

1) Purchase costs

1a. Client hw/sw _____ %

1c. Server hw/sw _____ %

1e. Networks/comms _____ %

1f. Other _____ %

(No need to name "other")

2) Support costs

2a. Client hw/sw _____ %

2c. Server hw/sw _____ %

2e. Networks/comms _____ %

2f. End user training _____ %

2g. Other _____ %

(No need to name "other")

3) Development costs

3a. In-house software development _____ %

3b. Other _____ %

(No need to name "other")

28. How much is your total IT budget for the current year?

[currency] _____

