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Y2000 Services Opportunities

U.S. Market Analysis Program

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Abstract

Never in the history of computing has an issue been so pervasive yet so misunderstood as that of the year 2000 century date change issue.

Doomsayers offer that with the arrival of the new millennium, even the most insignificant application with an improper date reference could spell disaster for a system and the company it supports.

This report provides executives with strategic insights into issues surrounding the century date change as well as how to address them. The report also presents guidelines for a conversion strategy and suggestions for a smooth transition. Though not a tutorial, this report is intended to provide a conceptual framework to help management develop a Y2000 conversion plan.

Extensive interviews were conducted with Y2K solution vendors as well as developers, managers, and executives in existing/potential Y2000 solution applying companies. The research focuses on organizations located in the U.S., however the same principles may also be relevant in other developed countries.

This report is written for IS executives trying to better understand the Y2000 problem, and develop a plan for addressing the issue. It is also intended for the vendor community to help them identify market opportunities and means of differentiation.

The report also provides a comprehensive analysis of the performance of IT vendors in meeting user-specific needs regarding the implementation and support of Y2000 conversions.

This report contains 30 pages and 23 charts. Several related Research Bulletins and a Year 2000 White Paper are also included as appendices.

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U.S. Market Analysis Program

Y2000 Services Opportunities

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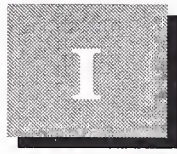
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Introduction

This section describes the purpose and scope of this report. It presents the research methodology and lists related reports published by INPUT.

A

Purpose of the Report

The Year 2000. Never in the history of computing has an issue been so pervasive yet so misunderstood. Doomsayers offer that with the arrival of the new millennium, even the most insignificant application with an improper date reference may bring a system - and a company - to its knees. Conversely, many IS executives are in denial regarding just how big the problem really is.

With the popular press reporting estimates currently hovering in the half a *trillion* dollar range for worldwide "Y2K" conversion expenditures, there is cause to be aware for both vendors of the technology and organizations considering a Y2000 conversion. This report describes the critical issues surrounding the "problem of the century" and gives both systems planners and vendors insights into market trends.

B

Objectives

This report had the following major objectives:

- Provide an objective synopsis of the problem, its scope, and potential costs
- Help marketing managers in software, systems, and professional services firms understand the market for Y2000 conversions
- Describe the current of level Y2000 conversion activity and forecast future trends

- Outline an approach to the Y2000 issue for companies considering conversion
- Identify the leading vendors of Y2000 conversions
- Illustrate their strengths and weaknesses

This report is written for IS executives trying to better understand the Y200 problem, and develop a plan for addressing the issue. It is also intended for the vendor community to help them identify market opportunities and means of differentiation.

C

Scope

This report provides executives with strategic insights into issues surrounding the century date change as well as how to address them. The report also presents guidelines for a conversion strategy and suggestions for a smooth transition. Though not a tutorial, this report is intended to provide a conceptual framework to help management develop a Y2000 conversion plan.

The research behind the following content focuses on organizations located in the U.S., however the same principles may also be relevant in other developed countries. Extensive interviews were conducted with Y2K solution vendors as well as developers, managers, and executives in existing/potential Y2000 solution applying companies. The vendors included are prominently recognized providers of Y2000 consulting services, tools, clock simulation, full conversion service, and/or an integrated Y2K conversion toolset.

Current possessors/likely purchasers of the technology surveyed were companies with at least \$25M in 1995 revenue. Data was also collected regarding large educational institutions and government purchasers. All major industry sectors are covered by the report as well as all organization sizes where significant IS activities are present. The emphasis is on large organizations.

The time scale addressed is 1997 to 2000. Given the rapid, ongoing development of Y2000 solution packages, greater emphasis is given to the near term of early 1997 to 1998.

D

Methodology

The research relies on interviews with knowledgeable entities within pertinent Y2000 solution supplying/applying organizations. The insights solicited from one hundred and ten IS professionals are analyzed in detail. Reviews of published materials, on-line resources, and case studies were also conducted to compile this report.

E

Report Structure

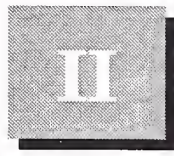
The following is a brief description of the organization of this report.

- Chapter II is an Executive Overview providing a summary of the research findings, analysis, conclusions, and recommendations of the report.
- Chapter III *Conversion Status*, presents an analysis of Y2000 solution vendors and breaks them down into various categories
- Chapter IV, *Approaches to Problem Resolution*, provides an evaluation of popular methods employed to address the Y2000 issue.
- Chapter V, *Vendor Performance Analysis*, establishes how much of a company's Y2000 related activities it intends to solicit from external service providers (ESPs) and what particular skills and services are being sought.
- Chapter VI, *Y2000 Conversion Funding*, reports INPUT's findings regarding Y2000 conversion cost estimates and breaks them down into several components. It also addresses how companies are funding their conversions and their expected timeline for completion.
- Appendix A, *Detailed Industry Charts*, includes several detailed graphical presentations regarding the relationship between a particular industry (process manufacturing, discrete manufacturing, and retail) and Y2000 conversion stage and cost as a function of revenue.
- Appendix B, *User Questionnaire*, contains a sample of the survey used to collect the data analyzed in the creation of this report.
- Appendix C, *The IT Industry and the Year 2000 - A White Paper*, presents a synopsis of the Y2000 issue. It summarizes major points presented in popular press and offers a broad perspective of the Y2000 conversion playing field. It also briefly describes some of the associated legal considerations.

It is intended for those who have not yet become familiar with the Y2000 problem and how it may impact their particular organization. For those readers who fall into this category, it should be read before the body of this report.

- Appendix D, *Related Y2000 Research Bulletins*, provides related research bulletins stemming from INPUT's U.S. Systems Integration Program and Information Services Market Analysis Program, including:
 - *The Real Future Shock - A Year 2000 Update*
 - *Vendor Liability and the Y2000 Crisis*
 - *Users Are Not Yet Ready for Y2000*

In addition, INPUT reviews vendor strategies in its Vendor Analysis Program. During the course of the year, INPUT issues monthly Research Bulletins through its Market Analysis Program (MAP). INPUT's MAP also provides vertical market forecasts and industry reports.



Executive Summary

The looming year 2000 (Y2000) problem may be summarized in a general sentence; programs utilizing conventional date formatting may perform calculation errors or cease functioning altogether. This can have dire consequences for businesses and may ultimately precipitate the failure of an enterprise.

Having been roused by the cacophony of "Y2000" solutions providers springing from the woodwork, most businesses have at least awakened to face these potentially devastating consequences and begun shuffling towards developing and administering viable solutions. Or have they?

INPUT research has shown that a substantial percentage are still just beginning to acquaint themselves with the issue, and those that have begun the transition have vastly underestimated the associated time/cost commitment.

A

U.S. Y2000 Solution Provider Market \$100 Billion

INPUT research has shown that the weighted average cost of a Y2000 conversion per organization is between \$700K and \$1M equating to a total U.S. Y2000 user expenditure of \$100B to \$140B. Focusing solely on companies with annual revenues between \$100M and \$500M, the average cost per firm is reduced to between \$500K and \$700K.

For the typical firm, these expenses will be broken down into the categories of Y2000 related products and services presented in Exhibit II-1 on the following page.

Generally, companies expect their internal IS resources to address the brunt of the issue with external software packages comprising the next greatest expense.

Exhibit II-1

U.S. Market for Y2000 Conversion Project Components

Cost Element	Percent of Total Cost	U.S. Market
Internal staff	29%	\$30B - \$40B
Software package upgrade	22%	\$22B - \$31B
New software application	16%	\$16B - \$22B
External consultants/developers	15%	\$15B - \$21B
Education and training	13%	\$13B - \$18B
New hardware	5%	\$5B - \$7B
Total	100%	\$70B - \$100B

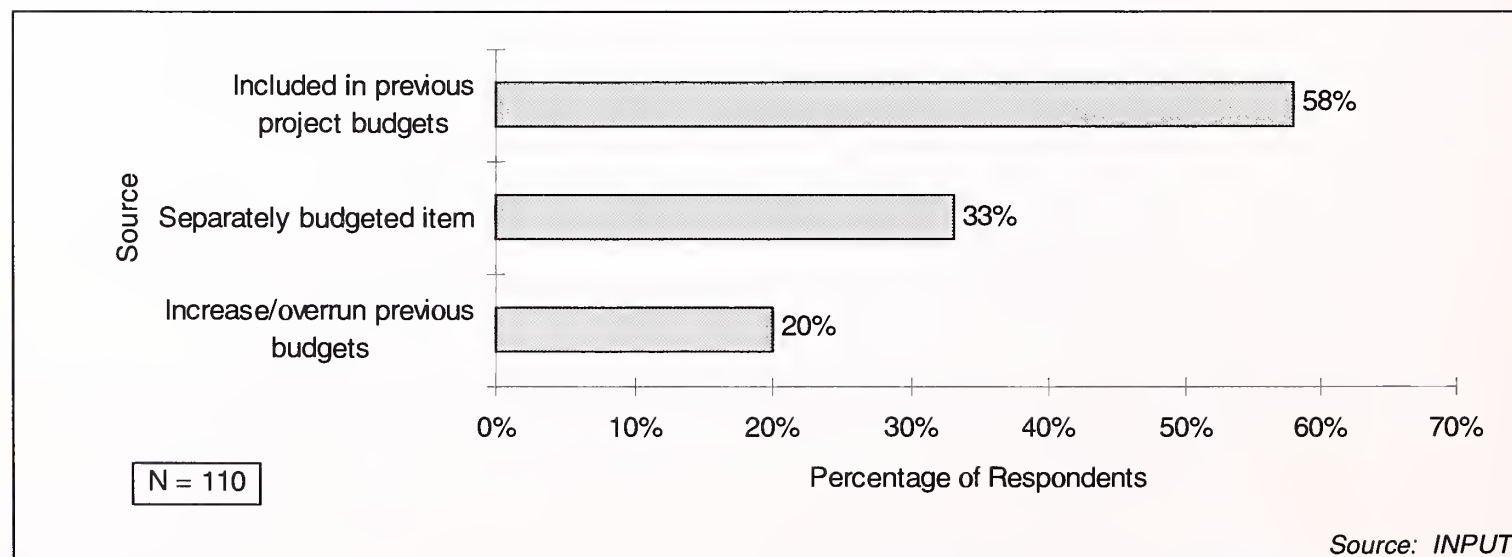
Source: INPUT

Companies initiating steps towards a Y2000 conversion expect to spend twice as much on internal staff than on external consultants/developers.

B**Cost Evaluation**

The vast majority of organizations have included Y2000 conversion expenditures in previously planned budgets (Exhibit II-2). 58% of respondents selected this category - nearly double the number of those electing to budget the Y2000 issue separately (33%). 20% expect to simply tack it onto previous budgets risking their overrun.

Exhibit II-2

Source of Funding for Y2000 Preparation

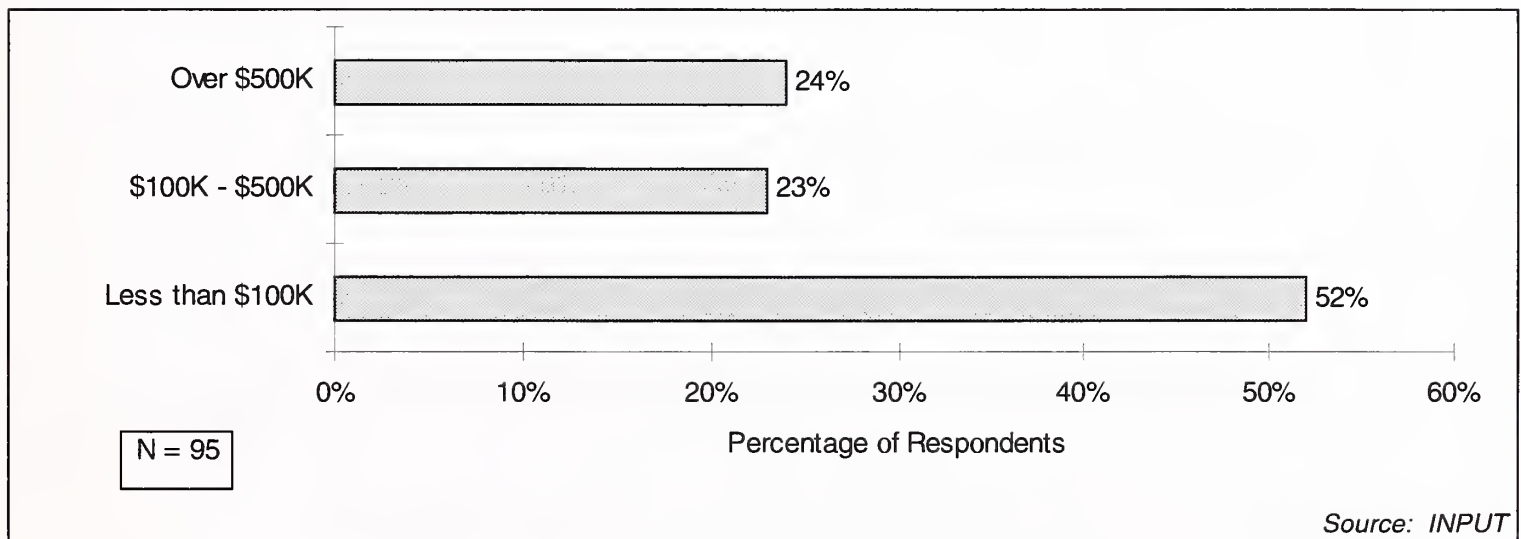
Of those giving a response, 52% believe that the endeavor will cost less than \$100K and fully 75% believe that it will cost no more than \$500K (Exhibit II-3). Only 24% of those polled estimate that the conversion will cost in excess of \$500K.

These responses considerably refute estimates hyped by the popular press which report figures averaging \$1 - \$2 million dollars per organization. However, less than 10% of the respondents expected Y2000 expenditures to run in this range and only 25% expect to spend over \$500K.

A weighted average of these responses yields a cost of \$700K - \$1 million per organization, 71% of which will be spent externally. This translates into a \$70 - \$100B U.S. market for Y2000 products and services.

Exhibit II-3

Estimate of Cost



C

Most Companies still in Early Planning Phases

Most of the companies that have begun Y2000 conversions are still in the "evaluation" phases rather than the actual "doing" phases and 7% have not formally begun a Y2000 audit.

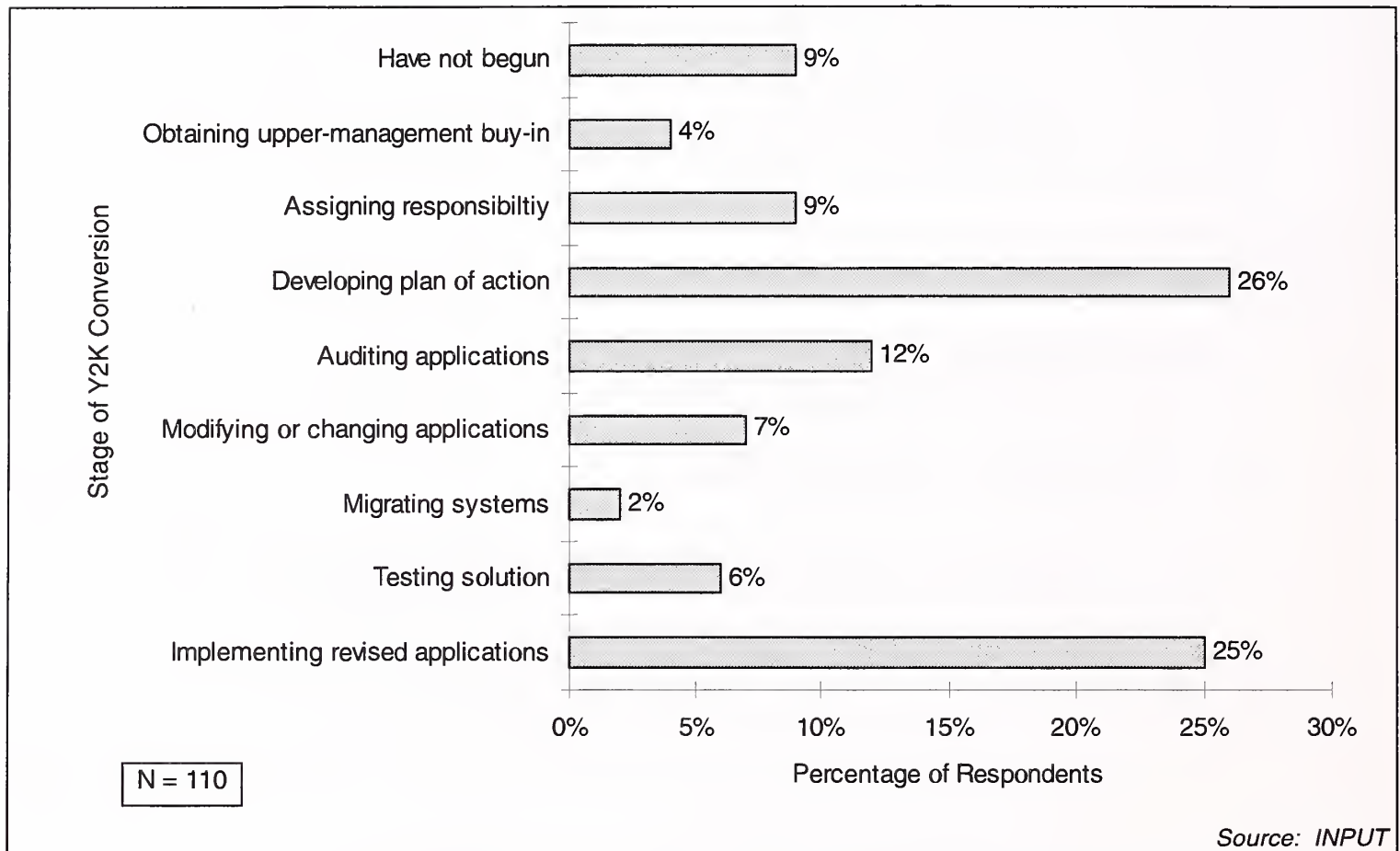
Companies in the first three phases of a Y2000 conversion process, including those that have not yet begun, account for over 50% of the companies included in the survey.

From Exhibit II-4, it can be seen that about one quarter of respondents are still working on developing a plan, however, only about half have progressed beyond this stage. This figure dwindles to 25% of the organizations beginning to implement revised applications.

These numbers indicate that a large proportion of companies across all industries have made little or no progress towards achieving a solution. To their credit however, by now the vast majority of corporations at least recognize the existence of a Y2000 issue and have begun the preliminary phases of developing a solution.

Exhibit II-4

Status of Preparation



D

Approaches Largely Undecided

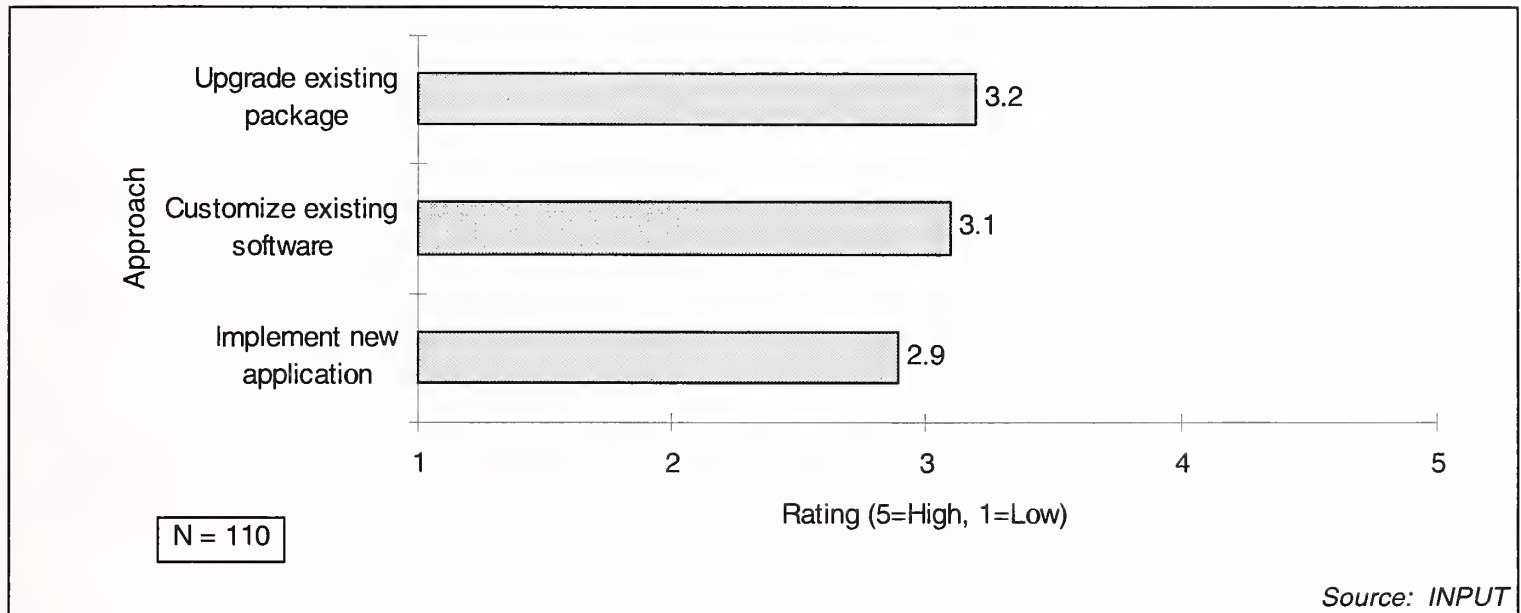
The highest rated approaches to addressing the Y2000 issue are to upgrade existing packages, customize existing software, and to implement new applications (Exhibit II-5). However, little enthusiasm was exhibited for any one tactic in particular.

The relatively low level of interest expressed in these conversion processes indicates that solutions are likely to combine several methodologies as companies address "patchwork" systems e.g. unique operating systems across an enterprise.

Fueling this tepid response is also a general lack of understanding regarding the significance of the Y2000 issue and how it is to be properly addressed. Corporations are weary of a rote solution and prefer to implement a solution which will cater to their specific needs.

Exhibit II-5

Preferred Approach to Resolving the Issue



E

Conclusion

The common perception among users is that there is little differentiation between vendors of Y2000 conversion solutions. No one vendor or product was mentioned more than once and all companies incorporating external services were generally pleased. This leads one to the belief that the emphasis would then become one of price.

The weighted average cost of a Y2000 compliancy conversion lies between \$700K and \$1M per U.S. company. When focusing only on companies with \$100M to \$500M in annual revenue, this estimated average cost figure is reduced to \$500K to \$700K per organization.

There is, however, very little correlation between a company's size and estimated conversion cost. This result refutes the expected opinion that the cost of a conversion is a direct function of an organization's size. Furthermore, as a company proceeds with a Y2000 conversion, predominantly the estimated ultimate cost does not vary a great deal from that which was initially proffered.

These figures translate into a \$70B to \$100B U.S. market for Y2000 conversions. U.S. firms expect internal costs to comprise an average of 29% of the total conversion cost equating to an estimated total U.S. expense of \$29B to \$40B. Thus, the actual composite expenditures on Y2000 conversion in the U.S. lie between \$100B and \$140B.

No statistically significant correlation was discerned relating industry and annual revenues to Y2000 conversion stage and cost. Companies are adhering to independent timelines regarding Y2000 conversion regardless of industry and organization size.

E

Recommendations

If a company has not already begun Y2000 preparations, it should not wait any further. A silver bullet solution in the eleventh hour is not a reasonable expectation.

When choosing a Y2000 solution product/service vendor, take special care to ensure that the vendor can address all of your specific needs. Some careful evaluation can eliminate the knee-jerk reaction to “just go to a Big-6 firm” – an option many cannot afford.

At the same time, users should take proper precautions to ensure they are receiving a quality solution from a reputable firm; one which will be able to provide product support into the new millennium and will not cease to exist at midnight, December 31, 1999.

As with any IS-related project, careful planning is required (see Appendix B—*The IT Industry and the Year 2000: A White Paper*). However, particularly in this instance where there is an absolute deadline for project completion, time is of the essence. This concern becomes critical as the year 2000 nears causing demand for external Y2000 conversion expertise to increase exponentially—to say nothing of the cost of employing these resources.

There is still much uncertainty within organizations regarding whether they have a problem, and if so, how big a problem it is and how they should fix it. Vendors should endeavor to capitalize on this lack of understanding by positioning themselves as a customizable resource to whom to turn for answers.

A company which does not present a rigorously “bound” solution, but rather one which melds with the particular needs of an organization will serve to overcome much of this difficulty for a corporation enlisting their aid.

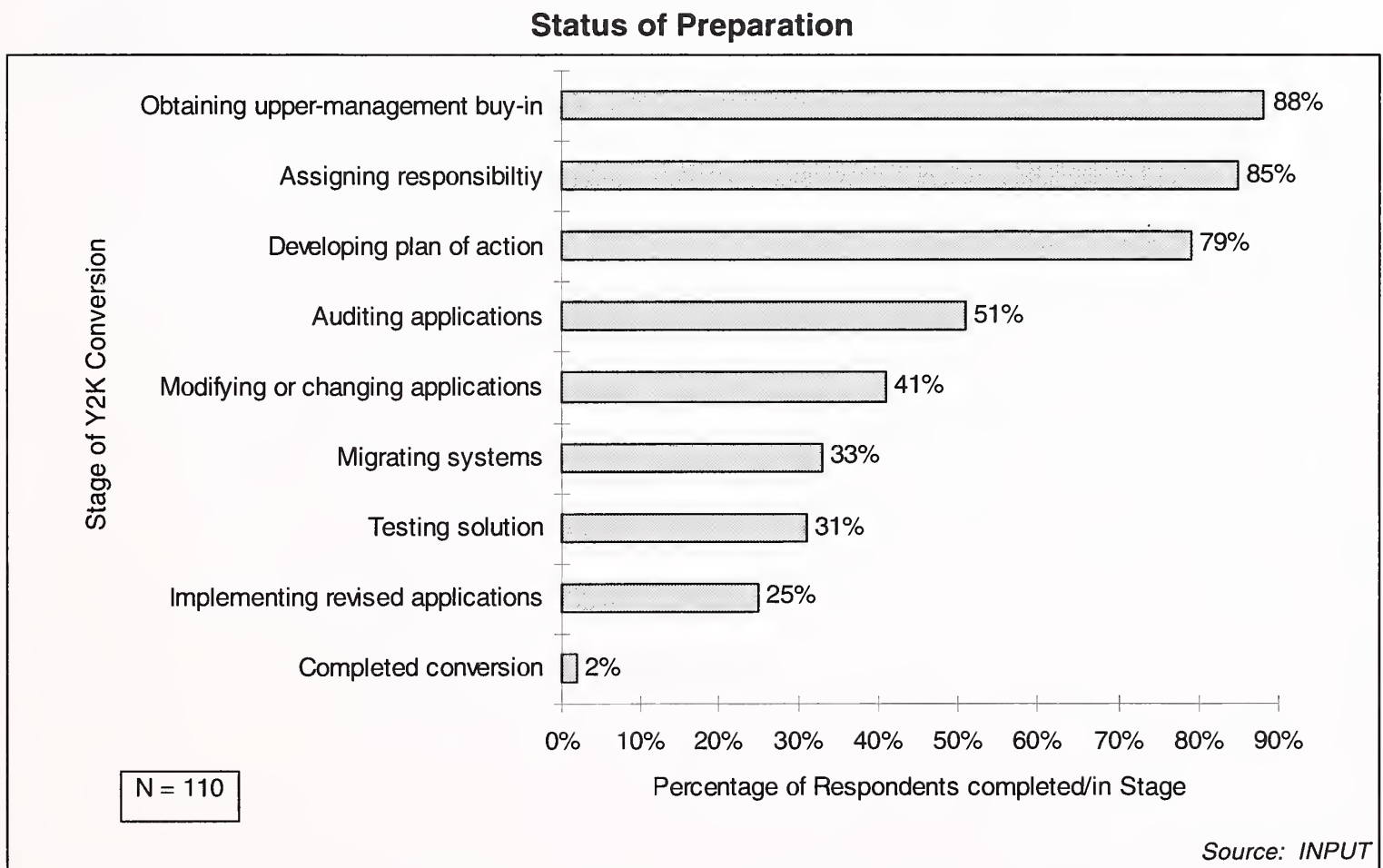
Vendors should endeavor to position themselves as providers of specialized solutions—one which incorporates various facets and isn’t a uniform solution to everyone’s Y2000 problems.



Conversion Status

Of the organizations included in this study that at least claim to have begun some sort of Y2000 conversion project, the vast majority appear to be mired in the preliminary phases with very little truly corrective progress made (Exhibit III-1).

Exhibit III-I



From Exhibit III-1, 88% of those interviewed have obtained upper management buy-in on the project, however 7% of the organizations have done nothing and only 3% report that their systems already account for the century change.

Though 25% claim to be in the final stage of implementing revised applications, only 2% report having actually completed their Y2000 conversion.

A great discrepancy exists between talking about the issue and actually beginning to move towards a solution. This line may be drawn between completing an action plan and beginning to audit applications. From the chart, 26% are still working on developing a plan, whereas only 51% have actually begun to audit applications. This figure dwindles to 25% of the organizations beginning to implement revised applications.

These numbers indicate that a large proportion of companies across all industries have made little or no progress towards achieving a solution. To their credit however, the vast majority of corporations at least recognize by now the existence of a Y2000 issue and have begun the preliminary phases of developing a solution.

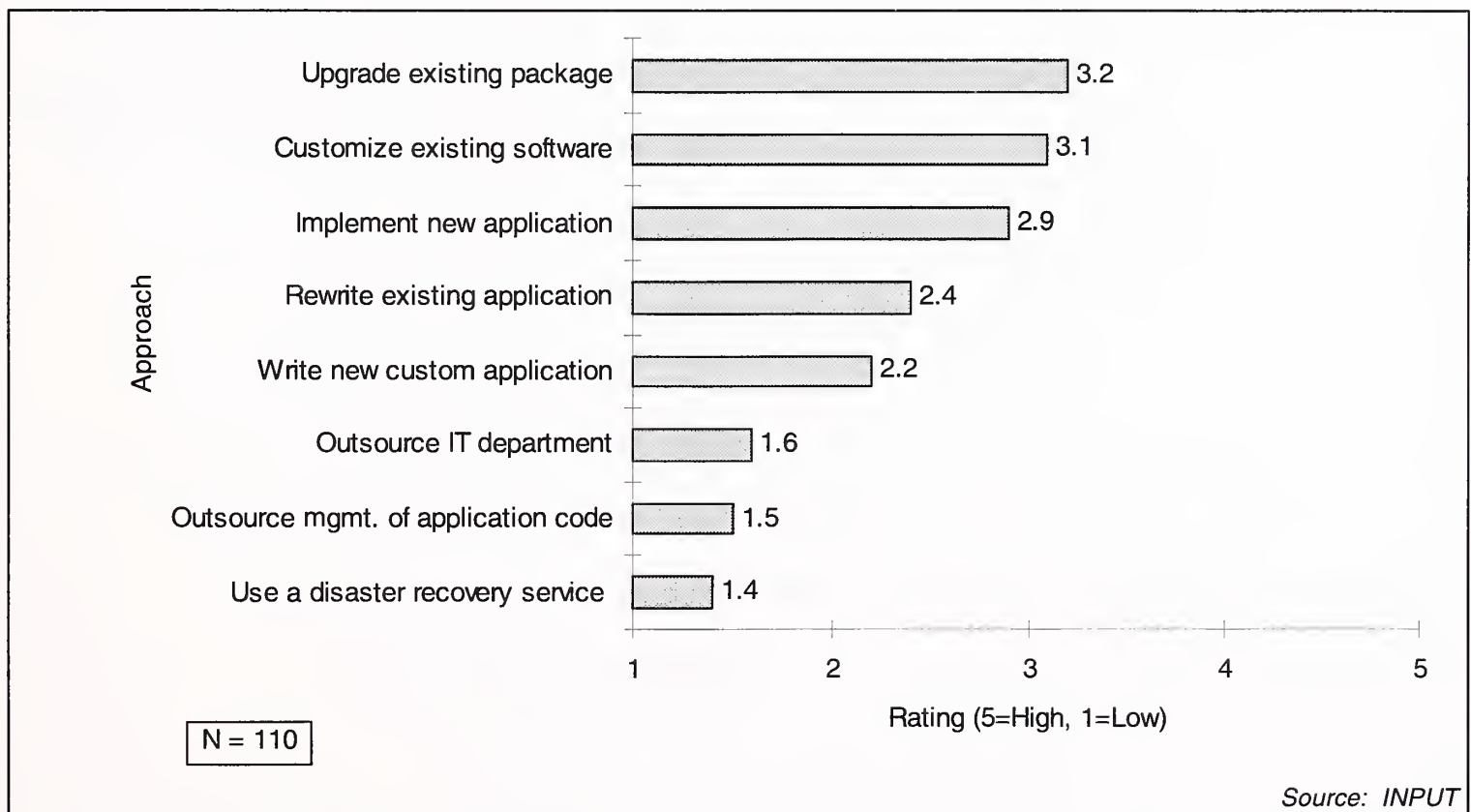
IV

Approaches to Problem Resolution

As depicted in Exhibit IV-1 below, users were asked to rank their preferred approach to resolving the Y2000 issue from several common options. Given an average rating response of 2.3 for these approaches, there is no singular resounding endorsement of one particular tack.

Exhibit IV-1

Preferred Approach to Resolving the Issue



Responses were generally tepid and noncommittal suggesting that a variety of methodologies may be employed and that there is no one hard and fast solution. A conversion may involve one, a few, or all of the stated approaches in concert.

A small amount of favor was granted towards implementing commercially developed upgrades to existing packages, modifying existing custom software, and implementing a new package altogether. Though clustered at the top of the rankings, these three approaches were still only marginally preferred.

This indecision and low ranking of approaches to the Y2000 issue invites a host of problems and opportunities for solution vendors. This perhaps explains the reluctance of vendors to specialize in any particular facet, appearing instead to be largely "Jacks of all trades" as organizations flesh out their plans. Of course, any plan is subject to change, and as companies begin their trek towards Y2000 compliance, initial methodologies may be superceded in light of the dynamic nature of the undertaking.

The survey results indicate that there is still much uncertainty within organizations regarding whether they have a problem, and if so, how big a problem it is and how they should fix it. Vendors should endeavor to capitalize on this lack of understanding by positioning themselves as a customizable resource to whom to turn for answers. A Y2000 solution vendor which does not present a rigorously bound solution will serve to overcome much of this difficulty for a corporation enlisting their aid.



Vendor Analysis

A

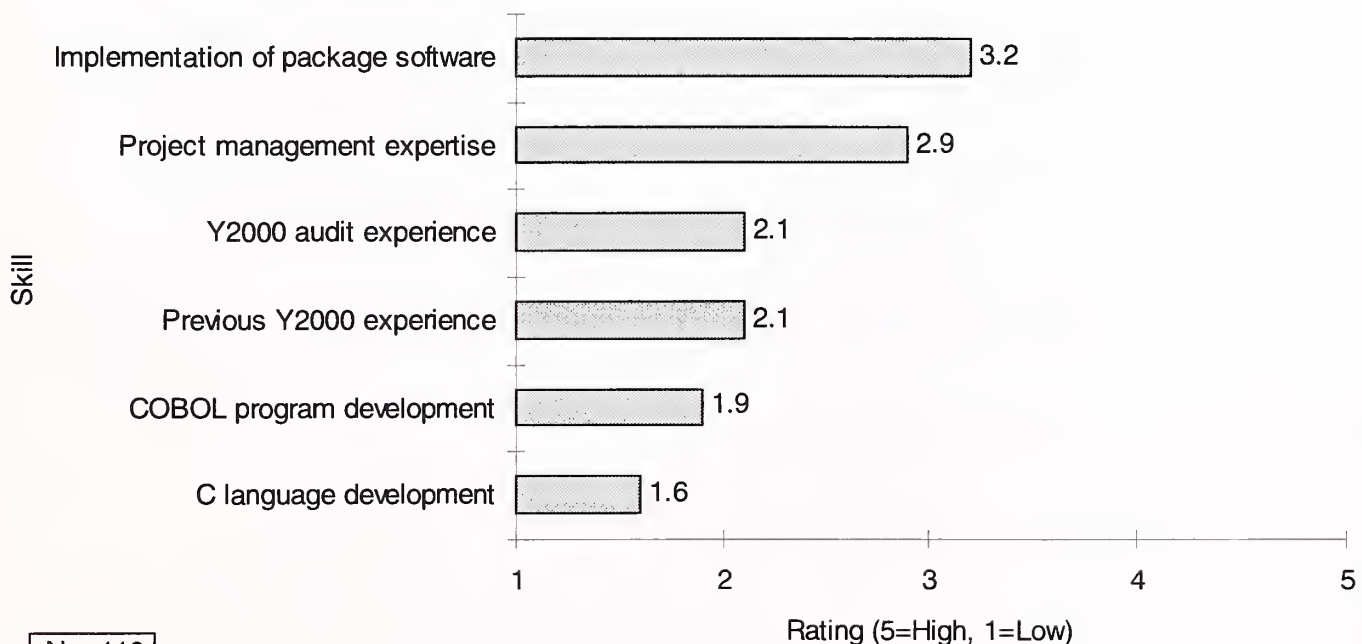
Critical Skill Sets Required of Vendors

Users were asked to rank the types of Y2000 skills they believed were most important to solicit from an external vendor (Exhibit V-1).

Again, with an average rating of 2.3, the catalog of skills required to ensure the success of a Y2000 conversion is not clearly defined. This phenomenon serves to bolster the impression that substantial vagaries remain regarding the problem and the unique situations which arise for each affected firm.

Exhibit V-1

Critical Skill Requirements



Source: INPUT

It is curious, however, that particular experience and/or expertise in the area of Y2000 specific endeavors are ranked substantially lower than the somewhat generic elements of software package implementation and project management skills. The pervasive opinion appears to be that a large portion of the ultimate solution simply involves unwrapping a box of "MS DateFix 3.0" and installing it with a moderate degree of competence. Yet even this perception is not well supported.

This is truly a barometer of how organizations currently view the situation - not very seriously - and if it does turn out to be a problem, it will be simple and inexpensive to fix. So what are we all in such a fret about? Let's cut out early and go grab a pint! *Not so fast!*

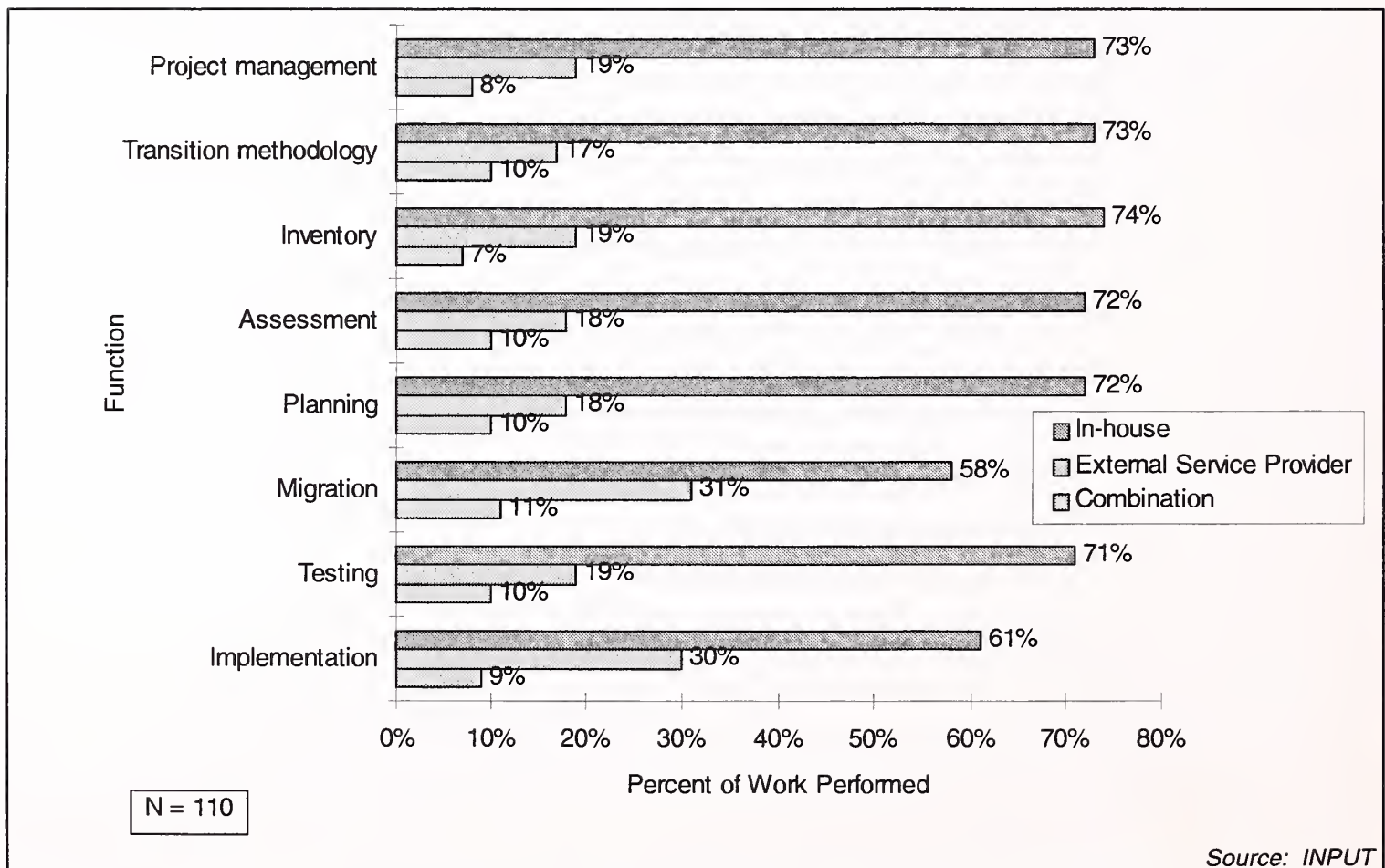
B

Provision of Y2000 Functions

Predominantly, the skills required by organizations to effect a Y2000 conversion will be sought in-house (Exhibit V-2).

Exhibit V-2

Provision of Y2000 Functions



An average of 70% of all of the above functions will be provided by internal personnel whereas scarcely 20% will be solicited from external service providers (ESPs). An average of only 10% will utilize some combination of internal and external resources.

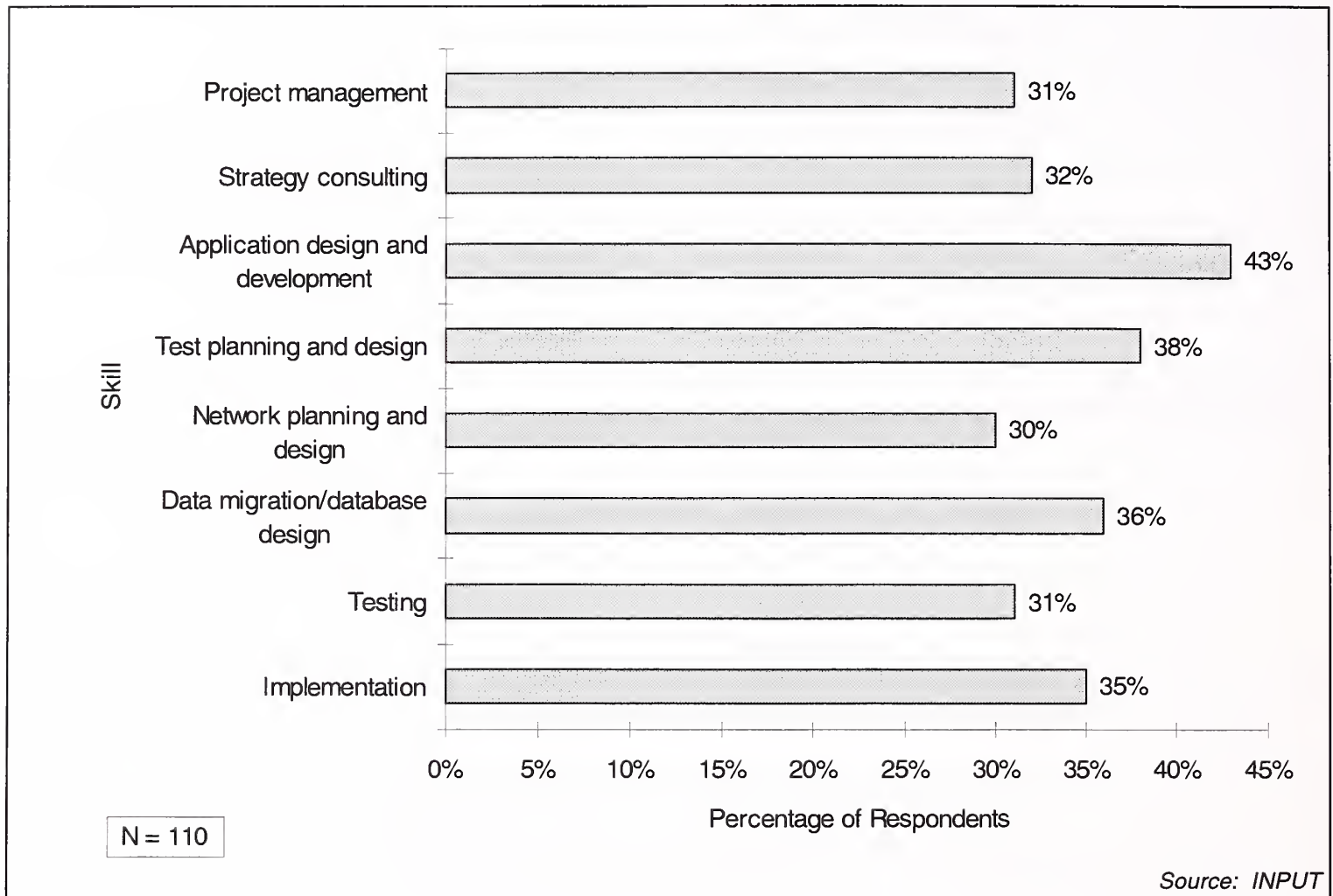
The areas of greatest demand for ESP services are migration (rehosting, rewriting, replacing, etc.) and implementation demonstrating at least 10% greater demand over all other categories. This phenomenon suggests that there will be a significantly greater tendency to enlist external assistance for the real “nuts and bolts” of a Y2000 conversion, however, the fact remains that the vast majority of skills will be provided internally.

C

External Service Provider Skill Requirements

Specific demand for each of the skills represented in Exhibit V-3 is again, fairly uniform; no one particular skill is desired heavily over others.

Exhibit V-3

ESP Skill Requirements

Rather, a comprehensive set of generic skills is sought with a mild emphasis on application design and development.

This uniformity and lackluster response also suggests that companies have largely not concretely ascertained what resources a Y2000 project will command.

D**User Satisfaction with Y2000 Solution Vendors**

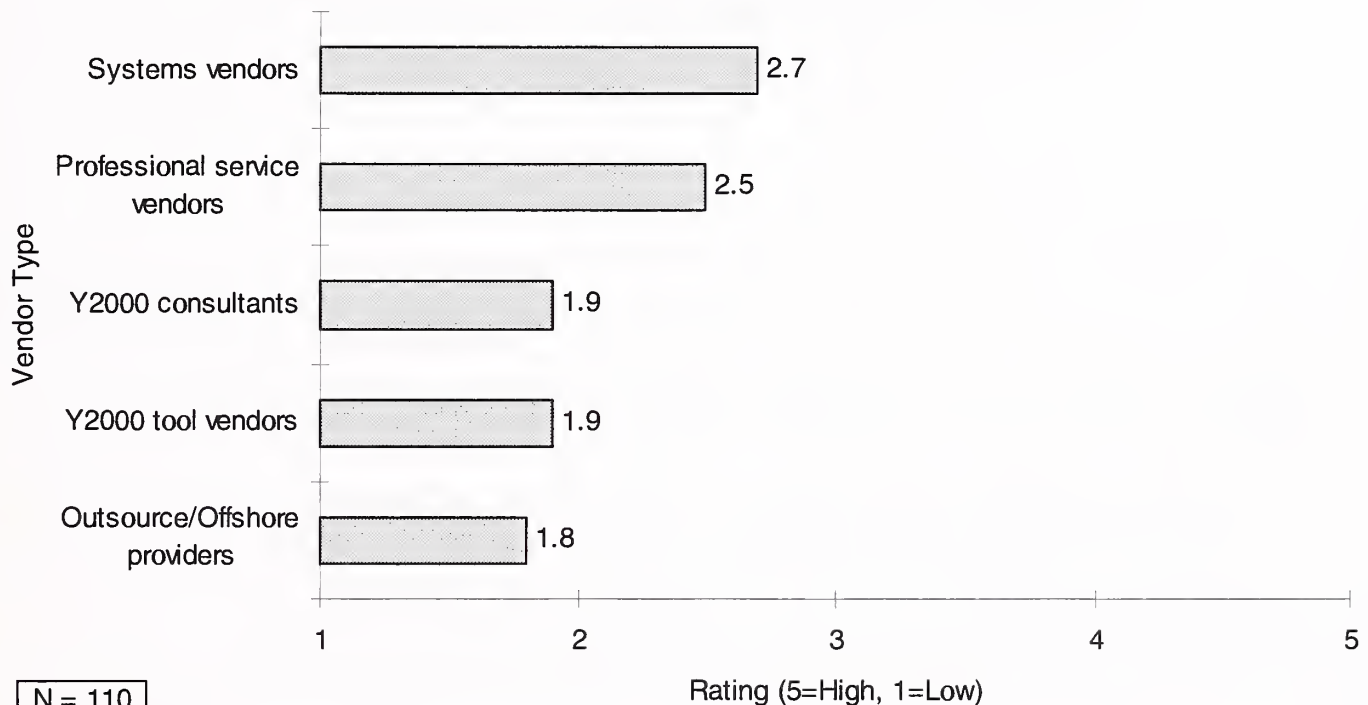
Yet in spite of all the confusion, the demand for services from those professing great knowledge of the subject, namely Y2000 consultants and software vendors, appears to be virtually nonexistent (Exhibit V-4).

This is not true however as the business of many Y2000 solution providers flourishes and new entities race to join the Y2000 revenue windfall party.

Indeed, this lack of knowledge is an area on which Y2000 professionals are capitalizing.

Exhibit V-4

Vendor Suitability to Assist Y2000 Conversion



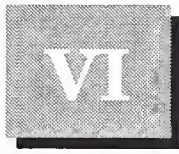
Source: INPUT

Realizing this, solution providers have been rapidly spurred into becoming “full service” vendors rather than offering one particular element or service. A stop at one of these Y2000 garages can seemingly solve all of your problems.

Only 10% of respondents said that they have used or are currently using specialized Y2000 tools to assist with their Y2000 preparations. Merely 5% report any intention of using similar services. Of those organizations with experience utilizing specialized Y2000 tools, the rating of the tool’s usefulness is typically quite high – an average of 4.4 on a scale of 1 to 5 – indicating a high degree of satisfaction with their particular vendor.

It is noteworthy that no same Y2000 solution provider was named twice indicating a high degree of satisfaction among end users seemingly regardless of which vendor was chosen.

(Blank)



Y2000 Conversion Funding

A

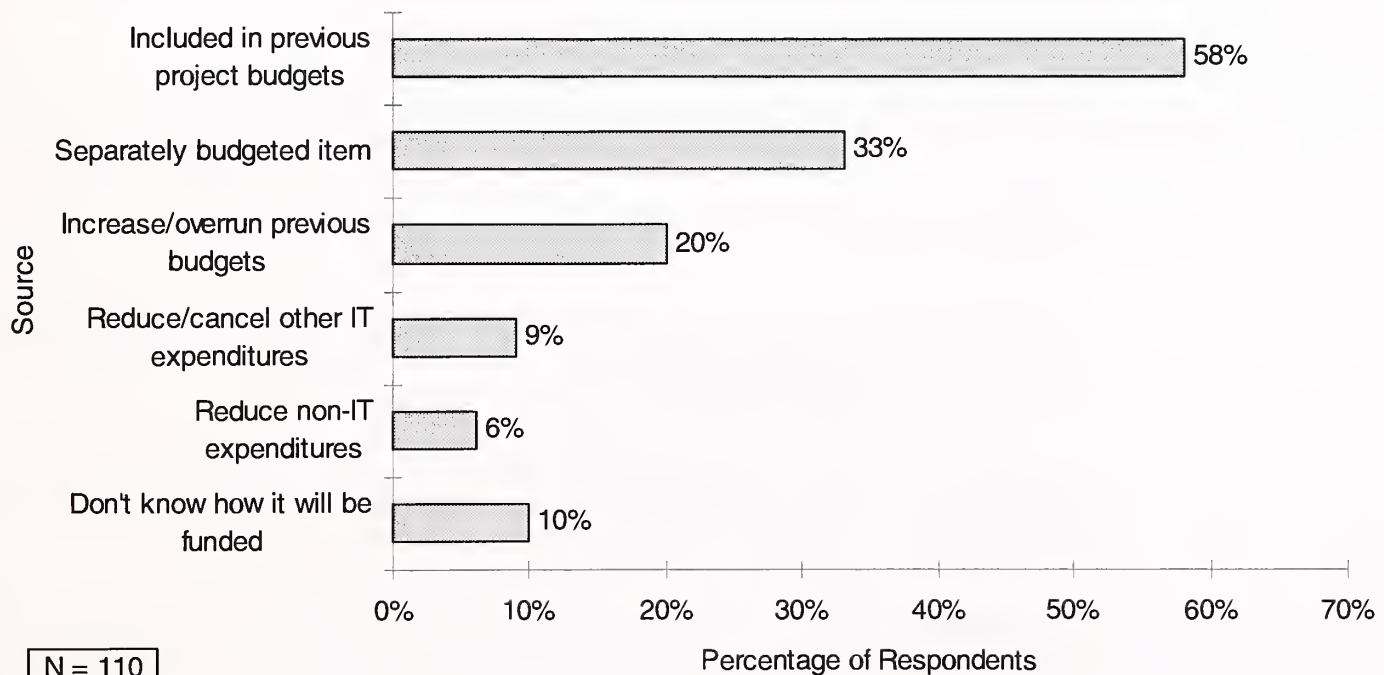
Impact of Y2000 on IT Expenditure

Y2000 related expenses are expected to have very little impact on other currently planned expenditures - IT-related or otherwise.

The vast majority of organizations have included Y2000 conversion expenditures in previously planned budgets (Exhibit VI-1). 58% of respondents selected this category - nearly double the number of those electing to budget the Y2000 issue separately (33%). 20% expect to simply tack it onto previous budgets risking their overrun.

Exhibit VI-1

Source of Funding for Y2000 Preparation



Source: INPUT

Where will this “extra” money come from? There appears to be a paradox when it comes to funding Y2000 projects. On one hand, companies already engaged in a transition are finding the scope expanding beyond what had initially been estimated and are pushing their anticipated completion dates back significantly.

Yet, on the other hand, those beginning to contemplate the issue believe it can be adequately addressed as a “free rider” - an insignificant expense that can be couched in miscellaneous existing budgets with little or no effect on other planned expenditures. 10% of those interviewed still don’t know where the money will come from.

Again, all of this confusion boils down to the simple fact that organizations are experiencing great difficulty in sizing up what impact the century date change will have on their business, how big a problem it is for them, and how much it will cost.

This is due to the exclusive nature of the undertaking. Rarely has an issue been so pervasive and common in virtually all organizations, yet so unique that very few people have experience with problems of the sort.

B

Y2000 Cost Estimates and Market Evaluation

13% of the organizations interviewed remain unsure how much they will spend on a Y2000 conversion. However, 52% of those giving a response believe that the endeavor will cost less than \$100K and fully 75% believe that it will cost no more than \$500K (Exhibit VI-2).

These responses considerably refute estimates hyped by the popular press which report figures averaging \$1 - \$2 million dollars per organization. However, less than 10% of the respondents expected Y2000 expenditures to run in this range and only 25% expect to spend over \$500K.

INPUT believes that there is an especially large discrepancy between the amount an organization expects to spend and the amount it ultimately will spend on a Y2000 conversion.

A weighted average of these responses yields a cost of \$700K - \$1 million per organization, 71% of which will be spent externally. This translates into a \$70 - \$100B U.S. market for Y2000 products and services.

The frequency of elements noted in the provision of Y2000 conversion cost estimates is presented in Exhibit VI-3.

Exhibit VI-2

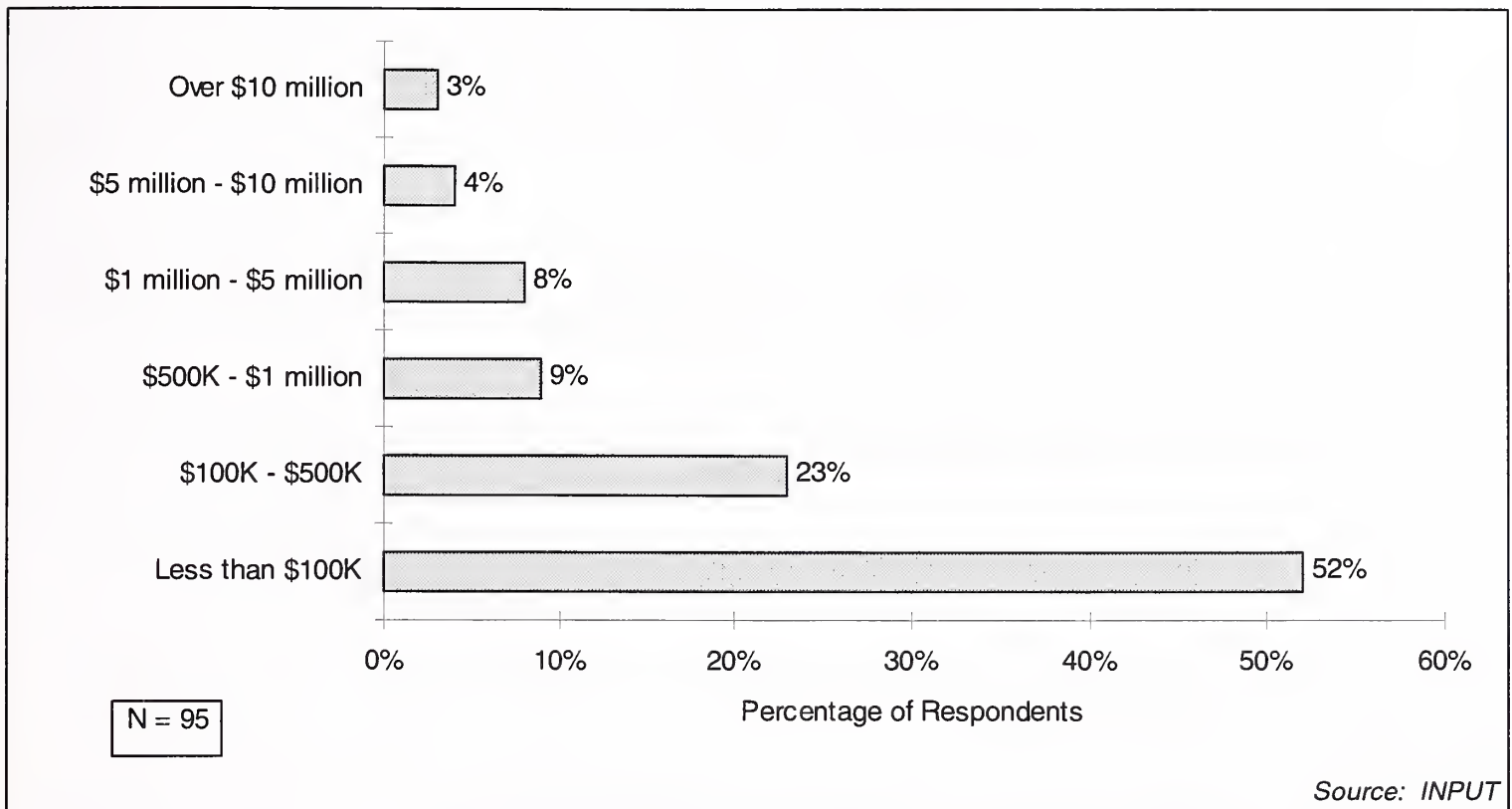
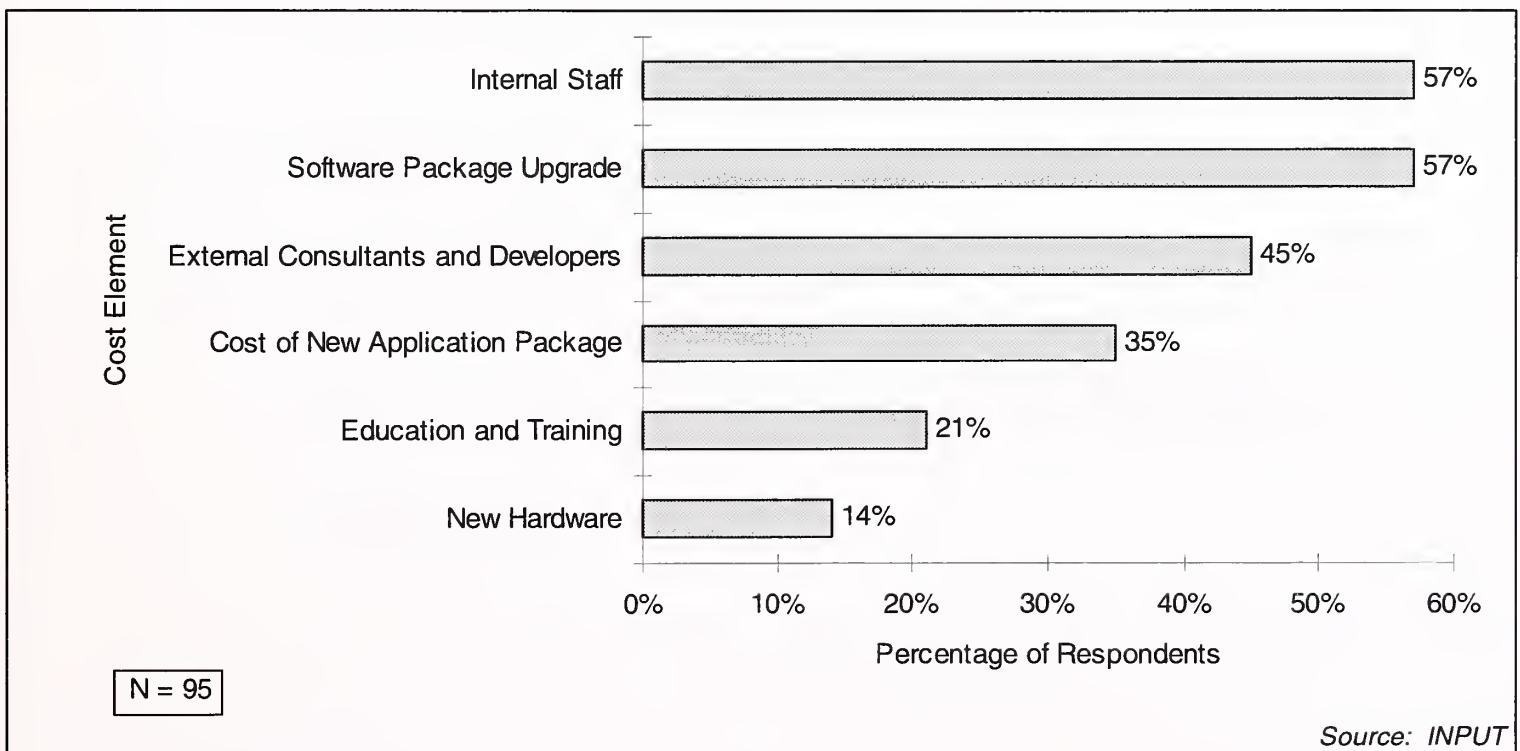
Estimate of Cost

Exhibit VI-3

Elements Included in Cost Estimate

57% of all respondents included the cost of internal personnel and software package upgrade expenditures in their Y2000 project cost estimates. This provides strong evidence that most organizations plan on dealing internally with the issue and simply employing new versions of existing software application packages. Conversely, 45% of those interviewed accounted for some assistance from external consultants and developers in assessing their Y2000 conversion costs.

Further breakdowns and detailed graphical presentations of what percent range each category contributed to the total cost are presented in Exhibits VI-4 through VI-9

Exhibit VI-4

Internal Staff Y2000 Conversion Cost Contribution Breakdown

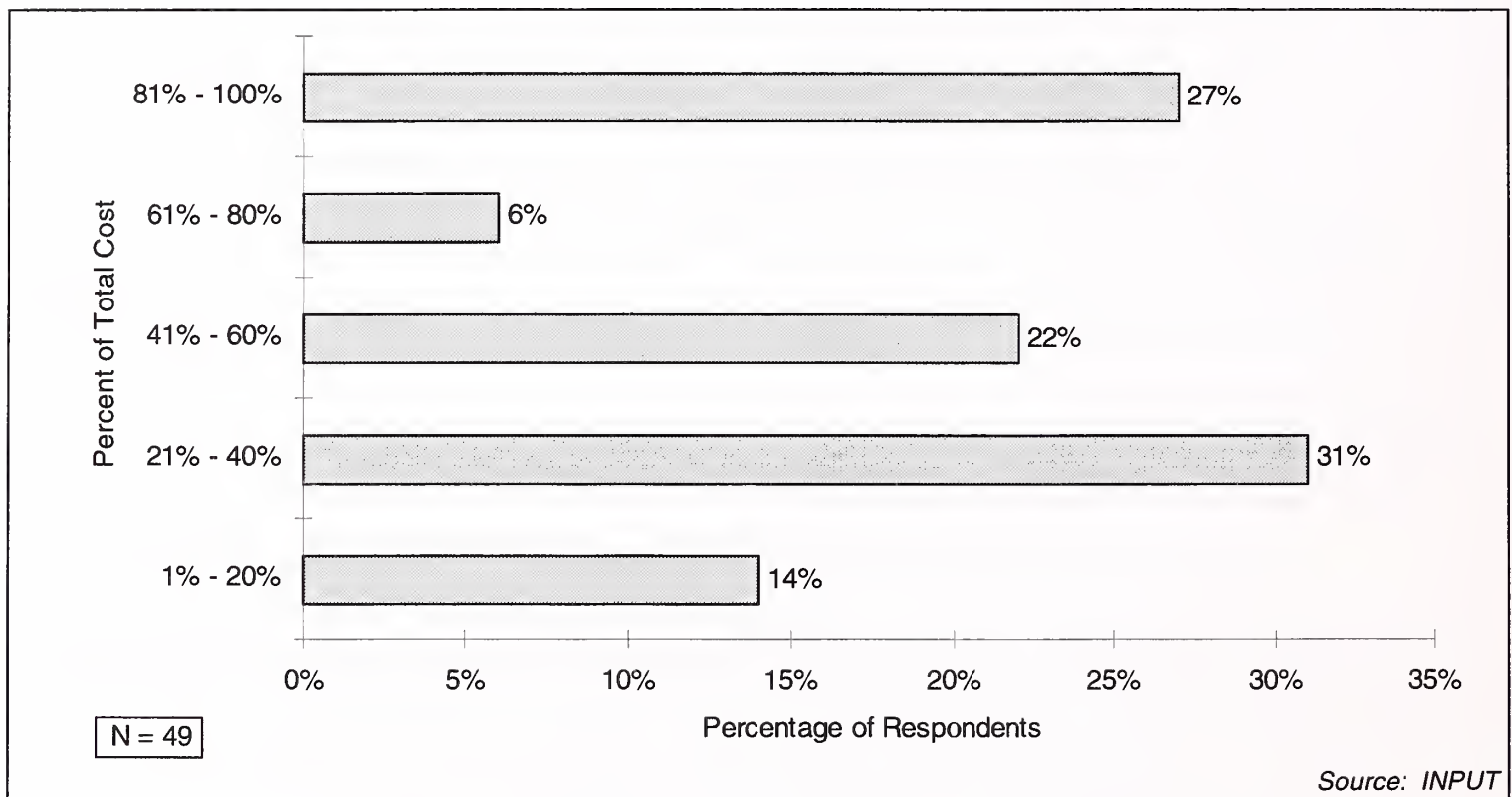
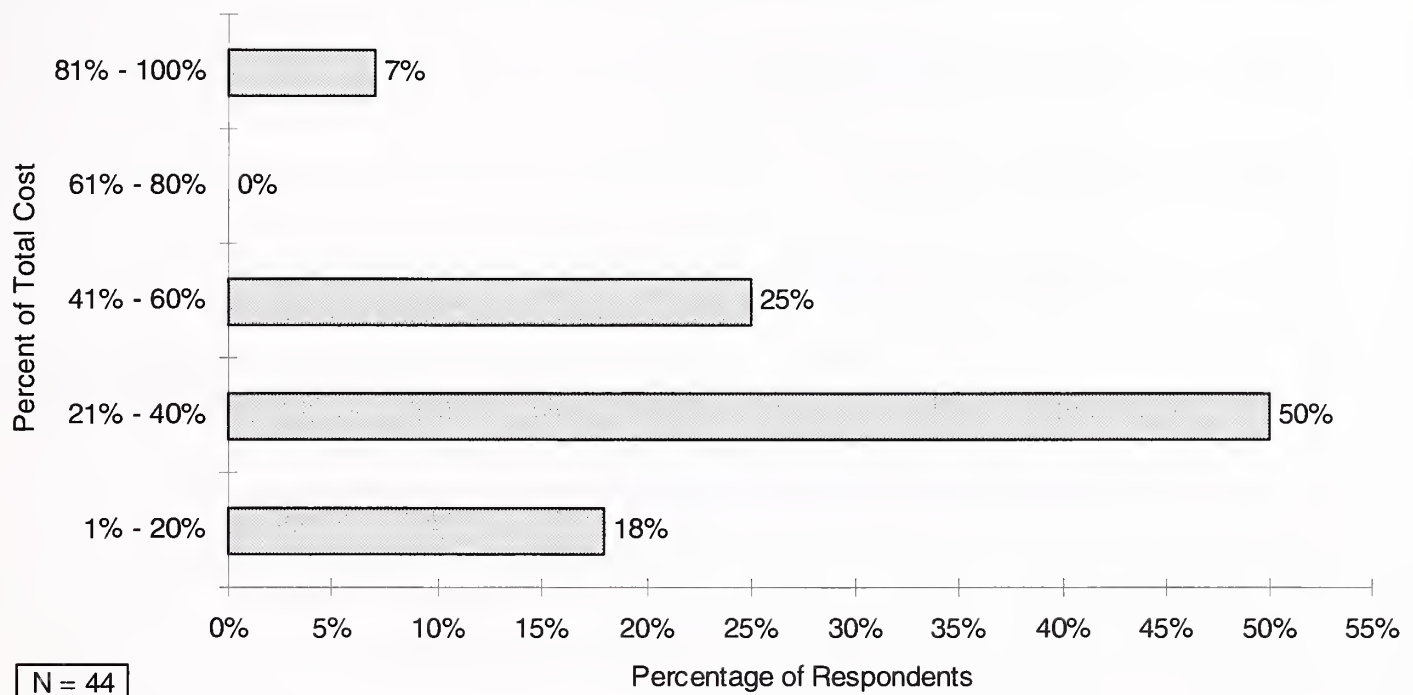
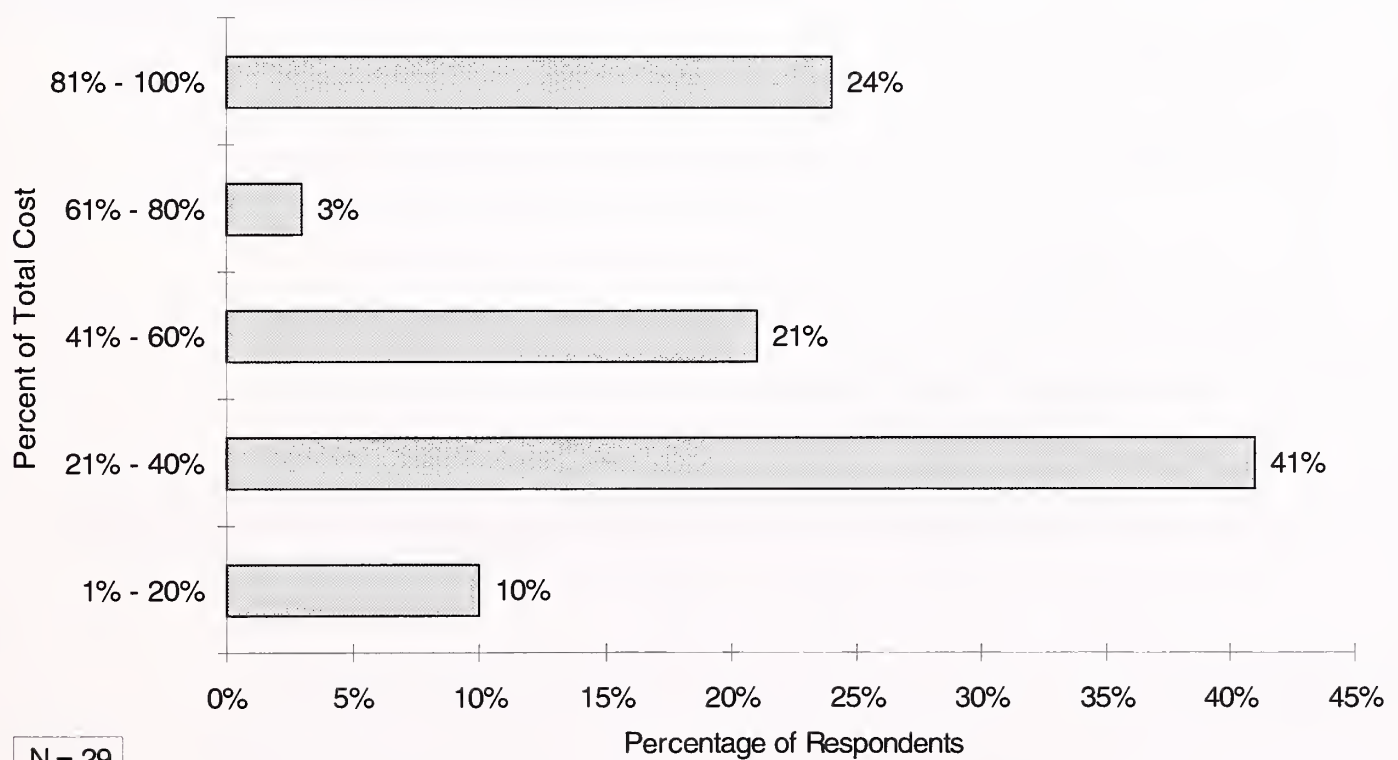


Exhibit VI-5

Software Package Upgrade Y2000 Conversion Cost Contribution Breakdown

Source: INPUT

Exhibit VI-6

New Application Package Y2000 Conversion Cost Contribution Breakdown

Source: INPUT

Exhibit VI-7

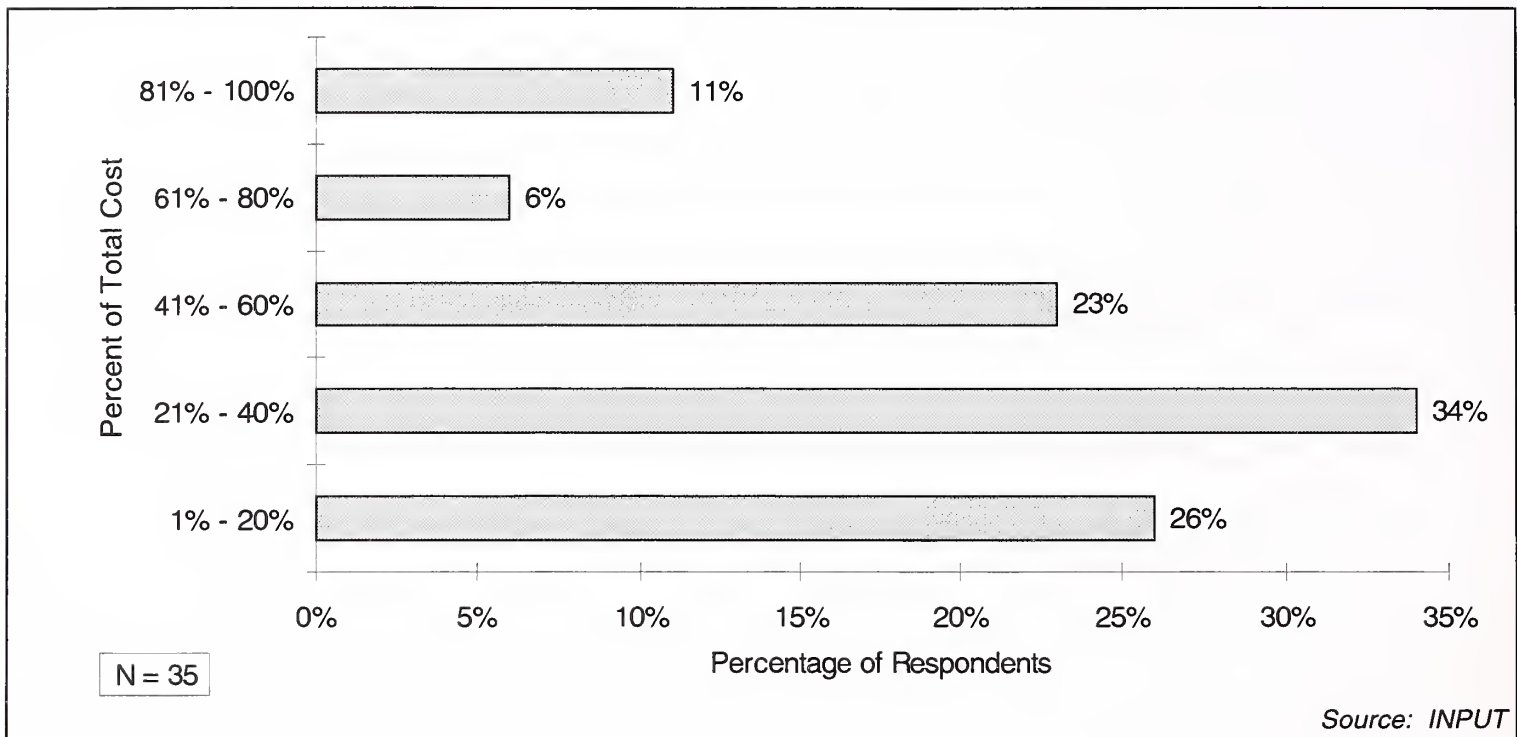
External Consultants and Developers Y2000 Conversion Cost Contribution Breakdown

Exhibit VI-8

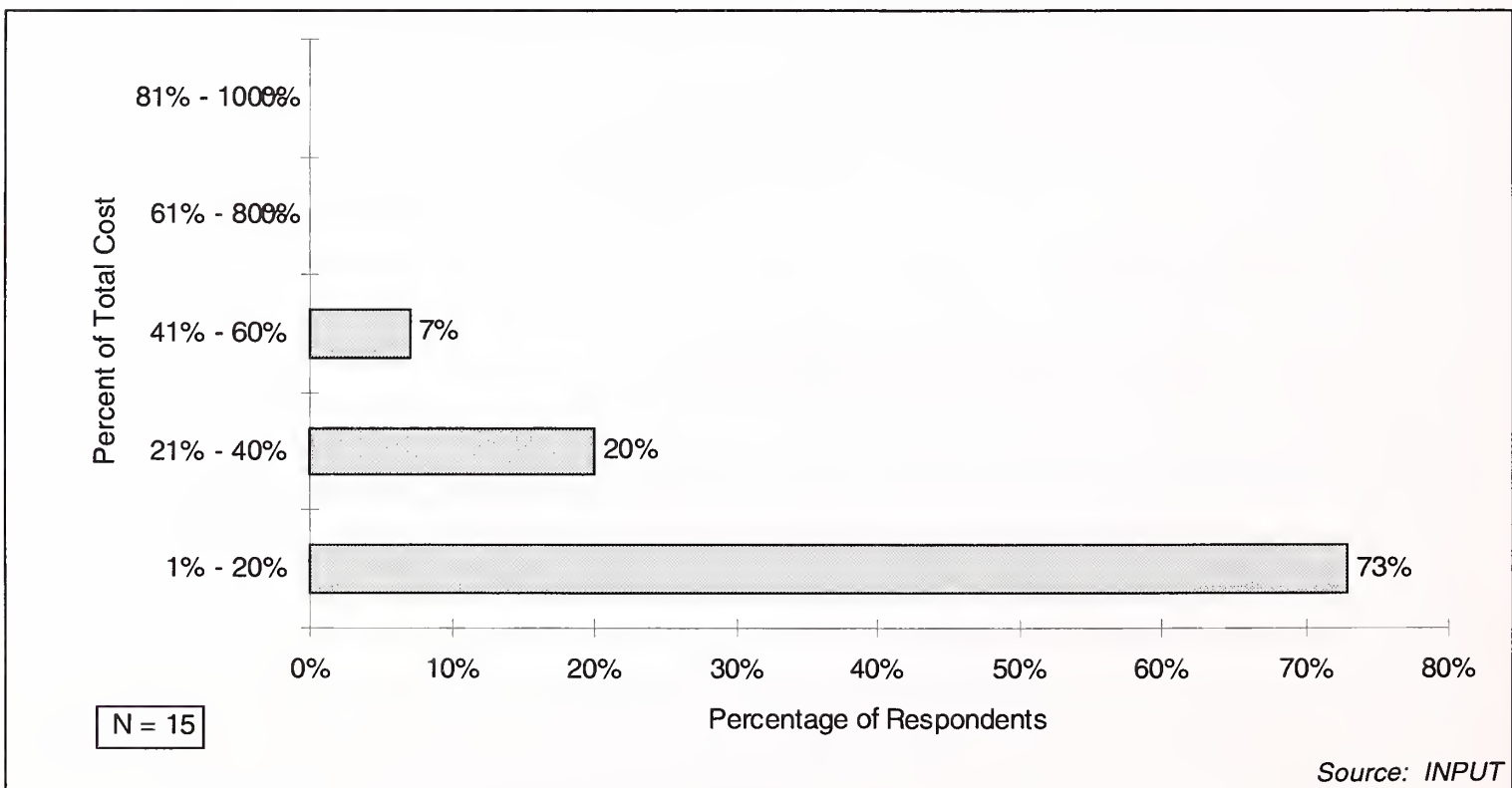
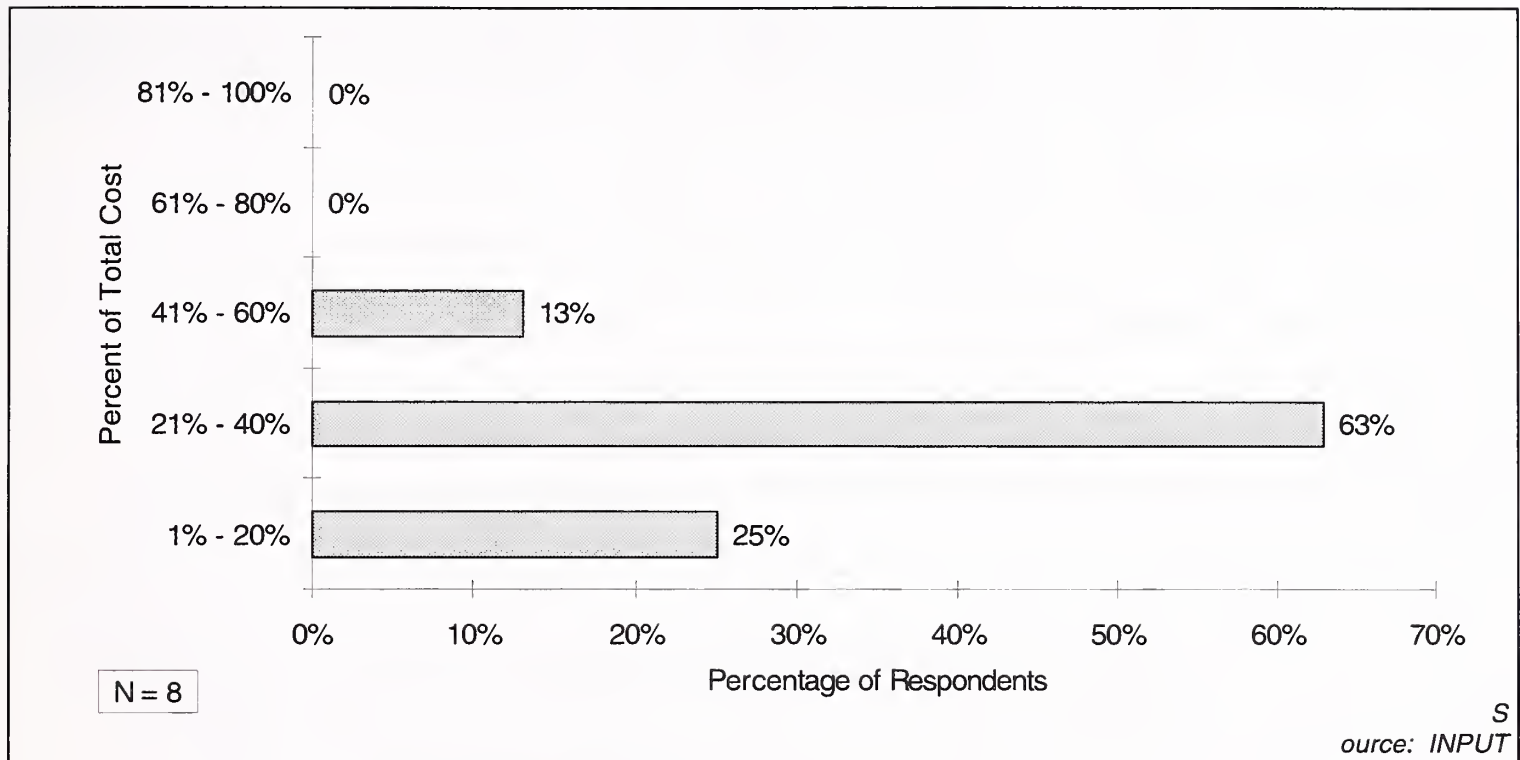
Education and Training Y2000 Conversion Cost Contribution Breakdown

Exhibit VI-9

New Hardware Y2000 Conversion Cost Contribution Breakdown

C

Cost Breakdown and U.S. Market Size

For a company with annual revenues between \$100M and \$500M, on average, a Y2000 conversion will cost between \$500K and \$700K. Utilizing these figures, an average organization can expect their Y2000-related expenditures to break down as presented in Exhibit VI-10.

However, roughly 30% of these cost will be simply internal costs - expenditures that would have occurred in the normal course of business - and can be viewed as opportunity costs; the value of work foregone in lieu of Y2000 related efforts. As such, this internal cost element is not included in the Y2000 market composite available for vendor pursuit.

Though total U.S. expenditures on Y2000 conversions are estimated to be between \$100B and \$140B, the "true" U.S. market for Y2000 solution providers lies between \$70B and \$100B.

Internal staff costs are by far the largest component of a Y2000 conversion as reported by those interviewed followed closely by the expense associated with upgrades to existing software packages. Companies expect to rely twice as much on internal resources than on external consultants.

Exhibit VI-10

U.S. Market for Y2000 Conversion Project Components

Cost Element	Percent of Total Cost	U.S. Market
Internal staff	29%	\$29B - \$41B
Software package upgrade	22%	\$22B - \$31B
New software application	16%	\$16B - \$22B
External consultants/developers	15%	\$15B - \$21B
Education and training	13%	\$13B - \$18B
New hardware	5%	\$5B - \$7B
Total	100%	\$70B - \$100B

Source: INPUT

Y2000 solution vendors should educate the public regarding the exclusive nature of the task in an effort to convince their potential markets that they cannot rely as heavily on internal resources and must thus depend on external specialists to ensure an effective and efficient conversion.

Firms also expect to spend approximately the same amount on education and training, and the purchase of altogether new software applications as on hired consultants and developers. On average, the purchase of new hardware is shown to be the least significant expenditure associated with a Y2000 conversion.

There is little correlation between the stage of completion a company has entered in their Y2000 conversion project and their estimate of what the ultimate cost of the undertaking will entail.

Further breakdowns regarding company revenues and industry yield no statistically significant correlation either (Appendix A).

Supporting earlier findings, a breakdown by stage of conversion vs. estimated cost still reveals that most companies expect to spend less than \$100K and the vast majority less than \$500K. However, a weighted average produces a cost figure of \$700K to \$1M.

D**Y2000 Conversion Completion Timeline**

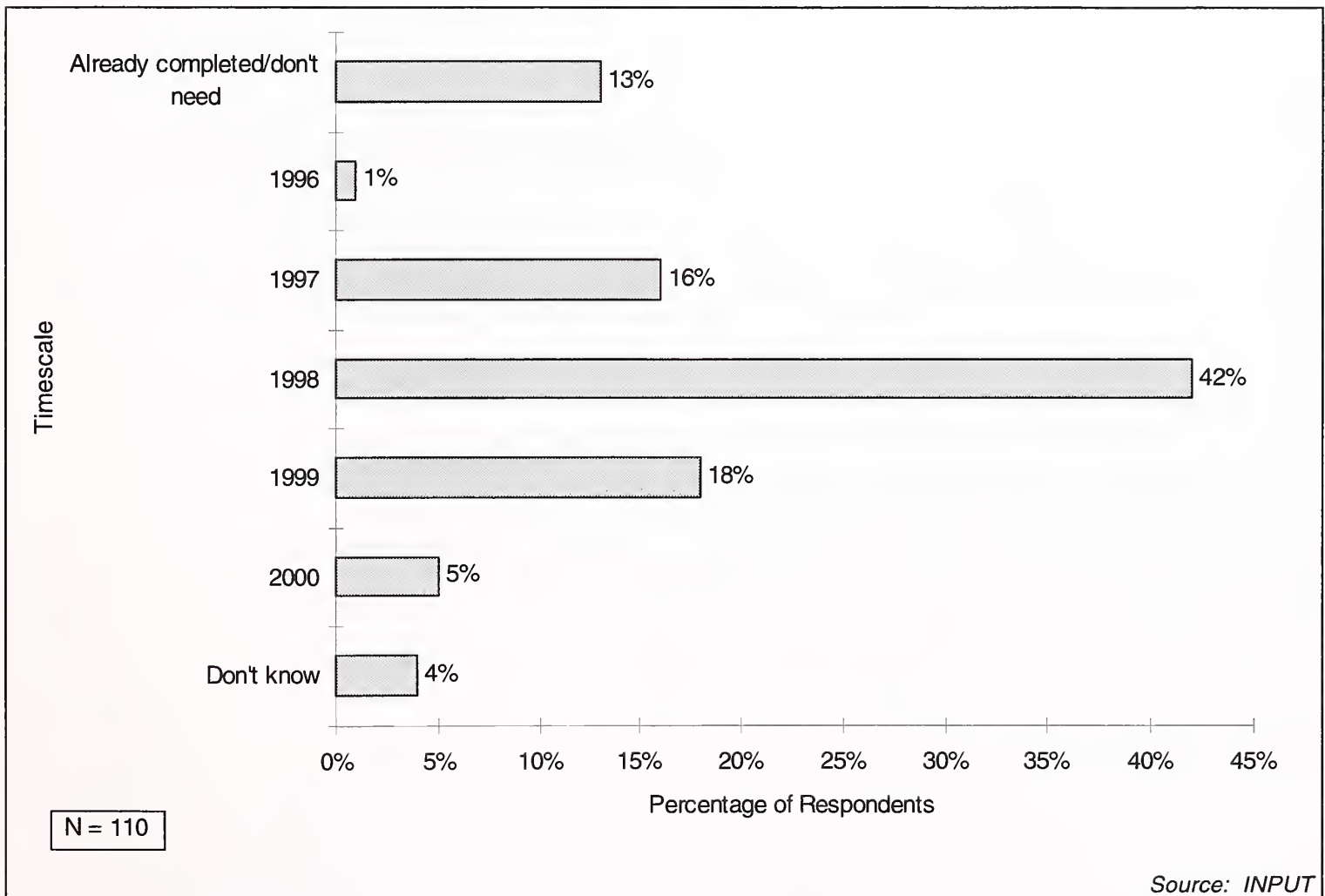
The majority of organizations expect to have their Y2000 conversions completed by the end of 1998 (Exhibit VI-11).

This figure is slipping, however, compared the results of an INPUT study of 1995 wherein most organizations anticipated completion dates in 1997. Several explanations may be offered which account for this discrepancy:

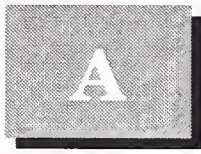
- Companies have underestimated the size of the problem and the resources (time, personnel, money) required to fix it
- Reluctance to believe that the problem is that important has managers pushing it back in favor of other projects
- Thinking that there is no hurry - three years is plenty of time to resolve the issue
- Procrastination - waiting for a simple and inexpensive "silver bullet" solution to appear and save the day
- IBM will fix the problem for free.

Exhibit VI-11

Timescale for Completion

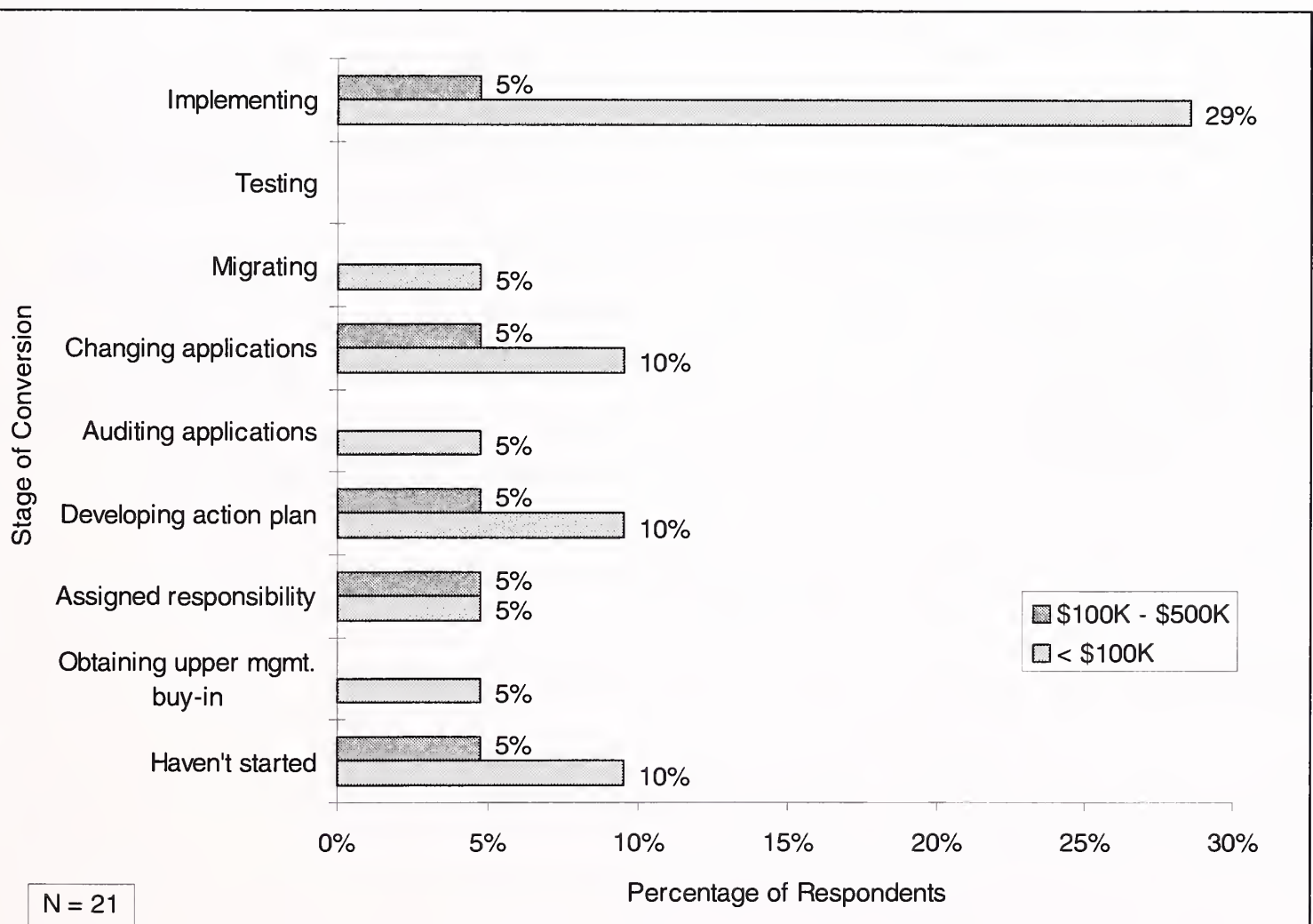


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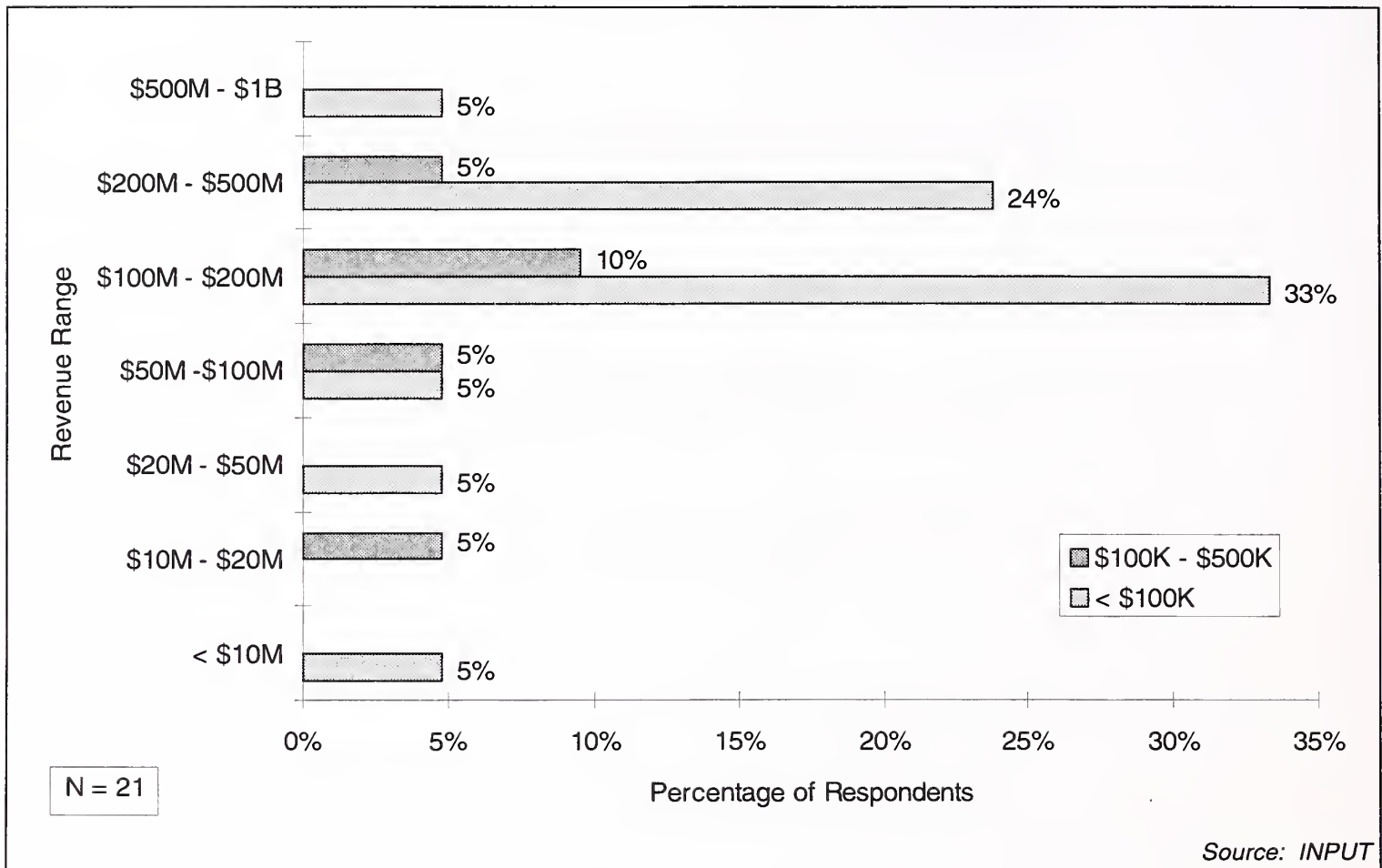
Detailed Industry Charts

Industry: Distribution
Y2000 Conversion Stage vs. Estimated Cost

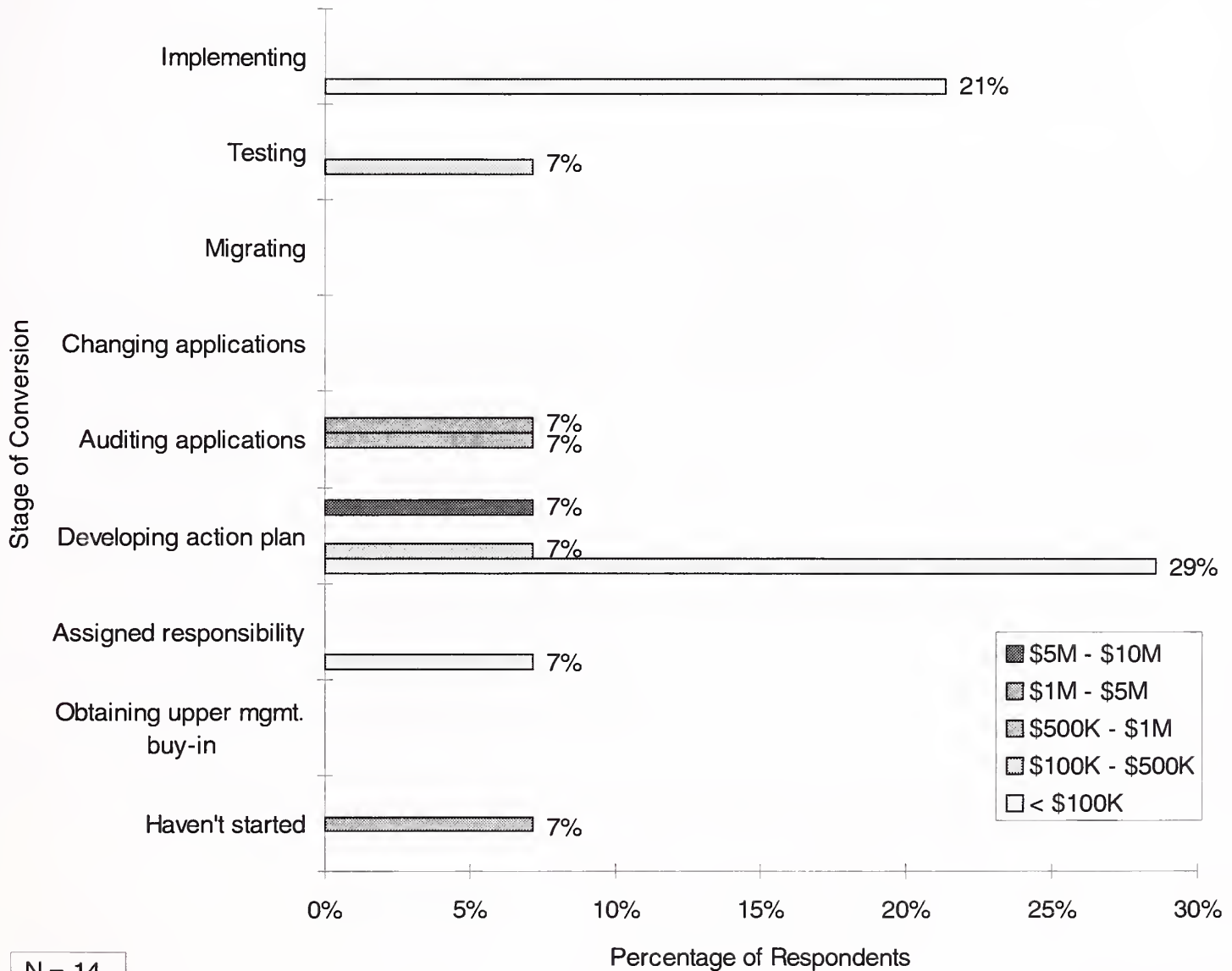


Source: INPUT

Industry: Distribution
Company Revenue vs. Estimated Y2000 Conversion Cost

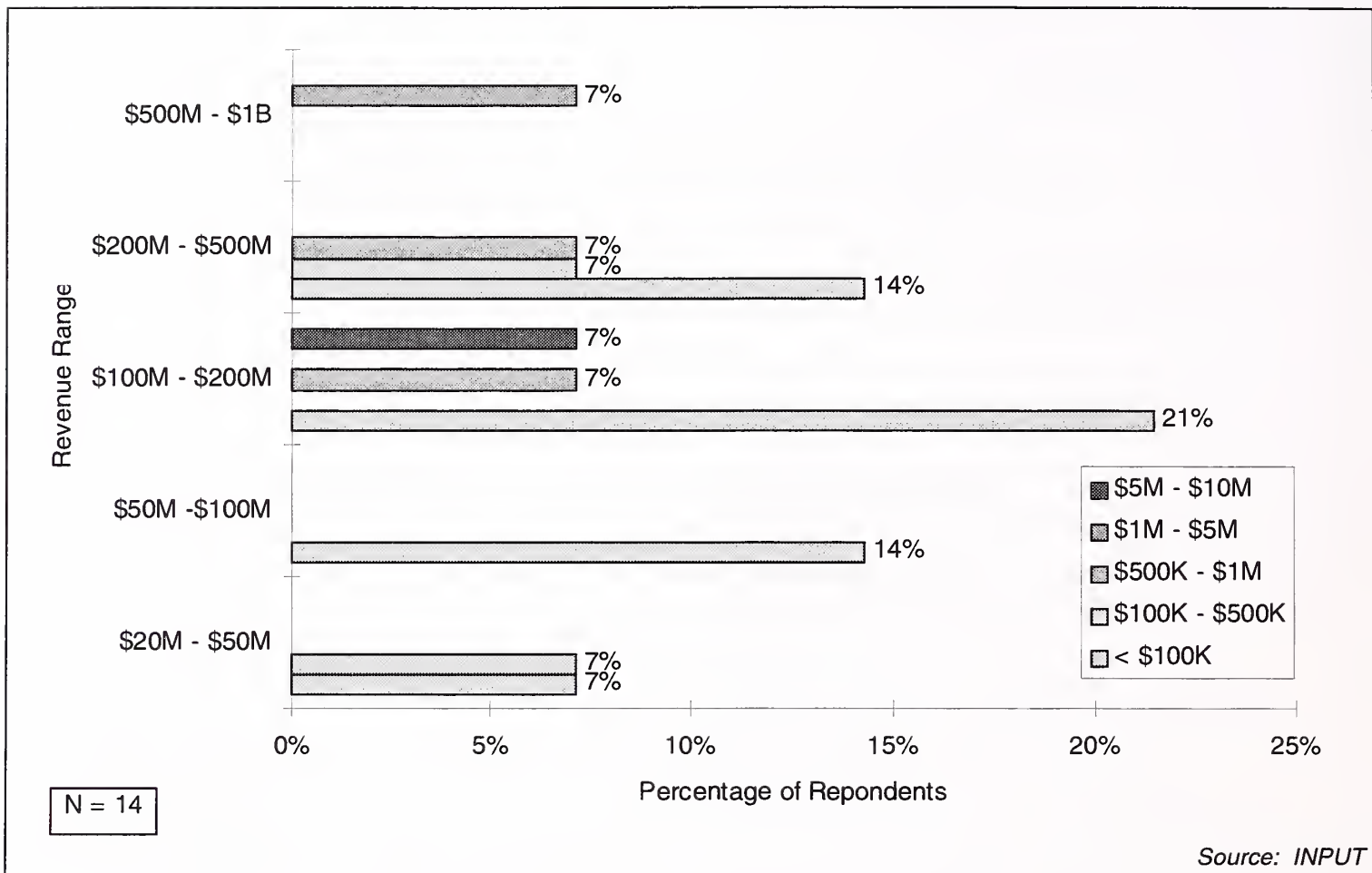


Industry: Discrete Manufacturing
Y2000 Conversion Stage vs. Estimated Cost

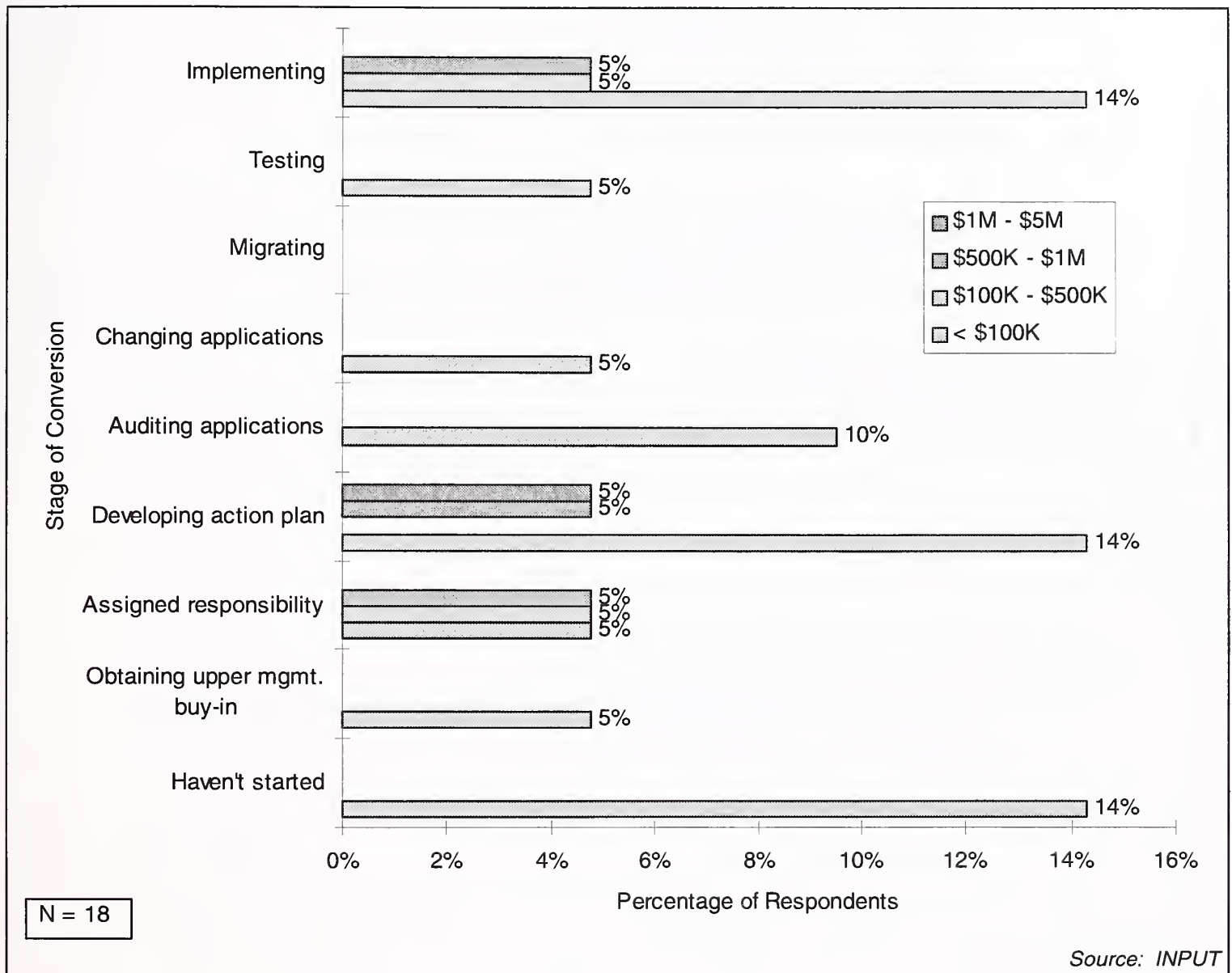


Source: INPUT

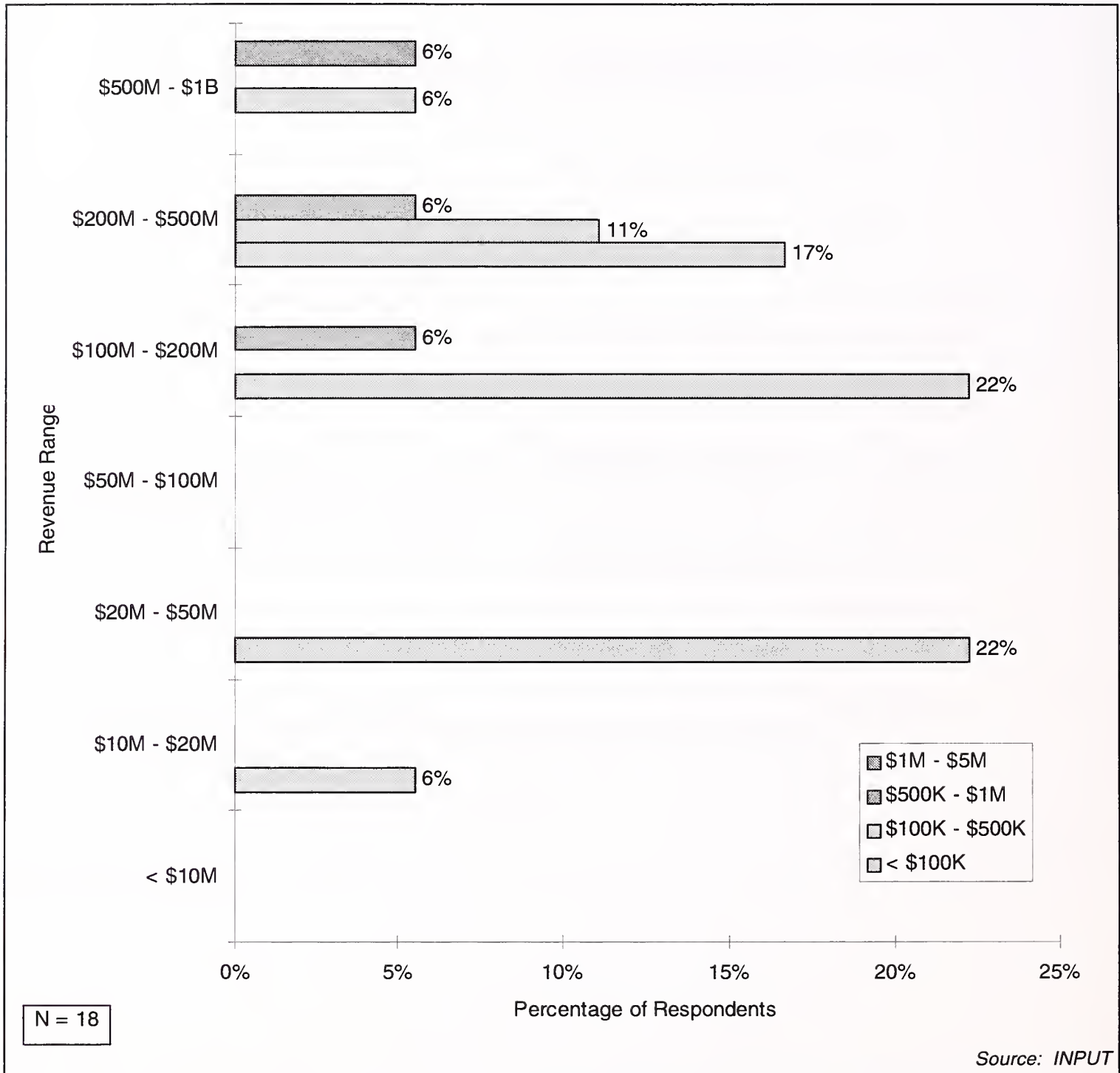
Industry: Discrete Manufacturing
Company Revenue vs. Estimated Y2000 Conversion Cost



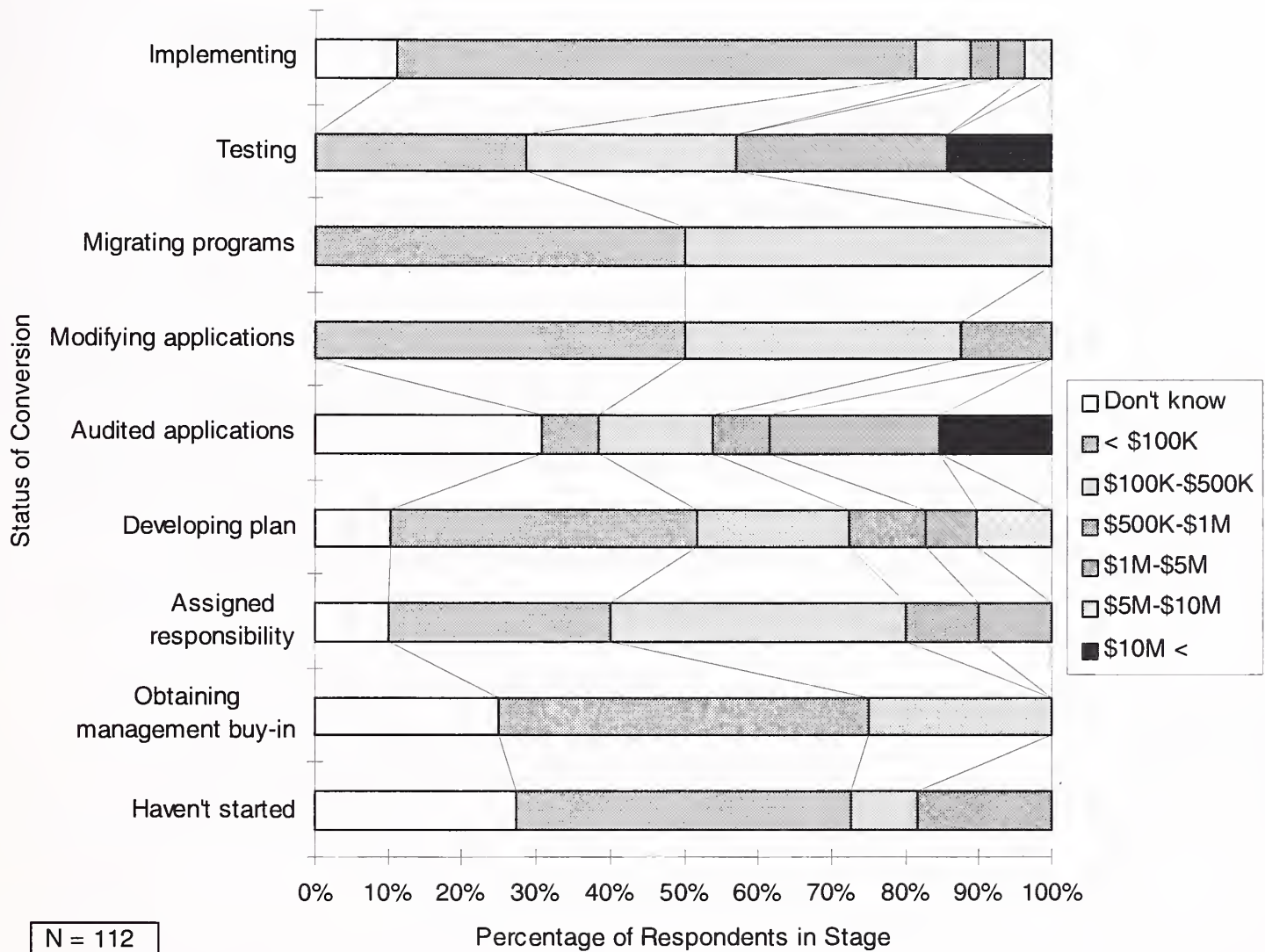
Industry: Process Manufacturing
Y2000 Conversion Stage vs. Estimated Cost



Industry: Process Manufacturing
Company Revenue vs. Estimated Y2000 Conversion Cost

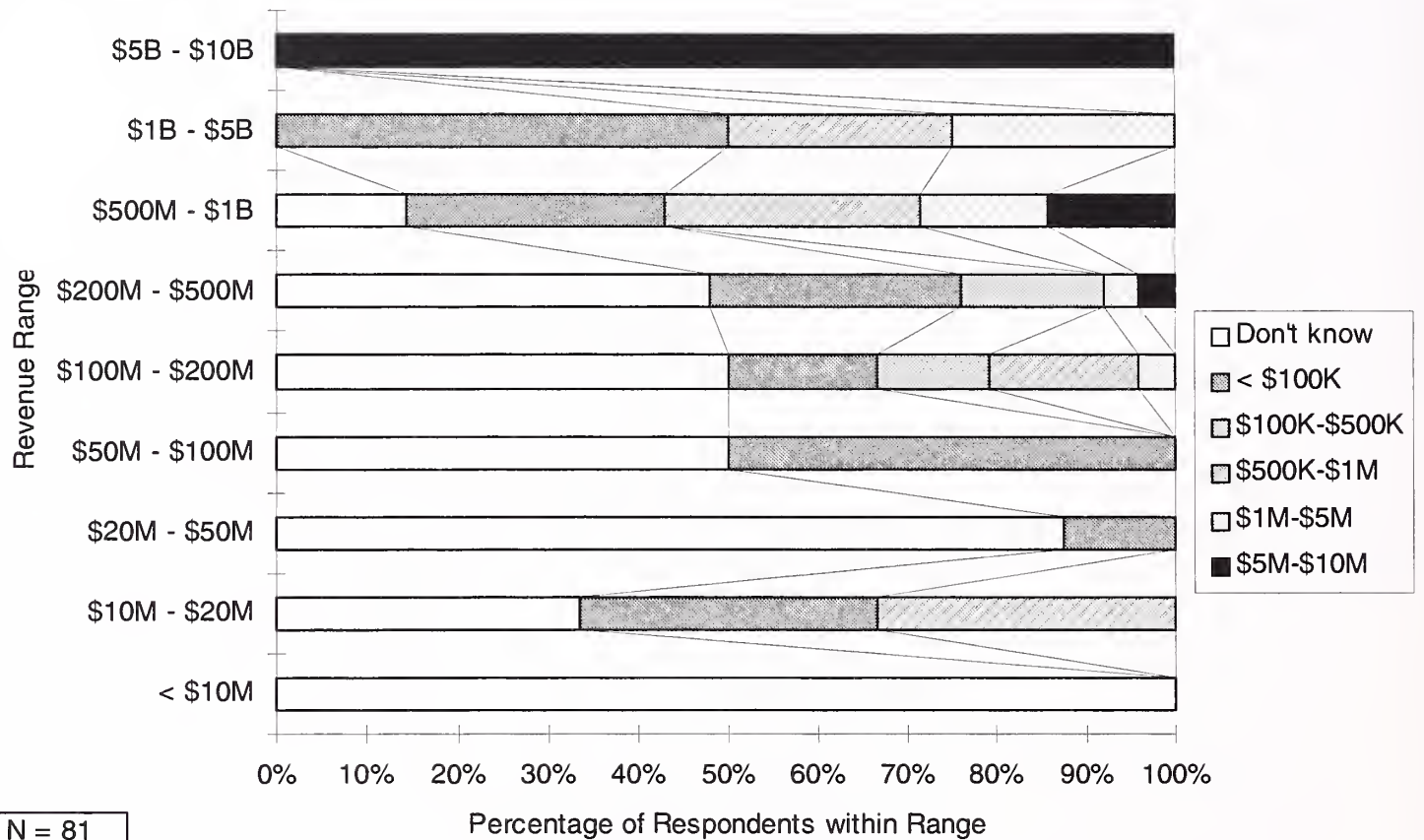


Y2000 Conversion Stage vs. Estimated Cost



Source: INPUT

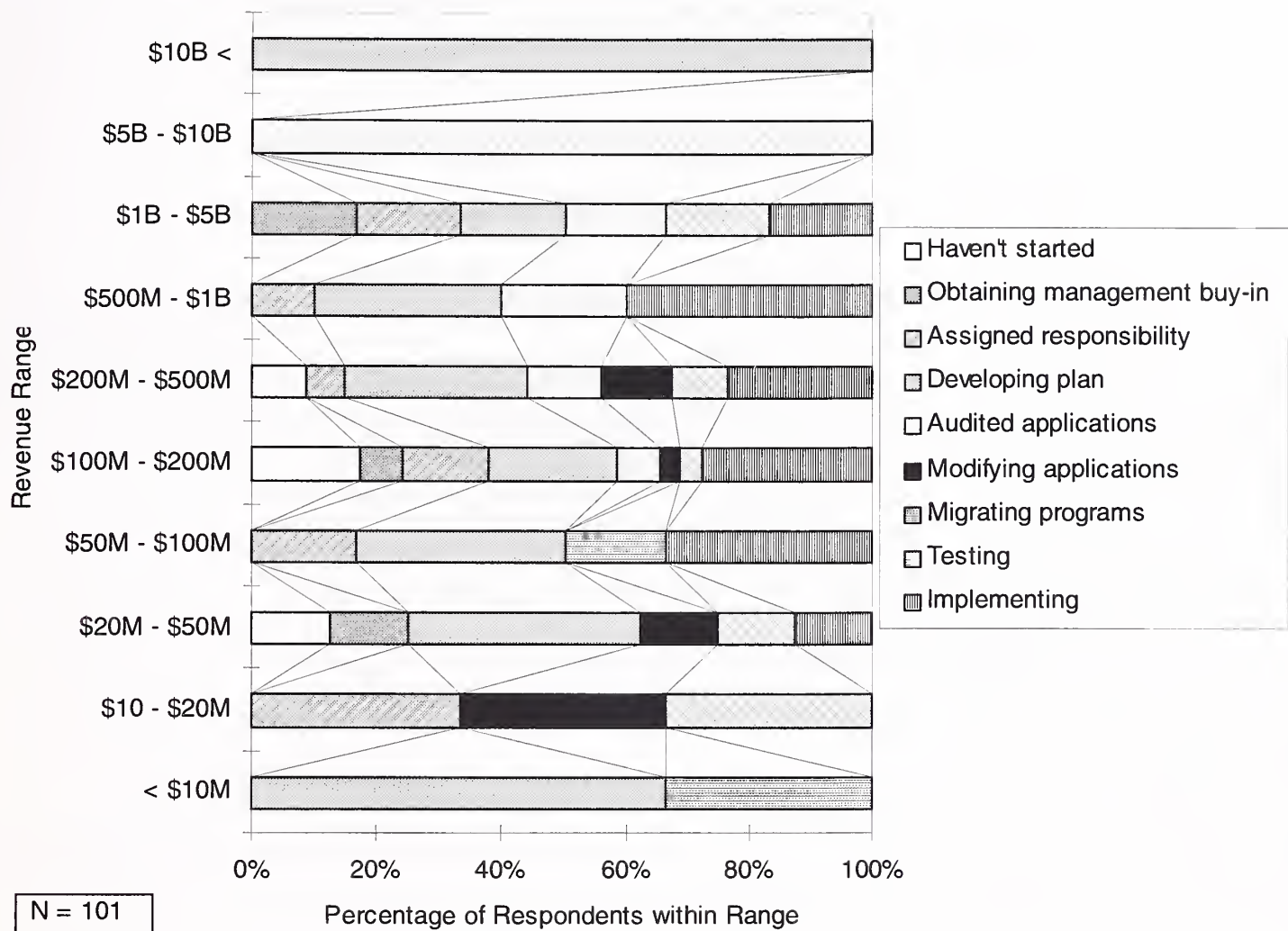
Company Revenue vs. Estimated Y2000 Conversion Cost



N = 81

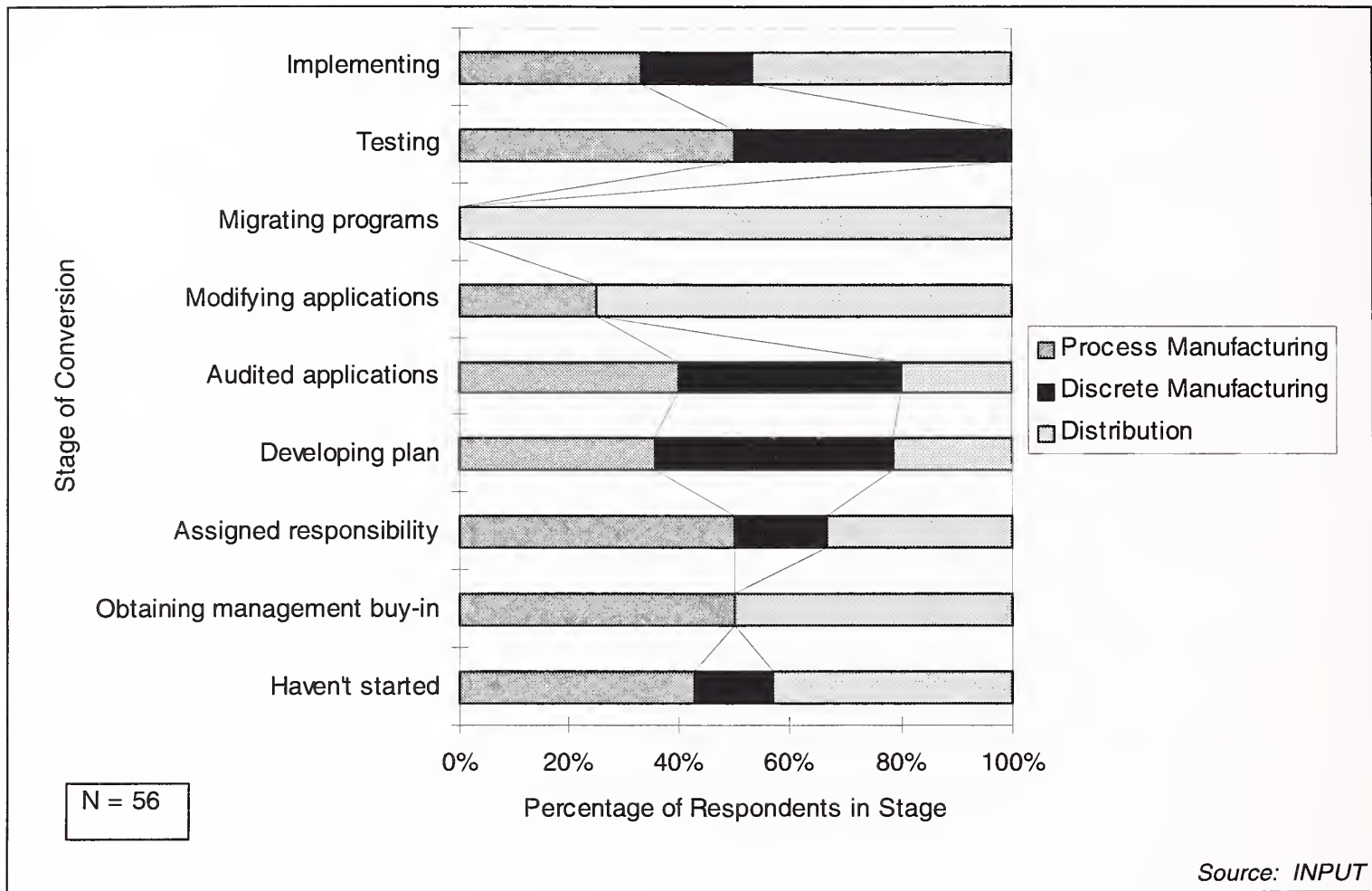
Source: INPUT

Company Revenue vs. Y2000 Conversion Stage



Source: INPUT

Industry vs. Y2000 Conversion Stage by Industry





User Questionnaire

INPUT, a research and consulting company based in Mountain View, California, is conducting a study of business readiness for Y2000. I would like 10 minutes of your time so that we might understand your company's preparations in this area.

Your name and your company's name will not be released and all your answers will be kept confidential. We will send a complementary copy of the executive overview of this study as a thank you for your assistance.

Are you responsible for your company's IT preparation for the year 2000?

Yes/No ☐

If **YES** — Go to Question 1

If **NO** — Who is the person responsible for this activity? _____

What is their position and telephone number?

Position: _____ Telephone Number: _____

Thank you for your assistance.

End of interview

Status of preparation

1. In preparation for Y2000, which of the following activities have you completed:

Activity	Completed
Working on obtaining upper mgmt. buy-in	
Someone made responsible for Y2000 readiness	
Developed plan of action	
Audited all applications	
Modified or changed applications	
Migration	
Testing	
Implemented revised applications	
Other	

- 1a. Comments on current status

Preferred Approach to Resolving the Issue

2. Please rate, on a scale of 1 to 5 (where 1 = will not use and 5 = will definitely use), how likely is it that you will use the following approaches to changing your applications:

Approach	Rating
Implement upgrade to existing package	
Modify existing custom software	
Rewrite existing application	
Build new custom application	
Implement new application package	
Outsourcing your IT department	
Outsource management of application code	
Contract for a disaster recovery service	
Other (1)	
Other (2)	

- 2a. Comments on approach to Y2000 issue

Critical Skill Requirements

3. Please rate, on a scale of 1 to 5 (where 1 = not important and 5 = very important), how important the availability of the following skills is to the success of your Y2000 preparations:

Skill	Rating
Project Management Expertise	
Y2000 Audit experience	
Implementation of package software	
Previous experience with Y2000 changes	
COBOL program development	
C language development	
Other language development (which one?)	
Other Skills (describe)	

- 3a. Comments on skill requirements

4. Who will provide the following functions for your Y2000 project? In-house (IH) or external service provider (ESP)?

Function	Provided by:
Project management	
Transition Methodology - the plan	
Inventory	
Assessment	
Planning	
Migration (rehosting, rewriting, replacing, etc.)	
Testing	
Implementation	
Other Functions (describe)	

4a. Other Comments

5. Which of the following skills would be needed from an external service provider?

Skill	Use an ESP
Project Management	
Strategy Consulting	
Application Design and Development	
Test Planning and Design	
Network Planning and Design	
Data Migration/Database Design	
Testing	
Implementation (roll-out)	
Other Skill (describe)	

5a. Other Comments

Source of Funding for Y2000 preparation

6. How do you intend to fund the activities associated with Y2000 preparation?

Source	Y/N
Separately budgeted item	
Included in budgets of previously planned projects	
Reduce/cancel expenditure in other IT developments	
Increase/overrun previous budgets	
Reduce non/IT expenditure	
Other (describe)	
Do not know how it will be funded	

6a. Comments on source of Y2000 funding

Y2000 Tools

7. Have you used, or do you intend to use, any special tools to help you with your Y2000 preparations?

Y/N _____

- 7a. If "Yes", then which tools have you used and, on a scale of 1 to 5 (5 = very useful) how useful was effective was each tool?

Tool (If name of tool not known, identify its purpose)	Rating of usefulness

- 7b. Comments on Y2000 tools

Vendors

8. How would you rate the suitability or preference of the following types of vendors to provide assistance with your year 2000 plans? (scale 1 - 5, 5 = most suitable or preferred)

Vendor type	Rating
Y2000 Consultants: companies that evolved or were created to address the Y2000 issue	
Y2000 Tool Vendors: companies focusing primarily on providing tools to assist others in the Y2000 inventory, assessment, migration and testing	
Outsource/Off-shore Providers: companies that focus on migrating systems with large labor pools or semi-automated "factories"	
Systems Vendors: companies that offer both hardware/software solutions and professional services	
Professional Services Vendors: Y2000 extensions to existing services and partnerships with tool vendors	
Other Type of Vendors	

9. Have you used, or do you intend to use, any outside service vendors to help you with your Y2000 preparations? Y/N

9a. If "Yes", then what did they do and who were the vendors?

Role	Vendor Name

9b. Comments on Y2000 service vendors

Estimate of cost

10. What is your current estimate of the cost, to your company, of fixing the Y2000 cost?

_____ Do not know

_____ Less than \$100K

_____ \$1 million - \$5 million

_____ \$100k - \$500K

_____ \$5 million - \$10 million

_____ \$500K - \$1 million

_____ Over \$10 million

- 10a. Which of the following cost elements did you include in your estimate?

Cost elements included in estimate	Y/N
Internal staff	
Software package upgrade	
Cost of new application package	
External consultants and developers	
New hardware	
Education and training	
Other (describe)	

- 10b. Comments on the cost of preparing for Y2000

Timescale for completion

11. When do you think you will have all IT changes complete and implemented?

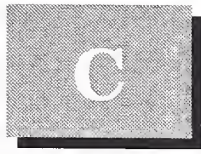
Already completed	_____	1998	_____
1996	_____	1999	_____
1997	_____	2000	_____

- 11a. What factors are most likely to disrupt your plans and cause you to miss your targets?
12. Do you have any other comments regarding the Y2000 issue and its resolution? For example, what lessons have you learned and what would be your advice to other companies when they are considering the Y2000 issue?

Lessons learned**Advice to others****Other comments**

Thank you for your time and patience. We will send you a summary of the study as soon as it is available.

End of interview



The IT Industry and the Year 2000: A White Paper

A

Introduction - "The Problem of the Century"

You've looked at your calendars and most of you are now at least dimly aware that the year 2000 is less than 3 years away. Likewise, the fact that the passing of this landmark could spell significant trouble for organizations whose current systems rely on traditional two-digit date fields is nothing new. The looming danger may be summarized in a general sentence; programs utilizing conventional date formatting may perform calculation errors or cease functioning altogether. This can have dire consequences for businesses and may precipitate the failure of an enterprise altogether.

Having been roused by the cacophony of "Y2000" solutions providers springing from the woodwork, most businesses have at least awakened to face these potentially devastating consequences and begun shuffling towards developing and administering viable solutions. Or have they? INPUT research has shown that a substantial percentage are still just beginning to acquaint themselves with the issue, and those that have begun the transition have vastly underestimated the associated time/cost commitment.

Attending the recent ITAA conference that addressed the Y2000 issue specifically, one couldn't help but be overwhelmed by the dizzying array of service vendors offering their own unique solution. But are they truly unique? A close look at the literature reveals that many of the differences are indiscernible, or that simply the user community isn't familiar enough with the issues to readily differentiate between vendor offerings. Virtually all vendors of Y2000 services offer full-service contracts - from initial diagnosis of present systems to the implementation and testing of formal solutions.

The result? The rush to tap into the estimated \$300B Y2000 compliance market has overwhelmed corporations with choices. In selecting a service vendor, a company must first perform several checks including;

- Ensure that the company is reputable - that they have an established lifespan and track record on similar projects
- Make sure that the company will not vaporize at midnight, December 31, 1999 and is taking proper measures to ensure the viability of their own enterprise beyond the Year 2000
- Ascertain which competencies must be scrutinized to determine that the firm is technically able to perform the conversion
- Obtain assurance that the vendor truly understands the scope of the Y2000 problem
- Ensure that the service provider can deliver a satisfactory solution on time and within budget
- Determine whether the vendor's technical solution evolved from a management solution, or vice-versa
- Evaluate how much of the conversion should be conducted internally and how much should be outsourced
- Assess the impact of enlisting offshore resources
- Determine whether software tools are enough or whether a comprehensive solution is required (software + external resources)?

These are but a few of the issues confronting an organization as it addresses a Year 2000 software conversion program. Each vendor or "Y2000" conversion expert has their own opinion regarding the steps a firm should take to ensure that they are year 2000 compliant, but generally they incorporate the same elements of any systems-related project:

- Planning - how to address the issue
- Analysis/Diagnostics - delineating the problem
- Assessment - sizing up the problem
- Solution Design
- Resource Allocation - time/money/expertise (internal/external) required
- Development

- Testing
- Implementation
- Maintenance

This is certainly not a hard and fast recipe for project management and there are undoubtedly innumerable subsets of each category, but most of the Y2K solution vendors provide services which fall into at least one or combine several (all?) of these general elements.

B

Addressing the Problem

There are several types of Y2000 solution vendor, each capable of providing one or more of the following products/services:

- Consulting
- Tool(s) - one or a few
- Clock simulation - date library or clock simulation support
- Full conversion service - possibly with other options, i.e. tools, but not primarily
- Integrated toolset - many possibly integrated tools covering stages of the project cycle in various combinations.

INPUT's experience has shown that vendors of Y2000 conversion products and services are reluctant to restrict themselves to one particular slice of the proverbial pie. For example, one may find that the vendor of a particular software diagnostic tool does not want to just sell the software tool, but has partnered with a consulting firm and now wants to bundle the tool with a comprehensive solution package. This pervasive development makes it difficult to obtain Y2000 conversion elements *a la carte*. While this may make decisions simpler since any one vendor can provide everything, how do you know what you're truly getting and just how a particular vendor's competencies stack up?

As the dawn draws nigh, organizations are realizing that the number of conversion options available to them is quickly dwindling. Considerations of proactively reengineering application systems, replacing systems with third-party application packages, or converting systems to client/server platforms are being abandoned in favor of more immediate, programmatic changes. These changes can generally be classified into two categories:

- Date field expansion - expanding the existing two-digit year fields to accommodate four-digit year fields.
- Date field interpretation - incorporate work-around logic into programs to convert two-digit year date fields into four-digit year date fields.

C

Synopsis of Conversion Strategies

There are six general conversion strategies that incorporate these two approaches:

- Date Field Expansion Strategy
- Smart Century Digit Date Field Strategy
- Century Window Strategy
- Datastore Duplexing Strategy
- Standard Date Routine Strategy
- Bridging Strategy

Date Field Expansion Strategy

The date field expansion strategy involves expanding an existing date field that does not contain a century indicator (e.g., *mmddyy*) to one that supports multi-century date values (e.g., *mmddccyy*). From a programming perspective, expanding the date fields is the most straightforward approach as well as the easiest to test. However, it is also the hardest to implement. This is due to the fact that all application components related to a specific date field must be modified at the same time the file is expanded to accommodate the expanded definition.

The massive synchronization of changes to the programs and files required to implement the date field expansion strategy is extremely difficult. It introduces project management problems such as requiring all source code to be frozen for long periods of time to prevent any further maintenance activities until these changes are complete. It also introduces difficulties associated with managing parallel development functions.

Smart Century Digit Date Field Strategy

The smart century digit approach, also known as “date value encoding”, uses an encoding scheme to represent the century value, usually as a one byte indicator. Although any unique character can be assigned to represent a specific century value, the most common scheme is shown below:

Code	Century	Value
0	19th century	18
1	20th century	19
2	21st century	20

Organizations should select the code value that ensures proper sort sequencing (i.e., 1 is less than 2). This date field conversion technique is most appropriate when the existing date format has an unused byte that can be used to indicate the century code (e.g., 1="1900", 2="2000"). This situation occurs when a six-digit date field is stored in packed storage format. The smart century digit approach requires that the physical data and all logic based components that access the date fields be converted in a single effort (e.g., this approach requires both data and program changes).

The introduction of processing logic to interpret the century codes adds to the program maintenance burden. If subsequently the date fields in the file are expanded, then all of this processing logic must be removed and the program retested. This strategy is best implemented as a temporary or short-term solution due to the increased overhead in processing and date access.

Century Window Strategy

The century window strategy establishes a base "bridge" between the two centuries. Date years that are greater than or equal to the base year are considered to be within the current century. Date years that are less than the base year are considered to be in the next century. For example, if the base year is 1930, then a two-digit date year value of 31 would be interpreted as the year '1931' while a two-digit date year of 29 would be considered to represent '2029'.

A two-digit value of 30 would be interpreted as the year '1930' given that the rule is "greater than or equal to" the base year. In other words, the strategy involves nothing more than a floating century window which allows years from two consecutive centuries to be represented by their last two digits and be protected against replication. Note, the interpretation rules must be consistent in all programs for a specific date field within the organization, as well as externally if the data is shared with other organizations.

Typically, an organization can use the century windowing technique to avoid or postpone physical field expansion by supporting multi-century date processing past December 31, 1999. Organizations whose applications use date fields that contain year values spanning more than one hundred years cannot use the century window technique. For example, birth dates and insurance policy start/end dates may span three centuries.

Datastore Duplexing Strategy

The datastore duplexing strategy involves the creation of a “duplicate” file/database so that one datastore contains unexpanded records (two-digit year date fields) and the second contains expanded records (four-digit year date fields). This technique uses an external process to copy an existing file and creates a year 2000 compliant format of the same data. Both year 2000 compliant and non-compliant programs can then process the data without any code modifications. The duplicated datastore can be deleted following the completion of the last processing job provided that it is recreated in each processing cycle.

Datastore duplexing is most applicable to batch processing - this technique is not easily deployed for files/databases that are maintained by on-line transaction processing. Depending on the type, size, and usage of the data store, this option may provide a more controlled conversion. The data duplication (date expand/contract) utility step can be migrated down the batch processing stream as each subsequent program is converted to read the new expanded date file. Typically this is a temporary solution and is usually coupled with field expansion and century window strategies. Very large files/databases are not good candidates for data duplexing as their duplication may require too much disk and CPU resource. The creation of large duplicate files may also adversely impact batch processing timeframes/windows.

Standard Date Routine Strategy

In conjunction with the other year 2000 conversion strategies, one or more standard date routines may be used as well. The standard (common) date routines can be developed in-house or commercially purchased. If an existing in-house date routine is not year 2000 compliant, the conversion effort involves the modification or replacement of the current program logic (i.e., call logic) to call a new date routine at the appropriate points within the program logic flow. The degree of code change depends on the structure of the program logic and date routine call parameters.

Bridging Strategy

The bridging strategy is a combination of date field expansion and century window techniques that enables date field definitions within programs to be expanded without requiring the simultaneous expansion of their related files/databases.

This strategy involves the same modifications of the program logic to accommodate expanded year 2000 compliant date fields as in the date field expansion strategy. Additionally however, interpretive logic is incorporated within the program to check whether or not the program requires the bridging technique. The bridging routine determines if input or output

records contain compliant (four-digit year) or non-compliant (two-digit year) date fields immediately after a datastore read or before a datastore write. The "I/O bridge" logic then expands or contracts the date fields appropriately based on the current status of each specific datastore being accessed.

The key advantages of this dynamic bridging strategy is that individual programs can be upgraded to support expanded date fields, validated, and then put back into the production environment "ready" for the future conversion of the physical datastores.

This approach is best suited for critical on-line transaction processing environments as it enables large numbers of programs to be upgraded over a period of time in preparation for the conversion of the master file/database over a weekend window.

D

Careful Planning the Key to Y2000 Conversion Cost Savings

An approach to saving on the expense of a Y2000 conversion is to perform the project in three phases. Each phase should have specific deliverables that build on each other to ensure a tightly controlled, well planned and implemented Y2000 solution. These phases are:

- **Analysis** - how many programs are impacted, how to fix and test them;
- **Pilot project** - proof of concept and process/procedure streamlining
- **Implementation** - repair, test, and implement each application group

Requests for proposals (RFPs) and bid requests should be issued against each specific phase and not all phases at once. This will make the bid/RFP creation and vendor selection much more cost effective.

Analysis

The analysis phase is where all of the questions at the beginning of this section are addressed. While simply getting the answer to how many objects are date impacted in many instances is all an IS professional is after, it is far from the complete picture. An RFP or bid request should address the following areas:

Tools

- Does the vendor solution incorporate tools that analyze all or many of the enterprise's application languages and files on multiple computer platforms? (the authoring RFP company should specify the languages, platforms, and data file access methods or database types such as Assembler, PL/1, Focus, and Easytrieve)

- Do these tools build a data repository that feeds automated change tools during the actual implementation phase?
- What is the annual or one-time charge for these tools?
- What type of repository is built? (SQL, Flat File, other)
- Can standard query and report writer tools already in the client inventory be used against the repository? (vendors must be informed what tools the client already possesses)

Methods

- describe the methodology used to perform the year 2000 project
- Provide graphical depiction and narrative of the tool flow and process

Deliverables

- Does the proposed solution provide a detailed plan for repairing and testing applications?
- Does the solution provide a general estimate of the total project manpower and application repair schedule?
- Does the solution provide the formal testing standards and strategy to be effectively utilized?
- Does the solution assist in awareness training to users and/or executives?
- Is there a tool repository for use in automated repair actions to be done?
- Does the solution provide a general impact analysis of affected application objects?

Vendor Information

- What is the financial status of the vendor? Will they be around in the year 2000 to honor any warranty?
- What volume of repair or conversion work has the vendor performed in the past? Can they provide references?
- For the proposed project lead personnel, what type of skills and experience do they have?

Project estimates/tracking

- How long will the analysis take? - a function of the estimated number of lines of code by language and platform

- How many personnel will be assigned at what are their duties?
- Will the work be done on-site, off-site, or in some combination of both?
- What is the vendor's suggested process for project tracking and reporting?

For any Y2000 conversion project, these questions are considered to be of major importance; any vendor who avoids these issues should be viewed as suspect. Accordingly, vendors of Y2000 applications should be as straightforward as possible when confronted with these questions.

Another critical point to remember is that most if not all vendors rely on a mix of analysis tools depending on the language and computer platforms involved. This mix may consist of in-house creations or licensed tools from other parties. A tool set that utilizes the same repository for all languages and platforms is rare. The key is to ensure that each tool provides a repository for future automation of repairs.

Performing a Pilot Project

A pilot project will allow the vendor who created the project plan with the client to work out any rough edges. As with any project, some processes and procedures will need tuning. Some adjustments to the tool set may be required to achieve a higher level of automation. For a Y2000 solution enlisting company, specific RFP/bid questions should include:

Tools

- Does the vendor offer, or is it willing to use another vendor's automated change tools that can utilize the existing analysis repository?
- Does the solution properly incorporate the existing change and problem management processes and procedures?
- Does the solution offer automated change tools for all involved languages? (if the answer is 'no', this may be where offshore resources will be useful)

Project Plan

- How will the vendor execute the pilot project plan? (staffing, schedule, deviations)
- Can the vendor operate in the defined testing environment and strategy?
- Does the vendor require on-site, off-site or offshore facilities?

Vendor information and tracking

- Does the vendor agree to operate under the defined project tracking process defined during the analysis phase?
- What experiences and skills make this vendor a candidate for inclusion in the project?
- Financial data and stability: will they be around? How long have they been in business? What is the size of their operation? What is the volume of their prior conversion or repair experience?
- Does the vendor have any affiliations with or capabilities to work with offshore companies where needed?

The Implementation Phase

Once the pilot phase has proved the concept of the repair actions, testing, and implementation, the bulk of the grunt work is performed. For the sake of speed and project timeliness, the recommended approach is to have broken up the applications into groups that can be provided to the year 2000 vendor in consumable portions. By assigning these work packets to a small repair/test team, the team will own it from client delivery to until client acceptance.

The learning curve of each team on the work packet application, testing, and exceptions tends to elongate the project versus having just one team intimately familiar with the application from beginning to end. This small team approach permits easier project management and multiple concurrent work packets to be in various stages of repair, test, or acceptance.

E**Legal Issues Surrounding the Year 2000**

First and foremost, the Y2000 issue is a technical one; a company should first work to fix its own internal problems. However, companies should also be careful not to ignore the legal ramifications involved and should endeavor to improve awareness regarding law and Y2000 conversions. There are many important legal issues and risks that require the attention of high-level executives. These aspects should not be overlooked during the management of a technical solution. The following sections delineate parties with legal interests in how a firm performs a Y2000 conversion and provide insights on avoiding liability.

Shareholders

When making an investment decision, investors in a company, partners, and long-term debt holders are entitled to know all the material facts regarding

the subject firm. The Securities and Exchange Commission requires that companies that are subject to federal reporting duties must disclose all material future anticipated liabilities. Generally accepted accounting principles may also require full disclosure. All companies, public or private, are subject to investor fraud claims for material nondisclosures. Accordingly, a company should carefully evaluate its impact analysis and enlist legal assistance to determine what disclosures must be made.

Furthermore, corporate management has a legal duty to shareholders to act in a responsible manner regarding the conduct of the business and protect the shareholder's investment. All companies - those employing a Y2000 conversion strategy or those who inexplicably are not - should act immediately to meet applicable legal standards of due diligence, prudence, and sound business judgment in addressing the issue. Corporate management should consider coverage under Directors and Officers (D&O) insurance and, with the assistance of legal counsel, create a record of diligence that can withstand the scrutiny of a non-technical judge and jury.

Customers

If a company's operations are adversely affected by a failure to properly address the Y2000 issue, its relationship with its customers may be at risk. Though the law in this area is complex, companies should work to develop force majeure (out-of-control developments), warranty disclaimer, and liability cap provisions with its most critical contracts. A company should demonstrate its diligence in addressing the issue by notifying customers in writing of potential problems work in conjunction with them to create back-up and parallel systems. Correspondingly, if a company has good reason to believe that its subcontractors and upstream suppliers may not become Y2000 compliant, it should work with them to identify and solve problem areas and take the necessary legal action to ensure that they do.

Third Parties

Employees, subcontractors, or any other entities that rely on the integrity of your systems or data should also be considered. Asking the question "What if our applications fail?", a company should use its impact analysis to identify all areas involving legal risks of collateral third-party damage that may result from affected data. As appropriate, back-up alternatives should be suggested and blind reliance on vulnerable applications should be discouraged.

Insurers

One way a company can protect itself from Y2000 exposure is through the effective use of general liability, errors and omissions, or first-party business insurance coverage. A careful review of a company's insurance assets may reveal coverage for accounts receivable or other important computerized data

affected by Y2000 failures. If a firm discovers that it doesn't have the right coverage, it should ensure that it acquires it. The law in this area is just beginning to evolve so it is important that a company keep apprised of developments.

Software Vendors

Whether or not a company's existing software vendors are legally responsible for making their products Y2000 compliant depends upon the nature of the contracts written with them. Typically, vendor-written contracts contain warranty disclaimers and liability caps. However, under many circumstances, such caveats are not robust and require careful legal analysis to properly interpret. In many instances, the law may require vendors to honor pre-sale representations about their products in letters, marketing pieces, demonstrations, and even oral statements. Such elements are taken into consideration when assessing the user's reasonable expectations, without liability caps, regardless of the content of the written contract.

If any software products owned or licensed by a company may fail, the firm should (a) conduct a legal analysis of all software-related contracts and licenses; (b) inventory all representations made by the vendor outside the contract for express or implied statements that the product was Y2000 compliant; and (c) give vendors appropriate legal notice of the company's intentions.

Looking ahead, a company should ensure that any newly acquired or licensed software package is compliant and that future contracts with vendors contain proper restrictions to avoid escape loopholes.

Software Maintenance Providers

Another question surrounding the Y2000 issue involves determining if outside parties who maintain a company's software applications are legally responsible for fixing Y2000 non-compliance problems. These parties are typically, but not always, the original vendors. Once again, this matter depends on the service contract associated with the software's purchase. There is often a difference between modifications to fix bugs for which the vendor pays, and customer-requested enhancements for which the end-user pays. The responsibility for major modification projects such as a Y2000 conversion is likely to fall outside the original scope of the agreement. Thus, the result of these negotiations will depend almost entirely on the strength of a company's legal position.

Non-Software Suppliers

If the companies on which another relies for the supply of ordinary goods and services experience Y2000 problems, their problems can become problems for downstream organizations. This issue is amplified if software application

interact - which is almost assured in any large organization. These suppliers should be contacted regarding their compliance plans and run tests to identify mutual and precipatory Y2000 problem areas. A downstream organization should review its contracts, particularly the force majeure and liability limitation clauses, to ascertain how the non-performance of companies on which it relies might be legally excused. If appropriate, a relying company should inform these organizations that a failure to fix Y2000 related problems will not excuse nonperformance. If a company is bound to a supplier through a long-term exclusivity agreement, their inability to demonstrate compliance may provide legal justification to pursue another supplier.

F

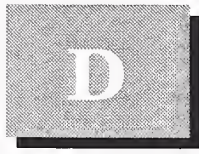
Conclusion

The coming of the year 2000 is not just a hardware or software issue, but a social problem with the potential to reach crisis levels in this information-hungry society. To avoid potentially expensive and crippling Y2000 problems, companies must ensure that not only is their own shop in order, but that every company on which it relies solves its own Y2000 problem as well. Along with the previous legal issues presented, steps on an organization's Y2000 conversion checklist should be:

- Gain executive management understanding and support
- Decide the proper mix of "make vs. buy" of the technical resources needed for the impact assessment, conversion, and testing processes
- Select the appropriate tools for all affected computer platforms and applications
- Create a plans to set conversion priorities base on the degree of importance attached to candidate systems
- Adopt an overall conversion methodology, including an adequate test plan allowing the necessary time to "get it right"
- Screen the introduction of new system resources to assure that the millennium problem is not reintroduced

The time to begin preparations for the year 2000 is now. The problems associated with the impending date change will only become greater as the year 2000 approaches. Organizations that wait for a proverbial silver bullet solution are assuming a tremendous risk. Even inherent bureaucratic delays can be costly. IT firms qualified to perform Y2000 conversions have commitments spanning the next year or so. A delay in starting a conversion

may spell difficulty in acquiring the services of a qualified Y2000 solution provider. These are all compelling arguments to begin preparation for year 2000 compliancy today.



Related Y2000 Research Bulletins

The Real Future Shock – A Year 2000 Update, February 1996

Vendor Liability and the Y2000 Crisis, April 1996

Users Are Not Yet Ready for Y2000, August 1996

The Real Future Shock - A Year 2000 Update

"Reality," an oft-quoted aphorism begins, "is what happens while you're busy making other plans." Prepare to rework your firm's current business plans for the next *four* years, because your clients, whether they've grasped it yet or not, will certainly be doing the same with theirs sometime soon.

An unprecedented IT industry dislocation is in the offing, involving profound reallocations of IT budgets, shifts in traditional IT spending patterns and critical alterations of the current availability and allocation of IT industry resources.

These revisions will be involuntary and inevitable and they are likely to take place at an *ever-increasing rate* over the next 4 years. Prepare yourself - and your company - for a *real* future shock.

THE PROBLEM

By now, virtually every aspect of modern human interaction is automated, but with

systems that are primarily incapable of functioning *properly* beyond December 31, 1999. The problem, variously referred to in the media as "The Millennium," "Year 2000" or "Y2000" problem, is ubiquitous. It is cross-platform and cross-vendor. It exists in mainframe, midrange, and personal computers alike. It can be found in microcode, operating systems, software compilers, applications, screens, databases and data itself.

The Y2000 problem itself is both simple and complex. It relates to the fact that most computer software, until recently, accounted for dates by using only two characters. The year 1996 for example is simply stated as "96." Time periods (age for example) are usually calculated by determining the difference between two numbers: 1958 to 1996 is 38 (96-58).

Using 00 to designate a year however, creates multiple problems: does "00" refer to 1900 or 2000? And in the case of time periods, 00-58

produces *negative* value which cannot be correctly used when calculating many business values. The complexity of the problem comes from the frequency of date usage. Date values are everywhere and often difficult to locate.

While complex, the Y2000 problem *is* "fixable." But the dimensions—and hence cost and time required for its solution—are unprecedented in both magnitude and urgency. Given society's near-total reliance on computers, neither the problem's solution nor deadline are in any way "negotiable."

Nor is the cost of such solutions. There are no "magic bullet" fixes; individual corporate Y2000 solutions are estimated to range from under \$1 million to over \$100 million, depending on how much code is affected.

The cost of programming or reprogramming all systems and software to correct for the Y2000 problem worldwide has ranged from \$50 billion to \$600 billion. Estimates continue to grow as more and more study is devoted to the problem, and its secondary consequences and ripple effects come into focus.

INPUT estimates the total cost of preempting the coming crisis at a conservative \$56 billion. The amount is derived by estimating the programming and implementation costs for the 10,000 largest firms as representing 50% of the market.

INPUT places the figure for these largest firms at \$28 billion (see Exhibit 1); therefore the worldwide market is \$56 billion.

Exhibit 1:

Worldwide Cost to Fix Year 2000 Dates for the 10,000 Largest Companies

Cost Categories	Cost (\$ billions)
Programming changes	\$20
Implementation	\$8
Total Costs	\$28

Source: INPUT

And what about your firm? Think about it... Consider for a moment current working projections for the overall IT market's direction and growth in spending over the next four years: for hardware; for software.

Now think about your own company's business plan, as *premised* on these projections for market spending, growth, and breakdown.

Now, withdraw at least \$50 billion - perhaps as high as \$600 billion—from that previously projected overall market for hardware and software. Allocate it to *non-discretionary* IT spending for goods and services your company does not currently sell (and thus could be spent with *other* IT vendors), and rework your present business plan. Impact ?

While the exact cost of the Y2000 problem is not yet known, one thing is certain *now*: at between \$50 and \$600 Billion dollars, Y2000 will undoubtedly end up constituting one of the single largest items of IT expenditure in the industry over the next four years. Money that will inevitably be withdrawn from existing IT markets. *Your* markets?

INPUT estimates the total worldwide expenses for information services from 1996 through 1999 at \$1,706 billion. At the low end of \$50 billion, the Y2000 problem represents 3% of that information services market. At the high end of \$600 billion the figure climbs to 35%. Either way it is a sizable opportunity.

How likely is this projected scenario? Unfortunately—because of the unique and unavoidable nature of the technological and commercial imperatives driving this shift—it is a virtual certainty.

Do we have your attention? Good. Because the picture actually gets much worse—or much better—depending on how quickly you respond to this information, the quality of your decision making, your reaction time, and the speed and flexibility of your particular organization.

WHAT'S AT STAKE?

Failing to promptly respond to this coming dislocation/reallocation of the IT marketplace may result in a severe loss of business. Only by entering the new service sector will you be able to salvage business losses attributable to the non-discretionary diversion of available IT funding to new or existing competitors capable of providing the Y2000 services your company could not.

Even assuming retention of client loyalty and customers, prepare for a reduction in client IT purchases in order to permit the funding of their Y2000-related services needs. Remember too that this multibillion-dollar market shift toward largely service-related markets will not be "discretionary."

Like you, your clients cannot avoid the decision to become Y2000 compliant and hope to remain in business. Recast your 5-year business plans to purchase and hire accordingly.

Other less obvious but significant Y2000 related threats include:

- Potential legal exposure
- Diminished ability to conduct business
- Increased cost of doing business
- Exclusion from strategic commercial and government markets

POTENTIAL LIABILITY

If a multibillion-dollar IT market opportunity doesn't grab your attention, how about the threat of legal liability that could result in a financial exposure of as high as \$100 million dollars *per client*, depending on their size, plus legal expenses.

How? On any of several potential bases:

- **Warranty debates (express and/or implied):** While the success of such claims is hardly guaranteed, clients whose hardware or software ceases to function could, depending on jurisdiction, plausibly *assert* claims based on a broad range of warranty-related theories.

Express warranties: Claims based on express, written warranties provided with the product in respect to maintenance, upgrades or support.

Implied warranties: Claims based on one or more of the following warranty-related theories/causes of action: 1) implied warranty of merchantability; 2) fitness for intended purpose or use.
- **Negligence:** Y2000 bugs, contained in the hardware and/or software sold, will likely be claimed as "latent defects," or flaws related to the design or manufacture (or negligence related to the hardware or software involved) that were - or should have been - known to you at the time of design, manufacture or sale.

Note: Claims for "latent defects" are deemed to run from the time of discovery by the client rather than the date of sale, significantly limiting your ability to rely on statute of limitations/expiration of warranty defenses that would otherwise be available.

Potential Liabilities

- Warranty debates
- Negligence
- Consulting arrangements
- Breach of contract
- Class action lawsuits

- **Consulting arrangements:** Claims relating to the selection and/or sale of the hardware or software that you - as an IT expert - knew or should have known was defective or manifestly inappropriate. Remember, *you* are the expert. The client is generally deemed to be in an inherently *vulnerable* position when dealing with experts, thus a more strict standard of liability is typically applied. Clients rely on your expertise which, if to their detriment, can result in standards of *strict* liability.
- **Breach of Contract:** Claims arising out of existing hardware/software/maintenance or upgrade agreements binding you to maintain the systems in good working order, make any necessary upgrades, or provide support needed to solve the client's problems.

Note: You could be on the hook for this *now*. Check the terms and conditions of any existing HW/SW/maintenance or upgrade agreements. Have your legal department review all agreements. Renew at your peril without incorporating appropriate Y2000 language to protect yourself.

Claims brought under either or both express or implied warranties could result in substantial legal exposure. On the darker side could lie legal judgments requiring your firm to "fix" your client's problems, problems whose solutions could cost into the multi-millions of dollars. Other risks include potential judgments resulting in massive awards for actual (or even consequential or punitive) damages depending on the particular facts, jurisdiction and legal standards applied.

- **Expensive "Asbestos industry"-type class action lawsuits:** We live in a litigious society, where the cost of the clean-up indicated above can range as high as

\$100 million dollars for larger clients. Do not be surprised to find state and possibly federal courts increasingly open-minded with respect to at least *trying* the issue of liability. Given the enormity of the Y2000 clean-up, this could become a popular/emerging political issue over the next five years. Remember too that state and federal governments - which will themselves have to reckon with the high cost of Y2000 cleanup in a time of increasing fiscal austerity - will have a solid stake in the outcome and precedent of any cases brought by their Attorneys General.

Clearly, selling your clients on Y2000 solutions *today* in a structured, preemptive fashion will be vastly preferable to—and easier than—having to deal with litigation or system failures and fixes applied after the fact; or—worse still—after the issue has also become a political and legal topic for the media, courts and politicians.

Obviously, an internal Y2000 legal review/audit, with possible redrafting of existing maintenance agreements and other service and warranty obligations, is strongly recommended.

INABILITY TO CONDUCT BUSINESS

As indicated above, Y2000 problems abide in the hardware, operating system, and applications levels. Failures can be expected to run the range from catastrophic shut-down to selective failure or errors in specific components or mission sectors. As a user, if your company fails to detect, provide, or adequately develop timely Y2000 solutions, such failures or errors could include: inability to log in to all or part of one's LAN or WAN; inability to back-up or restore data; inability to invoice, receive data, maintain inventories, or enter or process orders; and the loss of key data records or files. How long could your

particular organization sustain itself with the loss of any one or more of the above functions? How tolerant are your customers or suppliers?

INCREASED COST OF DOING BUSINESS

Internal administrative costs related to Y2000 concerns will include:

- **Employee salary, retention, and recruitment expenses:** As the demand - and competition—for a qualified technical staff vastly increases in response to the problem, increasingly desperate service providers and corporate MIS departments—particularly those who procrastinated or underestimated the enormity of their project's requirements—will be scrambling to hire trained personnel.
- **In-house Y2000 solution expenses:** These expenses will surface on several fronts: 1) costs associated with the acquisition or diversion of otherwise billable staff and IT resources to the task of providing in-house solutions (or, worse yet, having to contract for such services from a competitor); 2) costs associated with delays in payables, delivery of strategic components, products, etc. attributable to *external* Y2000 glitches on the part of vendors, clients or other Y2000 "stragglers" with whom you will inevitably be doing business; 3) possible loss or forced termination of EDI links with large vendors, suppliers or clients due to their—or your—lack of Y2000 compliance; and 4) cash-flow issues arising out of one or more of the above deviations from present business practice.

EXCLUSION FROM KEY COMMERCIAL AND GOVERNMENT MARKETS

Some government and commercial customers have already begun to make satisfactory Y2000 compliance programs a condition of doing business with them. This will help avoid

the sort of critical disruptions inevitably resulting from transacting business with unreliable vendor/ client/suppliers whose mission-critical systems may fail due to Y2000 compliance problems. Expect to see this as an accelerating trend from now on. Demand the same from your own business partners.

SUMMARY

The Y2000 problem will exert a profound influence on the IT market over the next five years.

- Beginning this year, these new developments will be felt at an ever increasing pace, reshaping markets, reallocating IT resources, and revising existing IT plans, budgets, business partnerships, strategic alliances and, in the process, the general IT business landscape.
- The sheer scale and complexity of the problem will rapidly create huge and unprecedented new market opportunities, while simultaneously introducing attendant risks and technical and commercial challenges of equal dimensions.
- The scale of demands produced by these problems and market opportunities will necessarily reallocate and tie up some segments of the industry's existing resources, resulting in increasing and desperate competition for skilled and trained personnel, thus increasing the cost of business for virtually all industry players.
- Both Y2000 proficiency *and* Y2000 compliance will increasingly emerge as requirements for doing and pursuing business in government and large commercial markets, and a condition for establishing or maintaining EDI and similar close IT business working relationships.

- The risk of legal costs and liability will likely emerge as some companies resort to litigation, stimulated by the multimillion-dollar costs of cleanup, quite possibly resulting in potentially unstable balance-sheets, new and dangerous legal precedents, all resulting in—what else?—*more* litigation.

BACK TO THE FUTURE ... OR BACK TO THE WALL?

Be prepared to go back to the future *now*: to revisit and rework your current 5-year business plans and projections so that they adequately reflect the market shifts inevitably resulting from this major diversion of IT spending.

THE BOTTOM LINE:

Count on having something less than 12 months from reading this to position your company for the new IT market. The sheer scale and complexity of measuring, developing,

implementing and testing solutions to the problem will require Y2000 clients to make their commitment to vendors sometime this year. Whether you decide to cast your lot as a customer or player in this multibillion-dollar market, you will need to move on this *now*!

What are the most dangerous misconceptions ?

- That you and/or your management team already know all about Y2000 and its impact - many of you do not;
- That this issue will go away;
- That a “magic bullet” solution is possible and will be found;
- That *your* business won't be affected by the problem or the profound market shifts that will result;
- That “neutrality” is possible or that there are sidelines from which your firm will be able to passively and safely watch the game.

This Research Bulletin is issued as part of INPUT's Systems Integration and Professional Services Program. If you have any questions or comments regarding this bulletin, please contact Charles Billingsley at INPUT, 1921 Gallows Road, Suite 250, Vienna, VA 22182-3900, (703) 847-6870.

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Vendor Liability and the Y2000 Crisis

Our last research bulletin examined the Y2000 problem from a macro level, examining what the Y2000 problem is, its impact on businesses, what you can do about it and some of the legal problems associated with it.

INPUT believes a more detailed look at the potential liability vendors face from this problem would be valuable since, as January 1, 2000 comes closer, an excess of litigation will spring up focusing on who is responsible for the problem and, more importantly, who is responsible for shouldering the cost of fixing it.

As part of our analysis, INPUT spoke with representatives from Arter & Hadden, a nationally recognized law firm specializing in information technology and business law. Legal views expressed here are theirs and are provided as an overview only. Specific legal questions regarding your company's precise liability should be discussed with a qualified attorney.

In the balance of this document, we consider some of the legal pitfalls you face in traversing these uncharted "liability" waters and how you can recognize and avoid them.

COPYRIGHT CONSIDERATIONS WHEN PERFORMING MODIFICATION SERVICES

In addition to counseling and advising clients who face the Y2000 Problem, the IT markets for Y2000 services will consist primarily of programming services geared to upgrading and maintaining existing computer systems so as to make these systems Y2000 compliant.

If you, as an information services provider, choose to compete in this software upgrade and system maintenance market, always have your clients provide you with all information they have regarding the circumstances under which their systems were acquired, including development contracts, transfer documents, assignments and licenses. Review of this information is crucial because you must have a clear picture of the ownership/licensing status of the software you'll be working on before entering into an agreement to perform modifications.

Ownership status of computer software is vital in determining whether you or your client have the right to make modifications to a particular piece of software in order to achieve Y2000 compliance. Furthermore, you must determine whether your client has the right to hire

someone other than the original software developer to perform the modifications.

Under United States copyright laws, computer software is considered a literary work. Therefore, the author of the software acquires a copyright for the software for either the life of the author plus fifty (50) years or, in the case of corporate authors, for seventy-five (75) years. (These periods of copyright ownership apply to computer software authored after January 1, 1978.)

One of the exclusive rights afforded to authors under our copyright laws is the "right to prepare derivative works." A derivative work is a work based on one or more preexisting copyrighted works. Although the current case law is not clear, some believe that any modification which affects the functioning of a computer program will constitute the creation of a derivative work. The derivative work, of course, is the post-modification software program.

A corporation can be the author of a computer software program if the software was originally created as a "work for hire." A work for hire arises when the software is created by an employee of the corporation within the course and scope of his regular employment. In this instance, the company itself would be considered the author of the software.

If your Y2000 client has developed its own software "in-house," it is likely that the individuals who wrote the software were employees of your client at the time they wrote the software. In that case, as a "work for hire," the copyright in the software would belong to your client. As the owner of the copyright, your client has the ability and freedom to hire a third party to make whatever changes it chooses to the software.

If your client has licensed the software from the copyright owner, its ability to make (or hire you

to make) modifications to the software will be controlled by the license agreement. It is likely that such a license will prohibit third-party modifications of the software. A thorough review of all licensing documents is advised prior to beginning any work.

In the event that your client is subject to a license which restricts its ability to modify the software, you or your client should first contact the original software developer to determine whether Y2000-compliant upgrades are available.

In the event that the original developer fails to offer Y2000-compliant upgrades, your client should seek to obtain that developer's permission to perform the necessary modifications. In the event such permission is not forthcoming, your client should consider some of the available legal remedies which are discussed below.

If the original developer does not provide upgrades and is unwilling to grant permission to your client to perform the modifications, seek advice from competent copyright counsel prior to embarking on a modification contract. This may help shield you from potentially enhanced liability for willful copyright infringement.

If the materials provided by your client show that your client neither developed the software at issue itself nor holds a license from the original developer, but actually owns the software outright, it is important to remember that even though your client may own the software it still does not own the copyright unless a valid copyright assignment has been made. If your client owns the software, but not the copyright, it may still have the right to perform limited Y2000 modifications under the copyright laws.

The Copyright Act grants "owners" of software programs the right to make or authorize the making of an adaptation of the computer

program provided that such adaptation is created as an "essential step" in using the computer program in conjunction with a machine. In the event of Y2000 compliance, a very strong argument can be made that modifications relating to the Y2000 Problem are "an essential step" in using the program.

This is especially true if the program will become inoperative after December 31, 1999. However, further modification, which is not related to or necessary for the continued operation of the computer software, is not likely authorized under this statute and would be considered to be the creation of an unauthorized derivative work.

Other possible arguments a software owner might make to defend a claim of copyright infringement on the basis of modifications to ensure Y2000 compliance include fair use, the first sale doctrine, and a **"private use"** defense.

The Copyright Act provides that **"fair use"** can be made of copyrighted works. This means that an individual can engage in acts which are infringing under the statute, but that such acts are excused because of the circumstances of use.

The statute requires that four factors be considered in assessing whether a use is fair: (1) the purpose and character of the defendant's use of the copyrighted work; (2) the nature of the work; (3) the substantiality of the taking from the work; and (4) the effect of the defendant's use upon the market for the work.

In the Y2000 compliance context, if the original developer refuses to provide an upgrade or perform ongoing maintenance to cause software to become Y2000 compliant, a very strong argument can be made that modifications in order to achieve Y2000 compliance are "fair."

However, if the original developer provides upgrades or is providing maintenance services and you would be performing the modifications

in competition with the original developer's business activities, it is much less likely that a court would find such use fair. Although the cases are somewhat unsettled on this topic, it would be advisable to get advice from counsel on a particular situation or to ask your client to indemnify you for possible copyright infringement claims.

The **"first sale doctrine"** provides that once an author of a work makes the first sale of a copy of that work, that author's rights are exhausted with regards to that particular copy. In the Y2000 compliance context, an argument can be made that a software developer has received the rewards of its work through payment for the original copy of the software purchased. This prevents a copyright owner from controlling the use to which the software is put after it has left his hands.

However, the application of the first sale doctrine in the instance of substantial modifications of the program is likely to be limited. Additionally, similar to the "essential step modification" discussed above, the first sale doctrine only applies to "owners" of copies of the software, not to mere licensees.

A third and final possible argument which could be made to defend a claim of copyright infringement is that of a **"private use"** defense. This is essentially an equitable defense that allows purchasers of software the right to use the software to satisfy the needs for which it was originally purchased; however, such a defense would exclude any commercial aspects to modifications which were made. It is likely that this type of argument would protect the client, but not the entity who is trying to market services related to Y2000 compliance.

Unfortunately, at this time, the copyright laws do not adequately address some of the unique problems associated with the protection of computer software. Different schemes have

been proposed and discussed by commentators, but the law does not reflect many computer program-specific provisions.

Consider the issues outlined above carefully before entering into any contract to provide modification services. Protect yourself and your client by fully considering the intellectual property ramifications of the work that you do. If the owner of the copyright in the software determines that your Y2000 compliance activities are infringing, the time and expense of potential litigation can negate any benefits you may receive from entering the burgeoning Y2000 market for modification services.

OTHER LEGAL ASPECTS YOU SHOULD CONSIDER PRIOR TO ENTERING THE Y2000 MARKET FOR SERVICES

Most of the remaining legal issues which arise in connection with the Y2000 Problem in computer software concern general issues of contract and tort liability and are relevant in any transaction involving the sale of software.

Contractual Liability:

- **Express Warranties**

Contractual liability is based on breach of warranty. Warranties may be either expressed or implied. An express warranty is a statement presented as fact, a product description or a promise made concerning the software product. If these representations become part of the "basis of the bargain" between the parties to the contract, then these representations will be treated as an express warranty that the product will perform as represented.

In order to determine the scope of the warranties which accompany a software transaction, it is important to look at all transaction documents, product manuals or

sales/marketing materials which may have accompanied the sale of the software.

In this event, a sales piece which states that, "This product will take you into the next century and beyond," may very well be treated as an express warranty that the product at issue is Y2000 compliant.

Whether or not these types of representations are considered to be part of a contract between the vendor and the ultimate software user depends on the terms of the contract between the parties. An effective disclaimer can usually be devised which will make clear that such statements are not assurances regarding the quality of the product and are not part of the sales contract.

In the instance of a shrink wrap license, it is unlikely that a disclaimer as to these types of warranties would be effective as courts are electing to prevent vendors from "giving with one hand and taking away with the other." However, if the contract consists of a sales document or license which was negotiated and executed by the parties as equal bargaining partners, courts are much more likely to allow disclaimers of warranties to stand.

It is important to continually review all advertisements and marketing pieces as well as to instruct your sales staff regarding the legal effect of the statements they make to your customers.

- **Implied Warranties**

If your software transaction is governed by the Uniform Commercial Code (U.C.C.), which does not strictly apply to software programming services per se, but does apply to "goods" such as a computer system sold with software installed, two types of implied warranties may arise.

These warranties are the warranty of merchantability and the warranty of fitness for a particular purpose. These warranties are not triggered by representations on the part of the software vendor but arise by operation of law.

The warranty of merchantability provides that in every sale of goods there is a promise that the software is suited for the ordinary purposes for which such software would be used. That is, if a certain type of software would be expected to have a ten-year life span or would be used to calculate dates beyond the year 2000 in ordinary circumstances, failure to provide a Y2000-compliant product would constitute a breach of that warranty. An investigation must be made to determine the ordinary expectations of a user of this type of software prior to determining whether a breach has actually occurred.

The implied warranty of fitness for a particular purpose arises when the vendor has knowledge that the purchaser is buying the product in order to fulfill a particular need and that the purchaser is relying on the superior skill or knowledge of the vendor to procure the appropriate product.

This warranty is especially significant in instances in which the vendor is also serving as a software developer or as a consultant to the purchaser of the software. In the situation where a customer comes to a developer and asks for a particular type of system which would need to operate beyond the year 2000, failure of that developer to cause the system to be Y2000 compliant would constitute a breach of this warranty.

Both of these implied warranties may be disclaimed in a contract for the sale of the software if such disclaimer conforms to the requirements of the U.C.C. Otherwise, the disclaimer will be considered to be ineffective and liability can arise for breach.

- **Tort (Wrongful Act or Damage) Liability:**

Possible non-contract claims which might arise in a software transaction concerning a non-Y2000 compliant software product include: fraud and misrepresentation, fraud in the inducement, negligent misrepresentation, professional malpractice, negligent design, and strict liability.

- **Fraud and Misrepresentation**

Tangentially connected to a claim for breach of express warranty, a claim for fraud and misrepresentation requires the purchaser to prove that the software vendor had intent to deceive and that the customer detrimentally relied on the deceptive representation. This type of claim is very difficult to prove and is many times precluded by a claim for breach of contract under express warranty if an intent to deceive cannot be shown. Additionally, as discussed above, a properly drafted contract disclaimer can greatly limit the potential liability stemming from express representations.

Liability for fraud arises just as it sounds: if you intentionally represent a system to be Y2000 compliant (when you know that it's not) in order to induce a purchaser to buy, liability for fraud can arise.

- **Fraud in the Inducement**

A claim of fraud in the inducement can be made when a plaintiff believes that it was led to enter into a contract due to the fraudulent misrepresentations of the vendor. In instances where statements outside the contract are effectively disclaimed with regards to the performance of the software, a fraud in the inducement claim could still be made to seek recovery outside the contract altogether if the vendor intentionally misleads the customer regarding the contents of the contract. For example, a vendor could represent that the

contract protects the customer (or provides a remedy against the vendor) from Y2000 problems when it really doesn't.

- **Negligent Misrepresentation**

This cause of action is not available in all states, but in those states that do recognize it, a buyer is able to recover for a misrepresentation without being required to prove deceptive intent on the part of the vendor. Liability under this theory might arise if a vendor were to assure a customer that a particular system was Y2000 compliant without knowing whether this was true. If a plaintiff can show that the statement was, in fact, not true and the vendor should have reasonably known this, liability under this theory may arise.

However, liability under this theory may be limited because states which allow this cause of action usually require proof of a special relationship between the parties which gives rise to a duty on the part of the vendor to provide accurate and non-misleading information.

- **Professional Malpractice**

Although this particular claim has not been fully litigated in the courts yet, it remains a viable claim in the instance of non-Y2000 compliant software, especially in the instance of custom designed software which is developed by specialized software firms.

Under this theory, "professionals" are held to a higher standard of care than ordinary vendors. A vendor who holds itself out as having special expertise or training in Y2000 issues may run into trouble if it fails to live up to its billing.

- **Negligent Design and Strict Liability**

These two theories arise under a products liability theory of recovery. Accordingly, courts are usually reluctant to allow recovery under a negligent design or strict liability standard if

only economic damage is alleged. However, in the instance where non-Y2000 compliance leads to the personal injury of an individual, design flaws inherent in the product could lead to a viable claim for negligent design or strict liability. The potential exposure for such claims in the event of an avionics software program or a medical equipment software program can be astronomical if Y2000 compliance is not immediately reviewed and remedied, if necessary.

HOW YOU CAN LIMIT YOUR POTENTIAL LIABILITY

- **Vendors**

As discussed above, vendors can limit their potential contractual liability by disclaiming warranties. Express representations outside the contract can be limited by including appropriate integration and merger clauses. These clauses would state clearly that the terms of the contract control and that representations not contained in the contract are inoperative. However, such clauses do not bar the tort claims of fraud and misrepresentation as discussed above, so additional assurances must be sought from the customer to the effect that the customer did not rely on any representations outside of the contract when deciding to make the software purchase.

A liquidated damages provision can be included in all contracts provided that the estimate of damages stated in the contract is a reasonable estimate of damage incurred due to breach of contract. Recovery can also be limited to the repair or replacement of the software, in this case the upgrade or modification of the current software version to a Y2000 compliant version.

As long as these types of provisions are negotiated between the parties and are made explicit in the contract, courts are likely to let them stand. However, before entering into such

an agreement you should have the agreement reviewed by competent legal counsel.

Placing similar limitations on product liability claims is much more difficult than the contract disclaimers for fraud and misrepresentation discussed above. However, these claims are also much more difficult for the plaintiff to prove and, hence, recovery is difficult. If you believe that you are facing exposure for potential tort liability, it is best to take immediate remedial measures in order to correct any perceived defects in the software due to non-Y2000 compliance.

For vendors, the road to the year 2000 is fraught with danger and potential liability. Attention to the niceties of copyright ownership and appropriate contracting and sales activities can make the transition much smoother. There is a tremendous business opportunity presented by the Y2000 problem. However, the potential for liability, if not addressed early, looms just as large.

• Buyers

For software purchasers, you may be wondering now what you can do to protect your rights if you have made non-Y2000 compliant software purchases. There are effective ways in which customers can protect themselves from the above limitations of liability and recover damages which may result from defective software.

Many of the problems faced by computer software purchasers can be avoided by diligent negotiation and attention to contract drafting. Remember, you are the customer. In many instances a vendor will be willing to modify their standard contract (even if it is on a pre-printed form) in order to get your business. If you are paying for a software system which should reasonably take you beyond the year 2000, you are entitled to assurance that you get what you pay for.

In the event that the software vendor attempts to limit all warranties express or implied in the contract, it is advisable to require the software vendor to provide some warranties stating that the software will meet some objectively determined performance criteria. Therefore, before entering into a software purchase contract, it is helpful to determine exactly what your expectations of the software's performance will be and make every attempt possible to include these terms in the contract.

Furthermore, if you are relying on any particular representations outside of the contract as the basis for your purchase, you should have those included by reference in the contract as well. For example, if you are relying on a copy of the user's manual to determine whether the software will perform in accordance with your needs, a reference in the contract incorporating the manual will serve as a warranty from the vendor that the software will perform as depicted in the manual.

Reference to external representations and documents can also serve as the basis for a claim for fraud, misrepresentation, or negligent design.

The purchaser of software should also make some provision for warranting future performance. This means that a purchaser of software should ensure it has a reasonable period in which to test and review the software in order to determine that such software conforms to the user's expectations and the representations provided in the contract. A test period should be provided to determine whether the software is Y2000 compliant. This is necessary because, even though the vendor may warrant that the system is Y2000 compliant and would therefore be liable under the contract if the system failed with the turn of the century, you can protect yourself from the disruption of your business if you are able to assess any deficiencies prior to that date.

If you would like further information about specific legal issues concerning the Y2000 problem or copyright regulations contact Mary

Jane Saunders or Courtney Bailey in the Washington, DC offices of Arter & Hadden, (202) 775-7100

This Research Bulletin is issued as part of INPUT's Systems Integration and Professional Services Program. If you have any questions or comments regarding this bulletin, please contact your local INPUT organization or Charles Billingsley at INPUT, 1921 Gallows Road, Suite 250, Vienna, VA 22182-3900, (703) 847-6870, FAX (703) 847-6872, E-mail: cbillingsley@input.com.

Users Are Not Yet Ready for Y2000

Introduction

Most organizations claim to be preparing for the Y2000 issue but few have progressed beyond the stage of appointing someone to be responsible for the initial audit.

Few users have produced detailed estimate of the work to be performed, and of the cost and source of skills and funding to allow the work to be completed in time.

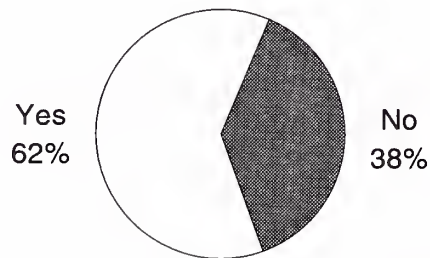
As part of an ongoing review of the market for software and services related to Y2000,

INPUT conducted interviews with 206 executives in U.S. corporation during July 1996.

This bulletin summarizes the findings of this survey and will help vendors fine tune their approaches to marketing and sales of application software, tools and services.

An electronic version of the presentation slides included in this bulletin is available. The presentation, plus additional details of the main Y2000 study may be requested by sending an email to Y2000@input.com.

Has your company examined the effect of the year change?



Percentage of respondents

206 Respondents

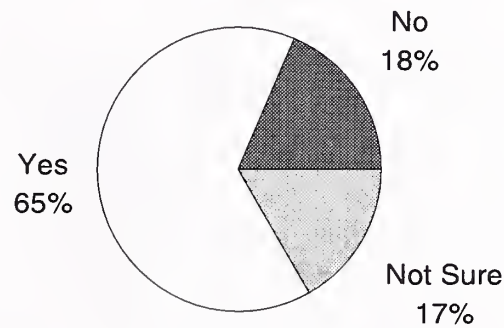
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- The 38% who have not examined the impact of Y2000 offer an excellent opportunity for software and services vendors - this is one issue that cannot be avoided!
- Although 62% have considered the impact only 12% have completed a Y2000 audit (i.e. they know what needs to be changed).
- This lack of preparation indicates there is still time and opportunity for vendors to market their Y2000 products and services.

The initial survey included responses from 206 companies.

However, 27 of the respondents had neither considered the impact of Y2000 nor have they plans to do anything about the issue. As such, it is felt that their responses to subsequent questions are skewed and they have not been included in other charts

Is a full audit planned to assess Y2000 impact?



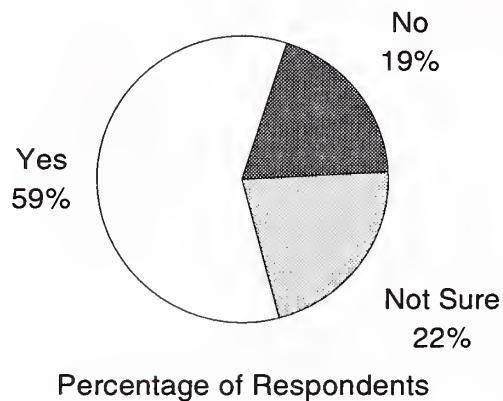
Percentage of respondents

179 Respondents

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- How many of your customers have decided not to have a full audit? Vendors should take the initiative and offer to manage the customer audit - otherwise time will run out
- Are their home-grown systems going to feed invalid data into your applications? Y2000 issues may arise not only because of errors in applications that run within a company but also because of incompatibility of data being fed from external applications (those at other businesses). As the use of electronic commerce increases then so does the risk of Y2000-related problems within intercompany transaction systems.

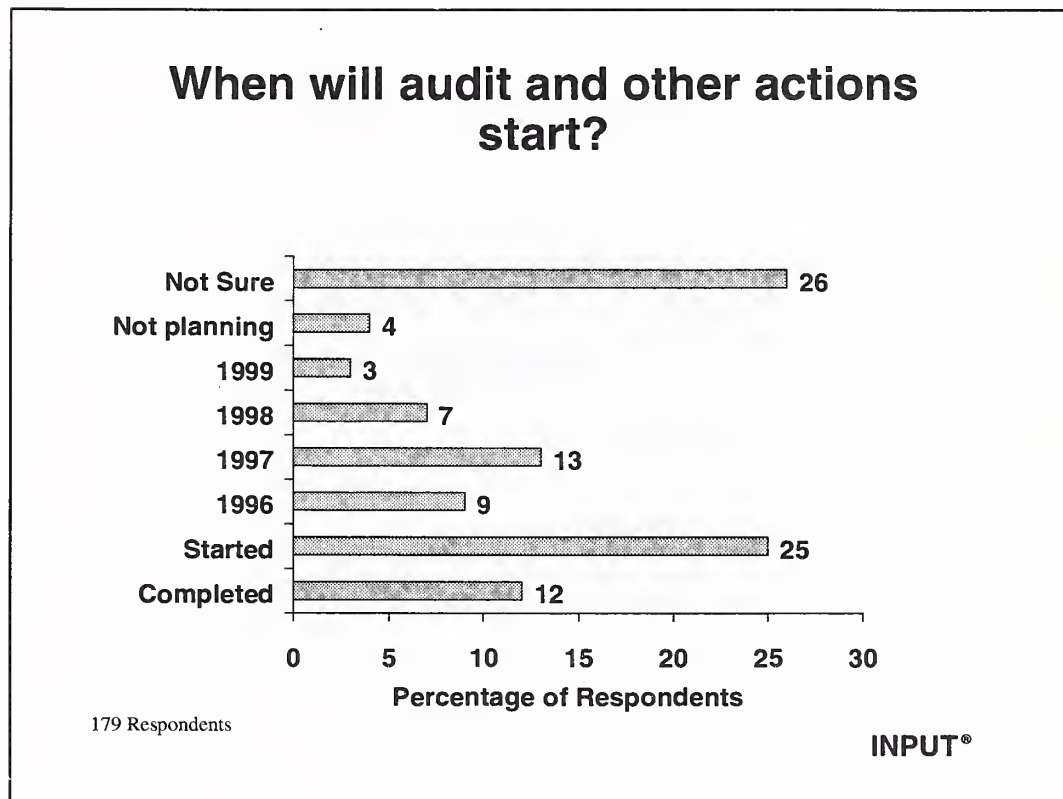
Has someone been assigned audit responsibility?



179 Respondents

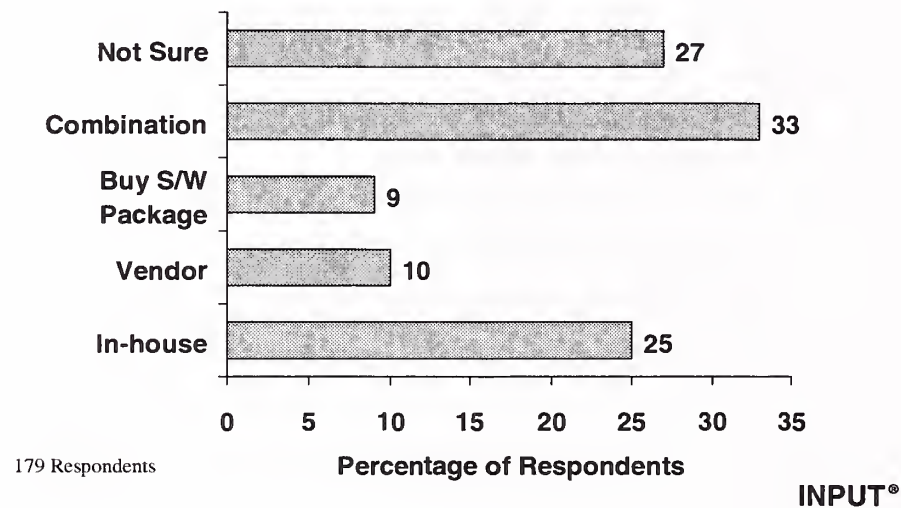
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- 40% of the respondents who have started down the Y2000 Readiness path, or who plan to do so, have not yet placed anyone in charge of the activity. Vendors need to push for this position to be filled and to check with each of their customers as to their status.
- The issue of making someone responsible is not limited to those companies who already have their plans in place. Comparison with the previous chart indicates that some companies who plan to do an audit have not yet decided who will be responsible for the activity.



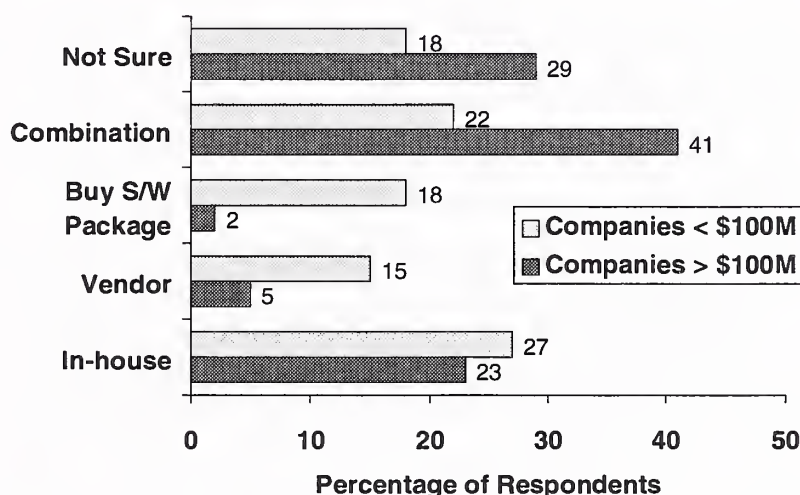
- Less than half of the companies have started the audit - they will need help to be finished all the subsequent activities in time.
- There are already reports of some vendors of staff augmentation services being short of COBOL programming expertise after 1996.
- Vendors need to consider the phasing of services over time i.e. the demand for audit, planning, modification and implementation will not all occur at the same time. Will the staff be available when required?

How do you plan to implement the changes? - All companies



- There is a diversity of approach. Given the few companies who have completed their audit, it is not practical for them to stipulate how they will fix the problem as its scope is not yet determined!
- It is expected that the percentage of in-house solutions will be less than this chart indicates once users understand that other projects will be severely impacted if internal staff focus on the Y2000 issue.

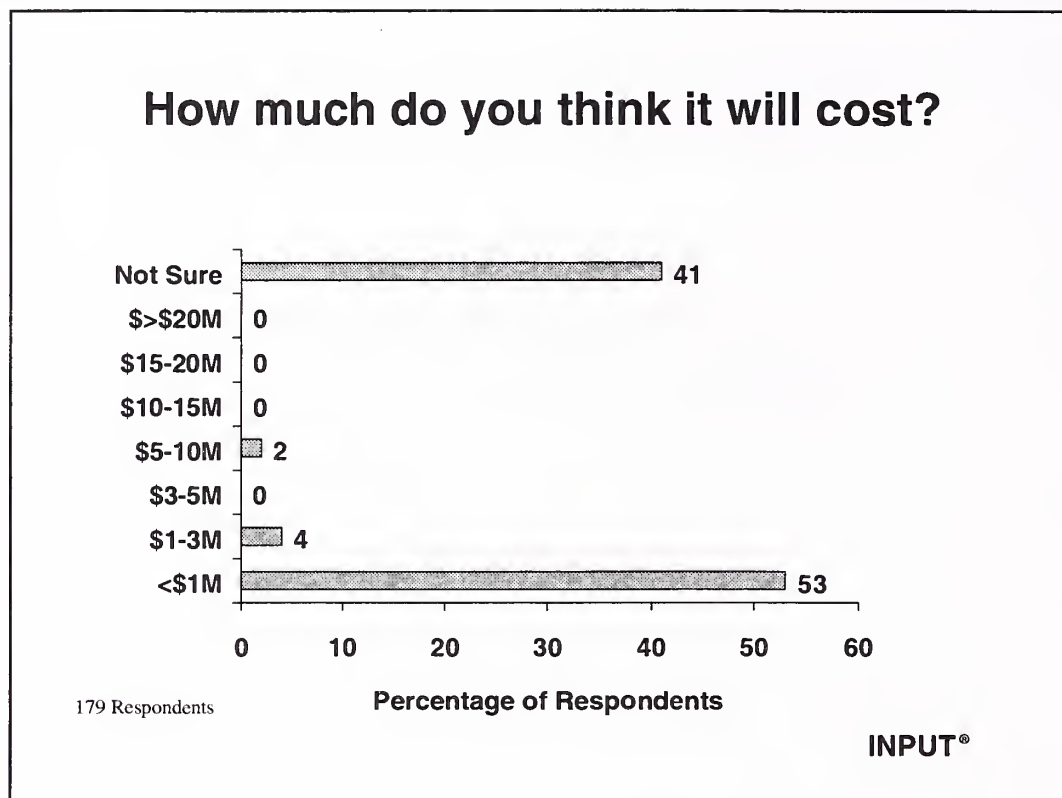
How do you plan to implement the changes? - Split by revenue



179 Respondents

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- According to this chart companies with revenue of less than \$100M are better prospects than larger companies. However, the following should also be considered:
 1. The number of companies with revenues of less than \$100M in the US is far greater than the number of companies with revenues of over \$100M. There are fewer than 2500 companies in the US with annual revenues over \$100M
 2. The size of services contracts may be correspondingly smaller in smaller companies
 3. The larger companies are more likely to use a combination of in house expertise, service vendors and new software packages.
- As Y2000 gets closer then the probability of an external vendor being used will increase.



- This indicates the uncertainty due to lack of knowledge of the extent of the problem. How can people determine how much the solution to an undefined problem will cost?
- As only a few, less than 12%, of the respondents have completed their Y2000 audit, then this chart indicates the “wishes” of the respondents rather than a measured amount.
- The average cost estimate for the respondents is just over \$1M

Recommendations for Vendors

- **Encourage clients to prepare for Y2000**
- **Ensure your staffing plans are in place**
- **Consider alliances with vendors of complementary products and services**
- **Look for associated opportunities**
- **Remember to schedule a Y2000 audit for your own company**

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This Research Bulletin is issued as part of INPUT's U.S. Information Services Market Analysis Program. If you have questions or comments on this bulletin, please call Wilson Haddow (wh@input.com) at INPUT, 1881 Landings Drive, Mountain View, CA 94043-0848, (415) 528-6311.

