STUDY

OF

ADVANCED APPLICATIONS

By

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This report is an extension of the previously distributed
"Summary of Results of the GUIDE/IBM Study of Advanced
Applications" dated 12/70. The additions are primarily
in the Preface, Section IV., and Section VI.

INTERNATIONAL BUSINESS MACHINES CORPORATION

Data Processing Division

Advanced Systems Planning

CONTENTS

PREFACE

Sponsorship And Distribution

The study reported was sponsored jointly by the User Strategy
Evaluation Committee (USEC) of GUIDE International and by the
Advanced Systems Planning Department, Data Processing Division
of International Business Machines Corporation.

The results of the study in the form of a summary have been
distributed to all respondents, to a distribution list within
IBM, and through USEC to the user community. This report is
an extension of the summary and contains additional analysis
particularly related to data processing capabilities. Because of
the added analysis, the report has been classified IBM CONFIDENTIAL
and will be distributed only within IBM.

How To Read The Report

For ease of use, the report has been organized into levels of
increasing detail. Most readers will find it unnecessary to
read the whole report in order to satisfy their interests. Below
are suggested reading plans for various classes of readers:

- Added Sections For Those Who Have Read The Summary   Page

    Read: •   The Detailed Capability Results   IV.1
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- A General Overview Of The Study And Results   Page

    Read: •   The Introduction   I.1
            •   The General Results   II.1
            •   Any Scenarios which are of particular
                 interest   III.?
            •   Any Capabilities which are of particular
                 interest   IV.?

- Specific Data Processing Areas Of Interest   Page

    Read: •   The Introduction   I.1
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            •   The Scenario, Area Forecasts and Detailed
                 Data Listings for the areas of interest   III.1
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            •   The Excluded Applications for the areas of
                 interest as listed in the Appendix   A.1

. <u>Evaluation and Verification of the Report</u>   <u>Page</u>

    Read: . The Introduction   I.1
              . The General Results   II.1
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              . Such of the Scenarios and Data Printouts
                 as are of interest   III.?
              . Such of the Capabilities as **are** of interest   IV.?

. <u>An Understanding of the Delphi Technique</u>   <u>Page</u>

    Read: . The Introduction   I.1
              . The Detailed Description of the Study   V.1
              . The Data Analysis Section   VI.1
              . Enough of the General and Detailed Results
                 to serve as an example   II,III &
                                                           IV

I. INTRODUCTION

AIMS OF THE STUDY

The growth and development of data processing equipment and the diverse uses that it has been put to has been one of the phenomenons of the 1960's. There is much reason to believe that this will continue into the 1970's and beyond. Ideally, technological decisions and the development of data processing equipment should be predicated on a knowledge of the future needs of the end users. Those needs are in turn based on future applications of data processing, when they can be economically, politically, and socially justified, and how the applications will be implemented. To determine the needs, the planner must look far into the future of a dynamic field. The traditional approach of trend projection solves some of the forecaster's problems, but he faces two risks with this approach. Future unpredicted events may cause a radical change in a trend or there may be entirely new areas for which no trend exists.

In situations like this the usual solution is to turn to an expert for advice or if the subject is complex and involves obscure interrelationships between many disciplines, then a consensus of experts is sought. This study utilizes the Delphi Technique, an advanced method of obtaining such a consensus of experts, to investigate the future course of the use of data processing.

The general aims of the study were twofold:

-- To determine to what uses data processing will be put in the future and when those uses will be generally in existence.

-- To determine what data processing capabilities are required, when in the future they will be needed, and if applicable, what magnitudes of the capabilities will be required.

The specific approach was to view the future from the viewpoint of the user of data processing, focusing on what he intends to do, when he intends to do it, and what is required to make it viable, independent of technological constraints.

THE DELPHI TECHNIQUE

The Delphi Technique was developed by the RAND Corporation in an effort to obtain consensus predictions of future events from a

panel of experts without encountering certain adverse psychological factors associated with open discussions and conferences. Those factors include: spurious influence by the more prestigious members of the group, reluctance to retreat from a publicly stated position, and bandwagon effect of majority opinion.

The technique consists of an iterative series of questionnaires which allow experts to anonymously interchange opinions through an intermediary. The intermediary compiles the opinions and provides them as controlled feedback in subsequent questionnaires. Experience has shown that this process causes a convergence of opinions or at least identifies schools of thought and reasons for nonconvergence.

It should be recognized that, while the Delphi Technique produces consensus judgments about the future, those judgments should not be considered to be "the truth about the future." The future will contain events that are totally unexpected today. Furthermore, the mere existence of the forecast may influence the future. Forecasts which predict undesirable results tend to be self-defeating, while forecasts with desirable results tend to be self-fulfilling. Thus, the current forecasts which deal with the extent to which we will pollute our environment will probably not come true because of all the effort exerted to avoid the predictions. In this sense, the Delphi Technique is not only a tool for predicting the future, but also a tool for shaping the future; and that after all is "the name of the game."

THE STUDY

The panel of respondents was selected from the companies and organizations that are members of the GUIDE users group and from throughout the IBM Corporation. Among the criteria for selection were:

- An interest in the future of data processing
- Acknowledged reputation
- Responsible position in their organization
- Breadth of knowledge in their organization's area
- Contribution to the field under investigation
- Years of experience
- Educational background

An effort was made to insure that all facets of data processing use were represented and to avoid concentrations in any one area or organization. An analysis of the resultant group and a list of the respondents who allowed us to include their names is included in a later section of the report.

The study consisted of a series of four questionnaires during the course of which the respondents were asked to:

- Develop a representative list of new applications of data processing which are not normal extensions of existing applications.

- Assign a measure of value to these applications.

- Forecast the date of implementation.

- Determine non-data processing factors whose occurrence or non-occurrence would cause the implementation date to be accelerated or retarded.

- Associate with each application critical data processing capabilities needed to make the application viable.

- Wherever possible, assign orders of magnitude to quantifiable requirements.

- Provide considerations and reasons for any strongly held positions or for any response not in general agreement with the rest of the panel.

In addition, for purposes of analysis, respondents were asked to evaluate their own degree of expertise relative to each application.

The study identified 134 future applications of which 108 of the more important ones were investigated through the full iterative process of the study. In the course of the investigation, 77 unique data processing capabilities were cited. Since many of the capabilities were required by more than one application, a total of 368 application-capability relationships were evaluated.

A detailed description of the study procedure with samples of questionnaires will be covered later in Section V.

II. GENERAL RESULTS

From the final results of the study it is possible to develop
a number of subjective views of the future of data processing.
They are:

- An overview of the uses of data processing in 1985
- An identification of general trends in applications
- A view of pervasive capabilities required by the
  applications
- Detailed views of application areas (See Section III)

Although these are subjective representations of the future,
they can be justified by the nature of the data produced by
the Delphi Technique. In general, there is a high level of
confidence associated with the quantitative data (dates,
magnitudes, etc.) because of the controlled interchange and
iteration of the technique. In addition, since the inter-
change is recorded, a large body of subjective data giving
the reasons and considerations associated with the responses
is collected. This can be used directly by the investigator
without having to derive it from the raw data.

THE 1985 WORLD OF DATA PROCESSING

By the year 1985 the use of computers will have reached into
almost all areas of business, governmental, and private life.
Most everyone will feel they enjoy the benefit of living in
the age of the computer. A closer look discloses that it is
also the age of communications, for it will be the marriage
of computers to widespread, high speed switched communication
networks that will have brought the computer into such perva-
sive use.

Home terminals will have passed the point at which one family
in a hundred has one installed. These terminals will be ini-
tially installed to provide custom tailored entertainment
and news. By 1985, with switching capability added to the
CATV cables, a multitude of services will be offered to the
terminal owner by entrepreneurs. The services include: home
computer assisted instruction, control of home appliances,
monitoring burglar and fire alarms, home banking and financial
services, customized periodical printouts, and access to informa-
tion data banks. The result will be an enhanced life style.

Businesses will have also taken advantage of data communication
networks. Many day-to-day transactions will be effected by
direct communication between computers. Businesses will pur-
chase access to information maintained centrally by information
utilities where the size or volatility of the information makes

it impractical for the individual business to maintain it them-
selves. Examples include: patent searches, freight rates,
automobile and driver registration files and many others.
Industry associations will have taken over monitoring and co-
ordination of business operations affecting multiple membei :
of an industry. For example, intermodal freight shipments wi]l
be centrally scheduled and tracked. Reservation systems will
be interconnected so that reservations for travel, accommodations,
and entertainment can be made through one intermediary. In
general, day-to-day business transactions will be facilitated.

Computer/communication systems will have moved into the business
office. Many secretarial services will be done through terminals
which provide editing, hyphenation, proofreading and also serve
as input to electronic filing and electronic intra-office mail
services. With the advent of the home terminal, white collar
workers and executives will find it possible to accomplish their
work using the terminal as a home work center. All of the
necessary work materials, references, and services as well as
conference type calls could be made available at the home.
Routine office functions will thus be facilitated.

Point of transaction terminals to service individual department
stores, supermarkets, etc. will have become commonplace. By
1985 the additional step of interconnecting these terminals to a
central facility for coordination and switching to financial
institutions will have brought the "Cashless/Checkless Society"
into reality in 20 percent of the metropolitan areas. A
consumer would be able to effect a purchase by presenting his
identification card at the point of sale. His demand deposit
account balances or lines of credit are checked, debited, and
the store's accounts credited while he makes his purchase no
matter how many different financial institutions are involved.
The result is additional services for the consumer.

Automation will have replaced many of the routine tedious tasks
or tasks demanding great precision and accuracy in industry.
Robots having the sensing and manipulatory capabilities of humans
will be in use in factories. These robots will have the addi-
tional asset of being on line to the factory computer which can
change their functions on demand. In fact some plants will have
become wholly automated running essentially without human inter-
vention. These plants will be highly adaptable, capable of
changing their products and product mixes in response to actual
and forecasted demands. Such plants may even accept orders for
products requiring new design, for by 1985 computer systems
capable of creative engineering design will be in existence.
These systems drawing on engineering practice data, design rules,
and previous designs will create new products based on customer
requirements. The systems will carry the design results through
to produce manufacturing specifications and procedures including
instructions for automated machinery. Human drudgery will have
been partially relieved.

Design is not the only area where computer creativity will exist.
Today's much discussed Management Information Systems will have
become a reality but with the added capabilities of creating
strategic plans from external and internal environmental data
and models of enterprise and economy. Scientific research will
be assisted by computer systems which monitor research plans
and results, and develop hypothesis of underlying relations and
principles. Thus, the power of men's minds will have been
extended.

The computer's power and capacity will have been turned to solving
many social ills facing the nation and the world. Urban and
suburban planning will be automated to suggest the best mixes
of people, jobs, recreation and aesthetic qualities. Efforts
will be made to protect the ecology through monitoring, prediction,
and control of pollution sources and new product development.
Traffic problems and accidents will have been alleviated by
traffic control, dynamically scheduled mass transit, and auto-
mobiles equipped with collision avoidance. Nationwide job banks
will attack unemployment and welfare will be centrally coordina-
ted to assure fair coverage for all who require it. The end
result is a better world in which to live in.

In summary, future applications will have progressed beyond the
normal extensions of today's applications to encompass most
areas of business, governmental and even areas which improve
the quality of life.

APPLICATION TRENDS

Three major new trends were identified in the forecasts of
future applications:

    . Tactical and Strategic Planning
    . The use of the Computer to Solve Social Ills and
      Problems
    . Home Terminals

In addition, an on-going trend of penetration of data processing
into new areas was discerned.

1.   Tactical and Strategic Planning

    Historically data processing has grown from the
    subapplications (sorting, collating, tabulating,
    etc.) of unit record days through individual
    applications (payroll, inventory control, accounts
    receivable, etc.) of the first computer systems to
    the integrated operational systems being installed
    today to take care of the day-to-day operations of
    a business.

The panel indicates that during the period 1975-1980
computer systems will begin to play a significant role
in first assisting and then completing tactical and
strategic planning via models of operations, enter-
prises, the economy, political regions and even whole
countries.

2. The Use of the Computer to Solve Social Ills and Problems

Many of the applications rated most highly by the
panel were associated with the utilization of computers
to attack social ills and problems. Six applications
focused on pollution prevention and protection of the
ecology. Public safety was addressed through appli-
cations to minimize aircraft and automobile accidents,
and to provide better crime protection through rapid
information interchange. Unemployment has generated
the need for nationwide job banks to match jobs to
job seekers and to level pockets of unemployment.
Urban and suburban and regional planners will have
data banks of land usage and models to plan the best
use of land resources balancing such factors as:
labor and job mix, transportation costs, tax base,
recreational facilities, school requirements, environ-
ment pollution, aesthetic qualities, etc.

Most of these will come about either as government
services or via government subsidy of private enter-
prise.

3. Home Terminals

The widespread advent of Cable Area Television (CATV)
in 1980-1985 will provide high speed, high capacity
two-way communication channels into the home. The
initial impetus will come from the entertainment
field as extended television offerings. The communi-
cation capability will be exploited to allow program
transmission on individual request. Once the communi-
cation capability exists and is incorporated into a
switched network, entrepreneurs will provide a wide-
range of services to the home consumer; these will
include: home education via Computer Assisted
Instruction (CAI), selective printout of newspaper or
magazine articles, home shopping services, automatic
meter readings, burglar and fire alarm monitoring, and
the use of the terminal as a home work station.

The home terminal would become a modular device priced
within the reach of the majority of families. Basically
it would be available as a television-type device with
simple keyboard or push button input. Additional capa-
bilities could be added to provide hard copy output,
light pen input, sensor inputs and analog and digital
control output.

4. New Areas of Use of Data Processing

   In the 1975-85 time period several industries will
   experience their first significant use of data pro-
   cessing. This will come about either because of the
   emergence of new industries, or improved cost justi-
   fication or data processing capabilities which open
   new areas. The following is a partial list identified
   by the panelists:

   Agriculture
   Oceanography
   Information Retrieval Data Banks
   Labor Negotiations
   Information Utilities

MAJOR REQUIRED CAPABILITIES

Many of the forecasted data processing capabilities were found
to be pervasive over a number of applications. The major
capabilities can be categorized as follows:

1. Data Base

   The need for large data bases was recognized by the group
   with 64 out of the 108 applications requiring it. The size
   data base required ranged from ten billion to a trillion
   bytes.

   A second aspect of data bases was identified; that is, the
   necessity to provide the functions to build, maintain,
   and use large data bases with large numbers of access
   for reading and updating. These functions would include:

   .   Data Independence - making it possible to
       change the data base organization without
       changing the programs.

   .   Dynamic Reorganization - the ability to
       reorganize all or part of the data base
       dynamically to provide better overall
       response for a particular application.

- Data Base Protection - protection of the
  data base against inadvertent or malicious
  alteration or destruction.

- Dynamic Recovery - the ability to dynamically
  correct errors or loss of the data base.

- Data Base Security - the ability to monitor
  and control access to the data base so as
  to permit only authorized access to the data.

2. Communication Network Systems

Almost half (52) of the applications suggested require
large numbers of terminals with many requiring the
interconnection of computer systems into networks for
information interchange. Simple information retrieval
utilities providing remote access to voluminous or
volatile data can involve computer-to-computer data
requests. The "Checkless/Cashless Society" requires
hundreds of thousands of terminals and hundreds of
computer systems interconnected. One terminal purchase
might require access to three or four systems to check
lines of credit, make the necessary loan to the buyer,
debit his account, and credit the seller's account all
while the buyer is standing at the point of sale
terminal.

3. Sensing and Controlling

Sensing of environments, the progress of operations,
and in some cases providing closed loop control was
involved in 29 out of the 108 applications. These ranged
from relatively small systems to diagnose car repairs to
worldwide weather and pollution monitoring networks for
input into weather and pollution forecasting systems.
Control systems ranged from automated warehouses, which
are beginning to be installed now, to robots capable of
performing by 1985 many of the sensing and manipulating
operations of a human. The scope included self-contained
systems to take control of a car to prevent a collision to
large systems for control of takeoff and landings at a
major metropolitan airport.

4. Software

The types of applications forecasted require that the
logic directing function will have to take on new
levels of capabilities resembling functions that have
been thought to be reserved for human intelligence.

Programs will be asked to create original work, such as new engineering designs. To accomplish this, systems will make use of such capabilities as:

- Multi-Attribute Pattern Matching -- comparing patterns of variables and selecting ones that most nearly match.

- Discovery Systems -- systems capable of selective browsing through text and data arrays leading to the formulation of underlying principles and relationships.

One major use of these kinds of program capabilities will be to relieve the programming load itself. Many of the complex systems forecasted will require the automatic generation of programs and data base organizations.

III. DETAILED APPLICATION RESULTS

The applications forecasted by the panelists can be grouped
into areas of data processing uses. Most of the areas identify
applications unique to an industry, others represent identifiable
areas which appear in many industries, while some new applica-
tions are identified with the consumer. Listed below are the
application groupings:

AGRICULTURE
AIRLINES
BUSINESS ASSISTANCE
COMPUTER ASSISTED RESEARCH
DISTRIBUTION & RETAIL
ECOLOGICAL
EDUCATION
FINANCIAL & INSURANCE
FREIGHT TRANSPORTATION
GOVERNMENT SERVICES
HOME TERMINALS
INFORMATION SYSTEMS
INFORMATION UTILITIES
JUDICIAL & LEGISLATIVE
MANUFACTURING & PROCESS
MEDIA
MEDICAL
OFFICE ASSISTANCE
PUBLIC AND PRIVATE TRANSIT
UTILITIES

The detailed results of the study are organized into the
application groupings. In this way the reader may review
only those groups for which he has a particular interest.
Each application grouping contains a scenario derived from the
applications, data, comments and reasons provided by the re-
spondents, and two detailed data presentations.

The first presentation lists the applications included in the grouping in chronological sequence. Figure 3.1 is a sample of one application "Inflight Monitoring and Diagnostics of Aircraft" in the Airlines grouping. The distribution of respondent date forecasts are illustrated by a percentage histogram. i.e., 65.5% of the respondents forecasted an implementation date in 1975-1977.

	AIRLINES						
TITLE	1970-71	72-74	75-77	78-80	81-85	*LATER*	*NE*

MONITORING AND *'S OF AIRCRAFT*

100-							
75-							
50-							
• 25-							
0-							
P.C.	0.0	0.0	65.5	31.0	1.7	1.7	0.0

Figure 3.1

In addition, the application values are presented in terms of: Impact on Society, Profitability to the Implementor, Usefulness to the Public, and Will Not be Implemented. Figure 3.2 indicates how the application values would appear for the above application.

ER	*IMPACT ON SOCIETY*	*PROFITABLE TO IMPLEMENTOR*	*USEFUL TO PUBLIC*	*WILL NOT BE IMPLEMENTED*
	1.98	3.07	2.62	⁻0.19

Figure 3.2

The value numbers are derived by assigning weights to the response categories and computing averages. The weights assigned were:

	Major	Impact on Society Significant	Little	No
Weight	5	3	1	0

	Very	Profitability to Implementor Moderate	Marginal
Weight	5	3	1

	Very	Usefulness to Public Moderate	Marginal
Weight	5	3	1

	Will Not be Implemented
Weight	-3

Thus the highest possible rating would be five.

The second data presentation consists of a detail sheet per application containing the complete description of the applications, capabilities and accelerating and retarding factors as evaluated by the respondents. Final response counts are listed for all areas addressed with counts for those respondents who identified themselves as experts listed separately.

In the controlled interchange between respondents, response patterns were indicated by consensuses. For the study purposes consensus was defined as the interquartile range i.e., the range containing 50 percent of the respondents with 25 percent of the respondents above and 25 percent below. On the detail presentations consensuses are represented by horizontal dashed lines with verticals at each end. In addition, the median response (50 percent above and 50 percent below) is also shown by a third vertical line between the end verticals.

For required data processing capabilities the respondents were asked to measure the relative magnitude of any quantifiable data relative to the original suggested quantity. This was done by giving them the opportunity to check fields to

III.3

identify whether the quantity was O.K. or should be some
multiple of ten greater or less. In the detail printouts
these responses are identified as shown below:

>10x-   10x-   O.K.   10x+   100x+   1000x+   >1000x+

The first is read as "greater than 10 times less," the second
"10 times less, etc.

AGRICULTURE

By 1981-1985 computers will begin to find direct use in agriculture. The first to take advantage will be large agri-businesses.

For example, in this period five percent of the irrigated farms will use computerized systems to monitor soil moisture content and to automatically regulate frequency and intensity of irrigation in order to maximize quality and quantity of the crops.

The advent of the home terminal in 1980-1985 will put the power of the computer within the reach of the average farmer. One percent of the farmers will subscribe to services capable of recommending agriculture product mixes taking into account consumer requirements, transportation costs, forecasted prices, local environment, etc. Also the service would provide account-ing, inventory control, tax computation and other administrative services necessary to manage a successful farm.

APPLICATION TITLE		1970-71	72-74	75-77	78-80	81-85	LATER	NEVER	IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
AUTOMATIC IRRIGATION CONTROL	100- 75- 50- 25- 0- P.C.	0.0	0.0	0.0	24.5	|-|-| 60.4	11.3	3.8	1.51	2.68	1.98	⁻0.53
AGRICULTURE INFORMATION AND ADMINISTRATION SYSTEM	100- 75- 50- 25- 0- P.C.	0.0	0.0	0.0	7.4	|-|-| 81.5	9.3	1.9	1.72	2.64	2.09	⁻0.47

III.6

APPLICATION DESCRIPTION

Automatic Irrigation Control -- The installation of systems in 5 percent of the irrigated farms to sense the moisture content of the soil and to automatically regulate the frequency and intensity of irrigation required to maximize quality and quantity of crops.

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL |
| | | | | | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | NOT BE |
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	0	20	26	7	12	28	9	6	22	17	10
EXPERT TOTALS	0	2	3	2	1	4	2	1	3	3	1

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	0	13	32	6	2
CONSENSUS					|-|-|		
EXPERT TOTALS	0	0	0	2	3	0	0
CONSENSUS				|--------|-|			

REQUIRED CAPABILITIES

A. Ten-times improvement in sensor equipment.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	31	9	2	2	1	0	3	33	2	0	0	0
CONSENSUS	|--|---------|							|-|-|				
EXPERT TOTALS												
CONSENSUS												

B. Availability of moisture demand model programs from a service organization. $200 per month.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	8	31	3	0	1	0	0	35	2	0	0	0
CONSENSUS	|--|-|							|-|-|				
EXPERT TOTALS												
CONSENSUS												

APPLICATION DESCRIPTION

<u>Agriculture Information And Administration System</u> -- The utilization by 1 percent of the farmers of a system providing terminal access to a data bank of agricultural information and business and management assistance. The system would be capable of recommending agriculture product mixes taking into account food mix requirements, transportation costs, price forecasts, local environment, and ecology that would result in optimum profit production. It would also provide accounting, inventory control and other administrative assistance required to manage a successful farm.

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL |
| | | | | | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | NOT BE |
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	3	20	25	6	13	26	10	7	24	14	9
EXPERT TOTALS	1	4	4	1	3	5	2	2	6	1	0

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	0	4	44	5	1
CONSENSUS					|-|-|		
EXPERT TOTALS	0	0	0	2	7	0	1
CONSENSUS					|-|-|		

REQUIRED CAPABILITIES

A. Massive communication interface <u>10,000 lines</u>.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	13	25	8	0	0	0	13	26	1	0	0	0
CONSENSUS	|----------|-|						|--------|-|					
EXPERT TOTALS	5	2	2	0	0	0	2	4	0	0	0	0
CONSENSUS	|--|----------|						|--------|-|					

B. Voice input and response capability.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	1	12	18	11	6							
CONSENSUS		|----------|---------|										
EXPERT TOTALS	0	2	3	2	2							
CONSENSUS		|--|---------|										

C. Inexpensive television type terminal with keyboard and light pen entry and hard copy output. <u>$25 per month</u>.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	23	16	4	0	3	0	0	35	2	0	0	0
CONSENSUS	|------|-----|							|-|-|				
EXPERT TOTALS	4	3	1	0	1	0	0	5	0	0	0	0
CONSENSUS	|----------|-|							|-|-|				

AIRLINES

Airlines, perhaps more than any other industry, have come to
rely on computers in the main stream of their business. Conse-
quently, they may be more disposed than others to make early
ventures into new application areas.

Automatic ticket vendor systems are already being tested by
airlines. These systems dispense tickets for destinations
designated by pressing a button. Payment is by credit card.
By 1977 at least one airline will have expanded this capability
to include: fare quotation, checking and boarding control,
and will have installed it in all of its airport terminal areas.

Airlines are beginning to let contracts for installation of
computerized baggage control. 1978-80 will find similar
installations at 20 percent of the nation's commercial airports.
One factor that may discourage installation of these two appli-
cations is continued concern about hijacking and bombing and
the difficulty of monitoring unmanned facilities.

Airlines will also move to improve aircraft availability by
installing onboard systems to monitor and diagnose inflight
performance. Malfunctions are read out to the crew and either
stored or telemetered for ground maintenance scheduling and
analysis. Once in the maintenance shop, ground checks will be
accomplished by computer. Twenty percent of the aircraft
will use inflight monitoring by 1977 and 20 percent of the
commercial airlines will have computerized ground diagnostics
by 1980.

AIRLINES

APPLICATION TITLE	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER	IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
IN-FLIGHT MONITORING AND DIAGNOSTICS OF AIRCRAFT								1.98	3.07	2.62	⁻0.19
P.C.	0.0	0.0	65.5	31.0	1.7	1.7	0.0				
AUTOMATED AIRLINE PASSENGER SERVICES SYSTEM								1.58	2.98	2.97	⁻0.14
P.C.	0.0	0.0	55.0	38.3	6.7	0.0	0.0				
AUTOMATED AIRCRAFT DIAGNOSTICS								1.57	3.38	2.76	⁻0.05
P.C.	0.0	0.0	23.7	74.6	1.7	0.0	0.0				
AUTOMATED BAGGAGE CONTROL								1.54	2.95	3.13	⁻0.20
P.C.	0.0	1.7	18.3	70.0	8.3	0.0	1.7				

Automated Aircraft Diagnostics -- The accomplishment by 20 percent of the commercial airlines of their ground checks of aircraft by computerized diagnostic systems.

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL |
| | | | | | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | NOT BE |
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	3	16	36	8	17	41	5	16	26	16	1
EXPERT TOTALS	0	3	10	1	3	11	0	1	8	3	0

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	14	44	1	0	0
CONSENSUS				|-|-|			
EXPERT TOTALS	0	0	2	11	0	0	0
CONSENSUS				|-|-|			

REQUIRED CAPABILITIES

A. Extensive data base of malfunction experience.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	37	13	2	0	0							
CONSENSUS	|--|---------|											
EXPERT TOTALS	9	2	0	0	0							
CONSENSUS	|--|-|											

B. Installation of proper sensing equipment on commercial aircraft.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	46	3	1	0	1							
CONSENSUS	|--|-|											
EXPERT TOTALS	11	0	0	0	0							
CONSENSUS	|--|-|											

APPLICATION DESCRIPTION

Automated Airline Passenger Services System -- The installation by one airline of a system capable of providing fare quotations, issuing tickets, and handling check-in and boarding control. The system would be operated by agents during heavy traffic periods and self-operated by the passenger at other times.

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL NOT BE |
| | | | | | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | |
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	1	21	36	8	14	39	10	20	28	12	3
EXPERT TOTALS	1	11	15	2	8	17	3	10	13	3	2

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	33	23	4	0	0
CONSENSUS			|-|--------|				
EXPERT TOTALS	0	0	17	6	2	0	0
CONSENSUS			|-|--------|				

REQUIRED CAPABILITIES

A. Mass data storage of 10 billion bytes.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	33	15	3	0	0	0	13	36	0	0	0	0
CONSENSUS	|--|---------|						|--------|-|					
EXPERT TOTALS	9	10	1	0	0	0	6	13	0	0	0	0
CONSENSUS	|----------|-|						|--------|-|					

B. Ticket taking terminal would also accept airline credit cards.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	38	13	2	0	0							
CONSENSUS	|--|---------|											
EXPERT TOTALS	15	7	1	0	0							
CONSENSUS	|--|---------|											

C. Public operatable display terminal for fare quotation, ticket sales and fare collection.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	37	14	1	0	0							
CONSENSUS	|--|---------|											
EXPERT TOTALS	14	8	1	0	0							
CONSENSUS	|--|---------|											

APPLICATION DESCRIPTION

Automated Baggage Control -- The availability at 20 percent of the commercial airports of systems for automatic pickup, control, loading, unloading, and delivery of passenger baggage.

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL |
| | | | | | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | NOT BE |
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	2	16	36	5	11	39	8	22	24	9	4
EXPERT TOTALS	2	7	7	2	7	11	0	6	8	2	0

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	1	11	42	5	0	1
CONSENSUS				|-|-|			
EXPERT TOTALS	0	1	4	13	0	0	0
CONSENSUS			|--------|-|				

REQUIRED CAPABILITIES

A. Standardized baggage labeling and label readers.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	41	8	2	0	1							
CONSENSUS	|--|-|											
EXPERT TOTALS	13	2	0	0	1							
CONSENSUS	|--|-|											

B. Ten-fold increase in baggage handling equipment - conveyors, sensing, loaders, etc.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	35	14	1	1	0	0	0	35	7	0	0	0
CONSENSUS	|--|---------|							|-|-|				
EXPERT TOTALS	9	5	0	1	0	0	0	7	5	0	0	0
CONSENSUS	|--|---------|							|-|--------|				

C. Computer controlled baggage sorters for check throughs.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	30	16	4	0	1							
CONSENSUS	|--|---------|											
EXPERT TOTALS	9	6	0	0	1							
CONSENSUS	|--|---------|											

<u>In-Flight Monitoring and Diagnostics of Aircraft</u> -- The utilization of computers to monitor and diagnose the in-flight performance of 20 percent of the commercial aircraft. The performance and environment is compared against a performance profile. Any malfunctions detected are read out to the crew and telemetered to the ground for maintenance scheduling and analysis.

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL NOT BE |
| | | | | | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | |
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	13	19	38	9	21	45	9	21	29	20	5
EXPERT TOTALS	6	10	8	2	9	11	6	11	11	3	0

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	38	18	1	1	0
CONSENSUS			|-|--------|				
EXPERT TOTALS	0	0	15	7	1	0	0
CONSENSUS			|-|--------|				

REQUIRED CAPABILITIES

A.   <u>Ten-fold</u> improvement in current telemetry equipment.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	10	35	5	0	2	1	7	37	0	0	0	0
CONSENSUS		|--|-|						|-|-|				
EXPERT TOTALS	3	15	2	0	1	1	2	13	0	0	0	0
CONSENSUS		|--|-|						|-|-|				

B.   Reduction in size of airborne computer systems by a <u>factor of 10</u>.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	0	32	12	2	5	1	9	35	1	0	0	0
CONSENSUS		|--|---------|						|-|-|				
EXPERT TOTALS	0	13	4	1	2	1	5	12	0	0	0	0
CONSENSUS		|--|--------|					|--------|-|					

Sophisticated general business assistance applications in the areas of tactical and strategic planning are on the verge of widespread implementation. Simulation of cash flow by corporations may become common with 20 percent of the larger companies using it by as early as 1972-74 and certainly no later than 1975-77.

Investment models for predicting security markets, analyzing potential investments and recommending buying and selling will be used by one out of ten of the more sophisticated banks, insurance companies, and investment firms by 1975-77.

In 1978-80 econometric models will be generally available and the majority of large companies will employ simulations of their enterprises to make strategic decisions. The two applications may be coupled so that econometric models provide environmental input into enterprise simulations.

Modeling and simulation efforts by companies will offer an entrepreneural marketing opportunity for groups experienced in model development or with pattern matching and discovery type software systems.

In the 1978-80 period industrial and military organizations will use computer assisted instruction to accomplish 20 percent of their on-the-job training. In the same period 20 percent of the larger corporations will be using the computer in such subjective areas as career path planning, matching personality traits, basic capabilities, ambitions, education, job evaluations, etc. to map career opportunities.

By 1981-85 five percent of the businesses and labor unions will use sophisticated models of economic and business cause and effects for simulation and evaluation of alternative proposals in labor/management negotiations.

BUSINESS ASSISTANCE

APPLICATION TITLE	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER	IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
CASH FLOW SIMULATION								1.40	3.40	1.98	⁻0.10
P.C.	0.0	24.1	65.5	8.6	0.0	1.7	0.0				
INVESTMENT MODELS								1.84	3.60	2.63	0.00
P.C.	0.0	5.3	59.6	31.6	3.5	0.0	0.0				
ECONOMETRIC MODELS OF THE ECONOMY								2.27	2.92	2.24	⁻0.14
P.C.	0.0	0.0	13.8	70.7	15.5	0.0	0.0				
COMPUTER ASSISTED INSTRUCTION - ON THE JOB TRAINING								3.10	3.23	3.28	⁻0.11
P.C.	0.0	1.5	10.6	78.8	6.1	3.0	0.0				
ENTERPRISE SIMULATION								2.09	3.38	1.70	⁻0.30
P.C.	0.0	1.6	14.3	57.1	27.0	0.0	0.0				
CAREER PATH PLANNING								2.37	2.35	2.34	⁻0.24
P.C.	0.0	0.0	4.9	47.5	26.2	14.8	6.6				
COMPUTER-ASSISTED LABOR/MANAGEMENT NEGOTIATIONS								2.29	2.38	2.57	⁻0.48
P.C.	0.0	0.0	0.0	26.4	50.9	13.2	9.4				

III.16

Career Path Planning -- The ulitization by 20 of the Fortune 500 Companies of a computerized system for matching personality traits, basic capabilities, ambitions, education and training as they relate to job opportunities. This would require a much more objective view of "career path" planning than is now being done by most major corporations.

IMPACT AND VALUE

	IMPACT ON SOCIETY				REASONS FOR IMPLEMENTATION						WILL NOT BE IMPLEMENTED
					PROFITABLE TO IMPLEMENTOR			USEFUL TO PUBLIC			
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	
GROUP TOTALS	7	30	22	2	10	25	21	11	24	18	5
EXPERT TOTALS	7	13	11	0	5	14	9	6	13	8	2

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	3	29	16	9	4
CONSENSUS				|-|--------|			
EXPERT TOTALS	0	0	2	11	10	4	1
CONSENSUS				|--------|-|			

REQUIRED CAPABILITIES

A. Multi-attribute pattern matching.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	34	10	5	1	1							
CONSENSUS	|--|---------|											
EXPERT TOTALS	16	5	4	0	1							
CONSENSUS	|--|---------|											

B. Input language for description of traits, ambitions, capabilities, etc.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	35	12	4	1	0							
CONSENSUS	|--|---------|											
EXPERT TOTALS	15	7	3	1	0							
CONSENSUS	|--|---------|											

Cash Flow Simulation -- The utilization of 20 percent of the Fortune 500 Companies of a simulation of their corporation cash flow.

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL NOT BE |
| | | | | | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | |
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	0	16	39	6	21	33	7	3	27	27	2
EXPERT TOTALS	0	10	18	4	13	18	1	3	14	13	1

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	14	38	5	0	1	0
CONSENSUS			|-|-|				
EXPERT TOTALS	0	6	20	2	0	1	0
CONSENSUS			|-|-|				

REQUIRED CAPABILITIES

A. Ten-times improvement in simulation techniques.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	10	26	13	0	0	0	8	31	1	0	0	0
CONSENSUS		|--|---------|						|-|-|				
EXPERT TOTALS	6	10	9	0	0	0	5	11	0	0	0	0
CONSENSUS		|--|---------|					|--------|-|					

B. Model development service.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	8	28	10	3	0							
CONSENSUS		|--|---------|										
EXPERT TOTALS	7	11	6	1	0							
CONSENSUS	|----------|---------|											

C. Interactive terminal system with complex search and interactive pattern matching for use in building, evaluating and optimizing the model.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	10	33	7	1	0							
CONSENSUS		|--|-|										
EXPERT TOTALS	7	13	5	0	0							
CONSENSUS	|----------|-|											

APPLICATION DESCRIPTION

Computer Assisted Instruction - On the Job Training -- The replacement of 20 percent of on-the-job training hours in industrial and military organization by computer assisted instruction.

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL NOT BE IMPLEMENTED |
| | | | | | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | |
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	
GROUP TOTALS	21	43	17	0	27	40	7	34	29	9	3
EXPERT TOTALS	3	8	2	0	4	8	0	5	7	0	0

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	1	7	52	4	2	0
CONSENSUS				|-|-|			
EXPERT TOTALS	0	1	1	10	1	0	0
CONSENSUS				|-|-|			

ACCELERATING AND RETARDING FACTORS

A. Successful utilization in 10 large corporations without union objection.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	19	30	8	0	7	22	17	1	0	1
EXPERT TOTALS	4	4	3	0	1	4	3	0	0	1

B. Federal subsidy.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	18	31	6	0	7	14	12	3	4	2
EXPERT TOTALS	5	6	0	0	3	2	1	0	2	0

REQUIRED CAPABILITIES

A. Course preparation language to reduce the preparation cost by a factor of 5 over today's CAI systems.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	33	17	3	1	1	0	6	41	4	0	0	0
CONSENSUS	|--|---------|							|-|-|				
EXPERT TOTALS	6	2	1	0	1	0	0	8	2	0	0	0
CONSENSUS	|--|---------|							|-|-|				

B. Terminal with display, full keyboard, light pen function keyboard, and video/audio output $200 per month.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	32	21	1	0	1	1	2	47	0	0	0	0
CONSENSUS	|--|---------|							|-|-|				
EXPERT TOTALS	5	4	0	0	1	0	1	8	0	0	0	0
CONSENSUS	|------|-----|							|-|-|				

Computer-Assisted Labor/Management Negotiations -- The availabilities in 5 percent of the labor/management negotiations of models of cause and effect that would enable the parties and/or arbitrators to evaluate the effect of various alternative proposals.

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL |
| | | | | | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | NOT BE |
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	8	27	23	2	9	30	15	15	24	15	10
EXPERT TOTALS	2	8	8	0	2	11	4	4	7	5	0

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	0	14	27	7	5
CONSENSUS				|--------|-|			
EXPERT TOTALS	0	0	0	6	10	1	0
CONSENSUS				|--------|-|			

REQUIRED CAPABILITIES

A. Search engine 10 times today's capabilities.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	13	20	8	1	3	1	2	36	2	1	0	0
CONSENSUS	|----------|---------|							|-|-|				
EXPERT TOTALS	4	6	1	0	1	0	1	8	1	1	0	0
CONSENSUS	|----------|-|							|-|-|				

B. Mass storage of 100 billion bytes.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	11	24	9	2	1	4	31	6	1	0	0	0
CONSENSUS	|--|---------|						|-|-|					
EXPERT TOTALS	4	7	2	0	0	2	6	1	1	0	0	0
CONSENSUS	|----------|-|						|-|-|					

Econometric Models of the Economy -- The utilization by 20 percent of the large corporations, large banks, and government agencies of econometric models of the economy to predict business growth, wages, and inflation for guidance in business planning and fiscal and monetary policy decisions. The models could provide direct input of external environment to enterprise simulation.

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL NOT BE IMPLEMENTED |
| | | | | | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | |
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	
GROUP TOTALS	10	22	27	2	14	34	12	10	23	22	3
EXPERT TOTALS	4	14	15	1	10	18	6	6	12	12	2

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	8	41	9	0	0
CONSENSUS				|-|-|			
EXPERT TOTALS	0	0	6	21	5	0	0
CONSENSUS				|-|-|			

REQUIRED CAPABILITIES

A. Interactive terminal system with complex search and interactive pattern matching for use in building, evaluating, and optimizing the model.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	12	31	2	3	1							
CONSENSUS		|--|-|										
EXPERT TOTALS	7	18	1	1	1							
CONSENSUS		|---|-|										

B. Deterministic models.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	37	11	1	0	1							
CONSENSUS	|--|---------|											
EXPERT TOTALS	19	8	0	0	1							
CONSENSUS	|--|---------|											

C. Model development service.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	8	35	4	1	1							
CONSENSUS		|--|-|										
EXPERT TOTALS	5	20	2	0	1							
CONSENSUS		|--|-|										

D. Data banks of economic factors available as input.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×-
GROUP TOTALS	46	2	1	0	0							
CONSENSUS	|--|-|											
EXPERT TOTALS	26	1	1	0	0							
CONSENSUS	|--|-|											

APPLICATION DESCRIPTION

<u>Enterprise Simulation</u> -- The utilization by 50 percent of the Fortune 500 companies of models of their enterprises. The model would be capable of testing varying organizations and policies under varying external environments.

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL |
| | | | | | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | NOT BE |
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	8	30	37	3	36	27	9	6	24	34	8
EXPERT TOTALS	1	5	3	0	7	2	0	2	2	4	0

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	1	9	36	17	0	0
CONSENSUS				|-|--------|			
EXPERT TOTALS	0	0	5	3	2	0	0
CONSENSUS			|----|-----|				

REQUIRED CAPABILITIES

A.   A model development service.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	5	34	8	4	2							
CONSENSUS		|--|---------|										
EXPERT TOTALS	0	6	0	0	2							
CONSENSUS		|--|--|										

B.   Mass storage of <u>100 billion bytes</u>.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	6	30	11	3	3	1	12	28	1	0	0	0
CONSENSUS		|--|---------|					|--------|-|					
EXPERT TOTALS	0	5	1	0	1	1	1	5	0	0	0	0
CONSENSUS		|--|---------|					|--------|-|					

C.   Advanced data base management system.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	36	10	5	0	1							
CONSENSUS	|--|---------|											
EXPERT TOTALS	6	1	0	0	0							
CONSENSUS	|--|-|											

D.   Interactive terminal system with complex search and interactive pattern matching for use in building evaluating and optimizing the model.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	12	38	3	0	1							
CONSENSUS		|--|-|										
EXPERT TOTALS	1	7	0	0	0							
CONSENSUS		|--|-|										

E.   A data bank of national and international economic, population, political, etc. factors as source for input of the external environment.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	13	36	2	1	0							
CONSENSUS		|---|-|										
EXPERT TOTALS	3	5	0	0	0							
CONSENSUS	|----------|-|											

APPLICATION DESCRIPTION

Investment Models -- The utilization by 20 percent of the investment firms, banks, and insurance companies of investment models. The models will be used to forecast the security markets, analyze potential investments against general criteria of asset selection, and make recommendations for buying and selling securities.

IMPACT AND VALUE

	IMPACT ON SOCIETY				REASONS FOR IMPLEMENTATION						WILL NOT BE
					PROFITABLE TO IMPLEMENTOR			USEFUL TO PUBLIC			
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	4	20	36	3	24	34	5	10	33	17	0
EXPERT TOTALS	1	12	16	1	12	17	1	3	18	8	0

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	3	34	18	2	0	0
CONSENSUS			|-|--------|				
EXPERT TOTALS	0	3	19	4	1	0	0
CONSENSUS			|-|-|				

REQUIRED CAPABILITIES

A. Interactive terminal system with complex search and interactive pattern matching, for use in building, evaluating, and optimizing the model.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	9	33	4	1	2							
CONSENSUS		|--|-|										
EXPERT TOTALS	5	13	2	0	1							
CONSENSUS		|--|-|										

B. Discovery system to determine the underlying relationships.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	12	24	7	3	2							
CONSENSUS		|---|--|										
EXPERT TOTALS	5	10	4	1	1							
CONSENSUS		|--|--------|										

C. Model development service.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	7	33	6	2	1							
CONSENSUS		|--|-|										
EXPERT TOTALS	4	13	2	1	1							
CONSENSUS		|--|-|										

COMPUTER ASSISTED RESEARCH

1978-80 will find the beginning of the utilization of computer
systems to monitor, coordinate and assist in highly creative
areas such as scientific research. Such systems will take
advantage of the computers ability to retain and refer to
large amounts of data and software with the capability of
discovering underlying principles and relationships. The
scientist will use the system to record his research plan
and the results as they develop. The system will assist him
by suggesting apparent relationships for his evaluation.
Practical applications will include: computer coordinated tests
of medical drugs for effectiveness and long range side effects
and monitoring of research for adverse ecological effects.

By 1985 complete systems will exist for assistance in whole
scientific disciplines particularly in newly developing areas
such as oceanography. An oceanography system would correlate
data drawn from ocean explorations, satellite observations,
and scientific studies to predict locations of undersea
mineral resources and to provide development data for farming
of fish and other sea crops.

APPLICATION TITLE		1970-71	72-74	75-77	78-80	81-85	LATER	NEVER	IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
COMPUTER COORDINATED TESTING OF MEDICAL DRUGS	100- 75- 50- 25- 0-								2.95	2.37	3.54	‾0.25
	P.C.	0.0	0.0	0.0	68.6	31.4	0.0	0.0				
RESEARCH MONITORING FOR ECOLOGICAL EFFECTS	100- 75- 50- 25- 0-								3.24	2.41	2.98	‾0.41
	P.C.	0.0	0.0	7.8	45.1	37.3	5.9	3.9				
COMPUTER ASSISTED OCEANOGRAPHY	100- 75- 50- 25- 0-								2.87	2.59	2.89	‾0.50
	P.C.	0.0	0.0	7.4	40.7	48.1	3.7	0.0				

III.24

APPLICATION DESCRIPTION

Computer Assisted Oceanography -- The existence of systems to correlate data drawn from ocean explorations, satellite observations, and scientific studies to locate undersea mineral resources and to provide development data for farming of fish and other sea crops.

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL NOT BE |
| | | | | | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | |
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	13	26	12	0	11	25	10	19	17	10	9
EXPERT TOTALS	2	4	1	0	2	4	0	4	3	0	1

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	4	22	26	2	0
CONSENSUS				|--------|-|			
EXPERT TOTALS	0	0	2	2	4	0	0
CONSENSUS				|-----|-----|			

ACCELERATING AND RETARDING FACTORS

A. International oceanographic resource planning agreement.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	10	24	6	0	0	11	9	7	4	0
EXPERT TOTALS	1	5	1	0	0	1	1	0	3	0

REQUIRED CAPABILITIES

A. Discovery system.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	26	13	4	1	4							
CONSENSUS	|--|---------|											
EXPERT TOTALS	4	1	1	0	1							
CONSENSUS	|--|-----------------|											

B. Mass storage of 100 billion bytes for the data.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	15	25	6	1	0	1	5	34	1	0	1	0
CONSENSUS	|----------|-|							|-|-|				
EXPERT TOTALS	1	5	0	1	0	1	0	3	0	0	1	0
CONSENSUS		|--|-|						|-|-|				

Computer Coordinated Testing of Medical Drugs -- The implementation of a mandatory comprehensive testing program for drugs and food products prior to their release to general use. The program would be administered and/or coordinated by the government and would be aimed at detecting long-range adverse side effects as well as determining drug effectiveness. The coordination and analysis would be computer assisted.

IMPACT AND VALUE

	IMPACT ON SOCIETY				REASONS FOR IMPLEMENTATION						WILL NOT BE IMPLEMENTED
					PROFITABLE TO IMPLEMENTOR			USEFUL TO PUBLIC			
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	
GROUP TOTALS	15	30	9	3	10	25	15	29	20	4	5
EXPERT TOTALS	4	7	3	0	4	5	1	9	2	0	2

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	0	35	16	0	0
CONSENSUS				|-|--------|			
EXPERT TOTALS	0	0	0	7	4	0	0
CONSENSUS				|-|--------|			

REQUIRED CAPABILITIES

A. Mass data storage of one trillion bytes.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	10	29	3	0	3	12	22	8	0	0	0	0
CONSENSUS	|--|-|					|--------|-|						
EXPERT TOTALS	3	6	0	0	1	2	5	2	0	0	0	0
CONSENSUS	|----------|-|						|-|-|					

B. Multi-attribute pattern matching.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	34	8	1	1	1							
CONSENSUS	|--|-|											
EXPERT TOTALS	7	2	0	1	0							
CONSENSUS	|--|--------|											

C. Discovery system to discover secondary and tertiary effects.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	30	12	1	1	1							
CONSENSUS	|--|---------|											
EXPERT TOTALS	6	3	0	1	0							
CONSENSUS	|--|---------|											

APPLICATION DESCRIPTION

Research Monitoring for Ecological Effects -- The utilization of computer systems in 20 percent of the Fortune 500 Companies to monitor stages of developmental research to predict the ecological implications relative to the manufacture, use, and disposal of potential products.

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL NOT BE |
| | | | | | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | |
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	19	28	9	1	8	29	13	21	20	8	8
EXPERT TOTALS	5	2	1	0	1	5	1	3	3	1	2

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	4	23	19	3	2
CONSENSUS				|-|--------|			
EXPERT TOTALS	0	0	1	4	3	0	0
CONSENSUS				|-|--------|			

ACCELERATING AND RETARDING FACTORS

A. Legislation enforcing pollution control.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	15	20	6	0	8	18	8	0	0	0
EXPERT TOTALS	4	4	0	0	3	4	1	0	0	0

REQUIRED CAPABILITIES

A. Discovery system.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	30	10	3	1	2							
CONSENSUS	|--|---------|											
EXPERT TOTALS	4	2	1	0	0							
CONSENSUS	|--|---------|											

B. Mass storage of 100 billion bytes.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	12	23	9	0	1	3	9	23	1	0	0	0
CONSENSUS	|----------|-|						|--------|-|				
EXPERT TOTALS	1	3	3	0	0							
CONSENSUS		|--|---------|									

DISTRIBUTION AND RETAIL

The computerization thrust in the retail market will be toward
point of transaction terminals for capture of sales data, credit
check, and credit sales entry. Within the next four years the
first successful implementation will be completed. This will
counteract the recent adverse publicity caused by the failure
of some pilot systems. By as early as 1975 and certainly before
1980 there will be such systems in 5 percent of the department
stores. The terminals will probably use magnetic stripe credit
cards for user identification but may incorporate more positive
identification methods such as voice-print, fingerprint, or
retina-print.

By 1980 the low markup stores such as supermarkets will have gone
to terminals for checkout. These systems would sense identifying
marks on the product or as in the case of produce be identified
by keyboard entries. Scales would have direct read-out capability.
Prices are determined from latest price lists and the customer
receives a printout of description and prices of his purchases.
Inventory control and automatic reorder follow from the data
capture.

In another significant step forward distribution industry will
begin to accept computer-to-computer orders and use automated
warehouses and freight terminals to speed their distribution.

APPLICATION TITLE		1970-71	72-74	75-77	78-80	81-85	LATER	NEVER	IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
RETAIL TERMINAL SYSTEMS	100- 75- 50- 25- 0-								2.01	3.98	2.51	0.00
	P.C.	0.0	3.1	67.2	29.7	0.0	0.0	0.0				
AUTOMATED WAREHOUSES	100- 75- 50- 25- 0-								1.48	3.35	1.74	⁻0.19
	P.C.	0.0	1.7	58.3	35.0	5.0	0.0	0.0				
SUPERMARKET CHECKOUT SYSTEMS	100- 75- 50- 25- 0-								1.55	2.95	2.53	⁻0.44
	P.C.	0.0	0.0	14.5	74.2	6.5	3.2	1.6				
AUTOMATED FREIGHT TERMINALS	100- 75- 50- 25- 0-								1.38	2.90	1.59	⁻0.63
	P.C.	0.0	0.0	1.6	65.6	29.5	3.3	0.0				

III.29

APPLICATION DESCRIPTION

Automated Freight Terminals -- The automation of 1 percent of the freight terminals. Based on teleprocessed manifests of incoming shipments the terminal system schedules the docks and storage facilities optimumly. Loading, unloading, movement and storage within the terminal is done automatically by automated equipment under computer control.

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL |
| | | | | | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | NOT BE |
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	3	17	46	11	26	33	6	5	25	29	17
EXPERT TOTALS	1	7	15	6	10	9	4	2	8	12	5

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	1	40	18	2	0
CONSENSUS				|-|--------|			
EXPERT TOTALS	0	0	1	17	6	1	0
CONSENSUS				|-|--------|			

ACCELERATING AND RETARDING FACTORS

A. Establishment of a guaranteed annual income removing most of labor's objections to automation.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	8	29	13	0	4	10	13	5	4	2
EXPERT TOTALS	6	13	4	0	2	5	3	3	1	2

B. Establishment of tax incentives for investment in automation.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	15	23	11	0	4	13	6	4	5	6
EXPERT TOTALS	9	12	2	0	3	5	3	1	3	2

REQUIRED CAPABILITIES

A. Network control.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	33	14	3	1	1							
CONSENSUS	|--|--------|											
EXPERT TOTALS	16	3	2	0	1							
CONSENSUS	|--|--------|											

B. Improved algorithms for resource leveling and scheduling.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	19	31	1	1	0							
CONSENSUS	|----------|-|											
EXPERT TOTALS	8	12	1	1	0							
CONSENSUS	|----------|-|											

C. Relatively high reliability - no outages of over one hour.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	34	15	2	0	1	0	2	39	3	0	0	0
CONSENSUS	|--|--------|							|-|-|				
EXPERT TOTALS	15	3	2	0	1	0	1	15	1	0	0	0
CONSENSUS	|--|--------|							|-|-|				

D. Mass storage of 100 billion bytes.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	11	30	4	0	1	1	14	31	0	0	0	0
CONSENSUS		|--|-|					|--------|-|					
EXPERT TOTALS	4	13	3	0	1	1	4	12	0	0	0	0
CONSENSUS		|--|-|					|--------|-|					

APPLICATION DESCRIPTION

Automated Warehouses -- The conversion of 1 percent of the warehouses in Fortune 500 Companies to computerized control of stacking and picking, and movement to and from docks and/or manufacturing floor.

IMPACT AND VALUE

| | IMPAZT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL |
| | | | | | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | NOT BE |
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	4	18	46	12	31	37	5	8	23	32	5
EXPERT TOTALS	2	9	16	5	14	14	2	4	10	12	2

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	1	35	21	3	0	0
CONSENSUS			|-|--------|				
EXPERT TOTALS	0	0	17	11	1	0	0
CONSENSUS			|-|--------|				

ACCELERATING AND RETARDING FACTORS

A. 25 percent reduction in cost of picking and stacking units.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	10	29	10	0	5	17	7	2	3	3
EXPERT TOTALS	7	14	5	0	2	8	3	0	3	2

B. Establishment of tax incentives for investment in automation equipment.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	19	22	9	0	5	10	5	3	5	8
EXPERT TOTALS	12	12	2	0	2	5	2	2	3	4

C. Establishment of guaranteed annual income removing most labor's objections to automation.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	9	27	14	0	3	12	9	5	5	1
EXPERT TOTALS	6	14	6	0	1	8	2	3	2	1

REQUIRED CAPABILITIES

A. Advanced data base management.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	30	10	4	6	2							
CONSENSUS	|--|---------|											
EXPERT TOTALS	13	3	3	5	1							
CONSENSUS	|--|-----------------|											

B. Relatively high reliability. No outages of greater than one hour.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	27	17	6	0	1	0	1	43	0	0	0	0
CONSENSUS	|--|---------|							|-|-|				
EXPERT TOTALS	9	10	4	0	1	0	1	19	0	0	0	0
CONSENSUS	|----------|-|							|-|-|				

Retail Terminal Systems -- The implementation in 5 percent of the department stores of a system to capture sales data at the point of transaction and integrate it into systems which process inventory control, billing, purchasing, sales analysis, credit check, etc.

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL |
| | | | | | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | NOT BE |
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	9	26	42	5	40	42	0	14	37	25	0
EXPERT TOTALS	1	3	8	0	6	6	0	2	5	4	0

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	2	43	19	0	0	0
CONSENSUS			|-|--------|				
EXPERT TOTALS	0	0	9	4	0	0	0
CONSENSUS			|-|--------|				

ACCELERATING AND RETARDING FACTORS

A. Successful implementation of one installation to counteract the recent failures in this area.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	18	33	4	3	24	17	3	0	0	0
EXPERT TOTALS	3	9	0	1	5	2	1	0	0	0

REQUIRED CAPABILITIES

A. Advanced data base management system.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	33	18	2	1	1							
CONSENSUS	|--|---------|											
EXPERT TOTALS	8	3	0	0	0							
CONSENSUS	|--|---------|											

B. Point-of-sale terminal for $5-$25 per month.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	37	14	3	0	1	0	0	39	9	0	0	0
CONSENSUS	|--|---------|							|-|-|				
EXPERT TOTALS	7	2	1	0	0	0	0	5	2	0	0	0
CONSENSUS	|--|---------|							|-|--------|				

C. Positive user identification (fingerprint, voice-print, retina-print, etc.)

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	11	21	17	5	2							
CONSENSUS		|--|---------|										
EXPERT TOTALS	1	5	4	1	0							
CONSENSUS		|--|---------|										

D. Label or price code scanners.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	27	27	1	0	0							
CONSENSUS	|----------|-|											
EXPERT TOTALS	3	8	0	0	0							
CONSENSUS	|----------|-|											

APPLICATION DESCRIPTION

Supermarket Checkout Systems -- The installation of systems in 1 percent of the supermarkets of systems to automatically enter the identification of items purchased. The system would price the item according to the latest price lists and deplete inventory.

IMPACT AND VALUE

	IMPACT ON SOCIETY				REASONS FOR IMPLEMENTATION						WILL
					PROFITABLE TO IMPLEMENTOR			USEFUL TO PUBLIC			NOT BE
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	4	14	34	7	17	29	11	12	27	16	9
EXPERT TOTALS	2	4	15	1	10	11	1	6	11	4	2

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	9	46	4	2	1
CONSENSUS				|-|-|			
EXPERT TOTALS	0	0	6	14	0	0	1
CONSENSUS			|--------|-|				

REQUIRED CAPABILITIES

A. Scanner for labels or price codes.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	42	11	0	0	0							
CONSENSUS	|--|-|											
EXPERT TOTALS	14	4	0	0	0							
CONSENSUS	|--|-|											

B. Checkout terminal to display prices as read and printout item description, price per unit measure, total price, etc. $1,000 purchase.

	NECESSRY	ASSET	USEFUL	SOME	USE NO	NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	38	13	1	0	0	0	0		44	2	0	0	0
CONSENSUS	|--|---------|								|-|-|				
EXPERT TOTALS	13	3	1	0	0	0	0		14	0	0	0	0
CONSENSUS	|--|-|								|-|-|				

ECOLOGICAL

Ecological problems are currently a matter of national concern. Much effort will be spent in the future endeavoring to solve these problems and the computer will play a major role. However, with the exception of pollution monitoring networks in general use in 20 percent of the metropolitan areas by 1975-77, the majority of the applications will require scientific development and will not become available untill 1978-1985. These include:

- Monitoring of research and development and use of ecological balance calculations to predict the results of the introduction of new products, by 20 percent of the large corporations.

- The extension of computerized weather forecasting to allow calculations of pollutant concentrations so that air pollution can be predicted.

- The use in 20 percent of the metropolitan areas of computer analysis of waste products so that they can be broken down into harmless components and either recycled or safely disposed of.

Air pollution prediction will require processors capable of 30 million instructions per second and worldwide networks of sensors. Many of these applications such as research monitoring and ecological balance calculations require data processing systems capable of discovering underlying principles and relationships.

APPLICATION TITLE		1970-71	72-74	75-77	78-80	81-85	LATER	NEVER	IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
POLLUTION MONITORING SYSTEMS									3.46	2.36	3.75	‾0.15
	P.C.	0.0	3.6	49.1	40.0	5.5	1.8	0.0				
RESEARCH MONITORING FOR ECOLOGICAL EFFECTS									3.24	2.41	2.98	‾0.41
	P.C.	0.0	0.0	7.8	45.1	37.3	5.9	3.9				
COMPUTERIZED WASTE DISPOSAL PLANTS									2.84	2.40	2.98	‾0.90
	P.C.	0.0	0.0	1.8	54.4	33.3	5.3	5.3				
ECOLOGICAL BALANCE CALCULATIONS									3.11	1.78	2.86	‾1.07
	P.C.	0.0	0.0	0.0	10.9	58.2	21.8	9.1				
AIR POLLUTION PREDICTION									3.22	1.98	3.25	‾0.66
	P.C.	0.0	0.0	0.0	1.9	60.4	35.8	1.9				
ECOLOGICAL PLANT SCHEDULING									3.00	1.56	2.48	‾1.59
	P.C.	0.0	0.0	0.0	0.0	54.5	21.8	23.6				

III.35

Air Pollution Prediction -- The existence of a global circulation model of the atmosphere. The model would include the horizontal hydrodynamics and thermodynamics of the atmosphere so that calculations of pollutant concentrations can be made for a given input source of pollutants. This would provide a dynamic air pollution prediction.

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL |
| | | | | | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | NOT BE |
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	19	29	8	1	8	20	17	31	10	7	13
EXPERT TOTALS	2	4	1	0	1	2	1	2	3	0	4

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	0	1	32	19	1
CONSENSUS					|-|--------|	
EXPERT TOTALS	0	0	0	0	6	2	0
CONSENSUS					|-|--|	

ACCELERATING AND RETARDING FACTORS

A. Legislation enforcing pollution control.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	12	20	6	0	8	16	7	2	0	0
EXPERT TOTALS	2	3	2	0	2	3	0	0	0	0

REQUIRED CAPABILITIES

A. Processor speeds of 30 MIPS (million)

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	11	32	3	0	0	0	0	39	2	0	0	0
CONSENSUS	|--|-|					|-|-|			
EXPERT TOTALS	1	2	2	0	0							
CONSENSUS		--	---------									

B. Massive communication interface - 10,000 lines to monitor a sensor network.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	30	15	1	0	0	0	4	33	3	0	0	0
CONSENSUS	|--|---------|					|-|-|			
EXPERT TOTALS	3	2	1	0	0							
CONSENSUS		------	-----									

C. Mass storage of 100 billion bytes.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	33	13	1	0	0	0	1	35	6	1	0	0
CONSENSUS	|--|---------|					|-|-|			
EXPERT TOTALS	2	3	1	0	0	0	0	4	0	1	0	0
CONSENSUS	|----------|-|					|-|-|			

APPLICATION DESCRIPTION

Computerized Waste Disposal Plants -- The existence in 20 percent of the metropolitan areas of plants designed to analyze complex chemical waste products and break them down under computer control.

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL |
| | | | | | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | NOT BE |
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	19	39	15	2	15	35	12	36	18	4	24
EXPERT TOTALS	3	3	0	0	2	4	0	3	1	0	2

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	1	31	19	3	3
CONSENSUS				|-|--------|			
EXPERT TOTALS	0	0	0	4	2	1	0
CONSENSUS				|-|--------|			

ACCELERATING AND RETARDING FACTORS

A. Federal subsidizing.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	19	20	7	0	6	13	12	2	1	2
EXPERT TOTALS	2	3	0	0	2	1	1	0	0	0

REQUIRED CAPABILITIES

A. Advanced analytical instrumentation under computer control.

	NECESSRY	ASS,T	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	40	9	2	0	0							
CONSENSUS	|--|-|											
EXPERT TOTALS	5	1	0	0	0							
CONSENSUS	|--|-|											

B. Discovery system for real time analysis of the waste.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	39	7	2	0	3							
CONSENSUS	|--|-|											
EXPERT TOTALS	4	1	0	0	1							
CONSENSUS	|--|--------|											

APPLICATION DESCRIPTION

Ecological Balance Calculations -- The existence of systems capable of calculating in advance the regional results of such actions as "over use of fertilizer, which wash into ponds and rivers, which causes excessive growth of algae, which chokes the waterways and kills the fish."

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL NOT BE IMPLEMENTED |
| | | | | | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | |
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	
GROUP TOTALS	24	40	12	1	9	26	21	36	15	7	29
EXPERT TOTALS	4	3	0	0	2	2	1	5	1	0	2

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	0	6	32	12	5
CONSENSUS					|-|--------|	
EXPERT TOTALS	0	0	0	3	2	2	0
CONSENSUS					--------	--------		

REQUIRED CAPABILITIES

A. Discovery system to discovery the secondary and tertiary effects.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	32	13	3	1	1							
CONSENSUS	|--|---------|											
EXPERT TOTALS	5	1	0	1	0							
CONSENSUS	|--|---------|											

B. Mass storage of 100 billion bytes.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	12	28	7	0	2	1	8	28	3	0	0	0
CONSENSUS		|--|-|						|-|-|				
EXPERT TOTALS	2	4	0	0	1							
CONSENSUS	|----------|-|											

C. Search engine 100 times today's capabilities.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	9	26	12	0	2	4	29	8	0	0	0	0
CONSENSUS		|--|---------|					|-|-|					
EXPERT TOTALS	2	5	0	0	0	0	4	1	0	0	0	0
CONSENSUS	|----------|-|						|-|-|					

Ecological Plant Scheduling -- The establishment of a nationwide system to schedule the operation of pollution-prone plants based on weather forecasts.

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL NOT BE |
| | MAJOR | SIGNIF. | LITTLE | NO | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | |
					VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	20	45	8	2	7	26	13	32	13	2	43
EXPERT TOTALS	7	13	0	0	1	9	2	10	2	0	12

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	0	0	30	12	13
CONSENSUS					|-|--------|		
EXPERT TOTALS	0	0	0	0	11	6	4
CONSENSUS					|-|--------|		

ACCELERATING AND RETARDING FACTORS

A. Availability of accurate seven-day weather forecasts.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	9	23	12	0	3	6	16	3	4	2
EXPERT TOTALS	1	10	5	0	1	3	6	0	1	2

B. Legislation enforcing pollution control.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	12	25	8	2	12	11	7	0	1	1
EXPERT TOTALS	3	10	5	2	4	3	2	0	0	1

REQUIRED CAPABILITIES

A. Input from nationwide weather forecasts.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	42	2	1	0	0							
CONSENSUS	|--|-|											
EXPERT TOTALS	16	2	1	0	0							
CONSENSUS	|--|-|											

B. Mass storage of <u>100 billion bytes</u>.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	30	11	3	0	0	0	6	27	5	0	0	0
CONSENSUS	|--|--------|							|-|-|				
EXPERT TOTALS	13	4	2	0	0	0	3	12	3	0	0	0
CONSENSUS	|--|--------|							|-|-|				

APPLICATION DESCRIPTION

<u>Pollution Monitoring Systems</u> -- Installation of a pollution monitoring system in 20 percent of the metropolitan areas. The systems would monitor air, water and noise pollution, detecting and locating sources of pollution before they become irritants. Fixed sensors would provide continuous monitoring of areas with mobile sensors used to isolate sources of pollution.

IMPACT AND VALUE

		IMPACT ON SOCIETY			REASONS FOR IMPLEMENTATION						WILL
					PROFITABLE TO IMPLEMENTOR			USEFUL TO PUBLIC			NOT BE
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	21	31	6	1	11	22	18	35	13	7	3
EXPERT TOTALS	6	8	1	0	3	6	5	10	2	3	0

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	2	27	22	3	1	0
CONSENSUS			|-|--------|				
EXPERT TOTALS	0	1	8	4	0	0	0
CONSENSUS			|-|--------|				

ACCELERATING AND RETARDING FACTORS

A. Legislation enforcing pollution control.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	15	20	5	0	11	21	4	1	0	0
EXPERT TOTALS	6	5	1	0	4	6	1	0	0	0

REQUIRED CAPABILITIES

A. Massive communication interface - 10,000 lines.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	14	29	2	1	1	1	6	34	1	0	0	0
CONSENSUS	|----------|-|							|-|-|				
EXPERT TOTALS	1	8	1	0	0	1	2	6	0	0	0	0
CONSENSUS	|--|-|							|--------|-|				

B. Low cost sensors capable of detecting many types and combinations of pollutants.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	45	2	1	0	0							
CONSENSUS	|--|-|											
EXPERT TOTALS	10	1	0	0	0							
CONSENSUS	|--|-|											

Research Monitoring for Ecological Effects -- The utilization of computer systems in 20 percent of the Fortune 500 Companies to monitor stages of developmental research to predict the ecological implications relative to the manufacture, use, and disposal of potential products.

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL |
| | MAJOR | SIGNIF. | LITTLE | NO | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | NOT BE |
					VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	19	28	9	1	8	29	13	21	20	8	8
EXPERT TOTALS	5	2	1	0	1	5	1	3	3	1	2

IMPLEMENTATION DATE

	1970-31	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	4	23	19	3	2
CONSENSUS				|-|--------|			
EXPERT TOTALS	0	0	1	4	3	0	0
CONSENSUS				|-|--------|			

ACCELERATING AND RETARDING FACTORS

A. Legislation enforcing pollution control.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	15	20	6	0	8	18	8	0	0	0
EXPERT TOTALS	4	4	0	0	3	4	1	0	0	0

REQUIRED CAPABILITIES

A. Discovery system.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	30	10	3	1	2							
CONSENSUS	|--|---------|											
EXPERT TOTALS	4	2	1	0	0							
CONSENSUS	|--|---------|											

B. Mass storage of 100 billion bytes.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	12	23	9	0	1	3	9	23	1	0	0	0
CONSENSUS	|---------|-|						|--------|-|					
EXPERT TOTALS	1	3	3	0	0							
CONSENSUS		|--|---------|										

EDUCATION

Popular magazines and the news media indicate that education is on the verge of a crisis. Many communities have refused to approve increased taxes to meet the increased cost of providing public education. Lack of funds makes it difficult to attract enough highly qualified, highly motivated people as teachers. Disagreements among parents, teachers and administration particularly in underprivilege areas raise questions as to whether our present educational institutions are meeting the needs of the public, all of this at a time when the demand for education is greater than ever.

The study indicates that in the future educational institutions will increasingly turn to the computer to provide quality education by conserving and maximizing the utilization of trained educators and school facilities. By 1980 one percent of the primary and secondary schools will use computer systems to provide dynamic day-to-day schedules for pupils, teachers, and facilities.

Scheduling becomes even more critical in 1980 when Computer Assisted Instruction (CAI) acccounts for 20 percent of the teaching hours. In the same time period monitoring and directing of students' progress via Computer Managed Instruction (CMI) will be used either as an alternative or in conjunction with CAI in 5 percent of the schools. The type of computer/student interaction presented by CAI will also be used to provide testing and guidance counseling, dynamically structuring the testing based on answers and response time to previous questions.

Interestingly enough although the emphasis on CAI has been primarily in relation to educational institutions, it will probably be industry and the military which will make the earliest progress with 20 percent of the on-job training hours being accomplished by CAI as early as 1975-77.

The next significant advance in education will be the utilization of the home terminal in the decade of the 80's as an educational device. Courses for all levels of education including graduate and post-graduate refresher will be available by then and used by at least 1 percent of the homes.

APPLICATION TITLE	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER	IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
DYNAMIC SCHEDULING OF EDUCATIONAL FACILITIES								2.23	2.34	2.77	⁻0.23
P.C.	0.0	0.0	11.7	65.0	21.7	0.0	1.7				
COMPUTER ASSISTED INSTRUCTION - ON THE JOB TRAINING								3.10	3.23	3.28	⁻0.11
P.C.	0.0	1.5	10.6	78.8	6.1	3.0	0.0				
COMPUTER MANAGED INSTRUCTION								2.71	2.29	3.13	⁻0.29
P.C.	0.0	0.0	5.1	50.8	32.2	8.5	3.4				
COMPUTER ASSISTED INSTRUCTION EDUCATIONAL INSTITUTIONS								3.56	2.86	3.73	⁻0.07
P.C.	0.0	0.0	1.5	61.2	32.8	4.5	0.0				
COMPUTER ASSISTED TESTING AND GUIDENCE COUNSELING								2.54	2.20	2.64	⁻0.48
P.C.	0.0	0.0	4.6	55.4	30.8	7.7	1.5				
HOME COMPUTER ASSISTED INSTRUCTION								3.41	2.52	3.66	⁻0.40
P.C.	0.0	0.0	3.2	22.6	58.1	16.1	0.0				

Computer Assisted Instruction - On The Job Training -- The replacement of 20 percent of on-the-job training hours in industrial and military organization by computer assisted instruction.

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL |
| | | | | | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | NOT BE |
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	21	43	17	0	27	40	7	34	29	9	3
EXPERT TOTALS	3	8	2	0	4	8	0	5	7	0	0

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	1	7	52	4	2	0
CONSENSUS				|-|-|			
EXPERT TOTALS	0	1	1	10	1	0	0 ·
CONSENSUS				|-|-|			

ACCELERATING AND RETARDING FACTORS

A. Successful utilization in 10 large corporations without union objection.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	19	30	8	0	7	22	17	1	0	1
EXPERT TOTALS	4	4	3	0	1	4	3	0	0	1

B. Federal subsidy.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	18	31	6	0	7	14	12	3	4	2
EXPERT TOTALS	5	6	0	0	3	2	1	0	2	0

REQUIRED CAPABILITIES

A. Course preparation language to reduce the preparation cost by a factor of 5 over today's CAI systems.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	33	17	3	1	1	0	6	41	4	0	0	0
CONSENSUS	|--|---------|							|-|-|				
EXPERT TOTALS	6	2	1	0	1	0	0	8	2	0	0	0
CONSENSUS	|--|---------|							|-|-|				

B. Terminal with display, full keyboard, light pen function keyboard, and video/audio output $200/month.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	32	21	1	0	1	1	2	47	0	0	0	0
CONSENSUS	|--|---------|							|-|-|				
EXPERT TOTALS	5	4	0	0	1	0	1	8	0	0	0	0
CONSENSUS	|------|-----|							|-|-|				

APPLICATION DESCRIPTION

Computer Assisted Instruction Educational Institutions -- The replacement of 20 percent of the teaching hours in educational institutions by computer assisted instruction.

IMPACT AND VALUE

	IMPACT ON SOCIETY				REASONS FOR IMPLEMENTATION						WILL
					PROFITABLE TO IMPLEMENTOR			USEFUL TO PUBLIC			NOT BE
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	32	40	8	0	18	44	10	44	26	4	2
EXPERT TOTALS	6	8	0	0	3	8	1	9	5	0	0

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	1	41	22	3	0
CONSENSUS				|-|--------|			
EXPERT TOTALS	0	0	0	6	8	0	0
CONSENSUS				|--------|-|			

ACCELERATING AND RETARDING FACTORS

A. Federal subsidies.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	27	29	3	0	7	24	13	2	3	0
EXPERT TOTALS	5	8	0	0	1	7	4	0	0	0

B. Successful demonstration in one large school system.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	15	33	11	0	9	20	11	4	1	0
EXPERT TOTALS	3	7	3	0	4	4	4	0	0	0

C. Pupil to teacher ratios rising to 100 to 1 in 10 percent of the schools due to lack of funds.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	32	22	3	0	3	14	14	6	4	2
EXPERT TOTALS	8	3	2	0	0	4	3	2	1	2

REQUIRED CAPABILITIES

A. Massive communication interface 10,000 lines.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	11	28	13	3	3	9	15	27	0	0	0	0
CONSENSUS	|--|--------|						|--------|-|					
EXPERT TOTALS	1	6	2	1	1	1	2	6	0	0	0	0
CONSENSUS	|--|--------|						|--------|-|					

B. Inexpensive terminal with display, full keyboard, function keyboard, and light pen. The terminal should be capable of television (audio and video) type displays. $100 per month.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	37	16	4	0	1	0	1	50	2	0	0	0
CONSENSUS	|--|--------|							|-|-|				
EXPERT TOTALS	5	5	1	0	0	0	0	9	1	0	0	0
CONSENSUS	|--------|-|							|-|-|				

C. Course preparation language to reduce the preparation cost by a factor of 10 over today's CAI systems.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	32	24	0	1	1	2	0	49	2	0	0	0
CONSENSUS	|--|--------|							|-|-|				
EXPERT TOTALS	6	4	0	1	0	0	0	9	1	0	0	0
CONSENSUS	|--|--------|							|-|-|				

D. Availability of courses from service organizations. $200 per month.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	4	33	13	1	1	0	5	39	2	0	0	0
CONSENSUS		|--|--------|						|-|-|				
EXPERT TOTALS	2	5	2	1	1	0	0	9	0	0	0	0
CONSENSUS		|--|--------|						|-|-|				

APPLICATION DESCRIPTION

Computer Assisted Testing and Guidance Counseling -- The accomplishment of 20 percent of the testing and guidance counseling in educational institutions with computer assistance. The system administers tests in subject matter, general IQ, aptitude, personality, etc., adapting the tests individually based on the answers and response time to previous questions. The results are evaluated and alternatives suggested to a counselor for individual guidance.

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL NOT BE |
| | | | | | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | |
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	13	37	30	0	8	39	21	21	30	19	13
EXPERT TOTALS	3	5	6	0	3	7	3	3	7	4	3

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	3	36	20	5	1
CONSENSUS				|-|--------|			
EXPERT TOTALS	0	0	0	7	4	2	1
CONSENSUS				|----|-----|			

ACCELERATING AND RETARDING FACTORS

A. Social rejection of testing as a means of measuring and ranking individuals.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	22	26	10	0	3	11	2	5	8	16
EXPERT TOTALS	3	6	3	0	3	1	1	0	0	3

B. Federal subsidy.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	21	28	8	0	2	16	7	10	4	2
EXPERT TOTALS	3	7	2	0	1	4	0	3	0	0

REQUIRED CAPABILITIES

A. Mass storage 100 billion bytes.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	7	21	18	4	5	11	29	11	0	0	0	0
CONSENSUS		|--|---------|					|-|-|					
EXPERT TOTALS	0	4	5	3	1	2	6	2	0	0	0	0
CONSENSUS		|----------|---------|					|-|-|					

B. Terminal with display, full keyboard, light pen. $100 per month.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	12	34	10	0	0	0	1	47	2	0	0	0
CONSENSUS		|--|-|						|-|-|				
EXPERT TOTALS	3	6	4	0	0	0	0	9	1	0	0	0
CONSENSUS		|--|---------|						|-|-|				

C. Program product for the application $500 per month.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	9	40	6	0	1	0	7	42	1	0	0	0
CONSENSUS		|--|-|						|-|-|				
EXPERT TOTALS	1	8	3	0	1	0	1	9	0	0	0	0
CONSENSUS		|--|---------|						|-|-|				

Computer Managed Instruction -- The implementation in 5 percent of the secondary schools of computer managed Instruction. The system would individually prescribe course modules, schedule and score tests, and determin the next module.

IMPACT AND VALUE

	IMPACT ON SOCIETY				REASONS FOR IMPLEMENTATION						WILL
					PROFITABLE TO IMPLEMENTOR			USEFUL TO PUBLIC			NOT BE
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	10	35	13	3	5	33	18	20	29	7	6
EXPERT TOTALS	6	15	5	1	3	17	5	11	12	3	2

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	3	30	19	5	2
CONSENSUS				|-|--------|			
EXPERT TOTALS	0	0	2	12	10	1	0
CONSENSUS				|-|--------|			

REQUIRED CAPABILITIES

A. Advanced data base management system.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	11	34	4	2	0							
CONSENSUS		|--|-|										
EXPERT TOTALS	2	19	1	0	0							
CONSENSUS		|--|-|										

B. Remote handwriting input.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	1	18	21	6	6							
CONSENSUS		|----------|-|										
EXPERT TOTALS	1	6	13	1	1							
CONSENSUS		|----------|-|										

C. Availability of the programs for management of specific courses from service organizations $50/month.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	15	24	8	3	0	0	2	31	7	0	0	0
CONSENSUS	|----------|-|							|-|-|				
EXPERT TOTALS	5	9	6	1	0	0	2	8	2	0	0	0
CONSENSUS		|--|----------|						|-|-|				

Dynamic Scheduling of Educational Facilities -- The utilization of computers in 1 percent of the primary and secondary schools to dynamically schedule the utilization of facilities in conjunction with modern team and modular teaching methods and individual rates of progress made possible by Computer Assisted Instruction (CAI.)

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL NOT BE |
| | | | | | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | |
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	8	26	25	3	9	28	21	17	26	14	5
EXPERT TOTALS	3	12	8	1	5	12	6	7	12	4	1

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	7	39	13	0	1
CONSENSUS				|-|-|			
EXPERT TOTALS	0	0	2	15	6	0	0
CONSENSUS				|-|--------|			

REQUIRED CAPABILITIES

A. Better scheduling algorithms.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	13	39	0	1	0							
CONSENSUS		|--|-|										
EXPERT TOTALS	6	14	0	0	0							
CONSENSUS	|----------|-|											

B. Availability of the application program from a service organization $100 per month.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	9	27	13	1	1	0	1	33	9	0	0	0
CONSENSUS		|--|---------|						|-|-|				
EXPERT TOTALS	3	12	3	0	1	0	0	11	2	0	0	0
CONSENSUS		|--|-|						|-|-|				

Home Computer Assisted Instruction -- The availability of computer assisted instruction in one percent of the homes. This would supplement public education at all levels and provide post graduate refresher and extension courses. Most of the educational materials (graphical, printed and/or sound) are provided at the terminal. The students progress is monitored and he is advanced at his own speed.

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL |
| | | | | | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | NOT BE |
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	30	40	10	2	13	43	13	50	14	8	11
EXPERT TOTALS	9	8	1	1	6	7	2	14	1	1	3

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	2	14	36	10	0
CONSENSUS				|--------|-|			
EXPERT TOTALS	0	0	1	4	11	1	0
CONSENSUS				|--------|-|			

ACCELERATING AND RETARDING FACTORS

A. CATV installed in one percent of the homes.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	14	29	7	0	7	13	14	9	1	0
EXPERT TOTALS	6	8	1	0	1	4	6	3	0	0

B. FCC regulation allowing new two-way switched communication networks.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	12	29	3	0	7	10	16	5	2	0
EXPERT TOTALS	5	6	1	0	1	2	8	1	0	0

C. Availability of college credits via CAI courses.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	25	21	7	0	3	15	12	8	7	1
EXPERT TOTALS	6	5	4	0	1	5	1	2	3	1

D. Failure of urban high schools: at least 10% of all high schools in the 10 largest cities in the U.S. closing because of conflict between parents, teachers and administration, recognition of poor educational quality or lack of funds.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	23	17	10	1	1	11	7	7	7	10
EXPERT TOTALS	7	5	3	0	1	5	2	1	2	4

REQUIRED CAPABILITIES

A. Inexpensive two-way television type terminal - $5-$30 per month.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	46	6	2	0	1	0	0	47	1	0	0	0
CONSENSUS	|--|-|							|-|-|				
EXPERT TOTALS	13	3	0	0	0	0	0	15	0	0	0	0
CONSENSUS	|--|-|							|-|-|				

B. High capacity two-way communication channels.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	31	18	1	0	5							
CONSENSUS	|--|---------|											
EXPERT TOTALS	8	8	0	0	1							
CONSENSUS	|---------|-|											

C. Availability comparable to today's telephone service.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	11	35	7	1	3							
CONSENSUS		|--|-|										
EXPERT TOTALS	2	14	1	0	0							
CONSENSUS		|--|-|										

D. Course preparation language to reduce the preparation cost by a factor of 10 over today's CAI systems.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	15	34	3	1	0	1	6	37	2	1	0	0
CONSENSUS	|----------|-|							|-|-|				
EXPERT TOTALS	2	12	0	1	0	0	3	11	0	0	0	0
CONSENSUS		|--|-|						|-|-|				

E. Massive communication interface 100,000 lines.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	9	33	8	1	2	1	16	31	0	0	0	0
CONSENSUS		|--|-|					|--------|-|					
EXPERT TOTALS	2	11	2	1	0	0	5	10	0	0	0	0
CONSENSUS		|--|-|					|--------|-|					

FINANCIAL AND INSURANCE

In the period 1975 through 1980 twenty percent of the banks will
have completed the more advanced applications related to their
day-to-day operations. Examples include: reserve requirements
models, automatic evaluation of commercial loan applications, and
terminals to automate bank teller functions including delivery
and collection of cash.

Beginning in 1978-80 banks will be in the process of expanding
their areas of business by providing increased computerized
services to their customers in the form of advisory services for
budget, tax, investment, savings and insurance planning. Insurance
companies will provide similar services, but will use their
marketing force to bring the service into the home via portable
agent's terminals. By 1980 twenty percent of the banks and insu-
rance companies will be offering these services.

By 1985 banks will be electronically interconnected to effect
electronic transfer of funds and account information. The
interconnection may be effected through an expanded Federal Reserve
System or the banks in an area might set up a financial utility
(perhaps a regulated monopoly) to act as the central switching
and coordination function for the electronic interchange. Once
this capability is in existence, banks and other financial institu-
tions can offer additional new services to their customers. For
example:

- A bank could offer automatic salary deposit to
  companies, debiting the company's account and
  depositing in employee's accounts even though the
  the accounts are in different banks.

- Similarly, individuals could pre-authorize payment
  of mortgages, car payments, insurance premiums, etc.

- Individuals could establish lines of credit in
  multiple financial institutions and have them
  activated in a prescribed sequence as required to
  meet uncovered debits from a demand deposit account.

By 1985 twenty percent of the metropolitan areas will have electro-
nic transfer of funds and will also have taken the additional step
of allowing connection of the point of sale terminals located in
retail and service outlets thus establishing the "Cashless/
Checkless Society." In this environment a customer desiring to
make a purchase

- Identifies himself via credit card, fingerprint,
  voice-print or some other means at the terminal,

- His demand deposit account balance, credit lines
  and credit rating is checked,

- The purchase is approved or denied.

- If approved, his account is debited,
  activating credit lines or establishing a
  credit account if necessary.

- The store's account is credited.

The transaction may involve three or four financial institutions,
but it is all completed before the customer leaves the point of
sale.

Toward the end of the 1980's when 1 percent of the homes have
multiple use home terminals connected to switched networks, it
will be possible to effect most financial transactions (payment
authorization, establishment of credit lines, financial planning,
etc.) directly from the home.

FINANCIAL

APPLICATION TITLE		1970-71	72-74	75-77	78-80	81-85	LATER	NEVER	IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
BANK RESERVE REQUIREMENTS MODEL									1.15	3.44	1.41	0.00
	P.C.	0.0	1.8	78.6	17.9	1.8	0.0	0.0				
AUTOMATED STOCK TRANSFER									1.70	3.69	2.79	⁻0.05
	P.C.	0.0	0.0	24.6	66.7	3.5	5.3	0.0				
COMMERCIAL LOAN CREDIT SCORING									1.64	2.54	1.64	⁻0.38
	P.C.	0.0	0.0	11.7	66.7	18.3	0.0	3.3				
BANKING SERVICE SYSTEM									1.67	2.73	2.72	⁻0.30
	P.C.	0.0	0.0	14.5	56.4	25.5	3.6	0.0				
INSURANCE SUPPORT SYSTEM									1.26	3.08	2.13	⁻0.25
	P.C.	0.0	0.0	5.5	54.5	38.2	0.0	1.8				
FINANCIAL UTILITY									3.07	3.14	2.63	⁻0.56
	P.C.	0.0	0.0	1.6	54.7	32.8	6.3	4.7				
CREDIT TRANSFER (GIRO) SYSTEM									3.13	3.26	2.85	⁻0.49
	P.C.	0.0	0.0	4.8	50.8	36.5	3.2	4.8				
INTEGRATED FINANCIAL SERVICE SYSTEM									1.95	3.03	2.74	⁻0.39
	P.C.	0.0	0.0	1.8	47.3	41.8	7.3	1.8				

APPLICATION TITLE		1970-71	72-74	75-77	78-80	81-85	LATER	NEVER	IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
CHECKLESS SOCIETY	100- 75- 50- 25- 0-								3.52	2.43	2.11	⁻1.44
	P.C.	0.0	0.0	0.0	16.7	69.7	10.6	3.0				

APPLICATION DESCRIPTION

Automated Stock Transfer -- The existence of a computer system supporting the transfer of securities. This system would eliminate certificates as evidence of ownership and make it possible to complete transfer transactions on the day of sale. Operation would be from terminals in broker's offices. The system would provide other services via the terminal such as bid and asked prices to facilitate large block transactions and quotations.

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL |
| | | | | | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | NOT BE |
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	2	22	28	9	28	27	4	12	33	11	1
EXPERT TOTALS	2	11	14	5	18	12	1	7	17	6	1

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	14	38	2	3	0
CONSENSUS				|-|-|			
EXPERT TOTALS	0	0	10	17	2	1	0
CONSENSUS			|--------|-|				

REQUIRED CAPABILITIES

A. Mass data storage of 100 billion bytes.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	33	12	3	1	0	1	9	35	0	0	0	0
CONSENSUS	|--|---------|							|-|-|				
EXPERT TOTALS	14	9	0	1	0	0	6	15	0	0	0	0
CONSENSUS	|--|---------|							|--------|-|				

B. Ten-fold increase in security features.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	47	0	1	2	0	0	2	37	3	1	0	0
CONSENSUS	|--|-|							|-|-|				
EXPERT TOTALS	23	0	0	2	0	0	1	15	3	1	0	0
CONSENSUS	|--|-|							|-|-|				

C. Network control.

	NECESSRY	ASSET	USEFUL	SOME USE	NO	NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	38	8	0	0	1								
CONSENSUS	|--|-|												
EXPERT TOTALS	19	4	0	0	1								
CONSENSUS	|--|-|												

D. Massive communication interface of 1000 lines.

	NECESSRY	ASSET	USEFUL	SOME USE	NO	NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	37	9	2	0	0	0	2	36	3	0	0	0
CONSENSUS	|--|-|							|-|-|				
EXPERT TOTALS	18	5	1	0	0	0	0	18	1	0	0	0
CONSENSUS	|--|--|							|-|-|				

<u>Bank Reserve Requirements Model</u> -- The implementation by 20 percent of the banks of a system to predict their day-to-day reserve requirements making it possible to make better use of their capital.

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL NOT BE |
| | | | | | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | |
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	2	11	50	18	35	30	14	1	20	49	0
EXPERT TOTALS	0	3	9	7	6	7	6	0	5	12	0

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	1	44	10	1	0	0
CONSENSUS			|-|-|				
EXPERT TOTALS	0	0	13	5	1	0	0
CONSENSUS			|-|--------|				

REQUIRED CAPABILITIES

A. Interactive terminal system with complex search and interactive pattern matching for use in building, evaluating and optimizing the model.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	8	17	12	5	5							
CONSENSUS		|--|---------|										
EXPERT TOTALS	4	4	1	3	2							
CONSENSUS	|----------|-----------------|											

B. Human interaction in operation of the model in order to find a best result even though a closed mathematical solution may not exist.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	12	30	4	1	1							
CONSENSUS		|---|-|										
EXPERT TOTALS	6	5	2	1	0							
CONSENSUS	|----------|-|											

C. Advanced data base management system.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	28	13	2	1	3							
CONSENSUS	|--|---------|											
EXPERT TOTALS	9	3	1	0	1							
CONSENSUS	|--|---------|											

APPLICATION DESCRIPTION

Banking Service System -- Availability in 25 percent of banks of a customer service system providing budget planning and surveillance, investment planning, tax calculating and related financial activities.

IMPACT AND VALUE

	IMPACT ON SOCIETY				REASONS FOR IMPLEMENTATION						WILL
					PROFITABLE TO IMPLEMENTOR			USEFUL TO PUBLIC			NOT BE
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	2	18	36	2	11	33	10	11	33	9	6
EXPERT TOTALS	2	8	17	1	7	15	4	6	16	3	2

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	8	31	14	2	0
CONSENSUS				|-|--------|			
EXPERT TOTALS	0	0	5	14	4	1	0
CONSENSUS				|-|-|			

REQUIRED CAPABILITIES

A. Mass storage of 100 billion bytes.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	12	21	12	1	0	3	29	9	0	0	0	0
CONSENSUS	|----------|---------|						|-|-|					
EXPERT TOTALS	4	7	8	1	0	2	11	3	0	0	0	0
CONSENSUS		|--|---------|					|-|-|				

B. Advanced data base management system.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	35	11	0	0	1							
CONSENSUS	|--|---------|											
EXPERT TOTALS	14	6	0	0	1							
CONSENSUS	|--|---------|											

APPLICATION DESCRIPTION

Checkless Society -- The establishment of point of transaction debiting in 20 percent of the metro-
politan areas. This application is an extension of the Financial Utility to include terminals at the
point of sale so that at the time of sale, transactions can be recorded and authorized or rejected.
Other services such as automatic budget control are possible by allowing the system to reject expendi-
tures for items that would overrun the previously established budget.

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL |
| | | | | | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | NOT BE |
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	36	32	9	0	23	26	4	20	21	8	39
EXPERT TOTALS	3	1	3	0	2	2	2	2	2	2	2

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	0	11	46	7	2
CONSENSUS					|-|-|		
EXPERT TOTALS	0	0	0	1	6	1	0
CONSENSUS					|-|-|		

REQUIRED CAPABILITIES

A. Positive user identification at the terminal (e.g. fingerprint, credit card, retina-print, voice-print,
etc.)

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	57	0	0	0	0							
CONSENSUS	|--|-|											
EXPERT TOTALS	7	0	0	0	0							
CONSENSUS	|--|-|											

B. Mass storage of **100 billion bytes**.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	45	6	0	0	0	0	4	12	25	5	0	0
CONSENSUS	|--|-|							|---------|-|				
EXPERT TOTALS	5	1	0	0	0	0	0	1	4	0	0	0
CONSENSUS	|--|-|							|-|-|				

C. Low cost terminal for point of sale entry and inquiries **$200-$300 purchase**.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	37	17	0	1	0	0	6	39	6	0	0	0
CONSENSUS	|--|---------|							|-|-|				
EXPERT TOTALS	5	2	0	0	0	0	0	4	1	0	0	0
CONSENSUS	|--|---------|							|-|-|				

D. Network control.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	44	6	1	0	1							
CONSENSUS	|--|-|											
EXPERT TOTALS	6	1	0	0	0							
CONSENSUS	|--|-|											

E. Massive communication interface **100,000 lines**.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	31	19	2	1	0	0	10	30	4	0	0	0
CONSENSUS	|--|---------|							|-|-|				
EXPERT TOTALS	5	1	1	0	0							
CONSENSUS	|--|---------|											

F. Advanced data base management with particular emphasis on security.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	50	2	1	0	1							
CONSENSUS	|--|-|											
EXPERT TOTALS	7	0	0	0	0							
CONSENSUS	|--|-|											

G. High reliability and availability. No discernible downtime at the terminals of longer than **1
minute**.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	13	39	3	1	0	0	7	33	9	0	0	0
CONSENSUS		|--|-|						|-|-|				
EXPERT TOTALS	0	7	0	0	0	0	1	2	2	0	0	0
CONSENSUS		|--|-|						|-|--------|				

III.57

APPLICATION DESCRIPTION

<u>Commercial Loan Credit Scoring</u> -- The implementation of a system for automatic evaluation of loans based on credit reports, business analysis and business knowledge in 20 percent of the banks.

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL NOT BE |
| | | | | | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | |
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	5	19	46	7	10	45	13	1	30	33	10
EXPERT TOTALS	1	2	4	2	2	5	2	0	5	3	0

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	7	40	11	0	2
CONSENSUS				|-|-|			
EXPERT TOTALS	0	0	0	8	3	0	0
CONSENSUS				|-|--------|			

REQUIRED CAPABILITIES

A. Multi-attribute pattern matching.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	14	27	7	0	4							
CONSENSUS	|----------|-|											
EXPERT TOTALS	2	7	1	0	0							
CONSENSUS	|--|-|											

B. Advanced data base management system.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	30	16	2	1	3							
CONSENSUS	|--|----------|											
EXPERT TOTALS	5	4	1	0	0							
CONSENSUS	|------|-----|											

C. Search engine <u>100 times</u> today's capabilities.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	6	31	10	2	3	4	32	6	0	0	0	0
CONSENSUS		|--|---------|					|-|-|					
EXPERT TOTALS	0	6	3	1	0	0	5	0	0	0	0	0
CONSENSUS		|--|---------|					|-|-|					

D. Mass storage <u>100 billion bytes</u>.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	9	36	3	1	3	7	16	20	0	1	0	0
CONSENSUS		|--|-|					|-|--------|					
EXPERT TOTALS	0	9	0	1	0	1	2	3	0	0	0	0
CONSENSUS		|--|-|					|----|-----|					

Credit Transfer (Giro) System -- The establishment of a nationwide credit transfer system to supplement the existing check transfer system and to act as a predecessor to the "checkless society." In this system, the normal check flow of buyer to seller to seller's bank to buyer's bank to buyer is reversed so that a credit authorization goes from buyer to buyer's bank to seller's bank. Buyer and seller receive statements verifying the transfer. In this system, a bill may become a credit authorization by having the buyer endorse it and include his account number on it.

IMPACT AND VALUE

	IMPACT ON SOCIETY				REASONS FOR IMPLEMENTATION						WILL NOT BE
					PROFITABLE TO IMPLEMENTOR			USEFUL TO PUBLIC			
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	23	40	15	1	29	37	5	27	26	15	13
EXPERT TOTALS	1	3	2	0	3	2	1	2	2	1	0

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	3	32	23	2	3
CONSENSUS				|-|--------|			
EXPERT TOTALS	0	0	0	3	3	0	1
CONSENSUS				|--------|-|			

REQUIRED CAPABILITIES

A. Positive user identification.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	48	4	1	0	2							
CONSENSUS	|--|-|											
EXPERT TOTALS	5	0	0	0	0							
CONSENSUS	|--|-|											

B. Mass storage <u>100 billion bytes</u>.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	39	11	1	0	1	1	2	35	9	0	0	0
CONSENSUS	|--|--|							|-|-|				
EXPERT TOTALS	3	2	0	0	0							
CONSENSUS	|--|---------|											

C. Advanced data base management system.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	48	5	1	0	1							
CONSENSUS	|--|-|											
EXPERT TOTALS	4	1	0	0	0							
CONSENSUS	|--|-|											

D. Network control.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	48	3	1	0	1							
CONSENSUS	|--|-|											
EXPERT TOTALS	4	1	0	0	0							
CONSENSUS	|--|-|											

APPLICATION DESCRIPTION

Financial Utility -- The establishement of an integrated financial service in 20 percent of the metropolitan areas. The utility (a regulated monopoly?) would primarily provide electronic transfer of funds between demand accounts in subscriber banks making possible such services as automatic deposit of salaries, automatic preauthorized debits and automatic activation of credit lines from various banks or financial institutions. Centralized credit checks could be made taking into account balance on hand, salaries, outstanding loans, and established credit lines.

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL |
| | | | | | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | NOT BE |
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	23	39	17	1	27	38	5	22	30	13	15
EXPERT TOTALS	7	7	4	0	6	9	1	5	7	3	3

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	1	35	21	4	3
CONSENSUS				|-|--------|			
EXPERT TOTALS	0	0	0	10	5	1	0
CONSENSUS				|-|--------|			

REQUIRED CAPABILITIES

A. Massive communication interface 10,000 lines.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	36	13	3	1	1	0	8	39	1	0	0	0
CONSENSUS	|--|---------|							|-|-|				
EXPERT TOTALS	9	3	1	0	0	0	3	8	0	0	0	0
CONSENSUS	|--|---------|						|--------|-|					

B. Network control.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	45	6	3	0	1							
CONSENSUS	|--|-|											
EXPERT TOTALS	13	0	1	0	0							
CONSENSUS	|--|-|											

C. Mass storage of 100 billion bytes.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	37	15	2	1	1	1	12	33	1	0	0	0
CONSENSUS	|--|---------|							|--------|-|				
EXPERT TOTALS	9	3	1	0	0	0	2	8	1	0	0	0
CONSENSUS	|--|---------|							|-|-|				

D. Advanced data base management system.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	38	13	2	0	1							
CONSENSUS	|--|---------|											
EXPERT TOTALS	9	2	1	0	0							
CONSENSUS	|--|--|											

Insurance Support System -- Establishment in 25 percent of the insurance companies of a consolidated system, accessible from a portable agent terminal, providing the functions of total insurance planning (file, health, casualty), customer reviews, and accounting (billing, payments, loans.)

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL NOT BE |
| | | | | | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | |
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	0	13	38	6	17	32	7	9	22	19	5
EXPERT TOTALS	0	6	11	0	4	11	2	3	7	5	0

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	3	30	21	0	1
CONSENSUS				|-|--------|			
EXPERT TOTALS	0	0	1	9	5	0	1
CONSENSUS				|-|--------|			

REQUIRED CAPABILITIES

A. Mass data storage of 100 billion bytes.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	30	10	3	2	3	5	13	24	2	0	0	0
CONSENSUS	|--|---------|						|--------|-|					
EXPERT TOTALS	7	1	1	1	2	2	4	5	1	0	0	0
CONSENSUS	|--|------------------|						|----|-----|					

B. Massive communication interface of 1000 lines.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	37	9	1	0	0	0	3	40	0	0	0	0
CONSENSUS	|--|-|						|-|-|					
EXPERT TOTALS	9	3	0	0	0	0	2	10	0	0	0	0
CONSENSUS	|--|--|						|-|-|					

APPLICATION DESCRIPTION

Integrated Financial Service Systems -- Utilization by 1 percent of the population of independent financial service systems which provide consolidated insurance, investment management, savings planning and financial administration services handled by a single service agent and administered to a single billing account.

IMPACT AND VALUE

| | | IMPACT ON SOCIETY | | | REASONS FOR IMPLEMENTATION | | | | | | WILL |
| | | | | | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | NOT BE |
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	5	22	30	4	20	26	10	18	21	17	8
EXPERT TOTALS	2	8	13	1	9	10	3	4	11	6	3

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	1	26	23	4	1
CONSENSUS				|--------|-|			
EXPERT TOTALS	0	0	1	10	11	0	1
CONSENSUS				|--------|-|			

REQUIRED CAPABILITIES

A. Mass storage 100 billion bytes.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	27	15	3	0	1	0	10	30	1	0	0	0
CONSENSUS	|--|---------|							|-|-|				
EXPERT TOTALS	5	8	3	0	1	0	5	8	0	0	0	0
CONSENSUS	|----------|-|						|--------|-|					

B. Advanced data base management system.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	39	6	0	0	1							
CONSENSUS	|--|-|											
EXPERT TOTALS	14	3	0	0	1							
CONSENSUS	|--|-|											

C. Massive communication interface - 10,000 lines.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	13	27	3	0	1	0	14	24	1	0	0	0
CONSENSUS	|----------|-|						|--------|-|					
EXPERT TOTALS	6	8	1	0	1	0	5	7	0	0	0	0
CONSENSUS	|----------|-|						|--------|-|					

FREIGHT TRANSPORTATION

The freight transportation industries are made up of many
independent carriers with the normal freight shipment involving
two or more different carriers. The future will find a much
greater degree of cooperation between carriers. This cooperation
will be brought about primarily under the auspices of carrier
associations or the Interstate Commerce Commision. Because of
the numbers of carriers involved and their geographical dispersion,
computers will play a large role in coordination and cooperation.

The study results show that by 1980 a shipment might follow this
pattern: the shipper desiring to make a shipment from St. Louis
to Hawaii has his computer consult with a freight rate service
for optimum routings and rates. By this time, this service is
routinely provided by information utilities to 20 percent of the
shippers. Having determined the desired route, his system takes
advantage of a service offered by 5 percent of the interstate
carriers and has his computer forward the requests for pickup,
bills of lading, and routings directly to the local carrier's
computer. The carrier's computer system schedules a local truck
to make th pickup and matches this shipment with others with
similar destinations. When the truck returns to the carrier's
new automated freight terminal (1 percent of the terminals would
be now automated) where the shipment is automatically stored,
containerized with cargo for Hawaii and loaded onto flat cars
for rail shipment to San Francisco. Because this is an inter-
modal shipment (truck, train, and ship) the carrier's computer
system enters the necessary data into the central system sponso-
red by the Interstate Commerce Department which will coordinate
the necessary carriers and track the shipment till it reaches
its destination. Any inquiries are instantly answered by the
system. At the destination the shipment may be again handled
by several carriers with automatic terminals and interconnected
systems until the shipment reaches its addressee.

The railroad industry is faced with growing financial problems.
One solution might be to modernize and automate. Railroad car
tracing, tracking and allocation beginning to be done by indivi-
dual lines in 1970 will be a nationwide reality in 1980. The
location of every car together with its contents will be known
by a computer system maintained by a railroad association. Also
this system will make nationwide allocations of cars to meet
actual or forecasted needs and will make recommendations to lines
on how to route cars to meet the allocations. Trains by this
time will be largely computer controlled in 5 percent of the
main lines and 5 percent of the yards. Each train will respond
to control from a central system and will incorporate collision
avoidance systems to detect blocked tracks.

Navigation and control of ships in open seas and all but the
closest of piloting situations will be under computer direction
reducing the sizes of crews needed to operate them.

FREIGHT TRANSPORTATION

APPLICATION TITLE		1970-71	72-74	75-77	78-80	81-85	LATER	NEVER	IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
AUTOMATED VEHICLE DIAGNOSTIC CENTERS	100- 75- 50- 25- 0- P.C.	 0.0	 0.0	 |-|--------| 65.1	 31.7	 1.6	 1.6	 0.0	2.10	3.13	3.46	‾0.26
FREIGHT RATE SERVICE	100- 75- 50- 25- 0- P.C.	 0.0	 1.8	 21.4	 |-|-| 71.4	 5.4	 0.0	 0.0	1.38	2.98	2.16	‾0.05
INTERCONNECTED SHIPPERS AND CARRIER SYSTEMS	100- 75- 50- 25- 0- P.C.	 0.0	 0.0	 3.8	 |-|-| 71.7	 24.5	 0.0	 0.0	1.39	2.79	2.11	‾0.30
RAILROAD CAR TRACING, TRACKING AND ALLOCATION	100- 75- 50- 25- 0- P.C.	 0.0	 0.0	 9.1	 |-|--------| 65.5	 21.8	 3.6	 0.0	1.50	3.06	2.55	‾0.19
AUTOMATED FREIGHT TERMINALS	100- 75- 50- 25- 0- P.C.	 0.0	 0.0	 1.6	 |-|--------| 65.6	 29.5	 3.3	 0.0	1.38	2.90	1.59	‾0.63
NATION-WIDE COORDINATION OF INTERMODAL FREIGHT SHIPMENTS	100- 75- 50- 25- 0- P.C.	 0.0	 0.0	 0.0	 |-|--------| 61.9	 31.7	 6.3	 0.0	2.36	3.01	2.59	‾0.70
COMPUTER CONTROL OF FREIGHT AND PASSENGER TRAINS	100- 75- 50- 25- 0- P.C.	 0.0	 1.8	 1.8	 |-|--------| 57.1	 39.3	 0.0	 0.0	1.52	2.66	2.09	‾0.42

APPLICATION DESCRIPTION

Automated Freight Terminals -- The automation of 1 percent of the freight terminals. Based on teleprocessing manifests of incoming shipments the terminal system schedules the docks and storage facilities optimumly. Loading, unloading, movement and storage within the terminal is done automatically by automated equipment under computer control.

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL |
| | | | | | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | NOT BE |
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	3	17	46	11	26	33	6	5	25	29	17
EXPERT TOTALS	1	7	15	6	10	9	4	2	8	12	5

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	1	40	18	2	0
CONSENSUS				|-|--------|			
EXPERT TOTALS	0	0	1	17	6	1	0
CONSENSUS				|-|--------|			

ACCELERATING AND RETARDING FACTORS

A. Establishment of a guaranteed annual income removing most of labor's objections to automation.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	8	29	13	0	4	10	13	5	4	2
EXPERT TOTALS	6	13	4	0	2	5	3	3	1	2

B. Establishment of tax incentives for investment in automation.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	15	23	11	0	4	13	6	4	5	6
EXPERT TOTALS	9	12	2	0	3	5	3	1	3	2

REQUIRED CAPABILITIES

A. Network control.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	33	14	3	1	1							
CONSENSUS	|--|--------|											
EXPERT TOTALS	16	3	2	0	1							
CONSENSUS	|--|--------|											

B. Improved algorithms for resource leveling and scheduling.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	19	31	1	1	0							
CONSENSUS	|----------|-|											
EXPERT TOTALS	8	12	1	1	0							
CONSENSUS	|----------|-|											

C. Relatively high reliability - no outages of over one hour.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	34	15	2	0	1	0	2	39	3	0	0	0
CONSENSUS	|--|--------|							|-|-|				
EXPERT TOTALS	15	3	2	0	1	0	1	15	1	0	0	0
CONSENSUS	|--|--------|							|-|-|				

D. Mass storage of 100 billion bytes.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	11	36	4	0	1	1	14	31	0	0	0	0
CONSENSUS		|--|-|					|--------|-|					
EXPERT TOTALS	4	13	3	0	1	1	4	12	0	0	0	0
CONSENSUS		|--|-|					|--------|-|					

APPLICATION DESCRIPTION

Automated Vehicle Diagnostic Centers -- The availability in 20 percent of the metropolitan areas of computer controlled vehicle diagnostic centers. The center would analyze the performance of automobiles and trucks, diagnose all malfunctions (including anti-pollution devices,) recommend repairs and preventive maintenance with price estimates.

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL |
| | | | | | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | NOT BE |
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	10	27	41	2	23	44	10	37	29	12	7
EXPERT TOTALS	6	10	18	1	11	18	4	19	11	4	2

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	41	20	1	1	0
CONSENSUS			|-|--------|				
EXPERT TOTALS	0	0	20	9	0	0	0
CONSENSUS			|-|--------|				

ACCELERATING AND RETARDING FACTORS

A.   Successful implementation of non-automated diagnostic centers.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	12	31	10	6	13	12	8	1	1	4
EXPERT TOTALS	4	15	6	3	5	8	4	1	0	2

REQUIRED CAPABILITIES

A.   Multi-attribute pattern matching.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	12	28	10	0	2							
CONSENSUS		|--|-|										
EXPERT TOTALS	6	14	4	0	2							
CONSENSUS		|--|-|										

B.   Low cost less than $500 per month for the computer system.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	26	20	2	3	3	0	0	38	10	0	0	0
CONSENSUS	|----------|-|							|-|-|				
EXPERT TOTALS	11	11	0	1	2	0	0	15	6	0	0	0
CONSENSUS	|----------|-|							|-|--------|				

C. $5-$10 cost per vehicle

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	9	17	5	1	0	1	0	18	2	0	0	0
CONSENSUS	|----------|-|							|-|-|				
EXPERT TOTALS	5	9	3	1	0	1	0	11	0	0	0	0
CONSENSUS	|----------|-|							|-|-|				

APPLICATION DESCRIPTION

<u>Computer Control of Freight and Passenger Trains</u> -- The implementation of computer systems to control the operation of trains on 5 percent of the main lines and in 5 percent of the yards. The system would track all trains, cause them to respond to block signals, control their operation and utilize collision avoidance to slow or halt the train in the event of the detection of collision paths.

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL |
| | | | | | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO UBLIC | | | NOT BE |
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	5	12	38	7	11	36	10	7	27	20	9
EXPERT TOTALS	2	4	10	0	4	10	2	3	7	4	0

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	1	1	32	22	0	0
CONSENSUS				|-|--------|		
EXPERT TOTALS	0	0	0	8	5	0	0
CONSENSUS				|-|--------|		

REQUIRED CAPABILITIES

A. Network control to connect onboard computers with system control computers.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	40	3	4	1	0							
CONSENSUS	|--|-|										
EXPERT TOTALS	10	1	0	0	0							
CONSENSUS	|--|-|										

B. Massive communication interface - <u>10,000 lines</u>.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	12	26	8	2	0	0	15	27	0	0	0	0
CONSENSUS		|---|-|				|--------|-|				
EXPERT TOTALS	3	4	3	0	0	0	3	6	0	0	0	0
CONSENSUS	|----------|--------|				|--------|-|				

C. Advanced data base management system.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	33	10	3	0	1							
CONSENSUS	|--|--------|										
EXPERT TOTALS	7	3	1	0	0							
CONSENSUS	|--|--------|										

Freight Rate Service -- The availability of a freight rate service to 20 percent of the interstate shippers. The system would allow retrieval of freight rates and the determination of the optimum rate and route.

IMPACT AND VALUE

	IMPACT ON SOCIETY				REASONS FOR IMPLEMENTATION						WILL
					PROFITABLE TO IMPLEMENTOR			USEFUL TO PUBLIC			NOT BE
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	2	12	38	9	12	37	11	6	27	21	1
EXPERT TOTALS	1	4	12	4	6	12	2	4	8	6	0

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	1	12	40	3	0	0
CONSENSUS				|-|-|			
EXPERT TOTALS	0	0	3	12	1	0	0
CONSENSUS				|-|-|			

REQUIRED CAPABILITIES

A. Advanced data base management system.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	31	13	1	0	2							
CONSENSUS	|--|---------|											
EXPERT TOTALS	11	3	1	0	0							
CONSENSUS	|--|---------|											

B. Availability of the application programs from a service organization $200 per month.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	13	30	2	0	2	0	0	39	4	0	0	0
CONSENSUS	|----------|-|							|-|-|				
EXPERT TOTALS	5	8	0	0	1	0	0	13	1	0	0	0
CONSENSUS	|----------|-|							|-|-|				

Interconnected Shippers and Carrier Systems -- The offering by 5 percent of the interstate freight carriers of the ability to interconnect their systems to those of the shippers they serve to allow the authorization to move freight, shipment traces, and bills to be interchanged directly.

IMPACT AND VALUE

	IMPACT ON SOCIETY				REASONS FOR IMPLEMENTATION						WILL NOT BE
					PROFITABLE TO IMPLEMENTOR			USEFUL TO PUBLIC			
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	2	13	36	7	10	37	9	7	25	19	6
EXPERT TOTALS	1	3	8	2	1	12	1	2	6	4	0

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	2	38	13	0	0
CONSENSUS				|-|-|			
EXPERT TOTALS	0	0	1	9	3	0	0
CONSENSUS				|-|-|			

ACCELERATING AND RETARDING FACTORS

A. Nationalization of transportation systems.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	7	17	11	1	0	5	6	1	5	10
EXPERT TOTALS	3	3	2	0	0	2	1	0	2	2

REQUIRED CAPABILITIES

A. Network control.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	34	9	1	1	1							
CONSENSUS	|--|---------|											
EXPERT TOTALS	10	0	1	0	0							
CONSENSUS	|--|-|											

B. Massive communication interface - 1000 lines.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	32	12	2	0	0	0	0	35	5	0	0	0
CONSENSUS	|--|---------|						|-|-|					
EXPERT TOTALS	9	1	1	0	0	0	0	8	0	0	0	0
CONSENSUS	|--|-|						|-|-|					

C. Advanced data base management.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	32	12	1	0	1							
CONSENSUS	|--|---------|											
EXPERT TOTALS	9	1	1	0	0							
CONSENSUS	|--|-|											

Nationwide Coordination of Intermodal Freight Shipments -- The existence of a system to allow the scheduling, coordination and monitoring of freight shipments using any combination of transportation services (train, truck, air, waterway, etc.).

IMPACT AND VALUE

	IMPACT ON SOCIETY				REASONS FOR IMPLEMENTATION						WILL
					PROFITABLE TO IMPLEMENTOR			USEFUL TO PUBLIC			NOT BE
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	12	34	29	4	28	33	5	21	32	9	19
EXPERT TOTALS	1	3	3	0	3	2	1	4	2	0	1

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	0	39	20	4	0
CONSENSUS				|-|-------⌐			
EXPERT TOTALS	0	0	0	4	3	0	0
CONSENSUS				|-|--------|			

ACCELERATING AND RETARDING FACTORS

A. Government ownership of all freight shippers.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	20	19	9	0	1	2	6	3	4	25
EXPERT TOTALS	3	2	1	0	1	0	0	0	1	3

B. ICC establishment of interface standards.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	13	35	2	0	1	10	19	4	4	2
EXPERT TOTALS	2	4	0	0	0	1	3	0	1	0

C. Anti-trust action precluding such cooperation between shippers.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	27	14	9	0	0	2	4	5	6	24
EXPERT TOTALS	4	2	0	0	0	1	0	0	1	2

REQUIRED CAPABILITIES

A. Development of complex scheduling and routing algorithms.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	41	11	1	0	0							
CONSENSUS	|--|-|											
EXPERT TOTALS	3	2	0	0	0							
CONSENSUS	|--|---------|											

B. Mass storage of 100 billion bytes.

	NECESSRY	ASSET	USEFUL	SOME	USE	NO	NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	12	38	2	0		1		0	3	40	3	0	0	0
CONSENSUS	|--|-|									|-|-|				
EXPERT TOTALS	0	5	0	0		0		0	0	5	0	0	0	0
CONSENSUS	|--|-|									|-|-|				

C. Network Control.

	NECESSRY	ASSET	USEFUL	SOME	USE	NO	NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	38	12	2	0		1								
CONSENSUS	|--|---------|													
EXPERT TOTALS	4	1	0	0		0								
CONSENSUS	|--|-|													

D. Advanced data base management system.

	NECESSRY	ASSET	USEFUL	SOME	USE	NO	NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	42	10	2	1		0								
CONSENSUS	|--|-|													
EXPERT TOTALS	4	1	0	0		0								
CONSENSUS	|--|-|													

E. Automatic package label readers.

	NECESSRY	ASSET	USEFUL	SOME	USE	NO	NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	16	25	9	1		0								
CONSENSUS	|----------|-|													
EXPERT TOTALS	0	3	2	0		0								
CONSENSUS	|--|----------|													

Railroad Car Tracing, Tracking and Allocation -- The establishment of a data base system maintaining the continuous location of all railroad cars throughout the North American continent together with their contents. This would allow the shipper to trace his shipment with only one inquiry and would allow optimum allocation of cars to meet actual or forecasted demands.

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL NOT BE |
| | | | | | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | |
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	2	17	32	10	15	36	7	12	28	14	4
EXPERT TOTALS	1	7	8	2	5	11	2	4	10	2	0

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	5	36	12	2	0
CONSENSUS				|-|--------|			
EXPERT TOTALS	0	0	1	11	1	1	0
CONSENSUS				|-|-|			

REQUIRED CAPABILITIES

A. Advanced scheduling algorithms.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	29	15	3	1	0							
CONSENSUS	|--|---------|											
EXPERT TOTALS	4	7	2	0	0							
CONSENSUS	|----------|-|											

B. Mass storage of 100 billion bytes.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	33	13	1	1	0	0	7	38	0	0	0	0
CONSENSUS	|--|---------|							|-|-|				
EXPERT TOTALS	8	4	1	0	0	0	0	10	0	0	0	0
CONSENSUS	|--|---------|							|-|-|				

C. Car identification system.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	48	1	0	0	0							
CONSENSUS	|--|-|											
EXPERT TOTALS	13	0	0	0	0							
CONSENSUS	|--|-|											

D. Network of car identification sensors.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	37	12	0	0	0							
CONSENSUS	|--|-|											
EXPERT TOTALS	7	6	0	0	0							
CONSENSUS	|--|---------|											

E. Massive communication interface - 10,000 lines.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	17	30	1	1	0	1	9	33	0	0	0	0
CONSENSUS	|----------|-|							|-|-|				
EXPERT TOTALS	4	8	1	0	0	0	2	7	0	0	0	0
CONSENSUS	|----------|-|							|-|-|				

F. Network control.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	44	2	1	0	1							
CONSENSUS	|--|-|											
EXPERT TOTALS	12	0	1	0	0							
CONSENSUS	|--|-|											

GOVERNMENT SERVICES

Many of the problems facing modern man are of such magnitude or of such wide scope that they can only be solved by governmental agencies either through direct action or by providing incentives for private enterprise. Because of the size and pervasiveness of the problems the computer may offer the only feasible solution.

One example is the area of air safety. The Federal Aviation Authority today provides air control for scheduled flights and for landings and takeoffs. At the present time they are in the process of installing computerized systems to assist the air controllers in their task. The next logical step, providing actual control of the aircraft during landing and takeoff will be a reality at the ten largest metropolitan airports by 1980. Probably by the same date or certainly by 1985 all air traffic (public, private, and military) throughout the continental United States will be controlled by computer-assisted systems.

State and local governments will continue their search for funds to provide their services. The study indicated that the experience of the existing two state lotteries and the ultimate success of New York's offtrack pari-mutual will lead four more states to join New York with such solutions before 1980. Coordination and control of local betting problems can only be solved by a computer-driven communication network.

The Defense Department will continue to be a large user of computers for the foreseeable future. Such things as computer controlled anti-ballistic missile (ABM) systems capable of handling a 100 missile salvo attack will be a reality by the 1978-80 time period. If the SALT talks should fail and if Red China should develop an intercontinental missile capability by 1977 as predicted by the respondent panel, the implementation may be accelerated.

Public welfare is an area of widespread concern. The panel predicts by 1980 at least ten states will have consolidated their welfare systems into a single computerized system to manage all aspects of welfare, unemployment, workman's compensation, etc. The only factors mitigating against this development would be for the federal government to take over welfare either generally as it exists now or as some form of guaranteed annual income.

The rising costs of health care is another area of concern. The panel believes that compulsory national health insurance will be a reality by 1980. This would be supported by a computer network interconnecting regional and local administrative systems.

The U. S. Weather Bureau has been the prime source of weather forecasts and dates. By 1980 these services will be expanded to

provide two-week computerized forecasts based on circulation
models and worldwide inputs from ground and spaceborne sensors.
By 1985 the necessary hydro and thermodynamics will be included
in the circulation model to make it possible to predict air
pollution given known conditions or sources of pollution.

Effective planning for the utilization of land resources in the
face of growing population and other competing needs will be
attacked by metropolitan and regional planning models in 1978-80
and by a National Land Inventory in 1981-85. These systems will
endeavor to indicate optimum population levels and land uses in
light of such factors as: labor and job mix, transportation costs,
tax base, recreation facilities, school requirements, environment
pollution, aesthetic qualities, etc. On a national and international
level, systems will be available after 1981 to assist governments
in planning resource management, international trade, transporta-
tion, population growth, food resources management, etc. These
systems will be of particular importance to developing countries.

Much concern is evidenced in the popular media over loss of
privacy brought about by the creation of government data banks.
Nevertheless, such systems--suitably controlled to insure against
abuse--will be created because the advantages will be too large
to ignore. 1981-85 will find such data banks as nationwide driver
and vehicle registration, and nationwide voter registration file
in existence. On the other hand, a single personal data bank
containing birth to death information on everyone no matter how
protected is so far in the future that it may be considered in
the never category.

APPLICATION TITLE		1970-71	72-74	75-77	78-80	81-85	LATER	NEVER	IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
AUTOMATED LANDINGS AND TAKEOFFS									2.78	2.73	3.21	‾0.44
	P.C.	0.0	0.0	25.4	57.1	14.3	3.2	0.0				
GOVERNMENT OPERATED LOTTERIES AND PARI-MUTUAL BETTING									1.62	2.62	1.52	‾0.49
	P.C.	0.0	1.8	17.9	64.3	8.9	1.8	5.4				
NATIONWIDE AIR TRAFFIC CONTROL									3.41	3.14	4.38	‾0.07
	P.C.	0.0	0.0	23.1	67.7	7.7	1.5	0.0				
DEFENSE AGAINST A 100 MISSILE SALVO ATTACK									2.74	2.29	2.77	‾0.55
	P.C.	0.0	0.0	3.5	70.2	17.5	3.5	5.3				
CONSOLIDATED PUBLIC WELFARE SYSTEMS									2.80	2.16	2.83	‾0.48
	P.C.	0.0	1.7	1.7	65.0	26.7	1.7	3.3				
NATIONAL HEALTH INSURANCE SYSTEMS									2.49	2.25	2.66	‾0.51
	P.C.	0.0	0.0	7.5	60.4	28.3	3.8	0.0				
AUTOMATED WEATHER FORECASTING									2.89	2.28	3.61	‾0.44
	P.C.	0.0	0.0	3.4	69.5	20.3	6.8	0.0				
METROPOLITAN PLANNING MODELS									3.29	2.65	3.52	‾0.24
	P.C.	0.0	0.0	0.0	59.3	37.0	3.7	0.0				

III.74

APPLICATION TITLE		1970-71	72-74	75-77	78-80	81-85	LATER	NEVER	IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED

NATION-WIDE DRIVER AND VEHICLE DATA BANK

IMPACT ON SOCIETY 2.34 · PROFITABLE TO IMPLEMENTOR 2.47 · USEFUL TO PUBLIC 2.66 · WILL NOT BE IMPLEMENTED ⁻0.34

P.C. 0.0 0.0 0.0 27.1 66.1 5.1 1.7

AUTOMATED FINGERPRINT ANALYSIS

IMPACT ON SOCIETY 2.39 · PROFITABLE TO IMPLEMENTOR 2.39 · USEFUL TO PUBLIC 2.58 · WILL NOT BE IMPLEMENTED ⁻0.34

P.C. 0.0 0.0 1.8 41.8 40.0 14.5 1.8

GOVERNMENTAL PLANNING SYSTEMS FOR DEVELOPING COUNTRIES

IMPACT ON SOCIETY 2.73 · PROFITABLE TO IMPLEMENTOR 2.07 · USEFUL TO PUBLIC 2.35 · WILL NOT BE IMPLEMENTED ⁻0.95

P.C. 0.0 0.0 0.0 5.8 51.9 36.5 5.8

NATIONAL LAND INVENTORY

IMPACT ON SOCIETY 2.63 · PROFITABLE TO IMPLEMENTOR 1.77 · USEFUL TO PUBLIC 2.65 · WILL NOT BE IMPLEMENTED ⁻0.82

P.C. 0.0 0.0 0.0 3.7 53.7 31.5 11.1

AUTOMATED PUBLIC LIBRARIES

IMPACT ON SOCIETY 2.17 · PROFITABLE TO IMPLEMENTOR 1.67 · USEFUL TO PUBLIC 2.62 · WILL NOT BE IMPLEMENTED ⁻0.74

P.C. 0.0 0.0 0.0 1.6 70.3 26.6 1.6

NATION-WIDE VOTER REGISTRATION

IMPACT ON SOCIETY 2.37 · PROFITABLE TO IMPLEMENTOR 1.75 · USEFUL TO PUBLIC 2.35 · WILL NOT BE IMPLEMENTED ⁻0.75

P.C. 0.0 0.0 0.0 5.5 60.0 29.1 5.5

HUMAN RESOURCE SYSTEMS

IMPACT ON SOCIETY 2.95 · PROFITABLE TO IMPLEMENTOR 1.50 · USEFUL TO PUBLIC 2.18 · WILL NOT BE IMPLEMENTED ⁻1.26

P.C. 0.0 0.0 0.0 0.0 7.5 73.6 18.9

PERSONAL DATA BANKS

IMPACT ON SOCIETY 3.19 · PROFITABLE TO IMPLEMENTOR 1.56 · USEFUL TO PUBLIC 1.83 · WILL NOT BE IMPLEMENTED ⁻1.67

P.C. 0.0 0.0 1.7 1.7 6.7 65.0 25.0

III.75

Automated Fingerprint Analysis -- The existence of a system that can, with reasonable probability, identify an arbitrary print from a master file without supporting data. This is in contrast to current systems, both manual and automated, where the probability of locating a match is virtually zero unless one has a small set of suspects.

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL NOT BE |
| | PROFITABLE TO IMPLEMENTOR | | | | | | | USEFUL TO PUBLIC | | | |
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	10	25	23	2	10	27	17	13	28	11	7
EXPERT TOTALS	2	3	2	0	3	3	0	3	3	1	0

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	1	23	22	8	1
CONSENSUS				|--------|-|			
EXPERT TOTALS	0	0	0	2	2	2	0
CONSENSUS				|--------|--------|			

ACCELERATING AND RETARDING FACTORS

A. Development of some other physical identification means to replace identification for other than latent fingerprints.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	12	18	10	0	1	7	9	3	9	2
EXPERT TOTALS	2	2	0	0	0	0	0	0	2	0

REQUIRED CAPABILITIES

A. Multi-attribute pattern matching.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	45	1	0	0	1							
CONSENSUS	|--|-|											
EXPERT TOTALS												
CONSENSUS												

B. Mass data storage of 10 billion bytes.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	35	11	2	0	0	0	1	37	4	2	0	0
CONSENSUS	|--|---------|							|-|-|				
EXPERT TOTALS												
CONSENSUS												

C. Ten-fold increase in image processing technology; scanning, digital conversion, storage and display.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	37	7	2	1	1	0	0	35	7	0	0	0
CONSENSUS	|--|-|							|-|-|				
EXPERT TOTALS												
CONSENSUS												

D. Fingerprint scanning device.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	42	3	2	0	0							
CONSENSUS	|--|-|											
EXPERT TOTALS												
CONSENSUS												

E. Graphical storage and retrieval - one billion pages.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	12	31	3	0	2	1	9	28	1	0	0	0
CONSENSUS		|---|-|					|--------|-|					
EXPERT TOTALS												
CONSENSUS												

Automated Landings and Takeoffs -- The utilization of automated control of airplanes in the patterns and during landing and takeoff at the ten largest metropolitan airports.

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL |
| | | | | | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | NOT BE |
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	25	26	22	5	21	36	8	39	19	8	12
EXPERT TOTALS	5	7	1	2	5	8	2	10	3	1	1

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	16	36	9	2	0
CONSENSUS			|--------|-|				
EXPERT TOTALS	0	0	7	3	4	1	0
CONSENSUS			|--------|--------|				

ACCELERATING AND RETARDING FACTORS

A. A major crash shortly after start up of the first system.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	13	31	13	0	3	10	6	7	4	4
EXPERT TOTALS	4	7	3	0	1	3	3	2	1	0

B. A major crash with substantial loss of life during take off or landing involving one of the jumbo jets.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	17	29	12	2	12	11	5	4	2	2
EXPERT TOTALS	4	7	3	1	4	4	1	0	1	0

REQUIRED CAPABILITIES

A. No-fail system, both hardware and software.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	49	4	0	1	0							
CONSENSUS	|--|-|											
EXPERT TOTALS	12	1	0	0	0							
CONSENSUS	|--|-|											

B. On-board computers for fast response and emergency back up.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10Y-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	49	4	1	0	0							
CONSENSUS	|--|-|											
EXPERT TOTALS	11	2	0	0	0							
CONSENSUS	|--|-|											

Automated Public Libraries -- The availability in 20 percent of the metropolitan areas of computerized libraries providing terminal searches in the library of abstracts of their documents and automated retrieval and delivery of the selected document or a copy of it.

IMPACT AND VALUE

	IMPACT ON SOCIETY				REASONS FOR IMPLEMENTATION						WILL
					PROFITABLE TO IMPLEMENTOR			USEFUL TO PUBLIC			NOT BE
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	11	28	37	2	7	22	34	20	32	16	20
EXPERT TOTALS	2	9	10	0	1	7	10	4	13	2	4

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	0	1	45	17	1
CONSENSUS					|-|--------|		
EXPERT TOTALS	0	0	0	0	15	7	0
CONSENSUS					|-|--------|		

ACCELERATING AND RETARDING FACTORS

A. Availability of two-way switched CATV in 20% of the metropolitan areas.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	11	25	18	0	1	13	22	6	2	0
EXPERT TOTALS	5	10	5	0	1	4	11	1	0	0

B. Federal subsidy.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	27	20	5	0	4	10	13	10	4	6
EXPERT TOTALS	9	8	1	0	2	5	4	3	0	3

REQUIRED CAPABILITIES

A. Mass storage - **1 trillion bytes**.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	31	21	3	0	1	3	13	30	5	1	0	0
CONSENSUS	|--|---------|						|--------|-|					
EXPERT TOTALS	11	7	0	0	0	0	1	12	2	0	0	0
CONSENSUS	|--|---------|						|-|-|					

B. Search engine **100 times** as fast as today's.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	12	36	7	0	1	1	8	34	7	1	0	0
CONSENSUS		|--|-|						|-|-|				
EXPERT TOTALS	4	10	4	0	0	0	1	13	2	0	0	0
CONSENSUS		|--|-|						|-|-|				

C. Automated system for entry of the published data, includes multifont readers, page turners and selective scan to distinguish an article from its adjacent material and to follow continued on page x situations.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	14	39	2	3	0							
CONSENSUS		|--|-|										
EXPERT TOTALS	4	16	0	0	0							
CONSENSUS		|--|-|										

D. Automated abstracting system.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	19	34	4	0	0							
CONSENSUS	|----------|-|											
EXPERT TOTALS	4	14	1	0	0							
CONSENSUS		|--|-|										

E. Computer network control.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	10	26	13	5	3							
CONSENSUS		|--|---------|										
EXPERT TOTALS	2	11	6	1	0							
CONSENSUS		|--|---------|										

F. Document display and reproduction terminal **$50 per month**.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	19	33	4	0	1	0	0	45	6	0	0	0
CONSENSUS	|----------|-|							|-|-|				
EXPERT TOTALS	6	12	2	0	0	0	0	12	1	0	0	0
CONSENSUS	|----------|-|				III.78			|-|-|				

Automated Weather Forecasting -- The availability of an automated weather forecasting system capable of producing weather forecasts for two weeks in advance which are at least as accurate as today's two-to-three day forecasts.

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL NOT BE |
| | | | | | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | |
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	20	39	20	0	13	35	17	46	20	6	12
EXPERT TOTALS	6	8	4	0	1	7	6	13	5	0	1

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	11	0	2	41	12	4	0
CONSENSUS				|-|--------|			
EXPERT TOTALS	0	0	1	13	3	0	0
CONSENSUS				|-|-|			

ACCELERATING AND RETARDING FACTORS

A. Development of spaceborne weather sensors.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	5	30	11	1	8	17	9	0	0	0
EXPERT TOTALS	1	12	2	0	5	6	2	0	0	0

REQUIRED CAPABILITIES

A. Mass storage of one trillion bytes for the statistical experience (what weather patterns produce rain and where, e.g.)

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	16	32	3	1	0	2	8	33	2	0	0	0
CONSENSUS	|---------|-|							|-|-|				
EXPERT TOTALS	3	10	1	0	0	0	2	8	2	0	0	0
CONSENSUS	|--|-|							|-|-|				

B. Processor performance of 100 MIPS (millions of instructions per second.)

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	18	23	8	0	1	1	10	29	4	0	0	0
CONSENSUS	|----------|-|							|--|-|				
EXPERT TOTALS	4	8	1	0	0	0	3	8	0	0	0	0
CONSENSUS	|----------|-|							|--------|-|				

C. Core storage of 10 million bytes.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	37	11	3	0	1	1	2	42	1	0	0	0
CONSENSUS	|--|---------|							|-|-|				
EXPERT TOTALS	10	2	1	0	0	0	1	10	0	0	0	0
CONSENSUS	|--|-|							|-|-|				

D. Advanced data base management.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	33	14	5	0	1							
CONSENSUS	|--|---------|											
EXPERT TOTALS	12	1	1	0	0							
CONSENSUS	|--|-|											

E. Massive communication interface for collection of worldwide weather data.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	47	2	3	0	1							
CONSENSUS	|--|-|											
EXPERT TOTALS	11	1	1	0	1							
CONSENSUS	|--|-|											

APPLICATION DESCRIPTION

Consolidated Public Welfare Systems -- The implementation of systems to manage all aspects of public welfare in ten states. The system maintains an integrated data base of welfare, unemployment and workman's compensation recipients.

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL NOT BE |
| | | | | | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | |
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	18	38	23	0	14	27	24	25	30	14	13
EXPERT TOTALS	7	10	6	0	5	7	8	7	9	6	2

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	1	1	39	16	1	2
CONSENSUS				|-|--------|			
EXPERT TOTALS	0	0	1	16	3	1	0
CONSENSUS				|-|-|			

ACCELERATING AND RETARDING FACTORS

A. Consolidation of welfare systems under a federal agency.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	31	18	4	1	8	8	13	7	7	4
EXPERT TOTALS	15	5	0	0	6	1	2	4	3	2

REQUIRED CAPABILITIES

A. Mass data storage, 100 billion bytes.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	30	17	3	0	1	4	13	30	0	0	0	0
CONSENSUS	|--|--------|						|--------|-|					
EXPERT TOTALS	6	8	1	0	1	1	5	7	0	0	0	0
CONSENSUS	|----------|-|						|--------|-|					

B. Automated generation of information systems.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	4	30	13	3	2							
CONSENSUS	|--|--------|											
EXPERT TOTALS	0	10	5	0	2							
CONSENSUS	|--|--------|											

C. Search engine 100 times today's capabilities.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	12	25	7	4	3	3	13	28	3	0	0	0
CONSENSUS	|--|--------|						|--------|-|					
EXPERT TOTALS	4	7	2	1	2	1	2	9	1	0	0	0
CONSENSUS	|---|--------|						|-|-|					

APPLICATION DESCRIPTION

Defense Against a 100 Missile Salvo Attack -- The existence of a computerized system capable of detecting, distinguishing, tracking, and routing interceptor missile to destroy an attack by 100 missiles.

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL |
| | | | | | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | NOT BE |
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	26	20	21	7	22	15	21	34	9	16	14
EXPERT TOTALS	3	0	4	1	2	2	0	3	0	1	3

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	2	40	10	2	3
CONSENSUS				|-|--------|			
EXPERT TOTALS	0	0	0	6	2	0	1
CONSENSUS				|-|--------|			

ACCELERATING AND RETARDING FACTORS

A. Failure to the SALT talks.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	12	27	6	5	16	6	3	0	1	2
EXPERT TOTALS	1	5	1	1	6	0	0	0	0	0

B. Development of intercontinental missile capability by Red China.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	19	21	5	1	11	22	5	1	0	0
EXPERT TOTALS	4	1	2	0	2	5	0	0	0	0

REQUIRED CAPABILITIES

A. Very high performance 1000 MIPS (million of instructions per second.)

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	37	6	2	0	0	0	5	33	0	0	0	1
CONSENSUS	|--|-|							|-|-|				
EXPERT TOTALS	5	1	0	0	0							
CONSENSUS	|--|-|											

B. Response time of one usec.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	31	10	1	0	1	1	2	35	0	0	0	0
CONSENSUS	|--|---------|							|-|-|				
EXPERT TOTALS	2	3	0	0	0							
CONSENSUS	|----------|-|											

C. Network control.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	44	1	0	0	1							
CONSENSUS	|--|-|											
EXPERT TOTALS	6	1	0	0	0							
CONSENSUS	|--|-|											

Government Operating Lotteries and Pari-Mutual Betting -- The use of computer-assisted systems in 10 percent of the states to support state lotteries and off-track betting. The systems would include the data processing associated with the administration of such systems and the calculation of odds and payoffs for the pari-mutual outlets.

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL NOT BE |
| | | | | | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | |
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	6	14	27	9	13	29	8	3	16	30	10
EXPERT TOTALS	2	4	5	2	3	5	3	0	5	7	2

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	1	10	36	5	1	3
CONSENSUS				|-|-|			
EXPERT TOTALS	0	1	2	8	0	0	0
CONSENSUS			|--------|-|				

ACCELERATING AND RETARDING FACTORS

A. Success of pilot installation (NYC):

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	8	21	10	2	17	9	3	0	0	0
EXPERT TOTALS	5	3	1	2	3	0	1	0	0	0

REQUIRED CAPABILITIES

A. Ten-fold increase in hardware security features.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	29	14	3	1	1	1	3	35	1	0	0	0
CONSENSUS	|--|---------|							|-|-|				
EXPERT TOTALS	3	5	1	0	0	0	1	4	0	0	0	0
CONSENSUS	|----------|-|							|-|-|				

B. Massive communication interface 10,000 lines.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	28	16	3	1	0	0	7	34	1	0	0	0
CONSENSUS	|--|---------|							|-|-|				
EXPERT TOTALS	5	3	1	0	0	0	1	5	0	0	0	0
CONSENSUS	|--|---------|							|-|-|				

Governmental Planning Systems for Developing Countries -- The utilization by 5 percent of the "Emerging Nations" of computerized systems to plan international trade, internal distribution, communications, transportation, business opportunities, resource development, etc.

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL NOT BE IMPLEMENTED |
	MAJOR	SIGNIF.	LITTLE	NO	PROFITABLE TO IMPLEMENTOR			USEFUL TO PUBLIC			
					VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	
GROUP TOTALS	10	34	12	0	8	23	15	12	23	12	19
EXPERT TOTALS	2	4	3	0	2	6	0	4	3	2	1

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	0	3	27	19	3
CONSENSUS					|-|--------|		
EXPERT TOTALS	0	0	0	1	3	4	0
CONSENSUS					|----|-----|		

ACCELERATING AND RETARDING FACTORS

A. Joint U.S. - USSR funding effort.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	17	16	6	0	0	5	8	3	5	12
EXPERT TOTALS	4	1	2	0	0	1	2	0	1	2

B. Availability of planning model.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	12	28	1	0	1	8	14	8	4	1
EXPERT TOTALS	2	5	0	0	1	2	1	2	0	0

REQUIRED CAPABILITIES

A. Model development service.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	30	10	6	0	0							
CONSENSUS	|--|---------|											
EXPERT TOTALS	4	2	1	0	0							
CONSENSUS	|--|---------|											

B. Mass storage of 100 billion bytes.

	NECESSRY	ASSET	USEFUL	SOME	USE NO	NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	28	12	3	1	1	1	3		31	5	1	0	0
CONSENSUS	|--|---------|								|-|-|				
EXPERT TOTALS	3	3	0	0	1	0	0		4	1	0	0	0
CONSENSUS	|---------|-|								|-|-|				

Human Resource Systems -- The availability of international communications-based systems designed to evaluate and recommend alternative/optimum solutions to world health and welfare problems: such as population growth, food resources management, and general economic well being.

IMPACT AND VALUE

	IMPACT ON SOCIETY				REASONS FOR IMPLEMENTATION						WILL NOT BE IMPLEMENTED
					PROFITABLE TO IMPLEMENTOR			USEFUL TO PUBLIC			
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	
GROUP TOTALS	19	27	7	1	3	20	18	16	15	10	26
EXPERT TOTALS	1	3	2	0	0	4	1	1	3	1	2

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	0	0	4	39	10
CONSENSUS						|-|-|	
EXPERT TOTALS	0	0	0	0	0	7	0
CONSENSUS						|-|-|	

ACCELERATING AND RETARDING FACTORS

A. Legislated due to severe population or pollution problems.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	14	14	9	0	1	1	5	4	12	6
EXPERT TOTALS	1	3	1	0	0	0	1	1	2	0

REQUIRED CAPABILITIES

A. Network control.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	32	11	2	1	1							
CONSENSUS	|--|---------|											
EXPERT TOTALS	5	1	0	0	0							
CONSENSUS	|--|-|											

B. Multi language interface capability.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	33	11	1	1	2							
CONSENSUS	|--|---------|											
EXPERT TOTALS	5	1	0	0	0							
CONSENSUS	|--|-|											

C. Automated generation of information systems.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	10	24	8	2	3							
CONSENSUS		|--|---------|										
EXPERT TOTALS	2	4	0	0	0							
CONSENSUS	|---------|-|											

D. Development of a human resources simulation model.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	41	5	1	0	1							
CONSENSUS	|--|-|											
EXPERT TOTALS	5	1	0	0	0							
CONSENSUS	|--|-|											

APPLICATION DESCRIPTION

<u>Metropolitan Planning Models</u> -- The utilization by 5 percent of the metropolitan areas of planning models to aid officials in planning future expansion of cities. The models will provide optimum population levels by balancing such factors as: labor and job mix, transportation costs, tax base, recreational facilities, school requirements, environment pollution, government financing requirements, aesthetic qualities, etc.

IMPACT AND VALUE

	IMPACT ON SOCIETY				REASONS FOR IMPLEMENTATION						WILL
					PROFITABLE TO IMPLEMENTOR			USEFUL TO PUBLIC			NOT BE
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	20	33	8	1	15	26	14	30	22	6	5
EXPERT TOTALS	7	6	1	1	4	6	2	7	6	1	1

IMPLEMENTATION DATE

	1977-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	0	32	20	2	0
CONSENSUS				|-|--------|			
EXPERT TOTALS	0	0	0	9	4	0	0
CONSENSUS				|-|-------|			

REQUIRED CAPABILITIES

A. <u>Ten-fold</u> increase in simulation techniques.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	31	15	2	0	1	0	1	34	5	0	0	0
CONSENSUS	|--|---------|							|-|-|				
EXPERT TOTALS	7	5	0	0	0	0	0	7	0	0	0	0
CONSENSUS	|--|----------|							|-|-|				

B. Mass storage of <u>10 billion bytes</u>.

	NECESSRY	ASSET	USEFUL	SOME	USE NO	NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	13	32	1	1	0	0	4	33	4	2	0	0	
CONSENSUS	|----------|-|							|-|-|				
EXPERT TOTALS	4	6	0	0	0	0	1	7	0	1	0	0	
CONSENSUS	|----------|-|							|-|-|				

C. Interactive terminal system including complex search and interactive pattern matching for assistance in building the model.

	NECESSRY	ASSET	USEFUL	SOME	USE NO	NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	29	18	1	0	1	0	0	23	3	0	0	0	
CONSENSUS	|--|---------|							|-|-|				
EXPERT TOTALS	8	4	0	0	0								
CONSENSUS	|--|---------|												

III.85

APPLICATION DESCRIPTION

<u>Metropolitan Planning Models</u> -- The utilization by 5 percent of the metropolitan areas of planning models to aid officials in planning future expansion of cities. The models will provide optimum population levels by balancing such factors as: labor and job mix, transportation costs, tax base, recreational facilities, school requirements, environment pollution, government financing requirements, aesthetic qualities, etc.

IMPACT AND VALUE

	IMPACT ON SOCIETY				REASONS FOR IMPLEMENTATION						WILL
					PROFITABLE TO IMPLEMENTOR			USEFUL TO PUBLIC			NOT BE
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	20	33	8	1	15	26	14	30	22	6	5
EXPERT TOTALS	7	6	1	1	4	6	2	7	6	1	1

IMPLEMENTATION DATE

	1977-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	0	32	20	2	0
CONSENSUS				|-|--------|			
EXPERT TOTALS	0	0	0	9	4	0	0
CONSENSUS				|-|-------|			

REQUIRED CAPABILITIES

A. <u>Ten-fold</u> increase in simulation techniques.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	31	15	2	0	1	0	1	34	5	0	0	0
CONSENSUS	|--|---------|							|-|-|				
EXPERT TOTALS	7	5	0	0	0	0	0	7	0	0	0	0
CONSENSUS	|--|----------|							|-|-|				

B. Mass storage of <u>10 billion bytes</u>.

	NECESSRY	ASSET	USEFUL	SOME	USE NO	NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	13	32	1	1	0	0	4	33	4	2	0	0	
CONSENSUS	|----------|-|							|-|-|				
EXPERT TOTALS	4	6	0	0	0	0	1	7	0	1	0	0	
CONSENSUS	|----------|-|							|-|-|				

C. Interactive terminal system including complex search and interactive pattern matching for assistance in building the model.

	NECESSRY	ASSET	USEFUL	SOME	USE NO	NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	29	18	1	0	1	0	0	23	3	0	0	0	
CONSENSUS	|--|---------|							|-|-|				
EXPERT TOTALS	8	4	0	0	0								
CONSENSUS	|--|---------|												

Nationwide Air Traffic Control -- The availability of a system for monitoring and controlling all air traffic -- public, private, and military throughout continental United States.

IMPACT AND VALUE

	IMPACT ON SOCIETY				REASONS FOR IMPLEMENTATION						WILL NOT BE IMPLEMENTED
					PROFITABLE TO IMPLEMENTOR			USEFUL TO PUBLIC			
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	
GROUP TOTALS	38	23	17	3	30	30	14	63	13	1	2
EXPERT TOTALS	9	4	1	0	6	3	3	12	2	0	0

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	15	44	5	1	0
CONSENSUS				|-|-|			
EXPERT TOTALS	0	0	5	5	2	0	0
CONSENSUS			|--------|-|				

ACCELERATING AND RETARDING FACTORS

A. Three major accidents in a period of six months involving mid-air collisions.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	18	30	10	0	13	9	6	3	1	5
EXPERT TOTALS	3	7	1	0	2	2	2	0	0	2

B. Federal appropriation for the system.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	33	21	4	0	13	27	5	3	0	0
EXPERT TOTALS	7	4	0	0	1	7	1	1	0	0

C. Rejection of the system by the pilots association.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	23	25	5	0	5	2	3	7	6	22
EXPERT TOTALS	6	3	1	0	3	0	0	1	0	4

REQUIRED CAPABILITIES

A. No-fail system; both hardware and software.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	46	9	1	0	1							
CONSENSUS	|--|-|											
EXPERT TOTALS	9	0	1	0	0							
CONSENSUS	|--|-|											

B. Network control.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	53	2	1	0	1							
CONSENSUS	|--|-|											
EXPERT TOTALS	10	0	0	0	0							
CONSENSUS	|--|-|											

C. Interactive three-dimensional display.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	18	34	3	0	1							
CONSENSUS	|----------|-|											
EXPERT TOTALS	3	7	0	0	0							
CONSENSUS	|----------|-|											

D. Reliable position and identification transponders for all aircraft $1,000 purchase.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	41	12	3	0	0	0	3	45	2	0	0	0
CONSENSUS	|--|---------|							|-|-|				
EXPERT TOTALS	8	2	0	0	0	0	0	7	0	0	0	0
CONSENSUS	|--|-|							|-|-|				

E. Mass storage of 1 trillion bytes accessible in microseconds.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	32	20	1	0	2	5	16	29	0	0	0	0
CONSENSUS	|--|---------|						|--------|-|					
EXPERT TOTALS	7	3	0	0	0	0	4	3	0	0	0	0
CONSENSUS	|--|---------|						|-|--------|					

APPLICATION DESCRIPTION

<u>Nationwide Driver and Vehicle Data Bank</u> -- A national data bank of driver and vehicle licensing information. The system would be used by states to determine eligibility for license of a new resident and to check ownership of vehicles being newly registered in the state. The system would contain consolidated driving records and could be sold to insurance companies for use in determining premium rates.

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL |
| | | | | | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | NOT BE |
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	9	26	22	3	10	29	16	15	25	15	7
EXPERT TOTALS	4	10	5	1	2	13	4	5	10	3	3

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	0	16	39	3	1
CONSENSUS				|--------|-|			
EXPERT TOTALS	0	0	0	5	11	1	0
CONSENSUS				|--------|-|			

REQUIRED CAPABILITIES

A. Network control.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	37	11	2	1	1							
CONSENSUS	|--|---------|											
EXPERT TOTALS	11	3	1	0	0							
CONSENSUS	|--|---------|											

B. <u>Ten times</u> improvement in security features.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	31	11	7	0	2	0	1	39	4	0	0	0
CONSENSUS	|--|---------|							|-|-|				
EXPERT TOTALS	7	6	1	0	0	0	0	10	1	0	0	0
CONSENSUS	|------|-----|							|-|-|				

C. Mass storage <u>100 billion bytes</u>.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	35	12	3	0	1	0	11	31	5	0	0	0
CONSENSUS	|--|---------|							|-|-|				
EXPERT TOTALS	8	4	2	0	0	0	5	6	1	0	0	0
CONSENSUS	|--|---------|						|--------|-|					

D. Advanced data base management.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	34	15	1	0	1							
ZONSENSUS	|--|---------|											
EXPERT TOTALS	9	6	0	0	0							
CONSENSUS	|--|---------|											

National Health Insurance Systems -- A system to support the requirements of a National Health Insurance Program. It would be linked to and support state/regional administration locations.

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL |
| | | | | | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | NOT BE |
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	9	29	15	2	8	26	15	16	22	11	10
EXPERT TOTALS	3	9	1	0	3	6	4	5	6	2	0

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	4	32	15	2	0
CONSENSUS				|-|--------|			
EXPERT TOTALS	0	0	4	6	1	0	0
CONSENSUS			|--------|-|				

ACCELERATING AND RETARDING FACTORS

A. Passage of enabling legislation.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	23	15	1	0	7	16	8	3	2	0
EXPERT TOTALS	8	1	0	0	3	4	2	0	0	0

REQUIRED CAPABILITIES

A. Mass storage of 100 billion bytes.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	29	15	2	0	1	0	2	38	1	0	0	0
CONSENSUS	|--|---------|							|-|-|				
EXPERT TOTALS	3	4	0	0	1	0	1	5	0	0	0	0
CONSENSUS	|----------|-|							|-|-|				

B. Network control.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	37	8	1	0	1							
CONSENSUS	|--|-|											
EXPERT TOTALS	7	0	1	0	0							
CONSENSUS	|--|-|											

C. Advanced data base management system.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	42	3	1	0	1							
CONSENSUS	|--|-|											
EXPERT TOTALS	7	0	1	0	0							
CONSENSUS	|--|-|											

National Land Inventory -- The implementation of a system to maintain an inventory of the uses of the nations land. Proposed new uses would be evaluated against a plan developed to consider the optimum use of our national land asset. The plan would balance competing uses for commercial, residential, recreational, urban, suburban, rural, etc., taking into account economical, socialogical, ecological, and aesthetic considerations.

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL NOT BE |
	MAJOR	SIGNIF.	LITTLE	NO	PROFITABLE TO IMPLEMENTOR VERY	MODERT	MARGINAL	USEFUL TO PUBLIC VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	13	28	14	2	4	24	18	18	22	8	17
EXPERT TOTALS	6	5	2	0	1	5	4	6	4	0	3

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	0	2	29	17	6
CONSENSUS					|-|--------|		
EXPERT TOTALS	0	0	0	2	5	4	0
CONSENSUS					|-|--------|		

REQUIRED CAPABILITIES

A. Mass data storage of 100 billion bytes.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	34	13	1	0	1	0	4	31	8	0	1	0
CONSENSUS	|--|---------|							|-|-|				
EXPERT TOTALS	7	3	0	0	0	0	1	6	0	0	1	0
CONSENSUS	|--|---------|							|-|-|				

B. Advanced data base management system.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	44	3	1	0	1							
CONSENSUS	|--|-|											
EXPERT TOTALS	10	0	0	0	0							
CONSENSUS	|--|-|											

C. Development of a complex land model.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	33	12	3	0	1							
CONSENSUS	|--|---------|											
EXPERT TOTALS	8	1	1	0	0							
CONSENSUS	|--|-|											

Nationwide Voter Registration -- The existence of a data bank containing nationwide registration data on all voters. Voters would be required to report changes of address. Cities and states would use data bank to determine voter eligibility.

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL NOT BE |
| | | | | | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | |
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	11	22	21	2	4	22	19	15	17	15	15
EXPERT TOTALS	5	6	2	0	0	7	2	3	4	2	4

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	0	3	33	16	3
CONSENSUS					|-|--------|		
EXPERT TOTALS	0	0	0	0	6	5	2
CONSENSUS					|--------|-|		

REQUIRED CAPABILITIES

A. Security/fraud detection and prevention facilities.

	NECESSRY	ASSET	USEFUL SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	45	1	1	0	0						
CONSENSUS	|--|-|										
EXPERT TOTALS	11	0	0	0	0						
CONSENSUS	|--|-|										

B. Mass data storage of 100 billion bytes.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	30	14	2	0	0	0	3	38	3	0	0	0
CONSENSUS	|--|--------|							|-|-|				
EXPERT TOTALS	7	4	0	0	0	0	1	7	1	0	0	0
CONSENSUS	|--|--------|							|-|-|				

C. Network control.

	NECESSRY	ASSET	USEFUL	SOME	USE NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	32	10	2	1	1							
CONSENSUS	|--|--------|											
EXPERT TOTALS	9	2	0	0	0							
CONSENSUS	|--|-|											

Personal Data Banks -- The creation of a system that logically integrates all data related to individuals including but not limited to financial information, credit ratings, criminal conviction records, medical histories, scholastic histories, census data, etc. The individual would have complete access to the contents of his file and would have legal recourse to change any erroneous entries. No other files, public or private, commercial or governmental could legally contain personal information. Access to the files would be available to organizations with a need but it would be rigoruously controlled to prevent loss of privacy.

IMPACT AND VALUE

	IMPACT ON SOCIETY				REASONS FOR IMPLEMENTATION						WILL NOT BE
					PROFITABLE TO IMPLEMENTOR			USEFUL TO PUBLIC			
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	30	15	6	0	4	23	9	14	11	12	35
EXPERT TOTALS	15	3	0	0	1	8	1	5	3	3	14

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	1	1	4	39	15
CONSENSUS						|-|--|	
EXPERT TOTALS	0	0	1	0	1	14	6
CONSENSUS						|-|--------|	

REQUIRED CAPABILITIES

A. Mass data storage of 100 trillion bytes.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	42	1	3	1	1	3	12	31	0	0	0	0
CONSENSUS	|--|-|						|--------|-|					
EXPERT TOTALS	14	0	1	0	0	0	6	7	0	0	0	0
CONSENSUS	|--|-|						|--------|-|					

B. Network control.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	44	2	1	0	1							
CONSENSUS	|--|-|											
EXPERT TOTALS	15	0	0	0	1							
CONSENSUS	|--|-|											

C. Massive communication interface 100,000 lines.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	38	6	3	2	0	1	6	38	0	0	0	0
CONSENSUS	|--|-|							|-|-|				
EXPERT TOTALS	13	2	0	1	0	0	2	10	0	0	0	0
CONSENSUS	|--|-|							|-|-|				

D. Advanced data base management system.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	44	2	3	0	0							
CONSENSUS	|--|-|											
EXPERT TOTALS	16	0	1	0	0							
CONSENSUS	|--|-|											

E. Ten-times improvement in security features.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	44	2	3	0	0	0	0	22	17	6	0	0
CONSENSUS	|--|-|							|--------|-|				
EXPERT TOTALS	14	0	2	0	0	0	0	7	2	3	0	0
CONSENSUS	|--|-|							|-|--------|				

F. One hundred times improvement in privacy features.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	40	5	3	0	0	0	2	36	5	1	0	0
CONSENSUS	|--|-|							|-|-|				
EXPERT TOTALS	11	3	1	0	0	0	0	9	2	0	0	0
CONSENSUS	|--|--------|							|-|-|				

HOME TERMINALS

The decade of the 80's will witness the beginning use of terminals in the home to tap the power of the computer and the benefits of a high capacity, widespread communications network. The panel projects that the use of home terminals will exceed the point where one out of one hundred families has one installed in the 1980-1985 period.

The initial impetus will be brought about by the general availability of Cable Area Television (CATV) providing high speed, two-way communication channels into the home. The CATV supplier will use the capacity to provide individualized news and entertainment in response to the users request. The selected program is sent to the requesting terminal at high speed at the viewers convenience. With this capability a viewer could "browse" through the day's news events and then request increasing levels of detail as his interest dictates, in much the same manner as we now read a newspaper.

The addition in 1985 of switching capabilities to CATV networks will provide an opportunity for entrepreneurs to provide a wide range of services to the home consumer. They include: home education via Computer Assisted Instruction (CAI) for all levels from pre-school to post-graduate refresher courses, home shopping services, home banking, automatic meter readings, burglar and fire alarm monitoring, control of home appliances, etc.

Businesses will take advantage of the terminal to make it possible for many white collar and management functions to be accomplished from a home work center without the necessity of commuting to a place of employment. The terminal would provide the worker with access to all the information, work materials, people and services he would normally have, including secretarial, filing and retrieval, mail pickup and delivery, and conference type communication hookups. Only unavoidable face-to-face meetings, on-site inspections, etc. would cause the worker to have to commute to the office and these occasions could be scheduled as business trips are now.

Some home terminal applications may precede the advent of general purpose home terminals due either to the magnitude of the need or because a limited set of facilities such as provided by picturephones may be adequate. For example, home CAI may become a major need, if existing education facilities fail to meet enlarging needs. Families may find it more economical to spend relatively large sums of money to provide special terminals and communication channels for home education rather than use expensive private schools. As another example, home shopping has been tried in San Diego using television and existing telephones. The panel suggests that this application may be viable prior to 1980 using the picture-phone.

APPLICATION TITLE		1970-71	72-74	75-77	78-80	81-85	LATER	NEVER	IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
HOME COMPUTER ASSISTED INSTRUCTION	100- 75- 50- 25- 0-								3.41	2.52	3.66	⁻0.40
	P.C.	0.0	0.0	3.2	22.6	58.1	16.1	0.0				
HOME SHOPPING SERVICES	100- 75- 50- 25- 0-								2.32	2.74	2.70	⁻0.59
	P.C.	0.0	0.0	1.5	4.6	78.5	12.3	3.1				
MULTIPLE USE HOME TERMINAL	100- 75- 50- 25- 0-								2.64	2.58	2.77	⁻0.56
	P.C.	0.0	0.0	0.0	16.1	59.7	21.0	3.2				
INTERACTIVE NEWS AND ENTERTAINMENT	100- 75- 50- 25- 0-								2.22	1.95	2.11	⁻1.35
	P.C.	0.0	1.5	1.5	7.5	61.2	25.4	3.0				
ELECTRONIC DELIVERY OF HARD COPY	100- 75- 50- 25- 0-								2.08	2.00	2.35	⁻0.83
	P.C.	0.0	0.0	0.0	8.2	45.9	39.3	6.6				

III.93

Home Computer Assisted Instruction -- The availability of computer assisted instruction in 1 percent of the homes. This would supplement public education at all levels and provide post graduate refresher and extension courses. Most of the educational materials (graphical, printed/and/or sound) are provided at the terminal. The students progress is monitored and he is advanced at his own speed.

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL NOT BE |
| | | | | | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | |
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	30	40	10	2	13	43	13	50	14	8	11
EXPERT TOTALS	9	8	1	1	6	7	2	14	1	1	3

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	2	14	36	10	0
CONSENSUS				|--------|-|			
EXPERT TOTALS	0	0	1	4	11	1	0
CONSENSUS				|--------|-|			

ACCELERATING AND RETARDING FACTORS

A. CATV installed in 1 percent of the homes.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	14	29	7	0	7	13	14	9	1	0
EXPERT TOTALS	6	8	1	0	1	4	6	3	0	0

B. FCC regulation allowing new two-way switched communication networks.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	12	29	3	0	7	10	16	5	2	0
EXPERT TOTALS	5	6	1	0	1	2	8	1	0	0

C. Availability of college credits via CAI courses.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	25	21	7	0	3	15	12	8	7	1
EXPERT TOTALS	6	5	4	0	1	5	1	2	3	1

D. Failure of urban high schools: at least 10 percent of all high schools in the 10 largest cities in the United States closing because of conflict between parents, teachers and administration, recognition of poor education quality or lack of funds.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	23	17	10	1	1	11	7	7	7	10
EXPERT TOTALS	7	5	3	0	1	5	2	1	2	4

REQUIRED CAPABILITIES

A. Inexpensive two-way television type terminal - $5-$30 per month.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	46	6	2	0	1	0	0	47	1	0	0	0
CONSENSUS	|--|-|							|-|-|				
EXPERT TOTALS	13	3	0	0	0	0	0	15	0	0	0	0
CONSENSUS	|--|-|							|-|-|				

B. High capacity two-way communication channels.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	31	18	1	0	5							
CONSENSUS	|--|---------|											
EXPERT TOTALS	8	8	0	0	1							
CONSENSUS	|----------|-|											

C. Availability comparable to today's telephone service.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	11	35	7	1	3							
CONSENSUS		|--|-|										
EXPERT TOTALS	2	14	1	0	0							
CONSENSUS		|--|-|										

D. Course preparation language to reduce the preparation cost by a factor of 10 over today's CAI systems

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	15	34	3	1	0	1	6	37	2	1	0	0
CONSENSUS	|----------|-|							|-|-|				
EXPERT TOTALS	2	12	0	1	0	0	3	11	0	0	0	0
CONSENSUS		|--|-|						|-|-|				

E. Massive communication interface 100,000 lines.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	9	33	8	1	2	1	16	31	0	0	0	0
CONSENSUS		|--|-|					|--------|-|					
EXPERT TOTALS	2	11	2	1	0	0	5	10	0	0	0	0
CONSENSUS		|--|-|					|--------|-|					

Home Shopping Services -- The availability via a terminal to 1 percent of the homes of a home shopping service. Products would be displayed and described in response to inquiries. Purchases can be entered at the terminal and transmitted to producers and distributors.

IMPACT_AND_VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL |
| | MAJOR | SIGNIF. | LITTLE | NO | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | NOT BE |
					VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	11	34	31	4	22	32	16	22	32	13	16
EXPERT TOTALS	3	4	8	0	3	7	3	4	5	3	3

IMPLEMENTATION_DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	1	3	51	8	2
CONSENSUS					|-|-|		
EXPERT TOTALS	0	0	0	2	12	2	1
CONSENSUS					|-|-|		

ACCELERATING_AND_RETARDING_FACTORS
A. Availability of CATV in 1% of the homes.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	14	27	13	0	7	10	17	8	2	0
EXPERT TOTALS	4	9	2	0	1	4	6	2	0	0

B. Fifty percent increase in working couples with resultant limited shopping time.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	8	26	22	0	1	8	13	12	3	6
EXPERT TOTALS	1	7	6	0	0	3	4	2	1	1

C. FCC regulation allowing new two-way switched communication networks.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	16	23	9	0	7	12	16	2	3	0
EXPERT TOTALS	6	5	2	0	1	2	7	0	0	0

D. Establishment of packaging and marking standards.

	ABSOLUTE	POSSIBLE	TO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	10	30	10	0	8	8	12	4	8	1
EXPERT TOTALS	1	8	4	0	2	2	3	1	3	0

REQUIRED_CAPABILITIES
A. High capacity two-way communication channels.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	33	18	1	1	2							
CONSENSUS	|--|---------|											
EXPERT TOTALS	9	3	0	0	1							
CONSENSUS	|--|---------|											

B. Inexpensive television like terminal with two-way communication $5-25 per month.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	51	3	0	0	1	0	1	44	0	0	0	0
CONSENSUS	|--|-|							|-|-|				
EXPERT TOTALS	12	1	0	0	0	0	0	10	0	0	0	0
CONSENSUS	|--|-|							|-|-|				

C. Massive communication interface 100,000 lines.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	11	35	5	1	1	7	30	11	0	0	0	0
CONSENSUS		|--|-|					|-|-|					
EXPERT TOTALS	4	6	3	0	0	2	7	2	0	0	0	0
CONSENSUS		|----------|-|					|-|-|					

D. Positive user/terminal identification.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	49	4	1	0	0							
CONSENSUS	|--|-|											
EXPERT TOTALS	10	1	1	0	0							
CONSENSUS	|--|-|											

<u>Interactive News and Entertainment</u> -- The availability in 1 percent of homes of media service that allows the subscriber to choose at his home terminal from a wide variety of offerings. His selection is individually transmitted to him. If he desires, he may request more in-depth coverage of particular items of interest.

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL |
| | | | | | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | NOT BE |
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	14	28	28	6	14	24	18	19	22	12	37
EXPERT TOTALS	4	10	8	1	5	7	7	7	8	1	12

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	1	1	5	41	17	2
CONSENSUS					|-|--------|		
EXPERT TOTALS	0	0	0	2	17	5	1
CONSENSUS					|-|-|		

ACCELERATING AND RETARDING FACTORS

A. The availability of CATV in 1 percent of the homes.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	14	28	12	0	5	14	20	7	0	0
EXPERT TOTALS	8	9	5	0	2	7	8	1	0	0

B. FCC authorization for new switched communication channels.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	12	27	8	0	8	8	18	3	1	0
EXPERT TOTALS	6	8	3	0	3	4	7	0	0	0

REQUIRED CAPABILITIES

A. Inexpensive television like terminal with two-way communication <u>$5-25 per month</u>.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	50	6	1	0	2	0	1	49	1	1	0	0
CONSENSUS	|--|-|							|-|-|				
EXPERT TOTALS	20	2	0	0	1	0	0	16	1	0	0	0
CONSENSUS	|--|-|							|-|-|				

B. Massive communication interface.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	53	2	0	0	1							
CONSENSUS	|--|-|											
EXPERT TOTALS	18	2	0	0	0							
CONSENSUS	|--|-|											

C. High capacity two-way communication channels.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	35	18	1	1	4							
CONSENSUS	|--|---------|											
EXPERT TOTALS	11	11	0	0	0							
CONSENSUS	|------|-----|											

D. High reliability - no more than 1 unscheduled interruption per month not to exceed <u>15 minutes</u>.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	6	30	16	2	4	3	9	40	0	0	0	0
CONSENSUS		|--|---------|						|-|-|				
EXPERT TOTALS	1	14	6	0	1	0	3	14	0	0	0	0
CONSENSUS		|--|---------|						|-|-|				

Multiple Use Homer Terminal -- The installation of a home terminal in 1 percent of the homes to accomplish som
combination of applications, assuming that most families would find the purchase of a home terminal to be
uneconomical unless they could use it for a relatively wide assortment of applications.

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL |
| | | | | | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | NOT BE |
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	15	25	19	2	14	27	14	20	21	14	12
EXPERT TOTALS	6	8	7	1	8	7	5	8	7	4	2

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	0	10	37	13	2
CONSENSUS					|-|-|		
EXPERT TOTALS	0	0	0	6	14	2	1
CONSENSUS				|--------|-|			

ACCELERATING AND RETARDING FACTORS

A.   CATV in 1 percent of the homes.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	6	31	13	0	8	11	11	5	1	1
EXPERT TOTALS	5	11	5	0	3	2	6	2	1	1

B.   FCC allowing the establishment of new two-way switched networks.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	10	31	8	0	11	8	14	4	1	0
EXPERT TOTALS	6	11	2	0	3	3	6	1	1	0

REQUIRED CAPABILITIES

A.   High capacity two-way communications channels switchable to allow access to many applications.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	37	12	5	0	1							
CONSENSUS	|--|---------|											
EXPERT TOTALS	12	7	3	0	0							
CONSENSUS	|--|---------|											

B.   Terminal with display, full keyboard and light pen capable of providing video and audio displays
and of accepting inputs from sensor devices. Purchase $500 to $1,500

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	38	12	1	0	2	2	8	37	1	0	0	0
CONSENSUS	|--|---------|							|-|-|				
EXPERT TOTALS	13	6	0	0	1	1	3	14	0	0	0	0
CONSENSUS	|--|---------|							|-|-|				

<u>Electronic Delivery of Hard Copy</u> -- The availability of the electronic delivery of a wide variety of hard copy items via the home terminal to 5 percent of the homes. Items could be viewed, and hard copy selected or rejected. Items might include newspapers, periodicals, mail, etc.

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL |
| | | | | | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | NOT BE |
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	8	23	26	2	6	27	19	13	24	16	18
EXPERT TOTALS	3	6	4	1	2	9	2	6	6	1	2

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	0	5	28	24	4
CONSENSUS					|-|--------|		
EXPERT TOTALS	0	0	0	1	8	6	0
CONSENSUS					|-|--------|		

REQUIRED CAPABILITIES

A. Low cost <u>($5-40/month)</u> terminal with both hard copy and video display capability (could be video cassette.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	43	5	2	0	0	0	1	39	1	0	0	0
CONSENSUS	|--|-|							|-|-|				
EXPERT TOTALS	13	0	1	0	0	0	0	8	0	0	0	0
CONSENSUS	|--|-|							|-|-|				

B. Mass storage of <u>100 billion bytes</u>.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	31	12	5	1	0	0	4	31	8	0	0	0
CONSENSUS	|--|--------|							|-|-|				
EXPERT TOTALS	9	2	1	1	0	0	1	6	3	0	0	0
CONSENSUS	|--|--------|							|-|--------|				

C. High capacity two-way communication channels.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	37	10	4	0	1							
CONSENSUS	|--|--------|											
EXPERT TOTALS	12	0	1	0	1							
CONSENSUS	|--|-|											

INFORMATION SYSTEMS

Information systems can be divided into three levels of increasing complexity -- operational, functional, and management. Operational systems maintain all the information relating to the status and control of an operation such as inventory, personnel, etc. Functional systems combine operational areas to provide integrated support to a complete function such as manufacturing, finance, etc. Management information systems integrate functional areas to provide support for higher management activities.

While each level can be thought of as being made up of an integration of the lower level systems, it is important to recognize that each is greater than the sum of its parts in that each must provide new information to support the roles of management that didn't exist at lower levels. These new roles are primarily associated with increased emphasis on longer range planning as you move up through management levels. Thus the operational manager is primarily concerned with planning the immediate operations, functional management is a tactical planner, while general managers and above are primarily strategic planners. At the operational level day-to-day status is needed to determine trends while at the general level external environmental information is required to make strategic plans.

We are now in the process of installing a great number of operational information systems, a fair number of functional systems, and a very few primitive management information systems. In the future we will continue to install new operational and functional systems and management information systems will be in a significant number of companies.

Many of the operational systems will be composed of geographically dispersed elements intercommunicating through high speed data links. A nationwide police information system is an example-- already in the process of being implemented it will be reasonably completed in ten years providing files on unsolved crimes, stolen property, known and wanted criminals, fingerprints modus operandi, etc. It may also by this time and certainly by 1985 incorporate automatic fingerprint analysis. In general this kind of inter-connection is typical of the trend in state and local governments as they move to integrated functional systems with overtones of management systems. There is no need for multiple files of tax-payers or taxable property, etc. when single logical files will do. The study illustrates how local health information systems installed in 20 percent of the metropolitan areas by 1980 can be expanded into statewide health information systems by 1985.

By 1985 functional systems such as Automated Plant Information systems in twenty percent of the Fortune 500 Companies will automate the complete internal information requirements so that the plant can dynamically respond to changing information.

The true management information system, as evidenced by instal-
lation in 20 percent of the Fortune 500 Companies, may come
into their own as early as 1980 but certainly no later than
1985. These systems will include internal operational and
historic status as well as external environment statistics
and forecasts. The planning process will be assisted by models
of the enterprise in its environment and result in an automated
plan which the system can translate into operational orders.
The system will measure the results against the plan and report
descrepancies to management for their action.

INFORMATION SYSTEMS

APPLICATION TITLE		1970-71	72-74	75-77	78-80	81-85	LATER	NEVER	IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
NATION-WIDE POLICE INFORMATION SYSTEM									3.44	2.43	3.67	‾0.15
	P.C.	0.0	0.0	31.3	65.6	3.1	0.0	0.0				
CONSOLIDATED PUBLIC WELFARE SYSTEMS									2.80	2.16	2.83	‾0.48
	P.C.	0.0	1.7	1.7	65.0	26.7	1.7	3.3				
AUTOMATED PLANT INFORMATION SYSTEMS									1.62	3.57	2.14	‾0.19
	P.C.	0.0	0.0	3.7	57.4	35.2	3.7	0.0				
MANAGEMENT INFORMATION SYSTEMS									2.23	3.62	2.32	‾0.18
	P.C.	0.0	0.0	4.8	54.8	38.7	1.6	0.0				
LEGISLATIVE SYSTEMS									2.02	2.13	2.67	‾0.33
	P.C.	0.0	1.9	3.7	64.8	24.1	5.6	0.0				
HEALTH INFORMATION SYSTEMS									3.30	2.10	3.26	‾0.78
	P.C.	0.0	0.0	3.1	61.5	26.2	4.6	4.6				
AUTOMATED FINGERPRINT ANALYSIS									2.39	2.39	2.58	‾0.34
	P.C.	0.0	0.0	1.8	41.8	40.0	14.5	1.8				
STATE HEALTH INFORMATION SYSTEMS									2.84	1.82	2.59	‾1.03
	P.C.	0.0	1.6	1.6	22.2	60.3	4.8	9.5				

APPLICATION DESCRIPTION

Automated Fingerprint Analysis -- The existence of a system that can, with reasonable probability, identify an arbitrary print from a master file without supporting data. This is in contrast to current systems, both manual and automated, where the probability of locating a match is virtually zero unless one has a small set of suspects.

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL |
| | | | | | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | NOT BE |
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	10	25	23	2	10	27	17	13	28	11	7
EXPERT TOTALS	2	3	2	0	3	3	0	3	3	1	0

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	1	23	22	8	1
CONSENSUS				|--------|-|			
EXPERT TOTALS	0	0	0	2	2	2	0
CONSENSUS				|--------|--------|			

ACCELERATING AND RETARDING FACTORS

A. Development of some other physical identification means to replace identification for other than latent fingerprints.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	12	18	10	0	1	7	9	3	9	2
EXPERT TOTALS	2	2	0	0	0	0	0	0	2	0

REQUIRED CAPABILITIES

A. Multi-attribute pattern matching.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	45	1	0	0	1							
CONSENSUS	|--|-|											
EXPERT TOTALS												
CONSENSUS												

B. Mass data storage of 10 billion bytes.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	35	11	2	0	0	0	1	37	4	2	0	0
CONSENSUS	|--|---------|							|-|-|				
EXPERT TOTALS												
CONSENSUS												

C. Ten-fold increase in image processing technology; scanning, digital conversion, storage and display.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	37	7	2	1	1	0	0	35	7	0	0	0
CONSENSUS	|--|-|							|-|-|				
EXPERT TOTALS												
CONSENSUS												

D. Fingerprint scanning device.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	42	3	2	0	0							
CONSENSUS	|--|-|											
EXPERT TOTALS												
CONSENSUS												

E. Graphical storage and retrieval - one billion pages.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	12	31	3	0	2	1	9	28	1	0	0	0
CONSENSUS		|---|-|					|--------|-|					
EXPERT TOTALS												
CONSENSUS												

APPLICATION DESCRIPTION

Automated Plant Information Systems -- The implementation in 20 percent of the Fortune 500 Companies of systems to provide complete automation of the information requirements of a manufacturing plant. The information is derived from production scheduling systems, raw material analysis, etc. Production centers are under adaptive computer control and respond dynamically to changing information.

IMPACT AND VALUE

	IMPACT ON SOCIETY				REASONS FOR IMPLEMENTATION						WILL NOT BE IMPLEMENTED
					PROFITABLE TO IMPLEMENTOR			USEFUL TO PUBLIC			
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	
GROUP TOTALS	3	16	39	4	25	32	4	5	29	23	4
EXPERT TOTALS	2	8	21	1	16	15	0	4	15	9	1

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	2	31	19	2	0
CONSENSUS				|-|--------|			
EXPERT TOTALS	0	0	2	12	11	1	0
CONSENSUS				|-|--------|			

ACCELERATING AND RETARDING FACTORS

A. Major shift in machine tool technology or a shift to forming.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	4	25	6	0	0	10	14	3	1	0
EXPERT TOTALS	3	12	2	0	0	6	5	2	1	0

REQUIRED CAPABILITIES

A. Automated generation of information systems.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	9	33	4	2	1							
CONSENSUS		|--|-|										
EXPERT TOTALS	5	14	2	1	1							
CONSENSUS		|--|-|										

B. Massive communication interface of 10,000 lines.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	11	27	4	3	2	4	11	27	1	0	0	0
CONSENSUS		|--|-|					|--------|-|					
EXPERT TOTALS	6	12	2	2	0	2	6	12	0	0	0	0
CONSENSUS	|----------|-|						|--------|-|					

C. Advanced data base management.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	43	2	3	1	0							
CONSENSUS	|--|-|											
EXPERT TOTALS	21	0	1	1	0							
CONSENSUS	|--|-|											

D. Mass storage of 100 billion bytes.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	15	27	6	0	0	1	14	28	1	0	0	0
CONSENSUS	|----------|-|						|--------|-|					
EXPERT TOTALS	9	10	4	0	0	1	7	13	0	0	0	0
CONSENSUS	|----------|-|						|--------|-|					

Consolidated Public Welfare Systems -- The implementation of systems to manage all aspects of public welfare in ten states. The system maintains an integrated data base of welfare, unemployment and workman's compensation recipients.

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL NOT BE |
| | | | | | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | |
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	18	38	23	0	14	27	24	25	30	14	13
EXPERT TOTALS	7	10	6	0	5	7	8	7	9	6	2

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	1	1	39	16	1	2
CONSENSUS				|-|--------|			
EXPERT TOTALS	0	0	1	16	3	1	0
CONSENSUS				|-|-|			

ACCELERATING AND RETARDING FACTORS

A. Consolidation of welfare systems under a federal agency.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	31	18	4	1	8	8	13	7	7	4
EXPERT TOTALS	15	5	0	0	6	1	2	4	3	2

REQUIRED CAPABILITIES

A. Mass data storage, 100 billion bytes.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	30	17	3	0	1	4	13	30	0	0	0	0
CONSENSUS	|--|---------|						|--------|-|					
EXPERT TOTALS	6	8	1	0	1	1	5	7	0	0	0	0
CONSENSUS	|----------|-|						|--------|-|					

B. Automated generation of information systems.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	4	30	13	3	2							
CONSENSUS	|--|---------|											
EXPERT TOTALS	0	10	5	0	2							
CONSENSUS	|--|---------|											

C. Search engine 100 times today's capabilities.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	12	25	7	4	3	3	13	28	3	0	0	0
CONSENSUS	|--|---------|						|--------|-|					
EXPERT TOTALS	4	7	2	1	2	1	2	9	1	0	0	0
CONSENSUS	|---|---------|						|-|-|					

Health Information Systems -- The implementation of health information systems by 20 percent of the metropolitan areas. The system would provide for accumulation of health data for all individuals from hospital visits, school and visiting nurses, physicians and dentists. It provides the individual with a continuing health record, which is available to assist in diagnosing and treatment. The system can be used in epidemic detection and control and for the evaluation of the effectiveness of drugs and treatments.

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL |
| | | | | | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | NOT BE |
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	28	39	10	1	12	31	17	41	18	5	21
EXPERT TOTALS	5	5	2	0	3	3	3	7	3	0	5

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	2	40	17	3	3
CONSENSUS				|-|--------|			
EXPERT TOTALS	0	0	0	9	4	0	0
CONSENSUS				|-|--------|			

ACCELERATING AND RETARDING FACTORS

A.   Passage of a National Health Insurance Act similar to Great Britain.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	23	29	4	0	5	22	8	5	6	2
EXPERT TOTALS	1	8	0	0	1	7	2	0	2	0

B.   Federal subsidy.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	28	23	4	0	5	22	11	6	5	0
EXPERT TOTALS	7	5	0	0	1	5	4	0	2	0

REQUIRED CAPABILITIES

A.   Mass storage of 100 billion bytes.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	36	15	2	1	1	1	8	30	8	0	0	0
CONSENSUS	|--|---------|							|-|-|				
EXPERT TOTALS	9	2	0	0	0	0	2	5	0	0	0	0
CONSENSUS	|--|-|					|--------|-|						

B.   Advanced data base management system.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	47	7	1	0	1							
CONSENSUS	|--|-|											
EXPERT TOTALS	10	2	0	0	0							
CONSENSUS	|--|-|											

C.   Network control.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	36	14	4	1	1							
CONSENSUS	|--|---------|											
EXPERT TOTALS	9	3	0	0	0							
CONSENSUS	|--|--|											

Legislative Systems -- The availability of legislative support systems for Congress and 20 percent of the state legislatures. Services provided would include:
. Tracking of progress of bills through legislative process.
. Tracking the usage of programs under existing legislation.
. Financial analysis of proposed bills.
. Tracking of services to constituencies.

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL NOT BE |
| | | | | | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | |
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	5	20	24	2	6	22	19	15	18	15	6
EXPERT TOTALS	1	5	4	0	2	7	0	4	5	1	1

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	1	2	35	13	3	0
CONSENSUS				|-|--------|			
EXPERT TOTALS	0	1	0	9	3	0	0
CONSENSUS				|-|-|			

REQUIRED CAPABILITIES

A. Mass storage of 100 billion bytes.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	12	30	2	2	0	1	12	28	1	0	0	0
CONSENSUS	|----------|-|						|--------|-|					
EXPERT TOTALS	2	8	0	0	0	0	2	5	0	0	0	0
CONSENSUS		|--|-|					|--------|-|					

Management Information Systems -- The existence of management information systems in 20 percent of the Fortune 500 Companies. The system would include assistance in the planning area by provision of historical and environmental data and the availability of simulations and models. The plan itself would be automated in its preparation and retained in processable form. Day-to-day operational results from integrated operational systems will be monitored against the plan and deviations reported to management. Management will, in turn, use the system to make specific inquiries, to test their solutions by simulation, and to implement the decision.

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL |
| | | | | | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | NOT BE |
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	12	18	31	2	30	27	4	12	23	22	4
EXPERT TOTALS	8	15	25	2	24	21	3	10	16	19	4

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	3	34	24	1	0
CONSENSUS				|-|--------|			
EXPERT TOTALS	0	0	3	23	16	1	0
CONSENSUS				|-|--------|			

REQUIRED CAPABILITIES

A. Mass data storage of 100 billion bytes.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	27	21	4	2	0	2	11	29	7	0	0	0
CONSENSUS	|------|-----|						|--------|-|					
EXPERT TOTALS	17	14	4	1	0	2	7	17	6	0	0	0
CONSENSUS	|----------|-|						|--------|-|					

B. Ten-fold improvement in simulation techniques and available software.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	37	15	1	3	0	0	2	39	4	0	0	0
CONSENSUS	|--|---------|							|-|-|				
EXPERT TOTALS	23	10	1	3	0	0	2	25	1	0	0	0
CONSENSUS	|--|---------|							|-|-|				

C. Advanced data base management system.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	48	5	1	0	0							
CONSENSUS	|--|-|											
EXPERT TOTALS	34	2	1	0	0							
CONSENSUS	|--|-|											

D. One hundred time increase in search engine capability.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	15	27	8	2	1	1	30	15	1	1	1	0
CONSENSUS	|----------|-|						|-|--------|					
EXPERT TOTALS	9	19	5	2	1	1	18	11	1	1	0	0
CONSENSUS		|---|-|					|-|--------|					

E. Advanced interactive language.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	29	21	1	1	1							
CONSENSUS	|--|---------|											
EXPERT TOTALS	18	15	1	1	1							
CONSENSUS	|------|-----|											

F. Automatic generation of information systems.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	7	41	3	2	2							
CONSENSUS		|--|-|										
EXPERT TOTALS	4	28	2	1	2							
CONSENSUS		|--|-|										

Nationwide Police Information System -- The availability of a nationwide information system to provide information on unsolved crimes, stolen property, wanted criminals, fingerprint files, modus operandi files, etc. The system would interface to existing state and local police information systems to provide and receive information.

IMPACT AND VALUE

	IMPACT ON SOCIETY				REASONS FOR IMPLEMENTATION						WILL NOT BE
					PROFITABLE TO IMPLEMENTOR			USEFUL TO PUBLIC			
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	30	41	9	1	15	35	19	43	27	5	4
EXPERT TOTALS	4	6	0	0	1	5	3	8	2	0	0

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	20	42	2	0	0
CONSENSUS			|--------|-|				
EXPERT TOTALS	0	0	3	8	0	0	0
CONSENSUS			|--------|-|				

ACCELERATING AND RETARDING FACTORS

A. Substantial (20-25%) increase in urban crime levels.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	14	36	7	1	14	28	3	0	0	2
EXPERT TOTALS	3	7	0	0	3	3	0	0	0	1

REQUIRED CAPABILITIES

A. Mass storage of one trillion bytes.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	36	13	4	2	0	0	15	30	1	0	0	0
CONSENSUS	|--|---------|						|--------|-|					
EXPERT TOTALS	4	4	1	0	0							
CONSENSUS	|----------|-|											

B. Advanced data base management system.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	38	12	2	1	0							
CONSENSUS	|--|---------|											
EXPERT TOTALS	5	4	0	0	0							
CONSENSUS	|--|---------|											

C. Network control.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	33	16	3	0	1							
CONSENSUS	|--|---------|											
EXPERT TOTALS	5	4	0	0	0							
CONSENSUS	|--|---------|											

D. Search engine 100 times greater than today.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	17	27	7	1	1	1	11	35	1	1	0	0
CONSENSUS	|----------|-|							|-|-|				
EXPERT TOTALS	0	6	2	0	0	0	0	6	0	0	0	0
CONSENSUS		|--|--|						|-|-|				

E. Image storage and display system one billion pages.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	7	34	11	2	0	3	9	36	0	0	0	0
CONSENSUS		|--|-|						|--|-|				
EXPERT TOTALS	0	6	2	0	0	0	0	6	0	0	0	0
CONSENSUS		|--|--|						|-|-|				

F. Fingerprint scanner.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	11	29	11	1	1							
CONSENSUS		|--|-|										
EXPERT TOTALS	1	6	1	0	1							
CONSENSUS		|--|-|										

APPLICATION DESCRIPTION

<u>State Health Information Systems</u> -- The implementation of health information by ten states. The system
provides the same services as above either directly or by interface to existing local systems.

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL |
| | | | | | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | NOT BE |
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	19	38	15	2	8	29	17	25	24	8	27
EXPERT TOTALS	3	6	1	0	0	6	2	4	3	2	2

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	1	1	14	38	3	6
CONSENSUS				|--------|-|			
EXPERT TOTALS	0	0	1	3	7	0	0
CONSENSUS				|--------|-|			

ACCELERATING AND RETARDING FACTORS

A. Federal subsidy.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	22	24	5	0	6	13	17	3	2	3
EXPERT TOTALS	4	5	0	0	3	3	0	1	1	0

REQUIRED CAPABILITIES

A. Mass storage of <u>one trillion</u> bytes.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	30	16	2	3	0	3	11	30	1	1	0	0
CONSENSUS	|--|---------|						|---------|-|					
EXPERT TOTALS	4	5	0	0	0	0	1	4	0	0	0	0
CONSENSUS	|---------|-|							|-|-|				

B. Advanced data base management system.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	46	4	1	1	0							
CONSENSUS	|--|-|											
EXPERT TOTALS	8	1	0	0	0							
CONSENSUS	|--|-|											

C. Network control.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	30	16	5	0	1							
CONSENSUS	|--|---------|											
EXPERT TOTALS	5	3	1	0	0							
CONSENSUS	|--|---------|											

D. Automated generation of information systems.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	5	11	22	7	5							
CONSENSUS		|----------|-|										
EXPERT TOTALS	0	1	5	2	1							
CONSENSUS			|--|----------|									

E. Search engine <u>100 times today</u>'s capabilities.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	8	35	5	0	3	1	11	33	2	1	0	0
CONSENSUS		|--|-|						|--|-|				
EXPERT TOTALS	1	6	2	0	0	0	1	4	1	0	0	0
CONSENSUS		|--|-|						|-|-|				

Information utilities are characterized as central on-line, real-time facilities serving many subscribers at remote locations. The types of services provided are information storage, retrieval, processing and computation. The beginning of such systems are seen in today's time sharing services and commercial data processing services.

By 1975-77 one percent of the businesses and self-employed professionals who do not have their own computer systems will make use of terminal systems to have their administrative applications processed by Information Utilities.

The concept originated in airline reservation systems of maintaining dynamic inventories which can be queried and updated will be expanded to other areas. Public concern over unemployment and government subsidies will bring about the installation of Job Placement Services by 20 percent of the metropolitan areas in 1975-1977. Initially these will serve local areas but will ultimately be nationally interconnected to help relieve localized pockets of unemployment. At the same time the many reservation systems now being installed will be interconnected into universal reservation systems that will allow a single interface for reservation for most services and events. By 1980-85 this type of service will have been expanded to include considerable logical functions as well as retrieval. For example, systems will be able to suggest vacation travel plans given gross requirements and then make the necessary arrangements and reservations to implement approved plans. Utilization will cover 50 percent of the travel agencies in 1980-85 time frame.

Information retrieval utilities are services providing rapid access to information which is too voluminous and/or volatile for users to economically maintain themselves. These types of services will begin to be implemented in 1978-80 and reach widespread use by the 1981-85 time period. Examples include literature, patent and law searches, freight rates, government activities, nationwide driver and vehicle data banks, and many others.

The advent of such systems will require: data bases in the trillion byte range, interconnection of large numbers of systems, the capability of processing thousands of calls concurrently, and the software to support this including the ability to automatically generate programs and data base organization as the needs change.

INFORMATION UTILITIES

III.111

APPLICATION TITLE		1970-71	72-74	75-77	78-80	81-85	LATER	NEVER	IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
COMMERCIAL DATA PROCESSING SERVICES	P.C.	0.0	11.7	65.0	20.0	3.3	0.0	0.0	1.95	3.52	2.94	⁻0.05
JOB PLACEMENT SERVICES	P.C.	0.0	4.7	64.1	28.1	3.1	0.0	0.0	3.10	2.43	3.76	⁻0.11
UNIVERSAL RESERVATION SYSTEMS	P.C.	0.0	1.5	53.0	42.4	0.0	1.5	1.5	2.38	3.23	3.63	⁻0.11
PROFESSIONAL LITERATURE SEARCH SYSTEMS	P.C.	0.0	0.0	10.3	65.5	20.7	3.4	0.0	2.02	2.27	2.33	⁻0.18
TELEPHONE DIRECTORY AND YELLOW PAGE DATA BANKS	P.C.	0.0	0.0	4.6	58.5	23.1	12.3	1.5	2.00	2.62	2.80	⁻0.29
LAW SEARCH	P.C.	0.0	0.0	1.5	66.2	23.1	6.2	3.1	2.63	2.77	2.96	⁻0.29
PATENT SEARCH	P.C.	0.0	0.0	3.0	56.1	33.3	7.6	0.0	1.46	2.48	2.09	⁻0.29
INFORMATION RETRIEVAL UTILITIES	P.C.	0.0	0.0	3.3	50.8	42.6	3.3	0.0	1.82	2.65	2.17	⁻0.42

APPLICATION TITLE		1970-71	72-74	75-77	78-80	81-85	LATER	NEVER	IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
GOVERNMENT ACTIVITIES INFORMATION UTILITY	100- 75- 50- 25- 0-								1.85	2.11	2.31	⁻0.44
	P.C.	0.0	0.0	1.8	50.9	38.2	5.5	3.6				
VACATION AND TRAVEL PLANNING SYSTEMS	100- 75- 50- 25- 0-								1.52	2.52	2.76	⁻0.32
	P.C.	0.0	0.0	3.3	46.7	25.0	25.0	0.0				
NATION-WIDE DRIVER AND VEHICLE DATA BANK	100- 75- 50- 25- 0-								2.34	2.47	2.66	⁻0.34
	P.C.	0.0	0.0	0.0	27.1	66.1	5.1	1.7				
DISEASE INFORMATION SYSTEMS	100- 75- 50- 25- 0-								2.68	2.13	3.35	⁻0.40
	P.C.	0.0	0.0	0.0	26.0	68.0	6.0	0.0				
AUTOMATED PUBLIC LIBRARIES	100- 75- 50- 25- 0-								2.17	1.67	2.62	⁻0.74
	P.C.	0.0	0.0	0.0	1.6	70.3	26.6	1.6				

Automated Public Libraries -- The availability in 20 percent of the metropolitan areas of computerized libraries providing terminal searches in the library of abstracts of their documents and automated retrieval and delivery of the selected document or a copy of it.

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL NOT BE IMPLEMENTED |
| | | | | | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | |
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	
GROUP TOTALS	11	28	37	2	7	22	34	20	32	16	20
EXPERT TOTALS	2	9	10	0	1	7	10	4	13	2	4

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	0	1	45	17	1
CONSENSUS					|-|--------|		
EXPERT TOTALS	0	0	0	0	15	7	0
CONSENSUS					|-|--------|		

ACCELERATING AND RETARDING FACTORS

A. Availability of two-way switched CATV in 20 percent of the metropolitan areas.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	11	25	18	0	1	13	22	6	2	0
EXPERT TOTALS	5	10	5	0	1	4	11	1	0	0

B. Federal subsidy.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	27	20	5	0	4	10	13	10	4	6
EXPERT TOTALS	9	8	1	0	2	5	4	3	0	3

REQUIRED CAPABILITIES

A. Mass storage - 1 trillion bytes.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	31	21	3	0	1	3	13	30	5	1	0	0
CONSENSUS	|--|--------|						|--------|-|				
EXPERT TOTALS	11	7	0	0	0	0	1	12	2	0	0	0
CONSENSUS	|--|--------|							|-|-|				

B. Search engine 100 times as fast as today's.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	12	36	7	0	1	1	8	34	7	1	0	0
CONSENSUS		|--|-|						|-|-|				
EXPERT TOTALS	4	10	4	0	0	0	1	13	2	0	0	0
CONSENSUS		|--|-|						|-|-|				

C. Automated system for entry of the published data, includes multifont readers, page turners and selective scan to distinguish an article from its adjacent material and to follow continued on page x situations.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	14	39	2	3	0							
CONSENSUS		|--|-|										
EXPERT TOTALS	4	16	0	0	0							
CONSENSUS		|--|-|										

D. Automated abstracting system.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	19	34	4	0	0							
CONSENSUS	|----------|-|											
EXPERT TOTALS	4	14	1	0	0							
CONSENSUS		|--|-|										

E. Computer network control.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	10	26	13	5	3							
CONSENSUS		|--|--------|										
EXPERT TOTALS	2	11	6	1	0							
CONSENSUS		|--|--------|										

F. Document display and reproduction terminal $50 per month.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	19	33	4	0	1	0	0	45	6	0	0	0
CONSENSUS	|----------|-|							|-|-|				
EXPERT TOTALS	6	12	2	0	0	0	0	12	1	0	0	0
CONSENSUS	|----------|-|							|-|-|				

Commercial Data Processing Services -- The use by 1 percent of the business and self-employed professionals who do not have their own computer systems of commercial data processing services. These services consist of prewritten (or tailored) applications accessed by the terminal.

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL |
| | | | | | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | NOT BE |
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	5	20	38	0	24	32	6	15	33	11	1
EXPERT TOTALS	3	15	21	0	17	20	2	11	19	6	0

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	7	39	12	2	0	0
CONSENSUS			|-|-|				
EXPERT TOTALS	0	5	25	8	1	0	0
CONSENSUS			|-|-|				

REQUIRED CAPABILITIES

A. Massive communication interface - 1,000 lines.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	29	13	6	0	2	0	3	39	1	0	0	0
CONSENSUS	|--|---------|							|-|-|				
EXPERT TOTALS	20	5	5	0	2	0	2	23	0	0	0	0
CONSENSUS	|--|---------|							|-|-|				

B. Program products to support the applications.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	48	4	0	0	0							
CONSENSUS	|--|-|											
EXPERT TOTALS	30	3	0	0	0							
CONSENSUS	|--|-|											

C. Advanced data base management system.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	32	17	1	0	1							
CONSENSUS	|--|---------|											
EXPERT TOTALS	22	9	1	0	1							
CONSENSUS	|--|---------|											

D. Terminal with medium speed input-output; 300 lines per minute, 300 cards per minute, $200/month.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	32	17	0	0	2	0	0	43	1	0	0	0
CONSENSUS	|--|---------|							|-|-|				
EXPERT TOTALS	17	13	0	0	2	0	0	28	0	0	0	0
CONSENSUS	|--|---------|							|-|-|				

APPLICATION DESCRIPTION

<u>Disease Information Systems</u> -- The availability in 20 percent of the metropolitan areas of systems to record the diseases diagnosed by physicians in the area. The system would be used to detect epidemics in their early stages, and disease trends such as the rise of new diseases, or effectiveness of preventive measures on old diseases.

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL NOT BE IMPLEMENTED |
| | | | | | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | |
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	
GROUP TOTALS	9	35	11	1	10	19	21	29	16	8	8
EXPERT TOTALS	2	8	3	1	3	5	4	8	4	1	2

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	0	13	34	3	0
CONSENSUS				|--------|-|			
EXPERT TOTALS	0	0	0	4	7	0	0
CONSENSUS				|--------|-|			

REQUIRED CAPABILITIES

A. Automatic generation of information systems.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	5	27	7	0	6							
CONSENSUS	|--|---------|											
EXPERT TOTALS	0	6	1	0	3							
CONSENSUS	|--|------------------------|											

B. Mass storage of <u>100 billion bytes</u>.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	8	26	8	1	2	2	10	26	1	0	0	0
CONSENSUS	|--|-|						|--------|-|					
EXPERT TOTALS	1	6	1	0	2	1	2	3	0	0	0	0
CONSENSUS	|--|---------|						|----|-----|					

Government Activities Information Utility -- The availability, through profit-making organizations, of continually updated data banks of government activities in legislative, executive and regulatory areas for the federal government and 10 percent of the states. This would include such items as status of legislation, current regulations and administrative directives, commission rulings, etc. Selected access to this information would be by subscription service through terminals at remote locations.

IMPACT AND VALUE

	IMPACT ON SOCIETY				REASONS FOR IMPLEMENTATION						WILL NOT BE IMPLEMENTED
					PROFITABLE TO IMPLEMENTOR			USEFUL TO PUBLIC			
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	
GROUP TOTALS	1	27	29	2	4	30	21	9	26	20	9
EXPERT TOTALS	0	6	5	0	0	7	4	1	7	3	1

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	1	28	21	3	2
CONSENSUS				|-|--------|			
EXPERT TOTALS	0	0	0	4	6	1	0
CONSENSUS				|--------|-|			

REQUIRED CAPABILITIES

A. Mass data storage of 100 billion bytes.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	11	31	3	0	0	0	5	33	2	0	0	0
CONSENSUS		|--|-|						|-|-|				
EXPERT TOTALS	1	7	0	0	0	0	1	5	0	0	0	0
CONSENSUS		|--|-|						|-|-|				

B. Ten-fold increase in image processing capabilities.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	6	32	3	1	2	0	1	34	3	0	0	0
CONSENSUS		|--|-|						|-|-|				
EXPERT TOTALS	1	6	1	0	0	0	0	5	0	0	0	0
CONSENSUS		|--|-|						|-|-|				

C. Search engine 10 times today's capabilities.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	11	28	2	2	1	1	1	33	5	0	0	0
CONSENSUS		|---|-|						|-|-|				
EXPERT TOTALS	1	6	1	0	0	0	0	6	0	0	0	0
CONSENSUS		|--|-|						|-|-|				

D. Massive communication interface 10,000 lines.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	10	26	8	0	0	0	12	28	1	0	0	0
CONSENSUS		|--|-|					|--------|-|					
EXPERT TOTALS	0	7	1	0	0	0	2	4	0	0	0	0
CONSENSUS		|--|-|					|--------|-|					

Information Retrieval Utilities -- The use by 10 percent of the Fortune 500 Companies and 0.1 percent of self-employed professionals of the services provided by information utilities. These utilities would provide rapid access to information compiled, indexed, and maintained in a central data bank primarily by interactive inquiries from remote terminals but also by computer to computer inquiries. The information would be voluminous and/or volatile so that users would find it uneconomical to maintain their own data bank.

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL |
| | | | | | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | NOT BE |
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	3	24	31	5	10	36	14	9	25	21	9
EXPERT TOTALS	2	12	15	0	5	17	6	5	14	7	2

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	2	31	26	2	0
CONSENSUS				|-|--------|			
EXPERT TOTALS	0	0	2	13	13	1	0
CONSENSUS				|-|--------|			

REQUIRED CAPABILITIES

A. Mass data storage of <u>one trillion bytes</u>.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	36	13	2	0	1	0	2	39	3	3	0	0
CONSENSUS	|--|---------|							|-|-|				
EXPERT TOTALS	14	7	1	0	1	0	1	19	1	0	0	0
CONSENSUS	|--|---------|							|-|-|				

B. Automated generation of information systems.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	10	37	3	0	2							
CONSENSUS		|--|-|										
EXPERT TOTALS	5	17	1	0	2							
CONSENSUS		|--|-|										

C. Massive communication interface.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	31	19	1	0	1							
CONSENSUS	|--|---------|											
EXPERT TOTALS	15	7	1	0	1							
CONSENSUS	|--|---------|											

D. Advanced **data base management system**.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	39	12	1	0	0							
CONSENSUS	|--|--|											
EXPERT TOTALS	17	7	1	0	0							
CONSENSUS	|--|---------|											

F. Search engine <u>1,000 times</u> today's capabilities.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	29	19	1	1	1	0	15	31	0	0	0	0
CONSENSUS	|--|---------|						|--------|-|					
EXPERT TOTALS	13	7	1	1	1	0	3	17	0	0	0	0
CONSENSUS	|--|---------|							|-|-|				

Job Placement Services -- The availability in 20 percent of the metropolitan areas of a data bank of job openings. The data bank could be searched from terminals in government unemployment centers and employment agencies for a match with job applicant capabilities, experience and desires.

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL |
| | | | | | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | NOT BE |
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	17	52	13	0	11	42	18	44	27	7	3
EXPERT TOTALS	5	14	2	0	1	15	4	12	7	2	0

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	3	41	18	2	0	0
CONSENSUS			|-|--------|				
EXPERT TOTALS	0	1	15	3	0	0	0
CONSENSUS			|-|-|				

ACCELERATING AND RETARDING FACTORS

A. Federal subsidy.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	34	21	5	0	21	27	5	2	0	0
EXPERT TOTALS	10	5	3	0	7	6	1	1	0	0

REQUIRED CAPABILITIES

A. Search engine **1,000 times faster** than today's systems.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	3	12	28	5	8	9	17	26	0	0	0	0
CONSENSUS		|----------|-|					|----|-----|					
EXPERT TOTALS	1	3	5	3	3	1	6	5	0	0	0	0
CONSENSUS		|----------|---------|					|-|--------|					

B. Massive communication interface **10,000 lines**.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	4	3	38	5	4	11	23	13	0	0	0	0
CONSENSUS			|--|-|				|-|--------|					
EXPERT TOTALS	1	0	11	2	1	2	8	3	0	0	0	0
CONSENSUS			|--|-|				|-|-|					

C. Advanced data base management.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	30	18	5	1	3							
CONSENSUS	|--|----------|											
EXPERT TOTALS	6	8	2	0	1							
CONSENSUS	|----------|-|											

D. Mass storage of **100 billion** bytes.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	3	27	12	11	3	7	34	12	0	0	0	0
CONSENSUS		|--|----------|					|-|-|					
EXPERT TOTALS	1	5	4	5	1	1	8	4	0	0	0	0
CONSENSUS		|----------|--------|					|-|--------|					

E. Network control.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	14	25	11	4	3							
CONSENSUS		|--|--------|										
EXPERT TOTALS	1	10	1	1	2							
CONSENSUS		|--|---------|										

APPLICATION DESCRIPTION

Law Search -- Data banks containing the federal, state and local statutes together with key court decisions available to 20 percent of the lawyers via interactive search from terminals in their offices.

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL |
| | | | | | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | NOT BE |
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	10	48	22	1	20	38	13	26	33	14	8
EXPERT TOTALS	2	18	8	1	8	13	6	10	11	6	2

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	1	43	15	4	2
CONSENSUS				|-|--------|			
EXPERT TOTA/S	0	0	0	19	4	2	2
CONSENSUS				|-|--------|			

ACCELERATING AND RETARDING FACTORS

A. Successful implementation in one state.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	15	32	9	2	7	31	7	3	0	1
EXPERT TOTALS	2	15	4	1	4	9	3	1	0	1

B. Development of a more accurate method of case reference.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	23	22	7	0	5	22	12	6	1	1
EXPERT TOTALS	10	9	1	0	3	7	5	2	1	1

REQUIRED CAPABILITIES

A. Automated or computer assisted system for capturing, analyzing, and cross-indexing the existing statutes and decisions.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	51	5	0	0	1							
CONSENSUS	|--|-|											
EXPERT TOTALS	22	3	0	0	0							
CONSENSUS	|--|-|											

B. A search engine capable of providing responses to complex inquiries at a rate 10,000 times greater than today's systems.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	10	31	12	2	0	3	17	33	1	0	0	0
CONSENSUS		|--|---------|					|--------|-|					
EXPERT TOTALS	3	14	4	2	0	1	6	12	1	0	0	0
CONSENSUS		|--|---------|					|--------|-|					

C. Mass storage of one trillion bytes.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	20	32	4	0	1	1	0	39	9	0	0	0
CONSENSUS	|---------|-|							|-|-|				
EXPERT TOTALS	8	12	3	0	1	0	0	13	4	0	0	0
CONSENSUS	|---------|-|							|-|-|				

D. Advanced data base management system.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	37	17	3	1	0							
CONSENSUS	|--|---------|											
EXPERT TOTALS	14	8	1	1	0							
CONSENSUS	|--|---------|											

E. Query language for use by lawyers.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	32	19	4	2	0							
CONSENSUS	|--|---------|											
EXPERT TOTALS	10	9	3	2	0							
CONSENSUS	|---------|-|											

F. Massive Communication Interface - 10,000 lines.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	18	20	10	4	2	2	4	42	1	0	0	0
CONSENSUS	|----------|---------|							|-|-|				
EXPERT TOTALS	7	8	4	3	0	0	1	17	1	0	0	0
CONSENSUS	|----------|---------|							|-|-|				

APPLICATION DESCRIPTION

<u>Nationwide Driver and Vehicle Data Bank</u> -- A national data bank of driver and vehicle licensing information. The system would be used by states to determine eligibility for license of a new resident and to check ownership of vehicles being newly registered in the state. The system would contain consolidated driving records and could be sold to insurance companies for use in determining premium rates.

IMPACT AND VALUE

	IMPACT ON SOCIETY				REASONS FOR IMPLEMENTATION						WILL
					PROFITABLE TO IMPLEMENTOR			USEFUL TO PUBLIC			NOT BE
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	9	26	22	3	10	29	16	15	25	15	7
EXPERT TOTALS	4	10	5	1	2	13	4	5	10	3	3

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	0	16	39	3	1
CONSENSUS				|--------|-|			
EXPERT TOTALS	0	0	0	5	11	1	0
CONSENSUS				|--------|-|			

REQUIRED CAPABILITIES

A. Network control.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	37	11	2	1	1							
CONSENSUS	|--|---------|											
EXPERT TOTALS	11	3	1	0	0							
CONSENSUS	|--|---------|											

B. Ten times improvement in security features.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	31	11	7	0	2	0	1	39	4	0	0	0
CONSENSUS	|--|---------|							|-|-|				
EXPERT TOTALS	7	6	1	0	0	0	0	10	1	0	0	0
CONSENSUS	|------|-----|							|-|-|				

C. Mass storage 100 billion bytes.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	35	12	3	0	1	0	11	31	5	0	0	0
CONSENSUS	|--|---------|							|-|-|				
EXPERT TOTALS	8	4	2	0	0	0	5	6	1	0	0	0
CONSENSUS	|--|---------|						|--------|-|					

D. Advanced data base management.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	34	15	1	0	1							
CONSENSUS	|--|---------|											
EXPERT TOTALS	9	6	0	0	0							
CONSENSUS	|--|---------|											

Patent Search -- The availability of the first data bank containing the complete files of the U. S. Patent Office for interactive search from terminals located in law firms, corporate law departments, etc.

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL |
| | MAJOR | SIGNIF. | LITTLE | NO | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | NOT BE |
					VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	4	12	64	2	14	39	16	12	26	33	8
EXPERT TOTALS	2	1	12	0	5	8	2	4	7	3	0

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	2	37	22	5	0
CONSENSUS				|-|--------|			
EXPERT TOTALS	0	0	1	7	7	1	0
CONSENSUS				|----|-----|			

ACCELERATING AND RETARDING FACTORS

A. Change in legal penalties for infringement.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	5	27	22	0	1	13	14	4	5	2
EXPERT TOTALS	1	7	4	0	0	2	5	1	2	1

REQUIRED CAPABILITIES

A. Automated or computer assisted system for capturing, analyzing and cross-indexing the existing files.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	59	2	0	0	0							
CONSENSUS	|--|-|											
EXPERT TOTALS	14	0	0	0	0							
CONSENSUS	|--|-|											

B. A search engine capable of providing responses to complex inquiries at a rate 10,000 times greater than today's systems.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	13	29	15	0	2	4	40	10	1	0	0	0
CONSENSUS		|--|---------|					|-|-|					
EXPERT TOTALS	5	9	1	0	0	0	8	1	1	0	0	0
CONSENSUS	|---------|-|						|-|-|					

C. Mass storage of one trillion bytes

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	43	16	0	1	0	0	1	49	3	0	0	0
CONSENSUS	|--|---------|							|-|-|				
EXPERT TOTALS	11	3	0	0	0	0	1	9	0	0	0	0
CONSENSUS	|--|-|							|-|-|				

D. Terminal with digital and graphical display and hard-copy output. Price approximately $200/month.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	17	31	10	0	0	0	2	50	1	0	0	0
CONSENSUS	|---------|-|							|-|-|				
EXPERT TOTALS	6	6	3	0	0	0	0	10	0	0	0	0
CONSENSUS	|---------|-|							|-|-|				

E. Graphical storage and access for 100 million pages.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	15	29	8	0	1	1	1	40	6	0	0	0
CONSENSUS	|---------|-|							|-|-|				
EXPERT TOTALS	5	5	2	0	1	0	0	7	2	0	0	0
CONSENSUS	|---------|-|							|-|-|				

Professional Literature Search Systems -- The utilization by 1 percent of research scientists and development engineers of terminal access to data banks of published research and development.

IMPACT AND VALUE

	IMPACT ON SOCIETY				REASONS FOR IMPLEMENTATION						WILL NOT BE
					PROFITABLE TO IMPLEMENTOR			USEFUL TO PUBLIC			IMPLEMENTED
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	
GROUP TOTALS	4	28	29	4	6	32	24	13	22	23	4
EXPERT TOTALS	2	12	13	0	2	14	9	5	9	9	2

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	6	38	12	2	0
CONSENSUS				|-|-|			
EXPERT TOTALS	0	0	4	17	2	0	0
CONSENSUS				|-|-|			

REQUIRED CAPABILITIES

A. **Mass storage 1 trillion bytes.**

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	12	32	5	0	2	1	16	27	2	0	0	0
CONSENSUS	|--|-|						|--------|-|					
EXPERT TOTALS	5	10	3	0	2	1	2	10	2	0		0
CONSENSUS	|---|--|						|-|-|					

B. **Search engine 1,000 times today's capabilities.**

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	14	26	8	2	0	3	24	15	0	0	0	0
CONSENSUS	|----------|-|						|-|--------|					
EXPERT TOTALS	5	11	3	1	0	1	8	4	0	0	0	0
CONSENSUS	|---|-|						|-|--------|					

C. **Query language to accommodate loosely worded requests.**

	NECESSRY	ASSET	USEFUL	SOME	USE NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	37	11	1	0	1							
CONSENSUS	|--|---------|											
EXPERT TOTALS	14	5	0	0	1							
CONSENSUS	|--|---------|											

D. **Network control to route requests to other systems.**

	NECESSRY	ASSET	USEFUL	SOME	USE NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	16	20	4	0	1							
CONSENSUS	|----------|-|											
EXPERT TOTALS	3	14	2	0	1							
CONSENSUS	|--|-|											

Telephone Directory and Yellow Page Data Banks -- The availability in 20 percent of the metropolitan areas of data banks supplementing the existing telephone directories. The system would use conventional or picturephones and largely replace information operators.

IMPACT AND VALUE

	IMPACT ON SOCIETY				REASONS FOR IMPLEMENTATION						WILL NOT BE IMPLEMENTED
					PROFITABLE TO IMPLEMENTOR			USEFUL TO PUBLIC			
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	
GROUP TOTALS	7	30	39	4	19	33	21	26	27	19	8
EXPERT TOTALS	2	11	16	2	9	12	9	9	10	10	1

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	3	38	15	8	1
CONSENSUS				|-|--------|			
EXPERT TOTALS	0	0	1	19	7	2	0
CONSENSUS				|-|--------|			

ACCELERATING AND RETARDING FACTORS

A. Installation of picturephones in 20 percent of the metropolitan communities.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	17	33	12	0	1	26	20	7	1	0
EXPERT TOTALS	7	16	5	0	0	15	8	2	1	0

REQUIRED CAPABILITIES

A. Voice recognition system capable of recognizing letters and numbers and simple words as spoken by 99 percent of the population.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	12	24	16	3	3							
CONSENSUS	|--|---------|										
EXPERT TOTALS	3	14	7	1	2							
CONSENSUS	|--|---------|										

B. Audio response capable of handling 1,000 voice responses simultaneously.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	35	16	4	2	0	0	1	46	0	0	0	0
CONSENSUS	|--|---------|							|-|-|				
EXPERT TOTALS	16	9	1	1	0	0	0	21	0	0	0	0
CONSENSUS	|--|---------|							|-|-|				

C. Alphabetic input terminal incorporated in the telephone.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	19	31	8	0	0							
CONSENSUS	|----------|-|										
EXPERT TOTALS	7	15	5	0	0							
CONSENSUS	|----------|-|										

D. Data base of 100 billion bytes.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	13	23	17	3	1	5	32	17	0	0	0	0
CONSENSUS	|--|---------|					|-|--------|					
EXPERT TOTALS	4	13	8	2	0	0	12	12	0	0	0	0
CONSENSUS	|--|---------|					|----|-----|					

E. Search engine 100 times faster than today's systems.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	10	27	11	3	2	4	7	36	2	0	0	0
CONSENSUS	|--|---------|						|-|-|				
EXPERT TOTALS	4	12	5	2	1	1	4	15	1	0	0	0
CONSENSUS	|--|---------|						|-|-|				

'. Updateable image files.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	10	22	6	9	7							
CONSENSUS	|--|----------------|										
XPERT TOTALS	4	10	3	5	3							
ONSENSUS	|--|----------------|										

APPLICATION DESCRIPTION

Universal Reservation Systems -- The availability of systems in 20 percent of the metropolitan areas that provide the ability to make reservations for most services and events. i.e., transportation, lodging, sporting events, restaurants, etc., through one terminal interface. The service provides an interface to existing reservation systems or provides a reservation system for services and events desiring the service.

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL |
| | MAJOR | SIGNIF. | LITTLE | NO | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | NOT BE |
					VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	8	41	32	1	26	41	12	37	36	5	3
EXPERT TOTALS	1	11	11	0	8	9	6	11	9	2	0

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	1	35	28	0	1	1
CONSENSUS			|-|--------|				
EXPERT TOTALS	0	0	16	8	0	0	0
CONSENSUS			|-|--------|				

ACCELERATING AND RETARDING FACTORS

A. Establishment of an industry standard for interchange between systems.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	20	29	9	0	18	15	9	2	3	1
EXPERT TOTALS	8	11	2	0	8	4	4	0	3	0

REQUIRED CAPABILITIES

A. Network control.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	41	10	5	0	0							
CONSENSUS	|--|---------|											
EXPERT TOTALS	16	4	2	0	0							
CONSENSUS	|--|---------|											

B. Mass storage 100 billion bytes.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	16	34	2	1	1	2	12	36	0	0	0	0
CONSENSUS	|----------|-|						|--------|-|					
EXPERT TOTALS	5	15	0	1	0	0	5	12	0	0	0	0
CONSENSUS	|--|-|						|--------|-|					

C. Advanced data base management service.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	39	15	1	1	1							
CONSENSUS	|--|---------|											
EXPERT TOTALS	14	7	1	0	0							
CONSENSUS	|--|---------|											

D. Massive communication interface 10,000 lines.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	15	25	12	1	1	3	12	37	0	0	0	0
CONSENSUS	|----------|---------|						|--------|-|					
EXPERT TOTALS	5	10	5	1	0	0	5	12	0	0	0	0
CONSENSUS	|--|---------|						|--------|-|					

E. Unscheduled interruptions no more than once per day not to exceed 15 minutes.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	20	28	5	1	0	0	6	44	1	0	0	0
CONSENSUS	|----------|-|						|-|-|					
EXPERT TOTALS	9	11	2	0	0	0	2	15	1	0	0	0
CONSENSUS	|----------|-|						|-|-|					

APPLICATION DESCRIPTION

Vacation and Travel Planning Systems -- Access from 50 percent of the travel agencies to systems containing recreational and travel itenerary information. The system would interactively accept gross travel plans, provide suggested accommodations, activities, side trips, etc. from which the client would make his selections. When the final itenerary is selected, the system would provide detailed routings, make all necessary reservations, and do the agency accounting and filing applications.

IMPACT AND VALUE

	IMPACT ON SOCIETY				REASONS FOR IMPLEMENTATION						WILL NOT BE
					PROFITABLE TO IMPLEMENTOR			USEFUL TO PUBLIC			
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	2	16	42	4	14	27	15	13	36	9	7
EXPERT TOTALS	1	6	12	2	5	10	2	5	11	2	2

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	2	28	15	15	0
CONSENSUS				|----|------|			
EXPERT TOTALS	0	0	1	10	3	5	0
CONSENSUS			|-|--------------|				

ACCELERATING AND RETARDING FACTORS

A. Availability of general travel reservations systems from which to expand to planning systems.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	16	25	7	0	5	12	11	3	4	0
EXPERT TOTALS	3	5	1	0	3	2	1	1	1	0

REQUIRED CAPABILITIES

A. Mass storage 100 billion bytes.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	28	16	5	1	0	1	9	34	1	0	0	0
CONSENSUS	|--|---------|							|-|-|				
EXPERT TOTALS	7	6	2	0	0	0	2	12	0	0	0	0
CONSENSUS	|----------|-|							|-|-|				

B. Network control for interconnection to universal reservation system.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	49	2	2	0	1							
CONSENSUS	|--|-|											
EXPERT TOTALS	15	0	1	0	0							
CONSENSUS	|--|-|											

C. Low cost terminals $20-$30 per month.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	33	15	3	1	0	0	0	33	12	0	0	0
CONSENSUS	|--|---------|							|-|--------|				
EXPERT TOTALS	12	4	1	0	0	0	0	10	3	0	0	0
CONSENSUS	|--|---------|							|-|-|				

D. Massive communication interface 10,000 lines.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	28	16	5	1	0	1	6	36	1	0	0	0
CONSENSUS	|--|---------|							|-|-|				
EXPERT TOTALS	6	5	2	0	0	0	3	12	0	0	0	0
CONSENSUS	|--|---------|							|-|-|				

E. Advanced data base management system.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	36	11	3	1	1							
CONSENSUS	|--|---------|											
EXPERT TOTALS	12	3	1	0	0							
CONSENSUS	|--|--|											

JUDICIAL AND LEGISLATIVE

Judicial and legislative areas of government have heretofore
not made extensive use of data processing, but the next 15 years
will find initial moves into this area. The crowded court
schedules will be addressed through systems to schedule court
appearances and handle routine appeals such as continuance without
necessity of scheduling sessions. This application will be used
by 20 percent of the courts by 1978-80.

Congress is presently considering a system to track the progress
of bills through the legislative process. By 1980 Congress and
20 percent of the state legislatures will be served by versions
of this system extended to provide information retrieval and other
tracking capabilities.

Twenty percent of the federal and state penal insitutions in 1985
will use data processing to maintain complete information files on
prisoners and parolees. The systems would maintain personality
profiles, skills, background, prison performance, parole performance,
etc., and would be used in planning and executing rehabilitation
programs.

JUDICIAL AND LEGISLATIVE

APPLICATION TITLE	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER	IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
AUTOMATED COURT SCHEDULING								2.70	2.22	3.14	⁻0.33
P.C.	0.0	0.0	17.5	66.7	12.3	1.8	1.8				
LEGISLATIVE SYSTEMS								2.02	2.13	2.67	⁻0.33
P.C.	0.0	1.9	3.7	64.8	24.1	5.6	0.0				
PENAL AND PAROLE INFORMATION SYSTEMS								2.35	2.08	2.48	⁻0.29
P.C.	0.0	0.0	3.6	21.8	65.5	7.3	1.8				

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APPLICATION DESCRIPTION

Automated Court Scheduling -- The use by 20 percent of federal, state and municipal courts of computerized systems to schedule courts.

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL NOT BE |
| | | | | | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | |
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	15	26	20	2	7	29	20	26	19	14	7
EXPERT TOTALS	4	4	5	0	3	6	3	7	2	4	1

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	10	38	7	1	1
CONSENSUS				|-|-|			
EXPERT TOTALS	0	0	0	9	2	0	0
CONSENSUS				|-|-|			

ACCELERATING AND RETARDING FACTORS

A. Legislative or judicial interpretation of "the speedy trial" to force scheduling of cases within a maximum time.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	11	28	6	1	13	19	4	2	0	0
EXPERT TOTALS	1	8	0	1	3	4	0	0	0	0

REQUIRED CAPABILITIES

A. Availability of the application program from a service organization. $200/month.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	9	34	4	2	1	1	0	40	5	0	0	0
CONSENSUS		|--|-|						|-|-|				
EXPERT TOTALS	4	6	0	0	0	0	0	7	0	0	0	0
CONSENSUS	|----------|-|							|-|-|				

Legislative Systems -- The availability of legislative support systems for Congress and 20 percent of the state legislatures. Services provided would include:
. Tracking of progress of bills through legislative process.
. Tracking the usage of programs under existing legislation.
. Financial analysis of proposed bills.
. Tracking of services to constituencies.

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL |
| | | | | | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | NOT BE |
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	5	20	24	2	6	22	19	15	18	15	6
EXPERT TOTALS	1	5	4	0	2	7	0	4	5	1	1

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	1	2	35	13	3	0
CONSENSUS				|-|--------|			
EXPERT TOTALS	0	1	0	9	3	0	0
CONSENSUS				|-|-|			

REQUIRED CAPABILITIES

A. Mass storage of 100 billion bytes.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	12	30	2	2	0	1	12	28	1	0	0	0
CONSENSUS	|----------|-|						|--------|-|					
EXPERT TOTALS	2	8	0	0	0	0	2	5	0	0	0	0
CONSENSUS		|--|-|					|--------|-|					

APPLICATION DESCRIPTION

Penal and Parole Information Systems -- The use of information systems by 20 percent of the federal and state penal institutions. The systems would maintain personality profiles, skills, background, prison performance, parole performance, etc., files on all prisoners and parolees. The system would be used to plan rehabilitation programs and to track the success or failure of such programs.

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL |
| | | | | | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | NOT BE |
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	6	31	25	0	3	32	20	12	27	15	6
EXPERT TOTALS	2	3	3	0	2	5	1	1	6	1	0

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	2	12	36	4	1
CONSENSUS				|--------|-|			
EXPERT TOTALS	0	0	0	3	4	0	0
CONSENSUS				|--------|-|			

ACCELERATING AND RETARDING FACTORS

A. Development of significant public arousement about penal conditions and reform similar to the current concern about ecology.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	13	24	5	3	4	10	13	4	2	2
EXPERT TOTALS	3	2	0	1	2	1	1	0	0	0

REQUIRED CAPABILITIES

A. Automatic generation of information systems.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	6	30	7	0	4							
CONSENSUS		|--|-|										
EXPERT TOTALS												
CONSENSUS												

B. Mass storage of 100 billion bytes.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	8	30	7	1	1	2	12	26	3	0	0	0
CONSENSUS		|--|-|					|--------|-|					
EXPERT TOTALS	0	3	2	0	0							
CONSENSUS		|--|---------|										

MANUFACTURING AND PROCESS

The thrust of future computer applications in manufacturing and process is toward increased automation. Labor's historic resistance to automation may be somewhat offset by the advent of guaranteed annual wages in 1975-1980.

Increased automation will lead ultimately to the establishment in the 1980's of fully automated manufacturing plants in 1 percent of the major companies. These plants would be able to operate essentially unattended, manufacturing a wide variety of products concurrently and capable of changing the variety dynamically in response to forecasted demands or actual orders. Computers will control the actual manufacturing and provide the necessary product and manufacturing design as well as accomplishing the administrative tasks of scheduling, purchasing, inventory control, accounts receivable and payable, etc.

In route to the automated plant, 1 percent of the warehouses in major companies will be automated by 1977. By 1980 systems will be capable of producing new engineering designs based on engineering standards and practices and previous designs given functional requirements as input. In a similar fashion manufacturing procedures and machine control instructions will be automatically generated from engineering designs. Special and general purpose robots will come into widespread use. By 1985 robots will be used to test drive 5 percent of the U. S. automobile production, and 20 percent of the Fortune 500 Companies will have robots capable of performing, sensing, and manipulating functions similar to those performed by people.

In 1980 it will be possible to simulate most new products and test the simulation rather than actual engineering models as is now done in aerospace. By 1985 computer controlled 100 percent quality assurance of 20 percent of the consumer products may be forced by consumer demand or legislative action.

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APPLICATION TITLE		1970-71	72-74	75-77	78-80	81-85	LATER	NEVER	IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
AUTOMATED WAREHOUSES									1.48	3.35	1.74	‾0.19
	P.C.	0.0	1.7	58.3	35.0	5.0	0.0	0.0				
AUTOMATED DESIGN ENGINEERING									1.63	3.49	1.85	‾0.29
	P.C.	0.0	0.0	10.7	78.6	8.9	1.8	0.0				
AUTOMATED MANUFACTURING ENGINEERING									1.63	3.19	1.75	‾0.56
	P.C.	0.0	0.0	6.8	78.0	13.6	1.7	0.0				
AUTOMATED PROCESS MANUFACTURING PLANT									2.15	3.42	2.25	‾0.45
	P.C.	0.0	0.0	5.6	27.8	66.7	0.0	0.0				
PRODUCT DEVELOPMENT SIMULATION SYSTEM									1.60	3.22	2.09	‾0.36
	P.C.	0.0	0.0	1.8	30.9	61.8	3.6	1.8				
AUTOMATED MANUFACTURING PLANT									2.44	2.39	1.57	‾1.56
	P.C.	0.0	0.0	0.0	13.6	71.2	13.6	1.7				
ROBOT-CONTROLLED AUTOMOBILE CHECKOUT									1.57	2.36	2.29	‾0.78
	P.C.	0.0	0.0	0.0	6.0	52.0	30.0	12.0				
CUSTOMER QUALITY ASSURANCE									2.64	2.08	3.31	‾0.66
	P.C.	0.0	0.9	0.0	1.9	57.7	26.9	13.5				

APPLICATION TITLE	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER	IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
AUTOMATED ROBOTS								2.72	1.86	1.37	‾1.70

```
                            100-
                             75-
                             50-                     ┌──┐
                             25-                  ┌──┘  └──┐
                              0-          ┌───────┘ |-|------| └────
                            P.C.   0.0   0.0   1.7   5.1   55.9  33.9   3.4
```

Automated Design Engineering -- The development of systems capable of producing new engineering designs fro[m] functional requirements based on engineering standards and practices and on prior solutions. Output is a computerized description of the part.

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL |
| | | | | | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | NOT BE |
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	2	25	49	5	35	35	6	6	30	32	8
EXPERT TOTALS	0	7	14	1	12	9	1	11	9	11	1

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	6	44	5	1	0
CONSENSUS				|-|-|			
EXPERT TOTALS	0	0	2	20	1	0	0
CONSENSUS				|-|-|			

REQUIRED CAPABILITIES

A. Development of specialized design languages that allow the selection of design elements and the indication of where and how they fit in the overall design continuity so that calculations and design criteria can be applied.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	38	13	0	1	1							
CONSENSUS	|--|---------|											
EXPERT TOTALS	10	6	0	1	1							
CONSENSUS	|--|---------|											

B. Mass storage of one trillion bytes.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	10	27	8	3	2	9	31	7	1	0	0	0
CONSENSUS		|--|---------|					|-|-|					
EXPERT TOTALS	3	7	3	2	2	4	9	2	0	0	0	0
CONSENSUS		|--|---------|				|--------|-|						

C. Search engine of 1000 times today's capabilities.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	10	26	12	1	2	6	31	9	0	0	0	0
CONSENSUS		|--|---------|					|-|-|					
EXPERT TOTALS	3	6	5	1	2	2	8	3	0	0	0	0
CONSENSUS		|--|---------|					|-|-|					

D. Concise, complete and machine processable representation of three dimensional objectives and their attributes.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	40	12	0	0	0							
CONSENSUS	|--|-|											
EXPERT TOTALS	13	5	0	0	0							
CONSENSUS	|--|---------|											

E. Discovery system.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	7	29	11	1	3							
CONSENSUS		|--|---------|										
EXPERT TOTALS	1	9	4	0	3							
CONSENSUS		|--|---------|										

APPLICATION DESCRIPTION

Automated Manufacturing Engineering -- The development of systems capable of taking a machine processable description of a part, breaking its manufacture into elementary manufacturing operations (cutting, forming, assembling, weaving, electroplating, etc.) and then making up a manufacturing procedure from the elementary operations available in the particular plant.

IMPACT AND VALUE

	IMPACT ON SOCIETY				REASONS FOR IMPLEMENTATION						WILL NOT BE
					PROFITABLE TO IMPLEMENTOR			USEFUL TO PUBLIC			
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	5	20	45	7	28	37	4	7	25	30	15
EXPERT TOTALS	1	3	7	1	4	6	2	1	5	6	1

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	4	46	8	1	0
CONSENSUS				|-|-|			
EXPERT TOTALS	0	0	1	8	1	0	0
CONSENSUS				|-|-|			

REQUIRED CAPABILITIES

A. Mass storage of 100 billion bytes.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	11	25	9	3	0	3	12	29	2	0	0	0
CONSENSUS		|--|--|					|---------|-|					
EXPERT TOTALS	3	2	2	0	0	0	1	4	1	0	0	0
CONSENSUS	|----------|---------|						|-|-|					

B. Search engine of 100 times today's capabilities.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	12	22	12	2	1	2	13	29	1	0	0	0
CONSENSUS		|--|---------|					|---------|-|					
EXPERT TOTALS	2	3	2	0	0	0	0	5	0	0	0	0
CONSENSUS	|----------|---------|						|-|-|					

C. Concise, complete, and machine processable representation of three dimensional objects and their attributes.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	38	11	0	0	0							
CONSENSUS	|--|-|											
EXPERT TOTALS	5	2	0	0	0							
CONSENSUS	|--|---------|											

D. Application development of a system capable of analyzing a part description for its fundamental manufacturing operations and then combine the operations into manufacturing routings and instruction

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	44	6	1	0	0							
CONSENSUS	|--|-|											
EXPERT TOTALS	6	1	0	0	0							
CONSENSUS	|--|-|											

Automated Manufacturing Plant -- The establishment in 1 percent of the Fortune 500 companies of a fully automated manufacturing plant designed to carry out some subset of the possible elementary manufacturing operations for discrete rather than continuous products. The plant would be capable of manufacturing a wide variety of products concurrently and of changing the variety dynamically. Automated Design Engineering and Automated Manufacturing Engineering would be included in the system. The plant would schedule itself on the basis of orders and forecasts, make its own purchases and control its inventory.

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL |
| | | | | | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | NOT BE |
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	14	34	21	3	28	14	7	8	23	15	41
EXPERT TOTALS	2	3	3	1	4	2	2	1	5	2	3

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	0	8	42	8	1
CONSENSUS					|-|-|		
EXPERT TOTALS	0	0	0	2	4	0	1
CONSENSUS				|--------|-|			

ACCELERATING AND RETARDING FACTORS

A. Establishment of tax incentives for investment in automation.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	15	26	9	0	3	10	8	4	8	4
EXPERT TOTALS	3	3	1	0	1	0	1	0	0	2

B. Establishment of a guaranteed annual income removing most of labor's objections to automation.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	8	25	15	0	2	10	10	5	6	2
EXPERT TOTALS	1	4	2	0	0	1	2	0	1	1

C. Doubling of current labor costs.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	21	28	3	0	4	8	15	17	2	0
EXPERT TOTALS	5	2	0	0	0	1	3	2	1	0

REQUIRED CAPABILITIES

A. Network control to coordinate the central plant system and the small control computers monitoring the processes.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	44	5	3	1	0							
CONSENSUS	|--|-|											
EXPERT TOTALS	7	0	0	0	0							
CONSENSUS	|--|-|											

B. Very high reliability one plant down time incident per year.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	13	30	4	1	2	1	2	32	9	0	0	0
CONSENSUS	|----------|-|							|-|-|				
EXPERT TOTALS	1	3	2	0	0	0	0	5	1	0	0	0
CONSENSUS		|--|---------|						|-|-|				

C. Development of better resource balancing and scheduling algorithms.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	13	34	3	1	0							
CONSENSUS	|----------|-|											
EXPERT TOTALS	0	7	0	0	0							
CONSENSUS		|--|-|										

D. Mass storage of 100 billion bytes.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	11	33	5	1	1	2	6	28	6	1	0	0
CONSENSUS		|--|-|						|-|-|				
EXPERT TOTALS	1	5	1	0	0	0	1	4	1	0	0	0
CONSENSUS		|--|-|						|-|-|				

E. Advanced data base management system.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	33	15	1	0	2							
CONSENSUS	|--|---------|											
EXPERT TOTALS	4	3	0	0	0							
CONSENSUS	|--|---------|											

APPLICATION DESCRIPTION

Automated Process Manufacturing Plant -- The establishment in 1 percent of the Fortune 500 Companies of a fully automated continuous process manufacturing plant designed to control, analyze, and process large systems of complex machinery producing paper, chemical, etc. The plant would schedule itself on the basis of orders and forecasts, make its own ups, and control its inventories.

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL |
| | | | | | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | NOT BE |
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	7	23	25	3	25	25	5	7	27	19	9
EXPERT TOTALS	3	11	3	1	7	9	1	2	11	3	3

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	3	15	36	0	0
CONSENSOS				|--------|-|			
EXPERT TOTALS	0	0	3	3	10	0	0
CONSENSUS				|--------|-|			

REQUIRED CAPABILITIES

A. Ten-fold improvement in sensing equipment.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	37	8	1	0	1	0	1	35	6	0	0	0
CONSENSUS	|--|-|							|-|-|				
EXPERT TOTALS	12	2	0	0	0	0	1	8	2	0	0	0
CONSENSUS	|--|-|							|-|-|				

B. Mass storage of 100 billion bytes.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	13	29	4	0	1	2	14	26	1	0	0	0
CONSENSUS	|----------|-|						|--------|-|					
EXPERT TOTALS	4	9	1	0	0	1	5	6	0	0	0	0
CONSENSUS	|----------|-|						|----|-----|					

C. Capability of monitoring 100,000 sensors.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	30	13	3	0	1	0	14	26	1	0	0	0
CONSENSUS	|--|---------|						|--------|-|					
EXPERT TOTALS	10	3	1	0	0	0	4	7	0	0	0	0
CONSENSUS	|--|---------|						|--------|-|					

Automated Robots -- The utilization of general purpose robots in 20 percent of the Fortune 500 companies. These robots would be capable of performing, sensing and manipulatory operations similar to those performed by people. Programming the robots might be accomplished by manually moving them through the required motions.

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL |
| | | | | | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | NOT BE |
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	24	28	16	0	15	23	7	9	17	15	46
EXPERT TOTALS	4	6	5	0	4	6	3	1	6	5	5

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	1	3	33	20	2
CONSENSUS					|-|--------|		
EXPERT TOTALS	0	0	0	1	7	6	0
CONSENSUS					|-|--------|		

ACCELERATING AND RETARDING FACTORS

A. The institution of a guaranteed annual income removing some union resistance to automation.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	5	26	17	0	2	9	10	3	7	2
EXPERT TOTALS	3	7	3	0	1	5	2	1	2	0

B. The establishment of tax incentives for investment in automation.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	14	24	11	0	3	11	4	6	8	3
EXPERT TOTALS	6	6	1	0	0	3	1	3	1	2

REQUIRED CAPABILITIES

A. Development in heuristic programming to make possible the generation of programs through manually stepping of the motions.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	19	26	3	1	1							
CONSENSUS	|----------|-|											
EXPERT TOTALS	2	8	1	0	0							
CONSENSUS		|--|-|										

B. Sensors capable of making visual distinguishments approaching the capability of the human eye.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	15	28	3	1	4							
CONSENSUS	|----------|-|											
EXPERT TOTALS	2	8	1	0	0							
CONSENSUS		|--|-|										

Automated Warehouses -- The conversion of 1 percent of the warehouses in Fortune 500 companies to computerized control of stacking and picking, and movement to and from docks and/or manufacturing floor.

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL NOT BE IMPLEMENTED |
| | | | | | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | |
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	
GROUP TOTALS	4	18	46	12	31	37	5	8	23	32	5
EXPERT TOTALS	2	9	16	5	14	14	2	4	10	12	2

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	1	35	21	3	0	0
CONSENSUS			|-|--------|				
EXPERT TOTALS	0	0	17	11	1	0	0
CONSENSUS			|-|--------|				

ACCELERATING AND RETARDING FACTORS

A. Twenty five percent reduction in cost of picking and stacking units.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	10	29	10	0	5	17	7	2	3	3
EXPERT TOTALS	7	14	5	0	2	8	3	0	3	2

B. Establishment of tax incentives for investment in automation equipment.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	19	22	9	0	5	10	5	3	5	8
EXPERT TOTALS	12	12	2	0	2	5	2	2	3	4

C. Establishment of guaranteed annual income removing most labor's objections to automation.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	9	27	14	0	3	12	9	5	5	1
EXPERT TOTALS	6	14	6	0	1	8	2	3	2	1

REQUIRED CAPABILITIES

A. Advanced data base management.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	30	10	4	6	2							
CONSENSUS	|--|---------|											
EXPERT TOTALS	13	3	3	5	1							
CONSENSUS	|--|-----------------|											

B. Relatively high reliability. No outages of greater than 1 hour.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	27	17	6	0	1	0	1	43	0	0	00	0
CONSENSUS	|--|---------|							|-|-|				
EXPERT TOTALS	9	10	4	0	1	0	1	19	0	0	0	0
CONSENSUS	|----------|-|							|-|-|				

APPLICATION DESCRIPTION

Customer Quality Assurance -- The installation of computer supported or controlled 100 percent quality assurance tests systems for 20 percent of the consumer products. The need for such systems will be brought about by massive consumer pressure forcing government regulations requiring long-term warranties of quality and safety. The warranties will be enforced with significant penalties for products that fail to meet their warranty.

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL |
| | | | | | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | NOT BE |
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	13	25	16	1	4	29	16	31	11	7	13
EXPERT TOTALS	3	4	2	0	0	8	1	5	3	0	0

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	0	1	30	14	7
CONSENSUS					|-|--------|		
EXPERT TOTALS	0	0	0	1	5	2	0
CONSENSUS					|-|--|		

ACCELERATING AND RETARDING FACTORS

A. Legislation establishing and enforcing warranty requirements.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	14	17	7	1	3	10	10	6	3	1
EXPERT TOTALS	5	3	0	1	1	3	2	0	1	0

REQUIRED CAPABILITIES

A. Ten-times improvement in test monitoring and sensing equipment.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	35	8	2	0	1	0	1	32	9	0	0	0
CONSENSUS	|--|-|							|-|-|				
EXPERT TOTALS	5	1	1	0	0	0	1	6	0	0	0	0
CONSENSUS	|--|--------|							|-|-|				

B. Network control to coordinate monitor and test computers located throughout the plant.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	32	9	2	1	1							
CONSENSUS	|--|---------|											
EXPERT TOTALS	6	1	1	0	0							
CONSENSUS	|--|--|											

APPLICATION DESCRIPTION

Product Development Simulation System -- The utilization by 20 percent of the Fortune 500 Companies of computer systems that simulates the construction of basic components at the lowest level, connecting these into larger sub-assemblies up to final product level. This system will not only predict the parts usage required, but also predicts the comparative cost/performance of substitutions as well as providing detailed manufacturing instructions.

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL NOT BE |
| | | | | | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | |
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	2	17	32	5	19	28	8	5	24	24	7
EXPERT TOTALS	0	8	14	2	9	11	4	5	8	10	4

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	1	17	34	2	1
CONSENSUS				|--------|-|			
EXPERT TOTALS	0	0	1	9	12	1	0
CONSENSUS				|--------|-|			

REQUIRED CAPABILITIES

A. Interactive terminal system with complex search and interactive pattern matching for use in building evaluating and optimizing the models.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	37	7	4	0	0							
CONSENSUS	|--|-|											
EXPERT TOTALS	15	3	3	0	0							
CONSENSUS	|--|---------|											

B. Service to assist in model development.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	9	27	9	2	0							
CONSENSUS		|--|-|										
EXPERT TOTALS	2	12	5	2	0							
CONSENSUS		|--|---------|										

C. Mass storage of 100 billion bytes.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	11	24	10	2	0	1	15	25	1	0	0	0
CONSENSUS		|--|---------|					|--------|-|					
EXPERT TOTALS	4	9	7	1	0	1	5	12	0	0	0	0
CONSENSUS		|--|---------|					|--------|-|					

D. Advanced data base management system.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	33	11	2	0	1							
CONSENSUS	|--|---------|											
EXPERT TOTALS	15	4	2	0	0							
CONSENSUS	|--|---------|											

Robot-Controlled Automobile Checkout -- The checking of 5 percent of the U. S. auto production by robots test driving on test tracks for safety, performance and repeatability of all functions. Results are recorded on-line and a profile of the vehicle characteristics produced immediately.

IMPACT AND VALUE

| | *IMPACT ON SOCIETY* | | | | *REASONS FOR IMPLEMENTATION* | | | | | | *WILL NOT BE* |
| | | | | | *PROFITABLE TO IMPLEMENTOR* | | | *USEFUL TO PUBLIC* | | | |
	MAJOR	*SIGNIF.*	*LITTLE*	*NO*	*VERY*	*MODERT*	*MARGINAL*	*VERY*	*MODERT*	*MARGINAL*	*IMPLEMENTED*
GROUP TOTALS	6	8	37	3	8	29	10	12	20	13	15
EXPERT TOTALS	2	0	5	0	1	3	3	3	1	2	2

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	0	3	26	15	6
CONSENSUS					|-|--------|		
EXPERT TOTALS	0	0	0	1	5	2	0
CONSENSUS					|-|--|		

REQUIRED CAPABILITIES

A. One hundred times improvement in robot/sensor development.

	NECESSRY	ASSET	USEFUL SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	33	6	2	0	0	0	2	29	6	0	0	0
CONSENSUS	|--|-|							|-|-|			
EXPERT TOTALS	3	3	0	0	0						
CONSENSUS	|------|-----|										

B. Multi-attribute pattern matching.

	NECESSRY	ASSET	USEFUL SOME	USE NO	NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	36	2	0	1	0							
CONSENSUS	|--|-|											
EXPERT TOTALS	7	0	0	0	0							
CONSENSUS	|--|-|											

MEDIA

The media industry has recently begun to move its use of data
processing into the main stream of the businesses. A Japanese
television network uses a system for production scheduling and
control of all of its programming. Many newspapers and periodi-
cals employ computerized typesetting. These trends will continue.
By 1980 twenty percent of the national and international periodi-
cals will use computer systems for editing, layout, proofread
and printing. This will include customization for regional,
sectional, and even smaller groupings of their subscribers.

The advent of the home terminal in the 1980's will provide an
increased opportunity for customized delivery to the public. In
1985 one percent of the homes in the United States will use the
home terminal to request desired programs and to request more
in-depth coverage for items of particular interest. By the end
of the 1980's use of home terminals will have substantially
increased and 5 percent of them will be equipped for hard
copy printout of individualized newspapers, periodicals, articles,
etc.

By 1985 a centralized automated subscription service will be
offered to publishers removing from them the necessity of maintain-
ing their own subscription lists.

MEDIA

APPLICATION TITLE	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER	IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
AUTOMATED PERIODICAL PUBLISHING								1.46	3.21	2.00	⁻0.10
P.C.	0.0	0.0	3.5	86.0	8.8	1.8	0.0				
AUTOMATED SUBSCRIPTION SERVICE								1.15	2.73	1.66	⁻0.39
P.C.	0.0	0.0	1.8	27.3	54.5	10.9	5.5				
INTERACTIVE NEWS AND ENTERTAINMENT								2.22	1.95	2.11	⁻1.35
P.C.	0.0	1.5	1.5	7.5	61.2	25.4	3.0				
ELECTRONIC DELIVERY OF HARD COPY								2.08	2.00	2.35	⁻0.83
P.C.	0.0	0.0	0.0	8.2	45.9	39.3	6.6				

III.144

APPLICATION DESCRIPTION

Automated Periodical Publishing -- The utilization of computer by 20 percent of the national and international publications to edit, layout, proofread, and print periodicals with customized regional and sectional editions.

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL |
| | | | | | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | NOT BE |
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	3	12	41	6	16	38	8	5	24	29	2
EXPERT TOTALS	2	5	16	1	8	14	2	2	11	9	0

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	2	49	5	1	0
CONSENSUS				|-|-|			
EXPERT TOTALS	0	0	1	18	3	0	0
CONSENSUS				|-|-|			

REQUIRED CAPABILITIES

A. Advanced photo composition systems.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	40	10	0	7	0							
CONSENSUS	|--|-|											
EXPERT TOTALS	14	6	0	0	0							
CONSENSUS	|--|---------|											

B. Availability of the application software $1,000/month.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	12	32	3	0	1	0	0	34	7	0	0	0
CONSENSUS		|---|-|						|-|-|				
EXPERT TOTALS	5	11	2	0	0	0	0	13	1	0	0	0
CONSENSUS	|----------|-|							|-|-|				

Automated Subscription Service -- The availability of a fully automated subscription system for processing 20 percent of the top 200 periodic publications. Information and data will be handled by one general subscription house clearing applications and processing renewals and cancellations. The system will permit terminal inquiry for all member publishers to gather data of particular concern, e.g., circulation, advertising lineage, and other marketing indicies.

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL |
| | | | | | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | NOT BE |
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	0	12	35	11	14	29	12	5	16	30	8
EXPERT TOTALS	0	4	7	3	4	9	0	2	6	4	3

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	1	15	30	6	3
CONSENSUS				|--------|-|			
EXPERT TOTALS	0	0	1	5	4	4	2
CONSENSUS				|--------|--------|			

REQUIRED CAPABILITIES

A. Mass data storage of one trillion bytes.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	10	33	5	0	0	0	31	12	0	0	0	0
CONSENSUS		|--|-|					|-|--------|					
EXPERT TOTALS	3	10	1	0	0	0	8	2	0	0	0	0
CONSENSUS		|--|-|					|-|-|					

B. Network control.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	29	16	3	0	1							
CONSENSUS	|--|---------|											
EXPERT TOTALS	11	2	1	0	0							
CONSENSUS	|--|-|											

C. Massive communication interface 10,000 lines.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	9	35	1	1	2	2	17	21	1	0	0	0
CONSENSUS		|--|-|					|--------|-|					
EXPERT TOTALS	3	10	1	0	0	0	5	5	0	0	0	0
CONSENSUS		|--|-|					|----|-----|					

APPLICATION DESCRIPTION

Electronic Delivery of Hard Copy -- The availability of the electronic delivery of a wide variety of hard copy items via the home terminal to 5 percent of the homes. Items could be viewed, and hard copy selected or rejected. Items might include newspapers, periodicals, mail, etc.

IMPACT AND VALUE

	IMPACT ON SOCIETY				REASONS FOR IMPLEMENTATION						WILL
					PROFITABLE TO IMPLEMENTOR			USEFUL TO PUBLIC			NOT BE
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	8	23	26	2	6	27	19	13	24	16	18
EXPERT TOTALS	3	6	4	1	2	9	2	6	6	1	2

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	0	5	28	24	4
CONSENSUS					|-|--------|		
EXPERT TOTALS	0	0	0	1	8	6	0
CONSENSUS					|-|--------|		

REQUIRED CAPABILITIES

A. Low cost ($5-40/month) terminal with both hard copy and video display capability (could be video cassette.)

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	43	5	2	0	0	0	1	39	1	0	0	0
CONSENSUS	|--|-|							|-|-|				
EXPERT TOTALS	13	0	1	0	0	0	0	8	0	0	0	0
CONSENSUS	|--|-|							|-|-|				

B. Mass storage of 100 billion bytes.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	31	12	5	1	0	0	4	31	8	0	0	0
CONSENSUS	|--|---------|							|-|-|				
EXPERT TOTALS	9	2	1	1	0	0	1	6	3	0	0	0
CONSENSUS	|--|---------|							|-|--------|				

C. High capacity two-way communication channels.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	37	10	4	0	1							
CONSENSUS	|--|---------|											
EXPERT TOTALS	12	0	1	0	1							
CONSENSUS	|--|-|											

Interactive News and Entertainment -- The availability in 1 percent of homes of media service that allows the subscriber to choose at his home terminal from a wide variety of offerings. His selection is individually transmitted to him. If he desires, he may request more in-depth coverage of particular items of interest.

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL NOT BE IMPLEMENTED |
| | | | | | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | |
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	
GROUP TOTALS	14	28	28	6	14	24	18	19	22	12	37
EXPERT TOTALS	4	10	8	1	5	7	7	7	8	1	12

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	1	1	5	41	17	2
CONSENSUS					|-|--------|		
EXPERT TOTALS	0	0	0	2	17	5	1
CONSENSUS					|-|-|		

ACCELERATING AND RETARDING FACTORS

A. The availability of CATV in 1% of the homes.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	14	28	12	0	5	14	20	7	0	0
EXPERT TOTALS	8	9	5	0	2	7	8	1	0	0

B. FCC authorization for new switched communication channels.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	12	27	8	0	8	8	18	3	1	0
EXPERT TOTALS	6	8	3	0	3	4	7	0	0	0

REQUIRED CAPABILITIES

A. Inexpensive television like terminal with two-way communication $5-25 per month.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	50	6	1	0	2	0	1	49	1	1	0	0
CONSENSUS	|--|-|							|-|-|				
EXPERT TOTALS	20	2	0	0	1	0	0	16	1	0	0	0
CONSENSUS	|--|-|							|-|-|				

B. Massive communication interface.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	53	2	0	0	1							
CONSENSUS	|--|-|											
EXPERT TOTALS	18	2	0	0	0							
CONSENSUS	|--|-|											

C. High capacity two-way communication channels.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	35	18	1	1	4							
CONSENSUS	|--|---------|											
EXPERT TOTALS	11	11	0	0	0							
CONSENSUS	|------|-----|											

D. High reliability - no more than 1 unscheduled interruption per month not to exceed 15 minutes.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	6	30	16	2	4	3	9	40	0	0	0	0
CONSENSUS		|--|--------|						|-|-|				
EXPERT TOTALS	1	14	6	0	1	0	3	14	0	0	0	0
CONSENSUS		|--|---------|						|-|-|				

MEDICAL

One of the more interesting areas of future use of data processing
is in the area of providing assistance in the improved delivery of
health care. Already pilot efforts are under way to provide
computerized analysis of medical tests such as EKG, EEG, etc.

By 1980 twenty percent of the physicians will have such service
available to them via a terminal located in their office. In the
same time frame twenty percent of the hospitals will provide
computerized multi-phasic screening as part of their admittance
procedure. The system collects personal data, general health
statements, specific complaints, etc. on arrival, schedules a
series of tests, conducts many of them, monitors the results of
the tests and schedules additional tests where indicated. The
results are presented to the physician for medical evaluation.

Possibly by 1980 and certainly no later than 1985 twenty percent
of the larger hospitals will have computerized systems for medical
diagnosis. Input into these systems may come directly from multi-
phasic screening systems. Computerized patient monitoring is
becoming more common today. This trend will continue into the
future culminating in 1985 with the availability in 20 percent
of the metropolitan areas of the ability to monitor ambulatory
out-patients who are suspected of having or have a history of
medical disorders.

The form of health care delivery itself will change in the future.
In the 1980-85 time frame 20 percent of the metropolitan areas
will have available computer coordinated vertically integrated
health facilities. These facilities will include physician
offices, neighborhood health care centers, hospitals, university
medical centers, nursing homes, rehabilitation centers and home
health care. A patient entering the system is moved to the
proper level to treat his health problem and as his problem
progresses, either positively or negatively, he may be shifted to
a different level. Coordination of the use of facilities is done
by a computer which tracks the patient while he is in the system
recording and maintaining his medical and administrative data.

New types of health facilities will be introduced. In 1980-85 five
percent of the population will have access to Preventive Medicine
Diagnostic centers which combine the characteristics of multi-
phasic screening and clinical decision systems but are directed
toward periodic physical checkups. These centers may be operated
by health insurance companies who will encourage utilization by
providing insurance premiums incentives.

III.150

APPLICATION TITLE		1970-71	72-74	75-77	78-80	81-85	LATER	NEVER	IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
COMPUTERIZED MEDICAL TEST ANALYSIS	P.C.	0.0	1.8	5.4	71.4	21.4	0.0	0.0	2.50	3.12	3.62	⁻0.10
COMPUTER COORDINATED TESTING OF MEDICAL DRUGS	P.C.	0.0	0.0	0.0	68.6	31.4	0.0	0.0	2.95	2.37	3.54	⁻0.25
CLINCAL DECISION SUPPORT SYSTEMS	P.C.	0.0	1.7	1.7	51.7	40.0	5.0	0.0	2.96	2.55	3.41	⁻0.40
MULTI-PHASIC SCREENING	P.C.	0.0	0.0	3.2	54.8	37.1	4.8	0.0	2.76	2.61	3.37	⁻0.33
DISEASE INFORMATION SYSTEMS	P.C.	0.0	0.0	0.0	26.0	68.0	6.0	0.0	2.68	2.13	3.35	⁻0.40
VERTICALLY INTEGRATED HEALTH CARE DELIVERY SYSTEM	P.C.	0.0	2.0	2.0	19.6	52.9	21.6	2.0	2.85	2.12	2.81	⁻0.61
PREVENTIVE MEDICINE DIAGNOSTIC CENTERS	P.C.	0.0	0.0	1.7	16.7	63.3	16.7	1.7	2.85	2.40	3.18	⁻0.62
OUT-PATIENT MONITORING	P.C.	0.0	0.0	1.6	3.2	54.0	39.7	1.6	2.51	1.22	1.71	⁻1.90

<u>Clinical Decision Support Systems</u> -- The availability of a clinical decision support system in 20 percent of the hospitals of over 500 beds. The system assists the physician in making diagnoses and prescribing treatment by evaluating symptoms and test results (perhaps, collected in a multi-phasic screening system) recommending additional tests and/or giving a list of possible diagnoses with the associated medical reasoning. When a diagnosis is reached, the system recommends treatment again with the medical reasoning.

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL NOT BE |
| | MAJOR | SIGNIF. | LITTLE | NO | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | IMPLEMENTED |
					VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	
GROUP TOTALS	20	43	14	4	17	36	16	43	20	5	11
EXPERT TOTALS	6	6	1	0	4	5	2	10	1	0	1

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	1	1	31	24	3	0
CONSENSUS				|-|--------|			
EXPERT TOTALS	0	0	0	7	4	0	0
CONSENSUS				|-|--------|			

REQUIRED CAPABILITIES

A. Mass storage of <u>100 billion bytes</u>.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	9	28	11	2	1	3	32	11	0	0	0	0
CONSENSUS		|--|---------|					|-|-|					
XPERT TOTALS	1	7	2	0	0	0	6	1	0	0	0	0
CONSENSUS		|--|-|					|-|-|					

B. Multi-attribute pattern matching.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	34	11	4	1	1							
CONSENSUS	|--|---------|											
EXPERT TOTALS	5	3	1	0	1							
CONSENSUS	|------|-----|											

C. <u>Ten-fold</u> increase in sensor technology.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	14	27	7	0	1	0	5	36	2	0	0	0
CONSENSUS	|---------|-|							|-|-|				
EXPERT TOTALS	2	7	1	0	0	0	2	5	0	0	0	0
CONSENSUS		|--|-|						|--------|-|				

D. Development of application programs by a service having access to medical personnel trained in data processing.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	37	10	3	1	1							
CONSENSUS	|--|---------|											
EXPERT TOTALS	6	3	0	1	0							
CONSENSUS	|--|---------|											

Computer Coordinated Testing of Medical Drugs -- The implementation of a mandatory comprehensive testing program for drugs and food products prior to their release to general use. The program would be administered and/or coordinated by the government and would be aimed at detecting long-range adverse side effects as well as determining drug effectiveness. The coordination and analysis would be computer assisted.

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL NOT BE IMPLEMENTED |
| | | | | | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | |
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	15	30	9	3	10	25	15	29	20	4	5
EXPERT TOTALS	4	7	3	0	4	5	1	9	2	0	2

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	0	35	16	0	0
CONSENSUS				|-|--------|			
EXPERT TOTALS	0	0	0	7	4	0	0
CONSENSUS				|-|--------|			

REQUIRED CAPABILITIES

A. Mass data storage of one trillion bytes.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	10	29	3	0	3	12	22	8	0	0	0	0
CONSENSUS	|--|-|					|--------|-|						
EXPERT TOTALS	3	6	0	0	1	2	5	2	0	0	0	0
CONSENSUS	|----------|-|						|-|-|					

B. Multi-attribute pattern matching.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	34	8	1	1	1							
CONSENSUS	|--|-|											
EXPERT TOTALS	7	2	0	1	0							
CONSENSUS	|--|--------|											

C. Discovery system to discover secondary and tertiary effects.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	30	12	1	1	1							
CONSENSUS	|--|--------|											
EXPERT TOTALS	6	3	0	1	0							
CONSENSUS	|--|--------|											

APPLICATION DESCRIPTION

Computerized Medical Test Analysis -- Computer-assisted interpretation of quantifiable medical tests, e.g. EKG, EEG, etc., for 20 percent of the physicians. The service would accept input from the conventional recording equipment doctors now have in their offices and would provide results through a terminal in the doctor's office or via telephone voice response.

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL NOT BE |
| | | | | | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | |
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	7	32	19	1	17	31	9	27	26	4	2
EXPERT TOTALS	4	13	2	0	8	8	1	11	7	0	1

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	1	3	40	12	0	0
CONSENSUS				|-|-|			
EXPERT TOTALS	0	1	3	14	2	0	0
CONSENSUS				|-|-|			

REQUIRED CAPABILITIES

A. Availability of the application programs from a service organization. $100 per month.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	10	34	4	0	2	0	0	39	5	0	0	0
CONSENSUS		|--|-|						|-|-|				
EXPERT TOTALS	3	11	2	0	1	0	0	12	1	0	0	0
CONSENSUS		|--|-|						|-|-|				

B. Multi-attribute pattern matching.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	33	11	1	2	1							
CONSENSUS	|--|---------|											
EXPERT TOTALS	10	4	0	2	1							
CONSENSUS	|--|---------|											

Disease Information Systems -- The availability in 20 percent of the metropolitan areas of systems to record the diseases diagnosed by physicians in the area. The system would be used to detect epidemics in their early stages, and disease trends such as the rise of new diseases, or effectiveness of preventive measures on old diseases.

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL |
| | | | | | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | NOT BE |
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	9	35	11	1	10	19	21	29	16	8	8
EXPERT TOTALS	2	8	3	1	3	5	4	8	4	1	2

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	0	13	34	3	0
CONSENSUS				|--------|-|			
EXPERT TOTALS	0	0	0	4	7	0	0
CONSENSUS				|--------|-|			

REQUIRED CAPABILITIES

A. Automatic generation of information systems.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	5	27	7	0	6							
CONSENSUS		|--|---------|										
EXPERT TOTALS	0	6	1	0	3							
CONSENSUS		|--|-----------------------|										

B. Mass storage of 100 billion bytes.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	8	26	8	1	2	2	10	26	1	0	0	0
CONSENSUS		|--|-|					|--------|-|					
EXPERT TOTALS	1	6	1	0	2	1	2	3	0	0	0	0
CONSENSUS		|--|---------|					|----|-----|					

Multi-Phasic Screening -- The use of computerized multi-phasic screening prior to admittance to 20 percent of the hospitals of over 500 beds. The system collects personal data, general health statements, specific complaints, etc., on arrival, schedules a series of tests, conducts many of them, monitors the results of the tests and schedules additional tests where indicated, and presents the results of the screening to a physician for medical evaluation.

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL NOT BE |
| | | | | | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | |
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	13	48	17	3	14	44	12	41	21	8	9
EXPERT TOTALS	4	12	2	0	4	9	1	10	2	2	4

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	2	34	23	3	0
CONSENSUS				|-|--------|			
EXPERT TOTALS	0	0	1	6	6	1	0
CONSENSUS				|----|-----|			

ACCELERATING AND RETARDING FACTORS

A. Passage of a Nationalized Health Insurance Act similar to Great Britain.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	19	29	2	0	5	17	14	4	4	3
EXPERT TOTALS	5	6	1	0	1	3	3	1	2	1

REQUIRED CAPABILITIES

A. Mass storage of 100 billion bytes.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	7	26	15	1	4	4	20	22	0	0	0	0
CONSENSUS	|--|---------|						|-|--------|					
EXPERT TOTALS	0	5	5	0	1	2	4	4	0	0	0	0
CONSENSUS	|----------|-|						|-|--------|					

B. Ten-fold increase in sensor technology.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	29	15	7	0	1	1	6	36	2	0	1	0
CONSENSUS	|--|---------|							|-|-|				
EXPERT TOTALS	5	4	2	0	0	0	2	8	0	0	0	0
CONSENSUS	|----------|-|							|-|-|				

C. Development of the application programs by a service having access to medical personnel trained in data processing.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	30	17	4	1	1							
CONSENSUS	|--|---------|											
EXPERT TOTALS	6	4	1	0	1							
CONSENSUS	|------|-----|											

D. Advanced data base management.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	28	17	4	2	1							
CONSENSUS	|--|---------|											
EXPERT TOTALS	6	5	0	0	1							
CONSENSUS	|------|-----|											

<u>Out-Patient Monitoring</u> -- The availability of out-patient monitoring in 20 percent of the metropolitan areas. Ambulatory patients with a history or suspsected medical disorder are fitted with sensors and telemetry equipment to be monitored by the central system. In the event of the detection of a problem, the system could request a hospital visit via the telemetry equipment or sound a loud request for assistance depending on the severity.

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL |
| | | | | | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | NOT BE |
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	15	38	17	2	8	15	15	19	13	6	52
EXPERT TOTALS	3	7	3	1	2	4	1	2	4	0	7

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	1	2	34	25	1
CONSENSUS					|-|--------|		
EXPERT TOTALS	0	0	0	0	6	6	1
CONSENSUS					|--------|-|		

ACCELERATING AND RETARDING FACTORS

A. FCC making available the necessary communication channels for public transmission.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	12	30	9	0	2	11	12	9	1	0
EXPERT TOTALS	3	7	1	0	1	3	2	2	0	0

B. Federal subsidy.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	18	26	5	0	2	10	15	7	4	1
EXPERT TOTALS	5	4	1	0	0	4	2	1	1	0

C. Establishment of a National Health Insurance Act similar to Great Britain.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	11	29	10	0	6	7	11	8	2	2
EXPERT TOTALS	3	6	2	0	1	4	1	1	0	1

REQUIRED CAPABILITIES

A. Inexpensive miniaturized reliable sensors and telemetry equipment. <u>$500</u>

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	49	3	0	0	0	0	10	37	1	0	1	0
CONSENSUS	|--|-|							|-|-|				
EXPERT TOTALS	10	0	0	0	0	0	4	4	0	0	0	0
CONSENSUS	|--|-|						|----|-----|					

B. High availability central systems - <u>one failure of more than one hour in a year.</u>

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	28	21	0	2	2	0	12	33	0	0	0	0
CONSENSUS	|--|---------|						|--------|-|					
EXPERT TOTALS	6	4	0	0	0	0	4	3	0	0	0	0
CONSENSUS	|--|---------|						|-|--------|					

C. Massive communication interface <u>10,000 channels.</u>

	NECESSRY	ASSET	USEFUL	SOME	USE NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	671000×+
GROUP TOTALS	31	12	4	2	3	4	8	31	2	0	0	0
CONSENSUS	|--|---------|						|--------|-|					
EXPERT TOTALS	5	3	1	0	1	0	2	5	0	0	0	0
CONSENSUS	|------|-----|						|--------|-|					

Preventive Medicine Diagnostic Centers -- The availability to 5 percent of the population of computerized medical diagnostic centers. This application is similar to multi-phasic screening but not associated with a scheduled hospital admittance.

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL |
| | | | | | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | NOT BE |
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	18	42	18	1	18	31	14	39	20	6	17
EXPERT TOTALS	7	8	1	0	3	7	0	9	2	0	6

IMPLEMENTATION ATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	1	10	38	10	1
CONSENSUS					|-|-|		
EXPERT TOTALS	0	0	1	3	9	3	1
CONSENSUS					|-|-|		

ACCELERATING AND RETARDING FACTORS

A. Passage of a Nationalized Health Insurance Act similar to Great Britain.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	18	29	3	0	4	17	13	5	4	3
EXPERT TOTALS	8	7	1	0	1	6	3	1	2	1

B. Federal subsidy.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	24	24	2	0	4	18	11	6	5	1
EXPERT TOTALS	11	4	1	0	2	5	2	2	1	1

REQUIRED CAPABILITIES

A. Ten-fold increase in sensor technology.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	16	24	7	4	1	1	8	31	3	0	0	0
CONSENSUS	|---------|-|							|-|-|				
EXPERT TOTALS	3	7	3	1	1	1	4	5	0	0	0	0
CONSENSUS		|--|---------|					|----|-----|					

B. Mass storage of 100 billion bytes.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	8	25	11	2	6	4	14	24	0	0	0	0
CONSENSUS		|--|---------|					|--------|-|					
EXPERT TOTALS	1	6	4	1	2	1	3	6	0	0	0	0
CONSENSUS		|------|-----|					|--------|-|					

C. Advanced data base management system.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	30	13	4	1	3							
CONSENSUS	|--|---------|											
EXPERT TOTALS	6	5	2	0	1							
CONSENSUS	|---------|-|											

D. Development of application programs by a service having access to medical personnel trained in data processing.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	32	16	1	2	1							
CONSENSUS	|--|---------|											
EXPERT TOTALS	6	7	0	2	0							
CONSENSUS	|---------|-|											

Vertically Integrated Health Care Delivery System -- The implementation in 20 percent of the metropolitan areas of computer coordinated health care facilities. These would include physician's offices, neighborhood health centers, hospitals, university, medical centers, nursing homes, rehabilitation centers, and home health care. A patient is admitted to the system and moved through the facilities as his medical problem progresses. Coordination of the use of the facilities is done by computer which tracks the patients while they are in the system, recording and retaining their medical and administrative information.

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL NOT BE |
| | | | | | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | |
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	14	29	11	0	7	25	15	20	19	9	12
EXPERT TOTALS	5	4	1	0	4	4	1	6	3	1	1

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	1	1	10	27	11	1
CONSENSUS					|-|-|		
EXPERT TOTALS	0	0	1	3	5	1	0
CONSENSUS				|--------|-|			

ACCELERATING AND RETARDING FACTORS

A. Overcome of legal restrictions as to what constitutes proof of ownership.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	2	12	13	0	1	4	4	4	2	2
EXPERT TOTALS	0	1	4	0	0	1	0	0	0	1

REQUIRED CAPABILITIES

A. Network control.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	30	12	2	1	1							
CONSENSUS	|--|---------|											
EXPERT TOTALS	5	3	1	1	0							
CONSENSUS	|------|-----|											

B. Advanced data base management system.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	33	10	1	0	1							
CONSENSUS	|--|---------|											
EXPERT TOTALS	8	1	1	0	0							
CONSENSUS	|--|-|											

C. Mass storage of 100 billion bytes.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	13	26	4	0	1	2	14	23	2	1	0	0
CONSENSUS	|---------|-|						|--------|-|					
EXPERT TOTALS	3	6	1	0	0	1	3	1	1	1	0	0
CONSENSUS	|---------|-|						|-|---------------|					

OFFICE ASSISTANCE

In the later 1970's the computer will move into the routine
operations of the business office. One percent of the secretaries
and typists will use a computer-assisted typing station. The
station will provide test editing, hyphenation and justification,
dictionary look up, etc. Completed typing could be electronically
filed or provided as direct input into electronic mail delivery
service which would be available in the same time frame between
businesses and other organization. The businessman or his
secretary would use a terminal for file retrievals and access
to operational information. The system might also provide
personalized information services such as appointment schedules,
tickler files, etc. In the 1980's home terminals coupled with
the above systems could make it possible for the businessman
to remain at home and still conduct most aspects of his business
using his terminal for access to his correspondence, files,
business data, etc., and for input of his directives, decisions,
memos, letters, etc. Most business meetings could be conducted
via the terminal, all others requiring on-site presence would be
scheduled much as business trips are now.

OFFICE ASSISTANCE

APPLICATION TITLE		1970-71	72-74	75-77	78-80	81-85	LATER	NEVER	IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
COPUTERIZED TYPING STATIONS	100- 75- 50- 25- 0-								1.43	2.78	2.41	⁻0.33
	P.C.	0.0	1.7	15.5	53.4	22.4	3.4	3.4				
OFFICE ELECTRONIC MAIL SERVICE	100- 75- 50- 25- 0-								2.84	3.40	3.56	⁻0.33
	P.C.	0.0	0.0	3.2	55.6	36.5	3.2	1.6				

Computerized Typing Stations -- The availability to 1 percent of the secretaries and typists of a computer-assisted typing station. The station would include text editing, hyphenization and justification, dictionary look-up, and tie into an Electronic Mail Service.

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL |
| | | | | | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | NOT BE |
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	0	16	42	4	12	35	10	12	24	20	7
EXPERT TOTALS	0	13	22	1	10	19	5	10	15	8	2

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	1	9	31	13	2	2
CONSENSUS				|-|--------|			
EXPERT TOTALS	0	1	6	17	6	0	1
CONSENSUS				|-|-|			

ACCELERATING AND RETARDING FACTORS

A. Development of a practical dictionary look-up scheme.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	7	24	12	0	8	13	8	3	1	0
EXPERT TOTALS	4	13	8	0	5	6	4	1	1	0

REQUIRED CAPABILITIES

A. Mass data storage of 10 billion bytes.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	8	27	8	3	3	3	30	9	0	0	0	0
CONSENSUS	|--|---------|					|-|-|					
EXPERT TOTALS	4	12	5	2	2	2	11	6	0	0	0	0
CONSENSUS	|--|---------|					|-|--------|					

B. Massive communication interface 1,000 lines.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
IP TOTALS	28	18	1	0	2	0	5	39	0	0	0	0
SENSUS	|--|---------|					|-|-|					
EXPERT TOTALS	13	9	1	0	2	0	2	18	0	0	0	0
CONSENSUS	|--|---------|					|-|-|					

Office Electronic Mail Service -- The availability of electronic mail service to organizations and enterprises. The service would provide transmission of most materials now sent by first class mail.

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL |
| | | | | | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | NOT BE |
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	19	39	21	1	35	33	5	44	22	6	9
EXPERT TOTALS	4	8	1	0	8	4	0	6	4	0	1

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	2	35	23	2	1
CONSENSUS				|-|-------|			
EXPERT TOTALS	0	0	0	9	3	0	0
CONSENSUS				|-|--|			

ACCELERATING AND RETARDING FACTORS

A. Increase of first class mail rate to 20 cents per letter.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	15	33	9	0	3	21	17	7	3	0
EXPERT TOTALS	3	6	1	0	0	4	6	0	0	0

B. FCC regulation allowing new two-way switched communication networks.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	13	27	5	0	8	11	13	3	2	1
EXPERT TOTALS	4	3	1	0	1	3	2	1	0	0

REQUIRED CAPABILITIES

A. Mass storage trillion bytes.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	13	30	7	1	3	2	6	33	1	0	0	0
CONSENSUS	|--|-|							|-|-|				
EXPERT TOTALS	4	4	1	0	1	1	1	4	1	0	0	0
CONSENSUS	|---------|-|						|--------|-|					

B. Network control with store and forward.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	36	15	4	0	0							
CONSENSUS	|--|---------|											
EXPERT TOTALS	6	3	1	0	0							
CONSENSUS	|--|---------|											

C. High reliability guaranteed 3 hour delivery.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	31	19	3	0	1	0	1	43	1	0	0	0
CONSENSUS	|--|---------|							|-|-|				
EXPERT TOTALS	4	4	1	0	1	0	0	6	0	0	0	0
CONSENSUS	|---------|-|							|-|-|				

D. Positive user/terminal identification.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	42	13	1	0	0							
CONSENSUS	|--|--|											
EXPERT TOTALS	7	3	0	0	0							
CONSENSUS	|--|---------|											

E. Inexpensive hard-copy transmission (facsimile.)

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	39	15	1	0	0							
CONSENSUS	|--|---------|											
EXPERT TOTALS	5	5	0	0	0							
CONSENSUS	|------|-----|											

F. Massive communication interface 100,000 lines.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	35	15	1	1	2	2	2	40	2	0	0	0
CONSENSUS	|--|---------|							|-|-|				
EXPERT TOTALS	5	4	0	0	1	1	0	5	1	0	0	0
CONSENSUS	|------|-----|							|-|-|				

G. Scramble transmission capability for security.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	35	16	4	0	0							
CONSENSUS	|--|---------|											
EXPERT TOTALS	5	2	3	0	0							
CONSENSUS	|------|------------|											

III.162

PUBLIC AND PRIVATE TRANSIT

The importance of the problems of moving people in and about the megalopolises of the future were recognized by the panel and several applications were suggested to help combat the problems.

By 1978 to 1980 today's traffic control applications will have come into widespread use in 20 percent of the metropolitan areas but with extended capabilities to control traffic with variable traffic speeds and routings, and controlled access and egress based on sensing traffic flows and volumes.

In 1981-85 five percent of the city mass transit systems will be computer scheduled to respond dynamically to predicted or sensed demands. Both of these applications will be brought about by public recognition of the need and subsequent Federal subsidy.

American historic preference for individual transportation coupled with increasing concern about traffic fatalities will in 1980-85 bring about the equipping of 20 percent of the automobiles with computerized collision avoidance systems. These systems will detect collision courses, slow and, if necessary, stop the car in time to prevent a collision with any object. At some point after 1985 roadways will be automated to take over control of vehicles while on the roadway.

APPLICATION TITLE		1970-71	72-74	75-77	78-80	81-85	LATER	NEVER	IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
AUTOMATED TRAFFIC CONTROL									2.85	2.63	3.84	⁻0.29
	P.C.	0.0	0.0	5.1	57.6	32.2	5.1	0.0				
AUTOMATED MASS TRANSIT SYSTEMS									3.17	2.79	3.87	⁻0.38
	P.C.	0.0	0.0	0.0	23.2	67.9	7.1	1.8				
AUTOMOBILE COLLISION AVOIDANCE SYSTEMS									3.15	1.98	2.58	⁻1.56
	P.C.	0.0	0.0	0.0	3.1	40.6	40.6	15.6				
AUTOMATED ROADWAYS									3.28	1.74	2.56	⁻1.44
	P.C.	1.5	0.0	0.0	0.0	19.7	68.2	10.6				

APPLICATION DESCRIPTION

<u>Automated Mass Transit Systems</u> -- Implementation by 5 percent of the metropolitan areas of computerized mass transit systems. The system will be designed to eliminate congestion in the movement of people and good by dynamically analyzing and balancing such factors as: location of people and businesses, work schedules, scheduled events, historic traffic patterns, weather, etc., and then optimally deploying the transit facilities.

IMPACT AND VALUE

	IMPACT ON SOCIETY				REASONS FOR IMPLEMENTATION						WILL NOT BE IMPLEMENTED
					PROFITABLE TO IMPLEMENTOR			USEFUL TO PUBLIC			
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	
GROUP TOTALS	20	30	10	0	17	27	10	43	8	5	8
EXPERT TOTALS	6	8	1	0	5	5	4	12	0	2	2

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	0	13	38	4	1
CONSENSUS					|-|-|		
EXPERT TOTALS	0	0	0	2	9	1	0
CONSENSUS					|-|-|		

ACCELERATING AND RETARDING FACTORS

A. Federal regulation and subsidy.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	21	20	4	0	3	14	11	7	2	1
EXPERT TOTALS	6	4	1	0	2	5	2	0	0	0

REQUIRED CAPABILITIES

A. Mass data storage of <u>10 billion bytes</u>.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	29	14	3	0	1	0	3	38	3	0	0	0
CONSENSUS	|--|---------|							|-|-|				
EXPERT TOTALS	7	3	0	0	0	0	0	7	1	0	0	0
CONSENSUS	|--|---------|							|-|-|				

B. <u>One hundred times improvement</u> in scheduling algorithms.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	29	15	2	1	0	1	8	33	1	0	0	0
CONSENSUS	|--|---------|							|-|-|				
EXPERT TOTALS	7	3	0	0	0	0	1	7	0	0	0	0
CONSENSUS	|--|---------|							|-|-|				

C. Model development assistance from a service organization.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	12	24	10	1	2							
CONSENSUS		|--|---------|										
EXPERT TOTALS	3	4	2	0	1							
CONSENSUS	|----------|---------|											

Automated Roadways -- The availability to the general public of the first computer controlled roadway for specially equipped automobiles. The automobile is under complete control of the roadway from entry to exit but may be driven normally when off the roadway. The system would allow high speed, high density traffic with maximum safety yet retain the convenience of individual transportation.

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL NOT BE |
| | | | | | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | |
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	32	33	7	1	13	21	13	34	10	7	39
EXPERT TOTALS	3	3	0	0	0	2	1	2	2	0	2

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	1	0	0	0	13	45	7
CONSENSUS					|-|-|	
EXPERT TOTALS	0	0	0	0	1	4	1
CONSENSUS					|-|-|	

ACCELERATING AND RETARDING FACTORS

A. Passage of federal appropriation for the roadway.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	31	18	2	0	0	10	9	16	8	1
EXPERT TOTALS	3	1	0	0	0	2	1	0	1	0

B. Utilization of electrical or electronical controls on automobiles to facilitate interfacing the special equipment.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	16	30	2	0	1	6	12	10	10	0
EXPERT TOTALS	1	3	0	0	1	1	1	0	0	0

REQUIRED CAPABILITIES

A. The special equipment for the automobile would have to be a computer for control and steering of the automobile under direction of the roadway computer system.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	38	8	2	0	5							
CONSENSUS		--	---------										
EXPERT TOTALS												
CONSENSUS												

B. Very high reliability of the system with back up systems capable of being dynamically switched in and either continuing control or bringing all traffic to a halt.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	51	2	1	0	0							
CONSENSUS		--	-										
EXPERT TOTALS												
CONSENSUS												

C. The capability to monitor in excess of 1 million sensors to follow the progress of all traffic.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	36	11	1	2	3	4	6	30	7	0	0	0
CONSENSUS	|--|---------|					|-|-|			
EXPERT TOTALS												
CONSENSUS												

APPLICATION DESCRIPTION

<u>Automated Traffic Control</u> -- Installation on the main throughfares of 20 percent of the metropolitan areas of sophisticated traffic control systems. The system would sense traffic volumes and speeds, set speed indicators and route destination indicators to optimize traffic flows and to prevent bottlenecks at major arterial entry points or accident sites.

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL NOT BE |
| | | | | | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | |
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	12	36	9	2	14	26	15	37	16	5	6
EXPERT TOTALS	4	11	2	0	4	9	2	12	4	1	1

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	3	34	19	3	0
CONSENSUS				|-|--------|			
EXPERT TOTALS	0	0	0	5	10	0	0
CONSENSUS				|--------|-|			

ACCELERATING AND RETARDING FACTORS
A. Federal subsidizing.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	14	25	4	0	2	12	17	6	1	0
EXPERT TOTALS	4	9	0	0	0	5	8	0	0	0

REQUIRED CAPABILITIES
A. Ten-times improvement in scheduling algorithms.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	11	28	9	1	0	0	2	37	2	0	0	0
CONSENSUS	|--|-|							|-|-|				
EXPERT TOTALS	1	7	3	1	0	0	2	7	1	0	0	0
CONSENSUS	|--|--------|							|-|-|				

B. Heuristic feedback on results of control actions taken.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	28	8	12	0	2							
CONSENSUS	|--|----------------|											
EXPERT TOTALS	6	3	2	0	2							
CONSENSUS	|----------|--------|											

C. Capability to monitor 100,000 sensors.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	29	15	3	1	1	4	14	23	1	0	0	0
CONSENSUS	|--|--------|						|--------|-|					
EXPERT TOTALS	6	3	2	1	0	2	5	5	0	0	0	0
CONSENSUS	|------|------|						|-|--------|					

Automobile Collision Avoidance Systems -- The equipping of 20% of the automobiles with radar like sensing devices and computer systems to first slow, then bring to a halt the automobile when a collision course with any object is detected.

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL NOT BE IMPLEMENTED |
| | MAJOR | SIGNIF. | LITTLE | NO | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | |
					VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	
GROUP TOTALS	34	24	13	2	21	14	13	33	14	2	42
EXPERT TOTALS	5	6	1	0	1	2	4	4	5	0	5

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	0	2	26	26	10
CONSENSUS					|--------|-|		
EXPERT TOTALS	0	0	0	1	2	6	2
CONSENSUS					|--------|-|		

ACCELERATING AND RETARDING FACTORS

A. Passage of legislation in at least one state requiring installation on all new cars.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	26	19	3	0	0	9	4	16	10	5
EXPERT TOTALS	5	3	1	0	0	1	0	4	1	2

B. Installation of computers in cars for other purposes, such as performance and maintenance monitoring.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	5	36	5	0	3	8	9	6	11	3
EXPERT TOTALS	2	6	0	0	0	2	1	2	1	1

REQUIRED CAPABILITIES

A. Fail safe design of computer system.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	36	13	1	0	3							
CONSENSUS	|--|---------|											
EXPERT TOTALS	5	4	0	0	1							
CONSENSUS	|------|-----|											

B. Inexpensive computer and wide angle sensing devices $1,000 purchase.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	42	10	0	1	0	3	26	22	0	0	0	0
CONSENSUS	|--|-|						|-|--------|					
EXPERT TOTALS	9	1	0	0	0	0	6	3	0	0	0	0
CONSENSUS	|--|-|						|-|--------|					

C. Sophisticated program to discriminate between dangerous and normal situations (i.e., overtaking and passing involve collision courses.)

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10×-	10×-	O.K.	10×+	100×+	1000×+	>1000×+
GROUP TOTALS	46	2	0	0	2							
CONSENSUS	|--|-|											
EXPERT TOTALS	8	1	0	0	0							
CONSENSUS	|--|-|											

UTILITIES

Utilities are relatively highly automated--most new power plants
are process controlled, as are power distribution networks and
gas lines. There are, however, new areas for the application of
computers in the utility industries.

Most utilities have only a limited picture of their load profiles
as they appear at major distribution points (central offices,
power stations, etc.) What is missing is the load profiles over
time for individual users or users in a limited area. By 1980
ten percent of the utilities will have installed remote data re-
corders to record such profiles. These profiles will be used
to better predict changing service needs.

In the same time frame the existing systems of regional power
grids will be joined into a nationwide grid. The grid will be
computer controlled to prevent power failures by drawing on power
reserves all over the nation to absorb the loss of one or more
plants.

The advent of widespread use of the picturephone in 1975-85 will
lead to computerized services being made available using the
picturephone as a terminal. The telephone companies will lead
the way. In 1980 twenty percent of the metropolitan areas will
be serviced by automated telephone directory and yellow page
data banks. Inquiries would be handled automatically from the
picturephone.

APPLICATION TITLE		1970-71	72-74	75-77	78-80	81-85	LATER	NEVER	IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
UTILITY USAGE RECORDING SYSTEM	100- 75- 50- 25- 0- P.C.	0.0	1.8	3.6	|-|-| 74.5	16.4	1.8	1.8	1.68	3.00	2.66	⁻0.36
NATION-WIDE POWER GRID	100- 75- 50- 25- 0- P.C.	0.0	0.0	1.7	|-|--| 73.3	23.3	1.7	0.0	2.75	3.27	3.42	⁻0.44
TELEPHONE DIRECTORY AND YELLOW PAGE DATA BANKS	100- 75- 50- 25- 0- P.C.	0.0	0.0	4.6	|-|--------| 58.5	23.1	12.3	1.5	2.00	2.62	2.80	⁻0.29

III.170

APPLICATION DESCRIPTION

Nationwide Power Grid -- The establishment of a nationwide power grid to balance power loads. The system would predict loads on the basis of historical records and weather forecasts. Power plant usage would be scheduled giving major consideration to utilization of plants in weather locations most favorable for pollution avoidance.

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL |
| | | | | | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | NOT BE |
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	15	44	16	5	34	30	5	41	23	3	12
EXPERT TOTALS	5	17	6	1	12	11	2	17	7	1	4

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	1	44	14	1	0
CONSENSUS				|-|--|			
EXPERT TOTALS	0	0	1	20	5	1	0
CONSENSUS				|-|-|			

ACCELERATING AND RETARDING FACTORS

A. Nationalization of the power industry.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	22	17	9	0	0	3	9	4	8	17
EXPERT TOTALS	10	9	3	0	0	1	4	2	5	7

B. Several (4) major black-outs.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	26	22	4	0	13	19	4	1	1	4
EXPERT TOTALS	13	6	3	0	6	8	1	1	1	1

C. Legislation enforcing pollution control.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	11	27	10	2	17	15	4	2	0	0
EXPERT TOTALS	7	8	7	2	6	5	2	1	0	0

REQUIRED CAPABILITIES

A. Better scheduling algorithms.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	31	13	6	0	0							
CONSENSUS	|--|---------|											
EXPERT TOTALS	15	3	5	0	0							
CONSENSUS	|--|---------|											

B. Mass storage of 100 billion bytes.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	10	35	1	1	1	0	4	36	0	0	0	0
CONSENSUS		|--|-|						|-|-|				
EXPERT TOTALS	6	15	1	0	1	0	2	17	0	0	0	0
CONSENSUS	|----------|-|							|-|-|				

C. Development of a nationwide power distribution model.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	43	4	0	0	1							
CONSENSUS	|--|-|											
EXPERT TOTALS	20	1	0	0	1							
CONSENSUS	|--|-|											

Telephone Directory and Yellow Page Data Banks -- The availability in 20 percent of the metropolitan areas of data banks supplementing the existing telephone directories. The system would use conventional or picture phones and largely replace information operators.

IMPACT AND VALUE

	IMPACT ON SOCIETY				REASONS FOR IMPLEMENTATION						WILL
					PROFITABLE TO IMPLEMENTOR			USEFUL TO PUBLIC			NOT BE
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	7	30	39	4	19	33	21	26	27	19	8
EXPERT TOTALS	2	11	16	2	9	12	9	9	10	10	1

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	0	3	38	15	8	1
CONSENSUS				|-|---------|			
EXPERT TOTALS	0	0	1	19	7	2	0
CONSENSUS				|-|---------|			

ACCELERATING AND RETARDING FACTORS

A. Installation of picture phones in 20 percent of the metropolitan communities.

	ABSOLUTE	POSSIBLE	NO EFFECT	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	17	33	12	0	1	26	20	7	1	0
EXPERT TOTALS	7	16	5	0	0	15	8	2	1	0

REQUIRED CAPABILITIES

A. Voice recognition system capable of recognizing letters and numbers and simple words as spoken by 99 percent of the population.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	12	24	16	3	3							
CONSENSUS		|--|---------|										
EXPERT TOTALS	3	14	7	1	2							
CONSENSUS		|--|---------|										

B. Audio response capable of handling 1,000 voice responses simultaneously.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	35	16	4	2	0	0	1	46	0	0	0	0
CONSENSUS	|--|---------|							|-|-|				
EXPERT TOTALS	16	9	1	1	0	0	0	21	0	0	0	0
CONSENSUS	|--|---------|							|-|-|				

C. Alphabetic input terminal incorporated in the telephone.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	19	31	8	0	0							
CONSENSUS	|----------|-|											
EXPERT TOTALS	7	15	5	0	0							
CONSENSUS	|----------|-|											

D. Data base of 100 billion bytes.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	13	23	17	3	1	5	32	17	0	0	0	0
CONSENSUS		|--|---------|					|-|--------|					
EXPERT TOTALS	4	13	8	2	0	0	12	12	0	0	0	0
CONSENSUS		|--|---------|					|----|-----|					

E. Search engine 100 times faster than today's systems.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	10	27	11	3	2	4	7	36	2	0	0	0
CONSENSUS		|--|---------|						|-|-|				
EXPERT TOTALS	4	12	5	2	1	1	4	15	1	0	0	0
CONSENSUS		|--|---------|						|-|-|				

F. Updateable image files.

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	10	22	6	9	7							
CONSENSUS		|--|-----------------|										
EXPERT TOTALS	4	10	3	5	3							
CONSENSUS		|--|-----------------|										

APPLICATION DESCRIPTION

<u>Utility Usage Recording System</u> -- The installation in 10 percent of the utilities (gas, electric and telephone) of a system of remote data recorders to record service profiles over time. The system would make it possible for utilities to determine the distribution of their loads by time and location. The recorders need not be on-line to the central facility but would be accessed periodically to pick up the accumulated readings.

IMPACT AND VALUE

| | IMPACT ON SOCIETY | | | | REASONS FOR IMPLEMENTATION | | | | | | WILL NOT BE |
| | | | | | PROFITABLE TO IMPLEMENTOR | | | USEFUL TO PUBLIC | | | |
	MAJOR	SIGNIF.	LITTLE	NO	VERY	MODERT	MARGINAL	VERY	MODERT	MARGINAL	IMPLEMENTED
GROUP TOTALS	5	14	32	5	17	27	11	17	19	15	7
EXPERT TOTALS	2	5	9	0	4	11	0	4	9	1	2

IMPLEMENTATION DATE

	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
GROUP TOTALS	0	1	2	41	9	1	1
CONSENSUS				|-|-|			
EXPERT TOTALS	0	0	0	14	2	0	0
CONSENSUS				|-|-|			

REQUIRED CAPABILITIES

A. Mass data storage of <u>100 billion bytes.</u>

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	14	29	2	0	2	2	9	31	0	0	0	0
CONSENSUS	|----------|-|						|--------|-|					
EXPERT TOTALS	3	8	1	0	1	1	1	9	0	0	0	0
CONSENSUS	|--|-|							|-|-|				

B. Inexpensive reliable collection devices. <u>$100 purchase.</u>

	NECESSRY	ASSET	USEFUL	SOME USE	NO NEED	>10x-	10x-	O.K.	10x+	100x+	1000x+	>1000x+
GROUP TOTALS	37	8	1	0	1	0	1	39	2	0	0	0
CONSENSUS	|--|-|							|-|-|				
EXPERT TOTALS	9	3	1	0	1	0	0	9	1	0	0	0
CONSENSUS	|--|---------|							|-|-|				

IV. DETAILED CAPABILITIES RESULTS

The panel of respondents was asked to associate with each
of the applications those data processing capabilities
which were critical to the implementation of the application.
In this section, the detailed data relating to the capabilities
is presented and discussions are provided identifying trends
and conclusions.

The study organization has produced four indications of
relative importance of the capabilities. These are:

1. The number of applications requiring a capability.

    This count is indicative of the breadth of the need
    for the capability.

2. The importance of the associated applications.

    Respondents were asked to rank the applications as
    to their importance to the general public, to the
    implementors, and to the ultimate users. Capabilities
    required by the more important applications are more
    important themselves.

3. The date the application is required.

    Capabilities associated with early implementation dates
    deserve immediate attention.

4. The value of the capability to the application.

    Respondents were lead to a consensus as to whether a
    capability was a "Necessity", a "Definite Asset",
    "Useful", "Some Use", or "No Use" to the application.

The relative importance of the four ranking factors is a subjective
judgment. This report will present data on all four measures
and leave it to the reader to form his own ultimate ranking based
on his weighings of the categories, the actual applications
involved, and any other pertinent factors available to him.

The remainder of this section is divided into eight subsections by grouping the identified capabilities into convenient areas:

> Communications Requirements
> Terminal Capabilities
> Data Base Requirements
> Capacity and Availability
> Advanced Capabilities
> Application Software Requirements
> Data Processing Services
> Special Products

Each subsection will start with a discussion of the capabilities, and where merited, possible trends and conclusions. Following the discussion are two sets of detailed presentations upon which the discussion is based. The first detailed presentation names the capabilities and lists the applications requiring each capability. The applications are cross-referenced by page number to the detailed printouts contained in Section III.

The second presentation contains data relating to the value of the capability. Figure 4.1 is a sample page from these presentations. Part 1 is the capability name. Part 2 presents the average of the values assigned to the applications requiring the capability. The derivation of these values is described in detail on pages III 2 and III 3. Briefly, they resulted from applying weights from 1 to 5 to the respondent's judgments of the applications effect on society, the implementors, and the public. "Will Not be Implemented" had a weight of 3. Thus, the maximum possible values would be 5, 5, 5, and 3 respectively. Part 3 is a count of the number of applications specifying the requirement for this capability. Part 4 provides histograms illustrating the distribution of capability values over time.

For example, 20.7 percent of the respondents judged the capability to be "Necessary." The 20.7 percent were distributed: 11.7 percent in 1978-80; 7.2 percent in 1981-85; .9 percent in LATER; and .9 percent in NEVER. The TOTAL category says that 98.2 percent of the respondents thought the capability had some value with 59.5 percent concentrated in 1978-80. From this part, it is possible to tell when and how strongly a capability is needed.

Capabilities which have magnitudes associated with them are treated by providing a separate page for each of the orders of magnitude requested. For example, Figure 4.1 is one of four "Search Engine" pages i.e., Search Engine 10,000 times more powerful, 1,000 times, 100 times and 10 times. This makes it possible to relate the specific magnitude to time.

②
IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
2.05	2.62	2.52	0.29

③ NUMBER OF REQUIRING APPLICATIONS – 2

④		TOTAL	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
NECESSARY	%	20.7	0.0	0.0	0.0	11.7	7.2	0.9	0.9
DEFINITE ASSET	%	53.2	0.0	0.0	1.8	32.4	15.3	3.6	0.0
USEFUL	%	22.5	0.0	0.0	0.0	13.5	6.3	2.7	0.0
SOME USE	%	1.8	0.0	0.0	0.0	1.8	0.0	0.0	0.0
TOTAL	%	98.2	0.0	0.0	1.8	59.5	28.8	7.2	0.9
NO USE	%	1.8	0.0	0.0	0.0	0.9	0.9	0.0	0.0

Figure 4.1

COMMUNICATIONS REQUIREMENTS

The single, most important conclusion to be drawn from the study is the reinforcement of the belief in the dependence of future applications on data communications. Approximately 70 percent of the identified advanced applications (74 out of 108) involved transmission of digital or analogue data to or from remote locations. Also, many of the remaining applications were associated with planning models which would probably be embedded in communication oriented information systems. The method and extent of use of data communications varies widely. Some applications involve interconnection between computer systems; others need large numbers of terminals for input and output; still others are composed of networks of remote sensors and controllers; and, of course, any combination of these.

Thirty-three applications specified the interconnection of remote processors to form computer networks. These networks would provide for remote access to data bases, the interchange of information, passage of control (as in a nationwide air traffic control system), load leveling, and distribution of load to specialized processors (process control, communication processors, general purpose, etc.).

The need for a hardware/software system for control of interconnected networks of computers was identified in 29 applications. This requirement was rated as "Necessary" by 70 percent of the respondents and as a "Definite Asset" by 20 percent with the need becoming widespread in the 1978-1980 time period. This system addresses the complexities of interconnecting computer systems. It must resolve which processor is in control of the network and be able to shift that control to other processors in the event of malfunction. Interchange standards must be provided to enable remote data base access, remote execution, and remote output of results. Translation may be necessary to accommodate heterogeneous processors. Switching, and store and forward may be required in networks where all processors are not directly connected to each other.

High capacity, two-way switched data channels was another specific requirement. This need was primarily associated with the advent of multiple application home terminals. The data channels were considered to be extensions of the one-way, non-switched capabilities provided by Cable Area Television (CATV). Because of the outgrowth from CATV the channels would probably be analogue rather than digital to accommodate television-like signals.

This requirement was rated as "Necessary" or a "Definite Asset" by 90 percent of the respondents with the need materializing in 1980 to 1985 in conjunction with home terminals. Five home terminal applications specified this need. There were ten other home terminal applications identified but not investigated which

would also require the capability. In addition, many of the other widespread communication applications such as Intra-Office Electronic Mail, Patent Searches, Universal Reservation Systems, etc. would also benefit although the need was not specifically identified for them.

The dilemma mitigating against early advent of home terminals as described by the respondents in their comments consisted of:

- The 1980-85 justification of relatively expensive home terminals rests on the availability of multiple applications.

- Multiple applications will not be available unless there is high capacity, two-way switched channels.

- High capacity, two-way switched channels depend upon there being multiple applications sources.

The conclusion suggested by the respondents is that home terminals will either wait until terminal and communication costs are substantially reduced or until the government provides incentives through subsidy or regulation.

An effort was made by the respondents to give a broad indication of the magnitude of the traffic requirements associated with 30 of the data communications oriented applications. The traffic was expressed in terms of the number of logical lines needed to handle the application. This can be interpreted as the number of simultaneous transactions in process during peak periods.

For 90 percent of the high traffic applications, orders of magnitudes for the number of lines were identified. Figure 4.2 illustrates the distribution of applications and required dates over line magnitudes.

REQUIRED NUMBER OF LINES

	1,000	10,000	100,000	Unspecified
Requesting Applications	6	17	4	3
Date Required	1975-77	1978-80	1981-85	1978-80

Figure 4.2

There is an apparent growth of one order of magnitude about every three years starting in 1976. A look at the four applications citing 100,000 lines shows that they are made up of applications having a very widespread usage, such as Checkless Society or Home CAI. Therefore, it is reasonable to conclude that 10,000 lines

will handle most applications with a relatively few applications
going to the order of 100,000 lines.

Networks for monitoring sensors and providing closed-loop control
are another important aspect of communication requirements. Eight
applications specifically identified sensor networks. Figure 4.3
lists the applications in sequence of descending breadth of
coverage, worldwide, nationwide, city-wide and plant-wide.

	Date	Breadth	Sensors	Lines	Control
Automated Weather Fore-casting	78-80	WW	-	-	No
Air Pollution Prediction	81-85	WW	-	10,000	No
Railroad Car Tracking	78-80	NW	-	-	No
Computer Controlled Trains	78-80	NW	-	10,000	Yes
Air Pollution Monitor-ing	75-77	CW	-	10,000	No
Automated Traffic Control	78-80	CW	100,000	-	Yes
Out Patient Monitor	81-85	CW	-	10,000	No
Automated Process Plant	81-85	PW	100,000	-	Yes

Figure 4.3

Figure 4.3 also identifies the required date, the number of sensors
or lines, when cited, and whether the application includes closed-
loop control. The distribution of these various parameters form
no discernible trend, but does clearly recognize the need for such
networks beginning in 1978.

COMMUNICATION REQUIREMENTS

Pages   Capabilities and Applications

MASSIVE COMMUNICATIONS INTERFACE - 100,000 LINES
III.49 III.94 HOME COMPUTER ASSISTED INSTRUCTION
III.57   CHECKLESS SOCIETY
III.91   PERSONAL DATA BANKS
III.162   OFFICE ELECTRONIC MAIL SERVICE

MASSIVE COMMUNICATIONS INTERFACE - 10,000 LINES
III.8   AGRICULTURE INFORMATION AND ADMINISTRATION SYSTEM
III.36   AIR POLLUTION PREDICTION
III.40   POLLUTION MONITORING SYSTEMS
III.45   COMPUTER ASSISTED INSTRUCTION EDUCATIONAL INSTITUTIONS
III.60   FINANCIAL UTILITY
III.62   INTEGRATED FINANCIAL SERVICE SYSTEM
III.67   COMPUTER CONTROL OF FREIGHT AND PASSENGER TRAINS
III.71   RAILROAD CAR TRACING, TRACKING AND ALLOCATION
III.82   GOVERNMENT OPERATING LOTTERIES AND PARI-MUTUAL BETTING
III.95   HOME SHOPPING SERVICES
III.103   AUTOMATED PLANT INFORMATION SYSTEMS
III.116   GOVERNMENT ACTIVITIES INFORMATION UTILITY
III.119   LAW SEARCH
III.124   UNIVERSAL RESERVATION SYSTEMS
III.125   VACATION AND TRAVEL PLANNING SYSTEMS
III.146   AUTOMATED SUBSCRIPTION SERVICE
III.156   OUT-PATIENT MONITORING

MASSIVE COMMUNICATIONS INTERFACE - 1,000 LINES
III.54   AUTOMATED STOCK TRANSFER
III.61   INSURANCE SUPPORT SYSTEM
III.69   INTERCONNECTED SHIPPERS AND CARRIER SYSTEMS
III.114   COMMERCIAL DATA PROCESSING SERVICES
III.118   JOB PLACEMENT SERVICES
III.161   COMPUTERIZED TYPING STATIONS

MASSIVE COMMUNICATIONS INTERFACE - UNSPECIFIED
III.79   AUTOMATED WEATHER FORECASTING
III.96 III.148 INTERACTIVE NEWS AND ENTERTAINMENT
III.117   INFORMATION RETRIEVAL UTILITIES

MASSIVE SENSOR NETWORK
III.71   RAILROAD CAR TRACING, TRACKING AND ALLOCATION
III.137   AUTOMATED PROCESS MANUFACTURING PLANT
III.166   AUTOMATED ROADWAYS
III.167   AUTOMATED TRAFFIC CONTROL

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
3.24	2.54	2.85	0.92

NUMBER OF REQUIRING APPLICATIONS — 4

	TOTAL	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
NECESSARY %	54.4	0.0	0.0	1.0	11.7	21.8	15.5	4.4
DEFINITE ASSET %	35.0	0.0	0.0	0.5	9.7	18.9	5.8	0.0
USEFUL %	6.8	0.0	0.0	0.5	2.4	1.5	2.4	0.0
SOME USE %	2.4	0.0	0.0	0.0	0.5	1.0	0.5	0.5
TOTAL %	98.5	0.0	0.0	1.9	24.3	43.2	24.3	4.9
NO USE %	1.5	0.0	0.0	0.5	1.0	0.0	0.0	0.0

MASSIVE COMMUNICATIONS INTERFACE — 10,000 LINES

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
2.26	2.66	2.63	0.46

NUMBER OF REQUIRING APPLICATIONS — 17

	TOTAL	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
NECESSARY								
%	36.7	0.0	0.1	2.9	15.2	12.7	5.0	0.7
DEFINITE ASSET								
%	47.8	0.0	0.5	4.3	19.5	19.5	3.7	0.2
USEFUL								
%	10.8	0.0	0.0	1.2	4.9	3.0	1.4	0.2
SOME USE								
%	2.6	0.0	0.0	0.2	1.3	0.4	0.7	0.0
TOTAL								
%	98.0	0.0	0.6	8.6	41.0	35.6	10.9	1.2
NO USE								
%	2.0	0.0	0.0	0.1	0.8	1.0	0.0	0.1

IV-10

MASSIVE COMMUNICATIONS INTERFACE — 1,000 LINES

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
1.87	3.02	2.75	0.18

NUMBER OF REQUIRING APPLICATIONS — 6

	TOTAL	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
NECESSARY %	56.9	0.0	1.0	15.5	30.0	9.7	0.3	0.3
DEFINITE ASSET %	21.7	0.0	1.0	4.1	10.7	4.8	1.0	0.0
USEFUL %	17.2	0.0	0.3	9.7	5.2	1.7	0.0	0.3
SOME USE %	1.7	0.0	0.3	1.0	0.3	0.0	0.0	0.0
TOTAL %	97.6	0.0	2.8	30.3	46.2	16.2	1.4	0.7
NO USE %	2.4	0.0	0.0	1.7	0.3	0.3	0.0	0.0

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
2.34	2.27	2.66	0.76

NUMBER OF REQUIRING APPLICATIONS — 3

	TOTAL	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
NECESSARY								
%	81.8	0.0	0.0	1.9	31.4	38.4	9.4	0.6
DEFINITE ASSET								
%	13.8	0.0	0.0	0.6	6.9	5.0	1.3	0.0
USEFUL								
%	2.5	0.0	0.0	0.0	1.3	1.3	0.0	0.0
SOME USE								
%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL								
%	98.1	0.0	0.0	2.5	39.6	44.7	10.7	0.6
NO USE								
%	1.9	0.0	0.0	0.0	0.6	0.6	0.6	0.0

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
2.51	2.64	2.73	0.66

NUMBER OF REQUIRING APPLICATIONS — 4

	TOTAL	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
NECESSARY								
%	58.2	0.5	0.0	2.6	22.4	17.3	14.3	1.0
DEFINITE ASSET								
%	33.7	0.0	0.0	1.0	12.8	15.3	4.6	0.0
USEFUL								
%	4.1	0.0	0.0	0.5	2.0	1.0	0.5	0.0
SOME USE								
%	1.5	0.0	0.0	0.0	0.0	0.5	0.5	0.5
TOTAL								
%	97.4	0.5	0.0	4.1	37.2	34.2	19.9	1.5
NO USE								
%	2.6	0.0	0.0	0.0	0.5	0.5	1.0	0.5

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
2.52	2.54	2.71	0.58

NUMBER OF REQUIRING APPLICATIONS — 29

	TOTAL	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
NECESSARY								
%	70.5	0.0	0.2	5.9	31.0	23.3	8.4	1.6
DEFINITE ASSET								
%	20.5	0.0	0.0	2.7	8.0	6.8	2.7	0.3
USEFUL								
%	5.8	0.0	0.0	0.6	2.4	1.9	0.8	0.1
SOME USE								
%	1.2	0.0	0.0	0.1	0.3	0.5	0.1	0.1
TOTAL								
%	98.0	0.0	0.2	9.3	41.8	32.5	11.9	2.3
NO USE								
%	2.0	0.0	0.1	0.1	0.2	0.7	0.5	0.3

IV.14

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
2.55	2.36	2.73	0.75

NUMBER OF REQUIRING APPLICATIONS — 5

	TOTAL	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
NECESSARY %	62.9	0.0	0.0	0.0	7.4	40.1	14.3	1.1
DEFINITE ASSET %	27.6	0.0	0.0	0.4	3.3	15.4	7.7	0.7
USEFUL %	4.0	0.0	0.0	0.0	0.0	2.6	1.5	0.0
SOME USE %	0.7	0.0	0.0	0.0	0.4	0.0	0.4	0.0
TOTAL %	95.2	0.0	0.0	0.4	11.0	58.1	23.9	1.8
NO USE %	4.8	0.0	0.0	0.7	1.1	2.6	0.4	0.0

IV.15

TERMINAL CAPABILITIES

Associated with the widespread use of data communications will be a multitude of terminals. Many of these terminals will be special purpose or will have special features required to accomplish specific applications. The respondents identified a number of these requirements.

For example, two types of terminals were specified to automate airline passenger services. The first would be designed to provide fare and schedule quotations, make reservations, and sell tickets and is capable of being operated by the general public. The second terminal would aid in automating passenger check-in and boarding control. It would read and accept previously purchased tickets and control access to the airplane. The terminals were judged to be "Necessary" by 1975-77 when at least one airline will have automated its passenger services.

The advent of store level retail systems will create a demand for point-of-sale terminals starting in 1975-77 and peaking in 1978-80. From these terminals, purchases will be recorded and perhaps priced, credit checks will be made, and eventually payment via the Checkless/Cashless Society may be initiated. To accomplish this, the terminals will require a method for reading price tags and/or package labels. There may also be input from scales such as might be used in weighing produce. A positive method of identification will be required if the terminal is to also be the payment vehicle. Initially, present visual verification of signatures and/or photographs may suffice; but ultimately, the system via the terminal must be capable of making the identification. The respondents have suggested voice prints, fingerprints, and even retina prints as a means of identification.

For air traffic control the respondents suggested that it would be a "Definite Asset" to have a three-dimensional display capability with which the system could interact, available by 1978-80.

There is a clear need for Computer Assisted Instruction (CAI) not only in the academic environment but also for industrial, business and military training and even for home education. To accomplish this in the 1978-80 time period, a special CAI terminal was rated as either "Necessary" or as a "Definite Asset" by 90 percent of the respondents. Such a terminal would have the ability to display printed, graphical and pictorial (television-like) data and to provide optional audio output. Interaction would be via functional and/or typewriter keyboards, and light pen or other pointer sensors.

The 1980-85 home terminal requires multiple functions to accomplish the range of applications foreseen. The applications suggested ranged over such ones as the relatively simple Home Shopping,

voluminous output Customized Periodicals, heavily interactive
Home CAI, and remotely controlled appliances. The terminal would
be modular to fit the varying consumer needs. Since the primary
impetus will have been generated by CATV, the terminal will be
basically a television-like display. User interaction will be
primarily via light pen or other pointer devices and functional
keyboards because of their ease of use. Some applications such
as Home Work Centers and CAI will require a full keyboard. Hard
copy output will be required for electronic mail delivery and
customized periodicals. Control of appliances requires input and
output of analogue signals. Interactive News and Entertainment
requires customized broadcasts. To accomplish this, the individually
addressed transmissions would have to be at high speed with the
terminal recording the transmission for later playback at normal
speed.

The terminal requirements identified in the study indicated a need
for specialized terminals and/or modular terminals that can be
customized to accommodate future communication oriented applications.

TERMINAL CAPABILITIES

Pages   Capabilities and Applications

AIRLINE CHECK IN TERMINAL
III.12   *AUTOMATED AIRLINE PASSENGER SERVICES SYSTEM*

AIRLINE TICKET TERMINAL
III.12   *AUTOMATED AIRLINE PASSENGER SERVICES SYSTEM*

CATV TERMINAL
III.8		*AGRICULTURE INFORMATION AND ADMINISTRATION SYSTEM*
III.49	III.94	*HOME COMPUTER ASSISTED INSTRUCTION*
III.95		*HOME SHOPPING SERVICES*
III.96	III.148	*INTERACTIVE NEWS AND ENTERTAINMENT*
III.97		*MULTIPLE USE HOME TERMINAL*

CAI TERMINAL
III.18	III.44	*COMPUTER ASSISTED INSTRUCTION - ON THE JOB TRAINING*
III.45		*COMPUTER ASSISTED INSTRUCTION EDUCATIONAL INSTITUTIONS*
III.46		*COMPUTER ASSISTED TESTING AND GUIDANCE COUNSELING*

FINGERPRINT SCANNER
III.76	III.102	*AUTOMATED FINGERPRINT ANALYSIS*
III.108		*NATIONWIDE POLICE INFORMATION SYSTEM*

LOW COST TERMINALS $20-30/MONTH
III.125   *VACATION AND TRAVEL PLANNING SYSTEMS*

HARD COPY GRAPHICAL OUTPUT
III.78	III.113	*AUTOMATED PUBLIC LIBRARIES*
III.98		*ELECTRONIC DELIVERY OF HARD COPY*
III.121		*PATENT SEARCH*
III.162		*OFFICE ELECTRONIC MAIL SERVICE*

INTERACTIVE 3-DIMENSIONAL DISPLAY
III.86   *NATIONWIDE AIR TRAFFIC CONTROL*

MEDIUM SPEED TERMINAL $200/MONTH
III.114   *COMMERCIAL DATA PROCESSING SERVICES*

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
1.58	2.98	2.97	0.14

NUMBER OF REQUIRING APPLICATIONS — 1

		TOTAL	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
NECESSARY									
%		71.2	0.0	0.0	46.2	23.1	1.9	0.0	0.0
DEFINITE ASSET									
%		25.0	0.0	0.0	9.6	13.5	1.9	0.0	0.0
USEFUL									
%		3.8	0.0	0.0	0.0	1.9	1.9	0.0	0.0
SOME USE									
%		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL									
%		100.0	0.0	0.0	55.8	38.5	5.8	0.0	0.0
NO USE									
%		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

AIRLINE TICKET TERMINAL

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
1.58	2.98	2.97	0.14

NUMBER OF REQUIRING APPLICATIONS — 1

		TOTAL	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
NECESSARY	%	72.5	0.0	0.0	47.1	23.5	2.0	0.0	0.0
DEFINITE ASSET	%	25.5	0.0	0.0	9.8	15.7	0.0	0.0	0.0
USEFUL	%	2.0	0.0	0.0	0.0	0.0	2.0	0.0	0.0
SOME USE	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	%	100.0	0.0	0.0	56.9	39.2	3.9	0.0	0.0
NO USE	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

IV.21

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
2.50	2.47	2.70	0.69

NUMBER OF REQUIRING APPLICATIONS — 5

		TOTAL	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
NECESSARY	%	78.0	0.0	0.0	0.8	9.5	52.7	14.0	1.1
DEFINITE ASSET	%	15.9	0.0	0.0	0.0	2.3	10.6	3.0	0.0
USEFUL	%	3.0	0.0	0.0	0.4	0.0	1.9	0.8	0.0
SOME USE	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	%	97.0	0.0	0.0	1.1	11.7	65.2	17.8	1.1
NO USE	%	3.0	0.0	0.0	0.0	0.8	1.1	0.8	0.4

CAI TERMINAL

IMPACT ON SOCIETY 3.07	PROFITABLE TO IMPLEMENTOR 2.77	USEFUL TO PUBLIC 3.22	WILL NOT BE IMPLEMENTED 0.22

NUMBER OF REQUIRING APPLICATIONS — 3

	TOTAL	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
NECESSARY %	47.9	0.0	0.0	4.7	32.0	10.1	1.2	0.0
DEFINITE ASSET %	42.0	0.0	0.0	1.8	27.2	9.5	3.0	0.6
USEFUL %	8.9	0.0	0.0	0.0	4.7	2.4	1.8	0.0
SOME USE %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL %	98.8	0.0	0.0	6.5	63.9	21.9	5.9	0.6
NO USE %	1.2	0.0	0.6	0.0	0.6	0.0	0.0	0.0

IV.23

FINGERPRINT SCANNER

IMPACT ON SOCIETY 2.99	PROFITABLE TO IMPLEMENTOR 2.41	USEFUL TO PUBLIC 3.20	WILL NOT BE IMPLEMENTED 0.23

NUMBER OF REQUIRING APPLICATIONS - 2

	TOTAL	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER

NECESSARY
% 52.0   0.0   0.0   4.1   23.5   18.4   6.1   0.0

DEFINITE ASSET
% 32.7   0.0   0.0   7.1   20.4   5.1   0.0   0.0

USEFUL
% 13.3   0.0   0.0   5.1   7.1   1.0   0.0   0.0

SOME USE
% 1.0   0.0   0.0   0.0   1.0   0.0   0.0   0.0

TOTAL
% 99.0   0.0   0.0   16.3   52.0   24.5   6.1   0.0

NO USE
% 1.0   0.0   0.0   1.0   0.0   0.0   0.0   0.0

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
1.52	2.52	2.76	0.32

NUMBER OF REQUIRING APPLICATIONS - 1

	TOTAL	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
NECESSARY %	62.7	0.0	0.0	0.0	27.5	17.6	17.6	0.0
DEFINITE ASSET %	29.4	0.0	0.0	0.0	19.6	7.8	2.0	0.0
USEFUL %	5.9	0.0	0.0	0.0	2.0	3.9	0.0	0.0
SOME USE %	2.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0
TOTAL %	100.0	0.0	0.0	0.0	49.0	29.4	21.6	0.0
NO USE %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

IV.25

HARD COPY GRAPHICAL OUTPUT

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
2.14	2.41	2.67	0.53

NUMBER OF REQUIRING APPLICATIONS — 4

	TOTAL	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
NECESSARY %	53.7	0.0	0.0	1.4	15.7	25.9	9.3	1.4
DEFINITE ASSET %	38.9	0.0	0.0	0.5	12.0	19.4	6.5	0.5
USEFUL %	6.9	0.0	0.0	0.0	2.8	1.9	2.3	0.0
SOME USE %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL %	99.5	0.0	0.0	1.9	30.6	47.2	18.1	1.9
NO USE %	0.5	0.0	0.0	0.0	0.0	0.5	0.0	0.0

IV.26

INTERACTIVE 3-DIMENSIONAL DISPLAY

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
3.41	3.14	4.38	0.07

NUMBER OF REQUIRING APPLICATIONS — 1

	TOTAL	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER

NECESSARY 100- 75- 50- 25- 0-

| % | 32.1 | 0.0 | 0.0 | 8.9 | 17.9 | 5.4 | 0.0 | 0.0 |

DEFINITE ASSET 100- 75- 50- 25- 0-

| % | 60.7 | 0.0 | 0.0 | 14.3 | 42.9 | 3.6 | 0.0 | 0.0 |

USEFUL 100- 75- 50- 25- 0-

| % | 5.4 | 0.0 | 0.0 | 0.0 | 5.4 | 0.0 | 0.0 | 0.0 |

SOME USE 100- 75- 50- 25- 0-

| % | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

TOTAL 100- 75- 50- 25- 0-

| % | 98.2 | 0.0 | 0.0 | 23.2 | 66.1 | 8.9 | 0.0 | 0.0 |

NO USE 100- 75- 50- 25- 0-

| % | 1.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.8 | 0.0 |

MEDIUM SPEED TERMINAL $200/MONTH

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
1.95	3.52	2.94	0.05

NUMBER OF REQUIRING APPLICATIONS — 1

	TOTAL	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
NECESSARY %	62.0	0.0	8.0	42.0	12.0	0.0	0.0	0.0
DEFINITE ASSET %	34.0	0.0	4.0	22.0	6.0	2.0	0.0	0.0
USEFUL %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SOME USE %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL %	96.0	0.0	12.0	64.0	18.0	2.0	0.0	0.0
NO USE %	4.0	0.0	0.0	4.0	0.0	0.0	0.0	0.0

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
2.01	3.35	2.55	0.37

NUMBER OF REQUIRING APPLICATIONS — 3

	TOTAL	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
NECESSARY %	53.5	0.0	0.0	15.7	29.6	6.3	1.9	0.0
DEFINITE ASSET %	39.6	0.0	0.6	11.9	22.0	5.0	0.0	0.0
USEFUL %	6.3	0.0	0.0	0.0	4.4	1.3	0.6	0.0
SOME USE %	0.6	0.0	0.0	0.0	0.6	0.0	0.0	0.0
TOTAL %	100.0	0.0	0.6	27.7	56.6	12.6	2.5	0.0
NO USE %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

```
        IMPACT   PROFITABLE   USEFUL      WILL
          ON         TO         TO       NOT BE
        SOCIETY  IMPLEMENTOR  PUBLIC  IMPLEMENTED
         2.43       3.14       2.37       0.64
```

NUMBER OF REQUIRING APPLICATIONS — 3

```
                 TOTAL  1970-71 72-74  75-77  78-80  81-85  LATER  NEVER
NECESSARY 100-
           75-
           50-
           25-
            0-

            %    69.1     0.0    0.6    18.5   29.6   18.5    1.2    0.6

DEFINITE  100-
ASSET      75-
           50-
           25-
            0-

            %    27.2     0.0    0.0     6.8    9.9    7.4    3.1    0.0

USEFUL    100-
           75-
           50-
           25-
            0-

            %     2.5     0.0    0.0     1.2    1.2    0.0    0.0    0.0

SOME USE  100-
           75-
           50-
           25-
            0-

            %     0.6     0.0    0.0     0.0    0.0    0.6    0.0    0.0

TOTAL     100-
           75-
           50-
           25-
            0-

            %    99.4     0.0    0.6    26.5   40.7   26.5    4.3    0.6

NO USE    100-
           75-
           50-
           25-
            0-

            %     0.6     0.0    0.0     0.6    0.0    0.0    0.0    0.0
```

POSITIVE USER IDENTIFICATION

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
2.76	3.17	2.75	0.57

NUMBER OF REQUIRING APPLICATIONS — 5

	TOTAL	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER

NECESSARY

%	74.6	0.0	0.0	4.0	24.3	39.5	5.8	1.1

DEFINITE ASSET

%	14.9	0.0	0.0	6.9	4.7	3.3	0.0	0.0

USEFUL

%	7.2	0.0	0.4	4.0	2.2	0.7	0.0	0.0

SOME USE

%	1.8	0.0	0.0	0.7	1.1	0.0	0.0	0.0

TOTAL

%	98.6	0.0	0.4	15.6	32.2	43.5	5.8	1.1

NO USE

%	1.4	0.0	0.0	0.7	0.0	0.7	0.0	0.0

IV.31

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
2.84	3.40	3.56	0.33

NUMBER OF REQUIRING APPLICATIONS — 1

	TOTAL	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER

NECESSARY 100—

| % | 63.0 | 0.0 | 0.0 | 1.9 | 29.6 | 25.9 | 3.7 | 1.9 |

DEFINITE ASSET 100—

| % | 29.6 | 0.0 | 0.0 | 1.9 | 18.5 | 9.3 | 0.0 | 0.0 |

USEFUL 100—

| % | 7.4 | 0.0 | 0.0 | 0.0 | 7.4 | 0.0 | 0.0 | 0.0 |

SOME USE 100—

| % | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

TOTAL 100—

| % | 100.0 | 0.0 | 0.0 | 3.7 | 55.6 | 35.2 | 3.7 | 1.9 |

NO USE 100—

| % | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

DATA BASE REQUIREMENTS

Requirements associated with data bases were the most pervasive need of all the required capabilities. This reflects the fact that 66 out of the 108 applications specified very large data bases, ranging from 10 billion bytes to 1 trillion bytes with one case calling for 100 trillion bytes.

The need for 10 billion to 1 trillion byte sizes becomes widespread in the 1978 to 1980 time period. There was a pronounced trend for the larger data base sizes to be assigned a higher degree of necessity. This suggests that for applications requiring 100 billion to 1 trillion bytes that data storage is the key requirement. Applications using 10 billion bytes or less appear to use large storage as an implementation convenience.

The 100 trillion byte data base was required for the "Personal Data Bank" application and must contain complete information files for the entire U.S. population. Twenty-five percent of the respondents judged this application to be in the "Never" category indicating some doubt as to whether it would ever be implemented.

The ability to search large data bases rapidly was also identified. As expected, the need occurred in the same time frame as for large data bases, 1978 and beyond. The degree of necessity was concentrated in the "Definite Asset" category. The speed requirements were cited in terms of search engines capable of performances ranging from 10 to 10,000 times as fast as today's capabilities. Only one application required a "Search Engine" of 1,000 times today's power and only two, Patent Search and Law Search asked for 10,000 times. The conclusion is that a hundred-fold increase will accommodate most applications.

Thirty-six applications cited the need for advanced data base management capabilities to better control data bases. Included in the criteria were:

- Data Independence - making it possible to change the data base organization without changing the programs.

- Dynamic Reorganization - the ability for the system to reorganize all or part of the data base dynamically, thus providing better overall responses to sensed demands or to provide preferential service for designated applications.

- Data Base Protection - protection of the data base against inadvertent or malicious alteration or destruction.

- Dynamic Recovery - the ability to dynamically correct errors or loss of the data base with little or no operator intervention.

- Data Base Security - the ability to monitor and control access to the data base so as to permit only authorized access to the data.

The need for these capabilities was judged by 71 percent of the respondents to be "Necessary." This need starts in 1975 and carries through 1985 in conjunction with the need for very large data bases. Only 11 out of the 36 applications requiring advanced data base facilities also required data bases of 100 billion or more. This fact coupled with the 1975 need for data base management, leads to the conclusion that data base management facilities have wide use and are not limited to massive data bases.

An advanced capability associated with data base requirements is the need for a system to automatically generate and reorganize information systems. This includes the programs and data base organizations needed to provide optimum implementation. Input to the system would be descriptions and timing of known and anticipated inputs and outputs together with expected usage statistics. Logical relationships between fields would be part of the descriptions. Data base organizations and program generation would be done on the basis of the relationships between known inputs and outputs. The system must maintain statistics on actual relationship usage. Periodically the system would re-optimize, generating new programs and data base organizations to reflect the latest statistics.

This capability was judged to be a "Definite Asset" with the need concentrated toward the later part of the 1978-1985 time period. This late date reflects the obvious difficulties in creating such a system as well as the sheer size and complexity of the advanced applications.

In summary, the need for advanced data base management facilities is required in 1975 which is before the widespread use of large, trillion byte data bases. The next step after 1978, to large, complex, dynamic information systems, may have to await the creation of automatic programming systems and very fast search engines.

DATA BASE REQUIREMENTS

Pages   Capabilities and Applications

                  MASS DATA STORAGE - 100 TRILLION BYTES
III.91   PERSONAL DATA BANKS

                  MASS STORAGE - 1 TRILLION BYTES
III.78   III.113 AUTOMATED PUBLIC LIBRARIES
III.79   AUTOMATED WEATHER FORECASTING
III.86   NATIONWIDE AIR TRAFFIC CONTROL
III.108   NATIONWIDE POLICE INFORMATION SYSTEM
III.109   STATE HEALTH INFORMATION SYSTEMS
III.117   INFORMATION RETRIEVAL UTILITIES
III.119   LAW SEARCH
III.121   PATENT SEARCH
III.122   PROFESSIONAL LITERATURE SEARCH SYSTEMS
III.162   OFFICE ELECTRONIC MAIL SERVICE

                  MASS STORAGE - 100 BILLION BYTES
III.25   COMPUTER ASSISTED OCEANOGRAPHY
III.26   III.152 COMPUTER COORDINATED TESTING OF MEDICAL DRUGS
III.27   III.41   RESEARCH MONITORING FOR ECOLOGICAL EFFECTS
III.30   III.65   AUTOMATED FREIGHT TERMINALS
III.36   AIR POLLUTION PREDICTION
III.38   ECOLOGICAL BALANCE CALCULATIONS
III.38   ECOLOGICAL BALANCE CALCULATIONS
III.39   ECOLOGICAL PLANT SCHEDULING
III.54   AUTOMATED STOCK TRANSFER
III.57   CHECKLESS SOCIETY
III.59   CREDIT TRANSFER (GIRO) SYSTEM
III.60   FINANCIAL UTILITY
III.61   INSURANCE SUPPORT SYSTEM
III.62   INTEGRATED FINANCIAL SERVICE SYSTEM
III.70   NATIONWIDE COORDINATION OF INTERMODAL FREIGHT SHIPMENTS
III.71   RAILROAD CAR TRACING, TRACKING AND ALLOCATION
III.80   III.104 CONSOLIDATED PUBLIC WELFARE SYSTEMS
III.83   GOVERNMENTAL PLANNING SYSTEMS FOR DEVELOPING COUNTRIES
III.87   III.120 NATIONWIDE DRIVER AND VEHICLE DATA BANK
III.88   NATIONAL HEALTH INSURANCE SYSTEMS
III.89   NATIONAL LAND INVENTORY
III.90   NATIONWIDE VOTER REGISTRATION
III.98   ELECTRONIC DELIVERY OF HARD COPY
III.103   AUTOMATED PLANT INFORMATION SYSTEMS
III.105   HEALTH INFORMATION SYSTEMS
III.106 III.129 LEGISLATIVE SYSTEMS
III.107   MANAGEMENT INFORMATION SYSTEMS
III.115 III.154 DISEASE INFORMATION SYSTEMS
III.116   GOVERNMENT ACTIVITIES INFORMATION UTILITY
III.124   UNIVERSAL RESERVATION SYSTEMS
III.125   VACATION AND TRAVEL PLANNING SYSTEMS

Pages   Capabilities and Applications

                      SEARCH ENGINE - 100 TIMES MORE POWERFUL
III.78   III.113 AUTOMATED PUBLIC LIBRARIES
III.80   III.104 CONSOLIDATED PUBLIC WELFARE SYSTEMS
III.98   ELECTRONIC DELIVERY OF HARD COPY
III.108   NATIONWIDE POLICE INFORMATION SYSTEM
III.109   STATE HEALTH INFORMATION SYSTEMS
III.118   JOB PLACEMENT SERVICES
III.122   PROFESSIONAL LITERATURE SEARCH SYSTEMS
III.123   III.172 TELEPHONE DIRECTORY AND YELLOW PAGE DATA BANKS
III.134   AUTOMATED DESIGN ENGINEERING
III.135   AUTOMATED MANUFACTURING ENGINEERING

                      SEARCH ENGINE - 10 TIMES MORE POWERFUL
III.19   COMPUTER-ASSISTED LABOR/MANAGEMENT NEGOTIATIONS
III.38   ECOLOGICAL BALANCE CALCULATIONS
III.58   COMMERCIAL LOAN CREDIT SCORING
III.107   MANAGEMENT INFORMATION SYSTEMS
III.116   GOVERNMENT ACTIVITIES INFORMATION UTILITY

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
2.37	2.75	2.59	0.47

NUMBER OF REQUIRING APPLICATIONS — 36

		TOTAL	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
NECESSARY	%	70.8	0.0	0.3	10.1	30.4	23.9	5.3	0.9
DEFINITE ASSET	%	22.1	0.0	0.4	3.7	10.9	5.7	1.2	0.2
USEFUL	%	4.1	0.0	0.1	0.9	1.6	0.7	0.5	0.3
SOME USE	%	1.1	0.0	0.1	0.3	0.3	0.2	0.1	0.1
TOTAL	%	98.1	0.0	0.8	15.0	43.1	30.5	7.1	1.5
NO USE	%	1.9	0.0	0.0	0.5	0.4	0.4	0.4	0.2

AUTOMATED GENERATION OF INFORMATION SYSTEMS

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
2.43	2.42	2.51	0.54

NUMBER OF REQUIRING APPLICATIONS — 8

		TOTAL	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
NECESSARY	%	14.3	0.0	0.0	0.0	4.1	6.9	2.0	1.3
DEFINITE ASSET	%	58.6	0.0	0.0	1.8	22.3	27.6	5.9	1.0
USEFUL	%	16.9	0.0	0.3	0.5	7.4	6.1	2.6	0.0
SOME USE	%	4.1	0.0	0.3	0.3	1.5	1.0	0.5	0.5
TOTAL	%	93.9	0.0	0.5	2.6	35.3	41.7	11.0	2.8
NO USE	%	6.1	0.0	0.0	0.0	2.8	1.8	0.8	0.8

MASS DATA STORAGE — 100 TRILLION BYTES

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
3.19	1.56	1.83	1.67

NUMBER OF REQUIRING APPLICATIONS — 1

	TOTAL	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
NECESSARY								
%	87.5	0.0	0.0	2.1	0.0	6.3	64.6	14.6
DEFINITE ASSET								
%	2.1	0.0	0.0	0.0	0.0	0.0	2.1	0.0
USEFUL								
%	6.3	0.0	0.0	0.0	2.1	2.1	0.0	2.1
SOME USE								
%	2.1	0.0	0.0	0.0	0.0	0.0	2.1	0.0
TOTAL								
%	97.9	0.0	0.0	2.1	2.1	8.3	68.8	16.7
NO USE								
%	2.1	0.0	0.0	0.0	0.0	0.0	2.1	0.0

MASS STORAGE — 1 TRILLION BYTES

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
2.58	2.49	3.03	0.40

NUMBER OF REQUIRING APPLICATIONS — 10

	TOTAL	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
NECESSARY %	49.7	0.0	0.0	4.7	23.8	17.8	2.4	0.9
DEFINITE ASSET %	39.6	0.0	0.0	2.4	21.8	12.4	3.0	0.0
USEFUL %	7.5	0.0	0.0	1.1	3.9	1.9	0.4	0.2
SOME USE %	1.9	0.0	0.2	0.0	1.1	0.2	0.2	0.2
TOTAL %	98.7	0.0	0.2	8.3	50.7	32.3	6.0	1.3
NO USE. %	1.3	0.0	0.0	0.0	0.9	0.2	0.2	0.0

MASS STORAGE – 100 BILLION BYTES

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
2.40	2.61	2.59	0.59

NUMBER OF REQUIRING APPLICATIONS — 42

		TOTAL	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
NECESSARY	%	44.0	0.0	0.0	1.5	17.0	19.1	5.4	0.9
DEFINITE ASSET	%	44.7	0.0	0.1	2.0	19.7	18.6	3.6	0.6
USEFUL	%	8.0	0.0	0.0	0.4	3.8	2.4	1.0	0.4
SOME USE	%	1.3	0.0	0.0	0.2	0.3	0.4	0.3	0.1
TOTAL	%	98.0	0.0	0.2	4.1	40.8	40.5	10.2	2.1
NO USE	%	2.0	0.0	0.0	0.2	0.5	0.6	0.3	0.3

MASS STORAGE - 10 BILLION BYTES

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
2.44	2.56	2.92	0.33

NUMBER OF REQUIRING APPLICATIONS - 14

	TOTAL	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
NECESSARY %	27.6	0.0	0.0	3.7	11.5	10.4	1.4	0.6
DEFINITE ASSET %	48.1	0.0	0.0	6.1	25.1	15.2	1.6	0.1
USEFUL %	16.8	0.0	0.3	2.1	8.4	4.7	0.9	0.4
SOME USE %	4.1	0.0	0.1	0.9	1.4	0.4	1.0	0.3
TOTAL %	96.7	0.0	0.4	12.8	46.4	30.8	4.8	1.4
NO USE %	3.3	0.0	0.0	1.0	1.3	0.7	0.3	0.0

MASS DATA STORAGE — 1 BILLION BYTES

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
1.43	2.78	2.41	0.33

NUMBER OF REQUIRING APPLICATIONS — 1

		TOTAL	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
NECESSARY	%	16.3	0.0	2.0	2.0	4.1	8.2	0.0	0.0
DEFINITE ASSET	%	55.1	0.0	0.0	4.1	36.7	10.2	4.1	0.0
USEFUL	%	16.3	0.0	0.0	8.2	4.1	4.1	0.0	0.0
SOME USE	%	6.1	0.0	0.0	2.0	2.0	0.0	0.0	2.0
TOTAL	%	93.9	0.0	2.0	16.3	46.9	22.4	4.1	2.0
NO USE	%	6.1	0.0	0.0	2.0	2.0	2.0	0.0	0.0

IV.45

SEARCH ENGINE — 10,000 TIMES MORE POWERFUL

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
2.05	2.62	2.52	0.29

NUMBER OF REQUIRING APPLICATIONS — 2

	TOTAL	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
NECESSARY %	20.7	0.0	0.0	0.0	11.7	7.2	0.9	0.9
DEFINITE ASSET %	53.2	0.0	0.0	1.8	32.4	15.3	3.6	0.0
USEFUL %	22.5	0.0	0.0	0.0	13.5	6.3	2.7	0.0
SOME USE %	1.8	0.0	0.0	0.0	1.8	0.0	0.0	0.0
TOTAL %	98.2	0.0	0.0	1.8	59.5	28.8	7.2	0.9
NO USE %	1.8	0.0	0.0	0.0	0.9	0.9	0.0	0.0

SEARCH ENGINE — 1,000 TIMES MORE POWERFUL

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
1.82	2.65	2.17	0.42

NUMBER OF REQUIRING APPLICATIONS — 1

	TOTAL	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
NECESSARY %	56.0	0.0	0.0	0.0	22.0	30.0	4.0	0.0
DEFINITE ASSET %	38.0	0.0	0.0	0.0	24.0	14.0	0.0	0.0
USEFUL %	2.0	0.0	0.0	0.0	0.0	2.0	0.0	0.0
SOME USE %	2.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0
TOTAL %	98.0	0.0	0.0	2.0	46.0	46.0	4.0	0.0
NO USE %	2.0	0.0	0.0	0.0	0.0	2.0	0.0	0.0

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
2.38	2.42	2.67	0.46

NUMBER OF REQUIRING APPLICATIONS - 10

	TOTAL	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
NECESSARY %	24.5	0.0	0.0	1.8	11.8	6.7	3.6	0.6
DEFINITE ASSET %	48.3	0.0	0.0	4.7	22.3	17.0	3.9	0.4
USEFUL %	19.3	0.0	0.4	4.9	9.7	2.6	1.6	0.2
SOME USE %	3.7	0.0	0.2	0.6	2.0	0.6	0.4	0.0
TOTAL %	95.9	0.0	0.6	12.0	45.8	26.8	9.5	1.2
NO USE %	4.1	0.0	0.2	1.2	2.0	0.0	0.4	0.4

SEARCH ENGINE — 10 TIMES MORE POWERFUL

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
2.25	2.46	2.34	0.53

NUMBER OF REQUIRING APPLICATIONS — 5

	TOTAL	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
NECESSARY %	22.6	0.0	0.0	0.0	7.5	10.9	3.3	0.8
DEFINITE ASSET %	54.0	0.0	0.0	2.1	25.5	23.0	2.1	1.3
USEFUL %	16.3	0.0	0.0	0.8	5.9	6.3	2.1	1.3
SOME USE %	2.9	0.0	0.0	0.4	0.8	0.8	0.8	0.0
TOTAL %	95.8	0.0	0.0	3.3	39.7	41.0	8.4	3.3
NO USE %	4.2	0.0	0.0	0.8	1.7	0.4	0.0	1.3

CAPACITY AND AVAILABILITY

The study was designed to predict future data processing needs independent of technological constraints. To accomplish this the respondents were given a set of future price/performance curves derived from published articles. (Figure 5.6 page V.8). They were asked to use the curves to determine the implementation dates where price/performance was the determining factor. These price/performance sensitive applications are listed in Appendix D.

For any of the applications listed in Appendix D, its required levels of price/performance are by definition found at the intersection of the forecasted date and the curves. Furthermore, if different price/performance curves are available, they may be used to adjust the implementation dates for these applications. However, the price/performance curves represent only the requirements for stand-alone implementation of any of these applications. It should be recognized that there are very few one application shops. Therefore, the total systems performance requirement will be greater because it will reflect the aggregation of conventional and advanced applications to be run on the system.

For applications which were not price/performance sensitive, the respondents identified the major requirements explicitly. Three applications: Missile Defense, Long Range Weather Forecasting, and Air Pollution Prediction are large Federal applications and had leading-edge performance requirements. Internal performance for the three ranged from 30 to 1000 MIPS (Millions of Instructions Per Second.) Missile Defense needed response times in microseconds and Weather Forecasting required 10 million bytes of internal storage. These needs were rated as "Necessary" or a "Definite Asset" for the 1978-85 time frame.

High availability was of paramount concern in those applications where there was risk of death or injury, or where substantial financial risks exist, as in the controlling of entire plants, or where great numbers of terminal users would be disrupted by outages. Availability ranged from "no outages of more than 1 hour" for automated warehouses and freight terminals to essentially "no-fail systems" for air traffic control and automated landings and take-offs.

The applications had varying requirements when considering frequencies of outage and duration. Automated plants were more concerned about avoiding any interruption requiring plant shutdown than they were in the duration of down time. On the other hand, terminal systems concentrated on concern about duration of outage. Those dealing with customers at the terminal required no interruptions with more than one minute discernible at the terminal. Others with more controlled users, i.e., employees, could tolerate up to 15 minutes duration.

Many of the advanced applications will require significantly better availability before they will be implemented. Furthermore, systems must include both longer mean time to failure and reduced duration of outage.

CAPACITY AND AVAILABILITY

Pages   Capabilities and Applications

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
2.00	2.62	2.80	0.29

NUMBER OF REQUIRING APPLICATIONS — 1

	TOTAL	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
NECESSARY	61.8	0.0	0.0	5.5	38.2	12.7	5.5	0.0
DEFINITE ASSET	29.1	0.0	0.0	0.0	14.5	10.9	3.6	0.0
USEFUL	5.5	0.0	0.0	0.0	0.0	1.8	3.6	0.0
SOME USE	3.6	0.0	0.0	0.0	1.8	0.0	1.0	0.0
TOTAL	100.0	0.0	0.0	5.5	54.5	25.5	14.5	0.0
NO USE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

CORE STORAGE — 10 BILLION BYTES

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
2.89	2.28	3.61	0.44

NUMBER OF REQUIRING APPLICATIONS — 1

		TOTAL	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
NECESSARY	100— 75— 50— 25— 0—								
%		70.6	0.0	0.0	3.9	52.9	11.8	2.0	0.0
DEFINITE ASSET	100— 75— 50— 25— 0—								
%		21.6	0.0	0.0	0.0	9.8	9.8	2.0	0.0
USEFUL	100— 75— 50— 25— 0—								
%		5.9	0.0	0.0	0.0	3.9	2.0	0.0	0.0
SOME USE	100— 75— 50— 25— 0—								
%		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	100— 75— 50— 25— 0—								
%		98.0	0.0	0.0	3.9	66.7	23.5	3.9	0.0
NO USE	100— 75— 50— 25— 0—								
%		2.0	0.0	0.0	0.0	2.0	0.0	0.0	0.0

HIGH AVAILABILITY

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
2.68	2.54	2.65	0.88

NUMBER OF REQUIRING APPLICATIONS — 13

		TOTAL	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
NECESSARY	100–75–50–25–0–								
	%	52.2	0.1	0.3	7.0	18.8	15.4	9.6	1.0
DEFINITE ASSET	100–75–50–25–0–								
	%	37.3	0.0	0.0	4.6	8.3	17.9	6.2	0.3
USEFUL	100–75–50–25–0–								
	%	6.7	0.0	0.0	1.0	2.0	2.4	1.1	0.1
SOME USE	100–75–50–25–0–								
	%	1.3	0.0	0.0	0.1	0.3	0.4	0.4	0.0
TOTAL	100–75–50–25–0–								
	%	97.6	0.1	0.3	12.8	29.4	36.2	17.4	1.4
NO USE	100–75–50–25–0–								
	%	2.4	0.0	0.0	0.3	0.6	0.6	0.9	0.1

HIGH PERFORMACE — 1000 MIPS

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
2.74	2.29	2.77	0.55

NUMBER OF REQUIRING APPLICATIONS — 1

	TOTAL	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER

NECESSARY

| % | 82.2 | 0.0 | 0.0 | 2.2 | 62.2 | 11.1 | 4.4 | 2.2 |

DEFINITE ASSET

| % | 13.3 | 0.0 | 0.0 | 0.0 | 11.1 | 2.2 | 0.0 | 0.0 |

USEFUL

| % | 4.4 | 0.0 | 0.0 | 0.0 | 2.2 | 2.2 | 0.0 | 0.0 |

SOME USE

| % | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

TOTAL

| % | 100.0 | 0.0 | 0.0 | 2.2 | 75.6 | 15.6 | 4.4 | 2.2 |

NO USE

| % | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

IV.55

	IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
	2.39	2.28	3.61	0.44

NUMBER OF REQUIRING APPLICATIONS — 1

		TOTAL	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
NECESSARY	%	36.7	0.0	0.0	2.0	22.4	10.2	2.0	0.0
DEFINITE ASSET	%	44.9	0.0	0.0	2.0	32.7	8.2	2.0	0.0
USEFUL	%	16.3	0.0	0.0	0.0	12.2	4.1	0.0	0.0
SOME USE	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	%	98.0	0.0	0.0	4.1	67.3	22.4	4.1	0.0
NO USE	%	2.0	0.0	0.0	0.0	2.0	0.0	0.0	0.0

HIGH PERFORMANCE — 30 MIPS

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
3.22	1.98	3.25	0.66

NUMBER OF REQUIRING APPLICATIONS — 1

	TOTAL	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
NECESSARY %	24.4	0.0	0.0	0.0	2.2	15.6	6.7	0.0
DEFINITE ASSET %	68.9	0.0	0.0	0.0	0.0	35.6	31.1	2.2
USEFUL %	6.7	0.0	0.0	0.0	0.0	2.2	4.4	0.0
SOME USE %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL %	100.0	0.0	0.0	0.0	2.2	53.3	42.2	2.2
NO USE %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

IMPACT	PROFITABLE	USEFUL	WILL
ON	TO	TO	NOT BE
SOCIETY	IMPLEMENTOR	PUBLIC	IMPLEMENTED
2.74	2.29	2.77	0.55

NUMBER OF REQUIRING APPLICATIONS — 1

	TOTAL	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
NECESSARY 100—75—50—25—0—								
%	72.1	0.0	0.0	2.3	58.1	9.3	0.0	2.3
DEFINITE ASSET 100—75—50—25—0—								
%	23.3	0.0	0.0	0.0	14.0	4.7	4.7	0.0
USEFUL 100—75—50—25—0—								
%	2.3	0.0	0.0	0.0	2.3	0.0	0.0	0.0
SOME USE 100—75—50—25—0—								
%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL 100—75—50—25—0—								
%	97.7	0.0	0.0	2.3	74.4	14.0	4.7	2.3
NO USE 100—75—50—25—0—								
%	2.3	0.0	0.0	0.0	0.0	2.3	0.0	0.0

ADVANCED CAPABILITIES

A number of applications were dependent on capabilities which
do not exist or exist in only rudimentary form in today's systems.
These ranged from a security and privacy mechanism needed by some
applications today to systems capable of making respectable scores
on standard I.Q. tests.

The need for a security and privacy mechanism was found to be
associated primarily with data base systems containing personal
or proprietary information and with applications which would be
attractive targets for fraud. This need becomes pronounced in
1975-77 and is an increasing requirement from 1978 on, as more of
these types of applications are implemented.

Storage and manipulation of graphical data was identified by four
applications. The need ranged up to one billion graphical pages
for a Nationwide Police Information System. It was rated as a
"Definite Asset" for the 1978-80 period.

Automated design and automated manufacturing engineering specified
a need to have concise internal representations of three-dimensional
objects. This permits capture and manipulation of information
conventionally retained in blueprint files. The related capability
for improved image processing was identified by two applications.
These requirements are needed in 1978-80 and beyond.

Voice or handwriting input was requested by two applications and
was rated as an "Asset" or "Useful." This would seem to indicate
either that these capabilities are not needed or that the respondents
did not believe they would come about in the 1975-85 time frame.

Three capabilities: Multi-Attribute Pattern Matching, Discovery
Systems, and Heuristic Programming, contribute to the programming
of applications typically thought to be in the exclusive domain
of human intelligence. Multi-Attribute Pattern Matching permits
a system to compare lists of attributes to determine similarities
and best matches.

For example, human beings find it relatively easy to make near
optimal layouts of dress patterns on a bolt of cloth; whereas, this
is a very difficult operation to program on today's system. The
reason is that people look at the whole pattern while computers
are limited to serial element-by-element comparisons.

This example is one from a large class of problems occurring in
most areas of present and future use of computers. Multi-Attribute
Pattern Matching can be used wherever there is a need to make
decisions based on applying patterns of experience and criteria to
similar situations looking for best matches.

Discovery systems are extensions of Multi-Attribute Pattern Matching
which would allow the system to selectively browse through data
files looking for similar patterns. The system would then form

hypothesis of the underlying principles and relationships causing the similarities. Further selective browsing would serve to confirm or reject the hypothesis. Such systems would probably operate inter- actively so that an investigator could monitor and control the direction of search. Carried to the ultimate, Multi-Attribute Pattern Matching and Discovery Systems could enable systems to address typical I.Q. test questions such as: "Wake is to Ship as Path is to _____? A. Forest, B. Man, C. Boat, D. Automobile."

Heuristic Programming would provide the ability to create programs capable of learning on the basis of experience. In a sense, this is an extension of discovery systems. By storing workable patterns, a discovery system can form hypothesis of successful patterns and then select the best ones to match the situations. The application requesting Heuristic Programming envisions using this capability to train general purpose robots by manually cycling them through the necessary motions.

These capabilities were rated as "Necessary" or a "Definite Asset" starting in 1975-77 for the first two and 1978-80 for Heuristic Programming. The list of applications requiring these capabilities, as a group, could be classed as visionary and will require system breakthroughs to be implemented.

ADVANCED CAPABILITIES

Pages		Capabilities and Applications

DISCOVERY SYSTEMS

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
2.61	2.66	2.78	0.52

NUMBER OF REQUIRING APPLICATIONS — 7

	TOTAL	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
NECESSARY								
%	45.6	0.0	0.0	3.1	21.7	16.2	3.7	0.9
DEFINITE ASSET								
%	36.1	0.0	0.3	4.9	17.1	11.8	1.2	0.6
USEFUL								
%	11.3	0.0	0.3	1.8	5.2	2.8	0.9	0.3
SOME USE								
%	1.8	0.0	0.0	0.9	0.6	0.3	0.0	0.0
TOTAL								
%	94.8	0.0	0.6	10.7	44.6	31.2	5.8	1.8
NO USE								
%	5.2	0.0	0.3	1.2	1.8	0.9	0.3	0.6

IV-63

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
2.71	2.29	3.13	00

NUMBER OF REQUIRING APPLICATIONS — 1

	TOTAL	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
NECESSARY %	1.9	0.0	0.0	1.9	0.0	0.0	0.0	0.0
DEFINITE ASSET %	34.6	0.0	0.0	0.0	25.0	5.8	1.9	1.9
USEFUL %	40.4	0.0	0.0	0.0	15.4	19.2	5.8	0.0
SOME USE %	11.5	0.0	0.0	0.0	5.8	3.8	0.0	1.9
TOTAL %	88.5	0.0	0.0	1.9	46.2	28.8	7.7	3.8
NO USE %	11.5	0.0	0.0	1.9	5.8	1.9	1.9	0.0

IV.64

HEURISTIC PROGRAMMING

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
2.78	2.20	2.44	1.09

NUMBER OF REQUIRING APPLICATIONS — 2

	TOTAL	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
NECESSARY %	46.5	0.0	0.0	0.0	18.2	21.2	7.1	0.0
DEFINITE ASSET %	34.3	0.0	0.0	1.0	6.1	20.2	7.1	0.0
USEFUL %	15.2	0.0	0.0	0.0	8.1	4.0	3.0	0.0
SOME USE %	1.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0
TOTAL %	97.0	0.0	0.0	1.0	32.3	45.5	18.2	0.0
NO USE %	3.0	0.0	0.0	1.0	1.0	1.0	0.0	0.0

IV.65

IMPROVED IMAGE PROCESSING CAPABILITIES

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
2.12	2.25	2.44	0.39

NUMBER OF REQUIRING APPLICATIONS — 2

	TOTAL	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
NECESSARY %	47.3	0.0	0.0	0.0	18.7	20.0	7.7	0.0
DEFINITE ASSET %	41.8	0.0	0.0	1.1	18.7	19.8	2.2	0.0
USEFUL %	5.5	0.0	0.0	1.1	2.2	2.2	0.0	0.0
SOME USE %	2.2	0.0	0.0	0.0	1.1	1.1	0.0	0.0
TOTAL %	96.7	0.0	0.0	2.2	40.7	44.0	9.9	0.0
NO USE %	3.3	0.0	0.0	0.0	2.2	0.0	0.0	1.1

IV.66

INTERNAL 3-DIMENSIONAL REPRESENTATION

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
1.63	3.34	1.60	0.43

NUMBER OF REQUIRING APPLICATIONS — 2

	TOTAL	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
NECESSARY								
%	76.4	0.0	0.0	3.1	63.9	9.3	2.1	0.0
DEFINITE ASSET								
%	21.6	0.0	0.0	4.1	16.5	1.0	0.0	0.0
USEFUL								
%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SOME USE								
%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL								
%	100.0	0.0	0.0	7.2	80.4	10.3	2.1	0.0
NO USE								
%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

	IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
	2.31	2.62	2.87	0.34

NUMBER OF REQUIRING APPLICATIONS — 8

	TOTAL	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
NECESSARY %	62.6	0.0	0.0	4.5	26.7	22.5	6.8	2.1
DEFINITE ASSET %	25.7	0.0	0.3	5.8	13.9	5.0	0.5	0.3
USEFUL %	7.3	0.0	0.0	2.1	4.2	0.8	0.0	0.3
SOME USE %	1.6	0.0	0.3	0.3	0.8	0.0	0.3	0.0
TOTAL %	97.1	0.0	0.5	12.6	45.5	28.3	7.6	2.6
NO USE %	2.9	0.0	0.0	0.5	1.3	0.8	0.3	0.0

IV.68

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
2.52	2.42	2.20	0.83

NUMBER OF REQUIRING APPLICATIONS — 6

	TOTAL	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
NECESSARY								
%	82.2	0.0	0.0	5.1	23.9	30.3	19.5	3.4
DEFINITE ASSET								
%	10.1	0.0	0.0	2.0	3.7	3.0	1.3	0.0
USEFUL								
%	5.4	0.0	0.3	0.7	1.7	2.0	0.0	0.7
SOME USE								
%	1.0	0.0	0.0	0.0	0.7	0.3	0.0	0.0
TOTAL								
%	98.7	0.0	0.3	7.7	30.0	35.7	20.8	4.0
NO USE								
%	1.3	0.0	0.0	0.0	0.3	0.3	0.3	0.3

```
      IMPACT   PROFITABLE   USEFUL      WILL
        ON          TO        TO      NOT BE
     SOCIETY  IMPLEMENTOR  PUBLIC  IMPLEMENTED
       2.99       2.41       3.20        0.23
```

NUMBER OF REQUIRING APPLICATIONS — 2

```
                  TOTAL  1970-71 72-74  75-77  78-80  81-85  LATER  NEVER
NECESSARY 100─
           75─
           50─
           25─  ┌······┐
            0─  ┘       └·········································
                %  28.0     0.0    0.0    5.0   15.0    3.0    5.0    0.0

DEFINITE  100─
ASSET      75─  ┌······┐
           50─  │      │
           25─  │      │              ┌······┐
            0─  ┘       └·············┘        └···············
                %  58.0     0.0    0.0    8.0   33.0   16.0    1.0    0.0

USEFUL    100─
           75─
           50─
           25─
            0─  ·····················································
                %  10.0     0.0    0.0    2.0    4.0    4.0    0.0    0.0

SOME USE  100─
           75─
           50─
           25─
            0─  ·····················································
                %   1.0     0.0    0.0    0.0    1.0    0.0    0.0    0.0

TOTAL     100─  ┌······┐
           75─  │      │
           50─  │      │              ┌······┐
           25─  │      │        ┌·····┘      └······┐
            0─  ┘       └·······┘                    └·········
                %  97.0     0.0    0.0   15.0   53.0   23.0    6.0    0.0

NO USE    100─
           75─
           50─
           25─
            0─  ·····················································
                %   3.0     0.0    0.0    1.0    1.0    1.0    0.0    0.0
```

```
       IMPACT    PROFITABLE    USEFUL       WILL
         ON          TO          TO       NOT BE
       SOCIETY  IMPLEMENTOR  PUBLIC  IMPLEMENTED
        1.46       2.48        2.09       0.29
```
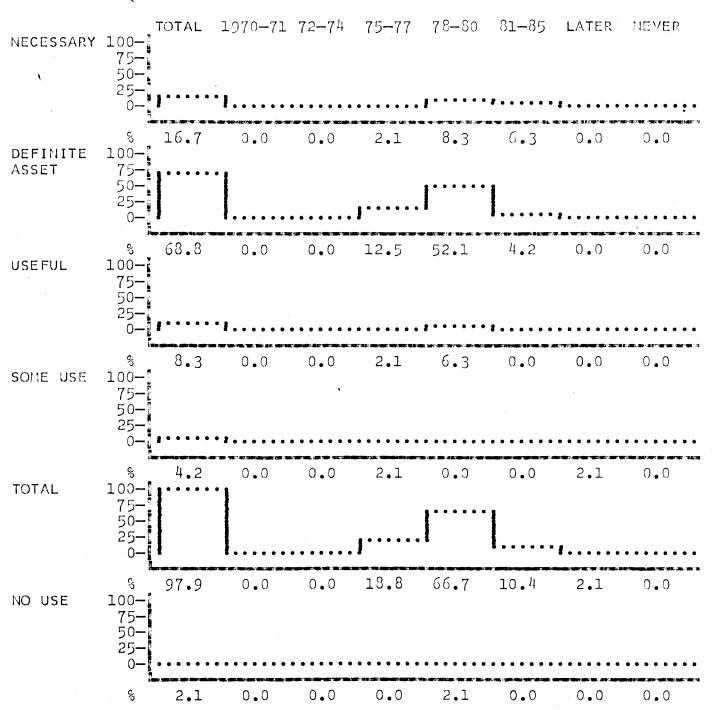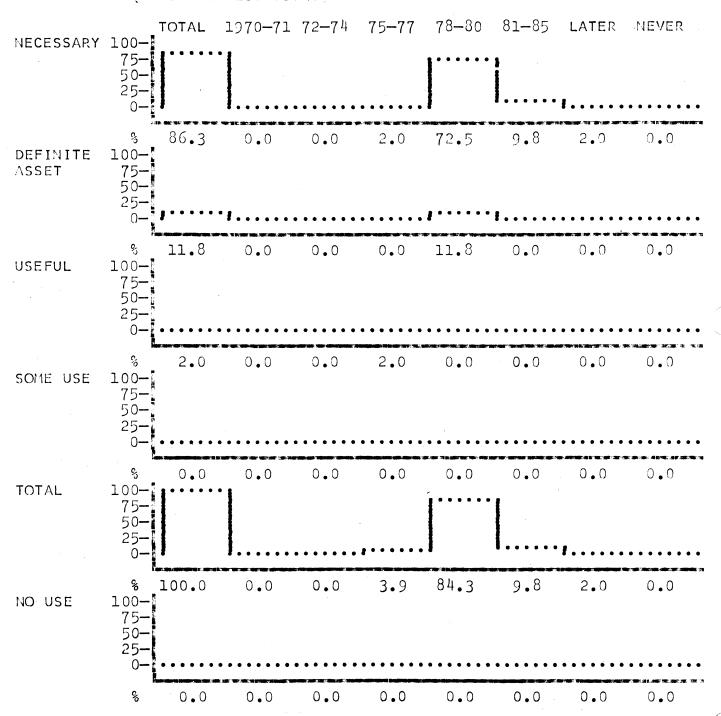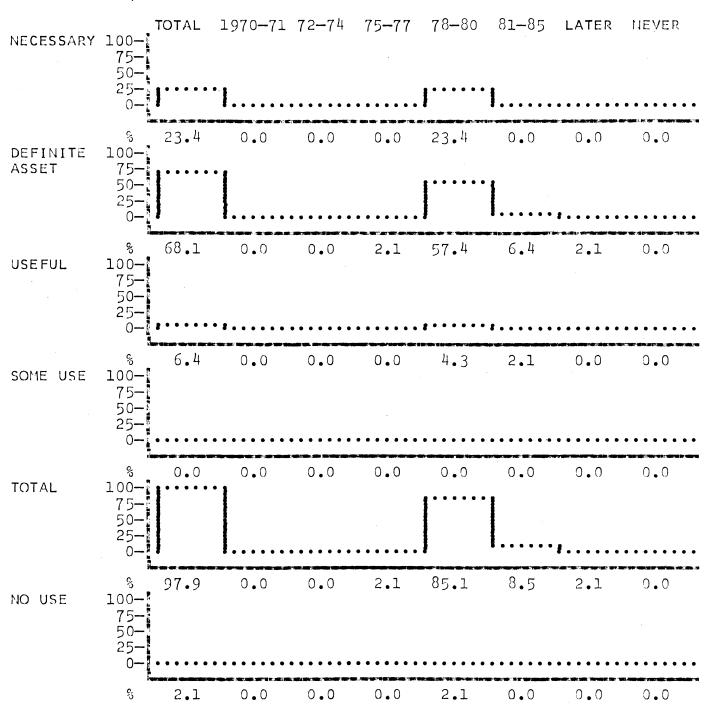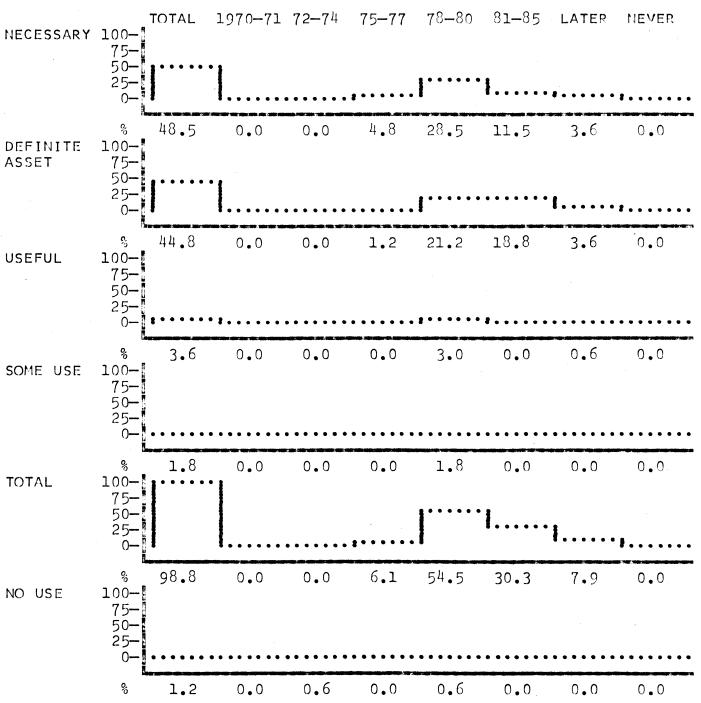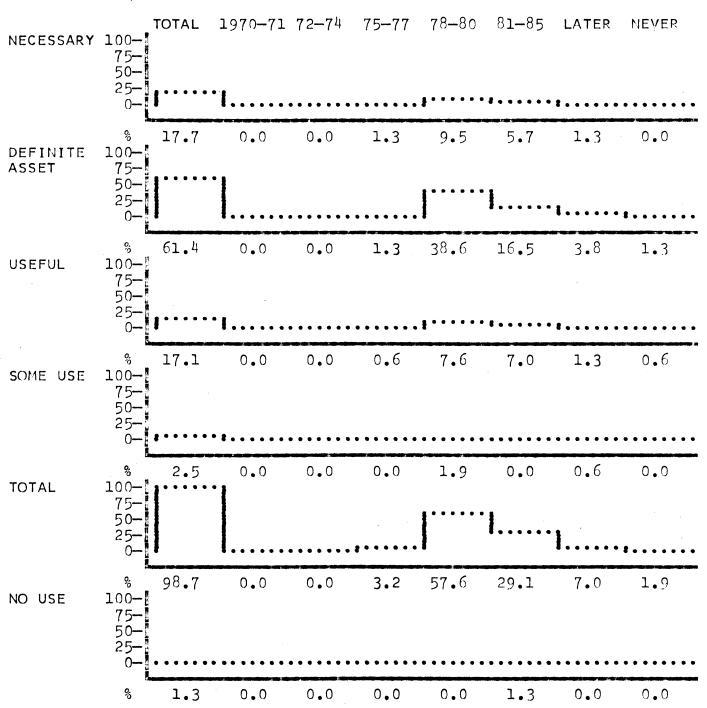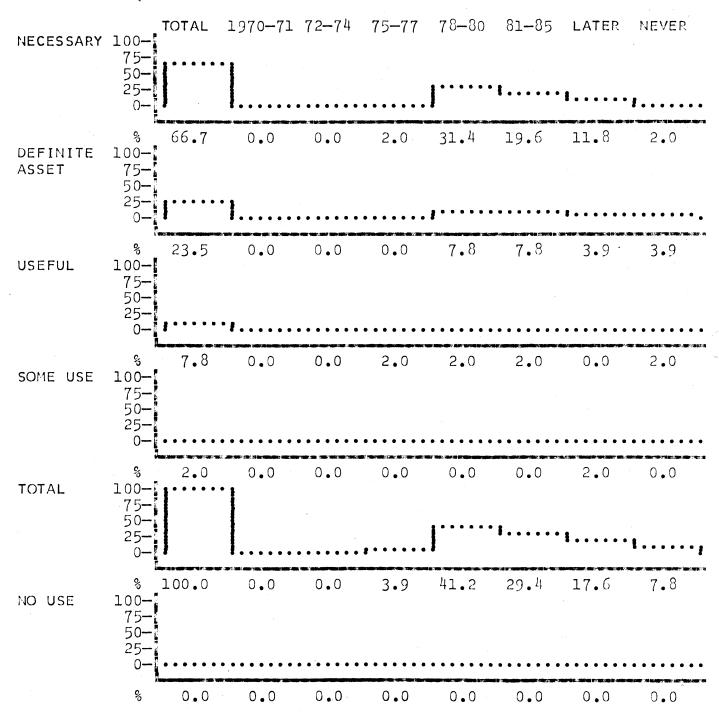
NUMBER OF REQUIRING APPLICATIONS — 1


```
                   TOTAL  1970-71 72-74  75-77  78-80  81-85  LATER  NEVER
NECESSARY  100-
            75-
            50-
            25-
             0-
            %   28.8    0.0    0.0    0.0   15.4    9.6    3.8    0.0

DEFINITE   100-
ASSET       75-
            50-
            25-
             0-
            %   55.8    0.0    0.0    1.9   34.6   19.2    0.0    0.0

USEFUL     100-
            75-
            50-
            25-
             0-
            %   13.5    0.0    0.0    0.0    1.9    7.7    3.8    0.0

SOME USE   100-
            75-
            50-
            25-
             0-
            %    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0

TOTAL      100-
            75-
            50-
            25-
             0-
            %   98.1    0.0    0.0    1.9   51.9   36.5    7.7    0.0

NO USE     100-
            75-
            50-
            25-
             0-
            %    1.9    0.0    0.0    1.9    0.0    0.0    0.0    0.0
```

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
2.00	2.62	2.80	0.29

NUMBER OF REQUIRING APPLICATIONS — 1

	TOTAL	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
NECESSARY %	19.2	0.0	0.0	0.0	7.7	7.7	3.8	0.0
DEFINITE ASSET %	40.4	0.0	0.0	3.8	25.0	11.5	0.0	0.0
USEFUL %	9.6	0.0	0.0	0.0	7.7	1.9	0.0	0.0
SOME USE %	17.3	0.0	0.0	0.0	5.8	5.8	5.8	0.0
TOTAL %	86.5	0.0	0.0	3.8	46.2	26.9	9.6	0.0
NO USE %	13.5	0.0	0.0	1.9	5.8	0.0	5.8	0.0

IV.72

VOICE INPUT

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
1.89	2.63	2.51	0.36

NUMBER OF REQUIRING APPLICATIONS - 2

		TOTAL	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
NECESSARY	%	12.5	0.0	0.0	0.0	4.8	5.8	1.9	0.0
DEFINITE ASSET	%	33.7	0.0	0.0	1.0	16.3	15.4	1.0	0.0
USEFUL	%	31.7	0.0	0.0	1.9	8.7	18.3	2.9	0.0
SOME USE	%	13.5	0.0	0.0	0.0	1.0	7.7	4.8	0.0
TOTAL	%	91.3	0.0	0.0	2.9	30.8	47.1	10.6	0.0
NO USE	%	8.7	0.0	0.0	0.0	1.9	3.8	1.9	1.0

APPLICATION SOFTWARE REQUIREMENTS

Assistance in the utilizing of general purpose data processing equipment and software systems was identified in 51 specific applications. Two classes of assistance were requested: systems and techniques to aid in the preparation of application programs and an outside vendor to offer the application program as a package.

Movement to tactical and strategic planning systems utilizing simulation and modeling techniques is a growing trend. To support these types of applications, an interactive terminal system utilizing complex search and interactive pattern matching was required by seven applications. The system would be used to build, evaluate, optimize, and operate models. For three applications, the problem of model development was addressed by designating the availability of the models from a vendor as a "Definite Asset." Another solution to the problem was to utilize the services of professional simulation and modeling experts. The demonstrated interest in planning systems coupled with the user's concern about his ability to accomplish the simulation and modeling work offers a marketing opportunity.

The Computer Assisted Instruction (CAI) applications also required both classes of requirements. The panel requested the availability of a library of courses for purchase and for an improved, easier to use course preparation language.

Specialized languages for specific application areas were requested. Query languages, either generalized or special purpose such as law research, were specified three times. A language for use with career path planning and another to facilitate automated design engineering were also needed. This represents a possible need for a wide variety of specialized commercial languages.

The problem of data capture involved in automating existing large files such as Patent Search was stated. The need for software systems capable of automatically capturing, analyzing, and cross-referencing data was rated as a "Necessity" for the three applications. A similar capability to provide automated abstracts for large libraries was rated as a "Definite Asset."

Many of the advanced applications involved scheduling, routing or allocation. Eight of these applications asked for better algorithms in this area.

The remaining application software requirements were for specific vendor-supplied application programs. The medical application programs had the additional requirement for programs to be prepared by or under the supervision of trained medical personnel to aid in overcoming physician reluctance to depend on non-professional solutions. Figure 4.4 below lists the applications and the degree of necessity assigned to them.

APPLICATION PROGRAMS

Application Programs for Commercial Data Processing Services	Necessary
Automated Court Scheduling	Definite Asset
Automated Manufacturing Engineering	Necessary
Automated Photo Composition	Necessary
Clinical Decision Support System	Necessary
Freight Car Tracing, Tracking and Allocation Program	Necessary
Freight Rate Application Program	Definite Asset
Medical Test Analysis	Definite Asset
Multi-Phasic Screening	Necessary
Preventive Medicine Diagnostic Center	Necessary

Figure 4.4

APPLICATION SOFTWARE REQUIREMENTS

ADVANCED PHOTO COMPOSITION

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
1.46	3.21	2.00	0.10

NUMBER OF REQUIRING APPLICATIONS — 1

		TOTAL	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
NECESSARY	%	79.6	0.0	0.0	4.1	67.3	6.1	2.0	0.0
DEFINITE ASSET	%	20.4	0.0	0.0	0.0	18.4	2.0	0.0	0.0
USEFUL	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SOME USE	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	%	100.0	0.0	0.0	4.1	85.7	8.2	2.0	0.0
NO USE	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

AUTOMATED ABSTRACTING

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
2.17	1.67	2.62	0.74

NUMBER OF REQUIRING APPLICATIONS — 1

	TOTAL	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
NECESSARY %	33.9	0.0	0.0	0.0	0.0	25.0	8.9	0.0
DEFINITE ASSET %	58.9	0.0	0.0	0.0	0.0	42.9	14.3	1.8
USEFUL %	7.1	0.0	0.0	0.0	0.0	5.4	1.8	0.0
SOME USE %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL %	100.0	0.0	0.0	0.0	0.0	73.2	25.0	1.8
NO USE %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
2.70	2.22	3.14	0.33

NUMBER OF REQUIRING APPLICATIONS — 1

	TOTAL	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
NECESSARY %	16.7	0.0	0.0	2.1	8.3	6.3	0.0	0.0
DEFINITE ASSET %	68.8	0.0	0.0	12.5	52.1	4.2	0.0	0.0
USEFUL %	8.3	0.0	0.0	2.1	6.3	0.0	0.0	0.0
SOME USE %	4.2	0.0	0.0	2.1	0.0	0.0	2.1	0.0
TOTAL %	97.9	0.0	0.0	18.8	66.7	10.4	2.1	0.0
NO USE %	2.1	0.0	0.0	0.0	2.1	0.0	0.0	0.0

AUTOMATED FILE CAPTURE

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
2.09	2.31	2.56	0.44

NUMBER OF REQUIRING APPLICATIONS — 3

	TOTAL	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
NECESSARY								
%	71.3	0.0	0.0	1.8	36.8	27.5	4.7	0.6
DEFINITE ASSET								
%	25.7	0.0	0.0	0.0	2.9	15.8	6.4	0.6
USEFUL								
%	0.6	0.0	0.0	0.0	0.0	0.0	0.6	0.0
SOME USE								
%	1.8	0.0	0.0	0.0	0.0	0.6	1.2	0.0
TOTAL								
%	99.4	0.0	0.0	1.8	39.8	43.9	12.9	1.2
NO USE								
%	0.6	0.0	0.0	0.0	0.6	0.0	0.0	0.0

AUTOMATED MANUFACTURING ENGINEERING PROGRAM

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
1.63	3.19	1.75	0.56

NUMBER OF REQUIRING APPLICATIONS — 1

	TOTAL	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
NECESSARY %	86.3	0.0	0.0	2.0	72.5	9.8	2.0	0.0
DEFINITE ASSET %	11.8	0.0	0.0	0.0	11.8	0.0	0.0	0.0
USEFUL %	2.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0
SOME USE %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL %	100.0	0.0	0.0	3.9	84.3	9.8	2.0	0.0
NO USE %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

IMPACT ON SOCIETY 1.46	PROFITABLE TO IMPLEMENTOR 3.21	USEFUL TO PUBLIC 2.00	WILL NOT BE IMPLEMENTED 0.10

NUMBER OF REQUIRING APPLICATIONS — 1

	TOTAL	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER

NECESSARY

| % | 23.4 | 0.0 | 0.0 | 0.0 | 23.4 | 0.0 | 0.0 | 0.0 |

DEFINITE ASSET

| % | 68.1 | 0.0 | 0.0 | 2.1 | 57.4 | 6.4 | 2.1 | 0.0 |

USEFUL

| % | 6.4 | 0.0 | 0.0 | 0.0 | 4.3 | 2.1 | 0.0 | 0.0 |

SOME USE

| % | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

TOTAL

| % | 97.9 | 0.0 | 0.0 | 2.1 | 85.1 | 8.5 | 2.1 | 0.0 |

NO USE

| % | 2.1 | 0.0 | 0.0 | 0.0 | 2.1 | 0.0 | 0.0 | 0.0 |

CAI COURSE PREPARATION LANGUAGE

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
3.36	2.87	3.56	0.20

NUMBER OF REQUIRING APPLICATIONS — 3

	TOTAL	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER

NECESSARY

%	48.5	0.0	0.0	4.8	28.5	11.5	3.6	0.0

DEFINITE ASSET

%	44.8	0.0	0.0	1.2	21.2	18.8	3.6	0.0

USEFUL

%	3.6	0.0	0.0	0.0	3.0	0.0	0.6	0.0

SOME USE

%	1.8	0.0	0.0	0.0	1.8	0.0	0.0	0.0

TOTAL

%	98.8	0.0	0.0	6.1	54.5	30.3	7.9	0.0

NO USE

%	1.2	0.0	0.6	0.0	0.6	0.0	0.0	0.0

CAI COURSES

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
2.96	2.46	3.17	0.28

NUMBER OF REQUIRING APPLICATIONS — 3

	TOTAL	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
NECESSARY %	17.7	0.0	0.0	1.3	9.5	5.7	1.3	0.0
DEFINITE ASSET %	61.4	0.0	0.0	1.3	38.6	16.5	3.8	1.3
USEFUL %	17.1	0.0	0.0	0.6	7.6	7.0	1.3	0.6
SOME USE %	2.5	0.0	0.0	0.0	1.9	0.0	0.6	0.0
TOTAL %	98.7	0.0	0.0	3.2	57.6	29.1	7.0	1.9
NO USE %	1.3	0.0	0.0	0.0	0.0	1.3	0.0	0.0

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
2.37	2.35	2.34	0.24

NUMBER OF REQUIRING APPLICATIONS — 1

	TOTAL	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
NECESSARY %	66.7	0.0	0.0	2.0	31.4	19.6	11.8	2.0
DEFINITE ASSET %	23.5	0.0	0.0	0.0	7.8	7.8	3.9	3.9
USEFUL %	7.8	0.0	0.0	2.0	2.0	2.0	0.0	2.0
SOME USE %	2.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0
TOTAL %	100.0	0.0	0.0	3.9	41.2	29.4	17.6	7.8
NO USE %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

COMMERCIAL DATA PROCESSING APPLICATION PROGRAMS

```
IMPACT   PROFITABLE  USEFUL      WILL
  ON         TO        TO       NOT BE
SOCIETY  IMPLEMENTOR  PUBLIC  IMPLEMENTED
 1.95       3.52      2.94       0.05
```

NUMBER OF REQUIRING APPLICATIONS - 1

	TOTAL	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
NECESSARY %	92.3	0.0	9.6	65.4	15.4	1.9	0.0	0.0
DEFINITE ASSET %	7.7	0.0	1.9	1.9	1.9	1.9	0.0	0.0
USEFUL %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SOME USE %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL %	100.0	0.0	11.5	67.3	17.3	3.8	0.0	0.0
NO USE %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

COMPLEX LAND USAGE MODEL

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
2.63	1.77	2.65	0.82

NUMBER OF REQUIRING APPLICATIONS — 1

	TOTAL	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
NECESSARY	68.8	0.0	0.0	0.0	0.0	41.7	18.8	8.3
DEFINITE ASSET	22.9	0.0	0.0	0.0	0.0	10.4	10.4	2.1
USEFUL	6.3	0.0	0.0	0.0	2.1	0.0	4.2	0.0
SOME USE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	97.9	0.0	0.0	0.0	2.1	52.1	33.3	10.4
NO USE	2.1	0.0	0.0	0.0	0.0	0.0	0.0	2.1

COMPLEX SCHEDULING AND ALLOCATION ALGORITHMS

IMPACT ON SOCIETY 2.32	PROFITABLE TO IMPLEMENTOR 2.81	USEFUL TO PUBLIC 2.72	WILL NOT BE IMPLEMENTED 0.59

NUMBER OF REQUIRING APPLICATIONS — 8

	TOTAL	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
NECESSARY %	46.0	0.0	0.0	1.0	26.4	16.3	2.0	0.3
DEFINITE ASSET %	46.2	0.0	0.0	2.3	23.6	17.8	2.0	0.5
USEFUL %	6.3	0.0	0.0	0.0	3.0	2.3	1.0	0.0
SOME USE %	1.5	0.0	0.0	0.0	0.0	1.0	0.5	0.0
TOTAL %	100.0	0.0	0.0	3.3	53.0	37.4	5.5	0.8
NO USE %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
1.63	3.49	1.85	0.29

NUMBER OF REQUIRING APPLICATIONS – 1

		TOTAL	1070-71	72-74	75-77	78-80	81-85	LATER	NEVER
NECESSARY	100- 75- 50- 25- 0-								
	%	73.5	0.0	0.0	4.1	57.1	10.2	2.0	0.0
DEFINITE ASSET	100- 75- 50- 25- 0-								
	%	22.4	0.0	0.0	4.1	18.4	0.0	0.0	0.0
USEFUL	100- 75- 50- 25- 0-								
	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SOME USE	100- 75- 50- 25- 0-								
	%	2.0	0.0	0.0	0.0	2.0	0.0	0.0	0.0
TOTAL	100- 75- 50- 25- 0-								
	%	98.0	0.0	0.0	8.2	77.6	10.2	2.0	0.0
NO USE	100- 75- 50- 25- 0-								
	%	2.0	0.0	0.0	0.0	2.0	0.0	0.0	0.0

IV.91

IMPACT ON SOCIETY 2.27	PROFITABLE TO IMPLEMENTOR 2.92	USEFUL TO PUBLIC 2.24	WILL NOT BE IMPLEMENTED 0.14

NUMBER OF REQUIRING APPLICATIONS – 1

		TOTAL	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
NECESSARY	%	74.0	0.0	0.0	8.0	52.0	14.0	0.0	0.0
DEFINITE ASSET	%	22.0	0.0	0.0	4.0	16.0	2.0	0.0	0.0
USEFUL	%	2.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0
SOME USE	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	%	98.0	0.0	0.0	14.0	68.0	16.0	0.0	0.0
NO USE	%	2.0	0.0	0.0	0.0	2.0	0.0	0.0	0.0

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
2.23	2.34	2.77	0.23

NUMBER OF REQUIRING APPLICATIONS - 1

	TOTAL	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
NECESSARY %	16.0	0.0	0.0	4.0	6.0	6.0	0.0	0.0
DEFINITE ASSET %	54.0	0.0	0.0	4.0	34.0	14.0	0.0	2.0
USEFUL %	26.0	0.0	0.0	2.0	22.0	2.0	0.0	0.0
SOME USE %	2.0	0.0	0.0	0.0	0.0	2.0	0.0	0.0
TOTAL %	98.0	0.0	0.0	10.0	62.0	24.0	0.0	2.0
NO USE %	2.0	0.0	0.0	0.0	2.0	0.0	0.0	0.0

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
2.95	1.50	2.18	1.26

NUMBER OF REQUIRING APPLICATIONS — 1

	TOTAL	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
NECESSARY %	85.1	0.0	0.0	0.0	0.0	4.3	61.7	19.1
DEFINITE ASSET %	10.6	0.0	0.0	0.0	0.0	2.1	8.5	0.0
USEFUL %	2.1	0.0	0.0	0.0	0.0	0.0	2.1	0.0
SOME USE %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL %	97.9	0.0	0.0	0.0	0.0	6.4	72.3	19.1
NO USE %	2.1	0.0	0.0	0.0	0.0	2.1	0.0	0.0

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
2.31	3.23	2.61	0.17

NUMBER OF REQUIRING APPLICATIONS — 3

	TOTAL	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
NECESSARY %	50.7	0.0	1.3	3.9	23.0	21.7	0.7	0.0
DEFINITE ASSET %	36.2	0.0	3.9	13.2	14.5	4.6	0.0	0.0
USEFUL %	10.5	0.0	2.6	5.3	0.7	1.3	0.7	0.0
SOME USE %	2.0	0.0	0.0	0.0	1.3	0.0	0.7	0.0
TOTAL %	99.3	0.0	7.9	22.4	39.5	27.6	2.0	0.0
NO USE %	0.7	0.0	0.0	0.0	0.0	0.0	0.7	0.0

INTERACTIVE MODELING AND SIMULATION SYSTEM

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
1.93	3.24	2.18	0.16

NUMBER OF REQUIRING APPLICATIONS — 7

	TOTAL	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
NECESSARY %	34.8	0.0	0.6	7.8	13.6	11.9	0.9	0.0
DEFINITE ASSET %	54.5	0.0	3.5	21.7	20.6	8.7	0.0	0.0
USEFUL %	7.2	0.0	0.9	1.7	4.1	0.0	0.3	0.3
SOME USE %	1.7	0.0	0.0	0.9	0.9	0.0	0.0	0.0
TOTAL %	98.3	0.0	4.9	32.2	39.1	20.6	1.2	0.3
NO USE %	1.7	0.0	0.3	0.6	0.3	0.3	0.3	0.0

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
2.50	3.12	3.62	0.10

NUMBER OF REQUIRING APPLICATIONS — 1

		TOTAL	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
NECESSARY	%	20.0	0.0	0.0	2.0	12.0	6.0	0.0	0.0
DEFINITE ASSET	%	68.0	0.0	0.0	4.0	50.0	14.0	0.0	0.0
USEFUL	%	8.0	0.0	0.0	0.0	6.0	2.0	0.0	0.0
SOME USE	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	%	96.0	0.0	0.0	6.0	68.0	22.0	0.0	0.0
NO USE	%	4.0	0.0	2.0	0.0	2.0	0.0	0.0	0.0

```
IMPACT    PROFITABLE   USEFUL      WILL
  ON          TO         TO       NOT BE
SOCIETY  IMPLEMENTOR  PUBLIC  IMPLEMENTED
 1.51        2.68       1.98      0.53
```

NUMBER OF REQUIRING APPLICATIONS – 1

		TOTAL	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
NECESSARY	%	18.6	0.0	0.0	0.0	7.0	9.3	0.0	2.3
DEFINITE ASSET	%	72.1	0.0	0.0	0.0	18.6	44.2	9.3	0.0
USEFUL	%	7.0	0.0	0.0	0.0	2.3	4.7	0.0	0.0
SOME USE	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	%	97.7	0.0	0.0	0.0	27.9	58.1	9.3	2.3
NO USE	%	2.3	0.0	0.0	0.0	0.0	0.0	0.0	2.3

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
2.95	1.50	2.18	1.26

NUMBER OF REQUIRING APPLICATIONS - 1

	TOTAL	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
NECESSARY								
%	68.1	0.0	0.0	0.0	0.0	2.1	55.3	10.6
DEFINITE ASSET								
%	23.4	0.0	0.0	0.0	0.0	4.3	12.8	6.4
USEFUL								
%	2.1	0.0	0.0	0.0	0.0	0.0	2.1	0.0
SOME USE								
%	2.1	0.0	0.0	0.0	0.0	0.0	2.1	0.0
TOTAL								
%	95.7	0.0	0.0	0.0	0.0	6.4	72.3	17.0
NO USE								
%	4.3	0.0	0.0	0.0	0.0	2.1	0.0	2.1

NATIONWIDE FREIGHT CAR TRACKING

	IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
	1.50	3.06	2.55	0.19

NUMBER OF REQUIRING APPLICATIONS — 1

		TOTAL	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
NECESSARY	%	97.9	0.0	0.0	8.3	64.6	20.8	4.2	0.0
DEFINITE ASSET	%	2.1	0.0	0.0	0.0	2.1	0.0	0.0	0.0
USEFUL	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SOME USE	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	%	100.0	0.0	0.0	8.3	66.7	20.8	4.2	0.0
NO USE	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
2.75	3.27	3.42	0.44

NUMBER OF REQUIRING APPLICATIONS — 1

	TOTAL	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
NECESSARY %	89.4	0.0	0.0	2.1	57.4	27.7	2.1	0.0
DEFINITE ASSET %	8.5	0.0	0.0	0.0	8.5	0.0	0.0	0.0
USEFUL %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SOME USE %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL %	97.9	0.0	0.0	2.1	66.0	27.7	2.1	0.0
NO USE %	2.1	0.0	0.0	0.0	2.1	0.0	0.0	0.0

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
2.86	2.52	3.32	0.45

NUMBER OF REQUIRING APPLICATIONS — 3

	TOTAL	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
NECESSARY %	63.9	0.0	0.0	1.3	23.2	35.5	3.9	0.0
DEFINITE ASSET %	27.1	0.0	0.0	0.0	12.3	12.9	1.9	0.0
USEFUL %	4.5	0.0	0.6	0.0	1.9	1.9	0.0	0.0
SOME USE %	2.6	0.0	0.0	0.0	0.6	0.6	0.6	0.6
TOTAL %	98.1	0.0	0.6	1.3	38.1	51.0	6.5	0.6
NO USE %	1.9	0.0	0.0	0.0	0.6	0.6	0.6	0.0

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
2.32	2.87	2.57	0.23

NUMBER OF REQUIRING APPLICATIONS — 3

	TOTAL	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
NECESSARY %	61.4	0.0	0.0	3.2	35.4	19.6	2.5	0.6
DEFINITE ASSET %	31.6	0.0	0.0	1.3	22.8	7.6	0.0	0.0
USEFUL %	3.8	0.0	0.0	0.0	3.2	0.6	0.0	0.0
SOME USE %	1.9	0.0	0.0	0.0	1.3	0.6	0.0	0.0
TOTAL %	98.7	0.0	0.0	4.4	62.7	28.5	2.5	0.6
NO USE %	1.3	0.0	0.0	0.0	0.6	0.0	0.6	0.0

DATA PROCESSING SERVICES

Two types of data processing services which are not generally available today were identified: Model Building Services and Information Data Banks.

Seven control and planning type of applications specifically asked for professional services in developing and programming of simulations and models. This need was rated as a "Definite Asset" starting in 1975. This specific need coupled with the previously mentioned trend to planning systems, indicates a potential marketing area.

The second service was that of providing access to data banks of information which is either too voluminous or too volatile for an organization to maintain itself. The service would maintain the data banks and defray their expenses by selling remote access to large numbers of users. Two specific examples were cited:

- A data bank containing economic, census, and other consumer and market data which would serve to describe the external business environment. Users would use the data as input into strategic planning systems.

- A data bank of aircraft performance expectations and potential malfunctions. The data bank would probably be maintained by aircraft mainframe and engine manufacturers. It would be used for preventive maintenance diagnostics of telemetered in-flight aircraft data.

Data Bank services become increasingly more economically attractive as computer networks and the associated communication capabilities become widespread in 1975.

DATA PROCESSING SERVICES

| Pages | Capabilities and Applications |

IMPACT ON SOCIETY 1.57	PROFITABLE TO IMPLEMENTOR 3.38	USEFUL TO PUBLIC 2.76	WILL NOT BE IMPLEMENTED 0.05

NUMBER OF REQUIRING APPLICATIONS — 1

		TOTAL	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
NECESSARY	%	71.2	0.0	0.0	17.3	51.9	1.9	0.0	0.0
DEFINITE ASSET	%	25.0	0.0	0.0	3.8	21.2	0.0	0.0	0.0
USEFUL	%	3.8	0.0	0.0	3.8	0.0	0.0	0.0	0.0
SOME USE	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	%	100.0	7.0	0.0	25.0	73.1	1.9	0.0	0.0
NO USE	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
2.17	3.17	1.94	0.23

NUMBER OF REQUIRING APPLICATIONS — 2

	TOTAL	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
NECESSARY %	58.4	0.0	0.0	8.9	40.6	8.9	0.0	0.0
DEFINITE ASSET %	37.6	0.0	1.0	5.9	18.8	11.9	0.0	0.0
USEFUL %	3.0	0.0	0.0	0.0	2.0	1.0	0.0	0.0
SOME USE %	1.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0
TOTAL %	100.0	0.0	1.0	14.9	62.4	21.8	0.0	0.0
NO USE %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

MODEL DEVELOPMENT

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
2.16	3.07	2.39	0.31

NUMBER OF REQUIRING APPLICATIONS — 7

	TOTAL	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
NECESSARY %	23.0	0.0	1.5	3.5	5.6	8.8	2.9	0.6
DEFINITE ASSET %	55.8	0.0	2.1	14.5	20.1	16.8	2.4	0.0
USEFUL %	15.6	0.0	0.9	2.9	5.6	3.8	1.5	0.9
SOME USE %	3.8	0.0	0.3	0.6	1.5	1.2	0.3	0.0
TOTAL %	98.2	0.0	4.7	21.5	32.7	30.7	7.1	1.5
NO USE %	1.8	0.0	0.3	0.6	0.6	0.3	0.0	0.0

SPECIAL PRODUCTS

There was a class of requests for specific products associated with specific applications which were highly specialized or distantly related to data processing. These are listed below without comment.

- Aircraft position altitude speed and course transponders

- Alphanumeric input from standard telephones

- Automobile computers for collision avoidance

- Baggage tag readers

- Commercial airborne computers

- Computerized baggage handling equipment

- Computerized baggage sorters

- Computerized chemical analytical equipment

- Improved sensor technology

- Improved telemetry

- Low cost computer systems for automotive diagnostic

- Low cost sensors for pollution monitoring

- Remote utility usage monitors

- Sensors with eye-like capabilities for general purpose robots

- Wide-angle collision sensing device

SPECIAL PRODUCTS

Pages   Capabilities and Applications

ADVANCED COMPUTER CONTROLLED CHEMICAL ANALYTIC EQUIPMENT

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
2.84	2.40	2.98	0.90

NUMBER OF REQUIRING APPLICATIONS — 1

		TOTAL	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
NECESSARY	100—								
	75—								
	50—								
	25—								
	0—								
	%	78.0	0.0	0.0	2.0	42.0	26.0	2SQQ	4.0
DEFINITE ASSET	100—								
	75—								
	50—								
	25—								
	0—								
	%	18.0	0.0	0.0	0.0	12.0	6.0	0.0	0.0
USEFUL	100—								
	75—								
	50—								
	25—								
	0—								
	%	4.0	0.0	0.0	0.0	2.0	0.0	2.0	0.0
SOME USE	100—								
	75—								
	50—								
	25—								
	0—								
	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	100—								
	75—								
	50—								
	25—								
	0—								
	%	100.0	0.0	0.0	2.0	56.0	32.0	6.0	4.0
NO USE	100—								
	75—								
	50—								
	25—								
	0—								
	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
2.38	2.90	2.91	0.31

NUMBER OF REQUIRING APPLICATIONS - 2

	TOTAL	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
NECESSARY %	47.1	0.0	0.0	12.5	28.8	5.8	0.0	0.0
DEFINITE ASSET %	33.7	0.0	0.0	21.2	10.6	1.0	1.0	0.0
USEFUL %	12.5	0.0	0.0	9.6	2.9	0.0	0.0	0.0
SOME USE %	1.9	0.0	0.0	1.0	1.0	0.0	0.0	0.0
TOTAL %	95.2	0.0	0.0	44.2	43.3	6.7	1.0	0.0
NO USE %	4.8	0.0	0.0	2.9	0.0	1.0	1.0	0.0

ALPHANUMERIC INPUT FROM STANDARD TELEPHONES

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
2.00	2.62	2.80	0.29

NUMBER OF REQUIRING APPLICATIONS — 1

		TOTAL	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
NECESSARY	%	32.1	0.0	0.0	1.8	16.1	7.1	7.1	0.0
DEFINITE ASSET	%	55.4	0.0	0.0	3.6	32.1	14.3	5.4	0.0
USEFUL	%	12.5	0.0	0.0	0.0	5.4	5.4	1.8	0.0
SOME USE	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	%	100.0	0.0	0.0	5.4	53.6	26.8	14.3	0.0
NO USE	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

AUTOMOBILE COMPUTER

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
3.28	1.74	2.56	1.44

NUMBER OF REQUIRING APPLICATIONS — 1

	TOTAL	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
NECESSARY %	71.7	1.9	0.0	0.0	0.0	15.1	49.1	5.7
DEFINITE ASSET %	15.1	0.0	0.0	0.0	0.0	3.8	11.3	0.0
USEFUL %	3.8	0.0	0.0	0.0	0.0	0.0	3.8	0.0
SOME USE %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL %	90.6	1.9	0.0	0.0	0.0	18.9	64.2	5.7
NO USE %	9.4	0.0	0.0	0.0	0.0	1.9	5.7	1.9

BAGGAGE TAG READERS

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
1.54	2.95	3.13	0.20

NUMBER OF REQUIRING APPLICATIONS — 1

	TOTAL	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
NECESSARY %	78.4	0.0	2.0	13.7	54.9	5.9	0.0	2.0
DEFINITE ASSET %	15.7	0.0	0.0	2.0	13.7	0.0	0.0	0.0
USEFUL %	3.9	0.0	0.0	0.0	2.0	2.0	0.0	0.0
SOME USE %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL %	98.0	0.0	2.0	15.A	70.6	7.8	0.0	2.0
NO USE %	2.0	0.0	0.0	0.0	2.0	0.0	0.0	0.0

COMPUTER CONTROLLED BAGGAGE SORTERS

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
1.54	2.95	3.13	0.20

NUMBER OF REQUIRING APPLICATIONS — 1

	TOTAL	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
NECESSARY %	58.0	0.0	2.0	8.0	46.0	2.0	0.0	0.0
DEFINITE ASSET %	32.0	0.0	0.0	8.0	22.0	2.0	0.0	0.0
USEFUL %	8.0	0.0	0.0	0.0	2.0	4.0	0.0	2.0
SOME USE %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL %	98.0	0.0	2.0	16.0	70.0	8.0	0.0	2.0
NO USE %	2.0	0.0	0.0	0.0	2.0	0.0	0.0	0.0

IMPROVED BAGGAGE HANDLING EQUIPMENT

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
1.54	2.95	3.13	0.20

NUMBER OF REQUIRING APPLICATIONS — 1

		TOTAL	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
NECESSARY	%	68.0	0.0	2.0	8.0	52.0	4.0	0.0	2.0
DEFINITE ASSET	%	28.0	0.0	0.0	6.0	20.0	2.0	0.0	0.0
USEFUL	%	2.0	0.0	0.0	0.0	0.0	2.0	0.0	0.0
SOME USE	%	2.0	0.0	0.0	0.0	2.0	0.0	0.0	0.0
TOTAL	%	100.0	0.0	2.0	14.0	74.0	8.0	0.0	2.0
NO USE	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
2.54	2.38	2.82	0.67

NUMBER OF REQUIRING APPLICATIONS — 9

	TOTAL	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
NECESSARY %	66.7	0.0	0.2	5.4	15.7	32.3	11.0	2.1
DEFINITE ASSET %	23.9	0.0	0.2	0.9	7.7	11.9	2.6	0.5
USEFUL %	6.8	0.0	0.2	0.0	1.6	4.2	0.7	0.0
SOME USE %	1.2	0.0	0.0	0.0	0.5	0.5	0.2	0.0
TOTAL %	98.6	0.0	0.7	6.3	25.5	48.9	14.5	2.6
NO USE %	1.4	0.0	0.0	0.0	0.5	0.5	0.0	0.5

IMPROVED TELEMETRY

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
2.25	2.14	2.16	1.05

NUMBER OF REQUIRING APPLICATIONS — 2

		TOTAL	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
NECESSARY	%	57.3	0.0	0.0	5.8	4.9	27.2	19.4	0.0
DEFINITE ASSET	%	36.9	0.0	0.0	25.2	9.7	1.0	1.0	0.0
USEFUL	%	3.9	0.0	0.0	2.9	1.0	0.0	0.0	0.0
SOME USE	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	%	98.1	0.0	0.0	34.0	15.5	28.2	20.4	0.0
NO USE	%	1.9	0.0	0.0	1.0	0.0	0.0	1.0	0.0

INEXPENSIVE AIRCRAFT POSITION AND IDENTIFICATION TRANSPONDERS

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
3.41	3.14	4.38	0.07

NUMBER OF REQUIRING APPLICATIONS — 1

	TOTAL	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
NECESSARY %	73.2	0.0	0.0	16.1	48.2	8.9	0.0	0.0
DEFINITE ASSET %	21.4	0.0	0.0	5.4	16.1	0.0	0.0	0.0
USEFUL %	5.4	0.0	0.0	3.6	0.0	0.0	1.8	0.0
SOME USE %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL %	100.0	0.0	0.0	25.0	64.3	8.9	1.8	0.0
NO USE %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

LOW COST COMPUTER SYSTEMS LESS THAN $500/MONTH

IMPACT ON SOCIETY 2.10	PROFITABLE TO IMPLEMENTOR 3.13	USEFUL TO PUBLIC 3.46	WILL NOT BE IMPLEMENTED 0.26

NUMBER OF REQUIRING APPLICATIONS - 1

	TOTAL	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
NECESSARY %	48.1	0.0	0.0	35.2	13.0	0.0	0.0	0.0
DEFINITE ASSET %	37.0	0.0	0.0	25.9	11.1	0.0	0.0	0.0
USEFUL %	3.7	0.0	0.0	1.9	0.0	1.9	0.0	0.0
SOME USE %	5.6	0.0	0.0	3.7	0.0	0.0	1.9	0.0
TOTAL %	94.4	0.0	0.0	66.7	24.1	1.9	1.9	0.0
NO USE %	5.6	0.0	0.0	1.9	3.7	0.0	0.0	0.0

LOW COST SENSORS

IMPACT ON SOCIETY 3.46	PROFITABLE TO IMPLEMENTOR 2.36	USEFUL TO PUBLIC 3.75	WILL NOT BE IMPLEMENTED 0.15

NUMBER OF REQUIRING APPLICATIONS — 1

	TOTAL	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
NECESSARY	93.6	0.0	2.1	42.6	44.7	2.1	2.1	0.0
DEFINITE ASSET	4.3	0.0	2.1	2.1	0.0	0.0	0.0	0.0
USEFUL	2.1	0.0	0.0	0.0	0.0	2.1	0.0	0.0
SOME USE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	100.0	0.0	4.3	44.7	44.7	4.3	2.1	0.0
NO USE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

```
IMK3T    PROFITABLE   USEFUL      WILL
  ON          TO        TO       NOT BE
SOCIETY  IMPLEMENTOR  PUBLIC  IMPLEMENTED
 2.72       1.86       1.37       1.70
```

NUMBER OF REQUIRING APPLICATIONS - 1

	TOTAL	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
NECESSARY %	28.0	0.0	0.0	0.0	2.0	14.0	12.0	0.0
DEFINITE ASSET %	56.0	0.0	0.0	0.0	2.0	40.0	14.0	0.0
USEFUL %	6.0	0.0	0.0	0.0	2.0	2.0	2.0	0.0
SOME USE %	2.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0
TOTAL %	92.0	0.0	0.0	0.0	6.0	56.0	30.0	0.0
NO USE %	8.0	0.0	0.0	2.0	0.0	6.0	0.0	0.0

UTILITY REMOTE USAGE RECORDING DEVICE

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
1.68	3.00	2.66	0.36

NUMBER OF REQUIRING APPLICATIONS - 1

		TOTAL	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
NECESSARY	%	78.7	0.0	2.1	2.1	55.3	14.9	2.1	2.1
DEFINITE ASSET	%	17.0	0.0	0.0	0.0	17.0	0.0	0.0	0.0
USEFUL	%	2.1	0.0	0.0	0.0	2.1	0.0	0.0	0.0
SOME USE	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	%	97.9	0.0	2.1	2.1	74.5	14.9	2.1	2.1
NO USE	%	2.1	0.0	0.0	0.0	0.0	2.1	0.0	0.0

WIDE-ANGLE SENSING DEVICE FOR AUTOMOBILE COLLISION AVOIDANCE

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
3.15	1.98	2.58	1.56

NUMBER OF REQUIRING APPLICATIONS — 1

	TOTAL	1970-71	72-74	75-77	78-80	81-85	LATER	NEVER
NECESSARY %	82.4	0.0	0.0	0.0	2.0	35.3	39.2	5.9
DEFINITE ASSET %	15.7	0.0	0.0	0.0	0.0	7.8	7.8	0.0
USEFUL %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SOME USE %	2.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0
TOTAL %	100.0	0.0	0.0	0.0	2.0	43.1	49.0	5.9
NO USE %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

V. OUTLINE OF THE STUDY

Four questionnaires were used in this study to pursue the line
of inquiry outlined in Figure 5.1. Examples of the questionnaires
are given in Figures 5.2-5.5. The first questionnaire (Figure 5.2)
presented a list of 57 new applications of data processing and asked
that the respondents judge their value in terms of "Impact on Society,"
"Profitability to the Implementor," "Usefulness to the Public,"
"Other Reasons" and "Will Not be Implemented." "Impact on Society"
was defined as "the effect of the life styles of people, their
relationships with each other, their perceptions of themselves, or
the structure of their institutions." The respondents were also
asked to provide additional significant applications which would
occur before 1985 and which were not simple extensions of existing
applications. The responses to this questionnaire were collated
and 77 new applications were added. Ten of the original applications
were dropped because the panel judged them to be of low value.

Questionnaire two (Figure 5.3) presented the composite list of
applications and asked the respondents to provide estimates of
the dates by which they judged the applications would have a 10
percent, 50 percent, and 90 percent probability of implementation.
The degree of implementation to be judged was indicated in the
description of each application, for example "in 20 percent of the
metropolitan areas." It was desired that the estimates be technologi-
cally independent, but also recognized that the price/performance
implications of technological development might be the overriding
consideration in determining an implementation date. For this
reason an arbitrary set of price/performance curves were included.
If price/performance was the governing concern, it was suggested that
the respondent pick his date by relating to the desired price/
performance on the curves. In this way if better price/performance
projections become available later, the estimated dates can be
adjusted accordingly. Figure 5.6 shows the curves used.

Respondents were also asked to evaluate their own degree of expertise
by selecting from among the following options:

- Expert working in the area
- Generally familiar with aspects
- Casually acquainted
- Unacquainted

A second part of this questionnaire asked the respondents to
identify for each application critical data processing capabilities
required to make the application viable. The third part repeated
questionnaire one questions for the added applications. The collated
responses resulted in dropping 11 of the added applications because
they were judged to have low values or were more properly included
as requirements. Included were 368 capabilities; but because many
capabilities were suggested for multiple applications, the net was
75 unique capabilities.

The third questionnaire (Figure 5.4) listed the composite list of applications and their associated capabilities. Also, for each application a representation of the consensus to date of the implementation date and the respondent's previous 50 percent probability estimates were included. The respondents were asked to re-estimate their 50 percent dates in view of the consensus and to provide reasons for their responses if they were still outside the consensus or held strong feelings supporting the consensus. In addition, they were asked to list for each application factors outside of the data processing area whose occurrence or non-occurrence would cause their estimates to be either accelerated or retarded.

For the capabilities, respondents were asked to evaluate the importance of the capability and for those capabilities which were quantified to indicate the true magnitude of the quantity relative to the given value. The latter was done by providing columns with multiples of ten which could be used to indicate how many times ten the values should be larger or smaller. For each response the respondent was asked to indicate the thinking that had lead to his answer.

The final questionnaire (Figure 5.5) included the applications and capabilities as before with consensuses to date, reasons and their previous responses. Respondents were asked to re-estimate their responses in light of the consensus and reasons. From the third questionnaire 93 accelerating and retarding factors were identified of which 71 were unique. These factors were listed in the fourth questionnaire and the panel was asked to determine how casually related each was to the associated application and to estimate when the factor would occur.

ACTION	QUESTIONNAIRE 1	QUESTIONNAIRE 2	QUESTIONNAIRE 3	QUESTIONNAIRE 4
Data Provided	.Suggested new applications	.Added applications	.Composite list of applications .Consensuses of date of implementation	.Composite list of applications .Consensuses of date of implementation .Reasons
Inquiry	.Estimate value	.Estimate value	.Re-estimate date .Give reasons .Identify accelerating and retarding factors	.Re-estimate date of implementation
Data Provided		.Composite list of applications	.Composite list of applications with capabilities	.Composite list of applications .Accelerating and retarding factors
Inquiry	.What new applications would you add?	.When might these be implemented? .What is your level of expertise?	.Evaluate the importance of the capabilities .What is the true relative magnitude of any quantities?	.Determine the degree of casual relationship .When will the factor occur?
Data Provided		.Composite list of applications		.Composite list of applications with capabilities .Consensuses .Reasons
Inquiry		.What data processing capabilities are required?		.Re-evaluate importance of the capabilities .What is the true relative magnitude of any quantities?

V.3

Figure 5.1

Figure 5.2

V.4

Respondent No._____ GUIDE/IBM STUDY OF ADVANCED APPLICATIONS QUESTIONNAIRE 1 PART 1 Impact Of The Applications On Society And The Reasons For Implementation A. Suggested future data processing applications are listed below. Evaluate their impact on society and the reasons for implementation. Indicate your judgment by checking the appropriate column.	B. IMPACT ON SOCIETY				C. REASONS FOR IMPLEMENTATION							D.
					PROFITABLE TO IMPLEMENTOR			USEFUL TO PUBLIC			OTHER (WRITE IN BELOW)	WILL NOT BE IMPLEMENTED
	MAJOR	SIGNIFICANT	LITTLE	NO	VERY	MODERATELY	MARGINALLY	VERY	MODERATELY	MARGINALLY		
40. Checkless Society -- The establishment of point of transaction debiting in 20 percent of the metropolitan areas. This application is an extension of the Financial Utility to include terminals at the point of sale so that at the time of sale, transactions can be recorded and authorized or rejected. Other services such as automatic budget control are possible by allowing the system to reject expenditures for items that would overrun the previously established budget.												
41. Home Banking -- The utilization of the home terminal in 1 percent of the homes to accomplish banking transactions. Credit transfer authorizations, changes in preauthorizations, changes in savings and investment plans, the establishment of credit lines, changes in automatic budget control, etc., could be made from the home terminal after suitable identification of the individual and/or terminal.												
42. Automated Banking Teller -- The installation in 20 percent of the banks of an unattended station to accomplish the transactions now processed by a bank teller including the receipt and delivery of cash.												

Figure 5.3

V.5

Respondent No._____ GUIDE/IBM DELPHI STUDY OF ADVANCED APPLICATIONS QUESTIONNAIRE 2 PART 1 Chronology And Expertise	B. Using the following symbols, indicate when you think the application will occur. A=Earliest Possible (10% prob.) B=Most likely (50% prob.) C=Almost Certainly Before (90% prob.)							C. How familiar are you with the area?			
A. Applications	Before 1972	1972 -74	1975 -77	1978 -80	1981 -85	After 1985	Never	Expert Working in the Area	Generally Familiar with Aspects	Casually Acquainted	Unacquainted
39. Financial Utility -- The establishment of an integrated financial service in 20 percent of the metropolitan areas. The utility (a regulated monopoly?) would primarily provide electronic transfer of funds between demand accounts in subscriber banks making possible such services as automatic deposit of salaries, automatic preauthorized debits and automatic activation of credit lines from various banks or financial institutions. Centralized credit checks could be made taking into account balance on hand, salaries, outstanding loans, and established credit lines.											
40. Checkless Society -- The establishment of point of transaction debiting in 20 percent of the metropolitan areas. This application is an extension of the Financial Utility to include terminals at the point of sale so that at the time of sale, transactions can be recorded and authorized or rejected. Other services such as automatic budget control are possible by allowing the system to reject expenditures for items that would overrun the previously established budget.											

APPLICATION DESCRIPTION

40. <u>Checkless Society</u> -- The establishment of point of transaction debiting in 20 percent of the metropolitan areas. This application is an extension of the Financial Utility to include terminals at the point of sale so that at the time of sale, transactions can be recorded and authorized or rejected. Other services such as automatic budget control are possible by allowing the system to reject expenditures for items that would overrun the previously established budget.

PART 1. MOST LIKELY DATE OF IMPLEMENTATION

Shown at the right is the group consensus obtained to date with your previous most likely (50% Prob.) date circled. In light of this consensus indicate your re-estimate of the most likely date by checking under the appropriate dates.

1970-71	72-74	75-77	78-80	81-85	*LATER*	*NEVER*
			L	MU		

If your new estimate is outside the consensus or if you have strong reasons supporting your position, list on the right the reasons why the group should accept your viewpoints.

Check the box to the right if a change in the arbitrary price performance curves would cause your estimate to change. There may be other technological, business, political, or social factors whose occurrence or non-occurrence would cause your estimate to change. List those factors to the right.

A change in the price performance curves. ☐
List other factors:

PART 2. DATA PROCESSING CAPABILITIES REQUIRED FOR IMPLEMENTATION

Estimate the importance of each capability by checking a column in group 1. For capabilities which are quantified below, check a column in group 2 to indicate your judgment of the true magnitude relative to stated quantity.

If you have strong reasons supporting your estimates of importance, (group 1) and/or magnitude (group 2), list the reasons why the group should accept your viewpoints.

Capability	Necessary	Definite Asset	Useful	Some Use	Not Required	>10 times less	10 times less	O.K.	10 times more	100 times more	1000 times more	>1000 times more	Reasons
	Group 1					Group 2							
Positive user identification at the terminal (e.g. fingerprint, credit card, retina-print, voice-print, etc.													
Mass storage of <u>100 billion bytes</u>.													
Low cost terminal for point of sale entry and inquiries $200-$300 purchase.													
Network control.													
Massive communication interface 100,000 lines.													
Advanced data base management with particular emphasis on security.													
High reliability and availability. No discernible downtime at the terminals of longer than <u>1 minute</u>.													

Figure 5.4   V.6

QUESTIONNAIRE 4

APPLICATION DESCRIPTION

40. **Checkless Society** -- The establishment of point of transaction debiting in 20 percent of the metropolitan areas. This application is an extension of the Financial Utility to include terminals at the point of sale so that at the time of sale, transactions can be recorded and authorized or rejected. Other services such as automatic budget control are possible by allowing the system to reject expenditures for items that would overrun the previously established budget.

PART 1. DATA PROCESSING CAPABILITIES REQUIRED FOR IMPLEMENTATION

In view of the consensus at the right and the reasons below re-estimate the importance and relative magnitude of the capabilities. Indicate your responses by checking the appropriate **columns**.

REQUIRED CAPABILITIES	REASONS	Necessary	Detrimental/Asset	Useful	Some Use	⊄	<10 X less	< X less	10 X more	100 X more	1000 X more
Positive user identification at the terminal (e.g. fingerprint, credit card, retina-print, voice-print, etc.		L M U									
Mass storage of 100 billion bytes.		L M U								L M U	
Low cost terminal for point of sale entry and inquiries $200-$300 purchase.	10 times more -- Purchase prices of $600-1,000 can probably be justified by 1980.	L M	U							L M U	
Network control.		L M U									
Massive communication interface 100,000 lines.		L M	U							L M U	
Advanced data base management with particular emphasis on security.		L M U									
High reliability and availability. No discernible downtime at the terminals of longer than 1 minute.	10 times less -- Up to 5 minutes downtime may be permissible if no more than once a month.	L	M U							L U M	

PART 2. IMPLEMENTATION DATE

In view of the consensus below and the reasons at the right, re-estimate the date of occurrence. (Use "A" = 10% Prob. "B" = 50% Prob. and "C" = 90% Prob.)

	Your Rsp.	Con.	Re-est.
1970-71			
1972-74			
1975-77			
1978-80		L	
1981-85		MU	
LATER			
NEVER			

REASONS

Early
- Banks will move into this area in search of new areas for profit.
- An independent agency may not be required.

Later
- Inability of banks to agree on a common system.
- Public re-education.
- Judicial precedents to allow bank listings as proof of payment.

Never
- Lack of public acceptance due to loss of float and reluctance to change.

Indicate the effect of the occurrence of each accelerating or retarding factor on the application implementation date by checking one of the change columns at the right. Estimate when the factor will occur by checking one of the date columns.

	Absolute Change	Possible Change	No Change	1970-71	1972-74	1975-77	1978-80	1981-85	LATER	NEVER

No accelerating or retarding factors were submitted. If you desire, you may include below any that now occur to you.

Figure 5.5   V.7

Figure **5.6**

VI. DATA ANALYSIS

The Respondent Panel Distribution

An effort was made to insure that all areas of data processing
applications were represented in the panel. Figure 6.1 lists the
area groupings that emerged and two measures of the distribution
of experts among those who responded to the last questionnaire.
The first column enumerates those who would appear to be experts
based on their company or organization affiliation and/or job
title. The second column shows the counts of experts based on
the respondent's self-evaluation. As was to be expected, there
are more experts identified in the second column than in the
first. This is because many of the respondents felt confident in
areas which they were not immediately associated.

RESPONDENT ANALYSIS

	OCCUPATION	SELF-ANALYSIS
AGRICULTURE	0	14
AIRLINES	2	24
BUSINESS ASSISTANCE	0	29
COMPUTER ASSISTED RESEARCH	2	17
DISTRIBUTION AND RETAIL	3	31
ECOLOGY	1	12
EDUCATION	2	20
FINANCIAL AND INSURANCE	6	21
FREIGHT TRANSPORTATION	2	21
GOVERNMENT SERVICES	4	11
HOME TERMINALS	0	31
INFORMATION SYSTEMS	3	16
INFORMATION UTILITIES	5	26
JUDICIAL AND LEGISLATIVE	1	18
MANUFACTURING AND PROCESS	18	19
MEDIA	4	24
MEDICAL	8	15
OFFICE ASSISTANCE	0	37
PUBLIC AND PRIVATE TRANSIT	0	14
UTILITIES	4	26

Figure 6.1

Consensus Analysis

One of the principles of the Delphi Technique is that the process should cause a convergence of the consensuses. Figure 6.2 represents the results of iterating the questions on the implementation date and the necessity and magnitude of the capabilities.

CONSENSUSES

	Implementation Date	Capabilities
Converged	85	230
Initially One Period Wide	0	103
No Change	23	218
Diverged	0	4
Median Shift	7	10
Three-period Consensus	1	6

Figure 6.2

In both cases the majority either converged or started at one period width and, therefore, couldn't converge. Only a very few actually diverged or remained as wide as three periods.

Experience with Delphi Studies in the past has indicated that in general the width of date projection consensuses is approximately equal to the median date of the projection, i.e., a projection with a median of 1980 can be expected to have a width of ten years. Figure 6.3 graphs the median implementation date of the consensuses against their width (the numbers represent the number of consensuses falling at a point.) If the results followed the expectation, they would fall approximately on the diagonal line. In fact, they, with the exception of one, either fall close to the line or in the lower right hand side. This indicates that most consensuses were as good or better than could be expected.

IMPLEMENTATION DATE

CONSENSUS WIDTH

Figure 6.3

Respondents were asked to evaluate their own degree of expertise.
In the detailed printouts of Section 3, the consensuses of the
experts are compared to the group as a whole. The results of that
comparison are shown in Figure 6.4.

Expert Consensus vs. Group Consensus

Expert Consensus Was:	Same Median Response	Different Median Response
Narrower	76	6
The Same Width	389	70
Same but Offset	8	2
Wider	82	19

Figure 6.4

In addition, no expert median was more than one period away
from the group median. From this we conclude that there
is little difference between expert and group opinions.
Therefore, group opinions are used in all of the results.

IBM versus Customer Consensus

During the study IBM and Customer responses were processed without
distinction between the two. The analysis consensuses were re-
calculated separately for the two groups. Comparison of the two
showed almost identical results for date and capability value
consensuses.

Comparison With Other Studies and Published Articles

It is possible to evaluate the results of the study by comparing
them to those obtained in other similar but independent studies.
The author knows of two other efforts which closely parallel this
study: In 1968, Parsons & Williams Incorporated conducted a
study using participants in FILE 68, an international seminar on
file organization held in Denmark; and The Institute fFor the Future
(IFF) of Middletown, Connecticut is conducting a study of future
risks associated with computer based systems for Skandia Insurance
Company. Ltd., of Stockholm, Sweden.

Both studies use the Delphi Technique; however, the Parsons &
Williams study had only two iterations, and the IFF study results
are only available through the third iteration as of this date.

VI.4

PARALLEL STUDIES OF FUTURE APPLICATIONS

STUDY* 1970. . . . 75. . . . 80. . . . 85. . . . LATER NEVER

r Pollution   G/I
Prediction   IFF
                     P&W

Automated Design   G/I
   Engineering   IFF
                     P&W

Automated Landings   G/I
   and Takeoffs   IFF
                     P&W

Automated Mass   G/I
   Transit System   IFF
                     P&W

Automated Roadways   G/I
                     IFF
                     P&W

Automated Stock   G/I
   Transfer   IFF
                     P&W

Automated Traffic   G/I
   Control   IFF
                     P&W

Automated Vehicle   G/I
   Diagnostic   IFF
     Centers   P&W

Automobile Colli-   G/I
   sion Avoidance   IFF
     Systems   P&W

Checkless Society   G/I
                     IFF
                     P&W

Clinical Decision   G/I
   Support System   IFF
                     P&W

* G/I   GUIDE/IBM-Study of Advanced Applications.

  IFF   Institute for the Future Study – A Delphi inquiry into the
         future risks of computer-based systems.

  P&W   Parsons & Williams-Forecast 1968-2000 of computer develop-
         ments and applications.

Figure 6.5

VI.5

STUDY* 1970. . . . .75. . . . .80. . . . .85. . . . . LATER NEVER

Item	Study
Computer Assisted Instruction - Educational Inst.	G/I
	IFF
	P&W
Computer Coordinated Testing of Medical Drugs	G/I
	IFF
	P&W
Computerized Medical Test Analysis	G/I
	IFF
	P&W
Home Computer Assisted Instruction	G/I
	IFF
	P&W
Inflight Monitoring and Diagnostics of Aircraft	G/I
	IFF
	P&W
Nationwide Air Traffic Control	G/I
	IFF
	P&W
Out Patient Monitoring	G/I
	IFF
	P&W
Personal Data Bank	G/I
	IFF
	P&W
Supermarket Check-out Systems	G/I
	IFF
	P&W
Universal Reservation Systems	G/I
	IFF
	P&W

* G/I   GUIDE/IBM-Study of Advanced Applications.

IFF   Institute for the Future Study - A Delphi inquiry into the
       future risks of computer-based systems.

P&W   Parsons & Williams-Forecast 1968-2000 of computer develop-
       ments and applications.

Figure 6.5 (con't)

Consequently, the width of consensus in both results is relatively wide. Nevertheless, the results of the three studies are compared in Figure 6.5 for those applications which are common. The results show considerable agreement, particularly, in view of different descriptions of the applications which could lead to differing interpretations as to when an application would be implemented. Therefore, we conclude that the panel selection and study organization is valid since it produced results comparable to other independent studies with similar objections.

Another way to validate results is to compare them to published articles relating to the applications. Two types of articles are applicable: those reporting pilot applications efforts underway and those containing predictions of future applications. Below is a partial list of articles considered by the investigators:

Subsistence and Reference	Study Result
. Home Printout of Newspapers by 1979 Saturday Review, October 10, 1970	1981-85
. Computer Assisted Publishing - 1980 Saturday Review, October 10, 1970	1978-80
. Computerized Job Banks in 42 Cities - Now U. S. News & World Report, July 27, 1970	1975-77
. Automatic Ticket Vendor Pilot Tested EDP Weekly, October 12, 1970	1975-77
. Supermarket Checkout Pilot System Wall Street Journal, August 7, 1970	1978-80
. Study Contract for Legislative Information System Forbes, October 1, 1970	1978-80
. Assembly Line Robots for GM's Vega Business Week, August 8, 1970	1981-85
. Two Airlines Announce Baggage Handling Systems New York Times, November 8, 1970	1978-80

On the basis of this limited sample it appears that the estimates of future dates generally match other predictions, whereas, successful pilot efforts of many of the applications make the above dates appear conservative.

APPENDIX A   Applications Deleted from the Original List

The following applications were dropped from the study because
the panel judged them to be of relatively low value. Their
elimination from the study does not mean they may not occur
and in fact some of the applications have been incorporated
in the scenarios. They are listed alphabetically within area
groupings and the value printout is shown.

AIRLINES

Automated Ground Control of Airplanes

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
1.86	2.15	2.09	⁻0.89

The utilization of automated dockings, undocking,
and taxiing of commercial aircraft at the ten
largest metropolitan airports.

EDUCATION

Automated Student ID/Credit System

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
1.31	2.25	1.86	⁻0.33

The implementation in 1 percent of the nation's
colleges of a system to capture billing, attendance,
and security data at the point of transaction
(cafeteria, library, bookstore, athletic events,
etc.) and maintain updated files in appropriate
portions of students' records.

Classroom Response System

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
1.75	1.77	2.20	⁻0.52

The installation of small desk terminals in 1 percent
of the secondary and college lecture halls. The
system would provide instantaneous monitoring of
class comprehension by summarizing and displaying
the responses to questions at the teacher's console.

Universal University Enrollment and Scheduling System

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
1.73	2.17	2.28	‾0.28

A system in 20 percent of the metropolitan areas for the processing of college enrollment and scheduling. The system will interrogate college openings and requirements, accept students' applications, select courses, and issue class schedules.

FINANCIAL

Automated Banking Teller

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
1.30	2.36	1.79	‾0.74

The installation in 20 percent of the banks of an unattended station to accomplish the transactions now processed by a bank teller including the receipt and delivery of cash.

Automated Currency Arbitrage System

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
1.28	2.37	1.56	‾0.53

The establishment of a system that would provide real-time, worldwide, money market rates and provide links to financial institutions from multiple nations so that money "buy" and "sell" orders could be processed expeditiously.

GOVERNMENT SERVICES

Centralized Selective Service Administration

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
1.93	1.47	1.73	‾0.86

The creation of a computer-assisted centralized selective service system to replace the function of local boards and insure equitable administration of the draft.

Precomputed Income Tax System

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
1.85	2.21	2.67	⁻0.39

The Internal Revenue Service will mail a completed
tax return to the taxpayer based on income reports
and standard deductions. The taxpayer would have
the option of signing and returning it or of re-
computing his own taxes.

State Information Systems

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
2.55	1.88	2.21	⁻0.70

The consolidation by ten states of the various
information systems that support state governments
into an integrated information system. Common data
between various support systems would be logically
shared, but not necessarily centralized, and the
system would interface to local information systems
to provide and receive information.

HOME TERMINAL

Automated Meal Preparation

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
1.26	0.80	0.74	⁻2.11

The availability of automated meal preparation in 1
percent of the homes. Specially packaged food pro-
ducts would be automatically prepared in accordance
with a stored menu. The system would maintain its
own inventory and either order automatically via
the Home Shopping Service or provide a shopping list.

Automated Plebiscite and Polls

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
2.21	1.39	1.73	⁻1.45

The utilization of home terminals in 75 percent of the
homes to conduct public opinion polls, surveys,
plebiscites, and elections.

Classified Advertising System

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
1.48	2.06	2.16	⁻0.48

The availability via the home terminal in 1 percent of the homes of a data bank containing classified advertising. Both input and selective retrieval would be featured.

Computerized Participatory Games

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
1.17	1.35	1.02	⁻1.37

The availability via the home terminal in 1 percent of the homes of such participatory games as bridge, chess, etc. The system would connect those desiring to play, conduct the game and, if desired, participate as a player.

Do-It-Yourself Diagnostic Services

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
1.39	1.42	1.80	⁻1.27

The availability via the home terminal of 1 percent of the households of a service to interactively diagnose appliances malfunction or other household problems, provide instructions for repair, provide lists of parts, recommend local sources of parts, and/or recommend local repair services.

Home Banking

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
1.89	1.31	1.37	⁻1.74

The utilization of the home terminal in 1 percent of the homes to accomplish banking transactions. Credit transfer authorizations, changes in pre-authorizations, changes in savings and investment plans, the establishment of credit lines, changes in automatic budget control, etc., could be made from the home terminal after suitable identification of the individual and/or terminal.

Home Electronic Mail Service

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
1.95	1.59	1.74	⁻1.65

The availability of electronic mail service via the home terminal to 5 percent of the homes.

Home Terminal Financial and Computational Services

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
1.62	2.08	2.17	⁻0.67

Availability via the home terminal in 1 percent of the homes of services to assist in such financial areas as budgeting, tax accounting, insurance and investment planning, as well as general computational requirements.

Home Work Centers

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
2.20	2.13	2.38	⁻0.84

Use by 0.1 percent of the non-production work force of home terminals as at least part-time home work centers. The system would provide all or most of the resources the employee needs to accomplish his job such as: secretarial service, internal mail service, filing, information retrieval and inquiry, computer access, etc. Face-to-face meetings and other needs to be at a physical location would be scheduled as business trips are now.

Menu Preparation Service

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
1.22	1.10	1.16	⁻1.44

The availability via a terminal to 1 percent of the homes of menu preparation service. The housewife controls the menu preparation by listing groundrules as to price, favorite and/or undesired food items, and special occasions. The menu provided can be adjusted by substitutions and additions. The system also provides recipes and shopping lists.

INFORMATION UTILITIES

Automated Patent Search

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
1.46	2.20	1.59	‾1.15

The availability of a system capable of accepting a patent application, analyzing it and searching the complete files of the U. S. Patent Office automatically. The search would be from terminals located in law firms, corporate law departments, etc.

National Directory

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
1.45	1.58	2.13	‾0.80

Existence of a computerized national directory for locating addresses and telephone numbers of individuals given their names. Inquiry is by mail or home terminal.

Professional Buyer Service

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
1.57	2.23	2.14	‾0.69

The utilization by 1 percent of the consumers of the services of a professional buyer who would utilize his data banks of product prices, availability, vendors, vendor performance, etc., to make the most advantageous purchases for the consumer much as an industrial buyer functions today.

MANUFACTURING & PROCESS

Automated Service Stations

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
1.42	2.20	1.90	‾1.07

The conversion of 20 percent of the service stations to dispense automatically gasoline and oil for automobiles. The station is activated via credit card with credit checks and control of the station directed from a central computer.

OFFICE ASSISTANCE

Electronic Filing Systems

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
1.45	2.65	1.94	-0.29

The use of 0.1 percent of clerical personnel of systems
that file documents in electronic and/or image form.
Indexing could be automatic or as directed by the clerk.
Retrieval and printout is computer controlled.

Personal Information Services

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
1.19	1.98	1.43	-0.67

The availability to 1 percent of the executives of a
personalized information system. The system would
assist the executive by providing an auxiliary memory
for names and descriptions of people and organizations
he deals with, **personal appointment calendar, correspon-
dence files,** current activity file, etc., by providing
computational and analysis services and by providing
skills and procedure support.

CAPABILITIES

The following application was dropped because it was belatedly
judged to be more properly included as a required capability.

Discovery Systems

IMPACT ON SOCIETY	PROFITABLE TO IMPLEMENTOR	USEFUL TO PUBLIC	WILL NOT BE IMPLEMENTED
2.57	1.94	2.32	-1.21

The existence of a computer system that will, with
human interaction, be capable of discovering underlying
properties and principles that govern the behavior of
complex systems and natural phenomenon.

The list below identifies those respondents who have allowed
us to use their names.

Mr. S. O. Albert   - IBM Corporation - DPD

Mr. Donald H. Bein   - A. O. Smith Corporation

Mr. R. D. Bernhard   - Continental Can Company, Inc.

Mr. Roger W. Borneman   - Atlantic Richfield Company

Dr. Ronald Brady   - Syracuse University

Mr. Allen J. Burris   - The Northern Trust Co.

Mr. J. E. Chapman   - IBM Corporation - DPD

Mr. C. L. Charles   - IBM Corporation - DPD

Mr. Albert F. Collard   - Eastern Air Lines, Inc. Information
                              Systems Dept.

Mr. Roger Creel   - Employers Insurance Co.

Mr. D. F. Daubenspeck   - IBM Corporation - DPD

Dr. Robert DeBaun   - America Cynamid

Mr. P. A. Dolan   - IBM Corporation - FE Division

Mr. G. J. Evans, Jr.   - IBM Corporation - DPD

Mr. John Filchak   - Southern New England Telephone Co.

Mr. Ralph A. Hawkins   - IBM Corporation - DPD

Mr. Robert V. Head   - Consultant

Mr. Willian Herbert   - CNA Insurance, Programming Systems

Mr. James A. Hodskins   - AT&T - Management Sciences

Mr. J. A. Hoede   - IBM World Trade Corporation

Dr. S. L. Jamison   - IBM Corporation - DPD

Mr. R. B. Johnson   - IBM Corporation - ASDD

Mr. A. Katz   - IBM Corporation - FSD

Mr. Robert C. King   - International Div.- Mobil Oil

Mr. Carl Klein	- Bristol Myers Company
Dr. R. G. Kokat	- IBM Corporation - ASDD
Mr. George J. Kost	- Eastern Data Center - Kennecott Copper Co.
Mr. E. F. Krieg	- IBM Corporation - CHQ
Mr. Nick Landin	- Union Pacific Railroad
Mr. Bork Lee	- Royal Globe Insurance Companies
Mr. Gordon H. Lossing	- The Dow Chemical Company
Mr. G. K. Magnuson	- IBM World Trade Corporation
Mr. Charles Mairet	- Deere & Company
Mr. Richard McCoy	- University of Wisconsin
Mr. Joseph M. Mehlmann	- Pennsalt Chemical Company
Mr. Robert Milne	- Atlantic Richfield
Mr. G. E. Mace	- IBM World Trade Corporation
Mr. Robert E. Nelson	- Readers Digest
Mr. Arthur Nesse	- Ford Motor Company
Mr. Willard Olsen	- North American Rockwell Corporation
Dr. D. G. Osborn	- IBM Corporation - DPD
Mr. J. W. Padian	- IBM Corporation - DPD
Mr. J. H. Pomerene	- IBM Corporation - CHQ
Mr. Norman J. Ream	- S. D. Leidesdorf & Co.
Mr. Ronald Richards	- Technical Support - Associated Hospital Services, Inc.
Mr. S. E. Rifkin	- IBM World Trade Corporation
Mr. Rudy L. Ruggles, Jr.	- IBM Corporation - CHQ
Mr. Walter J. Schroeder	- A.T. Kerney & Company, Inc.
Mr. A. E. Scott	- IBM Corporation - SDD
Mr. Robert Seawright	- Interactive Data Corporation

Mr. K. N. Shroff	- IBM Corporation - ASDD
Mr. Stanley E. Sinclair	- Cincinnati Gas & Electric Co.
Mr. Irwin J. Sitkin	- Aetna Life & Casualty
Mr. Donald Stanford	- Doubleday & Company
Mr. T. B. Steel, Jr.	- Private Consultant
Mr. P. A. Tattersall	- IBM Corporation - DPD
Mr. L. R. Walters	- IBM Corporation - ASDD
Mr. William F. Ward	- Dunn & Bradstreet, Inc.
Mr. Ray Wiles	- Aerospace Corporation
Mr. Allen P. Willis, Jr.	- Insurance Company of North America
Mr. Robert A. Windish	- First National Bank of Chicago
Mr. F. V. Wolford	- IBM Corporation - DPD

APPENDIX C   Alphabetic List of Applications

APPENDIX C   Continued

APPENDIX C   Continued

Percent of Respondents	Application
33.3	*HOME SHOPPING SERVICES*
32.8	*AUTOMATED PUBLIC LIBRARIES*
32.1	*OFFICE ELECTRONIC MAIL SERVICE*
29.8	*INTERACTIVE NEWS AND ENTERTAINMENT*
28.3	*RETAIL TERMINAL SYSTEMS*
27.5	*NATIONWIDE DRIVER AND VEHICLE DATA BANK*
26.7	*UNIVERSAL RESERVATION SYSTEMS*
26.5	*AUTOMATED DESIGN ENGINEERING*
26.5	*SUPERMARKET CHECKOUT SYSTEMS*
25.9	*HEALTH INFORMATION SYSTEMS*
25.9	*TELEPHONE DIRECTORY AND YELLOW PAGE DATA BANKS*
25.0	*HOME COMPUTER ASSISTED INSTRUCTION*
25.0	*INTERCONNECTED SHIPPERS AND CARRIER SYSTEMS*
24.5	*AUTOMATED MANUFACTURING PLANT*
24.5	*MANAGEMENT INFORMATION SYSTEMS*
23.4	*INSURANCE SUPPORT SYSTEM*
22.7	*ROBOT-CONTROLLED AUTOMOBILE CHECKOUT*
22.6	*NATIONWIDE COORDINATION OF INTERMODAL FREIGHT SHIPMENTS*
22.6	*STATE HEALTH INFORMATION SYSTEMS*
22.6	*MULTI-PHASIC SCREENING*
22.6	*COMPUTERIZED TYPING STATIONS*
22.2	*GOVERNMENT ACTIVITIES INFORMATION UTILITY*
22.0	*AUTOMATED MANUFACTURING ENGINEERING*
21.6	*PROFESSIONAL LITERATURE SEARCH SYSTEMS*
21.4	*VACATION AND TRAVEL PLANNING SYSTEMS*
21.3	*ELECTRONIC DELIVERY OF HARD COPY*
20.8	*COMPUTER CONTROL OF FREIGHT AND PASSENGER TRAINS*
20.8	*LEGISLATIVE SYSTEMS*
20.0	*AUTOMOBILE COLLISION AVOIDANCE SYSTEMS*
20.0	*CONSOLIDATED PUBLIC WELFARE SYSTEMS*
20.0	*AUTOMATED ROBOTS*
20.0	*AUTOMATED WEATHER FORECASTING*
20.0	*NATIONWIDE POWER GRID*
20.0	*BANKING SERVICE SYSTEM*
20.0	*INTEGRATED FINANCIAL SERVICE SYSTEM*
19.6	*COMPUTER ASSISTED INSTRUCTION - ON THE JOB TRAINING*
19.3	*LAW SEARCH*
19.2	*AUTOMATED LANDINGS AND TAKEOFFS*
18.9	*CLINICAL DECISION SUPPORT SYSTEMS*
18.8	*AUTOMATED PERIODICAL PUBLISHING*
18.4	*MULTIPLE USE HOME TERMINAL*
18.4	*AUTOMATED TRAFFIC CONTROL*
18.0	*AUTOMATED WAREHOUSES*
18.0	*AUTOMATED MASS TRANSIT SYSTEMS*
17.9	*COMPUTER ASSISTED INSTRUCTION EDUCATIONAL INSTITUTIONS*
17.9	*CREDIT TRANSFER (GIRO) SYSTEM*
17.6	*AUTOMATED FREIGHT TERMINALS*
17.6	*COMMERCIAL DATA PROCESSING SERVICES*
17.6	*AUTOMATED AIRCRAFT DIAGNOSTICS*
17.4	*RAILROAD CAR TRACING, TRACKING AND ALLOCATION*
17.4	*AUTOMATED FINGERPRINT ANALYSIS*
17.3	*FINANCIAL UTILITY*

Percent of Respondents	Application
17.0	AGRICULTURE INFORMATION AND ADMINISTRATION SYSTEM
17.0	AUTOMATED STOCK TRANSFER
16.7	AUTOMATED VEHICLE DIAGNOSTIC CENTERS
16.7	CHECKLESS SOCIETY
16.7	PENAL AND PAROLE INFORMATION SYSTEMS
16.7	AUTOMATED PROCESS MANUFACTURING PLANT
16.7	UTILITY USAGE RECORDING SYSTEM
16.4	JOB PLACEMENT SERVICES
16.4	IN-FLIGHT MONITORING AND DIAGNOSTICS OF AIRCRAFT
16.3	FREIGHT RATE SERVICE
16.3	AUTOMATED PLANT INFORMATION SYSTEMS
16.1	AUTOMATED ROADWAYS
16.1	PREVENTIVE MEDICINE DIAGNOSTIC CENTERS
15.9	CUSTOMER QUALITY ASSURANCE
15.9	AIR POLLUTION PREDICTION
15.7	INFORMATION RETRIEVAL UTILITIES
15.6	METROPOLITAN PLANNING MODELS
15.5	NATIONWIDE AIR TRAFFIC CONTROL
15.3	NATIONWIDE POLICE INFORMATION SYSTEM!
15.2	AUTOMATED AIRLINE PASSENGER SERVICES SYSTEM
15.1	COMPUTER ASSISTED TESTING AND GUIDANCE COUNSELING
14.6	AUTOMATED SUBSCRIPTION SERVICE
14.6	AUTOMATED BAGGAGE CONTROL
14.3	PRODUCT DEVELOPMENT SIMULATION SYSTEM
14.0	COMPUTERIZED WASTE DISPOSAL PLANTS
14.0	AUTOMATED COURT SCHEDULING
14.0	AUTOMATIC IRRIGATION CONTROL
13.7	OUT-PATIENT MONITORING
13.3	PATENT SEARCH
12.5	DISEASE INFORMATION SYSTEMS
12.5	COMPUTER COORDINATED TESTING OF MEDICAL DRUGS
12.2	BANK RESERVE REQUIREMENTS MODEL
11.8	ECONOMETRIC MODELS OF THE ECONOMY
11.3	COMMERCIAL LOAN CREDIT SCORING
11.1	ECOLOGICAL PLANT SCHEDULING
11.1	VERTICALLY INTEGRATED HEALTH CARE DELIVERY SYSTEM
10.9	COMPUTER-ASSISTED LABOR/MANAGEMENT NEGOTIATIONS
10.6	COMPUTER ASSISTED OCEANOGRAPHY
10.0	INVESTMENT MODELS
9.3	ECOLOGICAL BALANCE CALCULATIONS
9.1	ENTERPRISE SIMULATION
8.9	RESEARCH MONITORING FOR ECOLOGICAL EFFECTS
8.7	NATIONAL LAND INVENTORY
8.3	DEFENSE AGAINST A 100 MISSILE SALVO ATTACK
8.3	COMPUTERIZED MEDICAL TEST ANALYSIS
8.3	CASH FLOW SIMULATION
8.3	POLLUTION MONITORING SYSTEMS
7.5	DYNAMIC SCHEDULING OF EDUCATIONAL FACILITIES
6.8	HUMAN RESOURCE SYSTEMS
6.5	GOVERNMENT OPERATING LOTTERIES AND PARI-MUTUAL BETTING
6.4	NATIONAL HEALTH INSURANCE SYSTEMS
6.0	COMPUTER MANAGED INSTRUCTION
6.0	PERSONAL DATA BANKS
4.3	NATIONWIDE VOTER REGISTRATIONN
1.9	CAREER PATH PLANNING
0.0	GOVERNMENTAL PLANNING SYSTEMS FOR DEVELOPING COUNTRIES