

**An Overview of AI
and recent related
government activities**

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AN OVERVIEW OF AI
&
RECENT RELATED GOVERNMENT
ACTIVITIES

by

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Presentation to:
Artificial Intelligence Symposium
Expert Systems Applications
National Research Council of Canada
Ottawa, Ontario
January 29, 1987



WHAT IS ARTIFICIAL INTELLIGENCE?

- AI IS THE STUDY OF SYSTEMS THAT REPRESENT, ACQUIRE & USE KNOWLEDGE IN ORDER TO REASON, PERCEIVE, PLAN ACT & USE LANGUAGE
- AI IS THE ATTEMPT TO UNDERSTAND THE NATURE OF INTELLIGENCE AND PRODUCE NEW CLASSES OF INTELLIGENT MACHINES THROUGH PROGRAMMING COMPUTERS TO PERFORM TASKS WHICH REQUIRE REASONING & PERCEPTION

WHY IS AI IMPORTANT?

- **SUBSTITUTES FOR SCARCE EXPERTISE**
- **PROVIDES WAYS AND MEANS OF DOING THINGS THAT COULD NOT BE DONE BEFORE (e.g. ANALYSIS, PRODUCTION, CONTROL)**
- **ENHANCED VALUE ADDED TO PRODUCTS AND SERVICES**
- **PROVIDES MACHINES WITH AUTONOMY FOR COMPLEX AND DANGEROUS TASKS**
- **CREATES FLEXIBLE ACCESS TO COMPUTERS AND COMPUTER INFORMATION SYSTEMS**

WHAT ARE THE GOALS OF AI?

- THE PRIMARY GOAL OF ARTIFICIAL INTELLIGENCE IS TO *MAKE MACHINES SMARTER*
- THE SECONDARY GOALS OF AI ARE TO:
 - *UNDERSTAND* INTELLIGENCE
(NOBEL LAUREATE PURPOSE)
 - TO MAKE MACHINES *MORE USEFUL*
(THE COMMERCIAL PURPOSE)

SOME FACTS ABOUT AI

- A LOT OF HYPE
- NO RECENT FUNDAMENTAL BREAKTHROUGHS
- RESEARCH PROGRESS ON MANY FRONTS
- AN EMERGING TECHNOLOGY

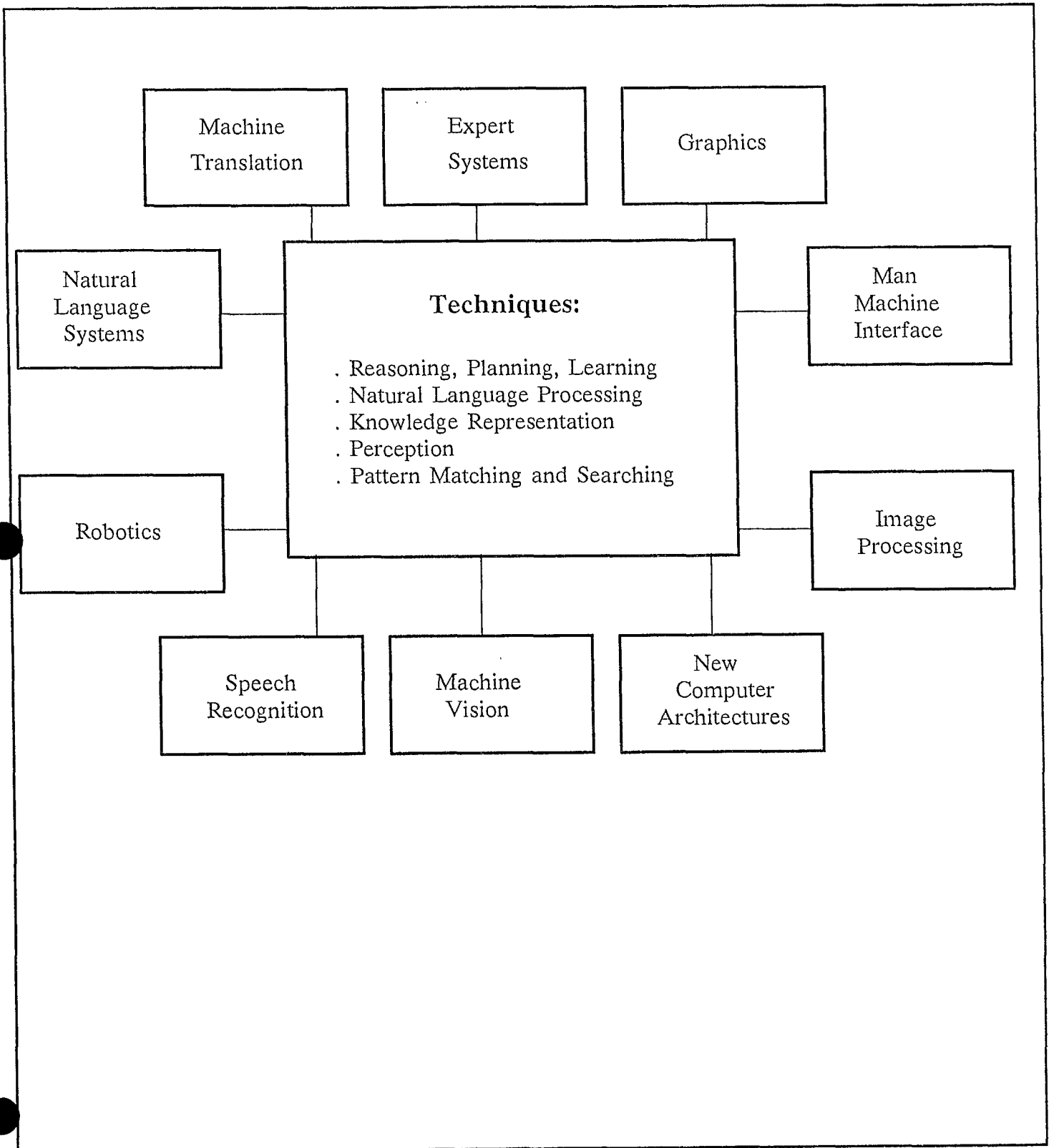
WHAT IS DRIVING THE COMMERCIAL ACCEPTANCE OF AI?

- FUNDAMENTAL ADVANCES IN HARDWARE
- EFFECTIVE AI LANGUAGE IMPLEMENTATIONS
- EMERGENCE OF AN "AI MENTALITY" IN
PROBLEM SOLVING
- DEVELOPMENT OF INTELLIGENT PROGRAMMING
ENVIRONMENTS

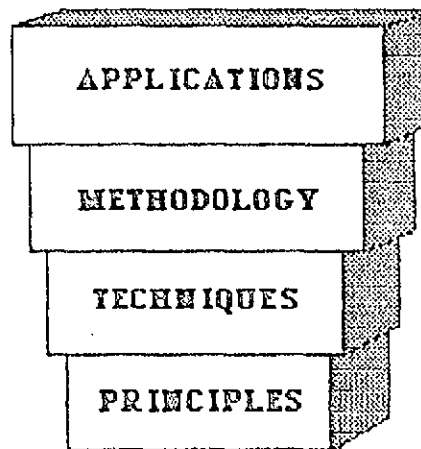
A Perspective on AI

- * AI systems get their strength primarily by sacrificing generality
- * Tasks which seem easy to people are often the most difficult to implement on a machine
- * What often is easiest to automate is a skill whose basis rests on some large but closed domain of knowledge
- * Frequently problems prove to be solvable by conventional means
- * Many problems are not suitable to current AI solutions

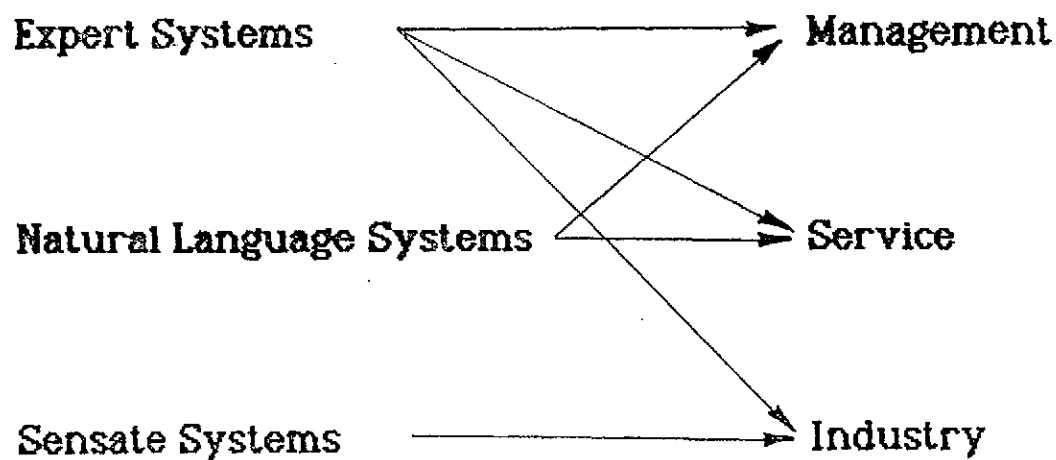
Common AI Techniques and Applications



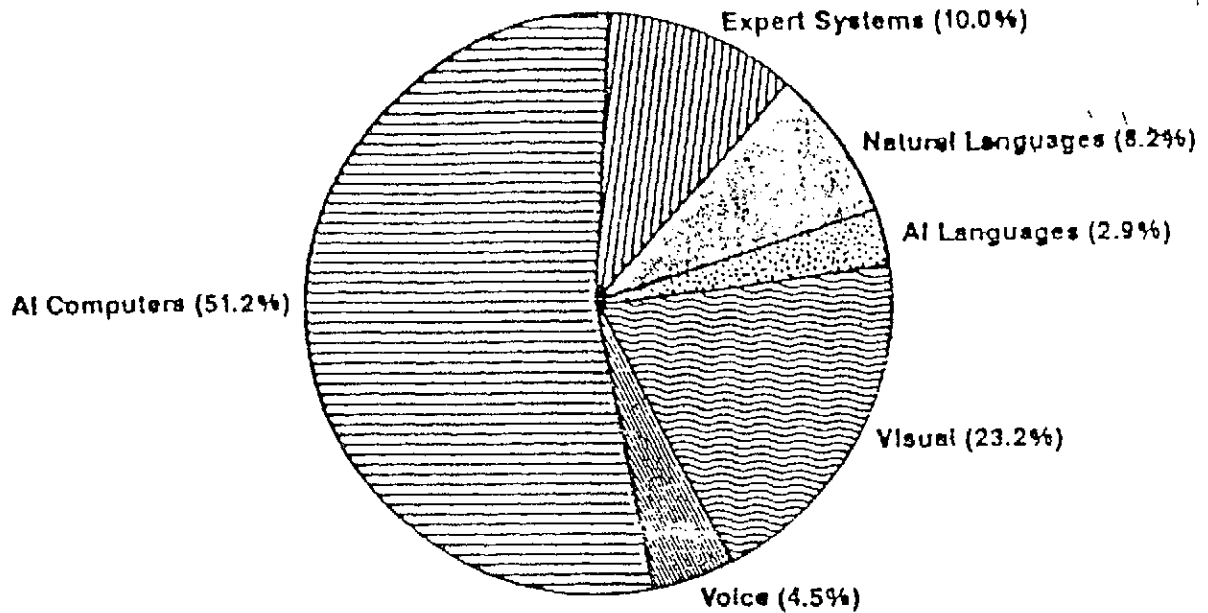
THE BASIC COMPONENTS OF AI



AI Applications and Their Emerging Market



Artificial Intelligence Market Product Areas in 1985



Source: DM Data in E.F. Hutton, 1985

THE ARTIFICIAL INTELLIGENCE MARKET
(Millions of Dollars)

MARKET AREA	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Expert Systems	4	9	17	38	74	145	245	385	570	810
Natural Language	5	8	18	40	59	125	210	320	465	650
Visual Recognition	10	22	51	116	168	260	370	500	660	840
Voice Recognition	5	7	11	20	33	55	85	140	200	270
AI Languages	3	5	8	12	21	35	45	65	80	105
AI Computers	28	56	103	217	364	510	710	970	1250	1570
Government Contracts*	20	30	40	50	95	150	150	155	175	200
TOTAL	55	107	208	443	719	1130	1665	2380	3225	4245

*Not in total, already included in other areas.

Source: DM Data in E.F. Hutton, 1985

SUMMARY

- AI IS LIKELY TO BE A TRANSFORMATIVE TECHNOLOGY
- AI WILL BE A TOOL OF IMMENSE CAPACITY TO ASSIST PEOPLE
- AI WILL GRADUALLY LEAK INTO WIDE ACCEPTANCE
- NEARLY EVERY FORM OF WORKPLACE IS A CANDIDATE FOR AI BASED TECHNOLOGY

FEDERAL PRIORITY AREAS FOR APPLIED AI

- ① INCREASE PRODUCTIVITY IN GOVERNMENT OPERATIONS
- ② ASSIST IN THE MANAGEMENT, EXPLOITATION & EXPLORATION OF RENEWABLE & NON-RENEWABLE RESOURCES
- ③ ENCOURAGE THE ENHANCEMENT OF THE VALUE-ADDED COMPONENTS OF CANADIAN INFORMATION AND COMMUNICATIONS PRODUCTS & SERVICES, AND
- ④ FACILITATE TRAINING & RE-TRAINING

WHAT IS MOST TRYING TO ACHIEVE WITH AI?

- ESTABLISH NATIONAL AWARENESS & IMPORTANCE OF AI AS A STRATEGIC TECHNOLOGY
- STIMULATE & CAJOLE GOVERNMENT, INDUSTRY & ACADEMIA INTO CREATING PROGRAMS, PROJECTS & QUALIFIED HUMAN RESOURCES TO DEVELOP & APPLY AI
- FACILITATE CREATION OF PROGRAMS, PROJECTS & QUALIFIED HUMAN RESOURCES BY DEVELOPING POLICIES & PLANS WHICH PRODUCE BOTH TECHNOLOGY PUSH & MARKET PULL FOR AI BASED APPLICATIONS
- CREATE NEW ECONOMIC WEALTH FOR CANADA

RECENT GOVERNMENT ACTIVITIES RELATED TO AI

COMMITTEE WORK:

- INTERDEPT'L AI COMMITTEE
- INTERDEPT'L AI USERS GROUP
- INTERDEPT'L SUB-COMMITTEE ON IT
- INTERDEPT'L COMMITTEE ON
FUTURES & FORECASTING
- INTERDEPT'L COMMITTEES ON OECD
- FEDERAL WORKING GROUP ON SOCIAL
& CULTURAL IMPACT OF S&T
- (NATIONAL) WORKING GROUP ON
IMAGE ANALYSIS AND AI
- SPACE STATION ADVANCED
TECHNOLOGY SUB-COMMITTEE

INTERDEPARTMENTAL AI COMMITTEE

GOAL:

**TO SUPPORT POLICY DEVELOPMENT &
IMPLEMENTATION FOR GOVERNMENT-
WIDE STRATEGY IN AI**

OBJECTIVES:

- **ADVOCACY FOR AI**
- **POLICY ADVICE**
- **POLICY DEVELOPMENT**
- **POLICY REVIEW**
- **PROGRAM MONITORING**
- **ESTABLISH & MAINTAIN NETWORKS**

MEMBERSHIP:

**DEPARTMENTAL SPECIALISTS IN
TECHNOLOGY RELATED POLICY
DEVELOPMENT**

INTERDEPARTMENTAL AI USERS GROUP

GOAL:

TO PERSUE TRANSFER OF EXPERIENCE &
KNOW-HOW AMONG TECHNICAL
SPECIALISTS & PROJECT MANAGERS
ENGAGED IN GOVERNMENT SPONSORED
IN-HOUSE AI BASED PROJECTS

OBJECTIVES:

- SHARE EXPERIENCES ABOUT PRODUCTS,
TECHNIQUES, PROJECTS & SUPPLIERS
- DEVELOP NETWORKS AMONG TECHNICAL
SPECIALISTS IN & OUTSIDE GOVERNMENT
- COORDINATE & ACT AS A CLEARING
HOUSE FOR NEW GOVERNMENT USERS
- INTERACT WITH INTERDEPARTMENTAL AI
COMMITTEE

MEMBERSHIP:

DEPARTMENTAL TECHNICAL SPECIALISTS
& PROJECT MANAGERS RESPONSIBLE FOR
DELIVERY OF AI BASED SYSTEMS

RECENT GOVERNMENT ACTIVITIES RELATED TO AI

STUDIES:

CURRENTLY AVAILABLE:

- **OPPORTUNITIES FOR USE OF AI
WITHIN GOVERNMENT**
- **SURVEY OF ADVANCED ROBOTICS
IN JAPAN**
- **EXPERT SYSTEMS: THEIR APPLICATION
IN THE CANADIAN TRANSPORTATION SECTOR**
- **STUDY TO ASSESS APPLICATIONS OF
AI TECHNOLOGIES IN: COMMUNICATIONS
& INFORMATION-BASED SYSTEMS**
- **PROCEEDINGS OF THE WORKSHOP ON:
THE APPLICATION OF EXPERT SYSTEMS TO
TRANSPORTATION**
- **EXPERT SYSTEMS**
- **MACHINE TRANSLATION & NATURAL
LANGUAGE PROCESSING:
OPPORTUNITIES FOR AI IN CANADA**

RECENT GOVERNMENT ACTIVITIES RELATED TO AI

STUDIES (CONT.):

FORTHCOMING REPORTS:

- **TECHNOLOGIES OF STRATEGIC
IMPORTANCE ASSOCIATED WITH
THE MOBILE SERVICING SYSTEM**
- **AI IN JAPANESE MANUFACTURING**
- **ADVANCED INFORMATION
TECHNOLOGY: THE TECHNOLOGICAL
LANDSCAPE**
- **CRITICAL REVIEW OF DEVELOPMENTS
IN COMPUTER VISION SYSTEMS**

RECENT GOVERNMENT ACTIVITIES RELATED TO AI

AREAS OF AI ACTIVITY:

SYSTEMS WORK:

- NATIONAL RESEARCH COUNCIL
- TRANSPORT CANADA
- DEPARTMENT OF COMMUNICATIONS
- NATIONAL REVENUE
- ENERGY, MINES & RESOURCES
- FORESTRY
- ENVIRONMENT CANADA
- DEPARTMENT OF NATIONAL DEFENCE
- HEALTH & WELFARE

STUDIES & POLICY

- FISHERIES & OCEANS
- DEPARTMENT OF PUBLIC WORKS
- NATIONAL MUSEUMS
- EMPLOYMENT & IMMIGRATION
- DEPARTMENT OF EXTERNAL AFFAIRS
- REGIONAL INDUSTRIAL EXPANSION
- SCIENCE & TECHNOLOGY

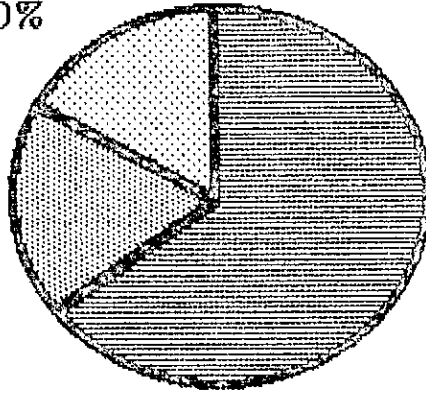
Types of AI Applications

Combination of ES/NLP

15.0%

NLP

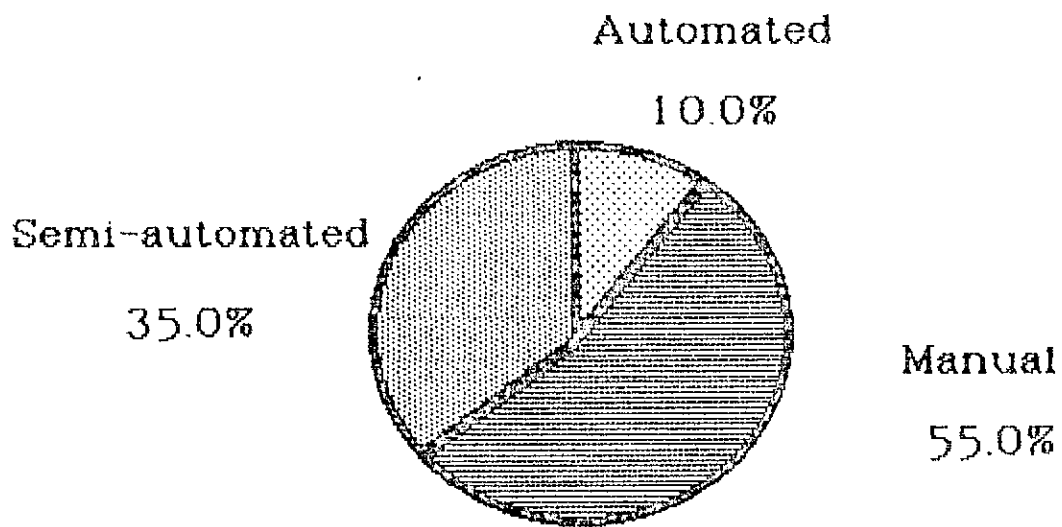
17.5%



Expert Systems

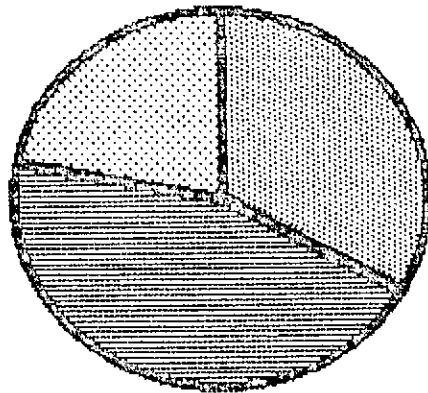
67.5%

Type of Application Being Replaced or Supported by AI



Timeframe for Implementation

Long Term
22.5%



Ready Today
35.0%

Possible in Near Future
42.5%

POLICY CONSIDERATIONS OPPORTUNITIES

RESEARCH - DEVELOPMENT - ACQUISITION - APPLICATION

- **TRAINING**
- **TRANSPORTATION**
- **COMMUNICATIONS**
- **NATURAL RESOURCES**
- **FINANCIAL SERVICES**
- **OFFICE ENVIRONMENTS**

FRAMEWORK

SETTING THE ENVIRONMENT

- **NATIONAL GOALS & OBJECTIVES**
- **TECHNOLOGICAL LANDSCAPE**
- **ECONOMIC COSTS & BENIFITS**
- **SOCIAL COSTS & BENIFITS**
- **NATIONAL STRENGTHS
& WEAKNESSES**

POLICY CONSIDERATIONS

(CONTINUED)

MECHANISMS *(EXAMPLES)*

PROCESSES FOR ACHIEVING RESULTS

- TRAIN QUALIFIED PEOPLE
- STRATEGIC PROCUREMENT
- INTELLECTUAL PROPERTY RIGHTS
- ATTENTION TO THE INNOVATION
CYCLE
- CONSORTIA
- ENTREPRENEURSHIP

