TEACHING MICROPROCESSORS TO PRACTISING PROFESSIONALS

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Abstract

Upgrading the skills of scientists, engineers, technologists and technicians involved in the design of digital systems is an important and difficult task. The impact of microelectronics on basic research, applied research, product development and other engineering services has increased the need for efficient methods of teaching and training in the area of microprocessors and data processing. The need is further compounded by the rapidly changing microelectronics technology. This paper describes an approach devised and partly implemented to address this complex issue. The following thre programs will be discussed in detail:

(i) In-depth Program;

(ii) General Awareness Program; and

(iii) Management Awareness Program.

This elaborate industrial training program involves eight 12-week courses, short courses, seminars, workshops, and apprenticeship. Appropriate examples and experiences will be given. An interesting student evaluation scheme will also be discussed. It is felt that the program is unique and of interest, not only to academics, but also to continuing education divisions of various institutions and companies.

OUTLINE

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1. WHY INDUSTRIAL TRAINING?

PROBLEM

- TREND
  1960's - THE DECADE OF ELECTRONICS
  1970's - THE DECADE OF (MICRO)COMPUTERS
  1980's - THE DECADE OF VLSI?
  ROBOTS?

- TOO FEW DESIGNERS
  1979 - 17 K COMPUTER ENGINEERS (CEs) PRODUCED
  1990 - 1 M CEs REQUIRED

- IF ALL UNIVERSITIES PRODUCED CEs ONLY, THE NUMBER WOULD BE < 1M

SOLUTION

- UNDERGRADUATE & GRADUATE PROGRAMS (UNIVERSITIES & COLLEGES)
- CONTINUING EDUCATION (UNIVERSITIES)
- INDUSTRIAL TRAINING (INSTITUTES, CENTRES)

2. WHAT IS THE IAMC?

FOUNDING INSTITUTIONS

THE INDUSTRIAL APPLICATIONS OF MICROELECTRONICS CENTRE, INC IS A FEDERALLY-INCORPORATED, NON-PROFIT COMPANY, FORMED ON OCTOBER 9, 1979 AS A RESULT OF CO-OPERATION OF THE FOLLOWING THREE GROUPS:

- THE UNIVERSITY OF MANITOBA AND MANITOBA RESEARCH COUNCIL
- MANITOBA INDUSTRY
- PROVINCIAL AND FEDERAL GOVERNMENTS

THE COMPANY OFFICES ARE LOCATED IN THE ENGINEERING BUILDING AT THE UNIVERSITY OF MANITOBA, WINNIPEG.

OBJECTIVES

FUNCTION: To serve the industry of Manitoba and Canada in developing and exploiting new and improved devices, subsystems, systems, and processes related to microelectronics.

MANDATE: To establish and maintain outstanding technical competence in microelectronics in order to achieve:

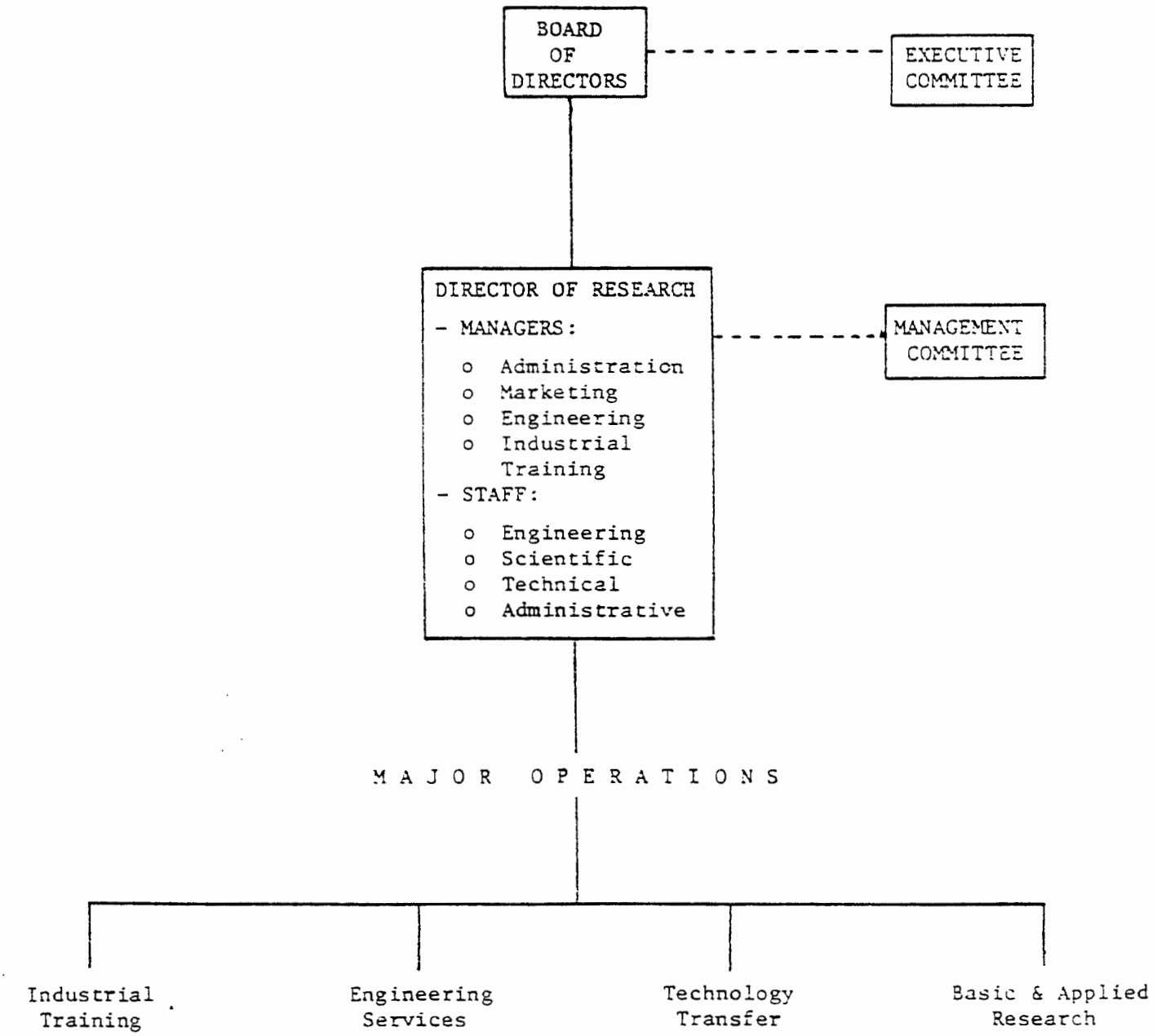
1. Transmittal of knowledge in the area of applications of microelectronics to engineers, scientists, technologists, technicians, and technical managers;

2. Product development and consulting for industry; and

3. Basic and applied research.

OPERATIONS

- Industrial Training
- Engineering Services
- Basic & Applied Research
- Technology Transfer



Operations chart

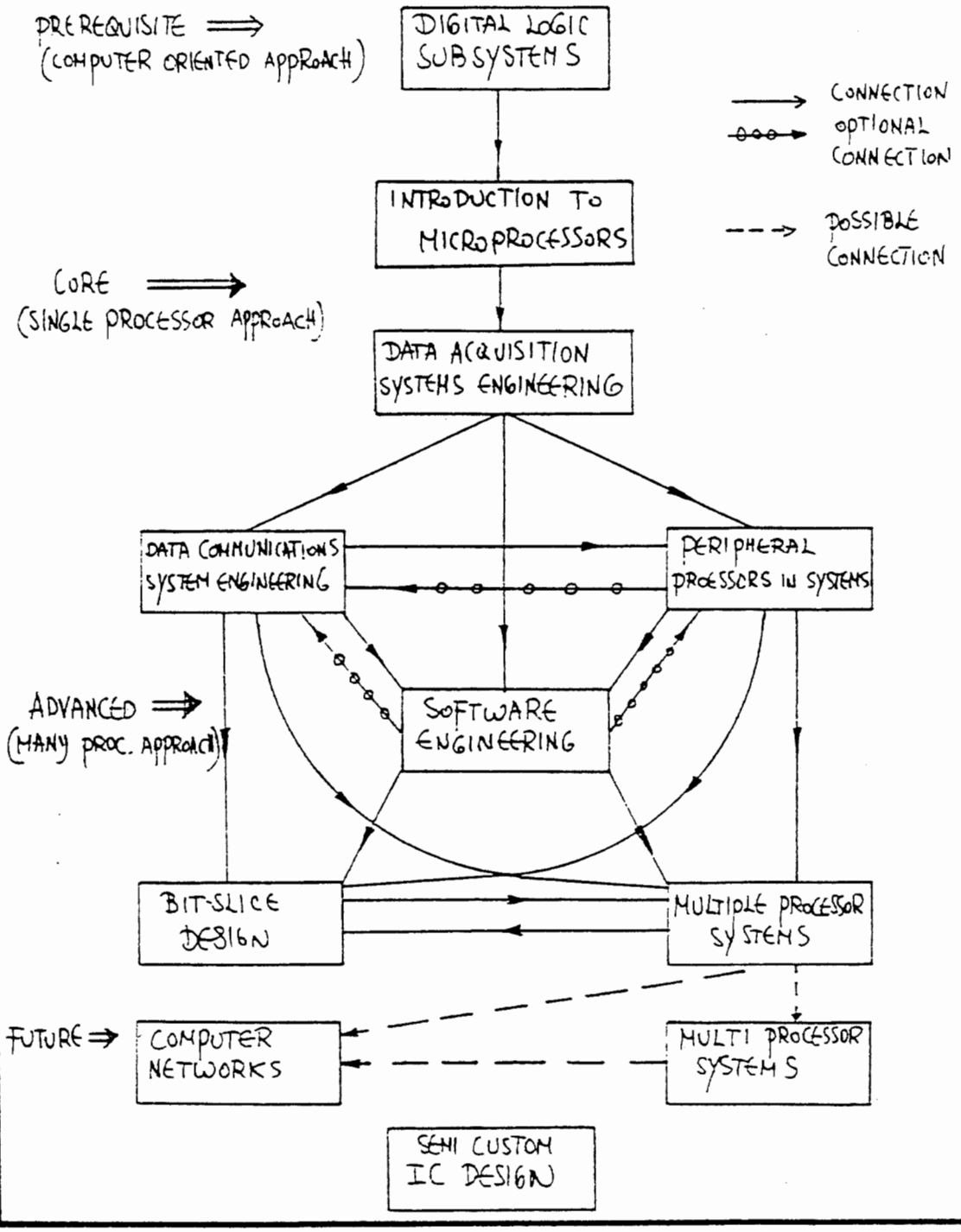
3. INDUSTRIAL TRAINING AT IAMC

1. IN-DEPTH PROGRAM (IDP)
2. TECHNICAL AWARENESS PROGRAM (TAP)
3. MANAGEMENT AWARENESS PROGRAM (MAP)
4. GENERAL AWARENESS PROGRAM (GAP)

3. THE IDP STRUCTURE

- 8 COURSES
- EACH COURSE 12 WEEKS
- ONE EVENING SESSION PER WEEK
- THREE HOURS OF LECTURE PER SESSION
- TWO HOURS OF LAB/TUTORIAL PER SESSION
- ONE ASSIGNMENT PER SESSION
- ONE INDIVIDUAL PROJECT PER COURSE
- < 25 PARTICIPANTS PER COURSE
- LECTURE NOTES
- TEXTBOOKS, MANUALS, DATA BOOKS
- FESS $300 TO $700

VERTICAL & HORIZONTAL
IDP COURSE OFFERING



6. PARTICIPATING COMPANIES

1. Burrough Business Machines
2. Manitoba Telephone System
3. Manitoba Hydro
4. Bristol Aerospace
5. GTE Lenkurt Electric
6. AEI Telecommunications
7. Indus Electronics
8. Northern Telecom
9. Phillips Cable
10. Atomic Energy of Canada
11. National Research Council
12. Manitoba Research Council
13. Canadian National Railways
14. SDS Alarm Systems
15. Ener-Corp Management
16. Great West Life Assurance
17. Canadian Grain Commission
18. RPL Investments
19. Appin Dynamics
20. AVCO Protective Systems
21. Magikist
22. Red River Community College
23. Winnipeg Photo

7. TAP COURSE OFFERING

STRUCTURE

- EACH COURSE 1-3 DAYS
- 60% LECTURE & TUTORIAL
- 40% LABORATORY
- LECTURE NOTES
- TEXTBOOKDS, DATA SHEETS
- FESS $300 TO $700

COURSES

1. INTRODUCTION TO MICROPROCESSORS: HANDS-ON APPLICATION PROGRAMMING OF THE 6800
2. INTRODUCTION TO MICROPROCESSORS: HANDS-ON APPLICATION PROGRAMMING OF THE 8085
3. MICROPROCESSOR TROUBLESHOOTING

*4. INTRODUCTION TO THE 6809

*5. INTRODUCTION TO THE 68,000

*6. INTRODUCTION TO THE 8086/8/7/9

*7. INTRODUCTION TO THE APX 432

*8. INTRODUCTION TO THE 2920

8. MAP COURSE OFFERING

STRUCTURE

- EACH COURSE 1-3 DAYS (IAMC OR IN-HOUSE)
- 80% LECTURE
- 20% LABORATORY
- LECTURE NOTES
- TEXTBOOKDS, DATA SHEETS
- FESS $400 TO $800

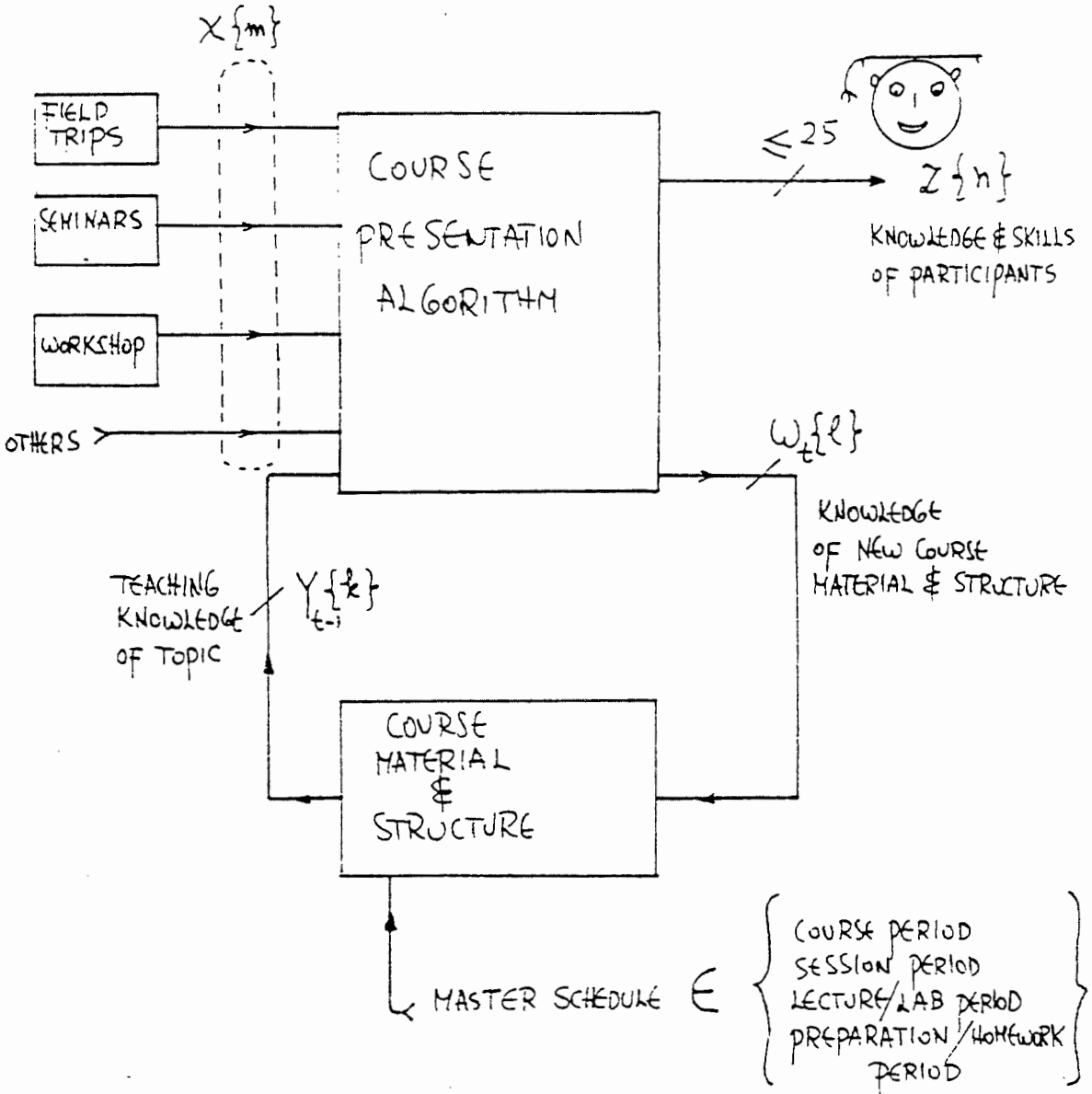
COURSES

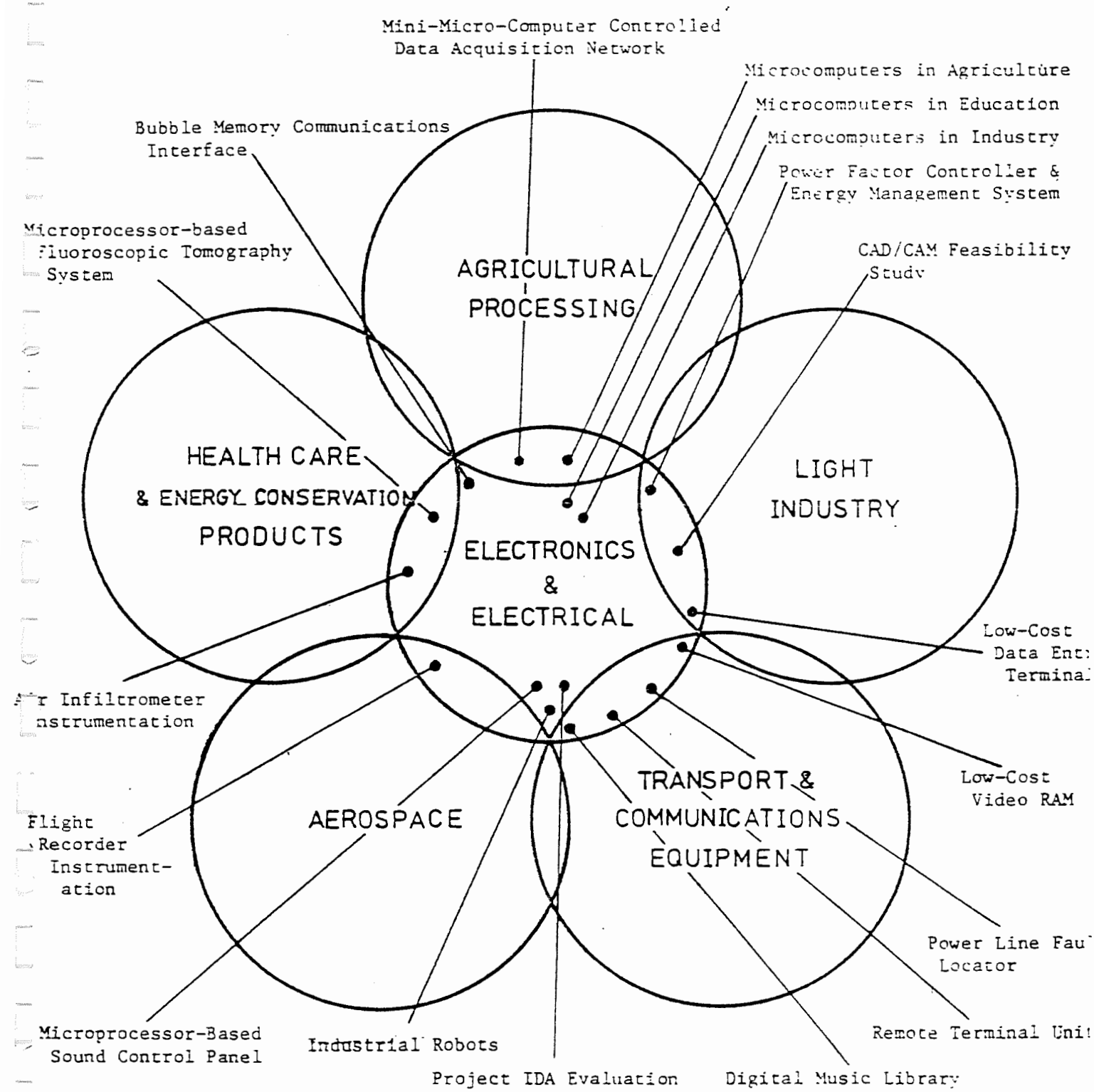
1. MICROPROCESSING FOR MANAGERS
*2. MANAGEMENT OF PROJECTS WITH MICROPROCESSORS

9. GENERAL AWARENESS PROGRAM (GAP)

- SEMINARS
  - INTEL
  - MOTOROLA
  - TEXAS INSTRUMENTS
  - MILLENIUM
  - MOSTEK
  - TEKTRONIX
- WORKSHOPS
  - TEKTRONIX
  - HEWLETT-PACKARD
  - INTEL
- PRESENTATIONS
  - INDUSTRY
  - GOVERNMENTS
  - TRADE COMMISSIONERS AND CONSULS
  - SCIENTIFIC ORGANIZATIONS
  - HIGH SCHOOL STUDENTS
- EXTERNAL
  - PRESENTATIONS
  - CONFERENCES
  - INTERVIEWS
- MICROS

COURSE AUTOMATON





Manitoba priority industrial sectors and the IAM Centre