

STRATEGIES FOR STARTING  
AN ELECTRONICS COMPANY:

THE  
ENTREPRENEURIAL  
ENGINEER

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# STRATEGIES FOR STARTING AN ELECTRONICS COMPANY: THE ENTREPRENEURIAL ENGINEER

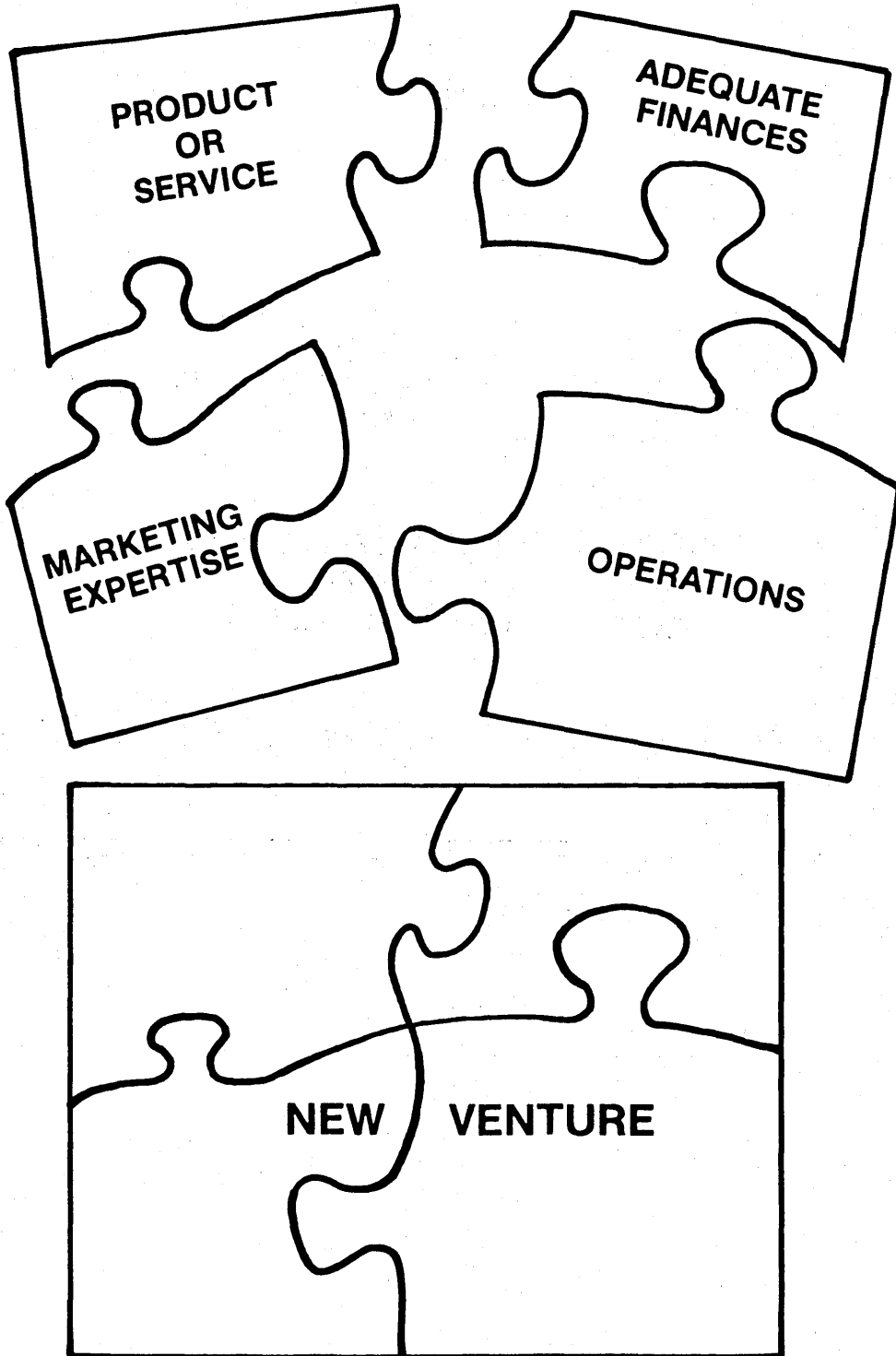
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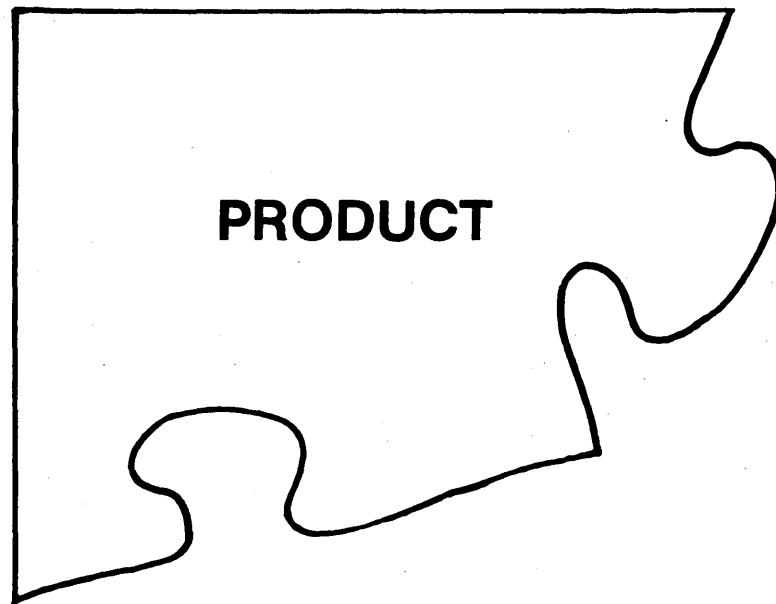
Thomas M. Whitney  
February 9, 1980

# **WHAT CHARACTERIZES THE ENTREPRENEUR**

- **URGE TO “MAKE THINGS HAPPEN”**
  - DESIRE TO BE OWN BOSS AND CONTROL
  - WILLINGNESS TO TAKE RISK
  
- **DESIRE FOR EGO SATISFACTION**
  - CHANGE THE WORLD
  - RECOGNITION AND FAME
  
- **DESIRE FOR PERSONAL FORTUNE**
  - INDEPENDENCE TO MAKE THINGS HAPPEN
  
- **LOVE OF THE PURE JOY OF WINNING**
  - COMPETITIVE

# PIECES OF A NEW VENTURE

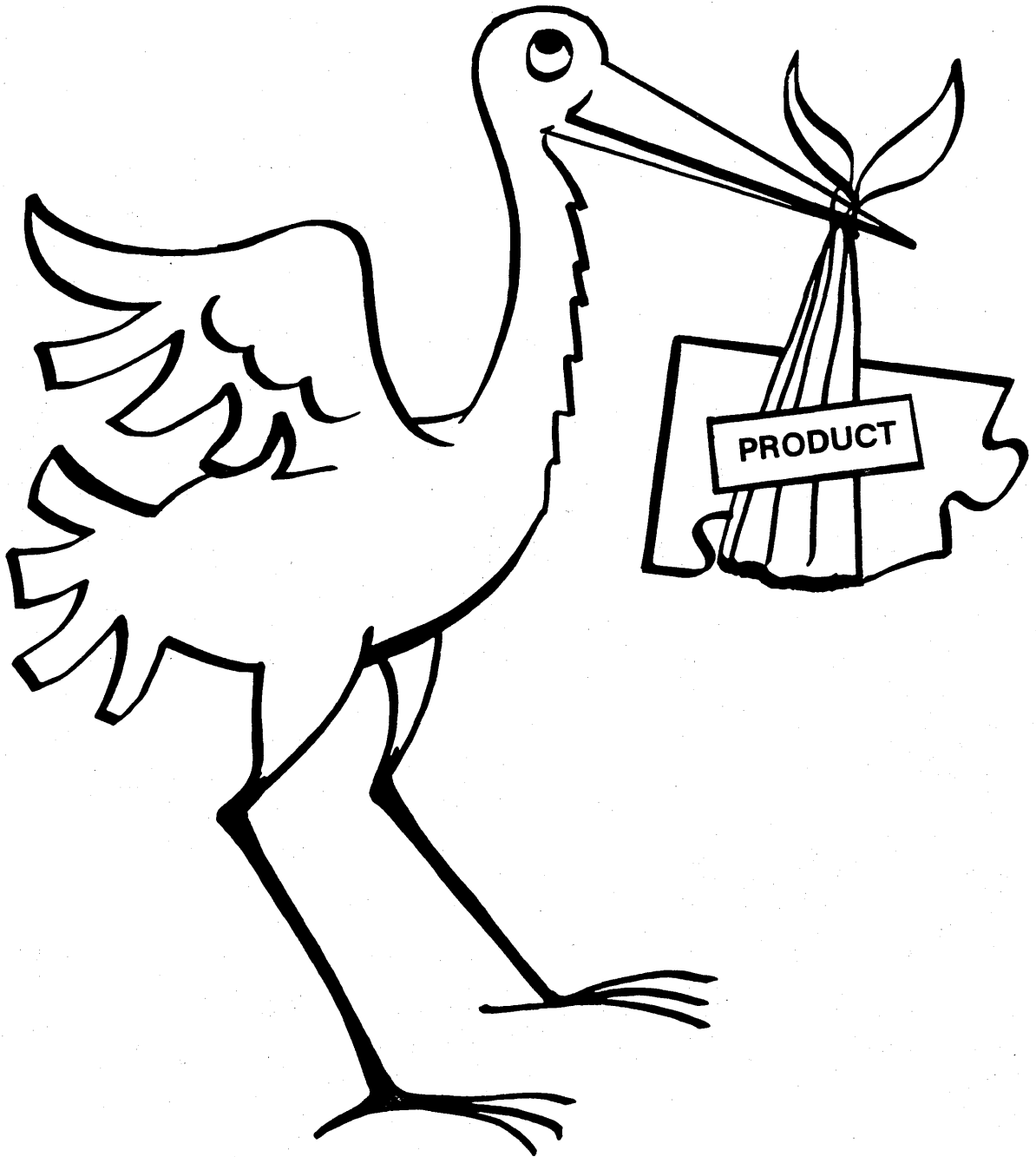




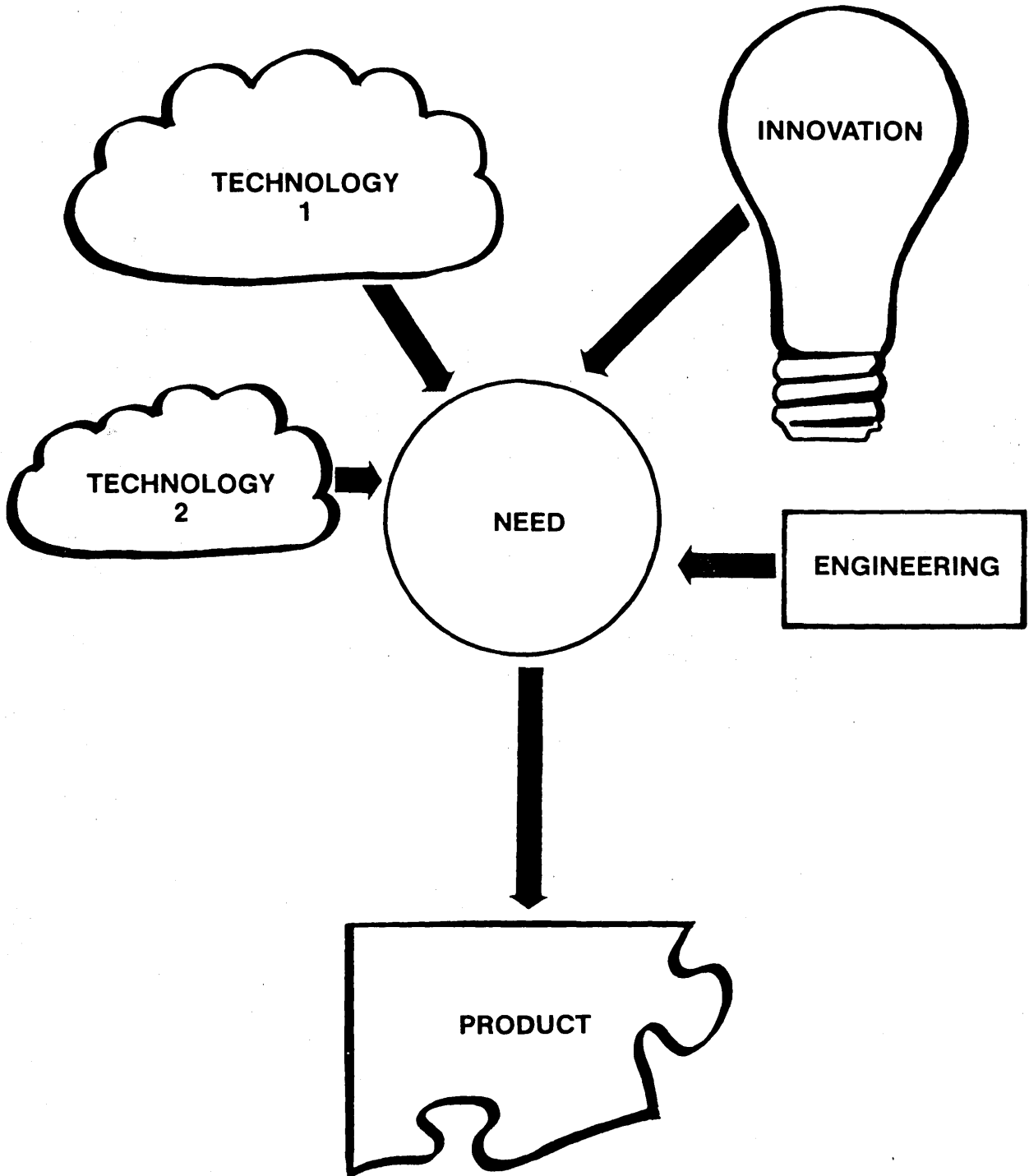
**MAIN THEME:**

**SUCCESSFUL NEW *PRODUCTS* ARE THE RESULT  
OF THE *INNOVATIVE* USE OF NEW  
*TECHNOLOGIES* TO SATISFY A *NEED*.**

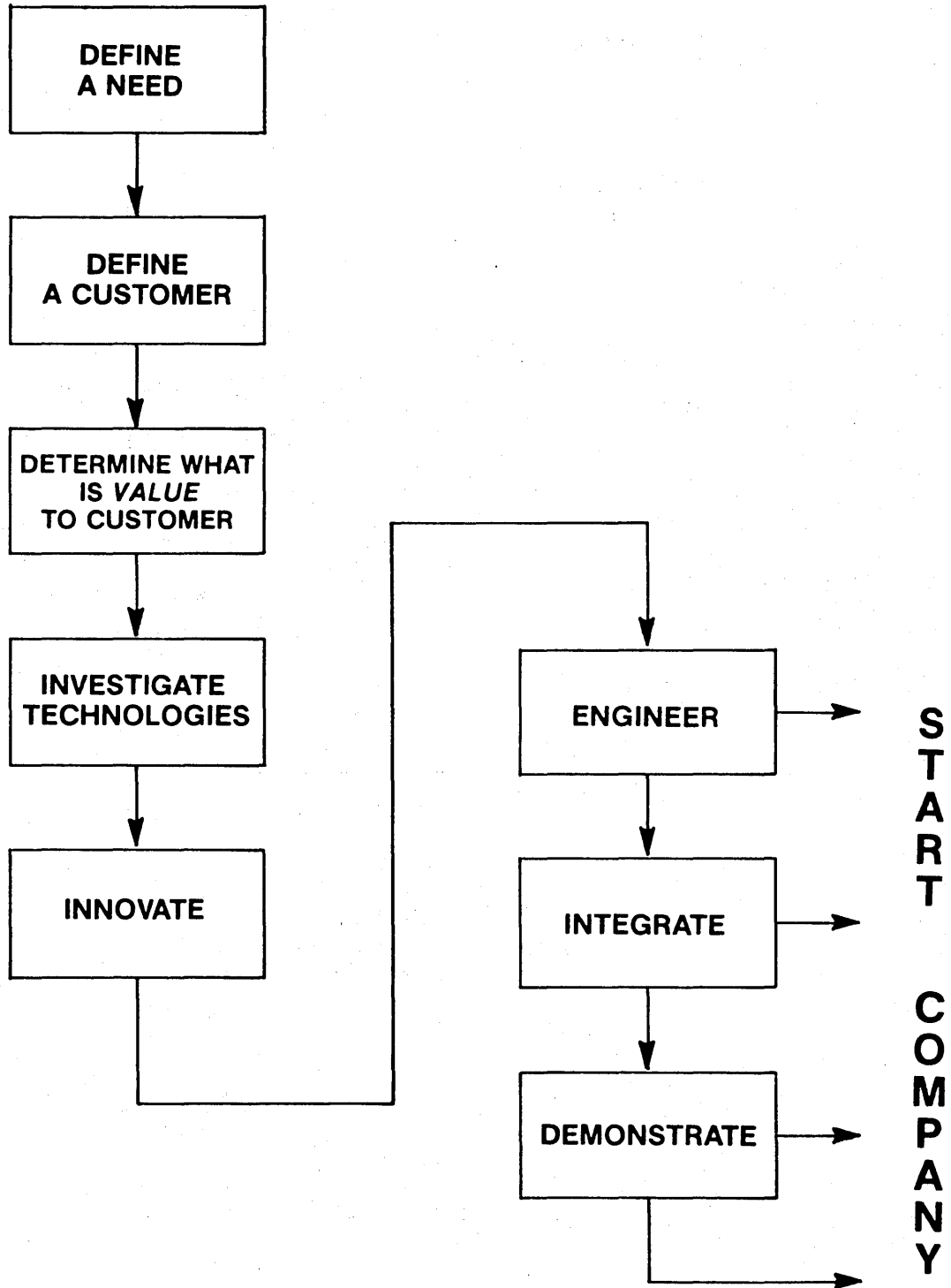
**MOMMY, WHERE DO NEW PRODUCTS  
COME FROM?**



# NEW PRODUCT PROCESS



# STRATEGY FLOWCHART





## DEFINE A NEED

- UNDERSTAND THE ENVIRONMENT
- TAP YOUR PERSONAL FRUSTRATIONS
- MOST DEADLY KIND OF THINKING -  
"IF IT'S A GOOD IDEA, WHY  
HASN'T IBM (GM, EXXON, HP, ...)   
ALREADY DONE IT?"

## DEFINE AND UNDERSTAND THE CUSTOMER

- WHAT IS VALUE TO THIS CUSTOMER?
- HOW WILL THE PRODUCT BE PURCHASED?  
(WHOSE MONEY, APPROVALS, ETC.)
- WHAT IS THE CUSTOMER'S HISTORY OF  
READILY ACCEPTING NEW PRODUCTS?
- WILL PRODUCT CHANGE FUNDAMENTAL  
WAYS OF OPERATING AND THINKING?

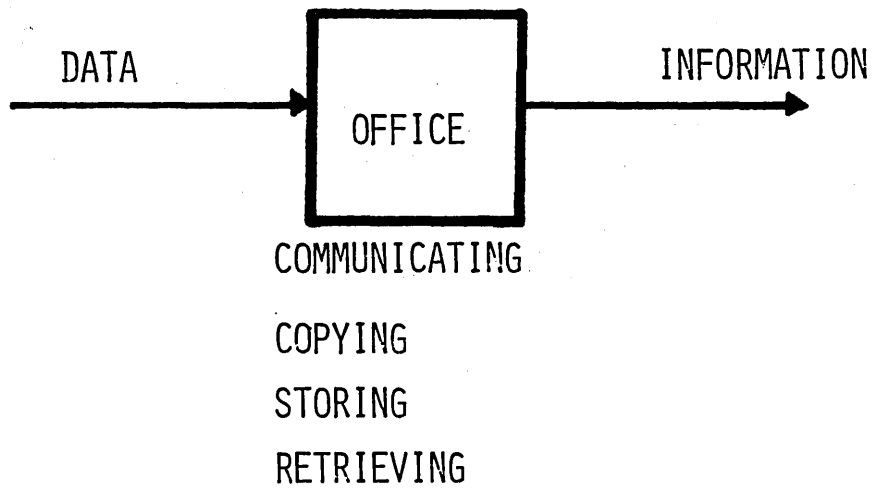
## SOME ENVIRONMENTS WITH CRITICAL NEEDS

- THE OFFICE
- THE FACTORY
- EDUCATION

COMPARISON OF OFFICE AND PRODUCTION WORKERS

	ANNUAL PRODUC- TIVITY INCREASE	LABOR FORCE		CAPITAL INVEST- MENT PER PERSON
		SIZE	GROWTH	
OFFICE	0.4%	45M	2.3%	\$ 2,300
PRODUCTION	0.6%	30M	0.8%	\$25,000

WHAT HAPPENS IN THE OFFICE?



WHO IS THE CUSTOMER?

- CLERK - TYPIST - SECRETARY
- OFFICE SUPERVISOR
- MANAGERS AT ALL LEVELS

## WHAT IS VALUE?

- TIME
- ACCURACY
- COST
- STORAGE SPACE
- AVAILABILITY OF INFORMATION

## WHAT ARE THE APPLICABLE NEW TECHNOLOGIES?

- MAN-MACHINE INTERFACE  
SOFTWARE + COMPUTATIONAL POWER +  
LOW COST MEMORY
- ELECTRONIC MAIL - FACSIMILE
- SPEECH RECOGNITION AND GENERATION
- THE LOW-COST, LETTER QUALITY PRINTER



## THE FACTORY

PROBLEM: U.S. PRODUCTIVITY IS NOT  
INCREASING

SOLUTION: INVEST IN MORE CAPITAL  
EQUIPMENT

YES, BUT WHAT CAPITAL EQUIPMENT?

## NEEDS OF THE FACTORY

- REDUCTION OF JOB REPETITIVENESS
- IMPROVED QUALITY CONTROL
- BETTER TRAINING
- INCREASED SAFETY
- ENERGY REDUCTION

## WHO IS THE CUSTOMER?

- THE DIRECT LABOR PERSON

## WHAT IS THE VALUE?

- JOB INTEREST
- SAFETY
- PRODUCTIVITY

WHAT ARE THE APPLICABLE NEW  
TECHNOLOGIES?

- ROBOTICS
- VOICE CONTROL
- INTELLIGENT CAMERAS
- MICROCOMPUTERS - GRAPHIC DISPLAYS

EDUCATION

PROCESS MONITORING AND DISPLAY

## NEEDS OF EDUCATION

- INDIVIDUAL INSTRUCTION
- CREATIVE AND "VISUAL" TEACHING AIDS
- REDUCTION OF ADMINISTRATIVE BURDENS
- TEACHER RE-EDUCATION

## WHO IS THE EDUCATION CUSTOMER?

- TEACHER
- ADMINISTRATOR

## WHAT IS VALUE?

- EDUCATIONAL EFFECTIVENESS
- SELF-MOTIVATED STUDENTS
- ADMINISTRATIVE PRODUCTIVITY
- ACCESS TO INFORMATION

## APPLICABLE NEW TECHNOLOGIES

- ELECTRONIC (TEACHING) GAMES
- PERSONAL COMPUTERS

COLOR GRAPHICS

SOUND

RECORD KEEPING

TEACHER RE-EDUCATION

- COMPUTER NETWORKS

THE "LIBRARY OF CONGRESS" AT  
YOUR FINGERTIPS

## APPLYING TECHNOLOGY

- CHARACTERISTICS OF SUCCESSES AND FAILURES

HISTORY OF TECHNOLOGY

PERSONAL EXPERIENCE

INSIGHT BASED ON AVAILABLE DATA

ASK THE "EXPERTS"  
BUT USE OWN JUDGEMENT

- EVALUATE THE RISK

LOCAL RISK

GLOBAL RISK



RISK EVALUATION FOR COMPUTER SYSTEM

PRODUCT RISK =

TECHNOLOGY \* ARCHITECTURE \* SOFTWARE \* MARKET  
RISK RISK RISK RISK

## TECHNOLOGY RISK

- NEW PROCESS?
- NEW MATERIALS?
- NEW TESTING METHODS?
- NUMBER OF SUPPLIERS?
- EFFECT OF MARGINAL QUALITY?
- LONG TERM RELIABILITY - LIABILITY  
IMPACT
- CONTINUING RESEARCH - LONG  
TERM VIABILITY
- FALL BACK STRATEGY

## ARCHITECTURE RISK

- AVAILABILITY OF COMPONENTS
- MARGIN OF ERROR IN PERFORMANCE ESTIMATES
- IMPACT ON SERVICE
- PERIPHERAL AVAILABILITY

## SOFTWARE RISK

- DEGREE OF COMPATIBILITY
- INTEGRATION AND CHECK OUT TIME
- RELIABILITY
- DOCUMENTATION
- TRAINING

## MARKET RISK

- ACCEPTABILITY OF "NEW" IDEA
- AVAILABILITY OF APPLICATION SOFTWARE
- COST OVER-RUNS
- DISTRIBUTION CHANNELS

## MAKING THE PRODUCT HAPPEN

- ENGINEER
  - NEED FOR "CONCEPTUAL INTEGRITY"
  - NEED FOR EXPERIENCE WITH SIMILAR PRODUCTS
  - SMALL GROUP
  - PLAN FOR ENHANCEMENTS, GROWTH
  
- INTEGRATE
  - ROLE OF ENTREPRENEUR
  - FOCUS ON "THE CONTRIBUTION"
  
- DEMONSTRATE
  - SIMULATE
  - SEE IT IN THREE DIMENSIONS
  - BE OPEN TO CHANGE
  - BUILD PROTOTYPES
  
- REWARD THE PEOPLE
  - PSYCHOLOGICAL
  - FINANCIAL
  - PROFESSIONAL

A CASE STUDY IN BIG COMPANY ENTREPRENEURIALISM:  
THE HP-35 CALCULATOR

TIME: 1970

NEED: PORTABLE SCIENTIFIC COMPUTATION -  
A SLIDE RULE REPLACEMENT

CUSTOMER: 2 MILLION SCIENTISTS AND  
ENGINEERS (U.S. ONLY)

VALUE: SPEED OF COMPUTATION  
ACCURACY  
PORTABILITY  
DEPENDABILITY  
REASONABLE COST (PERSONAL PRODUCT)

HP-35

INNOVATION:

A PERSONAL, PORTABLE,  
SCIENTIFIC 10-DIGIT  
CALCULATOR

TECHNOLOGY:

LOW-THRESHOLD, LOW POWER  
P-MOS LSI (ION IMPLANTATION)

LIGHT EMITTING DIODE DISPLAY  
(CUSTOM BIPOLAR DRIVERS)

"OILCAN" KEYBOARD

DECIMAL SCIENTIFIC ALGORITHMS



## HP-35 RISK EVALUATION

RISK = TECHNOLOGY \* ARCHITECTURE \* SOFTWARE \* MARKET

TECHNOLOGY - HIGH

ARCHITECTURE - LOW

SOFTWARE - MEDIUM

MARKET - MEDIUM

⇒ MEDIUM OVERALL RISK, ESPECIALLY  
FOR A COMPANY SIZE OF H.P.

## WHY WAS HP-35 SUCCESSFUL

- FILLED A NEED
- EXPERIENCED DEVELOPERS
  - BEEN THROUGH 9100 DESK-TOP CALCULATOR
  - USERS THEMSELVES
- INDEPENDENT DEVELOPMENT ORGANIZATION (CORPORATE RESEARCH LABORATORIES)
- CORPORATE COMMITMENT
  - FINANCIAL RESOURCES
  - TECHNICAL RESOURCES
- CLEAR, UNWAVERING IDEA OF PRODUCT PURPOSE

## MARKET NEEDS - THE COMMON FACTORS

- PERSONALIZATION -  
EASY-TO-USE PRODUCTS
- COMMUNICATIONS - SYSTEMS VIEWPOINT
- LOW POWER, WEIGHT, SIZE
- RELIABILITY

THE BIG THREE TECHNOLOGIES THAT WILL  
FILL THESE MARKET NEEDS

1. VLSI
2. "INTERFACE" TECHNOLOGY
3. MACHINE INTELLIGENCE

REQUIREMENTS FOR THE ENTREPRENEUR:

THE PERSON

- HEALTH
  - PHYSICAL
  - EMOTIONAL
- COMPETENCE
  - INFORMATION "GATHERER"
  - ANALYTIC
  - DECISION MAKER
- MOTIVATION, DEDICATION
- FIRST-HAND EXPERIENCE, KNOWLEDGE
- RESULTS ORIENTED - A "DOER"

# NEW PRODUCT PROCESS

