STRATEGIC THREATS & RESPONSES

An Overview

Business Segments

I. Computer Systems
   Products - supercomputers, medium to large scale computers,
   Markets - scientific and engineering applications

II. Peripherals
   Products - memory devices, memory media
   Markets - OEM, end user

III. Computer Services
   Markets - end users of computer applications in four market areas:
   - Commercial - e.g. Arbitron, BIS, FIS, SBS
   - Engineering - e.g. CIM, Cybernet
   - Education & Healthcare - e.g. USSA, Medlab
   - Other - Ticketron, BTC division, Ag Services

In addition, the international markets for services has characteristics sufficiently distinctive that from a product and market strategy viewpoint, it must be treated separately.
I. Computer Systems - super computers/ETA

- Development perspective, historical; technology and architecture:

<table>
<thead>
<tr>
<th>CDC</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>6600</td>
<td>Atlas</td>
</tr>
<tr>
<td>6800/7600</td>
<td>Stretch</td>
</tr>
<tr>
<td>8600/Cray 1</td>
<td>Lark</td>
</tr>
<tr>
<td>205/?</td>
<td>Illiac IV</td>
</tr>
<tr>
<td>TI</td>
<td>360-9X</td>
</tr>
</tbody>
</table>

- Development costs
- GF-10 technology risk, time/market risk, implications of possible delays; building the base in '85, '86
- Base building - marketing costs are additional expenses on the front end which in turn increases the total financial risk
- Financing

Computer Systems - medium to large scale computers

Historical Perspective: Start and evolution of major product lines. Current status of market shares. Change factors - IBM, Japanese, small special purpose companies. Historical (10-year) view of Control Data's key ratios and indicators - number of units, average price, marketing costs (percent of revenue), technical costs (percent to revenue), reliability, maintenance costs, gross profit (percent to revenue).

Responses

* a) narrower product and market focus
* b) increased technical expense
* c) cooperation
* d) marketing methodologies

Outlook: 5-year, 10-year prospects, 5-year extrapolation of 10-year key ratio trend lines

*Primary responses prior to 1983

R. M. Price
January 1, 1985
II. Peripherals

Historical Perspective: Why Control Data began development of peripherals; development and growth of the business; current status of competition - IBM, Japanese, small companies; technological and competitive impact on performance and costs.

Response to Opportunities and Threats

* a) cooperation
* b) narrower product focus
* c) increased technical expense
d) market segmentation
e) total product cost focus
f) marketing methodologies

Outlook: 5-year, 10-year prospects for the businesses

*Primary responses prior to 1983

R. M. Price
January 1, 1985
III. **Computer Services**

Systems/peripherals threats clear by mid-sixties. Basic strategic response was to diversify into another less threatened market, i.e. services.

**Historical Perspective:** The beginning of computer services, evolution

**Characteristics of Service Businesses:** Case histories - Arbitron, CDI, Cybernet/Systems interplay, ups and downs, Ticketron, FIS

**Current Status:** Competition/market share in four major segments - commercial, engineering, education and healthcare, other

**Outlook**

---

R. M. Price
January 1, 1985
# Worksheet for Applications Innovation

## I. BASE BUSINESS

<table>
<thead>
<tr>
<th>Base Business Technical Expense</th>
<th>for Application (S/M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(all of Control Data)</td>
<td>$S$</td>
</tr>
<tr>
<td>Research</td>
<td>$0.3$</td>
</tr>
<tr>
<td>Development</td>
<td>$38.9$</td>
</tr>
<tr>
<td>Support</td>
<td>$17.3$</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>$56.4$</td>
</tr>
</tbody>
</table>

Base Bus. Tech. Eff. in COS: $15.3$ est., $16.1$ est., $20.0$ est., $51.4$ est.

Base Bus. Tech. Effort for Application (Computer Business only) $234.2M$ $210.7$

## II. DEVELOPING BUSINESSES

<table>
<thead>
<tr>
<th>Net Innovation Expense for Application Business (Cots &amp; Exp - Rev)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(S5</td>
</tr>
<tr>
<td>International Services</td>
</tr>
<tr>
<td>Business Development</td>
</tr>
<tr>
<td>USTA</td>
</tr>
<tr>
<td>Comp &amp; Consulnt Svs*</td>
</tr>
<tr>
<td>Fin &amp; Busines Svs*</td>
</tr>
<tr>
<td>Corporate*</td>
</tr>
<tr>
<td><strong>Total</strong></td>
</tr>
</tbody>
</table>

*Only those entities in Developing Bus.*
RMP's notes re March Board

March Board - Strategic Threats and Responses

Medium to large scale computers

The Beginnings:

1604 - Scientific & Engineering oriented
Univac 1103 - Repeat fltg pt. multiply - add
  Demonstrate use in applied math
  Many applications involve this operation
  Matrix multiplication - wing stresses
48 Bit word
160,160-A used as "satellite" - 6600 concept
3600  3200  6600  7600
Upper 3000 Lower 3000 Super Comp.
1 2 oper. Systems 2 Oper. Sys.

X NPL X CYBER70
(Across the board)

1973 (1972?) Product Strategy Task Force

Power of
Apple
IBMPC
1604
3360
3300
6600
Cyber170
Cyber180
THE NAKED COMPUTER

would get two million miles to a gallon of gasoline. 

Mind-boggling? No more than watches that play Space Invaders, electronic bartenders, cars that talk back, calculators that sing, smart bombs, computer-drawn cartoons, digital records, or intelligent carburetors.

Consider the following. Computers perform one hundred thousand calculations per citizen every second. The average citizen's name pops up in a computer thirty-five times a day, gets passed between computers at least five times a day. The U.S. census alone collects five billion facts about us—all of which are good computer fodder.

But that's nothing. The collective brainpower of computers shipped in the next two years will equal that of all computers shipped from the beginning of time to now. By two years after that, the installed computer capacity will have doubled again.

Apple Computer was incorporated in 1977. Tandy didn't ship its first Radio Shack TRS-80 computer until 1978. Together they have shipped over two million computers by now—more than IBM has ever shipped.

And this isn't counting computers disguised in other products: microwave ovens that talk, bionic limbs that twitch to brain-wave signals, missiles that have eyes, or games that gobble quarters.

No nook, no cranny of society will be spared the invasion. For better or worse, they're with us—whether you consider them milestones of progress or just so much electronic kudzu. But weep not. The little devils seem benign. Almost friendly, even.

When IBM did its first market forecast for computers in 1948 it decided not to invest in the business. The market was too small. By the end of 1983 there were thirteen million computers in use in the world. A total of $200 billion will have been spent buying them, and many more billions making them run. Between 1981 and 1982 the number of computers in the world doubled; between 1982 and 1983 they doubled again. In twelve months IBM shipped more of its personal computers than all the computers it had shipped up to 1983.

You think computers aren't "in"? Well, how much trendier can you get than to be the subject of a Jerry Rubin "Networking Salon"? That's right, Jerry Rubin, number one Yippie war protester of the 1960s. In 1968, he said, "My goal is at the age of thirty-five to act like I'm fifteen." Now pushing forty, Jerry's turned Networking Salon at S. W. A. T. (Society for Whoopee Advertising, Trade, and Technology). It's for business professionals from real estate, and such—in an atmosphere that defies convention. Some of New York's top computer professionals now attend the salon, held on December 1.

The first French restaurant Valenciennes, France. In 1978, the famed École Polytechnique of Paris started serving customers now order by pushing buttons: entree, hors d'oeuvres, etc. Instead of handing the host the order, employees receive incoming calls, can make choices. Customers seem to like it.

Technology may save rock music. Paul Mawhinney, owner of the WIND of Chicago has started collecting the informa-
tion WIND of Chicago has a library runs on an Apple computer: computers. Instead of handing the host the order, employees receive incoming calls, can make choices. Customers seem to like it.

The first home computer? The Honeywell H316 "Kitchen Catalog. The $10,600 system could be programmed for many uses, including keeping track of golf investments.

Maybe attending a computer convention isn't so bad after all, especially if you're at the first Networking Salon this year. Jerry's turned it into a computer convention. Some of New York's top computer professionals now attend the salon, held on December 1.

The first French restaurant Valenciennes, France. In 1978, the famed École Polytechnique of Paris started serving customers now order by pushing buttons: entree, hors d'oeuvres, etc. Instead of handing the host the order, employees receive incoming calls, can make choices. Customers seem to like it.

Technology may save rock music. Paul Mawhinney, owner of the WIND of Chicago has started collecting the informa-
tion WIND of Chicago has a library runs on an Apple computer: computers. Instead of handing the host the order, employees receive incoming calls, can make choices. Customers seem to like it.
Personal Computers

An account of their hardware, software, applications and current proliferation. By making computers accessible to untrained people they promise to bring about the long-heralded computer revolution

by Hoo-min D. Toong and Amar Gupta

If the aircraft industry had evolved as spectacularly as the computer industry over the past 25 years, a Boeing 767 would cost $500 today, and it would circle the globe in 20 minutes on five gallons of fuel. Such performance would represent a rough analogue of the reduction in cost, the increase in speed of operation and the decrease in energy consumption of computers. The cost of computer logic devices is falling at the rate of 25 percent per year and the cost of computer memory at the rate of 40 percent per year. Computational speed has increased by a factor of 200 in 25 years. In the same period the cost, the energy consumption and the size of computers of comparable power have decreased by a factor of 10,000.

The result is the advent of the personal computer, which for less than $500 can put at the disposal of an individual about the same basic computing power as a mainframe computer did in the early 1960's and as a minicomputer did in the early 1970's. Twenty years ago the cost of a computer could be justified only if the machine met the needs of a large organization. The minicomputers introduced in the 1970's are appropriate for a department or a working group within such an organization. Today the personal computer can serve as a work station for the individual. Moreover, just as it has become financially feasible to provide a computer for the individual worker, so also technical developments have made the interface between man and machine increasingly "friendly," so that a wide array of computer functions are now accessible to people with no technical background.

The first personal computer was put on the market in 1975. By the end of this year more than a million personal computers will be in service in the U.S. alone. In 1981 total sales of personal computers and their accessories in the U.S. amounted to $2.2 billion; sales are expected to surpass $6 billion in 1985. There has been talk of a "computer revolution" ever since the electronics industry learned in the late 1950's to inscribe miniature electronic circuits on a chip of silicon. What has been witnessed so far has been a steady, albeit remarkably speedy, evolution. With the proliferation of personal computers, however, the way may indeed be open for a true revolution in how business is conducted, in how people organize their personal affairs and perhaps even in how people think.

Anatomy of a Computer

A computer is essentially a machine that receives, stores, manipulates and communicates information. It does so by breaking a task down into logical operations that can be carried out on binary numbers—strings of 0's and 1's—and doing hundreds of thousands or millions of such operations per second. At the heart of the computer is the central processing unit, which performs the basic arithmetic and logic functions and supervises the operation of the entire system. In a personal computer the central processing unit is a microprocessor: a single integrated circuit on a chip of silicon that is typically about a quarter of an inch on a side. Other silicon
CHAPTER 1

THE INVASION:
Computers by the Zillion

Picture ENIAC, the first computer. In 1946 it was the scientific marvel of the day, a thirty-ton triumph, standing two stories high and covering fifteen thousand square feet. A boxcar could fit inside it. Yet today, a $1,500 Radio Shack TRS-80 computer, smaller than a stereo, can add and subtract twenty times faster. Just the cost of the electricity to run ENIAC for a week could buy a couple of Radio Shack computers; an hour's worth could buy its computational equal in hand-held calculators.

The human equivalent of today's average computer is one million mathematicians working twenty-four hours a day doing sums, consuming a ton of scratch paper a second. The level of miniaturization in today's computer memory matches that of inscribing the Bible on the head of a pin.

Had automobile technology advanced at the rate of computer technology over the past thirty years, a Rolls-Royce would cost $2.50 and
A-Market Shares
1983 shipments by 2 digit 5K code
1984 shipments by 2 digit 5K code
1985 shipments by 2 digit 5K code
Competitive shipments - can we get the data?

-Trends/Ratios

-Major Thrusts --
Specialized computers
"workstations"
IBM
Japanese
Take markets from A above and point out unique strengths and weaknesses

-Key success factors - outlook -
Modest revenue growth - 5-10%/yr?
Profitability outlook modest
ROIC below company average
Why continue? a. Technology will allow
foster/specialized designs
CAD, custom LSI
b. Cooperation with semi-cond
mfgs (who?) can give us
economies of scale
It is market expertise that only comes with years of effort/learning. The problem is to rapidly shift the vehicle of
delivering that expertise.

In that sense "services" (which conventional wisdom still sees
as the delivery of "cycles" through comm. lines and dumb
terminals) and "systems are rapidly merging and will be
indistinguishable lines of business for Control data by 1990.
"Hardware" will be VLSI, integration of same. Only
semiconductor mfgrs, IBM, Japanese companies will be in the
hardware business. That does not mean we will not deliver
products as part of rendering a service. In fact for the last
five years the greatest weakness of our services businesses is
they couldn't figure out how to adapt and market hardware
deVICES as part of their service.