Bob Lucky - will help but can't commit to meetings - invited to come down and talk to his people

3/31 — 4/25 out of country
I.B. Cohen

exhibits

RECIPES FOR INFORMAL LEARNING ABOUT COMPUTERS THROUGH EXHIBITS

Proposal for the Publishing of Exhibit Cookbooks

Motivation

The Computer Museum is situated in one of the most computer knowledgable locations of the world. It lies a stone's throw from MIT and a short drive from the Route 128 industries. One of the great strengths of the Museum is its ability to stimulate expert volunteers from the Boston area to help create novel, instructive and entertaining hands-on exhibits. For example, about 70 volunteers helped develop the Smart Machines exhibit on robotics and artificial intelligence that opened in June 1987.

The Museum is frequently visited by curators and exhibit developers from museums and science centers throughout the US and from overseas who seek to learn about our exhibits, and find out 'how we do it.' Conversations with these visitors have reinforced the conclusion that the Computer Museum does indeed occupy a very special niche: our close contact with the Boston area academic communities and industry gives us access to expert help that other museums cannot match. In addition, the Museum has built up valuable in-house experience through four years of building and maintaining computer-based exhibits.

It seems appropriate to share the fruits of the Museum's exhibit development process with other Museums in a systematic fashion. Such sharing could make our exhibits available to tens of millions of museum-goers a year, as opposed to the 100,000 who visit The Computer Museum annually. In addition, recipient museums would save effort, and there would be less 'reinvention of the wheel.' Finally, it would reduce innefficient use of Computer Museum staff during time-consuming individual visits by outside Museum staff. The larger target audience for Computer Museum exhibits is also likely to stimulate greater contributions of equipment and effort from the donating institutions and individuals, thereby increasing the flow of new exhibits.

Cookbooks of Computer Exhibit Recipes

The Museum proposes to make its exhibits available through the distribution of 'Cookbooks' of recipes for replicating exhibits that have proven successful at The Computer Museum. The exhibits will be selected on the basis of educational potential and technical feasibility. All recipes will require only standard, commercially available, low cost hardware. Exhibits requiring costly workstations or minicomputers will not be included.

Exhibit cookbooks were first produced by the Exploratorium, the leading San Fransisco science center. The Exploratorium has had an enormously positive influence on science centers and museums across the world. Many institutions have replicated Exploratorium exhibits by using their cookbooks.

Computer Museum cookbooks would contain the following information:

- topic addressed by the exhibit
- detailed list of required hardware and sourcing addresses
- disc containing the exhibit software
- suggested exhibit text
- suggested illustrations or other ancillary material
- references for background reading
- list of other exhibits on related topics.

As of January 1988, the Museum has about twenty exhibits which would lend themselves to distribution as cookbook recipes. The topics they cover include computer graphics, artificial intelligence and programming. A further dozen exhibits suitable for distribution are expected to be developed for the Museum's Personal Computer Exploration Center, planned to open in late 1988.

The Museum would test the efficacy of the recipes with a partner institution. The Franklin Institute in Philadelphia has offered to act as a test site and provide feedback on the clarity, feasibility, and impact of exhibits based on Computer Museum recipes. They are a particularly appropriate institution for this role as they have a large visitor attendance, and employ one of the country's foremost exhibit evaluators.

Pilot Cookbook Recipes

The Museum proposes to initiate the cookbook project by preparing pilot recipes for two exhibits on computer graphics. The two exhibits selected are among those most frequently sought after by visitors from other Museums.

Pilot Recipe Number 1: Color By Numbers

This exhibit demonstrates the use of a color table in assigning colors to regions of an image. Visitors can mix various amounts of red green and blue to create a color for each of ten regions of a picture. The picture is a country scene, and the regions correspond to the sky, sun, clouds, trees, stream, grass, and so on. The colors in the image change instantaneously as visitors mix in new colors. This provides immediate reward and encourages the visitor to experiment further.

In addition to demonstrating the flexibility a color table confers on an electronic image, this exhibit also offers insight into color mixing. Many visitors simply enjoy seeing what colors result from different mixtures of red, green and blue.

Pilot Recipe Number 2: Cellular Automata

Since their invention by John Von Neuman in the 1940's and initial popularization by John Conway through the game of Life in 1970, cellular automata have become widely adopted, both for recreation and as models of many natural processes.

The Museum has an exhibit which allows visitors to play with a dozen different cellular automata rules, one of which is the game of Life. Some rules represent various of physical processes, such as billiard balls rolling on a surface, droplets of liquid coalescing, or a material becoming magnetized. Other rules show spectacular patterns of shape and color. Visitors choose a rule, the starting configuaration for the cellular automaton, and control the speed of evolution. Other options include the ability to freeze, single step, go backwards and learn about the rule.

Budget

The effort required to prepare each recipe will depend on the details of its current implementation at The Computer Museum. The following estimates represent an anticipated average cost to convert one Computer Museum exhibit into a tested Cookbook recipe.

ITEM	COST PER RECIPE
programming	$5,000
documentation	$2,500
materials	$500
testing and debugging	$2,000
TOTAL	$10,000

It is expected that a recipe would be ready for testing 3 months after the receipt of funding. A further 3 months would be required for evaluation from the testing institutions and the incorporation of improvements.

The project would be directed by the Computer Museum's curator, Dr. Oliver Strimpel. He has been responsible for all major exhibit development at the Computer Museum. In particular, he directed the development of the 4,000 square foot exhibit 'The Computer and the Image'.

Proposal To ACM SIGGRAPH

The Museum seeks $20,000 of seed funding from ACM SIGGRAPH to develop the two pilot Cookbook recipes on computer graphics outlined above. This grant would enable the Museum to create and test two quite different exhibit recipes. After completion of the pilot project, the Museum would be able to assess the value of the Cookbook and its effectiveness in making exciting and educational exhibits available to a wide audience.

If the pilot project is successful, the Computer Museum will seek support from industry to proceed with a full scale program of publishing and distributing exhibit cookbooks.

END 1/22/88

exhibits

COMPUTERS, COMPUTERS EVERYWHERE

DRAFT PROPOSAL FOR AN EDUCATIONAL FILM ON COMPUTERS, PAST, PRESENT AND FUTURE

Concept

The Computer Museum has long recognized the need for a top quality introductory film to present computers to museum visitors, school students, and the interested general public.

The Museum proposes to create two films. The first would be 35-40 minutes long, and would be suitable for widespread distribution among schools, industry, and other institutions. The second film would be derived from the first film, but would be only 10-12 minutes long. This version would be suitable for continual screening at The Computer Museum's entrance.

The film must be very fast-paced and engaging. It must build on viewers' experiences, and rapidly carry then into exciting developments beyond their experience. In addition, the film must have concrete educational objectives so as to make it suitable for classroom use.

Theme

The film will present computing through its diverse applications. For each application, it will show what the computer is actually doing, revealing the fundamental unity of all computing activity as the gathering, manipulation, and presentation of information.

The story will be arranged chronologically by application, starting with the military and scientific, then business uses, presenting an ever widening circle of applications. The technology, software or hardware, that enabled each application will be highlighted.

The presentation of each application will be in three parts:

1. What exactly is the application?
2. What is the computer doing?
3. How does this affect people's lives?

Preliminary List of Application Areas

Ballistics
Air Defence
H Bomb
Election Forecast
Census
Business Payroll
Weather forecasting
Computer-aided design (cars, airplanes)
Word Processing
Modelling and simulation (the economy, a business, a physical system)
Visualization (science, engineering)
Credit cards
Home banking, shopping and ATM's
Spreadsheets & planning
Embedded controllers in home appliances and cars
Graphic design
Music
Simulation (flight simulation)
Robotics

Style

The film should probably be presented by a well-known popularizer, of the James Burke or David Attenborough variety. The presenter should be filmed on site, explaining the applications, and his/her voice should also be used to narrate other portions of the film.

The Museum's unique film collection of vintage computers should be used as a resource for the early applications.

Then and now comparisons will occasionally be appropriate, but many of the more recent applications do not really map directly onto earlier ways of doing things.

Some possible then/now comparisons include
- adding machine versus spreadsheet
- census data processing over the past 100 years
- word processing versus typewriters
- CAD versus drawing board

Additional Content

The film could throw light on careers in the computer field by presenting brief portraits of selected engineers, programmers, and so on who were responsible for some of the featured applications. This facet may be of particular importance for school audiences.

Budget

The Museum proposes that the film's sponsor take responsibility for the production of the film. This includes the employment of a director and producer for the film, as well as the physical costs associated with creating a film. The Computer Museum will provide resources to determine the main story and content of the film, supply historical footage and other materials from its collection. To ensure the film's objectivity, it is important that The Museum retain editorial control. A close consulting relationship with the director is envisaged.

The following budget covers the resources to be provided by The Computer Museum towards the creation of both the long film (duration 35-40 minutes) and the short film (duration 10-12 minutes).

Research & development	$20,000
Provision of historical materials	$10,000
Editorial consulting	$20,000
TOTAL	$50,000

The film is expected to take 6-8 months to produce, starting as soon as funds are committed. The Museum would start screening the short film as soon as it was received.

The Museum would collaborate with the sponsor to ensure widespread distribution of the film to schools, colleges, and industry.

END OS 2/11/88

exhibits

Proposal for
A TRAVELLING EXHIBIT

YOU COUNT!
The Technology and Impact of Censuses

Celebrating the 100th Anniversary of
Automating the 1890 US Census

The Computer Museum and
SITES, The Smithsonian Institution Travelling Exhibit Service

Sponsored by UNISYS

Outline of the proposal
- Background
- Organization
- Promotion and Audience
- Exhibit Plan
- Educational Components
- Schedule
- Budget

Background

In the 1880s, it became clear that the 1890 US census would never be complete without new technology. Faced with Constitutional proportional representation, the US Congress was forced to consider radical new technologies to achieve this political purpose. A competition was held that resulted in an electrified card-counting machine installed to tabulate the 1890 census. Quickly other nations, including Russia and Austria, purchased census tabulating machines for their own use. From this time forward, the US Census Bureau has been at the forefront of using new technology for data processing. They bought the first UNIVAC I, the first general purpose commercial electronic computer, for the 1950 census. Currently, they use advanced machines and techniques that provide accurate censuses.

A travelling exhibit will explain the changing technologies and social issues that drive censuses. The exhibit will be historical and interactive, based on artifacts, films, photos, and the use of computers to pose questions, solve problems, and create simulated scenarios. Both social and technical questions will be explored in six vignettes: the early censuses; 1890; 1930; 1950; 1990; and the future. The displays will relate the census to important policitcal, economic, social, and natural resource issues. The exhibit will be engaging and dynamic, attracting an audience of families, educators, and students.

Organization

The exhibit will be developed by The Computer Museum and will open no later than October 1989 to celebrate the 1990 census. It will then travel to at least ten cities over a minimum of two years.

The exhibit will be presented to SITES, The Smithsonian Institution Travelling Exhibit Service, to travel under their aegis. SITES is the outreach arm of The Smithsonian, providing quality educational exhibitions throughout the United States. Preliminary discussions have determined their interest in this exhibit. If accepted, SITES markets and manages the exhibit during its period on the road. SITES will work with the developer (The Computer Museum) and the sponsor (UNISYS) to book the exhibit at specific institutions and in specific cities.

The project director will be Dr. Gwen Bell, Founding President; the interactive computing components will be under the direction of Dr. Oliver Strimpel, Curator. In addition, an historian and a coordinator will be hired. An outside design firm and fabrication firm will be selected. A small review panel will include Professor I. Bernard Cohen, Harvard University, Betsy Hennings, The Smithsonian Institution Travelling Exhibit Service, and a nominee of the sponsor.

Promotion and Audience
This project can and should be promoted as broadly as possible in the context of celebrating the 100th anniversary of mechanized data processing. Nationwide news articles and television spots should be targetted. The Museum has achieved such coverage in several anniversary events, including the 40th anniversary of the ENIAC and the 25th anniversary of computer games.

To promote interest in the exhibt a national junior high school essay competition on the theme "You Count" could be created. This could also be repeated at the local level for each exhibit site. (No budget has been considered for this promotional feature.)

Over two years, one to two million people will see the exhibit and its audience via the media will be hundreds of times that number. Both science and history museums are prime candidates to book the exhibit.

Exhibit Components
1. The First Censuses: A survey of various early attempts to count people, e.g., the Romans, the English doomsday book, and the early US.

2. 1890: The advent of the electrified tabulating machine and the great immigration to the US. A reproduction of the original Hollerith card punch and tabulating system can be used for demonstrations. In addition, a working model will allow the visitor to use the pantograph system to punch his own card. An interactive component will encourage the visitor to speculate about: "What would have been the character of the Congress if the census had not been completed? Would the Democrats or Republicans have had more control? Who would not have been elected? What was the impact of redistricting on the makeup of the Congress?

3. The 1930's: The total electrification of the Census. A recreation of a card computing system of the era and a film of a card system in action will capture this period. Social questions relating to the stockmarket crash, the mechanization of agriculture, and the introduction of such systems as Social Security can be illustrated with simulations of various scenarios.

4. The 1950's: The introduction of electronic computing. A recreation of the UNIVAC I will be used to establish contrasts with the earlier card tabulating systems showing the order of magnitude change in speed and storage space. Selecting appropriate data bases from this era to illustrate postwar population growth will allow the exhibit to be handtailored to each site.

5. The 1990 Census: The configuration of the current census machines. The emphasis will change from the hardware to the software improvements. The increasing range of data collected by the census from 1890 to 1990 will be shown. The use of statistical techniques, such as sampling, and specialized software development will be illustrated. Cooperation with the Census Bureau will be important to explain their current operation.

6. The Future: How do new technologies relate to the Census? What are new data processing, storage, programming, and data input systems that might be implemented? Video will be used to present the visions of experts and forecasters. The visitor will be provided with a way to record his own views.

Synthesis: Once again, a global view would be shown. A clock showing the growth of the numbers of computers and the numbers of people around the world. The question, "Why do 'YOU COUNT'?" will be explicited asked. Innovative ways will be developed to challenge and intrigue the visitor.

Educational Materials.

This exhibit lends itself to the development of a brochure that explains a brief summary of the history of computing and the census. Such a pamphlet would be produced for free distribution in teacher pre-visit materials to aid in school group visits and for sale in museum shops.

A special school package with pre- and post-visit materials will be developed for the junior-high level. This will include bibliographies, lists of films, and other materials that the teacher might use, and excises for classroom use.

Finally, contacts will be made with a publisher for a book based on the research carried out for the exhibition.

Schedule

1/1/88 - 7/1/88
- Secure funding
- Make agreement with SITES
- Establish a development team
- Start historical research

7/1/88 - 1/1/89
- Select designer and fabricator
- Complete historical research
- Specify interactive elements
- Outline educational materials

1/1/89 - 7/1/89
- Complete design
- Begin testing interactive components
- Complete editing exhibit text, films, and photos.
- Assemble artifacts

7/1/89 - 9/30/89
- Complete fabrication
- Install exhibit

10/1/89
- Open at The Computer Museum
- Fabricate crates

2/1/90
- Open at Another Museum

	7/1/88	1/1/89	7/1/89	TOTAL
CASH NEEDS				
Exhibit Development				
Historic Scenario	20,000	5,000		25,000
Interactive Components	10,000	20,000	10,000	40,000
Exhibit Coordination	10,000	10,000	5,000	25,000
Exhibit Design		50,000	15,000	65,000
Exhibit Fabrication		40,000	60,000	100,000
Equipment			10,000	10,000
Promotion			25,000	25,000
TOTAL CASH NEEDS	$40,000	$125,000	$125,000	$290,000
IN-KIND CONTRIBUTIONS				
Twelve Personal Computers		60,000		60,000
Four Large Video Monitors		20,000		20,000
Programming Interactive Elements		50,000		50,000
Editing for Video		15,000		15,000
Public Relations		25,000		25,000
TOTAL IN-KIND CONTRIBUTIONS				$160,000
GRAND TOTAL EXHIBITION COST				$450,000

* No estimation has been made for the contribution of SITES to the travelling component. On acceptance, they often agree to market the exhibit, pay for crating, and cover the insurance.

exhibits

PERSONAL COMPUTER EXPLORATION CENTER

PROPOSAL FOR A MAJOR NEW EXHIBIT AT THE COMPUTER MUSEUM

The Computer Museum proposes to develop a major, hands-on exhibit devoted to the history, technology and applications of the personal computer.
The displays will be dynamic, attracting attention of visitors with a wide range of computer experience.

Motivation

Public interest in the personal computer (PC) is high. It is a mass-produced item, advertised and sold like any other electrical appliance. Yet its range of applications and potential to affect professional and recreational life is almost limitless. In addition, its widespread introduction into schools and colleges is beginning to radically alter teaching, learning and research. The public is intrigued by PC's, and would like to know more about them. This is particularly true of people who are considering purchasing one, or who already own one.

The Personal Computer Exploration Center (PCEC) at The Computer Museum would serve an important educational function. It would provide the public with an objective, highly accessible source of information on PC's. PC's would be presented in a way that focussed on the unit as a consumer item, enabling the public to project themselves and their needs into the exhibit.

Size, Timescale and Cost

The PCEC would occupy 1 -1$\frac{1}{2}$ small bays of the Museum occupying 2,500 - 3,750 square feet. Exhibit development would start as soon as funding was obtained. The exhibit would open one year after funding was received.

The exhibit would cost from $800,000 to $1,200,000 depending on its overall size. Thirty percent of the resources would be derived from in-kind donations of hardware, software and the effort of individuals. Seventy percent ($550,000 - $800,000) would be needed in cash for the research and curatorial development, design, fabrication, display equipment and audio-visual presentations.

Content

1. Where Do PC's Come From?

The Museum has the world's finest collection of early PC's, including the first PC (Kenbak-1, 1971), the first computer to use a microprocessor (Micral, 1973) and an Apple 1 (1975). This section will display the dramatic trend of decreasing cost and increasing performance, using 10-20 historically significant machines as milestones. Projections into the future will reveal how the fast pace of change is expected to continue, emphasizing the spread of PC's across different sections of the population and across the world. Vintage magazines, advertisements and other ephemera will evoke the spirit of the early "hacker" days. Biographies of the key entrepreneurs and inventors will also add to the human interest of the story.

2. How PC's Work

A large dynamic model will show the landscape inside a PC, with magnifying glasses focussing on key components. These will include the microprocessor, memory, display, floppy and hard disk drives, ports and printer. The display will be exciting to watch, and will be large enough to act as a focus for tour groups of 30 people. The exhibit will aim to demystify the parts of a computer that the public may have heard of, but not know anything about. In addition, light and sound effects will amaze and delight all visitors, arousing the curiosity of even the least technically minded and thereby imparting a new level of fundamental computer literacy.

3. PC Users

The largest section of the exhibit will present 5-8 stereotypical users of PC's, complete with mock-ups of their work or home environments. For each user, a PC that best suits their needs will be displayed. The PC will be running a selection of software tpyical of that user. The public will be able to interact with simplified versions of the software that yield rapid payoff and insight into the functions being performed. Other functions will be presented non-interactively through video or previously composed screens of text, graphics, and animation. The following list indicates some of the stereotypes and software that might be included.

STEREOTYPE	PC	SOFTWARE
high school student	Apple II	games, educational, bulletin bds
professional	IBM System/2	word processing, spreadsheet
musician	Apple Macintosh	composition, sequencing
graphic artist	Amiga	paint, draw
small business	PC Clone	accounting, billing, tax
executive	Toshiba laptop	word processing, calendar
engineer/designer	NEC APC IV	CAD

The specifications and approximate cost of each displayed PC will be indicated. Each scenario will have several stations to increase the visitor throughput. There will be a total of 20-30 hands on exhibits.

The rapid progress in the field of personal computing makes it essential that the exhibit be thoroughly updated on a regular basis. Computers and software should be considered for upgrade on an 18 month cycle. This will ensure that the exhibit retains its dynamic state-of-the-art character.

4. To Learn More

A small section near the exhibit's exit will offer information about where to learn more about PC's and their uses. This will include literature on user groups, magazines, books, seminars, classes and other sources of information and training. In addition some reference publications and on-line resources will be available.

END
OS 1/13/88

exhibits

PROPOSAL FOR ENHANCING THE SAGE EXHIBIT AT THE COMPUTER MUSEUM

The first exhibit seen by visitors at a museum bears a special responsibility. It must sustain and build upon visitors' expectations, encouraging the largest possible number of museum-goers to enjoy and learn from their visit.

Powerful first impressions can be created by visually captivating objects and by powerful themes. The SAGE exhibit can make effective use of both approaches. Following the first approach, the Museum plans to make the SAGE artifacts more dramatic. Layout changes, lighting improvements and emphasis on the overall size of the computer will transform the exhibit. The major theme will be "Then and Now", in which both the hardware and the application will be compared with their modern equivalents. The layout of the proposed enhanced exhibit is shown on the maps on pages 4 and 5.

Displaying the SAGE Artifacts

The Museum has preserved about one third of a complete SAGE system, consisting of two arithmetic units, magnetic core, drum and tape units, operators and maintenance consoles, and six graphic display terminals. This equipment is currently on display. However, the exhibit needs to unite all these artifacts, showing that they belong to a single, giant computer. Some specific ideas for improvement are:

1. Wires connecting all of the SAGE units together. Most visitors do not realize that the units on the sixth floor and the blue room on the fifth floor are all part of one machine. The connection can be emphasized by running cables up to the ceiling and stretching between the machines.

2. The telephone handsets on the arithmetic units and the console should be active. When visitors pick up the phones, voices should carry on conversations similar to those that actually occurred during operations. A commentary should explain what is being simulated.

3. The master program for SAGE consisted of about 60,000 instructions. To convey some idea of the magnitude of such a program, and the storage medium used, several towers of punched cards representing the program will be displayed. Text and graphics will support some simple descriptions of the programming languages used and the nature of the tasks performed by the software.

In addition to 'theatrical' enhancements, the historical significance and role of SAGE will be presented through a series of signs and photographs that should appeal to the Museum's more serious visitors. The machine is significant both in the history of computer engineering as well as in its innovative application to radar surveillance and intercept planning. It embodied interactive computer graphics, making use of the light gun and large graphic display screens. It pioneered the use of very large numbers of vacuum tubes in a single machine, employing novel techniques of preventive maintenance.

Main Theme: Then and Now

Perhaps the most rapid evolution of technology in any field has occurred with the computer. It is fitting that The Computer Museum higlight this in the entry exhibit. SAGE provides a fine example of the state-of-the-art in computer technology of the 1950's. In performing its task it revolutionized US air defence. Visitors will witness the dramatic progress in the technology by seeing today's hardware next to that of SAGE. The following is a suggested list of SAGE artifacts and their modern counterparts:

SAGE	Modern Counterpart
arithmetic unit	80386 microprocessor
core memory stack	4 Megabit RAM chip
magnetic drum unit	3.5 inch floppy disk
operators console graphic display terminals	high resolution raster display
model of a complete SAGE system	workstation

Equally significant is the evolution of the tasks carried out by SAGE, both in the military and civilian spheres. For example, AWACS, an entire command and control center with greater versatility and power than SAGE, fits into a commercial jetliner and operates in flight. Descendents of the SAGE technology also manage airline traffic for FAA. Descendents of the SAGE operating system have led to modern airline passenger reservation systems. Displays of such contemporary applications will be presented in the exhibit, helping to place SAGE in perspective for the visitor. Images, video, text and hands-on demonstrations will provide examples of the tasks carried out by the computers in these modern systems.

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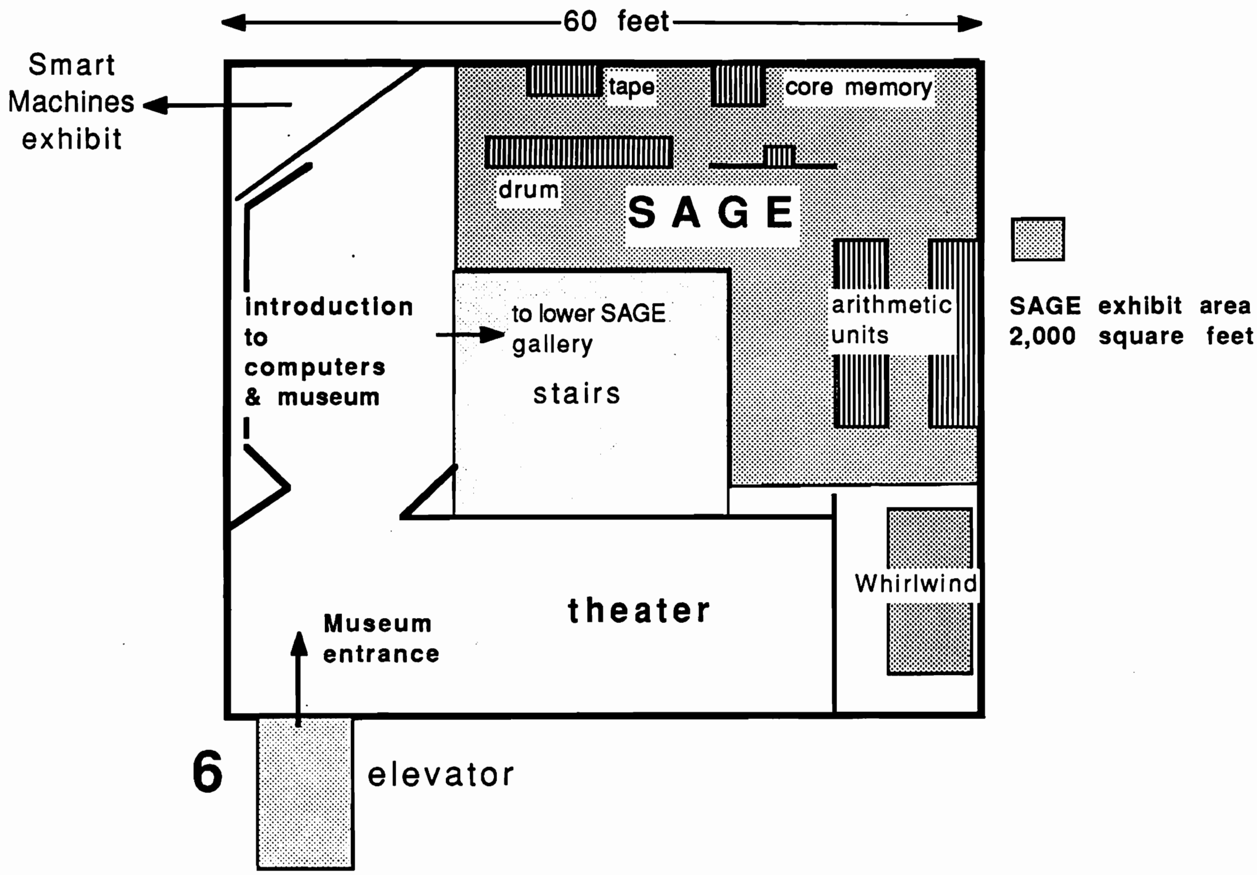
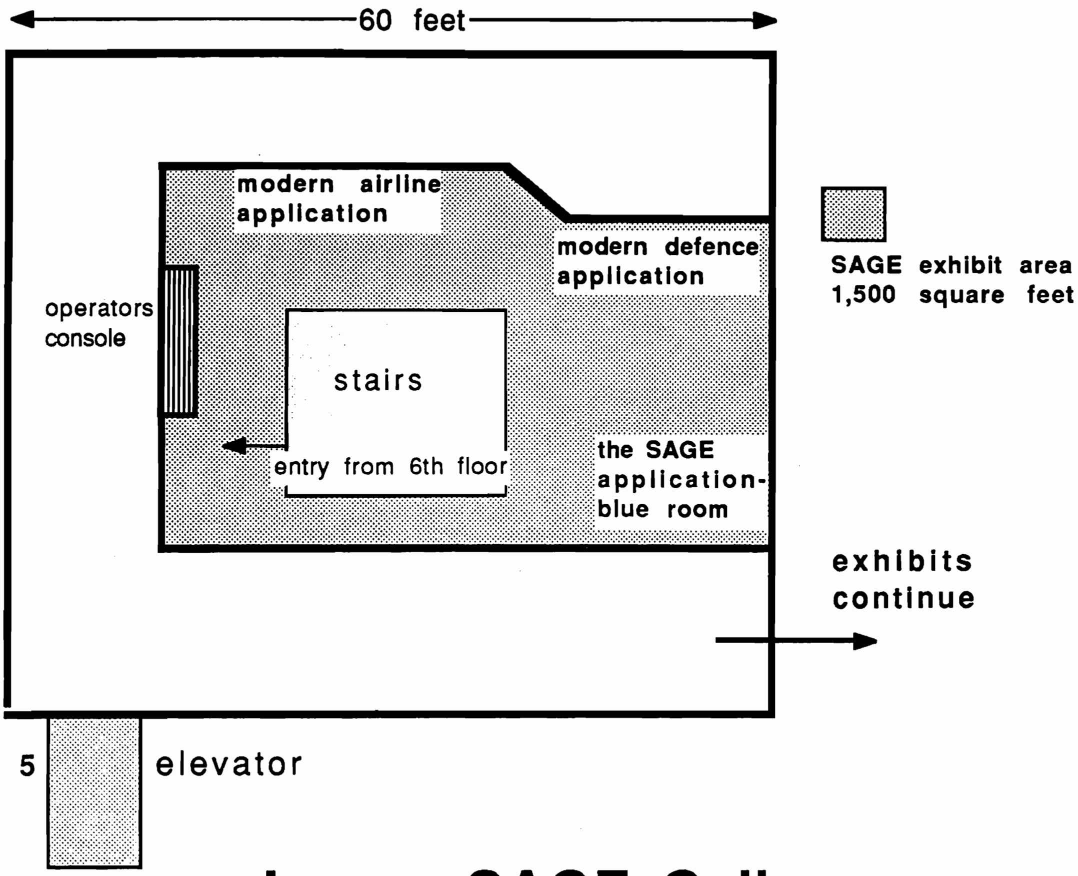


Upper SAGE Gallery



Lower SAGE Gallery

THE COMPUTER MUSEUM

SAGE EXHIBIT ENHANCEMENT: BUDGET

The SAGE exhibit enhancement covers a total exhibit area of 3,500 square feet, spread over two galleries at The Computer Museum. Exhibit development would start as soon as funds were received and take approximately 8 months to complete.

The exhibit enhancement proposal of January 13 1988 would cost a total of $133,000, of which about 35% would be derived from in-kind donations of hardware, software, equipment and time from individuals. The remaining 65% ($85,000), would be needed in cash for exhibit development, design, display equipment and fabrication. The following table gives an approximate breakdown of the expense, divided into two phases. In Phase 1, the exhibit development and design is carried out and improvements to the exisiting exhibit are effected. In Phase 2 the new displays on the modern descendents of SAGE are implemented.

ITEM	COST ($K)		IN KIND DONATIONS ($K)
	PHASE 1	PHASE 2	
exhibit design	15		
exhibit construction	14	10	
graphics & text	9	2	5
audio production	2		3
video		3	5
exhibit development	10	10	10
computer hardware		5	25
opening event		5	
TOTAL COST	50	35	48

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exhibits

TAXONOMY OF CURRENT AND PROPOSED EXHIBITS

Taxonomy based on ACM Computing Reviews

**** = very suitable topic for a Museum exhibit**
*** = moderately suitable**

C = current P = proposed

** hardware

C Timeline
IC

P The Chip Comes of Age
Memories

* computer systems organization

C Seymour Cray
See it Then - CW Communications Theater

* software

P Software

data

theory of computation

mathematics of computing

information systems

** **computing methodologies**

C The Computer and the Image
Smart Machines

P Computer Graphics and Simulation

** **computer applications**

C SAGE

P Census Centenary
Computing in Science
Computing in Medicine
Computer Publishing
Computer Art
Computer Games
SAGE Recreation
Defence Computing

** **computing milieux**

C Manufacturing
1960's Business Computing - Insurance
See it Then - CW Communications Theater
Personal Computers

P Computer Evolution Theater
Personal Computer Exploration Center
Information Age
Ubiquitous Computers
Computing in Japan/USSR ...
Computer Demography

END

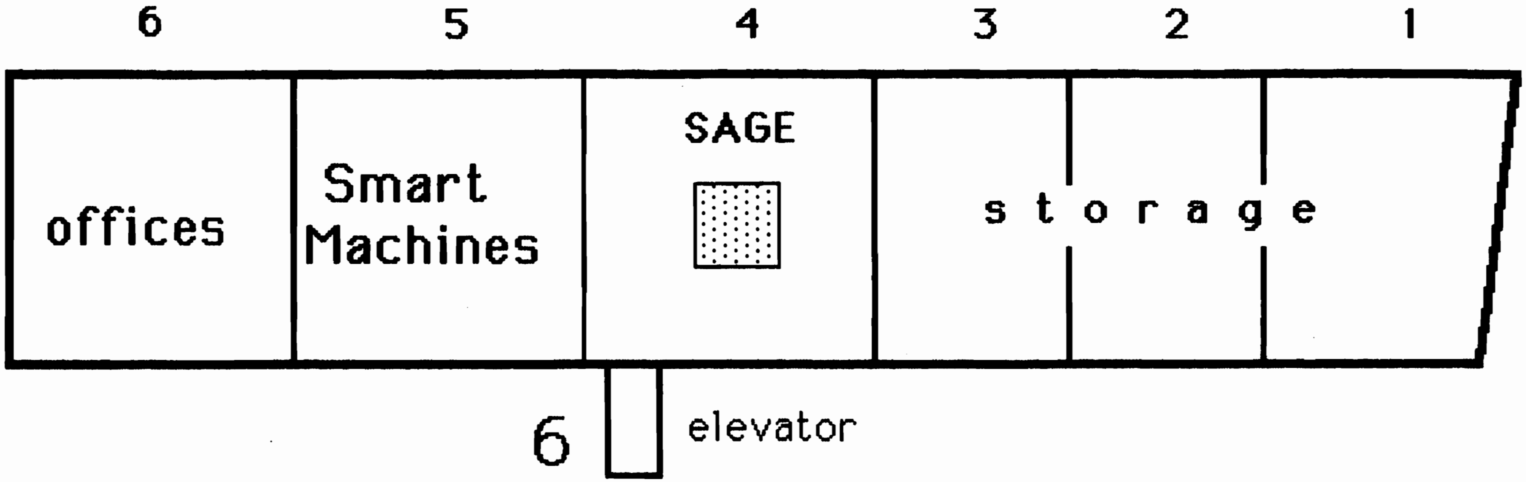
New Exhibit Ideas

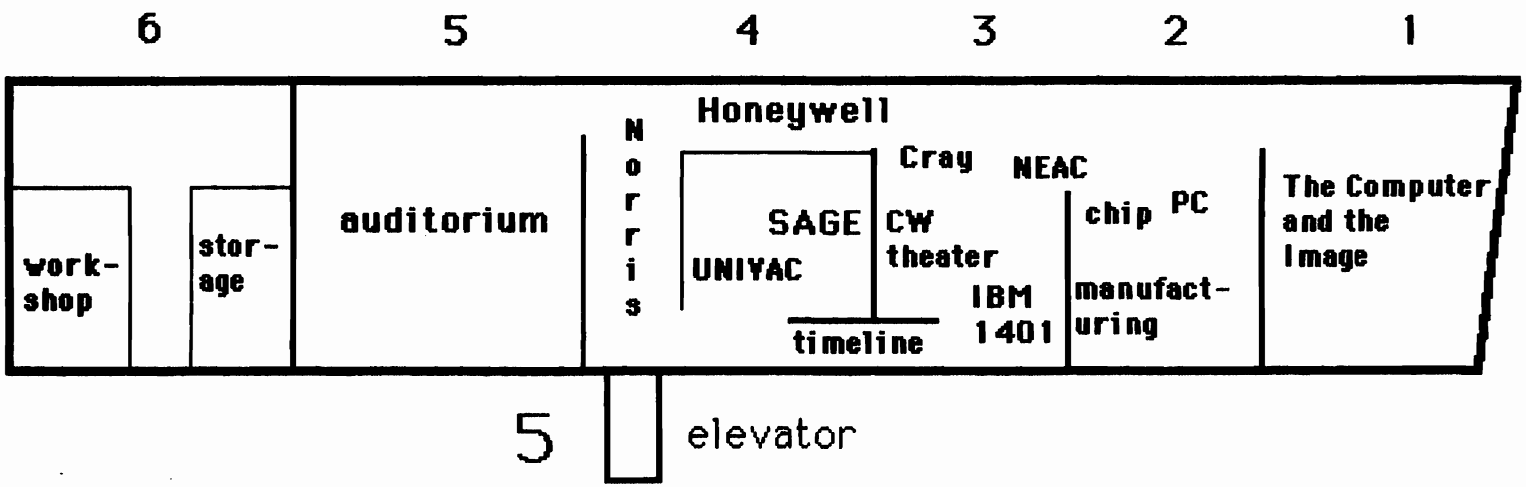
EXHIBIT TITLE	SIZE (sq ft)	TOTAL COST ($K)	CASH COST ($K)	PUBLIC INTEREST	SOCIAL IMPACT	ARTIFACT CONTENT	STATE-OF-THE-ART	HANDS ON	FILLS GAP	TRAVEL T COOK-BOOK C
Medium Effort										
Computer Evolution Theater	800	170	150	med	med	low	low	low	yes	T (video)
Memories	1,000	300	200	med	low	high	high	high	no	T
Computing in Science	1,500	500	300	med	low	low	med	med	no	-
Computing in Medicine	1,000	350	200	med	high	low	med	med	no	-
Computing in (country)	1,500	600	300	med	med	med	med/high	low	no	T
Computer Publishing	750	300	150	med	high	low	high	high	no	T
Computer Art	1,500	500	300	med/high	low	low	low	low	no	T
Computer Demography	800	250	150	med	med	low	low	med	no	-
Computer Games	1,000	300	200	med/high	low	low	high	high	no	-
Large Effort										
PC Exploration Center	4,000	1500	800	high	high	med	high	high	yes	C
The Chip Comes of Age	2,500	1200	800	high	high	high	high	high	yes	T
Software	2,500	800	400	med	low	low	med	high	yes	C
Information Age	700 x 6	250x6	130x6	med	high	med	high	med	yes	-
Image Gallery: Simulation	4,000	600	300	high	med	low	high	high	no	C
SAGE Recreation	3,000	1200	600	med	med	high	low	low	no	-
Census Centenary	1,000	1000	700	med	med	high	low	low	no	T
Future Computing	500 x 6	200x6	100x6	high	med	low	high	med	no	T
How Computers Work	2,000	500	400	med	low	low	low	high	yes	-
Ubiquitous Computers	2,500	1000	500	high	high	med	med	high	no	-
Defence Computing	2,000	800	400	high	high	low	high	med	no	-

November 6 1987

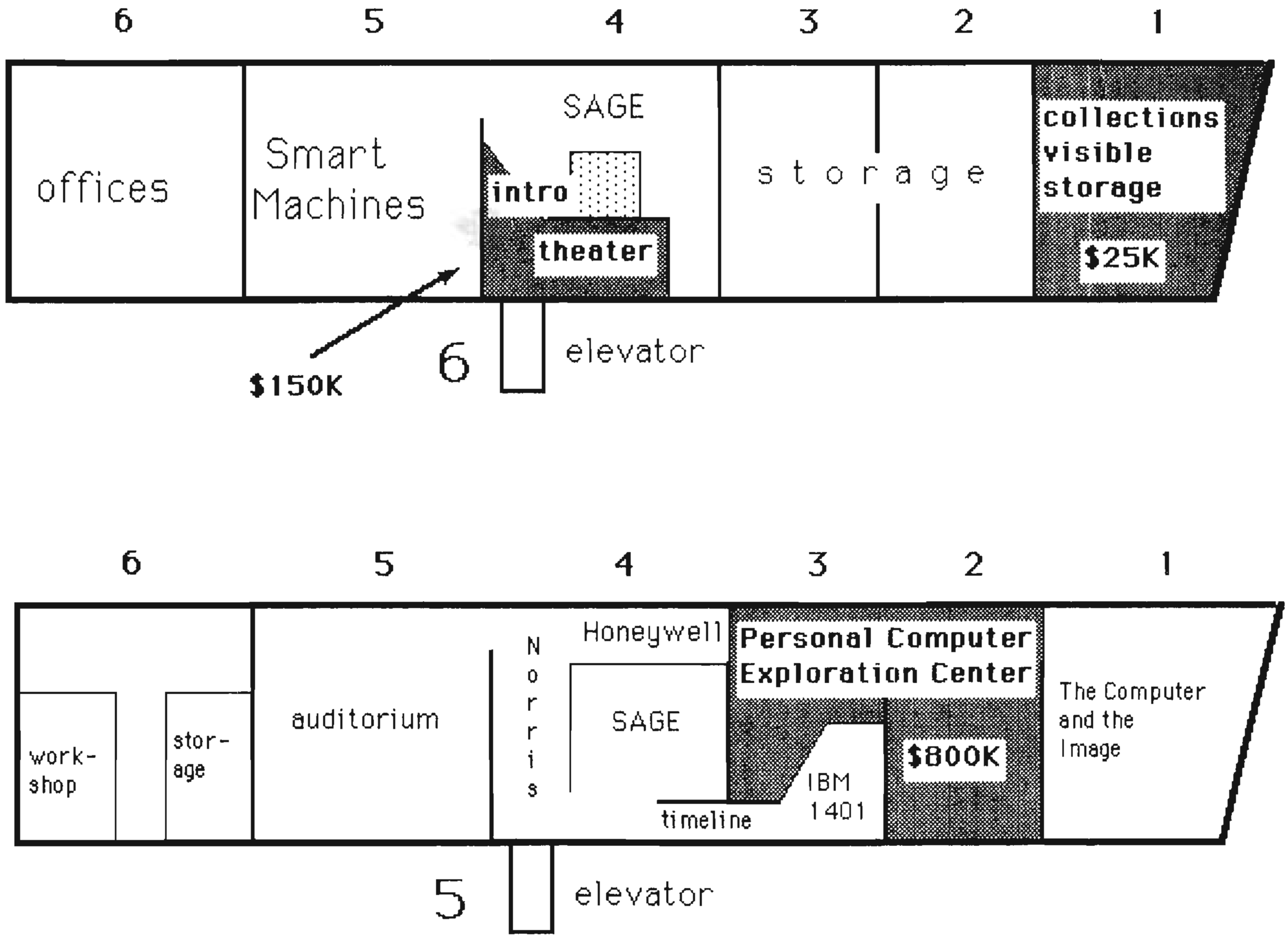
EXHIBIT DEVELOPMENT TIMELINE

calendar year	SCENARIO A	$(k)	SCENARIO B	$(K)	SCENARIO C	$(K)	RELEVANT EVENTS
1988	open Computer Evolution Theater	150	open Computer Evolution Theater	150	upgrade SAGE	75	CM Board meeting
phase one	open PCEC (4000 sq ft in bays 2/3 on 5)	800	open PCEC (3000 sq ft in bays 2/3 on 5)	500	upgrade PC	50	
1989	open Chip Comes of Age (bay 3 on 6)	800					
phase two	open Computer Graphics & Simulation (bay 1 on 5)	300	open Computer Graphics & Simulation (bay 1 on 5)	250	upgrade The Computer and the Image	75	July: ACM SIGGRAPH conference in Boston
	travel Chip		open Software (bays 3 &4 on 5)	250	upgrade IC exhibit	50	
1990	open Census Centenary (bay 3 on 6)	700			upgrade Cray	50	Centenary of first use of data processing in 1890 Census
phase three	travel Census						
	open Software (bay 3 on 6)	400	open Future Computing (Norris gallery)	200	upgrade manufacturing	50	
1991	open Information Age exhibit (bay 1 on 6 or 4 on 5)	800					Bicentenary of Charles Babbage's birth
	host traveling Babbage exhibit	100	open Information Age exhibit (bay 3 on 6)	500	open Future Computing (Norris gallery)	150	
1992	open Future Computing exhibit (Norris gallery)	200					
	TOTAL	$4250K		$1850K		$500K	

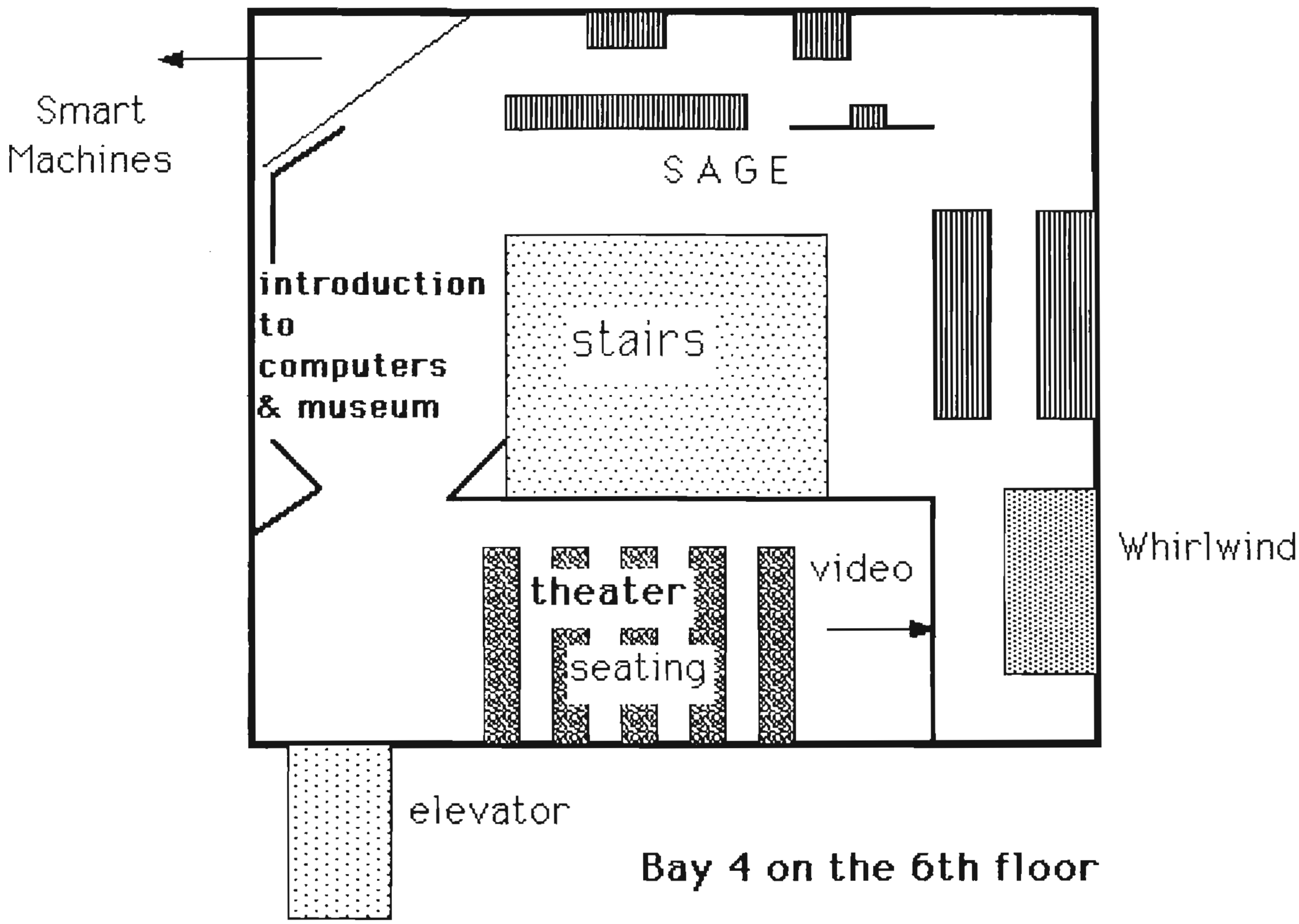




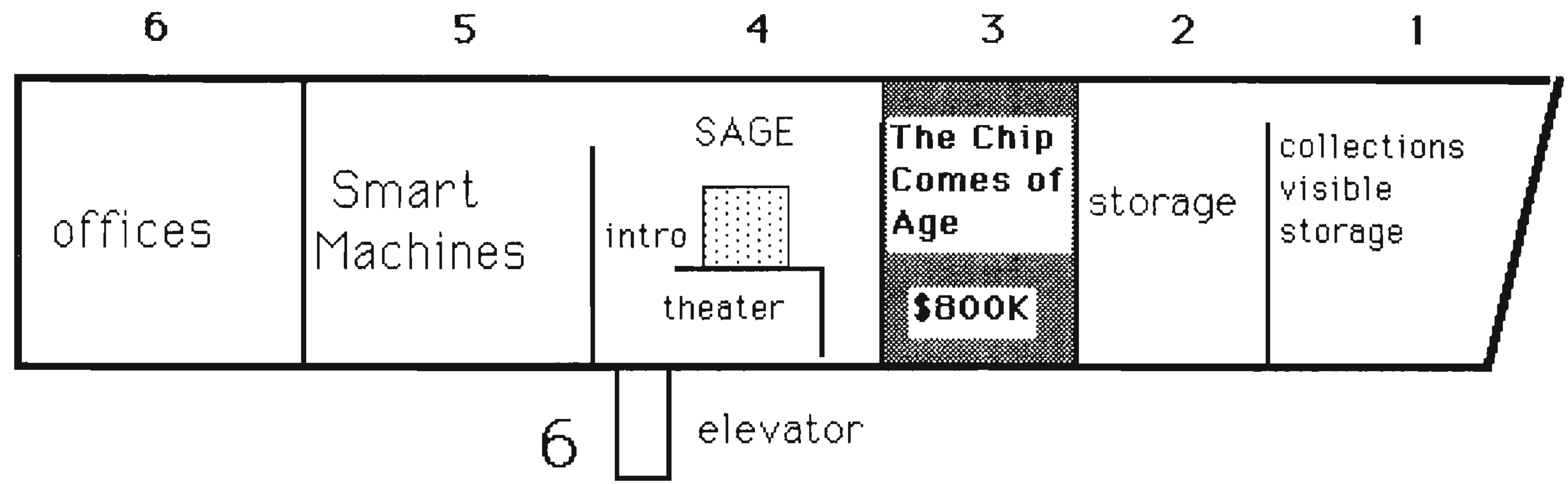
November 1987

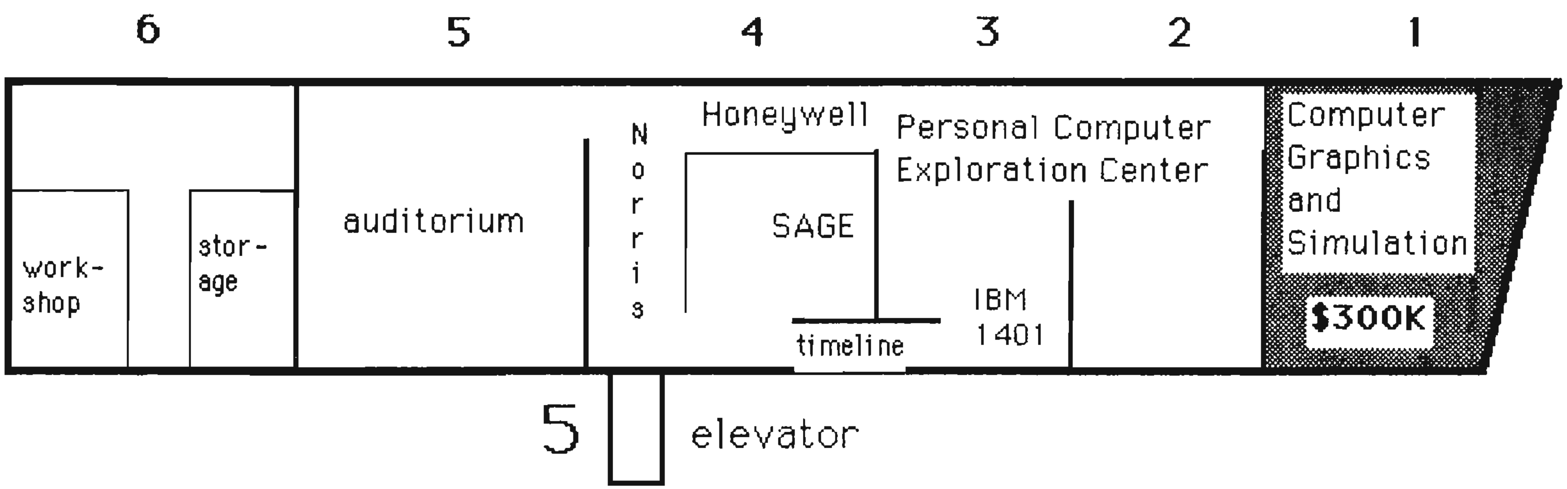


Scenario A : Phase One (Fall 1988)

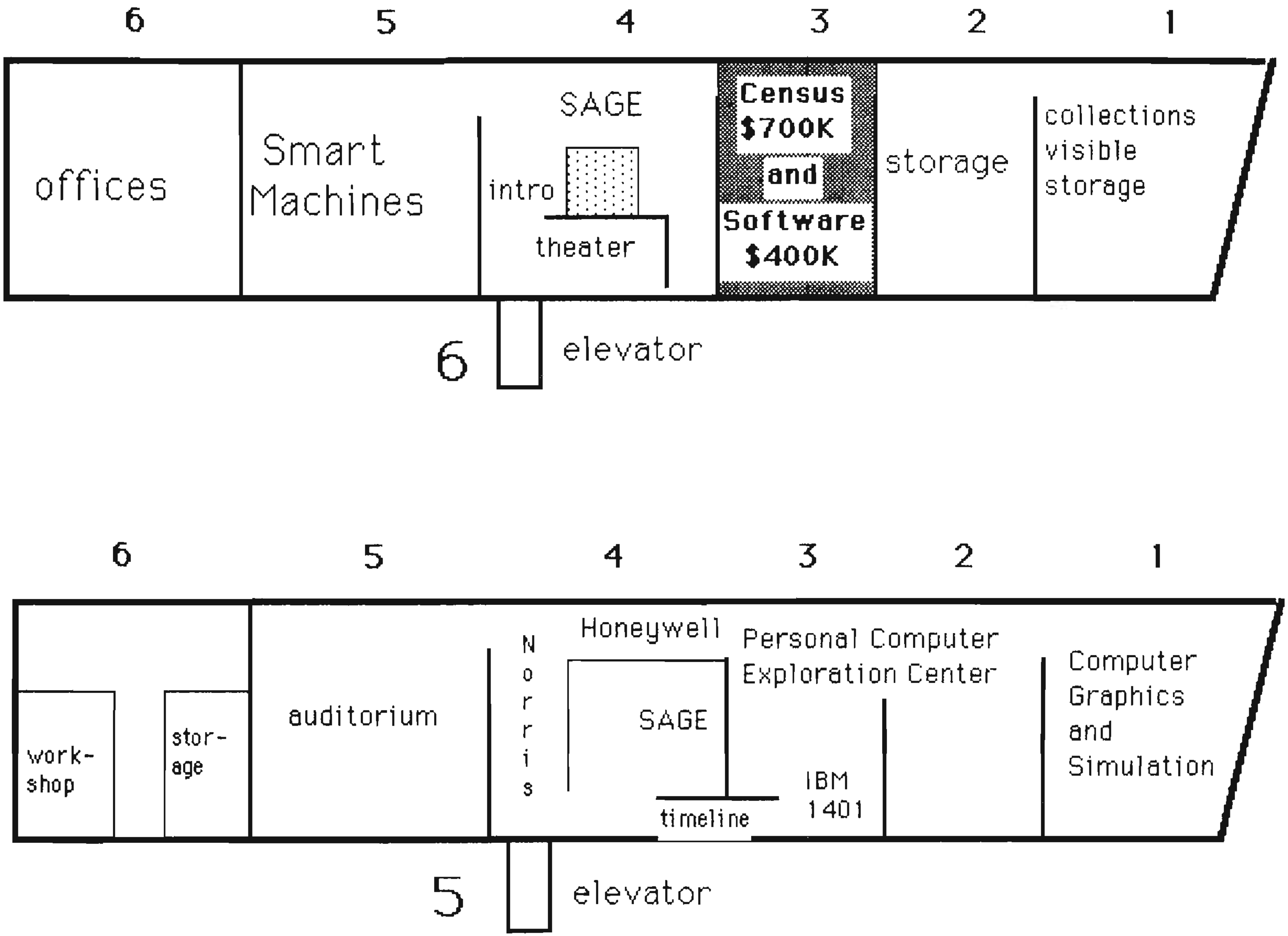


New 6th Floor Entry

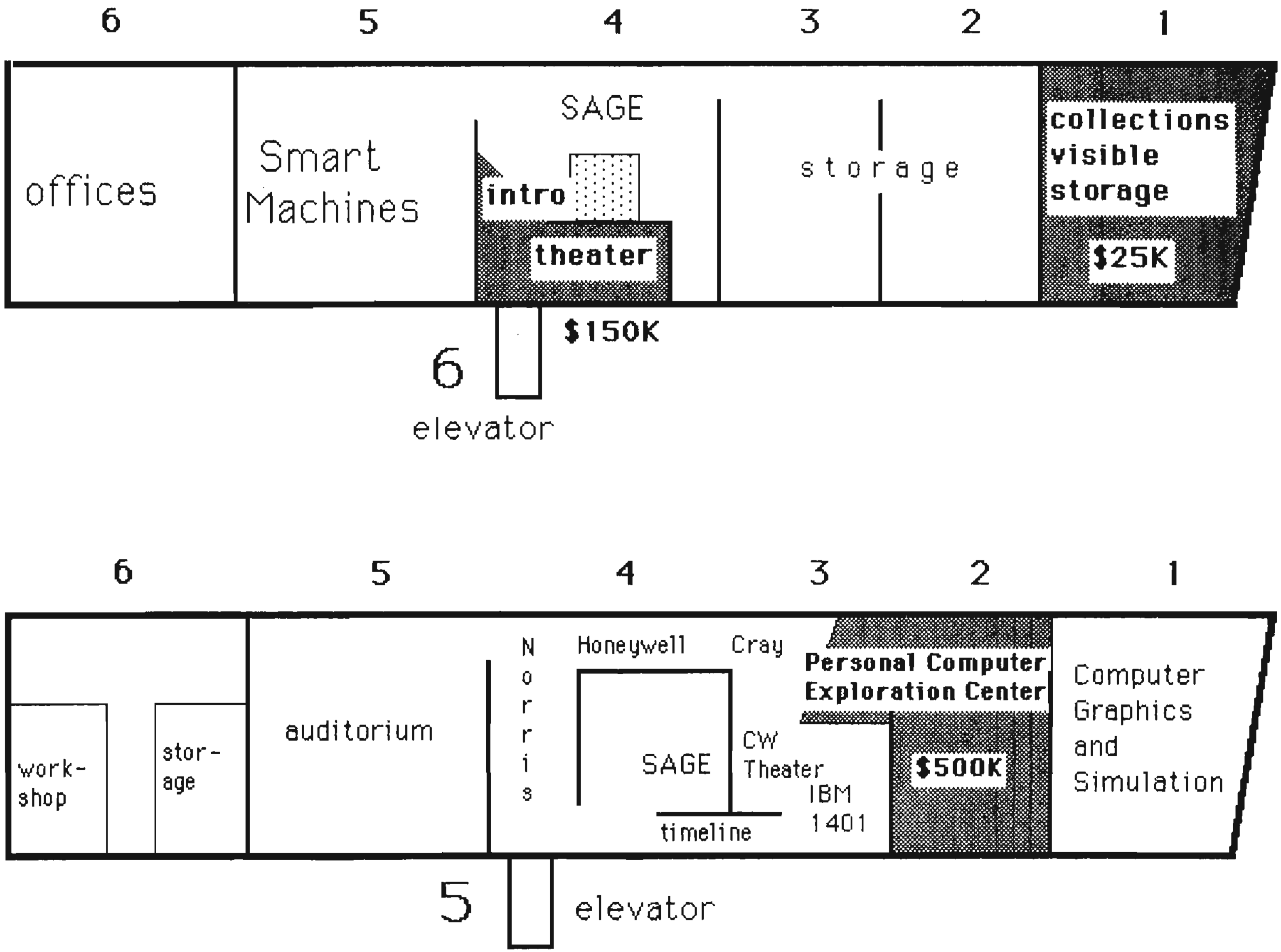




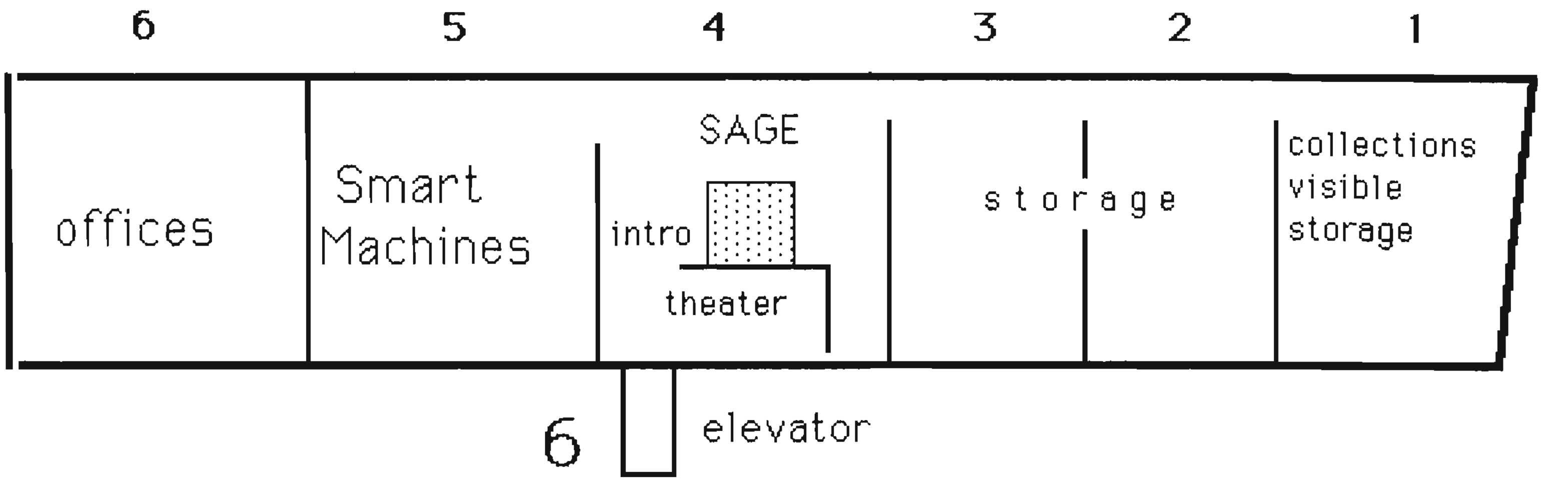
Scenario A: Phase Two (Fall 1989)

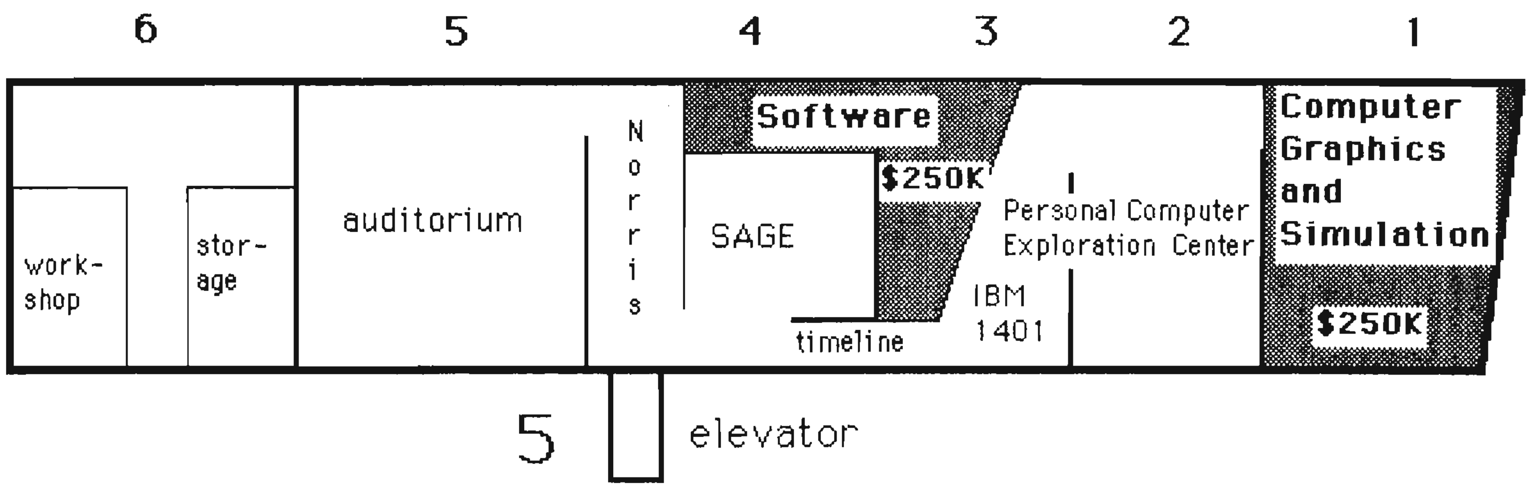


Scenario A: Phase Three (Fall 1990)



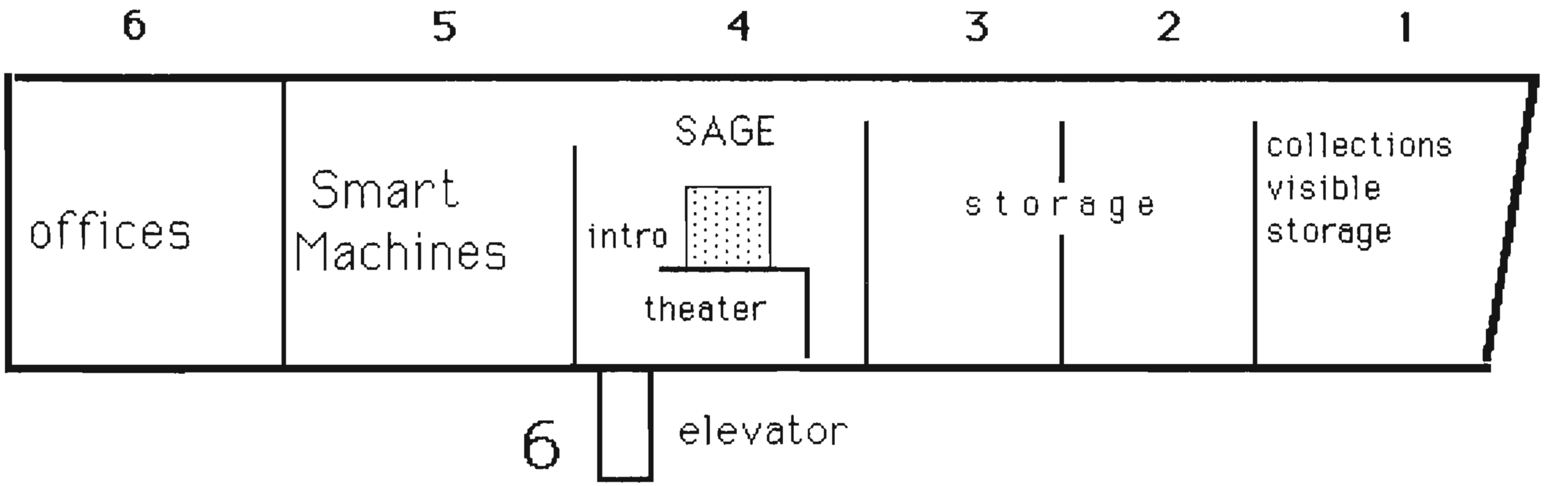
Scenario B: Phase One (Fall 1988)

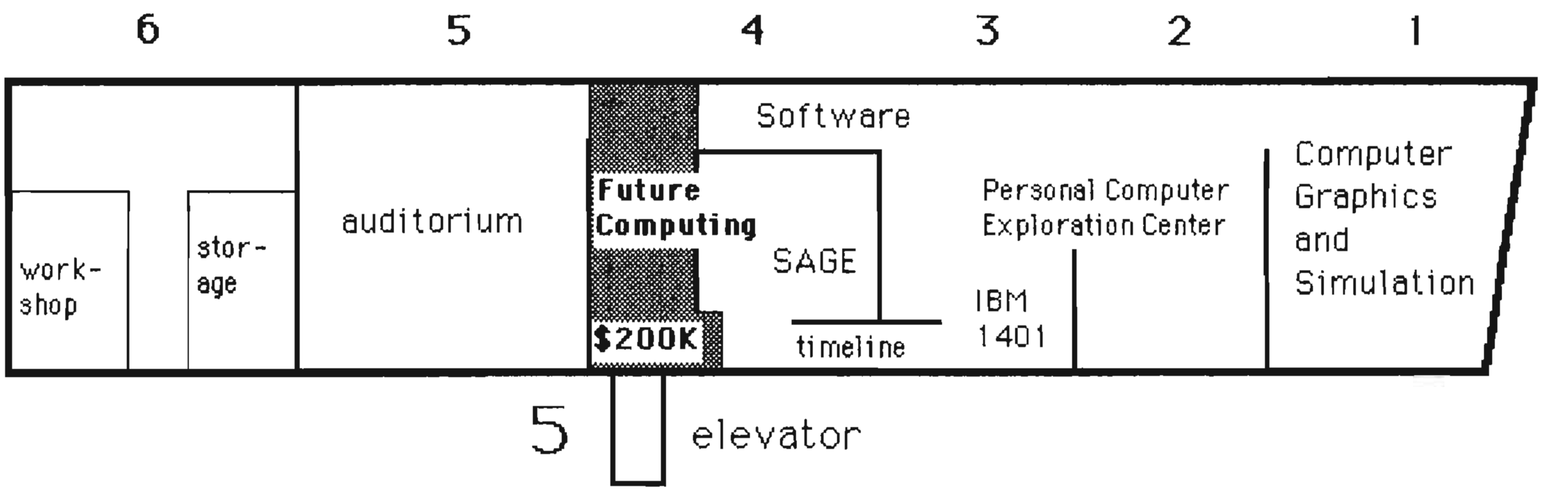




Scenario B: Phase Two (Fall 1989)

12 (Last)





Scenario B: Phase Three (Fall 1990)

Exhibits & Collectors

A PROPOSAL:

THE COMPUTER MUSEUM COLLECTIONS PROGRAM

Gardner

This is Lynn's — and was mine follows — ~~Lynn's w~~ written first. (by 3 weeks) and not printed on a laser printer! We've had meetings on them and there is a clear merger potential.

G

Lynn Hall

LH 10.22.87 date

THE COMPUTER MUSEUM MISSION AND ITS COLLECTIONS

Museums collect and interpret. "Interpretation is the process of placing the evidence of the past into meaningful contexts for contemporary museum visitors. Interpretation depends on research to recover accurate understandings of the role of an object, document, actions, or idea played in the past [or in the present]. Interpretation is more than presentation; it is education. Interpretation implies a pedagogical strategy uniting the object, the historian, and the visitor." (Nicholas Westbrook, Minnesota Historical Society)

THE MUSEUM'S MISSION

To educate and inspire all ages and levels of the public through dynamic exhibitions and programs on the technology, applications, and impact of computers.

To preserve and celebrate the history and understanding of computing worldwide.

To be an international resource for research into the history of computing.

THE COLLECTIONS

The Collections are the core of the Museum; they are the foundation on which the Museum was established. The Museum collects hardware, documentation, software, films and videotapes, and photographs. The Museum also maintains a library (books, periodicals, and audiotapes). For the Museum to carry out its Mission, the Collections should be:

<u>Preserved</u> -- through cataloguing, documentation, maintenance, and proper storage.

<u>Worldwide</u> -- through an active acquisitions program.

<u>A resource for the Museum</u> -- from which exhibits and programs on technology, applications, and impact of computers can be developed to educate and inspire all ages and levels.

<u>An international resource</u> -- for research and exhibition.

Current standards of professional museum operations emphasize the care, management, and use of collections. Leaders in the field encourage planning which views a museum's collections as a whole rather than separate parts which are maintained with temporary, quick, or isolated projects. This philosophy is reflected in IMS grant applications, and has been highlighted at conferences such as "A Common Agenda" in Washington in February of 1987, and conferences such as the recently held NEMA and MCN Conferences in Boston where representatives from the U.S. and abroad presented papers and projects that underline the importance of this philosophy.

The Museum has expressed its commitment to the care and management of its collections by creating the position of Collections Manager and committing resources to the development of projects related to the Collections. The intention of this paper is to request continued and increased support for a project which will bring the Museum's Collections up to today's professional standards and be the first step in a long range plan for the Collection.

THE COMPUTER MUSEUM COLLECTIONS PROGRAM

PHASE I

MANAGEMENT SURVEY
CONSERVATION SURVEY
REVIEW OF COLLECTING PHILOSOPHY

PHASE II

A COLLECTIONS MANAGEMENT TASK FORCE
INVENTORY AND VERIFICATION OF RECORDS

PHASE III

IMPLEMENTATION

PHASE I:

Management Survey, Conservation Survey, Review of Collecting Philosophy

The Museum's Collections have grown substantially since 1979. Along with this growth, and that of the Museum's, there is an ever increasing demand, both internally and externally, for use of the Collections. This increased size and use is straining current practices of Collections management and care. For example, the Film and Videotape conservation survey indicated that the Museum's continued use of original material will jeopardize this Collection. A recent inventory of books in the Library has shown a loss of 70 books over the past 3 years.

Coupled with the increased size of, and demand for, the Collections is the decrease in available storage space. The Museum's Collections are stored both on-site and in an off-site storage facility. The storage issue is critical on two fronts: one, it is unclear whether or not DEC will continue to store 60% of the current Hardware Collection, and two, storage at Museum Wharf is near capacity. Storage for future acquisitions is at risk.

Recommendations: In order to meet increasing demands, prevent further loss and damage, and come to terms with the storage issue, a Management Survey, Conservation Survey, and Review of the Museum's Collecting Philosophy should be undertaken. Furthermore, a long-range plan which views the Collections as a whole will help the Museum in the accreditation process and in receiving future funding of projects. Apropos of this, IMS has told the Museum that in order to obtain funding for conservation grants, a general survey of all Collections must be carried out.

MANAGEMENT SURVEY-- emphasis will be on procedures and policies, not on what is collected. A specialist on Collections Management will be commissioned to critique current procedures and policies. The survey will take 3-4 days.

CONSERVATION SURVEY -- a team of specialists will review the current practices and make recommendations for conservation measures for the Collections. The survey will take 2-3 days.

COLLECTING PHILOSOPHY REVIEW -- a sub-committee of the board will review the collecting philosophy and its classification system (taxonomy) and make recommendations to the board for any changes. This review will require 4-5 meetings.

PHASE II:
Collections Management Task Force, Inventory and Records Verification

COLLECTIONS MANAGEMENT TASK FORCE

Upon completion of Phase I, the Museum will form a Collections Management Task Force. The Task Force, comprised of museum professionals and members of the Board, will develop a collections management policy for submission to the Board of Directors for approval.

"A collections management policy is a detailed written statement that explains why a museum is in operation and how it goes about its business, and it articulates the museum's professional standards regarding objects left in its care. The policy serves as a guide for the staff and as a source of information for the public." (Marie C. Malaro, Smithsonian Institution)

In drafting the Collections Management Policy, the Task Force will draw from the surveys and review. They will also consider the following:

Collections management for a contemporary collecting museum
Documentation of the Collections
Database management
Internal and external accessibility for research and education
Storage
Accession and Deaccession Policies
Conservation

The Task Force will meet monthly for 6 months. Members of the Task Force will be chosen on the basis of their expertise on the topics to be addressed. A member of the Board will chair the Force.

Products:
A Collections Procedural Manual
A Collections Management Policy
Recommendations for collections projects
Recommendations for a long-range plan
Recommendations for a storage plan

Products:
A Collecting Philosophy which will be presented to the board at its February or June meeting.
A draft of a Collections Procedures Manual
A draft of a Collections Management Policy
The Conservation Survey will be completed in time for the Museum to submit a proposal to IMS for the Conservation Project Grant
An interim on-site storage plan will be developed and implemented.

INVENTORY

The Museum's Collections will be inventoried to verify current records. Where incomplete pertinent descriptive information will be entered. Items from the Hardware Collection will be photographed. The inventories will take place in areas where Collections are stored or exhibited.

Products:
Updated records
Identification of gaps in the Collections
List of missing objects

PHASE III:
Implementation

The Collections Project will not preclude the carrying out of daily responsibilities or ongoing projects. Implementation of new projects will be based on Operations Committee approval, funding, and phase of the Collections Program.

Recommended Projects:

DEACCESSIONING
Following the review of the Collecting Philosophy and Inventory of the Collections, recommendations can be made for objects to be deaccessioned from the Museum's Collections. With the Board's approval of the list, deaccessioning will begin.

DEC ARTIFACTS
Objects belonging to DEC will be returned after the Inventory. In addition, DEC equipment deaccessioned from the Museums Collection will be offered to DEC.

SEARCH FOR MISSING OBJECTS

COMPLETE CATALOGUING OF ALL COLLECTIONS

PHOTOGRAPHS
Because this Collection is one of the most requested and an income producer for the Museum, the search for copyright and origin of the photographs is necessary.

FILMS AND VIDEOTAPES
Like the Photograph Collection, films and videotapes are often requested and are an income producer. In addition, the Museum has submitted a proposal to IDG for production of a film on the history of computing using original footage from the Collection. The search for copyright and origin of the films and videotapes is necessary.

LIBRARY
For the staff's immediate use, a sign-out system will be implemented. INFORMART has expressed interest in sharing resources for a the members of both institutions. The Library will be placed on a database for the program to begin. Other 'science discovery centers' have expressed the same interest.

1 - by July 1
2 - next FY.
- 3 - can put off —

The Collections: A Plan

The collections of The Computer Museum comprise the following:

- Artifacts
- Films and video
- Photographs
- Books
- Archival materials: documents, manuals, manuscripts etc.
- Magazines
- Audiotapes
- CD ROM
- Software

Each area is relatively well-defined in terms of collection criteria and care except for CD ROM and software. (They will not be discussed.) Each will be discussed in terms of present status and needs in the following areas:

- Criteria for acceptance;
- Size and growth of the collection;
- Cataloging:
- Storage facilities accessibility;
- Special care; and
- Use.

The needs will be assessed in the following ways:

- Short term, especially essential activities that will lead to accreditation, with a plan to be accomplished by July 1, 1988.
- Long term, with a plan to be accomplished by July 1, 1992.

A capital budget of between $50,000 and 70,000 has been awarded to the short term activities. A capital budget and operating budgets for the long term plan will be established.

(Gordon Bell's final $320,000 of his million dollar pledge is allocated as follows: $100,000 to the building; $50-70,000 for putting the collections in order; $150,000 for fy 1989 for critical needs of that time.)

1. Artifacts.

• Criteria for acceptance. Criteria for accepting artifacts is quite well understood and has been applied for some time and this seems to be working. Two sheets are attached that show the kind of artifacts collected and the division of the collection of computers. These provide the guidelines for the kinds of artifacts. The criteria in selecting something that fits within these guidelines is as follows:

- a first or a prototype of an important class;
- the classic or standard manifestation of the type;
- a dinosaur or peculiar or unique example;
- close association with an important event or person;
- a representative clone or "also ran" machine.

In addition, ephemera and material that lends itself to exhibition is also collected. These range from "The Honeywell Animals" to advertising handout cards.

• Size and growth of the collection. The collection grew to 800 in eight years. Each year more people and institutions are offering the Museum items for the collection and, at the same time, the percentage of offers accepted is declining because of duplication of type or of artifact. The major growth surges occur from building a special exhibition, for example "On One Hand" led to significant additions to the calculator collection and "Smart Machines" to robots. Doubling in the next five years seems to be a projection that might err in being too large, allowing for growth.

• Cataloging. In 1979, the collection was list-processed on a DEC word processing system and in 1985 it was transferred to the VAX but is essentially the same.. This allows for a variety of characteristics, but has the shortcoming of not being a true data-base system. Jon Eklund, at the Smithsonian Institution National Museum of American History, is recommending a database system for both computer collections. Jointly, we agreed on the categories. (See attachment). After the system is decided on the job will be at least 100 hours of straight input and another 100 hours of time spent by staff members on reviewing the actual classification of each artifact. *Recommendation: The new system should be used for registering new artifacts for at least 4-6 months before the existing collection is transferred to a new system.*

• Storage facilities accessibility; Ideally, a large on-site storage area would allow the most precious, important, and frequently used artifacts to be kept on site. When Bay 5 (the site of Smart Machines) had well-organized artifacts in it, it was an important "behind the scenes" element of the Museum. Similarly, the well-organized warehouse maintained by IBM is an important display in itself. Our collection also includes quite a few dinosaurs that are appropriately warehoused off-site. If in the long run, we cannot have a good on-site viewable collection, then we need one that is well-maintained, accessible and monitored four times a year. At present the off-site warehouse includes many DEC artifacts that we might not have collected except for our origins. The development of a DEC collection means that we can sort through and de-accession appropriate machines that they value but do not fall within our criteria for keeping. In fact, the entire collection in the warehouse should be evaulated in terms of its perpetual care.
Recommendation: Take the opportunity with DEC's new collection manager to "sort out" the warehouse. If possible the first pass should be completed by next July 1, including recommendations for de-accessioning and for appropriate off-site storage.

Recommendation: Outfit Bay 1, Floor 6 for on-site collections, along with the cages in Bay 6, Floor 5. All collections should be removed from Bays 2 and 3 on Floor 6. Bay 2 (especially what is known as the robot closet) could be used as storage. Piling "junk" in these rooms only leads to a fire hazard and is not a good Museum practice. These activities should be completed by July 1, 1988.

• Special care. Most of artifacts will never work again and are made of industrial materials, therefore they don't need the kind of special environmental care that more precious collections need. However, because of their size and bulkiness, care is essential in moving them. Much of the damage that has been rendered to the objects has occurred in moving.

• Use. The major use of our collections is for our own exhibitions. It is a unique element that we have. Some artifacts have been loaned for other exhibitions and the development of travelling exhibits should more fully exploit this resource. Other uses have been for "exhibits" in lawsuits establishing prior art, for advertising and promotional photographs, and other film and photo purposes. Having the best, most unique, and "photographable" artifacts handy is useful for this public relations and income avenue of the Museum.

2. Film and Video

• Criteria for acceptance. The criteria for accepting film and video follows that of the collection of artifacts. In addition, we accept any film of computers that predates 1965. The problem of acquisition occurs with the great proliferation of video in the eighties. Inexpensive video has resulted in the proliferation of "talking head" video lectures, experimental videos of robots and promotional videos. In addition, computer graphics has resulted in computer animation and simulation films..

• Size and growth of the collection. The collection could grow from 100 to 500 in the next five years. The cost is not in keeping the material, but it is in caring for it (see below). It would seem that the growth could be tied to special funding, eg., the SIGGRAPH films. If, however, we had very strict acquisition rules to follow the criteria of the artifacts, then the collection may only double over the next five years. *Recommendation: The collection should only grow in special areas with special funding.*

• Cataloging. At present, the films are in a list-processed format. The title of many films is uninformative, and each film should be looked at and characterized with a group of descriptors that adequately can inform a user of the material in the film and its quality. *Recommendation: Cataloging the film/video collection is a major undertaking that needs to wait for special funding.*

• Storage facilities accessibility. *A recommendation has been made to copy all the films unto video-tape that can be made accessible to others. This would insure the preservation of the film or original tape. Proposals have been written to fund this project.*

• Special care. *A recommendation has been made to store the film in the proper environment to insure its preservation and that special funding or arrangements be made to do this.*

• Use. The Museum extensively uses its film and video collection in exhibitions. Many of the films are requested by college professors for educational use and by news media. Unfortunately, the Museum does not have free and clear rights to many of the films. *Recommendation. The funding proposal to clarify rights should be actively pursued.*

3. Photographs (including slides).

• Criteria for acceptance. The criteria follow that of the collections. In addition, photographs document the history and growth of the Museum. We also have photographs made of the collection and exhibitions.

• Size and growth of the collection. If we worked on expanding this collection it could easily grow from the 500 or so now in it to over 10,000. The trick is to add photographs that will add to the richness of the images for characterizing the history of computing. The photos and slides are in several places in the Museum and need to be brought together into one collection. *Recommendation. We should merge and evaluate the present collection by July 1 and come up with a sensible program to solicit photographs and evaluate their addition to the collection.*

• Cataloging. The current collection is filed and not catalogued. The very least that is needed is a listing of our photos available for circulation. (This probably will not require a data-base or extensive cataloging.) *Recommendation: The whole collection is rationalized in one place and a listing of the available photos or slides produced.*

• Storage facilities accessibility. This is only several file drawers. *Recommendation. Photographs and films should be under the care of one person but quickly accessible to both PR and the collections manager.*

• Special care. Negatives should be kept for all the circulating photographs in special envelopes and these should not circulate.

• Use. There is probably more call for use of photographs than any other part of the collection. It is important to have these accessible for our educational mission -- publishers and authors at all levels look to the Museum for photographs. Photographs are also an essential part of each of the Museum's quarterly Reports and of the exhibitions.

Rules for Library Acquisitions

Metarules

- There are exceptions to all rules
- Accept books pertaining to the mission of the museum and to operating as a museum.
- Collect books in any language
- All books written before 1900 should be considered "rare", i.e., artifacts.
- Consider bound dissertations as books

Rules that lead to an acquisition

- Accept all books on computing written before 1965.
- Accept books that relate to the collecting areas, including pre-computing era materials on calculators, memories, and other related areas.
- Collect all books on computer history.
- Collect all reference books on computers and calculators, eg., encyclopedias, dictionaries, catalogs, etc.
- Collect references on museum practices, especially relating to science and technology collections, interactive exhibits, registration practices, and other activities pertaining to a technology/collecting/exhibiting museum.
- Collect all biographies and autobiographies of people in computing or other areas of the collection (eg calculating).
- Collect all books by or about Board members, past and present.
- Collect some important books on the history of science and technology and science, technology and society.
- Collect generic books on computer languages and software.
- Collect in-depth on the subjects covered in the galleries.
- Collect The Annals of Computing History and Computing Reviews -- complete sets as the only periodicals (at present) in the library.
- Collect all books or catalogs on computer or computer-related museum exhibitions.
- Accept entire collections from significant computer scientists if they say this is "my library that relates to computer science."

Negative rules

- No children's books
- No specific application books for specific computers, eg., developing inventory control on the IBM pc; be careful about accepting applications books -- see qualifying rules.
- Don't collect language specific books for specific personal computers, eg., BASIC on the PC. (If kept examples will be placed in the technical files on the machines -- or the language files if we keep software by language.)
- Only accept incomplete "sets" if very important

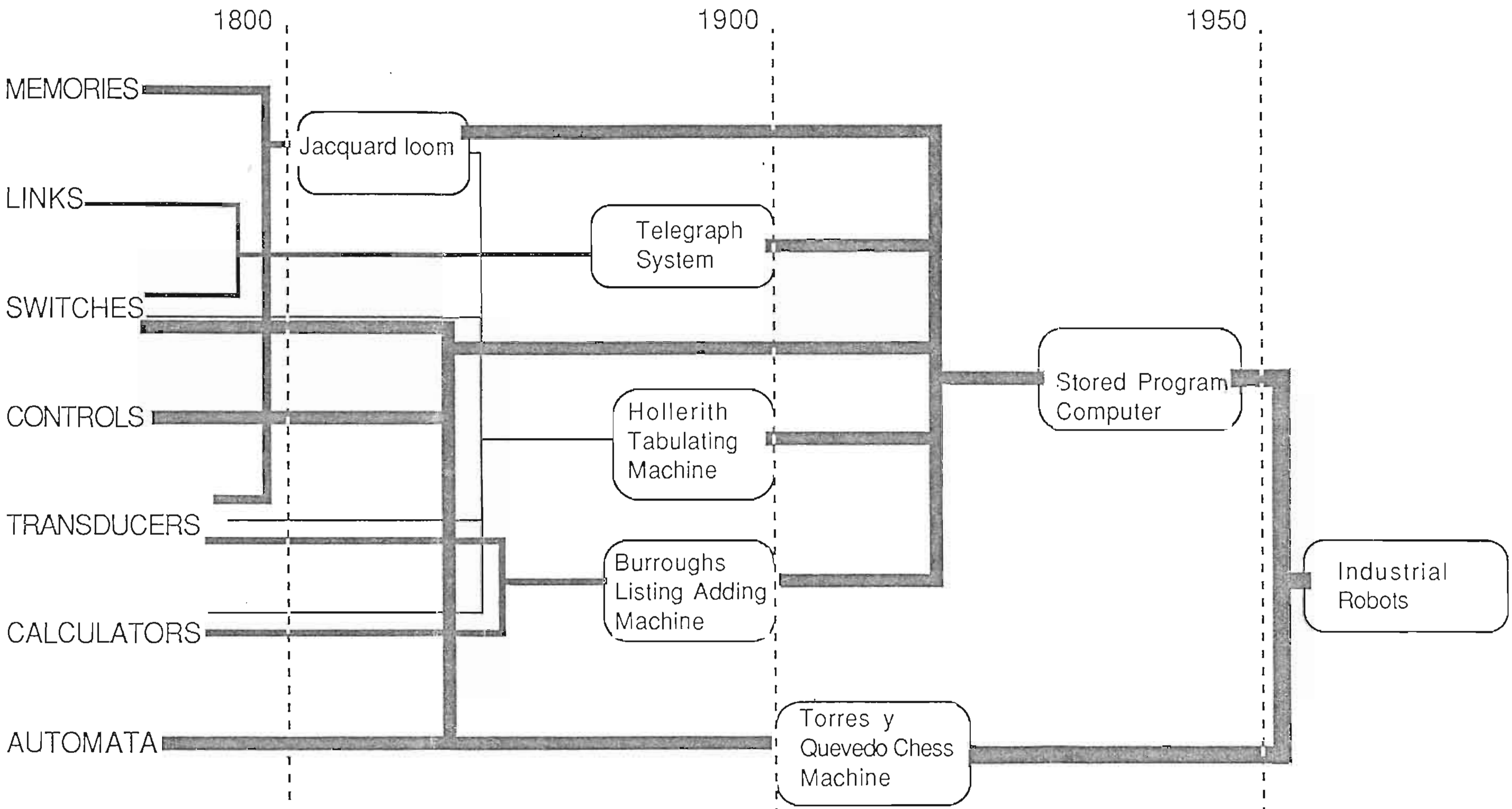
- No duplicates, unless they are likely to fall into the rare book category. or a "popular", likely to be used, references, or classics.

Qualifying Rules

- Specific application books checked for quality/importance with Computing Reviews
- Regard university press books favorably
- Use Computing Reviews to help decide on marginal books.

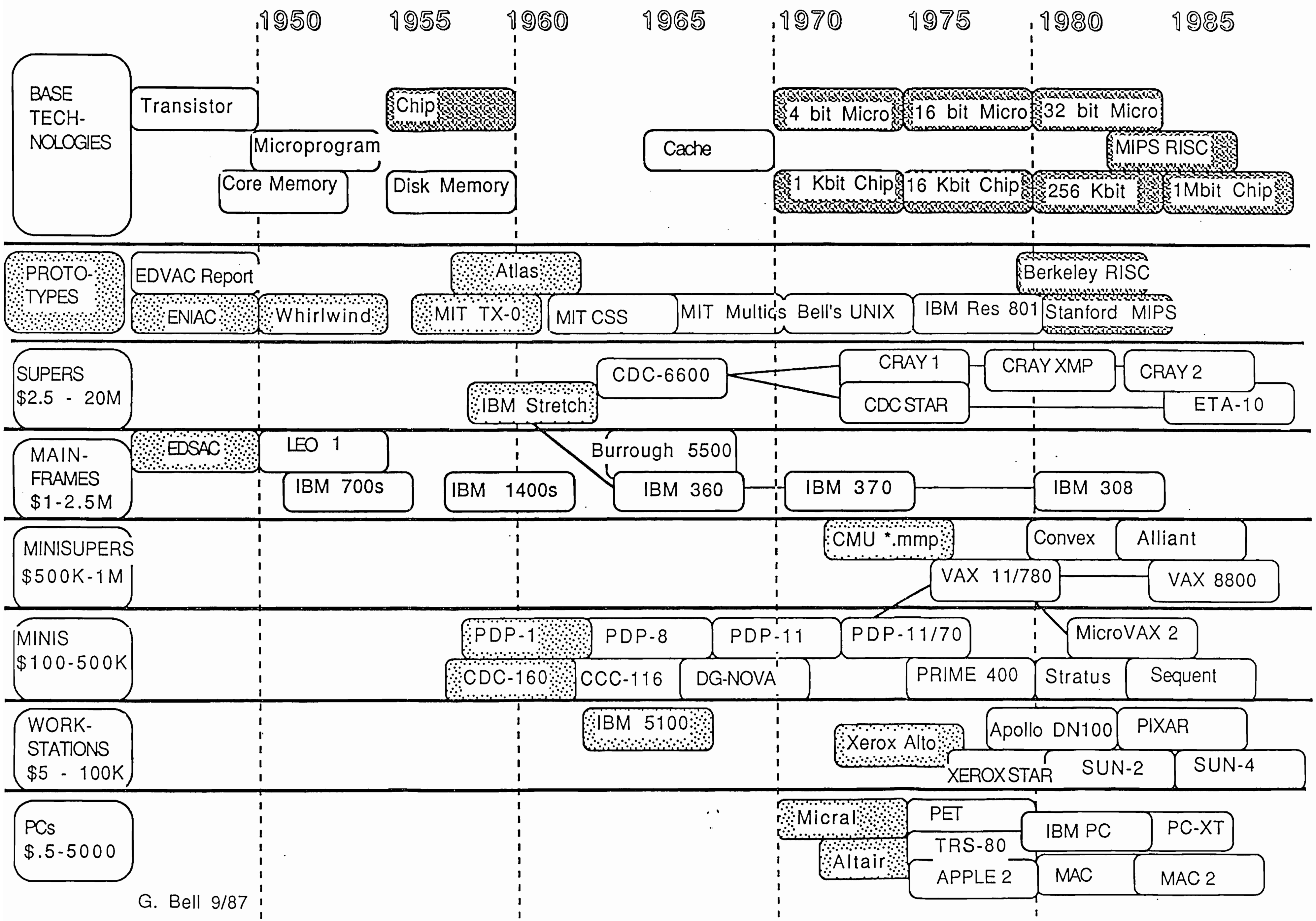
TAXONOMY OF COMPUTING DEVICES

Based on Bell & Newell, Computer Structures

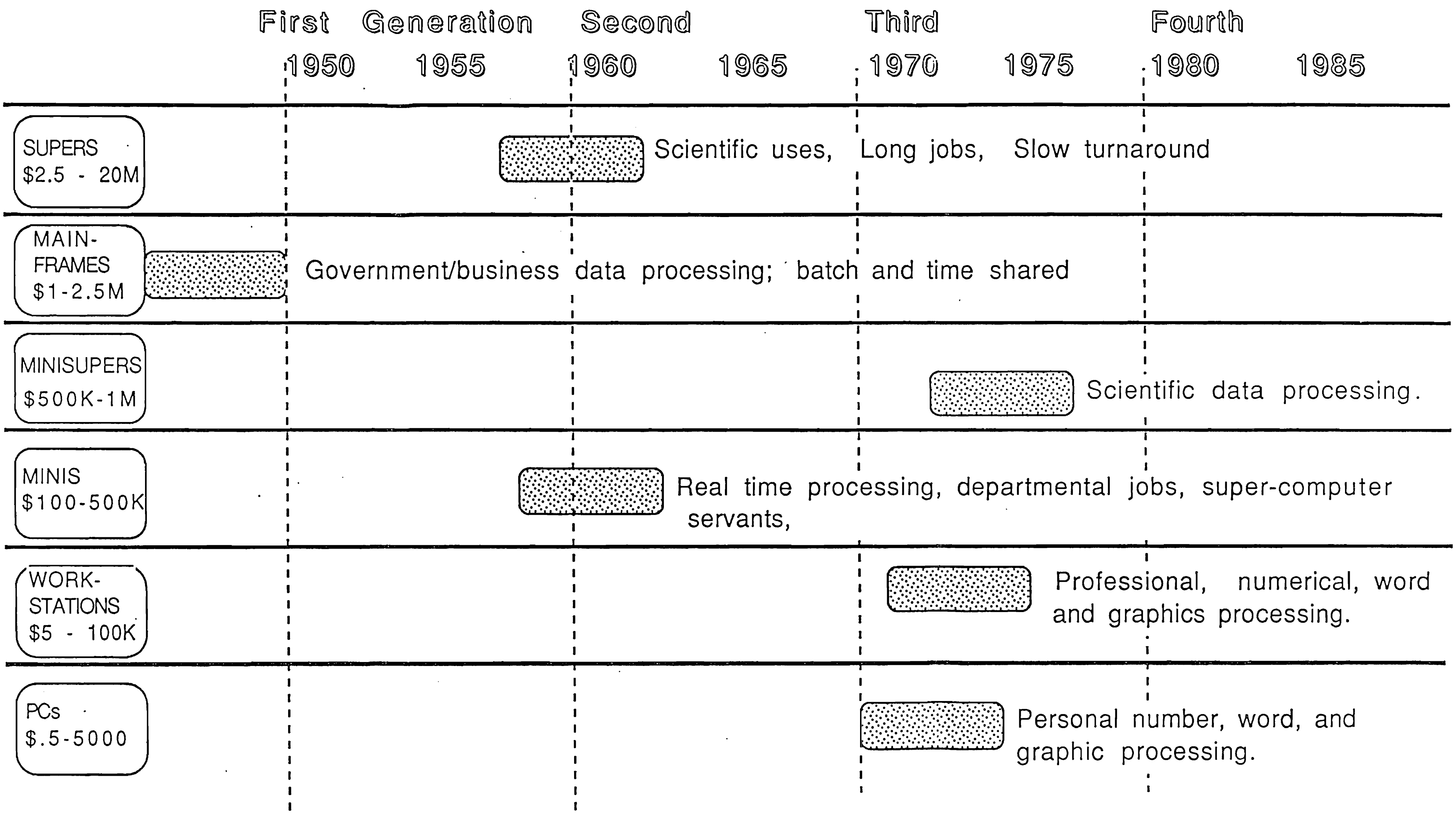


G. Bell 9/87

TAXONOMY OF THE COMPUTER COLLECTION



TAXONOMY OF THE COMPUTER COLLECTION



G. Bell 9/87

Exhibits Comm

Report: Science Learning in the Informal Setting,
Chicago Academy of Science, November 11-15, 1987

TO: Joe Cashen, Mark Hunt, Michael Oleksiw, Bonnie Turrentine, Mark Alio

From: Gwen Bell with the consensus of Oliver Strimpel

The meeting was called by the Director of the Chicago Academy of Science because they were having trouble redefining their own educational mission.

The speakers were all directed to the problems of providing better science education -- and the role of Museums in doing this. All the speakers read well-prepared papers and many of them were quite good. Many of the pre-eminent people spoke:

Ilan Chabay, Chief Guru of The New Curiosity Shop -- had been Assoc. Director of The Exploratorium under Oppenheimer and before that a Research Scientist at The Bureau of Standards.

Harris Shettel and Chandler Screven, the two pre-eminent museum evaluators in the country. (They advocated that evaluators should lead exhibition teams.)

George Tressel, Division Director, Materials Development, Research, and Informal Education. He reports to the Assistant Director for Education (Chandrashiri) who reports to Bloch. Michael Templeton reports to Tressel. George presented an excellent talk on the problem of all science education in the USA. He brought out the counter-intuitive factor that the post-Sputnik programs that related to excellence were equated by students with "difficulty" and so many pre-college students didn't take science and math so that they could "get good grades" and "get into college." His major programs -- million dollar items -- are for gradeschool science learning curricula that are done jointly with publishers. In addition, he funds Square One and other public television shows. But, Tressel has the vision to fund a broad scope of projects and enunciated the need to help the "elite students in high school". This is a program that we are eminently qualified participate in. He talked about mentor programs with universities and museums. We have a partially put together proposal on this and have a track record with a few students. It would be a natural and a proposal that could go to several places.

Roger Miles, Public Service Director for the British Natural History , has made the English Museum community sit up at attention. He has been highly controversial in doing popular exhibits. The Education and Curatorial people who do exhibits work for him. He talked about the balancing act of building exhibits to satisfy the creative needs of curators and trustees while entertaining and educating the public. Research is separate.

Leon Lederman, Director of the Fermi Lab, Member of the National Academy of Science, Professor at Columbia. Lederman is a charismatic educator and has turned the Fermi Lab in Illinois with its huge accelerator and several thousand scientists into a center for learning science for high school and college students. His vision and will turned it into an educational center -- and now it has outreach, classes, tours, and actively trains students, addresses the parents, and involves the scientists. As a result, Fermi has more money from the DOE that supports them.

Mihaly Csikszentmihalyi, Professor of Behavioral Sciences, University of Chicago, focussed the group on the goals of exhibits. He is highly regarded and outlined the following that people kept coming back to. He stressed the importance of having a goal in all exhibits -- but noted that the goal focussed the activity of reaching it, i.e., the mountain climber climbs for the experience of getting to the top. With clear goals, feedback is also essential. He noted a few rules: (1) match challenges and skill -- don't make things boring, on the one hand, or embarrassingly hard on the other; (2) aim for non self-consciousness so that the visitor becomes "enthralled, entranced" and time passes without seeming to pass; (3) aim to motivate with cognitive challenges.

Other people addressing the group came from The Media Lab at MIT, Berkeley, The California Academy of Science, and Walter Sullivan the science writer for the New York Times.

Some conclusions in the discussions are worth pointing out.

Why do people come to Museums?

1. For information. Jon Miller, who does public opinion, information, surveys for places like NSF, found that most adults visit museums to "keep up-to-date." On the other hand, he found that most children, and school groups, leave Museums with more questions than answers. A good visit results in "I wonder why? .. What was?" kind of questions on the bus ride home. It is the teacher and the school that can secure and embed the information component for the student. (Many felt that Museum's clients were "teachers" and not students. And that if we serve the teachers, by definition, the students are served.)

2. For Personal identity. To measure, to test, and to "see oneself" in other things. Better understanding of self by better understanding the world. Alot of discussion among the biology people was spent on showing evolution in museums (and one creationist was in the crowd.)

3. Social integration. To do things together, as a group, and have a forum for socializing. The ability to sit in groups helps this to happen -- to have a discussion with one another. To laugh and to be inspired and to learn together. (The purpose of many Museum's food provision relates to social integration.)

4. Entertainment. Having fun ... not being in school ... being amused and amazed in an enjoying atmosphere.

How to form an education department and where should the staff come from?

1. Everyone agreed that the "passion to communicate" is the most important component. In the talks of Leon Lederman, Paul Sally (Director, the School Math Project, U of Chicago), Zafra Lerman (a Chemistry professor from Columbia College), and Maggie McVoy (from the Verena project in Colorado) among others, we saw educators with a passion! This was transmitted in every word they said. They are leaders with a vision and everybody wanted to follow.

2. Everyone agreed that the teachers were the focus for the education director and that the education director had to have a network of teacher support. Direct mail was not an answer to communicating at all. Teachers need to be thanked and to be fed (literally), to be asked for input and to be motivated. The Museum has to work through teachers to the students.

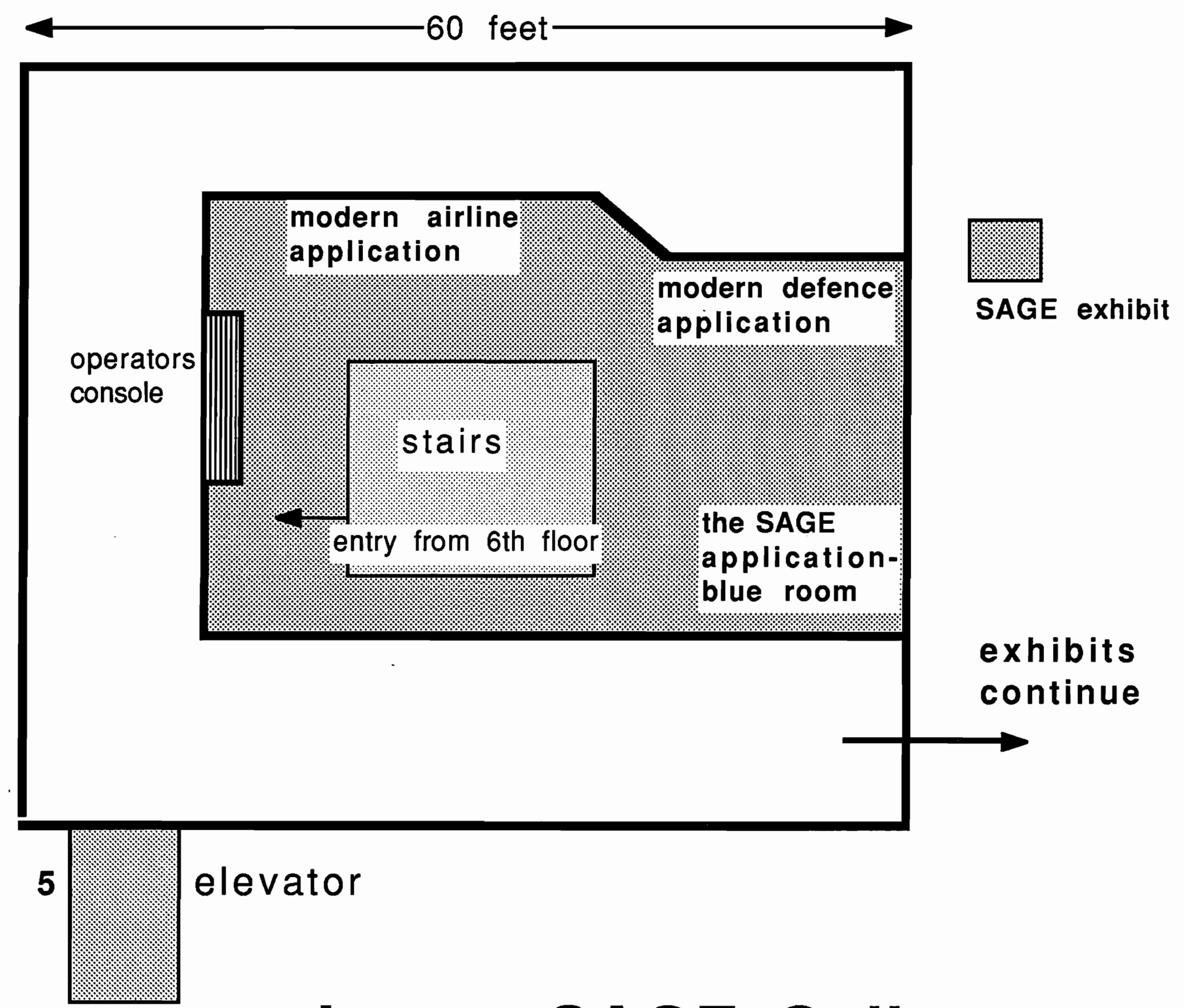
3. People also agreed that it is probably more important that an education leader in a Museum has had teaching experience than museum experience.

4. We had lunch with Bonnie Van Dorn, Director of ASTC, a former science teacher, and then education director of the Pacific Science Center. Bonnie suggested that a science "task force" -- not an ongoing committee be made up of the following:

- a key government bureaucrat from the State Dept of Education
- a leading teacher of teachers about math/computing
- a leading teacher on math/computing
- someone from the Girl Scouts, or any other group for students
- a leader from the parochial school sector

In these we should make sure to have minorities and women.

5. Everyone agreed that a museum's best support was a network of educators. If a museum can't get the local teachers support, it will never get the students.



Lower SAGE Gallery

PERSONAL COMPUTER EXPLORATION CENTER

Draft Outline Proposal for a Major New Exhibit at The Computer Museum

The Computer Museum proposes to develop a major, hands-on exhibit devoted to the history, technology and applications of the personal computer. The displays will be dynamic, attracting attention of visitors with a wide range of computer experience.

Motivation

Public interest in the personal computer (PC) is high. It is a mass-produced item, advertised and sold like any other electrical appliance. Yet its range of applications, and potential to affect professional and recreational life is almost limitless. The public is intrigued by PC's, and would like to know more about them. This is particularly true of people who are considering purchasing one, or who already own one.

The Personal Computer Exploration Center (PCEC) at The Computer Museum would serve an important educational function. It would provide the public with an objective, highly accessible source of information on PC's. PC's would be presented in a way that focussed on the unit as a consumer item, enabling the public to project themselves and their needs into the exhibit.

Size, Timescale and Cost

The PCEC would occupy 1 - $1\frac{1}{2}$ small bays of the Museum occupying 2,500 - 3,750 square feet. Exhibit development would start as soon as funding was obtained. The exhibit would open one year after funding was received.

The Museum would obtain in kind donations of equipment, software, and other resources from the industry, other organizations and individuals. This will have an approximate value of $300,000. The cash cost of the exhibit development will be $500K - $800K, depending mainly on the size of the exhibit. This cash pays for the Museum staff devoted to developing the exhibit, design and fabrication, display equipment and supplies and audiovisual media.

Content

1. Where Do PC's Come From?

The Museum has the world's finest collection of early PC's, including the first PC (Kenbak-1, 1971), the first PC to use a microprocessor (Micral, 1973) and an Apple 1 (1975). This section will display the dramatic trend of decreasing cost and increasing performance, using 10-20 historically significant machines as milestones. Projections into the future will reveal how the fast pace of change is expected to continue, emphasizing the spread of PC's across different sections of the population and across the world. Vintage magazines, advertisements and other ephemera will evoke the spirit of the early "hacker" days.

2. How PC's Work

A large model will show the landscape inside a PC, with magnifying glasses focussing on key components. These will include the microprocessor, memory, display, floppy and hard disk drives, ports and printer. The display will be exciting to watch, and will be large enough to act as a focus for tour groups of 30 people. The exhibit will aim to demystify the parts of a computer that the public may have heard of, but not know anything about..

3. PC Users

The largest section of the exhibit will present 5-8 stereotypical users of PC's, complete with mock-ups of their work or home environments. For each user, a PC that best suits their needs will be displayed. The PC will be running a selection of software tpyical of that user. The public will be able to interact with simplified versions of the software that yield rapid payoff and insight into the functions being performed. Other functions will be presented non-interactively through video or canned screen shots. The following list indicates some of the stereotypes and software that might be included.

STEREOTYPE	PC	SOFTWARE
high school student	Apple II	games, educational, bulletin bds
professional	IBM System/2	word processing, spreadsheet
musician	Apple Macintosh	composition, sequencing
graphic artist	Amiga	paint, draw
small business	PC Clone	accounting, billing, tax
executive	Toshiba laptop	word processing, calendar
engineer/designer	NEC APC IV	CAD

The specifications and approximate cost of each displayed PC will be indicated. Each scenario will have several stations to increase the visitor throughput. There will be a total of 20-30 hands on exhibits.

4. To Learn More

A small section near the exhibit's exit will offer information about where to learn more about PC's and their uses. This will include literature on user groups, magazines, books, seminars, classes and other sources of information and training. In addition some reference publications and on-line resources will be available.

END
OS 12/23/87

PROPOSAL FOR ENHANCING THE SAGE EXHIBIT AT THE COMPUTER MUSEUM

The first exhibit seen by visitors at a museum bears a special responsibility. It must sustain and build upon visitors' expectations, encouraging the largest possible number of museum-goers to enjoy and learn from their visit.

Powerful first impressions can be created by visually captivating objects and by powerful themes. The SAGE exhibit can make effective use of both approaches. Following the first approach, the Museum plans to make the SAGE artifacts more dramatic. Layout changes, lighting improvements and emphasis on the overall size of the computer will transform the exhibit. The major theme will be "Then and Now", in which both the hardware and the application will be compared with their modern equivalents. The layout of the proposed enhanced exhibit is shown on the maps on pages 4 and 5.

Displaying the SAGE Artifacts

The Museum has preserved about one third of a complete SAGE system, consisting of two arithmetic units, magnetic core, drum and tape units, operators and maintenance consoles, and six graphic display terminals. This equipment is currently on display. However, the exhibit needs to unite all these artifacts, showing that they belong to a single, giant computer. Some specific ideas for improvement are:

1. Wires connecting all of the SAGE units together. Most visitors do not realize that the units on the sixth floor and the blue room on the fifth floor are all part of one machine. The connection can be emphasized by running cables up to the ceiling and stretching between the machines.

2. The telephone handsets on the arithmetic units and the console should be active. When visitors pick up the phones, voices should carry on conversations similar to those that actually occurred during operations. A commentary should explain what is being simulated.

3. The master program for SAGE consisted of about 60,000 instructions. To convey some idea of the magnitude of such a program, and the storage medium used, several towers of punched cards representing the program will be displayed. Text and graphics will support some simple

descriptions of the programming languages used and the nature of the tasks performed by the software.

In addition to 'theatrical' enhancements, the historical significance and role of SAGE will be presented through a series of signs and photographs that should appeal to the Museum's more serious visitors. The machine is significant both in the history of computer engineering as well as in its innovative application to radar surveillance and intercept planning. It embodied interactive computer graphics, making use of the light gun and large graphic display screens. It pioneered the use of very large numbers of vacuum tubes in a single machine, employing novel techniques of preventive maintenance.

Main Theme: Then and Now

Perhaps the most rapid evolution of technology in any field has occurred with the computer. It is fitting that The Computer Museum higlight this in the entry exhibit. SAGE provides a fine example of the state-of-the-art in computer technology of the 1950's. In performing its task it revolutionized US air defence. Visitors will witness the dramatic progress in the technology by seeing today's hardware next to that of SAGE. The following is a suggested list of SAGE artifacts and their modern equivalents:

SAGE	Current Equivalent
arithmetic unit	6502 microprocessor
core memory plane	16K-bit RAM chip
core memory stack	64K-bit RAM chip
magnetic drum unit	3.5 inch floppy disk
tape drive	cartridge tape drive
operators console	no real modern equivalant
graphic display terminals	modern vector display

Equally significant is the evolution of the tasks carried out by SAGE, both in the military and civilian spheres. For example, AWACS, an entire command and control center with greater versatility and power than SAGE, fits into a commercial jetliner and operates in flight. Descendents of the SAGE technology also manage airline traffic for FAA. Displays of such contemporary applications will be presented in the exhibit, helping to place SAGE in perspective for the visitor. Images, video, text and hands-on demonstrations will provide examples of the tasks carried out by the computers in these modern systems.

OS
1/13/88

THE COMPUTER MUSEUM

SAGE EXHIBIT ENHANCEMENT: BUDGET

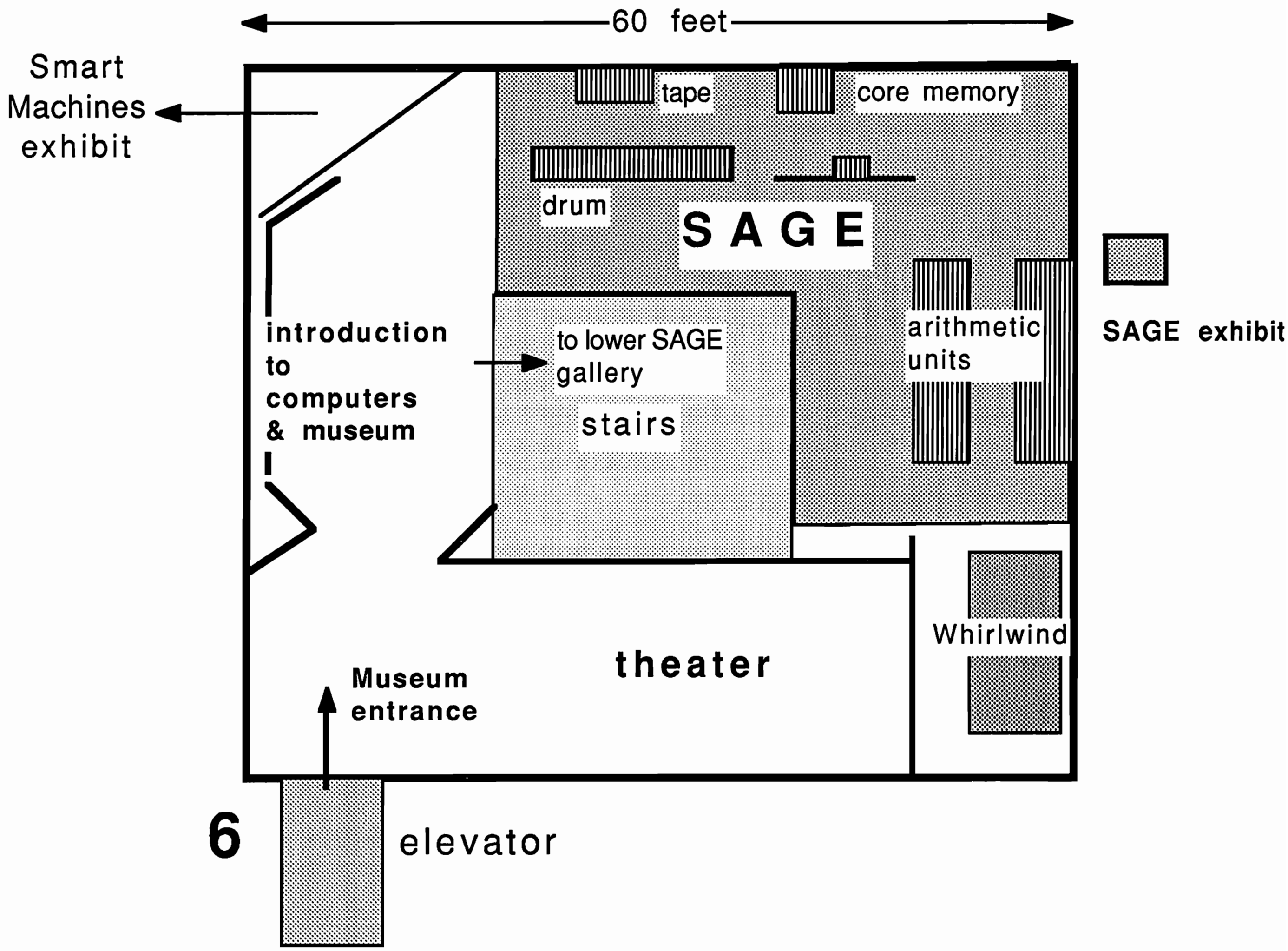
The SAGE exhibit enhancement covers a total exhibit area of 3,500 square feet, spread over two galleries at The Computer Museum. Exhibit development would start as soon as funds were received and take approximately 8 months to complete.

The exhibit enhancement proposal of January 13 1988 would cost a total of $133,000., of which about 35% would be derived from in-kind donations of hardware, software, equipment and time from individuals. The remaining 65% ($85,000), would be needed in cash for exhibit development, design, display equipment and fabrication. The following table gives an approximate breakdown of the expense, divided into two phases. In Phase 1, the exhibit development and design is carried out and improvements to the exisiting exhibit are effected. In Phase 2 the new displays on the modern descendents of SAGE are implemented.

($K)

ITEM	COST		IN KIND DONATIONS
	PHASE 1	PHASE 2	
exhibit design	15		
exhibit construction	14	10	
graphics & text	9	2	5
audio production	2		3
video		3	5
exhibit development	10	10	10
computer hardware		5	25
opening event		5	
TOTAL COST	50	35	48

OS
1/13/88



Upper SAGE Gallery

PRESERVATION OF HISTORICAL ARTIFACTS

The Computer Museum is a singular institution: preserving and exhibiting the international history of the technology computing. The genesis of the Museum was its collection and it remains a unique and important resource for the institution. The Museum plays a critical role in creating this country's computer artifact collection; it is accomplishing this by having a cooperative agreement with both The Smithsonian Institution and The Charles Babbage Institute. The three institutions' goal is to preserve the important artifacts of computing for future generations. Each Institution has its special strengths; the strength of The Computer Museum is in collecting artifacts internationally (irregardless to country origin) that relate to the history of technology of computing. The joint strategies and policies of the three institutions allows for the sharing of each others collections and this helps eliminate redundancy. Of the three institutions The Computer Museum has the largest exhibition space (40,000 sq. ft.); The Smithsonian has 10,000 sq. ft.; and the Charles Babbage Institute has none.

The Computer Museum also acts as a unique educational resource by providing artifacts and graphic materials to institutions worldwide. The Museum has become an important source for educational TV programs: production teams from US, Australia, Canada, China, England, France, Germany, Japan, Norway, and Yugoslavia have already visited the Museum.

The exhibits themselves are seen by 80,000 people per year; 25 percent of the visitors are tourists or traveling businessmen. The number will continue to increase as the Museum becomes better known internationally. The fact that Boston is a port city and one of the hubs of the computer industry allows identification with the location for those located elsewhere. In discussing the location, Eugene Amdahl put it most succinctly: "We all go through Boston--and since the city itself is a Museum, its fitting for The Computer Museum."

ARTIFICIAL INTELLIGENCE EXHIBIT

PRELIMINARY LISTING OF CONTENTS

Introduction

The exhibit encompasses a wider range than is normally referred to by terms such as 'Artificial Intelligence' or 'Robotics'. The aim is to show areas where computers can perform flexibly and naturally where some intelligence appears necessary.

The following list of contents includes many items that the Museum does not yet have. The process of putting together the exhibit will involve searching for donations of hardware, software and programming effort.

GIVING MACHINES THE SENSES

hearing - speech recognition	Kurzweil voice typewriter, Dragon chip set, IBM 500 word version
	application areas: disabled, military, industrial
vision	
object recognition	
edge detection	Datacube real time
optical character recognition	Cognex reader Kurzweil reading machine
depth perception, stereo matching	
industrial inspection	Automatix
touch	pressure sensors, strain gauges robot hands - Salisbury hand, MIT-Utah hand

ROBOTS

imitations of life	18th century automaton (from Smithsonian or European museum) modern 'animatronic' automata
mobile robots	Shakey (working if possible) Stanford Cart home 'toy' robot Denning mobile robot DRV legged robots: Marc Raibert's (CMU), Odex planetary rovers, JPL
early robot arms	Stanford Arm, Minsky's 'tentacle' arm, Rancho Arm ORM Scheinman's hydraulic arm
working teaching robot	Microbot or Intellidex running blocks world or building log cabin from University of Lowell
working industrial robot	PUMA from Unimation, Fujitsu or Ford
automated manufacture	case history such as watch assembly before and after automation - Seiko? auto assembly line (FIAT?) video
robots in fiction/entertainment	Chuck E. Cheese robot, film studio model (R2D2?) robot 'sandbox' - play area with inexpensive programmable toy robots (Arctec, NAMCO?) sophisticated clock-work toys?

EXPERT SYSTEMS

techniques: search, heuristics	MYCIN-type rules demonstrated with several demonstration knowledge bases: auto maintenance wine-tasting financial advisor general medicine
real examples	Macsyma General Motors? XCON (VAX configurer) fine art: Harold Cohen picture-drawing program - AARON music: reading and playing, automatic composition
game-playing programs	tic-tac-toe - display entire game tree chess - Torres-y-Quevedo's automaton Thompson and Condon's Belle and Greenblatt's machine working chess-player flashing board positions being considered - board evaluation speed and tree pruning checkers - Samuel's program backgammon champion (Berliner)

NATURAL LANGUAGE

	blocks world - re-implement Winograd's SHRDLU?
natural language front ends	Q&A from Symantec with museum data base INTELLECT from AIC
trick conversational programs	Eliza and Racter, showing how they work
language translation	from Logos?
style, grammar checkers	

AI TECHNIQUES

languages	LISP, Prolog - illustrated as part of other working demonstrations as well; the debate about the value of logic in AI
symbolic processing	Macsyma, other?
rule-based systems	see epxert system section

CLASSIC MACHINE FEATS

examples:
Slagle's MIT test-paper solver
Lenat's AM discovering numbers and Ramanujan's maximally factorisable numbers
Newell & Simon's LT(Logic Theorist) proving Russell's principia theorems
Tom Evans' intelligence test solvers

end 9/11/86

THE COMPUTER MUSEUM

DEVELOPMENT OF EXHIBITS AND MUSEUM EXTERIOR

Summary of decisions adopted by the Executive Committee Meeting September 10 1986

1. Artificial Intelligence Exhibit

Timetable

It is understood that an opening before the Summer 87 tourist season would be highly desirable. It was decided to aim for a June 1987 opening. This requires immediate hiring of the AI developer and assistant. The decision to fabricate the exhibit will be delayed to February 1 for a late June opening. Thus the construction expenses would not be committed until a clearer picture emerges of the total funds available for the project.

Funding

The founders of Symbolics Inc. are donating approximately 53,000 Symbolics shares to the Museum, currently worth about $320,000 ($6 a share). The Symbolics gift is to be used on a 2:1 exhibit to endowment basis.

The exhibit cannot be done well for less than $400,000. It is highly desirable to use the exhibit as a means of raising money for the building fund and endowment on a matching basis, such as 1:1:1.

It was decided to approach Russell Noftsker, president of Symbolics, for advice on a fund-raising strategy.

2. Software Exhibit

Cullinet have pledged a gift of $250,000 for a software exhibit. They have opted for a late 1987 opening. A small amount of extra capital ($21,000) still needs to be raised.

It was decided to aim for a November 1987 opening for the software exhibit.

3. Entry Bay

The attached proposal outlines an idea for the 6th floor entry bay, costing about $100,000. It is widely accepted that the entrance needs improvement, and changes will be mandated by the opening of the AI exhibit in bay 5, software in bay 3 and the tunnel to the BCS CDC. A minimal acceptable change might cost $25-50,000. Thus the added cost of a full bay-sized revamp is $50-75,000.

The executive committee liked the concept, and recommended it be discussed at the Board meeting.

4. Museum Facade and Approach

The committee felt that it was most desirable to place some displays and/or signs on the outside of the building, as well as make the wharf apron more attractive. This would require joint planning with The Children's Museum. It was decided to discuss this at the board meeting.

5. Production Specialist

The budget shows a line for a production specialist. This would be a new temporary staff position for a person with wood, metal and plexi skills. A member of The Children's Museum staff who has worked part time for the Computer Museum has applied for the job. His skills in customising artifiacts and displays to the tough museum conditions would help all major exhibit projects. A workshop space could be set up and equipped for $10,000. It is anticipated that some in-house capability would cut the overall costs of the projects, and also give us a better product.

It was decided to hire a production specialist and set up and equip a small workshop. The funds should almost entirely be drawn from the funded capital exhibit projects.

OS
9/12/86

attachments:

1. Capital Budget: entry bay, AI exhibit, software
2. Inside a Computer - entry bay proposal

	A	B	C	D	E	F	G	H
1	Project	Q1 FY87	Q2 FY87	Q3 FY87	Q4 FY87	Q1 FY88	Q2 FY88	TOTAL
2	**TOTAL COST**	**8000**	**52000**	**100000**	**329000**	**232000**	**113000**	**834000**
3								
4	**General - To**	**0**	**16000**	**1000**	**21000**	**10000**		**48000**
5	*Workshop*		*10000*					
6	Coll/Lib		1000	1000	1000	10000		
7	Auditorium				20000			
8	*Prod. Spec*		*5000*					
9								
10	**Entry - tot**	**0**	**5500**	**31000**	**71000**			**107500**
11	Developer		5000	10000	10000			
12	Design			10000	5000			
13	Construct				40000			
14	Graphics			10000	15000			
15	Gen Ad		500	1000	1000			
16								
17	**AI Income**	**7500**	**75000**		**150000**			**232500**
18	**AI Exh Tot**	**8000**	**26000**	**54000**	**206000**	**113000**		**407000**
19	Oliver	6000	11000	13000	13000	4000		
20	Developer		8500	8500	8500	8500		
21	Asst	1000	4000	4000	4000	3000		
22	Designer			5000	30000	15000		
23	*Prod Spec*			*6000*	*8000*	*1500*		
24	Construct				50000	60000		
25	Graphics				60000	20000		
26	Exh Hdwre			15000	20000			
27	Opening				10000			
28	Gen Ad	1000	2500	2500	2500	1000		
29								
30	**Software Inc**		**50000**			**200000**		**250000**
31	**Software Tot**	**0**	**4500**	**14000**	**31000**	**109000**	**113000**	**271500**
32	Oliver		4000	2000	2000	11000		
33	Developer			10000	10000	10000	10000	
34	Asst				2000	4000	4000	
35	Designer				15000	15000	10000	
36	*Prod Spec*					*7000*	*7000*	
37	Construct					30000	35000	
38	Graphics					15000	20000	
39	Exh Hdware					15000	15000	
40	Opening						10000	
41	Gen Ad		500	2000	2000	2000	2000	

DRAFT PROPOSAL FOR THE COMPUTER MUSEUM ENTRY BAY

Since the inadequacy of the current installation was noted shortly after the Museum Wharf opening, the desired qualities of the visitor's first experience at the Museum have been discussed at length. It should beckon, excite, not alienate and offer plenty of involvement. Ideas for the space have ranged from a multi-pod computer applications display, to a giant mural plotter.

To fulfil its educational mission, the Museum should have an exhibit on how computers work. Current exhibits and the proposed artificial intelligence and software exhibits and the Computer Discovery Center will chiefly address computer applications, software and social impact, omitting a basic explanation of the elementary nuts and bolts of a computer.

INSIDE A COMPUTER

As the elevator doors open, visitors would at once be confronted with a view of the entire bay and a feature which would tell them at once that they were walking inside a bay-size computer. The bay would be laid out with the main parts of a computer, with the INPUT, PROCESSOR, MEMORY and OUTPUT all occupying their islands, connected by appropriate (light pipe?) wires (buses). The SAGE computer would be used as the three-dimensional 'sculptural' component anchoring each island, and providing a vivid historical embodiment of each part of a computer. Each island would feature at least one involving interaction, demonstrating the working of that part.

At INPUT, visitors would feed data into a reader, using keyboard, mouse, punched card or magnetic tape. Coded pulses from their input will be seen to flash along wires to the processor.

At the PROCESSOR, visitors might watch a computer animation of a fetch/execute cycle, learning the basic notions of instruction cycles, the shuffling of data into registers amd to memory, and the performing of simple additions or boolean operations. Real processors from a PDP-8, to microprocessors under magnification, could supplement the SAGE arithmetic unit.

At MEMORY, the current core memory demonstration can be supplemented by other stations showing the principles of some other media, such as disc and the basic latch used in semiconductor memory. Visitors would be invited to contribute something to a memory - perhaps a hard disk that could be browsed. The SAGE core unit will anchor primary memory and the SAGE tape and drum units will anchor back-up or secondary memory.

continued....

Signals will flash along the wires to the OUTPUT, where messages appear, perhaps related sensibly to what is going on at INPUT or MEMORY. Perhaps this entire giant computer will be running a simple simulated program, such as inputing visitors' first names, storing them in memory, processing the names to generate statistics, outputing results.

The walls of the bay will be dressed to enhance the feeling of being inside a generic computer - large ventilation grilles, sockets, with a large fan near the power supply in one corner. Strictly, input and output should be outside the computer per se.

The displayed artifacts will also be described in text aimed at the serious visitor interested in the history of computing. There will therefore be two kinds of experience possible - the educational, how computers work one and the historical, traditional museum one. The former will be humorous, light-hearted, though technically clear and informative; the latter will be more factual and less interpretive. The exhibit design must allow these two tracks to coexist harmoniously, clearly signalling their respective roles to their audiences.

The involving interactions must be brief, allowing fast throughput. The bay must accomodate large numbers of people, as it will receive school groups, and provide access to the artificial intelligence and software exhibits,the Computer Discovery Center, and stairs to level 5.

OS
8/27/86

THE COMPUTER MUSEUM MARCH 4,1987

TO: PARTICIPANTS OF COLLECTIONS MEETING
FROM: GWEN BELL
SUBJECT: APRIL 10TH MEETING ON COMPUTER COLLECTIONS IN MUSEUMS
PARTICIPANTS:

DAVID ALLISON,CURATOR OF INFORMATION PROCESSING, NATIONAL MUSEUM OF AMERICAN HISTORY

ROBERT ANDERSON, DIRECTOR, THE ROYAL SCOTTISH MUSEUMS

I. BERNARD COHEN, PROFESSOR EMIRITUS, HISTORY OF SCIENCE, HARVARD

JON EKLUND, CURATOR, NATIONAL MUSEUM OF AMERICAN HISTORY

GARDNER HENDRIE, BOARD MEMBER, THE COMPUTER MUSEUM

BRIAN RANDELL, PROFESSOR OF COMPUTER SCIENCE, UNIVERSITY OF NEWCASTLE, TRUSTEE,THE COMPUTER MUSEUM AND FIRST CHAIRMAN OF THE COLLECTIONS COMMITTEE

GWEN BELL, FOUNDING PRESIDENT, THE COMPUTER MUSEUM

JOE CASHEN, EXECUTIVE DIRECTOR, THE COMPUTER MUSEUM

LYNN HALL, REGISTRAR, THE COMPUTER MUSEUM

OLIVER STRIMPEL, CURATOR, THE COMPUTER MUSEUM

AGENDA:

9:30: THE COLLECTING MISSION AND GOALS: WHAT SHOULD MUSEUMS COLLECT?, COMPUTER HARDWARE,SOFTWARE,FILM, VIDEO AND EPHEMERA. AN OVERALL MAP OF THE PRESENT COLLECTIONS.-G. BELL

COLLECTING AT THE NMAH - D. ALLISON

11:00: BREAK

11:15: THE HARDWARE COLLECTIONS: STRATEGIES AND TACTICS, ANALYSIS OF RECENT COLLECTION DECISIONS. DISCUSSION. -G.BELL

12:30-1:30: LUNCH

1:30-2:30: FILM AND VIDEO EPHEMERA: WHAT IS IT? COLLECTING AND EXHIBITING

2:30-3:00: STATUS OF THE SOFTWARE ARCHIVE PROJECT

3:00-3:30: WHAT WE'VE LEFT OUT; WHERE DO WE GO FROM HERE?

exhibits

THE COMPUTER MUSEUM EXHIBITS

Oliver Strimpel
July 1987

Contents

Part I: Existing Exhibits: Appraisal and Suggested Changes

Part II: Ideas for Major New Exhibits

Distributed to:

Joe Cashen, Gwen Bell, Mark Hunt, Matt Murray, Michael Oleksiw, Bonnie Turrentine

THE COMPUTER MUSEUM EXHIBITS

PART 1: EXISTING EXHIBITS: APPRAISAL AND SUGGESTED CHANGES

1.SAGE

Good points

Tour
The existing exhibit provides a good set of props for a guided tour. The artifacts are spaciously laid out so that a group of 30 can comfortably view the displayed objects and see and hear the guide.

Parties
The open plan is also valuable for parties and functions. The presence of the artifacts provides a unique atmosphere that would not be matched in the auditorium.

Imposing
The sheer size and imposing nature of the SAGE probably impresses most of the visitors. This raw sensation is a good one to capitalize on as an initial experience at a Museum.

Bad Points

Lack of Unity
There is no clear start or end to the exhibit. The unity of the display is further broken by the presence of UNIVAC and the separation onto two floors. Probably no more than 5% of visitors realize that the blue room is part of SAGE and that all the machines (except Whirlwind) on the 6th floor are part of one computer.

Signs
The text panels have a very uneven level of presentation. There are diversions to explain general points such as how a computer works. The text lacks immediacy and punch. There is insufficient differentiation of essential material and detail.

Lack of Context
There is only patchy comparison with other computers or machines that might enable visitors to grasp the nature of the SAGE hardware and application.

Atmosphere
Wheras the open plan is desirable for group tours and parties, it reduces the artifacts to isolated monuments on an expanse of carpet. This is a disadvantage if one is attempting to model a machine room scenario, and generate an exciting period atmosphere.

Safety
On the fifth floor, the staircase height is such that children can easily injure themselves while trying to run beneath it. Two serious accidents have occurred.

Possible Improvements

There appear to be two approaches. The first is to upgrade the exhibit, maintaining its general current disposition. The second is to redo it entirely on the 5th floor, making the 6th floor available for other uses.

1. Upgrade

In this approach, the bad points of the exhibit are addressed individually.

The unity of the exhibit is enhanced by using appropriate, signs, flooring, maps and items hanging in the space above the stairwell. Whirlwind will in any case be modified in the current plan for the 6th floor entry area, and the termination of Whirlwind and the start of SAGE can made more clear cut.

A new set of signs are prepared with several tiers of text. One tier will present only the most important information in a very readable style. This information would include the motivation for and use of SAGE as well as short descriptions of what each part does. Smaller type will present descriptions of the artifacts. Another layer of panels and demonstrations might explain in simple terms how each part of the system works.

The SAGE system could be placed in better context by displaying equivalent contemporary machines in a coherent fashion. The overall performance could be compared to a PC, the CPU to a microprocessor, the core memory to a RAM chip, the tape and drum to a current disc and tape unit, and the console and patch-board to its equivalent today. The comparison can be carried on to the blue room, where a current display of equivalent resolution could be displaying a similar radar flight map. It would be impressive to try and execute a similar task on a pc-based system, allowing visitors to play the role of the blue-room officers, checking on the flights. In all cases, cost, power consumption and size comparisons could be displayed.

The nature of the software and the programming techniques used should be indicated. The number of punched cards required to store the program might be placed on display as a couple of towers from floor to ceiling.

The atmopshere could be enhanced by making further use of photomurals (such as on the white wall above the stairwell) and sound and light effects. Messages should be piped down the telephone handsets attached to the exhibit. However, it would probably not be possible to create a true machine room atmosphere while preserving the present layout.

The risk of accidents below the staircase could be removed by building panels to block access to the space below the steps.

The upgrade described above would enhance the educational impact of SAGE, while preserving the space's good qualities listed above.

2. Recreation

The second alternative is to consolidate all of our SAGE artifacts on the fifth floor, and create a convincing machine room environment. The staircase would descend over and into the midst of the exhibit, and visitors would be surrounded by machinery, sound, and lighting effects. Uniformed manikins would be manning the consoles, and several screens would be animated to simulate actual operations.

The unity of the exhibit would be greatly enhanced in this approach as the SAGE would occupy a smaller, better defined space confined to a single floor. UNIVAC would be removed, and visitors would enter the SAGE room as they descended the steps, and leave as they entered the timeline.

The signs would be redone as suggested for the previous approach, and more information could be presented aurally through handsets. There would be insufficient space to compare each component with its current equivalant, but the overall task of SAGE could be simulated with several interactive touch-screen stations, and the comparisons made there.

The great strength of the approach would be the atmosphere. The concentration of the hardware into a more limited space, together with the simulation of a machine room through appropriate flooring, ceiling, lighting, mural, sound and models would create a very impressive overall atmosphere of a large military computer installation of the 1950's. While this approach would make a deep impression and entertain the visitor, the previous approach would offer more oportunity for learning.

Time and Cost

1. Upgrade

Time:

curator	2 months
research asst.	6 months
programmer	12 months
carpenter	6 months
workshop asst.	4 months

Cost:

salaries	$68,000
designer	$20,000
signs	$15,000
photos	$ 5,000
equipment	$ 5,000
audiovisual	$ 5,000
other	$ 5,000
total non-sal.	$55,000
TOTAL EXPENSE	$123,000

2. Recreation

Time:

curator	2 months
research asst.	8 months
programmer	8 months
carpenter	9 months
workshop asst.	6 months

Cost:

salaries:	$72,000
designer	$40,000
signs	$15,000
photos	$15,000
equipment	$14,000
audiovisual	$ 8,000
other	$ 5,000
total non-sal.	$97,000
TOTAL EXPENSE	$169,000

2. Timeline

Good Points

The timeline contains a profusion of artifacts and archives. Any visitor who was calculating or computing before 1970 will find something to identify with in the timeline. They will be interested to see other contemporary examples of the technology. Visitors with a knowledge of or interest in the history of computing will find the timeline exciting as an opportunity to see, at first hand, parts of the machines they have read so much about. This is an experience only The Computer Museum can offer.

The parts are quite attractively laid out so that a lay visitor might be intrigued at the visual quality of artifacts such as core memory, delay lines and so on.

Bad Points

There is little or no interpretation of the artifacts beyond brief labels that credit the source and name the model and maker. Even the timeline nature of the exhibit is probably lost on over half the visitors. There is no attempt to unify or organize the threads of development; processors, memories, documentation, applications are all thrown in together.

Possible Changes

The timeline occupies a corridor wall space that cannot readily be expanded without changing either the SAGE exhibit or the "See it Then" theater. It would not be possible to respond the the criticisms above without using much more space than is available.

It is probable that the Timeline as it exists now would not survive in a new exhibit plan in which the space in bays 2,3 and 4 was redeployed. It therefore seems inappropriate to devote considerable effort towards refurbishing the exhibit.

However two minor changes should be implemented in any case:

1. The years should be displayed more clearly to emphasize the timeline nature of the exhibit

2. A few of the most important artifacts could be picked out with, say, red signs that would offer elementary explanations. Examples might include the Whirlwind core plane, the UNIVAC tape, the ashtray, the teletype, the IBM 360/30, and the Nova.

3. See it Then Film Theater

Good Points

The films bring computing in the 50's and 60's to life very effectively.

Bad Points

Visitors without prior knowledge or experience have little context in which to place the films. This exhibit appeals to only a slightly wider audience than the timeline. The use of 16mm film causes maintenance problems.

Suggested Changes

Some introductory text before each film would help widen the appeal of the films.

However, it remains questionable whether the space is effectively used when the appeal of the films is narrow. It might be argued that the Museum could screen the film in the auditorium at advertised times, say once a day, functions permitting.

As this space is adjacent to others that might be replaced entirely, it might well be incorporated into a future new gallery. Significant effort should probably not be devoted to upgrading this theater at present.

4. IBM 1401 - Travellers Insurance

Strong Points

The recreation of a complete computer room of the 60 s complete with sound commentary and light cues is appealing can can be appreciated on a number of different levels. The exhibit tries to show how the machine was physically used and scheduled. This represents the start of commercial computing as we know it today. Visitors enjoy using the card punch machines.

Bad Points

The commentary's clarification of just what it is the computer is actually doing is hard to grasp. The choice of an insurance company does, however, make it rather hard to lend immediacy and excitement to the actual application. It would be difficult to demonstrate the task accomplished by the computer in a way visitors would appreciate. But without an appreciation of the value of the computer, the exhibit risks being viewed as a quaint piece of historical technology. The relevance of this first urbane use of computers does not seem to strike the visitor.

Suggested Changes

An interactive simulation of the insurance application would help visitors grasp what the machine was doing. It might also be worth trying to indicate how much human work would be involved to perform the task manually.

The programmer's office should have more printout piled up on the desk.

5. Seymour Cray

Good Points

Seymour Cray is certainly one of the foremost computer engineers. It is appropriate and exciting for some visitors to see so many of his machines on display. The quotations are well chosen.

Bad Points

There is no explanation of what is required to make computers run fast. There is little context-setting to tell visitors what Cray achieved and how outstanding he is. There are too many static machines sitting on the carpet. This exhibit is virtually ignored by most visitors. Worse, it may make some feel that this museum is not for them because it assumes too much prior knowledge. Finally, the exhibit occupies an awkward area at the intersection of several passageways which lacks an obvious beginning or end.

Suggested Changes

Short Term:
An interactive exhibit about computer speed and power is planned for this space. Visitors will be able to compare the speed of a personal computer with that of a minicomputer, workstation, mainframe and supercomputer. They will be able to discover some of the engineering approaches Cray adopted to make his machines run faster. After trying out this hands-on exhibit, visitors should be able to appreciate the Cray artifacts better.

Time and Cost:
Ben Blout, summer programming intern will implement a first version of this exhibit during the summer of 1987. The exhibit will run on a donated Sun-3 workstation that has a large high resolution display. The total cost is expected to be approximately $1000.

Long Term:
The original plan was to reuse the space to feature another computer pioneer, such as Alan Turing or Niklaus Wirth. However, the awkward nature of the space, and the realignment of the Museum's exhibit strategy toward educational exhibits on current technology, make it unlikely that this plan will be implemented.

This space should probably be viewed as part of a redesign of the whole of Bay 3 and perhaps Bay 2. The Cray artifacts would be taken off display, or possibly incorporated, in part, into another exhibit.

6. NEAC 2203

This early Japanese computer occupies a space next to the Cray exhibit. It was simply placed on the carpet when it arrived and has not been converted into an exhibit.

It requires a reader rail to hold text panels and the modification of the covering panels to reveal the modules inside the machine. All the pieces should be placed onto a black plinth. Some description of its capability and cost, should be presented, as well as comparison with other machines of its day. Some statistics on the Japanese computer industry would fit in well here.

Time and Cost

Time:

curator	0.5 month
carpenter	1 month

Cost:

salaries	$4,000
signs	$ 500
materials	$ 500
TOTAL COST	$5,000

7. Integrated Circuit

Good Points

Several panels make impressive comparisons, such as the one that contrasts a single chip with box full of boards from a PDP-8. The chips under a microscope are interesting. The public expects some explanation of integrated circuits.

Bad Points

The exhibit fails to generate a sense of excitement. Visitors miss many of the points it tries to make, possibly because they are tired of static exhibits at this point, and are lured ahead by the sounds of the PC's. The microscope is not well implemented - the magnification is too low, and there is insufficient accomanying information. The exhibit area may be too small to do justice to the topic.

Suggested Changes

The survival of this area in its present form depends on the wider plans for Bay 2. If the space's lifetime exceeds about 12 months, the following changes should be considered.

Remove peripheral panels to make space for a more focussed exhibit. The exhibit should concentrate on a single theme such as the anatomy of a chip, or the fabrication of a chip, or the many applications of chips. Another approach would be to describe the chips one finds inside a personal computer. At present there are a couple of panels on each of these topics; the exhibit is spread too thinly.

The microscope exhibit needs better packaging and signage. The text should suggest specific items to look for. State-of-the-art chips should be inserted. Plots of chip layouts should be displayed, and explained.

Time and Cost

Time:

curator	1 month
research asst.	2 months
carpenter	1 month
workshop asst.	1 month

Cost:

salaries	$14,000
designer	$ 5,000
signs	$ 5,000
photos	$ 2,000
equipment	$ 1,000
other	$ 1,000
total non-sal.	$14,000
TOTAL EXPENSE	$31,000

8. Manufacturing

Good Points

The exhibit shows some of the stages in manufacturing a computer. Computers have a 'black box' image for many visitors, and this exhibit shows that, like other products, computers are assembled from diverse parts along production lines. The idea of showing the evolution of a particular computer as it moves through the line, culminating in a working example of the manfuactured computer is a good one. Large photomurals provide some atmosphere.

Bad Points

As with the IC exhibit described above, the exhibit generally fails to excite or inspire. The sequence of steps, from the printed circuit board to the wave solder machine followed by the manual insertion table and the conveyor belt for final assembly are not sufficiently linked. The actual manufacturing machines are not sufficiently complete or animated to demonstrate their mode of use. The wave solder machine is not meaningful to a visitor who does not already know what it is.

The manual insertion table is denuded of most of the tools and cannot be re-equipped before adequate protection is installed.

The working exhibit based on the Data General eclipse uses an incomplete database and the machine itself is unreliable.

Suggested Changes

Once again, the plans for this area should be considered in the context of plans for Bay 2 as a whole. Bay 2 would appear to be a good site for a totally new exhibit as all the current exhibits would need significant changes to become successful.

An exhibit on manufacturing would require a lot of environmental props to become exciting. The industrial machines would need to be animated or actually working. Sound effects and video should be added.

The cost of carrying out a proper upgrade to this exhibit would be $60-90,000. In discussions with Board members and others, manufacturing has not been mentioned as a high priority. It is therefore recommended that this exhibit not be refurbished barring minor repairs:

- the manual insertion table should be replenished and protected
- the interactive exhibit on the installed base of computers running on Eclipse should be replaced with the more complete database running on the NEC APC III, already donated to the Museum.

9. Personal Computers

Good Points

Mound:
Some interesting,unusual machines are shown that excite knowlegable visitors.

Hands on Ring:
Some individual programs are entertaining and instructive. These include DECtalk and Maze Programming.

Bad Points

Mound:
There is insufficient text or graphical explanation or context for the machines. They are piled in without any sensible ordering. The public is not told what significance each machine has. The exhibit includes the Alto, Apollo, Kitchen Computer and the LINC. These are something of a stretch in an exhibit on personal computers. In contrast, the Museum's unique collection acquired as a result of the Early Model Personal Computer Contest is not incorporated into the display. The Kenbak, Scelbi, TV Typewriter, VDM-1, SWTPC 6800 and others are an integral part of the story.

It could also be argued that no personal computer exhibit should confine itself to displaying a collection of static artifacts. Some of the additional topics that might be addressed are described below.

Hands-on Ring:
There is no relationship between the various programs. The original theme of showing different interfaces to computers no longer holds up since Pencept and the paint program have been removed. In any case, this theme is a little obsolete since non-keyboard interfaces are becoming very common in the outside world and in the rest of the Museum.

Some programs are simply commercially available games that do not offer any special insights. The HP interactive label program does not work effectively. Few visitors realize what it is or take the trouble to use it.

Suggested Changes

The level of effort to be placed into refurbishing this exhibit should depend on the extent of overlap with the BCS Computer Discovery Center (CDC). Current plans for the CDC call for extensive treatment of personal computer applications. This would seem to make the hands-on ring redundant unless it was refurbished to focus on a distinct theme.

The historic PC's will not be covered by the CDC, nor anywhere else in the world. The Museum almost certainly has the best early model PC collection. It would therefore seem worthwhile to develop a sound exhibit on the development of personal computers. This exhibit could be approached in one of two ways: "historical timeline" or "PC Technology". The former could be carried out in the 800 square feet currently devoted to PC's. The latter would require about 1,500 square feet.

PC Historical Timeline

This alternative would appeal primarily to knowledgable visitors, especially those who had been using PC for a number of years. It would place many items from the Museum's collection in an illustrated and annotated timeline, indicating what innovation was incorporated in each machine. The layout and mode of display would make the exhibit look attractive and accessible, but there would be no interactive elements, and relatively little basic education about what a PC is and what it can do.

Time and Cost

Time:

curator	1 month
research asst.	3 months
carpenter	4 months
workshop asst.	4 months

Cost:

salaries	$26,000
designer	$10,000
signs	$ 5,000
photos	$ 2,000
equipment	$ 2,000
other	$ 2,000

total non-sal.	$21,000
TOTAL EXPENSE	$47,000

Personal Computer Technology

In this approach, the basic goal is to explain and demonstrate the evolution and current nature of PC technology. Interactive displays would explain how the various components of the PC worked. Many historic PC's would be displayed to illustrate the first implementation of aspects of the technology. For example the story on displays would include Don Lancaster's TV typewriter and Lee Felsenstein's VDM-1. The Micral would be shown as the first PC to use a microprocessor, and the opportunity would be exploited to explain how PC's depend on microprocessors. The introduction of various storage devices would be shown: cassette tape, stringy floppy, floppy disc, hard disk.

Several machines would be opened up with their components labelled. Selected concepts would be illustrated with interactive demonstrations. Statistics would be presented on the increasing cost/performance, and on the numbers of systems sold. Some corporate history might also be presented.

Time and Cost

Time:	curator	2 months
	research asst.	6 months
	programmer	6 months
	carpenter	8 months
	workshop asst.	6 months
Cost:	salaries	$62,000
	designer	$15,000
	signs	$ 8,000
	photos	$ 4,000
	equipment	$ 6,000
	other	$ 3,000
	total non-sal.	$36,000
	TOTAL EXPENSE	$98,000

10. Other Bay 2 Exhibits

Bay 2 also contains the tic-tac-toe player built of tinker toys, the Apollo guidance computer, and the ILLIAC IV. These are modular exhibits. The latter two were selected as interesting examples of computers based on integrated circuits - this being the unifying theme of the bay.

The tinker toy computer is enjoyed by visitors. It should probably remain on display until the space is needed for a new exhibit.

The Apollo guidance computer does not arouse great interest. The exhibit does not emphasize the key points about the machine, and tries to present too much information. It could be improved by simplifying and reducing the amount of text. The hands on interaction is a good idea, but is too hard for many visitors. This exhibit is probably not worth modifying as it was designed a an integrated package. It should be considered dispensible in future plans for the space. As it is relatively self-contained, it could also be moved to provide a feature in an unused space.

The ILLIAC IV is an artifact that interests visitors who have already heard of it as the first serious parallel computer. This is a small percentage of our visitors. Ideally this should be viewable upon request in a back store area, but this arrangement is no longer possible in the Museum. If it remains on display, the signs should be amended and a simplified tier of text about parallel processing and its importance should be provided. In addition, a board from the machine should be displayed. Some connection between the hardware and its role in parallel processing should be made if possible. In the longer term, ILLIAC IV can be removed from the exhibits. It would certainly be a centerpiece in any future exhibit on parallel processing.

11. The Computer and the Image

Good Points

The gallery offers a coherent theme of topical interest to the public. There are a good number of working hands-on exhibits, and plenty of visually interesting imagery. There are good films and video shows. Most of the exhibits are placed into a context that hints at their importance or application.

Bad Points

There is insufficient explanation for some visitors. The layout makes for overcrowding in some areas. The videos are poorly placed. Several working demonstrations are based on hardware that is hard to maintain. The field has moved in the three years since the gallery was developed and the gallery will soon be in need of updating.

Suggested Changes

The concept of the gallery is sound, and it does not need major changes to remain an effective and popular exhibit. However, a fuller treatment of the use of graphics in CAD is desirable. An example from civil engineering might be included, showing the ability to simulate the operation of a design before going ahead and building. The exhibit funded by Prime on the use of modelling in siting ice-cream stores should also help in this area.

EXHIBIT	SUGGESTED CHANGE
machine room	The contents of the room have changed since the gallery was opened. A new sign is needed.
image processing	This exhibit has never been completed. It is based on outdated donated hardware and software. The gallery badly needs an exciting hands on display on image processing. A good domain is that of satellite pictures. The current plan is to offer visitors satelite images of the Boston area and several other locations. Visitors could zoom in and out of these images, and carry out various transformations on the images, such as false coloring, classification, contrast stretching, and

spatial filtering. Images of other planets or radar and sonar images of the ocean depths could also be offered. The exhibit requires large disc storage space, and a powerful processor. If the current system based on the PDP-11/70, Grinnell display processor and MIPS software running under RSX-11M does not work by the end of summer 1987, other avenues should be sought.

anatomy of an image

This exhibit takes a picture of a visitor and then allows him or her to experiment with the basic parameters of a digital image - spatial resolution (number of pixels) and contrast (number of grey levels). The exhibit works well, but there have been problems with the MASSCOMP hardware. If MASSCOMP does not come through, alternative equipment donors should be sought and a the display reimplemented.

color-slice

Visitors take a black-and-white picture of their face which they convert to false color. This is popular and instructive. The interface needs improving. As with the previous exhibit, it is based on MASSCOMP hardware and may need reimplementation on new equipment.

teapot

This exhibit is about computer graphic rendering. A solid model of a teapot is rendered, complete with smooth shading. Unfortunately, visitors do not grasp all the stages that the computer has to go through here. The demonstration would be much more instructive if the various stages of rendering were shown in sequence: wire-frame, hidden line suppression, polygon shading, smooth shading and light-source modelling. In addition, the rendering could be taken much further, placing the teapot in an environment, and placing an environmental texture map onto its surface to look like reflections. This is a project for a serious volunteer. The switches and panel need to be secured and neatened.

cellular automata	This exhibit works well, but has become disconnected from the panels that relate to it. The two should be reunited.
Xynetics plotter	This exhibit has given maintenance problems. If it cannot be made to work on a regular basis, it should be removed and replaced by other exhibits on CAD. Visitors enjoy it when it does work.
design a circuit	This demonstration of the SPICE electrical CAD system by Mentor Graphics is too difficult and unrewarding for most visitors. It should be replaced by a more accessible example of CAD running on more easily maintained hardware, preferably with a color display.
slide show	This needs updating with slides taken from the 1987 SIGGRAPH slide sets. The exisiting slides are a little obsolete and faded. The monitor that displays the captions needs to be secured better.
Mandelbrot Sets	This PC-based exhibit does not do this subject justice. Incredibly beautiful images are avaialble (as shown in our Colors of Chaos temporary exhibit), and more powerful computers and displays could offer some potential for exploring the weird and wonderful shapes of the Mandelbrot Set. As it stands now, the exhibit is marginal. Most visitors do not get to grips with it. It needs a little more introductory material.
Image Contest	The 1985 winners of the International Computer Graphics Image Contest should be replaced with the 1987 winners.
Animation Theater	16mm film was selected to optimize image quality. However it appears that the quality is compromised by back-projection and a short throw from projector to screen. The quality and image size still compare very favorably with video. This exhibit earned mention as Boston Magazine's best least-known exhibit! Care should be taken to maintain projection equipment regularly. In

addition, the actual film should be updated every year after SIGGRAPH.

Videos	The video programs "Simulation" and "Computer Graphics in Action" need updating. Improved siting of the monitors should be considered.

Time and Cost

Time:	curator	2 months
	research asst.	5 months
	programmer	6 months
	workshop asst.	1 month
Cost:	salaries	$39,000
	audiovisual	$15,000
	photos	$ 5,000
	signs	$ 5,000
	other	$ 3,000
	TOTAL EXPENSE	$67,000

12. Honeywell Animals

This exhibit appeals to most visitors, adding a touch of pleasant whimsy to the end of a visit. Originally planned to end in January 1986, this exhibit has unofficially turned into a permanent exhibit. There is no need to alter the exhibit at present.

The material is not important enough to justify preservation of its space if competing needs arise. However, individual animals, if donated to the Museum, would make very attractive sculptural items in the lobby or any other foyer space that might arise in future plans.

13. Norris Gallery

An active temporary exhibit program consumes resources and money, but provides a valuable source of novelty and calendar listings to help promote the Museum.

The Norris Gallery has housed the Tinney paintings, the Calcomp-sponsored art contest winners, Colors of Chaos, Lillian Schwartz images, and On the One Hand. It is clearly useful for the Museum to have a temporary exhibit space so as to be able to house travelling exhibits, or develop exhibits ourselves that will travel.

If the Museum chooses to display more computer art, the Norris Gallery would be a good site. Provision for hanging pictures would then have to be installed as the current system of hanging pictures from eyelets screwed into the wooden ceiling is very awkward.

The current space constitutes the outside of the SAGE exhibit. If SAGE were reorganized along the lines of the recreation outlined above, it may be desirable to move the existing walls. The Norris Gallery would then disappear and an equivalent space should be carved out in future planning for other bays.

PART II: IDEAS FOR MAJOR NEW EXHIBITS

1. The Information Age

Introduction

One important aspect of the Museum's mission is to demonstrate and explain aspects of computing that are beyond the reach of the majority of the public. Personal computers are now very familiar to a large sector of the population. However, PC's do not by any means encompass all aspects of computing.

Our society depends on computers that perform functions well beyond the reach of small computers. Consider the following domains:

- electric power
- airline reservations
- air traffic control
- traffic management
- banking
- oil exploration
- scientific research

These areas require the use of large, often networked computer systems. Everyone has indirectly made use of these systems. The goal of this exhibit would be take the lid off these applications, revealing how computers carry out these tasks, and informing the public of domains they do not readily have access to.

Display Strategies

The exhibit would consist of between five and eight modules, each dealing with a particular application. Each module would occupy 5-800 square feet; the exhibit as a whole would therefore occupy between one and two small bays of the Museum. The exhibit could be replace existing exhibits on the fifth floor in bays 2 and 3, or occupy unused space in bays 2 and 3 on the sixth floor.

The modules would use hands-on exhibits, simulations, graphics, text and video to draw visitors into the application. Where possible, visitors should be able to experiment with simulations of the applications. For example, they might be asked to play the role of traffic manager for Manhatten, using the computer to release gridlock. Examples drawn from the actual solutions used in the field would be shown. A flavor of the complexity of the real domain would be conveyed, while still presenting the basic concepts used in each area.

Time and Cost

Each module can be developed independently of the others. However, at least three modules would be needed to give the project coherence. The following are estimates per module. If several modules were done together, there would be some economies of scale, but the following can serve as an approximate guide to the cost.

Time:

curator	2 months
research asst.	4 months
exh. coordinator	4 months
programmer	6 months
carpenter	4 months
workshop asst.	4 months

Cost:

salaries	$55,000
designer	$15,000
signs	$ 5,000
photos	$ 3,000
audiovisual	$ 7,000
equipment	$ 7,000
other	$ 5,000
total non-sal.	$21,000
TOTAL EXPENSE	$97,000

2. Software

A separate proposal for an exhibit on software has been written. Partial funding ($50,000 out of $250,000) has already been secured.

The exhibit would fulfil an important piece of the Museum's educational mission. The proposal suggests an exhibit of about 2,500 square feet, equivalent to a small Museum bay. This could be bay 2 on the fifth floor, or bay 3 on the sixth. A minimum of one year's lead time would be required between funding and opening.

3. Memories

A number of Board members and visitors have expressed interest in the idea of an exhibit featuring the development and technology of memory devices. The Museum has a good collection of artifacts, and the development of an exhibit would, no doubt, enhance the collection.

Display Strategies

The exhibit would present a historically organized view of memories featuring for each technology:

- underlying technology and physical principles employed
- speed and capacity
- cost
- domain of application.

Several examples of the memories in use would be shown, where possible allowing visitors to read and write from the memories, and witness the physical change they cause. The following memories would be included:

punched card, tape
read only - pegboard, rope, other
selectron
Williams Tube
delay line - acoustic, magneto-strictive
magnetic core, tape, drum, disc, bubble
semiconductor - RAM, ROM, EPROM; bipolar, CMOS, other
optical disc.

Time and Cost

Time:

curator	2 months
research asst.	4 months
programmer	8 months
carpenter	6 months
workshop asst.	6 months

Cost:

salaries	$57,000
designer	$25,000
signs	$ 6,000
photos	$ 3,000
audiovisual	$ 5,000
equipment	$ 7,000
other	$ 5,000
total non-sal.	$51,000
TOTAL EXPENSE	$108,000

4. How Computers Work

Introduction

Several discussions with Board members have indicated enthusiasm for an exhibit that attempts to convey basic computer nuts and bolts. It is felt that many visitors harbor a basic mistrust of computers which can only be addressed by presenting the essentials of a computer's operation in a friendly, accessible fashion.

An interesting example of such an exhibit is the "Soup Machine" at the National Museum of Science and Technology in Ottawa. Occupying a large wall, this exhibit executes a five minute program in which a narrator, accompanied by lights and movements, traces the sequence of steps that occur when a machine obeys a program to make soup. The scale and sheer implausibility of the display makes an unforgettable impression.

A proposal to base such an exhibit on the SAGE gallery was presented to Board members in the summer of 1986. The idea was to use the large artifacts as anchors in a gallery-wide simulation of the inside of a personal computer. Visitors would play the role of bits of data, travelling between the input, processor, control, memory and output. At each location, an interactive demonstration would explain the workings of that part of the computer, and show how it connects to the other parts. Several Board members were enthusuastic about the idea, but it was not pursued as attention concentrated on Smart Machines.

How Computers Work might be a natural choice for the entry bay on the sixth floor. It could be presented as an introduction to the rest of the Museum, and be designed to work well with groups. The entry bay must serve as the gateway to the other exhibits, and any exhibit there has to be very easy to grasp, and allow groups to pass through without traffic jams.

A detailed proposal should be prepared once the overall style and function of the entry bay has been determined.

END