BD Presentation
for
Exhibits Committee

Ideas for Future Exhibits

Computers and the Environment
Computer Bloopers and Mishaps
Computers, Music, and Entertainment
Futures of Computing
Computers in Medicine
Computers in Design
Computers and Special Needs
Current Issues in Computing
Artifact-intensive display
Computers and Science
Computers and Fine Arts
Computer Animation

Allocation of Exhibit Space by Content

	Plan*	Actual
History of Computing	20-30%	18%
How Computers Work	10-20%	22%
People in Computing	10%	—
How Computers are Used	40-60%	60%

* based on 10/88 Exhibit Policy Guidelines

Exhibit Issues

- Space
- Type of Next Exhibits
- Content of Next Exhibits

Museum Exhibit Development 1987-1992

Year	Exhibit	Funds Raised	Square Footage
Pre-'87	Image Gallery	——	3500
1987	Smart Machines	$400,000	3,750
1990	Walk-Through Computer	$900,000	5,500
1991	People and Computers	$850,000	4,500
1992	Tools and Toys	$550,000	3,750
1993	Networked Society	——	3,500
		Total Exhibits	24,500
Total	Museum Space		45,000

Museum Exhibit Development 1987-1992

Year	Exhibit	Funds Raised	Square Footage
prior to 1987	Image Gallery	—	~~3,750~~ 3500
1987	Smart Machines	$400,000	3,750
1990	Walk-Through Computer	$900,000	5,500
1991	People and Computers	$850,000	4,500
1992	Tools and Toys	$550,000	3,750
1993	Networks Society	?	3,500
	~~total Exhibit Space~~	~~2,700,000~~	~~21,250~~
			24,500
	total Museum Space (fls 1,5&6)		?

Exhibit Issues

Space

Type of Next Exhibits

Content of Next Exhibits

Allocation of Exhibit Space by Content

based on 10/88 Exhibit Policy Guidelines

	Plan	Actual
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based on 10/88 Exhibit Policy Guidelines

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Computers, Music, and Entertainment

Futures of Computing

Computers in Medicine

Computers in Design

Computers and Special Needs

Current Issues in Computing

Artifact-intensive display

Computers and Science

Computers and Fine Arts

Computer Animation

MEMO

DATE: 1/9/92

TO: C. G. Bell, E. Belove, D. Case, J. Clark, G. Hendrie, R. Lucky, J. McKenney, D. Nelson

CC: G. Bell, O. Strimpel

FR: Greg Welch

RE: January 14, 1992 Meeting of the Exhibits Committee

The Exhibits Committee will meet from 10-12 on January 14, 1992 in the 5th Floor Conference room (off the auditorium) of The Computer Museum. The following is a rough agenda for the meeting:

10:00-11:30 Future Exhibits at Museum

- Revisit mission statement: "Exhibits treat history, technology and applications of computers" and criteria for selecting new exhibitions (pp-10-14 from Strategic Plan)
- Determine applications/technologies future exhibits should examine (list of suggestions attached)
- Develop preliminary plan for next five exhibitions

11:30-12:00 Networked Society

- Preliminary planning process and national brainstorming sessions
- Location of exhibition and its impact on other exhibits, operations, and future expansion

Ideas for Future Exhibits

The following is a list of topics for future exhibits discussed at last year's Exhibit Committee meeting on January 9, 1991.

What four or five exhibits should the Museum develop over the next five years? Are there other more important topics the Museum should address?

Computers and the Environment

Computer Bloopers and Mishaps — can't fund

Computers, Music, and Entertainment

Futures of Computing

Computers in Medicine

Computers in Design

Computers and Special Needs

Current Issues in Computing — need's endowment

Artifact-intensive display

Computers and Science

Computers and Fine Arts

Computer Animation

COMPUTER MUSEUM EXHIBIT DEVELOPMENT ~~PLAN~~ Policy

The Purpose of the Exhibits

The Computer Museum's mission is, in part, *to educate and inspire all ages and levels of the public through dynamic exhibitions and programs on the technology, applications and impact of computers.*

New exhibits are needed at the Museum to help fulfil this mission, both in terms of the breadth of audience levels served, as well as the range of topics featured.

The exhibits should provide an environment for "landmark learning," the grasping of key ideas in a new subject. The aim is to raise curiosity and awareness, not to teach a course. Exhibition galleries filled with an engaging array of interactive displays, original artifacts, and video have a unique power to inspire visitors to make mental leaps into new fields. The selection of content and media should serve the educational goals of the exhibit.

Audiences to be Served

The audiences served may be coarsely divided into three groups. Group 1 consists of technically literate individuals, the majority of whom are professionally involved with computers. Group 2 consists of the remainder of the adult visitors, with little or no knowledge of computers; this group may have some interest in computing, perhaps through a family member, or through the use of word processors. Group 3 is the youth audience who visit as part of school-arranged field trips to the Museum, or with their families during weekends and vacations.

The degree to which an exhibit appeals to one of the groups depends both on the its subject matter as well as on the manner in which it is presented. The Museum will try to ensure that at least two of the three groups are well served by any individual exhibit. In addition, the Museum will produce supporting materials, such as worksheets, catalogs, and gallery guides, that will broaden each exhibit's educational impact. The overall mix of exhibits at the Museum will offer a rewarding experience for members from all audience groups.

Allocation of Exhibit Space by Content

There are four fundamental areas that should be addressed within the Museum's exhibits. Taken as a whole, these areas span the content areas delineated by the Museum's mission statement. Taken separately, they each offer the opportunity of engaging at least two of the Museum's audience groups.

1. History of Computing. 20 - 30%

A brief, introductory exhibit on the evolution of computer hardware and software is an essential component of a well-rounded museum visit; indeed, most visitors expect to see some history in a Museum. The Museum therefore plans to develop an introductory historical exhibit composed of two parts. In the first part, vignettes from key episodes in history of computing will be presented with emphasis on the social context that brought the technology about. The second part will consist of the recreation of a large computer installation of the vacuum tube era. The sheer size of vacuum tube computers will make a lasting impression on visitors. A single, powerful, visual impression to take home is an important characteristic of many successful museums. Every effort will be made to target these introductory exhibits towards all three audience groups.

A result of this policy is that only a very small percentage of the Museum's collection of historical artifacts will be on display in the public galleries. Visitors with a desire to see more of the collection (anticipated to consist mainly of audience group 1) will be accommodated by the Museum's Visible Storage area. This consists of a well organized artifact storage area in which most of the significant artifacts in the collection are laid out, well lit, and labelled with technical descriptions.

should be other historical exhibits

Although these may be the only permanent exhibits in which the historical theme is uppermost, many other aspects of computer history will be covered as introductory or background sections within other thematic exhibits. The history of software, for example, may be presented within a thematic gallery on software technology.

2. How Computers Work 10 - 20%

To address the mission's requirement for exhibits on computer technology, an introduction to the basic principles of computer hardware and software will be presented, either as a separate

exhibit, or as a facet of several thematic exhibits. Fundamental aspects to convey include the function of the processor, main memory, secondary memory, display and interfaces and how information flows between them. Other themes include miniaturization, the difference between hardware and software, and the nature of a program.

Special devices will be required to ensure that technical ideas are effectively communicated to members of audience groups 2 and 3. A major exhibit on the personal computer could provide a good opportunity for explaining basic elements of computer architecture and information flow within the computer. A theatrical computer 'set,' computer animation, and hands-on interactive demonstrations could be built to communicate technical concepts to non-technical audiences.

3. People in Computing 10%
The achievements of individual computer engineers and entrepreneurs provide a good vehicle for focussing on specific technologies and their applications and social impact. Temporary exhibits should be mounted to feature specific groups of individuals, perhaps on the occasion of important anniversaries. Biographical sketches will be incorporated wherever appropriate within permanent exhibits.

4. How Computers are Used 40 - 60%
This topic appeals to the largest proportion of visitors because people want to see what computers can do. In addition, the Museum is a natural place in which to demonstrate computer applications; visitors can engage directly with the applications, offering an experience that cannot be matched by text or audiovisual media alone.

Two of the existing major galleries in the Museum have themes that demonstrate types of computer use: "Smart Machines" shows achievements in artificial intelligence and robotics; "The Computer and the Image" shows image processing and computer graphic applications.

The Museum should greatly expand the scope and range of computer applications presented. Future exhibits being proposed in this area include a major exhibit on personal computers, in which the largest section will demonstrate about six generic application areas for

personal computers, each with half a dozen computers for visitors to use.

"The Networked Society" is a proposed exhibit that will feature large-scale computer applications that control information essential to the running of modern society. Examples will include airline reservations, telephone networks, on-line banking, international financial transactions, and supermarket systems.

In another proposed exhibit, "The Ubiquitous Computer," computer applications would be approached from a different perspective. This exhibit would reveal and explain the use of computers inside machines we use every day. Examples include the car, telephone, microwave oven, camera, and many other devices drawn from all walks of life.

Some other application-oriented themes for future exhibits include the use of computers in medicine, helping the disabled, defence, space, and publishing.

Layout of Exhibit Space

The excitement of a Museum visit should start as soon as the building is approached. Displays outside the building and in the lobby should serve to arouse interest and provide a taste of the Museum galleries. Kinetic or interactive sculptures and large-screen video might be appropriate here.

It is especially important that the first gallery seen by visitors place all audience groups in a good frame of mind. Visitors who desire to see computer history exhibits should have this opportunity early on in the visit, ~~possibly in the first exhibit.~~

Priority for Exhibit Development

Exhibit quality rather than quantity is usually the deciding factor in determining repeat visits. The Museum is already large enough to occupy most visitors for the typical two hour visit. Priority should therefore be given to the replacement of the least successful exhibits with new ones rather than expansion into unused space. An increase in the overall gallery square footage should be tied to visitor attendance levels.

Exporting Exhibits

Although the first priority is to develop The Computer Museum's galleries, the Museum should also clone or travel exhibits for audiences across the world. This can help the Museum reach audiences well beyond its reach in Boston. Increasing the Museum's visibility outside Boston can play a very beneficial role in the development of Museum support from new geographical regions.

One approach is to build exhibits that tour science and technology centers under the auspices of organizations such as the Smithsonian Institution Travelling Exhibition Service (SITES) or the Association of Science and Technology Centers. "Computers in Your Pocket" is the first such Computer Museum exhibit, currently being toured by SITES. Special funding is usually required to rebuild exhibits in a form suitable for touring.

Another approach is to build exhibit kits based on Computer Museum exhibits. These would include software, hardware specifications, installation and maintenance instructions, and explanations of the subject matter. Once developed, such kits could be sold at reasonable prices to science and technology centers that lack their own exhibit development teams. Unsolicited requests for exhibits from about 10 institutions and the absence of other providers of such items give preliminary indication that a market for exhibit kits exists.

Schedule of Exhibit Development

It is the Museum's objective to open one major new exhibit and a pair of temporary exhibits each year. This rate is required in order to keep the Museum exhibits current and relevant, as well as to maintain high visibility for the Museum. The opening of new exhibits has a significant impact on visitor attendance levels.

If possible, galleries near the entrance should be improved first.

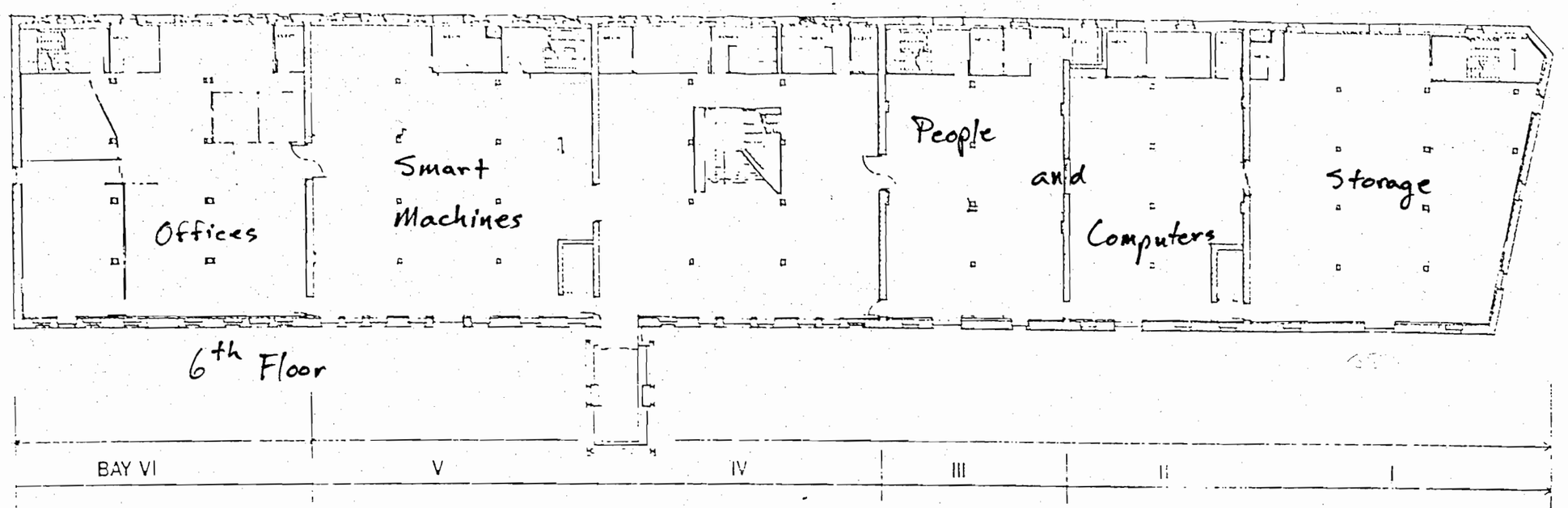
Exhibit Funding Strategy

The Museum exhibits will be self funding. In other words, all development costs will be met with funds raised specifically for the development of exhibits. Funds can be tied to specific exhibits, or,

more desirably for the Museum, applied to an exhibit development phase considered as a whole.

The main sources of funding are the computer and computer-user industries. These include both the corporations and the founders and other individuals within the corporations. Secondary sources of funding include state and federal government grants and independent foundations.

Funders will be acknowledged within the exhibits. The Museum will be sensitive to the promotional interests of the funder, but will be the final authority on the content of the exhibit and the use of the company name, logo and products.



Arrangement of Exhibits in June 1992

total 30x1250 +2000 = 39500

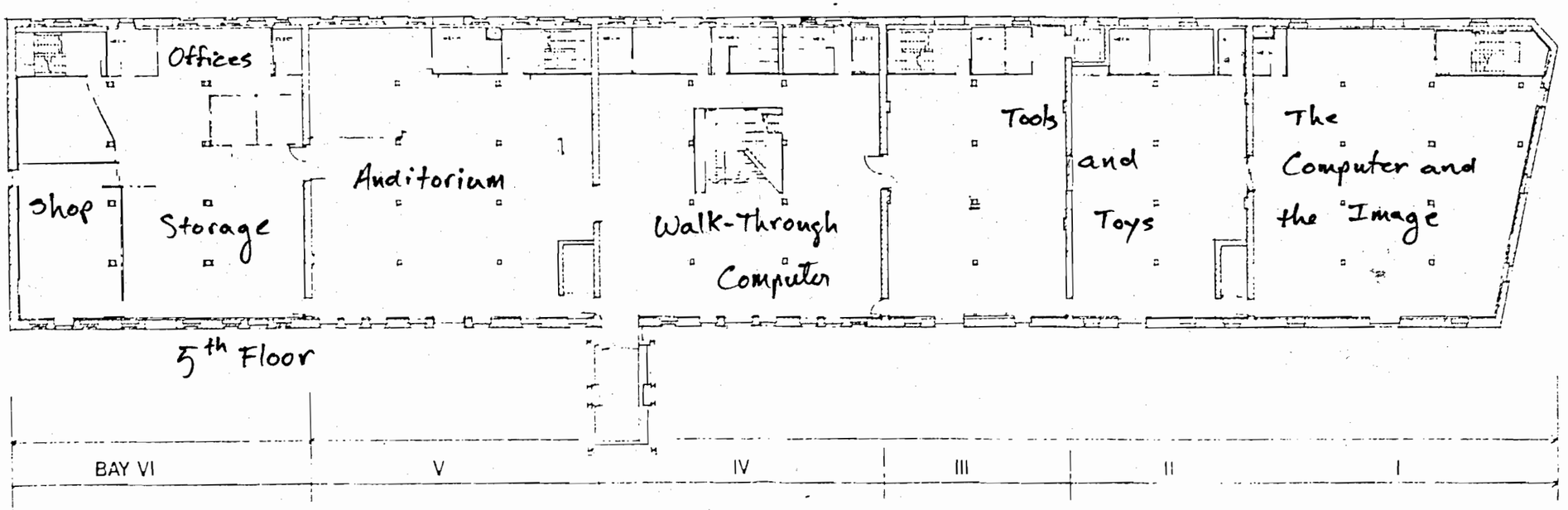


Exhibit Committee Meeting
January 14, 1992, The Computer Museum

Minutes

In attendance:

Gwen Bell, Ed Belove, James Clark (by speaker phone), Mary Beth Dorus, Gardner Hendrie, Robert Lucky, David Nelson, Natalie Rusk, Oliver Strimpel, and Greg Welch.

Introduction: Space Considerations

After examining the agenda for the meeting, the committee members agreed that the first order of business should be a discussion regarding the lack of existing exhibit space at the museum.

Using a blueprint of the museum, several proposed solutions were discussed, among them the possibility of converting the sixth floor- bay one visible storage area into exhibit space. This would entail securing off-site storage facilities at an extra expense to the museum. The one consideration against this proposal was that Gwen suggested that when artifacts are removed from the museum, they are usually considered inaccessible.

Another spacing-saving suggestion was to incorporate smaller-scale exhibits into our collection of majors exhibitions. By adding exhibits that take less space, it may not be necessary to remove existing exhibits to make room for the new.

Content of Future Exhibitions

The size and content of future exhibitions was debated at length. Using the attached list of ideas submitted by Computer Museum staff, the committee members discussed the viability of such exhibitions as "Computers in Music and Entertainment," "Computers in Medicine," and "Current Issues in Computing," the later of which Ed Belove suggested be changed to "Computing in Current Issues."

The following topics were selected as the most likely choices for exhibition:

- Computer Bloopers and Mishaps
- Computers in Animation
- Computers in Entertainment

Gardner proposed that the museum consider concentrating on a series of smaller scale exhibits, rather than trying to develop and open a "blockbuster" every year. Broken down into three groups, his exhibits suggestions are

a) large theme exhibitions
b) small theme exhibits
c) individual exhibit stations - not necessarily theme-related

By developing smaller-scale exhibits, or "exhibit stations," the museum will be better able to keep up with current technologies and topical subject material. The example that was used was the interest in the use of the Scud missile during the 1991 Gulf War. Although events moved as quickly as anticipated, and the conflict was ended within 6 weeks, this was an example of up-to-the-minute technology that people were interested in.

Exhibits Committee
1/14/92

Issues:

1) space – where do we put the next exhibit(s)
   a) take space from other uses
   b) replace current exhibits

2) type of next exhibits
   a) large theme exhibits
   b) more small theme exhibits
   c) individual exhibits stations

3) content of next exhibits
   a) application topics
   b) current issues (6 mos. – 1yr life)
   c) from the collection
   d) ?

CM to:
consider: Current Issues &
Bloopers
think up theme exhibit to replace one of the current exhibits – focus on entertainment (music, video, TV, etc.)
focus on considering small exhibits of exceptional quality

Ideas

AT&T Network control center - tape of earthquake & mothers day & speed up

Air Traffic conjestion on a national basis using Apollo computers - down linked from satellite

Washington DC

Vinton Cerf (host)	Corp for Nat'l Research Initatives
Bob Kahn	Corp for Nat'l Research Initatives
Senator Al Gore	
Eric Bloch	
Chuck Brownstein	NSF
Nico Haberman	NSF
Bill Wolfe	UVA
Anita Jones	MCI
Ross Perrot	Perrot Systems
Jon Ecklund	Smithsonian
Marc Rotenburg	CPSR

San Francisco

Dan Lynch (host)	InterOp
Dave Liddle	IBM
Wayne Rosing	SUN
Dave House	Intel
Chuck House	Informix
John Seely-Brown	Xerox PARC
Gordon Bell	
RuthAnne Quindlen	Alex Brown
Eric Benhamou	3COM
Judy Estrin	NCD
Tom McWilliams	Amdahl
DuWayne Peterson	NET
Craig Farrel	Pactel
David Brandin	InterOp
Richard Lowenthal	Stratacom

MEMO

DATE: 1/9/92

TO: C. G. Bell, E. Belove, D. Case, J. Clark, G. Hendrie, R. Lucky, J. McKenney, D. Nelson

CC: G. Bell, O. Strimpel

FR: Greg Welch

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10:00-11:30 Future Exhibits at Museum

- Revisit mission statement: "Exhibits treat history, technology and applications of computers" and criteria for selecting new exhibitions (pp-10-14 from Strategic Plan)
- Determine applications/technologies future exhibits should examine (list of suggestions attached)
- Develop preliminary plan for next five exhibitions

11:30-12:00 Networked Society

- Preliminary planning process and national brainstorming sessions
- Location of exhibition and its impact on other exhibits, operations, and future expansion

Ideas for Future Exhibits

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Computers and the Environment

Computer Bloopers and Mishaps – ~~an~~ individual exhib.?

Bob Lucky → **Computers, Music, and Entertainment**

Bob Lucky → **Futures of Computing**

Belove → **Computers in Medicine**

Computers in Design

Computers and Special Needs

Topical → **Current Issues in Computing** – small theme

Artifact-intensive display

Computers and Science

Computers and Fine Arts

Computer Animation

Morphing – use Michael Jackson

3/30 Wash. DC
Bos
S.V

MEMO

DATE: 1/9/92

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11:30-12:00 <u>Networked Society</u>

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Computers in Design

Computers and Special Needs

Current Issues in Computing

Artifact-intensive display

Computers and Science

Computers and Fine Arts

Computer Animation

FAX

The Computer Museum
300 Congress Street
Boston, MA 02210

TRANSMISSION RECORD

Date: 1/9/92

To: Gardner Hendrie

From: Greg Welch Ext. 337

TEL 617. 426. 2800
FAX 617. 426. 2943

Number of pages (including cover sheet): 337

Notes: I hope this meets with your approval. As you see I have placed the emphasis on future exhibit planning. Sorry we've had such trouble getting in touch.

Greg

MEMO

DATE:

TO: C. G. Bell, E. Belove, D. Case, J. Clark, G. Hendrie, R. Lucky, J. McKenney, D. Nelson

CC: G. Bell, O. Strimpel

FR: Greg Welch

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10:00-11:00 Networked Society

- Revise schedule (opening Oct. 93?)
- Preliminary planning process and national brainstorming sessions (see attached list)
- Goals of exhibition (see attached prospectus)
- Exhibit content and resources for exhibit development
- Outreach programs
- Location of exhibition and its impact on other exhibits, operations, and future expansion

11:00-12:00 Future Exhibits at Museum

- Revisit mission statement: "Exhibits treat history, technology and applications of computers" and criteria for selecting new exhibitions (pp-13-15 from Strategic Plan—attached)
- What applications/technologies should the future exhibits examine? (see list of suggestions)
- Develop preliminary plan for next five exhibitions

FAX

The Computer Museum
300 Congress Street
Boston, MA 02210

TRANSMISSION RECORD

Date: 12.4.91

To: Gardner Hendrie

From: Greg Welch Ext. 337

TEL 617. 426. 2800
FAX 617. 426. 2943

Number of pages (including cover sheet): 2

Notes:

Gardner,

Here is the agenda & program for the Exhibits Committee meeting on the 14th.

Greg

Name	***Affiliation***
Boston (Comp. Mus.)	
Paul Severino (host)	Wellfleet
Mitch Kapor	On Tech
Gardner Hendrie	Sigma Partners
Lee Sproul	Boston Univ.
William Griffin	GTE
Lawrence Tribe	Harvard Law Sch.
Keiichiro Kagiyama	NEC
Tom Malone	MIT
Sam Fuller	DEC
I.B. Cohen	
Jim McKenney	Harvard Bus. Sch.
Ed Belove	Ziff-Davis
James Lawrence	LEK Consulting
Michael Simmons	Bank of Boston
Pat McGovern	Int'l Data Group
Bill Foster	Stratus
Gary Marx	MIT
Lou Branscom	Harvard
New York	
Gerard Piel (host)	Scientific American
Naomi Seligman	Research Board
Cas Skrzypczak	NYNEX
Dick Case	IBM
Alan Westin	Columbia
Harriet Zuckerman	Columbia
George Heilmeier	Bellcore
Bob Lucky	AT&T
Stephen Roach	Morgan Stanley
Dan Davis	Swift Info Systems
Mike Mahoney	Princeton
Sam Albert	
Eli Noam	Columbia
	Dow Jones
	Mead
	Compuserve
	Dun & Bradstreet
	CBS, NBC, ABC

THE NETWORKED SOCIETY

Executive Summary

Computer networks span our world, transferring data at voluminous rates almost instantaneously. What are the implications of this marriage between data processing and mass communications technologies? How will it transform the way we work, live, and play? To examine these and other issues, and to enhance the public's appreciation for this technology, The Computer Museum is creating a major new exhibition entitled *The Networked Society*. This exhibit will show the strategic uses of networked computers upon which modern society depends. Examples of the applications which will be featured in the exhibition include:

- Communications Networks
- Banking
- International Markets
- Airline Reservations
- Manufacturing
- Utility Management
- Retailing

The exhibit will take Museum visitors right to the heart of these vital but invisible computer applications by means of hands-on interactive displays, mock-ups, and video. For example, visitors will be able to make reservations on a real airline reservation system, witness a simulation of a major telephone network control center, observe how point-of-sales terminals provide retailers with up-to-the-minute information on inventory, and use an ATM while observing a real-time commentary on the activity behind the scenes. But most importantly, the exhibit will provide visitors with an overarching vision of what all this means—how it has and is liable to affect our society.

The exhibit will be a microcosm of our networked society. Visitors will enter information about themselves at the start of the exhibit and be issued a card. The card will be used to activate exhibit modules on banking, telephone networking, retailing, and airline reservations. Information on the card will include the visitors' names, simulated credit, and a summary of their transactions in the exhibit. As they interact with each module, visitors will have the opportunity to learn how each sector relies on computers and how all the pieces are linked together. The exhibit will also examine some of the dilemmas associated with these applications, such as the impact upon an individual's right to privacy. The idea that data communication is a pervasive function that is rapidly becoming the lynch pin to many social activities is central to the exhibit.

Educational information within the exhibit will be presented at several levels of detail to accommodate the Museum's diverse audience. In addition, printed materials will be available in the gallery, and further materials for schoolteachers and students will also be prepared.

The exhibit development will be directed by The Computer Museum's Executive Director, Dr. Oliver Strimpel. An advisory group composed of experts in networked computer usage, classroom teaching, and exhibit design will be convened to assist in the formulation and creation of the exhibit.

The Networked Society
Living in a Wired World

Introduction: The Networked Society

We are living in a wired world. Computer networks span our globe, transferring data at voluminous rates almost instantaneously. From direct mail to credit checks, renewing a driver's licence to borrowing a book from the library, chances are a computer records the information, and sends it to other computers for record processing. Anyone who has ordered airline tickets, withdrawn money from an automatic teller, filed an insurance claim, used a credit card, made a phone call, or paid an electric bill has had their information processed by a computer. From the banking industry and international markets, to the airline and car-rental reservation systems, from manufacturing, retailing and academic research, to the Internal Revenue Service and a range of other government agencies, there are a multitude of powerful computer networks working 24 hours a day, processing and transferring information at lighting speeds.

It is estimated that on average, the name of every adult in the United States is processed 33 times a day by computers.

What are the implications of this marriage between data processing and mass communications technologies? How does it transform the way we work, live, play, and interact with others? To examine these and other issues, and to enhance the public's understand of this technology, The Computer Museum is planning a major new exhibition entitled *The Networked Society: Living in a Wired World.*

The Networked Society: The Exhibit

The Networked Society: Living in a Wired World will take Museum visitors right to the heart of these vital but invisible computer systems. Visitors will interact in *participatory environments*, familiar surroundings such as a bank or an airline reservation counter, where they will have the opportunity to look behind the scenes – *to walk behind the counter* – and interact with the computer systems that they deal with on a daily basis.

There will be six to eight participatory environments in the exhibit, illustrating computer systems used in areas such as banking and international finance, telephone networking, retailing, academic research, electronic communication, the maintenance of utilities, and airline reservations. For example, visitors will make reservations on a real airline reservation system, witness a simulation of a major telephone network control center, observe how point-of-

sales terminals provide retailers with up-to-the-minute information on inventory, and use an ATM while observing a real-time commentary on the activity behind the scenes.

In order to enrich the participatory nature of the exhibit, visitors will begin by entering information about themselves into a computer. They will then be issued a *data card*, a plastic pass containing the information they have entered, in addition to other fictitious details such as simulated credit. This data card will then be used to activate exhibit modules in the exhibit, allowing people to "purchase" goods and services, as well as find out about what other visitors are doing in the exhibit. In addition, the data card will also be used to record an "audit trail" of all the visitors' actions through the environments, which people will be able to review at certain key points in the exhibit.

The Networked Society: Themes

The two sided nature of the data card – it lets you interact with the participatory environments, yet it also keeps a record of all your movements and decisions – highlights one of the major themes of the exhibition. While the massive computer systems of the Networked Society have become essential to the operation of modern life, their existence raise a number of issues that affect many of the basic components of our lives.

The Networked Society: Living in a Wired World will explore the following issues to demonstrate the impact the growing web of computer networks is having on our society:

- *The power of computer networks to collect and organize information is testing the limits of personal privacy.*

> "By an overwhelming 79%-19% margin, Americans agree that : 'If we rewrote the Declaration of Independence today, we would probably add privacy to the list of life, liberty, and the pursuit of happiness,' as a fundamental right." - The Equifax Survey, conducted by Louis Harris & Associates and Dr. Alan Westin, Professor of Public Law and Government, Columbia University.

The right to personal privacy, although not specifically mentioned in the Constitution, is perceived by many as a fundamental component of the American way of life. Most people believe that personal information, from medical records to consumer purchases, should be accessible only to those people who have been given permission. This belief does not necessarily spring from a desire to hide damaging information, as much as to protect against the use of such information in a harmful manner. The past has shown that personal data has often been the key instrument in the discrimination of specific groups and peoples.

Computers did not create the threat to privacy, but their processing power clearly accentuate the problem. As Martin E. Hellman, Professor of Electrical Engineering at Stanford University has said:

> "The increased use of computers compounds the threat to privacy. It would be prohibitive expensive to search manually thought the large amount of data that can be intercepted on a high speed communication channel. But, once the data is in computer readable form, searching becomes extremely inexpensive. Compare the cost of using a word processor to locate all occurrences of a specific character sequence in a long document vs. the cost of the same task done by a human."

As more and more functions are monitored by computers, the threat to personal privacy increases. Use a credit card to make a purchase and the credit company has a record of your consumer habits which they can sell to interested parties - known as the sale of "secondary information." Make a call across town or across the country, and the phone company keeps a record of the number you called. Take out a book from the library and the title is stored in a database. Borrow money from a bank, and the regularity of your payments is recorded by a computer, creating what is commonly known as a "credit rating." This electronic "trail" that people leave as they interact with the Networked Society is in itself harmless. However, it can be of great harm in the hands of someone who wishes to use the information in a harmful manner. An example of this was seen in the nomination process of Judge Bork for Supreme Court Justice. Computer records of the videos he had rented were retrieved by people opposed to his nomination and revealed to the public. While Congress reacted to this invasion of personal privacy by enacting the Video Rental Privacy Act, known as the "Bork Bill," the Act only deals with video rental records, leaving the majority of databases containing personal information open to use by outside individuals.

Perhaps the greatest threat to privacy is the concept of a national database, containing records on every American citizen. Originally proposed in 1965, it drew great opposition and eventually was rejected based on the fear that it had great potential to be abused. In recent years, however, there have been claims that such a database is being compiled, not through the government, but by private industries:

> "In the 1960's, when large computers first became common, the major apprehension, most notable in the United States, was the creation of one great national data bank; the avoidance of this scenario in the West has nevertheless resulted in a series of discrete data banks that are not yet fully integrated, yet have tremendous potential for active and passive surveillance of individuals by governments and corporations. The U.S. Congressional Office of Technology Assessment remarked in 1988 that 'a defacto national

database is actively being created, although in a piecemeal fashion.'" - David H. Flaherty, Professor of History and Law, University of Western Ontario

Professor Flaherty is alluding to the "mosaic problem," which suggests that discrete packets of personal data, information "tiles" such as phone calls or library borrowing habits, do not, in themselves, pose a threat. However, if there is a way to tie together the information through the use of a *unique identifier* - most notably the Social Security number - then someone can gather the tiny bits of information and create a fairly accurate picture of an individual's habits, actions, and ideas. While clearly there is a need for the Social Security number in order to control the massive amount of data associated with tax collection, should people give out their number to other agencies and private companies that are not involved with tax collection?

The threat to personal privacy is the cost we pay for a efficient consumer economy. Credit ratings lower the risk for lenders, resulting in a lower cost for borrowing money. Computerized record keeping for phone calls and credit card purchases are the only way such a large system can be maintained. However, how much individual privacy are we we willing to give up for the benefit of society?

• *Computer Networks are testing the limits of our legal standards.*
During a recent arrest by Federal law-enforcement agents, a bulletin board system was confiscated because it contained stolen credit-card numbers and telephone access codes. By confiscating the system, the agents effectively shut down the board's operation, raising questions about whether the action by the government infringed upon the First Amendment rights of the board's operators. Just because the board's operators were publishing lists of stolen numbers, did that necessarily mean that the rest of the information on the board should be denied the right of distribution? If someone other than the board operators had placed the information on the board, which is quite possible with bulletin board systems, were the operators liable for the contraband information? Would they have be prosecuted if they had published the information in a printed form? Should information stored on computers enjoy the same protection as traditional information systems?

There has been a tendency to view computer data as something different than speech. For instance, how do we classify a virus, which is, after all, built of words. Are viruses free speech? Since the words have been shaped into a tool, can we no longer regard them as speech? Or is this a new form of speech? These issues strike at the heart of many protections guaranteed by

the Constitution. The question has been raised as to whether the Constitution can deal with these problems created by the new technology. Laurence H. Tribe, Professor of Constitutional Law at Harvard University Law School, who argues that the courts have tended to view computer data as something different than speech, has proposed the following amendment to the Constitution to clarify the issue:

> "This constitution's protections for the freedoms of speech, press, petition and assembly, and its protections against unreasonable searches and seizures and the deprivation of life, liberty, or property without due process of law, shall be construed as fully applicable without regard to the technological method or medium though which information content is generated, stored, altered, transmitted, or controlled."

Is computer data the same as speech? If so, does the constitution need to be amended to clarify this issue, or can the courts handle this in a case-by-case manner?

• *Computer Networks affect the way people communicate*

One only has to have an extended discussion in electronic mail to discover that people articulate their ideas differently over the networks than, say, over the telephone. Like all communication technologies, discussions over the networks require some getting used to (do you remember the first time you spoke to an answering machine?). It has been said of skilled network communicators that "they do good net."

One of the most popular ways people are using electronic mail is through Bulletin Board Systems (BBS), central computers which people connect to using modems. BBS exchange two main commodities: software and ideas. The latter, known as *conferencing*, provides members of the BBS with an opportunity to find people with common interests to discuss issues and concerns. Indeed, many BBS's are associated with specific interests, from the study of goldfish in Japan to the rights of adoptive fathers, prompting some to call them *specialty publishing houses*. The electronic mail conversations in these conference have been likened to a slow-motion discussion, with each member of the dialogue having the ability to edit their words before sending them.

How are these conferences, which are no longer affected by time or space, changing the way people discuss issues? Are discussions more thought-out? Are they becoming less spontaneous? How are they helping differently abled people who previously were not able to communicate in such an extensive way with others?

•*Computer Networks are changing the way personnel is being supervised*

Over 26 million people in the United States have their work supervised by computer. From airline reservation agents, to phone operators, to secretaries, to telecommuters (individuals who work from home via computers), people are being monitored by computers on a non-stop basis, being judged by standards such as the number of seconds they spend with a client on the phone, to the speed at which they type information into a computer.

This real-time monitoring has raised a number of issues about the use of computers in the work place. Can computers really monitor performance? Are we creating "computer sweatshops?" Is it morally sound to have computers watch over people?

•*Networks pose a threat to the security of computer systems*

Computers are being used daily to commit crimes that cost governments, companies and individuals billions of dollars a year. Many of these crimes are committed for financial gain, such as banks that are robbed electronically of millions of dollars, and research companies that have valuable data stolen from their systems. Other crimes are more malicious in nature. *Crackers*, the nickname given to people who enter computer systems without permission, have been known to "trespass" into private networks, change data and leave a virus that, at a later date, can do severe damage to important information. Perhaps the most frustrating part of these crimes is that they often go undiscovered until the virus has done its destructive work.

Is the same behavior used to encourage clever programming solutions also being used for criminal activities? Richard C. Hollinger, a member of the Department of Sociology and the Center for Studies in Criminology and Law at the University of Florida thinks so. In discussing a 1976 study by Don Parker of the SRI company, *Crimes By Computer*, he pointed out that Parker had found

> "... colleges and universities were responsible for creating a criminogenic atmosphere in which computer pranks, system vandalism, software piracy and unauthorized accesses of private computer files were both informally and formally rewarded, not punished. Today, almost twenty years later we find ourselves still wondering what can be done to infuse ethical values into a computer education process."

Can we rely on technology to keep our networks secure? Or do we need to teach members of the Networked Society ethical standards on how to behave on the networks?

The Need for a Planning Grant

The Computer Museum is in the preliminary planning stages of *The Networked Society: Living in a Wired World*. There is a great need for further investigation into a number of components of the exhibition. These include the following areas:

• *A further study of the themes in the exhibition.*

While this paper outlines five major themes associated with computer networks, there are a number of other issues that need to be explored, including a study of the unique culture that has evolved from human interaction in these large computer networks.

• *A further investigation of the participatory environment approach.*

The Computer Museum has tried with other exhibits to provide a limited amount of participation in planned settings, from the giant computer chips in *The Walk-Through Computer* to the historically correct vignettes in *People and Computers: Milestones of a Revolution*. However, what is being proposed for this exhibit would be settings where the entire space is dedicated to the environment, such as a telecommunication center or a retail store. How do we get people to interact with these settings? What kind of precautions do we need to take to ensure the durability of the exhibit?

• *Research the content presented in each environment.*

In order to present different environments where computer networks are used, The Computer Museum needs to further explore the different systems to see how they operate, such as the airline reservation systems and telephone communication networks.

• *An Advisory Board needs to be organized.*

The Board, made up of experts in the fields of computers and their impact on society, will help define the issues of the exhibition, as well as advise on the approach the Museum is taking to demonstrating the subject to visitors.

• *Develop educational materials and activities related to the exhibition.*

This will help in further extending the impact of the exhibition on visitors.

Section From Strategic Plan Relating to Future Exhibits

Overview of Criteria for Selecting New Exhibtions

- Appropriateness to Mission of the Museum
- Visitor appeal: potential to draw more and new visitors to the Museum.
- Fundability
- Potential for Outreach

Goal 3:
Create New Exhibitions to Serve as the Backbone of the Museum's Educational Mission

New exhibits will be selected according to the following criteria: importance of topic with regard to the Museum's educational mission, ability to draw visitors, and fundability.

Serving the educational mission of the museum

Every new exhibit must serve the Museum's educational mission. The Museum's mission is to span the evolution, technology, applications, and impact of computing in its exhibits. The Exhibits Committee has prepared a policy in which the Museum space is to be allocated approximately as follows:

Evolution of Computing	25%
Technology of Computing	15%
Applications & Impact	60%
People in Computing	woven into above exhibits

The balance of these themes should be maintained as the Museum is developed. For the period of this plan, the evolution of computing will be adequately presented by the 5,000 square foot (about 20%) exhibit "Milestones of a Revolution: People and Computers," opening June 1991. The Walk-Through Computer devotes about 5,000 square feet (also about 20%), to the technology of computing. Thus while these two exhibits stand, the bulk of the Museum's exhibit development should focus on computer applications and impact.

Audience Appeal

As indicated in the discussion of Goal 1, exhibits are the main driver of Museum visitation. While the educational purpose of the exhibits will not be compromised, the choice of new exhibits must include enough unusual, larger-than-life, promotable components to meet the objective of increasing overall visitation to 220,000 by 1996.

Fundability

The Museum's policy of developing a new exhibit only when sufficient targeted funds are raised should stand during the period covered by this plan. The primary funding strategy for new exhibits is to target corporations with an interest in the topic addressed. Secondary prospects for exhibit funding are foundations, both local, national, and government.

Adaptability for offsite uses, either as Exhibit Kits, videos or printed materials, to serve as a source for achievement of Goal 2, is also a factor.

Objective 1: Fund and open a major permanent exhibit each year that fulfils the Museum's educational mission and meets visitation goals.

Permanent Exhibit Development 1991-5

Exhibit	Overall Visitor Appeal	Primary Targets	Theme	Funding Potential & Cost
1991 Milestones	low	students, technology professionals, families of industry members	history	80% funded $850,000
1992 Computer Discovery Center	medium	students, families	application	high $750,000
1993 The Networked Society	medium-high	schools, computer industry, and their families	application	high $1 million
1994	medium		application	
1995	high		application	
1996	high		application	

Further permanent exhibits will be drawn from the following:

Exhibit	Visitor Appeal	Primary Targets	Theme	Funding Potential
Computers and the Environment	high	schools, families, tourists	application	high
Computers, Music & Entertainment	high	youth, non-technical, tourists	application	medium
Computers in the Fine Arts	low	art community, non-tech.	application	medium
Computers in Design	low	colleges, non-specialists	application	low-medium
Computers & Special Needs	low	general	application	medium-high
Computers in Science	low	sci/tech community, schools	application, cutting edge technology	low
Computers in Medicine	low	medical, comp. ind., schools	application	medium
Cutting Edge Computer Technology	medium	industry & technical, schools, colleges	technology of computing	medium
Topical Issues	low	schools, colleges, families,	social impact	low-medium
Computer Bloopers	low	industry, computer users	social impact	low
Artifact-intensive historical display	low	industry members, computer profession	evolution of computing	low-medium

Objective 2: Open Two Temporary Exhibits Each Year

Temporary exhibits add variety and change to the Museum at shorter intervals than is possible with major, permanent exhibits. Promotion and listings of temporary exhibits provide an important means of sustaining attendance between the opening of blockbusters.

The Museum should plan two temporary exhibits each year that complement the permanent exhibits and include topics of high public interest associated with a special event or anniversary. An example would be the use of computers in sports, using a well-known event such as the America's Cup or the Olympics as springboards.

Other suitable themes are computer art, especially interactive room-sized installations, cutting edge computer applications or technologies, and people in computing.

Temporary exhibits will either be developed by the Museum or obtained from professional associations, corporations, or universities.

The following table lists ideas on which temporary exhibits might be based.

Temporary Exhibit Ideas

Temporary Exhibit	Visitor Appeal	Target Segments	Theme	Funding Potential & Cost
1991 SIGGRAPH Art Show	medium	art community, non-technical	application	low $30,000
1991/2 Reality on Wheels	high	general	cutting edge technology, application	high $1 million
1992 Columbus & Navigation	medium	scientific, technical	application	medium $200,000
1992 Computers in the Olympics	medium	general, technical	application	medium $200,000
1993 Simulating the Biosphere	medium	scientific, schools	application	medium $200,000
1993 Harold Cohen Robot Artist	high	art, general, schools	application	medium $100,000

Ideas for Future Exhibits

Ideas for Future Exhibits

The following is a list of topics for future exhibits discussed at last year's Exhibit Committee meeting on January 9, 1991 (minutes attached).

According to the criteria for selecting exhibit topics outlined in the Long-Range Plan (pp 13-15), what four or five exhibits should the Museum develop over the next five years? Are there other more important topics you feel the Museum should address?

Computers and the Environment

Computer Bloopers and Mishaps

Computers, Music, and Entertainment

Futures of Computing

Computers in Medicine

Computers in Design

Computers and Special Needs

Current Issues in Computing

Artifact-intensive display

Computers and Science

Computers and Fine Arts

Computer Animation

Exhibit Committee Meeting
Wednesday, January 9, 1991
12:00-2:00 p.m.

MINUTES

In attendance: Gardner Hendrie, Jim McKenney, Gwen Bell, Dick Case, Martin Huntley, Adeline Naiman, Natalie Rusk, David Nelson, Greg Welch, and Oliver Strimpel

Introduction: Long-Range Planning
Oliver and Gardner explained how the Museum in the process of articulating a long-range plan and that one of the purposes of the meeting was to re-examine the Exhibit Plan set forth three years ago to verify that it still reflected current thinking on where the Museum's exhibit program ought to be headed.

Reality on Wheels
Discussion then focussed on the traveling exhibit, *Reality on Wheels*, currently in the early phase of development. *Should the Museum proceed with development?*

Gardner questioned whether developing this exhibit would present such a drain on the resources of the Museum that it would adversely affect the development of other exhibits. Greg pointed out that much of implementation would be done out-of-house and that additional in-house staff could be added as needed if the funds to proceed with the exhibit were available. David Nelson and Jim McKenney raised the issue of the exhibit's longevity. How soon would it become obsolete? Gwen and Oliver responded that a traveling exhibit usually only has a life-time of two years, and Greg added that during the course of the exhibit's life software certainly could be up-graded and that, in addition, the exhibit would treat broader issues relating to sensory perception, which would not become dated. A brief discussion of the exhibit's content followed.

Conclusions
Gardner proposed that the project be developed in two phases: a test-bed exhibit at the Museum and then a traveling version. Members of the Committee agreed this was a good idea.

Dick Case proposed that *Reality on Wheels* should be treated as a special case, outside the mainstream of the Museum's exhibit development efforts. If funds for the exhibit were forthcoming, its development could and should proceed with minimal impact upon the development of other planned exhibits. If, on the other hand, funds proved difficult to obtain, Museum resources should not be diverted from other projects, and the exhibit should be put on hold behind other projects in the development queue. Gardner seconded the motion, and it met with general approval.

Keeping Exhibits Up-to-date
All agreed that keeping the Museum's exhibits up-to-date and in good repair should be a very high priority. Two basic approaches were suggested for doing so. One: establish a policy that the maximum life of an exhibit be 5-7 years. Two: divide major exhibits into smaller components that could funded independently and enhanced more frequently.

Discussion concluded that a combination of the two approaches was best. Re-creating a major exhibit and selling it as a new project (even when the subject matter remained essentially the same) would ease fundraising. However, up-grading components of an exhibit might have to take place on a more frequent basis than 5-7 years, in which case, linking a specific sponsor with one component of the exhibit for the purpose of keeping it up-to-date was deemed desirable.

Finally, a third approach, with which the Committee concurred, was to include a maintenance and enhancement reserve into the development budget of all exhibits.

Balance of Themes in the Museum's exhibits

Discussion then focussed on the Exhibti PLan in the context of the long-range thinking about the Museum. Greg presented a breakdown of the Museum's space by major exhibit themes and showed that planned exhibit development would not significantly change the basic perctenages of 20% evolution of computing, 30% computing technology, 50% applications of computers.

Conclusion

The Committee felt that the existing balance of topics was appropriate and approved of the planned exhibits essentially maintaining this balance.

Traveling Exhibits

Both Gwen and Adeline suggested that the Museum ought to formulate a traveling exhibit policy. Two different models were proposed: create exhibits that travel under the auspices of SITES or ASTC, or create a traveling museum truck, in which the exhibit could be periodically changed.

It was agreed this issue warranted further discussion.

Future Exhibit Ideas

The following were proposed as potential topics for future exhibits:

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Computers in Medicine
Computers in Design
Computers and Special Needs
Current Issues in Computing
Artifact-intensive display
Computers and Science
Computers and Fine Arts

Space Issues

The meeting concluded with a brief discussion of the how the Museum ought to use its available space. Ideas for expanding the existing space of the museum by building a new floor or or relocating were offered. The notion of opening branch locations in other cities in the US and abroad was also commented upon. No definite conclusions were reached.

It was agreed that the next meeting should be scheduled for some time after the conclusion of the long-range planning process. Items for future discussion include: traveling exhibit policy, use of and/or expansion of space.

Proposed Invitees to a Series of Brainstorming Sessions for The Networked Society

Prospectus for The Networked Society

An Exhibit at The Computer Museum

The
Computer
Museum

300 Congress Street
Boston, MA 02210
(617) 426-2800

February 12, 1991

Mr. Gardner Hendrie
Sigma Partners
300 Commercial Street, #705
Boston, MA 02109

Dear Gardner:

I have enclosed the minutes from the last Exhibits Committee Meeting.

As we make progress on the Museum's Long-range Plan, the role exhibits must play in meeting our goals becomes increasingly clear. One thing is certain: new exhibits will be a major factor that influences visitation over the next five years. At the March 1 Board Meeting one of the topics of discussion will be the priority the Museum should give to increasing attendance.

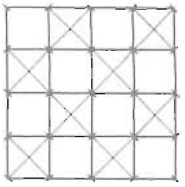
With this in mind, Oliver and I wish to convene a meeting of the Exhibits Committee to discuss the perceived impact on attendance of the exhibits currently proposed for development. Specifically, we wish to examine whether The Networked Society can be made to have the broad public appeal that will significantly boost visitorship to the Museum, and if not, whether we should proceed with its development or opt for an exhibit with greater drawing power.

If we are to develop this exhibit according to the schedule we propose, we wish to be in a position to apply for a federal planning grant this Spring. This limits our window of opportunity for this discussion. I will speak with you at the Board meeting or soon thereafter to try to schedule a time for us to meet.

Regards,

Gregory W. Welch
Director of Exhibits

Enclosure



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Agenda

Exhibit Committee Meeting
Wednesday, January 9, 1991
12:00-2:00 p.m.

Goal: To identify and discuss issues that will affect the strategy and direction for exhibit development for the 90s.

- Review of current plan (15 mins.)
  - What the Museum will look like in 1994.
    - Smart Machines
    - Walk-Through Computer
    - Computer and the Image
    - Milestones of a Revolution
    - Computer Discovery Center
    - Networked Society
- What should the Museum be in 1998?
  - space issues
    - visible storage vs. expanded exhibtis (15 mins.)
    - Reality on Wheels (15 mins.)
  - important computer issues of the 90s (30 mins.)
    - applications?
    - social issues?
  - how to address these issues? (30 mins.)

Martin Huntley

Agenda

Exhibit Committee Meeting
1/9/1991

Reality on Wheels (agenda item carried forward from the last meeting)

How much resource should be put on it relative to:
- Milestones
- Discovery Center
- Networked Society

How much should it travel versus be in Boston? --Should it be duplicated in Boston?

What new exhibits should we develop over the next 5 years?

change or maintain the balance proposed in the Museum's exhibit policy

specific ideas

What should we do about the amount of museum space devoted to exhibits?

keep it the same?--then what do we replace?

try to add space?--how?

Space Allocation by Theme of Exhibit

June 1991 (once Milestones opens)

Total Exhibits:	24,000 sq. ft.	
evolution	5,000 sq. ft.	21%
technology	7,500 sq. ft.	31%
applications	11,500 sq. ft.	48%

June 1992 (once Computer Discovery Center opens)

Total Exhibits:	24,000 sq. ft.	
evolution	5,000 sq. ft.	21%
technology	7,5000 sq. ft.	31%
applications	11,500 sq. ft.	48%

June 1993 (once Networked Society opens)
(if replaces Graphics gallery)

Total Exhibits:	24,000 sq. ft.	
evolution	5,000 sq. ft.	21%
technology	7,500 sq. ft.	31%
applications	11,500 sq. ft.	48%

(if replaces Visible storage)

Total Exhibits:	28,000 sq. ft.	
evolution	5,000 sq. ft.	18%
technology	7,500 sq. ft.	27%
applications	15,500 sq. ft.	55%

Ideas for New Exhibits

Computers in:

- medicine
- music
- fine arts
- design
- special needs
- science

Cutting edge computer technologies

Topical computer issues; a quick response exhibit area

Artifact-intensive historical display

1/8/91

Exhibits Committee Meeting of December 3, 9:30-11:30 am

Agenda

1. Review of overall space master plan

   Issues
   - total exhibit space and the visitation rate
   - collections space needs

2. Review of exhibit development plan

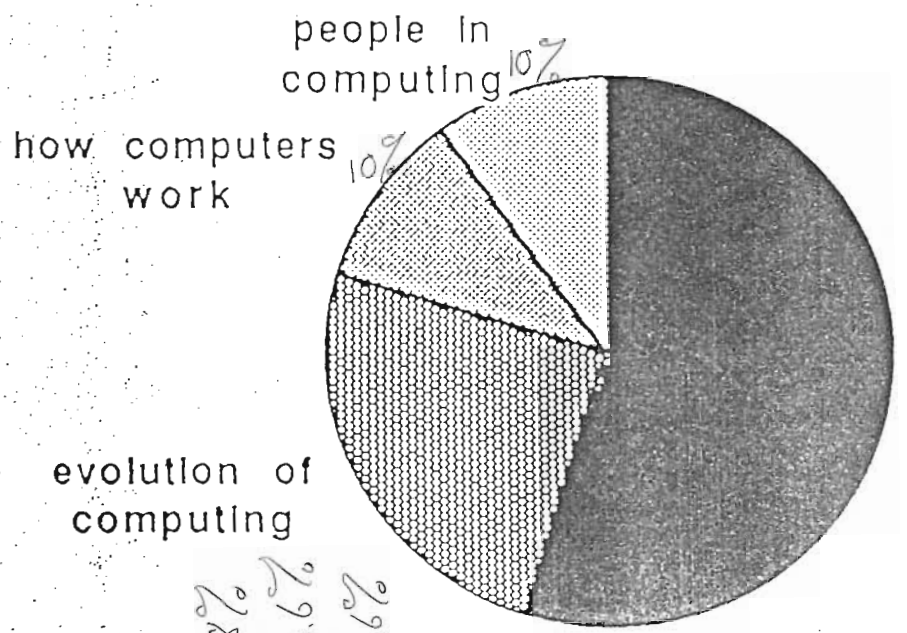
   Computer Discovery Center
   The Networked Society

3. Reality on Wheels

   maximising the impact for the Museum

OS
11/16/90

Proposed Allocation of Exhibit Space



5K pc theater etc 18%
3.75 smart machines 13.6%
13.6%
3.75 image 18%
5K walk thru 18%
5K milestones 18%
3.75 discovery 13.6%
3.75 network 13.6%
society
27.5K
8 downstairs

EXHIBIT THEMES	EXHIBITIONS
how computers work	Walk-Through Computer
evolution of computing	Milestones of a Revolution
computer applications & impact	Computer Discovery Center Networked Society
people in computing	

THE NETWORKED SOCIETY

This exhibit will show the strategic uses of networked computers upon which modern society depends. The featured applications will be drawn from the following areas:

- communications networks
- banking
- international markets
- airline reservations
- manufacturing
- utility management
- retailing

The exhibit will take Museum visitors right to the heart of these vital but invisible computer applications by means of hands-on interactive displays, mock-ups, and video. For example, visitors will be able to make reservations on a real airline reservation system, witness a simulation of a major telephone network control center, observe how point-of-sales terminals provide retailers with up-to-the-minute information on inventory, and use an ATM while observing a real-time commentary on the activity behind the scenes.

The exhibit will be a microcosm of our networked society, with a computer network connecting several modules together. Visitors will enter information about themselves at the start of the exhibit and be issued with a card. The card will be used to activate exhibit modules on banking, telephone networking, retailing, and airline reservations. Information on the card will include the visitors' names, simulated credit, and a summary of their transactions in the exhibit. As they interact with each module, visitors will have the opportunity to learn how each sector relies on computers.

Educational information within the exhibit will be presented at several levels of detail to accommodate the Museum's diverse audience. In addition, printed materials will be available in the gallery. Further materials for school teachers and students will also be prepared.

The exhibit development will be directed by The Computer Museum's Executive Director, Dr. Oliver Strimpel. An advisory group composed of experts in networked computer usage, classroom teaching, and exhibit design will be convened to assist in the formulation and creation of the exhibit.

The exhibit will cost roughly $1 million to develop and produce, and will open in late 1992.

COMPUTER DISCOVERY 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 applications of the personal computer.

THE NEED

Computers have enormous potential to affect professional and recreational life, and our world grows increasingly dependent on them every day. A basic understanding of computers is becoming nearly as important today as literacy and numeracy. Yet only a small percentage of society has adopted computers enthusiastically, while the vast majority of the population feels left out, unable to find a suitable entry to the world of computers. Existing educational facilities, such as schools, colleges, universities, book stores, and computer retailers only serve selected groups of individuals, many of whom already have some basic understanding of computers.

The purpose of the Computer Discovery Center is to offer the general public a unique mixture of learning and entertainment. Its goal is to expand everyone's understanding of how computers are used, and answer the question "What can a personal computer do for me?" The educational impact of the Computer Discovery Center will extend well beyond New England: exhibits will be developed into Exhibit Kits, which will be made available to science and technology centers and other educational institutions across the world. Millions of people a year will thus benefit from the development of the Computer Discovery Center at The Computer Museum.

THE EXHIBITION

Exhibits will be designed to appeal to a broad range of ages and experience levels. Many will address practical issues that will be of direct benefit to people in their personal or professional lives. The primary vehicle will be the participatory hands-on exhibit, where visitors can learn by doing.

Application areas will include art (graphic art, music), education, engineering, design, writing, communications, publishing, business, and entertainment. The public will be able to interact with exhibits that run simplified versions of the "real world" application software that yield rapid payoff and insight into the functions being performed. The goal of each exhibit will be to get visitors to grasp the point of each application, and think "Aha! Now I know what ... is all about!" Visitors will be able to create their own original documents, art, or music. Other functions will be presented non-interactively through video or previously composed screens of text, graphics, and animation. There will be a total of 20-30 hands-on exhibits.

Example: Word-processing
Visitors will see a post-card on a computer screen with a partial message. They will be invited to add to the message, type in their name and that of the recipient, and then print out the card. Visitors will then receive a laser-printed post card from the Computer Discovery Center to mail or keep as a souvenir. After only a few keystrokes, visitors who have never used a word-processor before will be able to grasp some key features, such as the ability to correct errors and work from a standard form already stored in the computer.

Example: Computer Music
A set of musical phrases will be pre-stored. Visitors will create their own pieces by selecting a series of phrases. When visitors request it, the computer will play the phrases by means of a synthesizer. Visitors will be able to control parameters such as the speed and timbre. Everyone who tries this out will experience a sense of power as thay will be able to use a computer to control musical sounds flexibly, storing and reusing sections at will.

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 will be evaluated for upgrade on an 18-month cycle. This will ensure that the exhibit retains its dynamic, state-of-the-art character.

The Computer Discovery Center will be supported by The Computer Museum's Resource Center, where magazines, books, reference

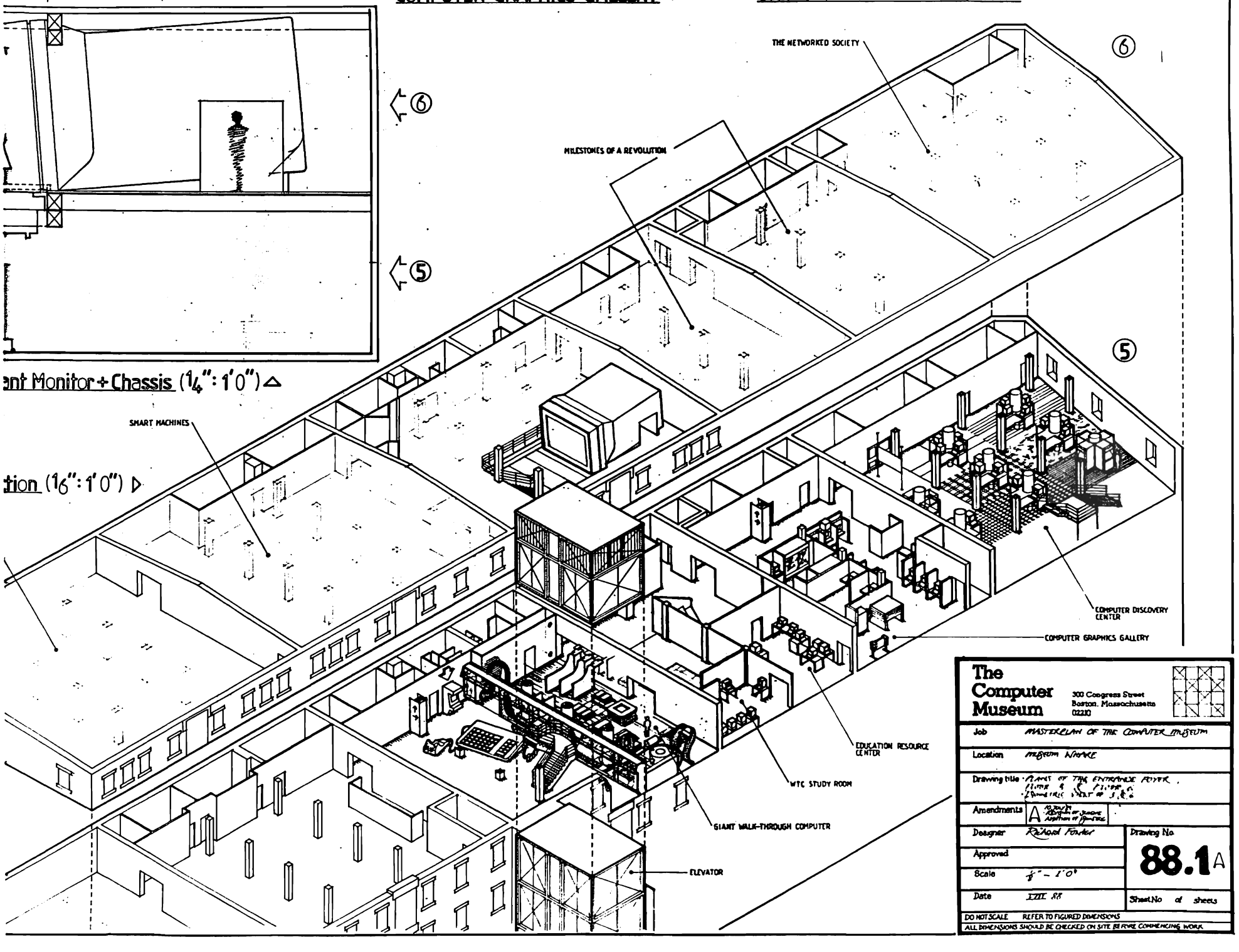
publications, and information about courses, user groups, and training programs will be available. This area will help visitors whose appetites for computers have been whetted discover where to turn next. The Resource Center will also display computer-related technology for educational purposes which will be of special interest to teachers (with or without their students) and families.

BUDGET

The Computer Discovery Center will require $500,000 of cash and an additional $150,000 of in-kind contributions, broken down as follows:

ITEM	COST ($K)	IN KIND
exhibit research & development	160	35
exhibit design	75	
exhibit fabrication	160	
graphics & video production	60	10
computer & video hardware	30	100
educational materials for distribution	15	5
TOTAL	**500**	**150**

END
6/13/89



ant Monitor + Chassis (¼": 1'0") △

tion (⅛": 1'0") ▷

The Computer Museum	300 Congress Street, Boston, Massachusetts 02210
Job	MASTERPLAN OF THE COMPUTER MUSEUM
Location	MUSEUM WHARF
Drawing title	PLANS OF THE ENTRANCE FOYER, FIRST & SECOND FLOORS, ISOMETRIC VIEW OF S.E.
Amendments	A 10 OCT 88 Addition of Isometric
Designer	Richard Fowler
Approved	
Scale	¼" - 1'0"
Date	XIII 88
Drawing No.	88.1A
Sheet No.	of sheets

DO NOT SCALE REFER TO FIGURED DIMENSIONS
ALL DIMENSIONS SHOULD BE CHECKED ON SITE BEFORE COMMENCING WORK

COMPUTER MUSEUM EXHIBIT DEVELOPMENT POLICY

The Purpose of the Exhibits

The Computer Museum's mission is, in part, *to educate and inspire all ages and levels of the public through dynamic exhibitions and programs on the technology, applications and impact of computers.*

Exhibits provide an environment for "landmark learning," the grasping of key ideas in a new subject. The aim is to raise curiosity and awareness, not to teach a course. Exhibition galleries filled with an engaging array of interactive displays, original artifacts, and video have a unique power to inspire visitors to make mental leaps into new fields. The selection of content and media serve the educational goals of the Museum.

The Museum's Audience

The audiences served may be divided into three groups. Group 1 consists of technically literate individuals, the majority of whom are professionally involved with computers. Group 2 consists of the remainder of the adult visitors, with little or no knowledge of computers; this group may have some interest in computing, perhaps through a family member, or through the use of personal computers. Group 3 are school-age visitors, who come to the Museum in group field trips, or with their families during weekends and vacations.

The degree to which an exhibit appeals to one of the groups depends both on the its subject matter as well as on the manner in which it is presented. The Museum will try to ensure that at least two of the three groups are well served by any individual exhibit. In addition, the Museum will produce supporting materials, such as worksheets, catalogs, and gallery guides, that will supplement each exhibit's educational impact. The overall mix of exhibits at the Museum will offer a rewarding experience for members from all audience groups.

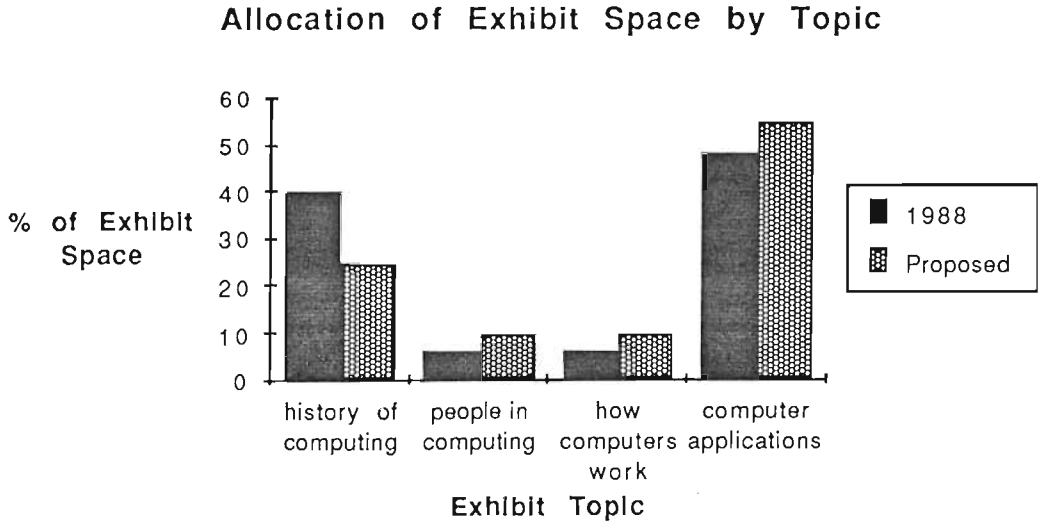
Two exhibit genres offer great potential rewards for all groups. The first are 'larger-than-life' displays, epitomized by the walk-through human heart in the Chicago Museum of Science and Industry, or the "Soup Machine" animated computer of NMST, Ottawa. Such exhibits instill a powerful take-home impression which is a salient

characteristic of many successful museums. The second is the hands-on interactive exhibit where visitors learn through actively doing something themselves. This stimulates a depth of understanding not attainable by passive watching or listening. Where possible, both of these types of exhibits should be a feature of new Museum galleries.

Allocation of Exhibit Space by Content

There are four fundamental areas that will be addressed within the Museum's exhibits. Taken as a whole, these areas span the content areas delineated by the Museum's mission statement. Taken separately, they each offer the opportunity of engaging at least two of the Museum's audience groups.

A percentage of Museum exhibit space to be devoted to each subject area is given. This figure refers to exhibits in which that particular subject area is the dominant theme. However, it is highly desirable for most exhibits to interweave elements of all the areas listed below. This will add a diversity that will widen the appeal of each exhibit.



1. History of Computing (20-30% of space)

An exhibit on the evolution of computer hardware, software and applications is an essential component of a well-rounded museum visit; indeed, most people expect to see some history in a Museum, but it must be presented in a lively manner to sustain interest and reward visitors. The Museum therefore plans to develop two historical exhibits. In the first, vignettes from key episodes in the history of computing will be presented with emphasis on the social context that brought the technology about. A typical vignette will include an original artifact in a period recreation, a video program presenting its application and impact, and an interactive computer offering visitors a means of sampling the type of problem to which the computer was applied. Text will fill in background context and related events. The second exhibit will consist of a dramatic, walk-through recreation of a large computer installation of the vacuum tube era. The sheer size of vacuum tube computers will make a lasting impression on visitors. Every effort will be made to target these introductory exhibits towards all three audience groups.

In addition to these two permanent exhibits in which the historical theme is uppermost, many other aspects of computer history will be covered as introductory or background sections within other thematic exhibits, both permanent and temporary. The history of personal computers, for example, may be presented within a thematic gallery on personal computing.

A result of this policy is that only a small percentage of the Museum's collection of historical artifacts will be on display in the public galleries. Visitors with a desire to see more of the collection (anticipated to consist mainly of audience group 1) will be accommodated by the Museum's Visible Storage area. This consists of a well organized artifact storage area in which most of the significant artifacts in the collection are laid out, well lit, and labelled with technical descriptions.

2. How Computers Work (10% of space)

To address the mission's requirement for exhibits on computer technology, an introduction to the basic principles of computer hardware and software will be presented, either as a separate exhibit, or as a facet of several thematic exhibits. Fundamental aspects to convey include the function of the processor, main memory, secondary memory, display and interfaces, and how

information flows between them. Other themes include miniaturization, the difference between hardware and software, and the nature of a program.

Special devices will be required to ensure that technical ideas are effectively communicated to members of audience groups 2 and 3. A major exhibit on the personal computer could provide a good opportunity for explaining basic elements of computer architecture and information flow within the computer. For example, a giant computer could be fabricated in the form of a landscape through which visitors roam to discover the anatomy of the computer, and learn what happens at each part through computer animation and hands-on interactive stations.

3. People in Computing (10% of space)

The achievements of individual computer engineers and entrepreneurs provide a good vehicle for focussing on specific technologies and their applications and social impact. Temporary exhibits may be mounted to feature specific groups of individuals, perhaps on the occasion of important anniversaries. Audiovisual programs featuring computer innovators will be used wherever appropriate to add a human dimension to the exhibits.

4. Computer Applications (50-60% of space)

This topic appeals to the largest proportion of visitors because people want to see what computers can do. In addition, the Museum is a natural place in which to demonstrate computer applications; visitors can engage directly with the applications, offering an experience that cannot be matched by text or audiovisual media alone.

Two of the existing major galleries in the Museum, constituting 25% of the total available exhibit space (37% of exhibit space open in 1988), have themes that demonstrate computer applications: "Smart Machines" shows achievements in artificial intelligence and robotics; "The Computer and the Image" shows image processing and computer graphic applications.

The Museum should greatly expand the scope and range of computer applications presented. Future exhibits being proposed in this area include a major exhibit on personal computers, in which the largest section will demonstrate about six generic application areas for personal computers, each with half a dozen computers for visitors to use.

"The Networked Society" is a proposed exhibit that will feature large-scale computer applications that control information essential to the running of modern society. Examples will include airline reservations, telephone networks, on-line banking, international financial transactions, and supermarket systems.

In another proposed exhibit, "The Ubiquitous Computer," computer applications would be approached from a different perspective. This exhibit would reveal and explain the use of computers inside machines we use every day. Examples include the car, telephone, microwave oven, camera, and many other devices drawn from all walks of life.

Some other application-oriented themes for future exhibits include the use of computers in medicine, helping the disabled, defence, space, and publishing.

Layout of Exhibit Space

The excitement of a Museum visit should start as soon as the building is approached. Displays outside the building and in the lobby should serve to arouse interest and provide a taste of the Museum galleries. Kinetic or interactive sculptures and large-screen video might be appropriate here.

It is especially important that the first gallery seen by visitors place all audience groups in a good frame of mind. Visitors who desire to see computer history exhibits should have this opportunity early on in the visit.

Exporting Exhibits

Although the first priority is to develop The Computer Museum's galleries, the Museum should also clone or travel exhibits for audiences across the world. This can help the Museum reach audiences well beyond its reach in Boston. Increasing the Museum's visibility outside Boston can play a very beneficial role in the development of Museum support from new geographical regions.

One approach is to build exhibits that tour science and technology centers under the auspices of organizations such as the Smithsonian Institution Travelling Exhibition Service (SITES) or the Association of Science and Technology Centers. "Computers in Your Pocket" is the first such Computer Museum exhibit, currently being toured by SITES. Special funding is usually required to rebuild exhibits in a form suitable for touring.

Another approach is to build exhibit kits based on Computer Museum exhibits. These would include software, hardware specifications, installation and maintenance instructions, and explanations of the subject matter. Once developed, such kits could be sold at reasonable prices to science and technology centers that lack their own exhibit development teams. Unsolicited requests for exhibits from about 10 institutions, and the absence of other providers of such items give preliminary indication that a market for exhibit kits exists.

Schedule of Exhibit Development

It is the Museum's objective to open one major new exhibit and a pair of temporary exhibits each year. This rate is required in order to keep the Museum exhibits current and relevant, as well as to maintain high visibility for the Museum. The opening of new exhibits has a significant impact on visitor attendance levels.

Exhibit quality rather than quantity is usually the deciding factor in determining repeat visits. The Museum is already large enough to occupy most visitors for the typical two hour visit. Priority should therefore be given to the replacement of the least successful exhibits with new ones rather than expansion into unused space. An increase in the overall gallery square footage should be tied to visitor attendance levels.

If possible, galleries near the entrance should be improved first.

Exhibit Funding Strategy

The Museum exhibits will be self funding. In other words, all development costs will be met with funds raised specifically for the development of exhibits. Funds can be tied to specific exhibits, or,

more desirably for the Museum, applied to an exhibit development phase considered as a whole.

The main sources of funding are the computer and computer-user industries. These include both the corporations and the founders and other individuals within the corporations. Secondary sources of funding include state and federal government grants and independent foundations.

Funders will be acknowledged within the exhibits. The Museum will be sensitive to the promotional interests of the funder, but will be the final authority on the content of the exhibit and the use of the company name, logo and products.

END

Criteria for New Exhibit Selection

- importance of topic
- audience appeal

  for one segment in particular, hitherto not well served

  overall attendance generation (block-buster)
- suitability for national, international outreach (kits, videos, . . .)

New Exhibits in Plan

Milestones of a Revolution: People and Computers

Computer Discovery Center

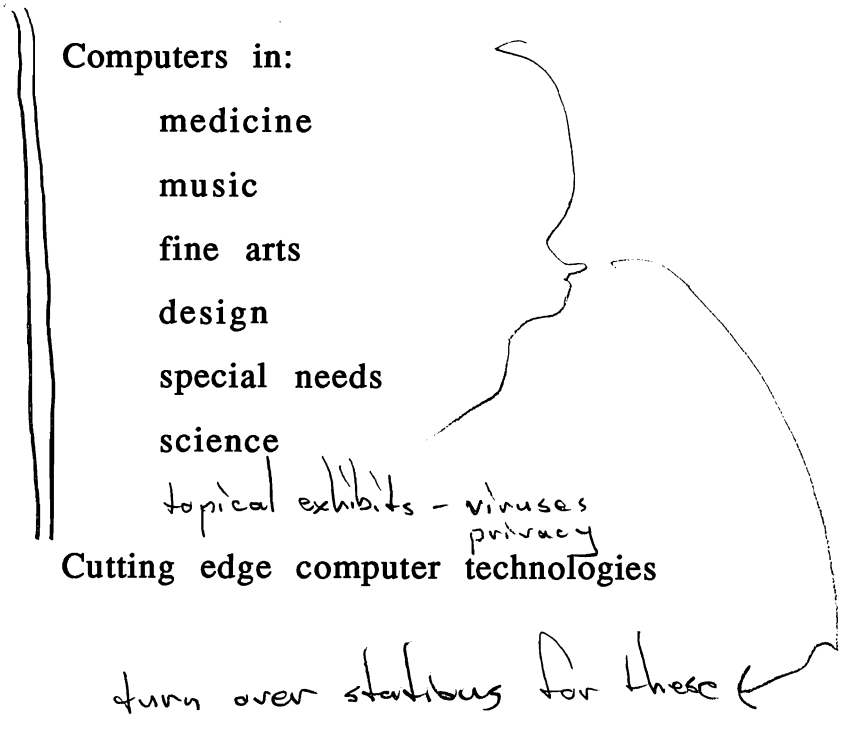
The Networked Society

Ideas for New Exhibits

Computers in:

- medicine
- music
- fine arts
- design
- special needs
- science
- topical exhibits - viruses, privacy

Cutting edge computer technologies



12/2/90

Exhibits Committee

Gwen Bell (staff)

Joe Cashen (staff)

Bernard Cohen

Thomas Gerrity

Gardner Hendrie

James McKenney

Adeline Naiman

David Nelson

Oliver Strimpel (staff)

Guests:

Richard Fowler

Robert Lucky

Robert Metcalfe

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.

Audience

Group 1: Computer Knowledgable Adults

Group 2: Other Adults

Group 3: Young People

Exporting Exhibits

traveling exhibits

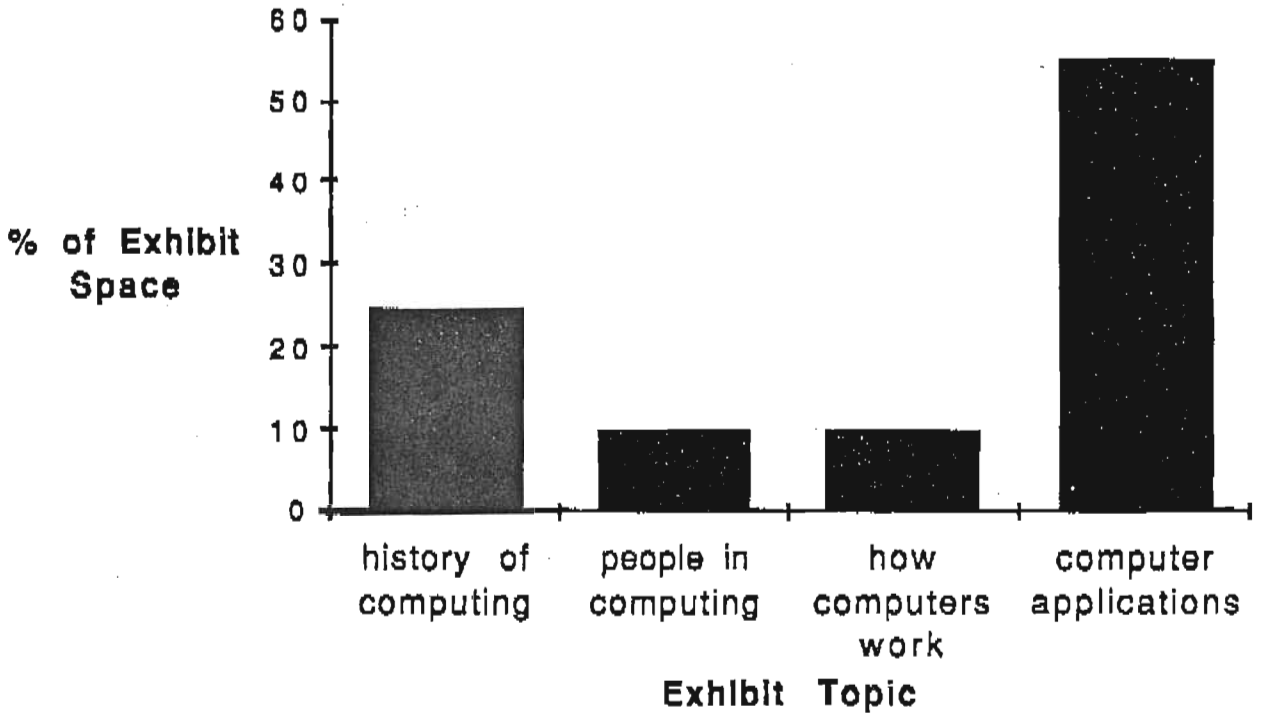
kits

Schedule

1 major exhibit per year

2 temporary exhibits per year

Proposed Allocation of Exhibit Space By Topic



Specific Exhibits

- History of Computing
- Sage
- Personal Computer Exploration Center
- Networked Society

software - what it is
miniaturization/speed

THE COMPUTER MUSEUM

EXHIBITS COMMITTEE MEETING May 9 1988

AGENDA

- **How should we allocate our exhibit space?**

  Theme exhibits:
  - "Smart Machines" - AI and Robots
  - "Interactive Image" - graphics
  - "SAGE" - computers in the 1950's
  - "PC Exploration Center" - current PC's and their applications
  - "The Networked Society" - computers behind the scenes managing information - airline reservations, stock market etc.
  - "The Ubiquitous Computer" - embedded controllers

  Generic Exhibits:
  - How Computers Work RM JM&K IB Cohen
  - Where Computers Came From
    - a history of computer hardware DN JM&K IB Cohen
    - a history of computer software

- **What exhibits should we try to open in the next two years?**

  SAGE
  Computer Evolution Theater
  The Interactive Image
  Personal Computer Exploration Center
  The Networked Society
  The Ubiquitous Computer
  other...

different designers

things you couldn't do without computers:
land on the moon

need to get success fast on interactive
need a dinasour

computer bugs:
steel mill that made bad metal to last JM
satellite that went up JM
F16 that rolled 180° when it crossed the equator DN

Minutes of the Exhibits Committee Meeting of May 9 1988

Present: Gardner Hendrie (Chairman), Gwen Bell, Joe Cashen, Bernard Cohen, James McKenny, Robert Metcalfe, David Nelson, Oliver Strimpel

How should we allocate our exhibit space?

GH introduced the notion of looking at exhibits as thematic or generic. Thematic exhibits, such as Smart Machines, The Interactive Image, SAGE, PC Exploration Center, The Networked Society and The Ubiquitous Computer present an application area or a particular type of computer usage. Generic exhibits address questions such as "How does a computer work?" and "How were computers developed?"

BC presented an overview of the Smithsonian's new exhibit. Their theme will be the nature of information; the first 1/3rd of the space will consist of a sequence of scenarios, starting with the laying of the Transatlantic Cable. Visitors will next see a reconstruction of ENIAC, followed by displays showing the emergence of the computer industry including many working examples. Some discussion of how computers work will also be included.

BC felt that three points should be conveyed with regard to how computers work: 1. Why miniaturize? 2. The difference between software and hardware 3. What is software like, what are the elements of a program? The aim is to raise awareness, not give a computer course.

RM asked whether the Museum's mission statement could guide the allocation of exhibit space. GH said that as the mission states that exhibits should educate and inspire ALL levels of the public, one could look at the space in terms of how they serve the Museum's three constituencies (computer knowledgable, those directly affected by computers, and the young).

RM asked what we might display that could be as uniquely appealing as the world's largest tree that he recently drove 12 hours to see. OS thought an improved SAGE exhibit might come closest. DN suggested that SAGE's size be reinforced through models or other means.

GH asked whether the Museum should have an exhibit on history, including hardware and software. GB said social history should be included. JM thought this should include how the computers were used, produced, what they replaced and what effect it had on an organization.

RM suggested a list of what would not be possible without computers.

The group felt software was important, all the more as it represents an increasing portion of the computer business in economic terms. DN picked a key software development for each decade: 40's stored program, 50's autocode, 60's languages, 70's structured programming, 80's object-oriented programming.

GB asked whether "well-rounded" was the goal the exhibits should be striving toward. DN suggested a gradation, from very interactive at one end to more historical at the other. JC preferred to think of the whole set of exhibits as a system, most of which should have broad appeal. OS said visitors 'maraud', follow their own path, so that order of exhibits is less important than correct content overall.

GH asked whether space should be devoted to how computers work. RM said that this, together with what they do and where they came from are three important aspects that we should present in a lively, interactive fashion, encouraging visitors to experience success while using computers in hands-on exhibits. DN felt history was the main point of the Museum; other subjects could be learned about elsewhere. JM felt that how computers work and their history should be presented, but in the context of how they're used. The ATM was a good example. Economics should also be addressed. BC also supported both types of generic exhibit, and cited the example of the credit card.

It was felt that specific descriptions of exhibit alternatives might help the committee members decide whether the generic subjects should be addressed in separate, dedicated exhibits, or embedded in thematic exhibits.

The next meeting was planned for the afternoon of June 17 1988 immediately after the meeting of The Computer Museum Board. Max Hopper would be invited to attend.

OS 5/11/88

Minutes of the Exhibits Committee Meeting of March 30 1988

Present: Gardner Hendrie (Chairman), Gwen Bell, Joe Cashen (for first part), Jim McKenny, Oliver Strimpel

Regrets received from Dave Nelson. OS and GB had met separately with Robert Lucky on March 28. A summary of this meeting is attached.

1. Mission of The Computer Museum OS handed out the mission statement with the portion pertaining to exhibits underlined. All present felt they were familiar with it.

2. Priorities for Developing Museum Wharf Site and Offsite Activities
JM felt that the priority should be to improve the Museum itself first, but if exhibits developed for the Museum site could also travel, so much the better. GB and OS said that it costs more to develop travelling exhibits. Pocket Computing, for example, is now being rebuilt under a new grant so that it can travel.
GH stated that the Museum should reach critical mass in its own exhibits so as to attract repeat visits, thereby boosting attendance. Helping other Museums through cookbooks was not a high priority, but a couple could be tried as experiments.

3. Taxonomy of the Field From Exhibit Point of View
JM said the field should really be a multi-dimensional space, not a taxonomic tree. All felt that the taxonomy was at best a way of being alerted to possible severe omissions, but could not be used to prioritize exhibit development or to conceive of new exhibit ideas.

4. Proposals for New Exhibits
OS handed out a list of the major exhibit ideas which included the Personal Computer Exploration Center (PCEC), The Interactive Image (update of the graphics gallery), and The Computer Age, incorporating sections on the chip, the networked society and ubiquitous computing. Plans for the entry bay and future computing were added to the list.

GH partitioned the Museum's audience into:
1. the computer knowledgable

2. people whose lives are affected by computers (eg. use them at work or have immediate family who work in computing)
3. young people and general public with little or no computer knowledge.

Ideas for specific exhibits were put forward:

PCEC: JM suggested information retreival and examples such as the Lotus signal to receive stock market quotes by FM radio

Interactive Image: JM mentioned 3D interactive information system on New Yok City being developed at the MIT Media Lab and also SOM's architectural visualizations.

The Chip and How it Works: JM felt it would be hard to do this well as it contains difficult material. GH and OS felt it was important to do something in this area, especially for audience types 2 & 3. (Note, Bob Lucky felt 'How it Works' is not needed in the Museum)

Ubiquitous Computing: GH felt the exhibit should include a wide range of products, not just the car; this would be especially valuable from audience groups 2 and 3.

GH proposed that the exhibit ideas be graded according to their fundability, draw (bearing above audience groups in mind), and educational value. The fundability was assessed by GB & JM on the basis of a list of prospects that was handed out as well as their intuition about their personal contacts.

Exhibit	Cost ($K)	Fundability (0=no, 1=yes)
PCEC	500	0.7
The Interactive Image	250	0.5
The Computer Age		
- The Chip & How it Works	1-200	0.5
- The Networked Society	5 x 150	
airline	150	0.7
banking	150	0.6
phones	150	0.6
stock market	150	?
power utility		low
traffic control		?

- Ubiquitous Computing	250	
auto	50-100	?
other	150-200	
Entry Bay		
- film	50	0.9
- welcome space	35	0.5
- SAGE upgrade	100	?
Future Computing	250	?

5. Tour Everyone was already familiar with the spaces.

6. Planning Exhibit Development Activity Through 1992
GB noted that in the past we had worked to fund and then develop one exhibit at a time with the result that long gaps separated one exhibit from the next. She recommended working on several at once in a pipelined fashion. OS said he could support the 'selling' of several exhibits at once but that the final stages of each exhibit's development should not coincide.

GB and OS stated the need for an overall design analysis of all the exhibit spaces excluding the Image Gallery and Smart Machines. The traffic flow needs improving and a good designer should be brought in to help set the framework for all new exhibits being planned in these spaces (such as The Computer Age and the PCEC). In addition, the designer could produce sketches which could be used to help fund the exhibits. This exercise would cost about $5000. GH and JM supported this initiative.

The following priorities were agreed:

Interactive Image: an all-out effort should be made to fund this for the next two months to make full use of the opportunity afforded by ACM SIGGRAPH 89 being in Boston. If the effort is unsuccessful, the effort should be dropped. GH will set up a meeting of GB, GH, OS with Dave Nelson to explore Apollo Computer's interest.

PCEC: GB thought she had a fair chance of raising up to $300K from 3 personal gifts and one corporate gift on a fast track. She was encouraged to proceed with this.

The Computer Age: It was agreed that efforts should be started now to set this in motion, even though it would probably not open before 1990-1. OS will send diagrammatic layouts of the proposed exhibits to JM by Monday April 11. JM would start to make contact with prospects in the banking and airline community that week. GH offered to call Bob Lucky to discuss AT&T's participation in The Computer Age exhibit. GB suggested that Linda Bodman be co-opted to the exhibits committee and this was supported by all present. GH offered to approach her.

Entry: GB and OS reported on the current status. The film is awaiting a meeting with UNISYS in April; the entry bay is awaiting the location of a pro-bono designer; the SAGE upgrade may be harder to fund, but GB offered to approach Robert Everett directly.
GB stated that it would be important to consider the entry as part of The Computer Age at least from the design point of view so as to ensure optimal use of space and smooth integration of the exhibits.

Future Computing: A proposal has been sent to Naomi Seligman.

7. The Next Meeting was set for one of May 9th and May 11th from 3-5pm at The Computer Museum. GH would select the date after discovering when absent members of the committee could attend.

OS
4/1/88

Computer Museum Exhibit Development Plan

Rev 1 - 7/15/88

Purpose of the Exhibits

Funding Strategy

Where the $ Come From?

The exhibits will be self funding

sources: companies

individuals - who specifically want to fund exhibits

professional associations

government & foundations

Limitations on company promotion in exhibits

The Museum will be sensitive to the interests of the funder but will be the final authority on the content of the exhibit and the use of the company name and logo.

Allocation of Exhibit Space by Content

Historical - Where Computers Came From

a summary exhibit on the evolution of computer hardware and software

a history gallery filled with historical computers (at the back of the museum)

How Computers Work

a specific exhibit such as Oliver's giant computer or worked into other exhibits where appropriate?

Biographical - People in Computing

multiple people at once

Example: Seymour Cray

Theme Exhibits - How Computers Are Used

Examples:

smart machines

pc's

graphics

networked society - computers we never see which control information in our society

American Airlines reservation system
telephone system
on-line banking -cash dispensing machine
stock quotation system - Lotus signal
supermarket checkout

ubiquitous computers - computers we never see which control machines we use every day

Ford car
telephone
microwave oven
dishwasher

Layout of Exhibit Space

Ground Floor Entrance

What the visitor sees first

The summary exhibit on the history of computing?

Priority should be given to replacing unsuccessful exhibits with new exhibits rather than developing unused space?

Schedule of Exhibit Development

It is the Museum's objective to open one major new exhibit per year

The Computer Museum

300 Congress Street
Boston, MA 02210
(617) 426-2800

March 3 1989

TO: Art Bardige, Dan Dennett, Gardner Hendrie, Signe Hanson, Danny Hillis, David Macaulay, Philip Morrison, Phylis Morrison

FIRST MEETING OF THE WALK-THROUGH COMPUTER ADVISORY GROUP

This is to confirm the first meeting at The Computer Museum for 6-8:30 pm (with informal dinner) on Monday March 13th. You can park right in front of the Museum. Enter from Congress Street, taking the turn in between the milk bottle and the Museum building (300 Congress Street).

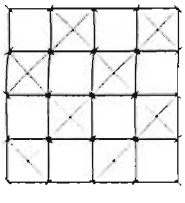
The Computer Museum entrance may be closed so please enter from the staff entrance door, the right-most door under the Children's Museum canopy. The person at the security desk will direct you.

The purpose of The Walk-through Computer is to address the topic of how a computer works. Other exhibits in the Museum, current and planned, tackle computer evolution, applications, and impact. I enclose a preliminary proposal which we can use as a basis for discussion—nothing in it is sacred, including the whole idea of building a scaled up model of a computer.

I'd like to start off by discussing what the public needs to know about how a computer works. The list starting on page 3 of the enclosed proposal can start the ball rolling. If we have time, we can then move on to discuss whether The Walk-through Computer is a good way of presenting the material.

Many thanks for joining in. We look forward to seeing you!

Oliver Strimpel



WALK-THROUGH COMPUTER

Proposal for a Landmark Educational Exhibit at The Computer Museum

Project Summary

The Computer Museum plans to develop and build a giant (2,000 square foot), walk-through computer. The purpose of the computer is to meet the general public's need to understand how a computer works.

The rapid emergence of the computer as a central tool in society has left many members of the public without a basic understanding of computers. Whereas existing or planned exhibits at The Computer Museum and other institutions address computer history and applications, no significant project at a public institution exists to tackle the most fundamental topic—how computers work.

The Walk-through Computer will consist of a large-scale, theatrical, functioning computer, complete with keyboard, mouse, display, printer, circuit boards with processor and memory, and disk drives. The computer will be running a real program with which visitors will interact. Special effects and computers themselves will be used to simulate information flow throughout the Walk-through Computer, and respond to visitors as they explore. Hands-on stations will nestle inside the Walk-through Computer to explain key parts of the computer in depth, offering opportunities to look closer and answering visitors' questions at many different levels.

The Walk-through Computer will offer museum visitors of all ages and backgrounds, singly or in groups, an enjoyable opportunity to discover how computers work. The Walk-through Computer will become the hall-mark of The Computer Museum.

WALK-THROUGH COMPUTER

Proposal for a Landmark Educational Feature at The Computer Museum

The Computer Museum's mission is, in part, to educate all levels of the public through dynamic exhibits on the technology of computing. The Computer Museum plans a major initiative to promote the public's understanding of how computers work: a giant (20 times actual size) Walk-through Computer.

Large-scale, gallery-sized exhibits have proved highly successful in museums and science centers around the world. Some have recreated complete industrial environments at nearly full scale, such as the elaborate and extensive coal mine at the Deutsches Museum, Munich. Others have used scaled-up models to offer a dramatic new view of a familiar object. The most famous example is the giant walk-through heart, on display at the Chicago Museum of Science and Industry and at The Franklin Institute, Philadelphia. The heart is frequently cited as "the best" or "the most memorable" exhibit in these museums.

Among existing exhibits, the "Soup Machine" at the National Museum of Science and Technology (NMST), Ottawa, probably comes closest to the idea proposed here. It consists of a large wall in which an animated machine, complete with sound, lights, and moving levers, executes a simple program to make a bowl of soup. The Soup Machine is highly effective in communicating its main point—namely that a computer program is a series of explicit instructions that are obeyed sequentially, and that some of the instructions require external input (data) while others produce output (results). However, this message is not integrated into visitors' existing notions of what a computer is. There needs to be a link between the Soup Machine and the personal computer that has, by now, been seen, even if not used, by almost everyone. In addition, the connection needs to be made between the soup-making program and the kinds of applications the public associates with computers.

Why a Walk-through Computer?

We are living at a time in which the computer has rapidly become one of society's most important tools, perhaps *the* most important tool. The speed of the computer's introduction has left many people bewildered and confused on many fronts. One might translate the average person's confusion into these three questions: How do computers work? What can they do? Where did they come from? The purpose of the Walk-through Computer is to help visitors answer the question "How does a computer work?" or, at least, to give them the concepts with which they can focus their questions more clearly.

Thematic exhibits at The Computer Museum and in science and technology centers around the world are beginning to address the question "What can computers do?" Other exhibits planned at The Computer Museum and at the Smithsonian Institution's National Museum of American History will address the question "Where did computers come from?" However, no other public

institution plans to address the question "How do computers work?" in depth. One reason for this is that computers are complicated machines; the task will be a challenging one. A second reason may be that, until recently, understanding how computers work was not regarded as a fundamental part of technology literacy. This attitude is changing rapidly, as computers take on an ever-expanding role in the world.

The concept of the giant Walk-through Computer emerged as a vehicle for tackling a somewhat daunting topic in a playful spirit. The large computer provides a framework on which to hang explanatory, interactive stations. Standing alone, such stations would lack the visual impact, excitement, and cohesiveness to engage the majority of museum-goers.

The Walk-through Computer will allow visitors to choose their own path through the many levels offered and attempt to answer their own questions. For example, some visitors may initially wish to understand what computers are doing at the level of ones and zeros, only to discover that when they have grasped this level, they still cannot see the connection between this logical concept and the computers they use at home or at school. Other visitors may desire to learn the detailed anatomy of the computer but then become mystified as to how the whole hangs together.

Collective experiences will be nurtured within the Walk-through Computer. A grouping of visitors will be able to interact with the computer as a team, while others gather round and watch. In addition, special modes will be preprogrammed into the Walk-through Computer for use with school groups as part of scheduled demonstrations and tours. Tour guides will be able to operate the entire machine as part of a presentation before they hand over control to the visiting group.

What Will Visitors Learn from the Walk-through Computer?

As the Walk-through Computer will address a diverse audience, the main educational goals of the exhibit will be to convey only a few important concepts. However, a rich array of further information will be available for those who seek it, without distracting them from the primary educational goals of the exhibit. This will be implemented, in part, through interactive, computer-based stations that use animation, and sound.

The important concepts will be drawn from the following:

1. Instructions

A computer obeys instructions, usually one at a time, using a device called a processor. The instructions "understood" by the processor are drawn from a repertoire of a few dozen. Individual instructions retrieve or send out information, carry out very simple arithmetic or logical operations, or cause the processor to execute another instruction, not necessarily the next one in the program. Each instruction that passes through the processor does very little, but computers execute instructions at an unimaginably rapid rate, so a lot gets done.

2. **Computer Programs (Software)**
A working computer follows a program, a series of instructions that have already been stored inside the computer. The program determines what the computer does. One can change the same computer from doing one job to doing another simply by changing the program.

3. **Programming a Computer**
People write programs in languages that look a little like English. Other programs (also written by people) are used to translate these languages into myriads of detailed instructions that the processor can "understand." These translation programs include programming languages (compilers and interpreters) and operating systems.

4. **Memory**
The computer has physical memory that stores instructions (programs) and data (information, facts, knowledge). Fast memory is made with silicon chips, and slower, (but more capacious) memory is made with magnetic and optical disks. Disks are used to archive and distribute computer programs and data.

5. **Input and Output**
Devices are needed to convert information that people can handle into the form handled by computers (electric charges, magnetic fields, and microscopic pits that represent ones and zeros). Input devices, such as keyboards and mice, convert hand and finger movements into computer-recognizable form, while output devices, such as printers and displays, do the reverse.

A Walk Through The Walk-Through Computer

Approach
As they approach the Walk-through Computer, visitors will see a giant monitor, keyboard, and mouse—scaled up to twenty times over normal size. A doorway into the ten-foot-tall front facade of a personal computer's chassis will beckon to one side. Visitors will see a changing image on the monitor screen—the output of the interactive program that the Walk-through Computer will be executing. Careful thought will be given to the selection of program(s) for the Walk-through Computer. The program will be performing a useful and genuine task; it will have a clear, graphical output (pictures connect quicker than words) and behavior that is clearly modifiable by visitors through the mouse and keyboard.

Keyboard
On reaching the keyboard, visitors will see that they can operate it by stepping onto the keys. Stepping on "function keys" will make something understandable happen (each keycap will be clearly labeled). The specific actions performed by the function keys will be determined by the program selected at that time for the Walk-through Computer. For example, if a paint program is selected, the function keys will perform such functions as erasing

the screen, changing the paint brush, selecting fonts, and changing colors. In addition to the function keys, all the keys of a normal keyboard will be active, causing a character to appear in a "dialog area" on the screen. When the return key is pressed, the computer will try to understand the character string entered and will execute it if it can. Otherwise, it will say, "I cannot understand that, try one of the following..."

A cut-away at the side of the keyboard will reveal what lies inside a keyboard and explain what it does and how it works. Visitors will be able to view the underside of the keyboard, seeing the action caused by other people stepping on the keys.

Mouse

Next, a visitor might operate the mouse. Small children could sit on top of the mouse while a friend or parent pushed it around on the giant mouse-pad. If a paint program is running, movement of the mouse will cause a brush to paint on the large monitor. The mouse and keyboard can be used simultaneously—indeed, visitors will be encouraged to work cooperatively.

The mouse will also have a transparent portion, revealing the ball, wheels, and encoders that track the motion in two dimensions and convert it into a form the computer can handle. The visitor can follow the action inside while making small movements of the mouse.

Monitor

The giant color monitor placed next to the keyboard and mouse will instantly display the effects of the keyboard and mouse inputs, as well as the results produced by the computer program. After interacting with the keyboard and mouse and watching the monitor's screen, the visitor can peer inside the monitor housing from an opening in the side of the monitor. The tube, deflection coils, shadow mask, and other parts will be visible, together with a short piece of animation (perhaps computer-generated) showing the operation of a raster color display.

The visitor's first contact with the computer will thus center on input and output, addressing the fifth item on the list of educational goals in the previous section.

Inside the Computer

Walking through a doorway into the chassis, the visitor will be greeted by a landscape of giant printed circuit cards and disk drives (floppy and Winchester). Visitors will walk over the motherboard, stepping onto any of the integrated circuits and passing through the rows of RAM. Vertical cards slotted into the horizontal, floor-level motherboard, will form walls that approach ceiling height. The power supply will stand out as a large, sculptural feature, complete with its huge smoothing capacitors.

The interior landscape need not adhere slavishly to any particular computer. In particular, artistic license will be taken to emphasize the information pathway through the machine. Visitors will watch video, pulsing light fibers, and other devices to simulate the flow of information throughout the computer

and its peripherals. Visitors will activate spoken explanations, special effects, and video animation by touching the appropriate component or through a proximity sensor.

Visitors will be able to watch the giant computer execute its program, seeing how all parts of the computer act as a coordinated whole, synchronized by a clock, and calling the memory and peripherals into play as needed. Visitors will be able to store images in the giant computer through commands entered via the giant keyboard, mouse, or other stations. This will cause information to flow into the RAM and disk. Flashing light pathways will simulate the flow and mechanical movement of the disk, and its heads will simulate writing to disk.

Interactive, computer-based stations will be built into the Walk-through Computer, offering visitors an opportunity to explore key aspects of the computer's physical or logical operation in one or more of three dimensions: physical scale, temporal scale, and level of abstraction.

The Microprocessor

Perhaps the most important series of stations will focus on the microprocessor. First, a "zoom control" will offer visitors the opportunity to see any part of the microprocessor at high magnification. Each part will be accompanied by a spoken description of its function.

Second, visitors will be able to slow the passage of time down a millionfold and watch the behavior of key parts of the microprocessor, such as the registers. The flow of information and control within the computer can then be followed in great detail. By varying the speed of execution, visitors will see how useful behavior emerges when many millions of elemental operations at the machine level are executed. They will be able to discover the distinction between instructions and data and see how a simple set of registers and instructions enables the computer to become a general-purpose information-handling machine.

Third, visitors will be able to choose the level of abstraction in their magnified, slowed-down processor to explore the giant gulf between the low-level operations carried out by the computer's processor, and the familiar high-level interactions, characteristic of such popular applications as word-processors and spreadsheets. At the highest level, an English description of the part being executed will be shown. As the abstraction level is lowered, the executing instructions will be shown in a high-level programming language, in assembly language, in binary, and at the lowest level, in voltages. This hierarchy of symbolic representation will be presented in a visually compelling way so that visitors can ee how a high-level instruction of the type they may have used themselves expands to thousands of low-level instructions that the processor can execute.

This series of stations will address the first three items on the list of educational goals in the previous section: instructions, programs, and programming.

The Main Memory (RAM)
At a simulated microscope housed among rows of RAM chips, visitors will focus on a simulated active portion of memory during the operation of the computer. Varying the scale from a bit up to a megabyte, visitors can watch patterns of ones and zeros change before their eyes. This will reveal the connection between individual bits of information and the macroscopic "knowledge" stored within a computer's memory. At each scale, the equivalent amount of information stored as pages of printed text will be indicated, conveying the sheer quantity of information required for many real-world problems. Visitors will be able to see functional descriptions of various chunks of memory as they change in real time. In addition, real RAM chips will be viewable under microscopes, and the detailed workings of an individual memory cell will be explained.

Floppy Disk Drive
The Walk-through Computer will be making periodic use of its disk drives. A disk access will cause a six-foot diameter platter to spin and a model of a head assembly to move across the surface. Patterns that simulate regions of magnetization will be printed onto the surface in all but a few tracks, where instead changing patterns will be projected to simulate the storage of new data. Visitors will be able to override the computer, initiating their own disk access, slowed down and explained with a voice commentary. The sequence will invite them to enter their name and see it converted into code and stored on the disk. They can then retrieve their input and also browse through several-thousand entries by previous visitors.

Together with a further explanatory model at the hard-disk drive, the RAM and the floppy disk will address the fourth concept listed in the previous section: memory.

Developing the Walk-through Computer

The Walk-through Computer will require careful planning, design, and fabrication to ensure that all its educational goals are met. The Computer Museum is convening an advisory committee composed of some of the world's leading experts in educational psychology, educational software, exhibit design, computer science, and classroom teaching. This group will provide a range of input that will help the Museum implement the concept accurately and effectively. The members of the committee are as follows:

Art Bardige, Learningways, former classroom teacher now director of an educational software-development company
Daniel C. Dennet, Tufts University, Professor of Cognitive Science and co-author of The Mind's I
Signe Hanson, Boston Children's Museum, Director of Exhibit Design
Gardner Hendrie, Sigma Partners, former computer architect and designer of minicomputers and fault-tolerant computers
Danny Hillis, Thinking Machines Corporation, computer architect, designer of the novel, massively parallel Connection Machine

Philip Morrison, MIT, Institute Professor and co-creator of many popular films, articles, and programs on science, including the PBS series "The Ring of Truth"

Phylis Morrison, former teacher, curriculum developer, and co-author and producer with Philip Morrison of science materials and programs

The project will be directed by The Computer Museum's Curator, Dr. Oliver Strimpel. Dr. Strimpel has directed exhibit development at The Computer Museum since 1984. He was responsible for "The Computer and the Image" and "Smart Machines," two 4,000-square-foot, highly interactive galleries which are the most successful exhibits at The Computer Museum. Prior to joining The Computer Museum, Dr. Strimpel was curator for Mathematics and Computing at The Science Museum, London, where he developed major interactive exhibits on information technology, and electronic imaging.

Adeline Naiman, Director of Education at The Computer Museum will take a lead role in the determination of the exhibit's content and will work to maximize its educational impact on Museum visitors. She has written extensively on the use of computers in education, is a former Managing Director of Technical Education Research Centers, Director of HRM Software, and Editor-in-Chief of the Elementary Science Study. She is currently Vice-chair of the Educational Technology Advisory Council of the State of Massachusetts.

The Walk-through Computer will be designed by Richard Fowler, visiting exhibit designer at The Computer Museum, on loan from Britain's award-winning and highly popular new National Museum of Photography, Film and Television, where he is head of design. Formerly senior designer at The Science Museum, London, he has designed numerous highly acclaimed exhibitions. He is particularly known for his designs of three-dimensional exhibit environments, including a nuclear power reactor and a television studio. He is uniquely qualified for the challenge of designing the Walk-through Computer.

Budget

The cash cost of developing the Walk-through Computer will be $487,000. As the budget below indicates, the bulk of the funds will be required to fabricate the exhibit. The development cycle will last approximately one year, from initial funding to the opening of the exhibit. The cash requirements can be approximated on a quarterly basis starting from the initial go-ahead:

1st quarter	2nd quarter	3rd quarter	4th quarter	TOTAL
$35,000	$65,000	$110,000	$277,000	$487,000

The Computer Museum has been very successful in securing in-kind donations of equipment and services for new exhibits. The Walk-through Computer would be no exception. It is expected that an additional 50% of the cost (approximately $260,000) of in-kind contributions will be raised. This is expected to be mainly in the area of programming and special effects in the exhibit, as well as in video equipment (such as a projection display for the giant monitor) and computers for the interactive stations. The Museum will draw on its sizable pool of skilled volunteer professionals to help with the implementation of the working elements and will vigorously seek new volunteers as needed.

ITEM	CASH COST	IN-KIND
concept development	$46,000	
exhibit design	$42,000	
fabrication	$275,000	$20,000
computer & video hardware	$22,000	$130,000
motion, effects, software	$65,000	$65,000
promotion, marketing	$25,000	$10,000
educational materials	$12,000	
administrative support		$35,000
TOTAL	**$487,000**	**$260,000**

END

Preliminary Set of Milestones for

MILESTONES OF COMPUTING

Please rank the following preliminary milestones according to the following codes:

5 - Must be included
4 - Would personally like to see included.
3 - May be included.
2 - Better left out in my opinion.
1 - Should not be included.

__4__ 1 -- Calculating and data processing before the computer. (1930s).

__3__ 2 -- An early British machine (EDSAC or Manchester Mark I) with the first 15 pioneers. (Atanasoff to Forrester) (c. 1937-1950)

__5__ 3 -- Early commercialization: UNIVAC -1. (c. ~~1955~~ 1951)

_____ 4 -- FORTRAN and COBOL: standard higher-level languages. (c. 1955-1962) as a sidebar

__5__ 5 -- ~~SABRE~~ and the IBM 360: Large-scale business applications. (c. ~~1967~~ 1964)

_____ 6 -- The Microprocessor: the ubiquitous computer (1972-1978)

__5__ 7 -- Personal Computing: spreadsheet, wordprocessing, hacking (1978-1988)

__1__ 8 -- Supercomputing: Cray-1: scientific computing (1985)

_____ 9 -- Standard operating systems: MS-DOS, UNIX (1985--) as a sidebar

_____ 10 -- Database: privacy, security. (1988 --)

_____ 11 -- Computers as International Commodities: , international aptitudes (1988 --)

_____ 12 -- The future: technologies and applications likely to emerge
13 Minicomputers
14 Networks

Please feel free to add suggestions in the space between the milestones.

Descriptions of the Milestones.

1 -- Calculating and data processing before the computer. (1930)

The intent of this milestone is to illustrate to visitors the techniques, such as mechanical adders and punched card processors, that were used to used to satisfy the need to store and manipulate information prior to the advent of the computer. This will give visitors a feel for the demands that led to the development of high-speed computers. The artifact base of this vignette might be a recreation of a clerk's office circa 1930. Among the interactive components, visitors might use a Monroe or an Ordner calculator to solve a problem posed to them.

2 -- An early British computer (EDSAC or Manchester Mark I c. 1948) with the first 15 pioneers. (c. 1937 - 1950)

A recreation of an early pioneering computer project would illustrate the general character of the period. The display would make immediately clear that the earliest computers were not manufactured goods, but experimental projects usually designed by the people faced by the problem computers were designed to solve. This milestone would emphasize that there was no first computer. Rather, the computer was developed independently and in various forms by several efforts in Europe and the United States. A video disc and interactive computer interface with clips from interviews of various pioneers, from Atanasoff to Forrester, would allow visitors to pose questions to and "meet" the people whose work contributed to the evolution of the modern computer. In this way also visitors will understand the motives that drove people to construct computers.

3 -- Early commercialization: UNIVAC - 1

The UNIVAC - 1, to many, signaled the opening of the computer era and the birth of an industry. It was the first computer to be produced in series and receive wide-spread recognition. Who bought it? What tasks did it perform? An artifactual recreation of a UNIVAC installation will answer these questions. Supporting panels will mention the commercial efforts of Zuse and Lyons Catering Ltd.

4 -- FORTRAN and COBOL: higher-level languages and standardization. (1960)

This milestone will introduce the early efforts to address two themes underlying the whole of computer history: the desire to ease programming, and to create standards independent of specific machines and companies. Interviews with key developers of early languages will explain why there were these needs, and how standard languages helped address them. Simple comparisons of machine code, assembler, and algebraic expressions will help visitors appreciate the need to simplify programming. Standardization might be illustrated by an analogy to natural languages: if there was a common international language, translation would be made much easier. The internationality of computer languages will be touched upon by mentions of Pascal and Algol.

5 -- Sabre and the IBM System/360: Large-scale Business applications (c. 1966)

In the mid-1960s, with the introduction of systems such as the IBM System/360, data processing became an integral part of large-scale business enterprises. The SABRE system illustrates this phenomena in a context that visitors can relate to their own experience: making flight reservations. A computer simulation that showed an airplane's seats filling up as reservations were made would illustrate the importance of real-time data processing in such applications. The 1960s were a period of economic expansion. Computers were linked to modernization, modernization to economic growth. As companies grew, they required larger systems. The IBM System/360 was intended to be a family of unified

architecture that would allow users to up-grade their equipment without expensive conversion of their software and data. The System/360 was widely-used and established the 8-bit byte.

6 -- **The Microprocessor: the ubiquitous computer. (1975-1980s)**

The integrated circuit and its outgrowth, the microprocessor, made possible the introduction of the computer as a control component in diverse applications, from factory floor to outerspace, from micro wave ovens to automobiles. Chips make wide-spread automation more feasible. Some raise concerns of the effect on human workers. A vignette that unveiled the computers that pervade our homes and lives would make people aware of how the computer has been incorporated into society to an even greater degree than they perhaps they are aware. The chip will in all likelihood be the base technology of computers through the turn of the century.

7 -- **Personal Computing: spreadsheet, wordprocessing, hacking. (1978-1988)**

With the application of the microprocessor the cost and size of a computer was reduced to the point where it was feasible for individual home use. One computer serving one person. The spread in computers used by non-computer scientists, programmers or trained personnel increased the importance of easily-used ("user-friendly") applications software. Such programs as spreadsheets and word-processors became the most widely-used.

8 -- **Supercomputing: Cray-1 and scientific computing.**

Since their genesis, computers generally have been designed to be optimal for either business data processing or scientific calculation. A focus on the Cray-1, the most famous and first "true" supercomputer, would illustrate to visitors the technical problems encountered when pushing the state of the art in calculating speed, and the types of tasks it performs. An interactive computer station would help visitors grasp just how fast a computer such as the Cray-1 calculates. Here visitors will understand the notion of time in computing terms.

9 -- **Standard Operating Systems: MS-DOS, UNIX (1984--)**

The movement toward portability of programs, which has its roots in the early high-level language efforts and system families, spreads to the demand for company-independent operating systems. This trends reflects the increasing influence of the user/customer on the market and is changing the face of the industry. Software becomes as key a driving force as hardware. Software companies begin to be important players.

10 -- **Database: Issues of Security and Privacy (1988 --)**

Computers have always served society's need to gather and make meaningful use of information, from census statistics and government data, to stock quotes and magazine subscriptions. No citizen is unaffected by this use of computers. The ability to manipulate vast quantities of data is an undeniable asset to society in many applications, but it raises questions of responsibility and appropriate use. How has this technology changed society? Do you receive more junk mail? How do they get your address? Police can keep better track of criminals. How might this affect you? This vignette would invite visitors to reflect upon such issues, by illustrating the extent to which such systems underlie society.

11 -- Computers as International Commodities: national aptitudes (1988 --)

As standards become more universal, the technology of computers becomes more of a utility, a commodity. Computer companies during the 70s spread their operations around the globe. Any computer system may be the product of many nations: architecture from Europe, chips from Asia, assembly in Mexico, software from U.S. Raw components, such as memory chips, have become raw materials fueling a new information age just as coal and steel fueled the industrial age.

12 -- The future: technologies and applications likely to emerge.

The last milestone might look ahead to give visitors a glimpse of the future. What technologies in the experimental phase today might be commonplace in 10 years?

Minutes

Meeting of the Advisory Committee to Historical Exhibits
January 26, 1989
1:00 - 3:30 pm.

Compiled by Gregory W. Welch

In attendance:

Dr. Gwen Bell, Dr. I. Bernard. Cohen, Mr. Gardner Hendrie, Ms. Jane Manzelli, Mr. Christopher Morgan, Dr. Adeline Naiman, Dr. Merritt Roe Smith, Dr. Oliver Strimpel, Mr. Gregory Welch.

The purpose of the meeting was to discuss the goals and broad approach of the Museum's historical exhibit, *Milestones*.

Introduction

Dr. Strimpel opened the meeting with a brief introduction to the Museum, the historical exhibits, and the process of exhibition creation. He stressed the Museum's mission to educate and inspire the public about the world of computers. While historical components will be incorporated into all the Museum's exhibitions, the Milestones and SAGE exhibits will be the only permanent exhibits dedicated to treating the history of computing.

Discussion

Interests of High School Students

Ms. Manzelli launched the committee's discussion by defining aspects of the history of computing that a high school student would wish to learn.

1) Why were computers invented, what problems did they solve?
2) Who were the people involved? The "intrigue" factor.
3) Economics: why are computers a technology that gets cheaper over time?
4) The size story.
5) History for glimpse of future.
6) Computers and responsibility.

Historical Perspective

Dr. Smith then elaborated on how the exhibit should treat history. The exhibit should seek to enhance "public understanding" of computer technology and science and their implications. This could be accomplished, in part, by a display that "mapped" the evolution of computers and helped visitors to situate themselves in this process. The exhibit should seek to illuminate how and why computers were developed and treat the broader implications of this process. However, rather than presenting the development of computers as an "onward march of progress," the exhibit should seek to explicate history as the "frayed web" of connections that it is.

Personal Context

Professor Cohen agreed with Dr. Smith that the state of the market and the social and technological problems that constituted the circumstances in which computers evolved must form an essential element of the exhibit. Space limitations, he felt, however, would preclude a thorough investigation of the implications of computer technology's potential. Nonetheless, this theme might be developed by illustrating the impact of computers over time on one character, an auto mechanical for example. The "hidden computer," the microprocessor, should also be featured in the exhibit.

Dr. Smith added that Video-taped interviews could present not only the "heroes" but also the "foot soldiers" of computer history.

Chris Morgan suggested a component of the exhibit called "How they did it" that would show the operation of computers over time.

Target Age

Professor Smith introduced the issue of what ages the exhibit should target, as he felt that younger children might not be a realistic audience. Dr. Bell clarified the issue by pointing out that the focus of the exhibit was history, and that young children, even though adept at using computers, may be too young to understand or appreciate concepts related to a historical perspective. Ms. Manzelli agreed.

Technological Story

Mr. Hendrie felt that the exhibit must tell the story of the change in computing technology which is"the incredible growth in the power, ease of use, and cheapness of computing" that has occurred in such a compressed span of time. This dramatic quantitative change has affected a qualitative change as well.

Mr. Morgan commented upon how little is generally know about the history of computing, even among the technical community, and that the exhibit should dispel the many myths that still prevail. To do so the exhibit would have to illustrate the multiple, interlocking, complex forces that came into play in the evolution of computing. Developments in a multitude of fields, ranging from economics, to education, from physics, to animation have all affected the direction and character of computing.

Time Period

Dr. Bell introduced the two issues of at what point in time should the exhibit begin, and how international in scope it should be.

All agreed that the exhibit should present a select number of "milestones" of seminal importance, even if such events fell within the same epoch. Professor Cohen argued that the exhibit ought to begin in the late 1930s and not focus on either Charles Babbage or Herman Hollerith. There was some disagreement over the issue of whether Hollerith deserved to be addressed. Cohen contended that Hollerith's invention, just as Babbage's, did not lead directly to the computer; he felt that a more general treatment of pre-computer calculating, including slide rules, tables, adding machines, and card-processing machines, was more appropriate. Dr. Strimpel argued that, nonetheless, Babbage represents an interesting "blind alley" in the historical development of the computer.

Mr. Hendrie asked whether the "milestones" should focus on the seminal inventor/invention, or the wide-spread use of the the innovation. Dr. Smith answered that while the "great inventor" deserves attention, such treatment should be within the context of the overall historical process.

International Coverage

All agreed that the exhibit should be as international as appropriate. The scarcity of foreign artifacts in the Museum's collection was touched upon. Dr. Bell, drawing on Dr. Smith's proposal of a map, suggested the use of a globe that would illustrate the expansion of computer installations and a counter indicating the "population" of computers.

Software

Dr. Strimpel wondered how the exhibit would treat software. Mr. Morgan contended that its was essential that the exhibit cover the introduction of the stored program. Mr. Hendrie felt that visitors would immediately recognize the advantages to expressing a problem in an algorithmic language over binary code. Professor Cohen commented upon the economic shift toward the importance of software with the advent of mass-produced systems. He also stressed the questions: Why is software so expensive? And, why are machines introduced without software? Mr. Welch introduced the idea of examining software through the people who produce it, and how they differ from the producers of hardware. In response to Dr. Strimpel's question as to what level or language the exhibit should use to contact high school students, Ms. Manzelli answered that while some advanced students are familiar with programming languages, the vast majority are unaware of software beyond the application level. The issue was raised as to whether the intention of the exhibit should be to "explain" software, or indeed explain computers at all. It was felt that the visitor should arrive at some general notion as to the distinction between hardware and software.

At this point, several members of the committee had to leave, and discussion turned to administrative issues. It was agreed that minutes should be compiled of the meeting and circulated. It was also suggested that the committee ought to meet at least twice more before June 1.

Presentation Considerations

The remaining members of the committee touched upon two points crucial to the exhibit: that it be streamline, and that it be stimulating and entertaining. After several comments on how the physical composition of the exhibit might reflect non-linear views of the history, and that the idea of displaying a milestone in an exciting manner would somewhat dictate the selection of vignettes, it was agreed that too complex and unstructured an approach might confuse visitors. For that reason it was concluded that a limited number of milestones balanced by more detailed tangential displays was the best approach to take.

The
Computer
Museum

300 Congress Street
Boston, MA 02210
(617) 426-2800

February 1, 1989

Gardner Hendrie
Sigma Partners
P.O. Box 1158
Northboro, MA 01532

Dear Gardner,

Thank you once again for attending the Advisory Committee meeting last Thursday. We all greatly enjoyed ourselves and consider the meeting to have been a tremendous success. The ideas developed and the perspectives offered will be essential contributions to the exhibit. As promised, I have compiled minutes of the discussion, which I have enclosed. If you feel I have omitted anything important, please let me know.

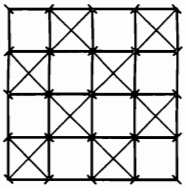
We wish to convene the Committee twice more before June 1. We were considering the weeks of March 13 and May 15. Please let me know soon if there are any times those weeks that you would not be available.

Before the next meeting, I will circulate for your reactions a list of the major milestones/thematic units we are contemplating using in the exhibit. See you in March.

Regards,

Gregory W. Welch
Exhibit Developer

Enclosures:



The Computer Museum

300 Congress Street
Boston, MA 02210
(617) 426-2800

To: Gardner Hendrie
Fax 508-393-7707
From: Oliver Strimpel, Computer Museum
4 pages

Gardner:

Here are some suggestions for advisory committees for

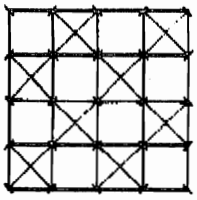
Giant Walk-Through Computer
PCEC
The Networked Society

Perhaps we could talk about these on the phone when you've had a chance to look this over.

The letter to the exhibits committee about the change over to special focus groups is in the mail.

I'd like to talk to Mitch about the giant pc idea as soon as possible.

Oliver
1/13/89



Giant Walk-Through Computer

Advisory Committee	specialty
Art Bardidge, Learningways	education
Gardner Hendrie, Sigma Partners	technical, ex officio
Danny Hillis, Thinking Machines	ideas, technical
Mitch Kapor, On Technology	ideas
David Macauley, "The Way Things Work"	ideas
Nick Negroponte, MIT	ideas
Judy Perrole, Northeastern U.	audience phsychology
Jonathan Rotenberg, BCS	ideas, audience
Rose-Anne Giordano, DEC	marketing
Suzanne Watzman, Watzman + Keyes	graphic exhibit designer

Computer Museum Staff:	Title
Oliver Strimpel	curator
Joe Cashen	executive director
Gwen Bell	founding president
Adeline Naiman	education director

Personal Computer Exploration Center

Advisory Committee	**specialty**
Art Bardidge, Learningways	education
Dave Cutler, Microsoft	software
Barry Folsom, Sun	general
Bob Frankston, Lotus	software, ideas
Gardner Hendrie, Sigma Partners	technical, ex officio
Michael Kollowich, PC Computing	marketing, ideas
Judy Perrole, Northeastern U.	audience phsychology
Jonathan Rotenberg, BCS	ideas
Tom Snyder, Tom Snyder Prod.	idea, games

Computer Museum Staff:	Title
Oliver Strimpel	Curator
Gwen Bell	Founding President
Joe Cashen	Executive Director
Adeline Naiman	Education Director

The Networked Society Exhibit

Proposed Committee Members

Advisory Committee	specialty
Gardner Hendrie (chairman)	technology
James McKenney	computing in business
Stu Wecker	communications
Max Hopper	airlines
Ed Kuge	general
Robert Lucky	communications
Diebold person?	
Edu person?	

Computer Museum Staff:	Title
Oliver Strimpel	curator
Greg Welch	exhibit developer
Joe Cashen	executive director
Gwen Bell	founding president
Adeline Naiman	education director

Gardner:

The following is the Milestones proposal. It was written as a fund-raising tool, and has already been used as such by Gwen and Gordon.

I also enclose Greg Welch's summary of a meeting on funding the Milestones exhibit.

Finally, I am sending preliminary lists for the advisory committees. I'd be happy to discuss these on the phone with you next week.

Merry Christmas!
Oliver
12/23/88

MILESTONES OF COMPUTING

Proposal for a New Exhibit on the History of Computing at The Computer Museum, Boston

In only a few decades, computers have assumed a central role in human society. The public is beginning to recognize them as indispensable tools upon which the maintenance and growth of modern civilization depends.

Along with this growing acceptance and reliance on computers comes an increasing demand for a basic level of understanding of computer history. The general public looks at the developments of the past as a means of understanding the present and preparing for the future. The nation's schools are beginning to introduce computing into the curriculum and many primary school teachers already seek to teach some computer history. The demand from all quarters will increase.

The Museum is planning to build a definitive, introductory exhibit on the major milestones of the history of computing. It will directly address the general public's need for a clear and dramatic exposition of the most important points of computer evolution. The exhibit's impact will be promulgated beyond the walls of The Computer Museum through a semi-popular, widely distributed book.

The Exhibition

The exhibition will consist of two galleries, entitled "Milestones," and "The World's Largest Computer." These two parts will complement each other, the one offering a comparative, chronological display, the other presenting an awe-inspiring, full-scale recreation of a building-sized computer.

Milestones

The major milestones in the history of computing will be presented in the context of people's ever-increasing need to store, manipulate, and retrieve information. Computers will be presented as tools that allow both old and radically new information-handling problems to be solved.

The milestones will be presented as a series of vignettes, each representing a particular period. The three fundamental aspects of computing — hardware, software, and applications — will be featured. The classic hardware artifacts that epitomized each era will be displayed. For example, this might be the UNIVAC-1 in the early 1950s, or the IBM System 360 in the mid-1960s. Exhibits on software, including system software, programming languages, and human interface will be presented. Actual samples of code in the various languages employed will be displayed, with clear explanations in a variety of media, including hands-on interactive demonstrations, video, and graphics. Examples will include the birth of high-level programming languages, and the introduction of the operating system. Visitors will also be shown the type of interface presented to the user by each computer. Lastly, typical problems which the computers solved will be portrayed. Visitors will be thrust into the computer users' shoes, and given simplified tasks to accomplish with computers.

Many threads of computer history will be featured throughout the exhibit. Perhaps the most dramatic one will be the physical size, cost, and performance compared to a 1989 computer. The technological advances will be presented in the light of the historical context: what problems were the machines built to solve, and how did this drive the evolution of the technology? Video segments, photographs, quotations, and other media will be used to make visitors engage with the key inventors, entrepreneurs, and computer users, thereby imparting a vivid human dimension to the exhibit.

The exhibit will appeal to all levels of the public because each vignette will have many layers. The simplest level will communicate a straight-forward message about the nature and impact of the work performed by computers in each period. Interactive elements, video and text will offer several deeper layers, offering information and insights to visitors with greater curiosity.

The World's Largest Computer

Visitors retain the deepest, most enduring impressions from large-scale, enveloping experiences that transport them into a setting well beyond anything they have seen before. The Computer Museum can achieve this impact by creating a highly realistic recreation of the world's largest computer — the SAGE. With 40,000 pounds of a SAGE

system already in the collection, the Museum has a unique opportunity. Sound effects, photomurals, uniformed manikins, video, and dozens of other realistic effects will combine with the original SAGE artifacts to offer visitors an unforgettable tour through the heart of this giant vacuum tube computer.

Making it Happen

The Computer Museum needs to raise $450,000 to develop these exhibits. A further $150,000 of in-kind gifts will be required in the form of equipment and services. Approximately 20% of the funds and in-kind gifts have already been secured. The exhibits will take approximately one year to develop.

The exhibits will occupy the Museum's most prominent gallery space — the two entrance bays that all visitors walk through as they enter and leave the Museum. Together, these exhibits will fulfil The Computer Museum's mission to educate and inspire the general public on the history of computing. They will, therefore, occupy this central position on a permanent basis, and will be viewed by well over 100,000 visitors a year.

END
OS 12/9/88

I N T E R O F F I C E M E M O R A N D U M

Boston Childrens Museum
a n d
The Computer Museum

Date: 21-Dec-1988 02:10pm EST
From: Greg Welch
WELCH
Title: Exhibit Developer
Dept: Computer Museum
Tel No: Ext. 337

TO: Oliver Strimpel (STRIMPEL)
TO: Gwen Bell (BELL)
TO: Jane Stanhope (STANHOPE)

Subject: Development for Historical Exhibits - Meeting 12/20

Gwen, Oliver, Greg, and Jane met Tuesday afternoon to discuss the progress of development efforts for the Milestones and SAGE exhibits, and future strategies.

Effort So Far and Organization

-- The goal of the development efforts for these two exhibits is $450,000, plus $150,000 worth of in-kind gifts.

-- It was decided that Greg shall be the central node coordinating all information concerning this development effort. He will maintain files documenting all approaches and pass copies on to Jane, who will update Development's files appropriately.

-- So far, UNISYS has pledged $20,000 to go toward developing the UNIVAC vingette. MITRE has pledged $10,000 for the SAGE exhibit.

Current Prospects

-- Letters have been sent to the following people by Gwen and Gordon requesting the indicated amounts:

- Allan Michaels $50,000
- Mr. and Mrs. Edward Fredkin $50,000
- Mr. Robert Everett $5,000 + DEC match
- Mr. and Mrs. David Rodgers $10,000
- Mr. Casey Powell $10,000

-- USENIX, represented by Steve Johnson and Alan Nemeth, has been approached by Gwen for 10% or $50,000.

Future Propsects and Strategies

-- Greg and Gwen will work on compiling a master prospect list for the exhibtis, that will include, corporations, individuals, and grants.

-- A three-pronged strategy was outlined to solicit donations from historic figures in computing:

- Gordon Bell, as a receiptient of the IEEE Eckert-Mauchly Award, could approach other recipients of the award.

- Likewise, Charles Bachman could solicit donations from other recipients of the Turing Award.

- Lastly, if Robert Everett was amenable, he could approach contacts within the aerospace/military/high-tech fields.

Gwen felt that setting a goal for each group as a whole in a letter from the "leader" setting forth his personal contribution as a challenge would be the best means of pursuing these potential donors.

Comments? Suggestions?

Milestones of the History of Computing Exhibit

Proposed List of Members of the Advisory Committee

Name	Function
Charles Bachman	software
I. Bernard Cohen	history of computing
Gardner Hendrie	technology & ex officio
Chris Morgan	social history of computing & pc's
Beth Lowd or Tom Platti	education
Merritt Roe Smith	social history

Staff:
Joe, Gwen, Adeline, Mark Hunt, Greg Welch, Oliver

In addition, Mark Hunt has suggested that there be strong marketing presence at the outset, especially as this will be the opening exhibit. He may suggest someone for the committee.

OS
12/23/88

Walk-Through Computer

Preliminary List of Advisory Committee Members

Name	Function
Art Bardidge, Learningways	education
Gardner Hendrie	technical, ex officio
Mitch Kapor	general ideas, potential funder
Judy Perrole, Northeastern U.	audience phsychology
Jonathan Rotenberg (?)	ideas, raprochement for PC exhibit
Dick Rubinstein, DEC	technical
Suzanne Watzman	graphic exhibit designer (may work with Richard Fowler)

Staff:
Joe, Gwen, Adeline, Mark Hunt, Oliver

THE COMPUTER MUSEUM EXHIBITS COMMITTEE

AGENDA for meeting of October 26 1988

1. **Review of Exhibit Development Policy draft document**

2. **Review of Exhibit Masterplan**

3. **Funding status of planned exhibits**

4. **Update on current exhibit activity:**
   The Interactive Image
   Terra Firma in Focus: Digital Images from Space
   ACM/SIGGRAPH '89 Art Show

MFA operating budget $30M/yr operating budget

In Boston 45M/yr contributed

No financially stable Museum without non-programatic budget of less than 3M/yr (facilities, marketing, development)

need to get to 5-6M operating budget before can get to 2-3M annual giving from corporations & individuals

overseers at BSO give ave. of 3K/yr.

exp./earned rev for MFA 2.45

The Computer Museum

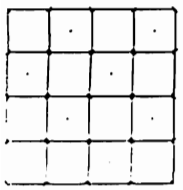
300 Congress Street
Boston, MA 02210
(617) 426-2800

Allison

To Collections Committee:
Bruce Brown
Bruce Bruemmer
Joe Cashen
Bernard Cohen
Jon Eklund
Tom Knight
Christopher Morgan
Jean Sammet
Oliver Strimpel
cc: Jamie Parker Pearson
Charles Jortberg
Ann Russell
from: Gwen Bell, 10/12/88

Re: Meeting on November 3rd; 12 noon.
Informal Lunch
Conservation Grant from IMS - G Bell
Ephemera - Show and tell - What to keep - A Stelling & G Bell
Document collection - Charles Jortberg & Ann Russell
The Digital collection - Jamie Parker Pearson
National Initiatives - Jon Eklund

Adjourn to Chris Morgan's
An evening of video and food



Exhibits List

Proposal status

	A	B	C	D	E
1	**POTENTIAL FUNDER**	**AMOUNT**	**PROPOSER**	**STATUS**	**NEXT STEP**
2					
3	**General**				
4	Cahners			idea	
5	Ziff-Davis			idea	
6	Dunn & Bradstreet			idea	
7	HP			idea	
8	Kodak		OS	meeting Nov 2	
9	Silicon Graphics	$20K	OS	equipment promised for November	pursue $ after equipment
10	Bank of Boston	$40K	GB	idea	
11	American Express	$40K	GB	idea	
12	DEC		JC, OS	idea, perhaps for theatrical PC	
13					
14	**Social History**				
15	UNISYS	$20K	GB, OS	letter sent 10/10	follow up call
16	Sloan Foundation	$100K	GB, OS, IB Cohen		
17	IBM	?	JC,OS	Hollerith, 360 & Future module	
18	Allen Michels?	$25K	GB	GB to approach	
19	Honeywell Bull		GB	Pampel	invite to dinner after talk
20	Travellers insurance	?	GB, OS	idea	invite to lunch
21					
22	**SAGE**				
23	Boeing Aerospace	$100K	Bob Everett	awaiting Bob	
24	IBM	$10K ?	OS, Jean Sammet	awaiting primary funding	
25	Everett personally	$10-25K	GB	GB to call	
26	Mitre	$10K		granted for 1989	
27	Fredkin and others	$50K	GB,OS	met Fredkin 8/30	keep warm
28					
29	**INTERACTIVE**	**IMAGE**			
30	USENIX	$20K	OS	proposal sent	USENIX Board decision
31					
32	**NETWORKED SOC.**				
33	American Airlines	$125K	GB, OS	considering proposal	check progress
34	Amdahl		GB	meeting Oct 19	
35	Banks		McKenny	call to set up meeting	
36	AT&T	$150K	Lucky/ OS	proposed	follow up at foundation lunch
37	NYNEX/Bell Atlantic	$150K?	Stu Wecker	idea	call Stewart

Shawd Financial

Proposal status

	A	B	C	D	E
38	Stratus/~~Citibank~~	$125K	GH, OS		
39	Diebold	?	?	idea	
40	UNISYS	$125K	GB, OS	met 8/17 w David Curry	follow up call
41	VM Software	$35K	GB,OS	idea	do research to match to exhibit
42	John Hancock			idea	research, invite to lunch
43	Dupont Electric Sys	$?	OS	idea	research, invite to lunch
44	Gillette			idea, use Gordon Brown, on Board	research, invite to lunch
45	Index Systems			idea - use Tom Gerrity on CM Board	
46	Standard Oil			idea	research
47					
48	**PCEC**				
49	David Bunnell	$250K	GB	OS discussed idea w Dave at Bowl	GB to write letter
50	Dell Computer	$100K	MO, Levy	is Joe Levy doing anything?	invite Levy to dineer after Abel
51	Cabot Foundation	?	JC, MO	hold	
52	Apple Computer	$10-20K now	Museum	write proposal/clarify BCS	MO to call Metcalfe; proposal
53	Compaq	?	GB, J. Doerr	GB to meet with John Doerr	
54	Hearst Foundation	$100K	GB	idea	get specs
55	ComputerLand	$50K	GB	idea: approach Steve Watson	
56	Ashton Tate	$50K	GB, OS, Bricklin	idea, Ed Esber, president	warm up, send proposal
57	Lotus	$100K	GB, OS	Durne coming to lunch	visit Manzi
58	Datapoint et al.	$20K-$50K	David Monroe	proposal sent	follow-up call
59	Commodore	machines	OS	letter sent	follow up
60	Interleaf			idea help with Desk-top pub	invite to party
61	Sony	?		idea	get Bob Wilson,201-930-6556 to visit
62	Hayes	?	GB	idea - cash & machines for telecom	
63	BASF	?		idea	research
64	Dysan	?		idea	research
65	Seagate	?		idea	research
66					
67	**Ubiquitous**				
68	Nat Semi	$50K	Gwen	send them new proposal	
69	Sun	?	GB	hold, GB to approach founders	
70	Ford	$100	GB/JC	proposal with Laurence	call Foundation, look at file
71	Intel	$100	GB	try them for 2nd round	
72	Raytheon	?	JC, OS	idea	
73					
74					

	A	B	C	D	E
75	**GRANTS/PLEDGES**	**RECEIVED**			
76	**General**				
77	Gordon Bell	$50K	GB		
78	Charette	$500	OS	30% discount on work	
79	Cullinet	$50K	GB,OS	money granted for software	switch from software
80					
81	**SAGE**				
82	Mitre	$10K	GB	money coming in 1989	
83					
84	**Interactive Image**				
85	SIGGRAPH	$20K	OS,GB		
86	NCGA	$20K	OS		
87					
88	**PCEC**				
89	Mitch Kapor	$100,000		granted	
90					
91	Maxell	$12K	OS	granted	
92					
93					
94	**REQUESTS**	**DECLINED**			
95	**Interactive Image**				
96	Prime	$60K	GB, OS, JC	declined	
97					
98	**Ubiquitous**				
99	Intel	$100K	GB	no cash for 3/4 yrs	
100					
101	**PCEC**				
102	Tandy	$100K	OS	declined	

Proposal status as of 10/26/88

	A	B	C	D	E
1	POTENTIAL FUNDER	AMOUNT	PROPOSER	STATUS	NEXT STEP
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3	**General**				
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6	Dunn & Bradstreet			idea	
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32	Amdahl		GB	meeting Oct 19	
33	Banks		McKenny	call to set up meeting	
34	AT&T	$150K	Lucky/ OS	meeting with Susannah Thompson	Gwen
35	NYNEX/Bell Atlantic	$150K?	Stu Wecker	idea	call Stewart
36	Stratus	$30K	GH, OS	GCH to speak to Bill Foster/budget	
37	Diebold	$30K	?	idea	GCH

SF
FAA exhib. 1

Dave Nelson

Proposal status as of 10/26/88

	A	B	C	D	E
38	Shared Financial	$30K			
39	UNISYS	$125K	GB, OS	met 8/17 w David Curry	follow up call
40	VM Software	$35K	GB,OS	idea	do research to match to exhibit
41	John Hancock			idea	research, invite to lunch
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47	**PCEC** Dan Bricklin		GB	will ask	
48	David Bunnell	$250K	GB	OS discussed idea w Dave at Bowl	GB to write letter
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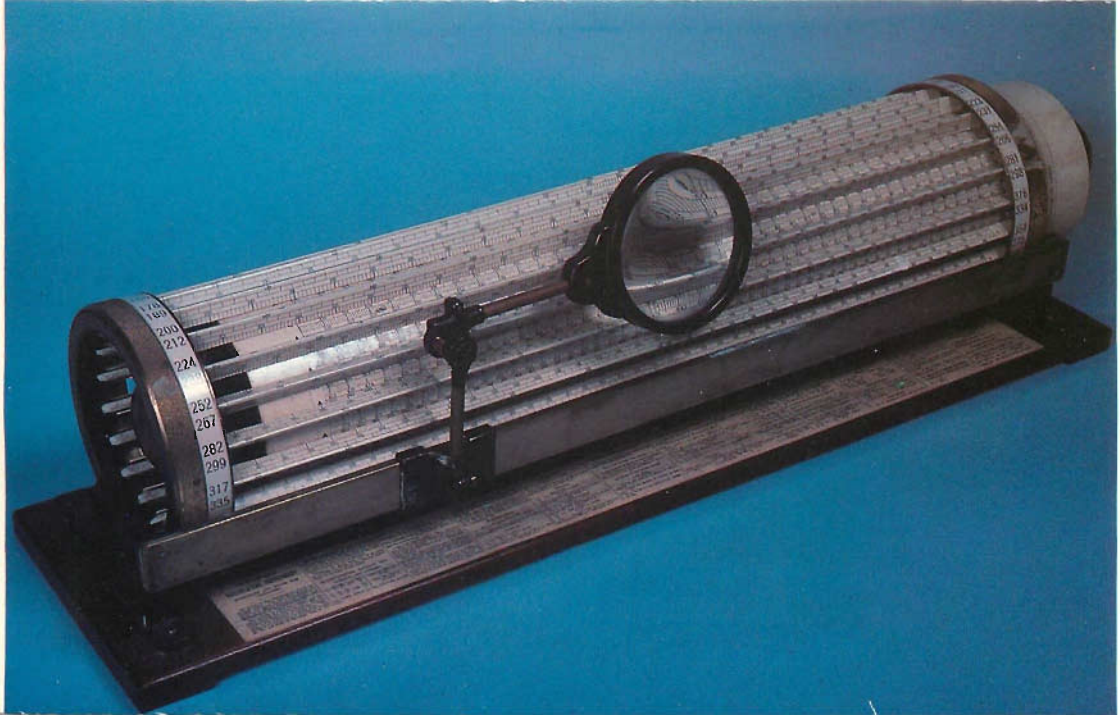
58	Commodore	equip/$10K	OS	write proposal for Toy	follow up
59	Interleaf			idea help with Desk-top pub	invite to party
60	Sony	?		idea	get Bob Wilson,201-930-6556 to visit
61	Hayes	?	GB	idea - cash & machines for telecom	
62	BASF	?		idea	research
63	Dysan	?		idea	research
64	Seagate	?		idea	research
65	Kapor			use letter to Agenda '88 people	
66	**Ubiquitous**				
67	Nat Semi	$50K	Gwen	send them new proposal	
68	Sun	?	GB	hold, GB to approach founders	
69	Ford	$100	GB/JC	proposal with Laurence	call Foundation, look at file
70	Intel	$100	GB	try them for 2nd round	
71	Raytheon	?	JC, OS	idea	
72					
73					

Proposal status as of 10/26/88

	A	B	C	D	E
74	**GRANTS/PLEDGES**	**RECEIVED**			
75	**General**				
76	Gordon Bell	$50K	GB		
77	Charette	$500	OS	30% discount on work	
78	Cullinet	$50K	GB,OS	money granted for software	switch from software
79					
80	**SAGE**				
81	Mitre	$10K	GB	money coming in 1989	
82					
83	**Interactive Image**				
84	SIGGRAPH	$20K	OS,GB		
85	NCGA	$20K	OS		
86					
87	**PCEC**				
88	Mitch Kapor	$100,000		granted	
89	Maxell	$12K	OS	granted	
90					
91					
92	**REQUESTS**	**DECLINED**			
93	**Interactive Image**				
94	Prime	$60K	GB, OS, JC	declined	
95	USENIX	$20K	OS	prefer to fund software exhibit	
96					
97	**Ubiquitous**				
98	Intel	$100K	GB	no cash for 3 or 4 yrs	
99					
100	**PCEC**				
101	Tandy	$100K	OS	declined	


200
212
224
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Achieved the Equivalence of a Sixty Foot Slide Rule (1881)
THE COMPUTER MUSEUM
Boston, Massachusetts

Gardner —
Here's your postcard
Thank you for your
annual gift.
Your leadership is
really appreciated!
Sincerely,
The Postcard
writer
(gb)