

d i g i t a l

INTEROFFICE MEMORANDUM

✓ TO: Gwen Bell, Director  
Digital Computer Museum  
MR2-A89

DATE: 24 Oct. 1980  
FROM: Jim Rogers *JR*  
DEPT: Comm'l Eng Pubs  
DTN: 264-4437  
L/MS: MK1-2H03

CC: Gordon Bell, Keeper  
Digital Computer Museum  
ML12-1/A51

SUBJECT: Comments on COMPUTER GENEALOGY Chart

I have had a chance to examine the Computer Genealogy Chart draft that you gave me last week, and I am forwarding the following comments to assist you in revising it.

1. What are the four numbered horizontal rows intended to convey? I can see that the dates in the white stripes between adjacent rows serve as a time axis. My difficulty arises when I try to apply the descriptor for each row (Manual, Mechanical, Electromechanical, and Electronic) to the devices included in that row. For example, the five relay machines (Zuse I up thru Harvard MKI) in the #1 row are not Electronic; the Tables or Simple Calculators in row #2 are not Electromechanical; and the Simple Calculators or Machine-readable Information devices in row #4 are not Manual. Apparently, the descriptors can't mean that all the items in that row are in that category: but what, then, do they mean?

2. The same problem shows up in the vertical column labels: Babbage's Analytic Engine is not an Electro-mechanical device, although all the other items in that column are.

3. The Simple Calculators tree needs some attention. The Leibniz machine is shown stemming from Shickhard's, yet there is (a) ample evidence that he based his mechanism on Pascal's adder, and (b) no evidence that Leibniz knew that Shickard's machine existed. Since Pascal was also unaware of Shickard's invention, maybe it would be better to separate the Shickard box from the direct line (by a dot or dots), and show Leibniz stemming directly from Pascal.

Continuing up from Leibniz, there are, according to Chase's article in the current Annals, five types of rotary calculators:

- (a) polyphase, non-reversible cycle: Thomas (Arithmometer), Rechnitzer (Autarith), Grant, Friden.
- (b) monophasic cycle: Marchant.
- (c) polyphase, reversible cycle: Baldwin, Odhner, Monroe (note that the Baldwin and Odhner machines were not called "Arithmometers").
- (d) key-driven: Comptometer (+ some accounting machines?).
- (e) partial-product: Vereea, Bollée, Steiger (Millionaire), Moon-Hopkins, Hamann (Mercedes).

This state of affairs suggests that the present chart layout has to change: either expand the Rotary Calculator section so that it includes all of the types, or abandon the attempt to display different lines, and instead show a selected subset of the items on a single line stemming from Leibniz. Neither of these alternatives is very attractive: the first might require a disproportionate amount of space on the chart, while the second might force you to omit many important inventions (due to lack of vertical space on one line).

I think that, on balance, the first alternative is preferable, and that it should at least be tried before you choose the second. Let's look at a draft layout of the 5 lines. If you eliminate one of the present (four) lines by combining the Pascal and Leibniz stems (as suggested above), then you would have to add a net of only one vertical line to display a total of 5 type-lines, and that may not be so bad.

4. Babbage -- where do Babbage's devices belong? They appear on the chart as off-shoots of tape and card-reading devices. While it is true that Babbage modelled the data and program input for the Analytic Engine on Jacquard's punched card design, the Difference Engine did not use cards at all; neither did Schuetz's device. Even with regard to the Analytic Engine, the rest of the design is much closer to Pascal's adder than Jacquard's Loom. How one shows these multiple dependencies, I don't know; the same problem arises with ENIAC, which, according to Goldstine, was modelled as an electronic substitute for Bush's Differential Analyzer. Maybe dotted lines would show these relationships. In any case, (a) there is a strong argument against showing your Complex Function Calculators as stemming from Jacquard; and (b) the Analytic Engine fits as a Calculator offshoot as well as it does as a Machine-readable Information device.

5. Miscellaneous items:

(a) best estimated date for the Abacus is 1500 b.c.; in any case, it should appear prior to, rather than after, Ktesibios.

(b) for Ktesibios, add the word "Regulator" after "Water Clock"; water clocks had been in use for years before Ktesibios, and his contribution was to add the water feed regulator.

(c) add a word to the Anshutz "Gyroscope" to distinguish it from the earlier (1852) Foucault invention.

(d) if you use boldface type for the name of the device, then the box labelled "Rechnitzer" needs to be changed-- Rechnitzer was the inventor, and the device was the Autarith; also, add the inventor's name (Felt) to the Comptometer box.

(e) in the column labelled "Machine-readable Information", add a date and/or inventor for the Flexowriter; you can fill up some of the empty space in between 1895 and the Flexowriter by adding the Punched Card Collator, dated about 1934; it holds an interesting place in history because IBM designed and produced it for one customer-- the Social Security Administration.

(f) under Computers, why refer to Atanasoff-Berry "reports", when you can refer to the machine itself? Also, Berry didn't join Atanasoff until 1939, so the "1935-42" date is early by a few years. Presumably, you are including the 1946 Von Neumann EDVAC Report because it contains the first design for a stored-program machine. If so, why not specify that fact by adding a phrase like "stored-program concept" to the information in the box?

(g) a few typos: one "t" in Gutenberg; Steiger, not Stegner; the copyright symbol should appear between the word Copyright and the date; "Disks" should be in boldface.

I think that the Computer Genealogy Chart is a very useful tool, and I would be pleased to work with you in tying up the loose ends.

# REPORT ON VISIT TO U.S.A. AND CANADA - OCTOBER 1980

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by A.W.Wilson

## 1 Purpose of Visit

(a) to study methods of interpretation and educational facilities in museums that have historical exhibits

(b) to obtain experience of Science Centres and Science Centre-type museums

## 2 Places visited

### Washington:

National Museum of History & Technology	NMHT
National Air & Space Museum	NASM
National Museum of Natural History	NMNH
Arts & Industries Building	AIB

### Philadelphia:

Franklin Institute Science Museum & Planetarium	FISM
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### Boston:

Boston Museum of Science & Hayden Planetarium	BMOS
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### Toronto:

Royal Ontario Museum	ROM
Ontario Science Centre	OSC

### Chicago:

Museum of Science & Industry	ChMSI
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### San Francisco:

California Academy of Sciences & Morrison Planetarium	CAS
Lawrence Hall of Science	LHS
Exploratorium	EXP

### Los Angeles:

California Museum of Science & Industry	CaMSI
Los Angeles County Natural History Museum	LANMH
Griffith Observatory & Planetarium	GOP

## 3 Report

I expected that the trip would be interesting, though arduous. In the event it proved so stimulating and exciting that it did not seem arduous at all.

The main advantage in visiting so many places in so short a

geographical location  
 degree of visitor-involvement - the extent to  
 which the displays themselves try to 'meet the visitor halfway'.

It certainly seemed that those museums which treated their visitors with the greatest respect and trust were in turn respected and responsibly used by visitors. There may however be significant differences between the way the British 'general public' and the North American 'general public' behave under similar conditions.

I intend to discuss these findings, particularly those in (b) above, with my colleagues in Education Service over the coming months, with a view to formulating policy for future developments in the Service.

\* \* \* \* \*

APPENDIX 1 - Activities in Museums (apart from studying the exhibits), and Research Papers collected:

	discussions with staff	attended event for:		papers collected (details below)
		1 public	2 schools	
NMHT	#	#		1
NASM	#		*	
FISM	#	#		2 3
BMOS	#	#	*	4
ROM	#			5
OSC	#	#		
ChMSI	#	#		
LHS	#			6 7
EXP	#		*	8 9 10
CaMSI	#		*	

Papers:

- 1 'The pause that refreshes - a study of visitor reactions to Discovery Corners . . .' R L Wolf, M E Munley, B L Tymitz (Smithsonian publication, 1979, 61pp)
- 2 'Measuring the Immeasurable - a pilot study of Museum Effectiveness' M Borun (Association of Science/Technology Centers, 1977, 114pp)
- 3 'To label or not to label?' M Borun, M Miller ('Museum News', March/April 1980, 4pp)
- 4 'See-through women replace yellow-bellied sapsuckers' D Davies ('Nature', September 6 1974, 1p)
- 5 'Hands On - setting up a Discovery Room in your Museum or School' (Royal Ontario Museum publication, 1979, 170pp)
- 6 'Summative Evaluation of a Participatory Science Exhibit' C I Sneider, L P Eason, A J Friedman ('Science Education', 63, 1, 1979, 12pp)
- 7 'Evaluation of the Effectiveness of Participatory Exhibits' L P Eason, M C Linn ('Curator', 19, 1, 1976, 17pp)
- 8 'A Rationale for a Science Museum', F Oppenheimer ('Curator', November 1968, 4pp)

List of Photographs

1 - 37 WASHINGTON

- 1 The Mall - general view
- 2 - 6 NMHT Foucault pendulum exhibit
- 7 NMHT signpost
- 8 - 18 NMHT Electricity galleries
- 10 NMHT Discovery Corner
- 19 NMHT Reconstructed Chemist's shop
- 20 - 22 NMSH 'Nation of Nations' exhibition
- 23 NASM Wallplan
- 24 - 25 NASM Airports exhibit (cartoon-style)
- 26 - 29 NASM Early Flight gallery
- 30 NASM Puppet show exhibit
- 31 - 33 NASM Exploring the Planets gallery
- 34 NASM entrance hall general view
- 35 NASM Saturn V nozzles exhibit (mirrors)
- 36 - 37 AIB general views

38 - 59 PHILADELPHIA

- 38 - 39 FISM external views
- 40 & 42 FISM Foucault pendulum exhibit
- 41 FISM signpost
- 43 FISM wallplan
- 44 FISM public demo: 'lightning'
- 45 - 52 FISM 'It's about time' exhibition (nos. 48 - 52 very dark exposures)
- 53 FISM energy roller-coaster
- 54 - 56 FISM giant heart exhibit
- 57 - 59 FISM interactive exhibits undergoing trials

60 - 77 BOSTON

- 60 BMOS external view
- 61 - 62 BMOS Discovery Room (see also 75)
- 63 BMOS public demo: 'snake'
- 64 BMOS wallplan
- 65 BMOS wind turbine exhibit
- 66 - 71 BMOS energy exhibit
- 72 BMOS transverse waves exhibit
- 73 BMOS hot air balloon sponsored exhibit
- 74 BMOS Foucault pendulum exhibit
- 75 BMOS 'more people need more food' exhibit
- 76 BMOS Discovery Room external notice
- 77 Boston: view of river from hotel

78 - 103 TORONTO

- 78 - 79 Toronto aerial views
- 80 - 82 ROM Discovery Room
- 83 ROM Touch wall
- 84 OSC Entrance hall
- 85 OSC classroom
- 86 OSC 'today's events'
- 87 OSC Energy House
- 88 OSC signpost
- 89 OSC self-test exhibit
- 90 OSC Laser demo stand
- 91 - 96 OSC 'Molecule' area
- 92 OSC advanced chemistry lab
- 93 OSC watching public demo 'flames'
- 97 OSC wallplan
- 98 OSC Foucault pendulum exhibit
- 99 OSC public demo 'flames'
- 100 OSC 'Physics Lab' (Discovery Room)
- 101 - 102 OSC Science Arcade
- 103 OSC entrance plaque

104 - 121 CHICAGO

- 104 ChMSI external view
- 105 ChMSI Foucault pendulum exhibit
- 106 - 109 ChMSI Energy exhibition
- 110 - 111 ChMSI 'Wheels a'rolling' exhibition
- 112 ChMSI Artscience exhibition (v dark exposure)
- 113 ChMSI awful Agriculture exhibit
- 114 ChMSI Hall of Communications entrance
- 115 ChMSI Public demo 'Rainbow'
- 116 ChMSI Industrial Revolution exhibit
- 117 ChMSI interior general view
- 118 - 119 ChMSI testing preschool exhibits (119 v v dark exposure)
- 120 ChMSI wallplan
- 121 ChMSSC in the coal mine

122 - 145 SAN FRANCISCO

- 122 LHS exterior view
- 123 - 124 LHS classroom
- 125 - 126 LHS optics exhibits (see ref. 7 in Appendix 1)
- 127 - 132 LHS energy exhibits
- 133 Golden Gate bridge from near Exploratorium

- 134 EXP exterior view
- 135 - 136 EXP interior views (see also 144)
- 137 EXP 'blower and ball' exhibit
- 138 EXP Explainer briefs school group
- 139 EXP relative motion pendulum exhibit
- 140 EXP notice outside entrance
- 141 -
- 142 EXP 'Everyone is you and me' exhibit
- 143 EXP sunlight prism colours exhibit
- 144 EXP interior view
- 145 EXP 'Test your awareness' exhibit

146 - 154 LOS ANGELES

- 146 CaMSI exterior view
- 147 - 150 CaMSI Mathematica exhibit
- 151 CaMSI electricity exhibit: introductory label
- 152 CaMSI energy roller-coaster
- 153 - 154 GOP Voyager photos

155 - 161 LONDON - Science Museum (comparison slides)

- 155 wallplan
- 156 signpost
- 157 - 158 Foucault pendulum exhibit
- 159 ~~plan at Main Entrance~~
- 160 'Silicon' exhibit in Chip exhibition
- 161 ~~electromagnet exhibit in Children's Gallery~~  
*label on big lathe*

Lynn,  
FYI,  
je

9/18/87

Gary Eichhorn  
Ron Smart

**digital**

**Digital Equipment Corporation  
Historical Collection**

# **Audiences:**

- Employees
- Customers
- Colleagues
- Students



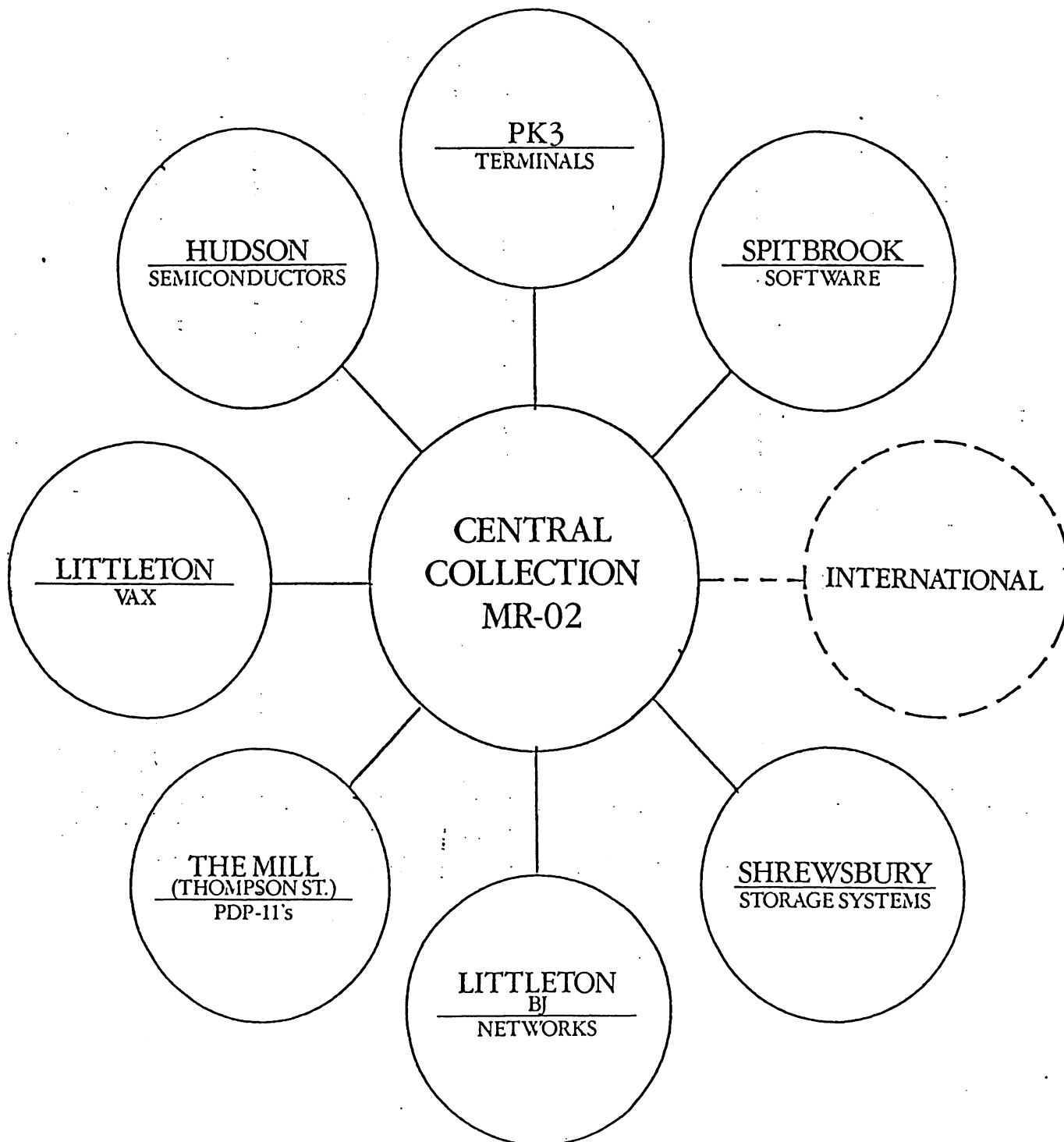
## **Objectives:**

- Capture the “totality” of Digital.
- Establish place in computing history.
- Document achievements.
- Foster corporate pride.
- Educate.

## **Goals:**

- Everyone involved.
- Framework/Guidance.
- Easy to implement and maintain.

# Architecture: A "Distributed Collection"



## **Collection Theme:**

“The original idea that created Digital Equipment Corporation in 1957 was to make computers that were affordable, approachable, versatile and easy-to-use by virtually anyone.”

# **Graphic Concept for Central Collection:**

- A “chronological mural” depicting product evolution over time.
- Floor displays highlighting key products.

LAD DEMO ROOM

POSTERS

SOFTWARE

NETWORKS

EDUCATION

APPLICATIONS + TURNKEY SYSTEMS

ELEVATORS

POSTERS

CPUS

COMPONENTS

BEGINNERS

ENTRANCE

RECEPTION AREA

1970's

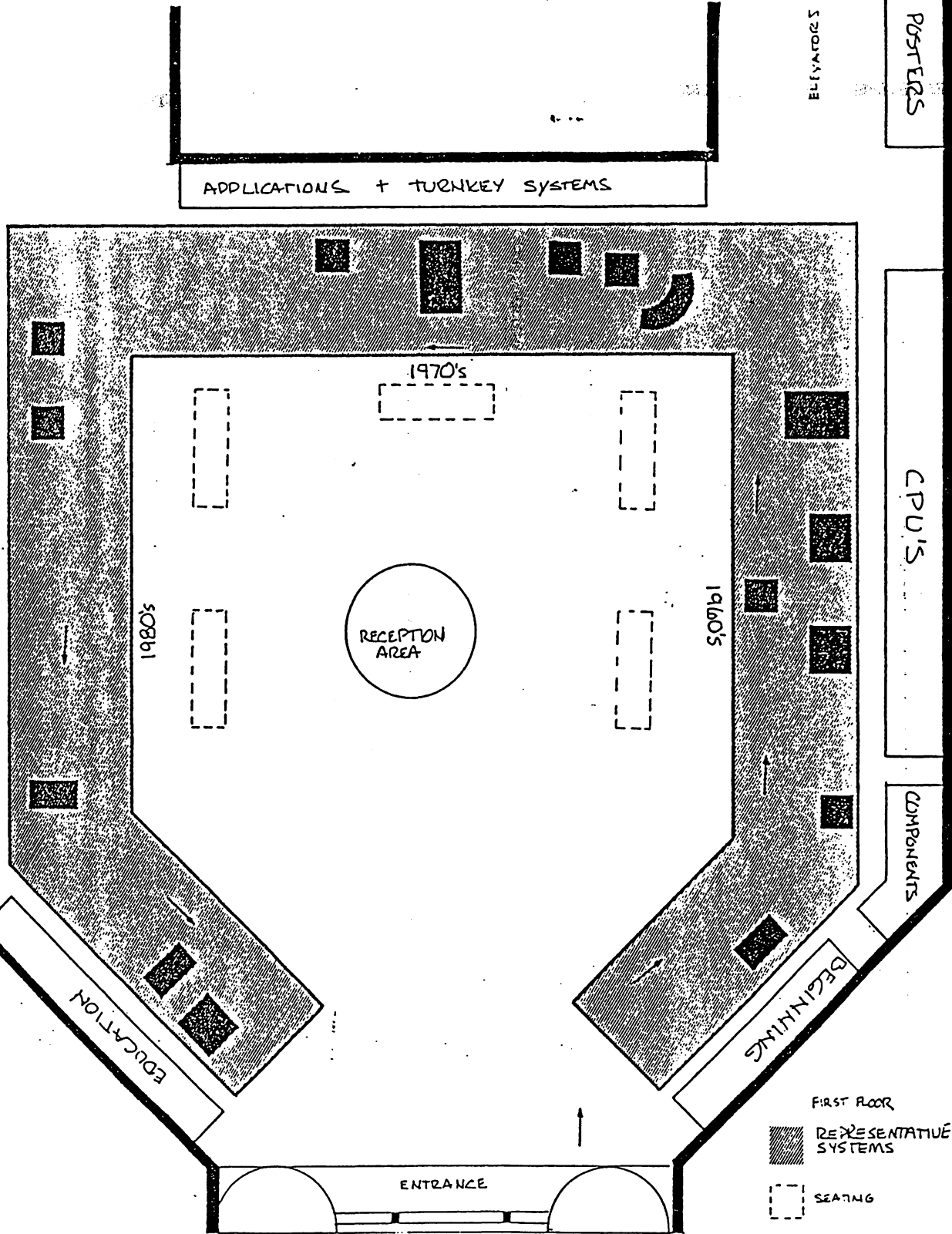
1980's

1960's

FIRST FLOOR

REPRESENTATIVE SYSTEMS

SEATING



BALCONY

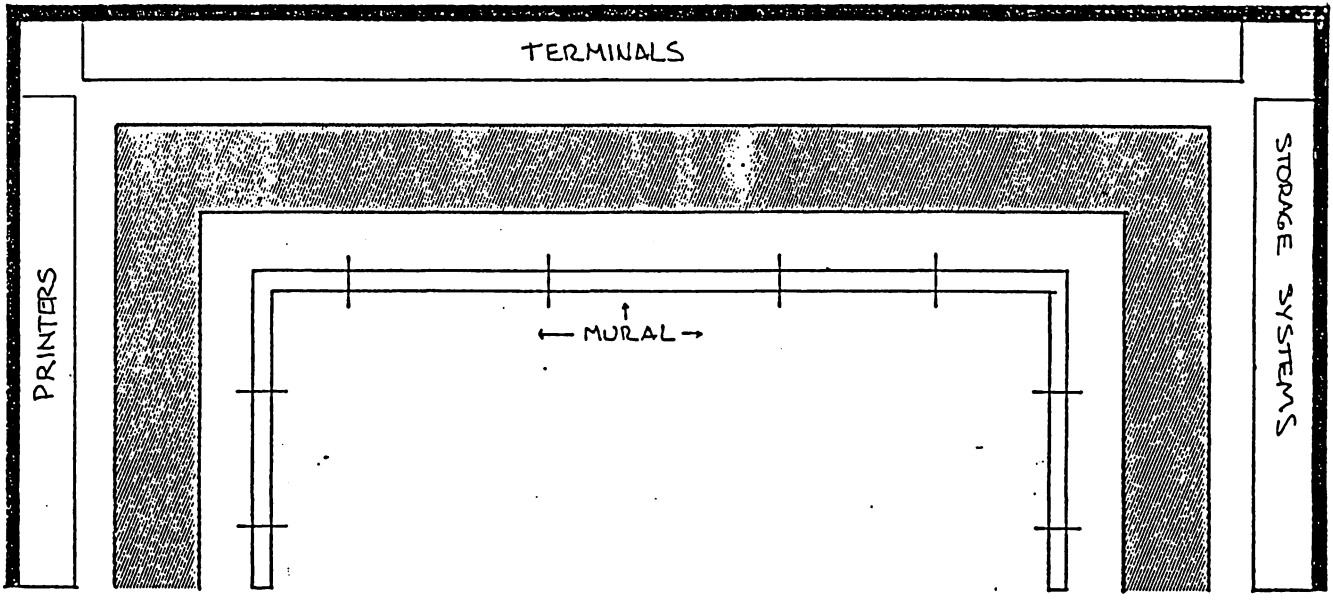
TERMINALS

PRINTERS

STORAGE SYSTEMS

MURAL

REPRESENTATIONAL SYSTEMS



## **Implementation Plan:**

- Review direction with Ken Olsen.
- Get commitment from facility/site managers on implementation.
- Form an Historical Collection Advisory Board.
- Develop appropriate relationships with Computer Museum.



EXAMPLE OF  
THE CENTRAL COLLECTION

Floor Display	Theme Statement	Highlight Products to be Displayed	Graphics/Photos																						
THE BEGINNING	"The original idea that created Digital Equipment Corporation in 1957 was to make computers that were affordable, approachable, versatile and easy to use by virtually anyone."	<ul style="list-style-type: none"> <li>o Original or recreated silk circuit etchings and dime store fishtanks</li> </ul>	<ul style="list-style-type: none"> <li>o Photos of founders</li> <li>o Photos of key influences, contributors, mentors, etc.</li> <li>o Early photos of The Mill</li> </ul>																						
COMPONENTS	"All the complexity we gave up by making computers simple, we put into making them fast."	<ul style="list-style-type: none"> <li>o Logic Modules</li> <li>o Flip Chips</li> <li>o FALCON</li> <li>o J-11</li> <li>o MPS</li> <li>o VAX Chip</li> </ul>	<ul style="list-style-type: none"> <li>o Photos of process technology "Clean Room" in old days vs. today</li> </ul>																						
PROCESSORS	"Digital never sold mystique, just functional tools to get the job done, tools that could be brought TO the product."	<ul style="list-style-type: none"> <li>o PDP-1</li> <li>o PDP-5</li> <li>o PDP-6</li> <li>o PDP-8</li> <li>o PDP-11</li> <li>o PDP-14</li> <li>o PDP-15</li> <li>o DECsystem</li> <li>o DECstation</li> <li>o DEC-LSI</li> <li>o VAX-11/780</li> </ul>	<ul style="list-style-type: none"> <li>o Early photos of computer assembly</li> <li>o Photos of products in key applications</li> </ul>																						
STORAGE SYSTEMS	TO BE DETERMINED	<ul style="list-style-type: none"> <li>o DECdisc</li> <li>o DECTape</li> <li>o TU-10</li> <li>o RK-15</li> <li>o RK-05</li> <li>o TU-16</li> <li>o RJ 503/04</li> <li>o PROM-8M</li> <li>o TU-70</li> <li>o RX 01</li> </ul>	<ul style="list-style-type: none"> <li>o Photographs of manufacturing techniques</li> <li>o Display showing contrast of early/current technology (results of miniaturization)</li> </ul>																						
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(Continued)

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APPLICATIONS & TELETYPE SYSTEMS	"We believe that computers belong on the factory floor, and in the laboratory and the classroom. They belong in the office and the printing plant, in the power station, the hospital, and the railroad yard.	<ul style="list-style-type: none"> <li>o LINC</li> <li>o One or more representative computer packs</li> <li>o MINC</li> <li>o EDOSYSTEM</li> <li>o Graphic 76</li> <li>o DECEDIT</li> <li>o TYPESET 8/10</li> </ul>	<ul style="list-style-type: none"> <li>o A series of photographs showing the diversity of applications of Digital systems, significant customers and historic events (space launch)</li> </ul>
TERMINALS & PRINTERS	"Computers should be designed to allow people to interact with them, to hold a dialogue with the computer even as the events it controls are happening.	<ul style="list-style-type: none"> <li>o LA-30   o VT-50   o RA Series</li> <li>o LA-35   o VT-52   o RA 80 Winchester</li> <li>o LA-36   o VT-55   o Optical</li> <li>o LA-180   o VT-155   o Storage Array</li> <li>o VT-05   o GT 40</li> <li>o VT-14   o 4KPi</li> </ul>	<ul style="list-style-type: none"> <li>o Photo of VT-100's coming off the manufacturing line (1 made per minute)</li> <li>o Engineer's sketch of first ergonomically designed terminals</li> </ul>
NETWORKS	"It was clear to us from the start that people needed to share information and workload among computers, people, and organization. The computer, as defined by Digital, became a communications device and introduced the idea of distributed processing."	<ul style="list-style-type: none"> <li>o DECNET</li> <li>o ETHERNET</li> </ul>	<ul style="list-style-type: none"> <li>o Graphic diagram of networking capability</li> <li>o Display contrasting fiber and copper cable</li> </ul>
EDUCATION	"Tools for working and learning: That is the idea of Digital."	<ul style="list-style-type: none"> <li>o Logic Handbook</li> <li>o Small Computer Handbook</li> <li>o Logic Laboratory</li> <li>o CLASSIC</li> </ul>	<ul style="list-style-type: none"> <li>o DECCUS users group meeting</li> <li>o Classroom scenes</li> </ul>

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Floor Display	Theme Statement	Highlight Products to be Displayed	Graphics/Photos
APPLICATIONS & TERMINAL KEY SYSTEMS	"We believe that computers belong on the factory floor, and in the laboratory and the classroom. They belong in the office and the printing plant, in the power station, the hospital, and the railroad yard.	<ul style="list-style-type: none"> <li>o LINC</li> <li>o One or more representative computer packs</li> <li>o MINC</li> <li>o EDOSYSTEM</li> <li>o Graphic 76</li> <li>o DECEDIT</li> <li>o TYPESET 8/10</li> </ul>	<ul style="list-style-type: none"> <li>o A series of photographs showing the diversity of applications of Digital systems, significant customers and historic events (space launch)</li> </ul>
TERMINALS & PRINTERS	"Computers should be designed to allow people to interact with them, to hold a dialogue with the computer even as the events it controls are happening.	<ul style="list-style-type: none"> <li>o LA-30   o VT-50   o RA Series</li> <li>o LA-35   o VT-52   o RA 80 Winchester</li> <li>o LA-36   o VT-55   o Optical</li> <li>o LA-180   o VT-155   o Storage Array</li> <li>o VT-05   o GT 40</li> <li>o VT-14   o 4KPi</li> </ul>	<ul style="list-style-type: none"> <li>o Photo of VT-100's coming off the manufacturing line (1 made per minute)</li> <li>o Engineer's sketch of first ergonomically designed terminals</li> </ul>
NETWORKS	"It was clear to us from the start that people needed to share information and workload among computers, people, and organization. The computer, as defined by Digital, became a communications device and introduced the idea of distributed processing."	<ul style="list-style-type: none"> <li>o DECNET</li> <li>o ETHERNET</li> </ul>	<ul style="list-style-type: none"> <li>o Graphic diagram of networking capability</li> <li>o Display contrasting fiber and copper cable</li> </ul>
EDUCATION	"Tools for working and learning: That is the idea of Digital."	<ul style="list-style-type: none"> <li>o Logic Handbook</li> <li>o Small Computer Handbook</li> <li>o Logic Laboratory</li> <li>o CLASSIC</li> </ul>	<ul style="list-style-type: none"> <li>o DECCUS users group meeting</li> <li>o Classroom scenes</li> </ul>