

The background is a collage of four faded images. Top left: A yellow-toned image of a person standing next to a large, curved structure, possibly a ship's hull. Top right: An aerial view of a large industrial facility with multiple buildings and smokestacks. Bottom left: A landscape with green trees and a blue sky. Bottom right: An interior view of a computer room or office from the mid-20th century, with people working at desks with large monitors.

Digital State: The Story of Minnesota's Computing Industry

Thomas J. Misa

Charles Babbage Institute

1 Mar. 2015

tinyurl.com/ful-misa

Topics today . . .

1. Mn *was* Silicon Valley
 2. Birth* in St. Paul's Midway
 3. “Silver mine” (impacts...*)
 4. “Gold mine” (consequences*)
 5. Lessons for high-tech innovation?
 6. CBI + what to ‘see’ today?
- *(of Mn's pioneering computer industry)

California's 'Silicon Valley'



California's 'Silicon Valley'



Adobe



Apple



Cisco



eBay



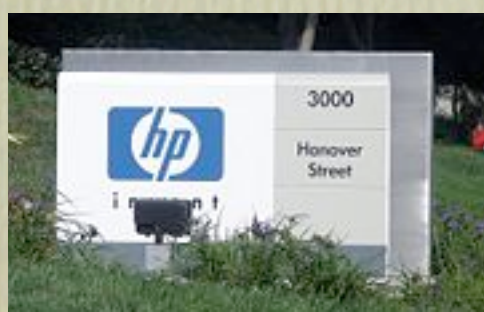
Facebook



Google



HP



Intel



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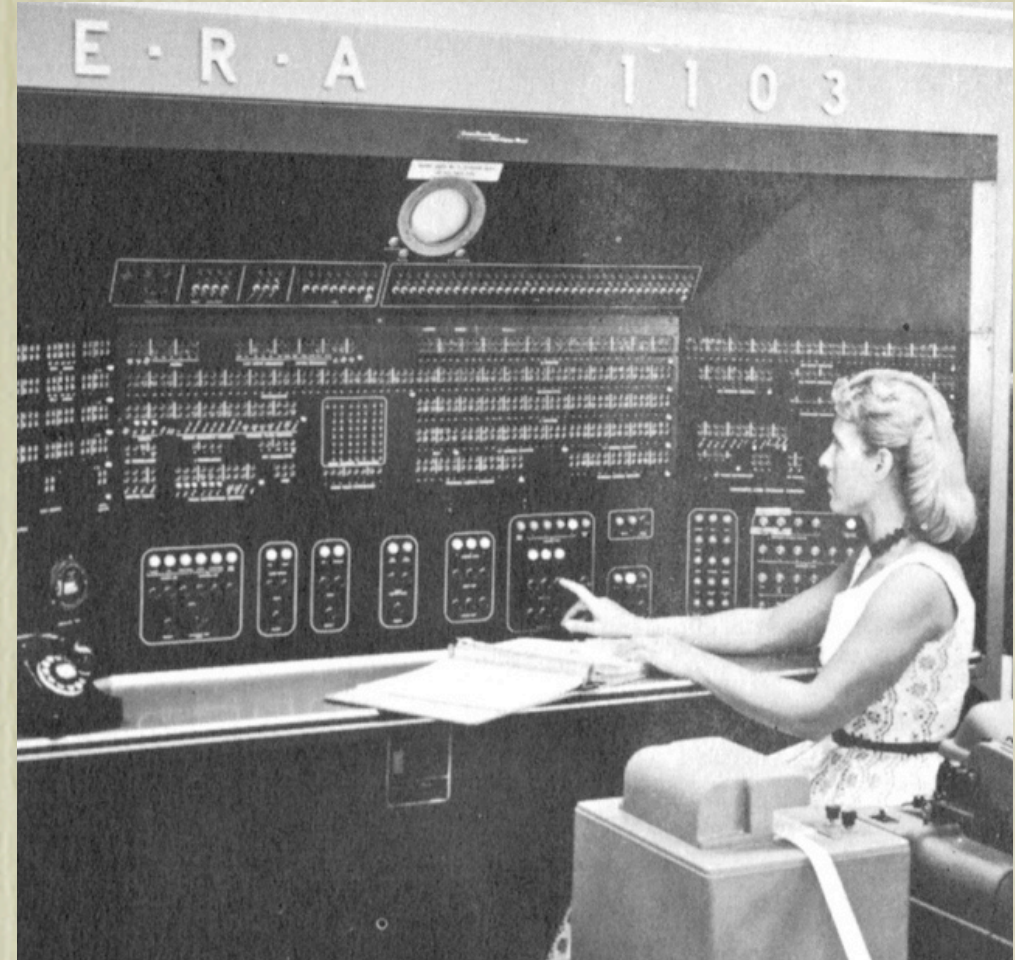


Oracle



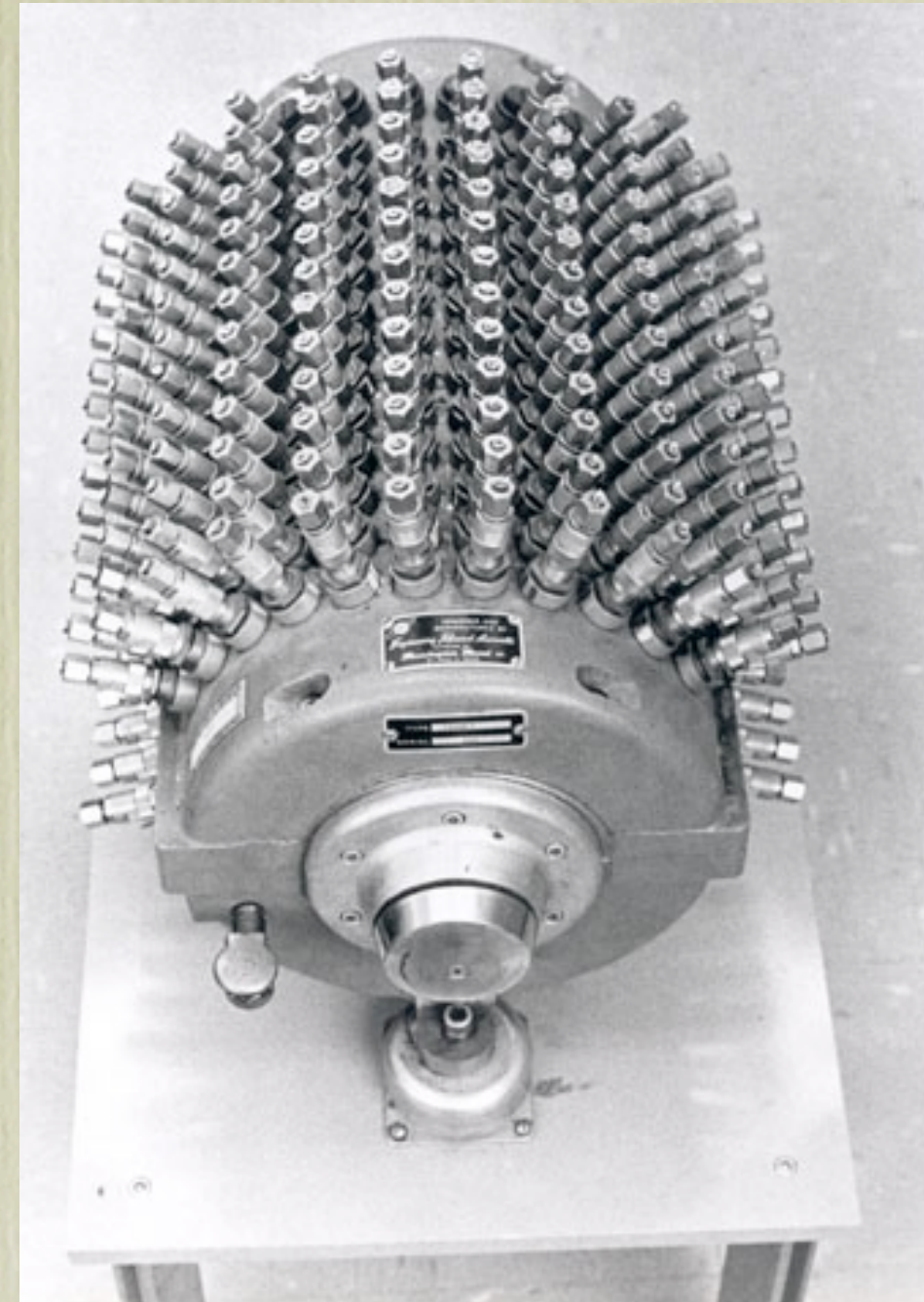
MN *was* Silicon Valley

- ‘stored program’ computer [1950]
- magnetic data storage
- computer industry
- ‘supercomputer’
- ‘first’ WWW



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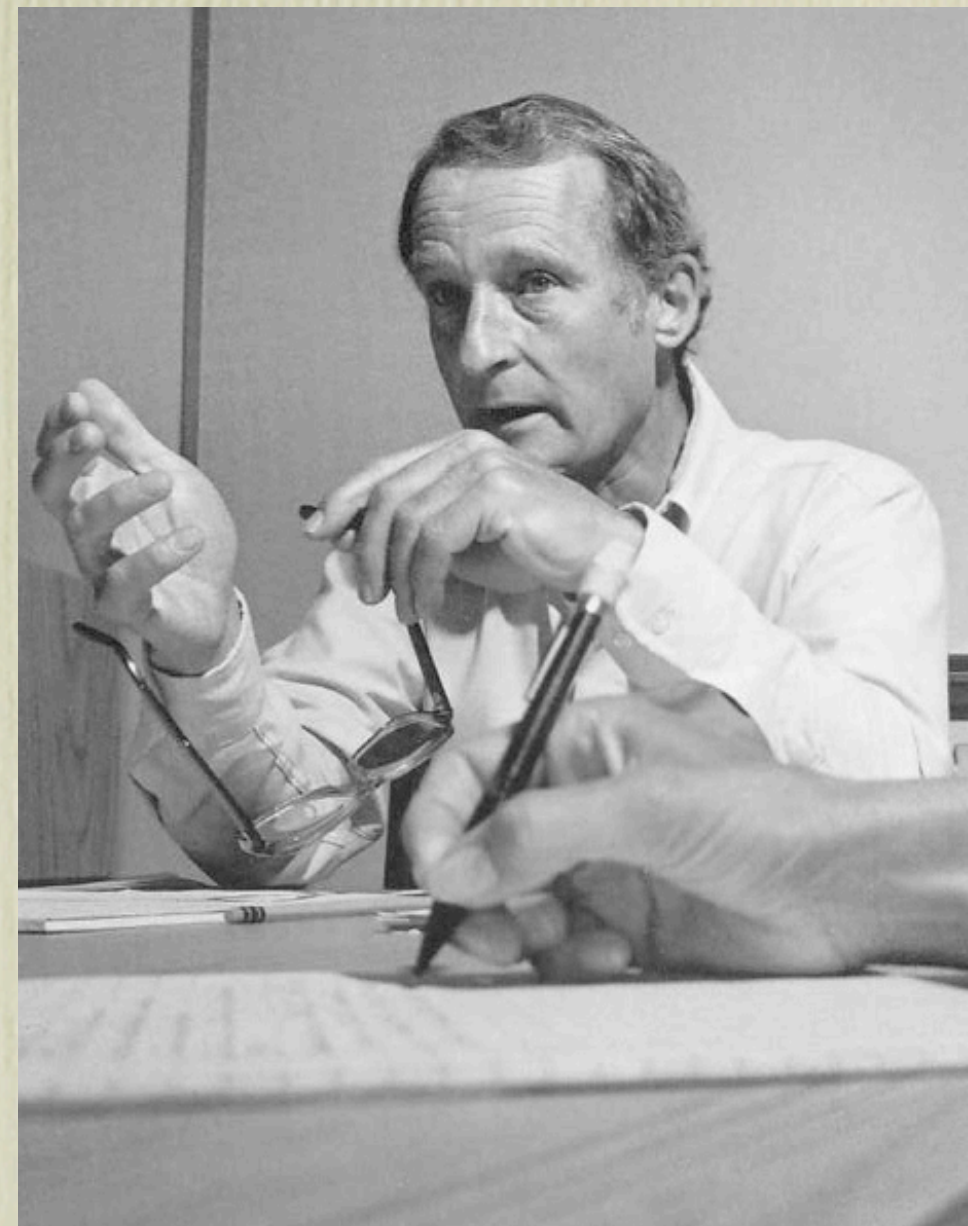
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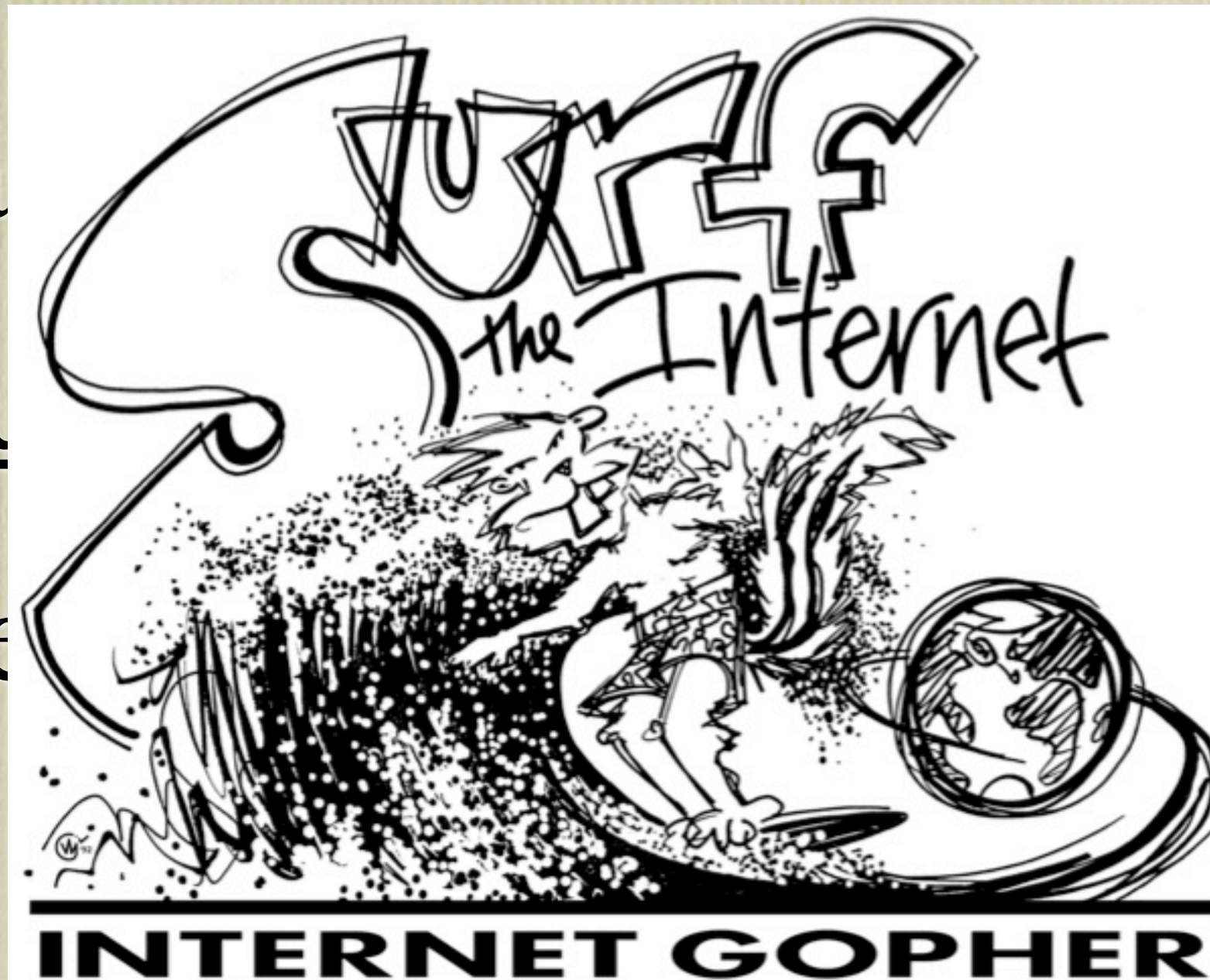
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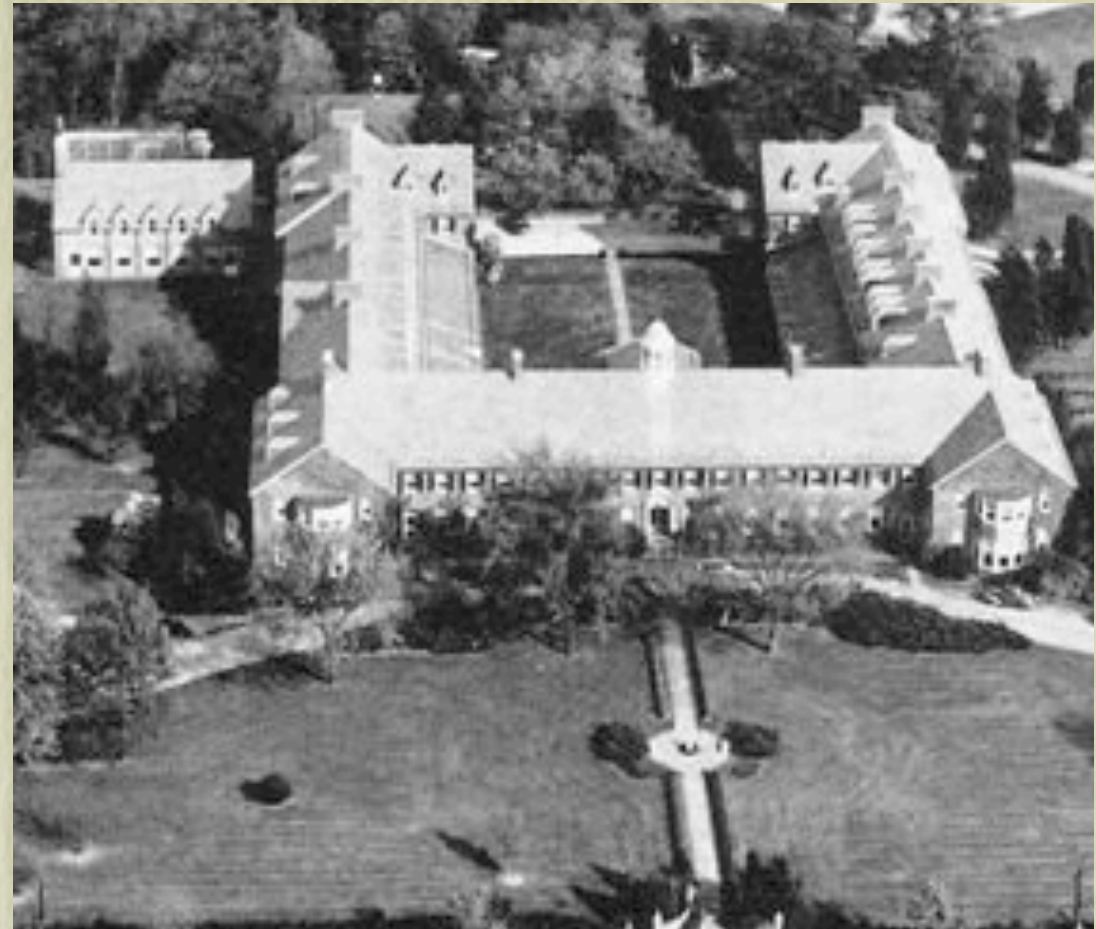


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Computer industry in St. Paul

- Secret crypto built Dayton OH ... to wartime Washington
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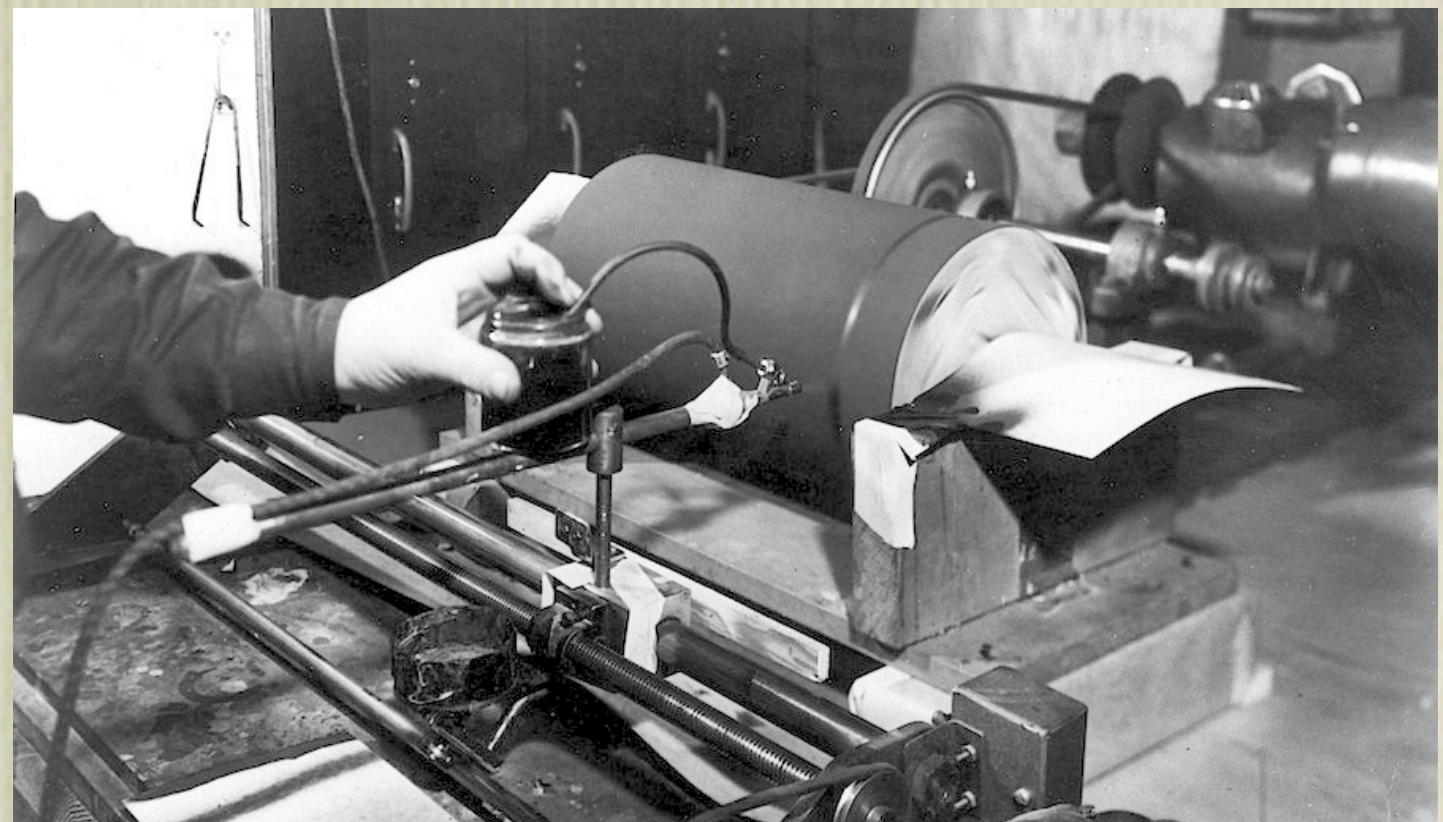
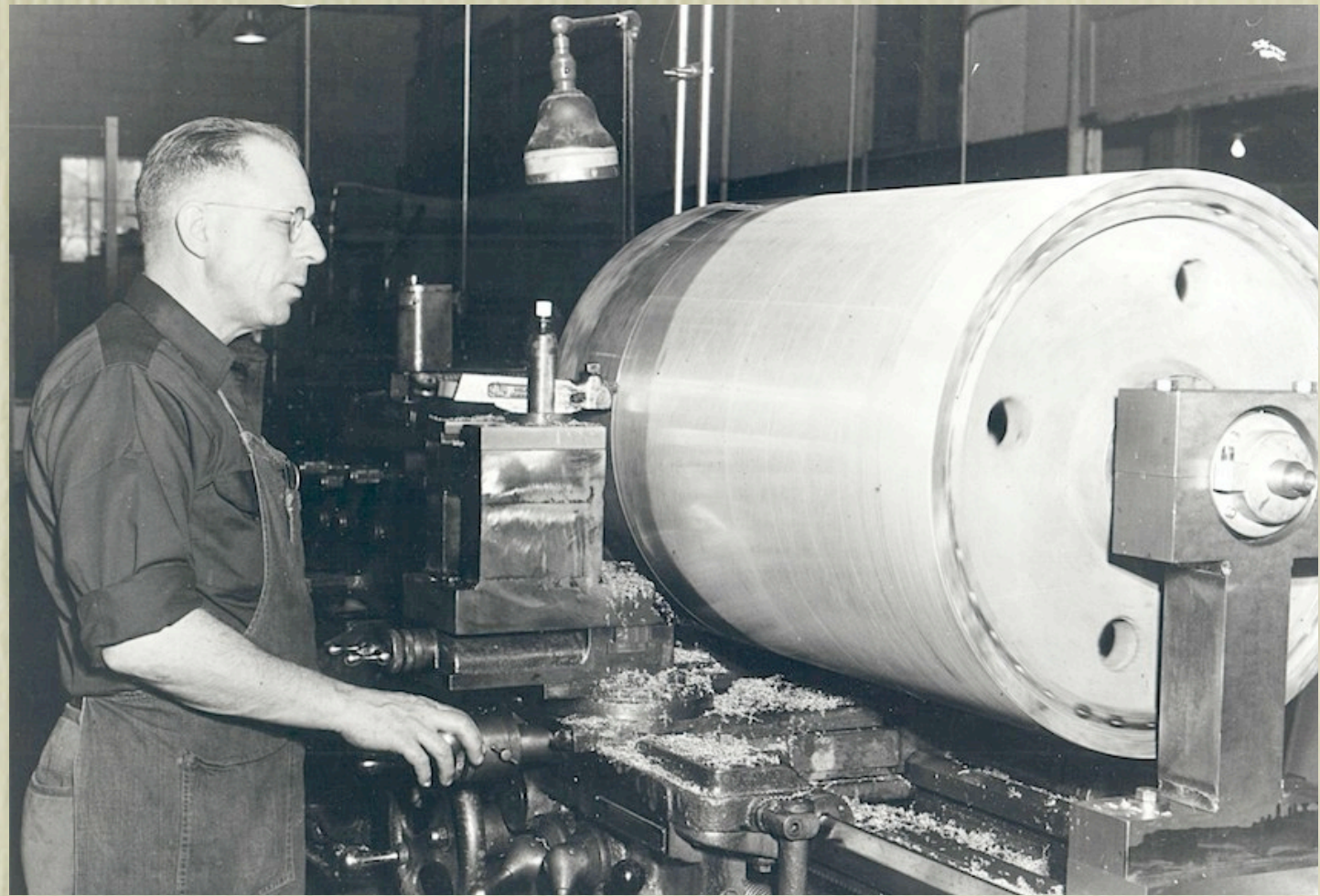
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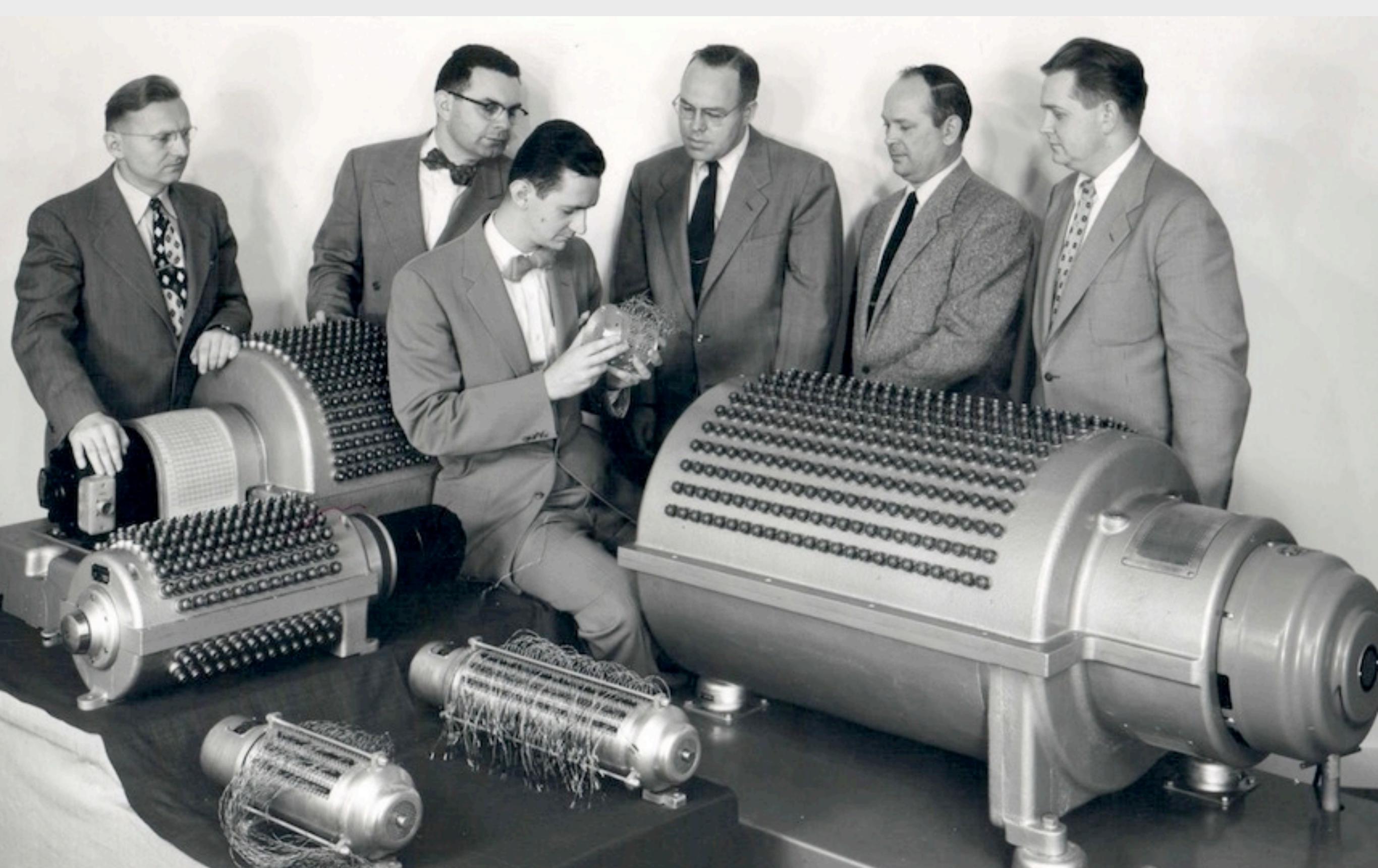




Birth in Midway industrial district

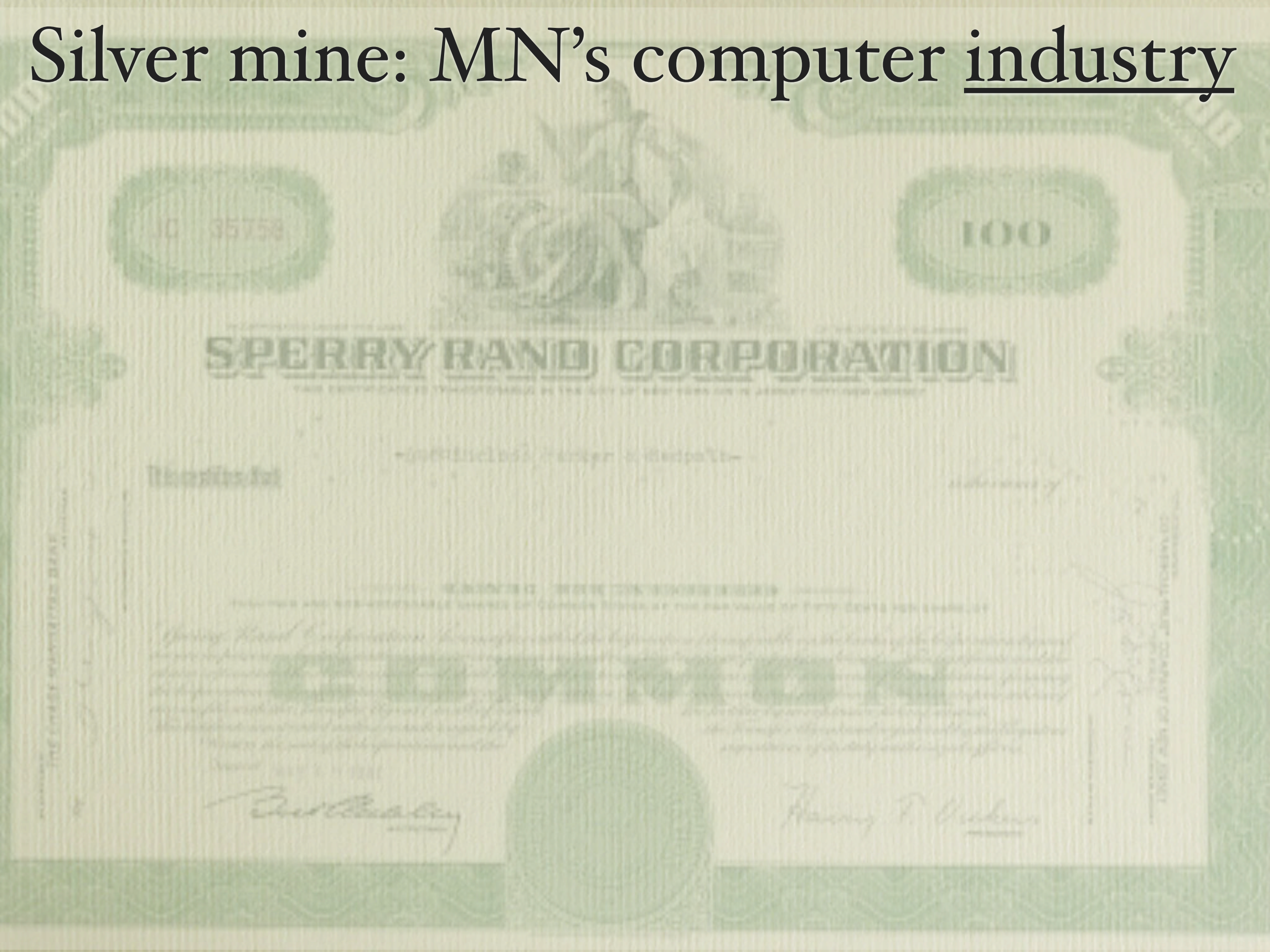
- Workers Snelling shops ► ERA
- Spray-on magnet ERA + 3M





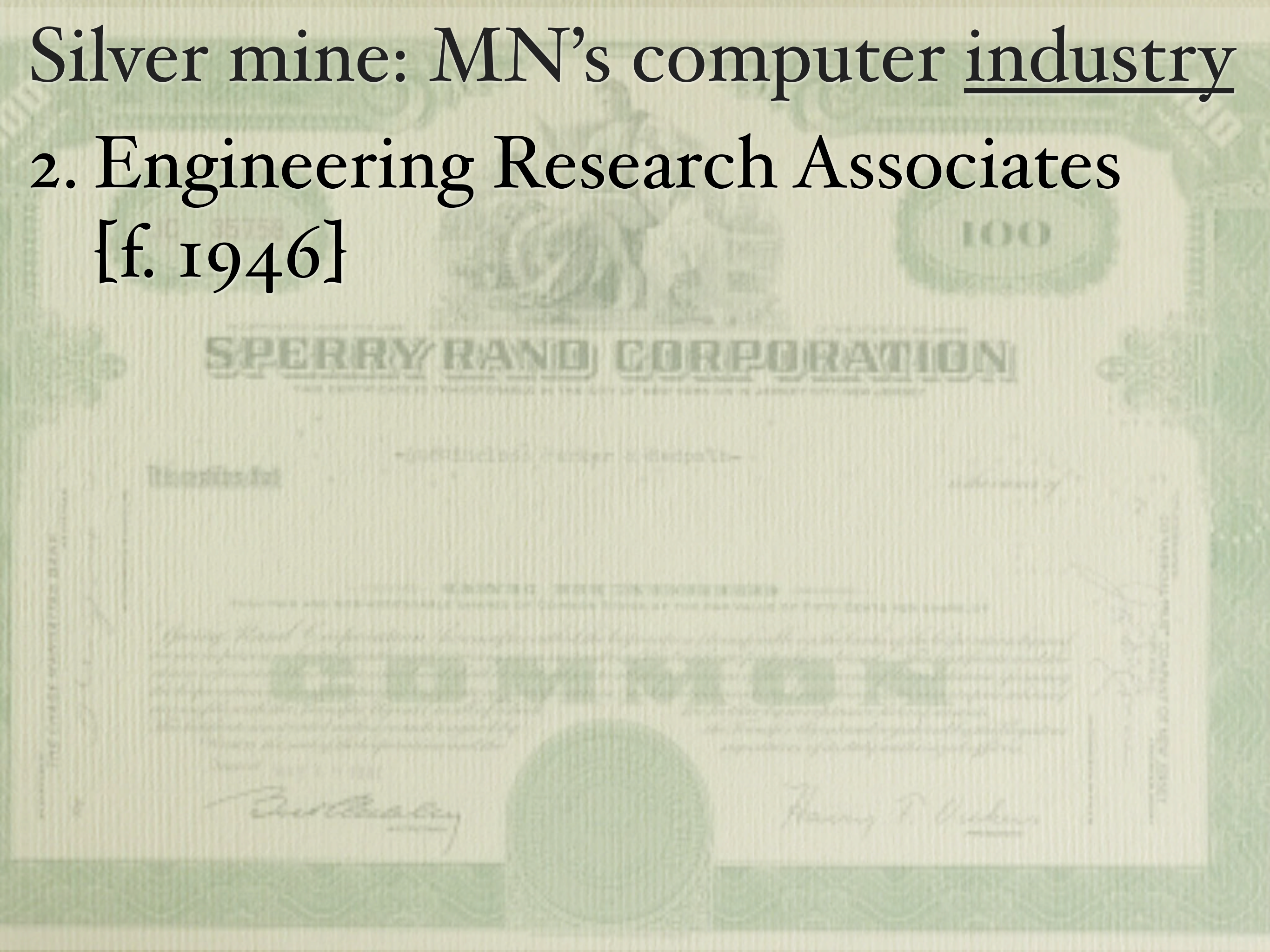
ERA's Jack Hill, Arnold Cohen, Frank Mullaney ,
Bob Perkins, Arnie Hendrickson, Bill Keye [c.1955]

Silver mine: MN's computer industry



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5. Honeywell (computing = 1958-91)
6. IBM-Rochester [1956--]

Silver mine: MN computer workforce

MN by mid-1970s . . .

- ... 1.8% of US population
- ... 3.3% of US manufacturing jobs
- ... 12% of US \$6B computer sales
- ... 17% of US computer mfg jobs

Why 'not' Silicon Valley MN?

- ✓ Technology & innovation
- ✓ Computer-center 'industrial district'
- ✓ Venture capital #2 [1958-63]
- ✓ Sales to military + govt + univ labs +
FAA's air-traffic control

Why 'not' Silicon Valley MN?

- ✓ Technology & innovation
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- ✓ Sales to military + govt + univ labs + ATC
- ◆ Less visible in commercial markets
- ◆ No journalist's "Silicon Valley" [1971]
- ◆ Secret work \Leftrightarrow public visibility?

Gold mine: longer consequences

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 \Rightarrow IBM's model 650 computer

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- ✓ lessons for high-tech innovation?

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- China closing in on Silicon Valley as home of internet giants {12.2014}
- Metro Detroit Tech Economy 'Equal to all of Silicon Valley' {2.12.2015}

Chasing Silicon Valley

Sand Hill Rd



Sand Hill Rd ↗

● Next Silicon Valley is ... *Silicon Valley*





Sand Hill Rd ↗

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Sand Hill Rd

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Sand Hill Rd

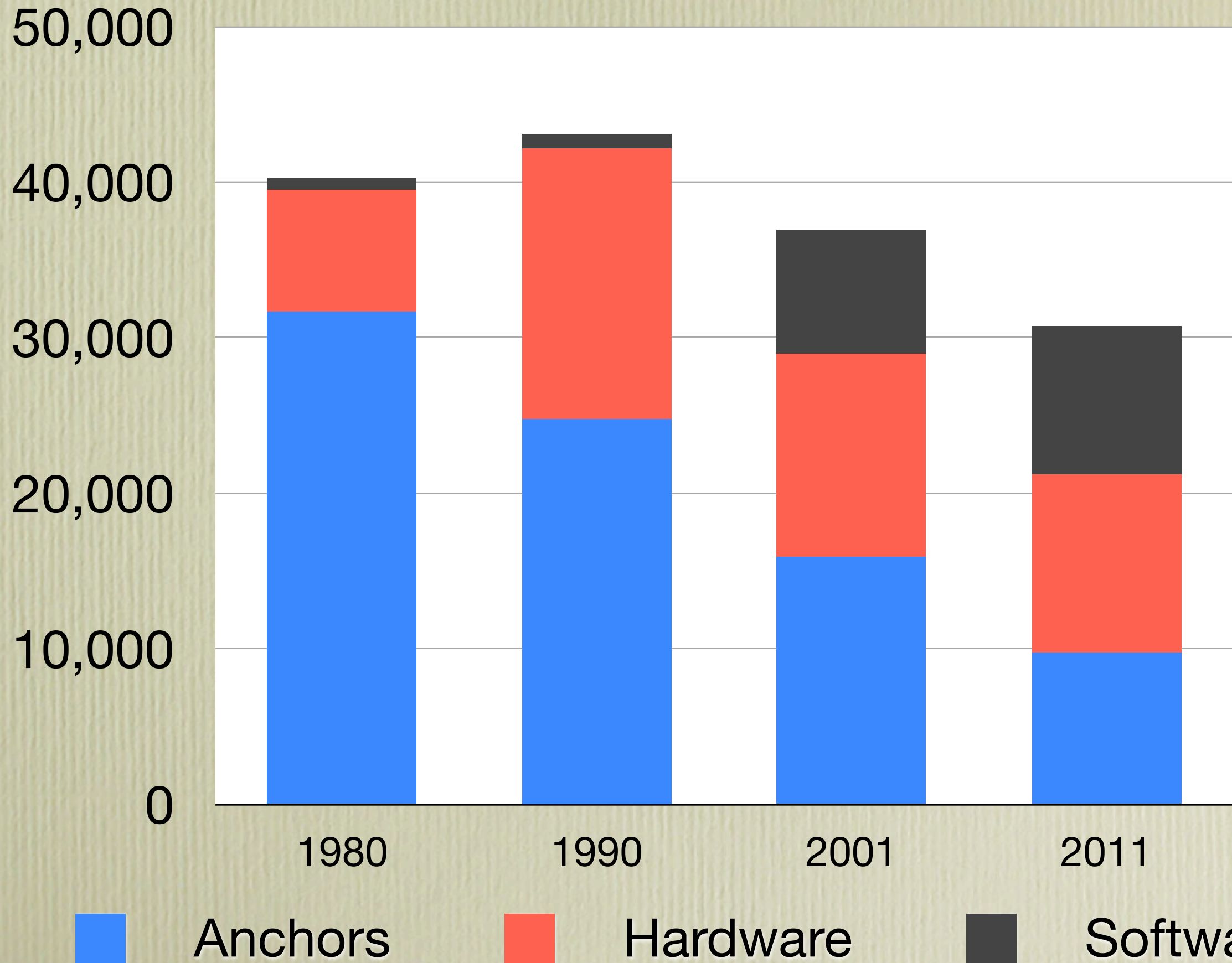
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- Why Creating The Next Silicon Valley ... Is The *Wrong Goal* [[Forbes](#) 7.2014]

Minnesota employment in computing (1980-2011)

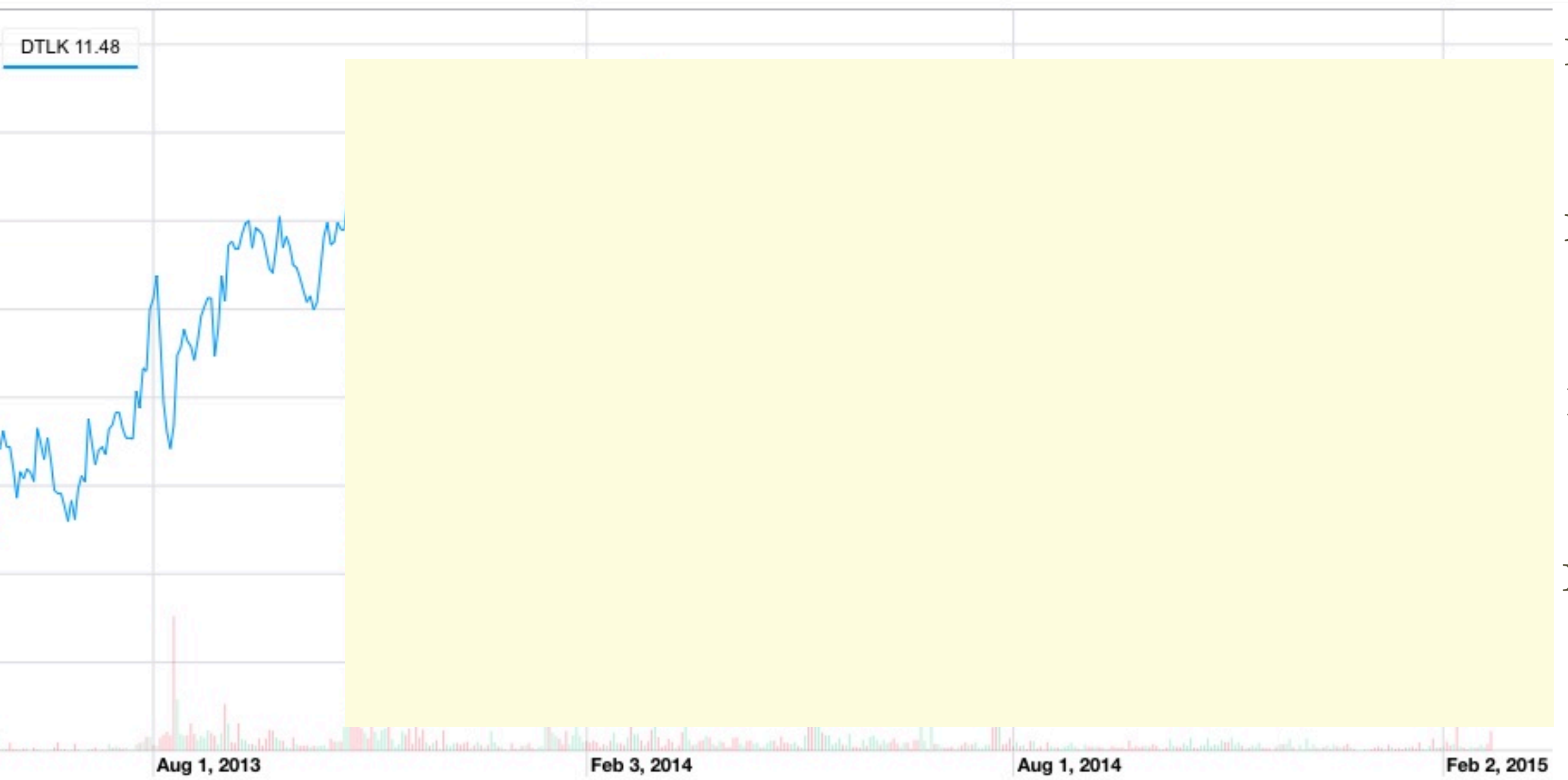


DTLK 11.48

Aug 1, 2013

Aug 1, 2013





I6

I5

I4

I3

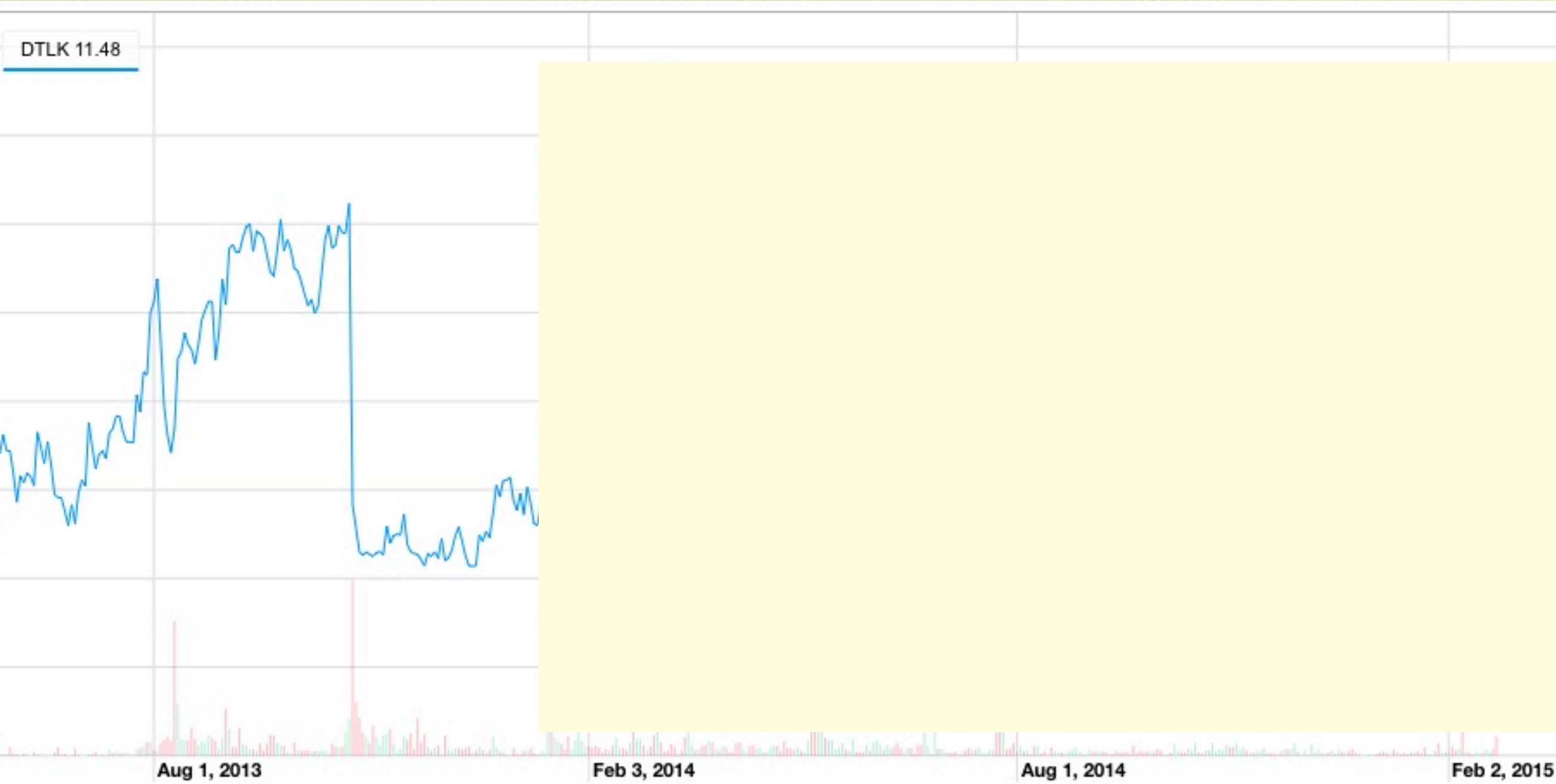
I2

II

IO

9

8



I6

I5

I4

I3

I2

II

IO

9

8



16

15

14

13

12

11

10

9

8



16
15
14
13
12
11
10
9
8



CBI *from* CA *to* MN 1980

- Computer history research and archiving
- 250 archival collections
- 400 oral histories
- 150,000 photos
- “1 mile” of paper records
- 4 staff + colleagues
- www.cbi.umn.edu



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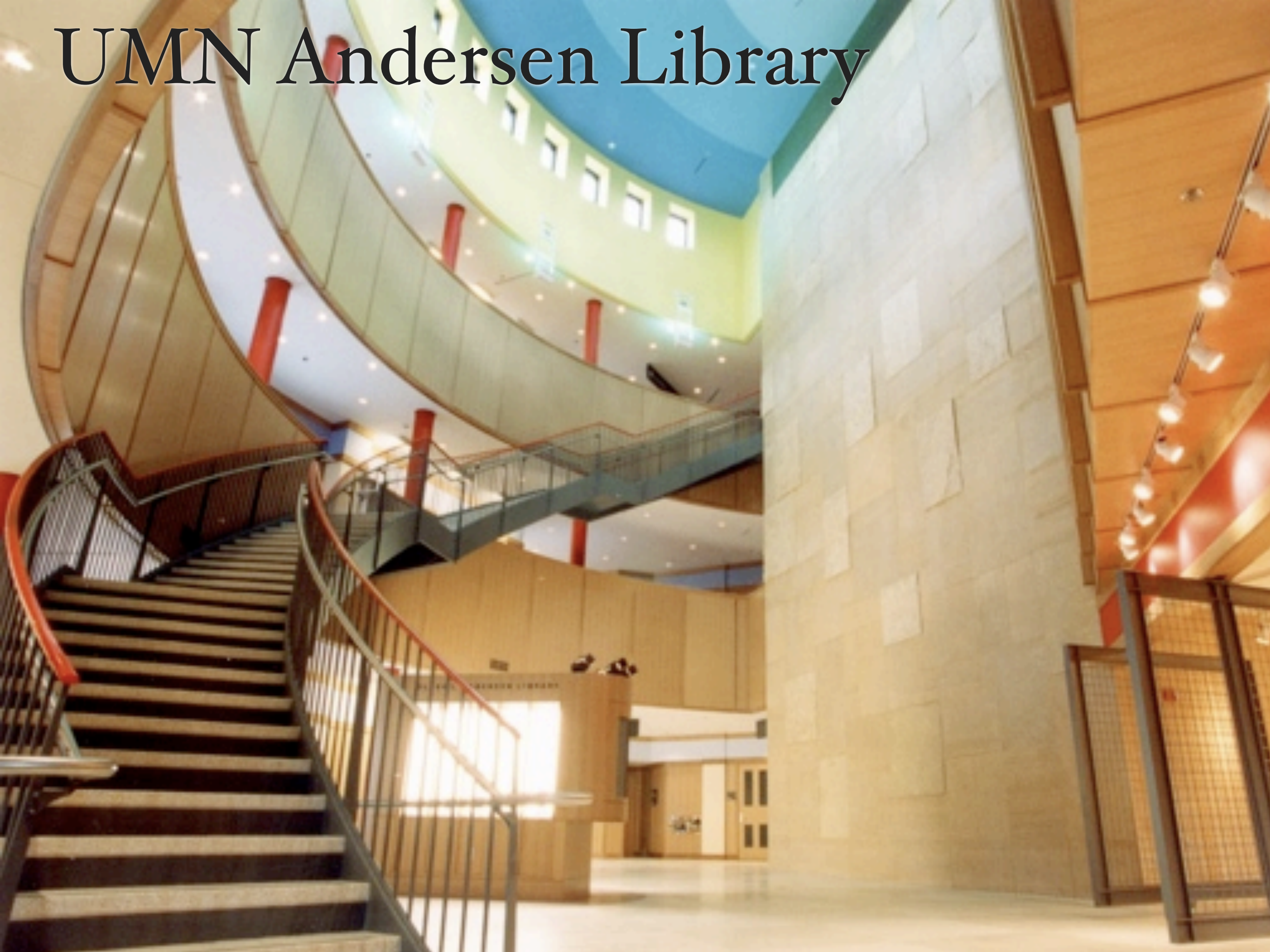
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Charles Babbage
(1791-1871)



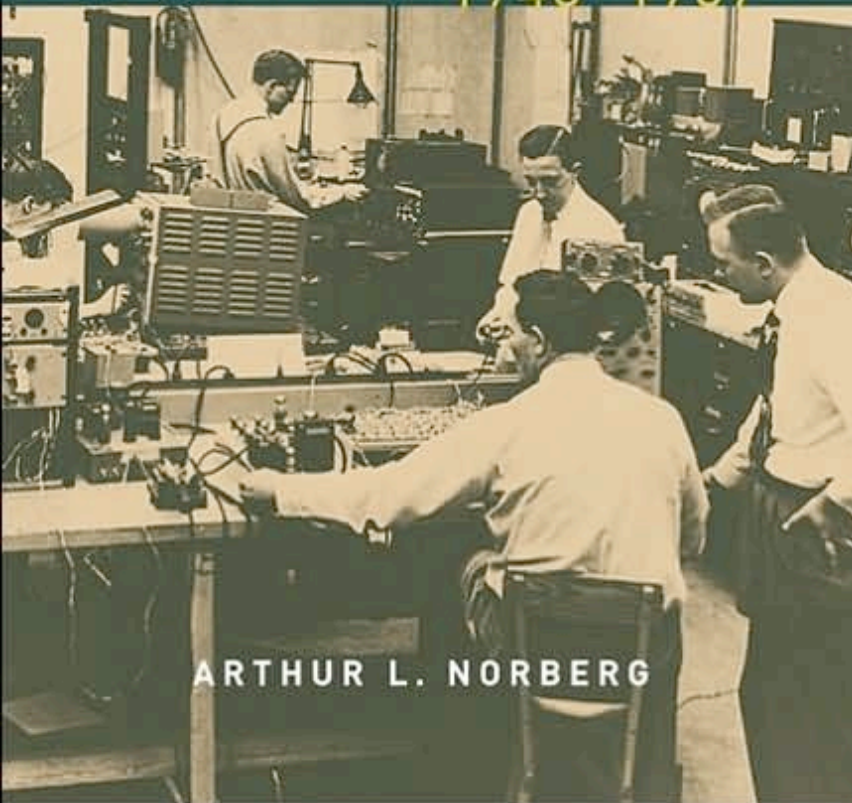
UMN Andersen Library



CBI *and* MN computing

COMPUTERS AND COMMERCE

A Study of Technology and Management
at Eckert-Mauchly Computer Company,
Engineering Research Associates, and
Remington Rand, 1946-1957



IBM Rochester

A Half Century of Innovation



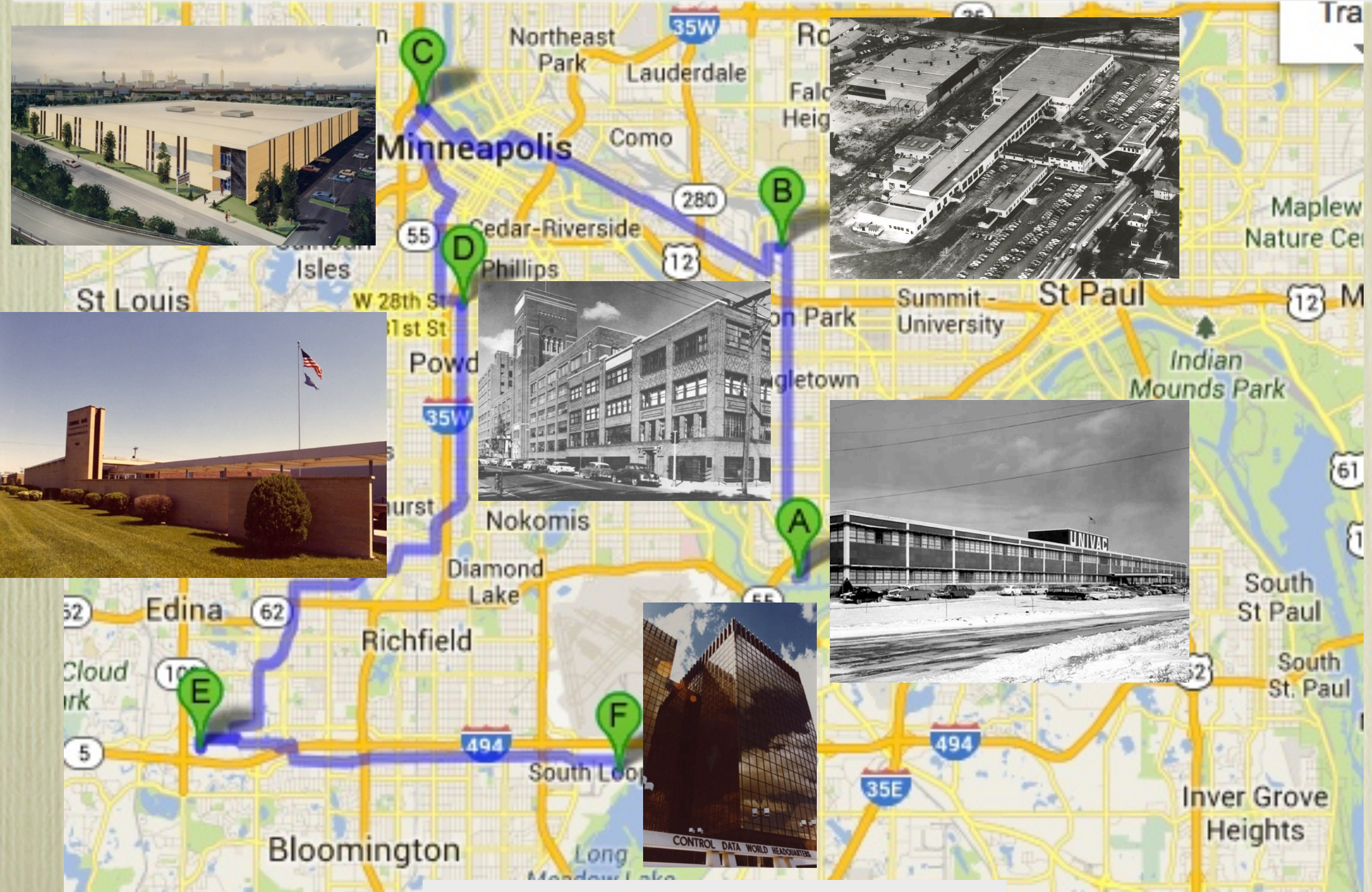
DIGITAL STATE

» THE STORY OF MINNESOTA'S COMPUTING INDUSTRY



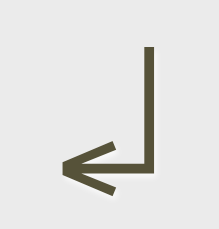
■ THOMAS J. MISA

What to see today?

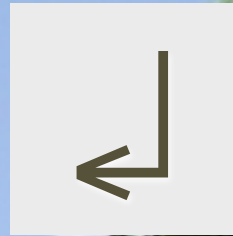


tinyurl.com/sia-misa





Univac West 7th/Shepard Rd (1956)



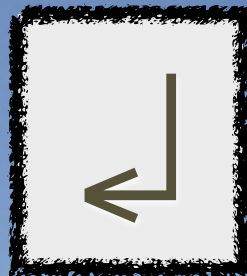
US Bank West 7th/Shepard Rd (2013)

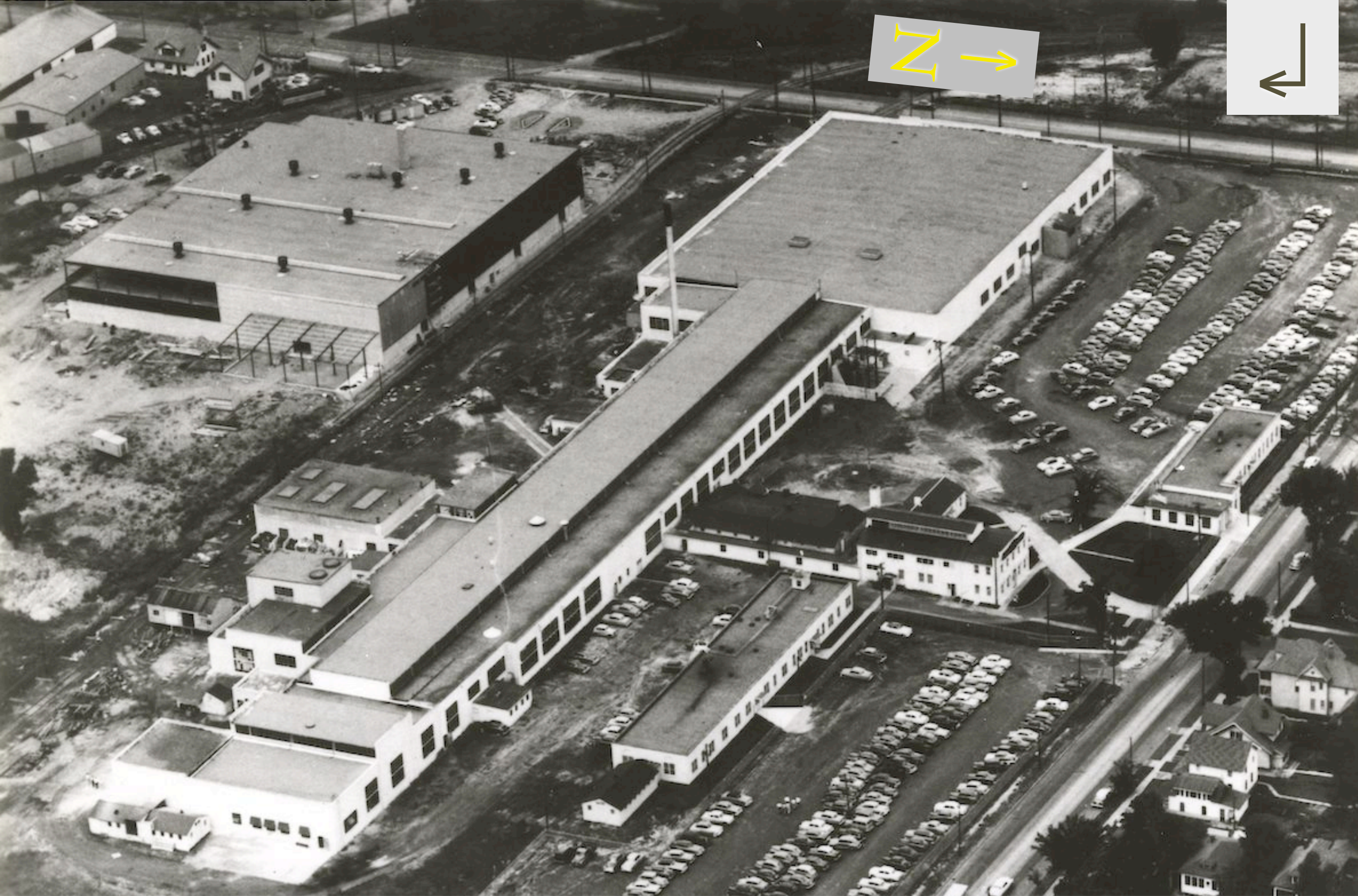


Greenwood Rd
↑

Available
Eric Rapp Bill Ritter
952 837 3040








ERA Plant #1 W. Minnehaha Ave. (c.1955)



Univac #2 W. Minnehaha Ave. (1986)



“Engineering Research Associates, the forerunner of Sperry’s Minnesota presence, is the acknowledged parent of some 100 Twin Cities computer firms. In commemoration of the 40th anniversary of ERA’s founding, this plaque is placed on the company’s original manufacturing site this 19th day of August 1986” [Rolland Anderson, Bill Geiger, Bob MacDonald, and Jack Nichols]

Univac #2 W. Minnehaha Ave. (1986)



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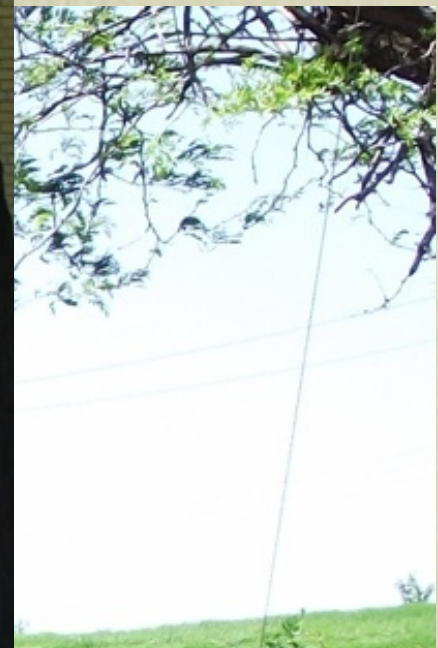
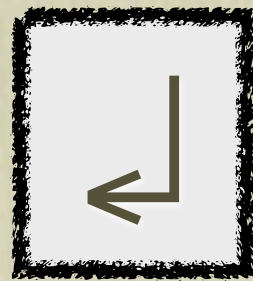
Control Data Northside plant (1967)



Control Data Northside plant (1973)



Control Data Northside plant (2013)



Control Data Northside plant (2013)



Honeywell S Minneapolis (here:1940s)

A photograph of a Wells Fargo Home Mortgage sign. The sign is a large, light-colored rectangular panel with the words "WELLS FARGO" in large, bold, dark letters, and "HOME MORTGAGE" in smaller, dark letters below it. The sign is mounted on a dark, rectangular base. In the background, there is a multi-story brick building with many windows. Bare trees are visible in the foreground and background. The sky is blue. A small, white, L-shaped arrow icon is in the top right corner of the image.

WELLS FARGO
HOME MORTGAGE

A black and white photograph of a street scene from the 1940s. Several vintage cars are parked along the side of a street. In the background, there are brick buildings and trees. The image is slightly faded and has a historical feel.

Honeywell S Minneapolis (here:1940s)



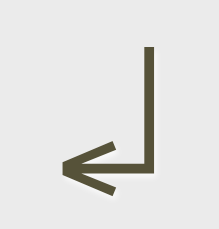
Honeywell relay department (c.1930) MHS



Honeywell S Minneapolis (c.1955) MHS



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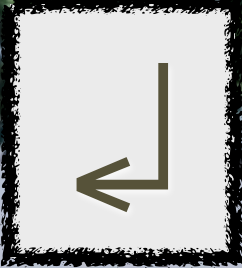
Control Data 7801 Computer Ave. (1980s)



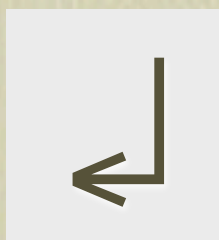
Control Data disk drive factory (1972)



Seagate 7801 Computer Ave. (2013)



Seagate 7801 Computer Ave. (2013)



Control Data *now* Health Partners (1980s)



Control Data *now* Health Partners (1980s)



to Airport/dwtm
Minneapolis

Control Data *Fibonacci series* (2004)

13	8
21	34

34



Control Data *Fibonacci series* (2004)

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21	34



» THE STORY OF MINNESOTA'S COMPUTING INDUSTRY



■ THOMAS J. MISA

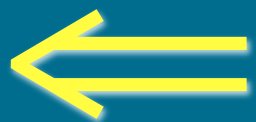
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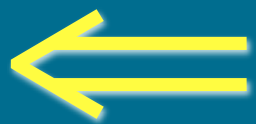


DATA
STATE

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.../ful-misa





AN: Can you tell me something about . . . Goldberg?

FM: In those days . . . security was very tight. We didn't tell anybody what we were doing or who we were doing it for. But it was built around a magnetic drum with the information going on the magnetic drum and then . . . compare two or more tracks in different ways . . . there were a lot of elements of computers in them . . . The output was on a line printer . . . designed also at ERA. There were a lot of . . . things that went into computers like the magnetic drum, tape reader, tape punch, line printer . . . used for more general-purpose computers.

AN: Were all of those developed at ERA? *FM:* Yes . . .