Uvod v računalništvo

Aleksander Sadikov

2015/2016

ПОЧТА СССР
1983
4к
1200
ЛЕТ
Мухаммед
аль-Хорезми

If we can specify an algorithm to solve a problem,
then we can automate its solution.

We are sailing, we are sailing,
home again 'cross the sea.
We are sailing stormy waters,
to be near you, to be free.

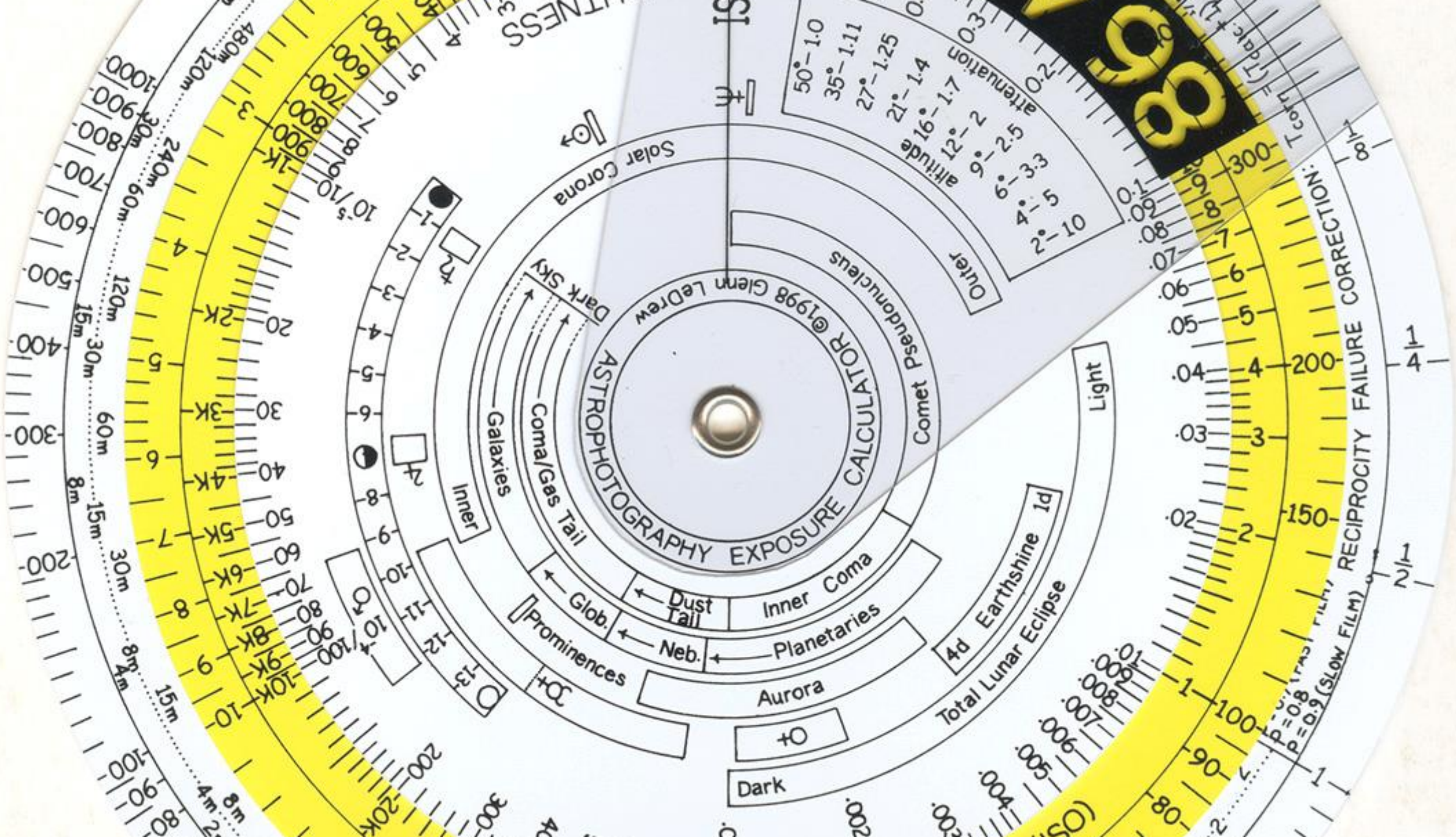
Astronomy, chemistry, medicine.

COMMON LOGARITHMS $\log_{10} x$

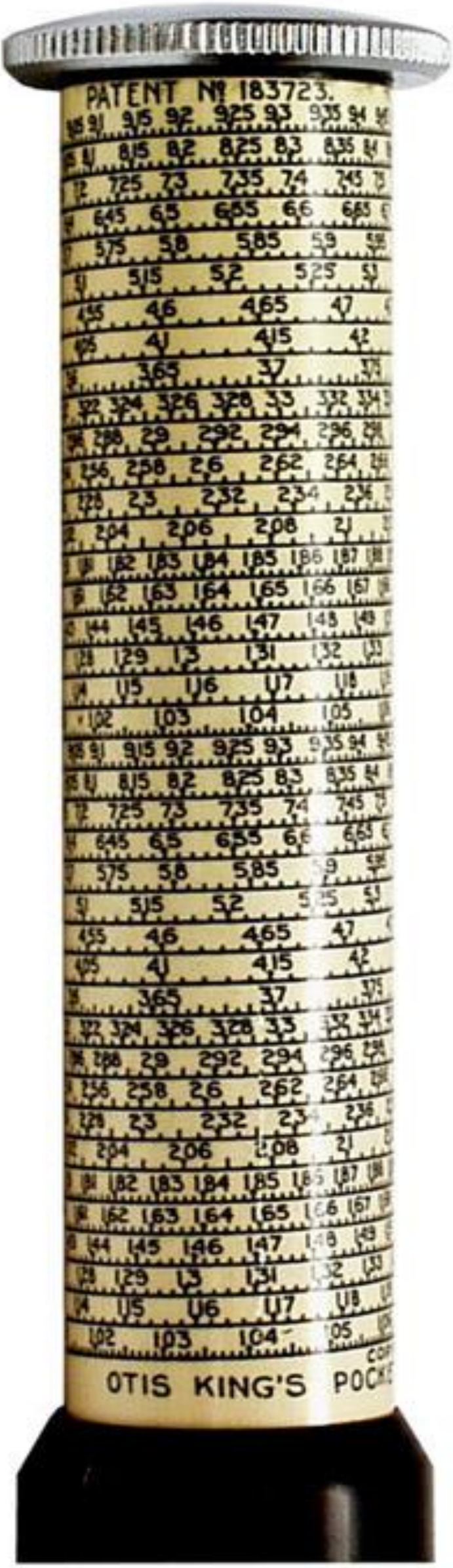
x	0	1	2	3	4	5	6	7	8	9	Δ_{89} +	1	2
50	·6990	6998	7007	7016	7024	7033	7042	7050	7059	7067	9	1	2
51	·7076	7084	7093	7101	7110	7118	7126	7135	7143	7152	8	1	2
52	·7160	7168	7177	7185	7193	7202	7210	7218	7226	7235	8	1	2
53	·7243	7251	7259	7267	7275	7284	7292	7300	7308	7316	8	1	2
54	·7324	7332	7340	7348	7356	7364	7372	7380	7388	7396	8	1	2
55	·7404	7412	7419	7427	7435	7443	7451	7459	7466	7474	8	1	2
56	·7482	7490	7497	7505	7513	7520	7528	7536	7543	7551	8	1	2
57	·7559	7566	7574	7582	7589	7597	7604	7612	7619	7627	8	1	2
58	·7634	7642	7649	7657	7664	7672	7679	7686	7694	7701	8	1	2
59	·7709	7716	7723	7731	7738	7745	7752	7760	7767	7774	7	1	1

The first slide rule appeared around 1622.

LL01 [e-0.01x
LL02 [e-0.1x
LL03 [e-1.0x
DF
CF
CIF
L
CI
C
D
LL3 [e 1.0x
LL2 [e 0.1x
LL1 [e 0.01x
Th [0.1x
Sh 2 [1.0x
Sh 1 [0.1x
A
B
T < 45° [0.1x
T > 45° [1.0x
ST [0.01x
S [0.1x
D
DI
K
EUGENE DIETZGEN CO.
PATS. 2,170,144 2,285,722 PAT'S. PEND.
MADE IN U.S.A.
DIETZGEN. MICROGLIDE TM
DIETZGEN
VECTOR TYPE LOG LOG

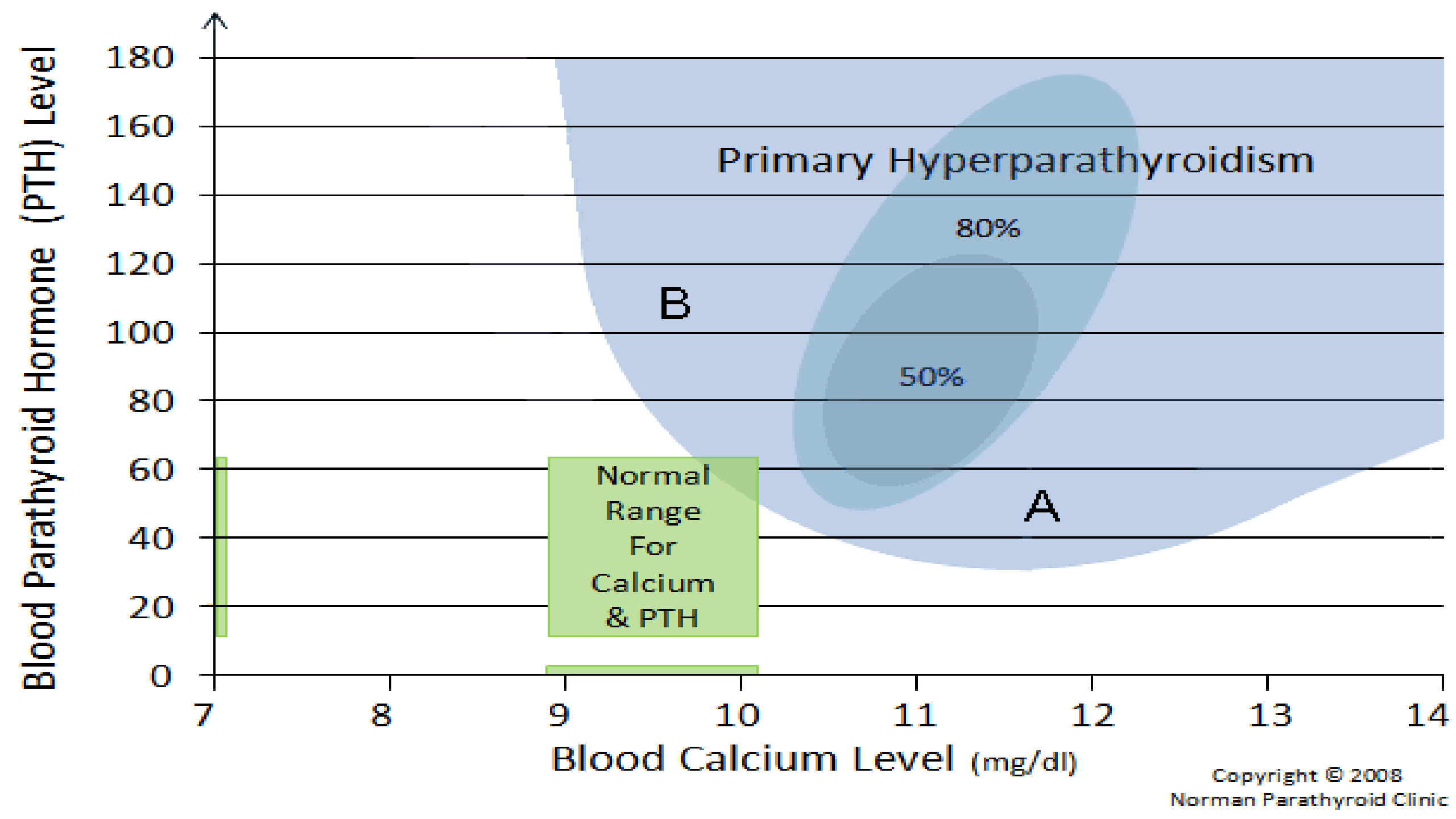

ASTROPHOTOGRAPHY EXPOSURE CALCULATOR ©1998 Glenn LeDrew
Solar Corona
Dark Sky
Inner
Galaxies
Coma/Gas Tail
Comet Pseudonucleus
Outer
Prominences
Glob.
Neb.
Dust Tail
Inner Coma
Planetaries
Aurora
Dark
Light
4d Earthshine 1d
Total Lunar Eclipse
50°–1.0
35°–1.11
27°–1.25
21°–1.4
16°–1.7
12°–2
9°–2.5
6°–3.3
4°–5
2°–10
altitude
attenuation
RECIPROCITY FAILURE CORRECTION:
P=0.8
P=0.9 (SLOW FILM)

OTIS KING'S PAT


PATENT Nº 183723.
OTIS KING'S POCK

No slide rules today?

Bauman JL, DiDomenico RJ, Viana M, Fitch M. *Arch Intern Med*. 2006 Dec 11-25;166(22):2539-45.



Copyright © 2008
Norman Parathyroid Clinic

Blaise Pascal (1672); Pascaline mechanical calculators; (+,-)

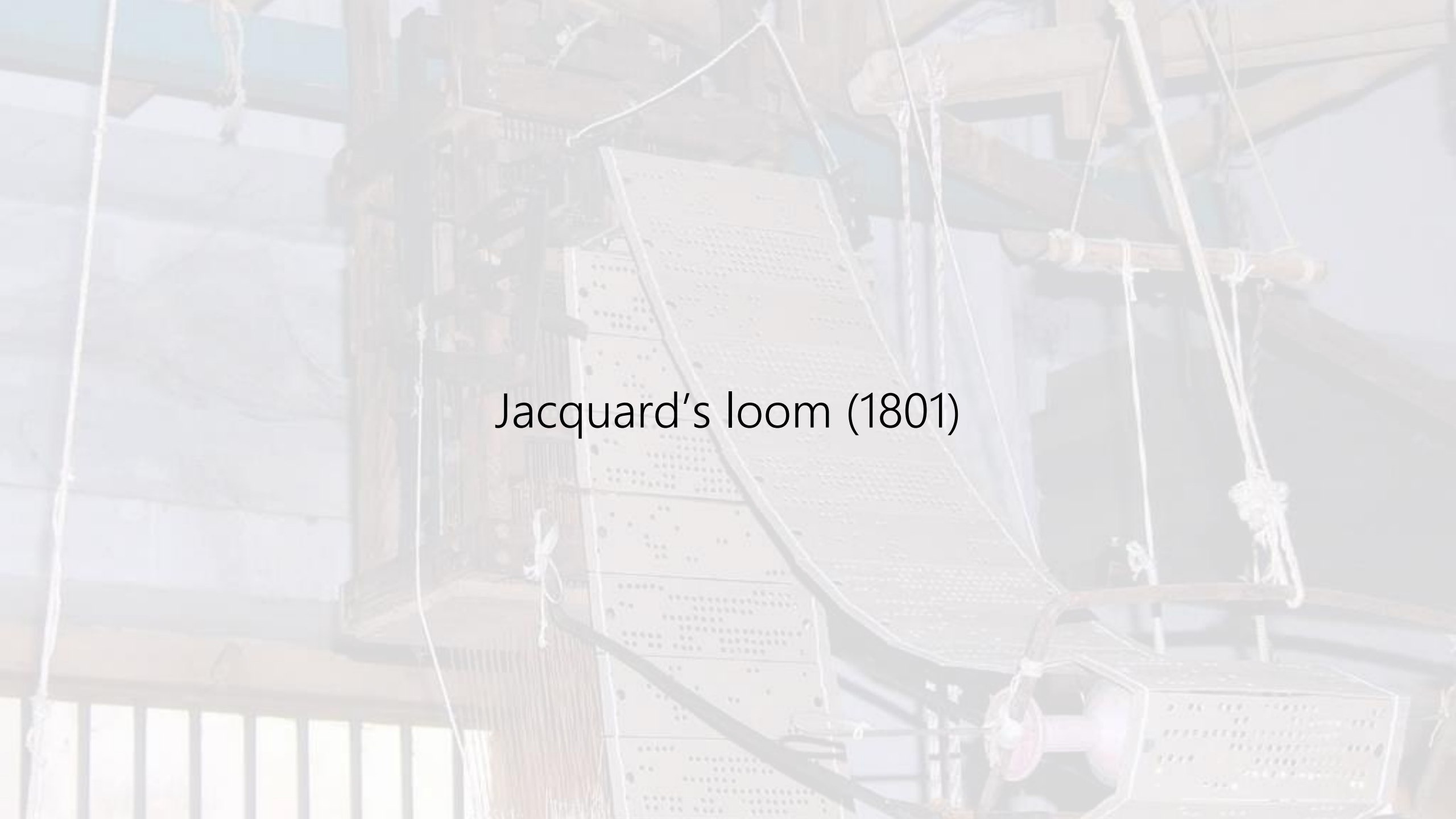
Gottfried Leibnitz (1674); Leibnitz's wheel; (+,-,×,÷)

Early mechanical machines were important, because they demonstrated how mechanization could automate, simplify, and speed up the drudgery of arithmetic computation.

Something’s missing though…

Memory & Programmability

And the very first computing device is…



Jacquard’s loom (1801)

Jacquard’s loom showed that the knowledge of an expert can be stored in machine-readable form.

Once the program was created, the expert was no longer needed.

And it burns, burns, burns…

Ned Ludd and the Luddites (1811-1816)

Charles Babbage (1823), Difference Engine

(+,-,×,÷, and more)

Charles Babbage (1830s), Analytic Engine (general-purpose computational machine)

mill, store, operator, and output unit

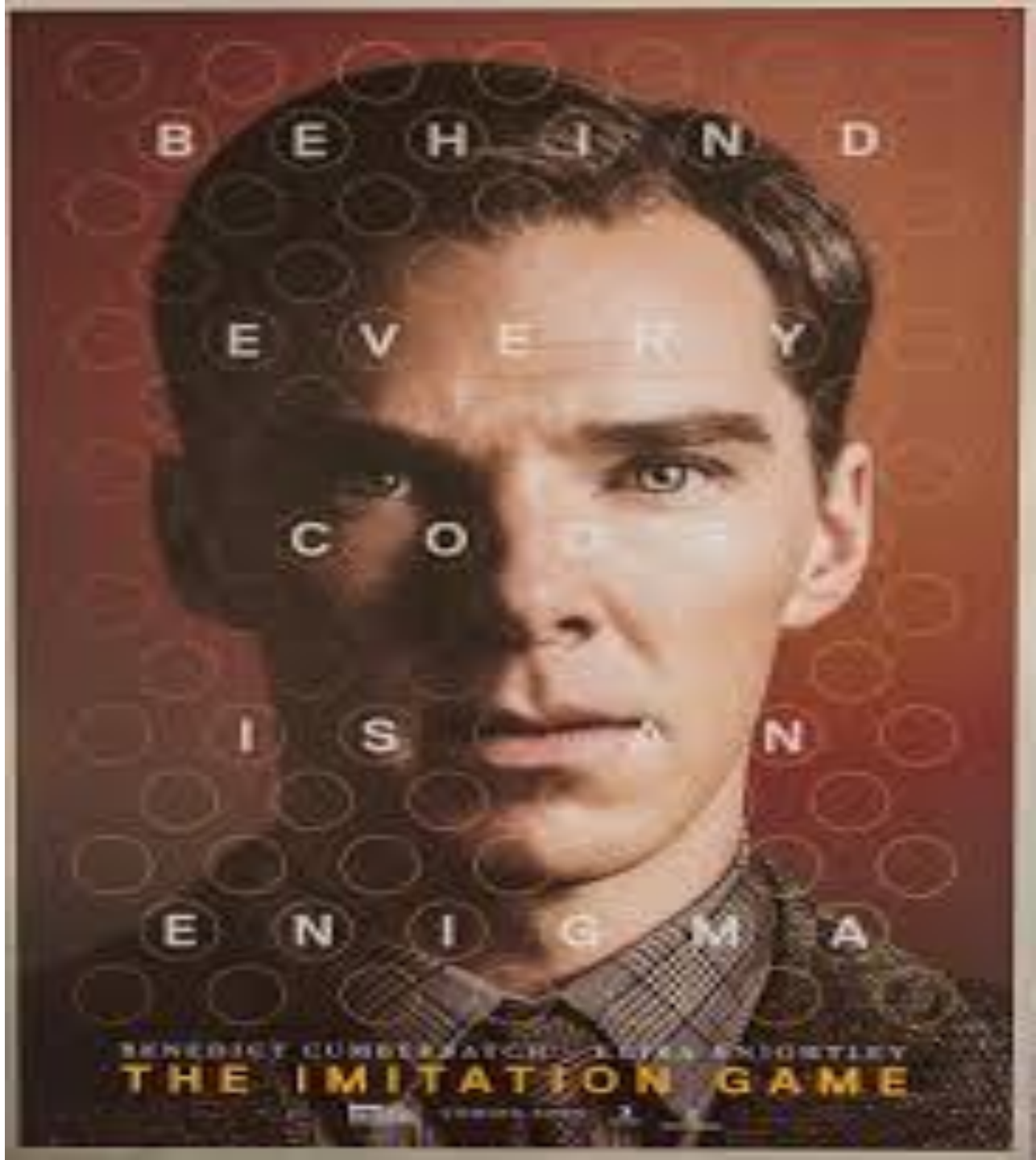
Herman Hollerith

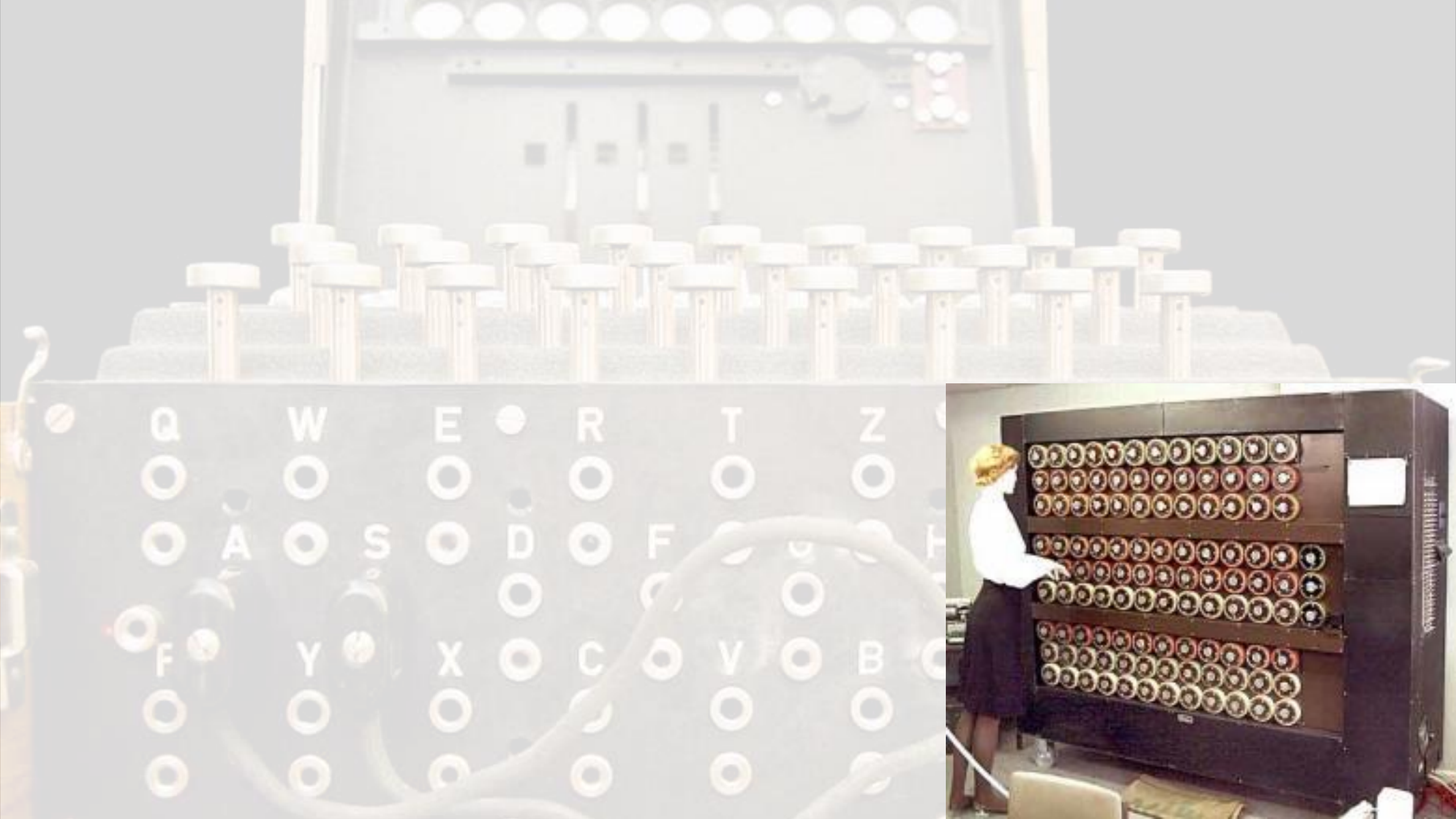
The story of a young statistician at the U.S. Census Bureau

IBM

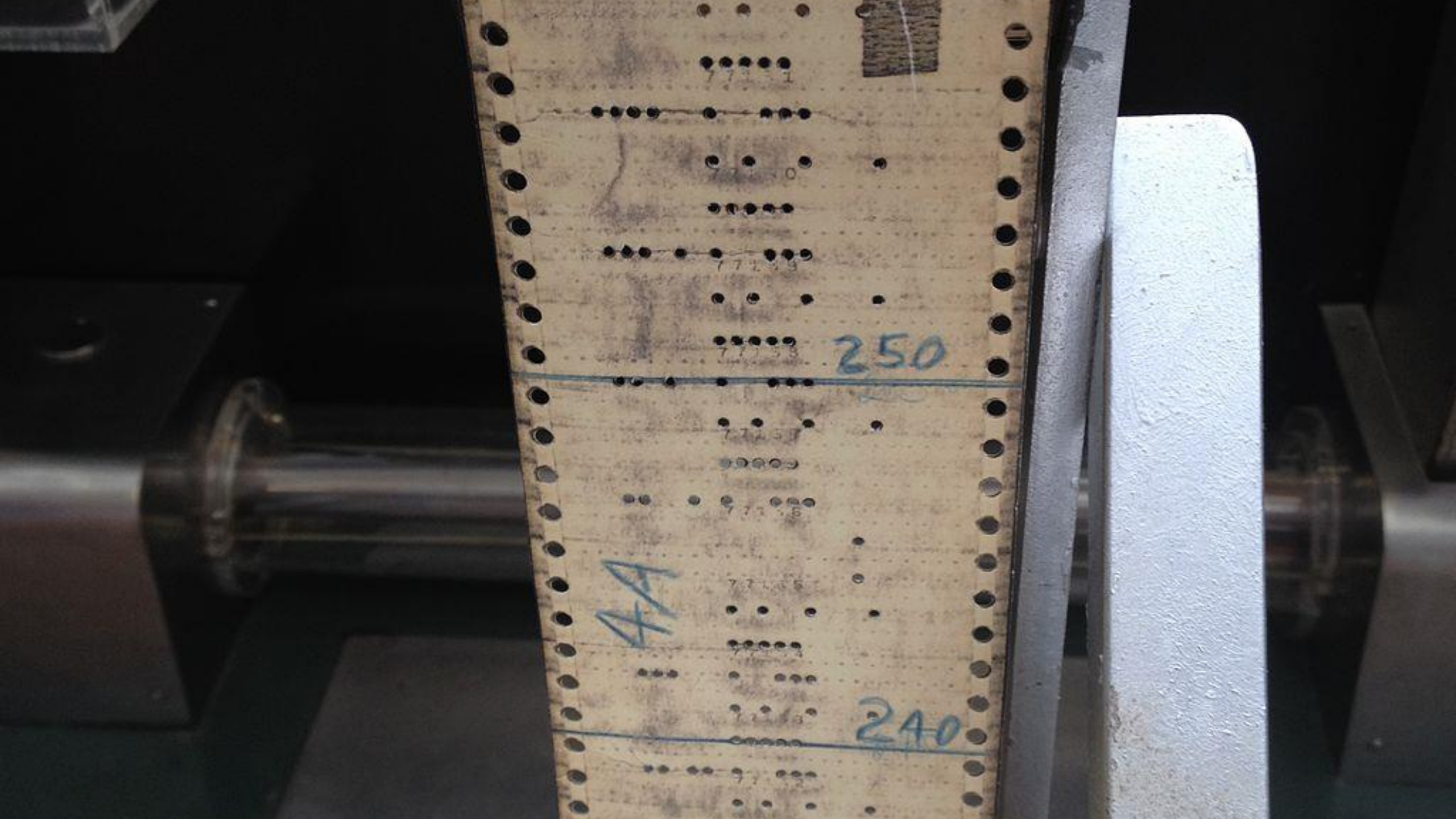
That concludes part I of this historical overview.

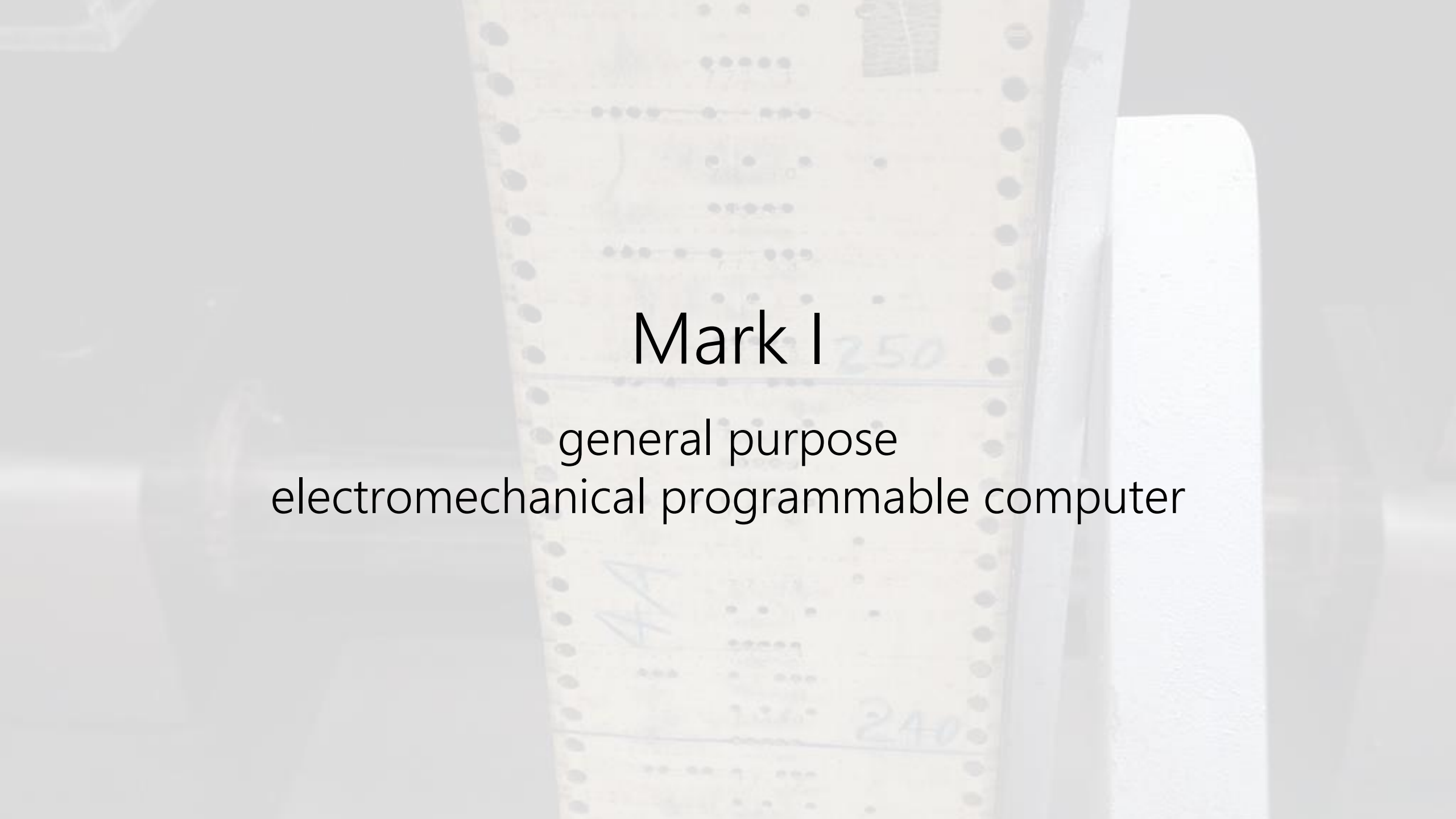
World War II


BEHIND
EVERY
COD
IS AN
ENIGMA
THE IMITATION GAME


Q W E R T Z
A S D F
F Y X C V B

U.S. Navy & IBM jointly fund
a project at Harvard University
under Professor Howard Aiken


250
240



Mark I

general purpose
electromechanical programmable computer

U.S. Army & University of Pennsylvania

ENIAC (Electronic Numerical Integrator and Calculator)

first fully electronic general-purpose programmable computer*

Alan Turing, England

Colossus, built in 1943 to help break Enigma

Konrad Zuse, Germany

Z1

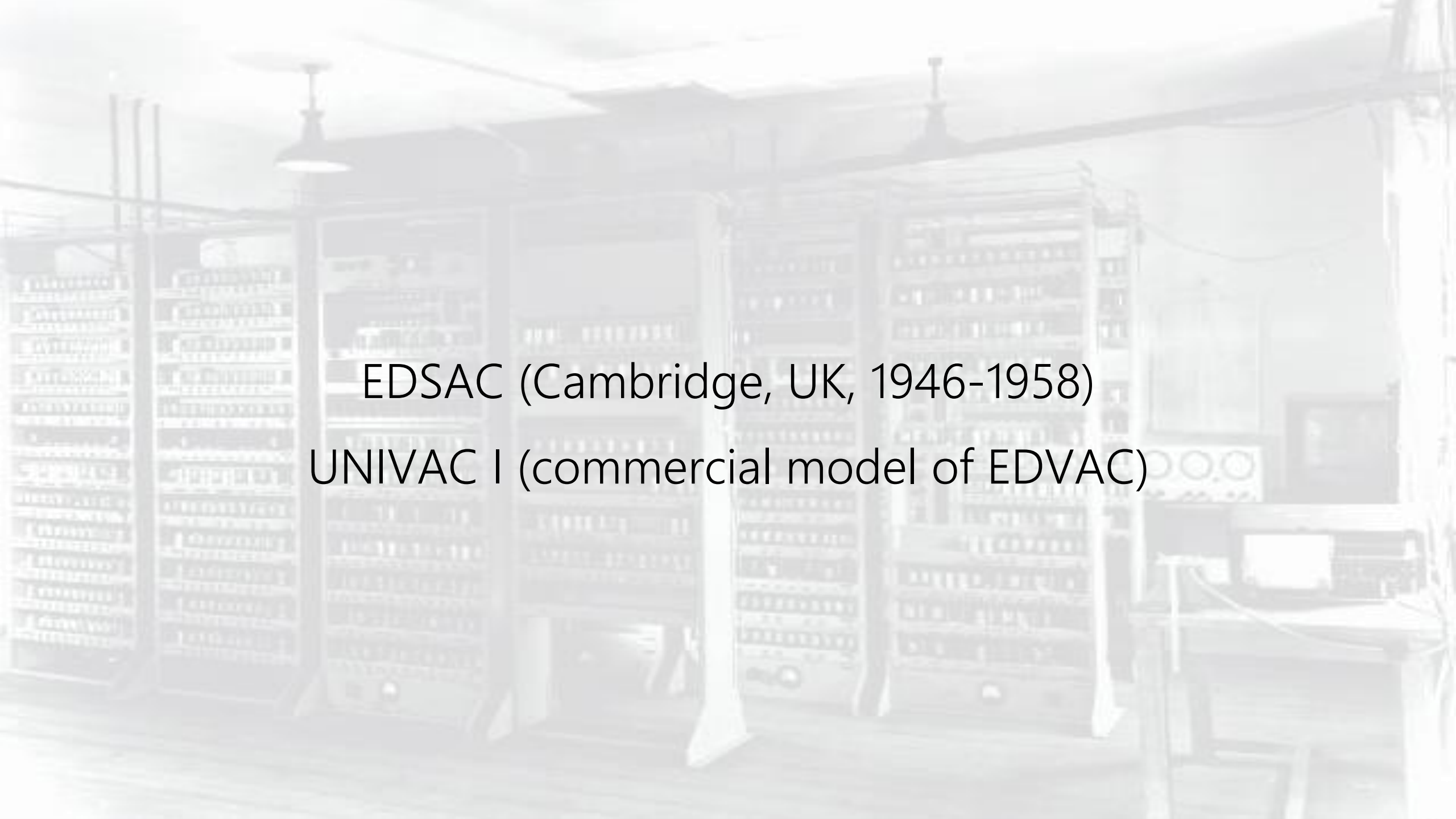
All these computers did not yet look like modern computers… one more step is missing.

Neumann János Lajos

(John von Neumann)

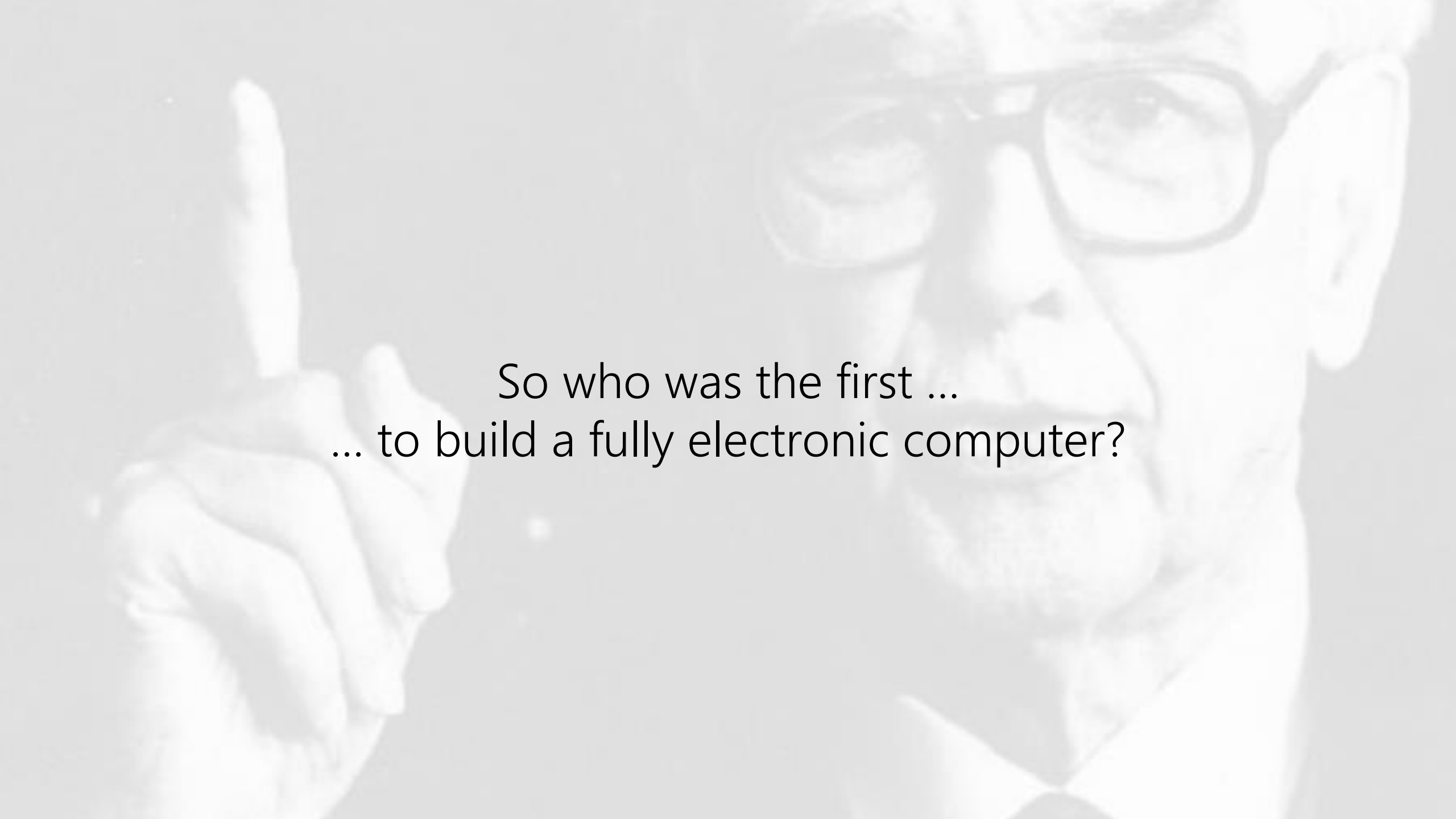
Stored program computer (1946)

EDVAC (1951)



EDSAC (Cambridge, UK, 1946-1958)

UNIVAC I (commercial model of EDVAC)



So who was the first …
… to build a fully electronic computer?

That concludes part II of this historical overview.

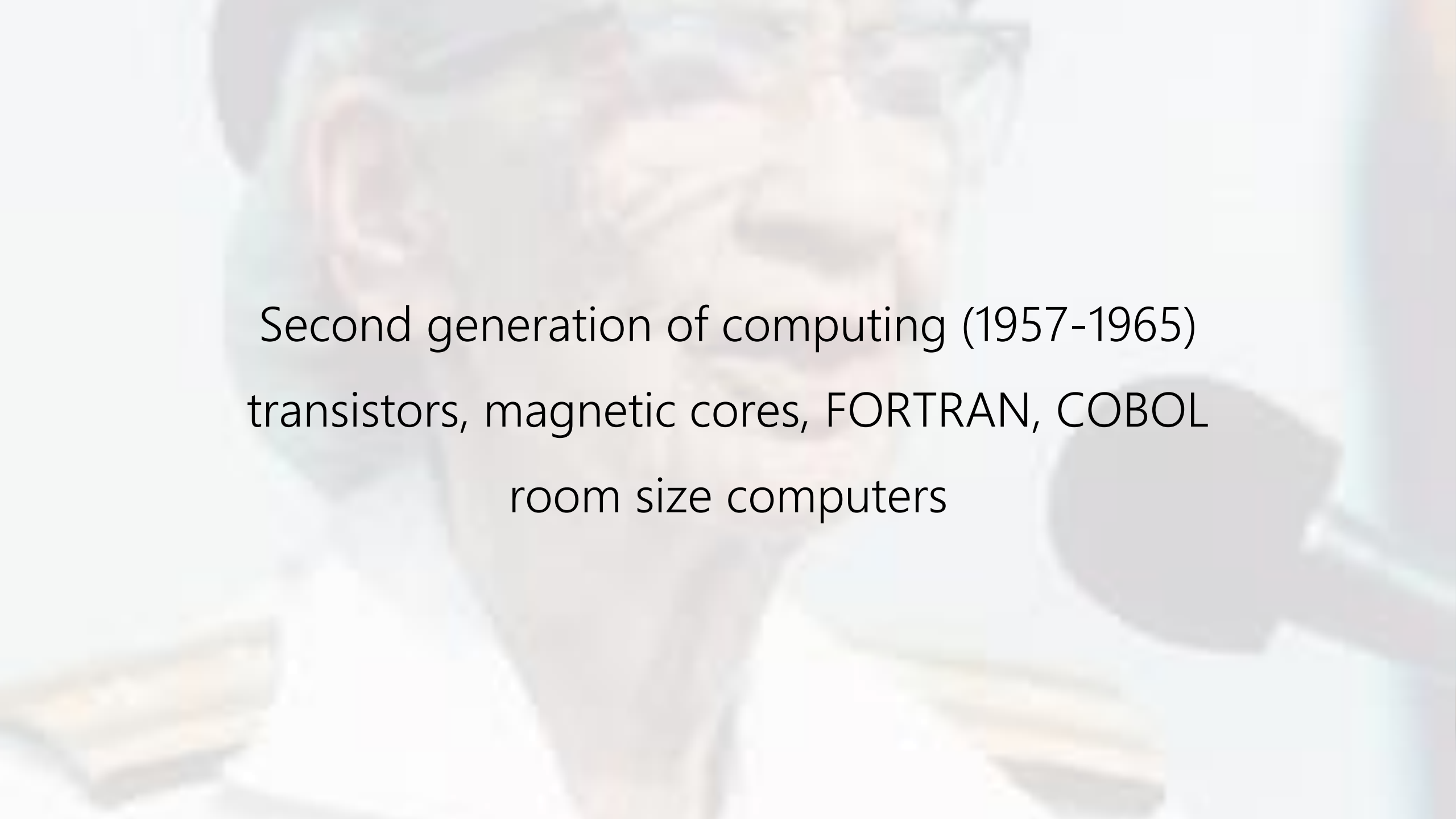
There is nothing new since Von Neumann.

Since 1950, computer systems development has been primarily an *evolutionary* process, not a revolutionary one.

First generation of computing (1950-1957)

UNIVAC I, IBM 701
bulky, expensive, slow, unreliable

building size computers



Second generation of computing (1957-1965)

transistors, magnetic cores, FORTRAN, COBOL

room size computers

Third generation of computing (1965-1975)

integrated circuit, PDP-1 minicomputer,
birth of software industry

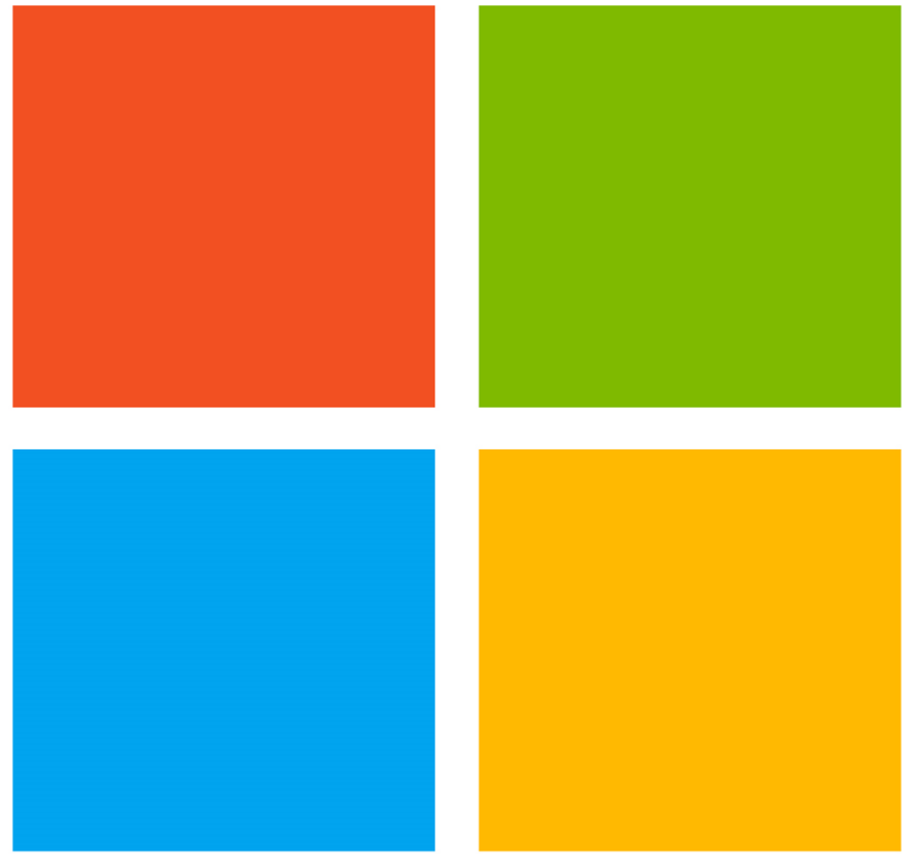
desk size computers

Fourth generation of computing (1975-1985)

first microcomputer Altair 8800, networks,
lots and lots of software

desktop (typewriter) size computers

About this Altair 8800 …



Microsoft

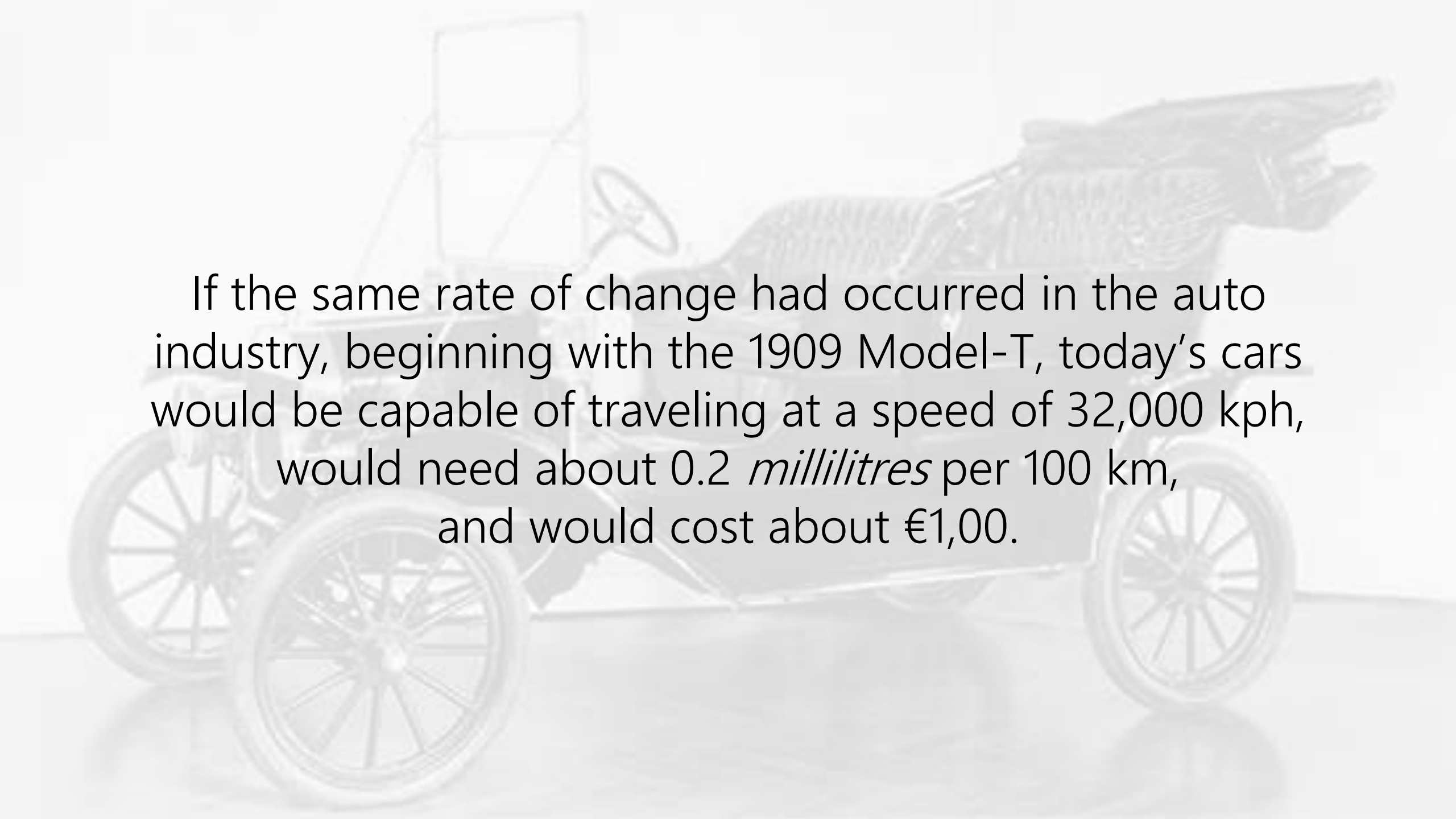
ZX Spectrum

Fifth generation of computing (1985-now)

concept of distinct generations outlived its usefulness, because things change so fast

Change is now the only constant.

Changes of this magnitude have never occurred so quickly in any other technology.



If the same rate of change had occurred in the auto industry, beginning with the 1909 Model-T, today's cars would be capable of traveling at a speed of 32,000 kph, would need about 0.2 *millilitres* per 100 km, and would cost about €1,00.

Take away lesson #P2

Technology and the world changes rapidly these days.
Don’t expect things to stay as they are.