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# Community Notes

**Code Campfire**  
[codecampfire.org/](http://codecampfire.org/)

**AI Tinkerers Group Nashville**  
[nashville.aitinkerers.org/](http://nashville.aitinkerers.org/)

**NSS Needs Volunteers**  
Talk to Ashley Canino on Slack!

**Nashville Data Nerds**  
Brilliant Women in Data  
Tuesday, March 25, 2025

# We Built I.T. : Women In Tech Through History



# Women Who Built Technology As We Know It Today

**Word Processing:** Evelyn Berezin, Merle Bachman, Suzanne Landa, Ulrike Brandi, Mary Jane Forbes, Dr. Lorinda Cherry **Leaders & Entrepreneurs:** Hamilton, Saydean Zeldin, Elsie Shutt, Ann Hardy, Ruth Leach Amonette, Anita Borg **Early Hardware:** Betty Holberton, Beulah Henry, Dr. Rózsa Péter, Mary Kenneth Keller, Stephanie "Steve" Shirley's, Betty Holberton, Margaret Fox, Jean Bartik, Grace Hopper, Milly Koss, Gloria Gordon Bolotsky, Thelma Estrin, Frances Spence and Ruth Teitelbaum, Margaret Hamilton, Patricia "Patsy" Simmers **Programming Languages:** Grace Hopper, Jean Sammet, Betty Holberton, Deborah "Debby" Castle, Mary K. Hawes, Jean E. Sammet, Gertrude Tierney, Kathleen Booth, Cynthia Solomon, Mary Kenneth Keller, Barbara Liskov, Karen Spärck Jones, Fran Allen **Compilers:** Grace Hopper , Lois Haibt, Frances E. Holberton, Adele Goldberg , Jean Sammet, Frances Elizabeth Allen **Personal Computers:** Mary Allen Wilkes, Adele Goldberg, Ruth Lichterman, Carol Shaw, Fran Bilas, and Kay McNulty **Hardware:** Frances Spence, Ruth Teitelbaum, Thelma Estrin, Gloria Gordon Bolotsky, Milly Koss, Patsy Simmers, Margaret Fox, Betty Holberton **Entrepreneuers & Leaders:** Diane Green, Meg Whitman, Sheryl Sandberg, Ursula Burns, Reshma Saujani, Whitney Wolfe Herd, Anne Wojcicki, Cher Wang, Weili Dai, Limor Fried, Julia Jartz, Kimberly Bryant, KAthren Minshew, Leah Busque, Lynda Winman, Aileen Lee, Pooja Sankar, Lisa Falzone, Debbie Sterling, Sheila Lirio Marcelo, Jessica Livingston, Dame Vera Stephanie "Steve" Shirley, Elsie Shutt, Elizabeth "Jake" Feinler, Pam Hardt-English, Sandra Kurtzig, Judith Estrin, Ann Winblad, Adele Goldberg, Brenda Laurel **Data & Databases:** E.F. "Betty" Codd, Patrcia Selinger, Sophie Wilson, Barbara Liskov, Shafi Goldwasser, Florence Nightingale, Gertrude Cox, Thelma Estrin **UI & UX:** Susan Kare, Brenda Laurel, Joy Mountford, Gillian Crampton Smith, Karen Holtzblatt **Mobile Development:** Sophie Wilson, Radia Perlman, Donna Dubinsky, Danese Cooper, Cher Wang **AI & Machine Learning:** Fei-Fei Li, Cynthia Breazeal, Daphne Koller, Carol Riley, Latanya Sweeney **Web:** Dame Wendy Hall, Caterina Fake, Mitchell Baker, Brewster Kahle, Stacey Horn, Dr. Genevieve Bell **Mathematics & Algorithms:** Ada Lovelace, Katherine Johnson, Annie Easley, Marilyn Meltzer, Mary Jackson **Video Games:** Roberta Williams, Donna Bailey, Brenda Romero, Kim Swift, Jane Jensen, Carol Shaw, Amy Hennig, Sheri Graner Ray, Muriel Tramis, Reiko Kodama, Mabel Addis, Anne Westfall, Rebecca Heineman, Corrinne Yu **Telecommunications:** Hedy Lamarr, Shirley Ann Jackson, Erna Schneider Hoover, Patricia Bath, Marian Croak **Space Technology:** Margaret Hamilton, Katherine Johnson, Dorothy Vaughan, Mary Jackson, Nancy Grace Roman, Ellen Ochoa **Computer Science Education:** Mildred Dresselhaus, Maria Klawe, Sister Mary Kenneth Keller, Gladys West, Frances Allen, Eva Tardos **Robotics & Automation:** Cynthia Breazeal, Maja Mataric, Helen Greiner, Ayanna Howard, Daniela Rus, Yoky Matsuoka **Open Source & Internet Freedom:** Radia Perlman, Mitchell Baker, Danese Cooper, Audrey Tang, Elizabeth Feinler **Information Security:** Dorothy Denning, Taher Elgamal, Katie Moussouris, Window Snyder, Nicole Pelerin **Human-Computer Interaction:** Lucy Suchman, Brenna Laurel, Sara Kiesler, Terry Roberts, Karen Sparck Jones, Gillian Crampton Smith **Digital Art & Creative Technology:** Lillian Schwarts, Laurie Andeson, Rebecca Allen, Joan Jonas, Camille Utterback, Char Davis ...**ALL OF US...**



## Early Pioneers



## Groundbreakers



## Data



## Entreprenuers



## UI/UX

# Early Pioneers





# Halley's Comet , Human Computers, & The First Programmer

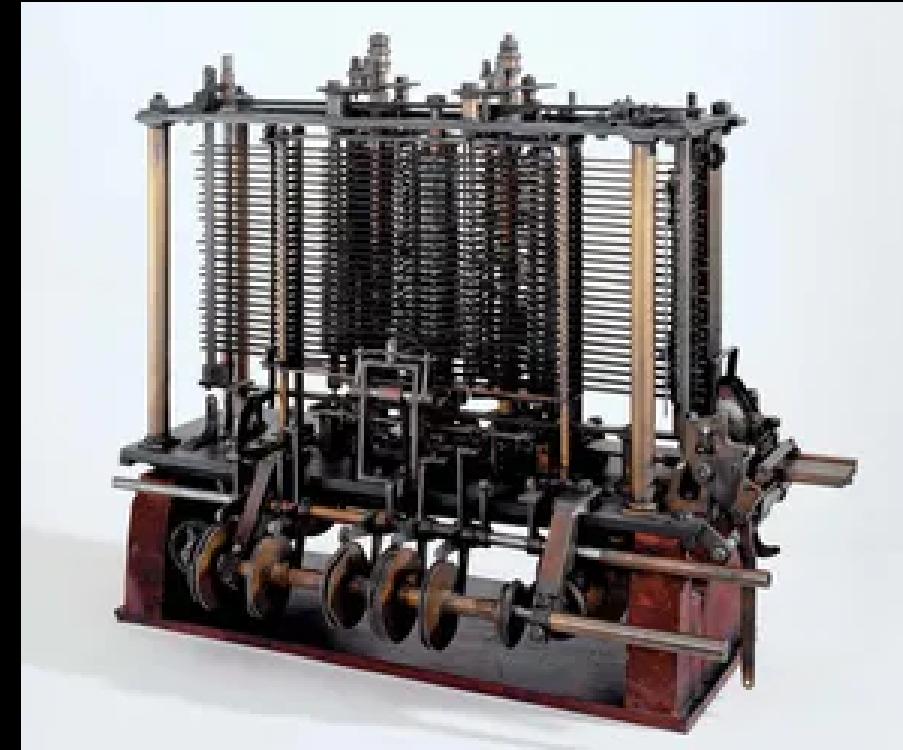


1753



Nicole-Reine Lepaute - collaborate with Jérôme Lalande to calculate Haley's Comet

1843



Ada Lovelace collaborated with Charles Babbage on his analytical engine

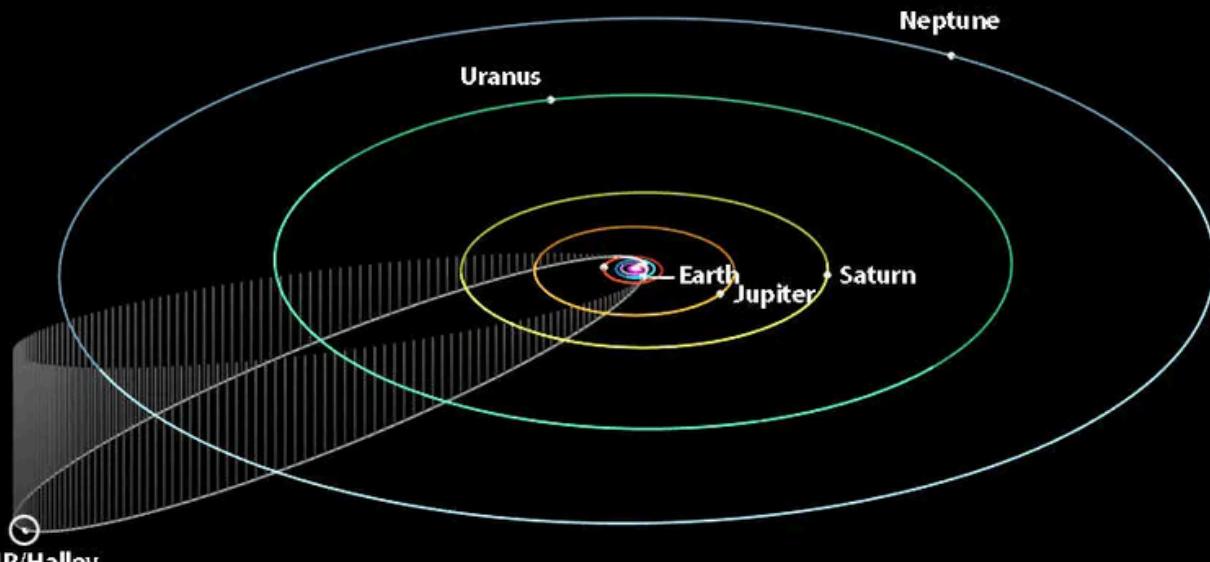
1877- 1975



Women to work as “computers” collecting and analyzing data.



# Nicole-Reine Etable de la Brière Lepaute



Did the calculations to predict the next appearance of Haley's comet better than anyone of the time.

Did she get credit for this?

Nombre de vibrations par heure.	Nombre de vibrations par heure.			Nombre de vibrations par heure.	Nombre de vibrations par heure.				
	plain.	poiss.	figue.		plain.	poiss.	figue.		
18000	0	4	5	62	15100	0	2	1	04
17900	0	3	5	82	15000	0	2	1	38
17800	0	2	6	02	14900	0	2	1	72
17700	0	2	6	22	14800	0	2	2	07
17600	0	2	6	43	14700	0	2	2	42
17500	0	2	6	64	14600	0	2	2	78
17400	0	2	6	85	14500	0	2	2	16
17300	0	2	7	05	14400	0	2	3	53
17200	0	2	7	26	14300	0	2	3	92
17100	0	2	7	47	14200	0	2	4	32
17000	0	2	7	68	14100	0	2	4	72
16900	0	2	7	89	14000	0	2	5	13
16800	0	2	8	09	13900	0	2	5	55
16700	0	2	8	29	13800	0	2	5	98
16600	0	2	8	50	13700	0	2	6	42
16500	0	2	8	71	13600	0	2	6	87
16400	0	2	9	23	13500	0	2	7	33
16300	0	2	9	49	13400	0	2	7	80
16200	0	2	9	75	13300	0	2	8	28
16100	0	2	10	02	13200	0	2	8	77
16000	0	2	10	30	13100	0	2	9	27
15900	0	2	10	59	13000	0	2	9	79
15800	0	2	10	87	12900	0	2	10	28
15700	0	2	11	16	12800	0	2	10	85
15600	0	2	11	46	12700	0	2	11	40
15500	0	2	11	76	12600	0	2	11	96
15400	0	2	12	07	12500	0	2	12	54
15300	0	2	12	39	12400	0	2	12	13
15200	0	2	12	71	12300	0	2	12	74

TABLE VI

Calculated the solar eclipse chart on  
1 April 1764

# Lady Lovelace: First Female Computer Programmer

Number of Operation.	Nature of Operation.	Variables acted upon.	Variables receiving results.	Indication of change in the value on any Variable.	Statement of Results.	Data.		Working Variables.								Result Variables.				
						V <sub>1</sub>	V <sub>2</sub>	V <sub>3</sub>	V <sub>4</sub>	V <sub>5</sub>	V <sub>6</sub>	V <sub>7</sub>	V <sub>8</sub>	V <sub>9</sub>	V <sub>10</sub>	V <sub>11</sub>	V <sub>12</sub>	V <sub>13</sub>	V <sub>14</sub>	
1	$\times$	V <sub>2</sub> $\times$ V <sub>3</sub>	V <sub>4</sub> , V <sub>5</sub> , V <sub>6</sub>	$V_2 = V_2$ $V_3 = V_3$ $V_4 = V_4$ $V_5 = V_5$ $V_6 = V_6$	$= 2n$	1	2	n	2n	2n	2n									
2	-	V <sub>4</sub> - V <sub>3</sub>	V <sub>4</sub>	$V_4 = V_3$	$= 2n - 1$		1			2n - 1										
3	+	V <sub>4</sub> + V <sub>1</sub>	V <sub>5</sub>	$V_4 = V_4$ $V_5 = V_5$	$= 2n + 1$		1				2n + 1									
4	+	V <sub>4</sub> + V <sub>4</sub>	V <sub>11</sub>	$V_4 = V_4$ $V_5 = V_5$ $V_4 = V_4$	$= 2n - 1$				0	0										
5	+	V <sub>10</sub> + V <sub>2</sub>	V <sub>11</sub>	$V_{10} = V_{10}$ $V_2 = V_2$	$= \frac{1}{2} \cdot 2n - 1$															
6	-	V <sub>13</sub> - V <sub>10</sub>	V <sub>12</sub>	$V_{10} = V_{10}$ $V_2 = V_2$ $V_{13} = V_{13}$	$= -\frac{1}{2} \cdot 2n + 1 = A_0$															
7	-	V <sub>2</sub> - V <sub>1</sub>	V <sub>10</sub>	$V_2 = V_2$ $V_1 = V_1$	$= n - 1 (= 3)$		1		n											
8	+	V <sub>2</sub> + V <sub>2</sub>	V <sub>7</sub>	$V_2 = V_2$ $V_7 = V_7$	$= 2 + 0 = 2$		2					2								
9	+	V <sub>8</sub> + V <sub>7</sub>	V <sub>13</sub>	$V_8 = V_8$ $V_7 = V_7$	$= \frac{2}{2} = A_1$					2n	2									
10	$\times$	V <sub>12</sub> $\times$ V <sub>10</sub>	V <sub>12</sub>	$V_{12} = V_{12}$ $V_{10} = V_{10}$	$= B_1 \cdot \frac{2n}{2} = B_1 A_1$											$\frac{2n}{2} = A_1$	B <sub>1</sub>			
11	+	V <sub>12</sub> + V <sub>13</sub>	V <sub>13</sub>	$V_{12} = V_{12}$ $V_{13} = V_{13}$	$= -\frac{1}{2} \cdot \frac{2n - 1}{2n + 1} + B_1 \cdot \frac{2n}{2}$											0	$\left\{ -\frac{1}{2} \cdot \frac{2n - 1}{2n + 1} + B_1 \cdot \frac{2n}{2} \right\}$			
12	-	V <sub>10</sub> - V <sub>1</sub>	V <sub>10</sub>	$V_{10} = V_{10}$ $V_1 = V_1$	$= n - 2 (= 2)$		1													
13	-	V <sub>6</sub> - V <sub>1</sub>	V <sub>6</sub>	$V_6 = V_6$	$= 2n - 1$		1				2n - 1									
14	+	V <sub>1</sub> + V <sub>7</sub>	V <sub>2</sub>	$V_1 = V_1$ $V_7 = V_7$	$= 2 + 1 = 3$		1					3								
15	+	V <sub>6</sub> + V <sub>7</sub>	V <sub>8</sub>	$V_6 = V_6$ $V_7 = V_7$	$= \frac{2n - 1}{3}$					2n - 1	3	2n - 1								
16	$\times$	V <sub>8</sub> $\times$ V <sub>10</sub>	V <sub>11</sub>	$V_8 = V_8$ $V_{10} = V_{10}$	$= \frac{2n}{2} \cdot \frac{2n - 1}{3}$							0					$\frac{2n}{2} \cdot \frac{2n - 1}{3}$			
17	-	V <sub>6</sub> - V <sub>1</sub>	V <sub>6</sub>	$V_6 = V_6$	$= 2n - 2$		1			2n - 2										
18	+	V <sub>1</sub> + V <sub>7</sub>	V <sub>7</sub>	$V_1 = V_1$ $V_7 = V_7$	$= 3 + 1 = 4$		1					4								
19	+	V <sub>6</sub> + V <sub>7</sub>	V <sub>9</sub>	$V_6 = V_6$ $V_7 = V_7$	$= \frac{2n - 2}{4}$					2n - 2	4	2n - 2					$\left\{ \frac{2n}{2} \cdot \frac{2n - 1}{3} \cdot \frac{2n - 2}{3} = A_2 \right\}$			
20	$\times$	V <sub>9</sub> $\times$ V <sub>10</sub>	V <sub>11</sub>	$V_9 = V_9$ $V_{10} = V_{10}$	$= \frac{2n}{2} \cdot \frac{2n - 1}{3} \cdot \frac{2n - 2}{4} = A_2$							0								
21	$\times$	V <sub>12</sub> $\times$ V <sub>10</sub>	V <sub>12</sub>	$V_{12} = V_{12}$ $V_{10} = V_{10}$	$= B_2 \cdot \frac{2n}{2} \cdot \frac{2n - 1}{3} \cdot \frac{2n - 2}{4} = B_2 A_2$											0	B <sub>2</sub> A <sub>2</sub>	E <sub>2</sub>		
22	+	V <sub>12</sub> + V <sub>13</sub>	V <sub>12</sub>	$V_{12} = V_{12}$ $V_{13} = V_{13}$	$= A_0 + B_1 A_1 + B_2 A_2$											0	$\left\{ A_0 + B_1 A_1 + B_2 A_2 \right\}$			
23	-	V <sub>10</sub> - V <sub>1</sub>	V <sub>10</sub>	$V_{10} = V_{10}$ $V_1 = V_1$	$= n - 3 (= 1)$		1													
24	+	V <sub>13</sub> + V <sub>12</sub>	V <sub>24</sub>	$V_{13} = V_{13}$ $V_{12} = V_{12}$	$= B_2$														B <sub>2</sub>	
25	+	V <sub>1</sub> + V <sub>3</sub>	V <sub>3</sub>	$V_1 = V_1$ $V_3 = V_3$	$= n + 1 = 4 + 1 = 5$		1		n + 1			0	0							

Here follows a repetition of Operations thirteen to twenty-three.



One of Ada's diagrams representing the sequence of a program for Babbage's Analytical Engine. Ada first conceived the programming concepts: Loops, Binary, Storage, Switch, memory, indexing, comments

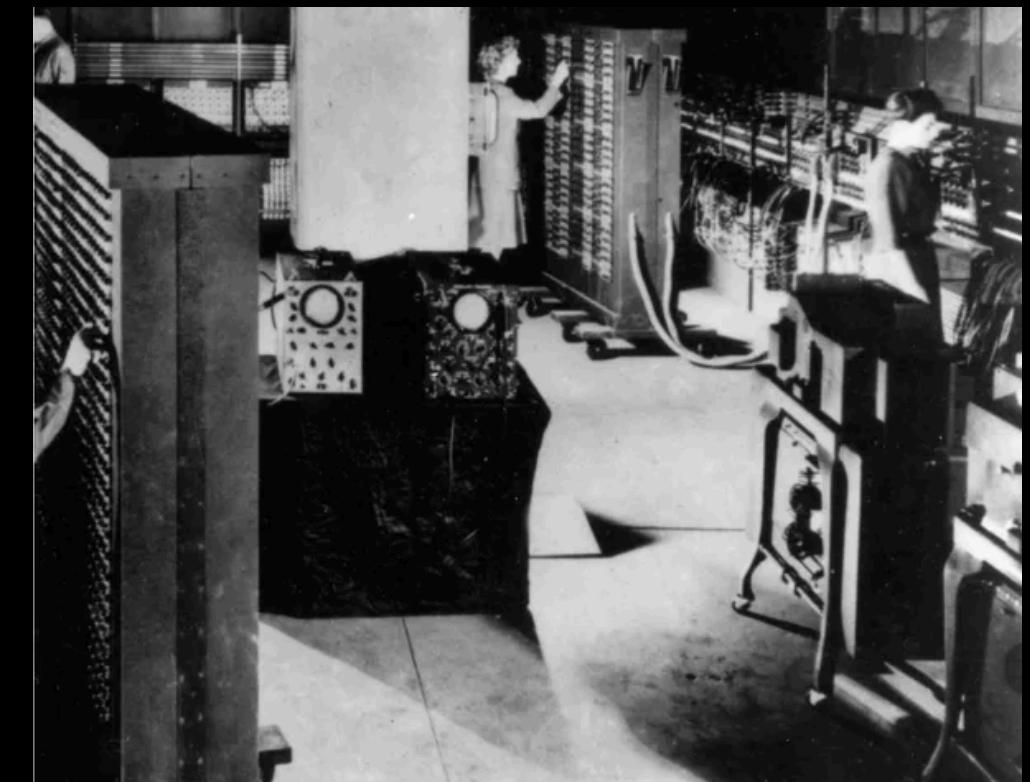
# Women as Human Computers



The Harvard Computers



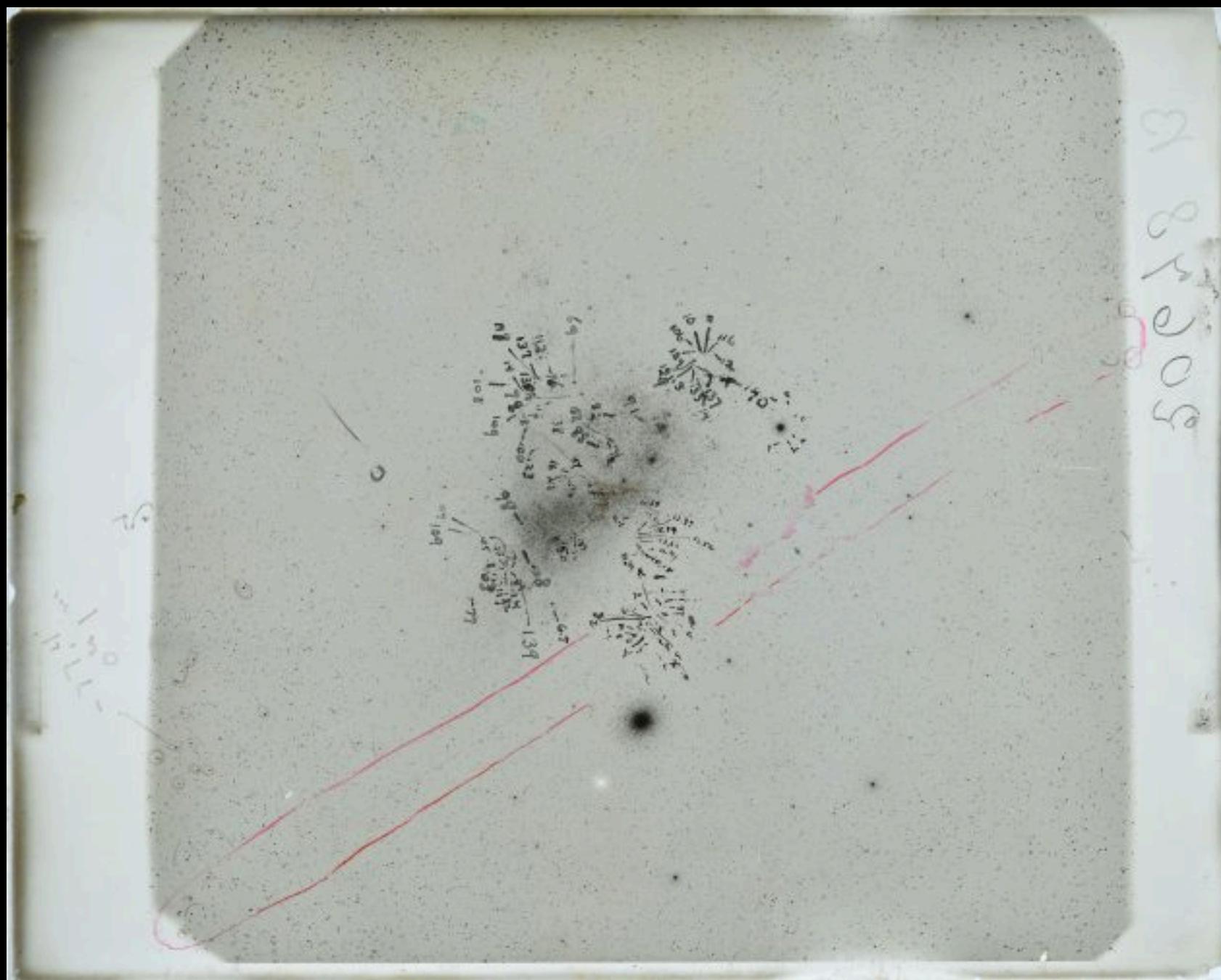
Mathematical Tables Project



The Philadelphia Computing Section

The start of programming being a Pink Ghetto job market

# The Harvard Computers



A glass plate photograph used to calculate the universe. The women, prepared the plates, took the photographs, and did the calculations.



The majority of these women are not remembered individually but collectively, as Pickering's Harem.

# Mathematical Tables Project

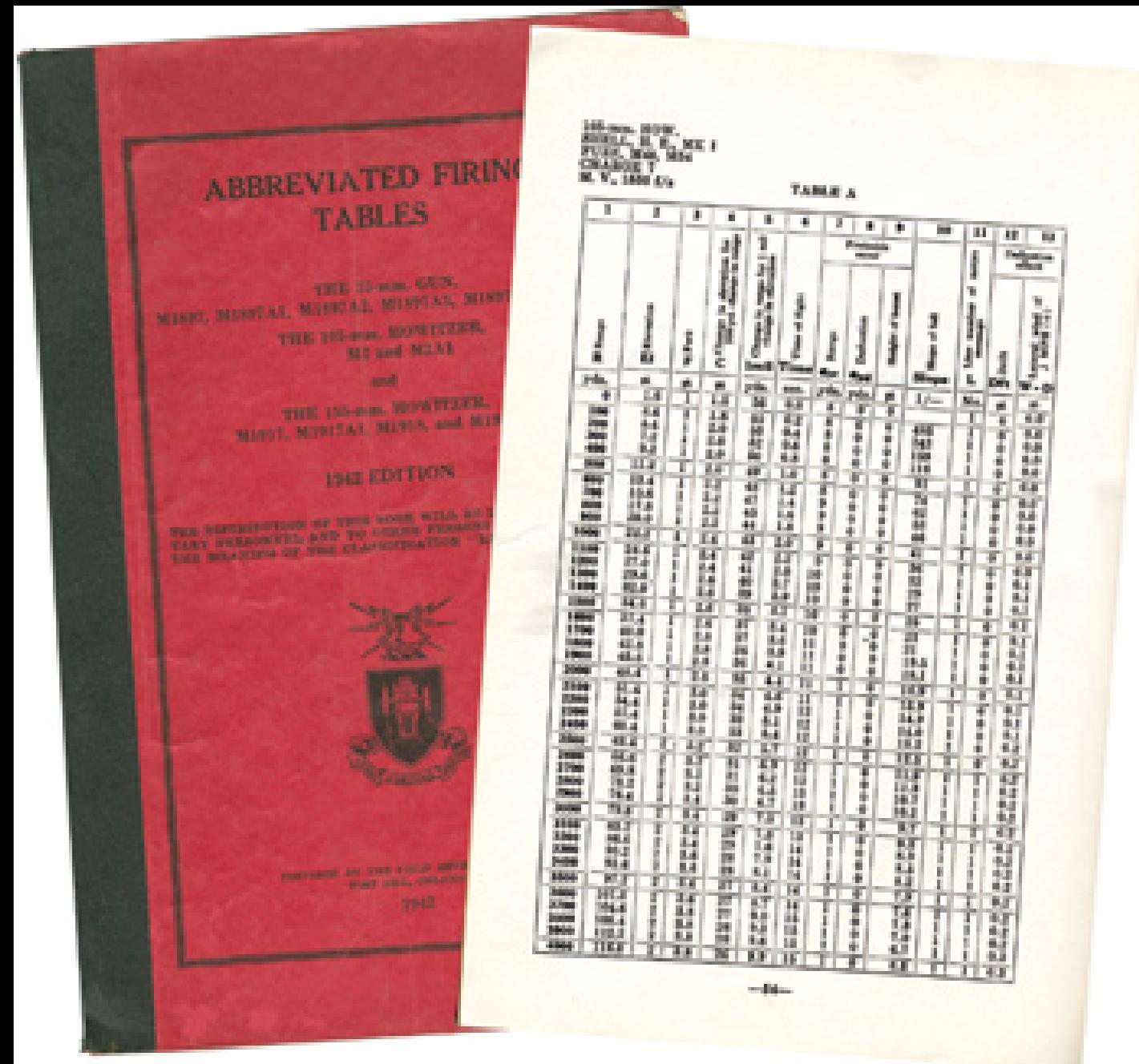


Produced thirty-seven volumes of tables for trigonometric functions, exponentials, logarithms



Women worked with calculating machine, doing their part then handing the pages to the next group

# The Philadelphia Computing Section



Produced the weather and trajectory tables for each weapon that was released during WWII



Kathleen Antonelli (far left), Alyse Snyder, and Sis Stump operate the differential analyzer in the basement of the Moore School of Electrical Engineering in the years leading up to ENIAC's construction.

# Early Pioneers



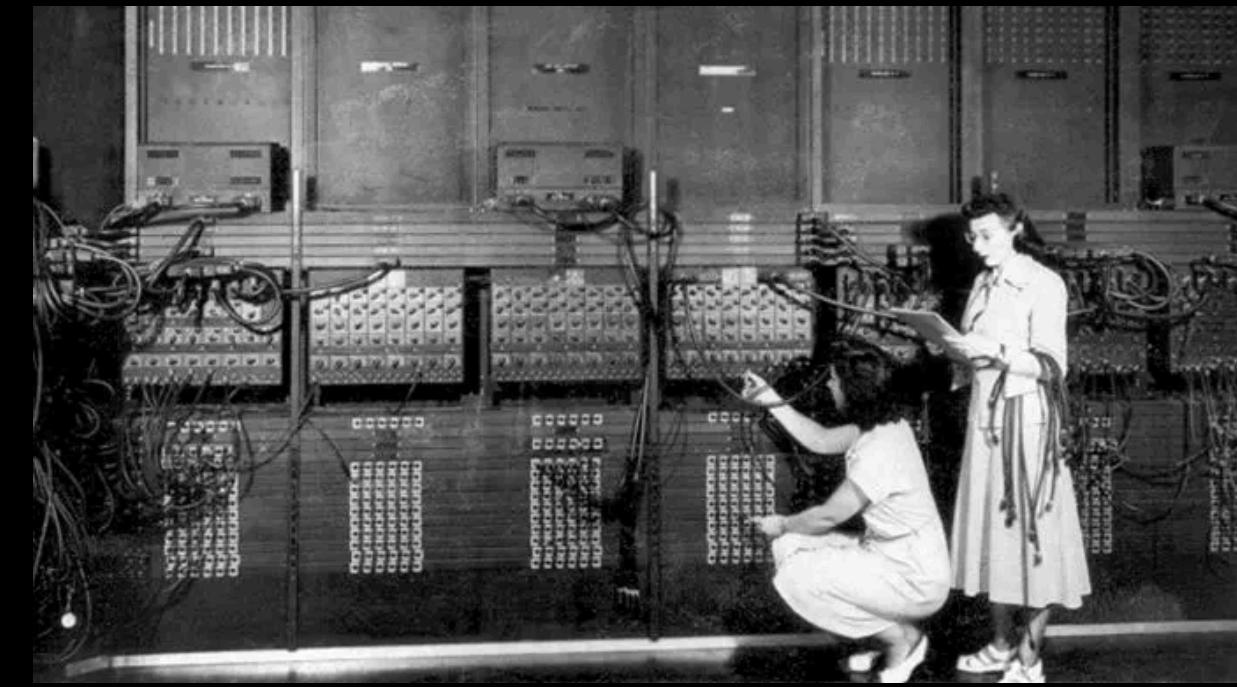
# Groundbreakers



# Groundbreakers



# ENIAC & the "Sensational Six"



"They were handed a new field, perhaps by people who underestimated the intellectual requirements of that field, who simply said 'We built it and you program it.' It was more sophisticated than that, and they rose to the occasion." - Andre DeHon

# Grace Hopper

Created the base for how we program and interact with computers today

## Contributions to Tech:

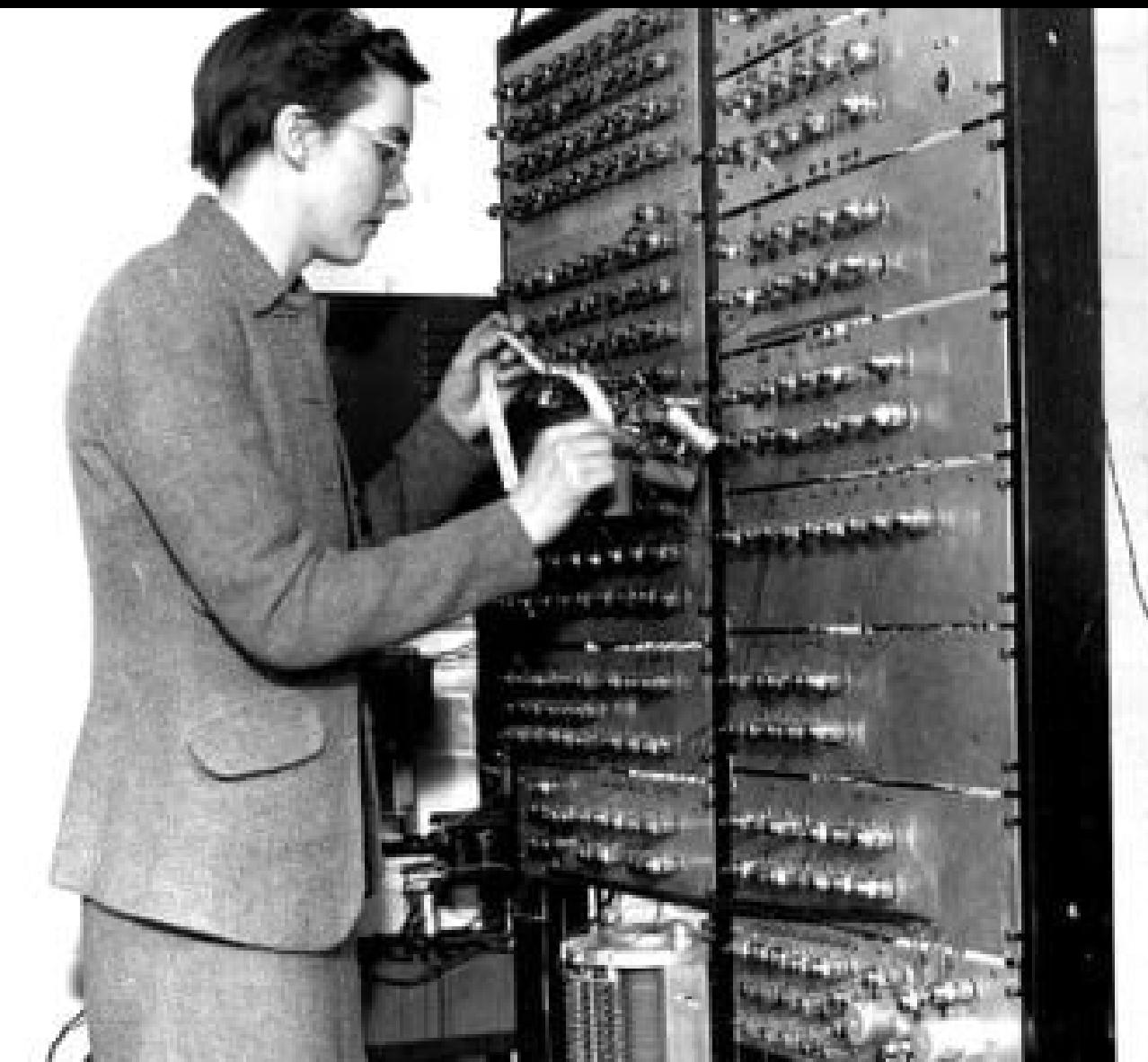
- Automating Programming
- First Bug (a Moth)
- First Programming Languages (Flow-Matic & COBOL)
- First Compiler (A-o)
- Networking: small distributed machines over large centralized
- Standards for testing
- Encouraged others to pursue computers



"So I decided data processors ought to be able to write their programs in English, and the computers would translate them into machine code."

**"The most important thing I've accomplished, other than building the compiler, is training young people."**

# Kathleen Booth



- Created the first Assembly Language
- Built Computers
- Programmed Computers
- Taught Programming

```
MONITOR FOR 6802 1.4          9-14-80  TSC ASSEMBLER PAGE 2

C000          ORG      ROM+$0000 BEGIN MONITOR
C000 8E 00 70  START    LDS      #STACK
*****
* FUNCTION: INITA - Initialize ACIA
* INPUT: none
* OUTPUT: none
* CALLS: none
* DESTROYS: acc A

0013        RESETA  EQU     %00010011
0011        CTLREG EQU     %00010001

C003 86 13  INITA   LDA A  #RESETA  RESET ACIA
C005 B7 80 04          STA A  ACIA
C008 86 11          LDA A  #CTLREG  SET 8 BITS AND 2 STOP
C00A B7 80 04          STA A  ACIA

C00D 7E C0 F1        JMP     SIGNON  GO TO START OF MONITOR
*****
* FUNCTION: INCH - Input character
* INPUT: none
* OUTPUT: char in acc A
* DESTROYS: acc A
* CALLS: none
* DESCRIPTION: Gets 1 character from terminal

C010 B6 80 04  INCH    LDA A  ACIA    GET STATUS
C013 47          ASR A   ACIA    SHIFT RDRF FLAG INTO CARRY
C014 24 FA          BCC    INCH    RECIEVE NOT READY
C016 B6 80 05          LDA A  ACIA+1  GET CHAR
C019 84 7F          AND A  #$7F    MASK PARITY
C01B 7E C0 79          JMP    OUTCH   ECHO & RTS
*****
* FUNCTION: INHEX - INPUT HEX DIGIT
* INPUT: none
* OUTPUT: Digit in acc A
* CALLS: INCH
* DESTROYS: acc A
* Returns to monitor if not HEX input

C01E 8D F0        INHEX   BSR     INCH    GET A CHAR
C020 81 30          CMP A  #'0    ZERO
C022 2B 11          BMI    HEXERR  NOT HEX
C024 81 39          CMP A  #'9    NINE
C026 2F 0A          BLE    HEXRTS  GOOD HEX
C028 81 41          CMP A  #'A    NOT HEX
C02A 2B 09          BMI    HEXERR  NOT HEX
C02C 81 46          CMP A  #'F    FIX A-F
C02E 2E 05          BGT    HEXERR
C030 80 07          SUB A  #7    CONVERT ASCII TO DIGIT
C032 84 0F          HEXRTS AND A  #$0F
C034 39              RTS
C035 7E C0 AF        HEXERR  JMP     CTRL    RETURN TO CONTROL LOOP
```

# Winning WWII & Getting to the Moon



Katherine Johnson

Dorothy Vaughan

Mary W. Jackson

Margaret Hamilton

# Katherine Johnson



Katherine Receiving the Presidential Medal of Freedom  
in 2015

"We needed to be assertive as women in those days – assertive and aggressive – and the degree to which we had to be that way depended on where you were. I had to be. In the early days of NASA women were not allowed to put their names on the reports – no woman in my division had had her name on a report. I was working with Ted Skopinski and he wanted to leave and go to Houston ... but Henry Pearson, our supervisor – he was not a fan of women – kept pushing him to finish the report we were working on. Finally, Ted told him, "Katherine should finish the report, she's done most of the work anyway." So Ted left Pearson with no choice; I finished the report and my name went on it, and that was the first time a woman in our division had her name on something."

# Mary W. Jackson



The first female African American NASA engineer.



Mary Jackson, first row, far right, stands with staff in front of the 4 foot by 4 foot Supersonic Pressure Tunnel in the 1950's.

# Dorothy Vaughan

NASA's First Black Manager

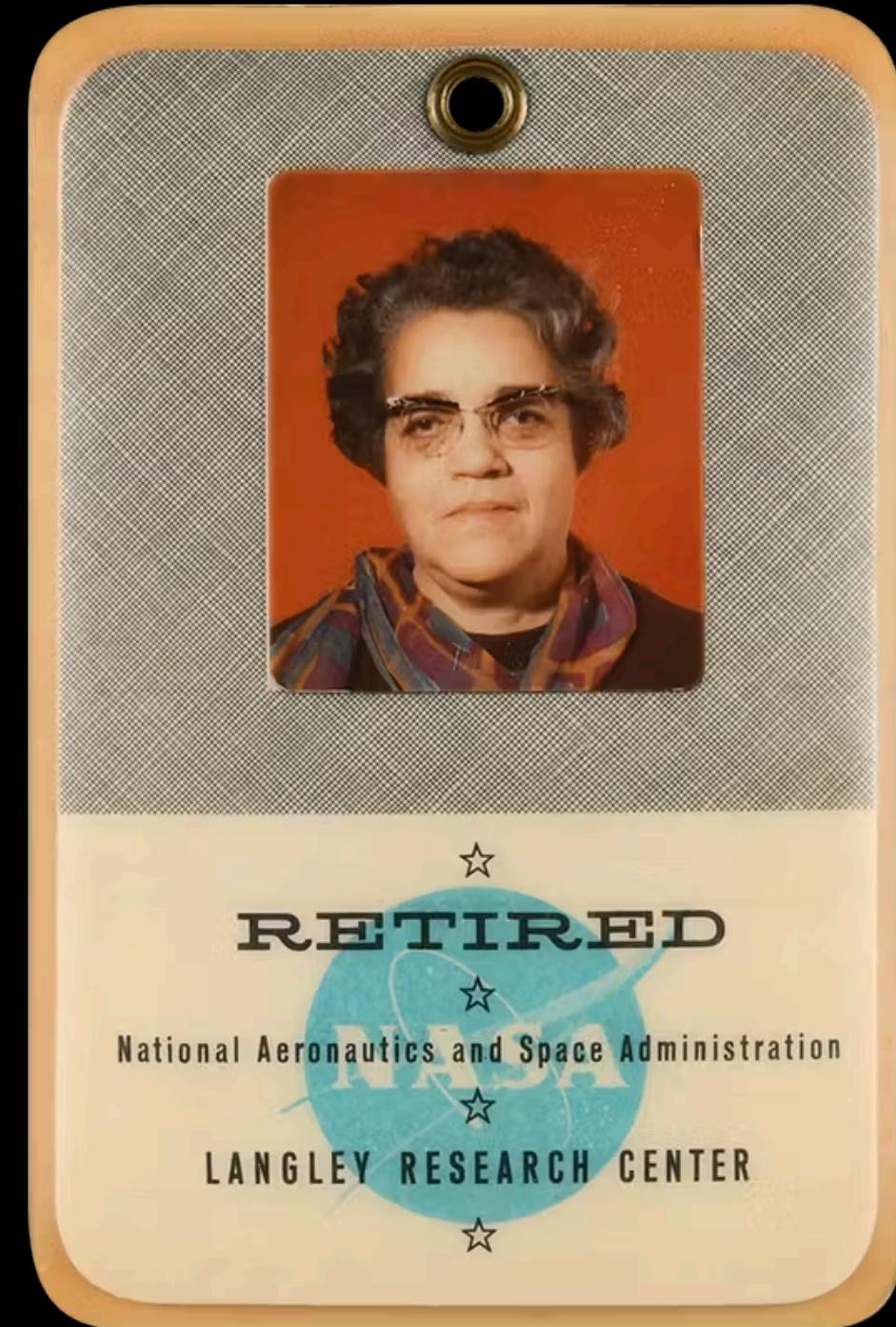
Managed the “West Area Computing” unit, an all-black group of female mathematicians

Built an astounding reputation for her unit

Self-Taught Programmer (FORTRAN)

Taught her unit FORTRAN

Raised 6 children



"I changed what I could, and what I couldn't, I endured."

# Margaret Hamilton

Hamilton's work called "the foundation for ultra-reliable software design"



Hamilton in 1969, standing next to listings of the software she and her MIT team produced for the Apollo project



In an Apollo Command Module. NASA

# Early Tech Business



Personal Computers



Early Hardware



Word Processing



Programming Languages



Compilers

These Women: Established Foundations, Documentation, Standards, Usability, Programability

# Programming Languages

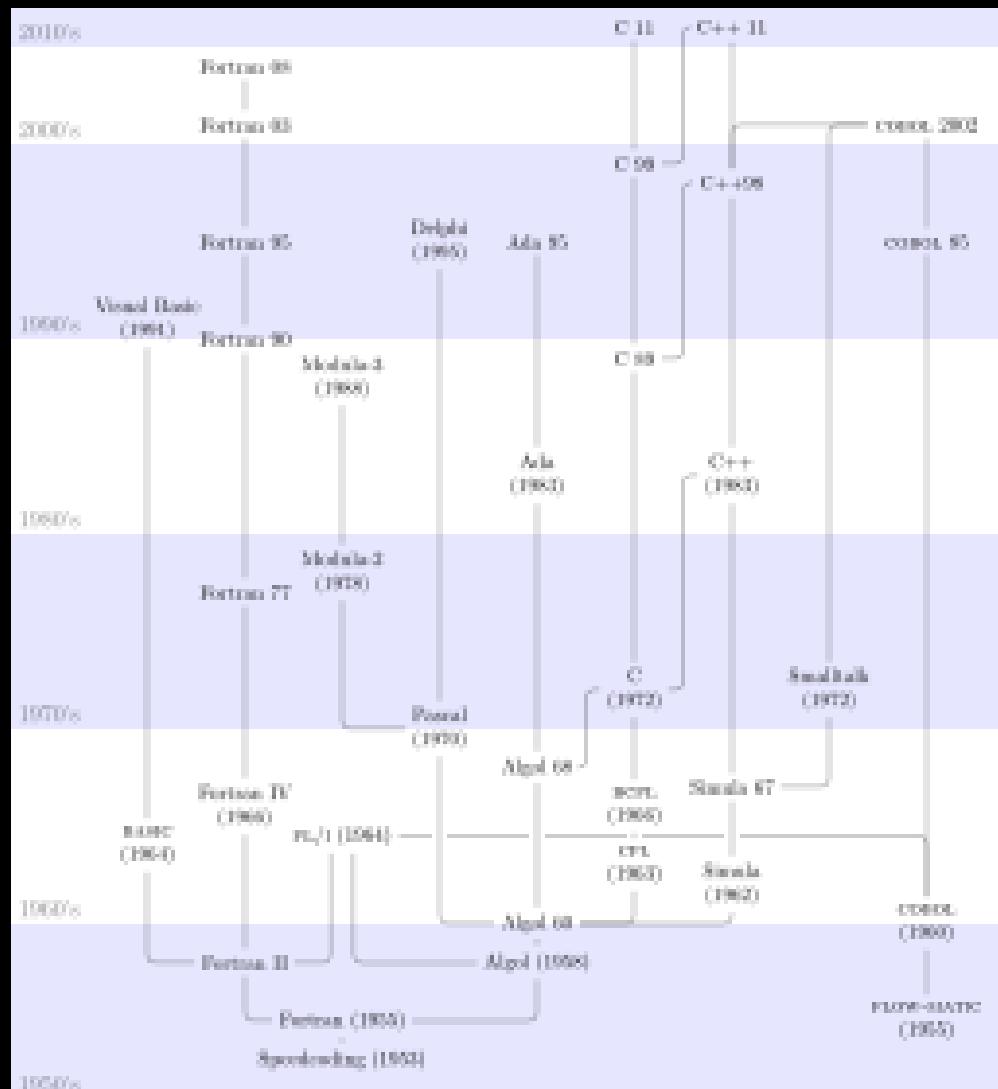
## FORTRAN

Developed for Scientific and Engineering applications

Lois Haibt, Irene Adler, Joyce Curry, Betty Holberton, Evelyn Boyd Granville



Punch Card for FORTAN



FORTRAN and COBOL genealogy tree

## COBOL

English-Like language in which the same program could run on different hardware

Grace Hopper, Jean Sammet, Betty Holberton, Mary K. Hawes, and Gertrude Tierney

```
1 IDENTIFICATION DIVISION.  
2 PROGRAM-ID. ADD_NUMBERS.  
3 DATA DIVISION.  
4 FILE SECTION.  
5 WORKING-STORAGE SECTION.  
6 01 FIRST-NUMBER PICTURE IS 99.  
7 01 SECOND-NUMBER PICTURE IS 99.  
8 01 RESULT PICTURE IS 9999.  
9 PROCEDURE DIVISION.  
10  
11 MAIN-PROCEDURE.  
12 DISPLAY "Here is the first Number "  
13 MOVE 8 TO FIRST-NUMBER  
14 DISPLAY FIRST-NUMBER  
15  
16 DISPLAY "Let's add 20 to that number."  
17 ADD 20 TO FIRST-NUMBER  
18 DISPLAY FIRST-NUMBER  
19  
20 DISPLAY "Create a second variable"  
21 MOVE 30 TO SECOND-NUMBER  
22 DISPLAY SECOND-NUMBER  
23  
24 *>COMMENT: COMPUTE THE TWO NUMBER AND PLACE INTO RESULT*  
25 COMPUTE RESULT = FIRST-NUMBER + SECOND-NUMBER.  
26  
27 DISPLAY "The result is:".  
28 DISPLAY RESULT.  
29 STOP RUN.  
30 END PROGRAM ADD_NUMBERS.  
31
```

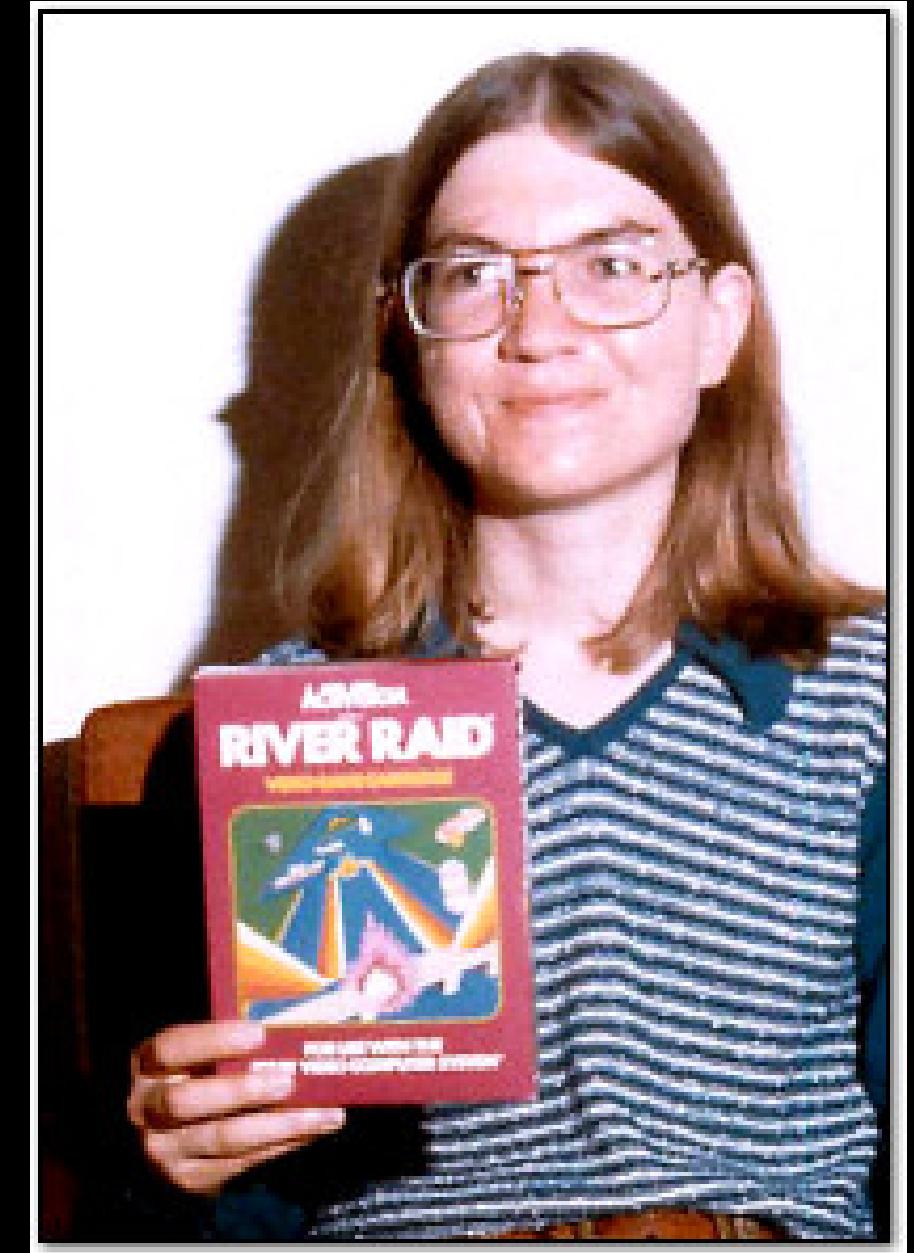
# Personal Computers



Mary Allen Wilkes and the LINC



Ruth Lichterman & the Apple I computer



Carol Shaw, programmed early  
Atari Games

# Word Processing



Evelyn Berezin and the first Word Processor, the Data Secretary



Dr. Lorinda Cherry text processing tools for Unix

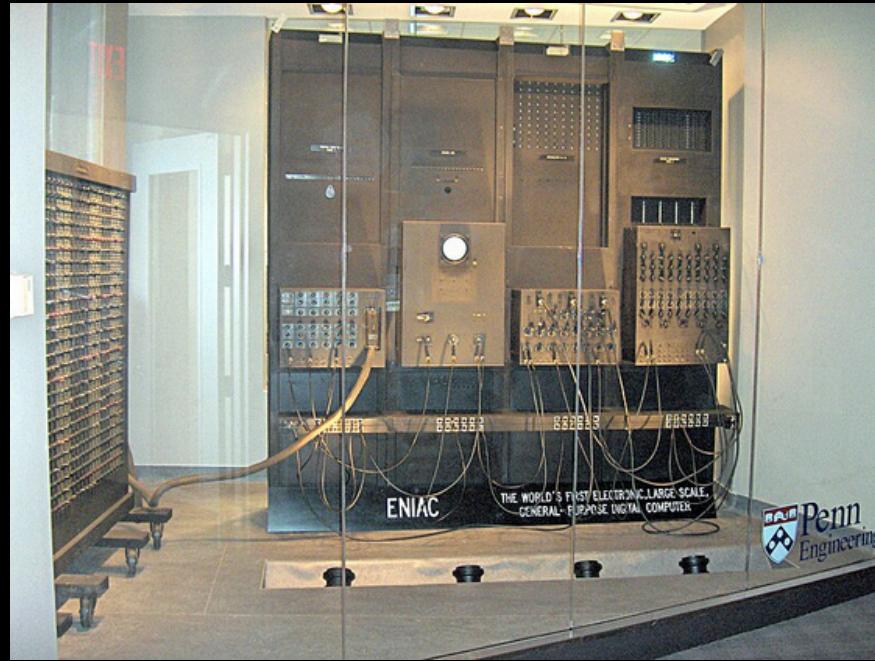


Merle Bachman led the software development team for the Wang Word Processing System (WPS) in 1976



Ulrike Brandi and Mary Jane Forbes contributed to the development of Xerox PARC

# Early Hardware



Frances Spence and Ruth Teitelbaum designed new ways to wire the program control systems for ENIAC



Betty Holberton designed the console keyboard layout in 1952 (still used today)

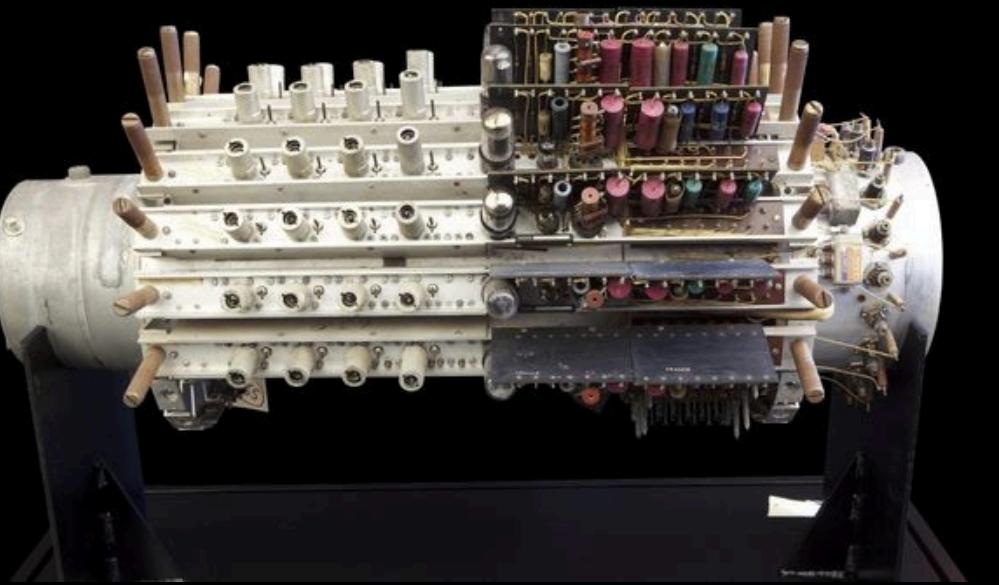


Gloria Gordon Bolotsky - Developed standard for hardware reliability

# Early Hardware



Patsy Simmers designed the memory for the  
MANIAC



Milly Koss - Memory for UNIVAC



Thelma Estrin - developed the first EEG

# Compilers

Frances E. Holberton helped develop early compiler standards



Lois Haibt key developer of the first FORTRAN compiler

Grace Hopper led the development of the first compiler, A-o



Adele Goldberg object-oriented programming compilers

# Early Pioneers



# Groundbreakers



# UI/UX



# Entreprenuers



# Elsie Shutt

Founded the First Software Company

Hired mostly women who had families

Women worked from home

Had a training program for women without experience

First known to do code reviews

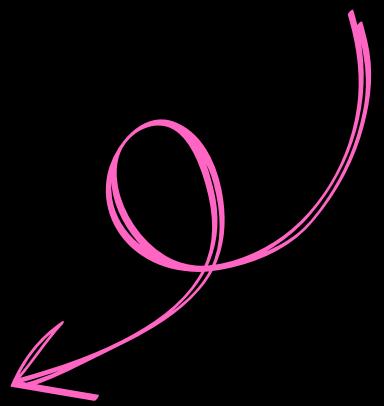


# Ann Hardy

First Female VP at Tymshare (1966)

Wrote whole operating systems: a pioneer in time-sharing systems and computer networks.

Foundations of the internet



Founded KeyLogic, focusing on time-sharing hardware and software

Co-founded Agorics, specializing in web-based marketplace applications.



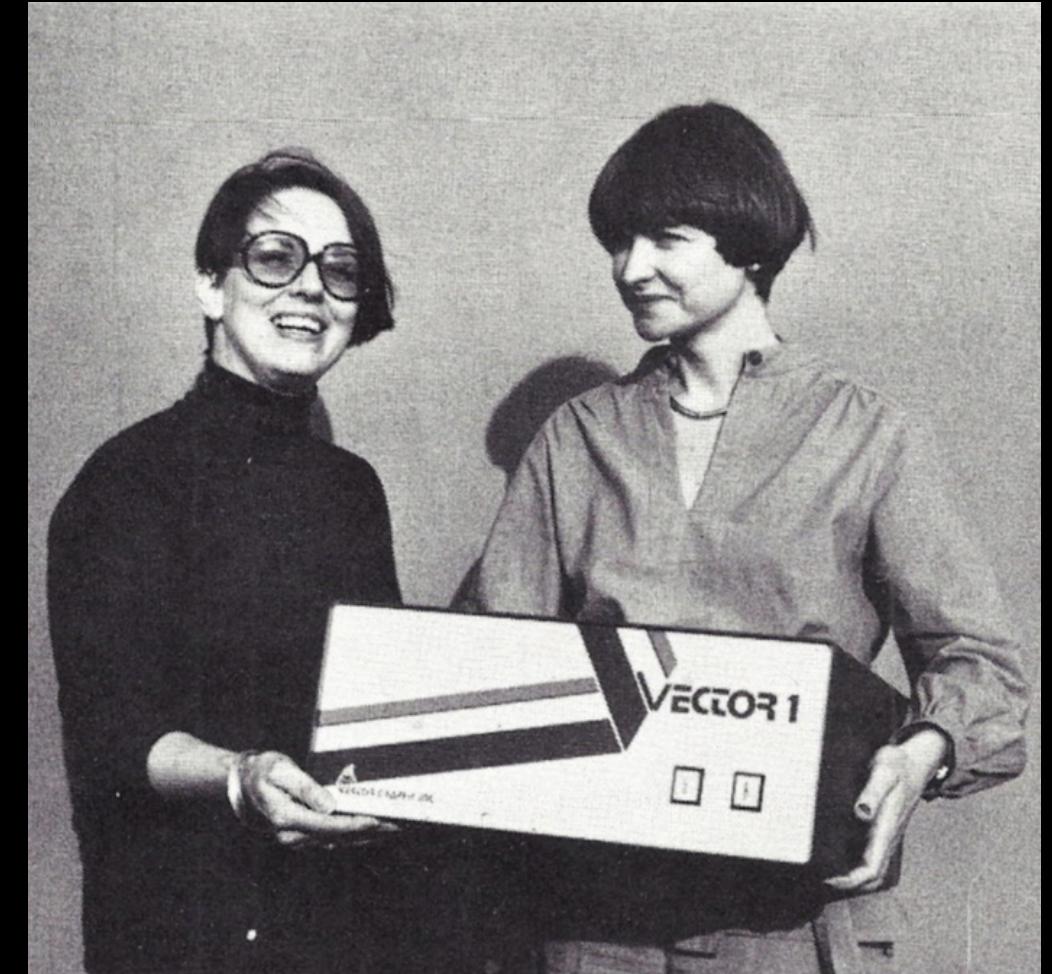
# Lore Harp McGovern & Carole Ely



First Product: 8K RAM board for the S-100 bus of an Altair 8800

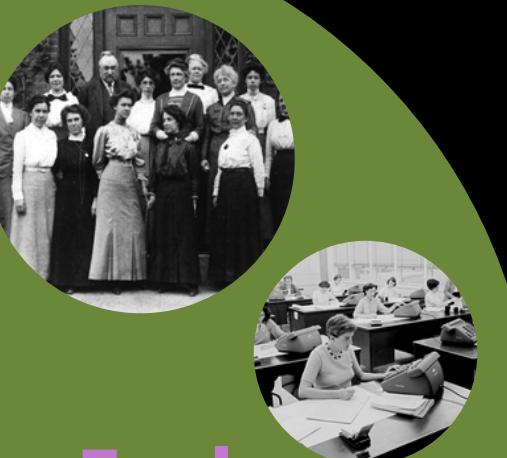


Second Product: 1702 PROM board and the Vector 1, a full microcomputer



Carole Ely (left) and Lore Harp holding a Vector 1.

Starting capital = \$6,000  
First Year Sales > \$1 million



## Early Pioneers



## Groundbreakers



## Data



## Entreprenuers

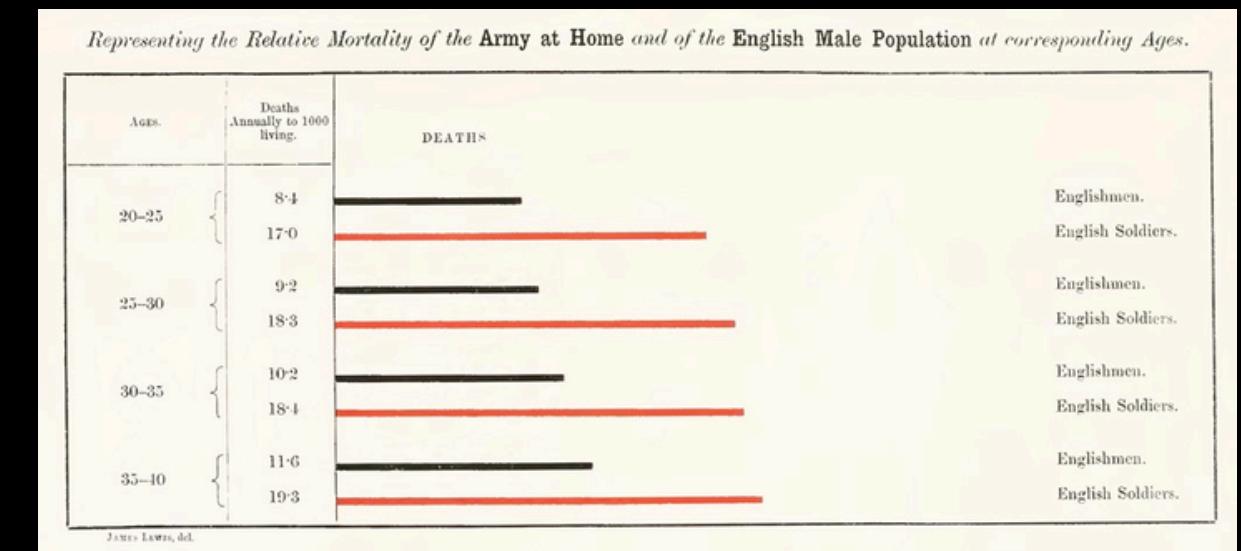
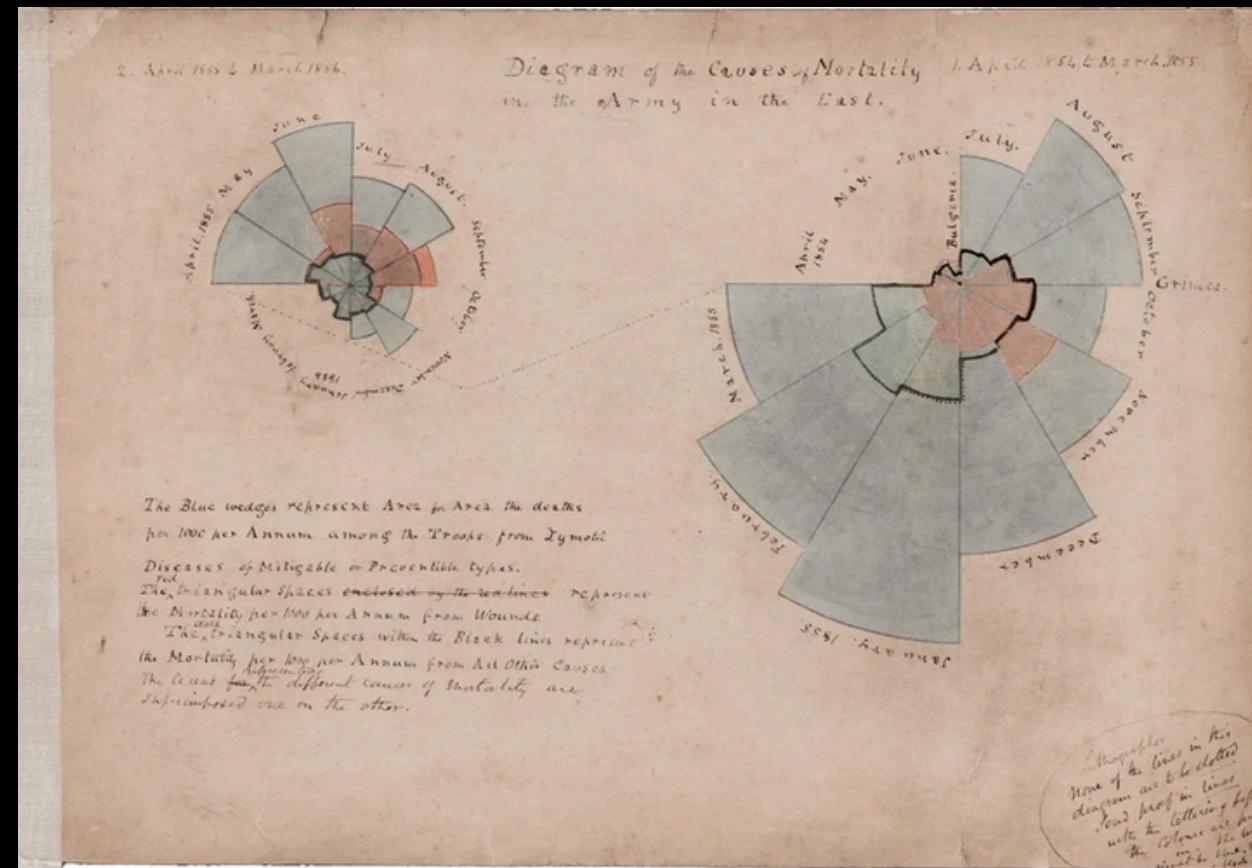


## UI/UX

# Data



# Florence Nightingale

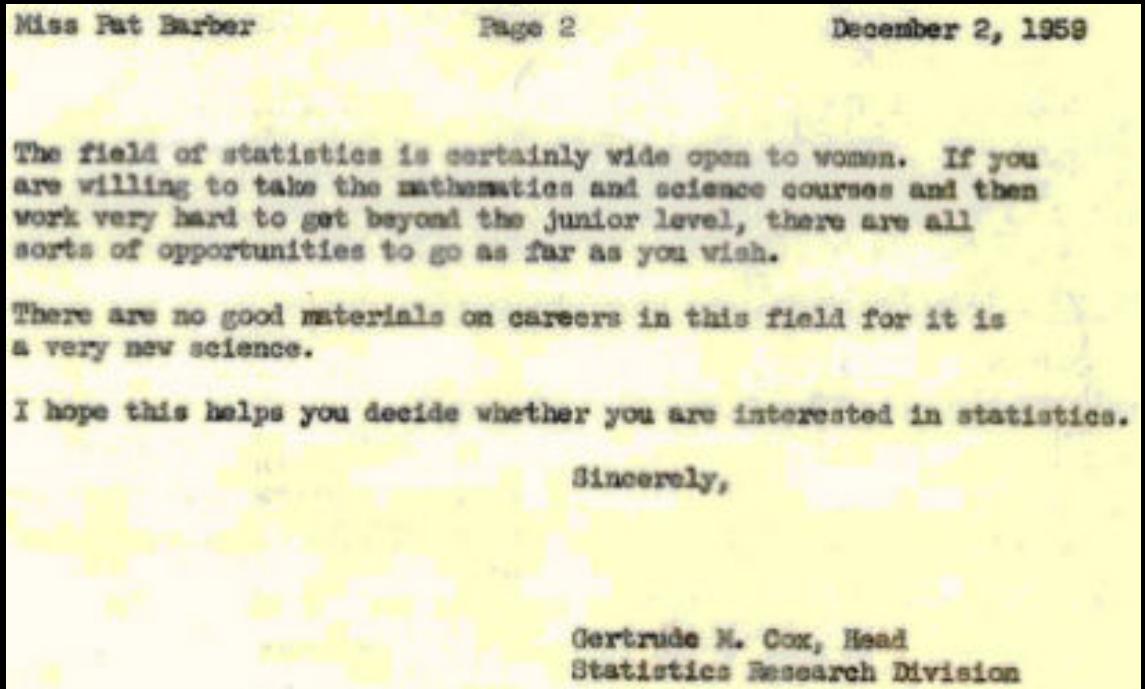


Showed that more soldiers died from preventable diseases than from battle wounds

# Data Science

## Statistics: Gertrude Cox

Layed the foundations for modern data analysis.



The field of statistics is certainly wide open to women. If you are willing to take the mathematics and science courses and then work very hard to get beyond the junior level, there are all sorts of opportunities to go as far as you wish.



## Data Processing: Barbara McClintock

Data-driven work led to bioinformatics.



Used data to discover the origins of Maize and a whole ton about genetics.

# Data Science



Natural Language Programming: Karen Spärck Jones

Laid the foundation for modern search engines and text-based AI models.



Big Data Processing: Frances Allen

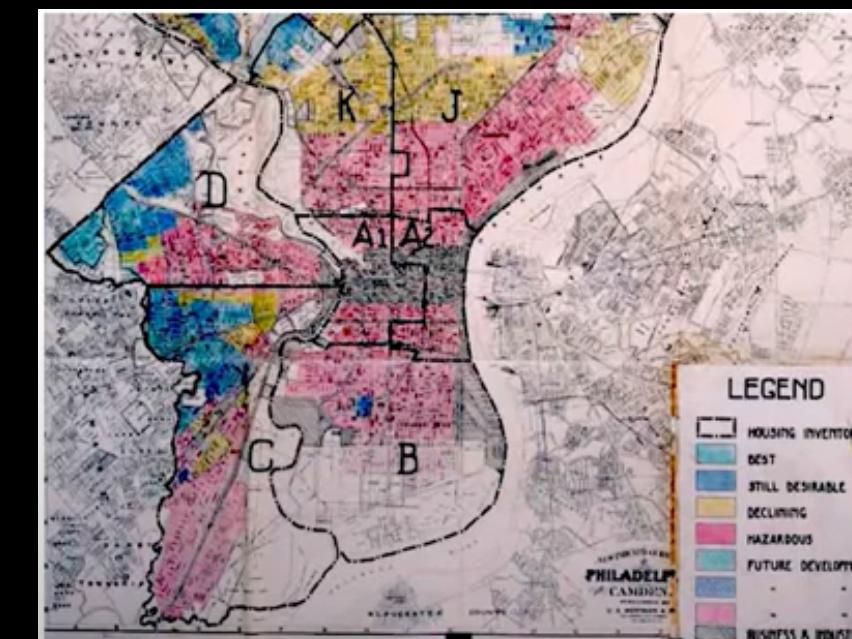
Made significant contributions to compiler optimization and parallel computing

$$w_{i,j} = tf_{i,j} \times \log \left( \frac{N}{df_i} \right)$$

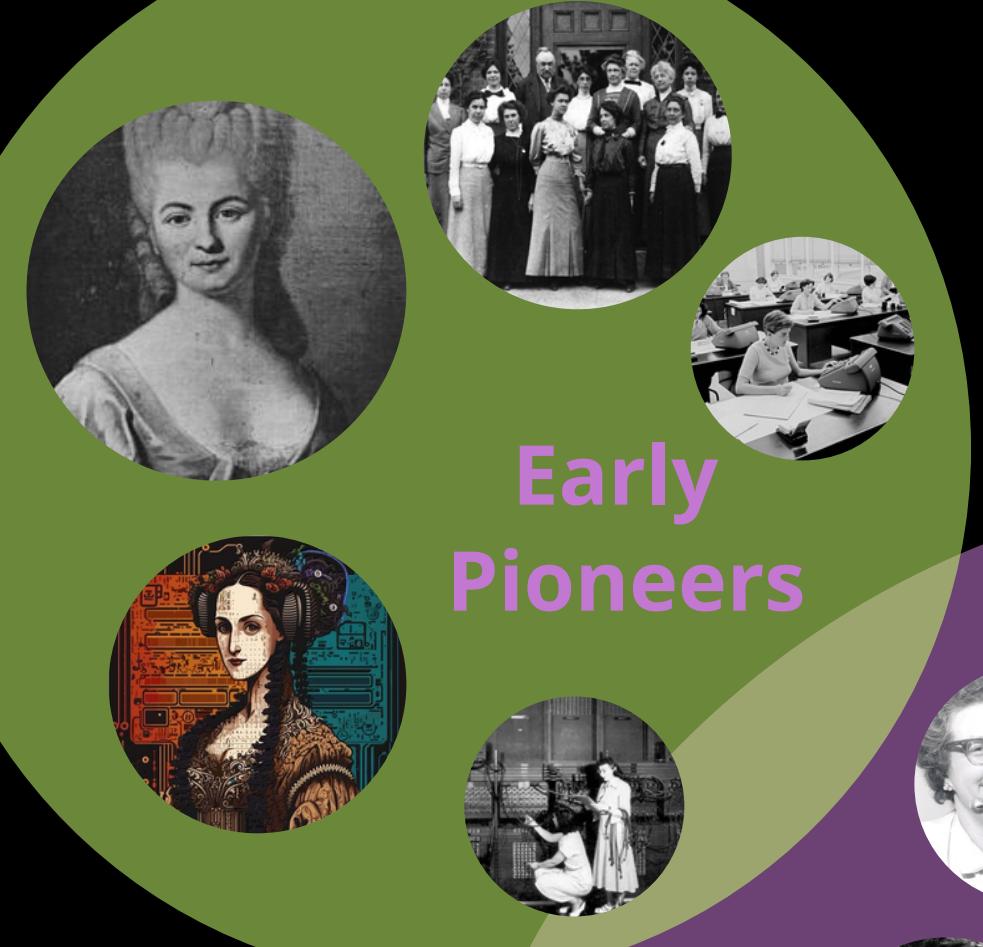
Term weighting formula that influences search engine and Natural Language Processing (NLP) today



Ethics: Cynthia Dwork  
algorithmic fairness, cryptography, and differential privacy



## Early Pioneers



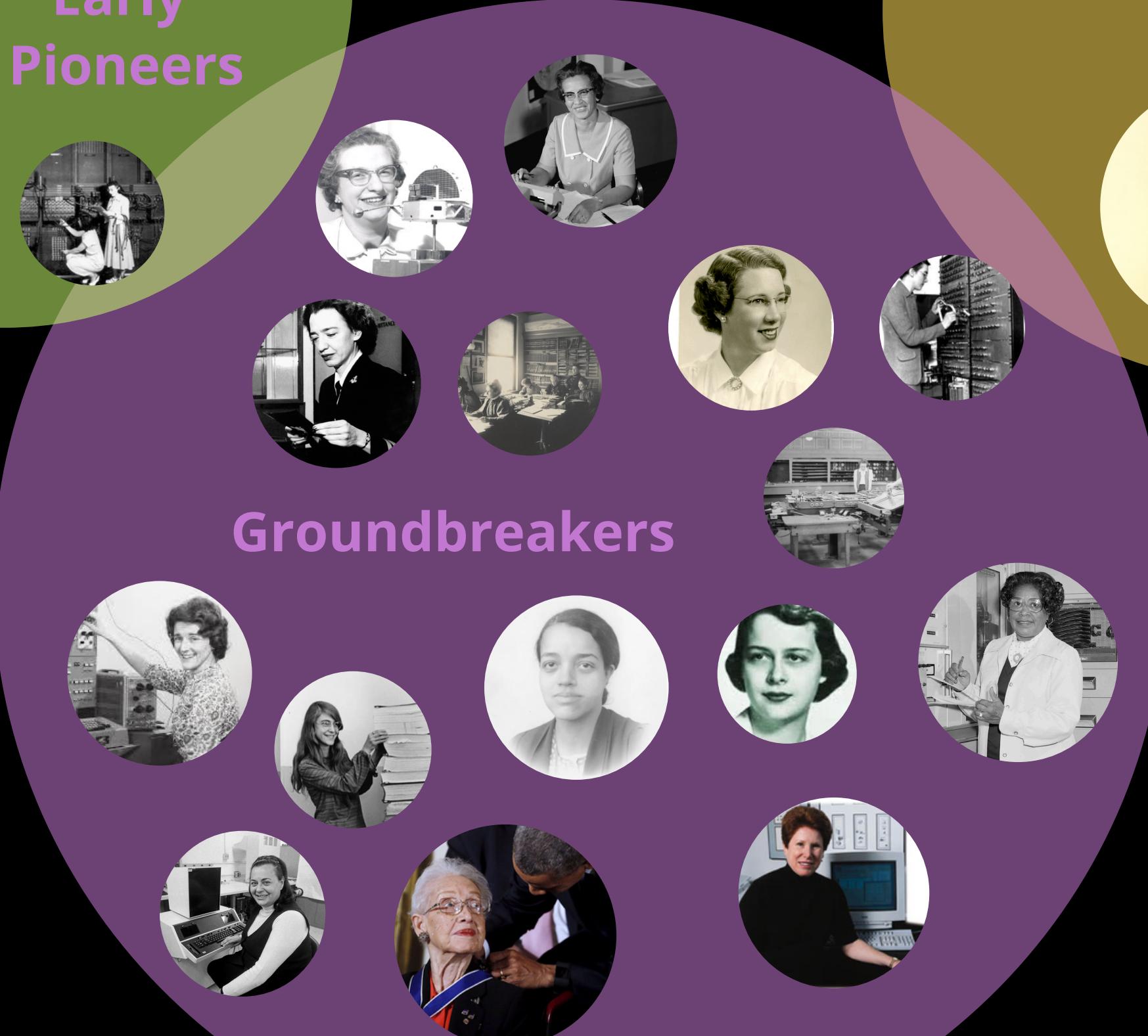
## Data



## UI/UX



## Groundbreakers



## Entrepreneurs



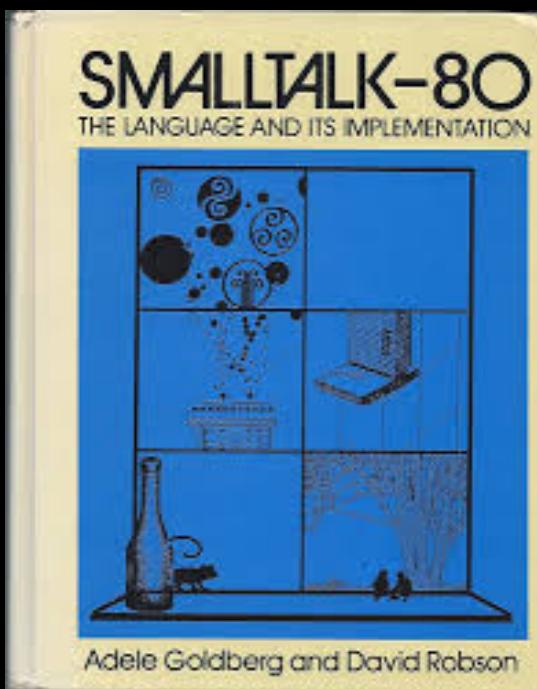
# UI/UX



# UI/UX

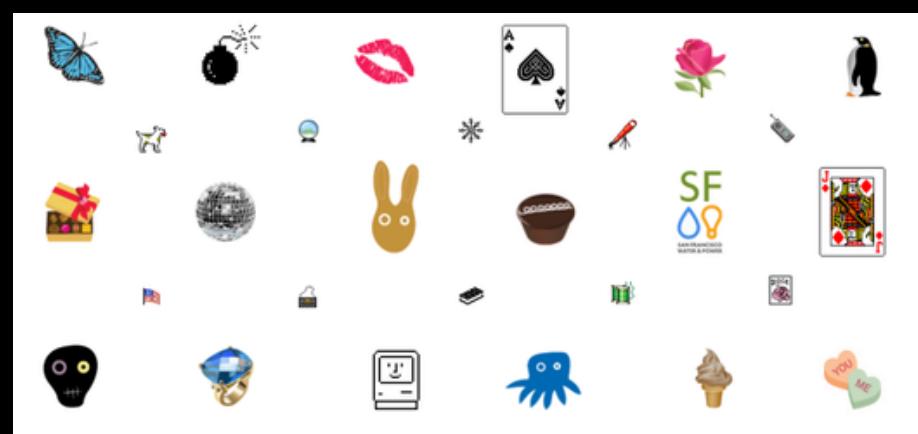
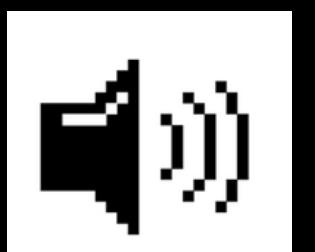
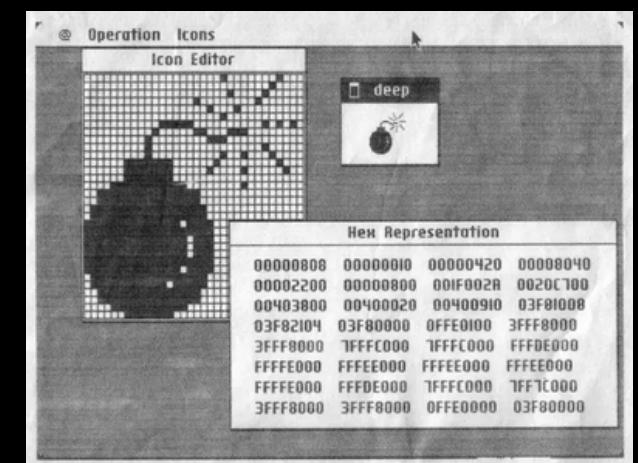
## Graphical User Interfaces

Adele Goldberg (1970s)



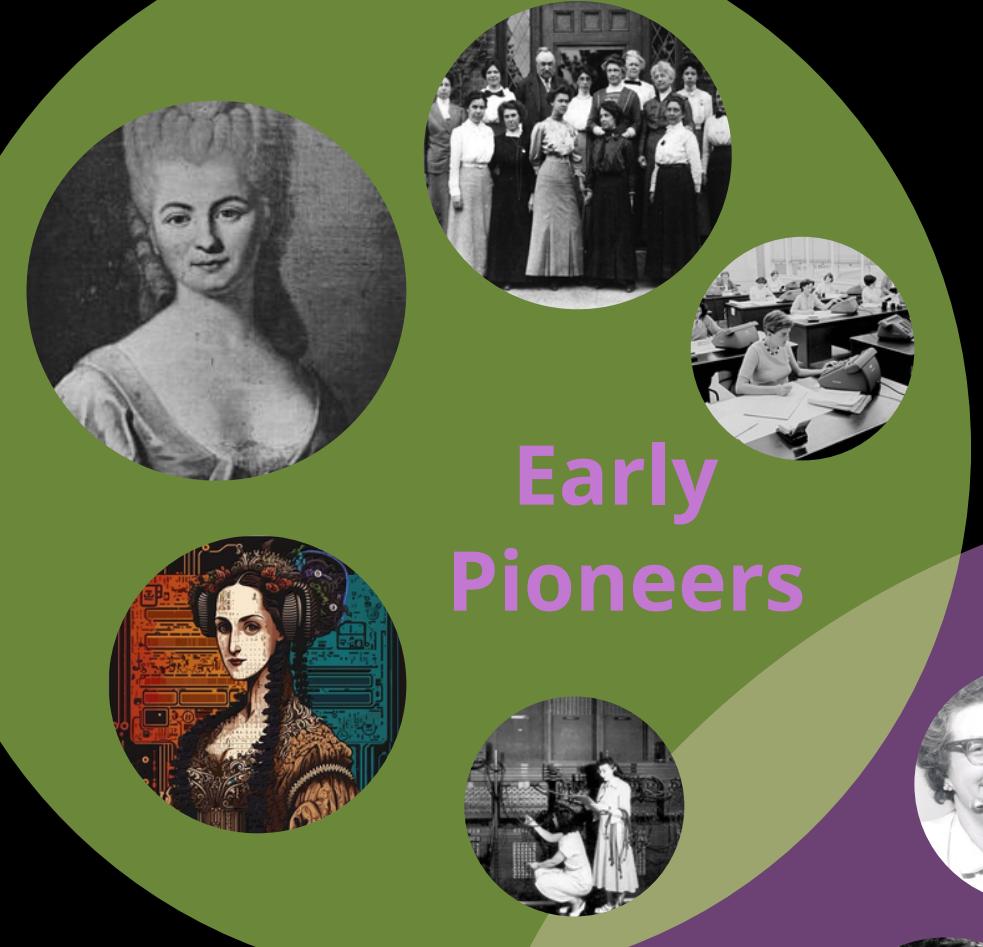
## Digital typography and iconography

Susan Kare (1980's)



Created the original  
Macintosh icons including  
"Happy Mac"

## Early Pioneers



## Data



## UI/UX



## Groundbreakers



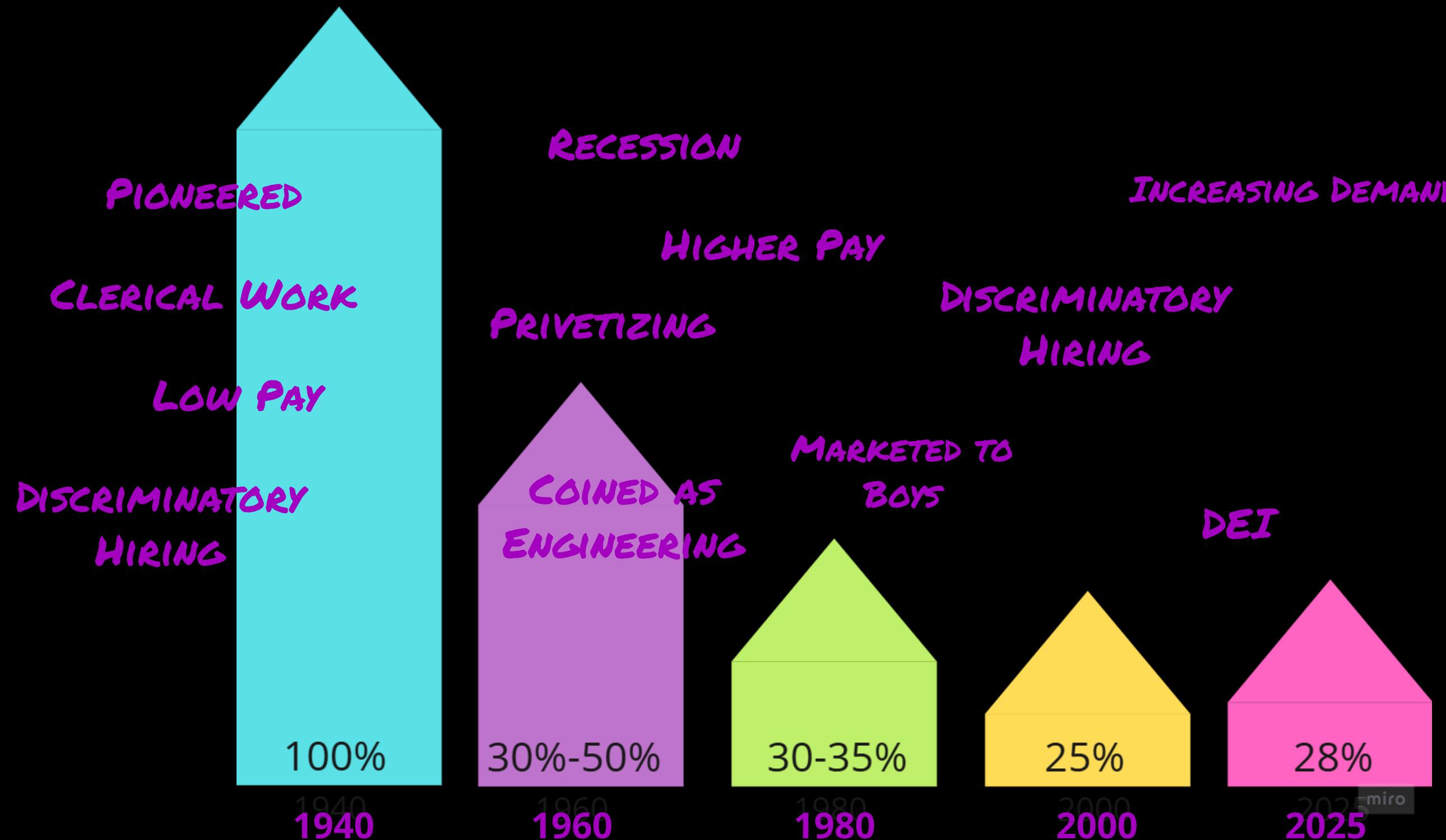
## Entrepreneurs



# Women Who Built Technology As We Know It Today

**Word Processing:** Evelyn Berezin, Merle Bachman, Suzanne Landa, Ulrike Brandi, Mary Jane Forbes, Dr. Lorinda Cherry **Leaders & Entrepreneurs:** Hamilton, Saydean Zeldin, Elsie Shutt, Ann Hardy, Ruth Leach Amonette, Anita Borg **Early Hardware:** Betty Holberton, Beulah Henry, Dr. Rózsa Péter, Mary Kenneth Keller, Stephanie "Steve" Shirley's, Betty Holberton, Margaret Fox, Jean Bartik, Grace Hopper, Milly Koss, Gloria Gordon Bolotsky, Thelma Estrin, Frances Spence and Ruth Teitelbaum, Margaret Hamilton, Patricia "Patsy" Simmers **Programming Languages:** Grace Hopper, Jean Sammet, Betty Holberton, Deborah "Debby" Castle, Mary K. Hawes, Jean E. Sammet, Gertrude Tierney, Kathleen Booth, Cynthia Solomon, Mary Kenneth Keller, Barbara Liskov, Karen Spärck Jones, Fran Allen **Compilers:** Grace Hopper , Lois Haibt, Frances E. Holberton, Adele Goldberg , Jean Sammet, Frances Elizabeth Allen **Personal Computers:** Mary Allen Wilkes, Adele Goldberg, Ruth Lichterman, Carol Shaw, Fran Bilas, and Kay McNulty **Hardware:** Frances Spence, Ruth Teitelbaum, Thelma Estrin, Gloria Gordon Bolotsky, Milly Koss, Patsy Simmers, Margaret Fox, Betty Holberton **Entrepreneuers & Leaders:** Diane Green, Meg Whitman, Sheryl Sandberg, Ursula Burns, Reshma Saujani, Whitney Wolfe Herd, Anne Wojcicki, Cher Wang, Weili Dai, Limor Fried, Julia Jartz, Kimberly Bryant, KAthren Minshew, Leah Busque, Lynda Winman, Aileen Lee, Pooja Sankar, Lisa Falzone, Debbie Sterling, Sheila Lirio Marcelo, Jessica Livingston, Dame Vera Stephanie "Steve" Shirley, Elsie Shutt, Elizabeth "Jake" Feinler, Pam Hardt-English, Sandra Kurtzig, Judith Estrin, Ann Winblad, Adele Goldberg, Brenda Laurel **Data & Databases:** E.F. "Betty" Codd, Patrcia Selinger, Sophie Wilson, Barbara Liskov, Shafi Goldwasser, Florence Nightingale, Gertrude Cox, Thelma Estrin **UI & UX:** Susan Kare, Brenda Laurel, Joy Mountford, Gillian Crampton Smith, Karen Holtzblatt **Mobile Development:** Sophie Wilson, Radia Perlman, Donna Dubinsky, Danese Cooper, Cher Wang **AI & Machine Learning:** Fei-Fei Li, Cynthia Breazeal, Daphne Koller, Carol Riley, Latanya Sweeney **Web:** Dame Wendy Hall, Caterina Fake, Mitchell Baker, Brewster Kahle, Stacey Horn, Dr. Genevieve Bell **Mathematics & Algorithms:** Ada Lovelace, Katherine Johnson, Annie Easley, Marilyn Meltzer, Mary Jackson **Video Games:** Roberta Williams, Donna Bailey, Brenda Romero, Kim Swift, Jane Jensen, Carol Shaw, Amy Hennig, Sheri Graner Ray, Muriel Tramis, Reiko Kodama, Mabel Addis, Anne Westfall, Rebecca Heineman, Corrinne Yu **Telecommunications:** Hedy Lamarr, Shirley Ann Jackson, Erna Schneider Hoover, Patricia Bath, Marian Croak **Space Technology:** Margaret Hamilton, Katherine Johnson, Dorothy Vaughan, Mary Jackson, Nancy Grace Roman, Ellen Ochoa **Computer Science Education:** Mildred Dresselhaus, Maria Klawe, Sister Mary Kenneth Keller, Gladys West, Frances Allen, Eva Tardos **Robotics & Automation:** Cynthia Breazeal, Maja Mataric, Helen Greiner, Ayanna Howard, Daniela Rus, Yoky Matsuoka **Open Source & Internet Freedom:** Radia Perlman, Mitchell Baker, Danese Cooper, Audrey Tang, Elizabeth Feinler **Information Security:** Dorothy Denning, Taher Elgamal, Katie Moussouris, Window Snyder, Nicole Pelerin **Human-Computer Interaction:** Lucy Suchman, Brenna Laurel, Sara Kiesler, Terry Roberts, Karen Sparck Jones, Gillian Crampton Smith **Digital Art & Creative Technology:** Lillian Schwarts, Laurie Andeson, Rebecca Allen, Joan Jonas, Camille Utterback, Char Davis ...**ALL OF US...**

# What Happened to Women in Coding?



Knowledge

Experiences

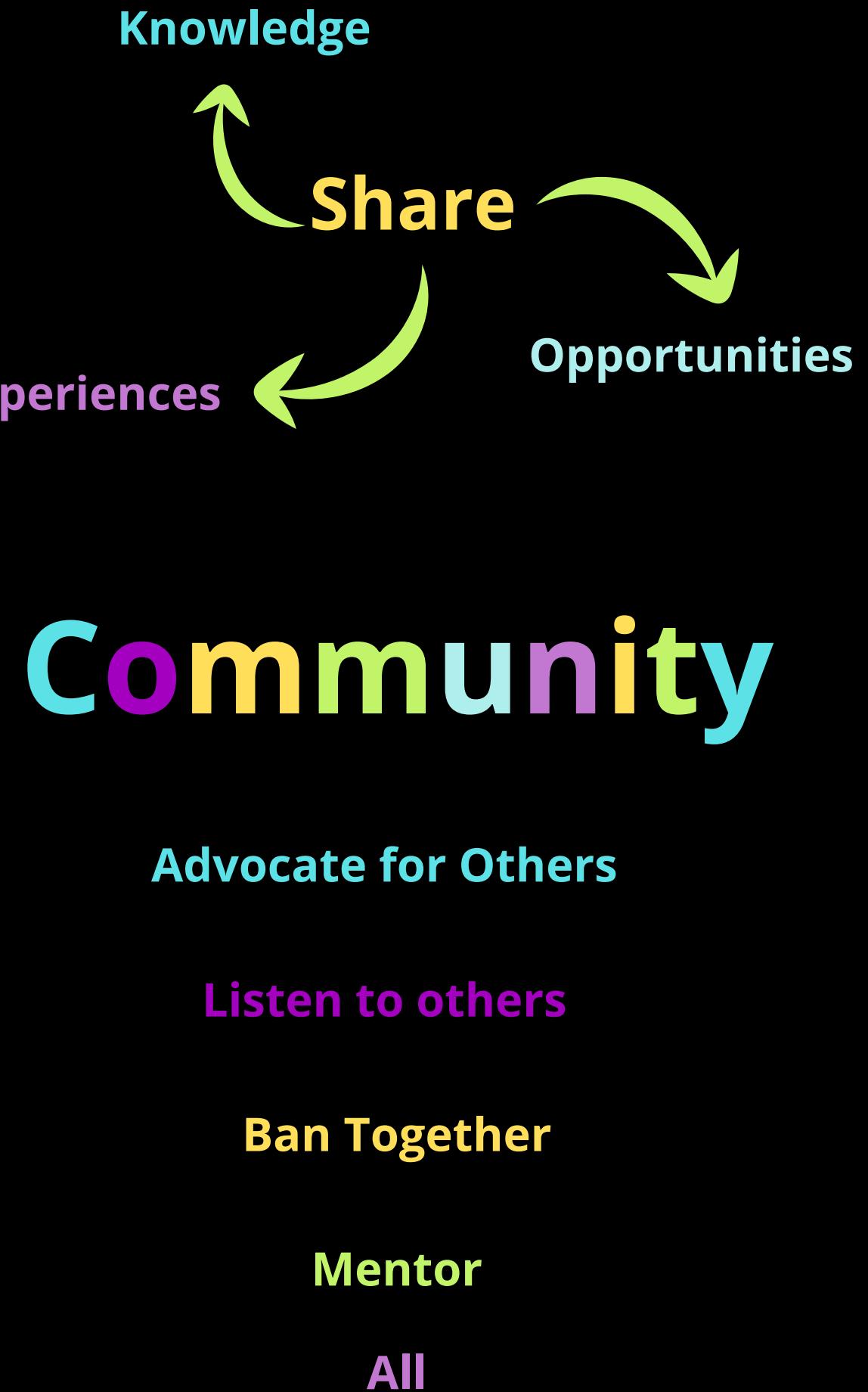
Share

Opportunities



# Community





Defend Yourself

With information

Be Prepared

# **NEXT MEET UP!**