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Entrepreneurship

“The pursuit of opportunity, without regard for resources currently controlled”.

Howard Stevenson
Harvard Business School

Bret Waters

Founder and CEO of three Silicon Valley software companies:

- Metagraphics – developed the first web-based document generation engine.

  Sold to Linotext America.

- Artmachine – developed the first pure-SaaS digital media management system.

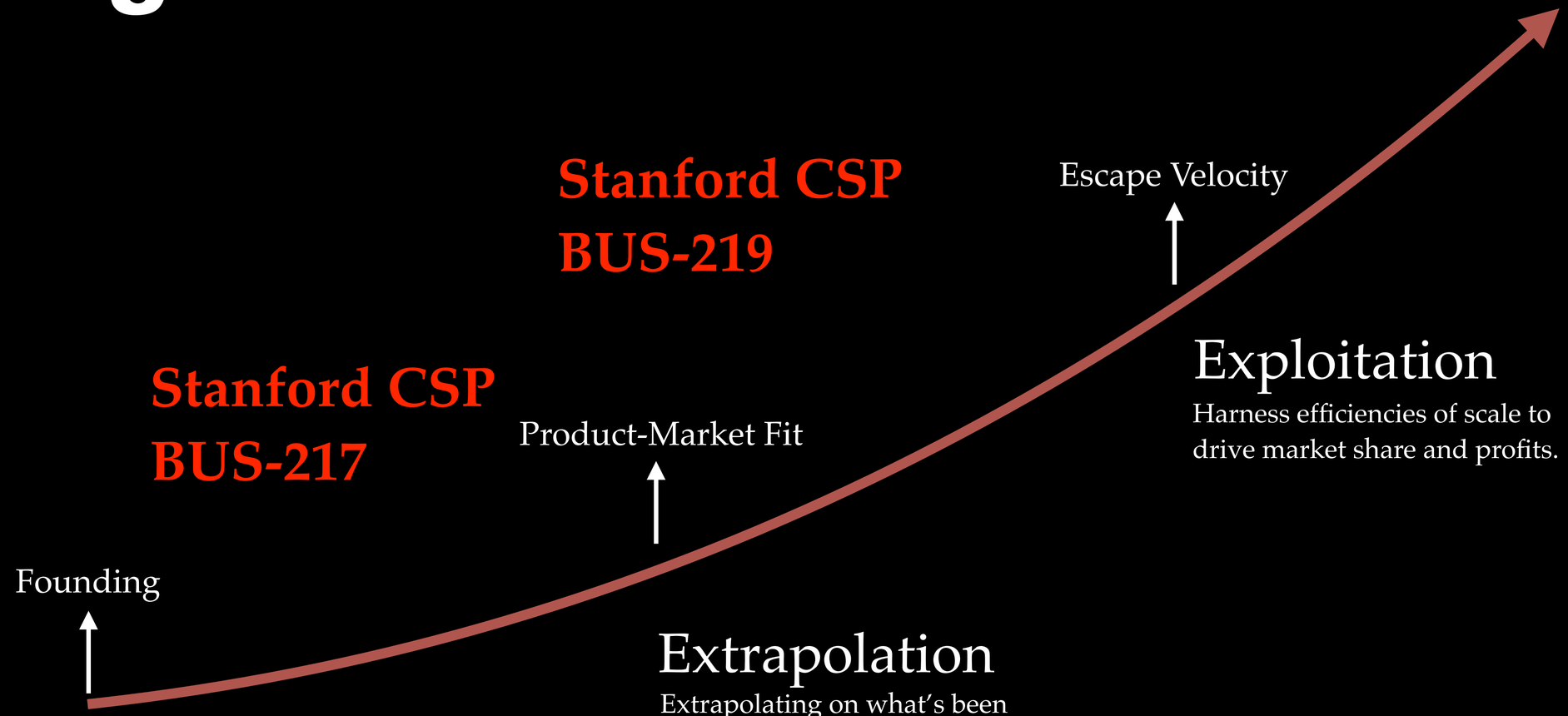
  Sold to OpenText.

- Tivix – developed fintech systems for major banks around the world.

  Sold to Kellton.

Now I teach two entrepreneurship courses at Stanford.

Stages of a venture.



Bret Waters

I also ran two nonprofit organizations:

- **President of Woodside School Foundation**

  A 501(c)3 non-profit focused on local K-12 eduction, managing a $10 million endowment.

- **Interim CEO of Stanford New Schools**

  A 501(c)3 non-profit charter school management organization operated by Stanford University.

For 15 years I’ve coached startup CEOs at
Miller Center for Social Entrepreneurship.

In getting from a startup idea to a successful, growing venture, what do you think matters most?

Ideas are cheap. Execution is hard.

Most startup ideas fail. Investors know this and so they invest in founders who can execute a path to success when the original idea fails.

My goal with this course is to make you one of those founders.

Here are some ideas that failed, but now the business is worth billions.

YouTube's idea was a video dating site.

Android's idea was an OS for digital cameras.

Uber's idea was a fleet of company-owned cars, called "UberTaxi".

Instagram's idea was a mobile check-in app (like Foursquare) called "Burbn".

The Twitter team's idea was a Flash-based podcasting platform called "Odeo".

Slack's original idea was a video game studio.

“The verb you want to be using with respect to startup ideas is not “think up” but notice. The way to get startup ideas is not to try to think of startup ideas. It’s to look for problems.”

- Paul Graham
  Co-founder of Y-Combinator

Uber was born when a group of friends spent $800 to hire a private driver and then listened to the driver talk about how much downtime he had every week, waiting for business.

Airbnb was born when roommates in San Francisco needed to rent out a spare bedroom to pay the rent.

Cisco was born when two computer administrators at Stanford were frustrated by slow network speeds.

This is often how great startups begin, when a founder notices a problem worth solving and falls in love with solving that problem

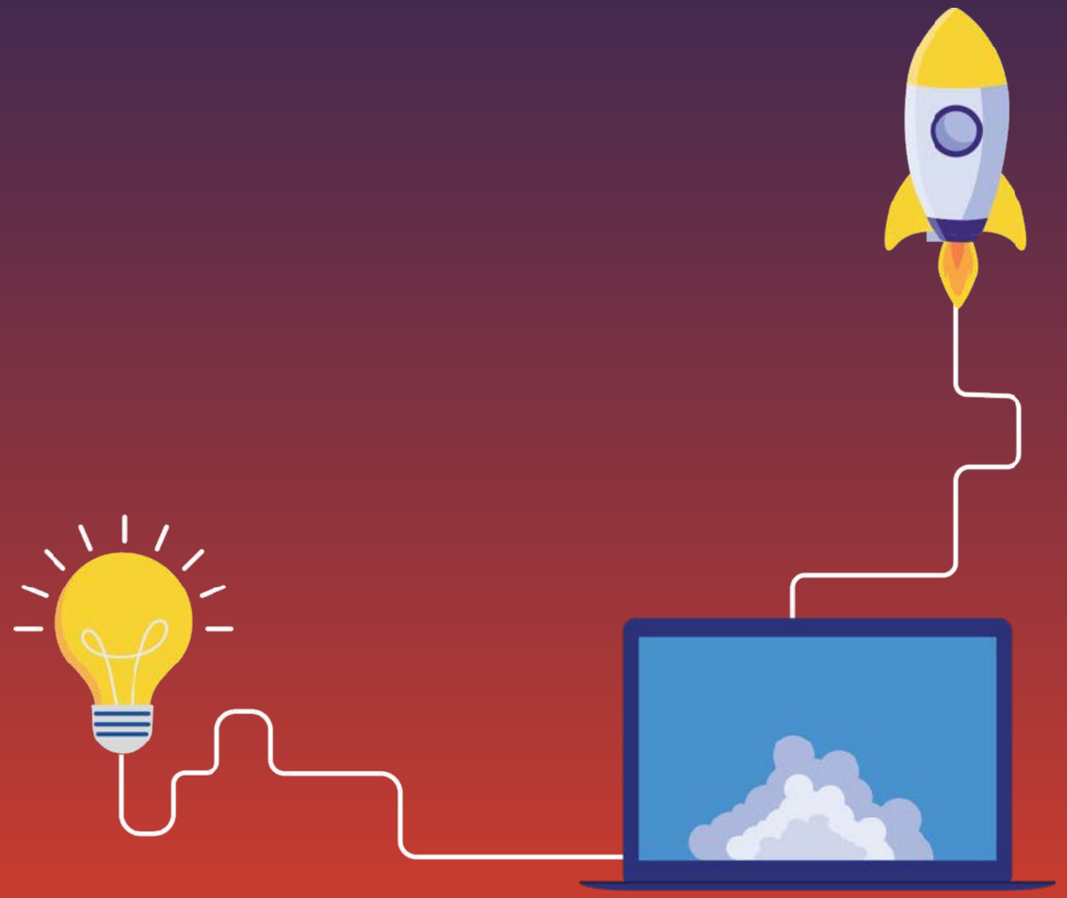
In my career, I've worked with hundreds of startup founders. I've seen patterns with regard to which ones succeed and which ones fail.

Based on these patterns, I've put together an 8-step process for getting from a startup idea to a launched and funded venture, poised for success.

That's what this course is about.

The Launch Path.

BUS-217: Eight steps to a successful startup.



1) Listen to the waves.
2) Build something people want.
3) Draw the landscape.
4) Create an engine of growth.
5) Engineer an economic model.
6) Create a capital strategy.
7) Frame a Funnel.
8) Be a Master Storyteller.

The Launch Path.

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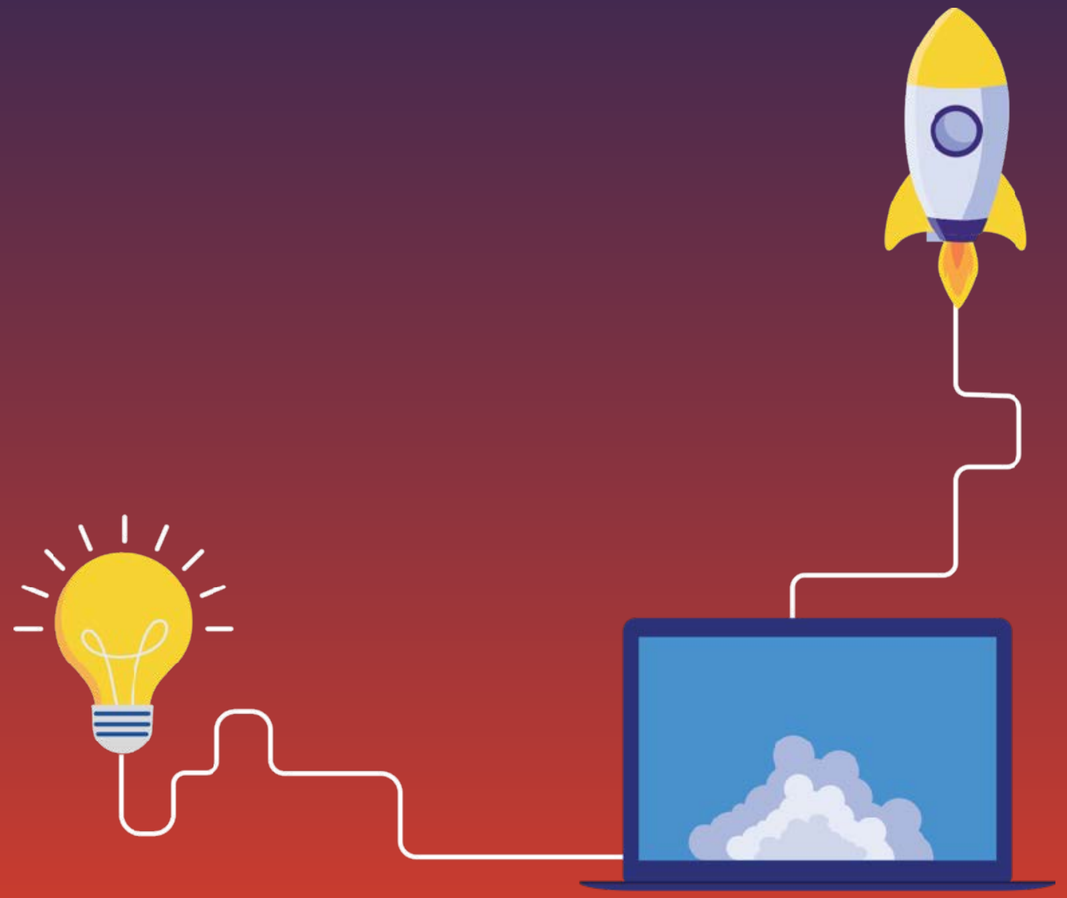

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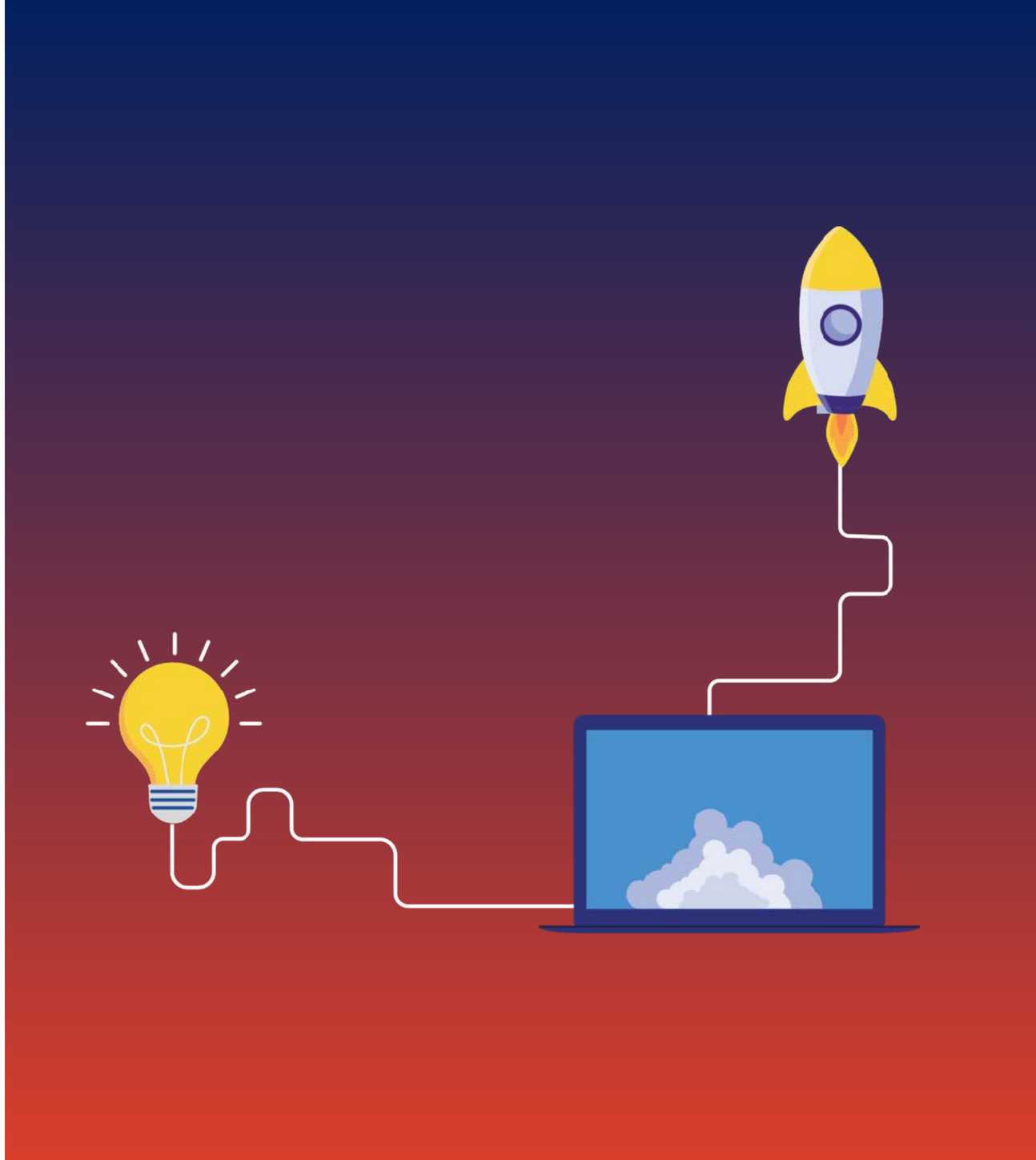
STEP 1:

Listen to the Waves.



The Launch Path

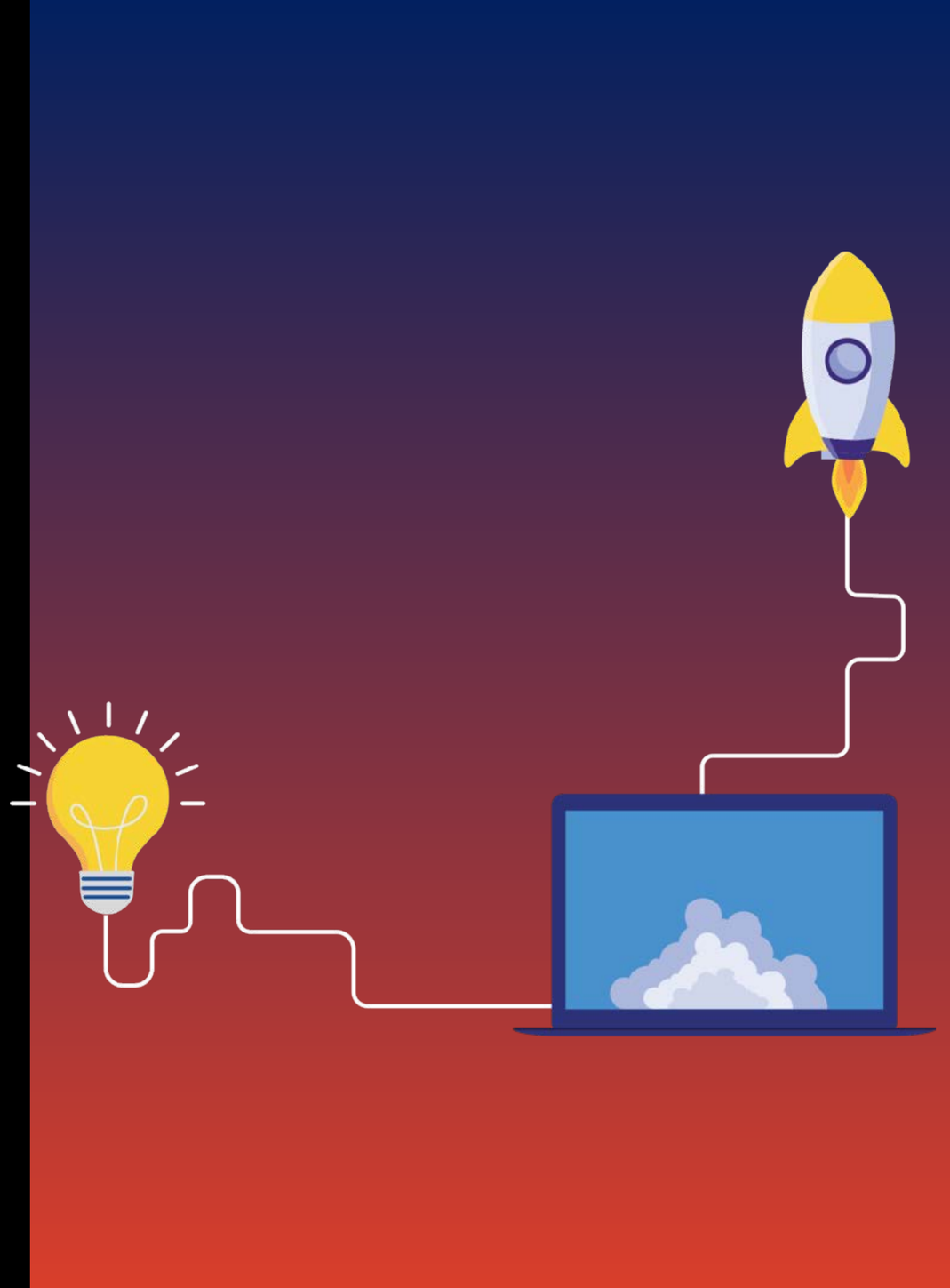
Step 1: Listen to the Waves.

Where do most startups begin?

Most great startups begin with a founder who notices a problem worth solving.

STEP 2:

Build something people want.



The Launch Path

Step 2: Learn what people want

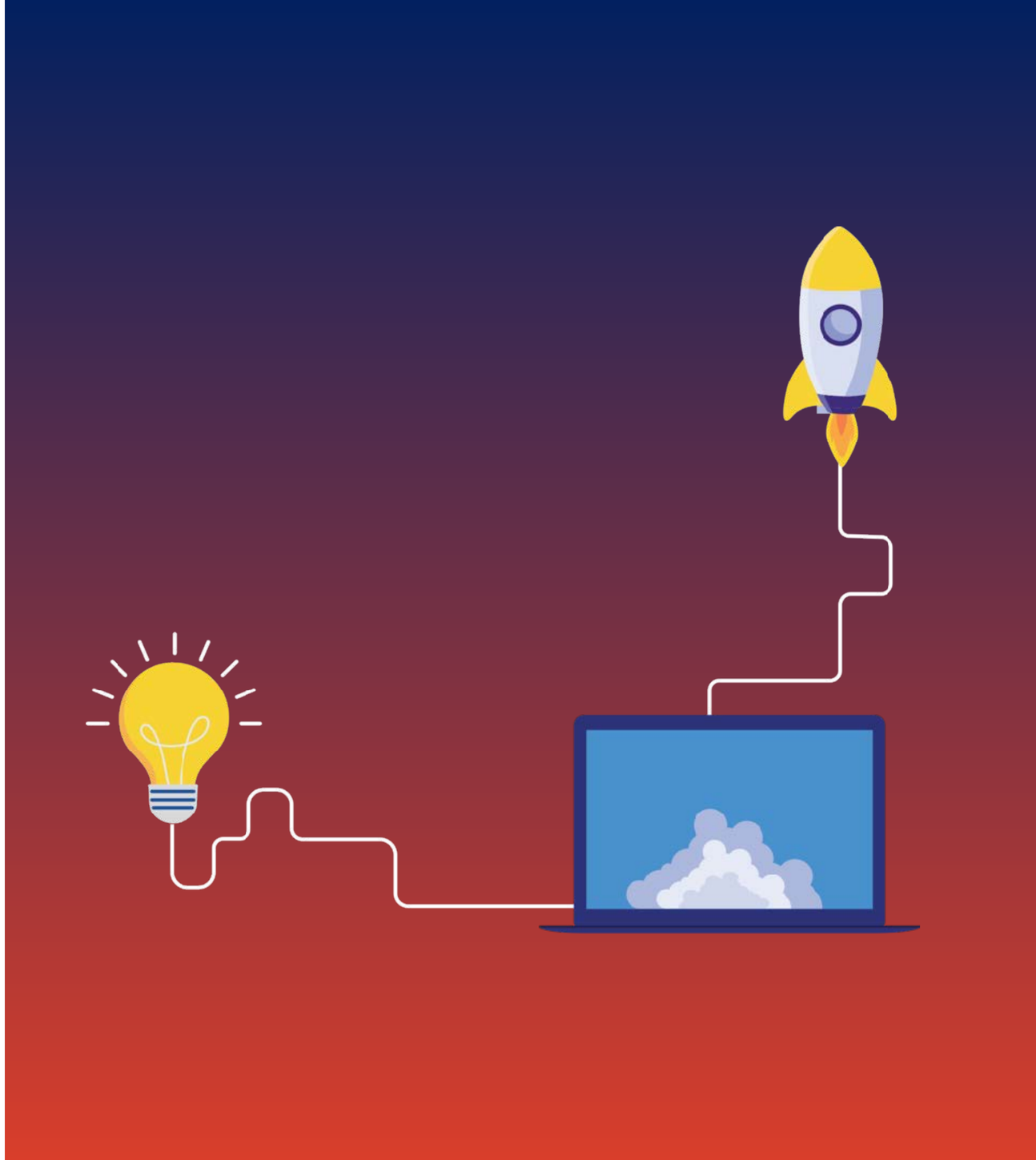
Don’t build something that no one cares about.

The only way to win is to learn faster than anyone else.

- ERIC RIES

STEP 3:

Draw the landscape



The Launch Path

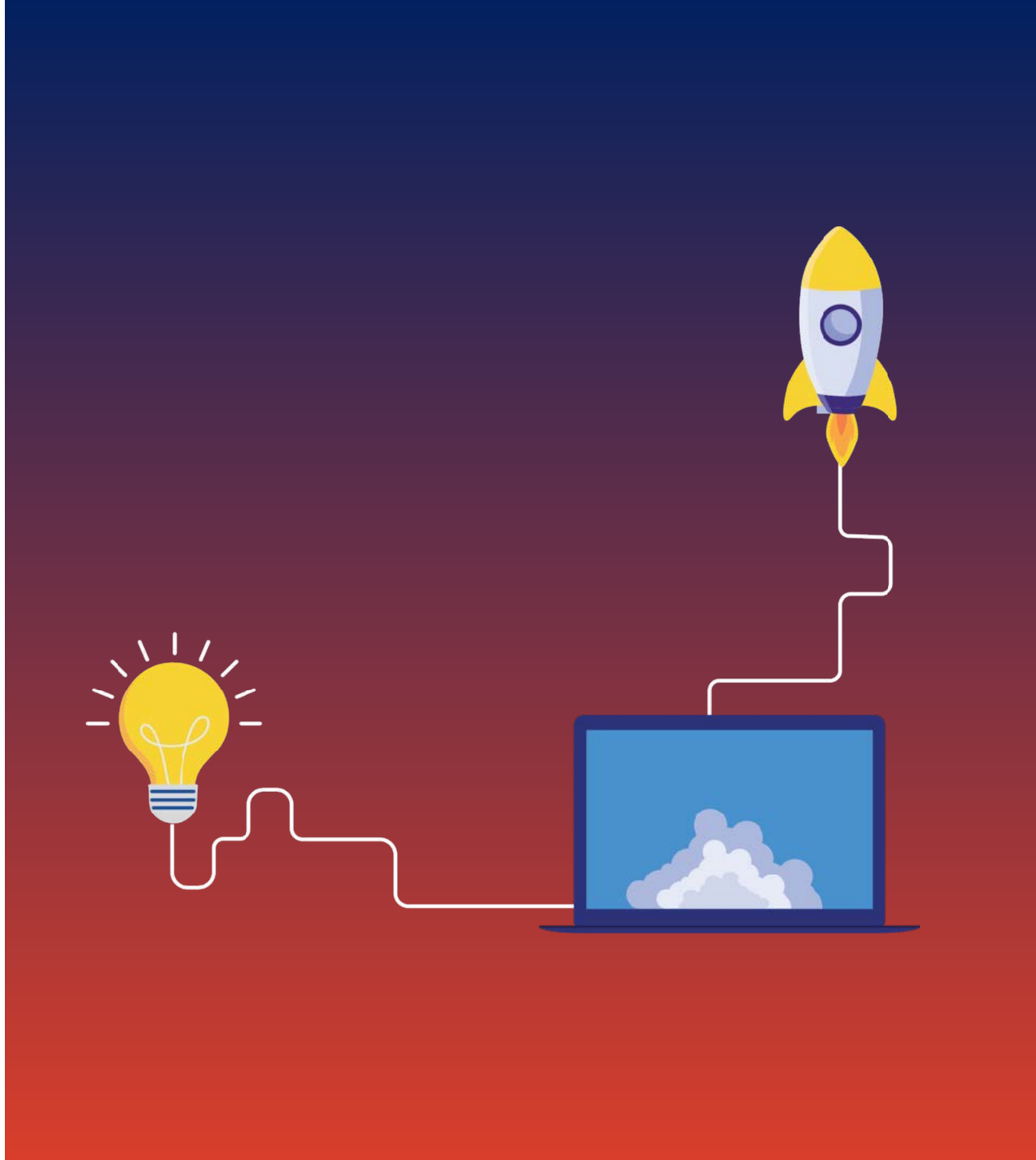
Step 3: Draw the landscape

Every startup operates within a landscape of competitors and alternatives.

> **“I looked at my competitors, and I thought, if they could do it, I could do it. And if they are popular and doing well, I could compete with them.”**
>
> - TOMMY HILFIGER

STEP 4:

Design a engine of growth



The Launch Path

Step 4: Design an engine of growth

You’re gonna need a business model.

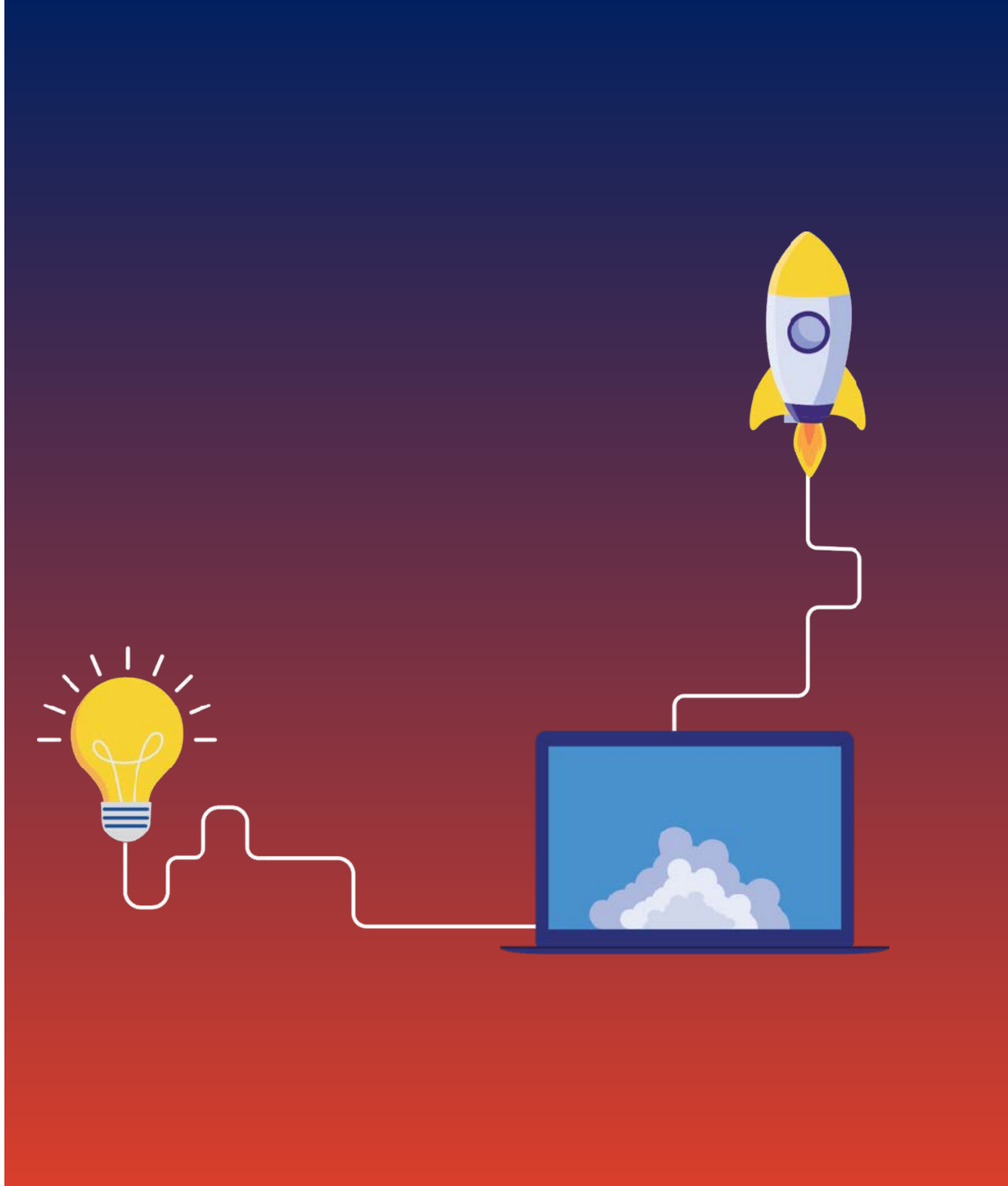
A business model is the rationale by which an organization creates, delivers, and captures value.

Luck is not a business model.

- ANTHONY BOURDAIN

STEP 5:

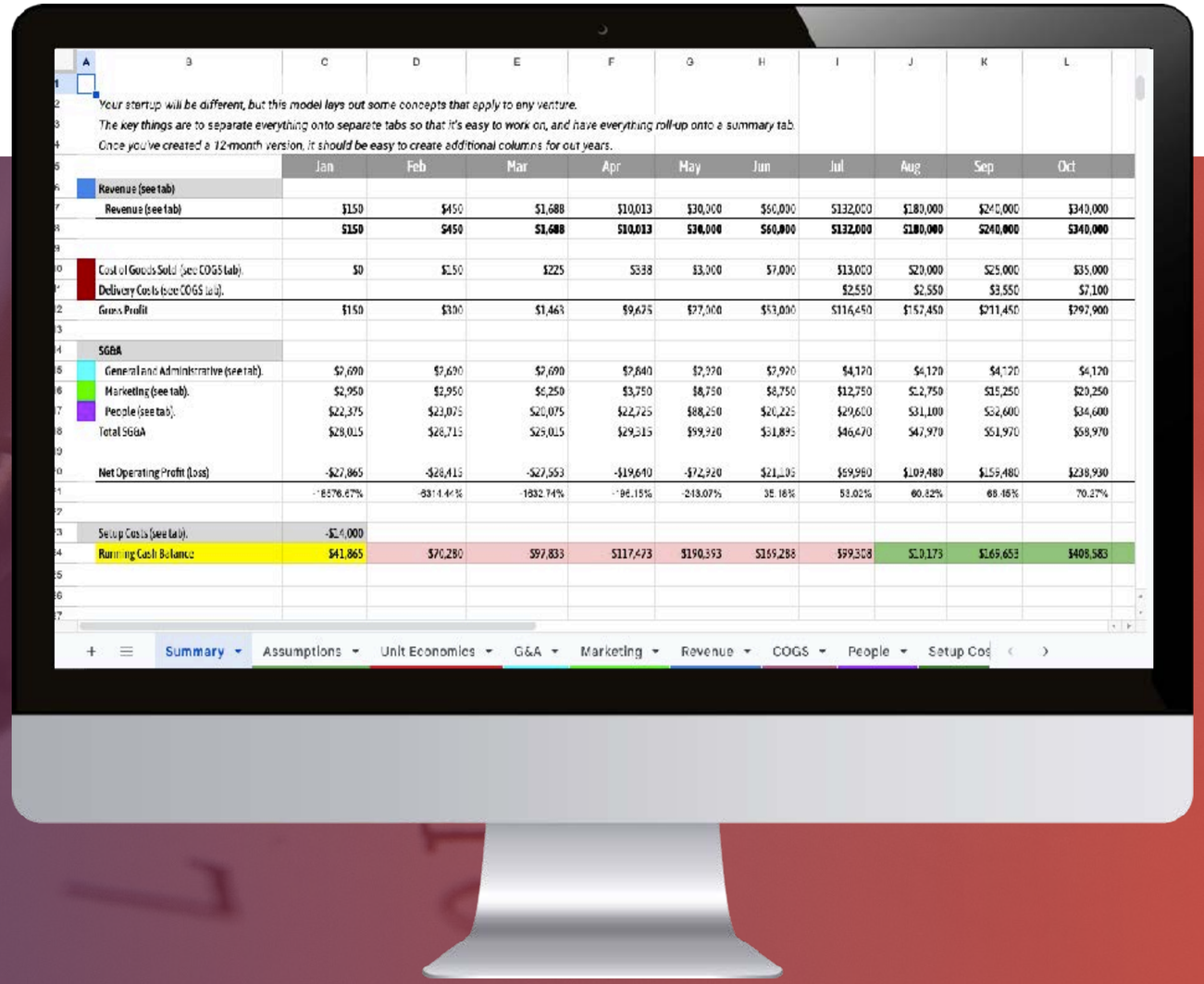
Engineer an economic model



The Launch Path

Step 5: Engineer an economic model

The numbers need to work

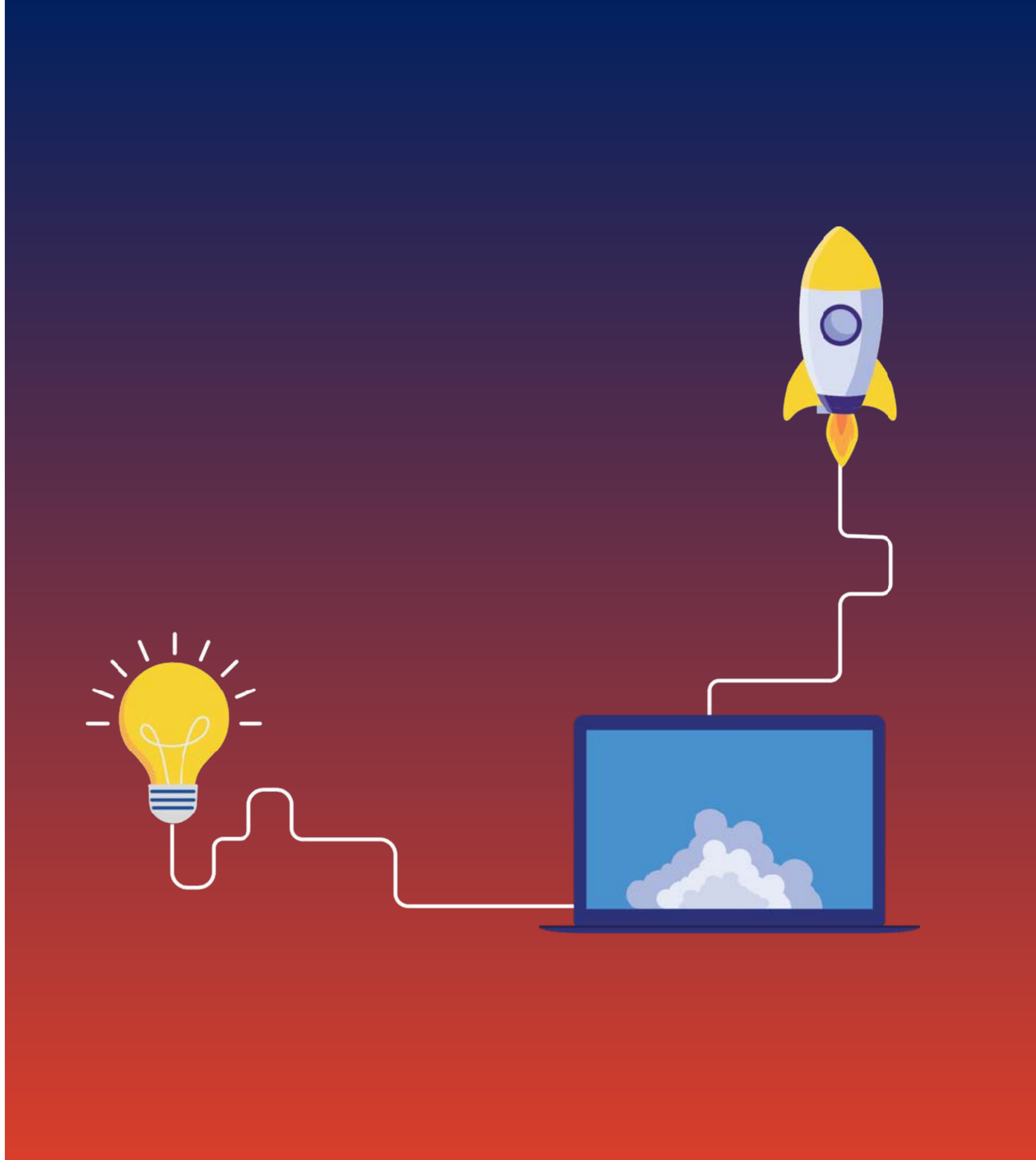


For every one of our failures, we had spreadsheets that looked great.

- SCOTT COOK

STEP 6:

Develop a capital strategy



Step 6: Develop a capital strategy

There are many great ways to finance a startup venture in 2024.

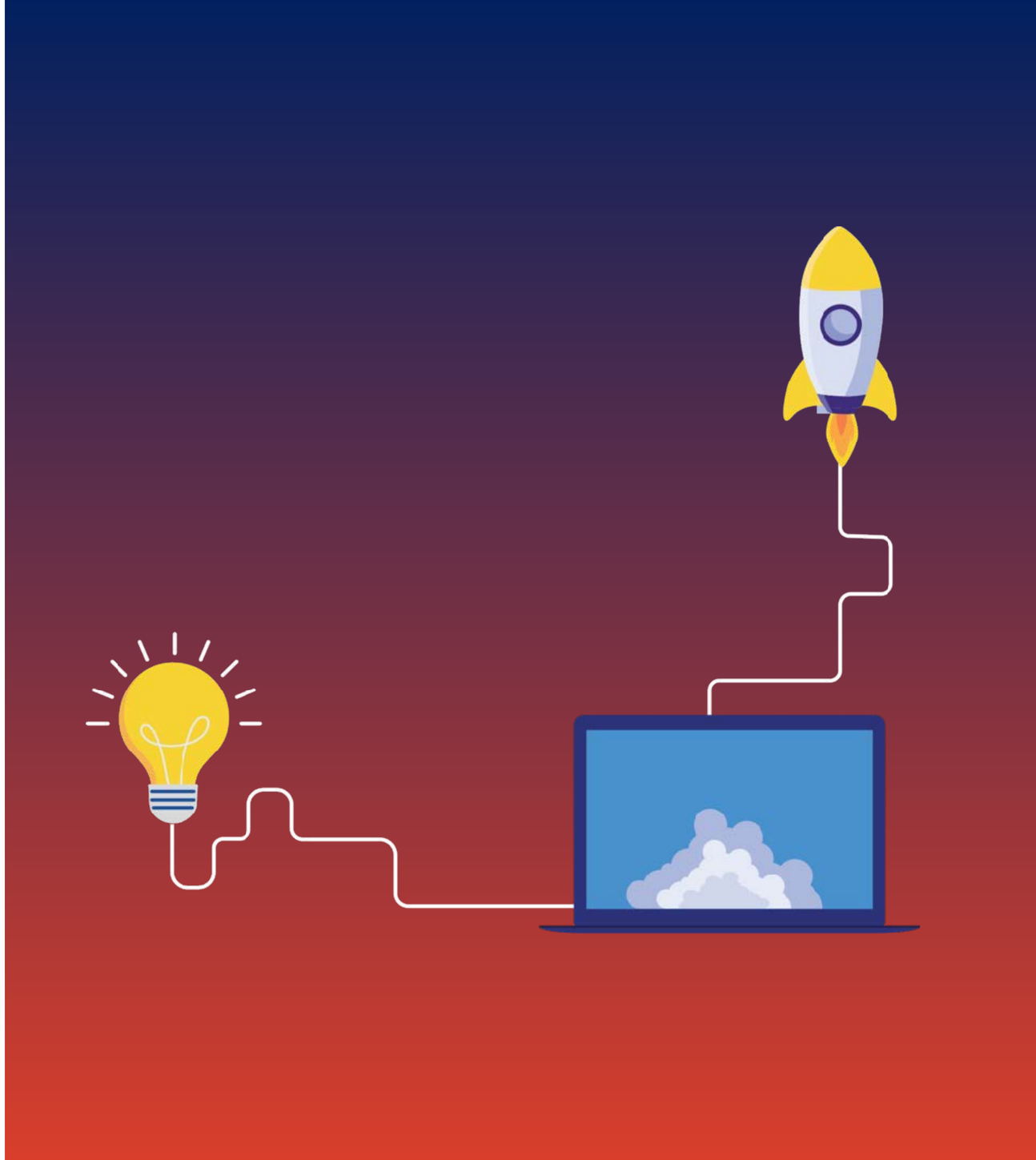
My goal with this chapter is to open up the solution set a bit in your mind so you can choose the form of financing that makes sense for your particular venture.

It’s not just VC. Revenue share notes, demand dividend, SAFE’s, royalty-based notes, SIB’s and so much more.

> **Be so good they can’t ignore you.**
>
> - STEVE MARTIN

STEP 7:

Frame a funnel



The Launch Path

Step 7: Frame a funnel

We need a scalable process for getting customers at a rational cost.

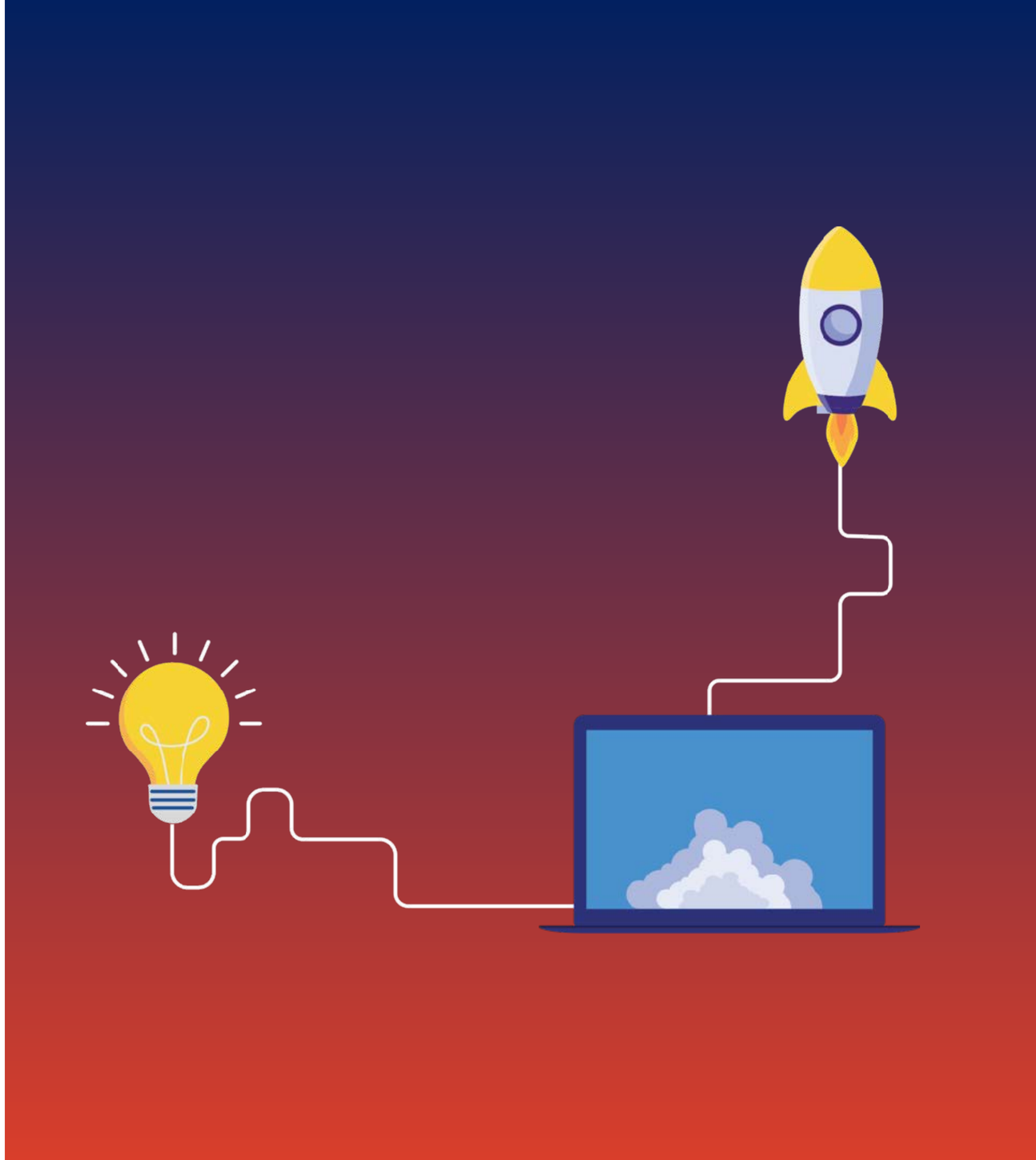
Most startups die from lack of customers. Others die because they realize too late that the economics of their customer acquisition process are impossible to survive. Both are painful deaths, so let's try to avoid them.

The purpose of a business is to create and keep a customer.

- PETER DRUCKER

STEP 8:

Be a master storyteller



The Launch Path

Step 8: Be a master storyteller

Every great entrepreneur has the ability to tell a crisp, clear, and compelling story about what she's working on, and why it matters.

The Launch Path Canvas

Name of Startup Venture: Fitaco, Inc

Prepared by: Bret Waters

Date:

Iteration:

Problem

One clear sentence that articulates the problem your startup solves.

Consumers in the US spend $231 billion/year on fast food, and most of it is really unhealthy.

The paradox is that consumers today want to eat healthy, but also have a busy life that often drives them to resort to the convenience of fast food.

Solution

How does your venture solve the problem you have articulated? Keep this short and concise!

Fast food doesn't need to be unhealthy. Our startup is developing a new brand of health-conscious fast food (healthy tacos!), delivered directly to your home or office.

Why it matters

Why is this a problem worth solving?

The National Institutes for Health say that today a fast food diet may kill more people prematurely every year than cigarette smoking.

Alternatives

When a customer looks at alternative ways to solve the problem we solve, what will they see? This is a list of competitors and alternatives. Link to a graphic representation of the landscape.

There are many food delivery services, from Uber Eats to Doordash to Grubhub.

See visualization at this link.

Customer

It's all about understanding customers. Write a one-sentence description of key customer personas and the problems we solve for each. Circle the one that is most influential.

Adventurous Alex: A thrill-seeking foodie always on the hunt for unique and spicy taco creations to satisfy their daring palate.

Health-Conscious Hailey: A fitness enthusiast looking for wholesome and fresh ingredient options that align with their nutritious lifestyle at the taqueria.

Busy Bert: An on-the-go professional seeking quick, flavorful, and portable taco choices to enjoy during a busy workday.

Vegetarian Victoria: A plant-based eater in search of flavorful and creative vegetarian and vegan taco selections that cater to their dietary preferences.

Traditional Tony: A lover of classic flavors, Tony enjoys indulging in authentic and time-honored taco recipes that remind him of his cultural heritage.

Family-Oriented Felix: A parent looking for a family-friendly meal delivery with a variety of options to cater to the taste preferences of both kids and adults.

Budget-Conscious Bella: A student or frugal diner in pursuit of affordable yet flavorful taco choices that won't break the bank at the taqueria.

Path to PMF

What is our path to Product Market Fit? Customer Development, MVP's, etc.

1. Farmers' markets where we can get input on our menu items.
2. One truck in the Palo Alto area for a pilot project.
3. Scale slowly to additional markets, based on our learnings.

Top 3 Benefits

What are the top 3 benefits that your product or services provides to customers?

1. Convenience. Use our mobile app to place a custom order and it's delivered directly to you.
2. Healthy food, designed by a nutritionist.
3. Tacos. Everybody loves tacos.

Distribution

What are our distribution channels? Direct to consumer, via resellers, or?

We intend to sell direct to consumer, via our mobile app and website, with delivery via our own vans.

In the future, we may be open to distribution partnerships.

Positioning

Within this landscape of competitors and alternatives, how is your venture positioned?

Our positioning can basically be summed-up in two words: healthy, and delicious.

There are many food delivery apps that can deliver something that is delicious but not very healthy. Or you could eat a kale salad.

We serve delicious tacos designed by a nutritionist. That's our unique positioning.

Economics

What are the Unit Economics for this venture, what do we expect the CAC-LTV to look like, and what are out capital needs? (Link to full spreadsheet).

One unit = one average order: $15, on which our gross profit is $8.50.

Early tests indicate CAC of $11, and we expect an initial LTV of three orders per customer ($25.50), which will grow with time.

Our initial capital needs are $220K, which will get us through the pilot launch. We will propose to investors structuring this as a SAFE.

See full spreadsheet at this link.

Team

What are the characteristics of the right team to make this venture a success?

The right team aligns with our target demographic - people who want to eat healthy and also enjoy the convenience of a quick taco meal.

The economics of our venture are such that we'll need drivers and cooks who are affordable, so we will work hard to make it an attractive part-time job for students, and a great evening second job for anybody.

Defensibility

What is your secret sauce that is difficult for competitors to copy?

The fact that we own the customer and customer data is a big part of our defensibility.

A restaurant selling through a 3rd-party like Doordash owns neither the customer nor the data.

The Launch Path Canvas

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One clear sentence that articulates the problem your startup solves.

Consumers in the US spend $331 billion/year on fast food, and most of it is really unhealthy.

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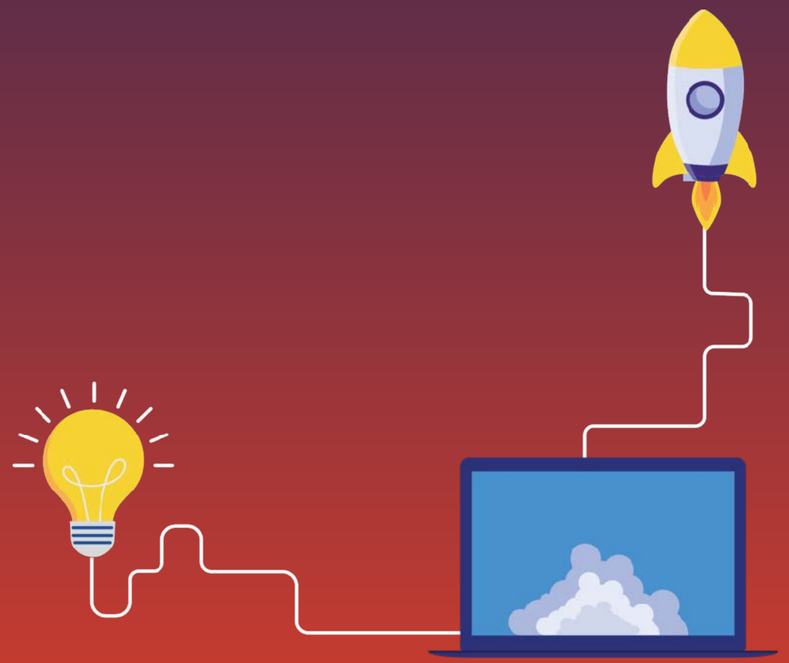
The Launch Path.

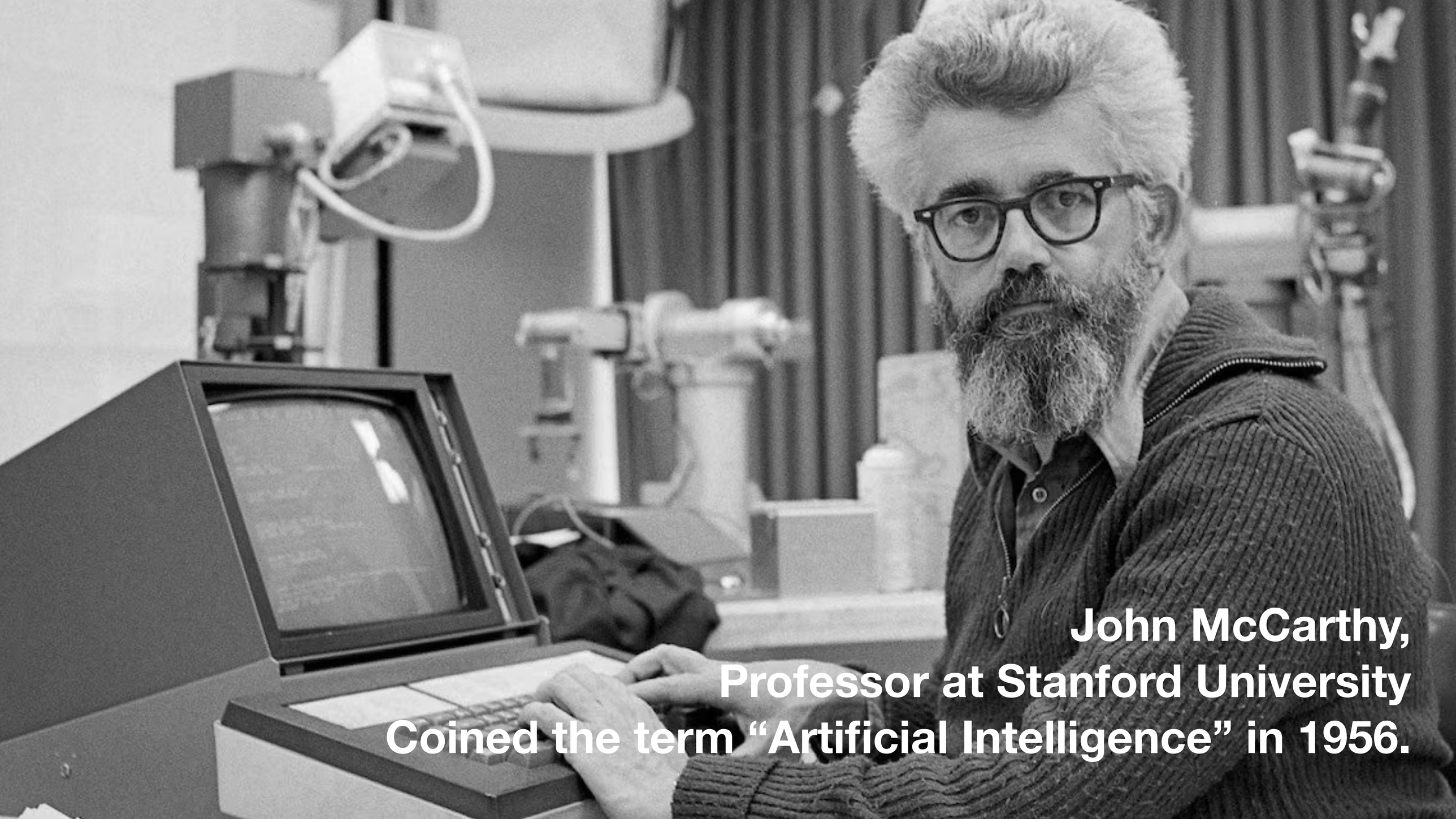
BUS-217: Eight steps to a successful startup.



1) Listen to the waves- April 9.
2) Build something people want- April 16.
3) Draw the landscape - April 23.
4) Create an engine of growth - April 30.
5) Engineer an economic model - May 7.
6) Create a capital strategy- May 14.
7) Frame a Funnel - May 21.
8) Be a Master Storyteller - May 28.

10 minute break.

AI


John McCarthy,
Professor at Stanford University
Coined the term “Artificial Intelligence” in 1956.

What island has benefited from AI more than any other?

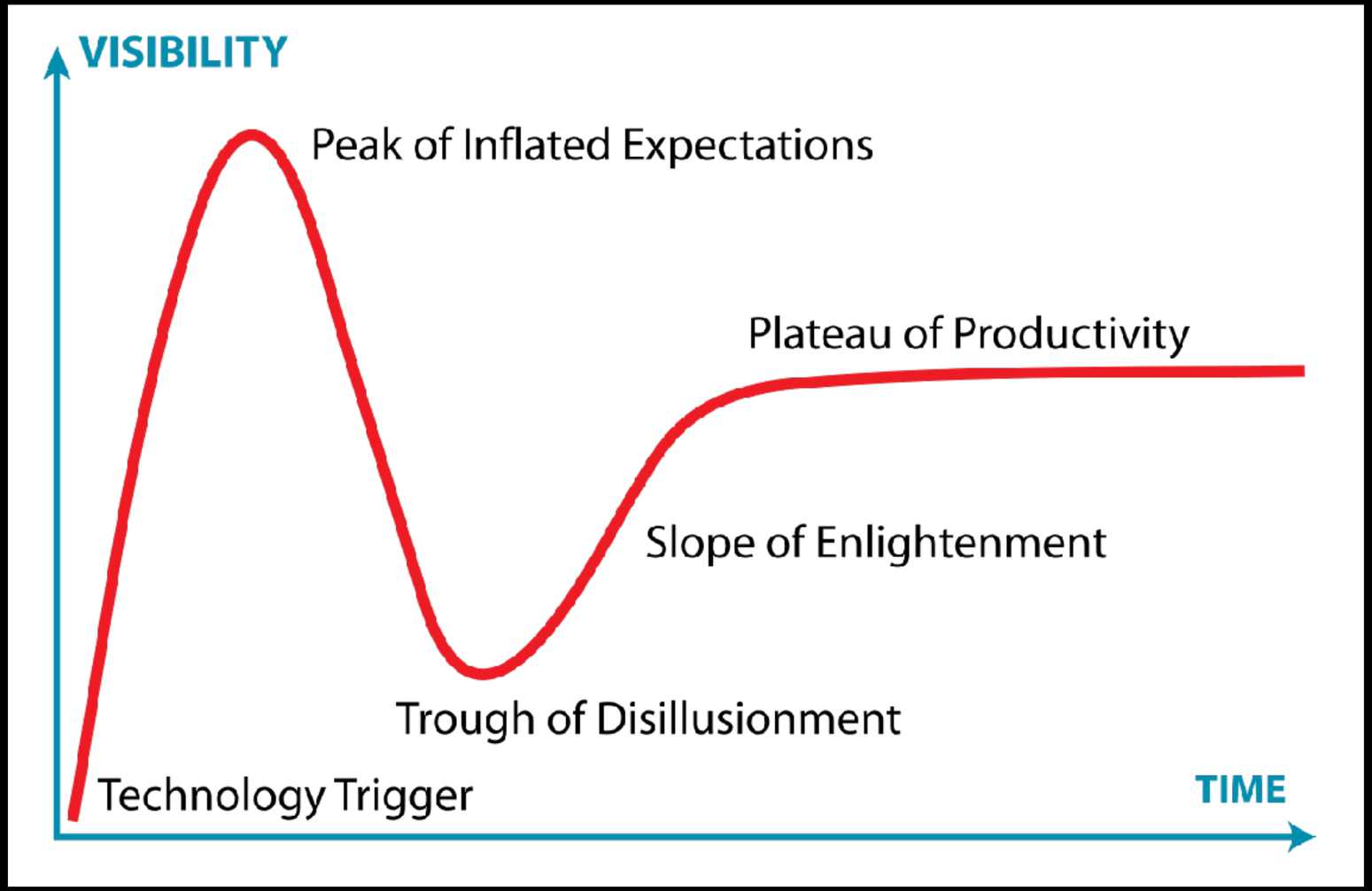
Internet top level domain names (TLDs) are assigned to countries (.uk, .pt, .es).

The TLD “.ai” is owned by the island nation of Anguilla.

NORTH ATLANTIC OCEAN
TURKS AND CAICOS ISLANDS
BRITISH VIRGIN ISLANDS
ANGUILLA
SAINT MARTIN
ANTIGUA AND BARBUDA
SAINT KITTS
CARIBBEAN SEA

In 2024, the island country of Anguilla had $32 million in revenue from selling “.ai” domain names – representing over 20% of the government’s income.

The Gartner Hype Cycle



So where are we with AI right now?

Generative AI (ChatGPT, etc) is having a big impact on everything right now.

We'll look at some of the ways that launching a startup can be accelerated with these tools.

Have experiences and recommendations? Post them for your classmates in the #ai_for_startups channel on Slack!

Stanford CSP BUS-217, Spring 2025

If you will submit this it will help me to understand your background so that I can tailor the course material appropriately. Thanks very much! Looking forward our first session on Wednesday, April 9.

Your Name:

First Last

But you like to be called:

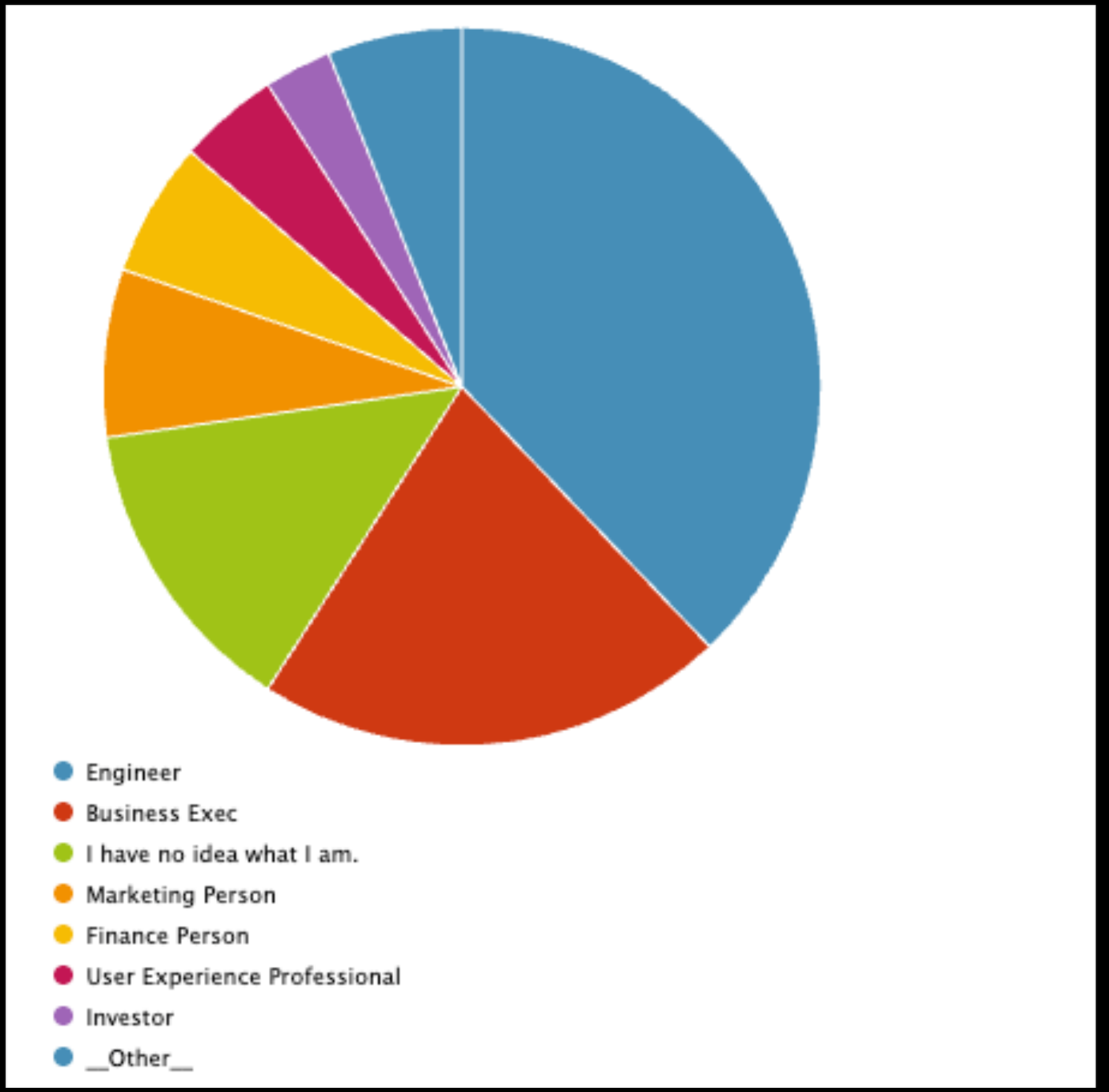
In your professional life today you are a:

You are taking this course because:

Personal geography (eg: "From Brazil, now living in San Francisco").

What is your personal superpower?

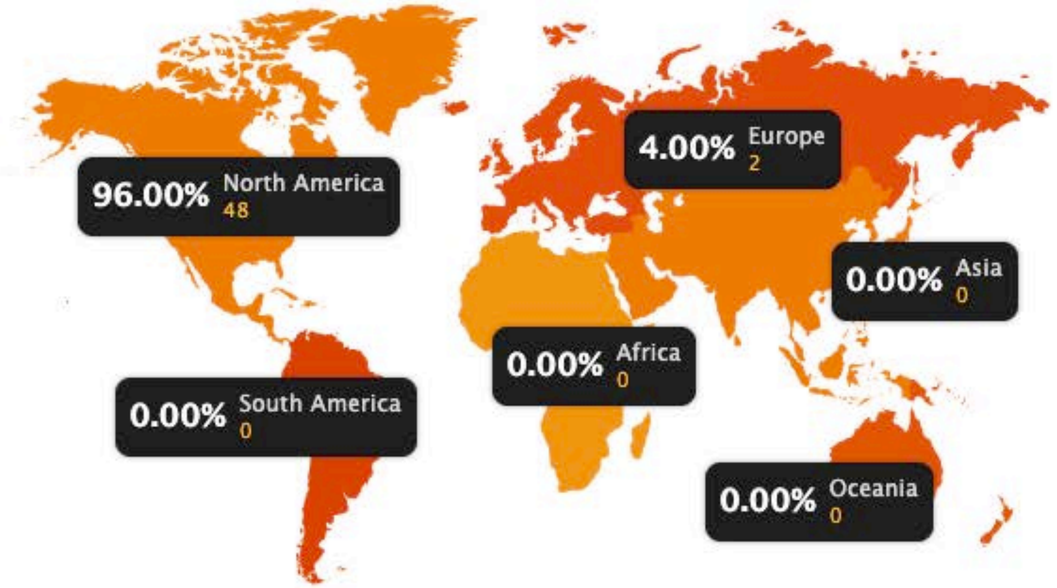
Specific things you'd like to get out of the course:


Engineer
Business Exec
I have no idea what I am.
Marketing Person
Finance Person
User Experience Professional
Investor
__Other__

Choices	Percentage
I want to start a venture.	64.62%
I want to scale an existing venture.	20.00%
Startups are just a topic I'm interested in.	9.23%
I want to start a nonprofit or social enterprise.	4.62%
What? I thought this was a poetry class.	1.54%

Entries by Region

April 2025



Top Countries

	United States	94.00%	47
	Puerto Rico	2.00%	1
	Germany	2.00%	1
	Sweden	2.00%	1

Top Cities

	San Francisco	12.00%	6
	Stanford	6.00%	3
	Oakland	6.00%	3
	Fairfield	4.00%	2
	Palo Alto	4.00%	2
	San Jose	4.00%	2
	Walnut Creek	4.00%	2
	Vallejo	2.00%	1
	Hayward	2.00%	1
	Backnang	2.00%	1

Entries by Software

April 2025

Internet Browser

	Chrome	42.00%	21
	Safari	42.00%	21
	Internet Explorer	0.00%	0
	Firefox	0.00%	0
	Opera	0.00%	0
	Other	16.00%	8

Desktop Operating System

	Linux	4.00%	2
	Mac OS X	80.00%	40
	Windows	0.00%	0
	Other	16.00%	8

Eating junk food is killing people more than smoking, finds a study

TNN | Last updated on -May 6, 2019, 17:30 IST

Share

Comments (6)

01 /10 **Are you living a healthy life?**

When it comes to following a healthy diet, smoking is considered to be one of the biggest evils risking our health. From the risk of developing cancer, cardiac complications, breathing difficulties and the danger of catching second-hand smoke, there is a very valid reason to say no to smoking.

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JORDAN YEOH'S FITNESS

Eating junk food is killing people more than smoking, finds a study

TNN | Last updated on -May 6, 2019, 17:30 IST

Share

Comments (6)

01 /10 | **Are you living a healthy life?**

Fast food kills - and yet we buy a lot of it.

“A fast food diet increase your chances of developing depression, cancer, type 2 diabetes, heart disease and other chronic conditions.” -Cleveland Clinic.

“Over the past 50 years, the health of Americans has gotten worse, Today, eating processed foods and fast foods may kill more people prematurely than cigarette smoking”.
- National Institutes for Health

“The health benefits of a natural, plant-based diet have been established by numerous research studies”
- Stanford School of Medicine

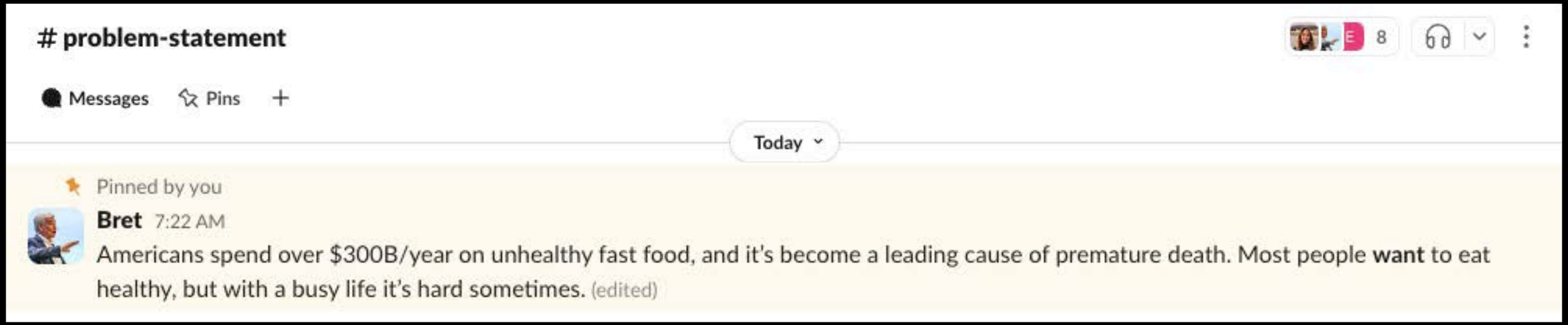
Problem Statement for Bret's awesome new startup:

Americans spend over $300B/year on unhealthy fast food, and it's become a leading cause of premature death. Most people want to eat healthy, but with a busy life it's hard sometimes.

Bret's awesome new startup:

Americans spend over $300B/year on unhealthy fast food, and it's become a leading cause of premature death. Most people want to eat healthy, but with a busy life it's hard sometimes.

Over the course of the next eight weeks, I will produce deliverables of each step, as examples you can refer to as you develop your own startup idea.



Your first assignment is to write a simple and clear statement of the problem your startup solves, and post it to the #problem_statement channel on Slack.

You are not writing marketing copy, so no buzzword mumbo jumbo! Just a nice, simple, clear articulation of the problem your startup solves.

Frame it as a problem from a customer perspective. In other words, we're not fixing the fact that most fast food is unhealthy – we're fixing the fact that most consumers want to eat healthy but often don't feel as if they have the time.

Administrative details.

If you are taking the class for a grade, you have one deliverable at the end of the course:

- A short slide deck about a startup venture, demonstrating that you understood the concepts we discussed in the course.
- You can choose whether to present it in class or not.
- Due to me before the final class session.

Administrative details:

Eight Wednesdays, 7pm - 8:50pm.

Grade will be based on attendance, participation, and one deliverable.

Interactive format - ask questions, and bring thoughts!

Be respectful, raise your hand, ask good questions and let others do the same.

Our primary communication between classes will be Slack.

I'll give you 100% and ask that you please do your part.

CO
HO

Every week I'll be at the CoHo an hour before class.

Join if you want for food, beverages, discussion.

Purely optional.

Hair

Want to volunteer to lead a Zoom-based study group with weekly calls?

Let me know.

bus217.org

On the class website you will find recaps of each class session, additional reading, assignments, videos, etc.

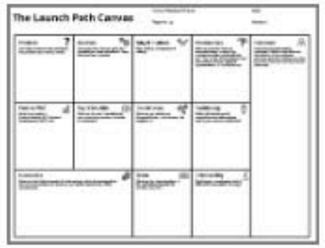
STANFORD CONTINUING STUDIES BUS-217

The Launch Path

Getting from a startup idea to a launch-ready venture.

Download The Launch Path Canvas.

- Other Reading
- Resources
- LinkedIn Group
- Side Sessions



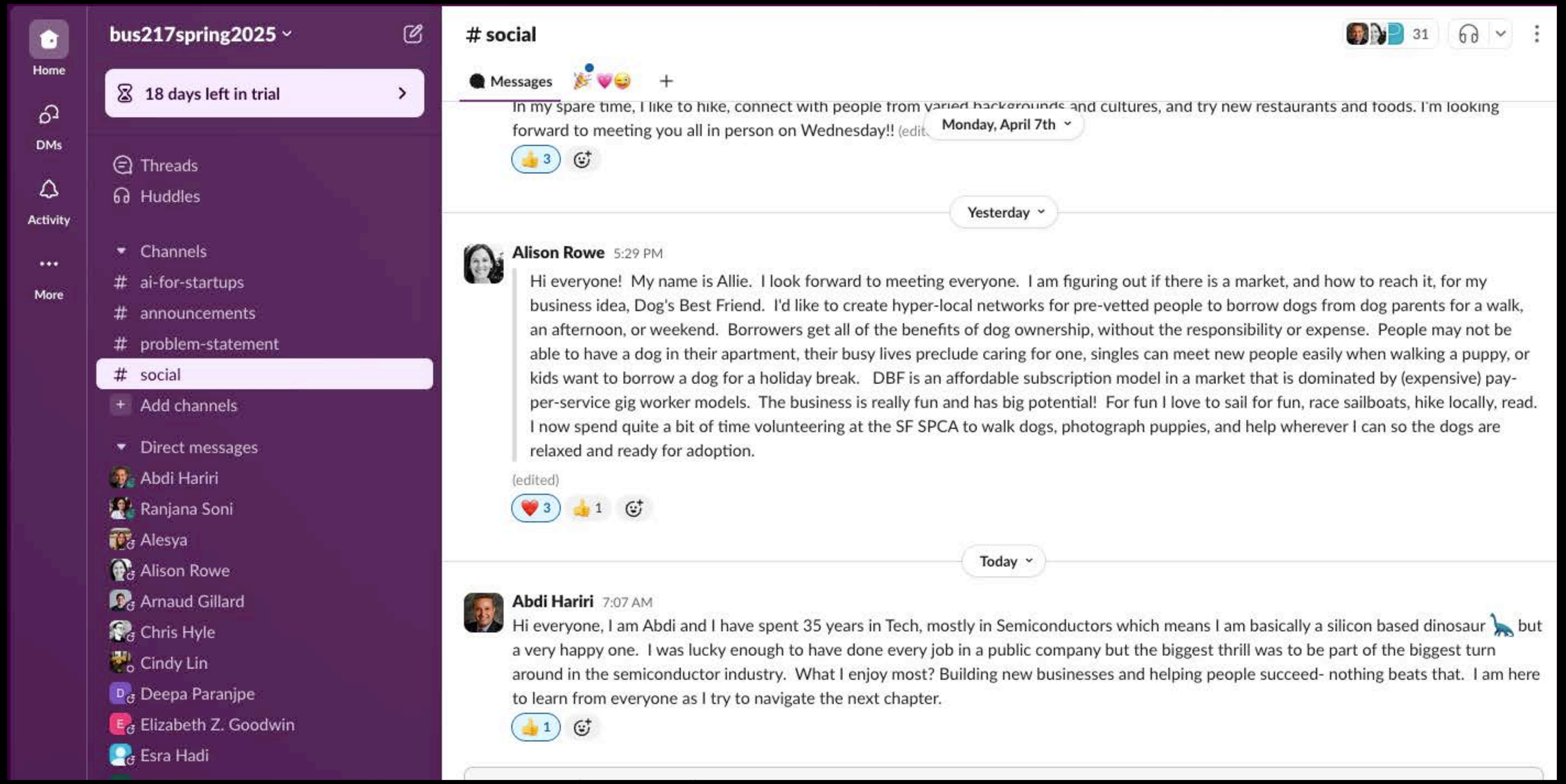
Download Canvas as a PDF or here is a Google Sheets version.

- **Week 1:** Listen to the Waves.
- **Week 2**: Build something people want.
- **Week 3**: Draw the landscape.
- **Week 4:** Design an engine of growth.
- **Week 5:** Engineer an economic model.
- **Week 6:** Develop a capital strategy.
- **Week 7:** Frame a funnel.
- **Week 8**: Become a master storyteller.

–

- Side session: Nonprofits and Social Ventures

Our Slack Workspace



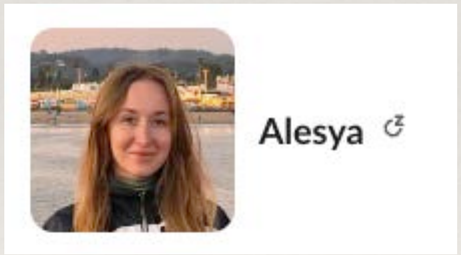
Make it easy for your classmates to get to know you by using the same name across everything in class.

Be like Alesya!

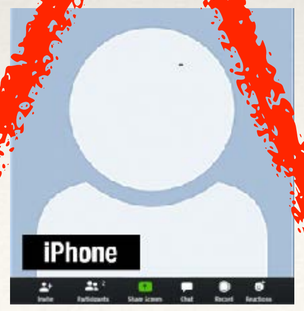
Name: Samuel Robert Smith | Alesya Pyrkova

Name Tag:

Slack:



Zoom:



Some of you are sippers.

Some of you are gulpers.

If you want to sip this class:

All you need to do is show up on Wednesday nights and have something interesting to say.

If you want to gulp this class:

Regular Wednesday night class sessions - be active in discussions.

Produce deliverables for our own startup for each step on The Launch Path.

Participate in Slack discussions with classmates.

Join the pre-class discussions at the CoHo.

Choose to present your own startup idea to the class.

Join the optional calls we will have occasionally.

I have designed this course to be satisfying for both sippers and gulpers.

My goals for our time together:

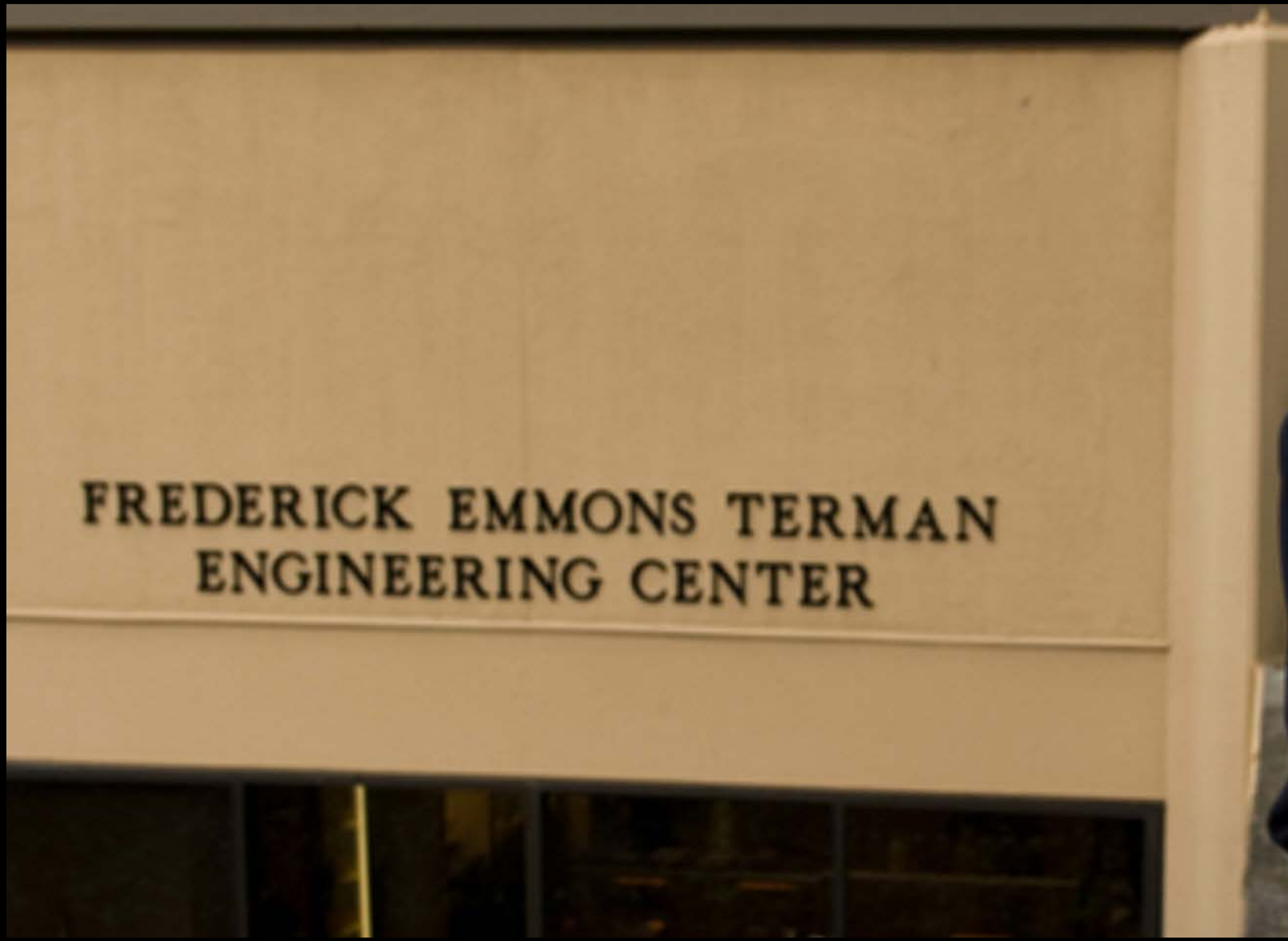
Introduce you to a set of frameworks that will be helpful for any sort of new venture - tech, non-tech, social venture, etc.

Create an environment of knowledge-sharing and cross-pollination so that you learn from each other.

Have fun and make life-long connections.

This week's assignments:

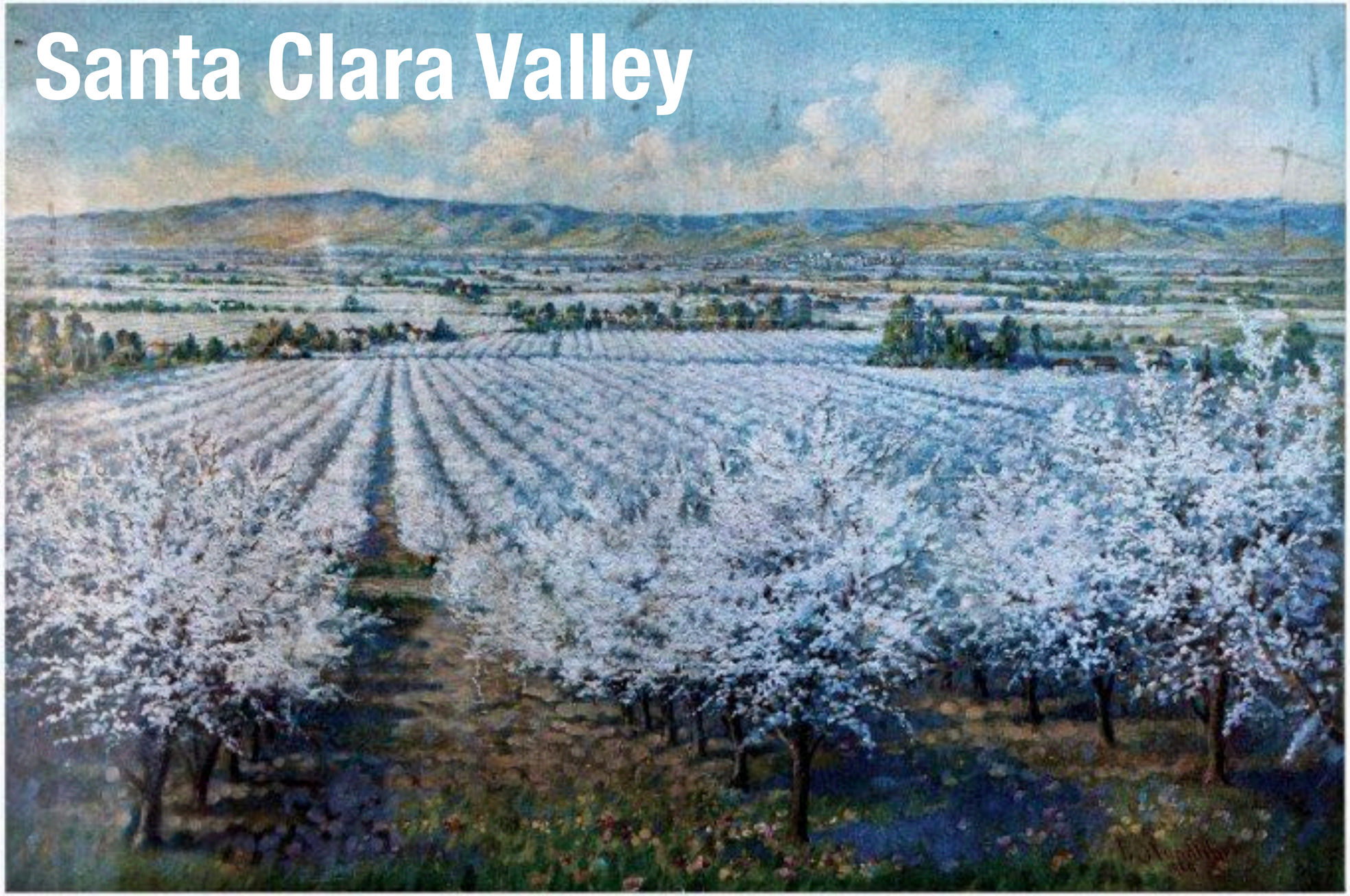
- In the #problem_statement channel on Slack, share a short, concise statement of the problem your startup solves.
- In the #social channel on Slack, post a photo of a favorite food that you grew up with.


FREDERICK EMMONS TERMAN
ENGINEERING CENTER

The History of Silicon Valley

Silicon Valley, California
Global hub of entrepreneurship and innovation.
Headquarters of more than 4,000 tech companies.
The GDP of the Bay Area is more than $500 billion, larger than most countries in the world.

Santa Clara Valley

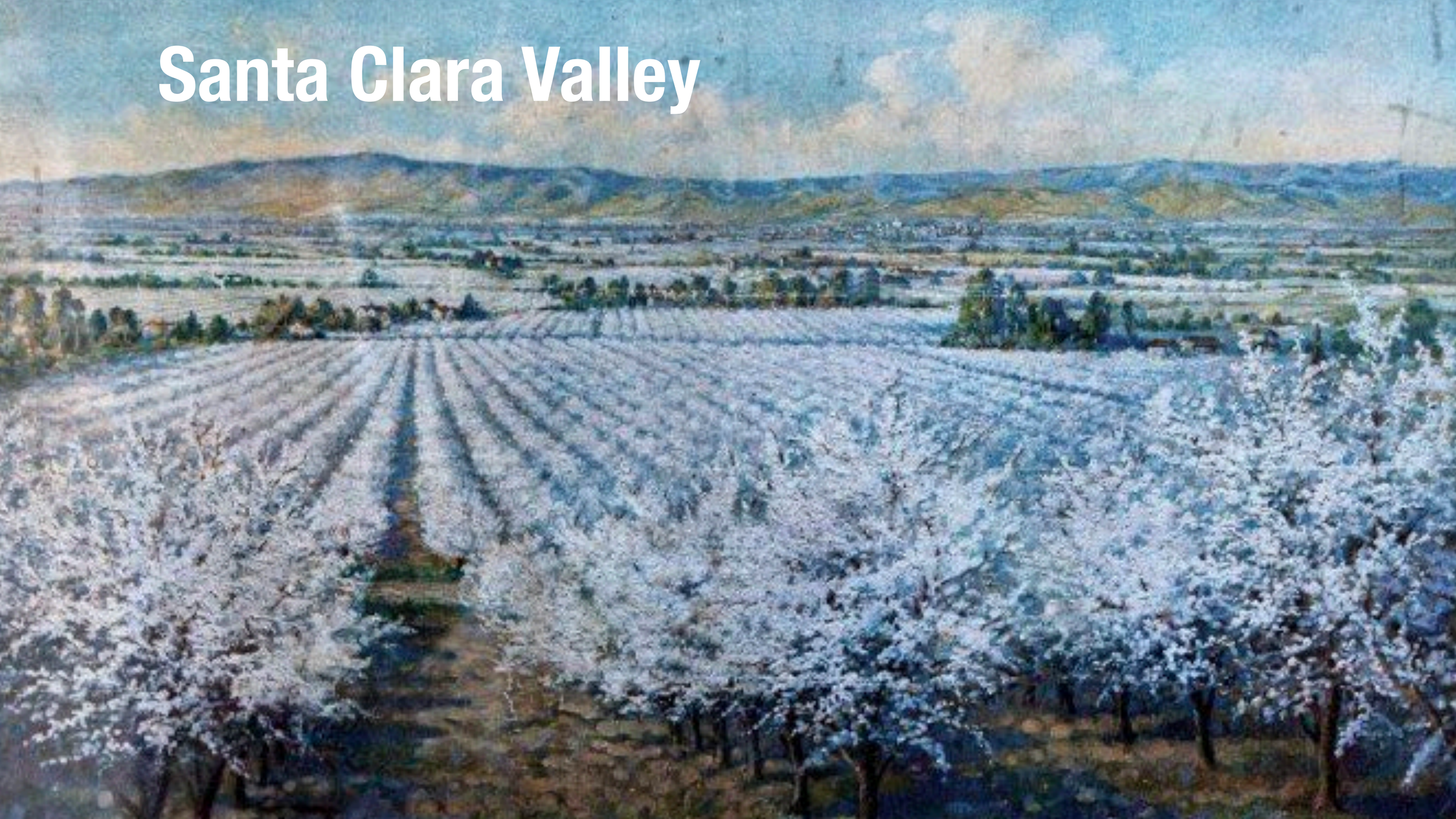


Blossom Scene in the Santa Clara Valley of California

You are most cordially urged to visit "The Valley of Heart's Delight"

For detailed information, contact the San Jose Chamber of Commerce

Santa Clara Valley



Chapter 1:

The Entrepreneurs of 1849.

CALIFORNIA GOLD RUSH 1849

1999

San Francisco, 1849

The population of San Francisco increased from 1,000 to 25,000 in less than two years.

San Francisco, 1849

The population of San Francisco increased from 1,000 to 25,000 in less than two years.

CALIFORNIA GOLD RUSH 1849

1999

The “49ers” were known as hard-working, resourceful entrepreneurs.

They traveled thousands of miles to get to California, where they mined for gold, built stores, launched businesses, and created jobs.

Leland Stanford

A famous 49er.

Leland Stanford

Grew up in New York, went to law school.

Lost everything in a fire.

Decided to join the California Gold Rush.

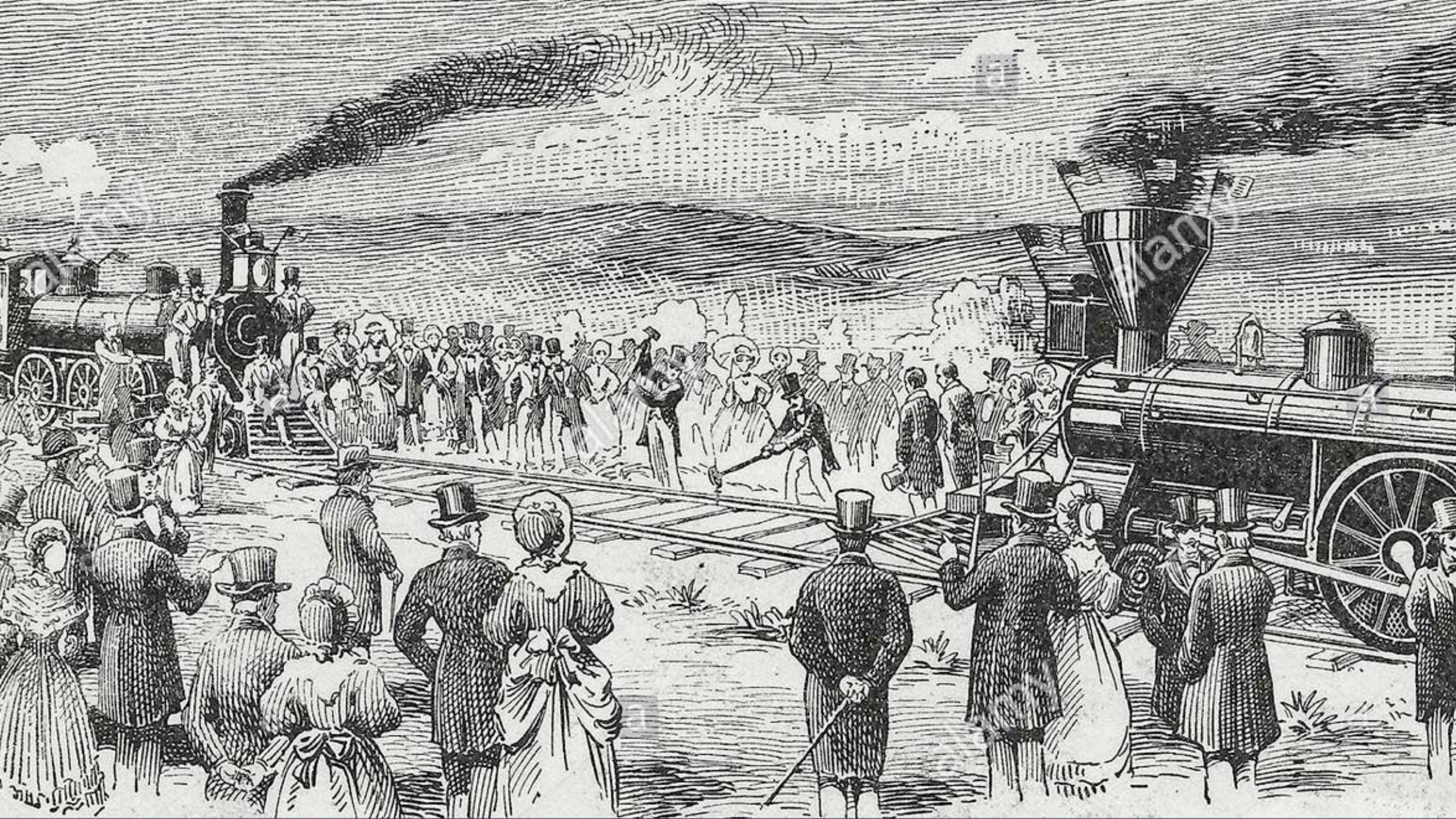
1852, owned a general store for miners.

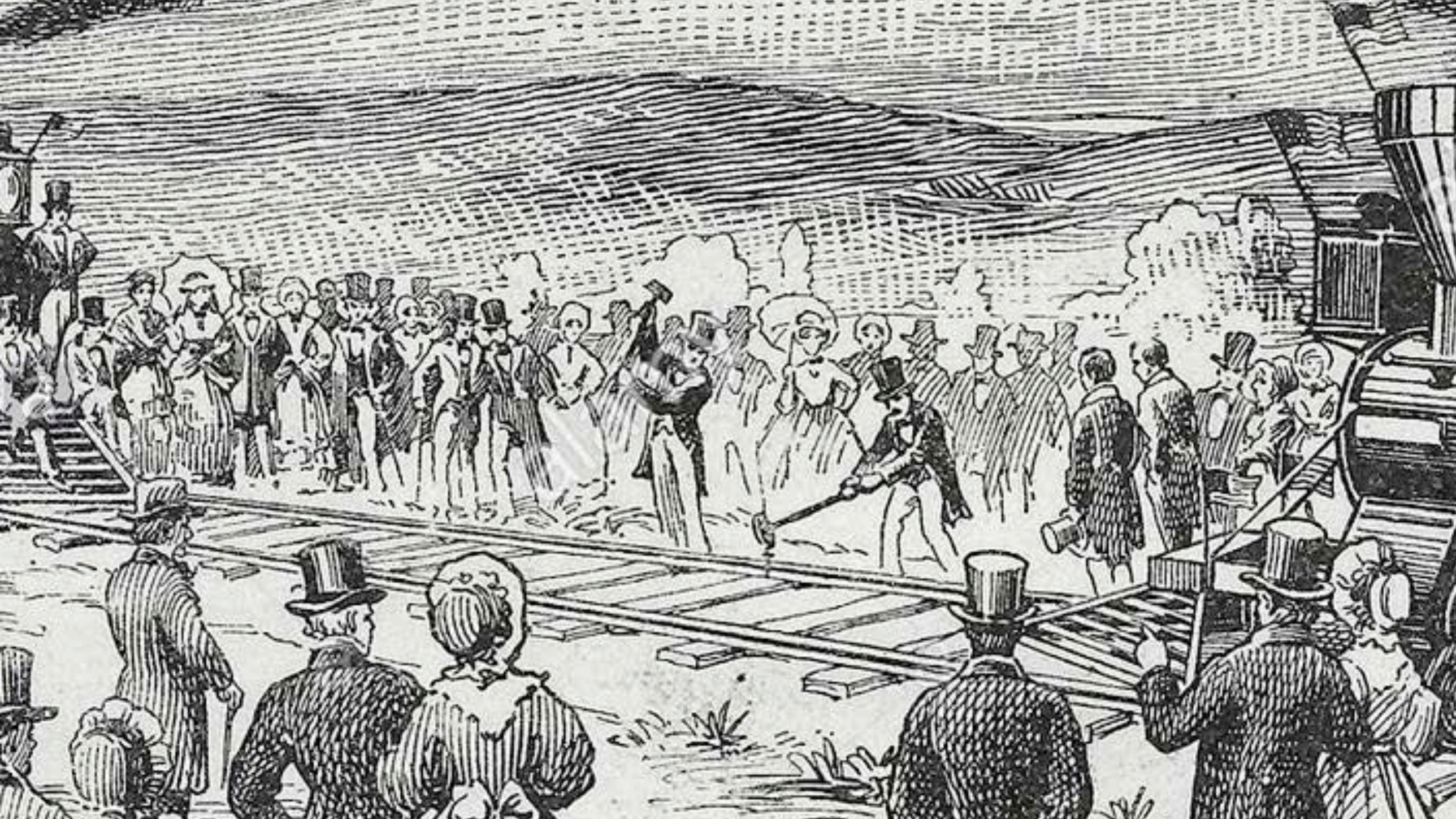
1856, opened more businesses in Sacramento.

1861, co-founded the Central Pacific Railroad.

1868, co-founded Pacific Union and then merged with Wells Fargo & Company.

Built the transcontinental railroad.





The Call–Chronicle–Examiner

SAN FRANCISCO, THURSDAY, APRIL 19, 1906.

EARTHQUAKE AND FIRE: SAN FRANCISCO IN RUINS

NO HOPE LEFT FOR SAFETY OF ANY BUILDINGS

BLOW BUILDINGS UP TO CHECK FLAMES

WHOLE CITY IS ABLAZE

CHURCH OF SAINT IGNATIUS IS DESTROYED

MAYOR CONFERS WITH MILITARY AND CITIZENS

The Call—Chronicle—Examiner

SAN FRANCISCO, THURSDAY, APRIL 19, 1906.

EARTHQUAKE AND FIRE: SAN FRANCISCO IN RUINS

The home of Leland and Jane Stanford after 1906 earthquake.

Then tragedy struck.

Their only child,
Leland Stanford Jr,
died at 15.

In their grief, Leland Stanford and his wife Jane decided to launch a new startup venture in their son’s memory, on the land they owned in Santa Clara Valley.

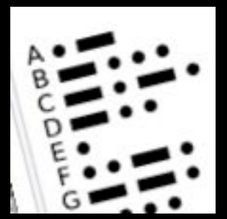
It was an innovative new startup.

- “A university which will fit the graduate for some useful pursuit”.
- “To prohibit religious instruction, but to teach the immortality of the soul.”
- “To afford equal facilities and give equal advantages to both sexes”.

Stanford University, Founded 1891

Chapter 2:

The First Internet.



The Telegraph

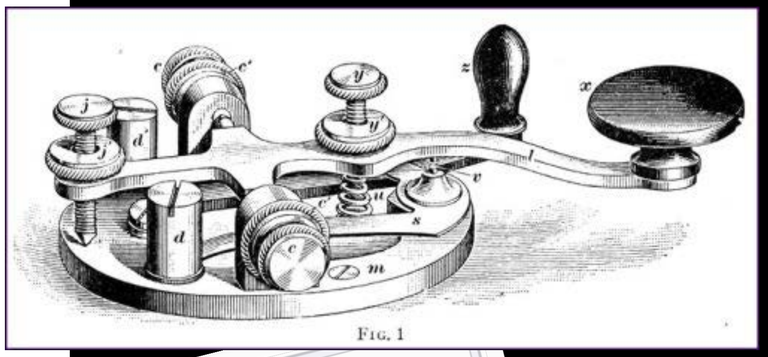


Fig. 1

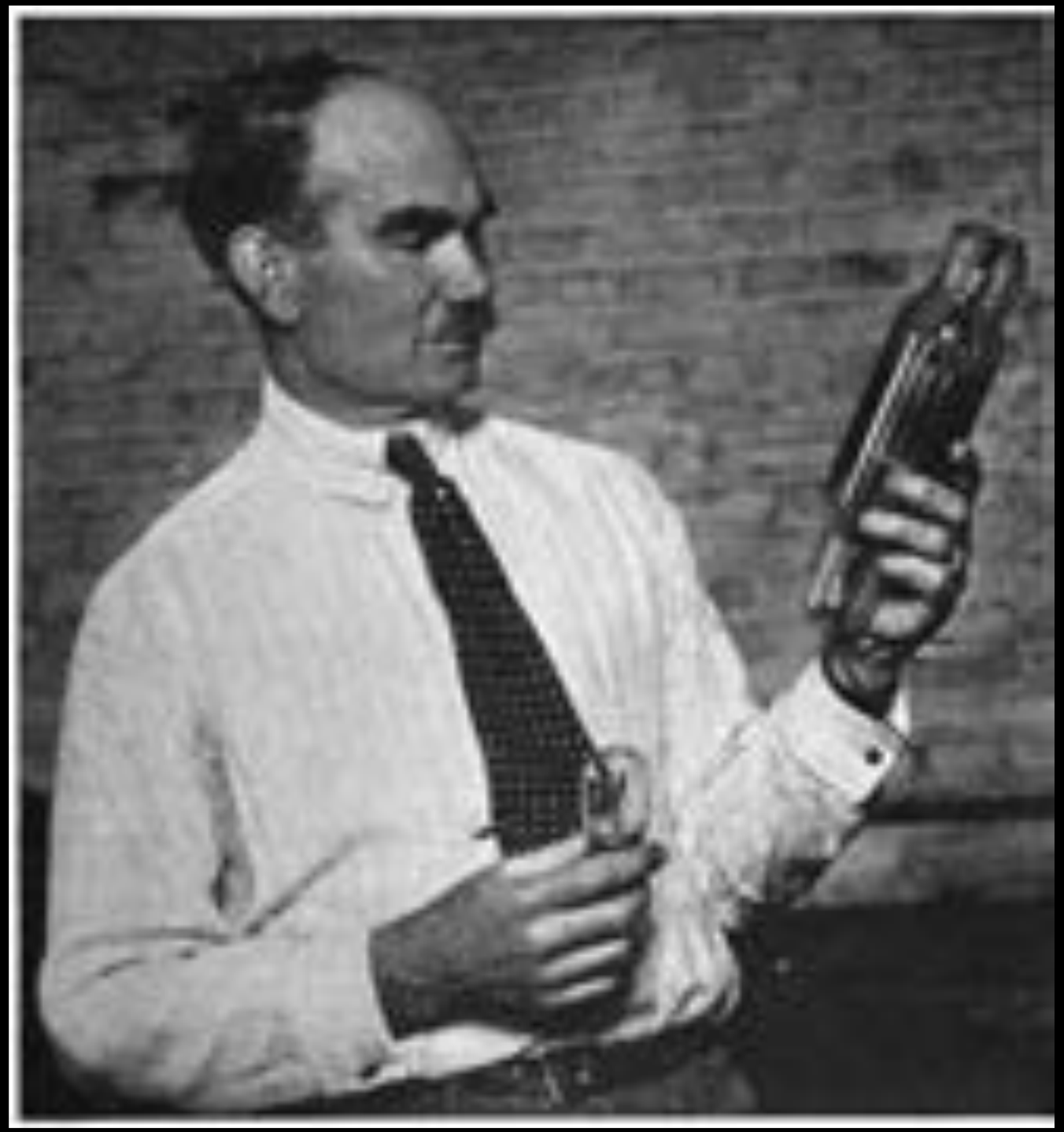
International Morse Code

1. The length of a dot is one unit.
2. A dash is three units.
3. The space between parts of the same letter is one unit.
4. The space between letters is three units.
5. The space between words is seven units.

A	·−	U	··−
B	−···	V	···−
C	−·−·	W	·−−
D	−··	X	−··−
E	·	Y	−·−−
F	··−·	Z	−−··
G	−−·		
H	····		
I	··		
J	·−−−	1	·−−−−
K	−·−	2	··−−−
L	·−··	3	···−−
M	−−	4	····−
N	−·	5	·····
O	−−−	6	−····
P	·−−·	7	−−···
Q	−−·−	8	−−−··
R	·−·	9	−−−−·
S	···	0	−−−−−
T	−		

Federal Telegraph Company, Emerson Street, Palo Alto

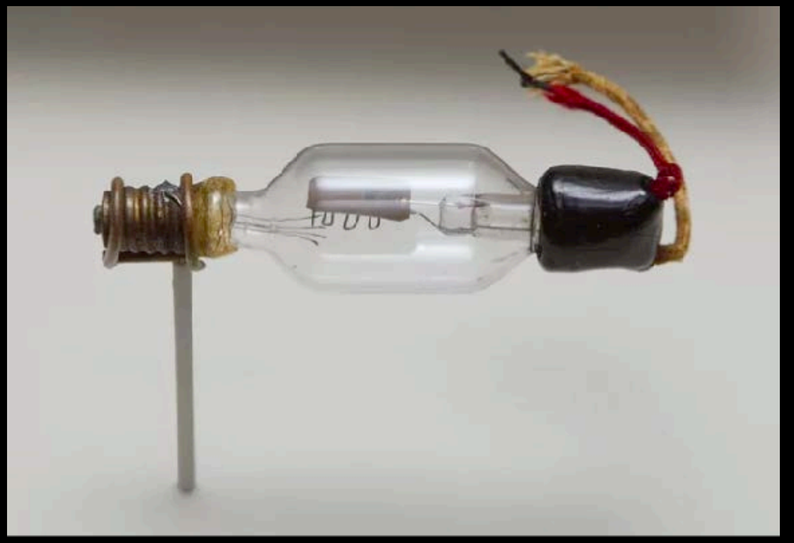
Federal Telegraph Company, Emerson Street, Palo Alto



Lee DeForest
Federal Telegraph
Company
Palo Alto

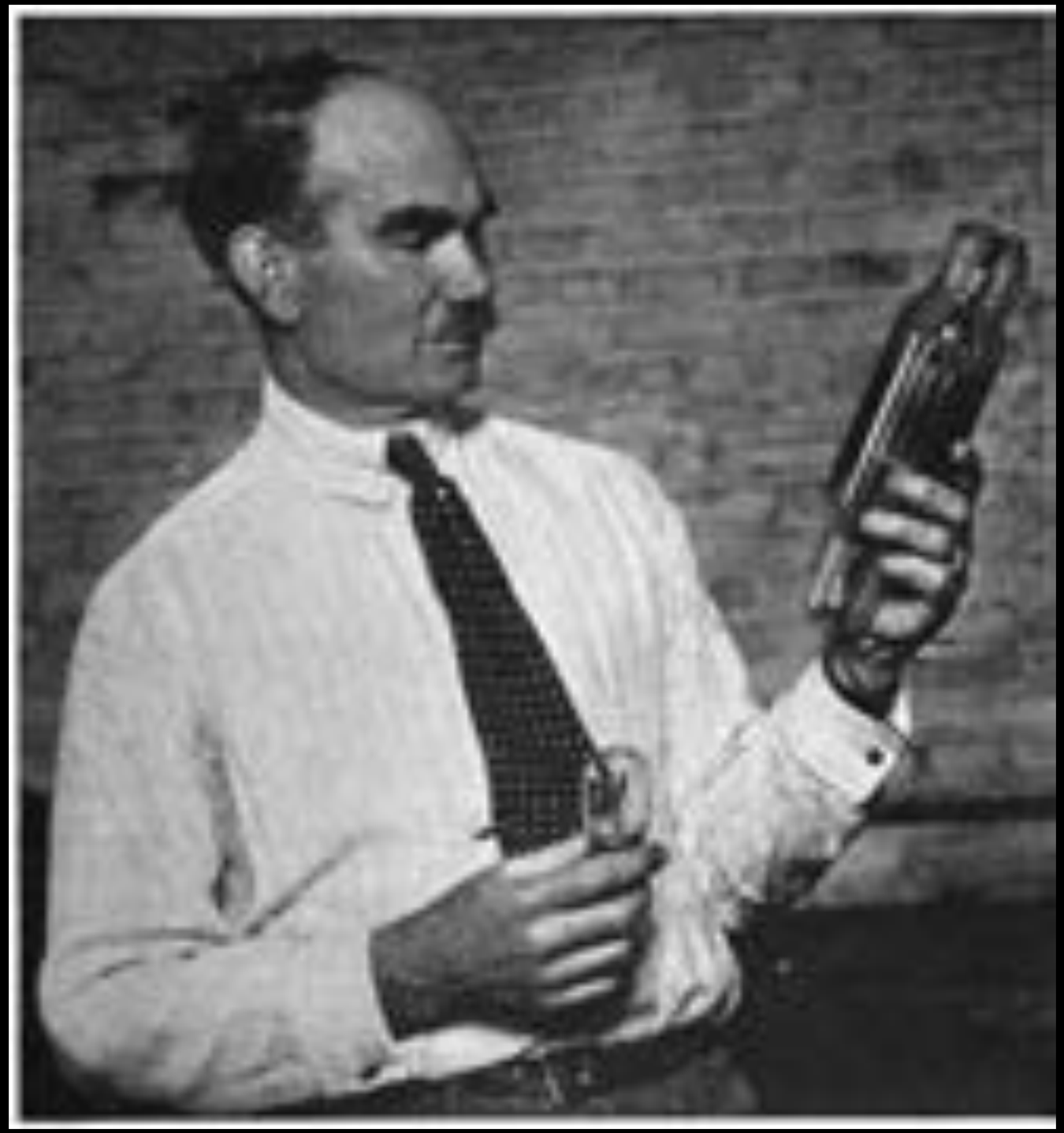
While working on developing a “next-generation telegraph”, he invented of the vacuum tube amplifer.

January 25, 1915 at the World's Fair in San Francisco, Lee DeForest's tube amplifier was used for the first transcontinental phone call.



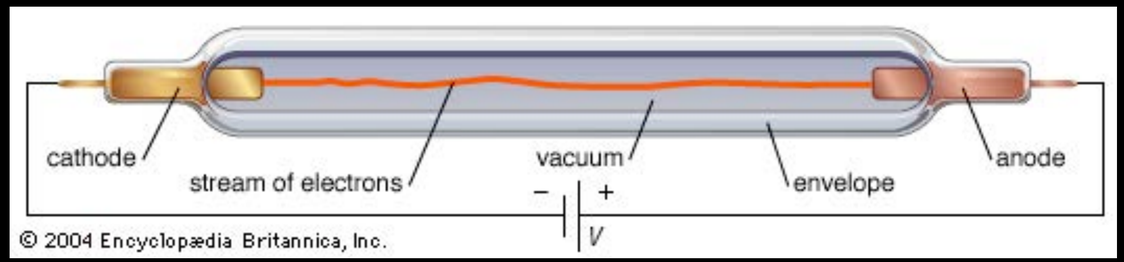
Chapter 3:

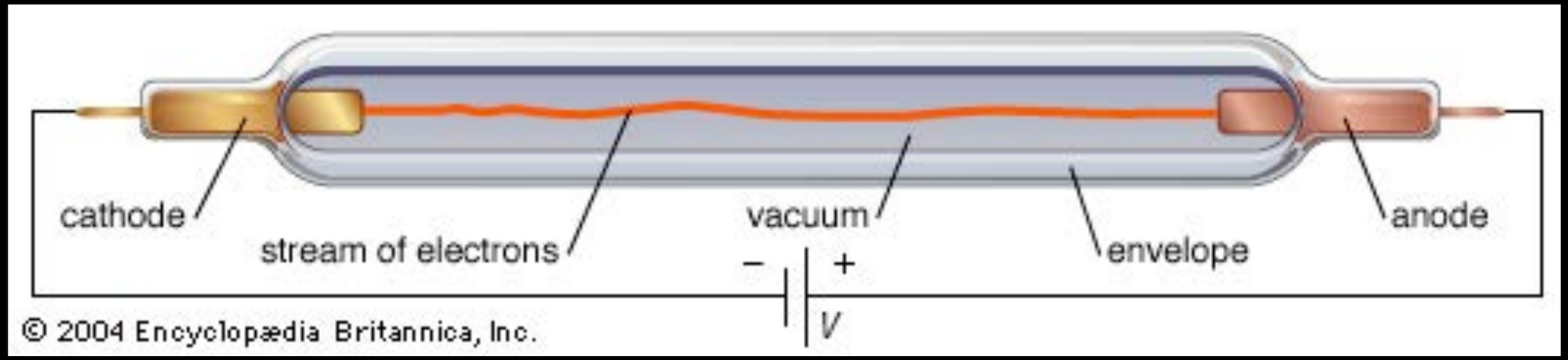
Tubes.



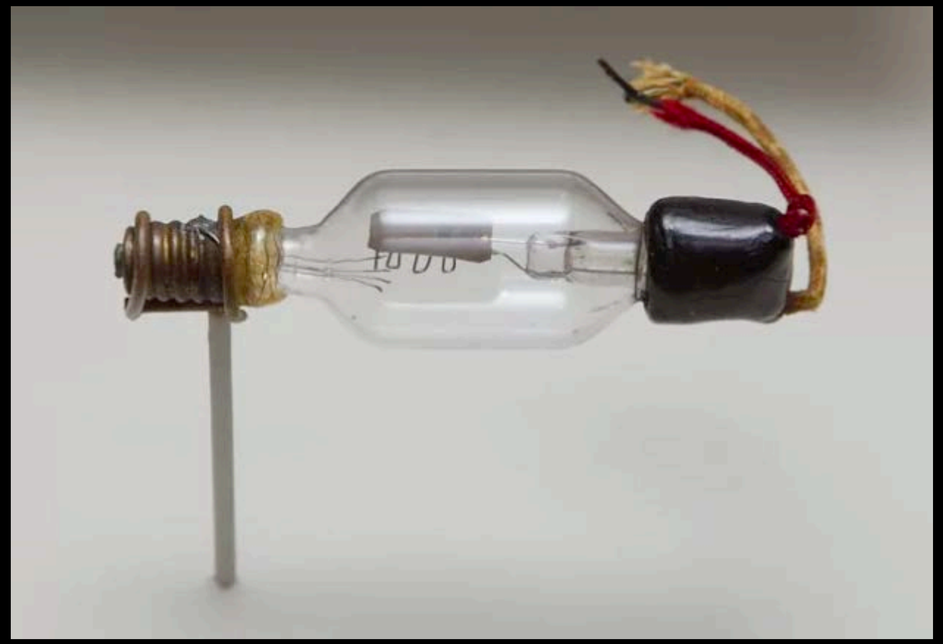
Lee DeForest
Federal Telegraph Company
Palo Alto

His invention, the vacuum tube amplifier, became the one device to rule them all.





Lee Deforest's new invention controlled the flow of electrons and the field became known as "electon-ics".



Stanford University created new courses, studies, and research in this new field of “electronics".

For the entire first half of the twentieth century, vacuum tubes were what drove the development of radio, television, radar, sound recording and reproduction, long distance telephone networks, home entertainment systems, and more.

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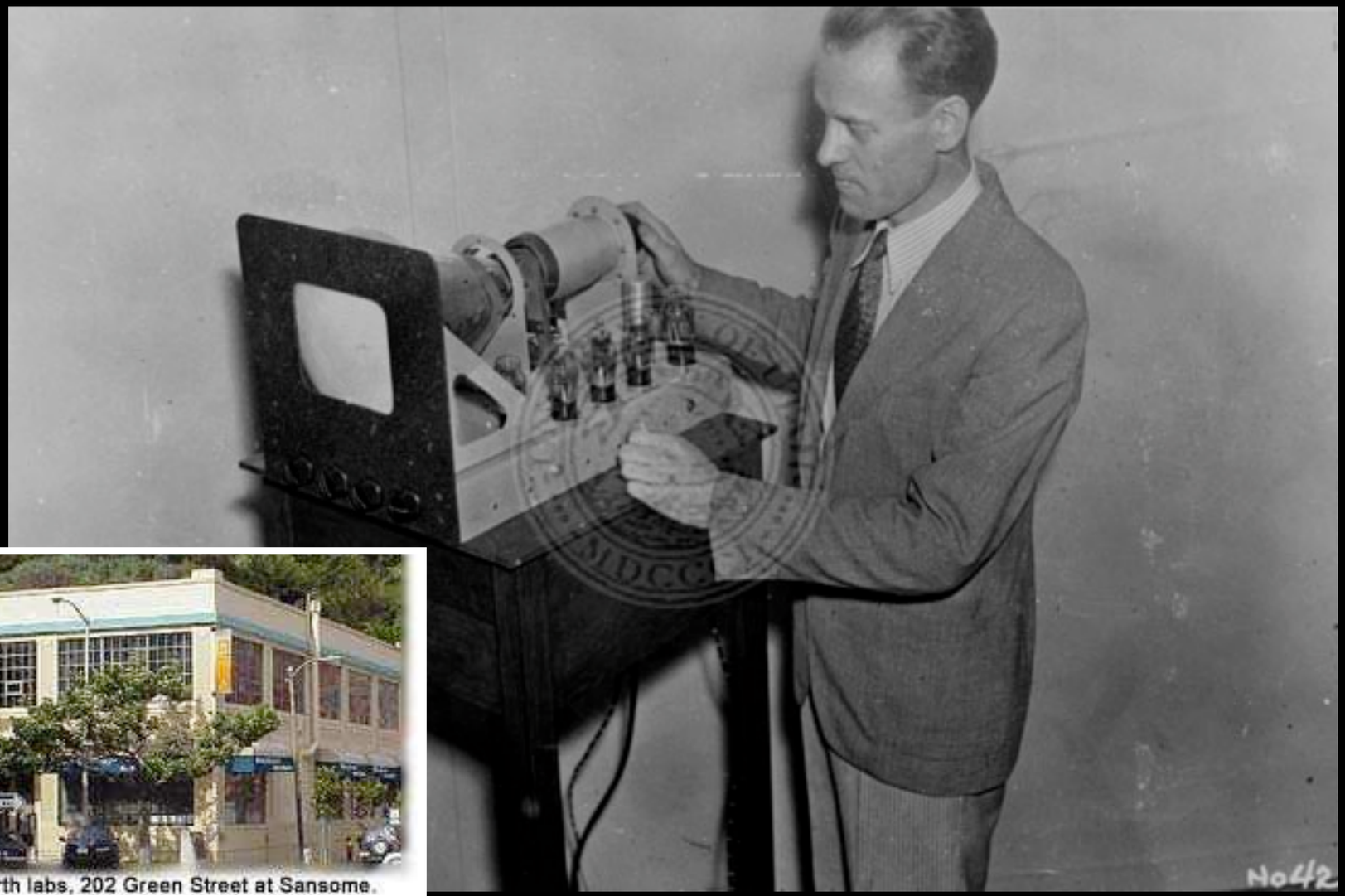
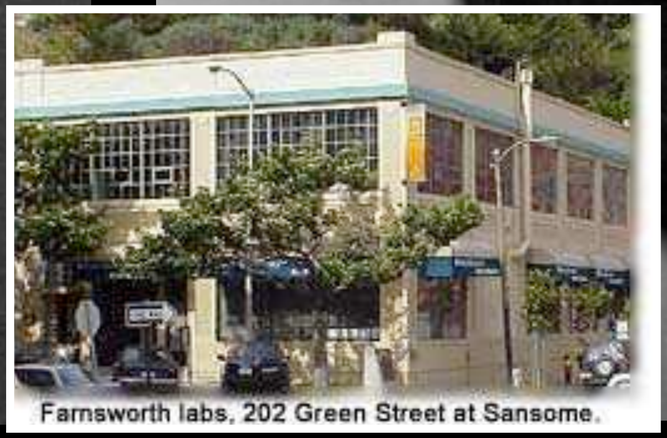
21-year-old Philo Farnsworth, “The Genius of Green Street”

Invented the television in his lab at 202 Green Street in San Francisco.





Farnsworth labs, 202 Green Street at Sansome.

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Farnsworth labs, 202 Green Street at Sansome.

Frederick Terman

Dean of the Stanford University
School of Engineering
“The Father of Silicon Valley”

Frederick Terman

Dean of the Stanford University
School of Engineering
“The Father of Silicon Valley”

Terman started doing an innovative thing: He actively encouraged his students to found companies when they finished their studies, and he even personally invested in some of them.

Frederick Terman and two of his students,
Bill Hewlett and Dave Packard.

They founded HP in this garage, at 367 Addison Avenue in Palo Alto. It's still there.

The HP200A oscillator.

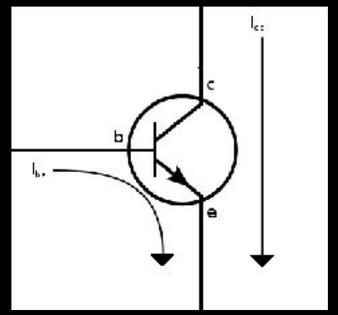
HP's first customer was Disney.
They bought 8 units at $71.50 each,
for use in making the movie *Fantasia*.

Electron Tube
300B-98C
MADE IN CHINA
12AX7EH
electro-harmonix
Made in Russia
thetubestore.com
Perfect Pair

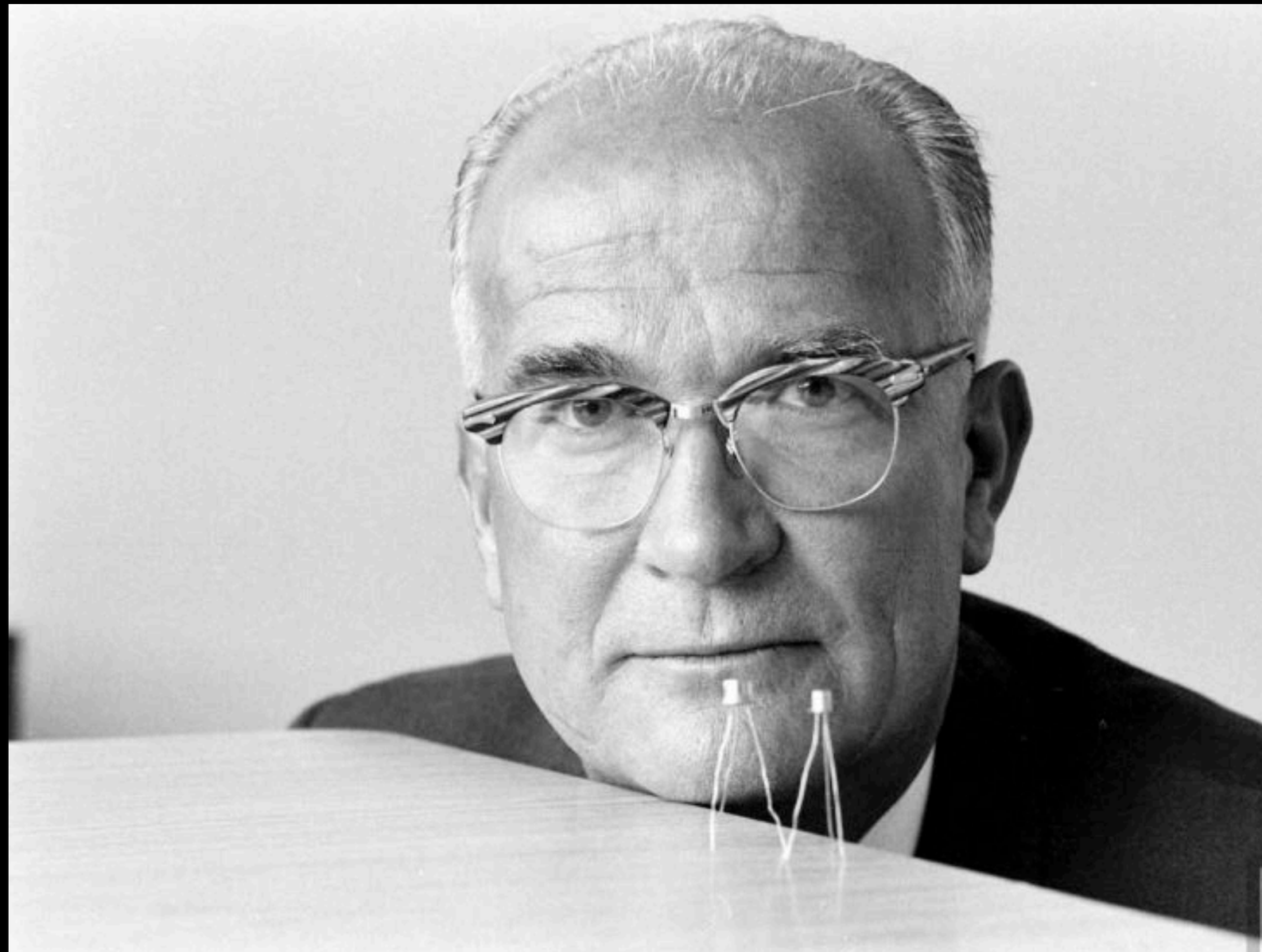
Electron Tube
300B-98C
MADE IN CHINA
12AX7EH
electro-harmonix
Made in Russia
thetubestore.com
Perfect Pair

Chapter 4:

Transistors.

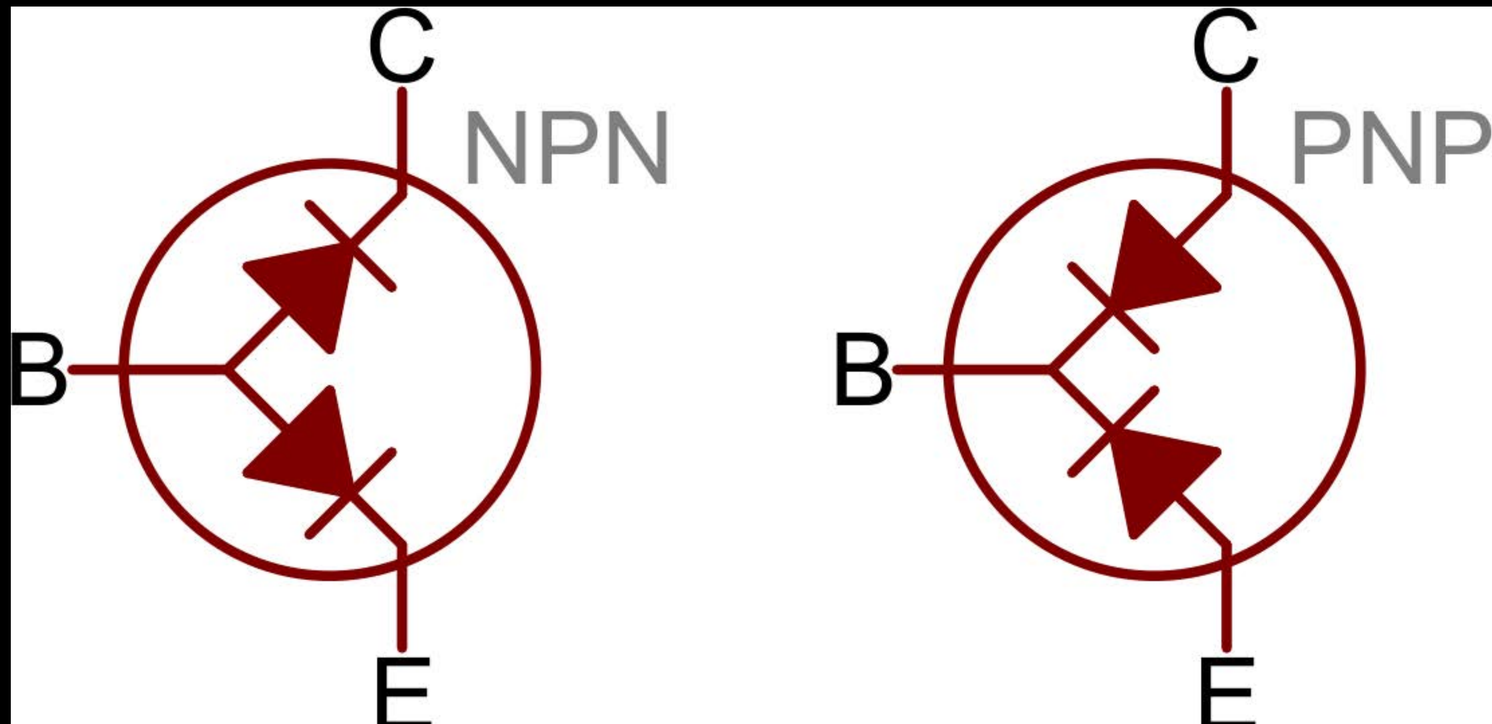


William Shockley: A Palo Alto guy wins the Nobel prize in physics, 1956.

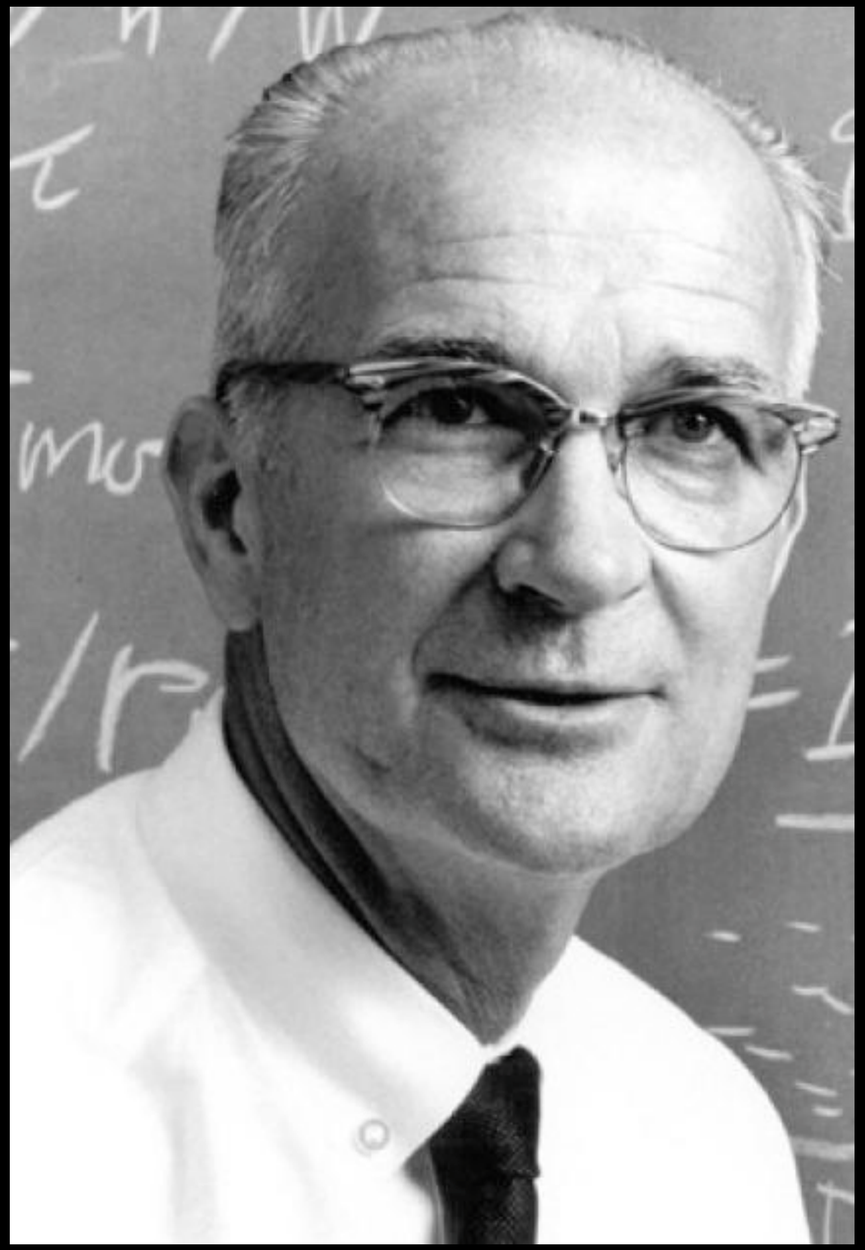


Transistors.
LIFE

The Transistor did everything a vacuum tube did, but was smaller, faster, cheaper to manufacture, and consumed less energy.



391 San Antonio Road, Mountain View, California



William Shockley

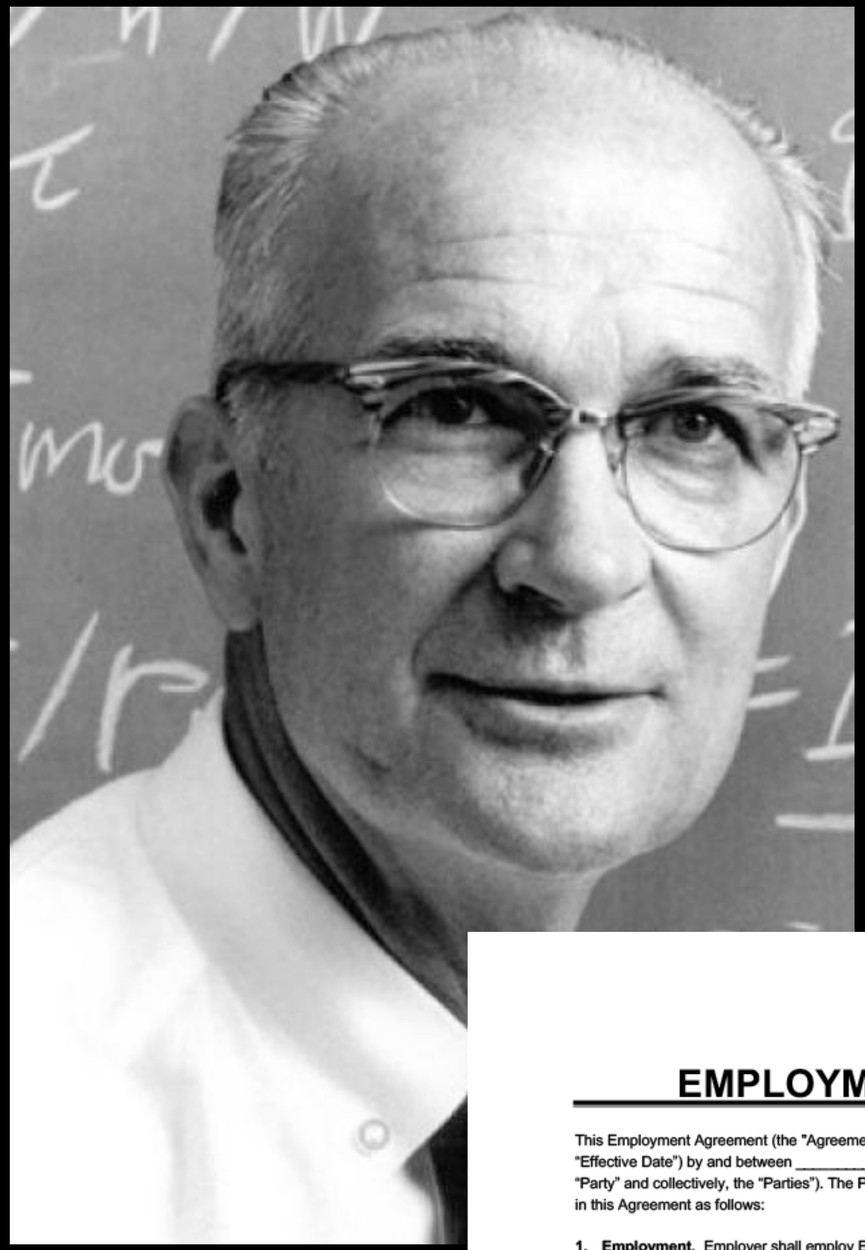
Brilliant technology guy.
Terrible manager.

The “traitorous eight” quit their jobs at Shockley Semiconductor to create a startup to compete with their boss.

EXIT

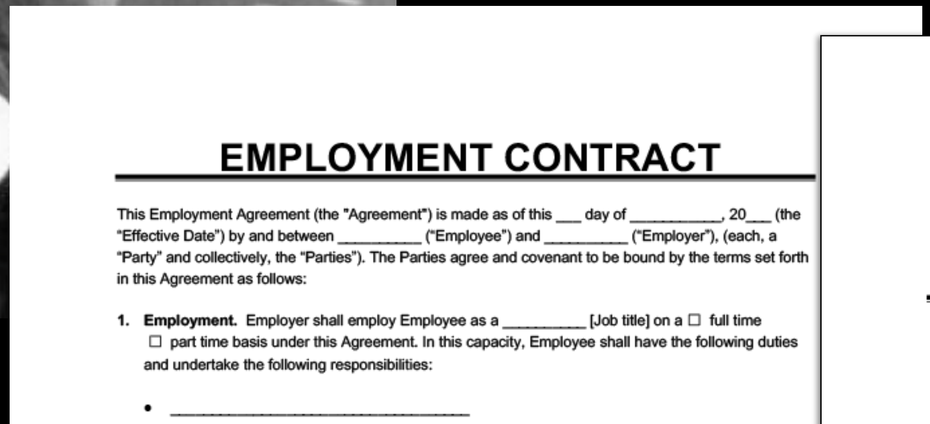
Signed by the founders of Fairchild Semiconductor, in lieu of a partnership document.

Courtesy of Special Collections, Stanford University Librarie



But wait!

William Shockley, their former employer, tried to sue them, citing non-compete agreements they had signed.



EMPLOYMENT CONTRACT

This Employment Agreement (the "Agreement") is made as of this ___ day of _____, 20___ (the "Effective Date") by and between _____ ("Employee") and _____ ("Employer"), (each, a "Party" and collectively, the "Parties"). The Parties agree and covenant to be bound by the terms set forth in this Agreement as follows:

1. **Employment.** Employer shall employ Employee as a _____ [Job title] on a ☐ full time ☐ part time basis under this Agreement. In this capacity, Employee shall have the following duties and undertake the following responsibilities:

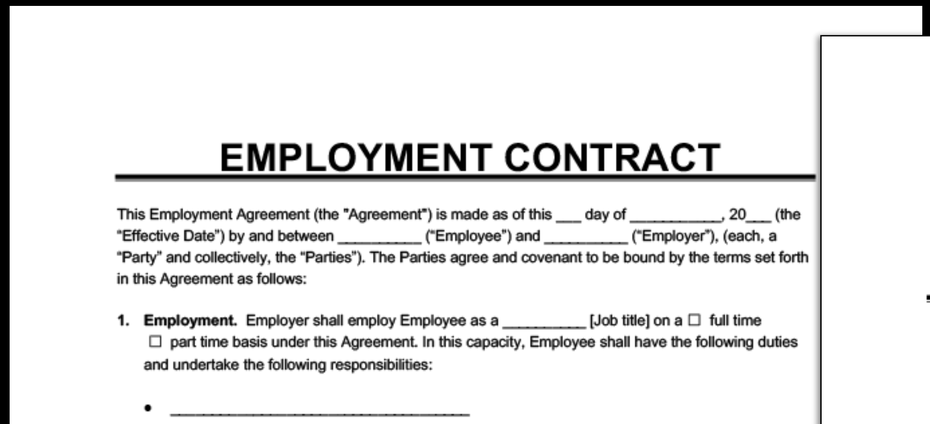
State of _____

EMPLOYEE NON-COMPETE AGREEMENT

This Non-Compete (the "Agreement") is made as of this _____ day of _____, 20_____, (the "Effective Date") by and between _____ ("Company"), located at _____, and _____ ("Employee"), residing at _____.

California law since 1941 states that non-compete agreements are not enforceable.

"Every contract by which anyone is restrained from engaging in a lawful profession, trade, or business of any kind is to that extent void."



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In California, non-compete
agreements are unenforceable.
#winning #startups #awesome

5:26

Instagram

Your story | jaded.ele... | pia.in.a.pod | lil_wyatt838 | fre

heaven.is.nevaeh

Liked by **kyia_kayaks** and **others**

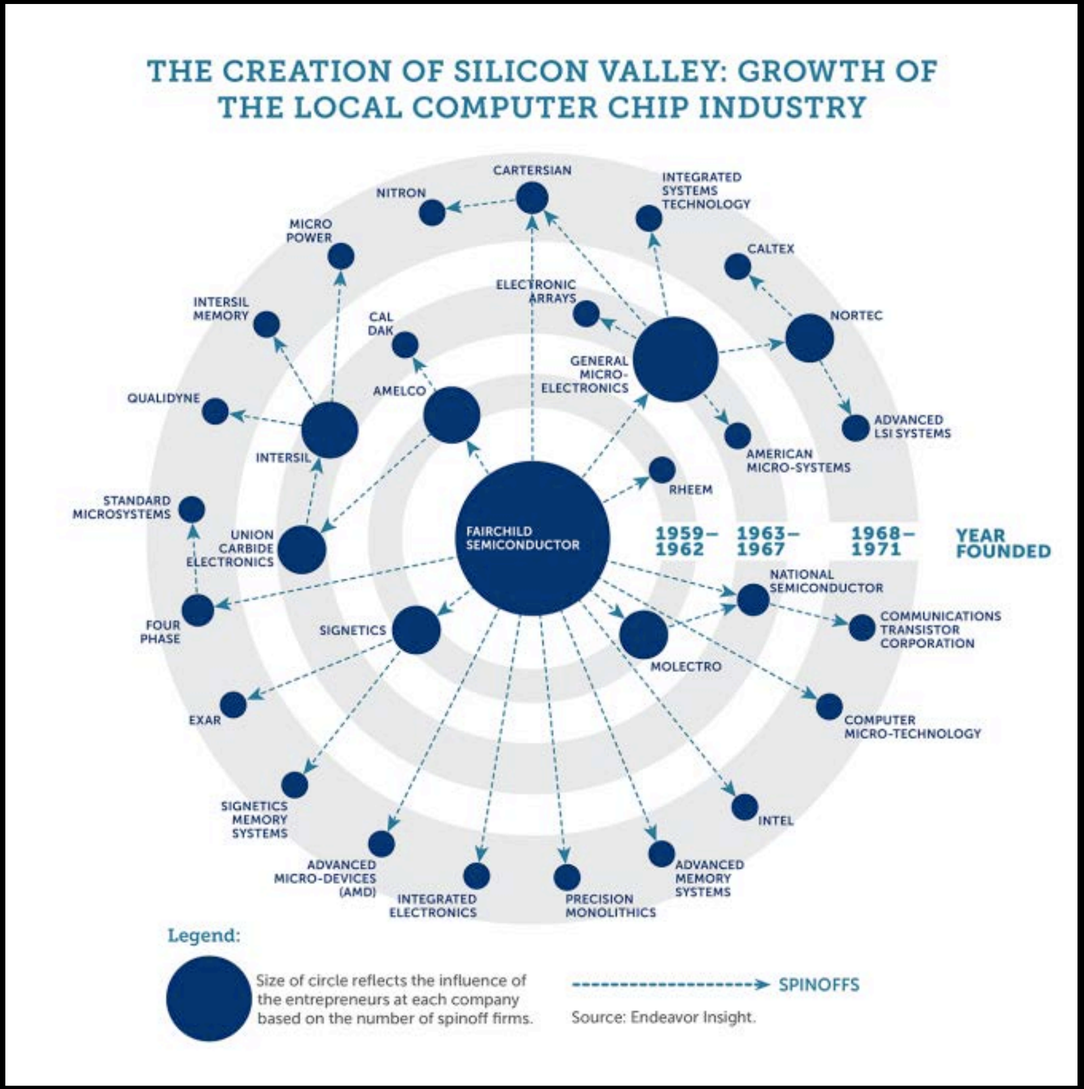
heaven.is.nevaeh Your favorite duo 💕

heaven.is.nevaeh

Liked by **kyia_kayaks** and **others**

heaven.is.nevaeh Your favorite duo 💞

They founded Fairchild Semiconductor at 844 Charleston Road, Palo Alto.

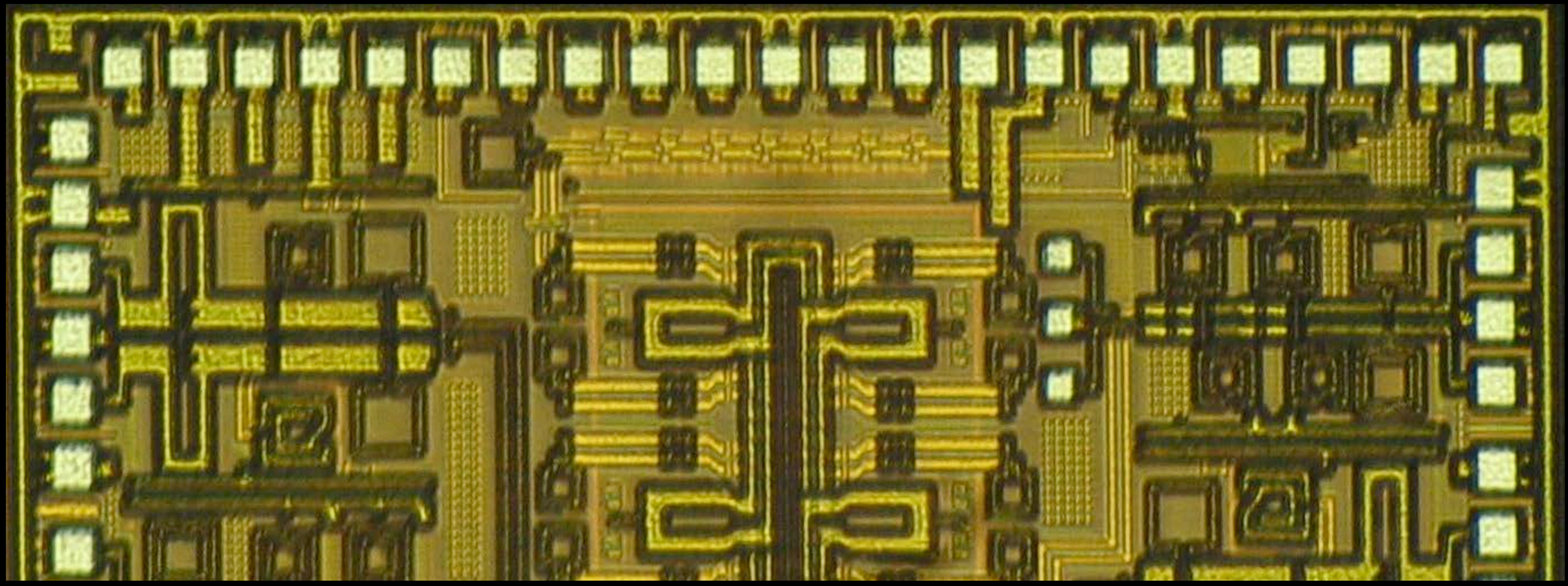


Today there are 92 publicly-listed companies that can be traced back to Fairchild.

They are worth over $2.1 trillion, more than the annual GDP of Canada, India, or Spain.

They employ over 800,000 people.

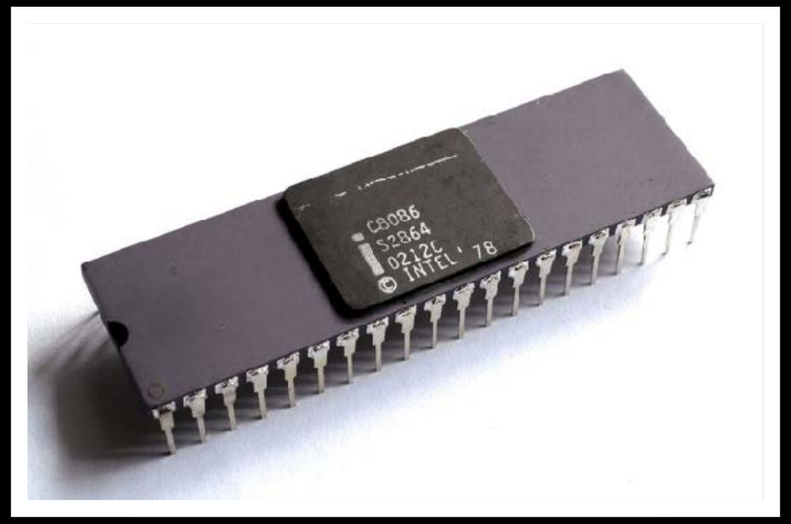
In 1959, Robert Noyce and Gordon Moore at Fairchild Semiconductor started working on a new innovation:
Multiple microscopic transistors a single semiconductor chip.
A complete integrated circuit.



Gordon Moore
Robert Noyce

What’s the key manufacturing ingredient?

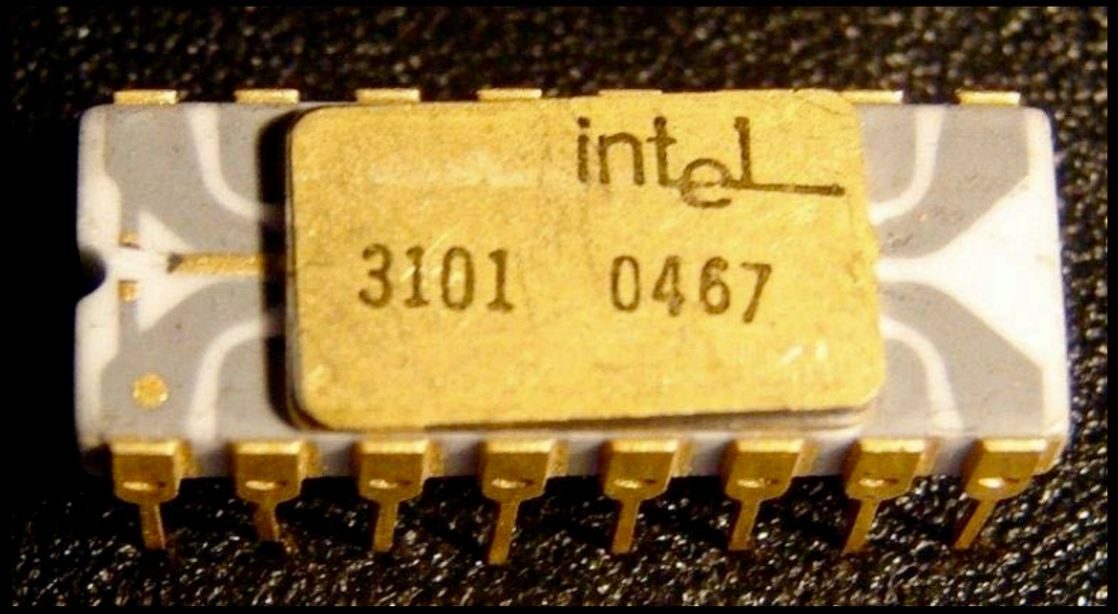
Transistor.

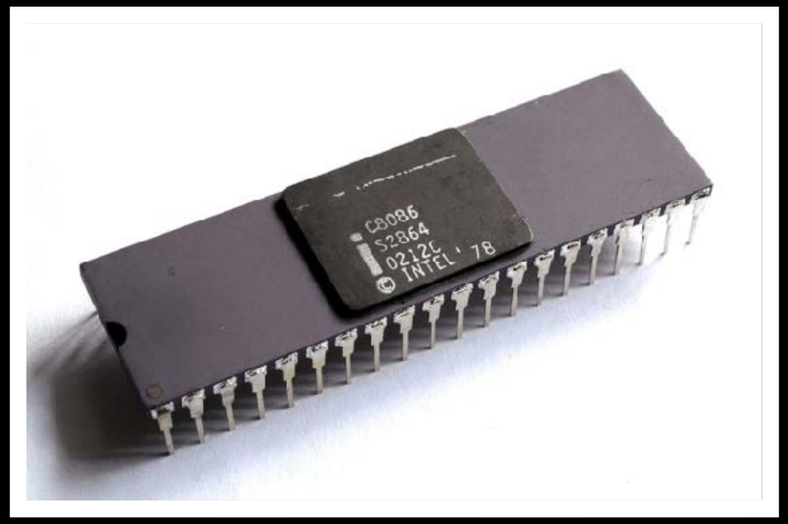


Hundreds of transistors on one semiconductor chip.

Silicon.

384 transistors on one chip.





Electronic

★ New York, N.Y., Monday, January 11,

SILICON VALLEY U.S.A.

(This is the first of a three-part series on the history of the semiconductor industry in the Bay Area, a behind-the-scenes report of the men, money, and litigation which spawned 23 companies — from the fledgling rebels of Shockley Transistor to the present day.)

By DON C. HOEFLER

It was not a vintage year for semiconductor start-ups. Yet the 1970 year-end box score on the San Francisco Peninsula and Santa Clara Valley of California found four more new entries in the IC sweeps, one more than in 1969.

The pace has been so frantic that even hardened veterans of the semiconductor wars find it hard to realize that the Bay Area story covers an era of only 15 years. And only 23 years have passed since the invention of the transistor, which made it all possible.

For the story really begins on the day before Christmas Eve, Dec. 23, 1947. That was the day, at Bell Telephone Laboratories in Murray Hill, N.J., three distinguished scientists, Dr. John Bardeen, Dr. Walter Brattain and Dr. William Shockley, demonstrated the first successful transistor. It was made of germanium, a point-contact device that looked something like a crystal detector, complete with cat's whiskers.

The three inventors won the Nobel Prize for their efforts, but only one of them, Dr. Shockley, was determined to capitalize on the transistor commercially. In him lies the genesis of the San Francisco silicon story.

It was only by a quirk of fate, however, coupled with lack of management foresight, that Boston failed to become the major semiconductor center San Francisco is today. When Dr. Shockley left Bell Labs in 1954, he headed first for New England to become a consultant to Raytheon Co., with a view toward establishing a semiconductor firm there under its auspices.

His financial plan called for a guarantee to him of $1 million over a 3-year period — hardly unreasonable by today's standards. But the Raytheon management 16 years ago couldn't see it, so Dr. Shockley left the company after only 1 month.

See SILICON, Page 4

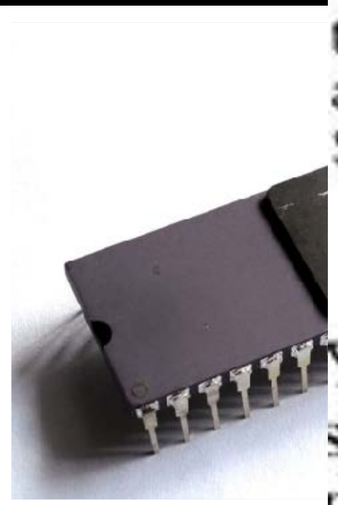
Silicon.

Electronic

★ New York, N.Y., Monday, January 11,

SILICON VALLEY U.S.A.

(This is the first of a three-part series on the history of the semiconductor industry in the Bay Area, a behind-the-scenes report of the men, money, and litigation which spawned 23 companies — from the fledgling rebels of Shockley Transistor to the present day.)



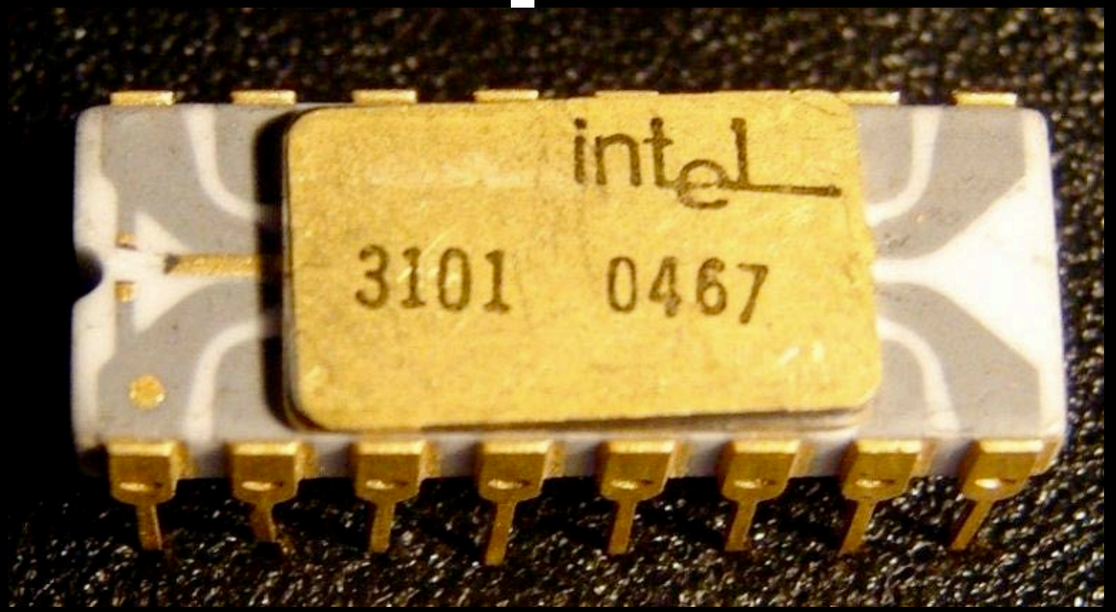
By DON C. HOEFLER

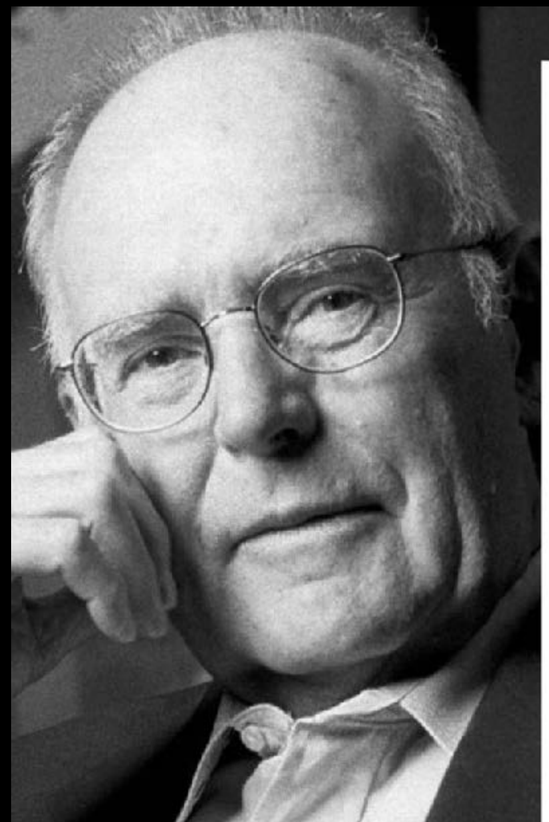
It was not a vintage year for semiconductor start-ups. Yet the 1970 year-end box score on the San Francisco Peninsula and Santa Clara Valley of California found four more new entries in the IC sweeps, one more than in 1969.

The pace has been so frantic that even hardened veter-

on.

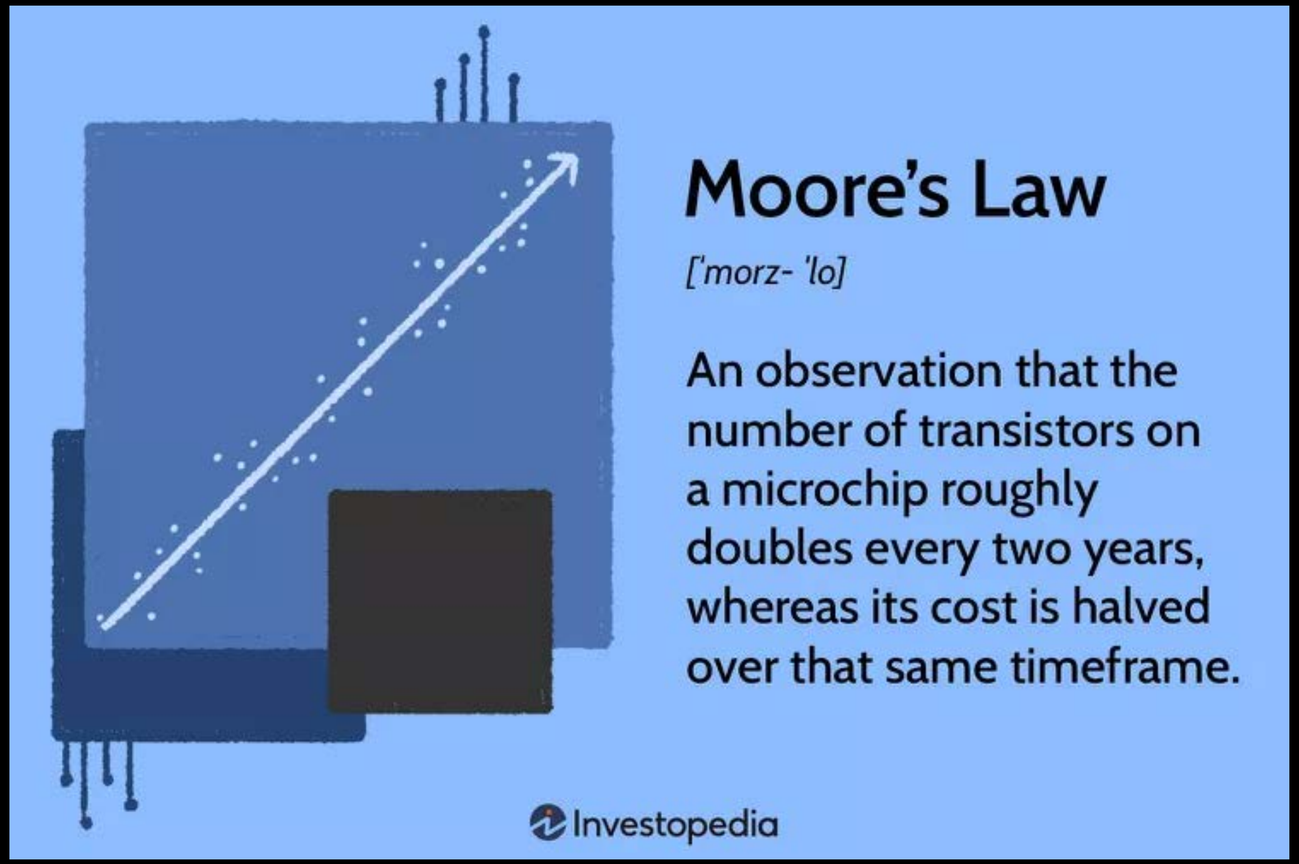
The first Intel product:
384 transistors on one chip.





GORDON MOORE

Co-founder and emeritus
chairman of Intel Corporation
Author of Moore's Law



Year	Transistors/Chip
1965	384
1967	768
1969	1,536
1971	3,072
1973	6,144
1975	12,288
1977	24,576
1979	49,152
1981	98,304
1983	196,608
1985	393,216
1987	786,432
1989	1,572,864
1991	3,145,728
1993	6,291,456
1995	12,582,912
1997	25,165,824
1999	50,331,648
2001	100,663,296
2003	201,326,592

2003	201,326,592
2005	402,653,184
2007	805,306,368
2009	1,610,612,736
2011	3,221,225,472
2013	6,442,450,944
2015	12,884,901,888
2017	25,769,803,776
2019	51,539,607,552
2021	103,079,215,104
2023	206,158,430,208

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Mar 19, 2024 - Technology

Nvidia's latest AI chip packs more than 200 billion transistors

Ina Fried

Chapter 5:

Money.

Courtesy of Special Collections, Stanford University Libraries

The “traitorous eight” who quit their jobs at Shockley Semiconductor and founded Fairchild Semiconductor.

Eugene Kleiner

Eugene Kleiner

Co-Founder
Fairchild Semiconductor.

Tom Perkins

General Manager
Hewlett-Packard

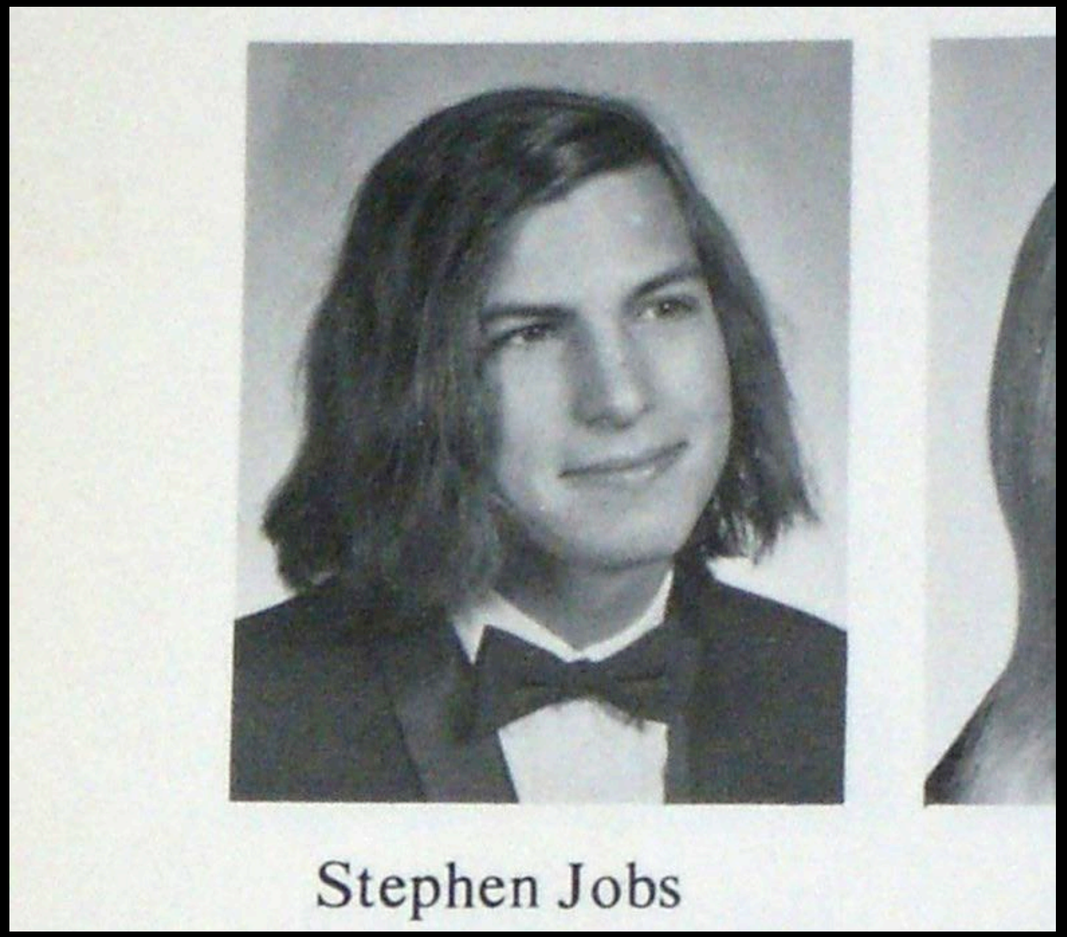
KLEINER PERKINS

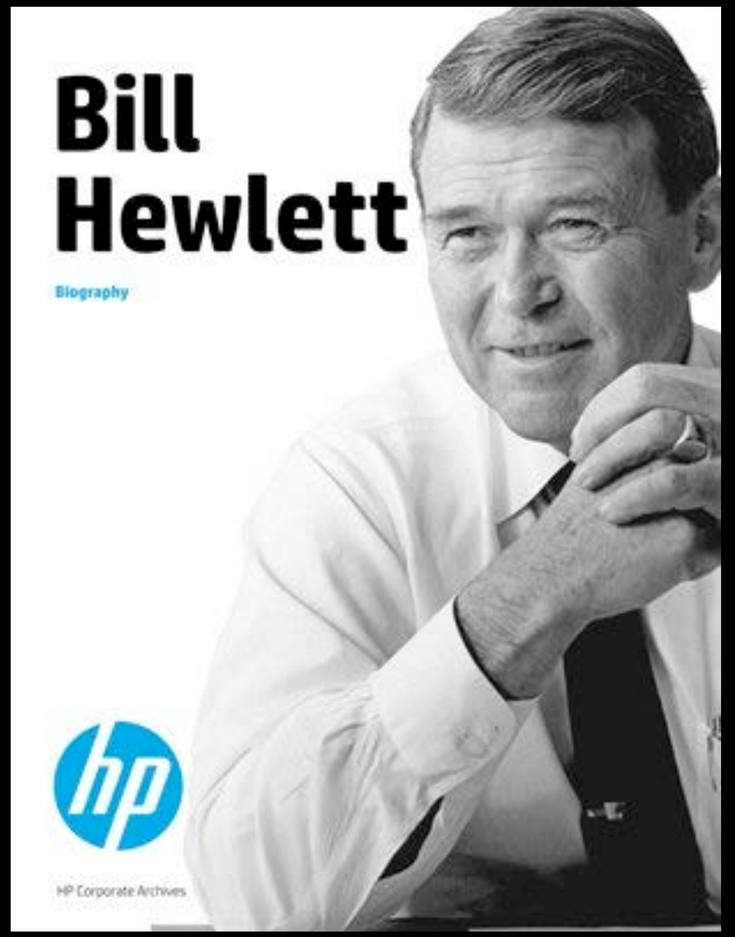
Located on Sand Hill Road, this Venture Capital firm has funded Amazon, Google, Skype, AOL, Spotify, Slack, DocuSign, Brio Technology, Electronic Arts, Flextronics, Genentech, Hybritech, Intuit, Lotus Development, LSI Logic, Macromedia, Netscape, Quantum, Segway, Sun Microsystems Tandem Computers, and many more.

Today, this one road has the highest density of venture capital firms in the world.

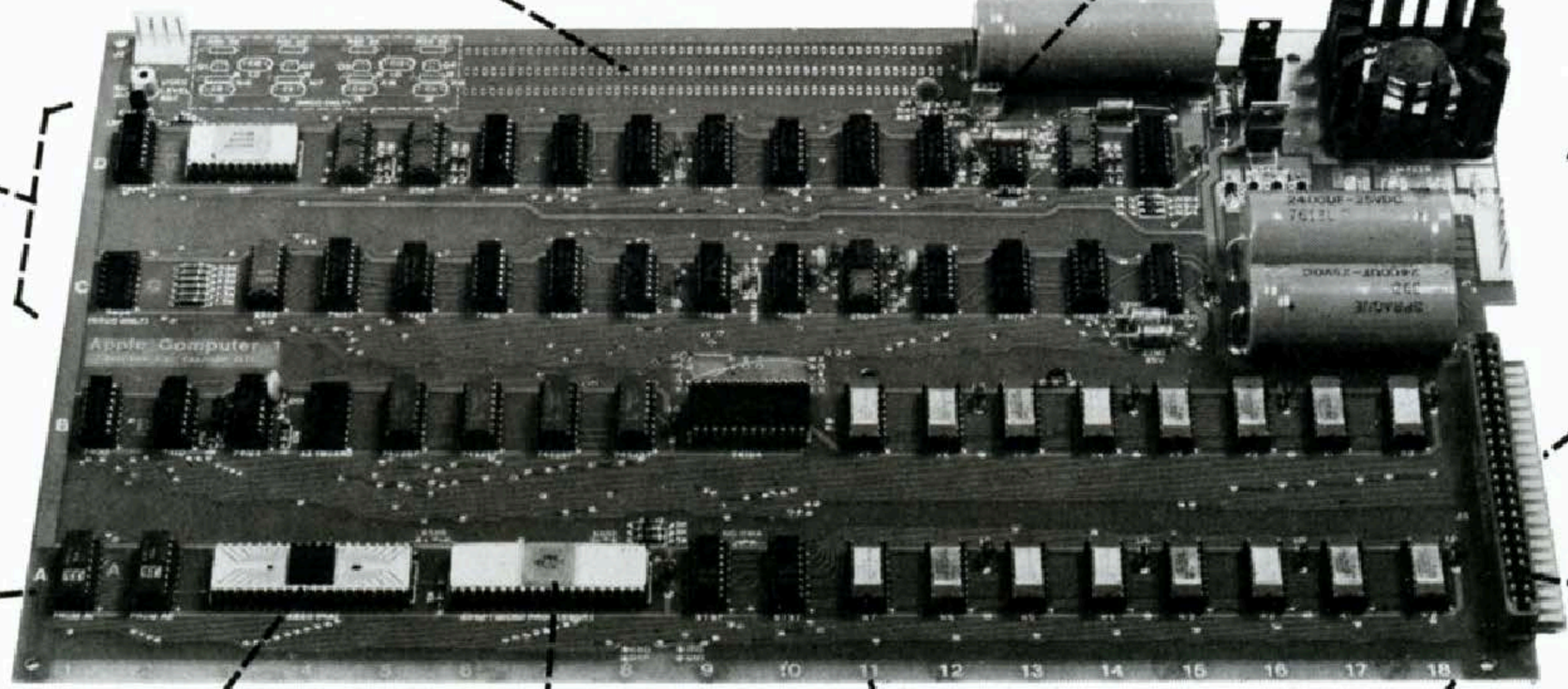
Chapter 7:

The Personal Computer.


Stephen Jobs


Bill
Hewlett
Biography
HP Corporate Archives

The Apple I.



APPLE Computer Company • 770 Welch Rd., Palo Alto, CA 94304 • (415) 326-4248

CIRCLE NO. 7 ON INQUIRY CARD

Apple Introduces the First Low Cost Microcomputer System with a Video Terminal and 8K Bytes of RAM on a Single PC Card.

The Apple Computer. A truly complete microcomputer system on a single PC board. Based on the MOS Technology 6502 microprocessor, the Apple also has a built-in video terminal and sockets for 8K bytes of on-board RAM memory. With the addition of a keyboard and video monitor, you'll have an extremely powerful computer system that can be used for anything from developing programs to playing games or running BASIC.

Combining the computer, video terminal and dynamic memory on a single board has resulted in a large reduction in chip count, which means more reliability and lowered cost. Since the Apple comes fully assembled, tested & burned-in and has a complete power supply on-board, initial set-up is essentially "hassle free" and you can be running within minutes. At $666.66 (including 4K bytes RAM!) it opens many new possibilities for users and systems manufacturers.

You Don't Need an Expensive Teletype.

Using the built-in video terminal and keyboard interface, you avoid all the expense, noise and maintenance associated with a teletype. And the Apple video terminal is six times faster than a teletype, which means more throughput and less waiting. The Apple connects directly to a video monitor (or home TV with an inexpensive RF modulator) and displays 960 easy to read characters in 24 rows of 40 characters per line with automatic scrolling. The video display section contains its own 1K bytes of memory, so all the RAM memory is available for user programs. And the Keyboard Interface lets you use almost any ASCII-encoded keyboard.

The Apple Computer makes it possible for many people with limited budgets to step up to a video terminal as an I/O device for their computer.

No More Switches, No More Lights.

Compared to switches and LED's, a video terminal can display vast amounts of information simultaneously. The Apple video terminal can display the contents of 192 memory locations at once on the screen. And the firmware in PROMS enables you to enter, display and debug programs (all in hex) from the keyboard, rendering a front panel unnecessary. The firmware also allows your programs to print characters on the display, and since you'll be looking at letters and numbers instead of just LED's, the door is open to all kinds of alphanumeric software (i.e., Games and BASIC).

8K Bytes RAM in 16 Chips!

The Apple Computer uses the new 16-pin 4K dynamic memory chips. They are faster and take ¼ the space and power of even the low power 2102's (the memory chip that everyone else uses). That means 8K bytes in sixteen chips. It also means no more 28 amp power supplies.

The system is fully expandable to 65K via an edge connector which carries both the address and data busses, power supplies and all timing signals. All dynamic memory refreshing for both on and off-board memory is done automatically. Also, the Apple Computer can be upgraded to use the 16K chips when they become available. That's 32K bytes on-board RAM in 16 IC's—the equivalent of 256 2102's!

A Little Cassette Board That Works!

Unlike many other cassette boards on the marketplace, ours works every time. It plugs directly into the upright connector on the main board and stands only 2" tall. And since it is very fast (1500 bits per second), you can read or write 4K bytes in about 20 seconds. All timing is done in software, which results in crystal-controlled accuracy and uniformity from unit to unit.

Unlike some other cassette interfaces which require an expensive tape recorder, the Apple Cassette Interface works reliably with almost any audio-grade cassette recorder.

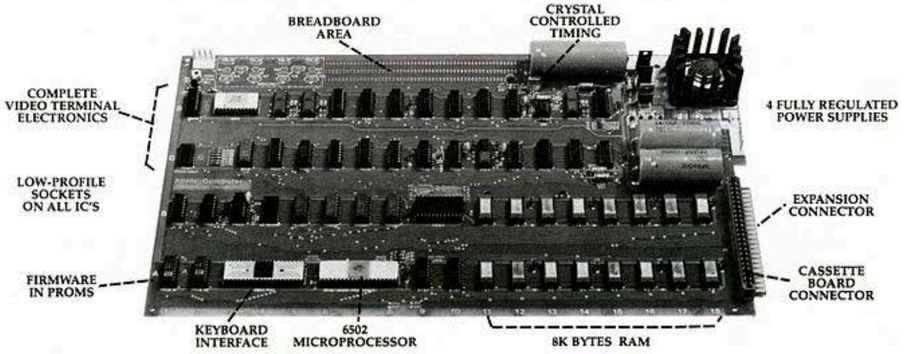
Software:

A tape of **APPLE BASIC** is included free with the Cassette Interface. Apple Basic features immediate error messages and fast execution, and lets you program in a higher level language immediately and without added cost. Also available **now** are a dis-assembler and many games, with many software packages, (including a macro assembler) in the works. And since our philosophy is to provide software for our machines free or at minimal cost, you won't be continually paying for access to this growing software library.

The Apple Computer is in stock at almost all major computer stores. (If your local computer store doesn't carry our products, encourage them or write us direct). **Dealer inquiries invited.**

Byte into an Apple $666.66*

* includes 4K bytes RAM



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CIRCLE NO. 7 ON INQUIRY CARD

I bought an Apple II in the summer of 1977.

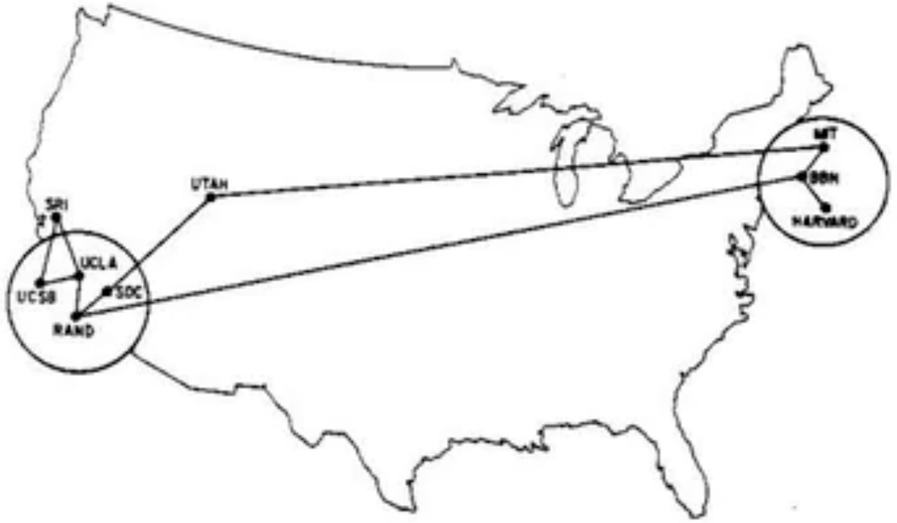
Sun
silicon graphics tezro
sgi
sgi

Chapter 7:

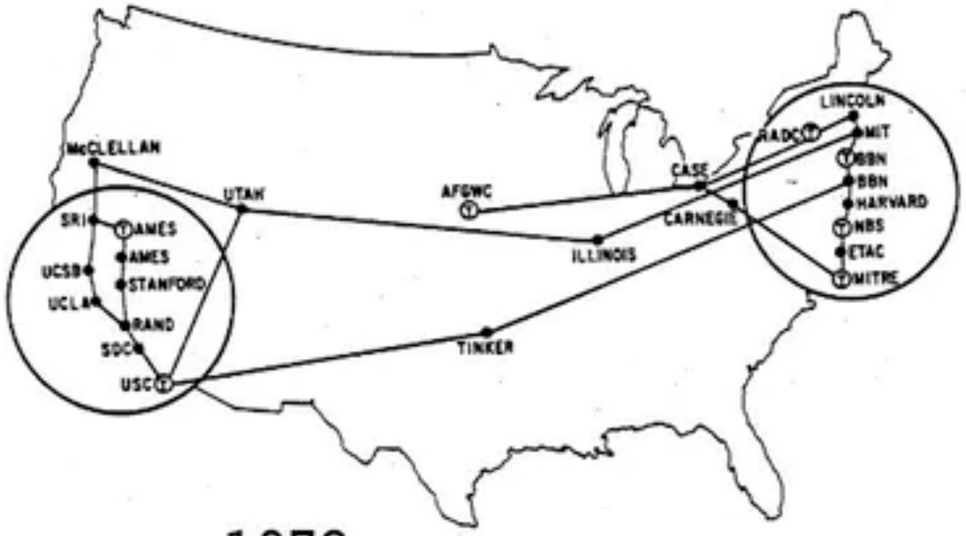
The Second Internet.

ARPANET

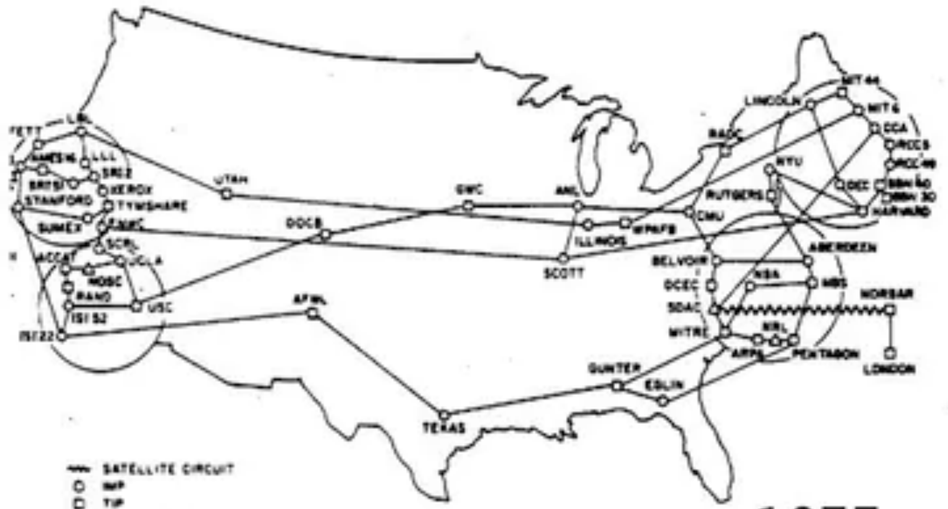
1969



1970

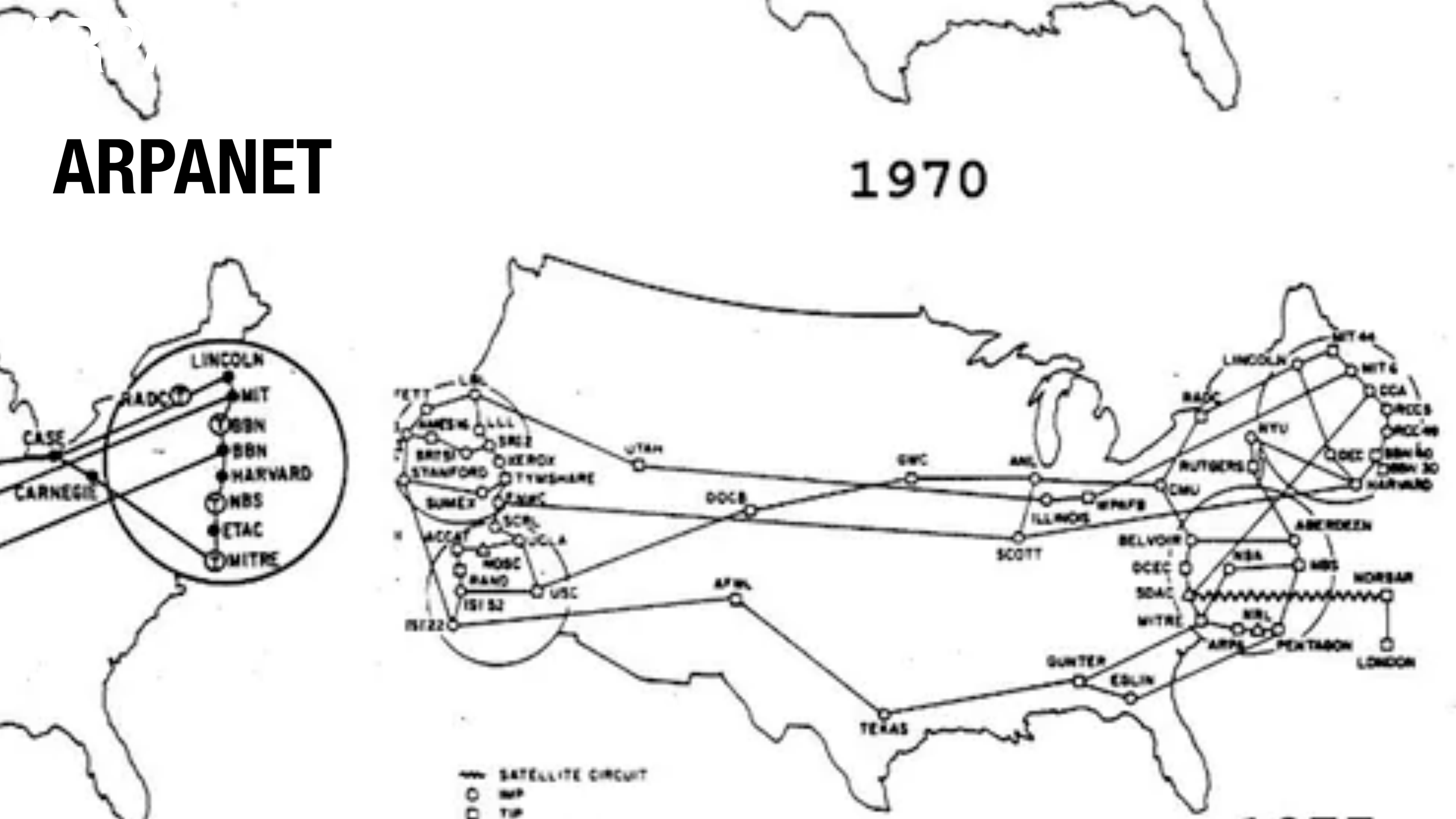


1972

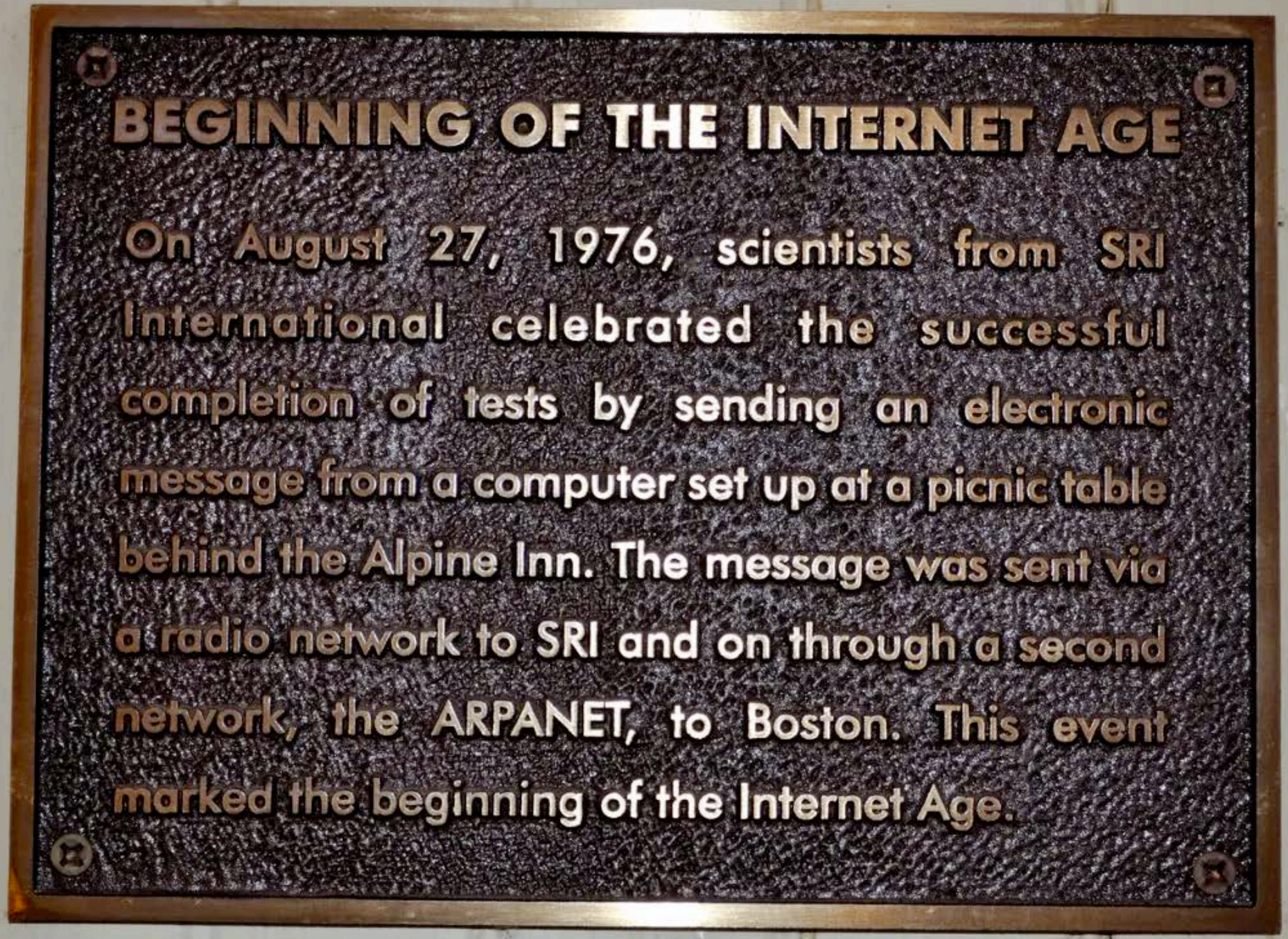


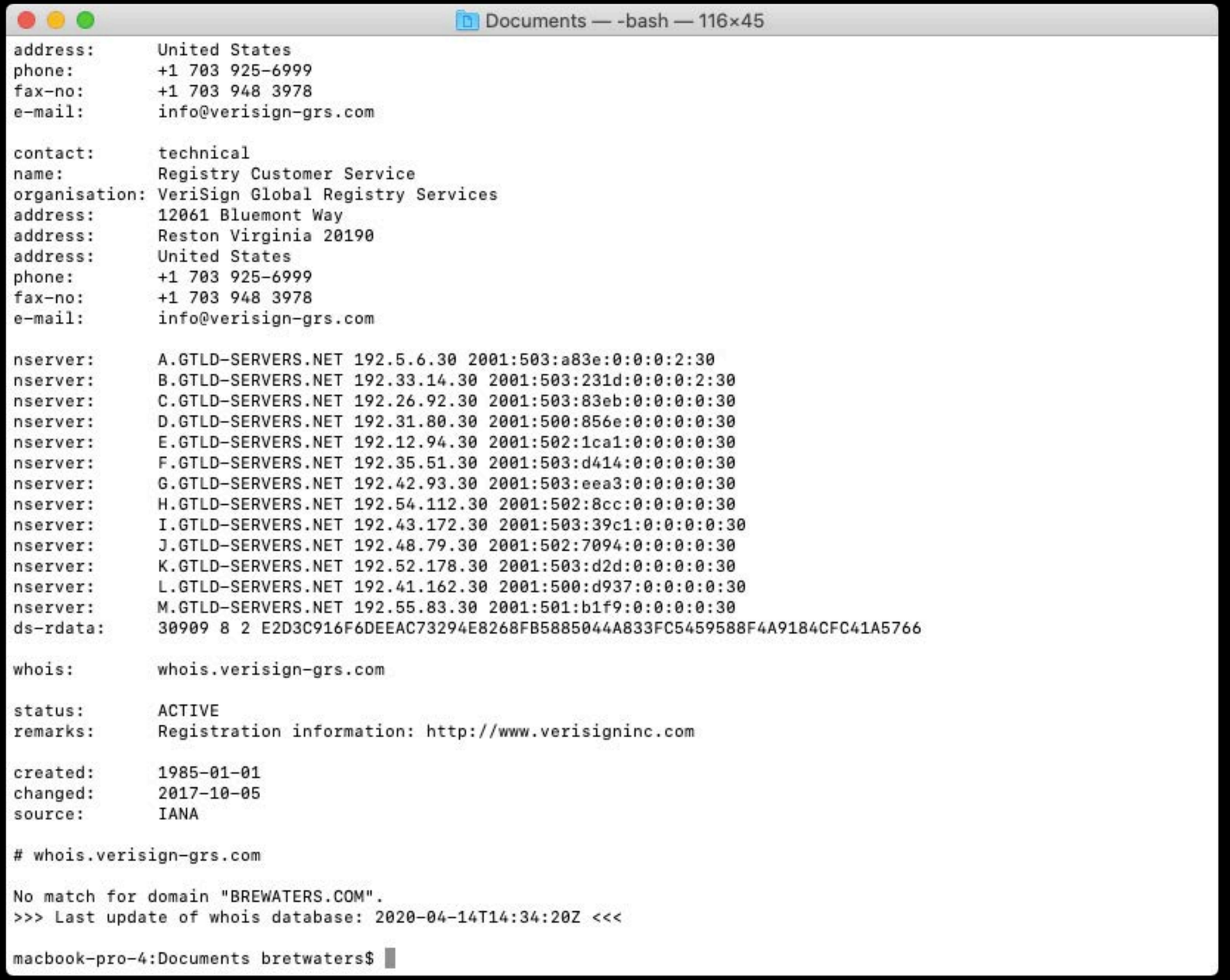
1977

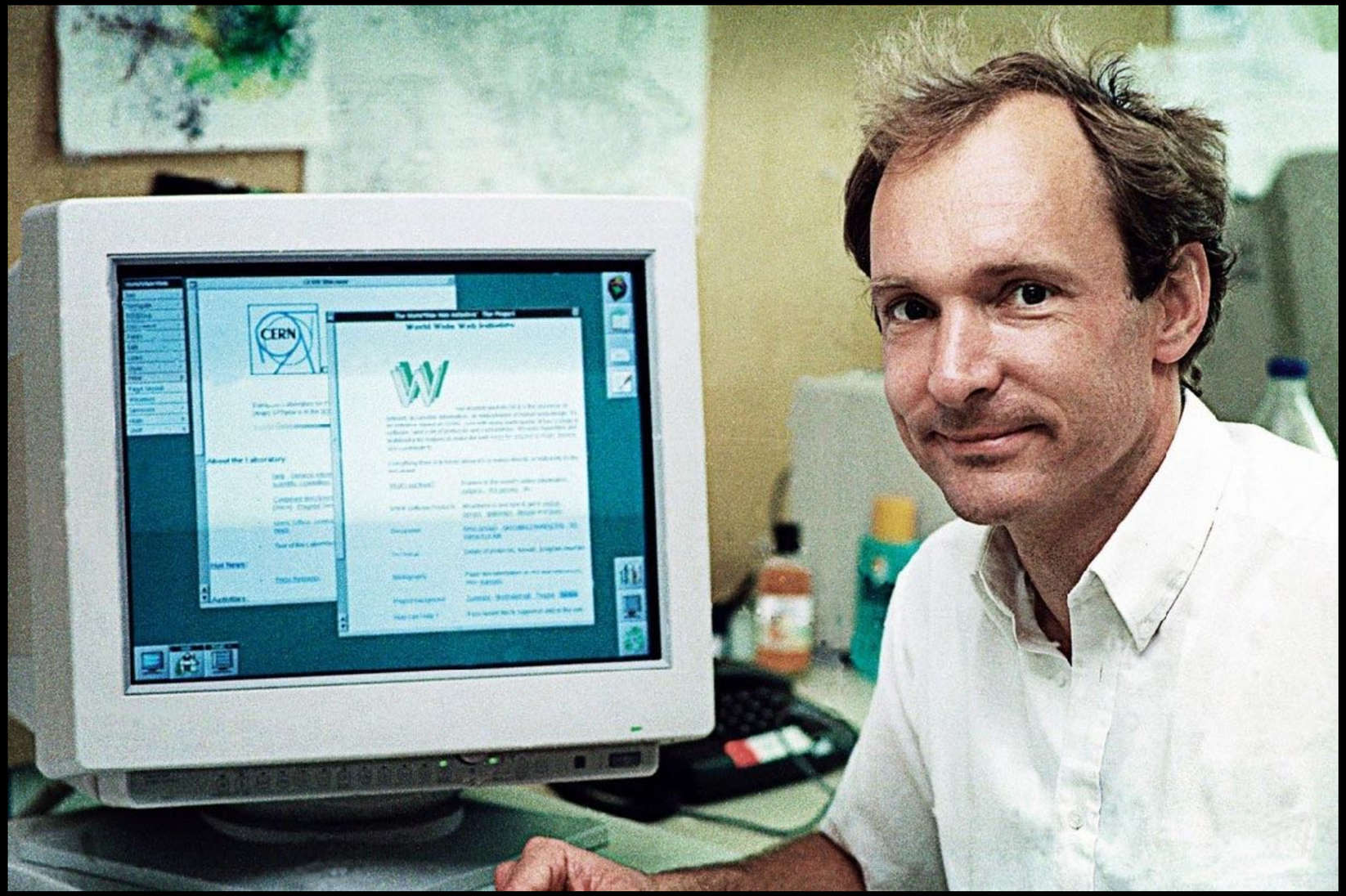
ARPANET


1970
LINCOLN
RADC
MIT
BBN
BBN
HARVARD
NBS
ETAC
MITRE
CASE
CARNEGIE
UTAH
GWC
ANL
DOCB
SCOTT
ILLINOIS
WPAFB
CMU
RUTGERS
NYU
LINCOLN
MIT 44
MIT 6
CCA
RCCS
DEC
HARVARD
ABERDEEN
BELVOIR
NSA
NBS
OCEC
SDAC
MITRE
NRL
ARPA
PENTAGON
NORSAR
LONDON
GUNTER
EGLIN
TEXAS
AFWL
USC
ISI 52
ISI 22
RAND
NOSC
UCLA
SCRL
SUMEX
STANFORD
XEROX
TYMSHARE
SRI 2
LLL
LBL
SATELLITE CIRCUIT
IMP
TIP

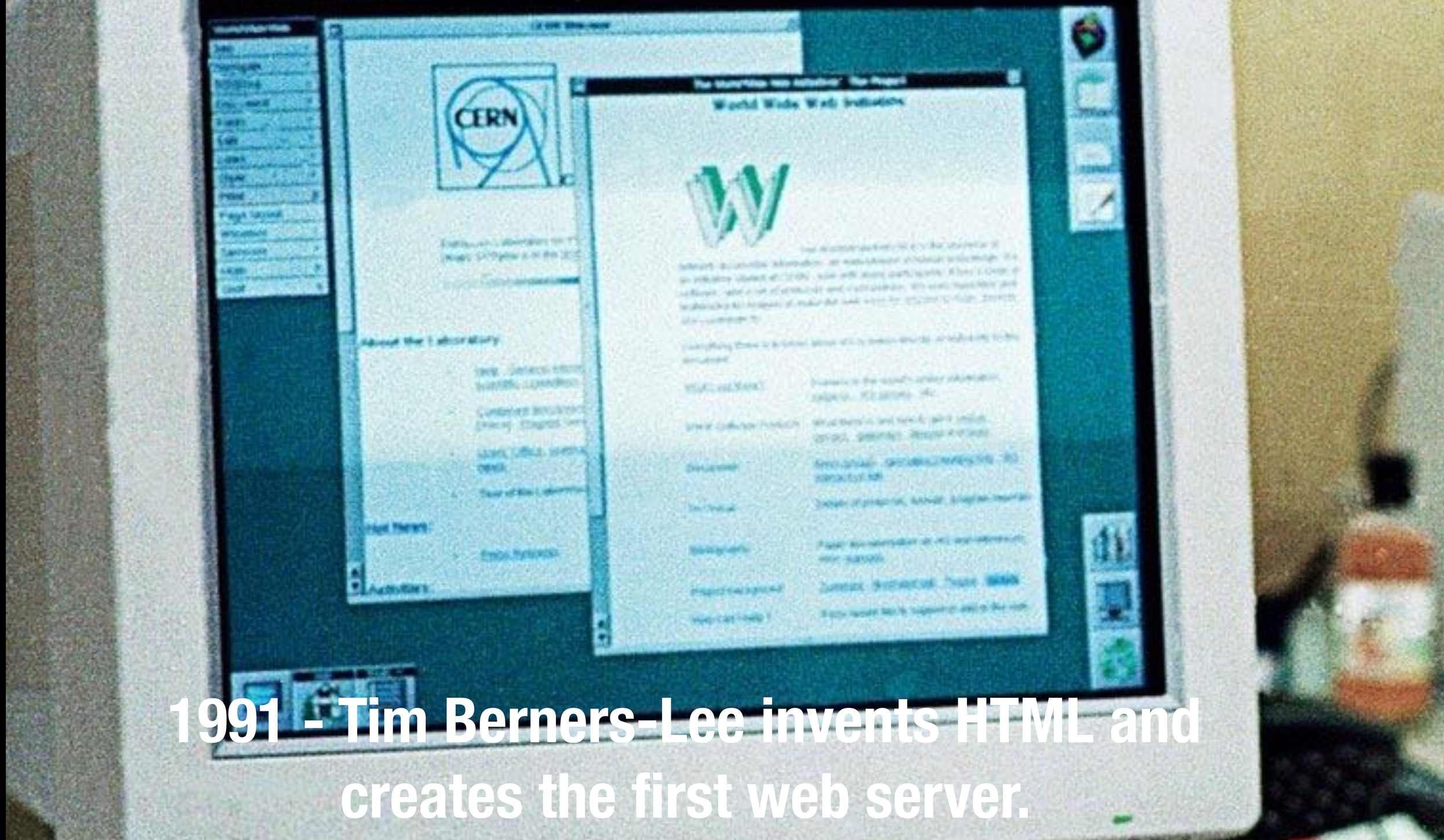
ALPINE INN
Formerly Rossotti's
3915 ALPINE RD.
TELEPHONE
SQA 930


BEGINNING OF THE INTERNET AGE
On August 27, 1976, scientists from SRI International celebrated the successful completion of tests by sending an electronic message from a computer set up at a picnic table behind the Alpine Inn. The message was sent via a radio network to SRI and on through a second network, the ARPANET, to Boston. This event marked the beginning of the Internet Age.


Documents — -bash — 116×45
address: United States
phone: +1 703 925-6999
fax-no: +1 703 948 3978
e-mail: info@verisign-grs.com
contact: technical
name: Registry Customer Service
organisation: VeriSign Global Registry Services
address: 12061 Bluemont Way
address: Reston Virginia 20190
address: United States
phone: +1 703 925-6999
fax-no: +1 703 948 3978
e-mail: info@verisign-grs.com
nserver: A.GTLD-SERVERS.NET 192.5.6.30 2001:503:a83e:0:0:0:2:30
nserver: B.GTLD-SERVERS.NET 192.33.14.30 2001:503:231d:0:0:0:2:30
nserver: C.GTLD-SERVERS.NET 192.26.92.30 2001:503:83eb:0:0:0:0:30
nserver: D.GTLD-SERVERS.NET 192.31.80.30 2001:500:856e:0:0:0:0:30
nserver: E.GTLD-SERVERS.NET 192.12.94.30 2001:502:1ca1:0:0:0:0:30
nserver: F.GTLD-SERVERS.NET 192.35.51.30 2001:503:d414:0:0:0:0:30
nserver: G.GTLD-SERVERS.NET 192.42.93.30 2001:503:eea3:0:0:0:0:30
nserver: H.GTLD-SERVERS.NET 192.54.112.30 2001:502:8cc:0:0:0:0:30
nserver: I.GTLD-SERVERS.NET 192.43.172.30 2001:503:39c1:0:0:0:0:30
nserver: J.GTLD-SERVERS.NET 192.48.79.30 2001:502:7094:0:0:0:0:30
nserver: K.GTLD-SERVERS.NET 192.52.178.30 2001:503:d2d:0:0:0:0:30
nserver: L.GTLD-SERVERS.NET 192.41.162.30 2001:500:d937:0:0:0:0:30
nserver: M.GTLD-SERVERS.NET 192.55.83.30 2001:501:b1f9:0:0:0:0:30
ds-rdata: 30909 8 2 E2D3C916F6DEEAC73294E8268FB5885044A833FC5459588F4A9184CFC41A5766
whois: whois.verisign-grs.com
status: ACTIVE
remarks: Registration information: http://www.verisigninc.com
created: 1985-01-01
changed: 2017-10-05
source: IANA
whois.verisign-grs.com
No match for domain "BREWATERS.COM".
>>> Last update of whois database: 2020-04-14T14:34:20Z <<<
macbook-pro-4:Documents bretwaters$



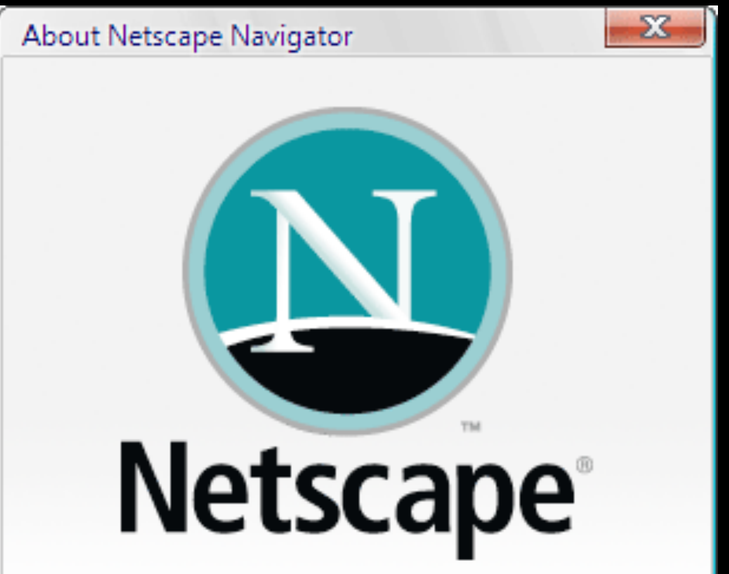
1991 - Tim Berners-Lee invents HTML and creates the first web server.



1991 - Tim Berners-Lee invents HTML and creates the first web server.

Marc Andreessen
Developer of Mosaic, 1993
One of the first web browsers.

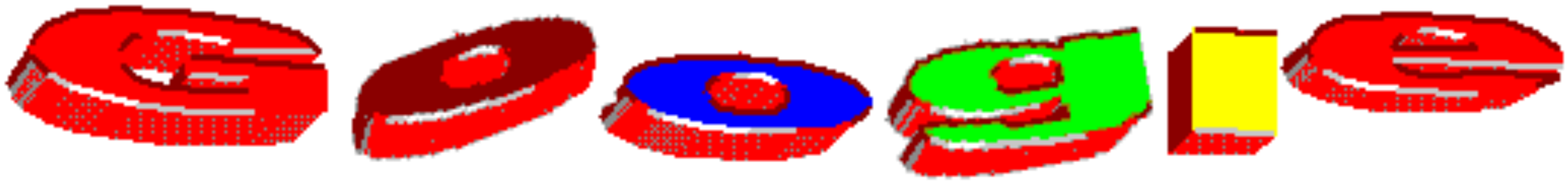
Netscape had an IPO in 1995
The stock more than doubled on the first day.
$2.9B in market cap on day one.
The internet gold rush was on.



Marc Andreessen
Co-founder of Netscape, 1993

google.stanford.edu launched in 1996.

google.stanford.edu launched in 1996.



Search Stanford

10 results | clustering on | Search

The servers for google.stanford.edu

Eugene Kleiner

KLEINER PERKINS

Sand Hill Road

Google Receives $25 Million in Equity Funding

Subscribe

Sequoia Capital and Kleiner Perkins Lead Investment; General Partners Michael Moritz and John Doerr Join Board

Palo Alto, Calif. – June 7, 1999 – Google, a start-up dedicated to providing the best search experience on the web, today announced it has completed a $25 million round of equity funding led by Sequoia Capital and Kleiner Perkins Caufield & Byers.

Google also announced that Michael Moritz, general partner of Sequoia Capital, and John Doerr, general partner of Kleiner Perkins Caufield & Buyers, have joined its board of directors. Michael Moritz is currently a director of numerous companies, including Yahoo, eToys, Quote.com, eGroups, PlanetRx, Flextronics, and WebVan. John Doerr was a co-founder of @Home and is a director of several high growth internet companies, including Amazon.com, Drugstore.com, Handspring, Healtheon/WebMD, Homeshop.com, Intuit, and Sun Microsystems.

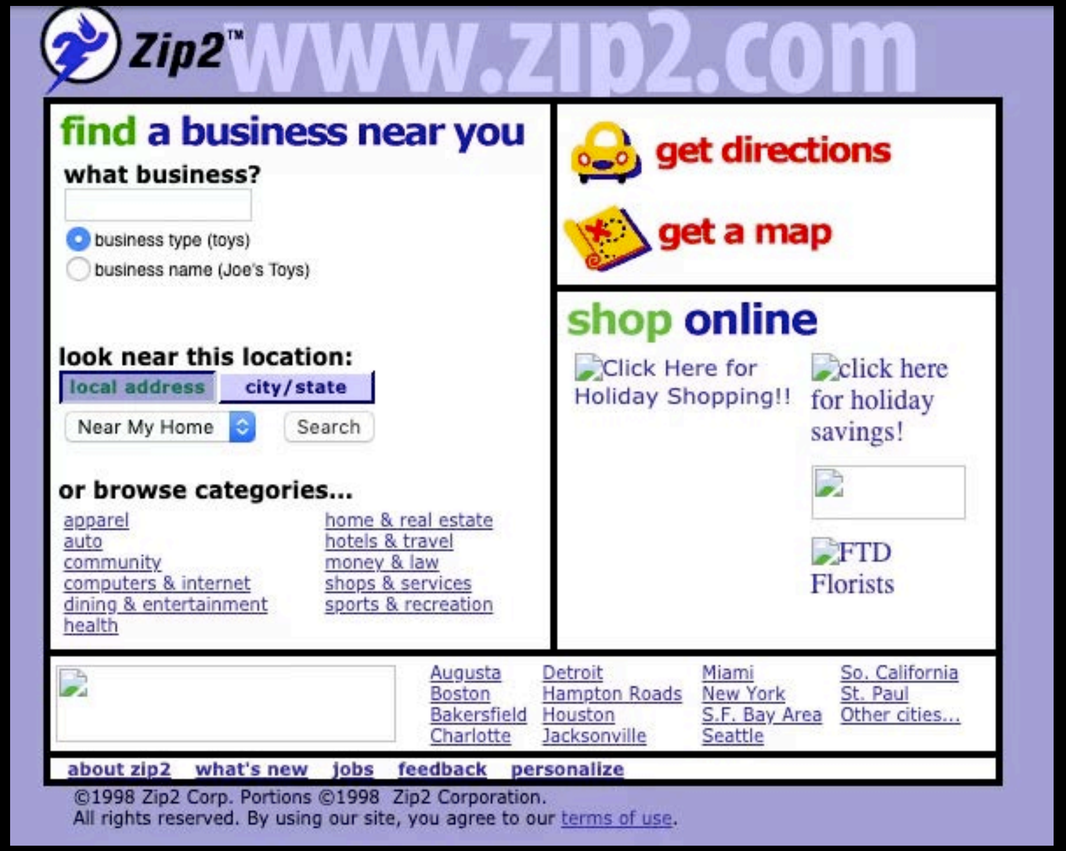
"We are delighted to have venture capitalists of this caliber help us build the company," said Larry Page, CEO and co-founder of Google. "We plan to aggressively grow the company and the technology so we can continue to provide the best search experience on the web."

Google employs several key technologies to generate search results of unprecedented accuracy and quality. These technologies extend Stanford University research into large-scale data mining of the Web. "A perfect search engine will process and understand all the information in the world," said Sergey Brin, Google president and co-founder of Google. "That is where Google is headed."

Raised $25M from Kleiner in 1999.
Had an IPO in 2004 with a market cap of $23 billion.

A Palo Alto guy named Elon Musk.

Co-Founded Zip2, sold it for $300M.



Elon Musk became part of the founding team at PayPal.

Peter Thiel

Elon Musk

The PayPal Mafia

Two years after founding, PayPal was acquired by eBay for $1.5 billion.

The founders went on to found a slew of new companies.

PayPal

Jawed Karim and Chad Hurley founded YouTube
Jeremy Stopelman and Russel Simmons founded Yelp.
David Sacks, founded Yammer
Peter Thiel, wrote check that launched Facebook.
Reid Hoffman, founded LinkedIn.
Max Levchin founded Slide, VP Eng at Google, founded Affirm.
Elon Musk, founded SpaceX, Tesla, The Boring Co.

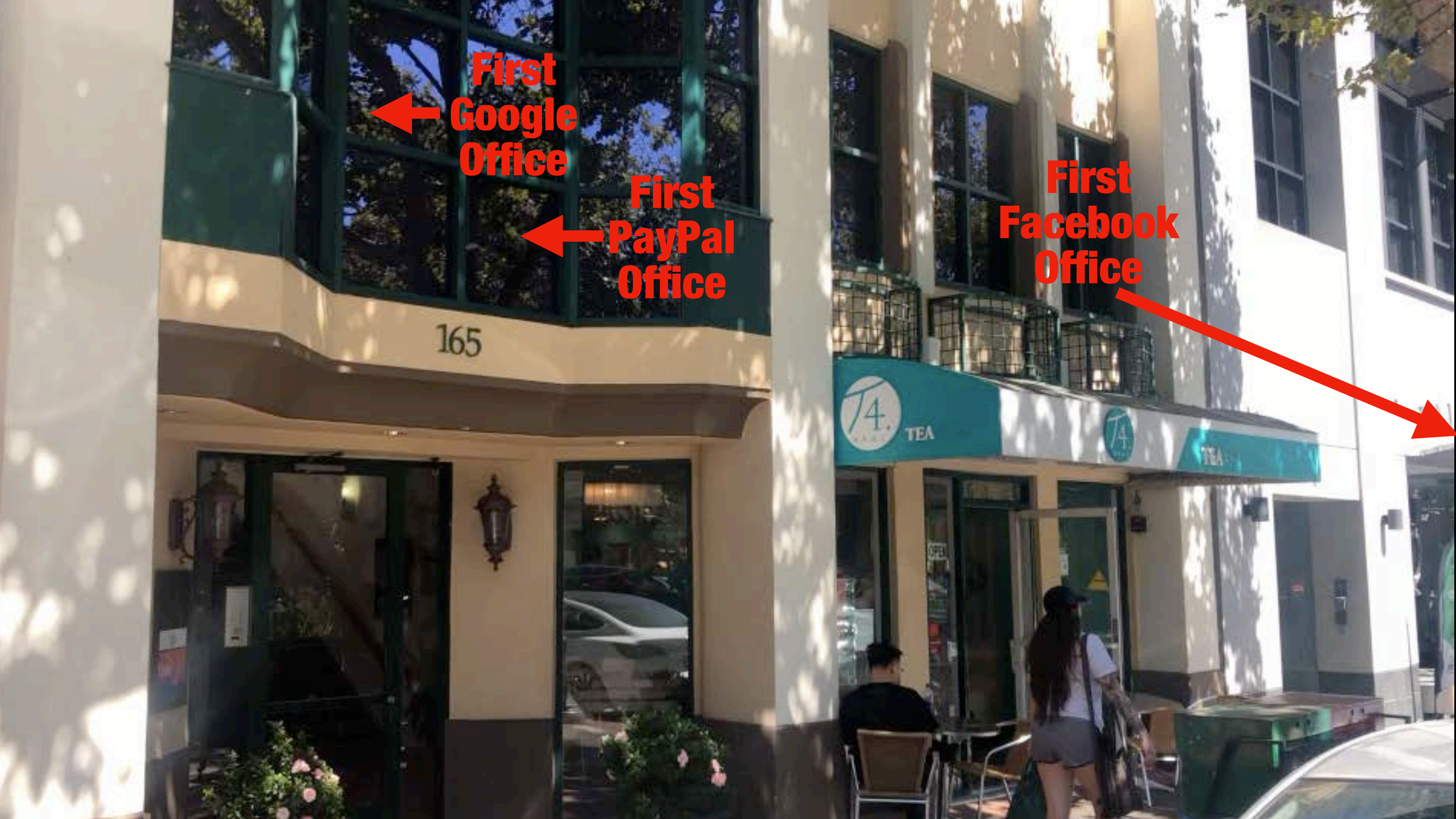
YouTube facebook yammer yelp affirm

TESLA SPACEX THE BORING COMPANY LinkedIn

165 University Avenue

Logitech®
165 University Avenue

165 University Avenue


First
Google
Office
First
PayPal
Office
First
Facebook
Office
165
TEA
TEA

Lots of old white men.
But now let’s talk about the women.

- Two years after Stanford University was founded, Leland Stanford died.

- Two years after Stanford University was founded, Leland Stanford died.
- Jane Stanford ran it for more than a decade, building it into a world-class institution.

Elizabeth J. Feinler

Director, Network Information Center
Stanford Research Institute

Beginning in 1974, her group was the overall naming authority of the Internet, developing and managing the name registries of the top-level domains including .mil, .gov, .edu, .org, and .com.

She manually managed the HOSTS.TXT file with every domain name and IP address on the internet. Every single connection on the internet referred to her file which she updated daily.

In 1986 the DNS (Domain Name System) protocol was developed. Today 600 DNS root servers around the world do the job that one woman once did by hand.

Johanna Hoffman

Only woman on the Mac team.
Only person who
could stand up to Steve Jobs

Aileen Lee

Founded first woman-led VC firm.
Coined the term startup unicorn.

Katrina Lake

Founded StitchFix
Took it public at the age of 34.

Sheryl Sandberg
Google and Facebook
Now investor.

Katie Haun

Launched $1.5B
Haun Ventures, March 2022

Susan Wojcicki

First Marketing Mgr at Google
CEO of YouTube
Her net worth is >$600M

OK, now back to our story.

Chapter 8:

Mobile/Social

Even though much of telephone technology was developed in Silicon Valley, it was slow to get into the mobile phone business.

Ericsson from Sweden

Motorola from Chicago

Blackberry from Canada

Nokia from Finland

2007

Apple announces iPhone.

2007

Google buys Android.

2008

Friday
20
280
kik
31
IF

kik
CNN
31

Billion dollar apps, founded here.

Today there are 1.46 billion iPhone users.
And 3.92 billion Android users.

That’s 5.38 billion iPhone and Android users on a planet of 7.83 billion people.

This may the most impactful thing developed in Silicon Valley.

Anyone on the planet who has one of these is connected to all the information available in the world today.

9:41 AM
100%
Messages
Calendar
Tuesday
9
Photos
Camera
Weather
Clock
Maps
Videos
Notes
Reminders
Stocks
Game Center
Newsstand
iTunes Store
App Store
iBooks
Health
Passbook
Settings
Phone
Mail
Safari
Music

Rechargeable
Li-ion Battery A2479
3.83V ⎓ 10.78Wh
WARNING
Authorized Service Provider
Only. Potential for fire or burning.
Do not disassemble, puncture,
crush, heat, or burn.
TIS 2217-2548
Importer: Apple South
Asia (Thailand) Ltd.
E184259 6NH
2815mAh
Apple Japan
Li-ion
TAPTIC ENGINE

The entire history of Silicon Valley is inside:

Amplifier invented by Lee DeForest.

Transistors invented by William Shockley

Semiconductor chips invented by Moore and Noyce

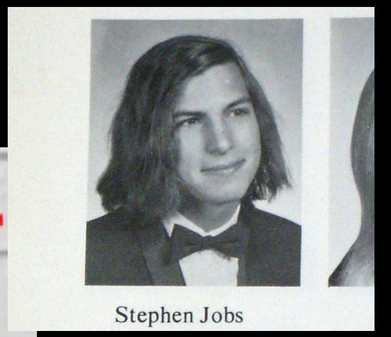
TCP/IP Internet connection, invented by SRI

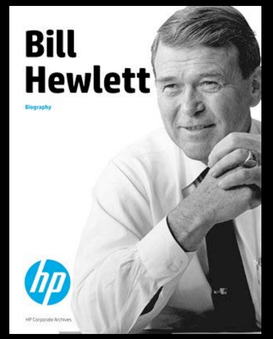
Web Browser invented by Marc Andreessen

Search developed by Larry and Sergey.

And lots and lots of silicon…..

A culture of reinvestment.





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AI, Machine Learning, Autonomous Vehicles,
Gene Editing, Blockchain, Medical Devices,
Deep Learning, New EV technologies,
AgTech, and much more.

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for global entrepreneurs.

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