SpaceX founding , Musk’s vision, facilities, organization, personnel

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Company Description

- **SpaceX** offers a family of launch vehicles that improves launch reliability and low cost
- Company philosophy : **simplicity, reliability and cost effectiveness are closely connected**
- **SpaceX** corporate structure is flat - business processes are lean, resulting in fast decision-making and product delivery
- **SpaceX** design and manufacturing facilities are located near the Los Angeles International Airport
- **SpaceX** vehicle design teams are **co- located** with production and quality assurance staff
- **SpaceX** has developed and flown the **Falcon 1** launch vehicle, the **Falcon 9** medium-lift launch vehicle, the **Falcon Heavy** launch vehicle and **Dragon** space craft- the first commercially produced spacecraft to visit the **International Space Station (ISS)**
- **SpaceX** operates propulsion and structural test facilities in Central Texas, launch sites in Florida and California, and a commercial orbital launch site in South Texas
- **SpaceX** customer are commercial, government and international
- **NASA** has awarded **SpaceX** contracts to transport astronauts to space as well as to launch scientific satellites
- **SpaceX's** first crewed test flight with the **Crew Dragon** spacecraft launched in May 2020
- **NASA** has certified the **Falcon 9 / Crew Dragon** system for human spaceflight
- **SpaceX** is providing operational missions to the International Space Station
- **SpaceX** is on contract with the **U.S. Space Force** for multiple missions on the Falcon family of launch vehicles

Founding Elon Musk

- **Elon Musk** was born on June 28, 1971 in Pretoria, South Africa
- He grew up in South Africa and attended school through high school
- He moved to Canada at age 17 to avoid mandatory service in the South African military and obtained his Canadian citizenship (Mother was Canadian)
- **Musk** became a U.S. citizen in 2002
- He studied briefly at Pretoria University in South Africa, Queen's University in Canada, and Stanford University in the US
- **Elon Musk** education includes physics and economics degrees from the University of Pennsylvania

- He is the current CEO&Chief Product Architect of **Tesla,** Inc
- He is CEO of **Solar City**
- He is CEO & CTO of **SpaceX**
- He is the founder of the **Boring Company**
- He is primary owner of **X Corp**
- He is co-founder of **Neuralink** and **OpenAI**
- He is president of the **Musk Foundation**

Founding Elon Musk

- In early 2002 **Elon Musk** was pursuing a grand scheme to rekindle public interest in sending humans to **Mars**
- **Musk's** idea was to place a small greenhouse laden with seeds and nutrient gel on the **Martian** surface to establish life there, if only temporarily
- He figured out a mission that would cost about $15 to $20 million which isn't a lot of money but it's about a 10th of what a low-cost **NASA** mission would be
- The idea was called **Mars Oasis**
- The plan was to put a small robotic land rover on the surface of **Mars** with seeds and dehydrated nutrient gel
- They would hydrate upon landing and you'd have plants growing in a **Martian** radiation, gravity conditions
- And you'd also be maintaining, essentially, life support systems on the surface of **Mars**

- He'd already talked to contractors who would build it for a comparatively low cost
- Estimated mission cost $15 to $20 million
- The problem was launching it

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Founding Elon Musk

- The lowest cost launch vehicles in US is Boeing's Delta 2 which costs about $50 million
- **Musk** made three visits to Moscow to look at buying a Russian launch
- He actually did get to a deal
- Too many complications - Too high a risk
- On the flight home, **Musk** recalls:
- “I was trying to understand why rockets were so expensive
- The **lowest cost** to make anything is the **spot value of the material** constituents
- It is a question of **how efficient** you can be about getting the **atoms from raw material state to rocket shape.”**

- In early 2002 **Musk** met with aerospace engineers at a hotel in Los Angeles International Airport to discuss founding a space launch company, with reportedly some having scoffed at the idea
- According to filings, **SpaceX** was incorporated on 14 March 2002
- The company was named "**Space Exploration Technologies Corporation”** it was quickly changed to be "**SpaceX”**
- In April 2002 he invited five to join the company as early employees: **Michael Griffin, Jim Cantrell, John Garvey, Tom Mueller,** and **Chris Thompson**
- **Mueller** and **Thompson** became the company's first and second employee respectively
- **Musk** provided half of his $180 million from **PayPal** stocks to the newly founded company securing both employees with two-years' worth of salary

Founding

Early Employees

- **Musk** assumed the role of **Chief Engineer**, after having offered the title to **Griffin** who did not join **SpaceX**
  - He is now **CEO** and **Chief Technical Officer**
- **Tom Mueller(ex-TRW)** was in charge of developing rocket engines, propellant tanks and plumbing
- **Chris Thompson** (**ex- McDonnell Douglas**)was in charge of making the rocket's body and couplings
- **Hans Koenigsmann (ex- Microcosm Inc)**-was in charge of making the rocket's avionics (electronic systems)
- In August 2002, **Gwynne Shotwell (ex- Microcosm Inc)** was hired as the head of sales for the company
- At first, **SpaceX's** employees would meet at hotels in airports, but later the company headquartered at a building in 13El Segundo, California

Tom Mueller

Chris Thompson

Hans Koenigsmann

Gwynne Shotwell

Elon Musk Vision for SpaceX

Make spaceflight routine and affordable

Make humans a multi-planet species

Colonize Mars

Define the Vision

Communicate it Relentlessly

Work Towards Small Wins

Company Locations

- **SpaceX** started out in California in 2002
- Its first **Falcon 1** test launches were in the Marshall Islands
- It is now primarily U.S. based
- **SpaceX** has offices, launchpads, factories, and test facilities in:
  - California
  - Florida
  - Texas
  - Virginia
  - Washington
  - Washington DC

Facilities

- **SpaceX** operates launch facilities:
  - **Cape Canaveral Space Launch Complex 40 (SLC-40)**
  - **Vandenberg Space Force Base Space Launch Complex 4 E (SLC-4E)**
  - **Kennedy Space Center Launch Complex 39A (LC-39A)**
  - **Brownsville South Texas Launch Site (Starbase)**

- **SpaceX** operates test rocket test facility :
  - **McGregor, Texas**
- **SpaceX** operates rocket and spacecraft manufacturing facility**:**
  - **Hawthorne , California**
  - **Headquarters**
- **SpaceX** operates Starlink manufacturing facility:
  - **Redmond , Washington**

Cape Canaveral Air Force Station Launch Facility

SpaceX's go-to launchpad is **SLC-40**
Rockets are horizontally assembled in a building just south of the launchpad, rolled out to the stand, and slowly tilted vertical

Vandenberg Air Force Base Launch Facility

Space Launch Complex-4 — Vandenberg Air Force Base, California

Falcon 9 v1.1 at SLC-4E September 2013

Kennedy Space Center Launch Facility

Launch Complex 39A — Kennedy Space Center, Florida

Launch Complex 39A
Rockets are horizontally assembled in the SpaceX building and rolled out to the stand, and slowly tilted vertical

Starbase Launch Facility

Starbase facility in Boca Chica, Texas

- **Starbase** is a launch site, production, and development facility for **Starship** rockets, located at Boca Chica, Texas
- In early 2018, **SpaceX** announced that the launch site would be used exclusively for launching the Starship space craft using the **Super Heavy** booster
- Between 2018 and 2020, the site added significant rocket production and test capacity

Rocket Engine Test Facility

- **SpaceX** needed a test site for the **Merlin** and **Kestrel** engines
- In 2002, the company rented a space at the **Mojave Air and Space Port** to test the turbopumps
    - One time, black sooty clouds from the turbopump enveloped the air traffic control tower
- A bigger testing facility was needed, especially the higher thrust **Merlin** engine
- **SpaceX** finally picked a testing site at **McGregor, Texas** that was previously owned by the bankrupted **Beal Aerospace**

SpaceX rocket development facility in McGregor, Texas

Design and Manufacturing Facility

- **SpaceX** adopted:
- A "**flat**" organization structure
- **Vertical integration** manufacturing model
  - Design and build major parts in house
    - Engines
    - Avionics
    - Structures
    - Heat shields
  - Proven technology
- Emphasize manufacturing efficiency
- Minimize costs by avoiding external suppliers
- Assemble rockets horizontally
  - NASA "stacks" rockets vertically
    - Vehicle Assembly Building (VAB)

Design and Manufacturing Facility

SpaceX headquarters in Hawthorne, CA

Rocket Engine Test facility

- **SpaceX** needed a facility to test-fire noisy rocket engines and launch prototype spacecraft
- **SpaceX** took over the mothballed **Beal Aerospace** facility in **McGregor, Texas**
- The site already had rocket-engine-test stands
- It is remote enough to not bother too many locals
- It is close enough to habitation to support an engineering workforce

Starlink Production and Test Facility

Starlink Satellite Factory — Redmond, Washington

- In 2015, **Musk** introduced a plan to surround Earth in thousands of satellites to bring high-speed broadband internet to everyone on the planet
- The project is called **Starlink**
- **SpacX** has since built a facility in **Redmond, Washington**, to build and test satellites
- The plan is to build and launch roughly 12,000 low-Earth-orbit satellites

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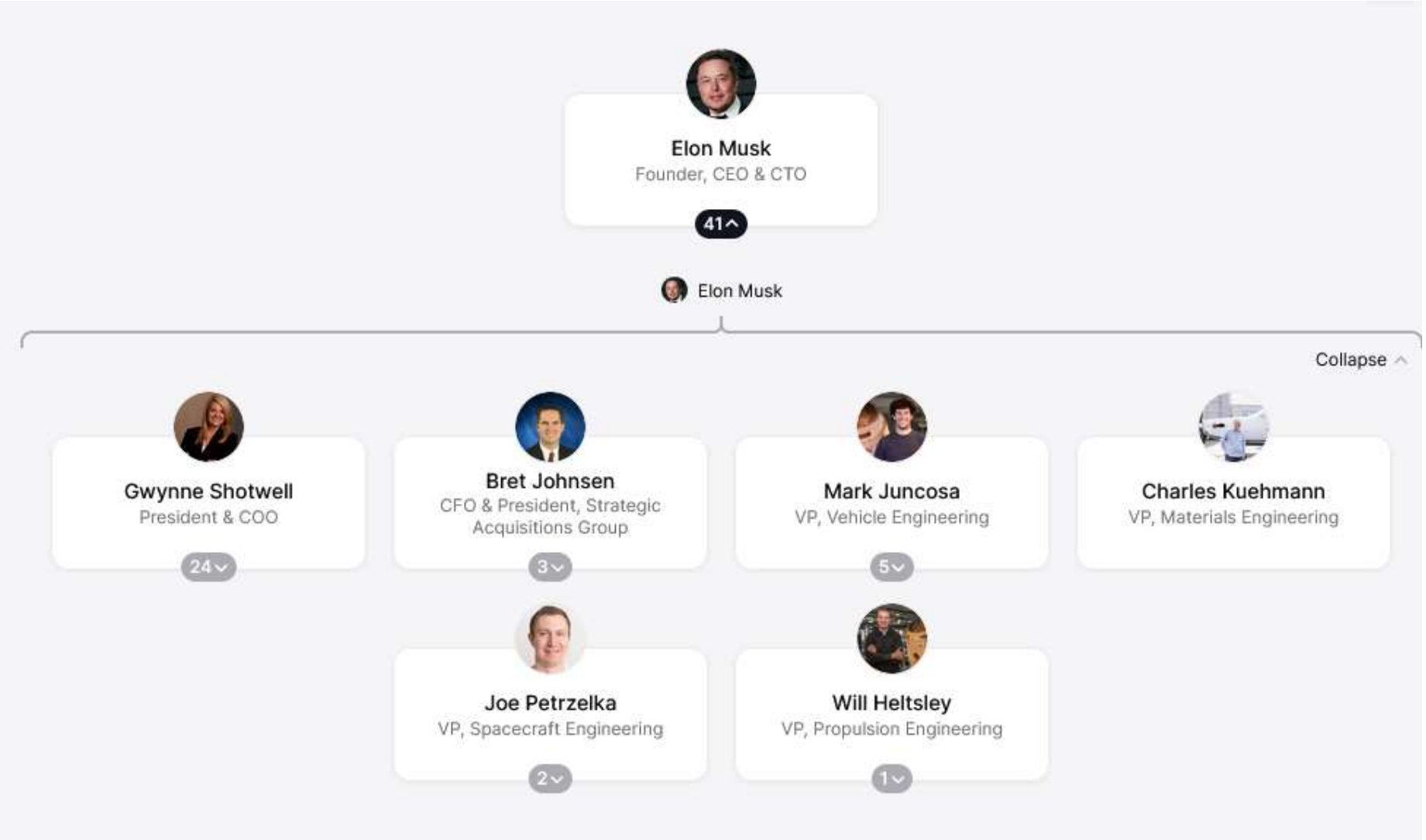
Organization Leadership Team



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Organization

Board of Directors

- The board of directors has different types of education and wide range of experience in different industries
- Education histories include degrees in philosophy and political science, law French cuisine, computer engineering, and mechanical engineering
- Some previous experiences:
  - Working at Google
  - Senior associate at Wilson Sonsini Goodrich & Rosati
  - Associate at Davies Ward Phillips & Vineberg LLP
  - CEO at Me.dium
  - Co-founder at The Kitchen Community
- Experience with Tesla Motors, PayPal, Netscape, and Impulse Space Propulsion

Antonio Gracias

Board Member

Barry Schuler

Board Advisor

Donald Harrison

Board Member

Garrett Reisman

Senior Advisor

Kimbal Musk

Board Member

Luke Nosek

Board Member

Steve Jurvetson

Board Member

Thomas Mueller

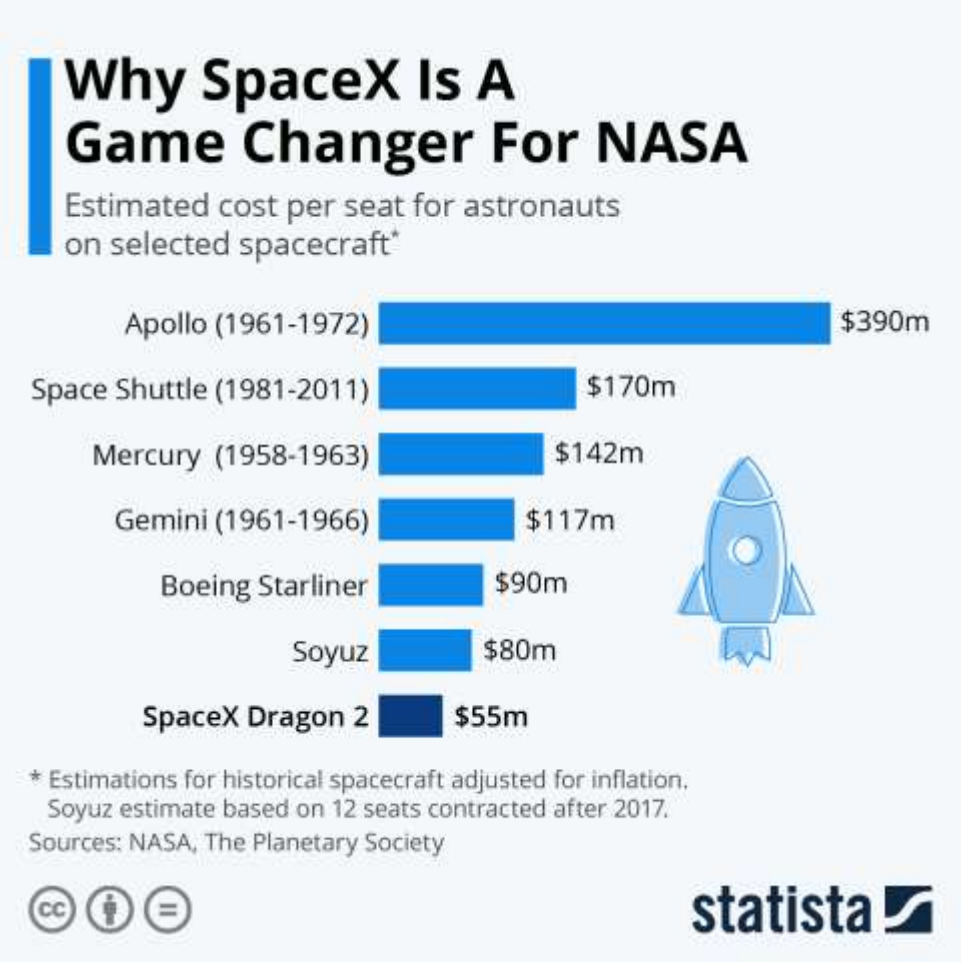
Senior Advisor

Personnel

- Total employment ~ 12,000 employees 49.8% of SpaceX employees are White
- 86.3% male employees
- 13.7% female employees
- 38% are aged from 30 to 40 years old
- Most (38.9%) employees earn around $40,000 to $60,000 each year
- Most hold the following degrees:
  - 54.7% have a Bachelor's Degree
  - 19.1% have an Associate Degree
  - 10.6% have a Master's Degree
  - 8.0% have a High School Diploma
  - 1.6% have a Doctorate Degree

- Most prominent employees' majors :
  - 24.9% have a major in Mechanical Engineering
  - 15% have a major in Business
  - 10.6% have a major in Aerospace Engineering
  - 8.1% have a major in Electrical Engineering
  - 5.3% have a major in Aviation
  - 3.9% have a major in Precision Metal Working

Payoff



[Bing Videos]

Next Session

SpaceX and NASA commercial funding