

# **ENTREPRENEURSHIP** **for Computer Science and** **Engineering**

**Lecture I:**

**Introduction and Course Overview**

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# Today...

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- Introduction
- Course Overview
- Getting Started
- Announcements
  - Classes are on Sunday and Tuesday, 15:00 to 16:30 in Room 202
  - Course webpage: To be announced!

# Outline

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- Introduction

- News Flash: Entrepreneurship Can Be Taught!

- Course Overview

- Objectives, topics, and learning outcomes
- Administritivia

- Getting Started

- Why are you interested in entrepreneurship?
- What is a startup?
- What is entrepreneurship?
- Who is an entrepreneur?
- Types of entrepreneurship
- Why do startups usually fail?

# The First Question

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- Do you think entrepreneurship can be taught?
  - To be a successful entrepreneur, you must have a great and innovative product!

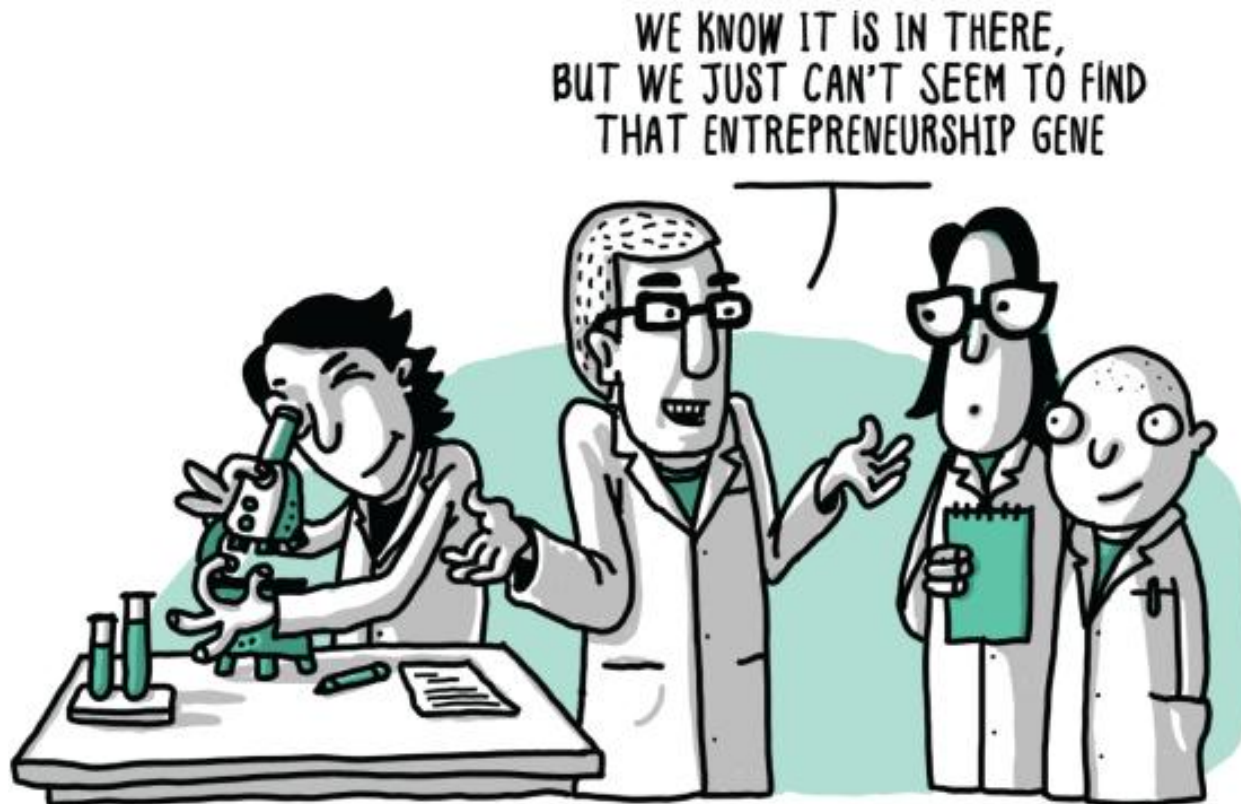


<https://startuptalky.com/famous-entrepreneur-world/>

# News Flash: Entrepreneurship Can Be Taught!

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- Entrepreneurship is nurture, not nature. Everyone can be an entrepreneur, and it can be taught.



# Always remember the pioneers

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- Computer science celebrities



# Course Objectives

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- Starting a new venture is a serious undertaking with a great deal of risk and sacrifice.
- The objective of this course is to increase your odds of succeeding in starting, executing, and growing a company.
- The course will provide you with a scientific and practical end-to-end framework, which will help you either succeed quickly or **fail fast** (if failure was inevitable for the path that you were on)

# List of Topics

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- **Considered:** a reasonably critical and comprehensive understanding
- **Thoughtful:** fluent, flexible, and efficient understanding
- **Masterful:** a powerful and illuminating understanding





# Learning Outcomes

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- After finishing this course, you should be able to:
  1. Form a complementary team and create an innovative culture
  2. Conduct in-depth primary and secondary market research, select a beachhead market, and calculate its **Total Addressable Market (TAM)** size
  3. Identify leap-of-faith assumptions, namely the value and growth hypotheses of a startup
  4. Appreciate the build-measure-learn feedback loop as a scientific method to spiral towards testing and verifying leap-of-faith assumptions
  5. Design and develop a **Minimum Viable Product (MVP)** to enter the build phase of the build-measure-learn feedback loop as quickly as possible

# Learning Outcomes

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- After finishing this course, you should be able to:
  6. Test MVP with early adopters, collect feedback, and apply actionable analytics to steer MVP towards a Viable Product (VP)
  7. Apply split-test (or A/B) experiments to evaluate different variations of an MVP or VP feature
  8. Identify different engines of growth (e.g., viral and paid engines of growth) to determine product-market fit and achieve a sustainable business
  9. Differentiate between various types of pivots (e.g., zoom in, zoom out, customer segment, and engine of growth pivots)
  10. Design a business model, set a pricing framework, calculate the Lifetime Value (LTV) of an acquired customer, and compute the Cost of Customer Acquisition (COCA)

# Learning Outcomes

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- After finishing this course, you should be able to:
  - 11. Value pre-revenue and post-revenue companies
  - 12. Differentiate between different corporate metrics (e.g., price-to-earnings ratio and return-on-assets), stock types, bonds, equity, and debt
  - 13. Understand the venture capital financing process and raise money for a startup the right way
  - 14. Apply accrual accounting and interpret the three core financial statements, namely, the balance sheet, income statement, and cash flow statement
  - 15. Recognize different exit policies (e.g., Initial Public Offering)

# Assessment Methods

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- How learning will be measured?

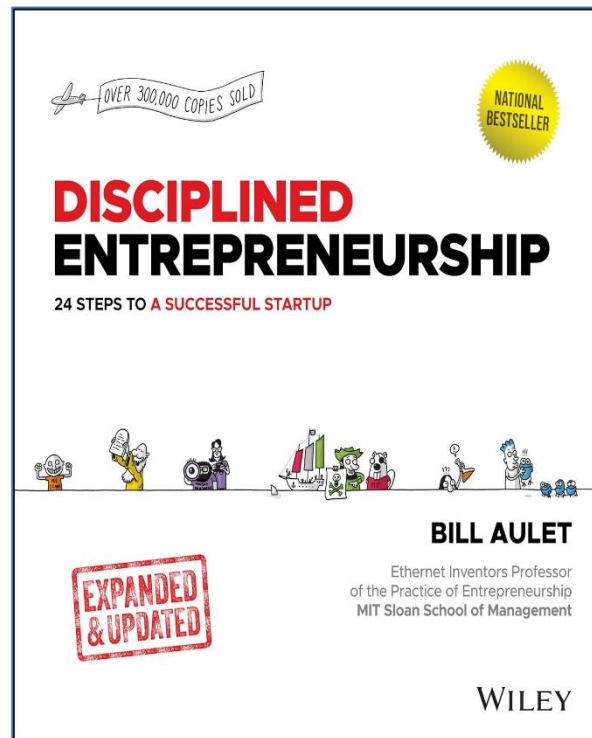
Item/activity	#	Weight	Grade (20)
Capstone project (MVP)*	1	30%	6
Exams*	2	40%	8
Problem sets*	3 to 4	10%	2
Presentations (Idea + BP)*	2	10%	2
Reading and tutorial making	2	10%	2
In-class participation and attendance	32 + 8	+5%	+1

- Must get at least **50%** of scores from \*-items to pass the course.

# Textbooks (I)

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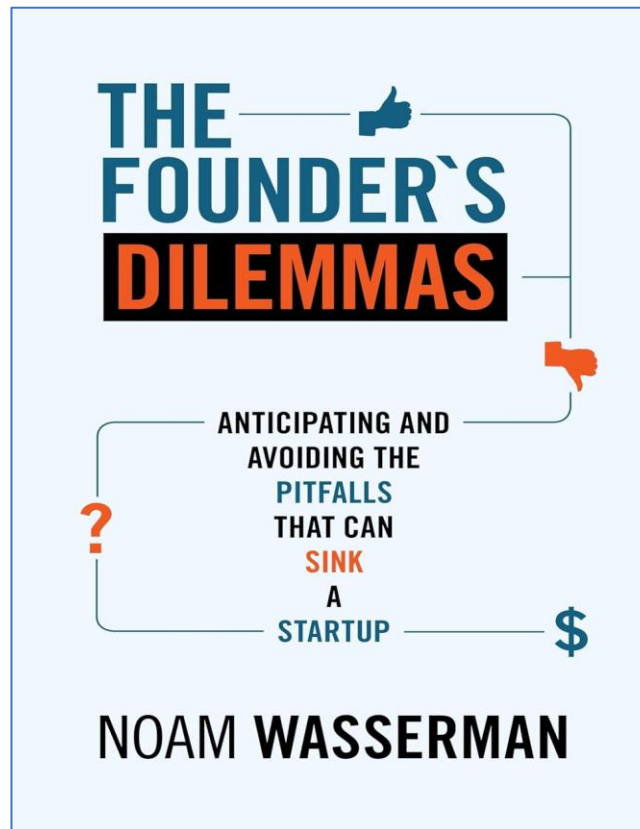
- No specific textbook, but here are some references:
  - Aulet, Bill. *Disciplined Entrepreneurship: 24 Steps to a Successful Startup*, Expanded & Updated. United Kingdom: Wiley, 2024.



# Textbooks (II)

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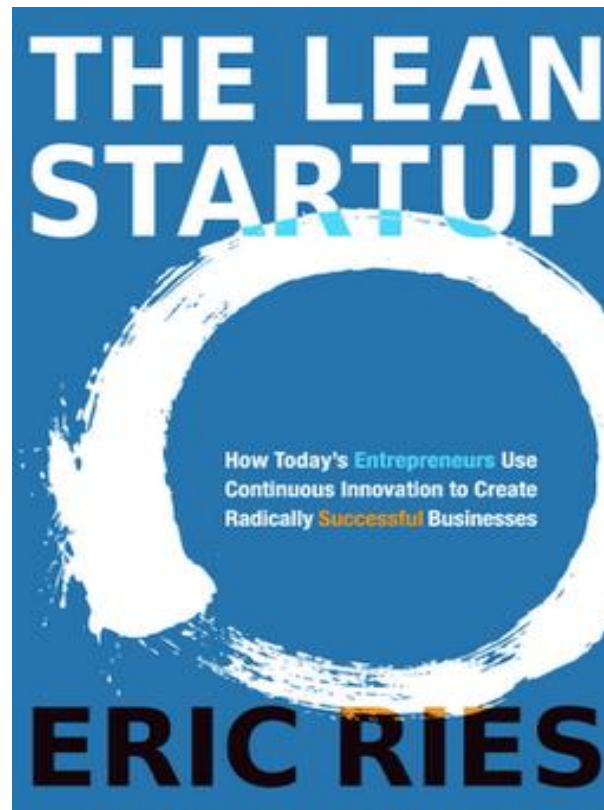
- Wasserman, Noam. *The Founder's Dilemmas: Anticipating and Avoiding the Pitfalls That Can Sink a Startup*. United Kingdom: Princeton University Press, 2013.



# Textbooks (III)

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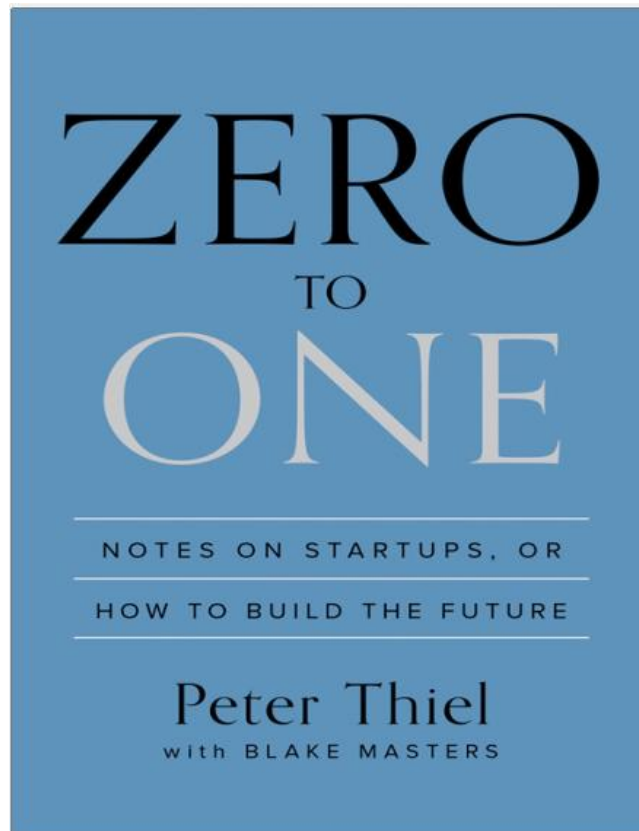
- Ries, Eric. *The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses*, Crown Business, 2011.



# Textbooks (IV)

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- Thiel, Peter., Masters, Blake. *Zero to One: Notes on Startups, Or How to Build the Future*. Germany: Crown, 2014.

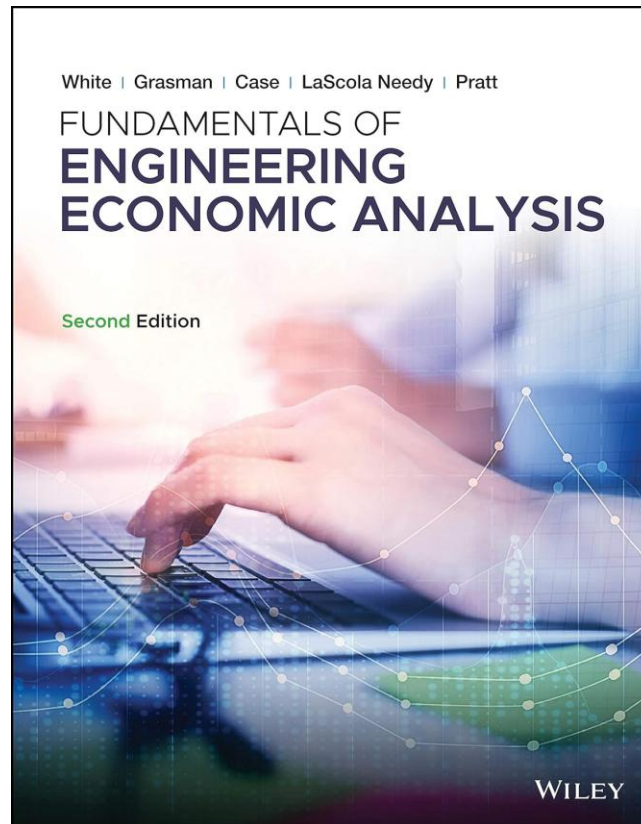




# Complementary textbooks

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- White, John A., Grasman, Kellie S., Case, Kenneth E., LaScola Needy, Kim., Pratt, David B.. *Fundamentals of Engineering Economic Analysis*. United Kingdom: Wiley, 2020.



# Other textbooks

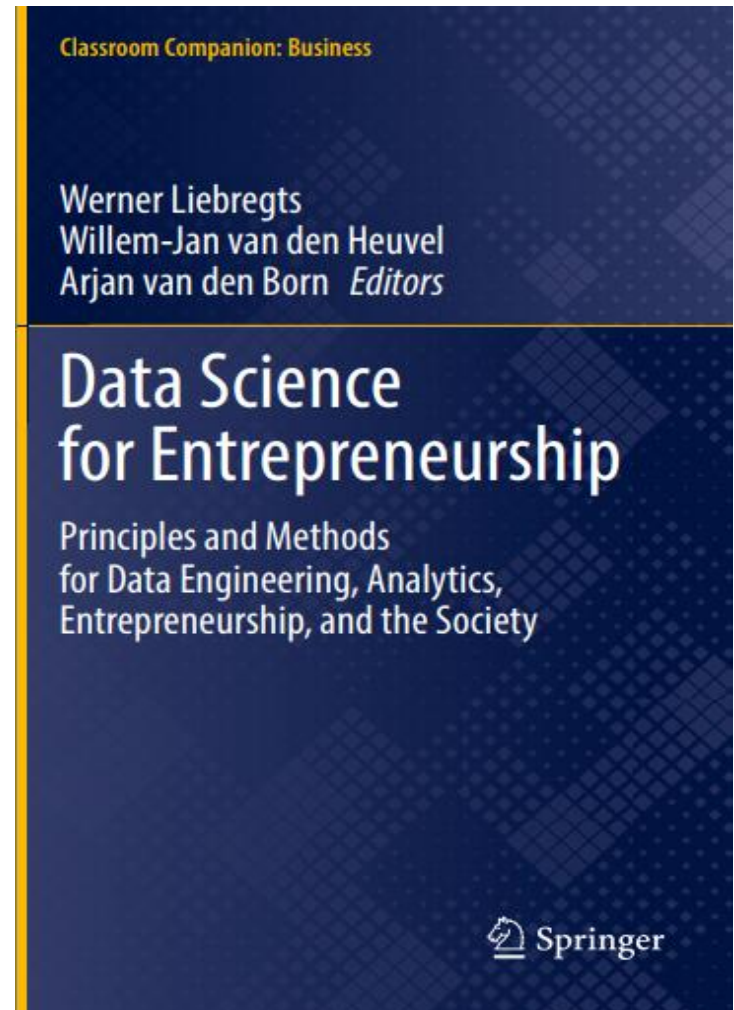
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- Read, Stuart., Sarasvathy, Saras D., Dew, Nick., Wiltbank, Robert. *Effectual Entrepreneurship*. 2<sup>nd</sup> edition, United Kingdom: Routledge, 2017.
- Nandan, H.. *Fundamentals of Entrepreneurship*. 3<sup>rd</sup> edition, India: PHI Learning, 2013.
- Bock, Laszlo. *Work Rules! Insights from Inside Google That Will Transform How You Live and Lead*. United States: Grand Central Publishing, 2022.
- and
  - “**How Google Works**”, 2014 by Eric Schmidt and Jonathan Rosenberg

# Reading and tutorial-making works

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- Work 1: Book reading
  - Select a chapter
  - Translate to Persian
- Work 2: Tutorial making
  - Choose a topic
  - Create a tutorial/slides
  - With practical examples



# Reading and tutorial-making topics

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1. Computer Model for Feasibility Analysis and Reporting (COMFAR)
  - <https://www.unido.org/comfar>
2. Cashflows: A Package for Investment Modeling and Advanced Engineering Economics using Python
  - <https://cashflows.readthedocs.io/en/latest/>
3. QuantLib-Python Object Building Documentation
  - <https://quantlib-python-docs.readthedocs.io/en/latest/>
4. Python Accounting
  - <https://python-accounting.readthedocs.io/en/latest/>
5. Zipline and pyfolio
  - <https://quantopian.github.io/pyfolio/>

# Reading and tutorial-making topics

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## 6. Market analysis and research platforms

- **Market research:** A study done to collect statistics on a given market within a specific industry.
- **Market analysis:** Interpretation of market information to determine a market's size, growth potential, audience, and competitive landscape.
- Example platforms:
  1. Grand View Research (<https://www.grandviewresearch.com>)
  2. Transparency Market Research (<https://www.transparencymarketresearch.com/>)
  3. Future Market Insights (<https://www.futuremarketinsights.com/>)
  4. Allied Market Research (<https://www.alliedmarketresearch.com>)

## 7. Patents, copyright, and trading laws

## 8. Company establishment and types of companies and businesses

# Reading and tutorial-making topics

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## 9. Review top startups in a specific business

- Example: Finance, cyber-security, Internet of Things
  - The 50 Hottest Fintech Startups In 2025 (Forbes 2025 Fintech 50)
  - <https://www.forbes.com/lists/fintech50/>

## 10. Choose a scientific paper about entrepreneurship and replicate/improve its results

- Example journals:
  - Entrepreneurship Theory and Practice
  - Entrepreneurship and Regional Development
  - Strategic Entrepreneurship Journal

## 11. Other relevant topics

# Target Audience and Prerequisites

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- Target audience
  - All AUT students
  - Specifically, AUT CSE students
- Prerequisites
  - Being an AUT student,
  - Familiar with computers and basic programming,
  - Have **passion** and **discipline**.

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  - Why are you interested in entrepreneurship?
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  - Why do startups usually fail?



# Why are you interested in entrepreneurship?

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- You may have an *idea* that can **change the world** or improve an existing process you are *familiar* with
- You may have a **technological breakthrough** and want to *capitalize* on it
  - perhaps by founding a *startup*
- You may have a **passion** and want to learn about entrepreneurship while looking for a good idea, technology, and/or a *partner*

# Why are you Interested in Entrepreneurship?

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- Three most common ways to start a new venture

I have a  
technological  
breakthrough!



I have  
an idea!



I have  
a passion!



# Raison d'Être (Reason for Existence)

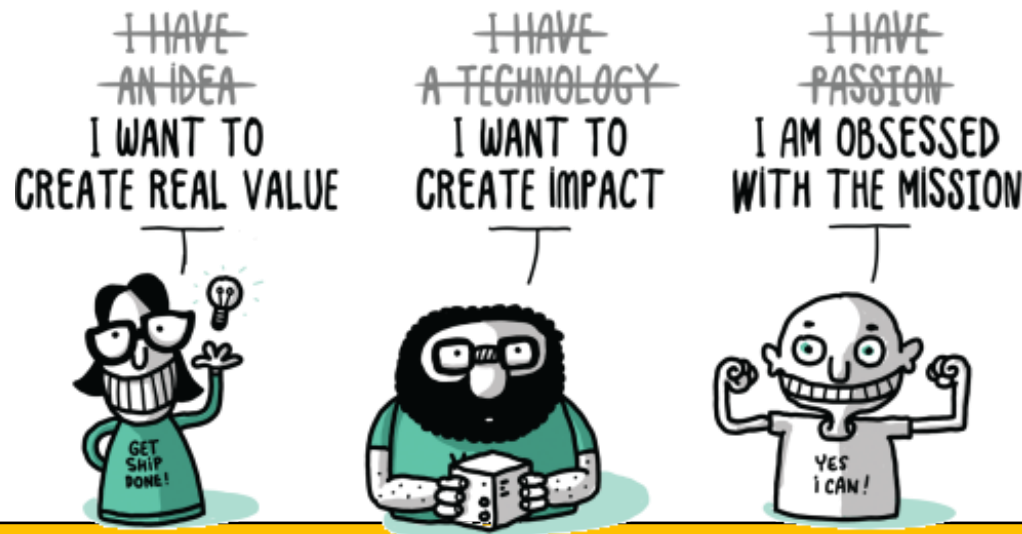
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- Internal motivations must be at a higher level.
  - Please do not try to start a company because you simply have an idea or technology.



# Raison d'Être (Reason for Existence)

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In any of these cases, at this stage, you may want to explore the world of **startups** and **entrepreneurship**.  
If so, let us get started!

# What is a Startup?

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- A startup is an **organization** designed to **innovate** a new product or service under conditions of extreme uncertainty
  - “*The Lean Startup*” by Eric Ries
  - An **organization** encompasses mission, vision, strategy, culture, accounting, finance, operations, etc.
  - In this context, however, it operates under too much uncertainty, following *leap-of-faith assumptions* concerning its invention
  - **Innovation** = Invention × commercialization
    - This implies that having a product does not mean you have a business.

# The Single Condition for a Business

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- The single **necessary** and **sufficient** condition for a business is a **paying customer**
- The day someone pays you money for your product or service, you have a business, and NOT the day before!
  - However, having a paying customer does not mean you have a *sustainable* business!
- To have a **sustainable** business, you need enough customers paying enough money within a reasonable amount of time.

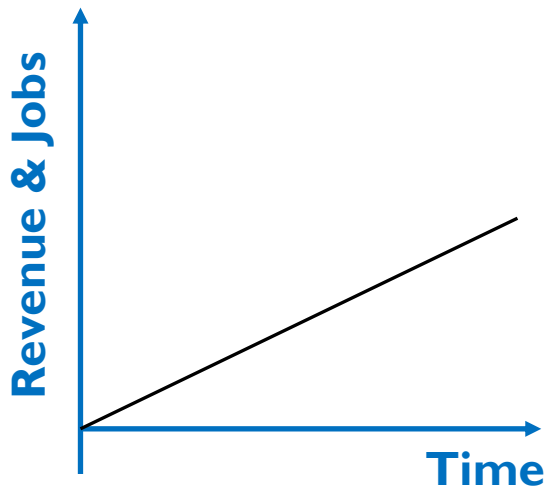
# Entrepreneurship

- Entrepreneurship is *the process* of creating a *sustainable* business
- There are two types of entrepreneurship
  - Small and Medium Enterprise (SME)
  - Innovation-Driven Enterprise (IDE)

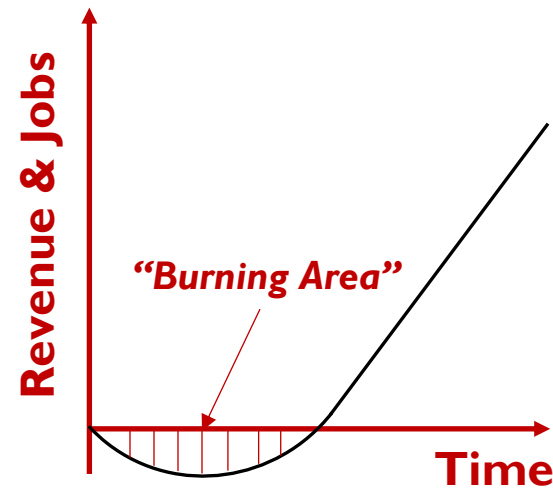
	SME	IDE
Market	Local and/or Regional	Regional/Global
Invention	Not Necessary	Necessary
Jobs	Non-tradable	Tradable
External Capital	Typically No	Yes
Growth	Linear	Exponential

# SME and IDE Expected Revenue & Job Trends

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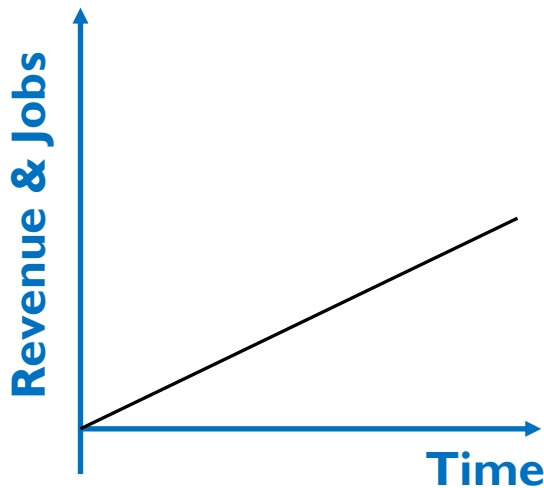
**SME:** Usually Not Risky



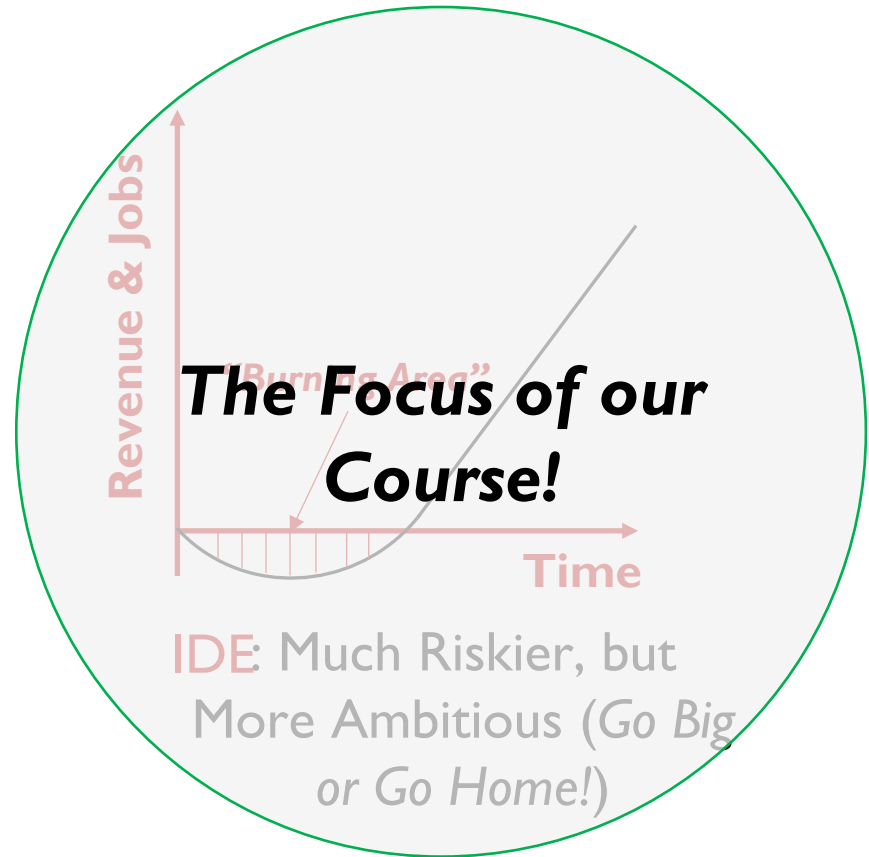
**IDE:** Much Riskier, but  
More Ambitious (*Go Big  
or Go Home!*)



# SME and IDE Expected Revenue & Job Trends



SME: Usually Not Risky



# Ten common myths about entrepreneurship

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- I. Entrepreneurship is about mercurial individuals.
  - The truth is that entrepreneurship is a **team sport**, and that gets truer every day as the world gets more complex.

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2. Entrepreneurs succeed because they have special charisma.
  - **Authenticity** is much more important than charisma.

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  - The truth is that entrepreneurship is a **team sport**, and that gets truer every day as the world gets more complex.
2. Entrepreneurs succeed because they have special charisma.
  - **Authenticity** is much more important than charisma.
3. Entrepreneurs are born, not made.
  - Entrepreneurship is **nurture**, not nature.

# Ten common myths about entrepreneurship

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4. Entrepreneurs are successful because they are smarter than the rest of us.
  - It is all about **focus** on becoming an expert in one area rather than general intelligence.

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5. You have to love risk to be an entrepreneur.
  - What entrepreneurs learn is how to take **intelligent informed risk**.

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  - It is all about **focus** on becoming an expert in one area rather than general intelligence.
5. You have to love risk to be an entrepreneur.
  - What entrepreneurs learn is how to take **intelligent informed risk**.
6. Entrepreneurs are lucky.
  - By **working smart and hard**, entrepreneurs **make their own luck**; they do not depend on random events happening.

# Ten common myths about entrepreneurship

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- While good entrepreneurs might appear to be lucky, that luck is often **by design**.
- They see a future opportunity, and they work **diligently** to be prepared to take advantage of it when it happens.

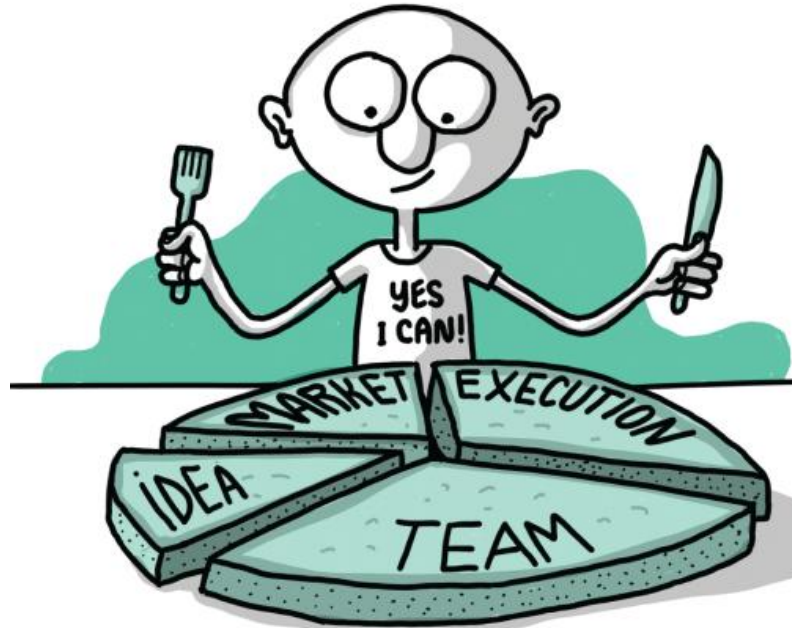




# Ten common myths about entrepreneurship

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7. Entrepreneurs are successful because they came up with a novel idea.
- An idea is necessary to **catalyze** a team into action, but what is even more important is executing effectively on a **viable idea** that will **evolve**.



# Ten common myths about entrepreneurship

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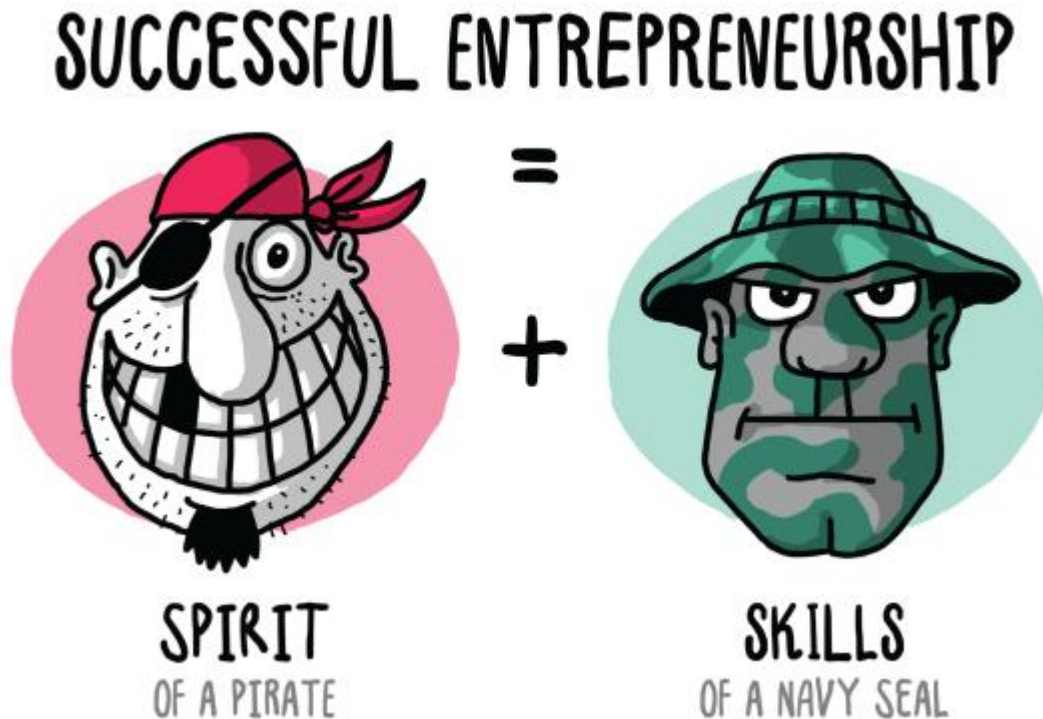
8. You need to be young to be a successful entrepreneur.
  - **Average age** at founding for the 1,000 fastest-growing new ventures was **45** (Pierre Azoulay).
  - Successful entrepreneurship is more likely to come with age and **experience**.
9. Entrepreneurs succeed at a rate of less than 10%.
  - Success would be defined as being **in business** five years after founding.
  - If you know what you are doing, entrepreneurship is not as risky as it is generally perceived.

# Ten common myths about entrepreneurship

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## 10. Entrepreneurs are undisciplined.

- Entrepreneurs must have *extraordinary discipline* to be successful.

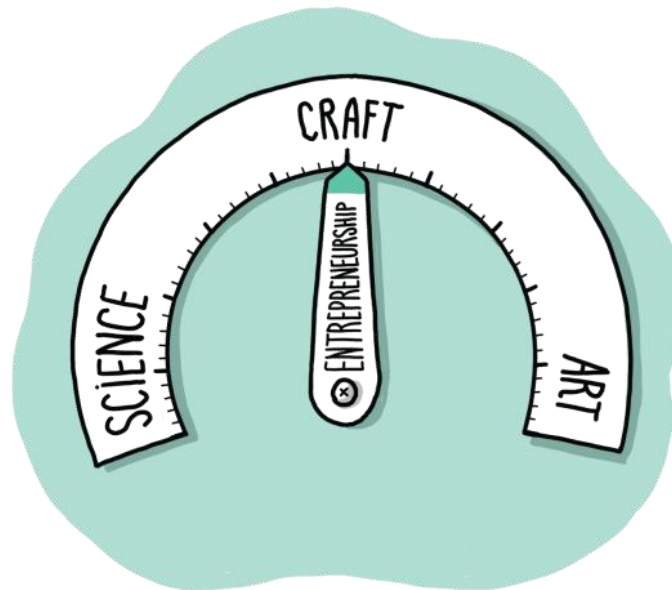


# Five useful mental models about entrepreneurship

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## I. Entrepreneurship is a craft, not a science or art.

- The sciences are well-defined and deterministic; art is the opposite.
- Entrepreneurship is a craft that sits between these two ends of the spectrum.



# Five useful mental models about entrepreneurship

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## 2. Entrepreneurship is a mindset, a skill set, and a way of operating.

- The four Hs summarize four key pillars to becoming a successful entrepreneur—and it all starts with the Heart.



HEART  
SPIRIT



HEAD  
KNOWLEDGE



HAND  
CAPABILITY



HOME  
COMMUNITY

## Five useful mental models about entrepreneurship

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**3. Everyone is capable of entrepreneurship.**

**4. Entrepreneurship is more than startups.**

- Startups backed by venture capital.
- Entrepreneurs are needed and certainly can exist inside already established organizations.
- They can be in nonprofits, academia, government, and faith-based organizations.

**5. Sustained and successful entrepreneurship is an ethical activity.**

# Entrepreneurship vs. Management

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- Innovation-Driven Enterprise (IDE) entrepreneurship is a **special** kind of management
  - Entrepreneurship is cool, innovative, and exciting
  - Management is dull, serious, and bland
  - What is actually exciting is to see a startup succeed and change the world
    - This cannot happen without *managing* it rightly
    - The road to excitement passes through the (boring) management stuff!
- Why is IDE entrepreneurship a **special** kind of management?

# Entrepreneurship vs. Management

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- Why **special**?
  - Traditional business thinking suggests:
    - Perfecting a product, even if it takes a great deal of time, hence, *long development cycles*
    - Large teams and hierarchical organizations
    - Failures are unacceptable
  - Modern business (or entrepreneurial) thinking suggests:
    - Building a minimum viable product (MVP); hence, *short development cycles*
    - Focusing on what customers want, thus experimenting tremendously
    - Failing as a prerequisite for success
    - Small teams and flat organizations



# Schools of Thought in Entrepreneurship

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- Three major schools of thought:

- 1. “Just Do It”

- Most entrepreneurs are wary of implementing traditional management practices, afraid that this will invite bureaucracy or stifle creativity
    - They assume management is the problem, hence, chaos is the answer
    - Unfortunately, this approach leads to chaos more often than it does to success

- 2. “Launch a Rocket Ship”

- Specify every single step to take in excruciating detail (typically by tapping into a proven set of techniques used for managing big companies)
    - Specify the expected result of every single step taken– what happens if a tiny error occurs?
    - Can you adapt or pivot?

# Schools of Thought in Entrepreneurship

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- Three major schools of thought:

- 3. “Plan and Improve, but Verify”

- Set a (hypothetical) path to reach a destination (you are not sure whether this path will lead to the destination)
    - Experiment with and validate your path
    - Persevere, adapt, or even pivot if needed
      - If you are driving to work, do you give up if there is a detour in the road or you made a wrong turn?
        - No, you remain thoroughly focused on getting to your destination

The third school of thought is the recommended one!

# Who is an Entrepreneur?

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- Anyone who creates a startup is an entrepreneur
  - This implies that an entrepreneur should have a (strong) appetite for risk-taking.
- But an entrepreneur does not need to create a startup;
  - she/he can operate inside “established” organizations
  - This entrepreneur is typically referred to as an “intrapreneur”.
- In addition, an entrepreneur does not need to invent!
  - E.g., Steve Jobs identified the computer mouse created by Xerox PARC and commercialized it effectively through Apple.
  - E.g., Larry Page and Sergey Brin used AdWords (which was created by Overture Services, Inc.) on their search results pages.

# The startup realty

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- The grim reality is that most startups fail
- Five essential elements lead to successful startups:



**IDEA**



**TEAM &  
Execution**



**BUSINESS  
MODEL**



**FUNDING**







**TIMING**

# What makes startups succeed?

- Succeeded 😊



Idea	Team	B M	Funding	Timing
				
10	9	8	6	10

Idea	Team	B M	Funding	Timing
				
8	9	5	4	9

Idea	Team	B M	Funding	Timing
				
8	10	7	7	10

[Based on a study by IdeaLab]

# What makes startups succeed?

- Failed



friendster®

kozmo.com

webvan

Idea	Team	B M	Funding	Timing
8	5	4	6	6

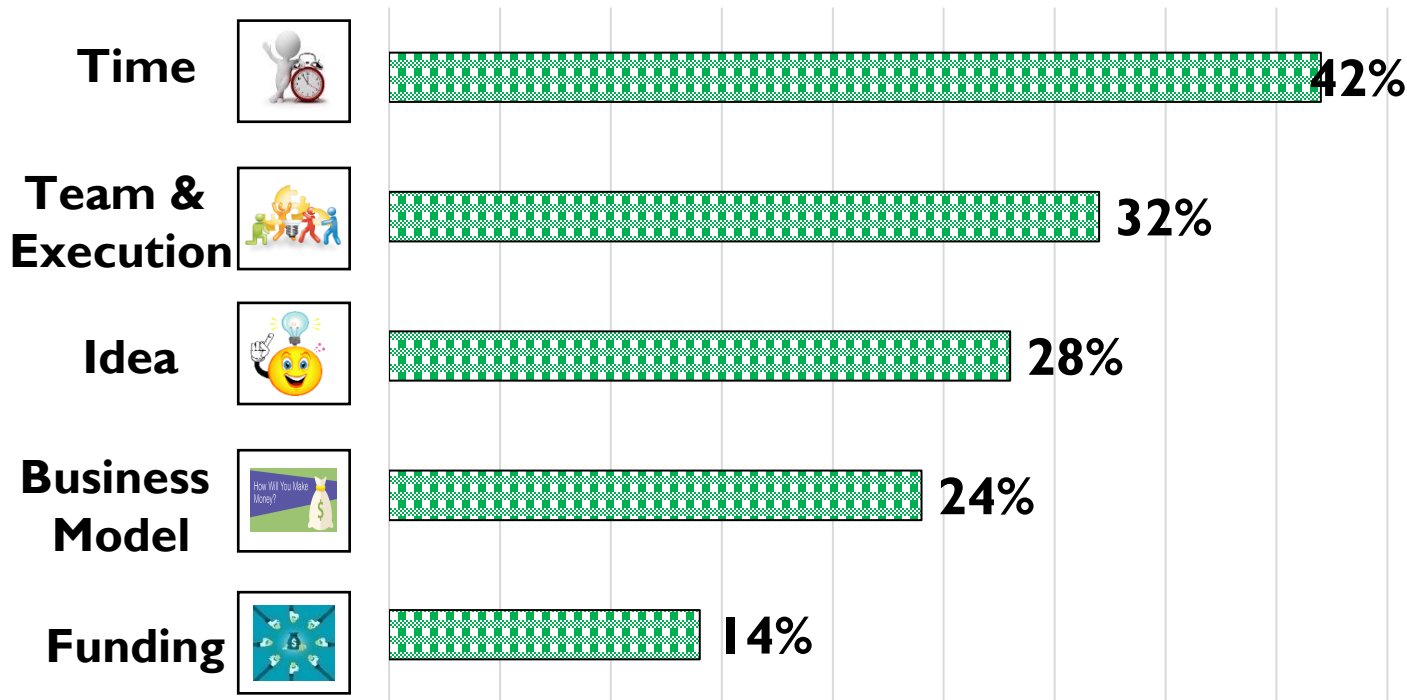
Idea	Team	B M	Funding	Timing
4	5	6	10	4

Idea	Team	B M	Funding	Timing
4	5	6	10	4

[Based on a study by IdeaLab]

# What makes startups succeed?

- Factors of success



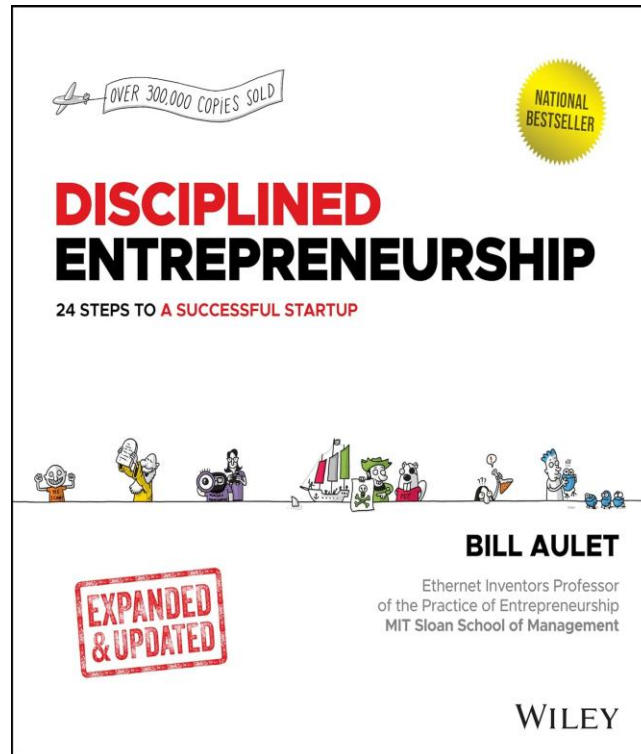
**Factors of  
success  
across more  
than 200  
companies**

**[Based on a study by IdeaLab]**

# Reading assignment

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- Read “**STEP 0: Getting Started**” of the “**Disciplined Entrepreneurship**” book
  - 2024 by Bill Aulet





# Next Class

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- Forming teams and generating ideas
- Performing market segmentation and research (Part I)