



# **Code.org Mobile App leveraging Learning through Teaching Education Strategies**

Dedicated to Empowering Students Everywhere to Learn through Teaching Code



# Agenda

01

## Landscape

Current landscape and opportunities for growth

02

## Our Solution

Overview, demo, and technical explanation

03

## Roadmap

Features to implement in future iterations

04

## Conclusion

Conclusions and final recommendation



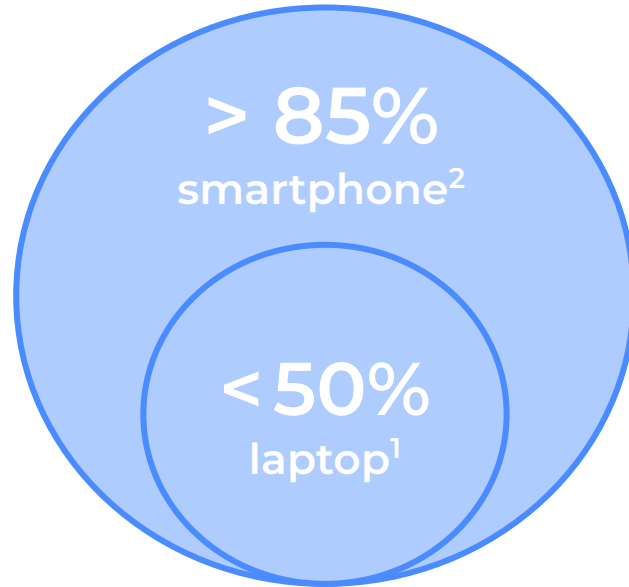
# Households with Laptops



1. Statista. (2023). Number of households with a computer at home worldwide from 2005 to 2019. Retrieved from <https://www.statista.com/statistics/748551/worldwide-households-with-computer/>



# Households with Laptops are fractional compared to Individuals with Smartphones Worldwide



1. Statista. (2023). Number of households with a computer at home worldwide from 2005 to 2019. Retrieved from <https://www.statista.com/statistics/748551/worldwide-households-with-computer/>
2. Statista. (2023). Number of smartphone users worldwide from 2016 to 2021. Retrieved from <https://www.statista.com/statistics/330695/number-of-smartphone-users-worldwide/>



# **Traditional Coding Techniques on Laptops are Not User Friendly on Smartphones**

**Our solution:**





# Our solution: Empower the Student to Learn through creating Teaching Videos with direct AI Feedback

- Alexis emphasized Code.org strives to **teach coding concepts**, not to directly create top software engineers
- Looking at my personal coding journey, my knowledge was surface level until I began teaching others
- **Learning by teaching** is a method that has been repeatedly **scientifically validated**<sup>1</sup>
- **Our solution:** We coded an app where the main method of assessing the students:
  - **Employs learning by teaching** through assigning students to record videos of them teaching that code.org lesson's material
  - **Leverages AI** for quick **feedback**, convenient organization, and **summary metrics** for both the teachers and code.org

1. Wagner, M., & Gansemer-Topf, A. (2004). Learning by Teaching Others: a Qualitative Study Exploring the Benefits of Peer Teaching. Landscape Journal, 23(2), 161-172. Retrieved from <https://www.jstor.org/stable/43323711>

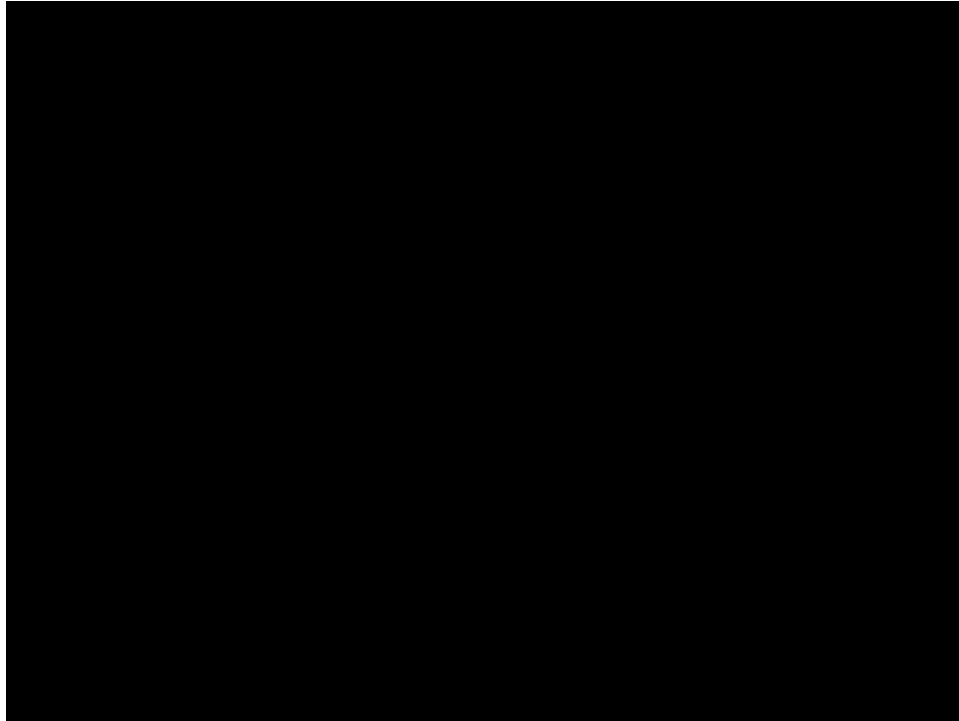


**Demo**





## Mobile App Demo – Student Perspective



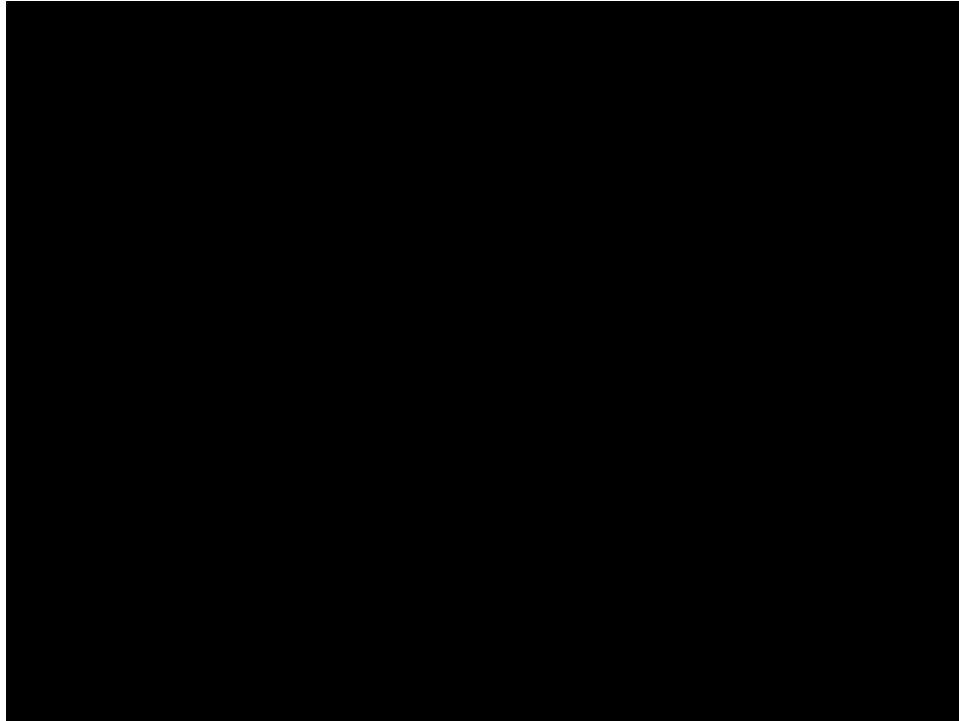


# Example Student Video Submission





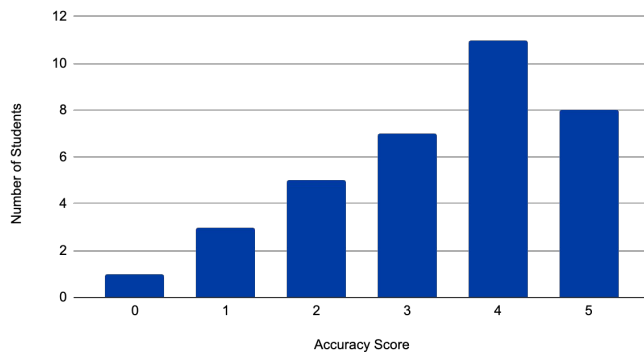
## Mobile App Demo – Teacher Perspective



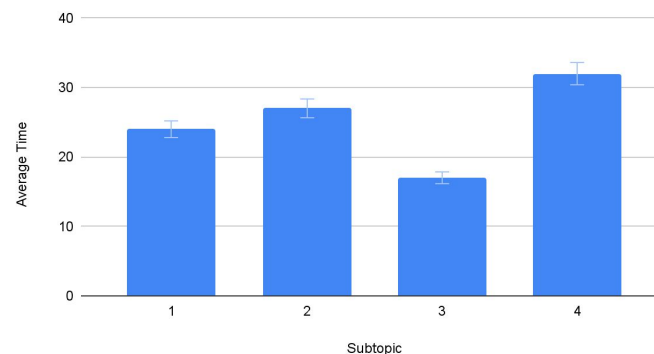


# Class-wide data visualizations give teachers insight into student performance

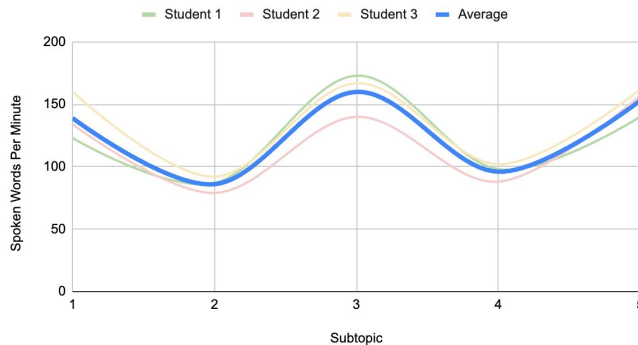
Count of Accuracy Scores by Student



Average Time Spent Covering Each Subtopic



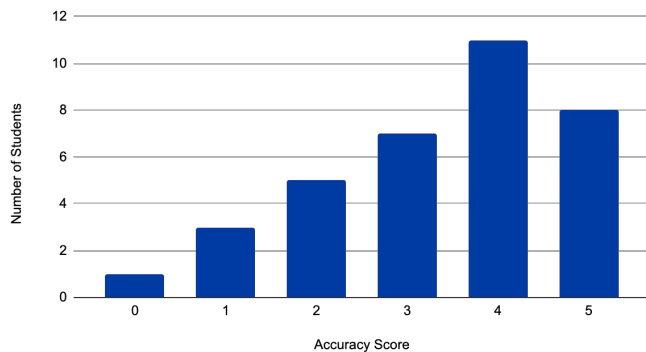
Spoken Words Per Minute By Students Across Subtopics



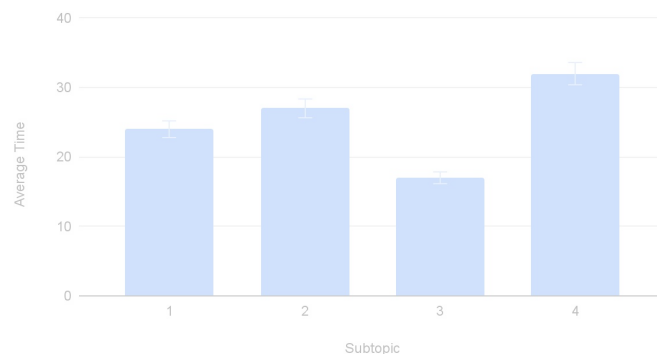


# Class-wide data visualizations give teachers insight into student performance

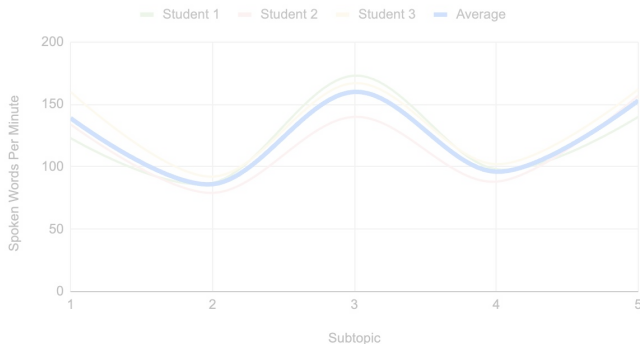
Count of Accuracy Scores by Student



Average Time Spent Covering Each Subtopic



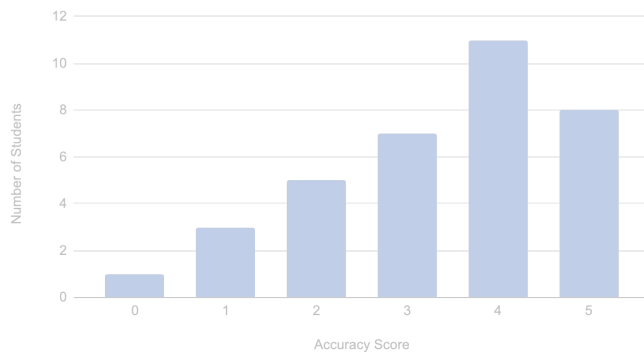
Spoken Words Per Minute By Students Across Subtopics



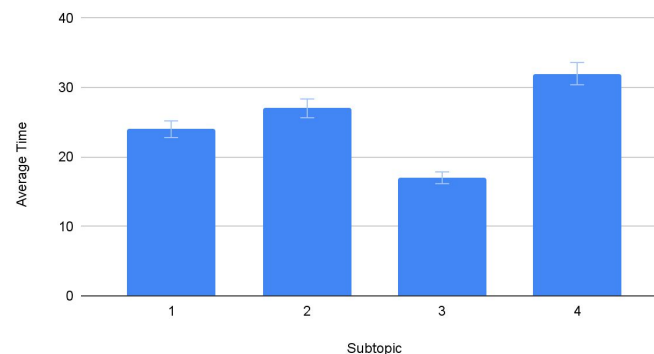


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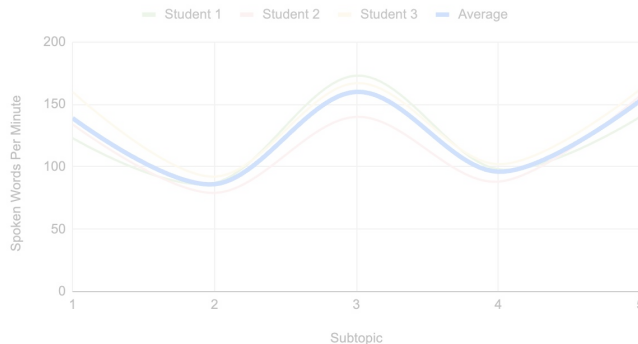
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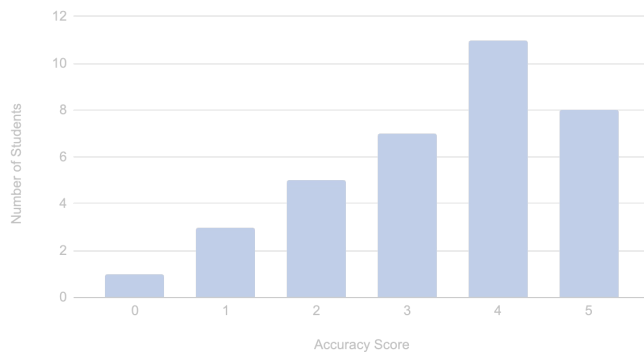
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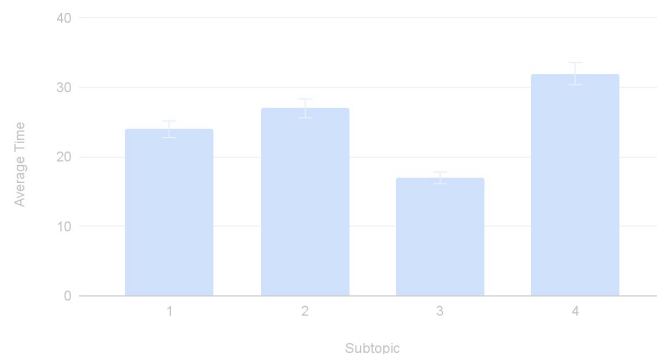


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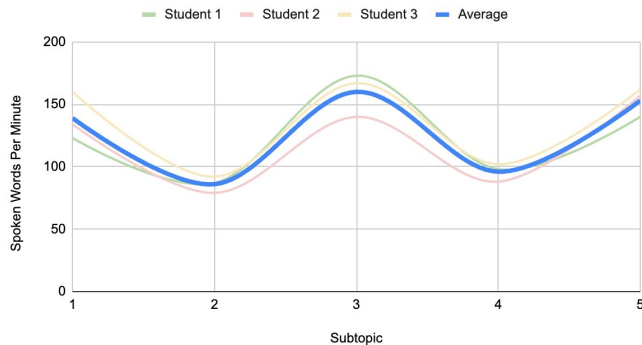
Count of Accuracy Scores by Student



Average Time Spent Covering Each Subtopic



Spoken Words Per Minute By Students Across Subtopics





# Technical Explanation



# Technical Explanation



## Server

- Flask PWA

## API Calls

- YouTube Transcript
- GPT-3.5 Turbo

Playground

Your presets Save View code Share ...

**SYSTEM**

Numerically grade the student's implementation of the following algorithm and specification out of 10. The student may use natural language pseudocode, but must be specific in any loop termination, recursive cases, and conditionals.

Two Sum: Given an array of integers nums and an integer target, return indices of the two numbers such that they add up to target.

You may assume that each input would have exactly one solution without stating it, and you may not use the same element twice.

You can return the answer in any order.

For full points the solution should use a hash map to store differences as keys and indices as values. They should clearly specify

**USER**

Create a hash map. For each number in the input array, check if the target minus the number is in the hash map. If it is, return the current number and the value in the hash map. Else, you add the difference to the map with the current number as its value.

**ASSISTANT**

I would rate this implementation a 9 out of 10.

The student correctly uses a hash map to store differences as keys and indices as values. They also specify that the keys in the hash map will be the differences between the target and the numbers in the input array, and the values will be the indices of those numbers.

The student also correctly checks if the target minus the current number is in the hash map, and if it is, returns the current number and the value in the hash map.

The only improvement I would suggest is to clarify that the solution should return the indices of the numbers (not the values themselves), as stated in the problem specification

Submit ↻

Give us feedback

Mode Chat

Model gpt-3.5-turbo

Temperature 0

Maximum length 256

Stop sequences Enter sequence and press Tab

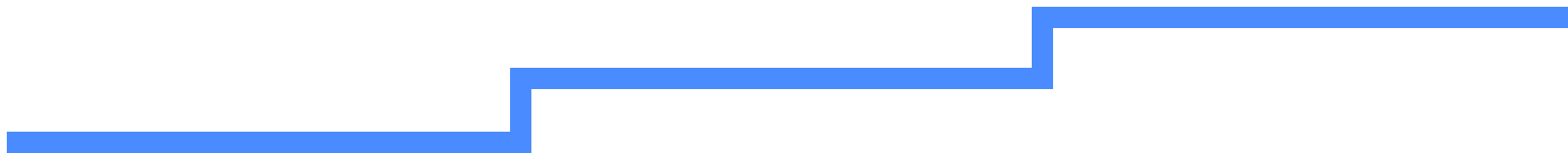
Top P 1

Frequency penalty 0

Presence penalty 0



# Roadmap





# Roadmap

## Phase 1

- Train a model to suggest assessments
- Create teacher portal for teachers to learn code from each others content
- Build out the teacher dashboard



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## Phase 1

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## Phase 2

- Facilitate connections between classmates through interactive feature
- Progressively gamify the user experience



# Roadmap

## Phase 1

- Train a model to suggest assessments
- Create teacher portal for teachers to learn code from each others content
- Build out the teacher dashboard

## Phase 2

- Facilitate connections between classmates through interactive feature
- Progressively gamify the user experience

## Phase 3

- Leverage screened volunteer mentors working within the technical sector to enhance engagement, connectivity, and inspiration



# Growth Opportunities with Our Solution

1. Code.org is now **accessible to many more low income areas**
2. Teachers and code.org are able to **gain insights on weaknesses to strategically enhance their materials**
3. Furthers solutions to **other pain points** challenged by Code.org



# Areas Our Solution could be leveraged to Target Additional Pain Points

## Current Pain Points

1. **Filming new content**  
Logistical challenge to schedule with top video talent
2. **Teaching professionalism**  
User feedback that modules are cumbersome
3. **Training New Teachers**  
Synchronous 7 hour workshops

## Leverage Our Solution

1. **Frictionless** access to **crowdsourced** new **content** with the opportunity to license
2. **Seamlessly** teaches students methods to **discuss technical concepts**
3. **Empowers educators** to teach lessons and receive quick AI feedback



# Code.org Key Desired Results and Method to Leverage Our Solution

## 1. Increase CS accessibility

- MVP: Assess coding knowledge on a **more accessible platform**, mobile devices
- MVP: Learning-by-teaching makes coding **accessible to students with different learning styles**
- MVP: **Crowd source** new teaching content to rapidly expand into new areas

## 2. Increase engagement

- MVP: Encourage **interactions between classmates** through likes and comments
- Future phase: **Incentivize video creation** through competitions to showcase clips of student-generated content on Code.org or Code.org YouTube channel<sup>1</sup>
- Future phase: Increase **gamification** with animations and rewards given insights on when users are predicted most likely to close the app





# Code.org Key Desired Results and Method to Leverage Our Solution

## 3. Increase students in higher-level CS programs

- MVP: Increasing **accessibility of the product and teacher training funnels more students** to higher-level programs
- Future phase: **Volunteers to inspire** and mentor students

## 4. Insights into mobile-oriented CS learning

- MVP: **Automated summary metrics** through generative AI

## 5. Insights into mobile coding interfaces

- Future phase: Implement traditional methods of coding that are user friendly for smartphones shown in the Appendix



**Thank you**



# Appendix

# Methods of Traditional Coding

```
for i in neighbors:  
    print('neighbor: ', i)
```

```
checked = False  
if checked ==   :  
    print(result)
```

# Pseudocode

**Two Sum:** Given an array of integers *nums* and an integer *target*, return indices of the two numbers such that they add up to *target*.

**Student Answer:** Create a hash map. For each number in the input array, check if the target minus the number is in the hash map. If it is, return the current number and the value in the hash map. Else, you add the difference to the map with the current number as its value.

**How correct is the student's solution?**

Ref sol

```
class Solution:
    def twoSum(self, nums: List[int], target: int) -> List[int]:
        prevMap = {} # val -> index

        for i, n in enumerate(nums):
            diff = target - n
            if diff in prevMap:
                return [prevMap[diff], i]
            prevMap[n] = i
```















# Understanding the Problem



## Jupiter

Jupiter is the biggest planet of them all



## Mars

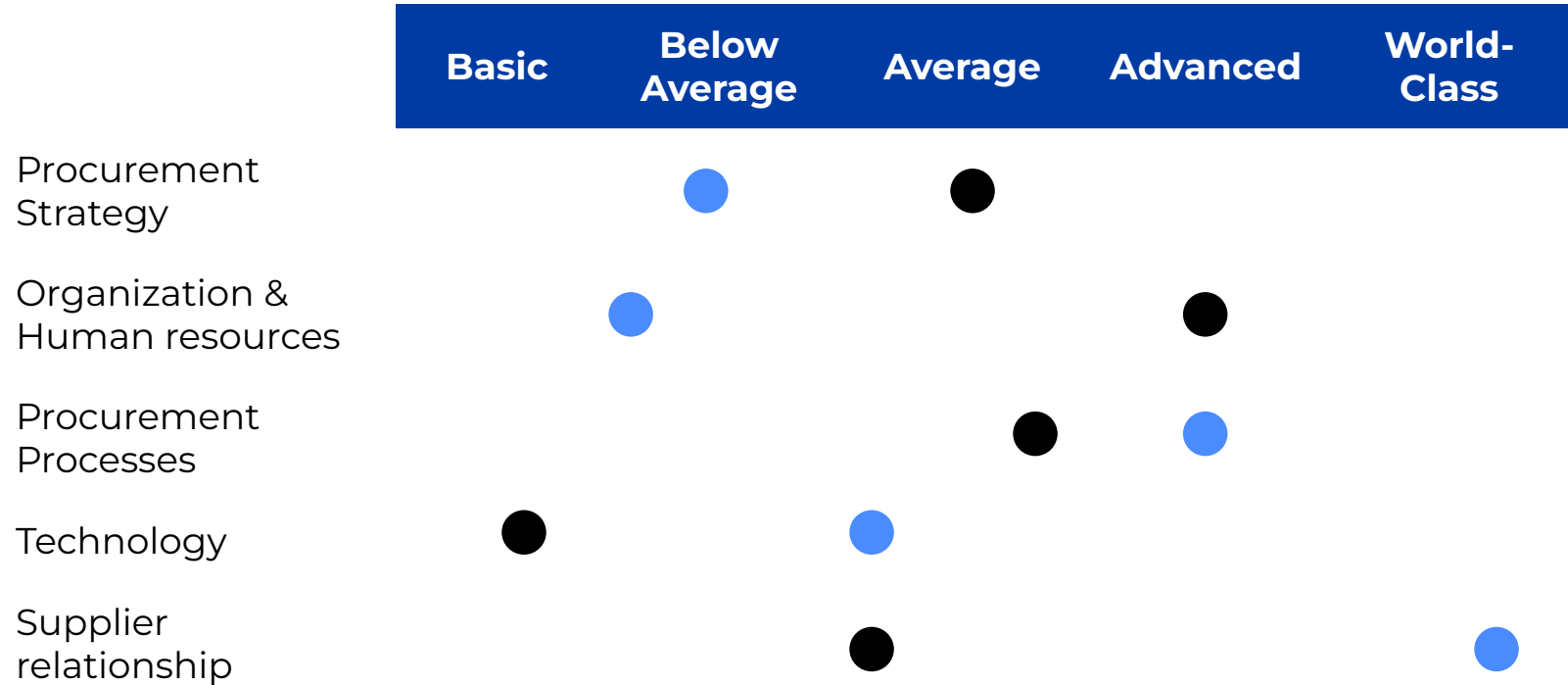
Despite being red, Mars is a cold place



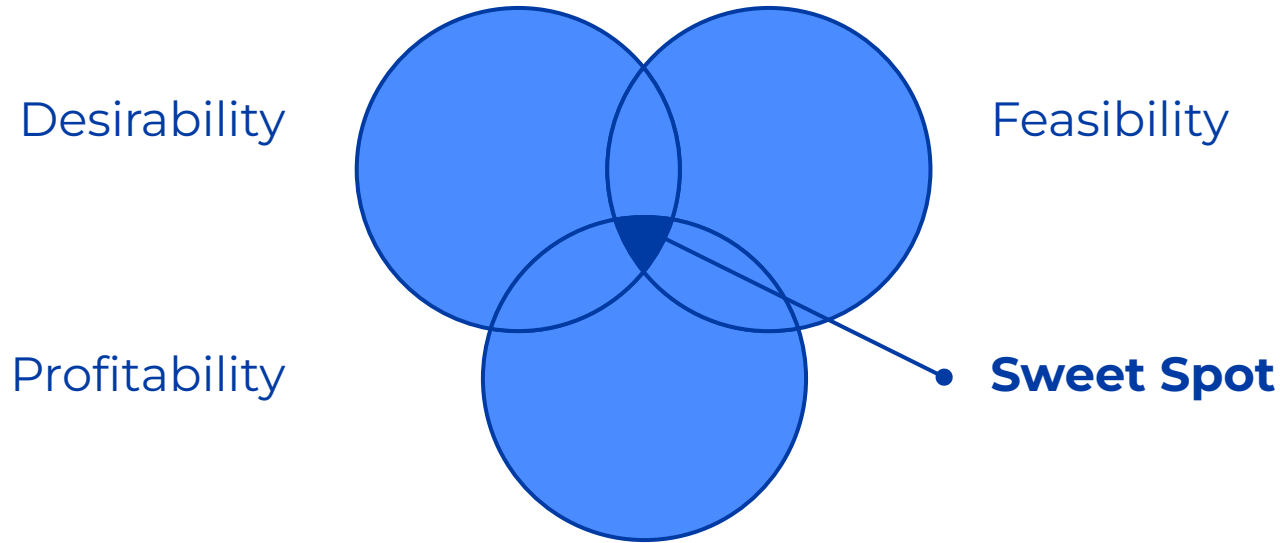
## Saturn

It's composed of hydrogen and helium

# Maturity Model



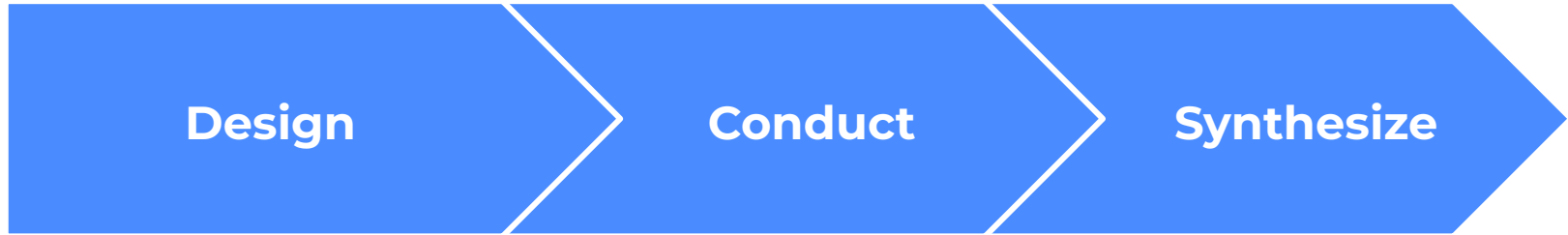
# The “Entering a New Market” Framework Includes 3 Components



# SWOT

Internal	<b>Strengths</b> <ul style="list-style-type: none"><li>• Insert your own text</li><li>• Insert your own text</li></ul>	<b>Weaknesses</b> <ul style="list-style-type: none"><li>• Insert your own text</li><li>• Insert your own text</li></ul>
	<b>Opportunities</b> <ul style="list-style-type: none"><li>• Insert your own text</li><li>• Insert your own text</li></ul>	<b>Threats</b> <ul style="list-style-type: none"><li>• Insert your own text</li><li>• Insert your own text</li></ul>

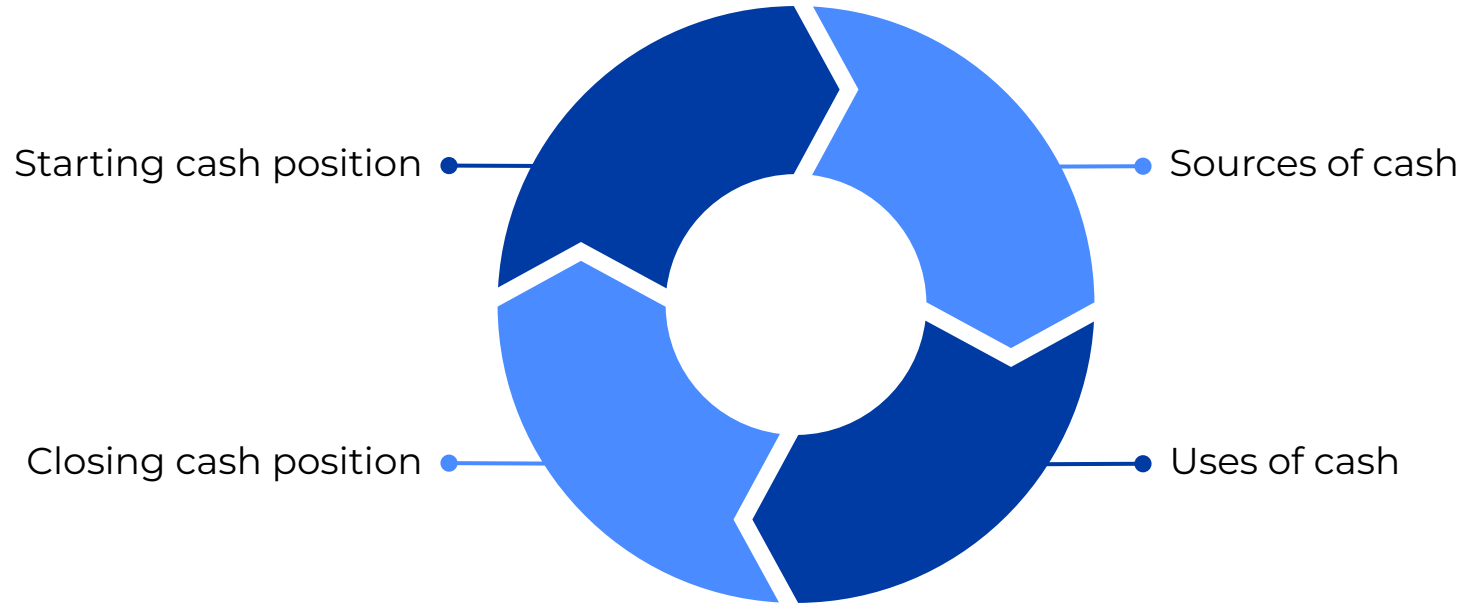
# Data Gathering Survey



- Determine the main objective
  - Determine the sample
  - Design the survey
- Provide clear value proposition
  - Perform a trial run to pretest survey
  - Administer survey
- Prepare and analyze data
  - Identify the “what?”
  - Summarize and interpret results

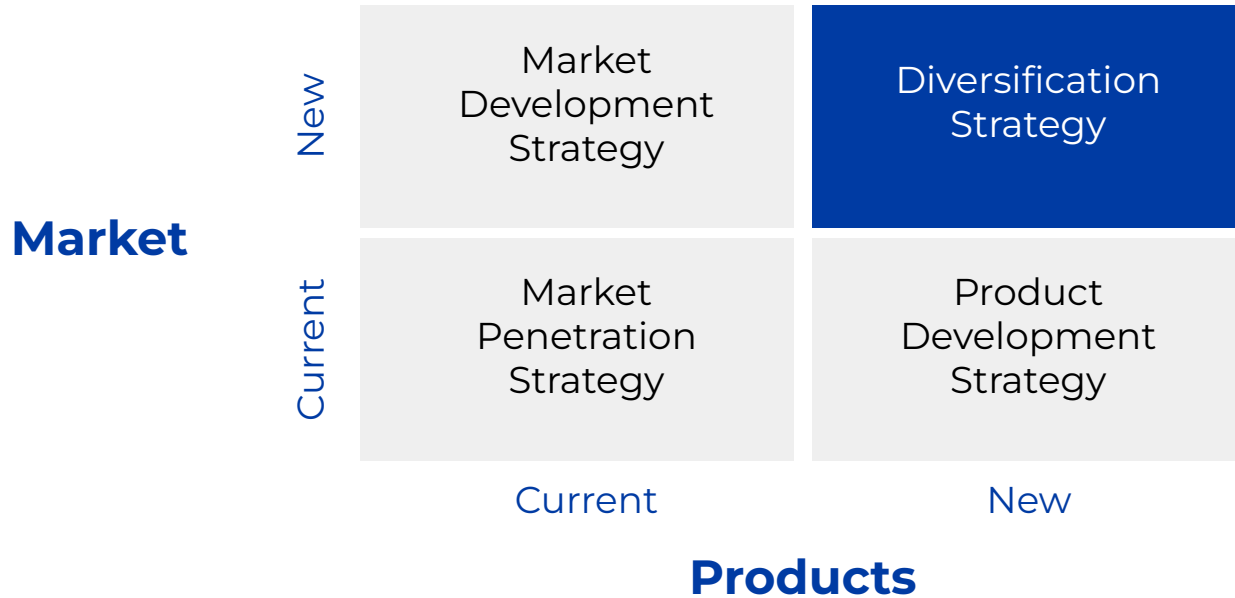


# Financial Analysis

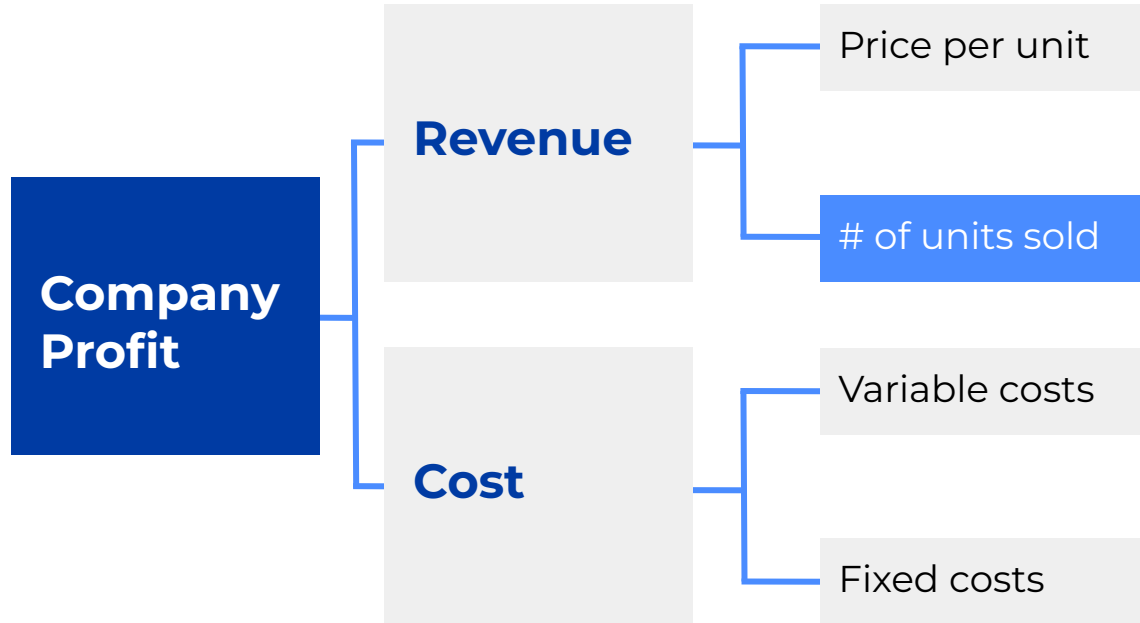


# Ansoff Growth Matrix

Insert your own title



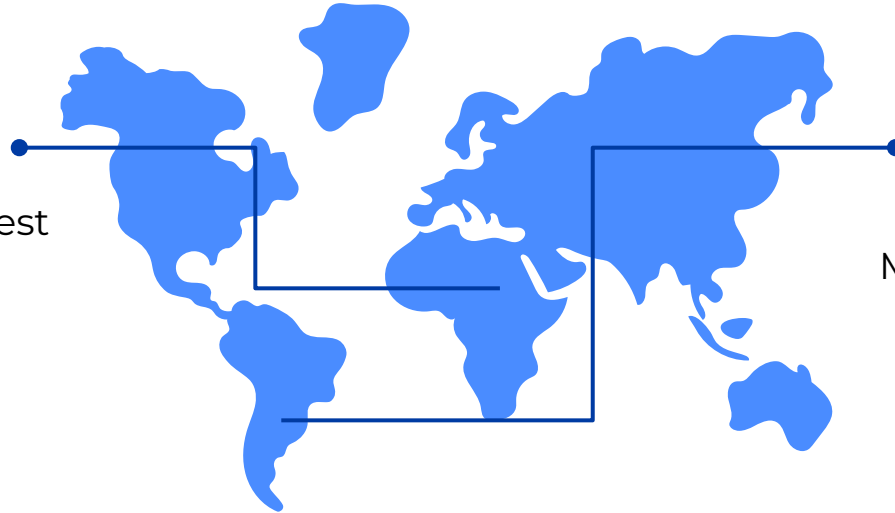
# Segmentation by Distribution



# Strategy Map

## Jupiter

Jupiter is the biggest planet of them all



## Mars

Despite being red, Mars is a cold place

# Strategy Map

<b>Financial</b>	Increase revenue	Increase profit	Decrease fixed cost
<b>Customer</b>	Increase customer satisfaction	Become a trusted brand	Sell new products
<b>Internal Process</b>	Understand customer segments	Decrease delivery time	
<b>Learning &amp; Growth</b>	Improve employee satisfaction	Improve customer information	


# Our Solution

## Mercury

Mercury is the closest planet to the Sun and the smallest one in the Solar System—it's only a bit larger than the Moon

## Venus

Venus has a beautiful name and is the second planet from the Sun. It's terribly hot—even hotter than Mercury




“This is a quote, words full of  
wisdom that someone  
important said and can make  
the reader get inspired”

—Someone Famous

**A picture is  
worth a  
thousand words**





The slide features a white background with three solid blue squares: a medium blue square on the left, a dark blue square on the right, and a smaller dark blue square in the top right corner.

# 5,600.00

Big numbers catch your audience's attention



# A picture always reinforces the concept

Images reveal large amounts of data, so remember: use an image instead of a long text

# 02

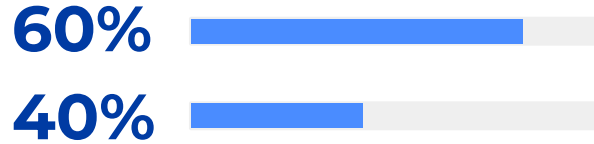
## Target

You could enter a subtitle  
here if you need it

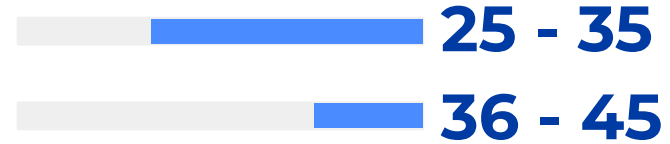


# Our Target

## Gender



## Age



## Interests

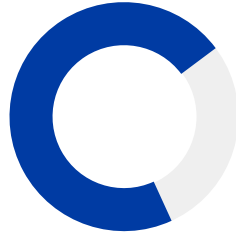


# Percentages



**55%**

Jupiter is the biggest  
planet of them all



**80%**

Despite being red,  
Mars is a cold place



**60%**

It's composed of  
hydrogen and helium

# Our Consultants



**John Doe**

You can replace the  
image on the screen  
with your own



**Helena James**

You can replace the  
image on the screen  
with your own

# Our Partners

## Mercury

Mercury is the closest planet to the Sun

## Venus

Venus has a beautiful name, but it's hot

## Jupiter

It's the biggest planet in the Solar System

## Mars

Despite being red, Mars is a cold place

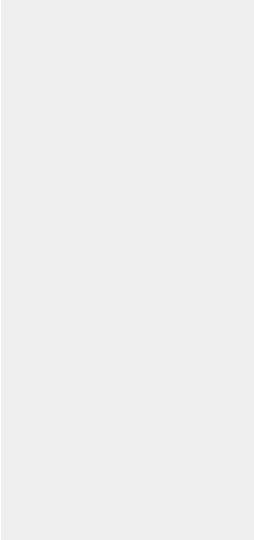
# Testimonials

“Venus has a beautiful name  
and is the second planet  
from the Sun. It’s terribly hot”

—**John Doe**

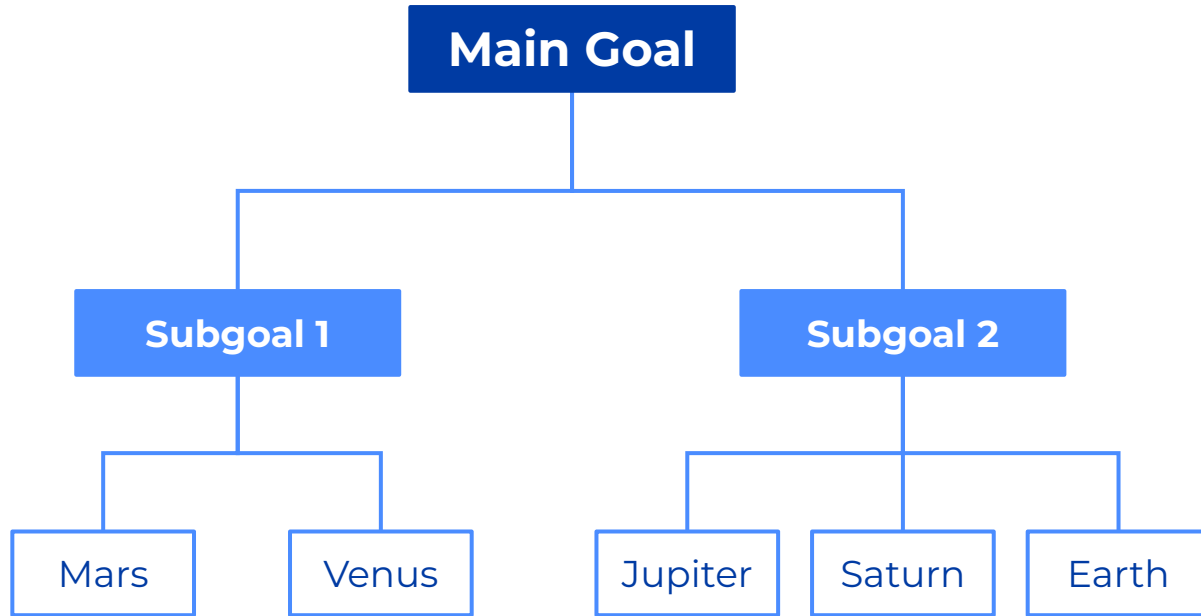
“Mercury is the closest planet  
to the Sun and the smallest  
one in the Solar System”

—**Helena Patterson**





# Upcoming Goals



# Awards

## Mercury

Mercury is the closest planet to the Sun and the smallest one

## Venus

Venus has a beautiful name, but it's terribly hot

## Mars

Despite being red, Mars is actually a cold place

## Jupiter

Jupiter is the biggest planet in the Solar System

## Saturn

Saturn is the ringed one and a gas giant

## Neptune

Neptune is the farthest planet from the Sun

# Thanks

Do you have any questions?

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## Photos:

- Side view businessman calculating finance numbers
- Happy woman working laptop
- Close up woman working laptop
- Man with laptop posing coworkers

# Resources

Did you like the resources on this template? Get them for free at our other websites.

## Photos:

- Business woman looking out window sitting office
- Top view office desk with growth chart hands with keyboard
- Front view elegant business woman using laptop with copy space
- Business man enjoying day office

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(<https://fonts.google.com/specimen/Montserrat>)

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Create your Story with our illustrated concepts. Choose the style you like the most, edit its colors, pick the background and layers you want to show and bring them to life with the animator panel! It will boost your presentation. Check out [How it Works](#).



Pana



Amico



Bro



Rafiki



Cuate

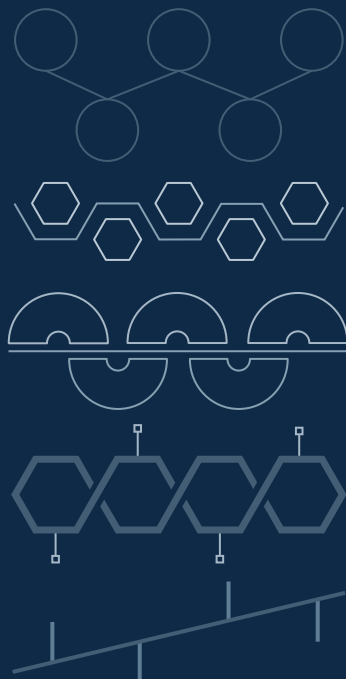
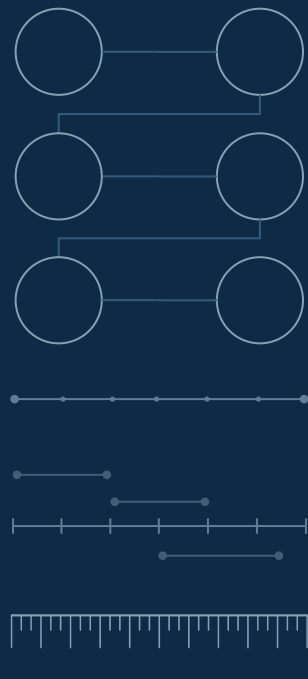
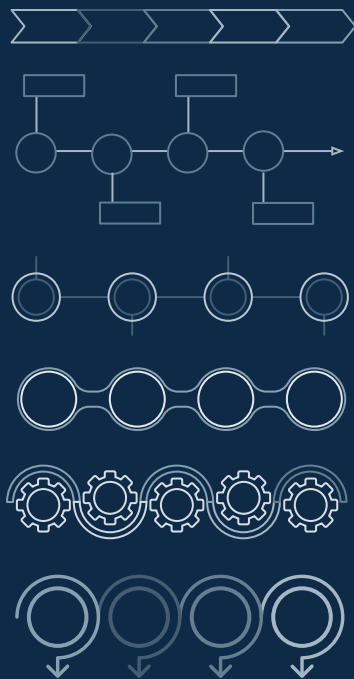
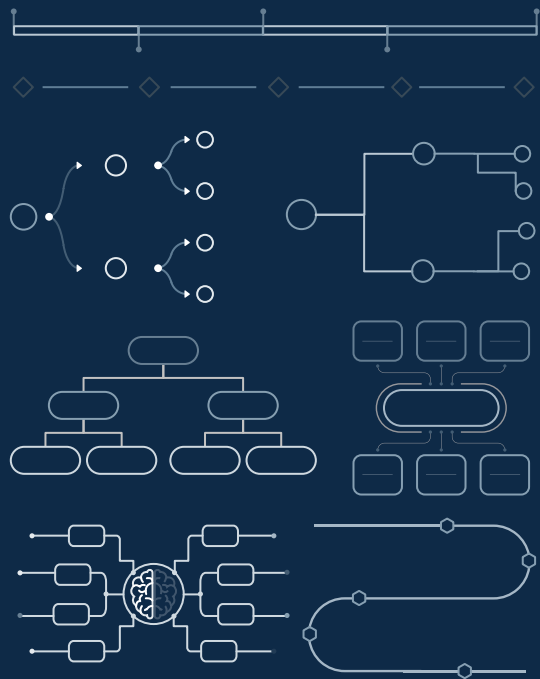
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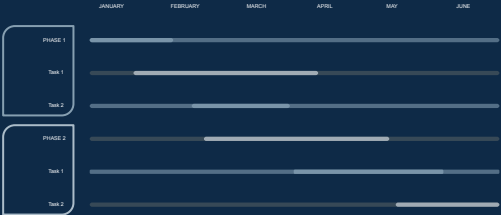
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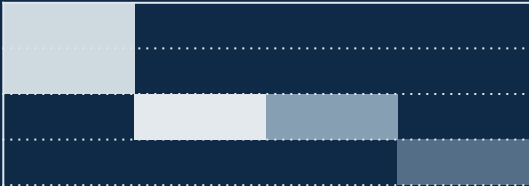
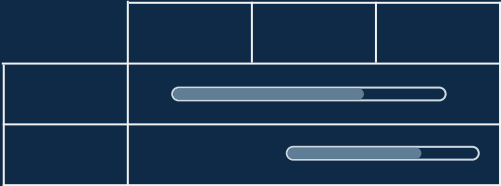


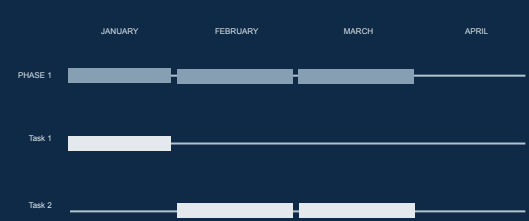




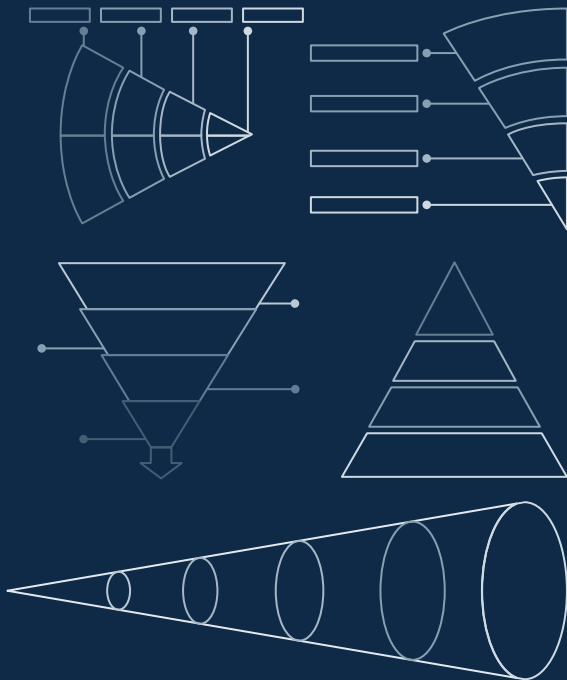
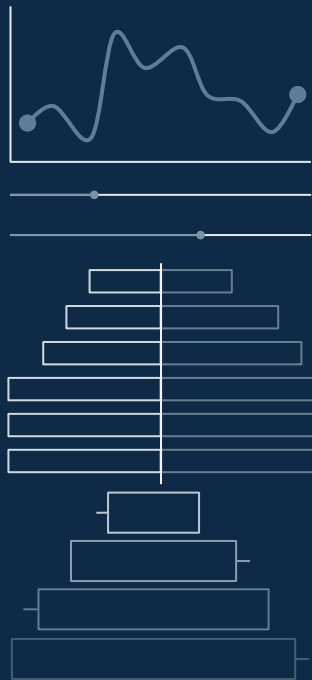
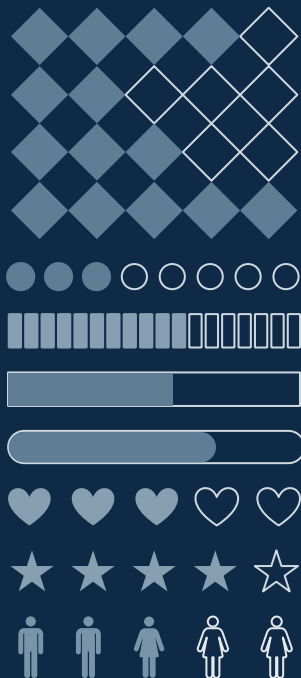
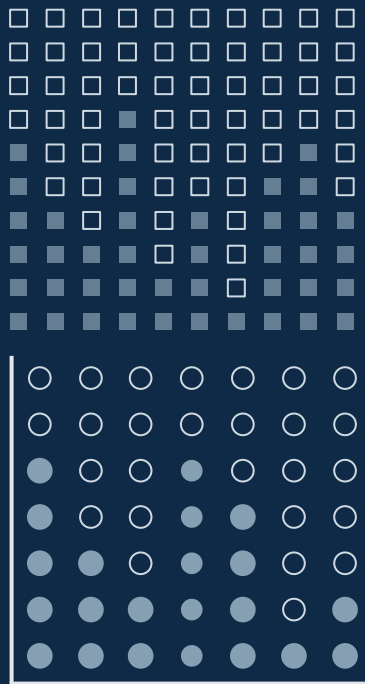






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In Google Slides, you can also use Flaticon's extension, allowing you to customize and add even more icons.





## Educational Icons



## Medical Icons



## Business Icons



## Teamwork Icons



## Help & Support Icons



## Avatar Icons



## Creative Process Icons



## Performing Arts Icons



## Nature Icons



# SEO & Marketing Icons



