



# **Analysis of Yogurt Park's Queuing System**



IEOR 174  
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# Objectives



## PURPOSE

Analyze and optimize Yogurt Park's queuing system to enhance efficiency and customer satisfaction.



## CHALLENGES

Long queues, inefficient service, and customer dissatisfaction during peak hours.

# Baseline Methodology



## DATA COLLECTION

Observations conducted on October 22, 2024, from 6–8 PM.



## QUANTITATIVE METRICS

Arrival rates, service times, and customer departures recorded in 30-minute intervals.



## RELEVANT FRAMEWORK

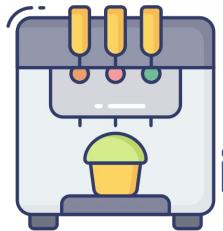
FIFO queuing system with time-dependent rates.

# Building the Simulation



## INPUTS

Time blocks,  
arrival/service rates,  
number of servers,  
number of machines.



## FEATURES

Modeling varying arrival  
rates, accounting for  
machine congestion,  
walking delays based on  
different scenarios



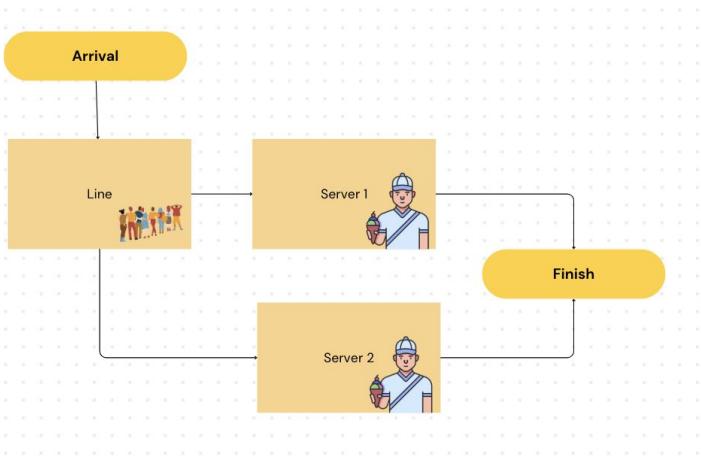
## OUTPUTS

Average/max wait times  
and server utilization,  
machine utilization for each  
time period.

## Simulation Results

# Model 1 Output

Baseline Model (Poisson Arrival, 2 Servers)



Averaged Simulation Results Across 50 Runs:

Index	block_start	block_end	num_customers	avg_wait_time	max_wait_time	\
0	6.0	6.5	20.38	1.063321	3.748829	
1	6.5	7.0	29.14	2.574037	7.075266	
2	7.0	7.5	24.64	1.757417	5.309918	
3	7.5	8.0	30.52	1.094453	3.699458	

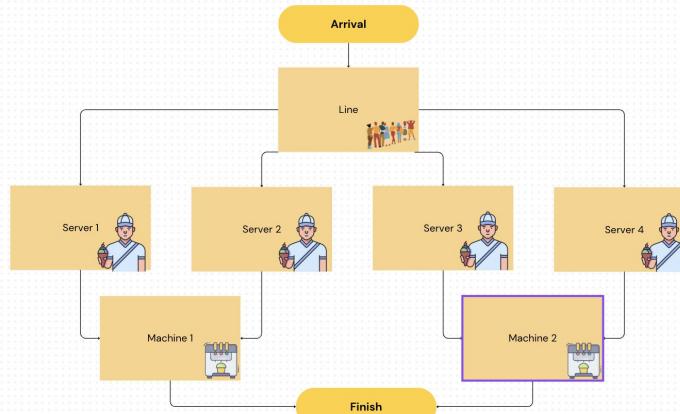
  

Index	server_utilization	machine_utilization
0	0.697584	0.697584
1	0.971002	0.971002
2	0.816113	0.816113
3	0.745622	0.745622

## Simulation Results

# Model 2 Output

Additional Servers Model (Poisson Arrival, 4 Servers total)



## Additional Variables in Model:

congestion\_delay\_mean =  
average congestion delay in minutes  
walking\_time\_mean =  
average walking delay in minutes

Averaged Simulation Results Across 50 Runs:

Index	block_start	block_end	num_customers	avg_wait_time	max_wait_time	\
0	6.0	6.5	19.38	1.597439	4.597288	
1	6.5	7.0	28.70	3.515608	8.948054	
2	7.0	7.5	26.28	3.243975	7.757472	
3	7.5	8.0	30.84	2.470684	6.252610	

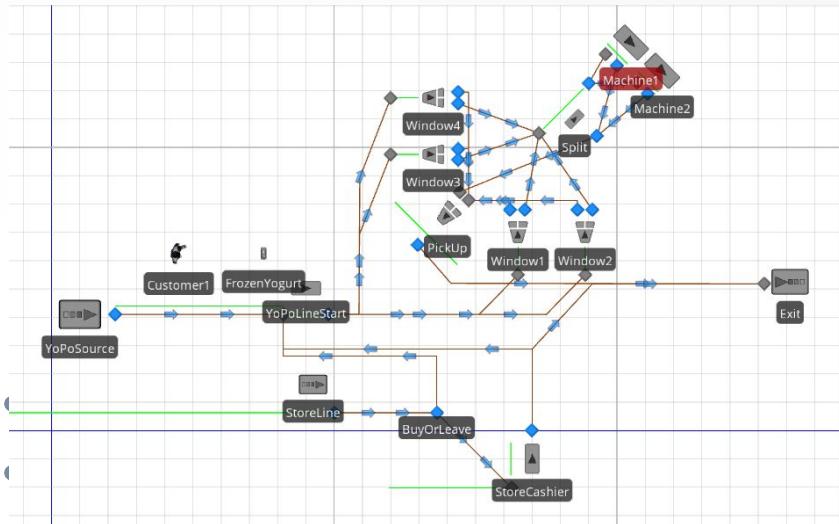
server\_utilization machine\_utilization

Index	server_utilization	machine_utilization
0	0.314645	0.629289
1	0.495685	0.991369
2	0.449077	0.898155
3	0.394069	0.788139

## Simulation Results

# Model 3 Output

2 Stores Model



## Additional Variables in Model:

- Additional Source for people who enter the gift shop
- Transfer node to split people who make a purchase and those who don't
- One cashier to manage purchases made at the gift shop

Sink	Exit	[DestroyedEntities]	FlowTime	TimeInSystem	Average (Min...)
					2.5622
					Maximum (Min...)
					10.0240
					Minimum (Min...)
					0.3269
					Observations
					215.0000

# Key Insights

## BOTTLENECKS

Significant strain during peak times.

## OPERATIONAL IMPROVEMENTS

Adjust staffing schedules to balance workloads.

## UNDERUTILIZED RESOURCES

Servers idle during non-peak hours.



# What We Learned



## CHALLENGES

Data collection, parameter tuning, and balancing model realism with complexity.



## LESSONS

Importance of precise data and iterative model refinement.

# Recommendations



## ADDITIONAL SERVERS

Add servers or increase service rates during peak hours.



## DYNAMIC STAFFING

Implement dynamic staffing to match demand.



## ALTERNATIVE MECHANISMS

Explore alternative queuing mechanisms, such as multi-server queues.

# Next Steps and Conclusion

Collect data over multiple days for more comprehensive analysis.

Integrate real-time analytics to optimize staffing dynamically.

Demonstrates practical applications of queuing theory.

## FINAL THOUGHTS

- Optimizing queuing systems enhances operational efficiency and customer satisfaction.
- Real-world applications of simulation modeling underscore its importance.



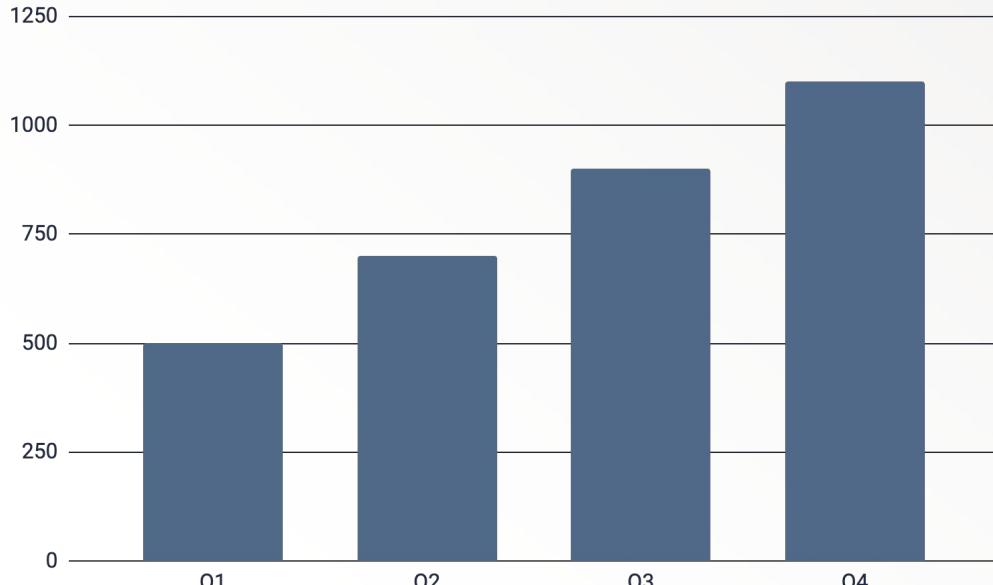
# THANKS!



# 10 MILLION

First-year revenue of the project

# PROJECT DATA



## BENEFITS OF USING GRAPHS

Graphs in project proposals offer visual organization, enabling clear presentation of information in a structured format. They enhance the visual appeal, facilitate data comparison and improve overall clarity and professionalism of your project proposal

Follow the link in the graph to modify its data and then paste the new one here. [For more info, click here](#)



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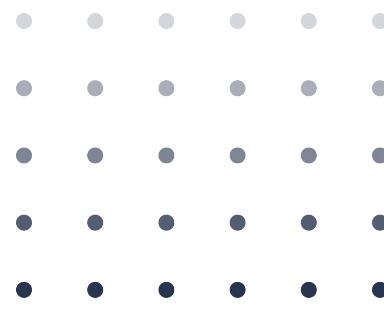
COMMUNICATION  
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CONCLUSION



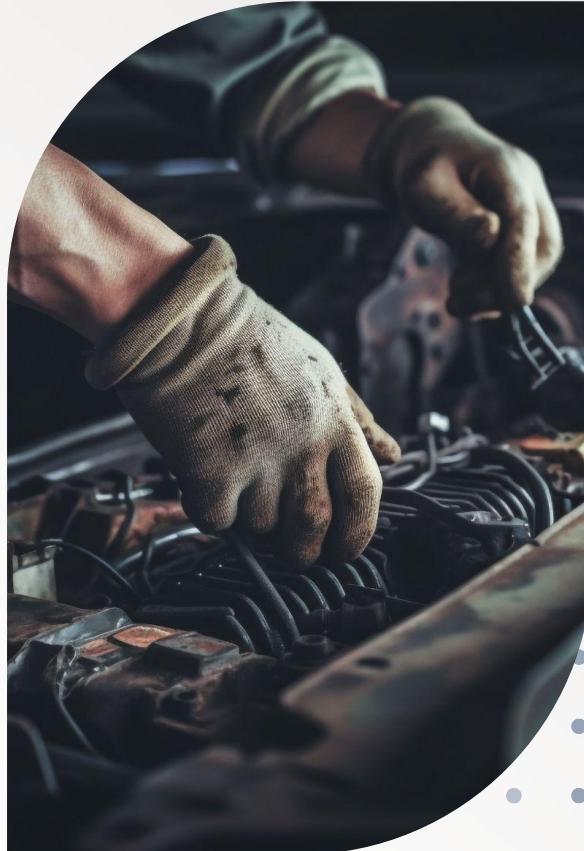
# PROJECT ACTIVITIES

Activity	Start Date	End Date	Resource	Cost	Revenue
Market Research	1/1/20XX	1/15/20XX	Market research firm	\$20,000	
Product Development	1/16/20XX	6/30/20XX	R&D team	\$200,000	
Beta Testing	7/1/20XX	8/15/20XX	Beta testers	\$10,000	
Marketing Campaign	1/1/20XX	1/15/20XX	Advertising agency	\$100,000	
Product Launch	1/16/20XX	6/30/20XX	Sales team	\$50,000	\$500,000
Post-Launch Support	7/1/20XX	8/15/20XX	Support team	\$50,000	\$800,000

# HOW TO CREATE A PROJECT PROPOSAL

Creating a project proposal can be done in five steps:

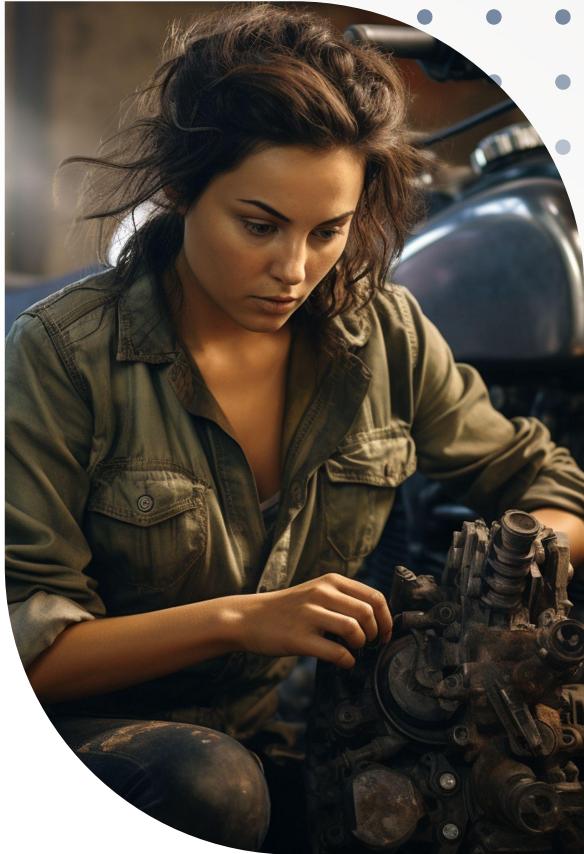
1. Define the project objectives and timeline
2. Identify resources needed to complete the project
3. Develop a budget for the project and estimate any potential risks associated with it
4. Write down your proposed solution and provide supporting documents or evidence that prove its feasibility if necessary
5. Develop a communication plan to ensure key stakeholders are kept informed of progress throughout the entire process





# WHAT TO SHOW IN A MOCKUP

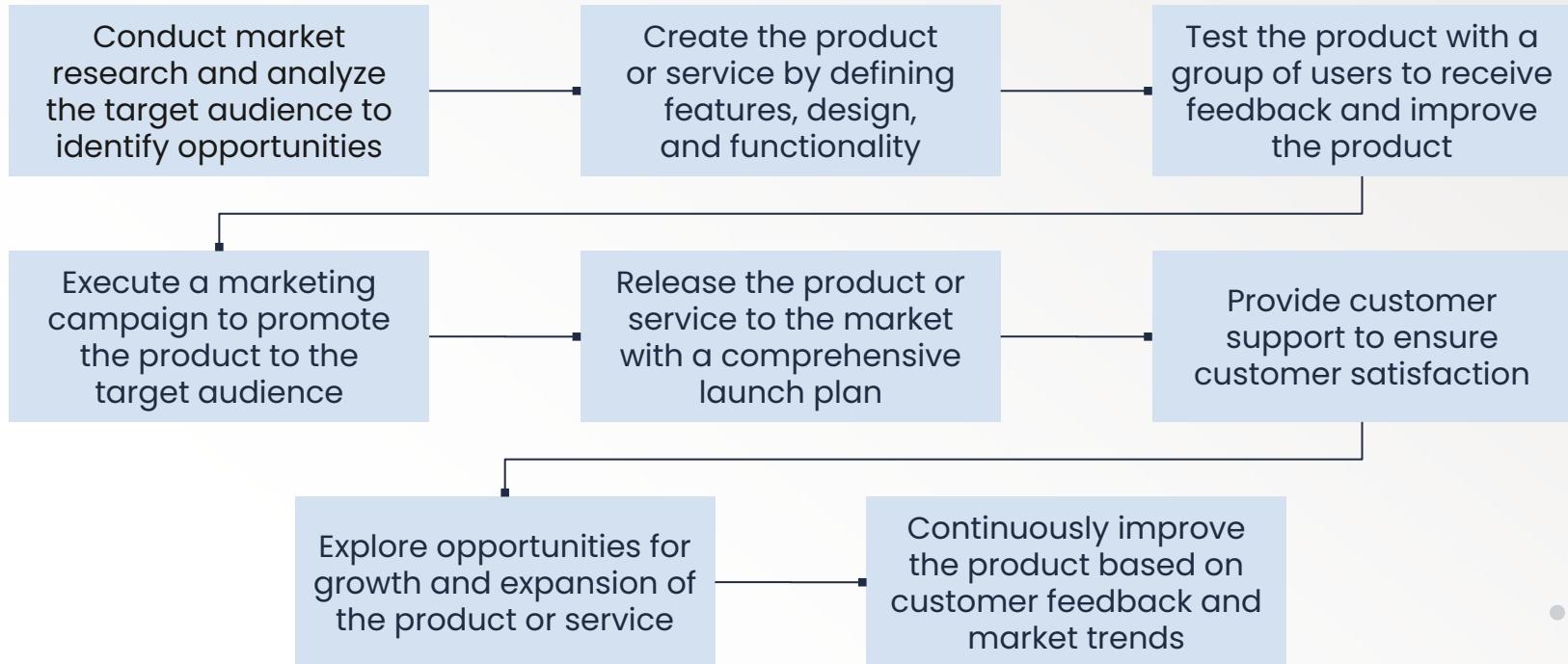
1. Product/website description: A brief overview of the product/website, including its key features, dimensions, and materials used
2. Features and benefits: A detailed explanation of the product's/website's features and how they will benefit the user
3. Technical specifications: A list of the product's/website's technical specifications, such as dimensions, weight, power requirements, connectivity options and hosting platform



01

# OBJECTIVES OF THE PROJECT

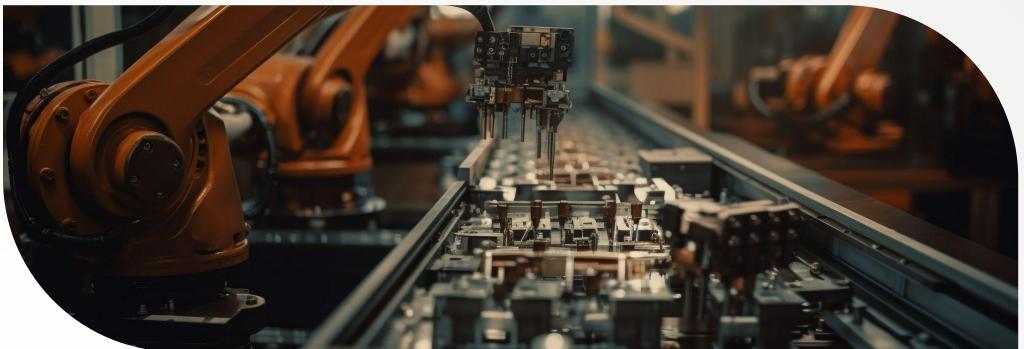
# PROJECT TIMELINE



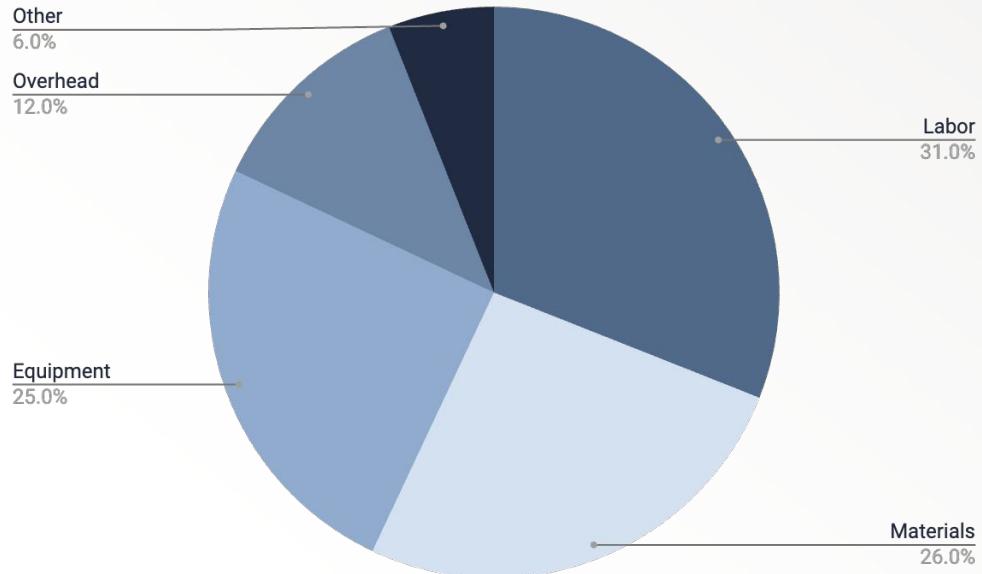
# PROJECT ROADMAP

# PHOTO SHOWCASE

A photo showcase can be a useful addition to a business project proposal as it can help to visually communicate the concept or idea being proposed



# PROJECT EXPENSES



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# KPI DASHBOARD

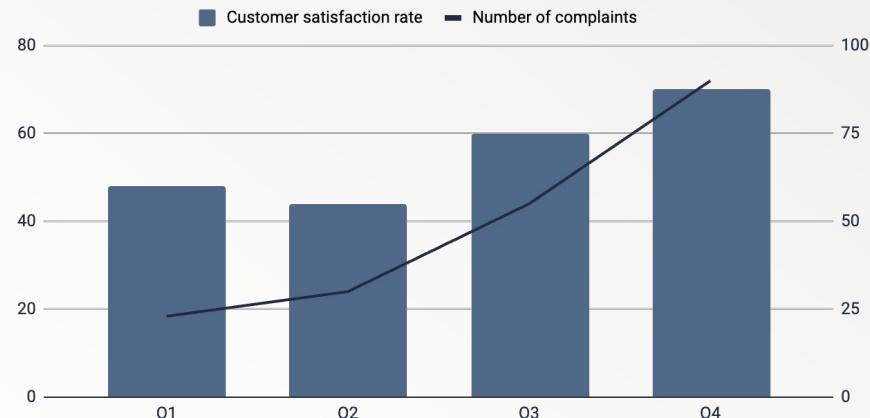
RESOURCE	UTILIZATION RATE	COST PER UNIT
Labor	85%	\$50
Equipment	70%	\$100
Materials	95%	\$20
Rent	90%	\$1,000
Energy	80%	\$80
Software licenses	80%	\$200
Advertising	60%	\$500

120 U/DAY

Output per worker

2H

Time to complete a task



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# ICON PACK

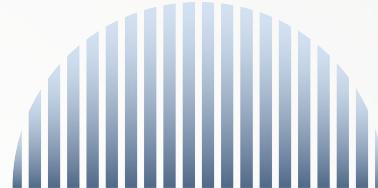


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## Vectors:

- [Gradient modern business card](#)





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- [Gradient modern business card](#)

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## **Icons:**

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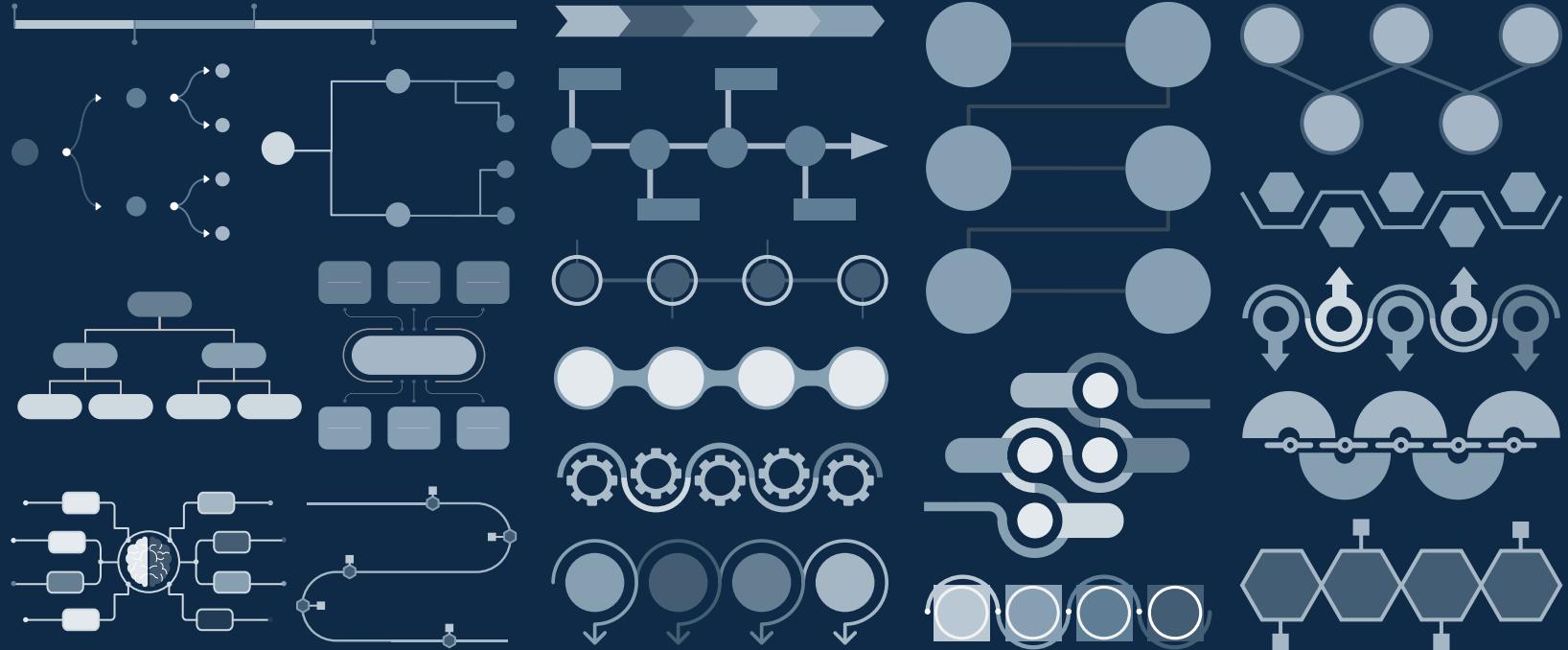
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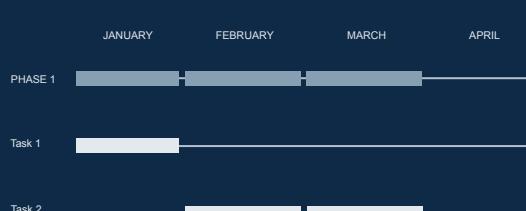
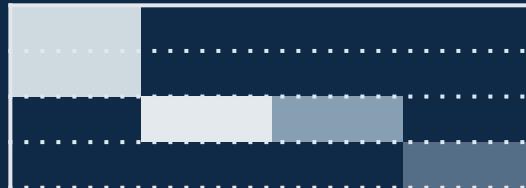
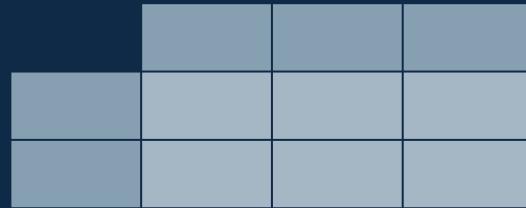
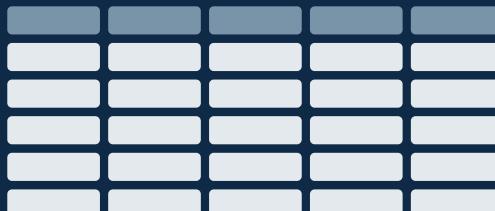
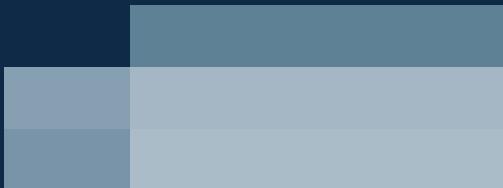
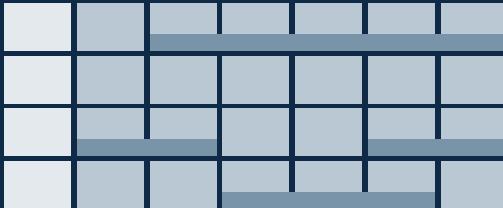
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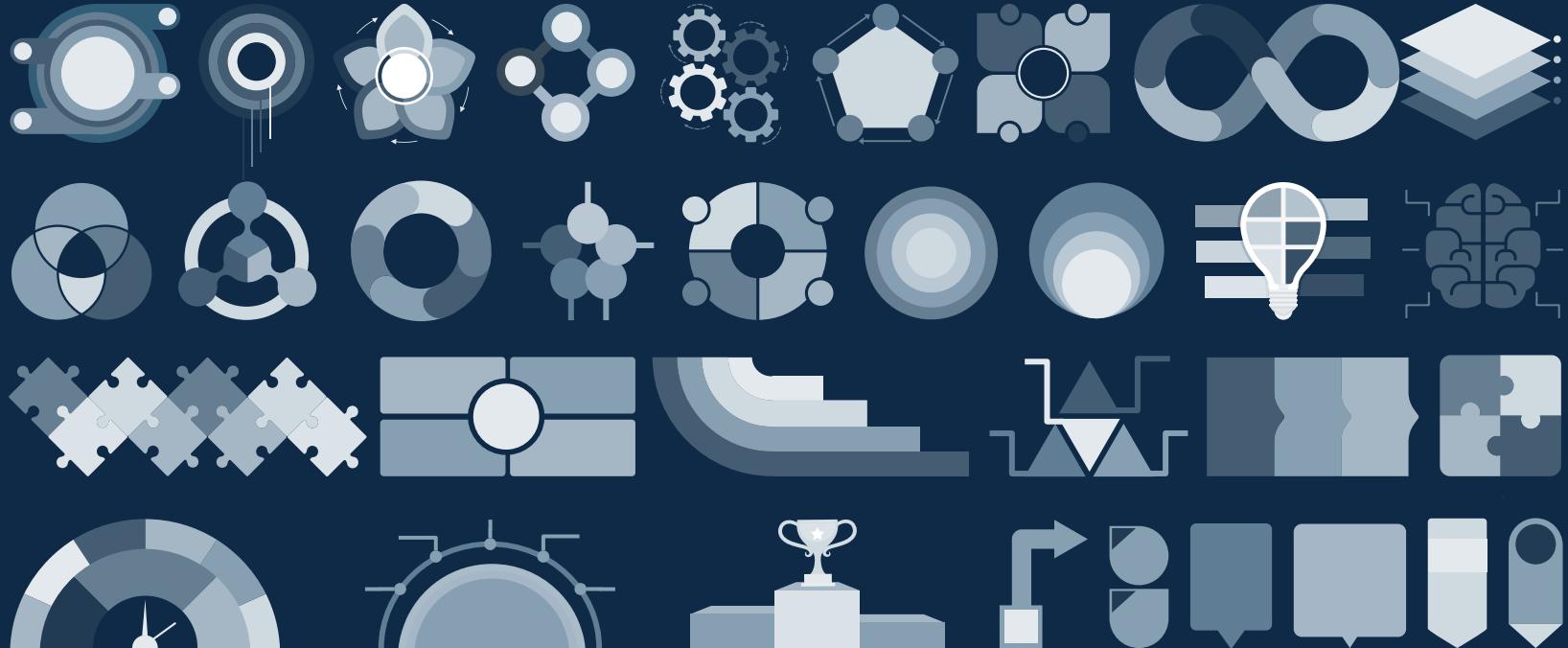
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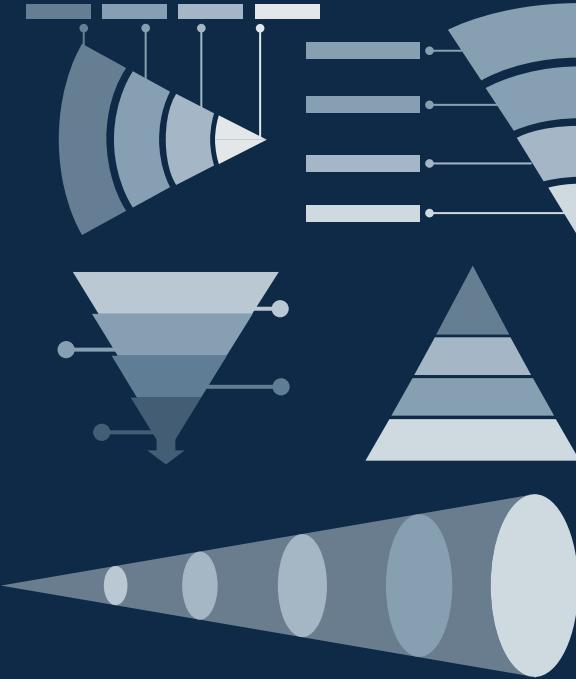
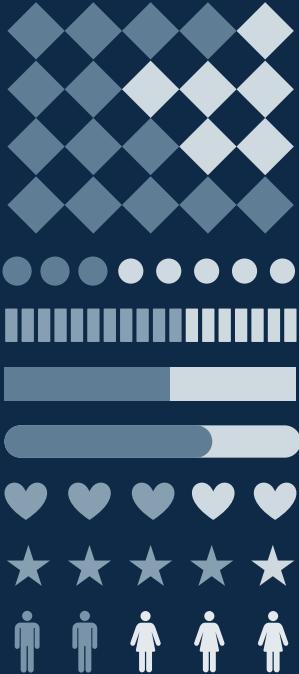
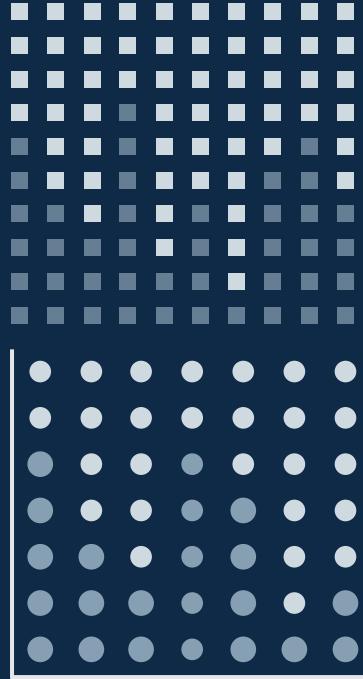












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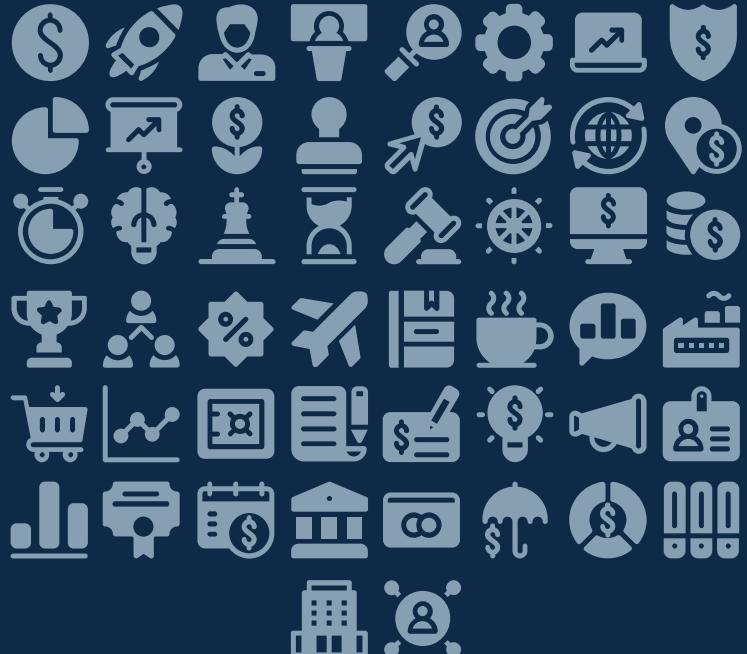
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## Medical Icons



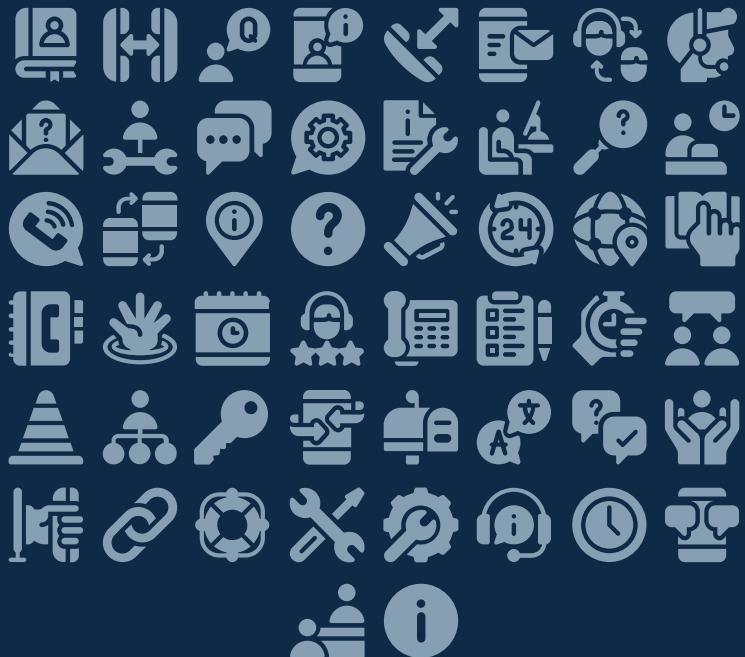
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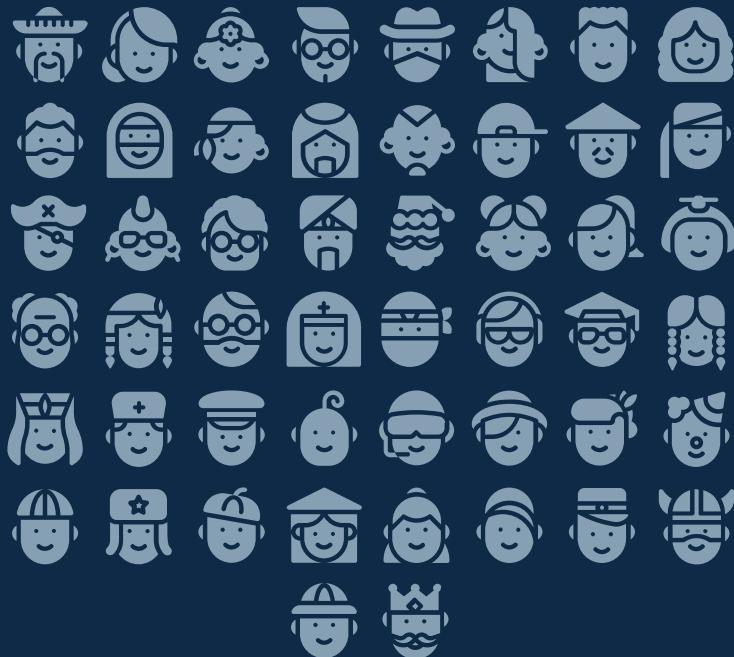
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