

Network Analysis of P2P Bus Routes in Metro Manila

BONGS Urban Planners

Bono, Neil, Gerard, Selin, Franz





We are a **world-class** Urban Planning Collective of talented **Data Scientists** that leverage Data Science tools in partnership with **Transpo coalition** to identify opportunities to **improve** Metro Manila's **transportation system**.



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Why are
we here?

O2

What can
we do?

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How can
we do it?

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What
happens
after?

The current situation





11M

Commuting Population in NCR

What is P2P?

Premium P2P bus service is an initiative by the **Department of Transportation (DOTr)** to offer **commuters** another **reliable and safe** mode of **transport** and help **reduce the traffic volume** in **Metro Manila** and beyond.



Why focus on P2P?



It is a government initiative to promote public transportation



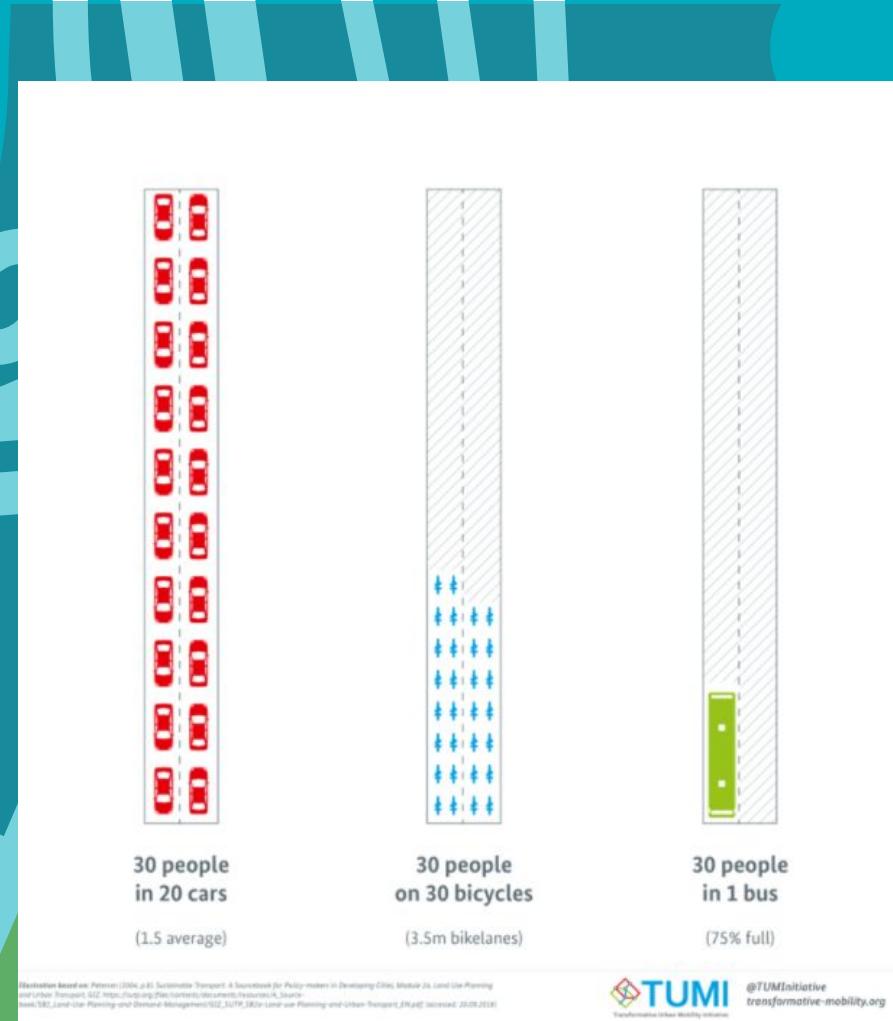
Buses offer better road utilization than other means of transport



P2P Buses promotes Sustainable transport



P2P is way to attract private vehicle owners to shift to sustainable commuting



**How can we help public
commuters improve their
commuting experience by
improving the P2P routes?**

Methodology

Data Collection

Get the P2P routes



Centrality

Use centrality measures to evaluate the best routes to include in the P2P network

Feature Engineering

For this study, check only Metro Manila routes



Compute shortest distances

Compute the shortest distance of the routes using osmnx

Visualization

Draw the network using Networkx



Recommendation

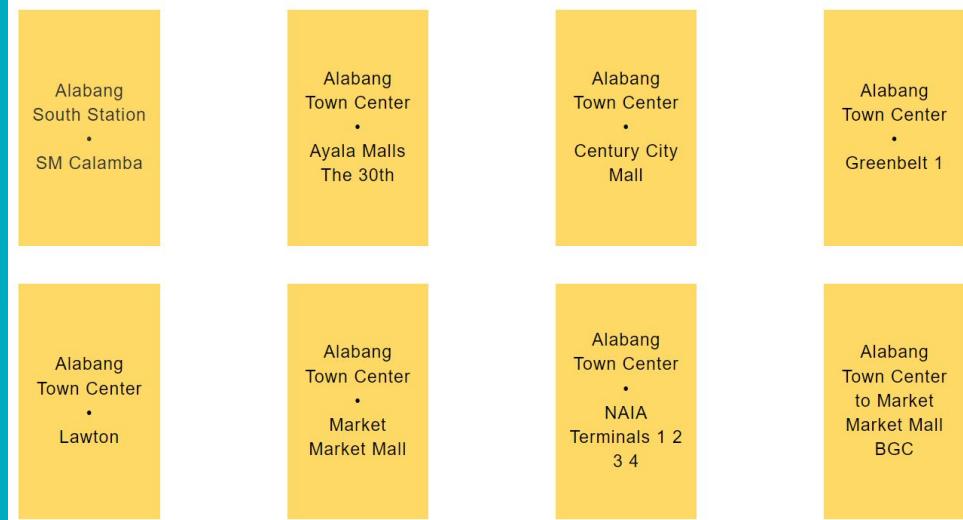
Recommend adding several routes to the existing P2P network

About the Data

P2P Routes

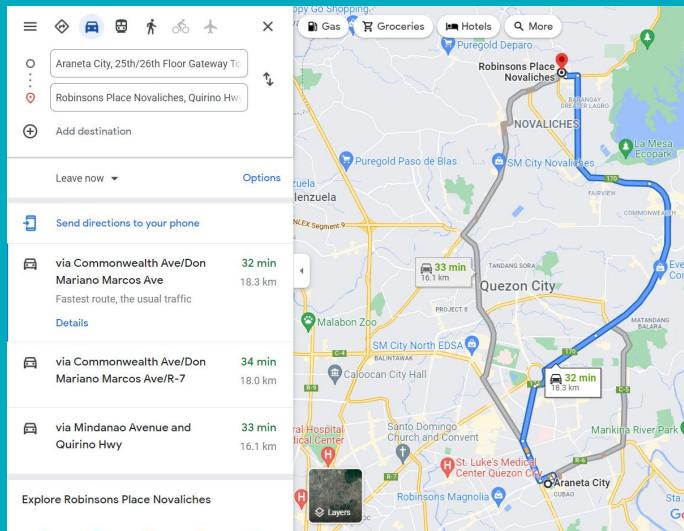
Via the official P2P website

[P2P Bus Schedule - Premium Point to Point Bus Schedule](#)



Distances

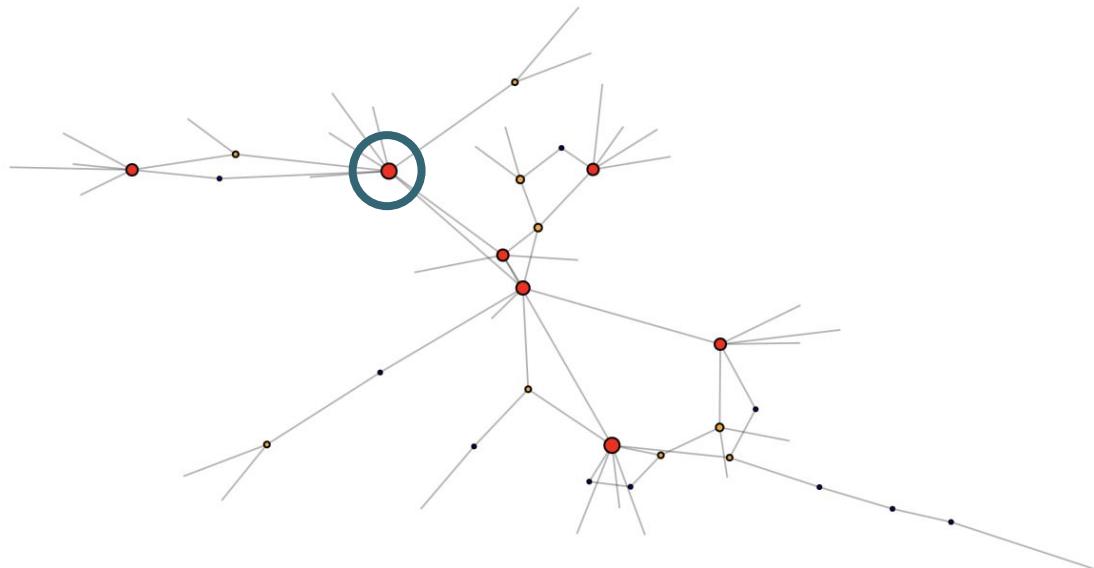
Via Google Maps



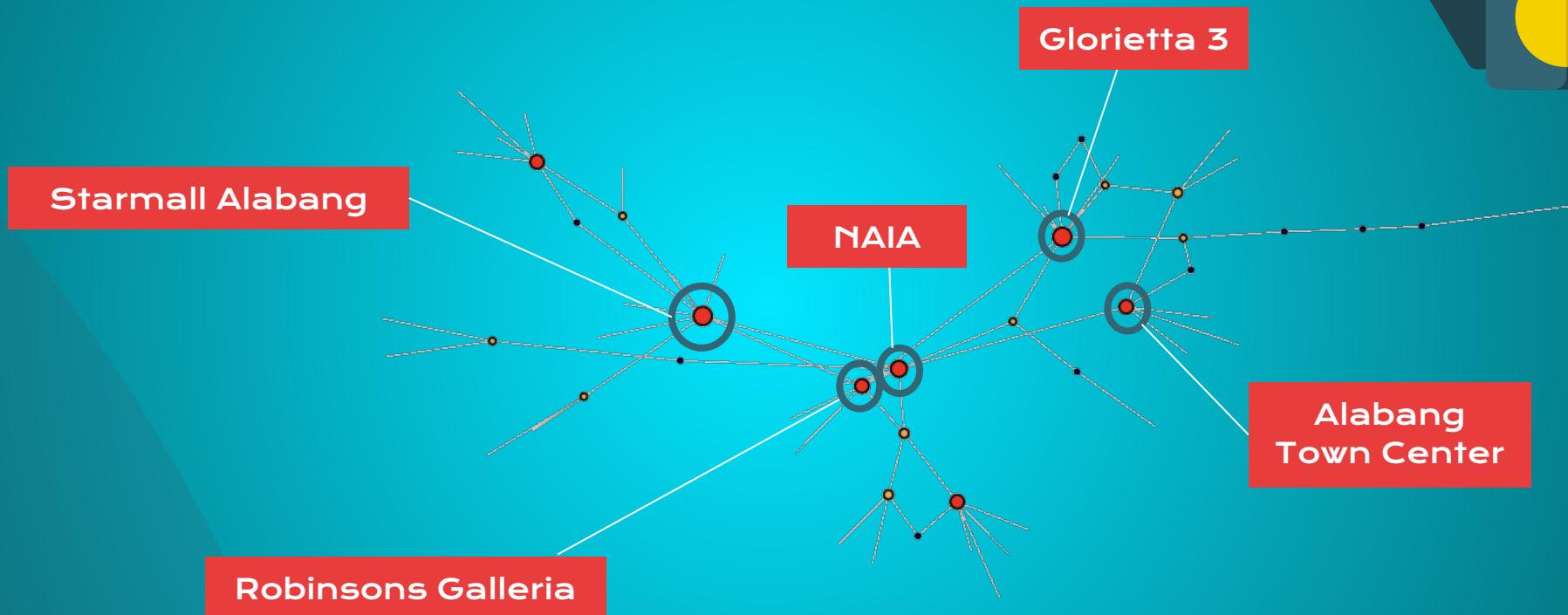
Current P2P Bus Routes

Starmall Alabang

9 connections



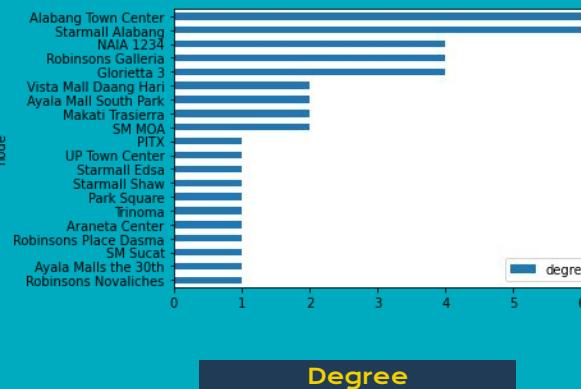
Current P2P Bus Routes



Exploratory Data Analysis Results

Most connections (Degrees)

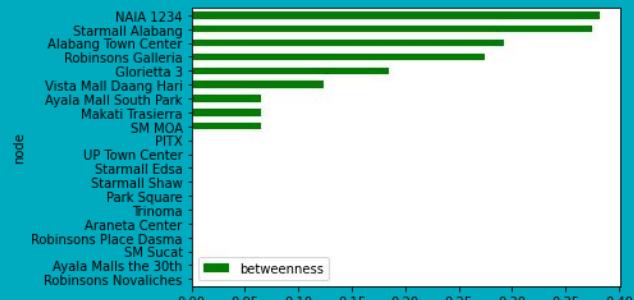
StarMall Alabang
Alabang Town Center
NAIA



Shows how many connections a terminal has. Higher value means the terminal is more central.

Highest Betweenness

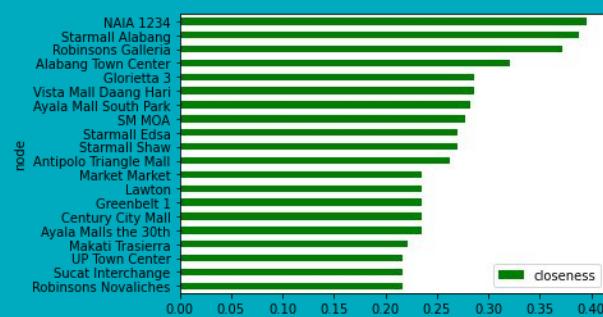
NAIA
StarMall Alabang
Alabang Town Center



Measures the contribution of a terminal as a bridge or interchange hub to other terminals.

Closeness

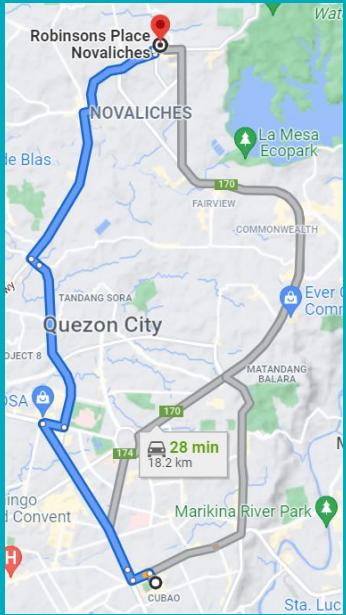
NAIA
Starmall Alabang
Robinsons Galleria



Measures how close the a terminal is to all other terminals. Higher closeness have the shortest distance to all other terminals

New Routes

Araneta Center to
Robinsons Novaliches



Araneta Center

Betweenness

0.000 → 0.017

From To

Closeness

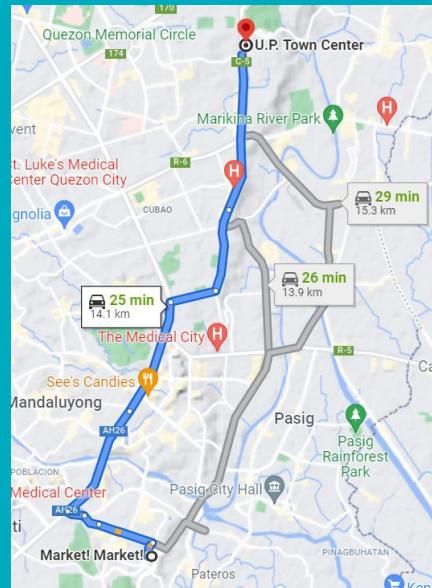
0.212 → 0.242

From To

Original route:

Araneta > Annapolis >
Ortigas > Shaw > Boni >
Guadalupe > Buendia >
Ayala > Glorietta 3 >
Novaliches

Market! Market! to
UP Town Center



Market! Market!

Betweenness

0.000 → 0.043

From To

Closeness

0.236 → 0.274

From To

Original route:

Market! Market! > Alabang
Town Center > NAIA >
Robinsons Galleria >
Glorietta 3 > UP Town Center

Routes of the New Routes using Shortest Distance



Next Steps

1

FARE

Incorporate fare as a measure for optimizing the network and consider cost impact of adding new routes

2

MORE NETWORKS

Add more modes of transport to the analysis such as Jeeps, Trains, etc.

3

PEAK HOURS

Incorporate the time of day in the analysis

P2Para Sa Bayan!



Thanks!

Sign our petition here:
bit.ly/p2para_sa_bayan

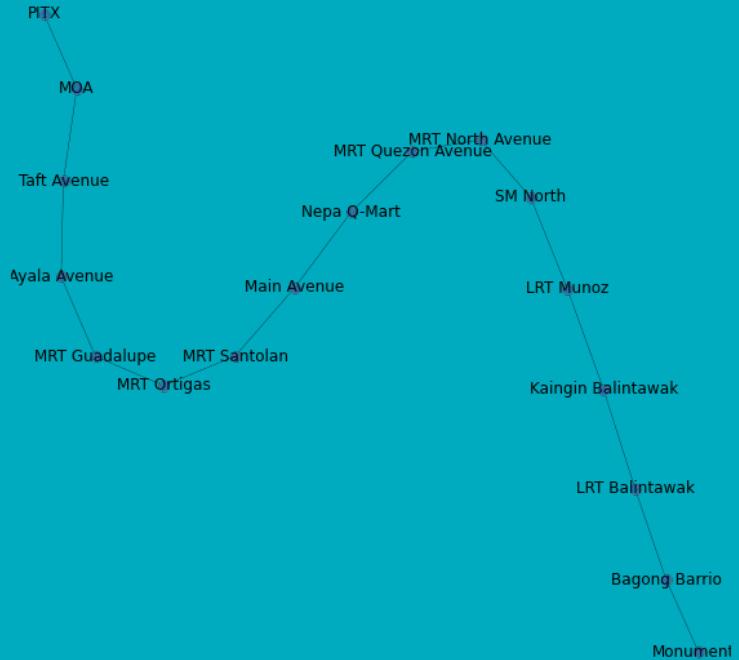
bongs-urbanplanners.com

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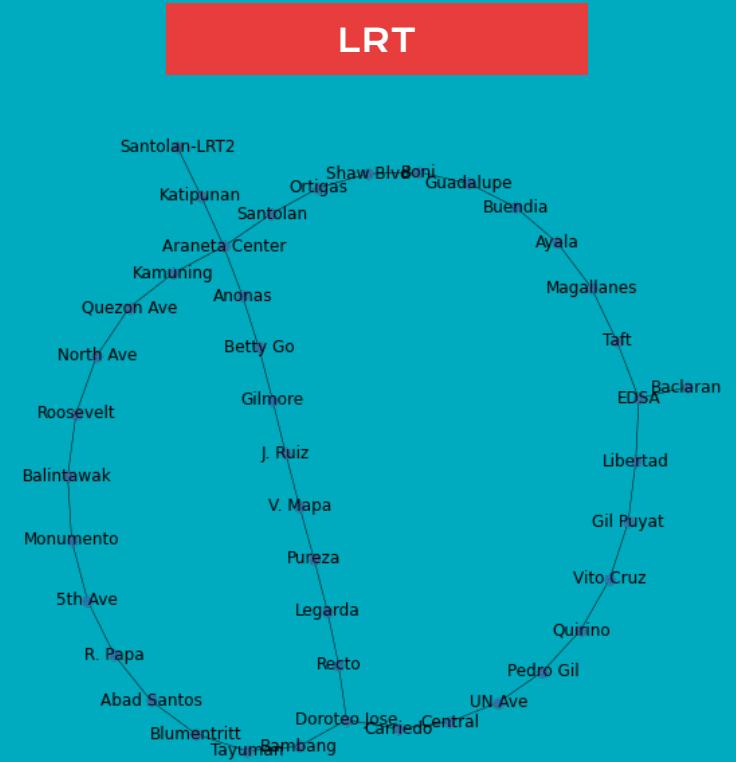


Locations

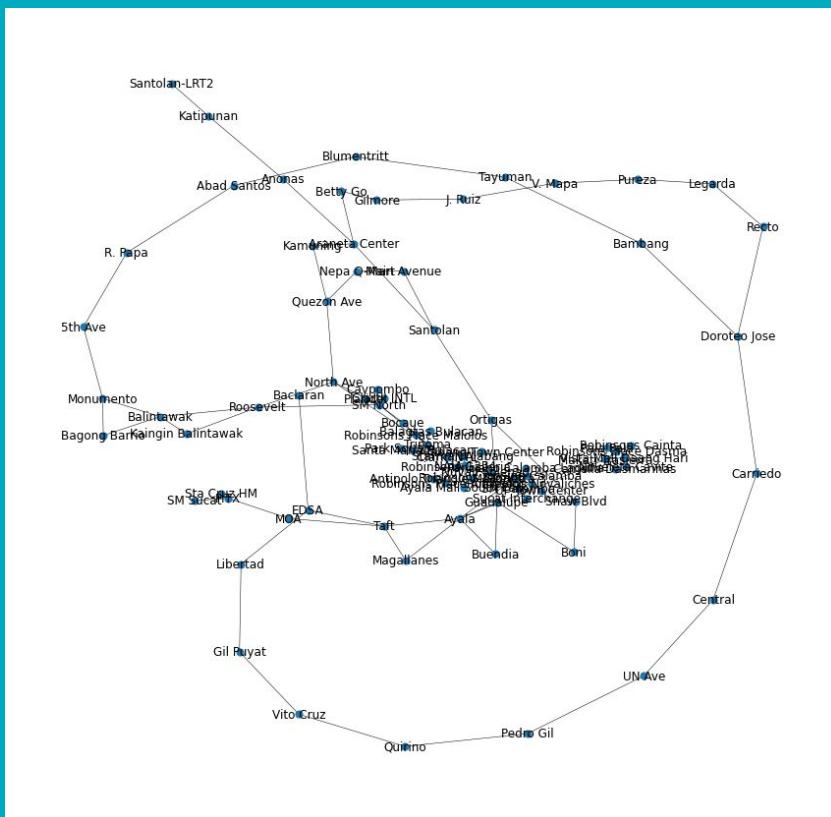
EDSA Carousel



Locations



Merged Network



Route Recommendations

1

2

3

X to Y

Centrality measure of _

X to Y

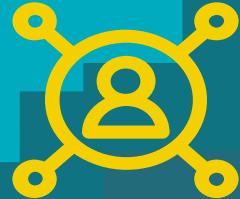
Centrality measure of _

X to Y

Centrality measure of _



Recommendations



Add node

Add nodes somewhere



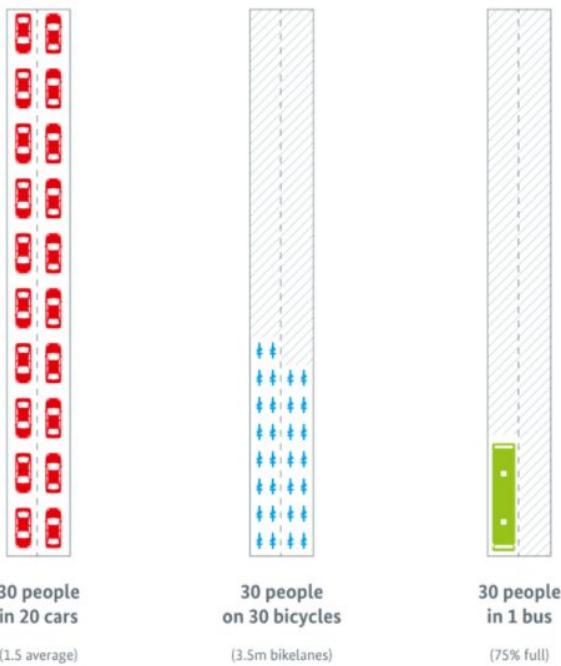
Examine weak edges

Maximize weak ties

Evaluation



Random images for use



Our Strengths

LOYALTY

Neptune is the farthest planet from the Sun



RELIABILITY

Mercury is the closest planet to the Sun



EFFICIENCY

Despite being red, Mars is actually a cold place



COMMITMENT

Jupiter is the biggest planet in the Solar System



Customer Profile

GENDER



AGE



To modify this graph, click on it, follow the link, change the data and paste the new graph here

CLASS -A-



CLASS -B-





85,320

NEW DRIVERS EVERY YEAR

Our Growth



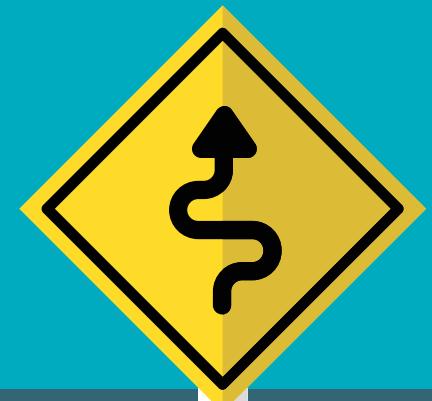
To modify this graph, click on it, follow the link, change the data and paste the resulting graph here

20,000

Expected income
for 2021

100

New employees
next year



A photograph of a young man with dark hair and a beard, wearing a denim vest over a white shirt, fastening his seatbelt in the driver's seat of a car. The background shows the interior of the car and some blurred buildings through the window.

A Picture Is
Worth a
Thousand
Words

Customer Testimonials



JOHN PATTERSON
XX.XXXX.XXX

"Despite being red, Mars is a cold place. The planet is full of iron oxide dust."

XX DRIVER LICENSE XX

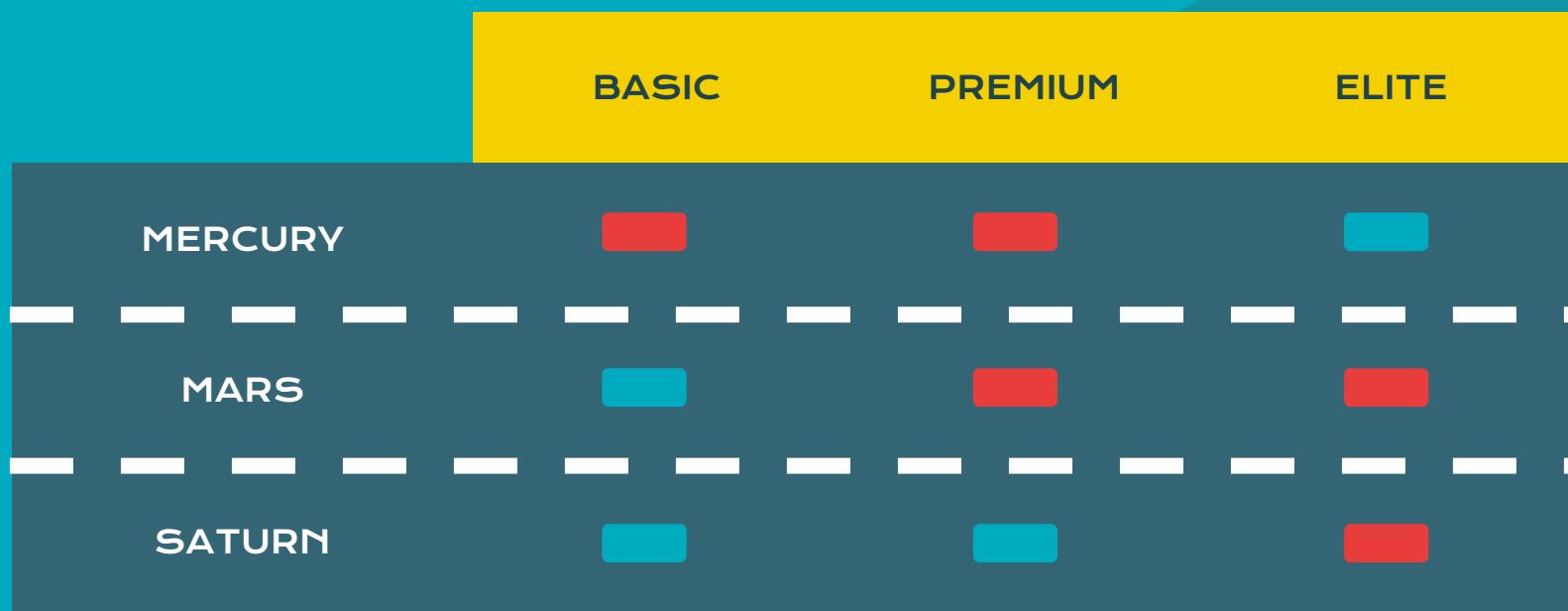


HELENA JAMES
XX.XXXX.XXX

"Mercury is the closest planet to the Sun and the smallest one in the Solar System."

XX DRIVER LICENSE XX

Our Fleet



Our Team

JENNA DOE

Despite being red, Mars
is a cold place full of
iron oxide dust

JOHN JAMES

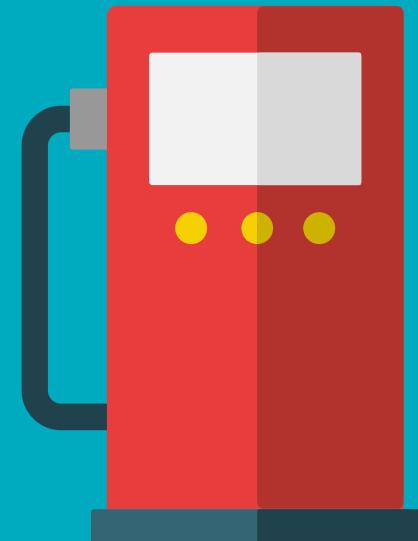
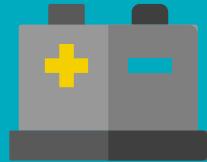
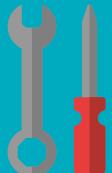
Jupiter is a gas giant
and the biggest planet
in the Solar System

JANE PATTERSON

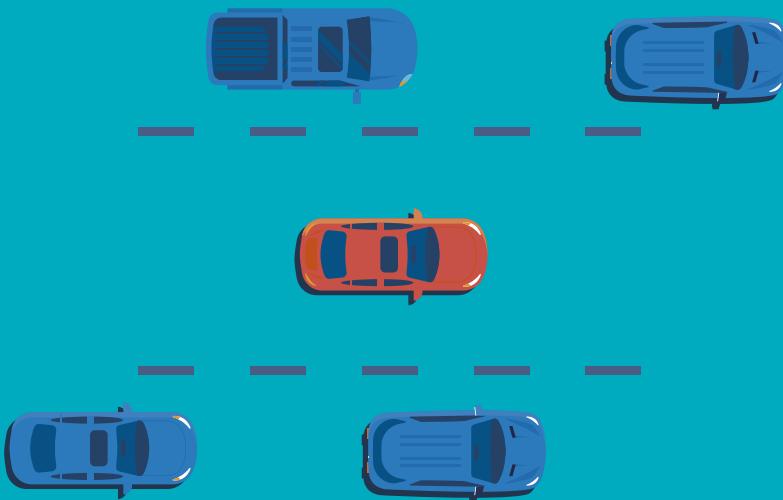
Mercury is the closest
planet to the Sun and
the smallest one

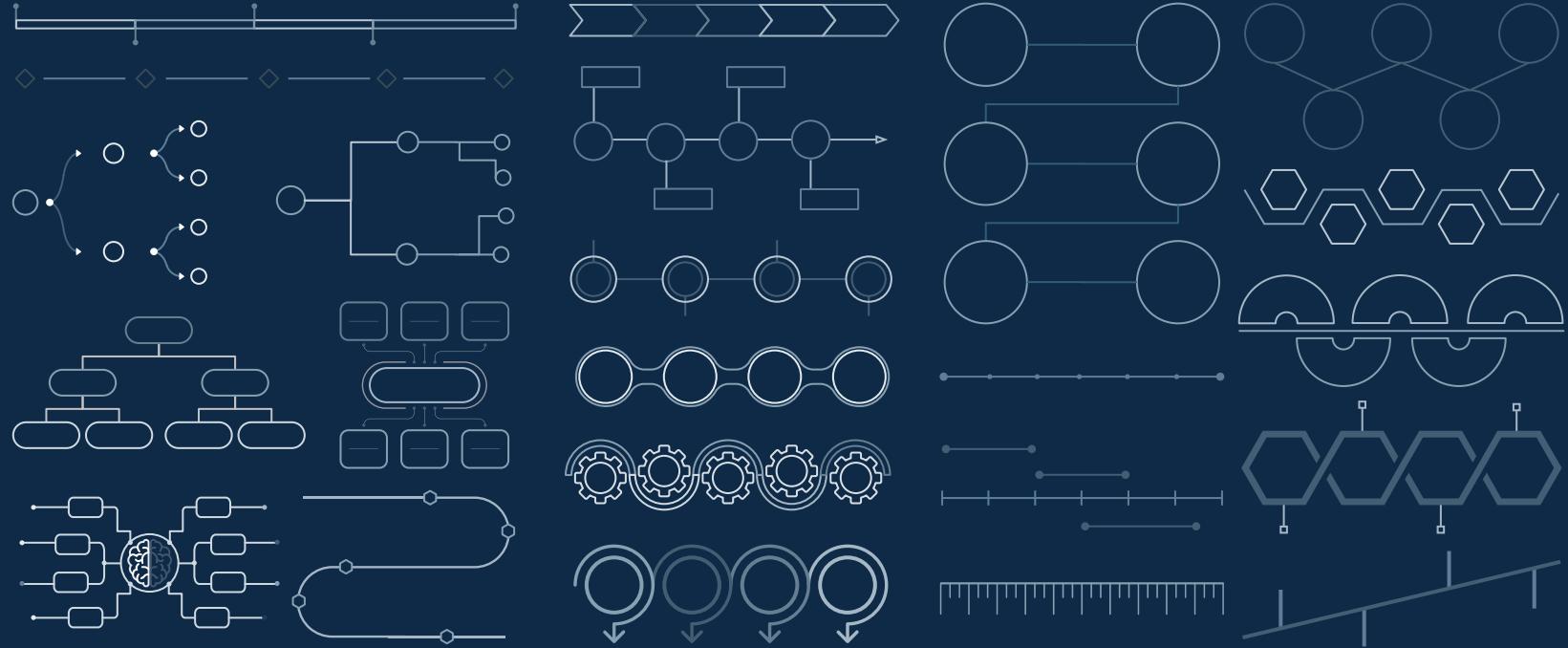


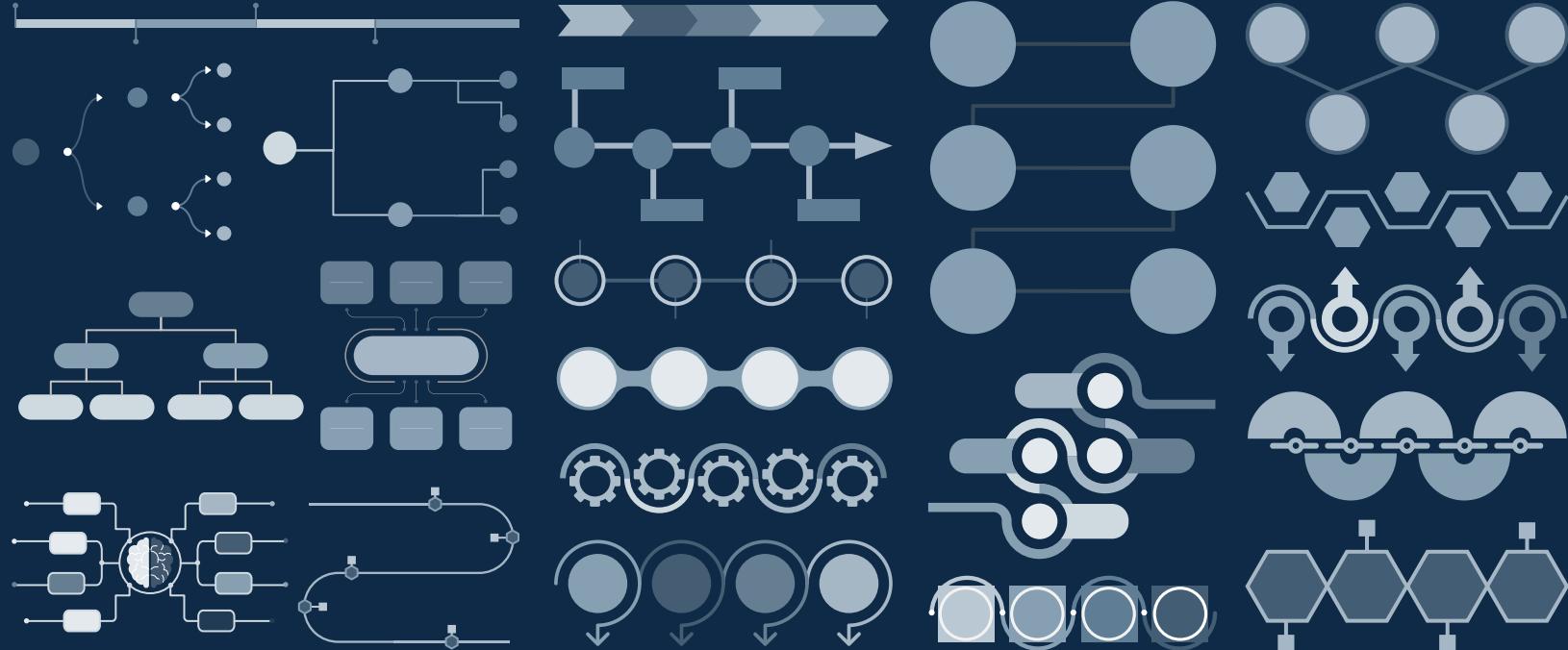
Alternative Resources

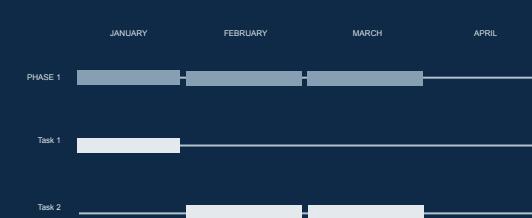
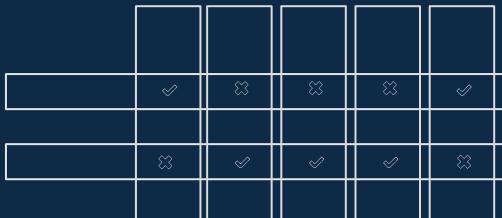
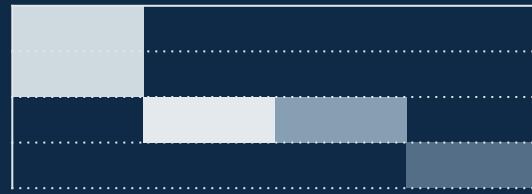
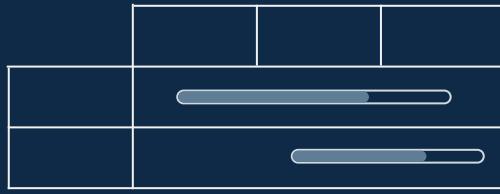
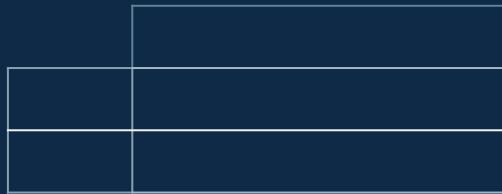
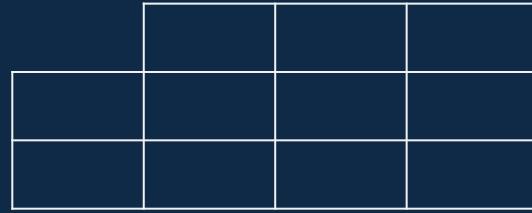
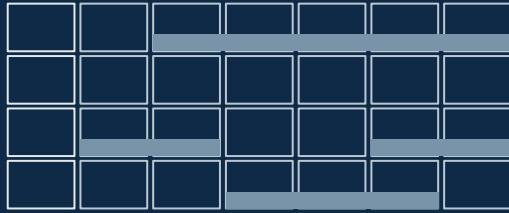


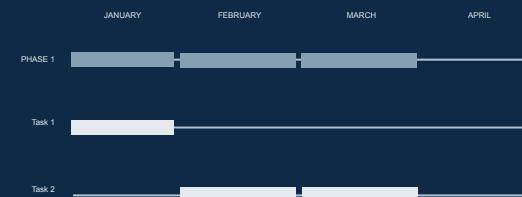
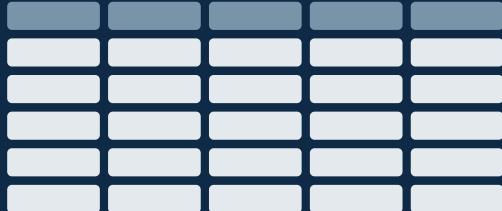
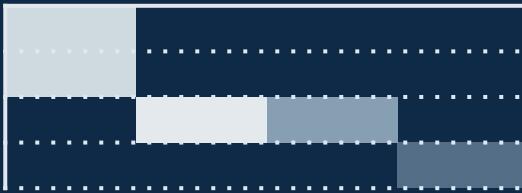
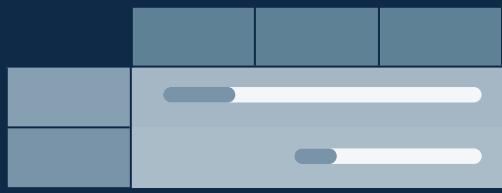
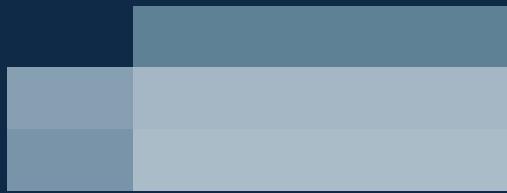
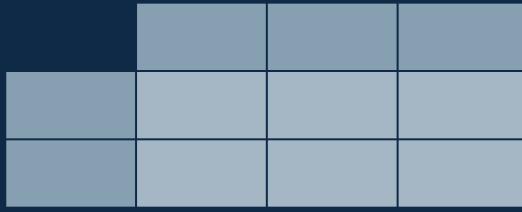
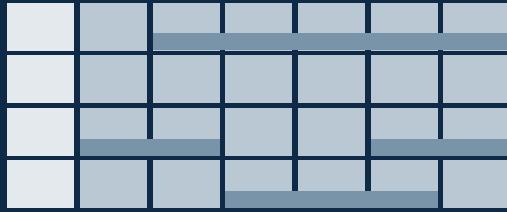
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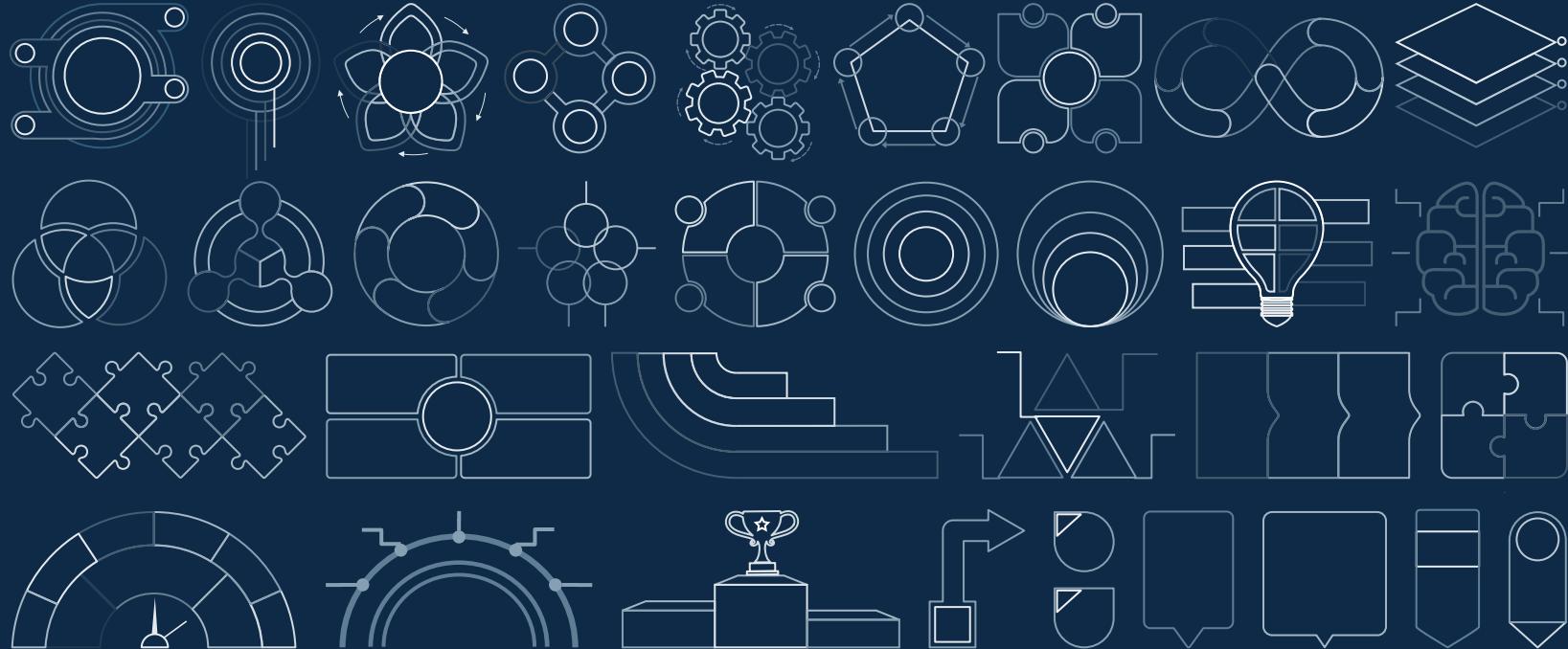


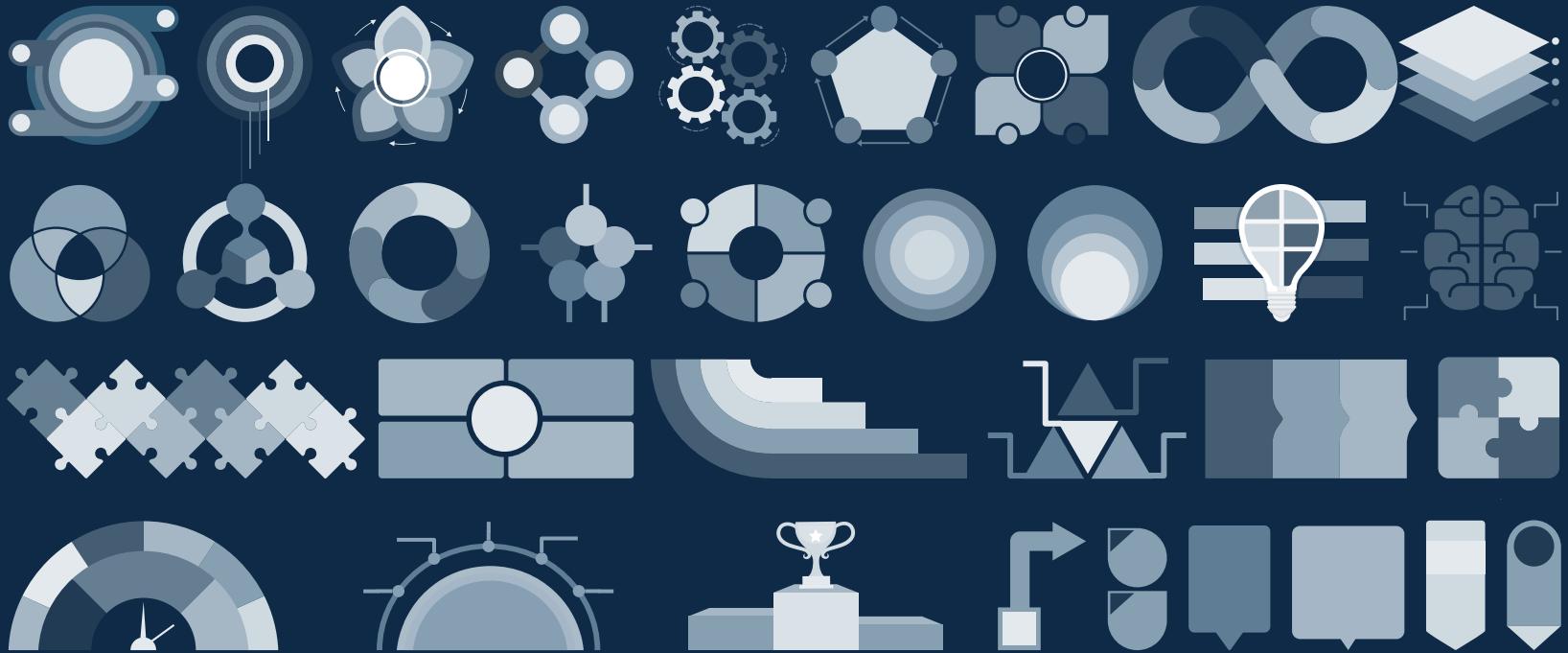


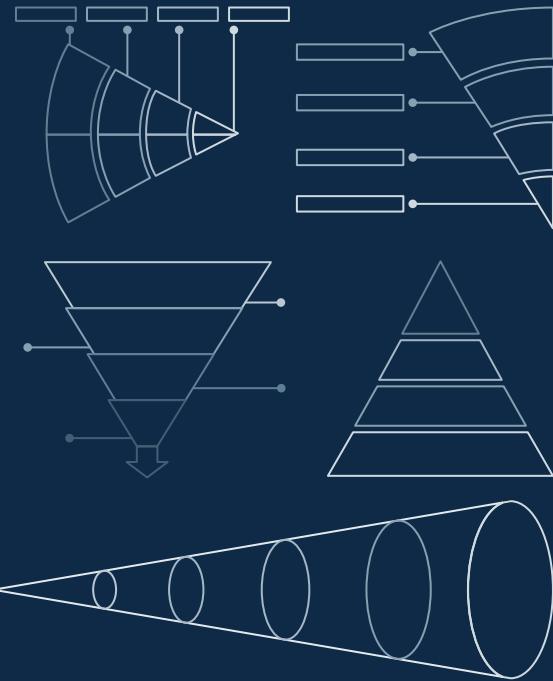
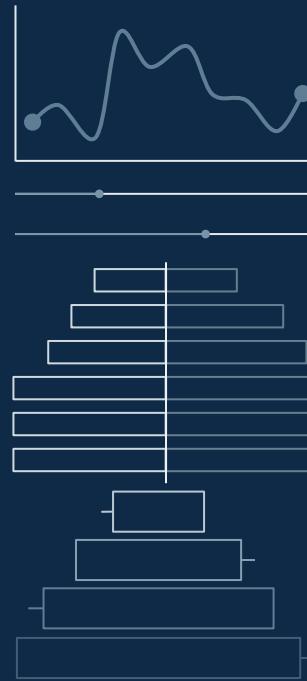
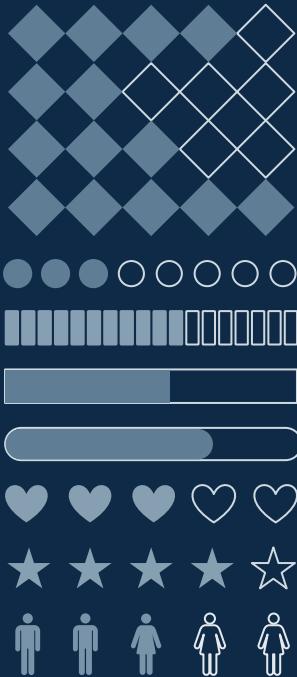
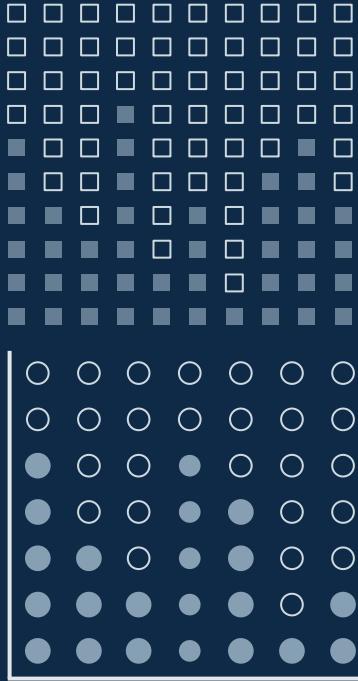


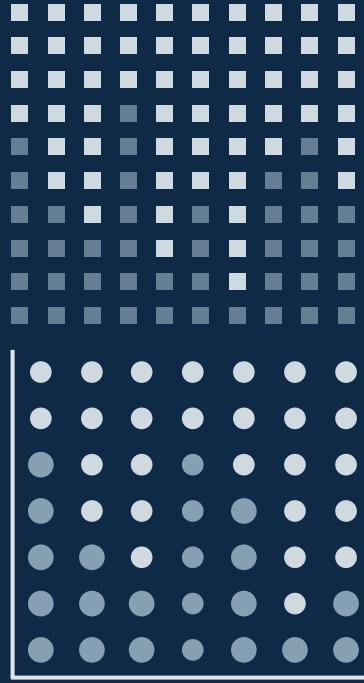












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Avatar Icons



Creative Process Icons



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Creative Process Icons



Performing Arts Icons



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