



Evaluating Coronavirus Effect of on 2020 Stock Returns

Through Metrics, Ratios,
and Classification

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MSBA '21

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01

Introduction

Business Objectives
Data



Business Objective

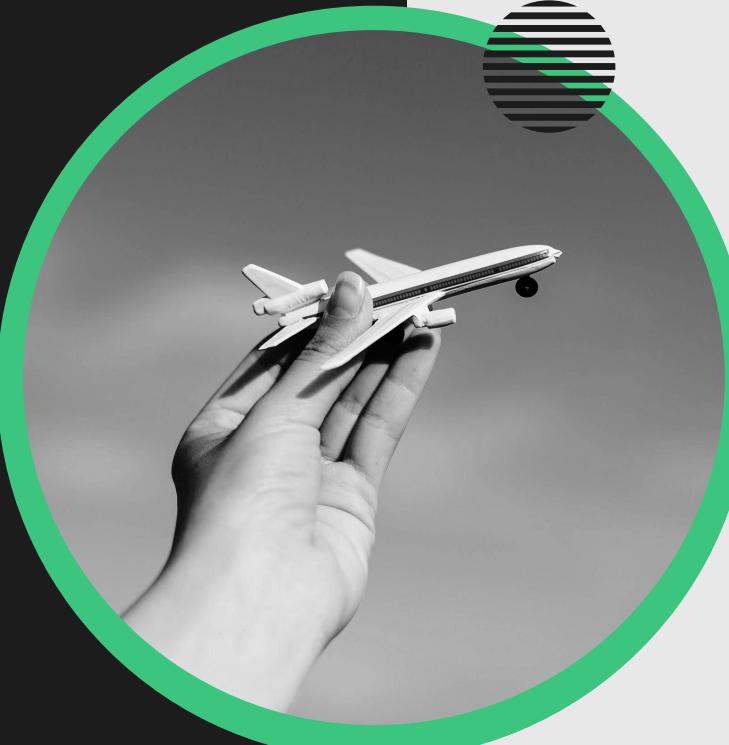
1. Determine the most predictive industry classifier (GIC, SIC, NAICS)
2. Determine which industries where most and least affected/bounced back
3. Determine the most and least predictive stock metrics and ratios
4. Run a combined Linear Regression with metrics, ratios, and best classifier.

Data



- Copustats data from Wharton Research Data Services (WRDS)
- Stock on the Russel 3000
- Metric data from fiscal year 2019
- Classification data from fiscal year 2019
- Return data from fiscal year 2020





02

Industry Classifier

GIC, SIC, NAICS

Industry Classifiers

	GIC	SIC	NAICS
Sector	11	64	23
Group	24	232	232
Industry	69	349	516
Sub-Industry	154		

Industry Classifiers Adj R²

	GIC		SIC		NAICS	
	Count	Mean Adj R ²	Count	Mean Adj R ²	Count	Mean Adj R ²
Sector	11	0.103	64	0.107	23	0.073
Group	24	0.112	232	0.116	232	0.127
Industry	69	0.139	349	0.126	516	0.129
Sub-Industry	154	<u>0.167</u>				

GIC Sub Industry Classifiers Early 2020 Returns

Top

	Coef	Std Err	t	P> t	[0.025	0.975]
Oil & Gas Drilling	-0.7784	0.145	-5.372	0.000	-1.063	-0.494
Oil & Gas Exploration & Production	-0.6594	0.048	-13.652	0.000	-0.754	-0.565
Oil & Gas Equipment & Services	-0.6312	0.059	-10.670	0.000	-0.747	-0.515
Department Stores	-0.6250	0.145	-4.313	0.000	-0.909	-0.341
Hotel & Resort REITs	-0.5776	0.077	-7.457	0.000	-0.729	-0.426

Bottom

	Coef	Std Err	t	P> t	[0.025	0.975]
Specialized REITs	-0.1622	0.053	-3.066	0.002	-0.266	-0.058
Application Software	-0.1598	0.029	-5.458	0.000	-0.217	-0.102
Packaged Foods & Meats	-0.1535	0.050	-3.089	0.002	-0.251	-0.056
Biotechnology	-0.1123	0.020	-5.671	0.000	-0.151	-0.073
Health Care Equipment	-0.0903	0.034	-2.626	0.009	-0.158	-0.023

Adj R^2: 0.156

GIC Sub Industry Classifiers Late 2020 Returns

Top

	Coef	Std Err	t	P> t	[0.025	0.975]
Housewares & Specialties	7.1362	0.566	12.618	0.000	6.027	8.245
Home Improvement Retail	3.6681	0.438	8.373	0.000	2.809	4.527
Automobile Manufacturers	3.3169	0.400	8.294	0.000	2.533	4.101
Homefurnishing Retail	3.0359	0.370	8.200	0.000	2.310	3.762
Heavy Electrical Equipment	2.5883	0.566	4.577	0.000	1.479	3.697

Bottom

	Coef	Std Err	t	P> t	[0.025	0.975]
Research & Consulting Services	0.4729	0.196	2.414	0.016	0.089	0.857
Thrifts & Mortgage Finance	0.4694	0.146	3.214	0.001	0.183	0.756
Retail REITs	0.4587	0.189	2.433	0.015	0.089	0.828
Regional Banks	0.4264	0.063	6.814	0.000	0.304	0.549
Pharmaceuticals	0.3722	0.122	3.040	0.002	0.132	0.612

Adj R^2: 0.179



2020 Classifiers Returns

Early 2020

Affected the Most

- Oil & Gas Drilling
- Oil & Gas Exploration & Production
- Oil & Gas Equipment & Services
- Department Stores
- Hotel & Resort REITs

Affected the Least

- Specialized REITs
- Application Software
- Packaged Foods & Meats
- Biotechnology
- Health Care Equipment

Late 2020

Bounce Back the Most

- Housewares & Specialties
- Home Improvement Retail
- Automobile Manufacturers
- Homefurnishing Retail
- Heavy Electrical Equipment

Bounce Back the Least

- Research & Consulting Services
- Thrifts & Mortgage Finance
- Retail REITs
- Regional Banks
- Pharmaceuticals

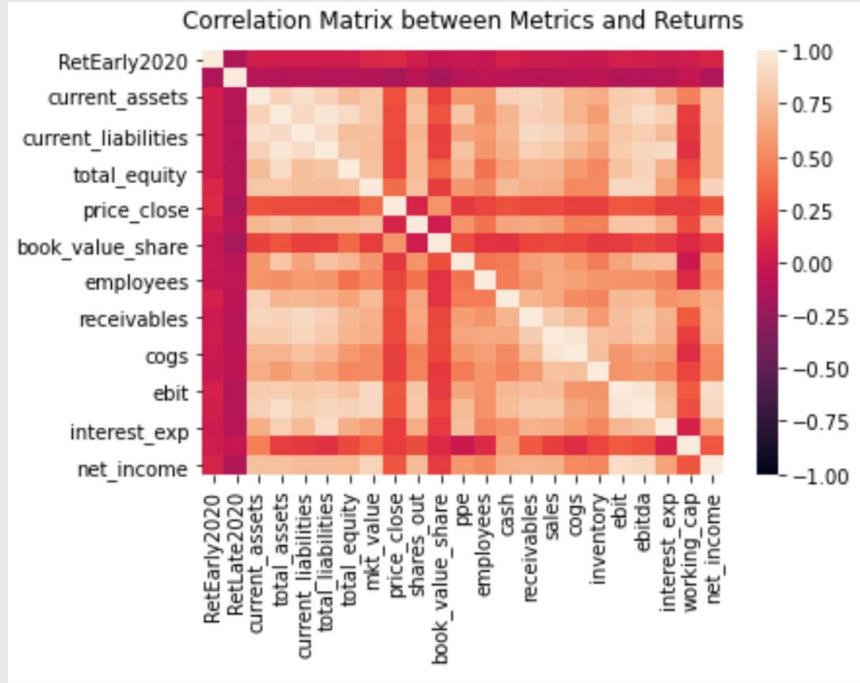
03

Metrics and Ratios

Russel 3000



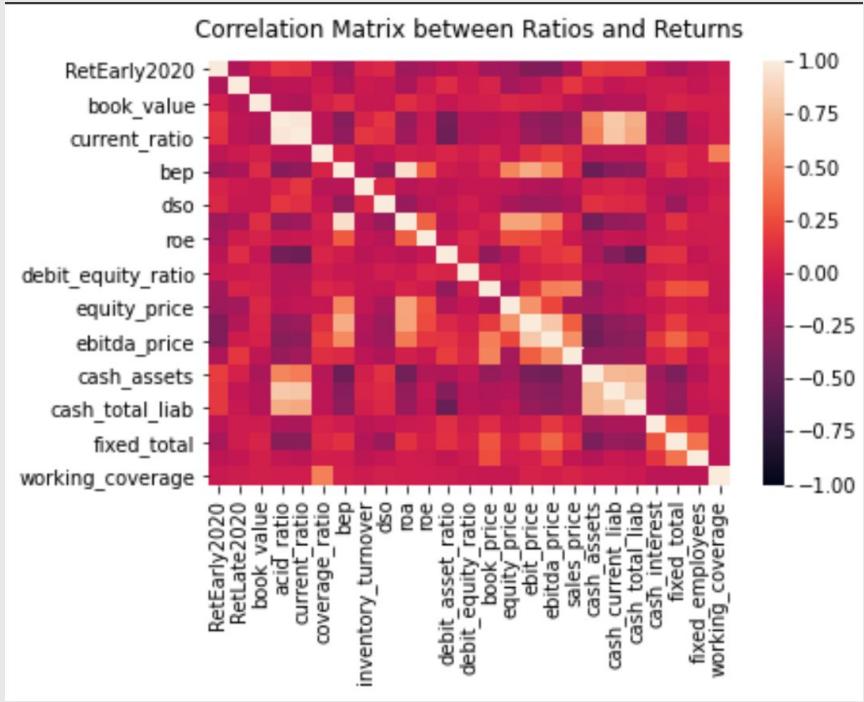
21 Metrics



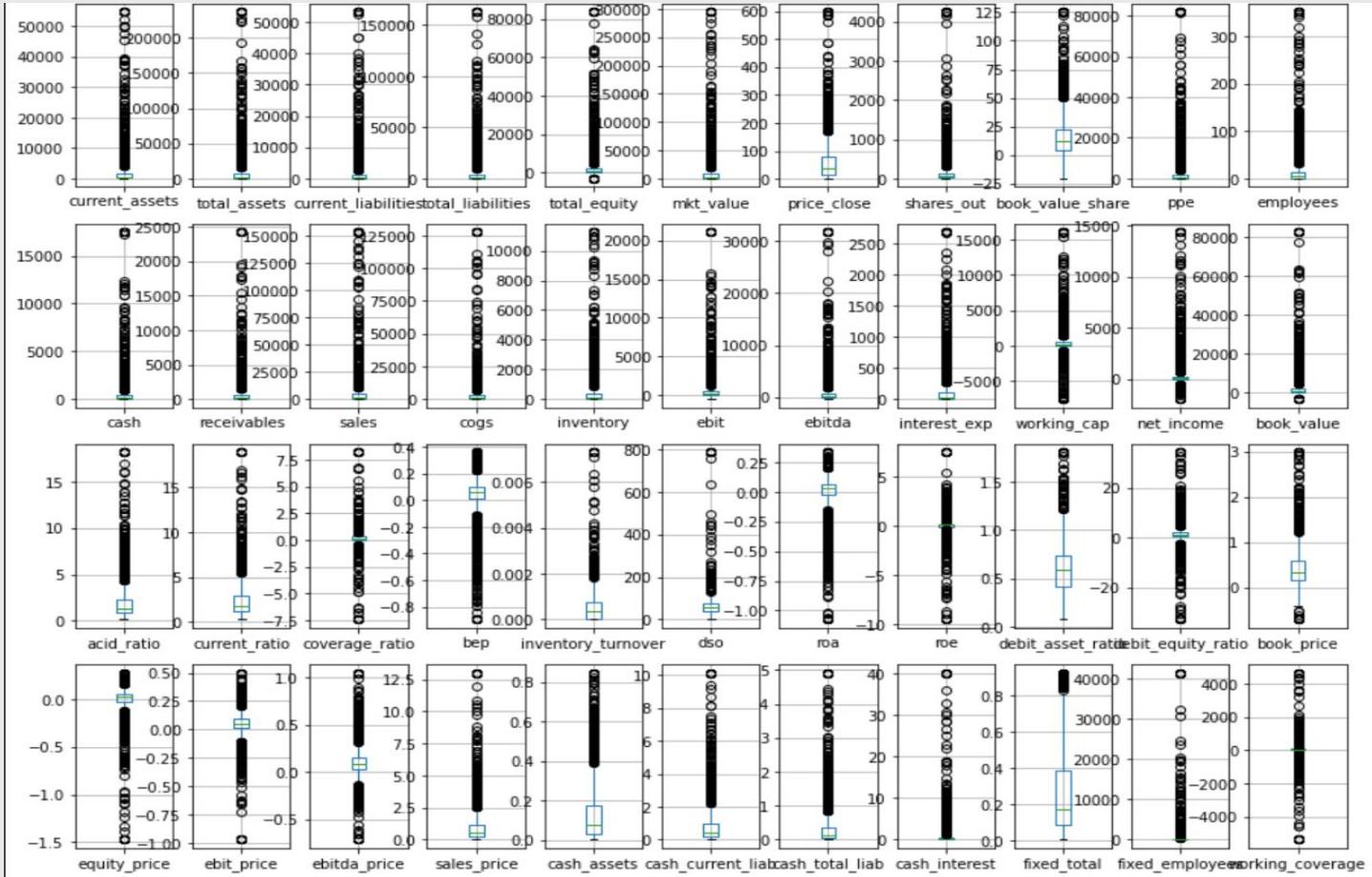
'current_assets', 'total_assets',
'current_liabilities', 'total_liabilities',
'total_equity', 'mkt_value', 'price_close',
'shares_out', 'book_value_share', 'ppe',
'employees', 'cash', 'receivables', 'sales',
'cogs', 'inventory', 'ebit', 'ebitda',
'interest_exp', 'working_cap', 'net_income'

23 Ratios

'book_value', 'acid_ratio', 'current_ratio',
'dso', 'roa', 'roe', 'coverage_ratio', 'bep',
'inventory_turnover', 'debit_asset_ratio',
'debit_equity_ratio', 'book_price',
'equity_price', 'ebit_price', 'ebitda_price',
'sales_price', 'cash_assets',
'cash_current_liab', 'cash_total_liab',
'cash_interest', 'fixed_total',
'fixed_employees', 'working_coverage'



Winsorized Metrics and Ratios



Metrics & Ratios Early 2020 Returns



	Coef	Std Err	t	P> t	[0.025	0.975]
sales_price	0.020500	0.008000	2.698	0.007	0.006000	0.035000
price_close	0.000300	0.000000	2.007	0.045	0.000007	0.001000
net_income	0.000049	0.000014	3.517	0.000	0.000022	0.000076
ebitda	-0.000029	0.000014	-2.105	0.035	-0.000056	-0.000002
roe	-0.030800	0.007000	-4.377	0.000	-0.045000	-0.017000
book_price	-0.122600	0.028000	-4.370	0.000	-0.178000	-0.068000
const	-0.136300	0.045000	-3.037	0.002	-0.224000	-0.048000
debit_asset_ratio	-0.149100	0.048000	-3.117	0.002	-0.243000	-0.055000
equity_price	-0.225800	0.082000	-2.759	0.006	-0.386000	-0.065000
ebitda_price	-0.230700	0.117000	-1.975	0.048	-0.460000	-0.002000
ebit_price	-0.467300	0.162000	-2.888	0.004	-0.785000	-0.150000

Adj R²: 0.182

Metrics & Ratios Late2020 Returns



	Coef	Std Err	t	P> t	[0.025	0.975]
ebitda_price	1.4511	0.410	3.537	0.000	0.646	2.256
const	0.9297	0.158	5.899	0.000	0.621	1.239
cash_total_liab	0.1959	0.088	2.216	0.027	0.022	0.369
roe	0.0951	0.025	3.843	0.000	0.047	0.144
sales_price	0.0867	0.027	3.250	0.001	0.034	0.139
book_value_share	-0.0085	0.002	-3.492	0.000	-0.013	-0.004
cash_current_liab	-0.1231	0.055	-2.241	0.025	-0.231	-0.015
ebit_price	-2.4069	0.569	-4.233	0.000	-3.522	-1.292

Adj R^2: 0.107



2020 Metric Returns

Sales to Price

Top Positive Metric at the 95% Statistical Significant Level

- Was a positive statistically significant variable for both Early and Late 2020 Returns
- Makes sense because Sales is at the top of the balance sheet.
- This, connected with a high price, is a great signal for investors and subsequently positive stock returns.

High top line health on the balance sheet means money is coming in the company:

EBIT to Price

Top Positive Metric at the 95% Statistical Significant Level

- Was a negative statistically significant variable for both Early and Late 2020 Returns.
- Makes sense because EBIT is low on the balance sheet just above interest and taxes.
- This would mean low net income and stock holders equity, and combined with a low price, subsequently negative stock return

Low bottom line health on the balance sheet means there isn't much to pay off Interest, Taxes, and/or Working Capital.





04

Final Model

Metrics, Ratios, and
Classifiers



Metrics, Ratios, Classifiers Early 2020 Returns

	Coef	Std Err	t	P> t	[0.025	0.975]
Integrated Telecommunication Services	0.525300	0.161000	3.255	0.001	0.209000	0.842000
bep	0.477100	0.179000	2.670	0.008	0.127000	0.828000
Health Care Distributors	0.305600	0.088000	3.490	0.000	0.134000	0.477000
Food Retail	0.274200	0.116000	2.358	0.019	0.046000	0.502000
Water Utilities	0.249500	0.111000	2.243	0.025	0.031000	0.46800
....
Oil & Gas Equipment & Services	-0.311700	0.070000	-4.445	0.000	-0.449000	-0.174000
Oil & Gas Exploration & Production	-0.347400	0.076000	-4.569	0.000	-0.497000	-0.198000
roa	-0.365800	0.168000	-2.181	0.029	-0.695000	-0.037000
Oil & Gas Drilling	-0.466100	0.170000	-2.748	0.006	-0.799000	-0.133000
ebit_price	-0.671600	0.176000	-3.806	0.000	-1.018000	-0.325000

Adj R^2: 0.218

Metrics, Ratios, Classifiers Late 2020 Returns

	Coef	Std Err	t	P> t	[0.025	0.975]
Housewares & Specialties	5.928100e+00	6.010000e-01	9.872	0.000	4.750000e+00	7.106000e+00
Automobile Manufacturers	3.472900e+00	5.460000e-01	6.362	0.000	2.402000e+00	4.544000e+00
Home Improvement Retail	3.066200e+00	5.620000e-01	5.457	0.000	1.964000e+00	4.168000e+00
Life & Health Insurance	2.370900e+00	1.030000e+00	2.302	0.021	3.510000e-01	4.391000e+00
ebitda_price	1.740300e+00	4.390000e-01	3.969	0.000	8.800000e-01	2.600000e+00
...
Commercial Printing	-9.262000e-01	4.670000e-01	-1.984	0.047	-1.842000e+00	-1.000000e-02
Gas Utilities	-9.668000e-01	3.430000e-01	-2.818	0.005	-1.640000e+00	-2.940000e-01
bep	-1.550600e+00	5.840000e-01	-2.654	0.008	-2.697000e+00	-4.040000e-01
Integrated Telecommunication Services	-1.572600e+00	5.280000e-01	-2.980	0.003	-2.608000e+00	-5.370000e-01
ebit_price	-2.575600e+00	5.770000e-01	-4.464	0.000	-3.707000e+00	-1.444000e+00

Adj R²: 0.258



2020 Metric Returns



Early 2020

Top 5 Variables

- Integrated Telecommunication Services
- Basic Earning Power
- Health Care Distributors
- Food Retail
- Water Utilities

Bottom 5 Variables

- Oil & Gas Equipment & Services
- Oil & Gas Exploration & Production
- Return on Asset
- Oil & Gas Drilling
- EBIT to Price

Late 2020

Top 5 Variables

- Housewares & Specialties
- Automobile Manufacturers
- Home Improvement Retail
- Life & Health Insurance
- EBITDA to Price

Bottom 5 Variables

- Commercial Printing
- Gas Utilities
- Basic Earning Power
- Integrated Telecommunication Services
- EBIT to Price

Adjusted R²

	Early 2020 Adj R ²	Late 2020 Adj R ²
GIC Sub Industry Classifiers	0.156	0.179
Metrics & Ratios	0.182	0.107
GIC Sub Industry Classifiers Metrics & Ratios	0.218	<u>0.258</u>

Future Improvements



Holm-Bonferroni Method

To control for Multiple Variable Testing and avoid Data Mining in the financial sense



Better Metrics and Ratios

Metrics and Ratios had the most predictive power.



Use Different Model

Use a model instead of OLS that is more accurate but less interpretable
(Ex. Neural Network with Lime)



Thank You!



Questions?



Industry Classifiers



	classifiers	adjR2_early	adjR2_late	adjR2_mean
gic_sub_industry	154	0.158047	0.175685	0.166866
gic_industry	69	0.146104	0.132098	0.139101
naics_industry	516	0.071038	0.186942	0.128990
naics_group	232	0.111412	0.144024	0.127718
sic_industry	349	0.107587	0.145237	0.126412
sic_group	232	0.106741	0.125953	0.116347
gic_group	24	0.122970	0.101845	0.112407
sic_sector	64	0.105715	0.109146	0.107431
gic_sector	11	0.115544	0.090513	0.103029
naicscs_sector	23	0.075383	0.072564	0.073974

Things That Can Help Us

Prevention of Pollution

	Yes	No
Action 1		
Action 2		
Action 3		
Action 4		
Action 5		

Reduce Global Warming

	Yes	No
Action 1		
Action 2		
Action 3		
Action 4		
Action 5		



CO2 Emissions in Transport Industry

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presentation begins



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WHOA!

Add an impactful sentence to
start with a bang!



01

About CO₂ Emissions

Here you could describe the topic of the section



02

Control

Here you could describe the topic of the section



03

Prevention

Here you could describe the topic of the section



04

Conclusion

Here you could describe the topic of the section



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

—Someone Famous



01

About CO₂ Emissions

You can enter a subtitle
here if you need it



Pollution Problems



Mercury

Mercury is the closest planet to the Sun. It's only a bit larger than the Moon



Venus

Venus has a beautiful name, but it's terribly hot, even hotter than Mercury

How We Can Help



Saturn

Saturn is composed of hydrogen and helium



Jupiter

It's the biggest planet in the Solar System



Neptune

It's the fourth-largest planet in the Solar System

CO₂ Emissions in Transport Industry

Despite being red, Mars is actually a very cold place. It's full of iron oxide dust, which gives the planet its reddish cast



Awesome Words



1,200,300

Big numbers catch your
audience's attention easily

A picture is worth a thousand words





Prevention

How to deal with air pollution

- Plant more trees
- Raise factory chimneys
- Provide a filter / filter pollutants in chimneys
- Replace fossil fuels with alternative fuels
- Keep the factory away from residential areas

How to reduce CO₂ emissions

- Perform water filter / cycle
- Do not throw away waste
- Do not dump industrial waste into rivers
- Plant more trees, as many as possible
- Maintain fertility of the soil, and keep the environment healthy



02

About Pollution Control

You can enter a subtitle here if you need it



This Is a Map



 Campaigns

Mars

Despite being red, Mars is a cold place

Jupiter

It's the biggest planet in the Solar System

Tasks We Can Do

	Monday	Tuesday	Wednesday
Task 1		X	
Task 2	X	---	---
Task 3			X

Tips to Reduce CO₂ Emissions



Mercury

Mercury is the smallest planet of them all



Venus

Venus is the second planet from the Sun



Mars

Despite being red, Mars is a cold place



Jupiter

It's the biggest planet in the Solar System



Saturn

Saturn is the ringed one and a gas giant



Neptune

It's the farthest planet from the Sun

Our Process

Saturn

Saturn is the ringed one
and a gas giant

Venus

Venus is the second
planet from the Sun



Jupiter

It's the biggest planet in
the Solar System

5,000,000

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

3,000,000

Saturn, the ringed planet, is composed mostly
of hydrogen and helium

Ways to Reduce Pollution

1

Mercury is the closest planet to the Sun and the smallest

2

Venus is the second planet from the Sun

3

Despite being red, Mars is actually a cold place

Jupiter is the biggest planet in the Solar System

6

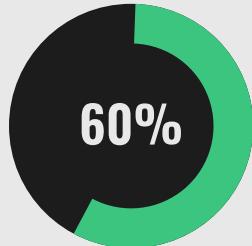
Saturn is the ringed one and a gas giant

5

Neptune is the farthest planet from the Sun

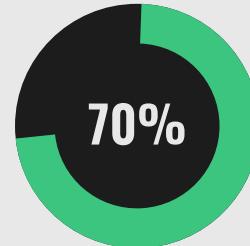
4

Important Data



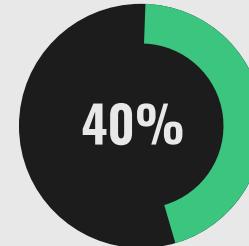
Mars

Despite being red, Mars is a cold place



Saturn

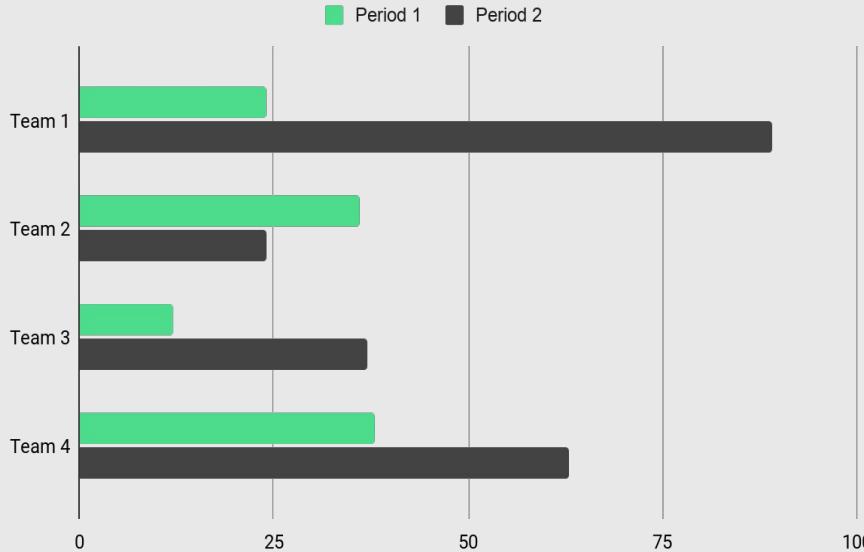
It's the biggest planet in the Solar System



Jupiter

Saturn is the ringed one and a gas giant

Evolution of Our Strategies



Despite being red, Mars
is a cold place

It's the second-brightest
natural object

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

03

Prevention of Pollution

You can enter a subtitle
here if you need it

Things That Can Help Us

Prevention of Pollution

	Yes	No
Action 1		
Action 2		
Action 3		
Action 4		
Action 5		

Reduce Global Warming

	Yes	No
Action 1		
Action 2		
Action 3		
Action 4		
Action 5		



Saturn

Saturn is the ringed one and
a gas giant



Neptune

It's the farthest planet from
the Sun





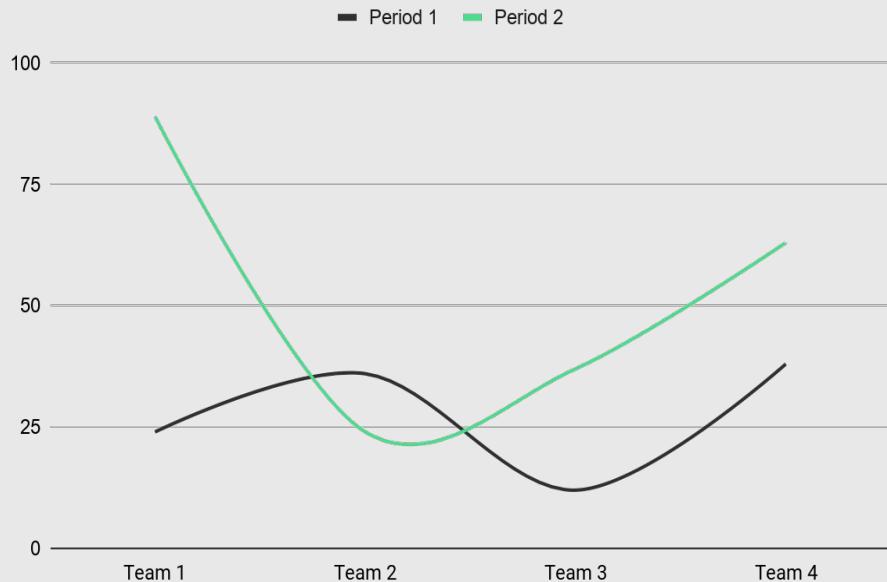
Our Plan of Action

GOALS	STRATEGY	ACTIONS
VENUS	Venus has a beautiful name and is the second planet from the Sun	<ul style="list-style-type: none">• Action 1• Action 2
MERCURY	Mercury is the closest planet to the Sun and the smallest of them all	<ul style="list-style-type: none">• Action 1• Action 2
MARS	Despite being red, Mars is actually a very cold place	<ul style="list-style-type: none">• Action 1• Action 2
JUPITER	Jupiter is a gas giant and the biggest planet of them all	<ul style="list-style-type: none">• Action 1• Action 2



Prevalence

- Despite being red, Mars is a cold place
 - It's the second-brightest natural object
- To modify this graph, click on it, follow the link, change the data and paste the new graph here



Nature Needs Our Help!



It's the second-brightest natural object in the night sky after the Moon



Neptune is the farthest planet from the Sun and the fourth-largest by diameter



It's a gas giant and the biggest planet in the entire Solar System



Yes, this is the ringed one. It's composed mostly of hydrogen and helium

Our Values

Mercury

Mercury is the smallest planet of them all

Venus

Venus is the second planet from the Sun

Mars

Despite being red, Mars is a cold place

Jupiter

It's the biggest planet in the Solar System

Our Team



Louis Williams

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with your own



Gregory Calderon

You can replace the image
with your own



Jose Matthews

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with your own

Desktop Software



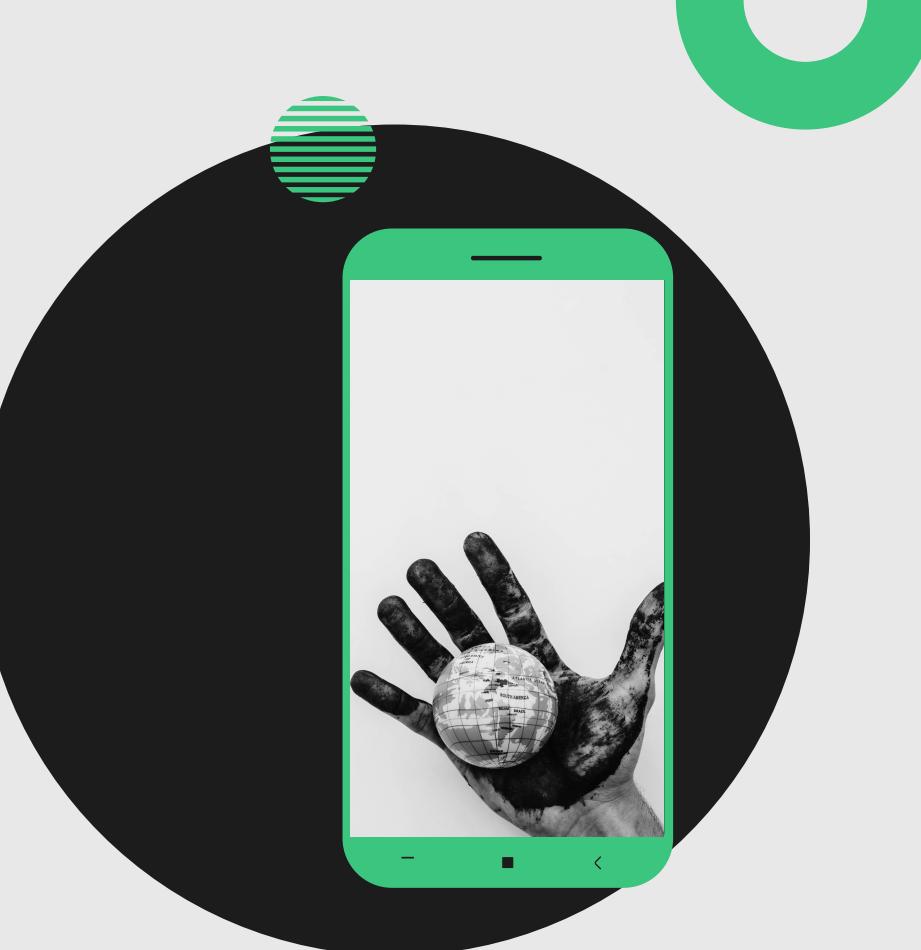
Our Web

You can replace the image on this screen with your own work. Just delete this one, add yours and center it properly

Tablet Device

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Mobile Web

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- Full shot woman walking with luggage in train station
- Medium shot man listening to music
- on riding a bike in the park alongside his father
- Japan city with automobile

Resources



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- Billboard template in urban environment
- Close-up casual man holding his bike
- Businessmen posing together in the office
- Passenger in the train sitting and wearing medical mask
- Close-up of dirty human hand with globe over white surface
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- Japanese culture urban style
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Oswald

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

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#ccccccff

#ff6a00

Stories by Freepik

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Pana



Amico



Bro



Rafiki

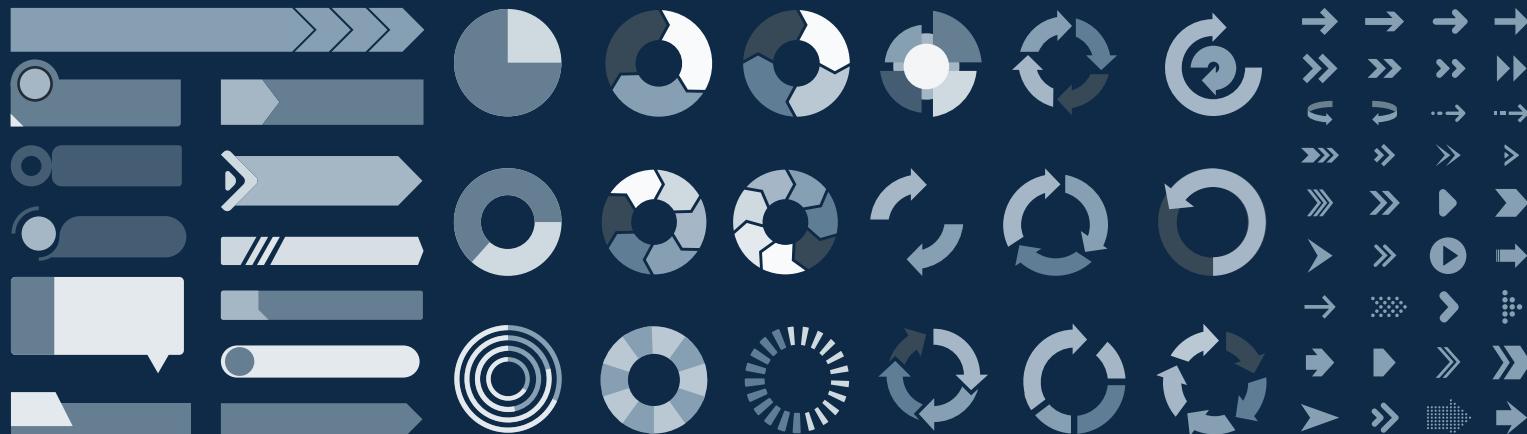


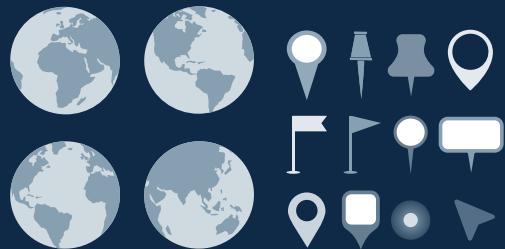
Cuate

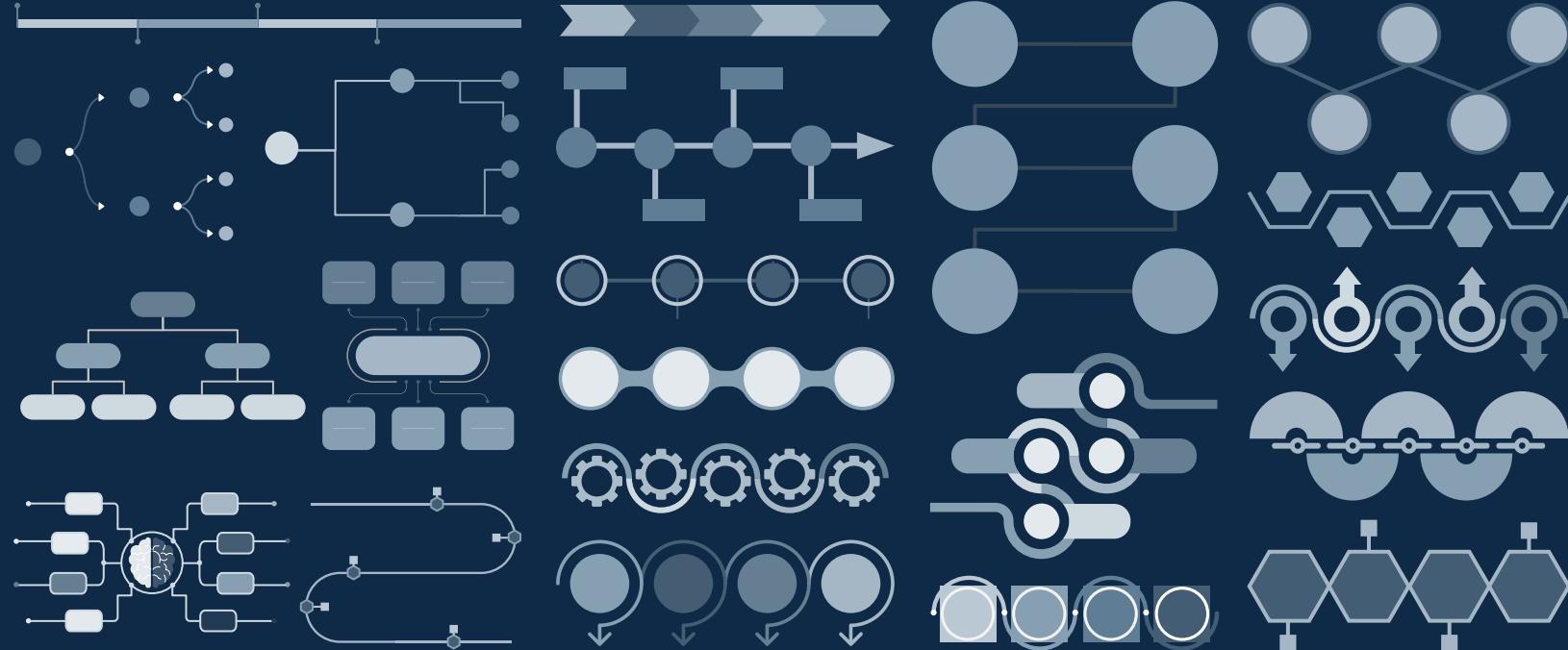
Use our editable graphic resources...

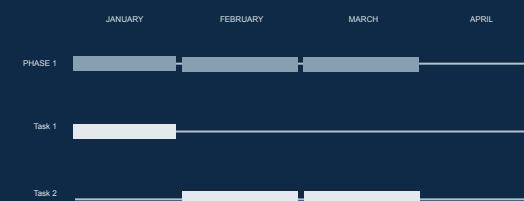
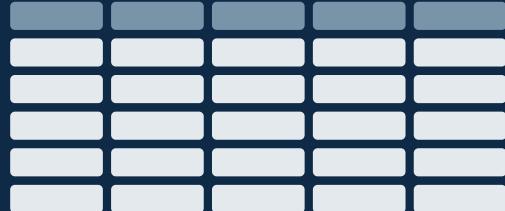
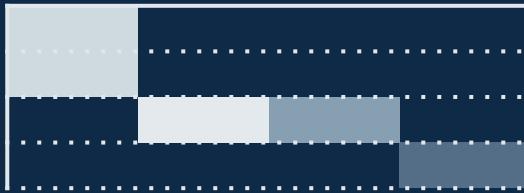
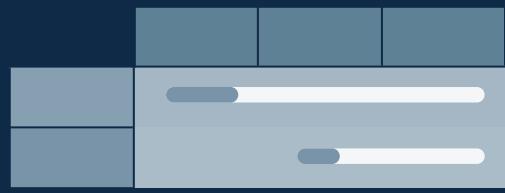
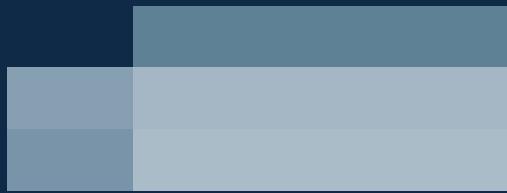
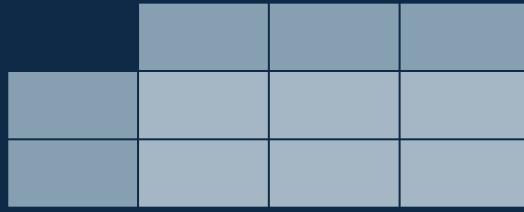
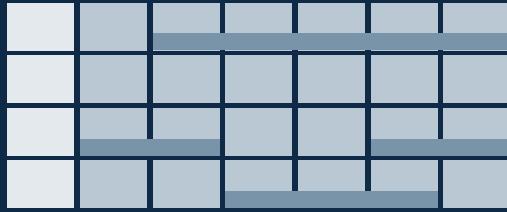
You can easily resize these resources without losing quality. To change the color, just ungroup the resource and click on the object you want to change. Then, click on the paint bucket and select the color you want.

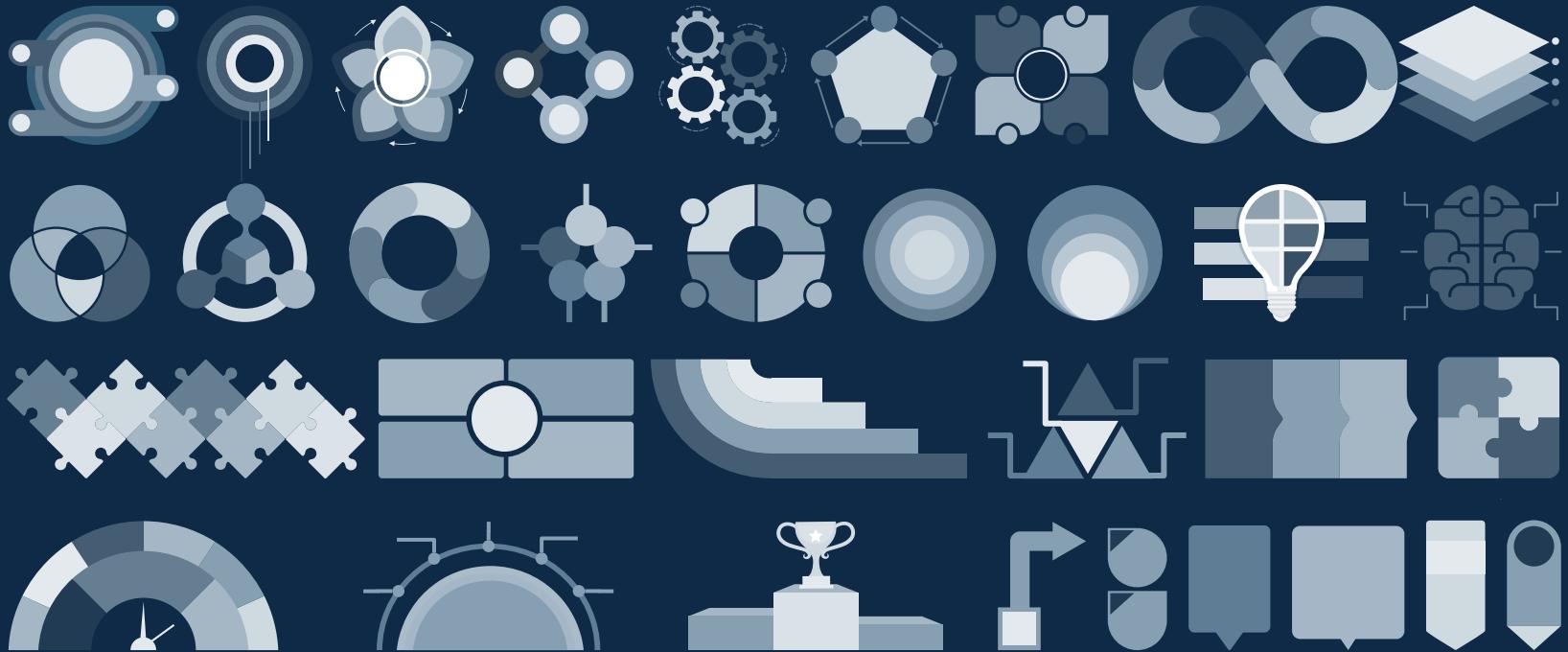
Group the resource again when you're done. You can also look for more infographics on Slidesgo.

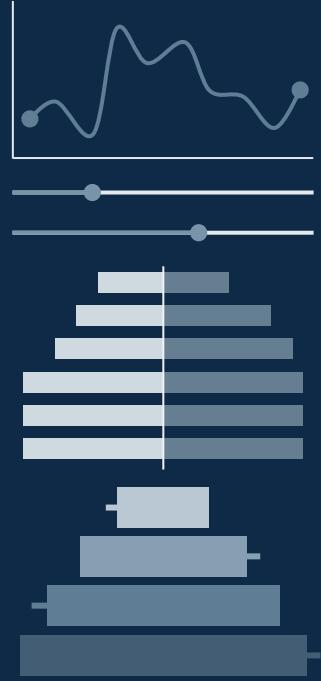
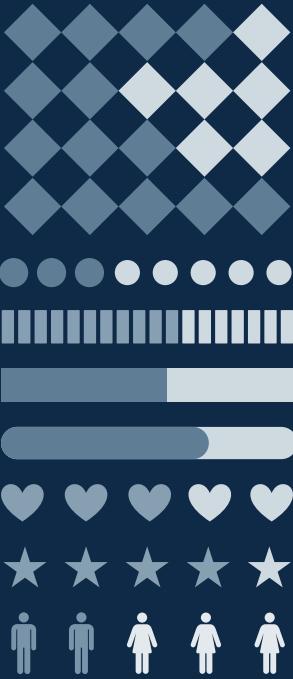
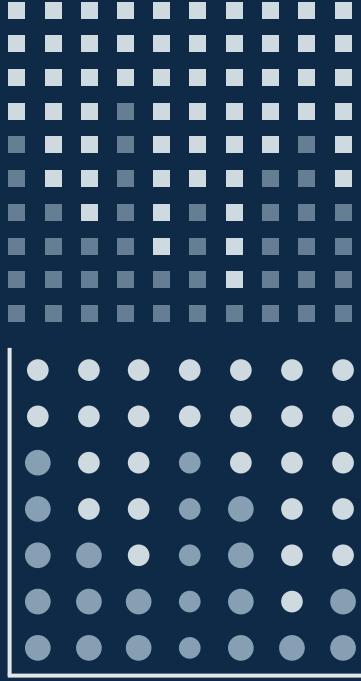












...and our sets of editable icons

You can resize these icons without losing quality.

You can change the stroke and fill color; just select the icon and click on the paint bucket/pen.

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



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Medical Icons



Business Icons



Teamwork Icons



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Nature Icons



SEO & Marketing Icons

