



Charging into a Sustainable California

Kick-Off Deck



For Better with Data

Agenda

— Welcome & Hackathon overview

5 mins

— Define the Opportunity

15 mins

— Data, Tools and Submissions

15 mins

— Case Study

15 mins

— Q&A

10 mins





Welcome and Hackathon Overview

With us today:



Arvind Sathi
Director Data Scientist,
KPMG



Joshua Kuehl
Senior Associate,
University Innovation, **KPMG**



Neena Sathi
Lecturer, **UCI**

KPMG DCwP Overview

Data Citizens with Purpose (DCwP) is the leading way KPMG professionals work Together, For Better with data. DCwP provides active learning experiences to serve our communities and develop data driven solutions to difficult ESG concerns.

Pro bono engagements



Structured, multi week engagements with nonprofit organizations that provide data-driven insights to support the decision-making efforts of our nonprofit clients.

Hackathons



Time bound events organized for participants to use data to develop innovative approaches to address ESG concerns.

Univ Innovation Program



Capstone, hackathon and other experiential learning events delivered to university students as they explore digital careers

Hackathons

Our Mission

Create an opportunity for KPMG employees to use data & analytics skills in a manner that cultivates an innovative mindset

Program objectives



Engage our people to better use data to gain insights and solve problems



Foster innovative ideas for KPMG to act on its ESG commitments and support clients on their ESG journey



Create an environment that promotes a digital mindset and supports the activation of our firmwide data platforms

Our Approach

Prompt participants to perform a data-driven analysis to generate ideas that could solve a ESG challenge.

Tenants of a 'good' prompt

- ✓ Of interest to the firm
- ✓ Of interest to the participants
- ✓ ESG Related
- ✓ Data Solvable



University Innovation Program

Our Mission

Provide university students with experiential learning opportunities that will enhance their digital literacy, as they explore future careers

Our Approach

We blend KPMG hiring needs and learning interests on university campuses to provide strategic learning experiences

Program objectives



Target and engage diverse student populations with varying degrees of digital literacy



Deliver experiences using leading practice data concepts and technology



Prompt students to solve real-world problems using data and analytics



Prepare students to convey their analytic findings by providing storytelling instruction



Overview of Hackathon

Hackathon Topic – Charging into a Sustainable California



The electrification of transportation has the potential to eliminate 29% of carbon emissions. You will tackle the challenge of how to best electrify our roads in California to encourage balanced growth in our neighborhoods and regions.

Questions to consider:

1. *Identify what factors governments, car companies, small business, energy companies should consider when planning for charging stations*
2. *Create a model and accompanying visualization to illustrate how EVs should be best distributed in specific communities*
3. *Explore how governments and corporations should incentivize usage of charging stations at designated locations.*



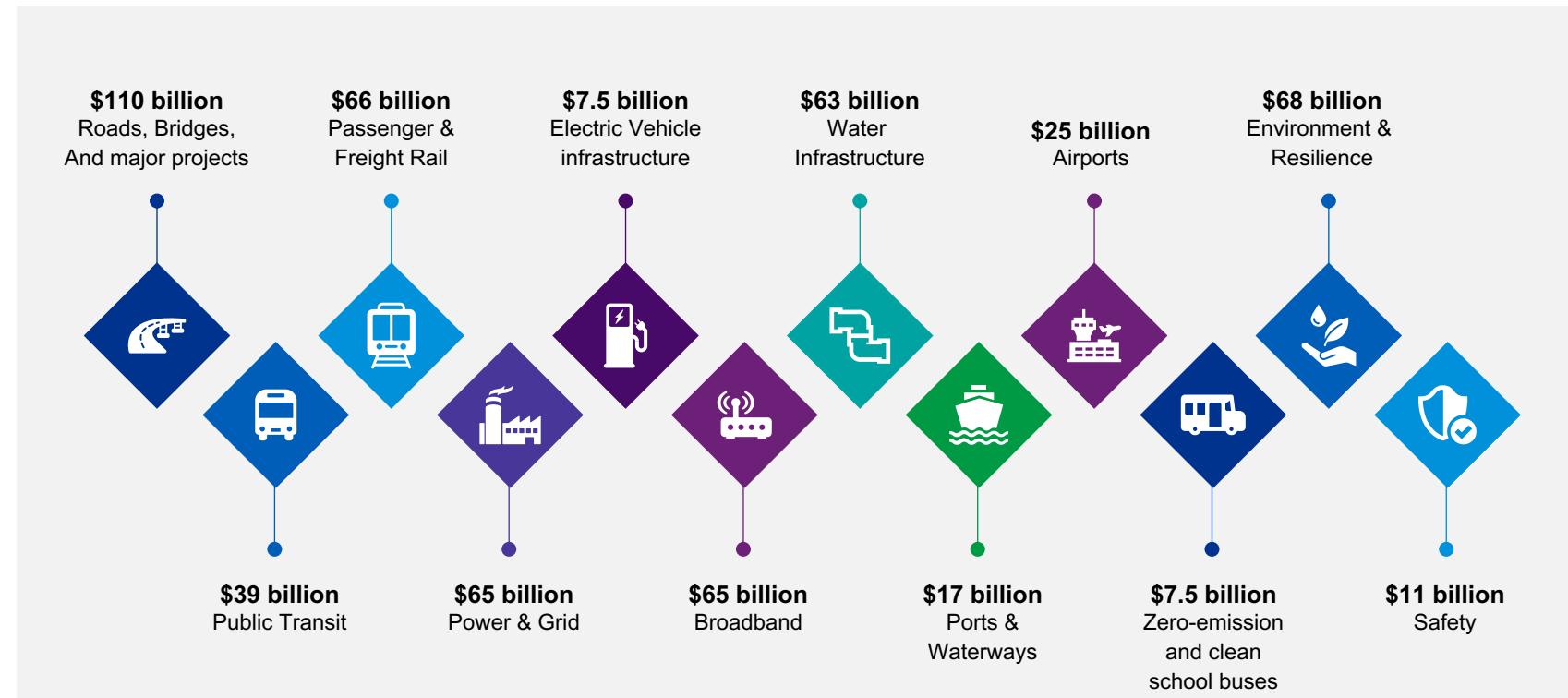
The opportunity: Infrastructure Investment



Understanding the Bipartisan Infrastructure Law

BIL has more breadth than typical Federal Infrastructure Bills

- President Biden signed into law the 2,702 page bill on November 15, 2021
- \$1.2 Trillion dollar bill with roughly \$550 billion in new spending above baseline levels
- Creates programs for various Federal agencies including Department of Transportation, Energy, Commerce, Agriculture, and more
- Establishes funding criteria that targets mobility and community connectivity, environmental justice, and social equity



Key Takeaways

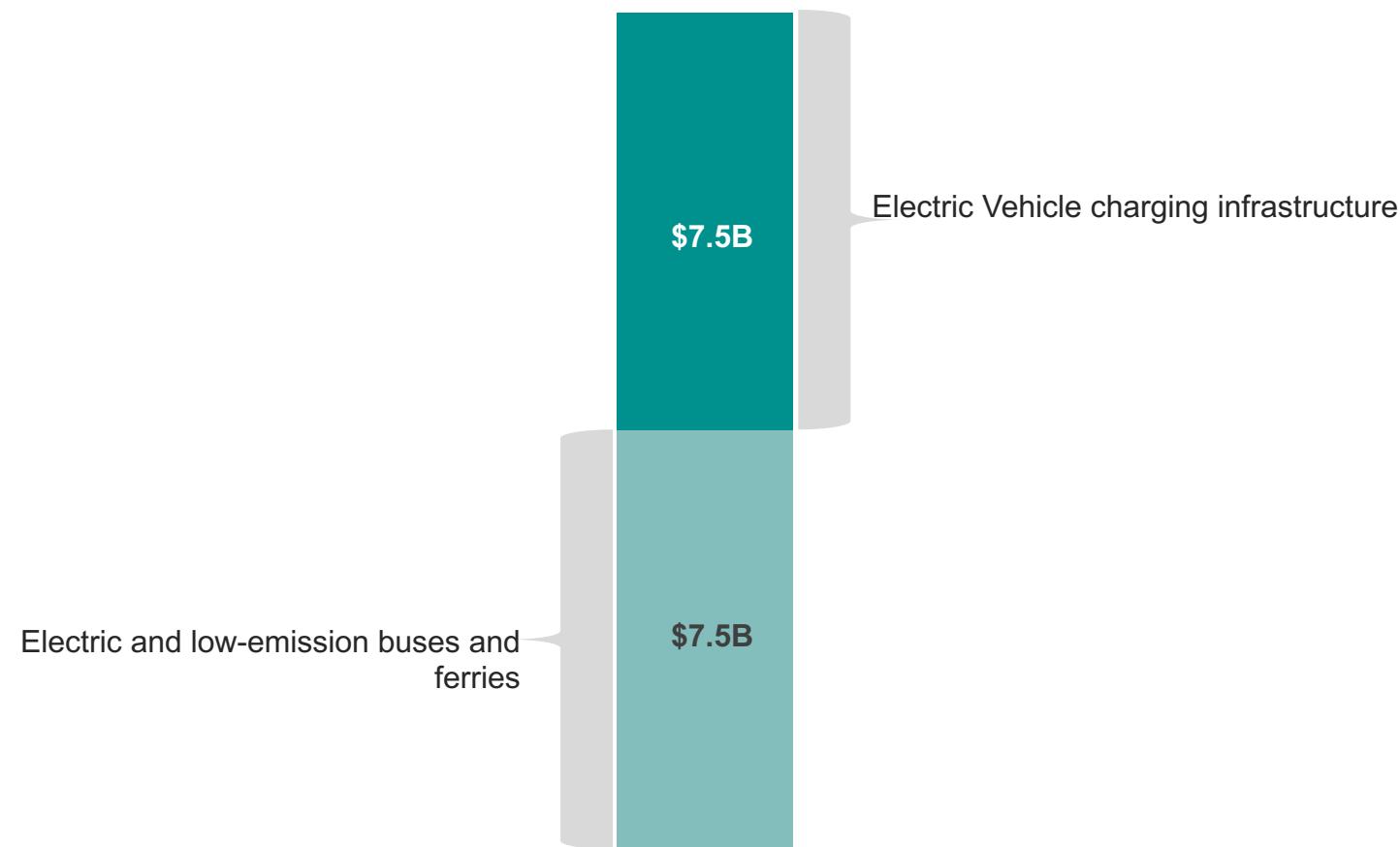
- Creates opportunities across many sectors including transportation, water, broadband, EVs, Energy, and more
- More competitive grants to track and apply for
- Highly competitive grant application process
- New criteria to assess and incorporate into projects and applications
- Significantly more funding flowing to local governments via Formula funds
- More funding and data to implement, monitor, and report

Electric Vehicles and Charging Infrastructure

Key Highlights

- First national investment in EV charging infrastructure to build a national network of EV chargers along highways and in rural and disadvantaged communities. Also includes funds to electrify school and transit buses and passenger ferries
- **\$7.5 billion for national network of EV chargers** (including \$2.5 billion “alternative fuels” and \$5 billion for National EV Formula Program)
- **\$7.5 billion** for low emissions /electric school buses
- **\$250 million** for electric or low emissions ferries
- Numerous grant programs are expanding eligibilities to include EV projects as an eligible project

\$15B is allocated towards electric vehicles, infrastructure, buses and transit



California Goals

California plans to use the estimated \$134 million in formula funding from the first two years of the NEVI Program to primarily provide connectivity for passenger vehicles throughout the state, complementary to state investments.

- Ensuring ZEV infrastructure will meet the needs of the growing ZEV market.
 - By 2025: 250,000 electric vehicle chargers, including 10,000 DCFC6
 - By 2030: 1.2 million chargers, including 37,500 DCFC for light-duty vehicles and 157,000 chargers for medium- and heavy-duty vehicles by 2030.
- Accelerating deployment and ensuring equitable outcomes.

5-year National Electric Vehicle Infrastructure Funding by State

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

FY 2022-2026 FUNDING FOR THE NATIONAL ELECTRIC VEHICLE INFRASTRUCTURE FORMULA PROGRAM UNDER THE BIPARTISAN INFRASTRUCTURE LAW

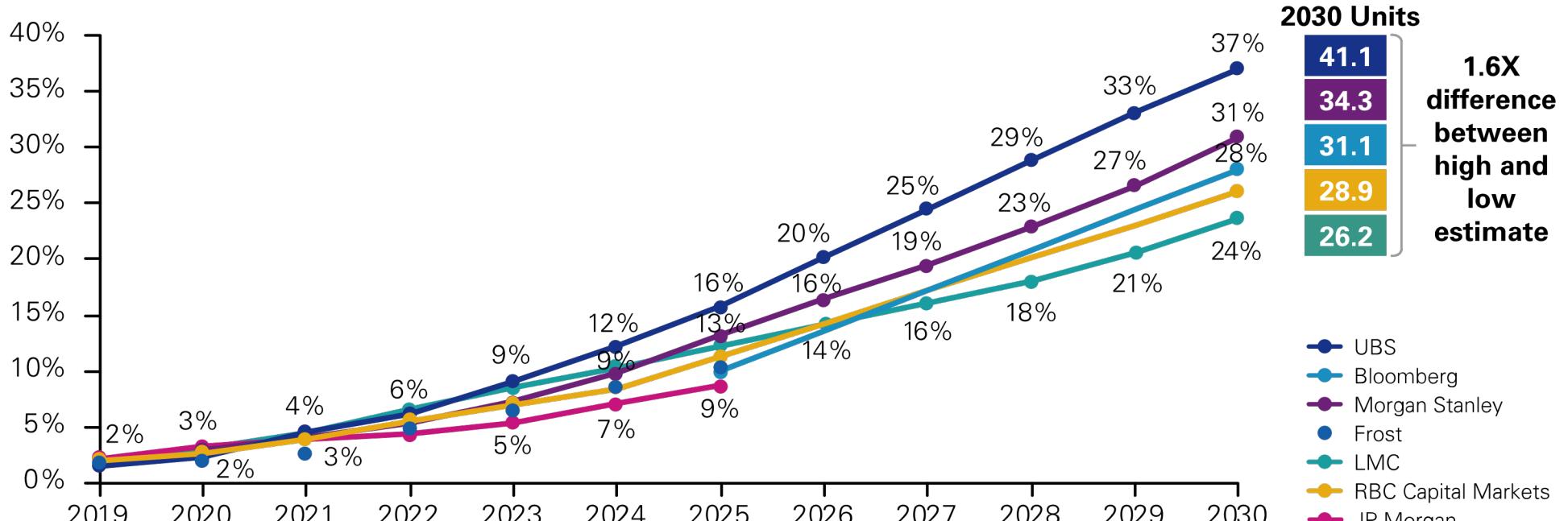
State	Actual FY 2022	Estimated FY 2023	Estimated FY 2024	Estimated FY 2025	Estimated FY 2026	Estimated Total
Alabama	11,738,801	16,892,267	16,892,384	16,892,399	16,892,434	79,308,285
Alaska	7,758,240	11,164,195	11,164,272	11,164,282	11,164,305	52,415,294
Arizona	11,320,762	16,290,704	16,290,816	16,290,830	16,290,864	76,483,976
Arkansas	8,010,850	11,527,704	11,527,783	11,527,793	11,527,817	54,121,947
California	56,789,406	81,720,595	81,721,161	81,721,230	81,721,400	383,673,792

https://www.fhwa.dot.gov/environment/nevi/ev_deployment_plans/ca_nevi_plan.pdf

https://www.fhwa.dot.gov/bipartisan-infrastructure-law/evs_5year_nevi_funding_by_state.cfm

There is no consensus on EV adoption

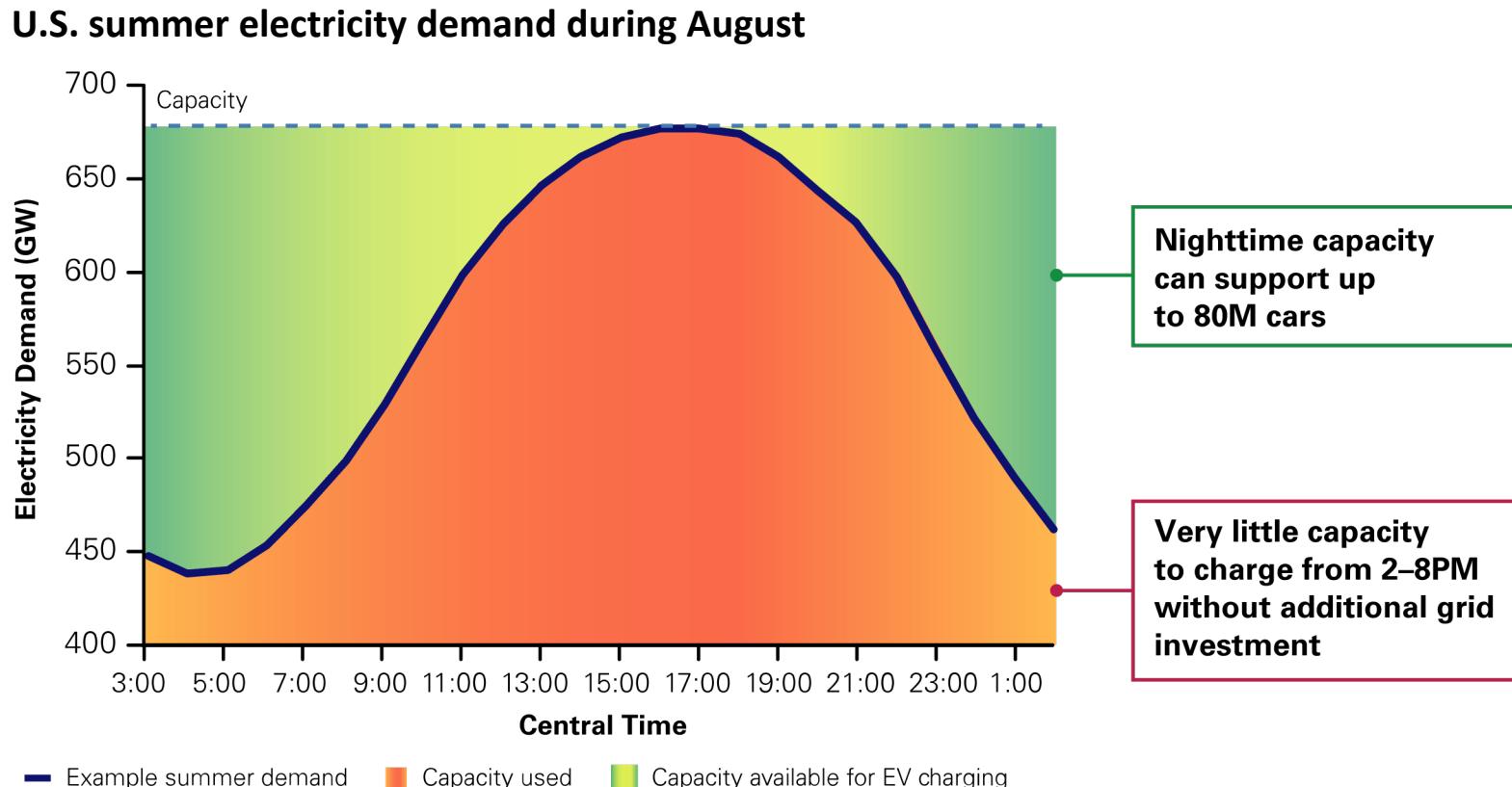
Global BEV sales forecast—analysts' viewpoints



Sources: JPMorgan; UBS; RBC Capital Markets; Morgan Stanley, LMC; Bloomberg

Note: 2030 units are based on analyst BEV share estimates and LMC 2030 volumes for consistency

The grid challenge



Notes: Summer demand from August 2016

Source: KPMG analysis



Data, Tools and Submission

Hackathon Data Sets

Please make use of any public datasets.

This material includes a number of resources from where you can source the data. In each case, we have provided the link to that dataset.

1. <https://www.energy.gov/eere/slsc/maps/lead-tool> provides useful data by state and county on number of housings and energy consumption by household.
2. https://afdc.energy.gov/data_download provides data on current and planned EV charging stations
3. <https://hepgis.fhwa.dot.gov/fhwagis/ViewMap.aspx?map=Highway+Information|National+Highway+System> provides a map of highways across US. You can use this map to find all highways passing through a geolocation.
4. <https://anl.maps.arcgis.com/apps/webappviewer/index.html?id=33f3e1fc30bf476099923224a1c1b3ee> provides current EV locations and gaps across highways
5. <https://hepgis.fhwa.dot.gov/fhwagis/ViewMap.aspx?map=Demographic+Information|Population+2020> demographic information
6. <https://data.census.gov/> provides population related data

Hackathon Tool

The Single Platform for Everyday AI

Dataiku enables everyone across the organization to participate in building AI and consuming AI-driven applications.

Data Preparation

Visualization

Machine Learning

Data Ops

MLOps

Analytic Apps

Designed for Everyone

**data
iku**

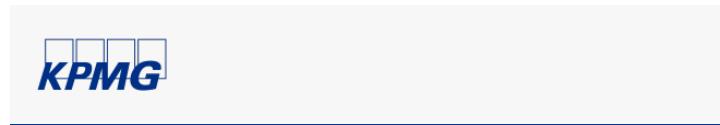
Product ▾ Solutions ▾ Stories ▾ Company ▾ Partners ▾ Blog CONTACT US GET STARTED

New

How to access Illuminate

Wednesday, January 18, 2023 at 11:32:04 Pacific Standard Time

Subject: You are invited to join the Innovation Platform!
Date: Wednesday, January 18, 2023 at 11:22:47 AM Pacific Standard Time
From: KPMG Illuminate US
To: Arvind Sathi
Attachments: a02daf1238e15f748cad8ba37093a7f5e77495f0



You are invited to join the Innovation Platform!

Hey Sathi, Arvind,

KPMG Illuminate administrator created an account for you and now waiting for you to complete the registration.

[Complete registration](#)

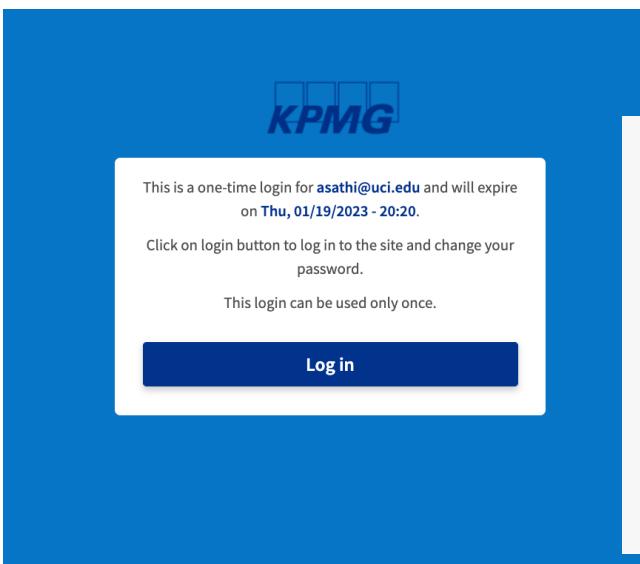
This link can only be used once to log in and will lead you to a page where you can set your password.

After setting your password, you will be able to log in in the future using:
<https://kpmg-us.live.itonicsit.de>

username: **asathi@uci.edu**
password: Your password

You have received this notification because you use ITONICS - the #1 innovation OS to empower collaboration and drive growth!

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You have just used your one-time login link. It is no longer necessary to use this link to log in. Please change your password.

Edit User

[Account Settings](#) Personal Data Notifications

E-Mail Address * asathi@uci.edu

Password Confirm Password

I have read and accept the KPMG Illuminate Terms & Conditions as shown above [Agree](#)

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[Cookies Policy - ITONICS Enterprise Application](#)

Last Update: 16th of May 2018
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What are cookies?
Cookies are small pieces of data sent from a website and stored on the user's computer by the user's web browser while the user is browsing the website. A cookie file allows the Service to work as designed.
Cookies can be "persistent" or "session-based".

How cookies are used?
When the Service is being used and accessed, a number of cookies files will be placed in the web browser.

Why are cookies used?
The Service uses both session and persistent cookies to ensure the technical function of the Service (cookies lifetime is indicated in parentheses below).

[ITONICS Privacy Policy](#)

About this policy
Along with our Cookie Policy, this policy explains how we collect and handle your information across all of our applications, mobile apps and other services. We'll review this policy from time to time to make sure it's up-to-date. If we make changes, we'll post the latest version here. When we make significant changes, we'll let you know when you next access our services, or by other communications.

change these Terms at any time. When changes have been made to these Terms, Guest will receive a notification that the Terms have changed upon

KPMG US Privacy Statement

Last updated July 1, 2021

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Please review this Privacy Statement to learn more about how we collect, use, share and protect the personal information that we have obtained. By engaging in Activities (e.g., using online services or visiting a KPMG office), you consent to the collection and processing of your personal information as set forth in this Privacy Statement.

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 - 1.1 Automatic Collection of Personal Information
 - 1.1.1 IP Addresses
 - 1.1.2 Cookies
 - 1.1.3 Interest-Based Advertising
 - 1.1.4 Do Not Track
 - 1.1.5 Usage Analytics
 - 1.1.6 Web Beacons

[Decline](#)

I have read and accept the KPMG Illuminate Terms & Conditions as shown above

[Agree](#)

Passwords match: yes

[Save](#)

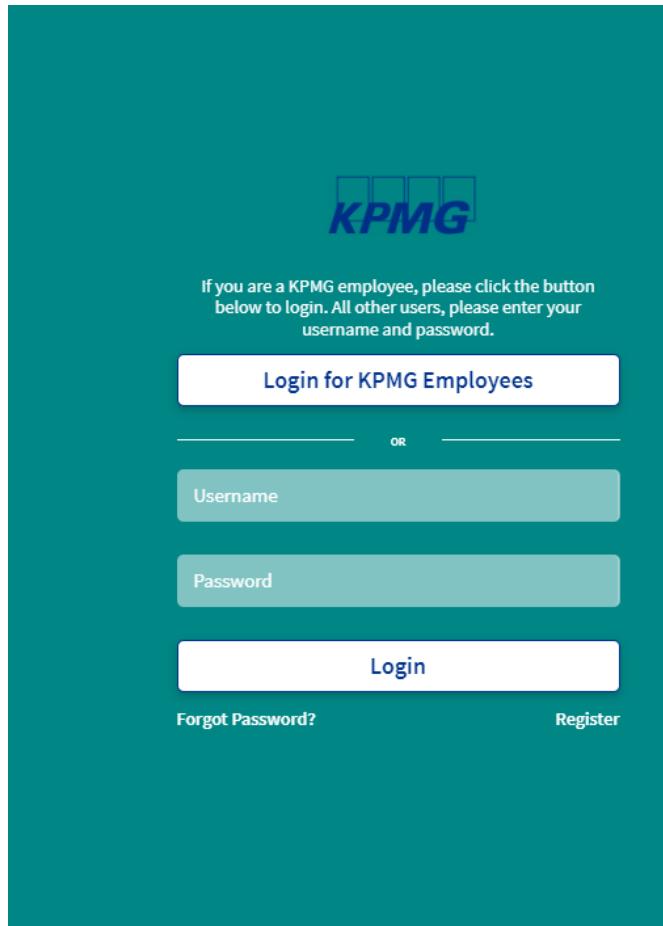
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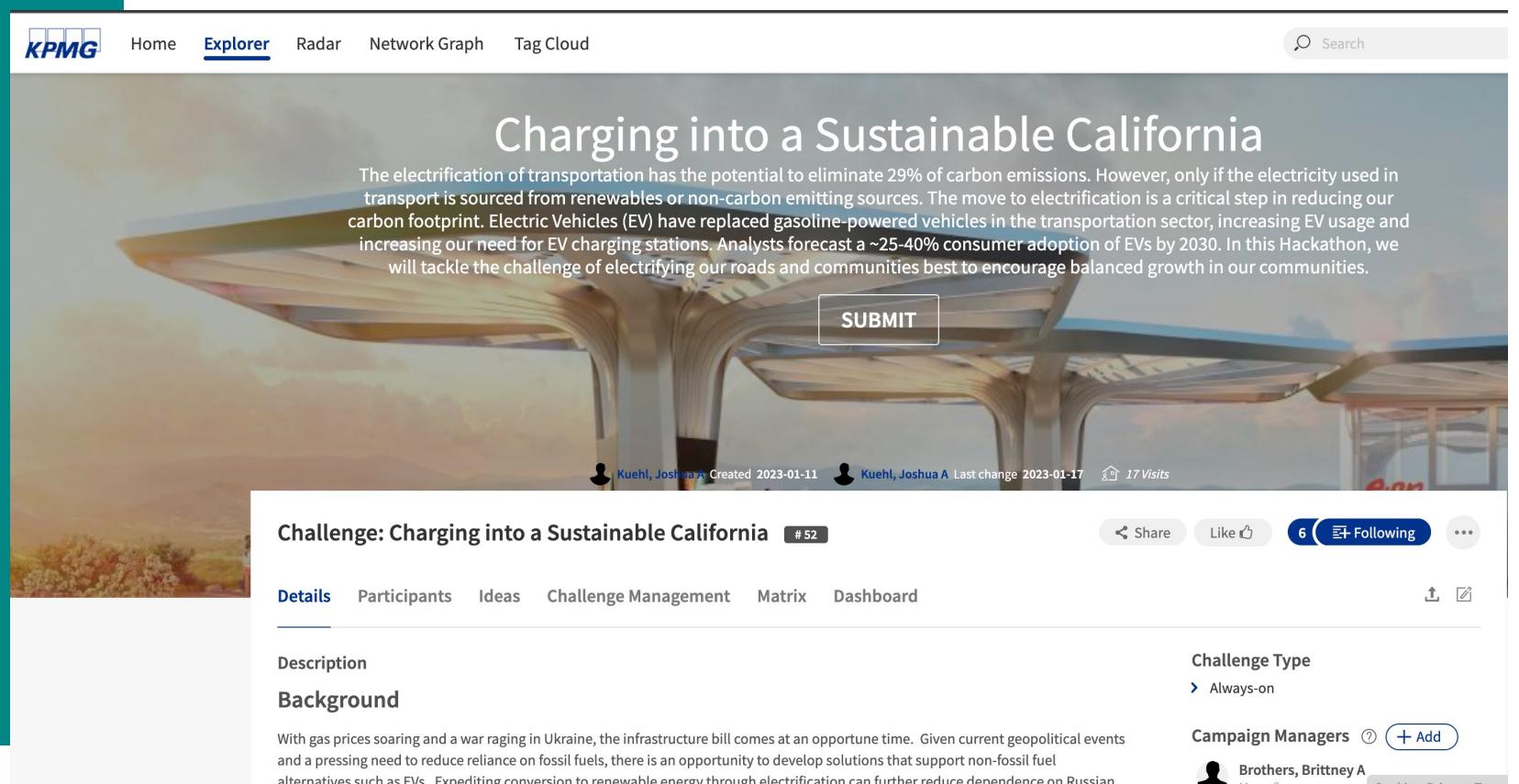
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New

Submit using Illuminate



The image shows the KPMG Illuminate login page. It features a teal header with the KPMG logo. Below the header, there is a message for KPMG employees: "If you are a KPMG employee, please click the button below to login. All other users, please enter your username and password." A white button labeled "Login for KPMG Employees" is present. Below this, a horizontal line with the word "OR" in the center separates the employee login from the standard user login fields. There are two light blue input fields: one for "Username" and one for "Password". Below these fields is a white button labeled "Login". At the bottom left is a link "Forgot Password?", and at the bottom right is a link "Register".



The image shows a challenge details page titled "Charging into a Sustainable California". The title is displayed prominently at the top of a large image showing a futuristic train in motion. Below the title, a descriptive text explains the potential of electric vehicle electrification to reduce carbon emissions. A "SUBMIT" button is located in the upper right corner of the image area. Below the image, the challenge's metadata is shown: "Kuehl, Joshua A Created 2023-01-11" and "Kuehl, Joshua A Last change 2023-01-17" with a "17 Visits" badge. The challenge title "Challenge: Charging into a Sustainable California" is followed by a "# 52" badge. Below the title, a navigation bar includes links for "Details", "Participants", "Ideas", "Challenge Management", "Matrix", and "Dashboard". To the right, there are sections for "Challenge Type" (set to "Always-on"), "Campaign Managers" (listing "Brothers, Brittney A" as a user), and links for "Cookies", "Privacy", and "Terms".

Timeline

Date	Time (EST)	Session
01/18/2023	12:30 to 1:30 pm	Hackathon Kick Off
01/30/2023	2:00 pm	Submit your entry
02/07/2023	4:00 to 5:30 pm	Final presentation to KPMG Judges

Raise questions on Teams channel.

Hackathon Success

Submission Checklist

- Team name and introductions
- Apply Methodology
- Identify data sets used
- Share model
- Tell a story related to insights
- Share recommendation

Judging Criteria

Technical

Hypothesis addresses the problem statement, data preparation is coherent, conclusions are supported.



Innovation & Creativity

Engaging and innovative hypothesis, good use of data to tell the story, a clear path to create action

Tips for Success

1. Develop a Precise Hypothesis

- Think about geographical boundaries
- Scalability
- Follow on projects

3. Keep It Under 8 Minutes and 50 Mb

2. Define Nebulous Terms for Clarity in Your Analysis

- Example: Living wage work does not mean the same thing in a developing country as the US

4. Build an Appendix

- Use for technical information

5. Anticipate the Judging Process

- Preliminary Round Judging
- Final Round Judging

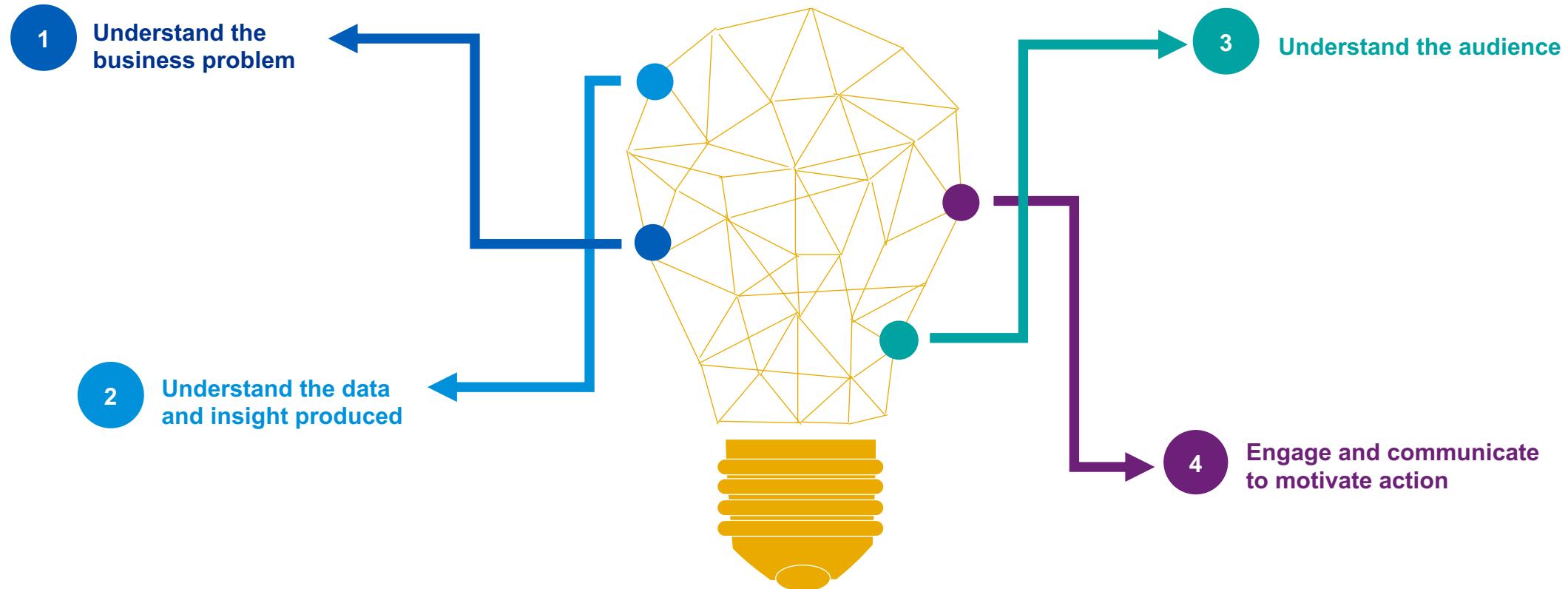
Hypothesis Development vs Data Science Experimentation

How does data science help you in your problem solving?

We develop causal hypotheses and use data to substantiate those hypotheses.

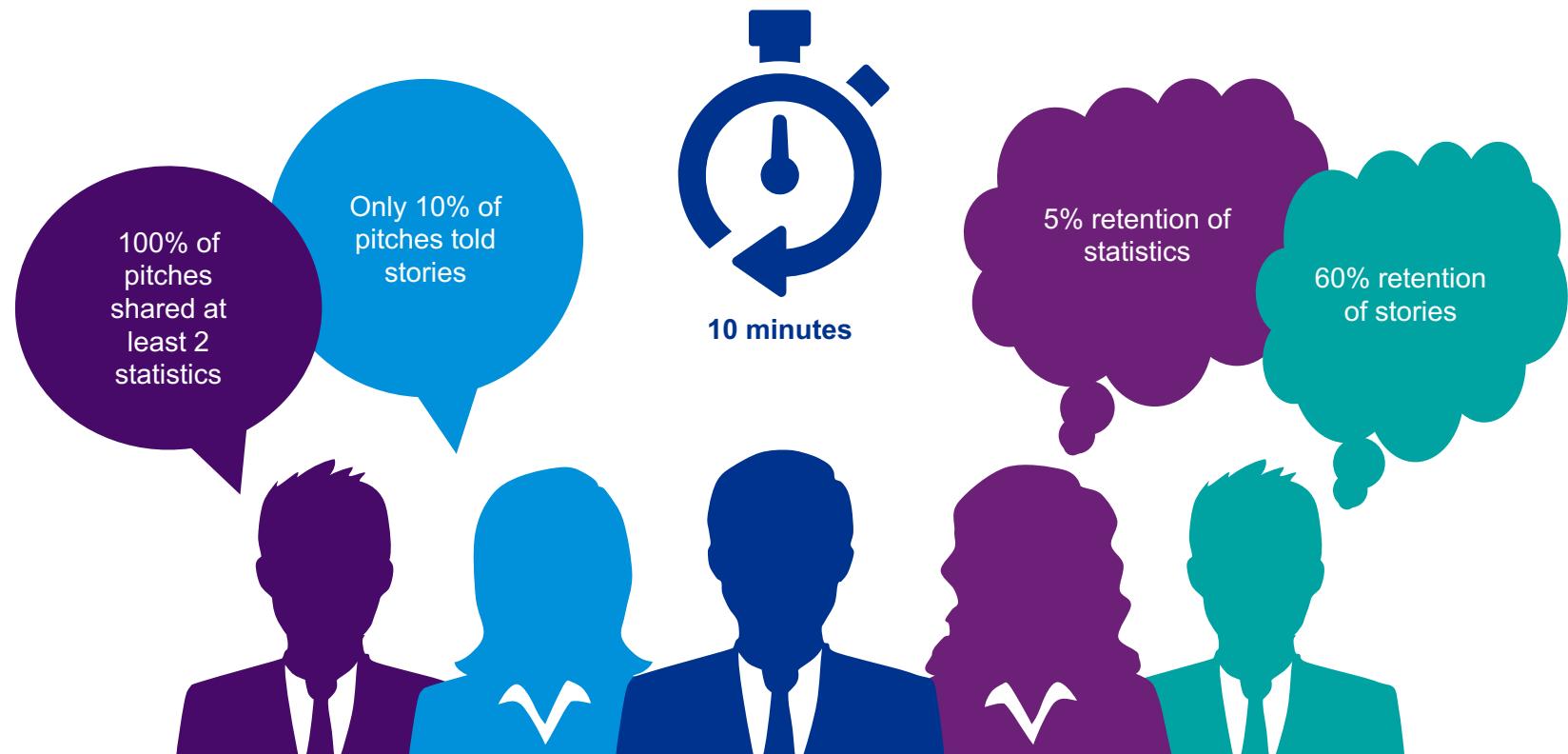
Data storytelling and motivating action

Connecting with the audience in an engaging way that leads them from the business question, developing credibility in the underlying data, and ultimately developing visualizations that explain the insight developed to help drive decision making.



What will your audience remember?

We spend a lot of time on the mechanics to be credible; however, people can often get lost in the details. We have to connect to something of value to the audience. The right data and insights told the wrong way, will not be acted on. The way you drive value is by acting on decisions.



User Persona – Start your story with a User

Can you use analytics to answer your user's questions?

Jane Smith



Occupation: Works in retail

Interests: Jane is a people person and likes that her job involves interacting with people.

Concerns: She is afraid to catch germs and pass to others in the family.

Decision-making style:

Needs proof to be convinced.
Can deal with numbers and charts.

User Questions:

- Current COVID spread in my community?
- What is the current vaccination rate?
- Projections for vaccination in near future?
- Short term forecast?

Usage Scenario – What is really driving your user?

Let me use analytics to help Dr. Jones respond to the question from Janice.

Janice Smith



Dr. Jones



I am planning a 50-people indoor birthday party in early March.

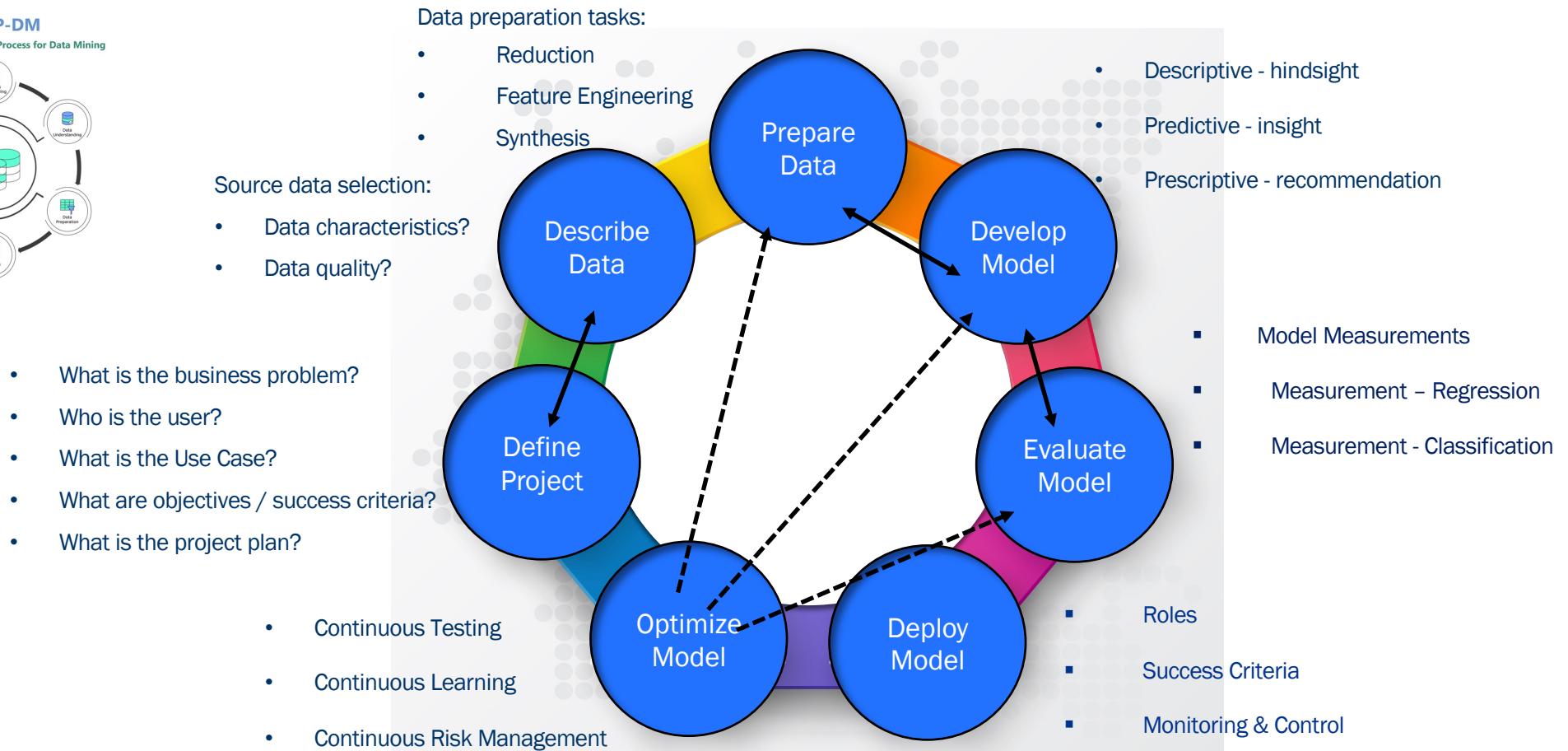
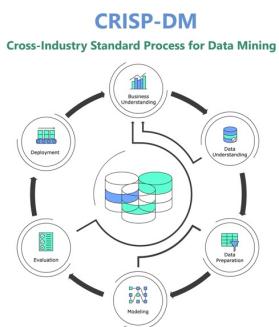
On Jan 26th, there were 3,543 Covid-related deaths in US.

What is the projection for Covid severity in late February?

Is it safe for my family and friends to attend my party?

Data Science Methodology

What steps would you take to analyze the data to make an informed decision and how would you convey that decision to your user?



Step 2 – Describe Data - Example

Before analysis, make observations about your data and make sure you believe the data.

2.4 Describe Data Values

COVID_Confirmed_USA_Facts – Basic Statistics

A	B	C	D	E	F	G	LY	LZ	MA
	countyFIPS	County Name	State	stateFIPS	1/22/20	1/23/20	12/18/20	12/19/20	12/20/20
	56035	Sublette County	WY	56	0	0	562	563	565
	56037	Sweetwater County	WY	56	0	0	2696	2702	2718
	56039	Teton County	WY	56	0	0	1990	1992	2002
	56041	Uinta County	WY	56	0	0	1399	1406	1416
	56043	Washakie County	WY	56	0	0	690	695	699
	56045	Weston County	WY	56	0	0	443	443	446
Count	3,195	3,195	3,195	3,195	3,195	3,195	3,195	3,195	3,195
Minimum	0	n/a	n/a	1	0	0	0	0	0
Maximum	56,045	n/a	n/a	56	1	1	596,721	610,372	623,670
Average	29,882	n/a	n/a	30	0	0	5,353	5,411	5,463
Median	29,123	n/a	n/a	29	0	0	1,366	1,376	1,389
Mode	0	n/a	n/a	48	0	0	0	0	0

Minimum Covid cases on Dec 18, 2020, is 0!

Step 3 – Prepare Data – Transformation Example

While you may have the right data, it may not be in the right format and may need to be transformed.

A	B	C	D	ABG	ABH	ABI	ABJ	ABK	ABL	ABM
countyFIPS	County Name	State	StateFIPS	1/21/22	1/22/22	1/23/22	1/24/22	1/25/22	1/26/22	1/27/22
6059	Orange County	CA		496944	500413	503296	507671	509881	510999	511260

USA Facts data has dates in columns

Transform

- State and county as index
- New column - Date
- New column - Total Cases

County Name	countyFIPS	State	StateFIPS	Date	Total Cases
Orange County	6059	CA	6	1/21/22	496944
Orange County	6059	CA	6	1/22/22	500413
Orange County	6059	CA	6	1/23/22	503296
Orange County	6059	CA	6	1/24/22	507671
Orange County	6059	CA	6	1/25/22	509881
Orange County	6059	CA	6	1/26/22	510999
Orange County	6059	CA	6	1/27/22	511260

Step 3 – Prepare Data – Transformation Example

What steps would you take to analyze the data to make an informed decision and how would you convey that decision to your user?

A	B	C	D	ABG	ABH	ABI	ABJ	ABK	ABL	ABM
countyFIPS	County Name	State	StateFIPS	1/21/22	1/22/22	1/23/22	1/24/22	1/25/22	1/26/22	1/27/22
6059	Orange County	CA		496944	500413	503296	507671	509881	510999	511260

USA Facts data has dates in columns

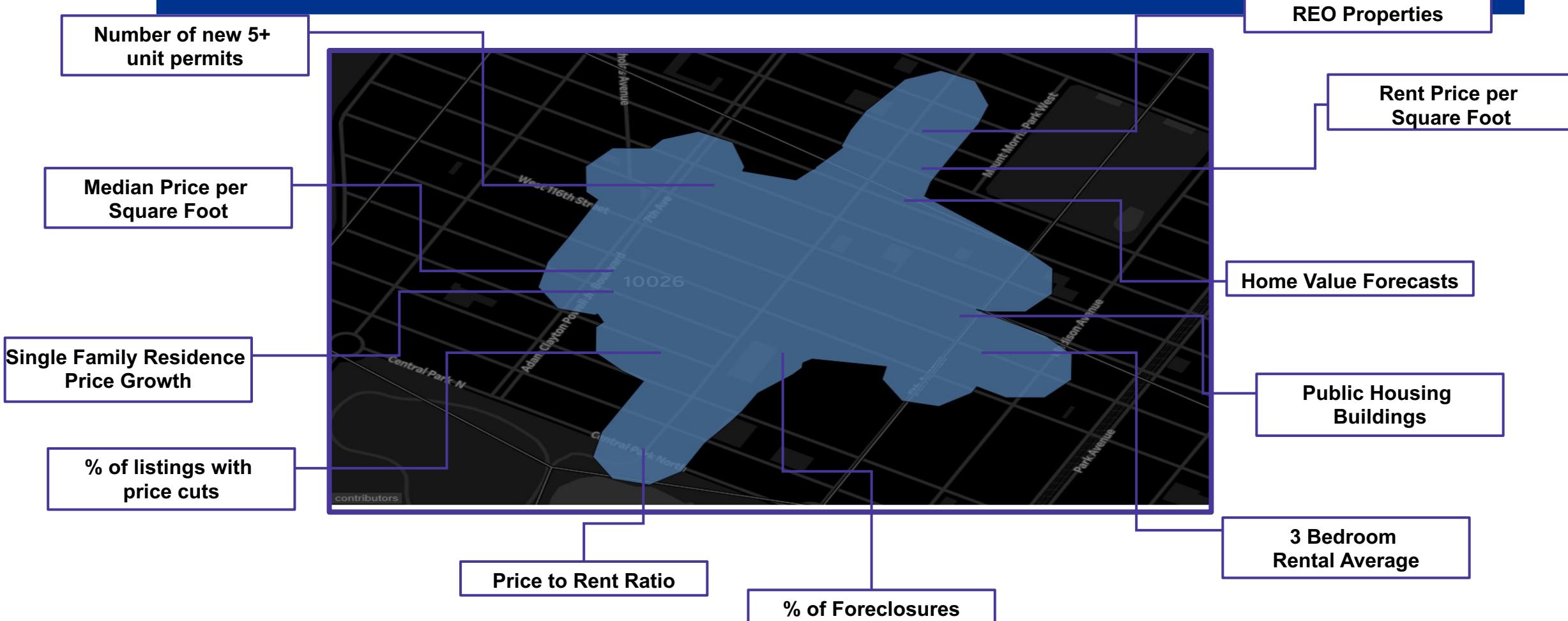
Transform

- State and county as index
- New column - Date
- New column - Total Cases

County Name	countyFIPS	State	StateFIPS	Date	Total Cases
Orange County	6059	CA	6	1/21/22	496944
Orange County	6059	CA	6	1/22/22	500413
Orange County	6059	CA	6	1/23/22	503296
Orange County	6059	CA	6	1/24/22	507671
Orange County	6059	CA	6	1/25/22	509881
Orange County	6059	CA	6	1/26/22	510999
Orange County	6059	CA	6	1/27/22	511260

Feature Engineering to create Signals

Hundreds of signals can be created and combined for decision-making



Step 3 – Prepare Data – Feature Engineering Example

Feature engineering involves creating new variables that are easier to analyze and visualize.

USA Facts reports total cases.

Incremental cases = Total Cases (date) – Total Cases (previous date)

Group by state and county

Subtract previous row

County Name	countyFIPS	State	StateFIPS	Date	Total Cases
Orange County	6059	CA	6	1/21/22	496944
Orange County	6059	CA	6	1/22/22	500413
Orange County	6059	CA	6	1/23/22	503296
Orange County	6059	CA	6	1/24/22	507671
Orange County	6059	CA	6	1/25/22	509881
Orange County	6059	CA	6	1/26/22	510999
Orange County	6059	CA	6	1/27/22	511260



County Name	countyFIPS	State	StateFIPS	Date	Total Cases	Inc_Cases
Orange County	6059	CA	6	1/21/22	496944	3731
Orange County	6059	CA	6	1/22/22	500413	3469
Orange County	6059	CA	6	1/23/22	503296	2883
Orange County	6059	CA	6	1/24/22	507671	4375
Orange County	6059	CA	6	1/25/22	509881	2210
Orange County	6059	CA	6	1/26/22	510999	1118
Orange County	6059	CA	6	1/27/22	511260	261

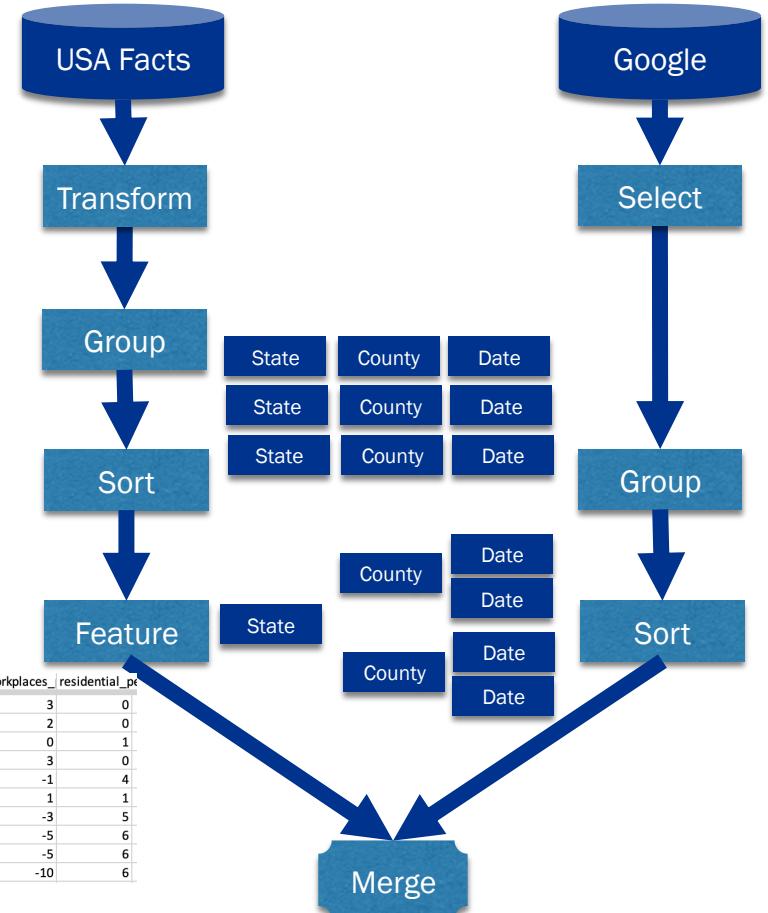
Step 3 – Prepare Data – Merge Example

Data from multiple sources is merged to form an Analytics Base Table (ABT)

Merge USA Facts and Google Data

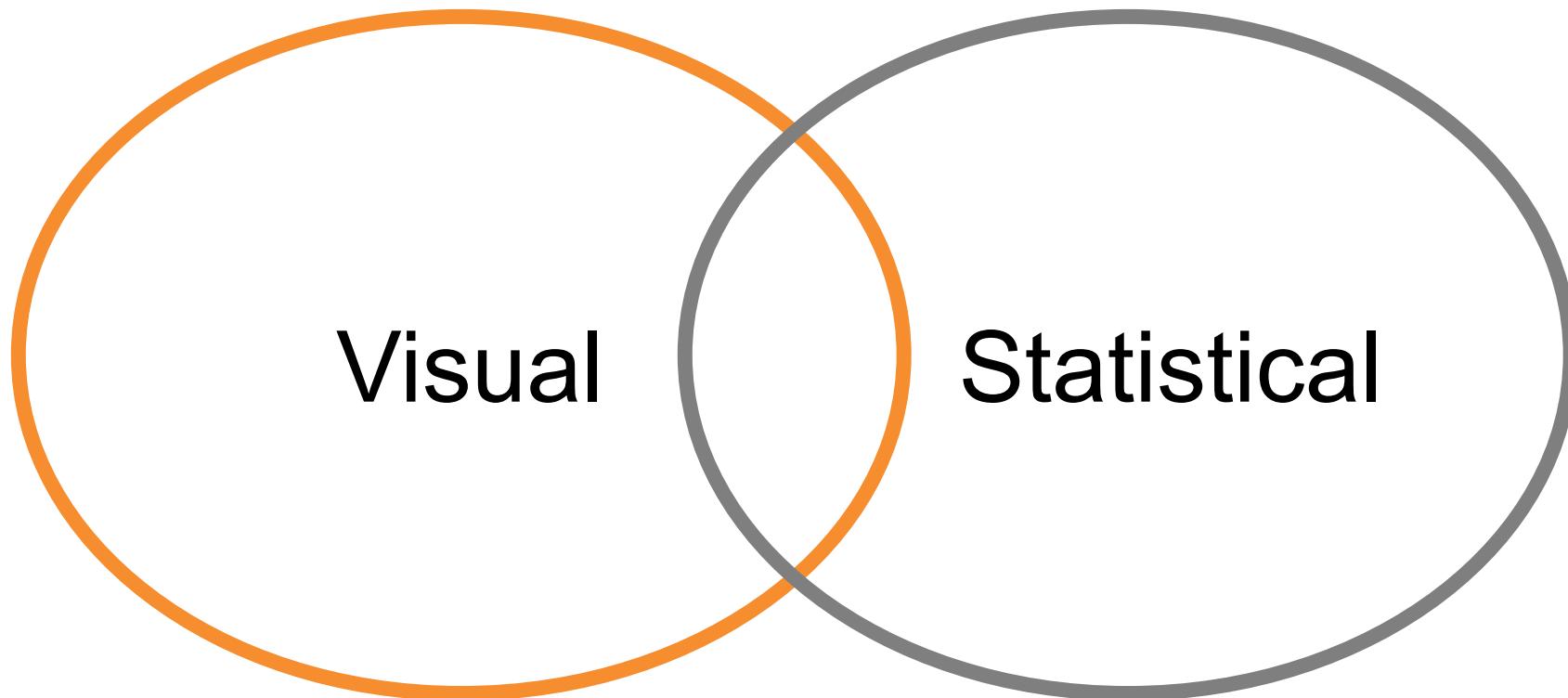
- Index: CountyFIPS, date
- Overlapping data - Inner merge

State	StateFIPS	County Name	countyFIPS	Date	Total Cases	Incremental	cases moving	Total Deaths	Inc Deaths	death moving	retail_and_recreation_percent	grocery_and_parks_percent	transit_stations_percent	workplaces_percent	residential_percent	
CA	6	Orange Count	6059	3/6/20	83	3	4.571428571	0	0	0	1	2	6	-3	3	0
CA	6	Orange Count	6059	3/7/20	98	15	5.857142857	0	0	0	-1	3	12	-4	2	0
CA	6	Orange Count	6059	3/8/20	124	26	9.285714286	0	0	0	1	0	17	-8	0	1
CA	6	Orange Count	6059	3/9/20	132	8	9.714285714	0	0	0	3	2	9	-6	3	0
CA	6	Orange Count	6059	3/10/20	157	25	12.85714286	0	0	0	-1	1	-30	-15	-1	4
CA	6	Orange Count	6059	3/11/20	186	29	16.28571429	0	0	0	3	4	7	-7	1	1
CA	6	Orange Count	6059	3/12/20	206	20	18	0	0	0	-5	10	-40	-21	-3	5
CA	6	Orange Count	6059	3/13/20	236	30	21.85714286	0	0	0	-4	39	-38	-23	-5	6
CA	6	Orange Count	6059	3/14/20	272	36	24.85714286	0	0	0	-15	33	-32	-23	-5	6
CA	6	Orange Count	6059	3/15/20	310	38	26.57142857	0	0	0	-18	15	-7	-26	-10	6



Step 3 – Develop Model – Visual vs Statistical

Do not hide behind statistics. Visual modeling is often better than a complicated statistical model.



Step 3 – Develop Model – Descriptive Analysis

Past data can be analyzed to spot trends and patterns using Descriptive Analysis.

Focus Area

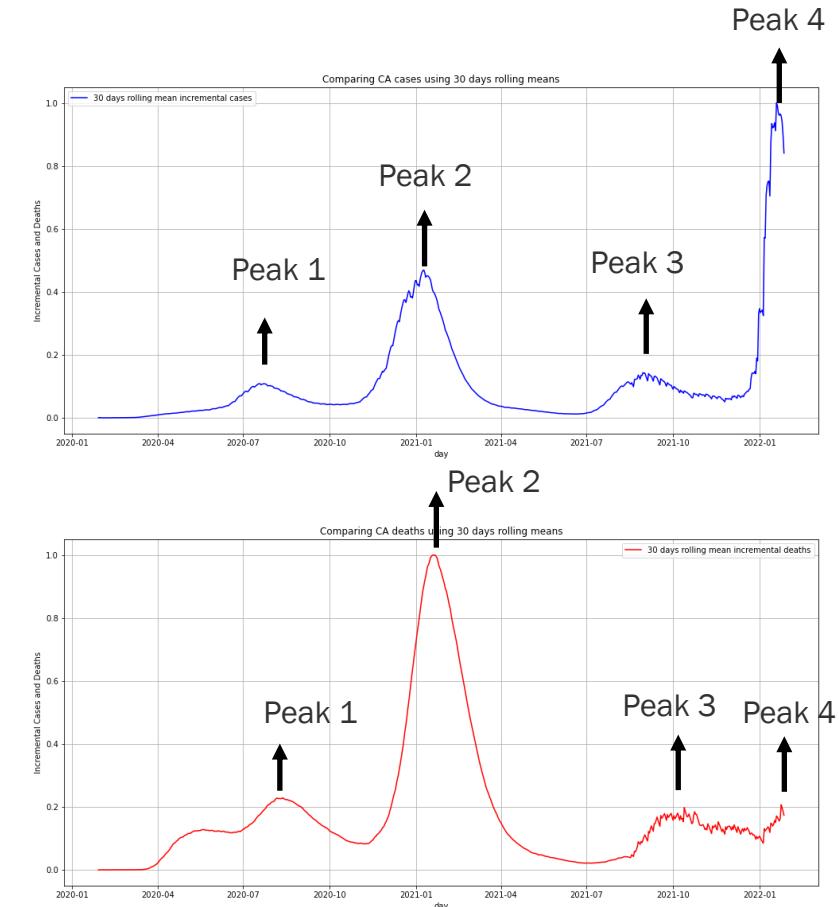
- Analysis of Historical Data
- Hindsight
- Peaks of Covid cases in California
- Peaks of Covid deaths in California

Used For

- Business Reporting
- Dashboards
- KPI Score Cards
- Data Marts

Outcomes

- Ability to visualize past data



Step 4 – Develop Model – Predictive Analysis

Can we use the time delay between past covid cases and deaths to predict future rise in severity.

Focus Area

- Prediction of future events
- Insights
- Will cases trend up or trend down?
- Time lag between cases, hospitalization and deaths

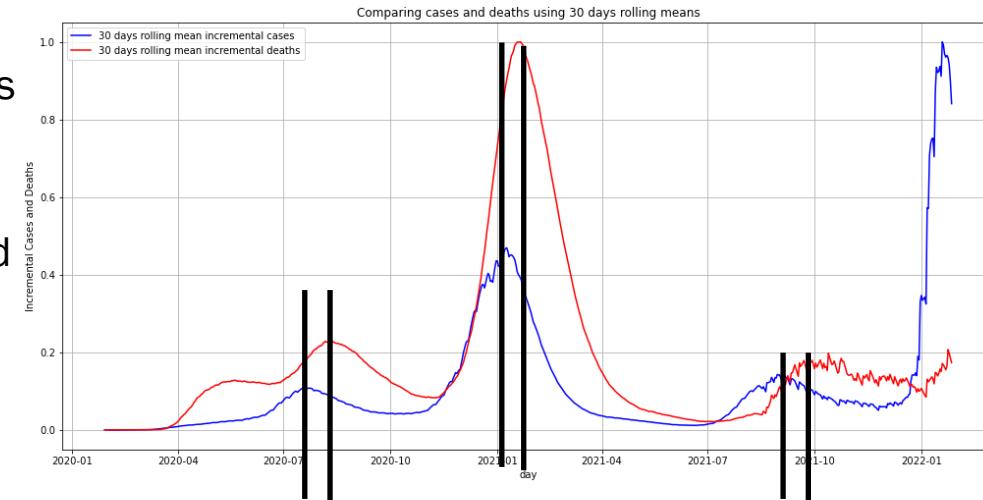
Used For

Enablers

- Data visualization
- Text Mining
- Machine Learning

Outcomes

- Ability to estimate future events



Step 4 – Develop Model – Prescriptive Analysis

Can we combine past trends, future predictions and expert-provided heuristics to make a decision.

Focus Area

- Prescription for action

Used For

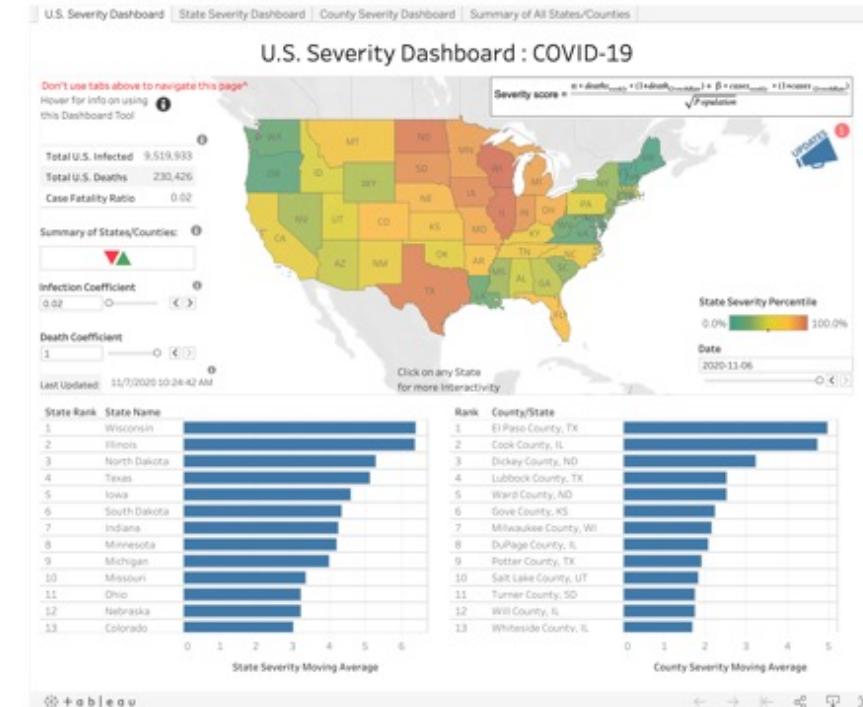
- Making decisions
- What are the safe spots to travel next month?
- Should be drop masking requirements in social gatherings?

Enablers

- Decision Modeling
- Expert Systems (AI)
- Simulation
- Scoring Engines

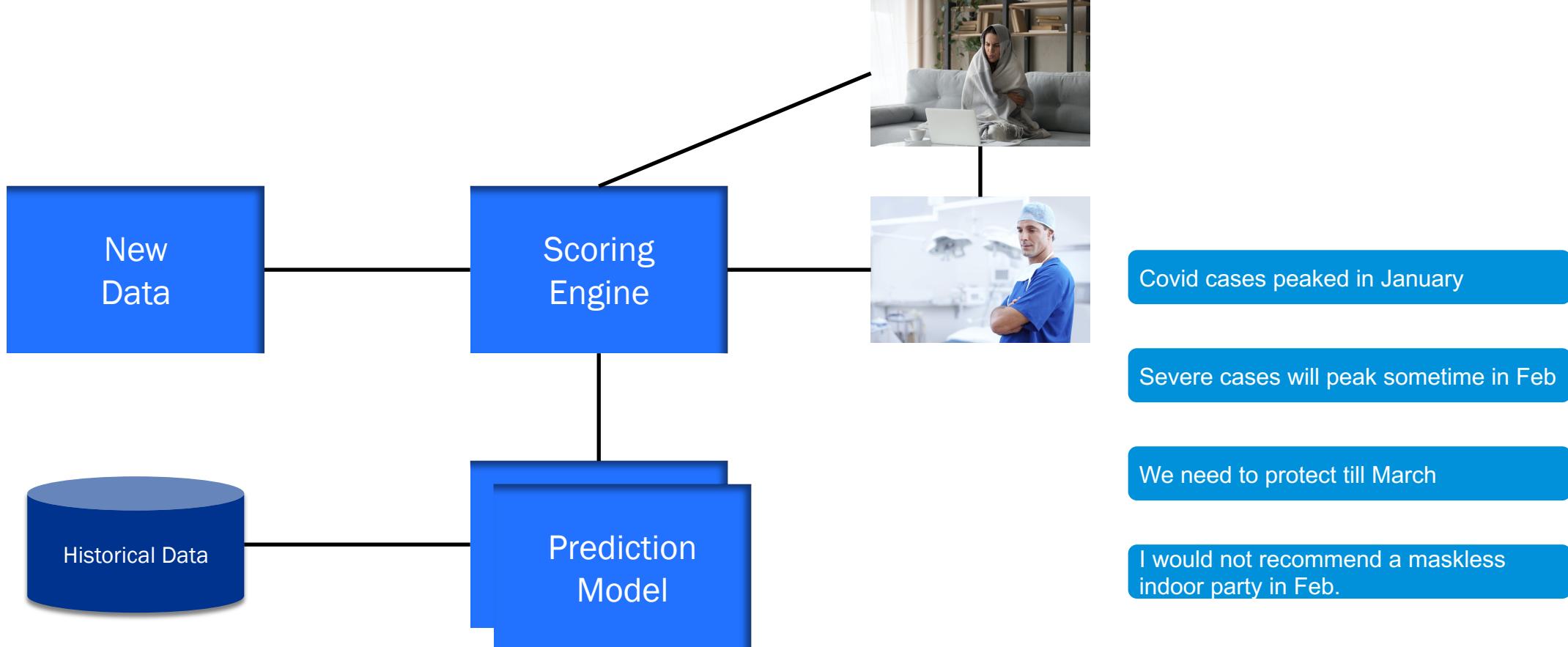
Outcomes

- Recommendation to user



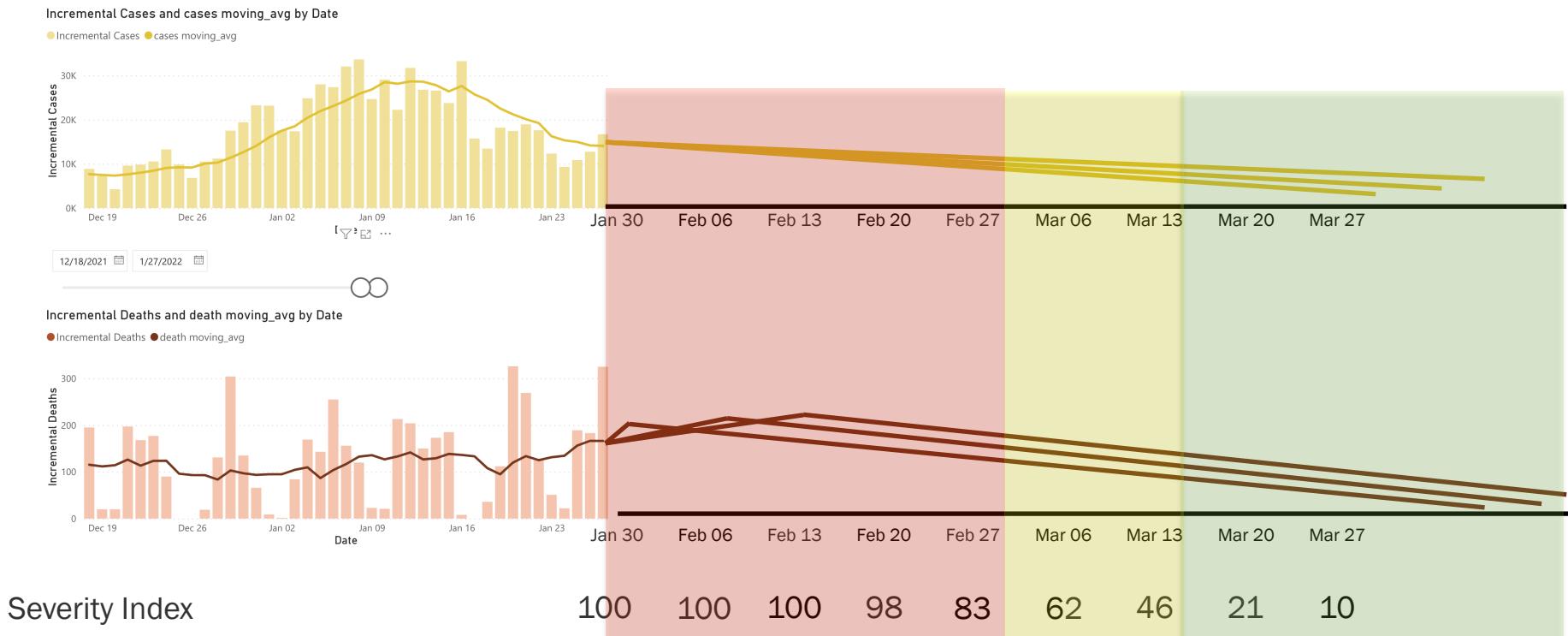
Step 5 – Deploy Model – Scoring Engine

The model can now be used by Dr. Jones to respond to the question Janice asked.



Step 5 – Deploy Model – Visualize the model output

Janice is comfortable with data and charts and needs proof to be convinced.



Summary

Winners are better at explaining what they did

- CRISP-DM provides a framework for defining the overall data science project.
- Define Project - identifies the business purpose and success criteria.
- Describe Data - allows us to identify details of data sources.
- Prepare Data - transforms the data to the format needed for modeling.
- Develop Model - can be performed in many ways
 - Visual inspection is a good way to get started.
 - If you do not see expected patterns in your data, you probably need to work on your data transformations and feature engineering
 - Model must correspond to the business understanding
- Deploy Model – Scoring Engines, reports and graphs can be used to summarize input data and model results.



Case Study



For Better with Data

BTT Presentation to KPMG

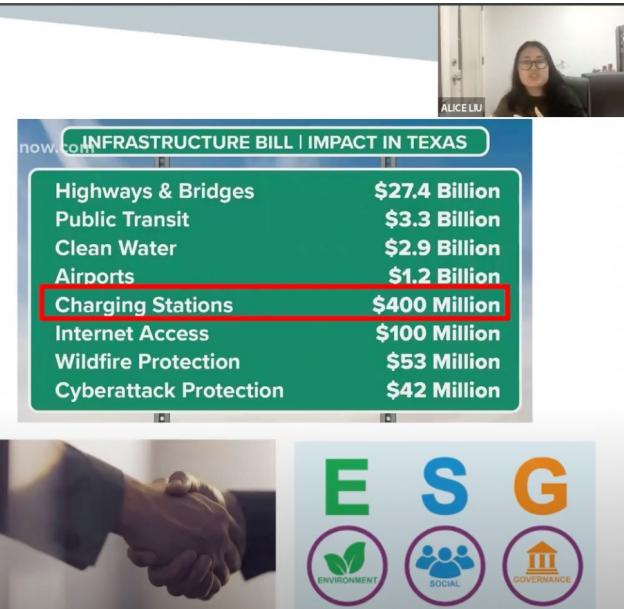
“

To prescribe placement of electric vehicle charging stations that appeals to the private corporation persona within the Dallas, TX area.

—

Business Impact

- KPMG Clients
- ESG Goals
- The Bipartisan Infrastructure Bill



BTT Presentation to KPMG

Key Findings



The logo consists of a green circle containing the text "EVCS Supply and Demand".

Understanding the supply and demand of EV Charging Station

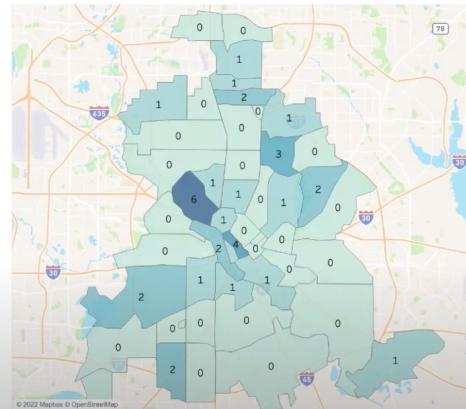
The logo consists of a teal circle containing the text "EVCS Demand Analysis".

Explaining underlying factors affecting demand

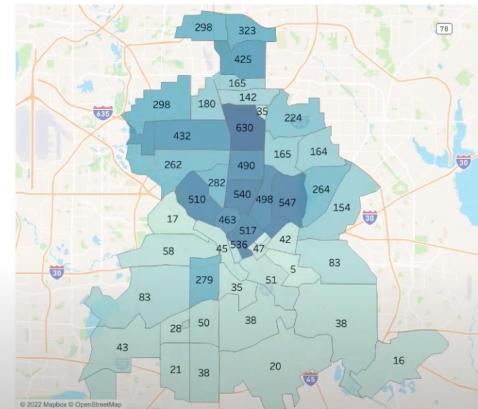
Optimal Placement of EVCS

Placing future EV Charging Stations

Supply and Demand



EV charging stations



EV registrations

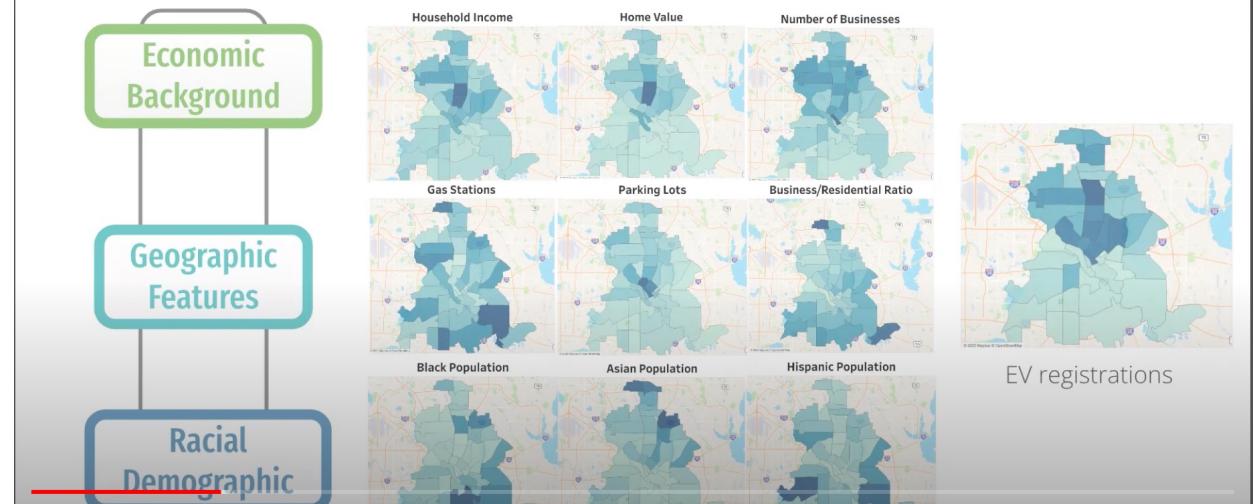


BTT Presentation to KPMG

Demand Analysis

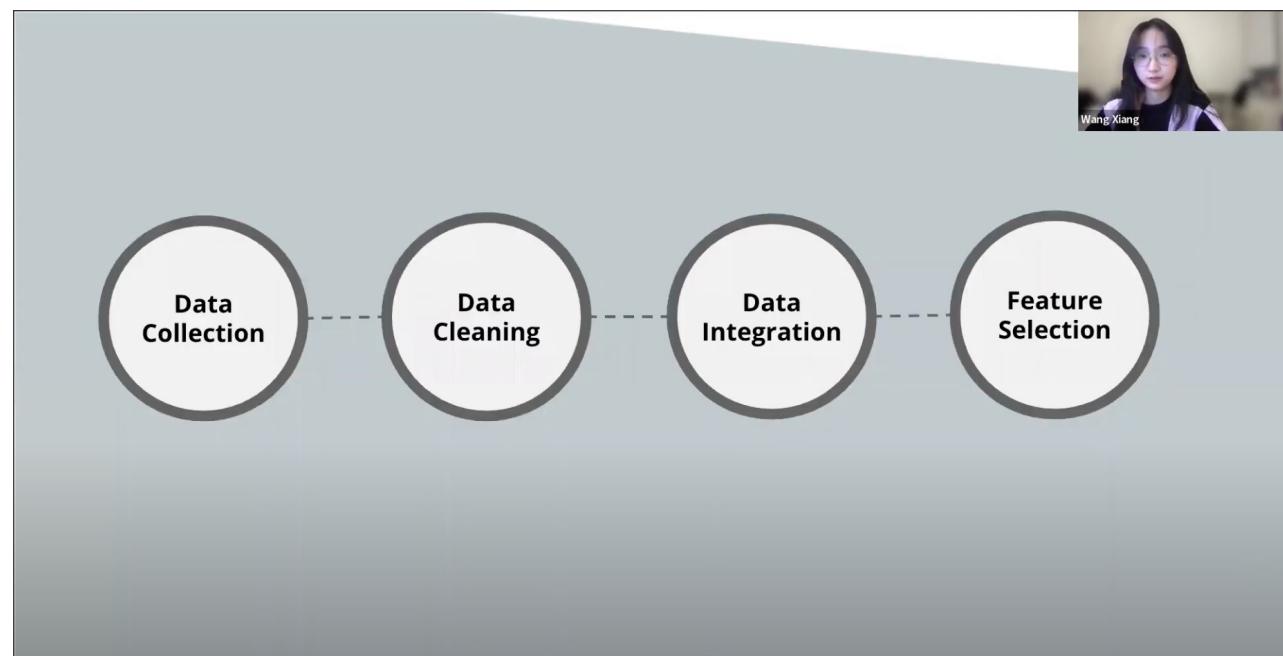
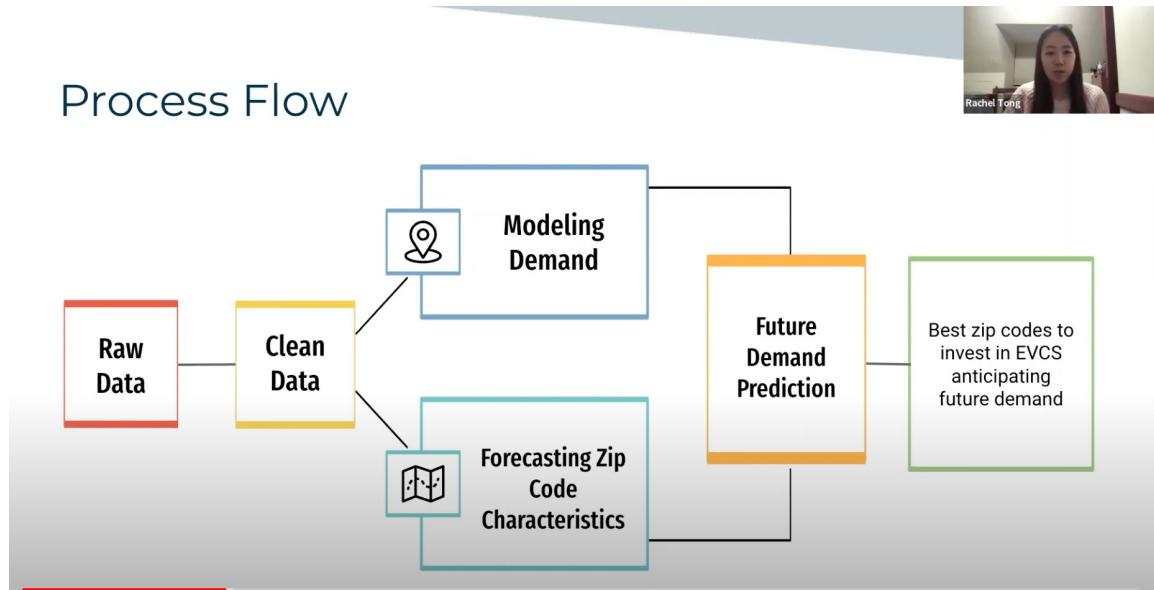


Demand Analysis



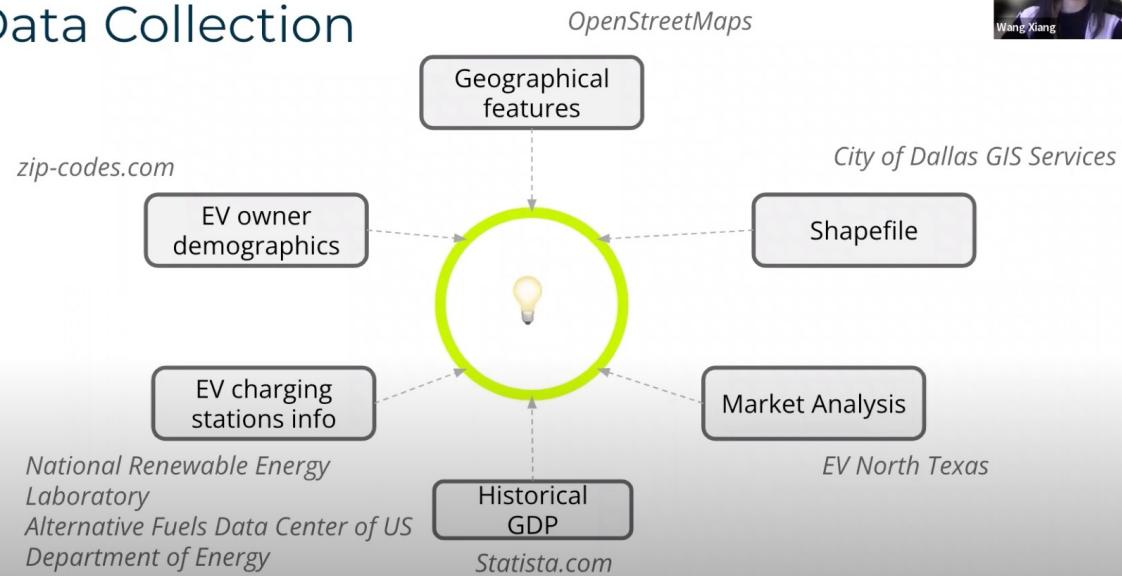
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Process Flow



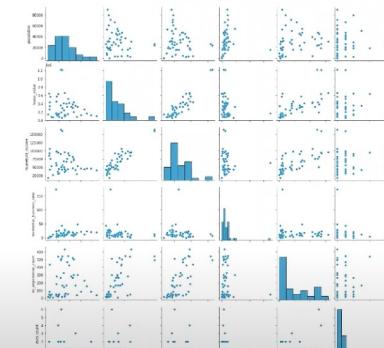
BTT Presentation to KPMG

Data Collection

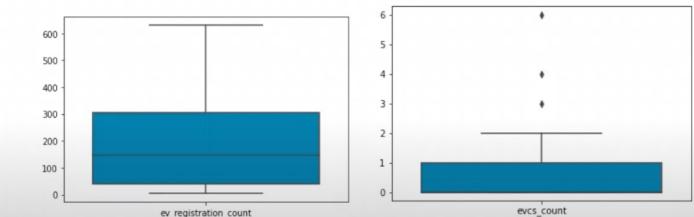


Wang Xiang

Data Integration & EDA



Have a basic understanding of what the data looks like and the relationship between columns to facilitate feature selection



There are more variations in EV registration count than in EV charging station count in our dataset

BTT Presentation to KPMG

Feature Selection



Demographics

- Population
- Gender
- Race & Ethnicity

Geographic Features

- Business / Residential Building Ratio
- Shops
- Parking Lots
- Gas Stations

Economic Background

- House Value
- Household Income
- **EV registrations**

Model Overview

EV Registrations ~ Economic + Geographic + Demographic Features

Model	Simple	Explainable	Feature Selection	Quick to Train	Inflexible
OLS	✓	✓		✓	✗
Lasso	✓	✓	✓	✓	✗
Random Forest		✓	✓		
Gradient Boosted Trees			✓		

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Model Comparison

Model Name	Description	RMSE
OLS	Fits a hyperplane by assigning optimal weights to each feature	191
Lasso	OLS that penalizes features with large weights	117
Random Forest	Fit multiple "overfit" trees in parallel and average the results	75
Gradient Boosted Decision Tree	Iterative tuning of a tree by correcting errors	79

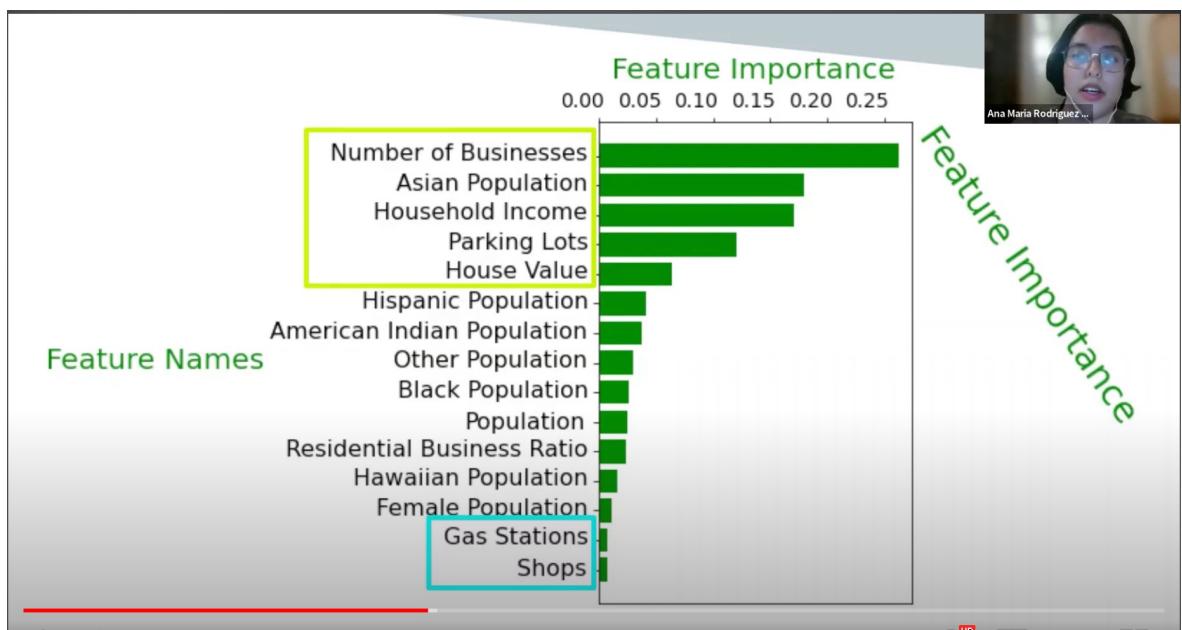
$$\text{RMSE} \sim (y_{pred} - y_{ref})^2$$

5 - 630

Range



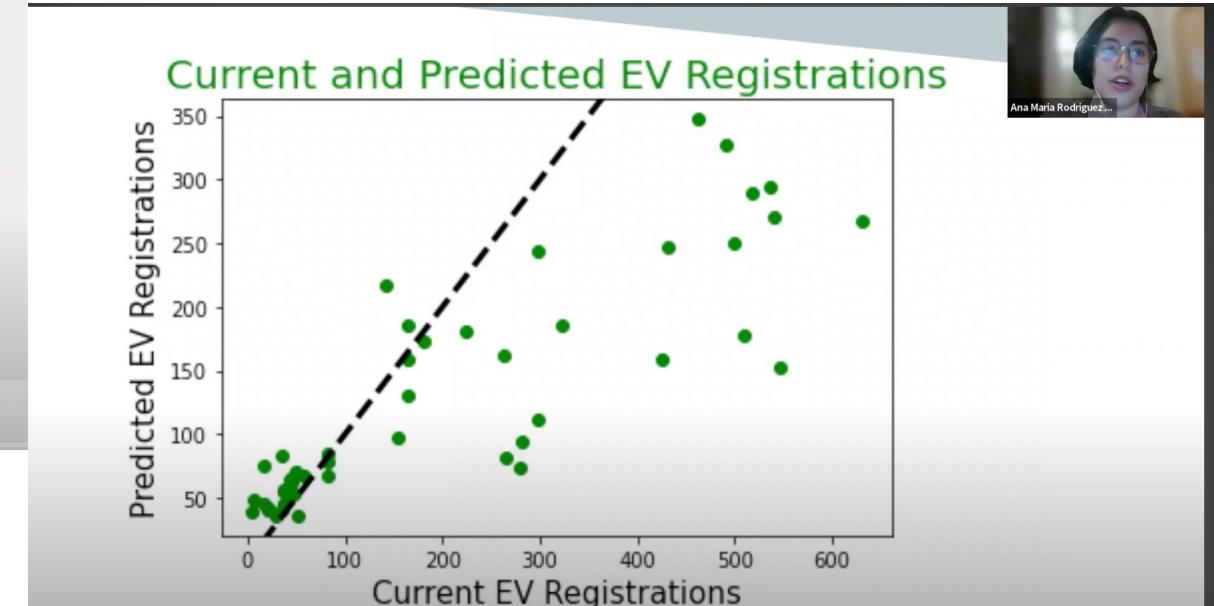
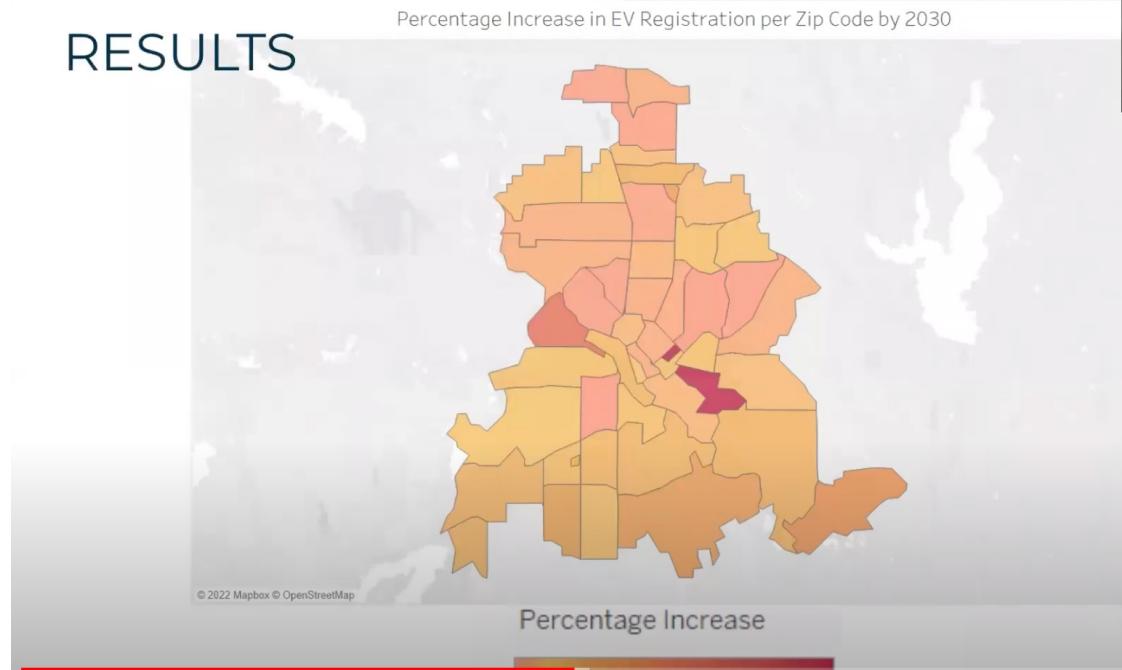
Melina Tsai



Ana Maria Rodriguez

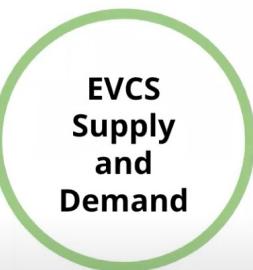
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RESULTS



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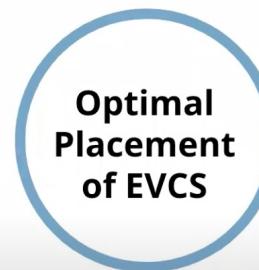
What We Learned



Supply and Demand
of EV Charging
Stations



Most Important
Features: Number of
Businesses, Asian
Population, Household



Place in Zip Codes
with Highest
Demand Increase

Next Steps

-
- A large video thumbnail showing a woman with dark hair, identified as Rachel Tong, speaking.



Q&A



For Better with Data



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