Tableau Platform for Deploying Data Science

TC22 Hands-On Training

Amir Meimand & Larry Clark

Amir Intro

- Live in San Jose, CA
- Joined Tableau in October, 2019
- Not a real doctor (some people may say)
- Big fan of ‘The Office’

Larry Intro

- Live in Austin, TX
- Joined Tableau in October, 2018
- We have two dogs (on purpose) and three cats (by luck)
- YouTube video with 1.2MM views

TC22 AI/ML Workshops

Empirical ML engine powering Explain Data

Tableau

You are Here!

External ML Services

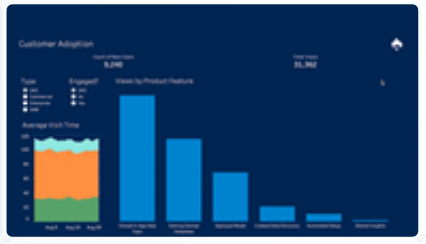
HOT: Data Science with Tableau Native

HOT: Tableau Platform for Deploying Data Science

Einstein Discovery Integration

Analytics Extensions

HOT: Tableau Business Science

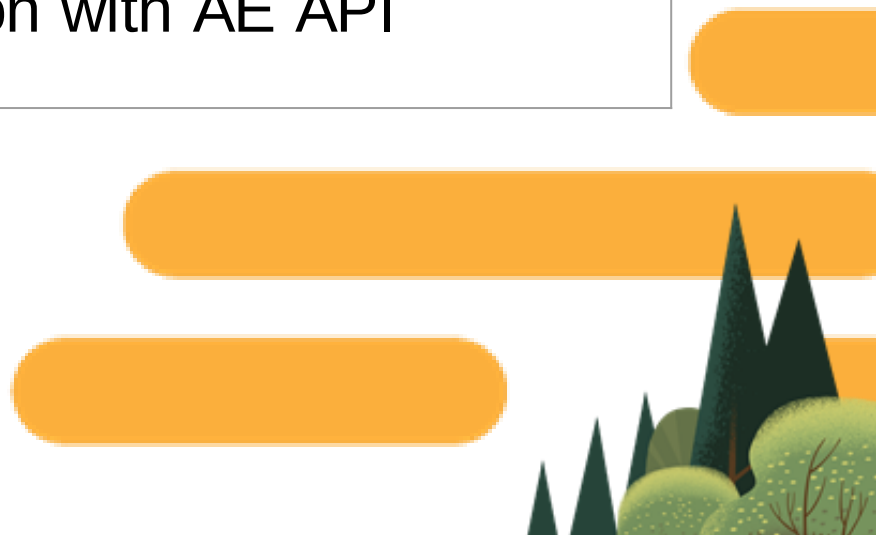


Einstein Discover in Tableau

Tableau Platform for Deploying Data Science

Agenda

:00 - :05	Introductions
:05 - :25	TabPy example, demo & hands-on
:25 - :50	Analytics Extension API demo & hands-on
:50 - :60	Third-party ML (ex: SageMaker) integration with AE API



What is the Analytics Extensions API?

- **Extend Tableau calculations to dynamically include popular data science programming languages and external tools and platforms**
- **Create integrations similar to Tableau's integrations with TabPy and MATLAB**
- **TabPy API expanded to make it more generalizable to any external analytics engine**

Analytics extensions can receive data from Tableau in real time and return data after it has been scored, transformed, or augmented

Use Cases:

- **Add a new programming language as a calculation engine to Tableau**
- **Call a web service directly from a calculation**

Augmented Analytics & Data Science Strategy

Leveraging AI Across the User Spectrum

TABLEAU CONFERENCE

Business Scientists
Guided & Automated ML

No-code ML Model Authoring

Simulation

Scoring in Data Pipelines

Visual Advanced Analytics & Predictive Calculations

Prediction Monitoring

BI Analysts & Explorers
AI-augmented analysis

Discovery Stories
Explain Data
Report Insights

Ask Data
Conversational Queries

End Users
Better, Faster Decision-making with AI

Data Scientists
Deploy & scale bespoke models

BYOM

Analytics Extensions

Notebooking

Prep Script Nodes

Tableau Native DS Capabilities

TC22 HOT Session: “Hands-on: Advanced Analytics with Tableau Native Functions”

Predictive Modeling Functions - Tableau

Function	Syntax	Description
MODEL_QUANTILE	`MODEL_QUANTILE( model_specification (optional), quantile, target_expression, predictor_expression(s))`	Returns a target numeric value within the probable range defined by the target expression and other predictors, at a specified quantile. This is the Posterior Predictive Quantile. Example: `MODEL_QUANTILE(0.5, SUM([Sales]),COUNT([Orders]))`
MODEL_PERCENTILE	`MODEL_PERCENTILE( model_specification (optional), target_expression, predictor_expression(s))`	Returns the probability (between 0 and 1) of the expected value being less than or equal to the observed mark, defined by the target expression and other predictors. This is the Posterior Predictive Distribution Function, also known as the Cumulative Distribution Function (CDF). Example: `MODEL_PERCENTILE( SUM([Sales]),COUNT([Orders]))`

How Predictive Modeling Functions Work in Tableau - Tableau

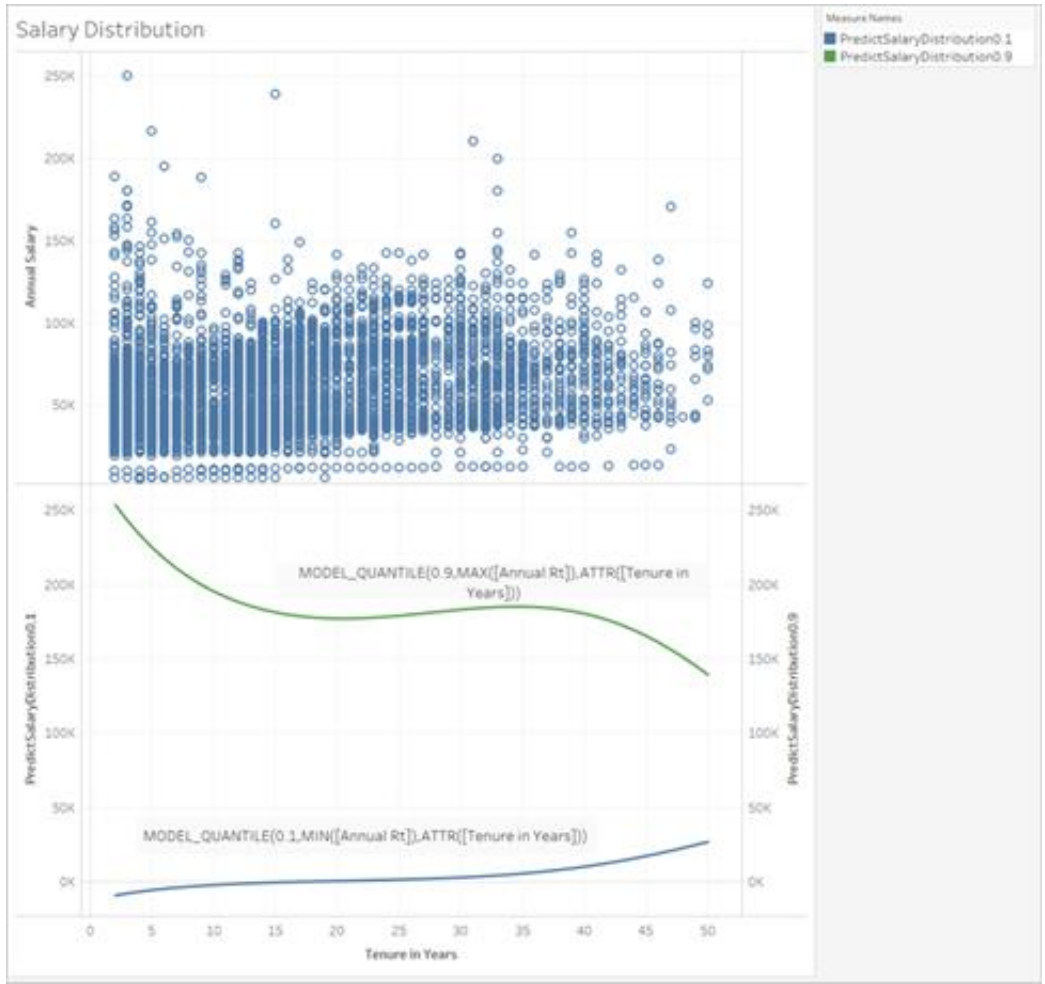


Tableau Data Science Integration

Bring your Data and ML model together

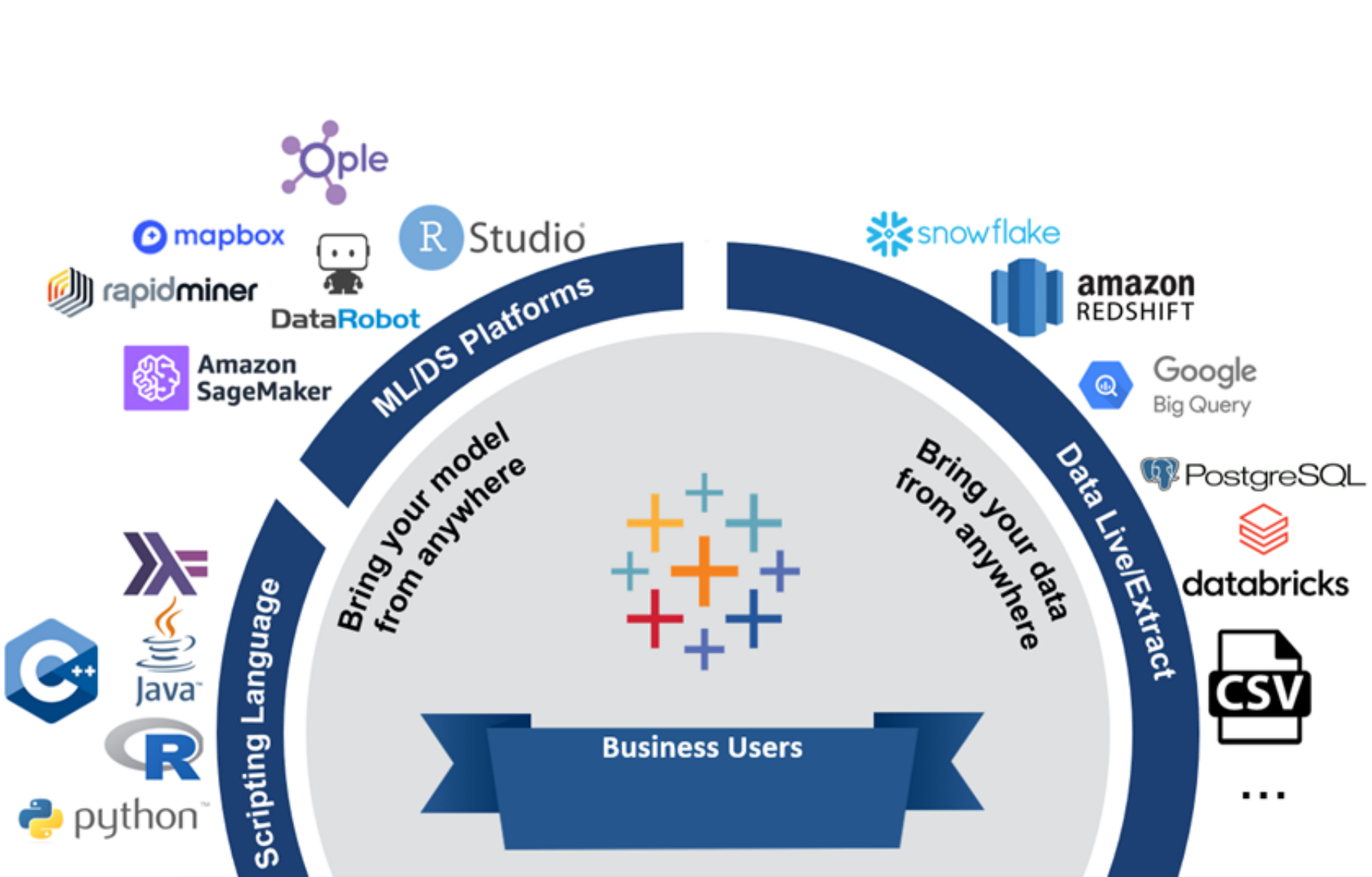
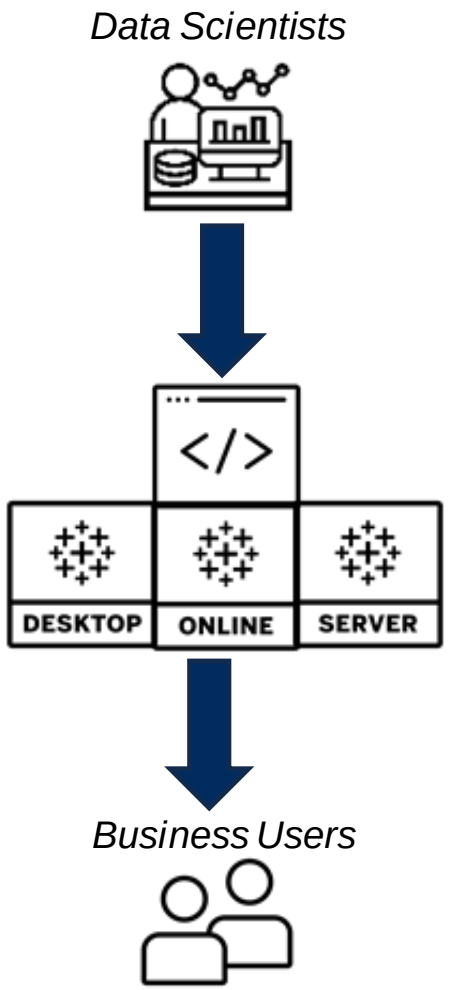


Tableau Data Science Integration

Bridging the gap between data science and business users



✓ **Bring your own function/model**

✓ **Ease of model deployment**

✓ **Build on-demand report/analytics**

Business Problem

Maxima Coverage Telcomm Company

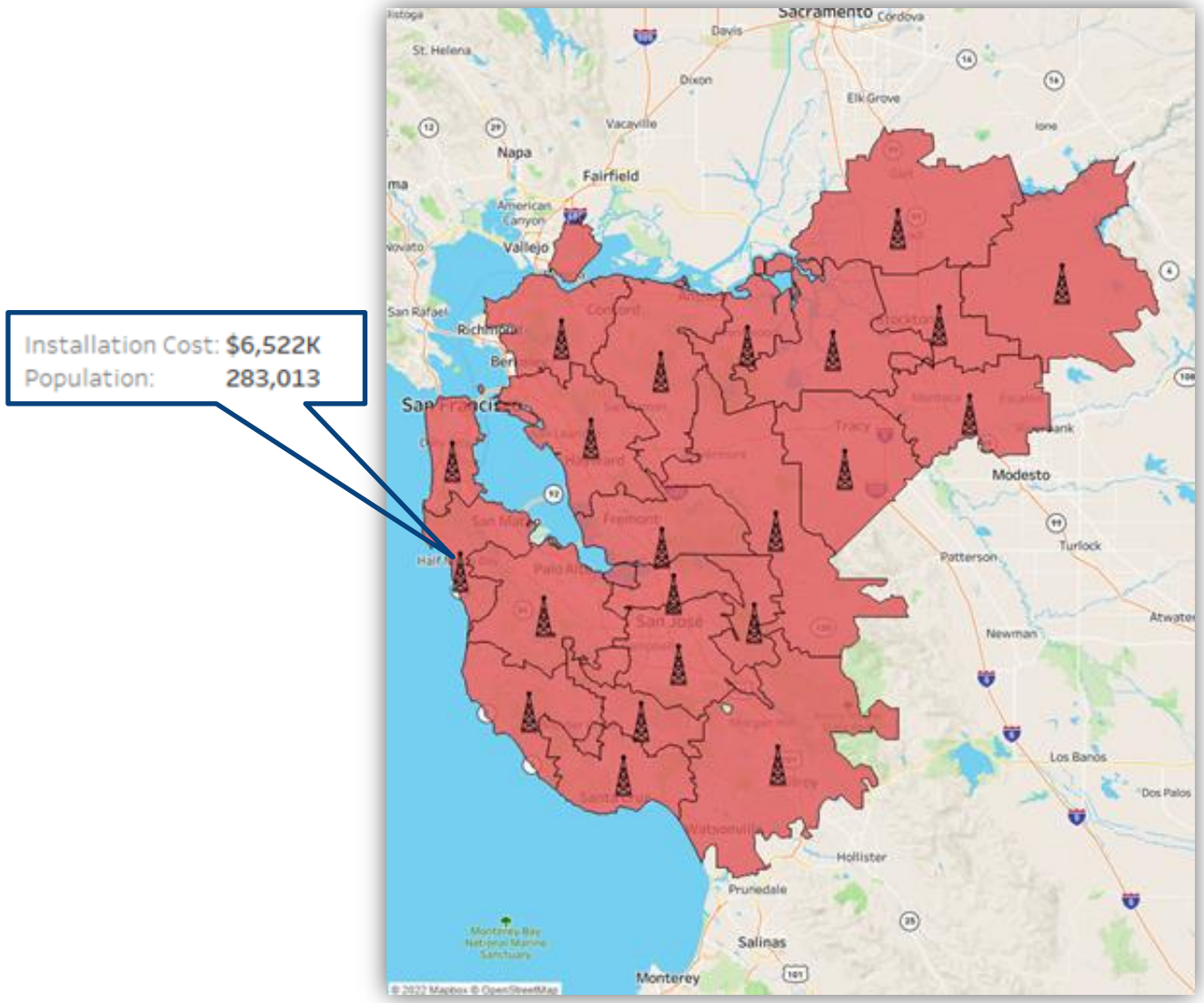
- Low Growth in Profitability
  - Low Customer Acquisition
    - Low Coverage Rate

Business goal is to improve coverage rate across the country

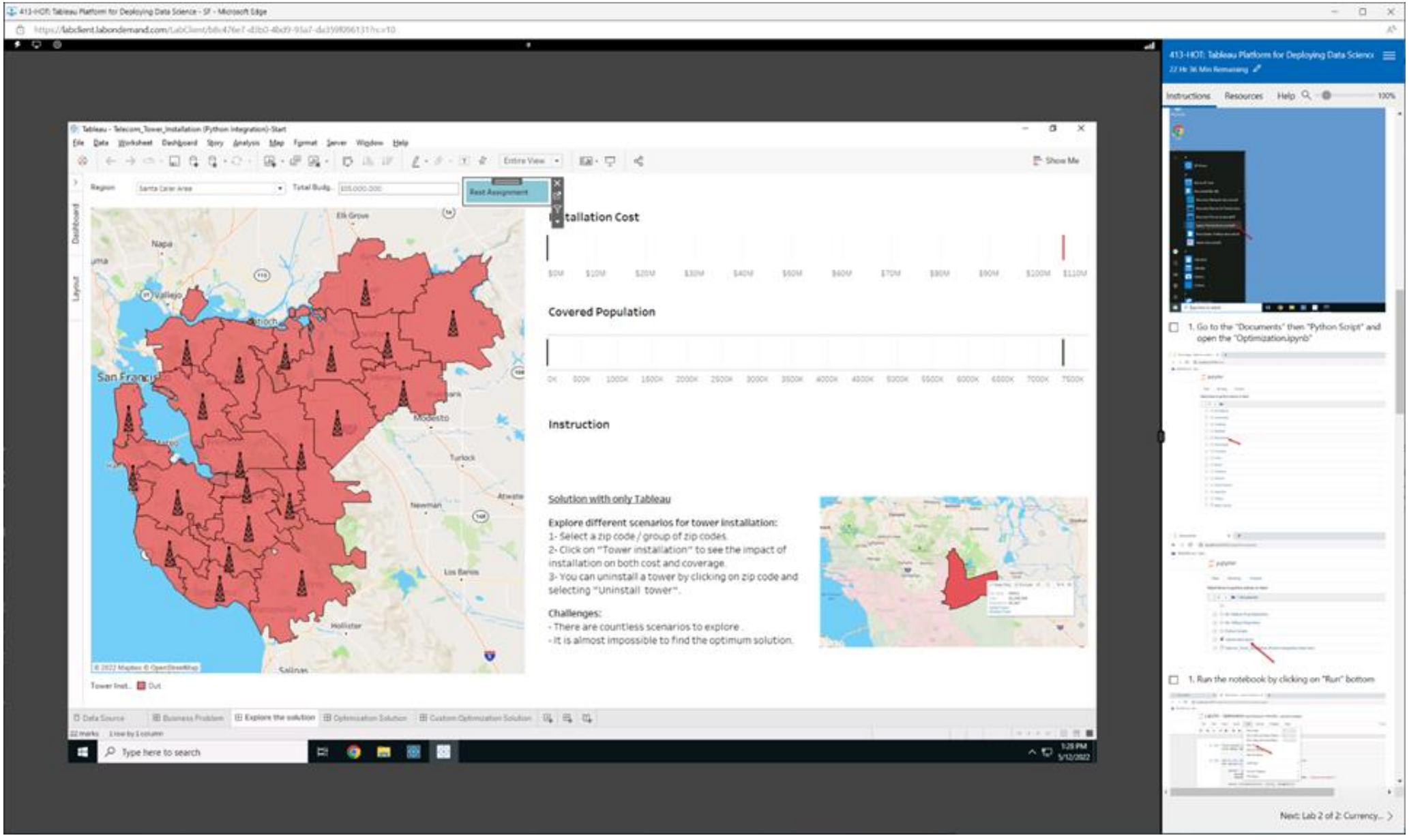
Use Case: Telecom Site Selection

Maxima Coverage Company

- **Business Goal:** Improve the coverage rate
- **Business Solution:** Install towers in low coverage areas
- Multiple potential locations:
  - Installation Cost
  - Covered Population
- **Constraint(s):** Budget constraint



Hands-On: Telecom Site Selection in Tableau



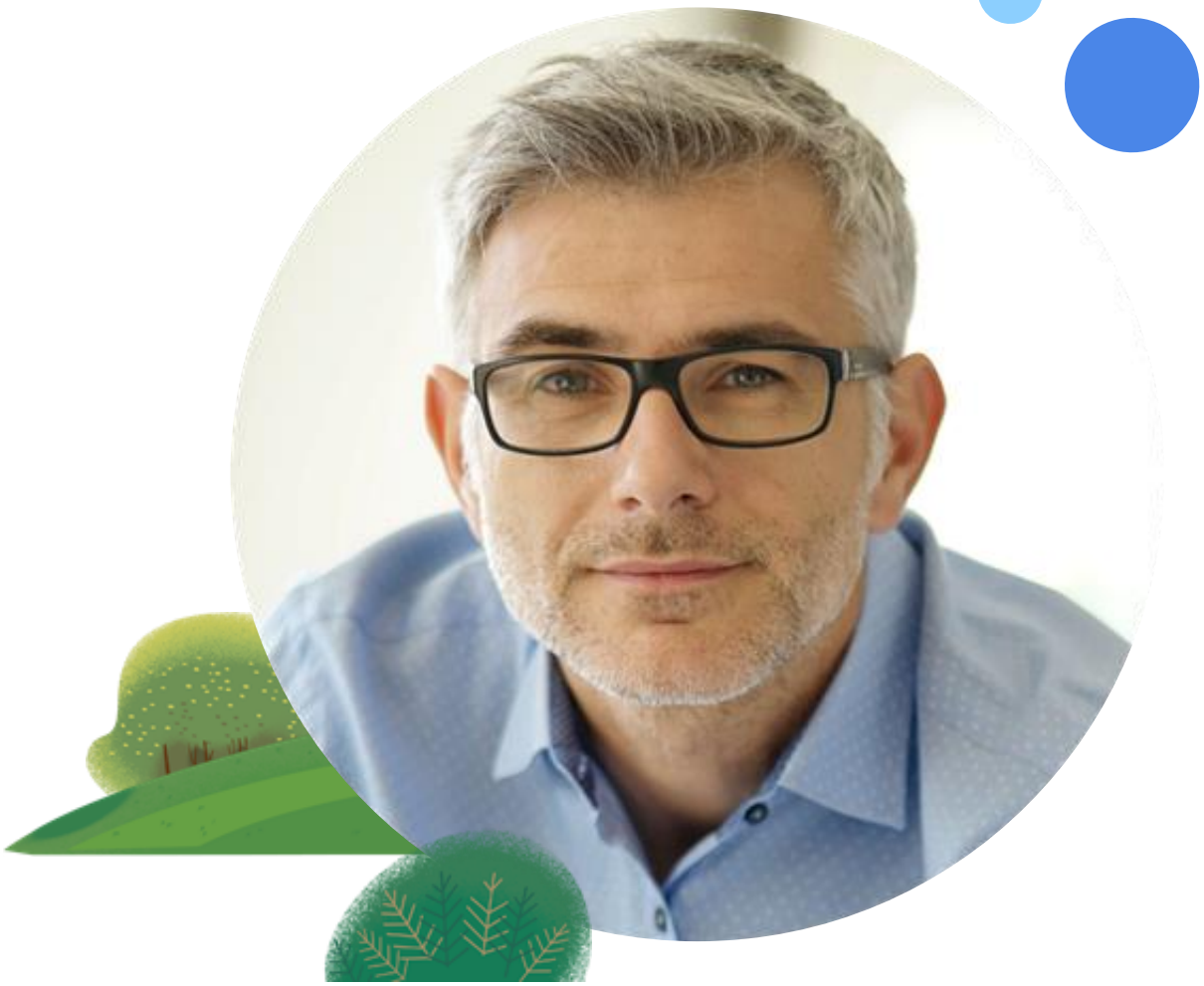
Meet Jon

Chief Data Scientist

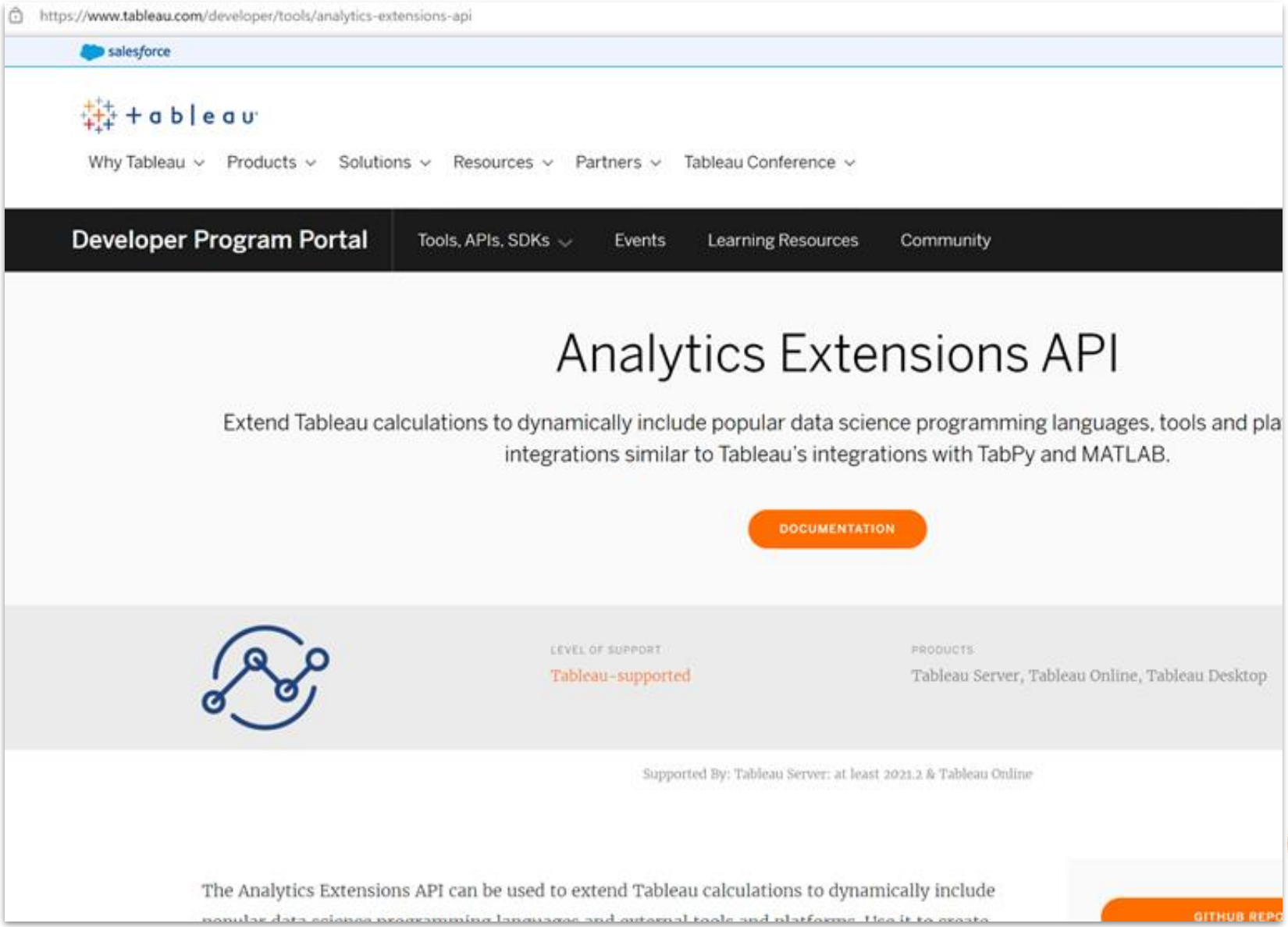
Jon's Data Science team developed **a machine learning model to find the optimum locations for towers installation** to maximize the total coverage while considering budget limit. Although it is **powerful model** to solving the business problem, it **can not generate any value unless business users be able incorporate it into heir analytical workflow.**

On the business side, Field managers need to run **what-if analysis** to estimate the required budget for different levels of coverage. At the operational level, considering the **business dynamic**, field engineers need to **interact with the model in the real-time** to get answer relevant to the business circumstances.

Jon's team has a need for an **easy-to-use deployment platform** to **operationalize their models** and enable business users to **build their own analytics** empowered by the ML model in **self-service manner.**



Hands-On Lab 2: Analytics Extension Samples

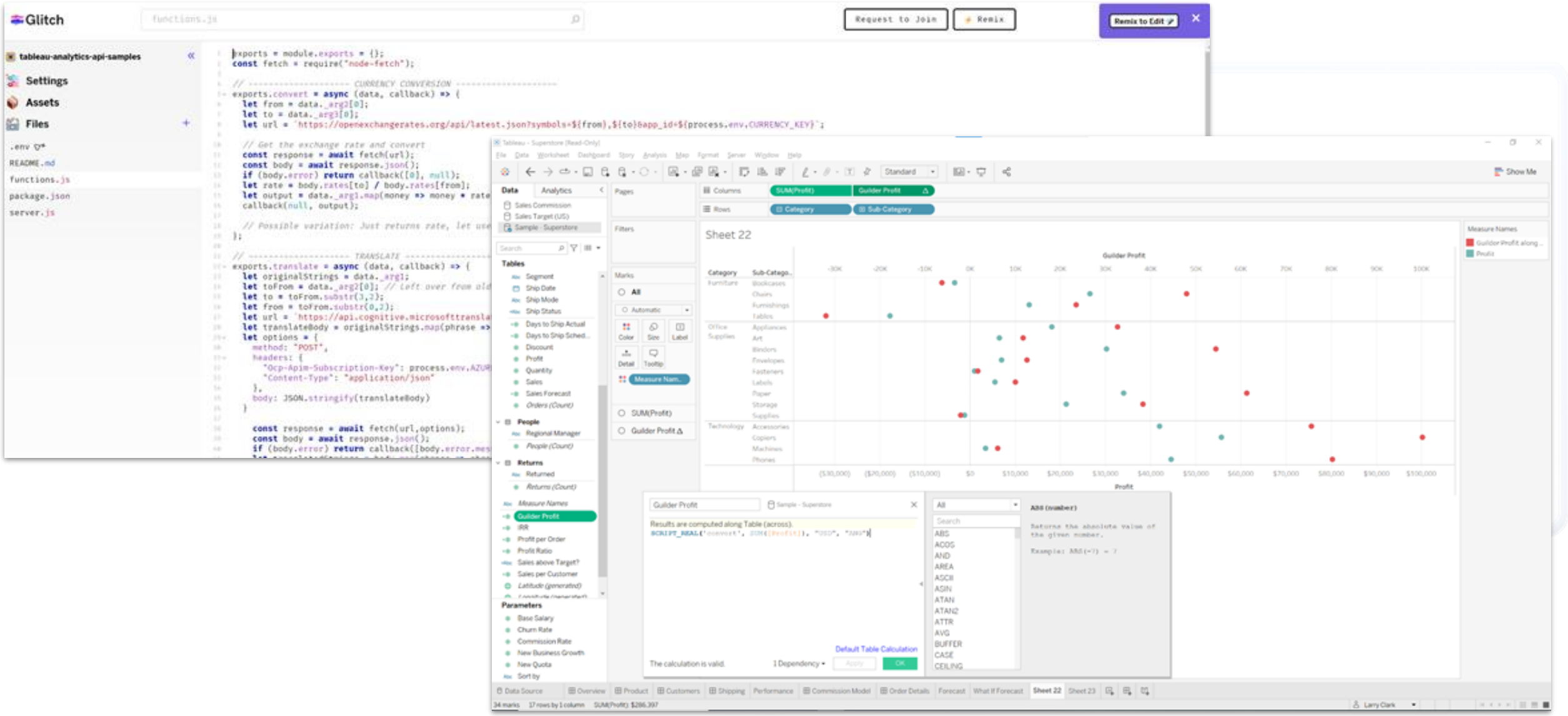


Examples

- TabPy - Execute Python code and saved Python functions in Tableau.
- MATLAB integration Use MATLAB models in Tableau visualizations.
- Ople.ai ML predictive modeling - Score data with predictive models built in Ople.ai
- Haskell language integration - Execute Haskell code in Tableau.
- AltTabPy - Simplified TabPy that executes Python code with no additional features.
- Plumbertableau - plumbertableau lets you call external R code from Tableau workbooks
- Einstein Discovery: Access Einstein Discovery predictions in Tableau calculated fields.
- Additional Tableau Functions - Example functions that can be added to Tableau calculations with the AE API.

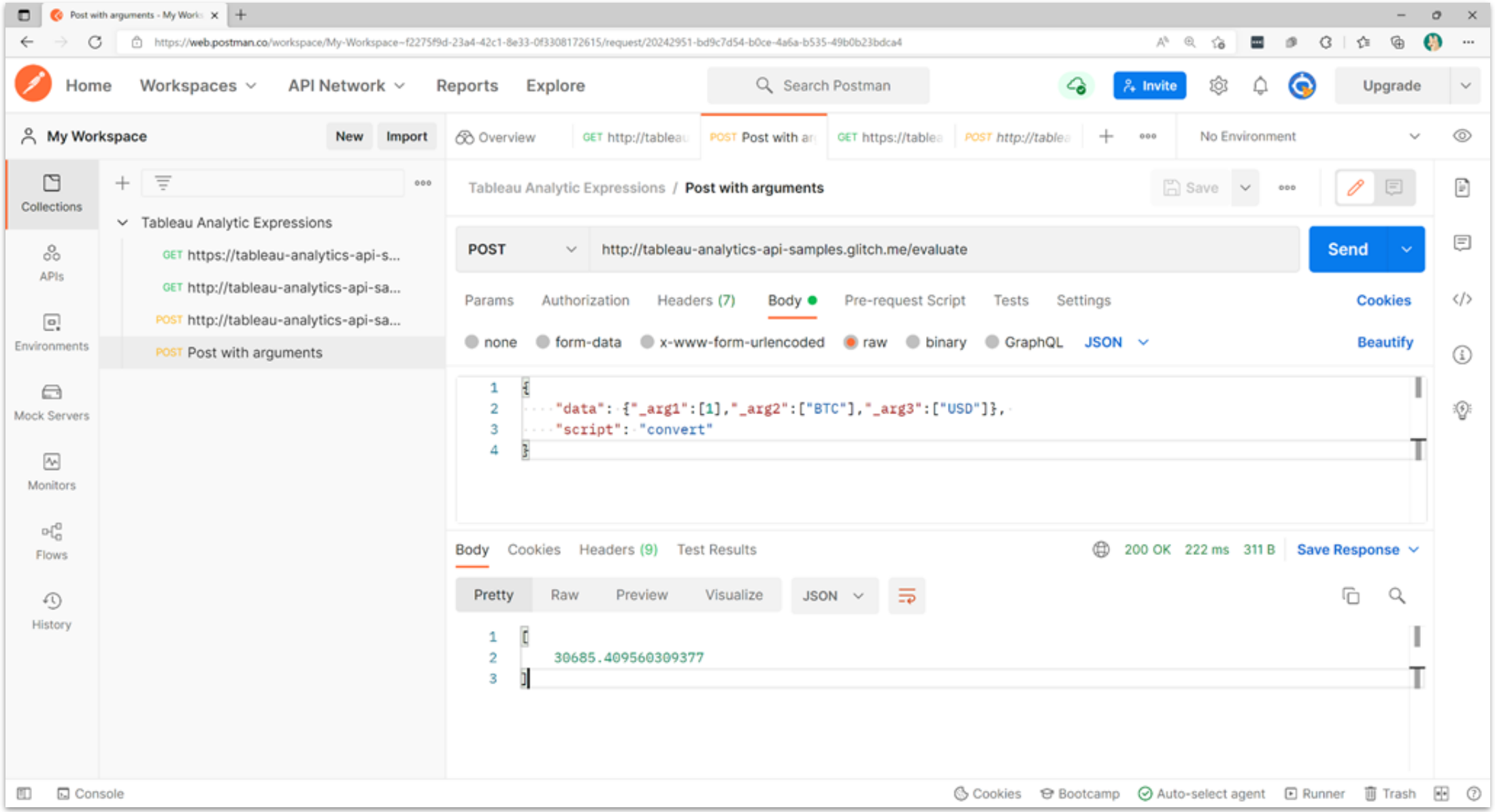
Hands-on: Analytics Extensions Sample

TABLEAU CONFERENCE

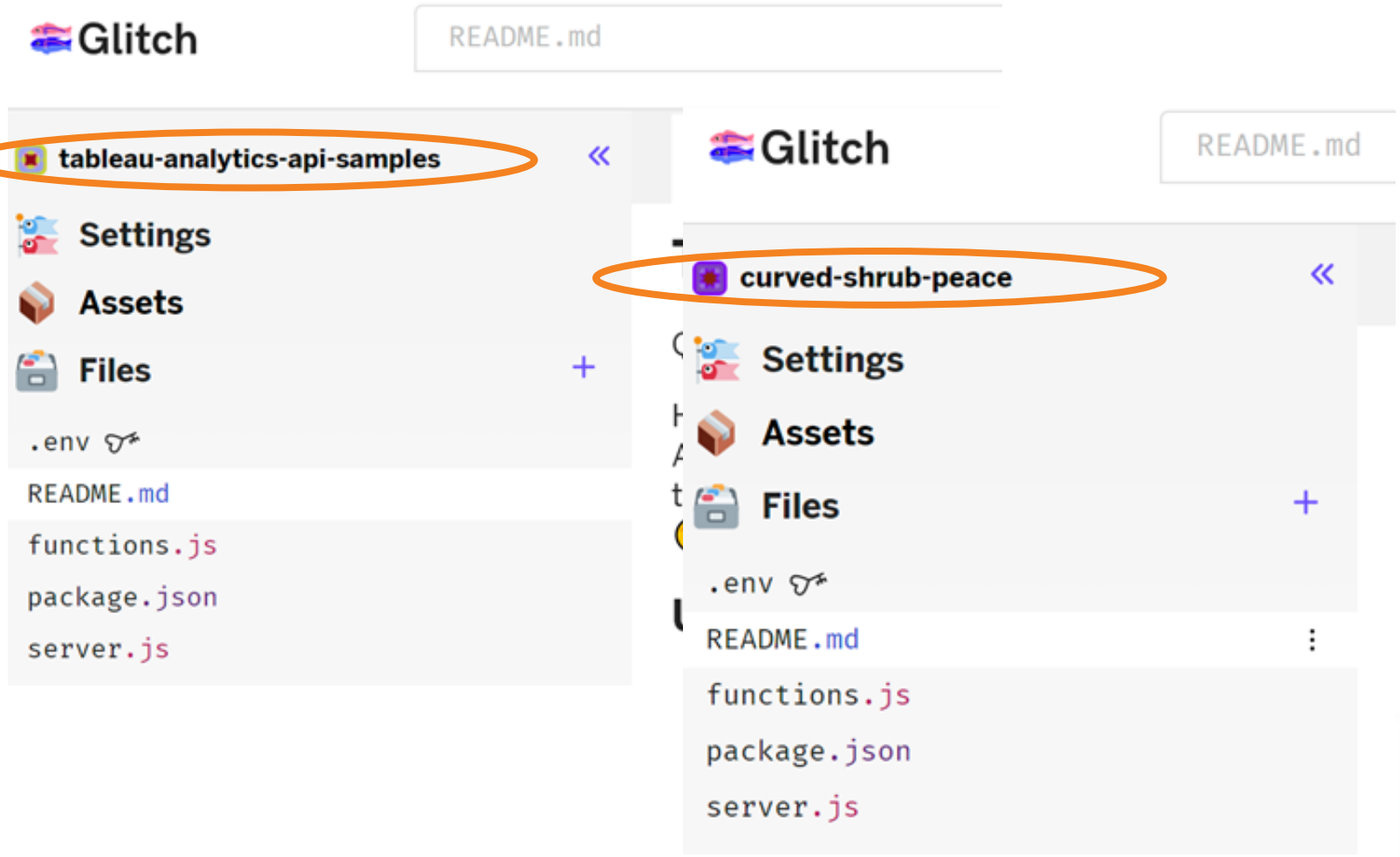


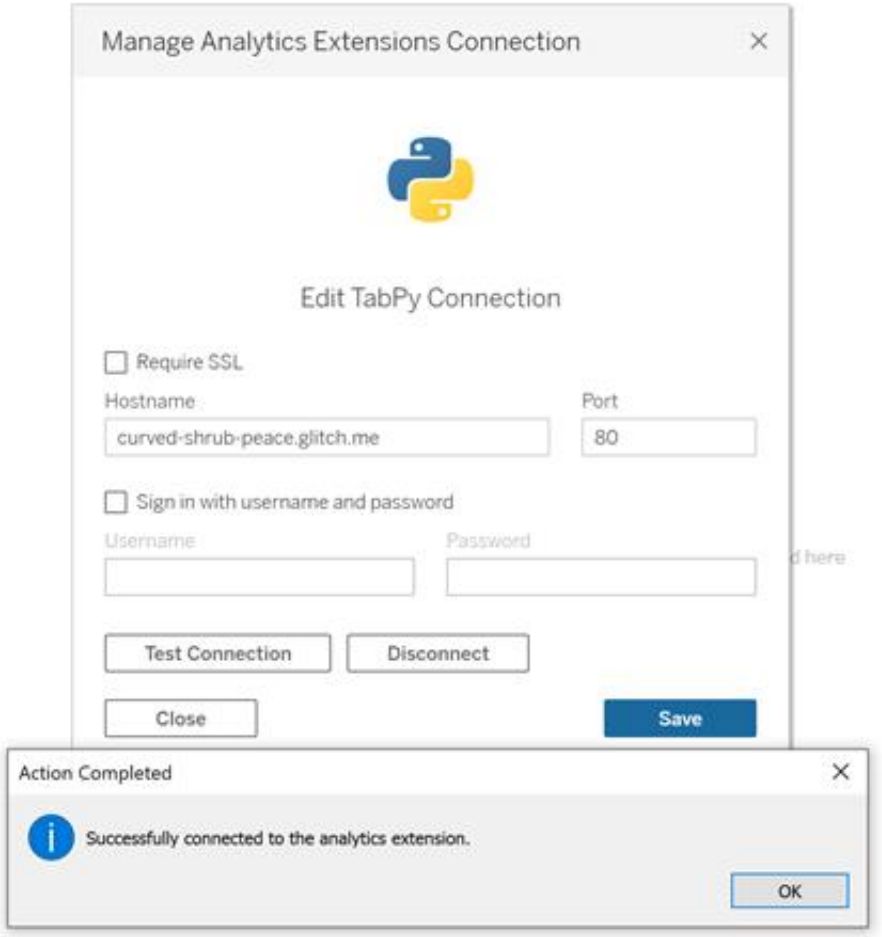
Analytic Extensions - Web API Details

TABLEAU CONFERENCE



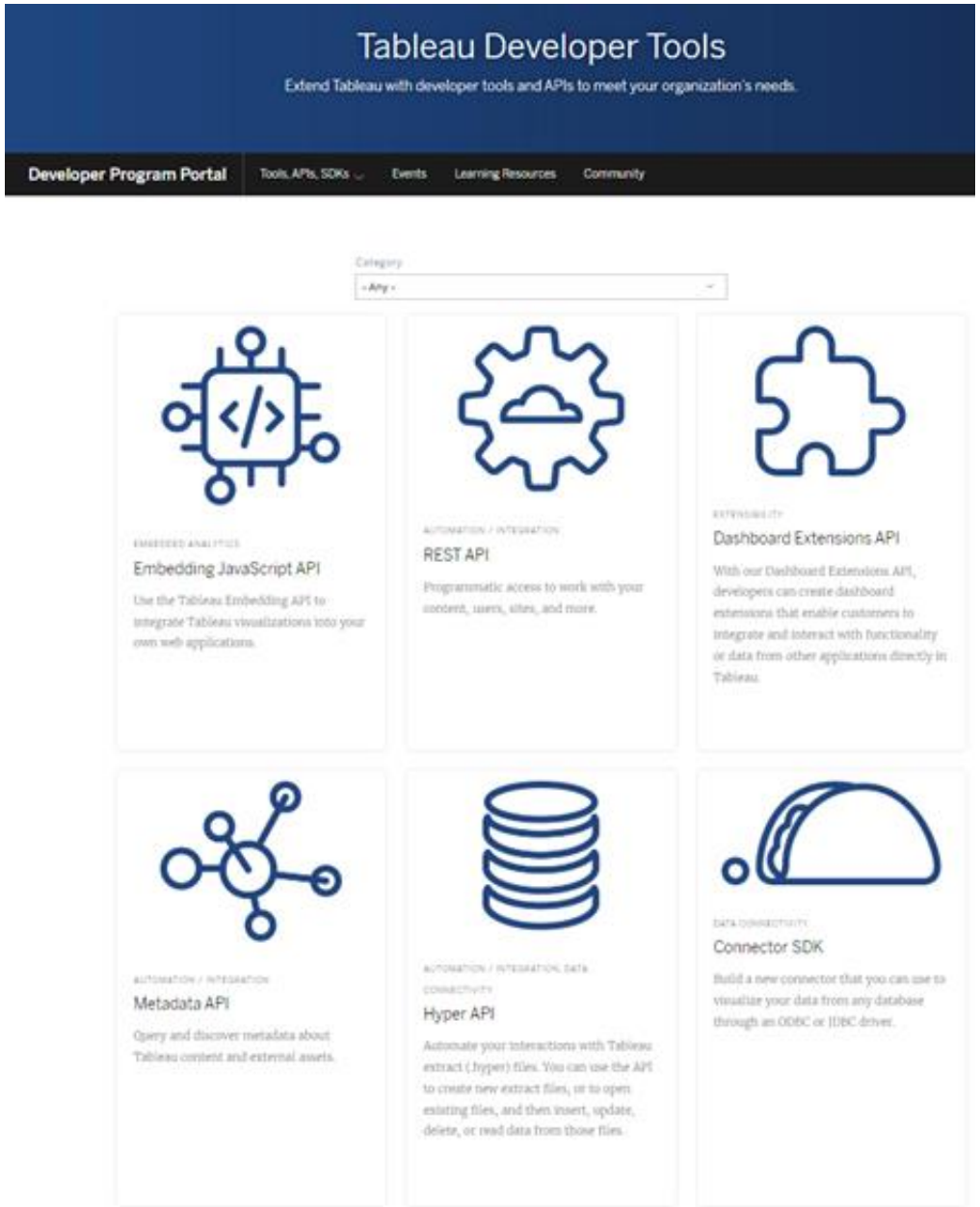
Glitch Remix (in case we overwhelm glitch)

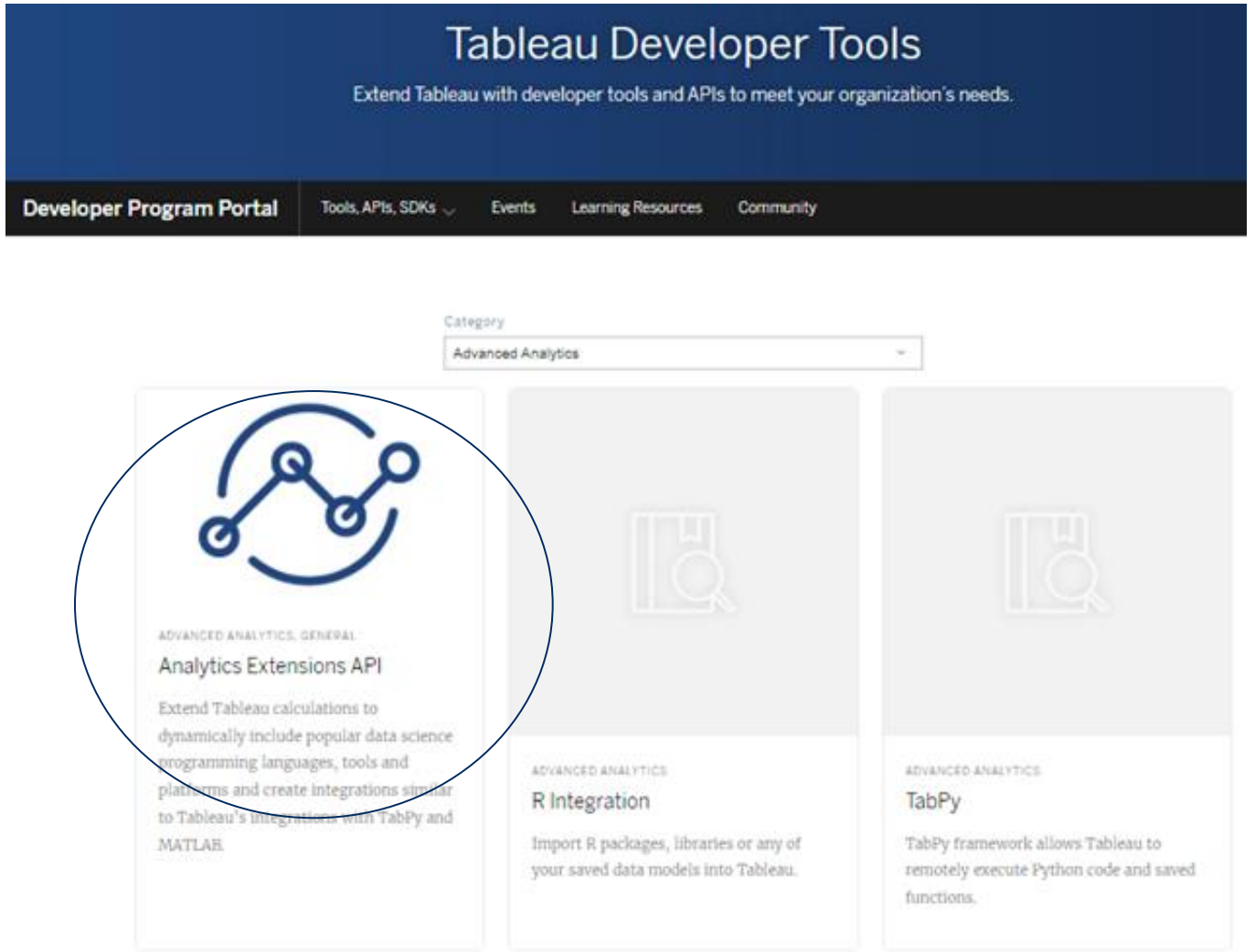




https://www.tableau.com/developer/tools

TABLEAU CONFERENCE





Resources

- https://www.tableau.com/developer/tools/analytics-extensions-api
- **YouTube:** Using the Tableau Analytics Extension API to Integrate with Julia
- **YouTube:** Tableau Developer User Group: Learn more about Analytics Extensions
- **Webinar:** Analytics Extensions API Webinar - Tableau Developer Preview
- **Examples:**
- Tableau External Services API: Haskell Expressions as CalculationsDataboss (starschema.net)
- README.md – tableau-analytics-api-samples (glitch.com)
- Build Predictive Analytics in Tableau Using Machine Learning Models Deployed on Amazon SageMaker
- **Tutorial:** Getting Started with the Analytics Extensions API (tableau.com)

Tableau Integration with Third-Party ML Platforms

Tableau Data Science Integration

Amazon SageMaker

Foundation:

- ✓ Tableau' Analytics Extensions API
- ✓ AWS CloudFormation
- ✓ Amazon Cognito Authentication

Pre-requisitions:

- ➢ Domain by Amazon Route 53
- ➢ SSL certification by AWS certificate
- ➢ ACM provisioned in us-east-1 region

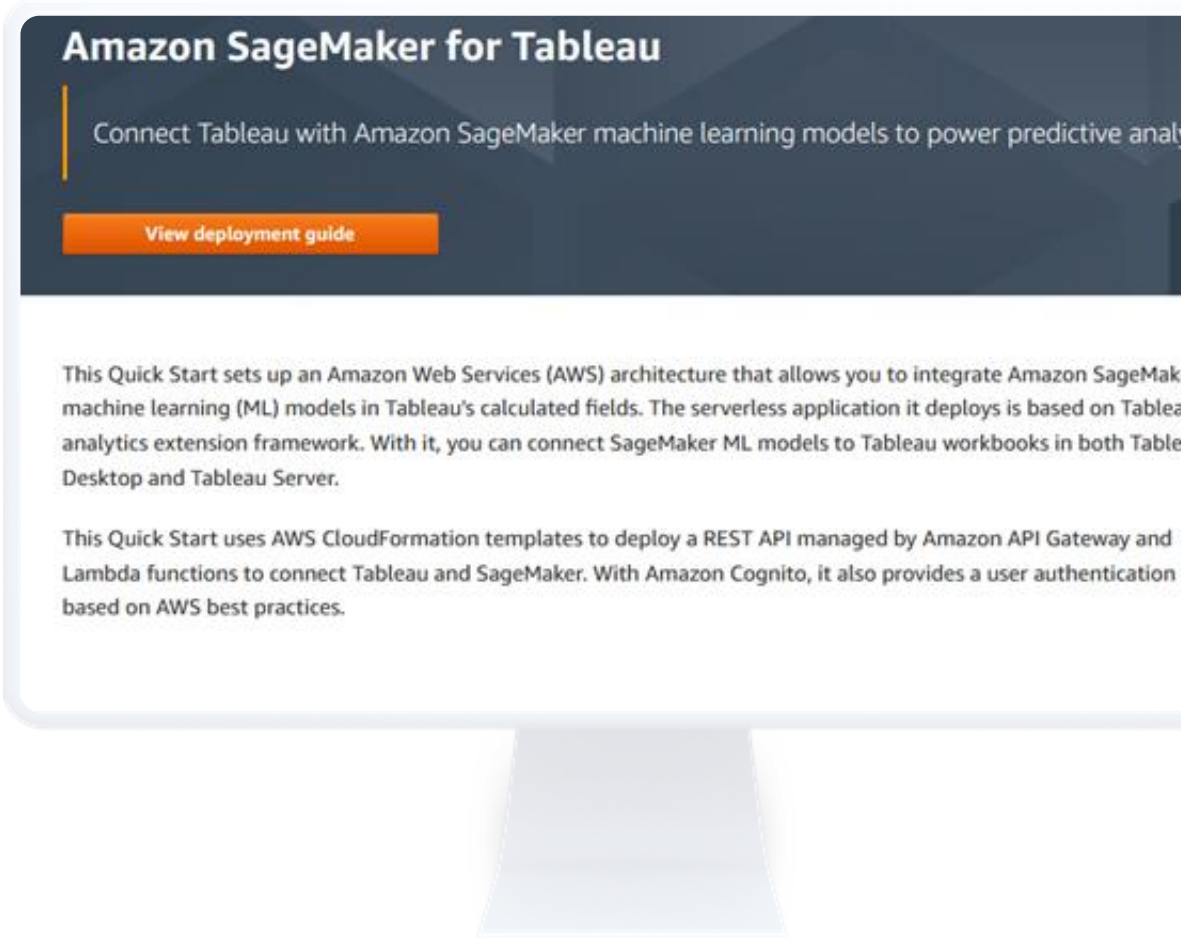


Tableau Data Science Integration

Amazon SageMaker

AWS Quick Start

- One time deployment
- No code, just click
- New, existing or no VPC

Amazon SageMaker

- Any type of model
- SageMaker autopilot
- Custom model

Tableau Platform

- Desktop/Server/Online
- Table Calculation
- Real time prediction

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