

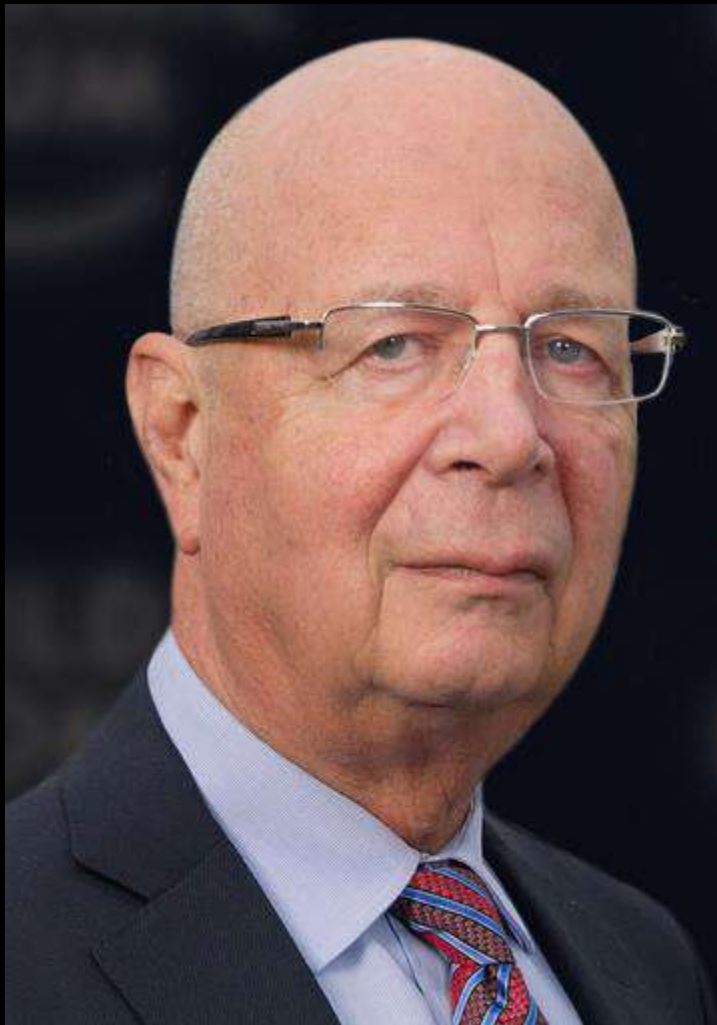


# See What's Possible with SAS® VA Workshop

8<sup>th</sup> January 2019 – Morning Session

# Agenda

09.00 AM	Introduction
09.15 AM	What's New in SAS® Visual Analytics (VA)?
10.45 AM	Tea Break
11.00 AM	Discover SAS® Viya® Advanced Analytics
12.30 PM	Lunch
01.30 PM	Managing SAS® Viya® VA environment
03.00 PM	Migrating from SAS® 9 VA to SAS® Viya® VA
03.45 PM	Q & A



In the new world,  
it is not the big fish  
which eats the  
small fish, it's the  
**fast fish** which  
eats the **slow fish**

Klaus Schwab  
Founder and Executive Chairman  
World Economic Forum



# The Analytics Economy

Big Data Economy

Digital Economy

IoT Economy

API Economy







 SAS<sup>®</sup> Viya<sup>™</sup>

Our digital transformation  
to power the analytics economy

## Data Enablement

## Parallel & Serial, Pub / Sub, Web Services, MQs

# Microservices

UAA

Data Source Mgmt

BI GUIs

Data Mgmt GUIs

Folders

CAS Mgmt

Query Gen

etc...

Log

Env Mgr

Analytics GUIs

Model Mgmt

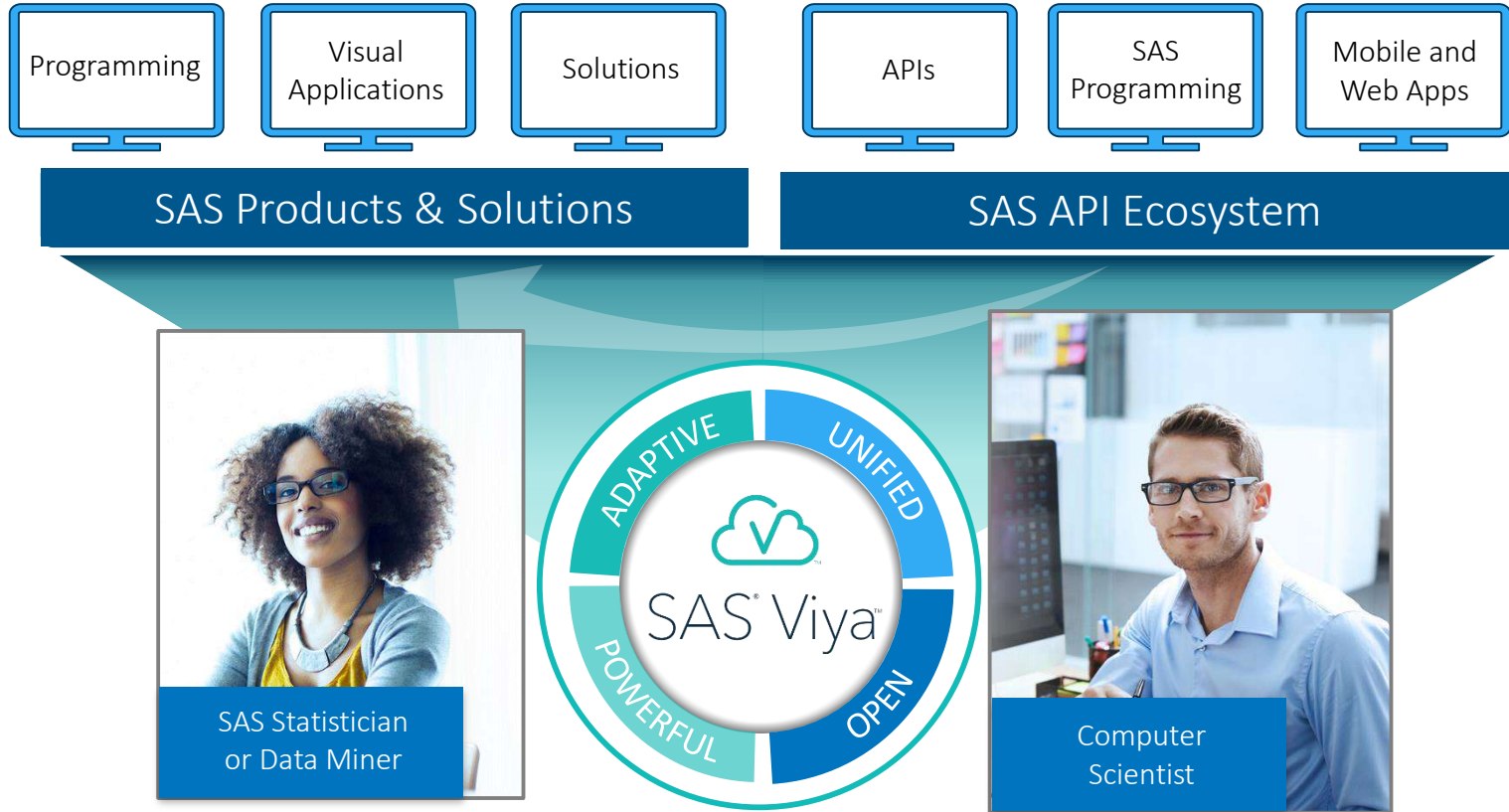
Audit

## IT Enablement

## Platform



# SAS® Deployment Strategy





# What's New in SAS<sup>®</sup> Visual Analytics

## On SAS<sup>®</sup> Viya



# SAS® Visual Analytics



New

Search

Quick Access

Manage M...

Build Models

Explore an...

SAS Drive

Manage Data

Visual Stati...

All Recent Projects View Reports Develop SAS Code Prepare Data Build Models Manage Models Manage Datasets Build Graphs

## Filter View Reports

Item Name

Date Modified

Start date:

End date:

Modified By (no fil...

Filter

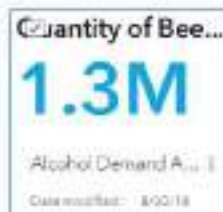
tlibw

Anne-Marie Ch...

Daria Rozovits...

Stephen Ludlow

Anup/Nandoo...



## Alcohol Demand Analysis

Summary Comments

Show: Details



Type

Modified by:

Report

Stephen Ludlow

Shared with:

(none)

Tags:

Location:

SAS Content / Public / SAS UK Pre-Sales / Alcohol Demand Analysis

## AX Policy Exercise (WPC) Hospital Data

Close

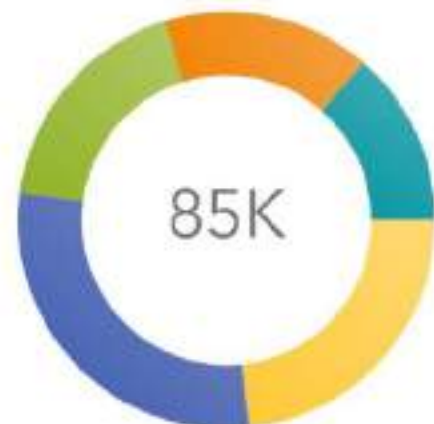
Hospital Data

# Conditions to View

5

## Emergency and Hospitalization Data

Patients with Health Conditions



superutilizer

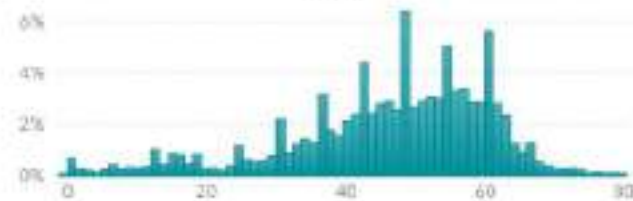
1% 3-5% 6-10%

11-25% Remaining Population

Number of Conditions per Patient

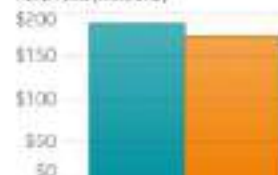


Age



Top Conditions

Paid Amt (millions)



Services Count (millions)



Major Depressive, Bipolar, and Paranoid Disorders

Cardio-Respiratory Failure and Shock

Diabetes without Complication

Breast, Prostate, Colorectal and Other Cancers and Tumors

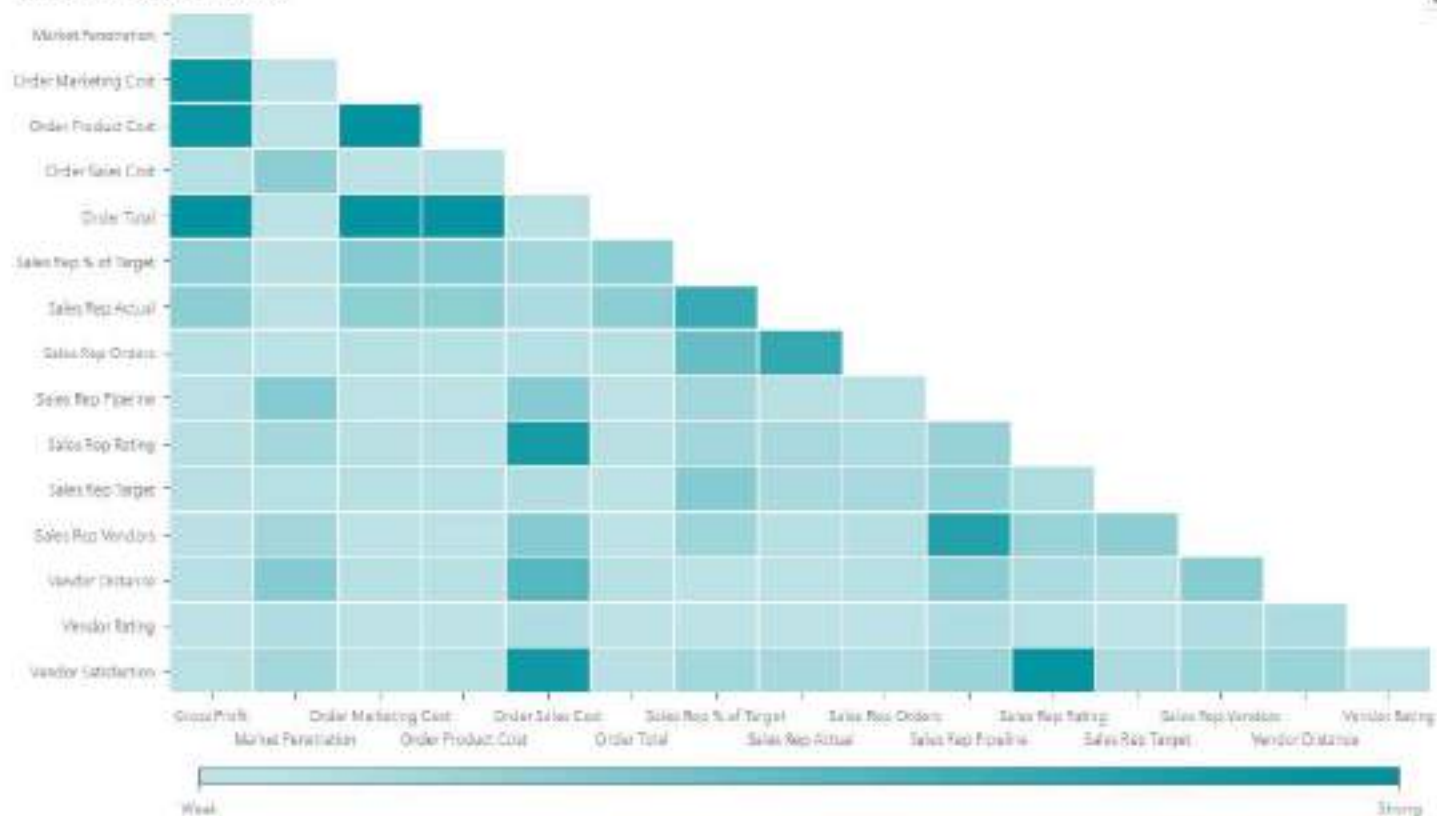
Congenitive Heart Failure

Paid Amt Services Count

## Exploration

Page 1 Page 2 Page 3

## Correlation of Selected Measures



## Options

Exploration

## General

Name

Exploration

## Theme

Report theme

Matrix

Report background

Font

Font

Arial

## Layout

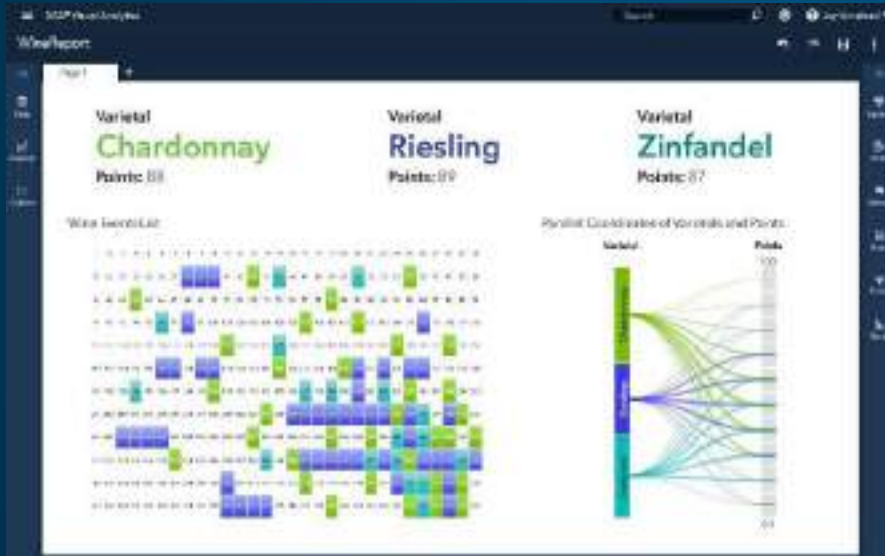
## AX Policy Exercise (WPC) Hospital Data





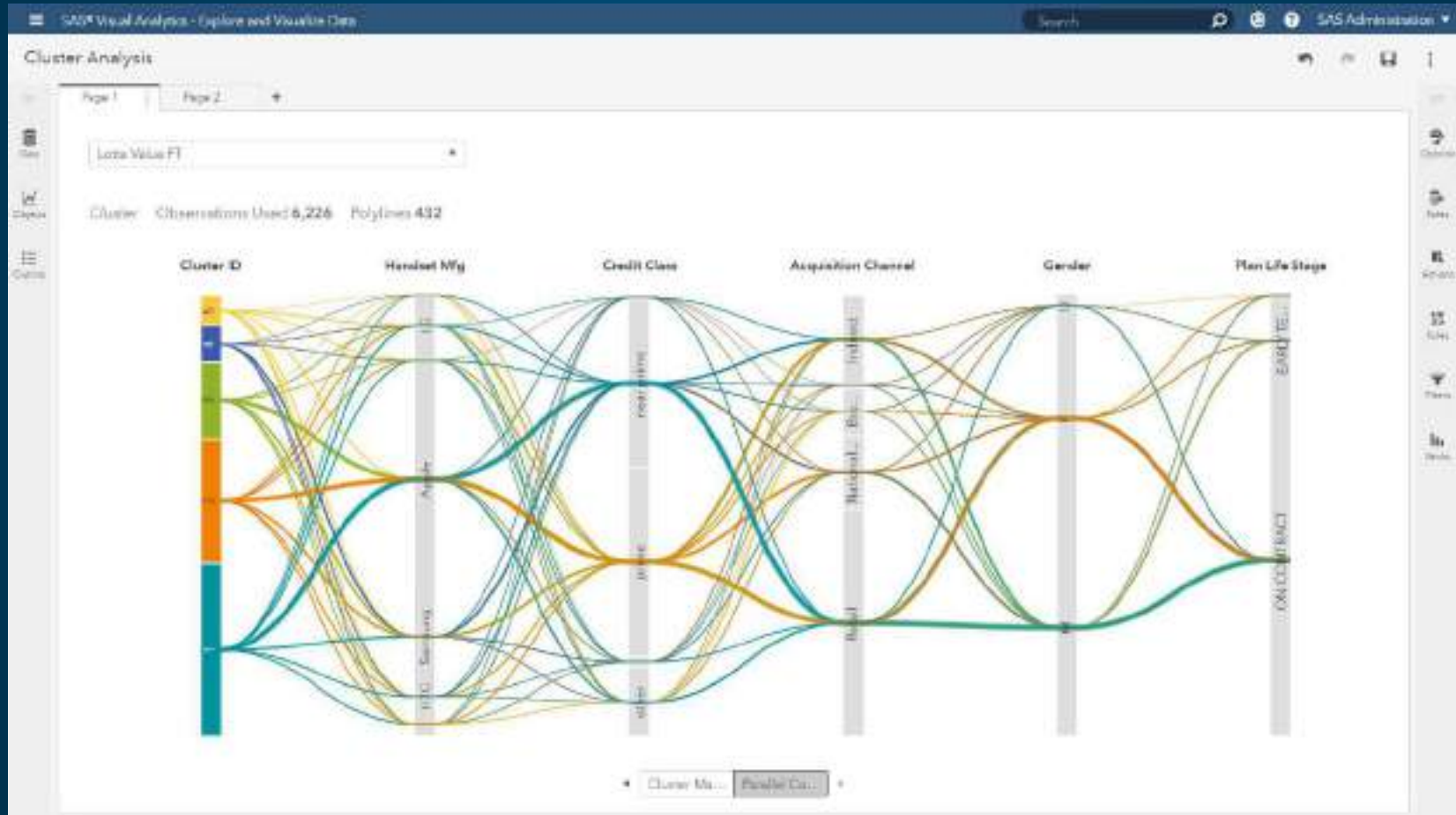


# Visual Exploration

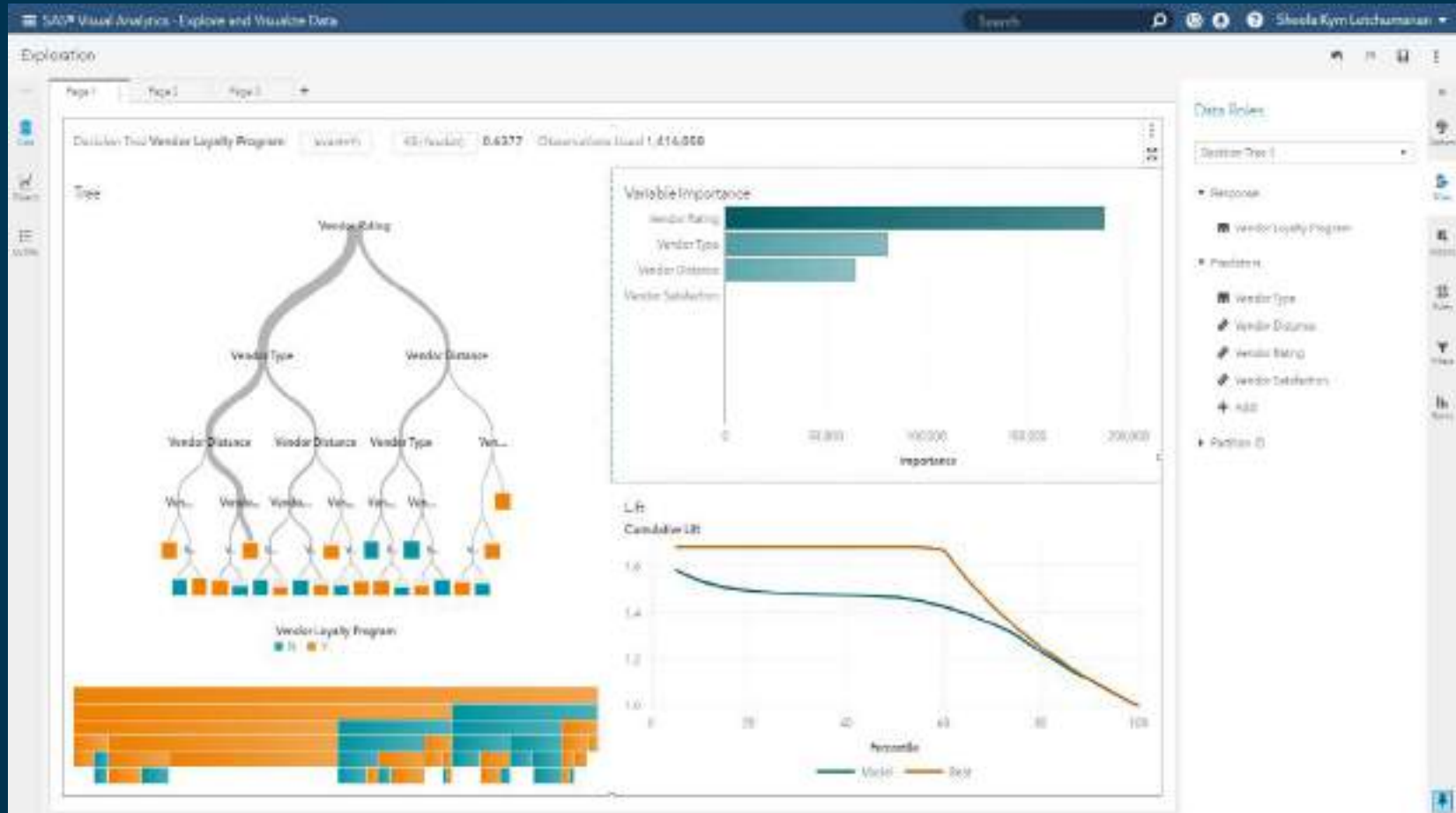


- Auto-charting
- Discover relationships, trends, outliers, clusters
- Forecasting and scenario analysis
- Decision trees
- Text analysis (e.g. word cloud)
- Interaction between objects
- Custom calculations
- 3<sup>rd</sup>-party visualizations (e.g. D3, Google Chart)

# Visual Exploration – KYC



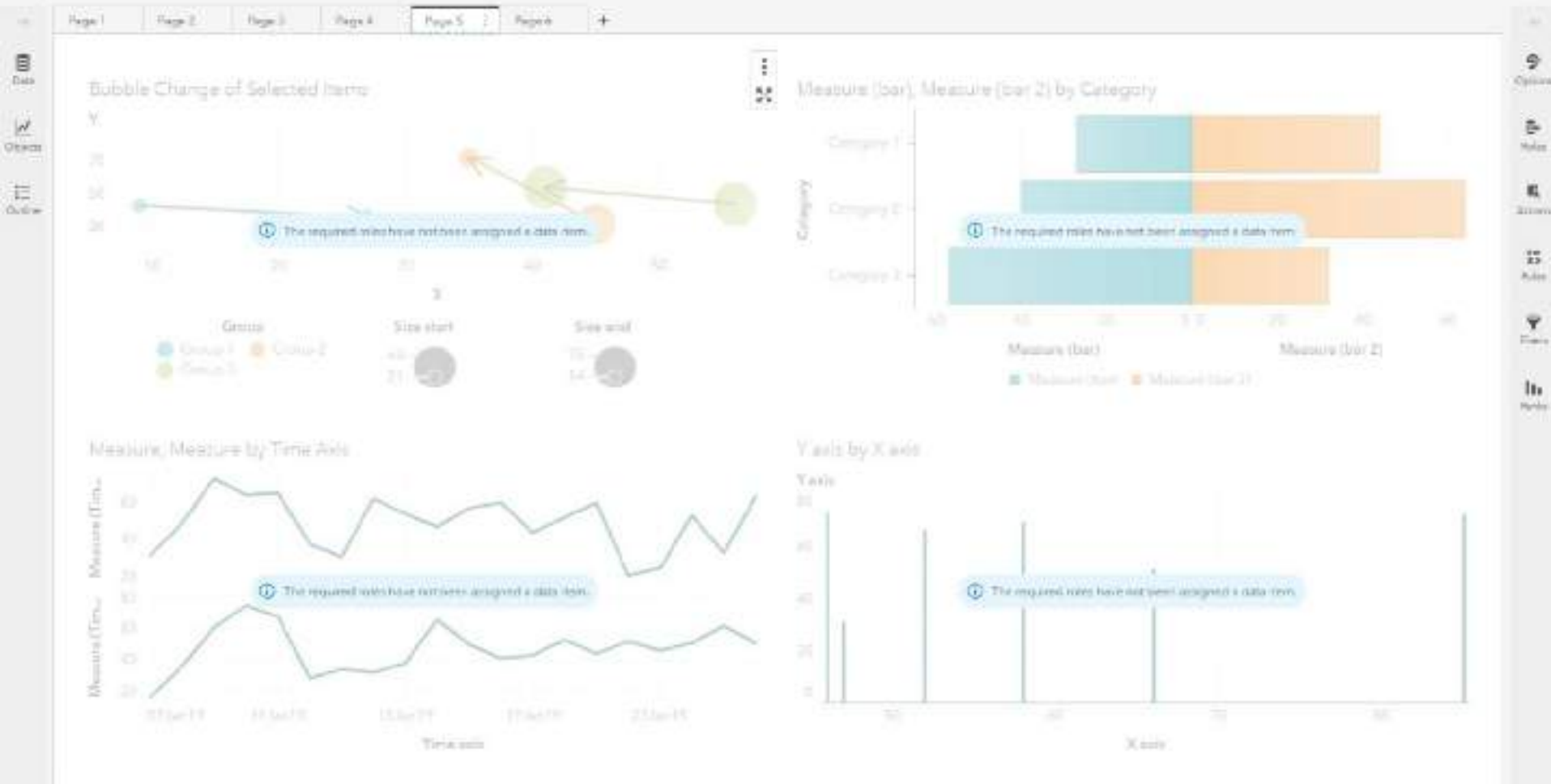
# Visual Exploration – Decision Tree



# Visual Exploration – Text Analysis



## Report 1





## Report 1

Page 1 Page 2 Page 3 Page 4 Page 5 Page 6 +

Task from Start to Finish



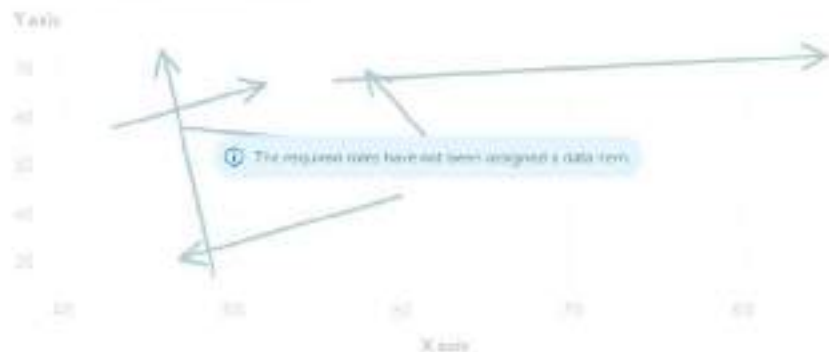
Measure by Category



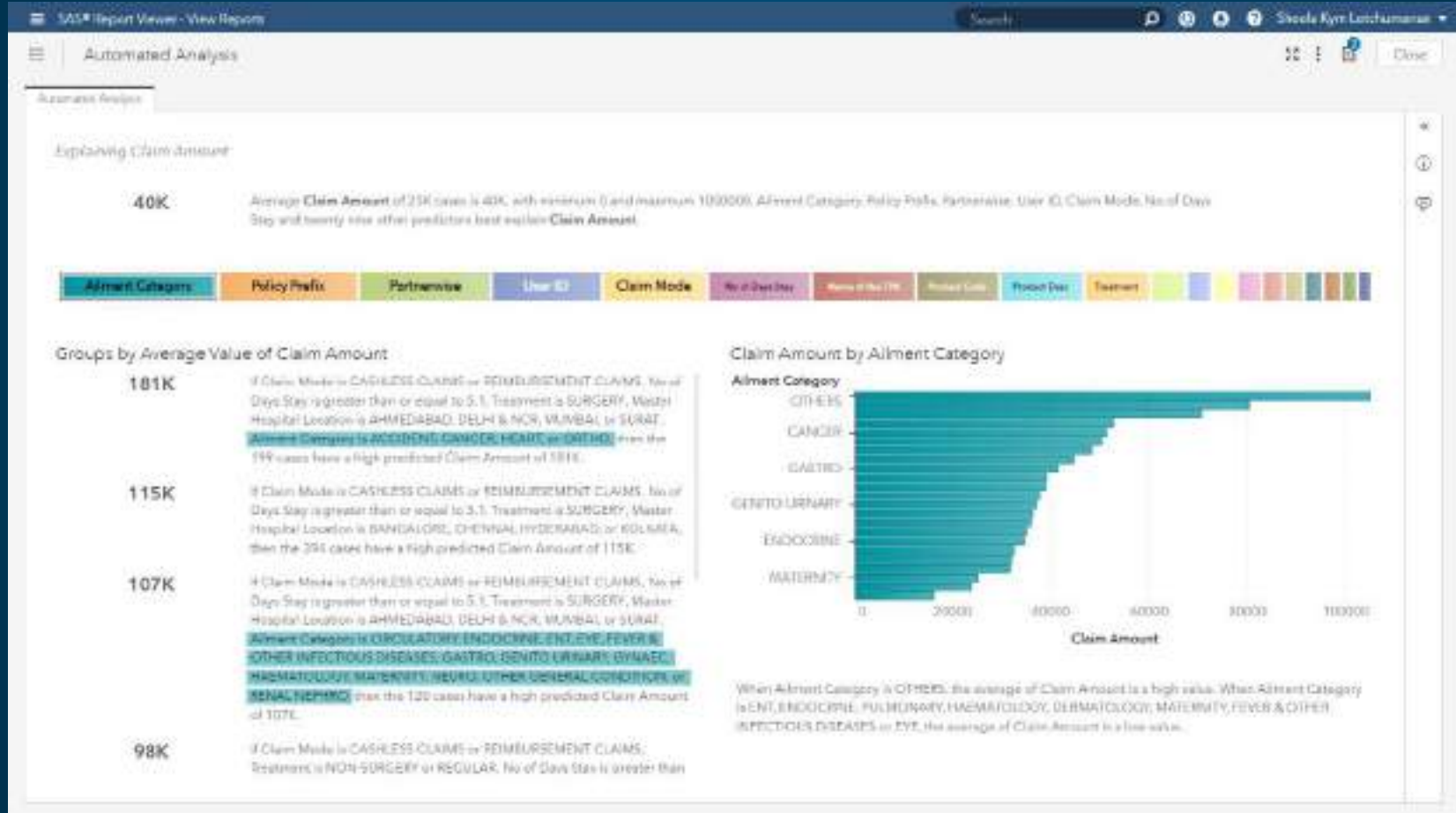
Y axis by X axis



Vector Plot of Selected Items



# Visual Exploration - Automated Analysis





# Hands-On Exercise

Tasks:

1 Create an Automated Analysis





# Interactive Reporting



- Responsive and precise layouts
- Dashboard creation
- Report formatting for user interactivity; filters, prompts, linking, etc.
- Share, interact and collaborate

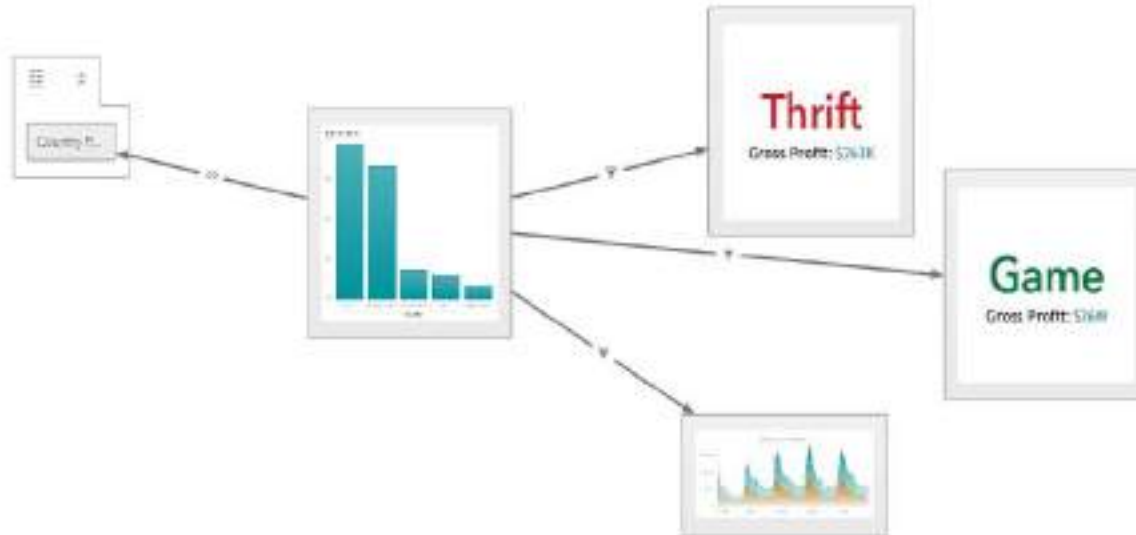
# Intuitive Interaction Design

Actions Diagram

Product Performance ▾



View Options



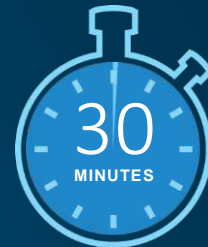




# Hands-On Exercise

Tasks:

1 Create an Interactive Report



# D3.js : Data-Driven Documents

[Overview](#) [Examples](#) [Documentation](#) [Source](#)



Get D3.js on Distro

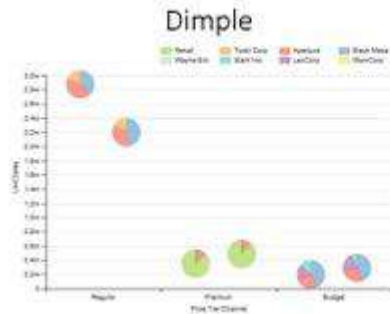


Like visualization and creative coding? Try interactive JavaScript notebooks in **Observable**.

**D3.js** is a JavaScript library for manipulating documents based on data. **D3.js** helps you bring data to life using HTML, SVG, and CSS. **D3.js**'s emphasis on web standards gives you the full capabilities of modern browsers without tying yourself to a proprietary framework, combining powerful visualization components and a data-driven approach to DOM manipulation.

[Get more examples](#)

# Third Party Visualization Support



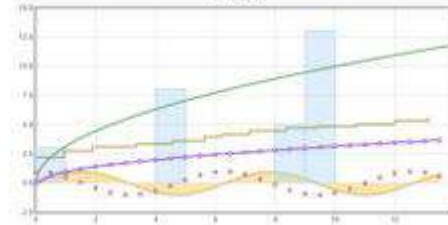
**Google Charts**



**D3.js**

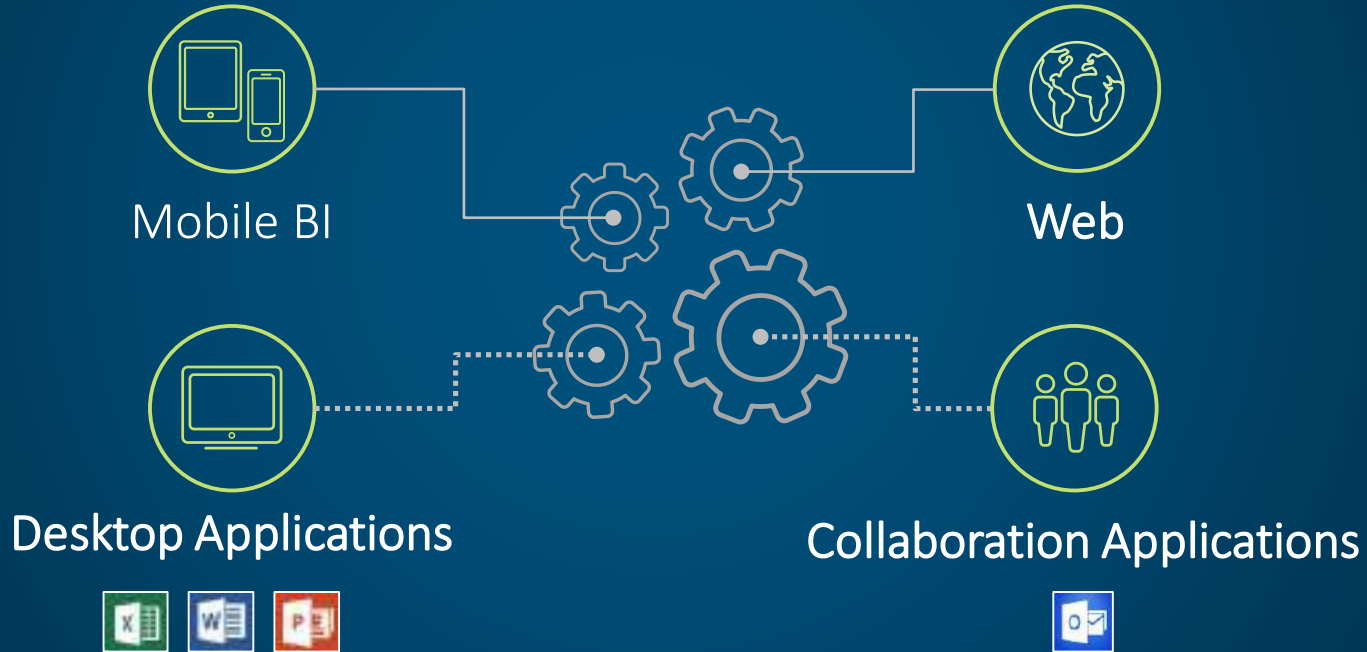


**Flot**





# Collaboration and Information Sharing



# Visual Analytics

## Access Reports Anywhere





# Tea Break

20 minutes

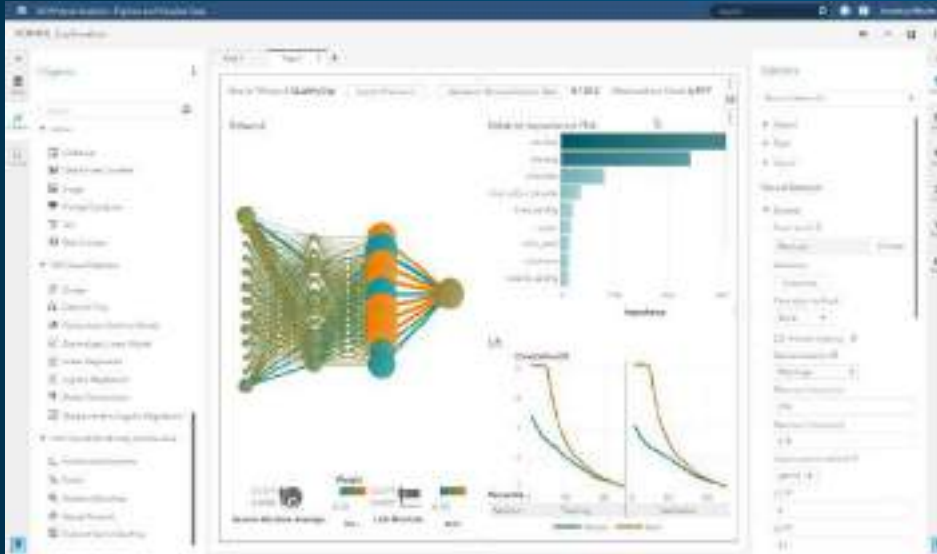




# SAS<sup>®</sup> Viya<sup>®</sup> Advanced Analytics



# Modern Machine Learning

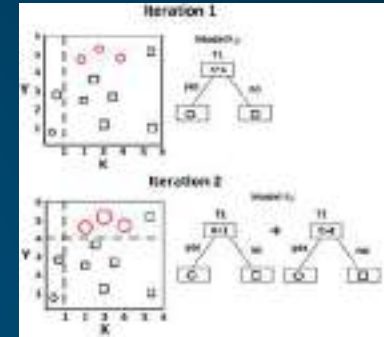


- Forrest
- Neural Network (including Deep Learning)
- Gradient Boosting
- Support Vector Machines
- Factorization Machines
- Bayesian Networks
- Autotuning

# Machine Learning

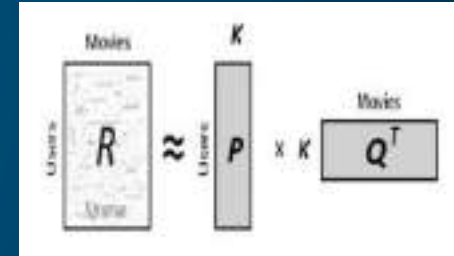
## Gradient Boosting:

- An ensemble of short decision trees (stumps)
- Generally used in ranking systems



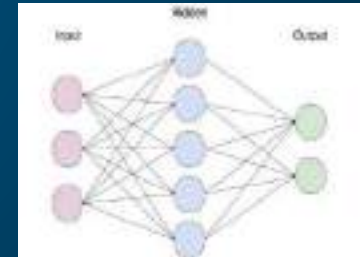
## Factorization Machine:

- A model that factorizes a matrix into a product of matrices
- Useful for data sets with many missing values (sparse)
- Generally used in Recommendation Engines

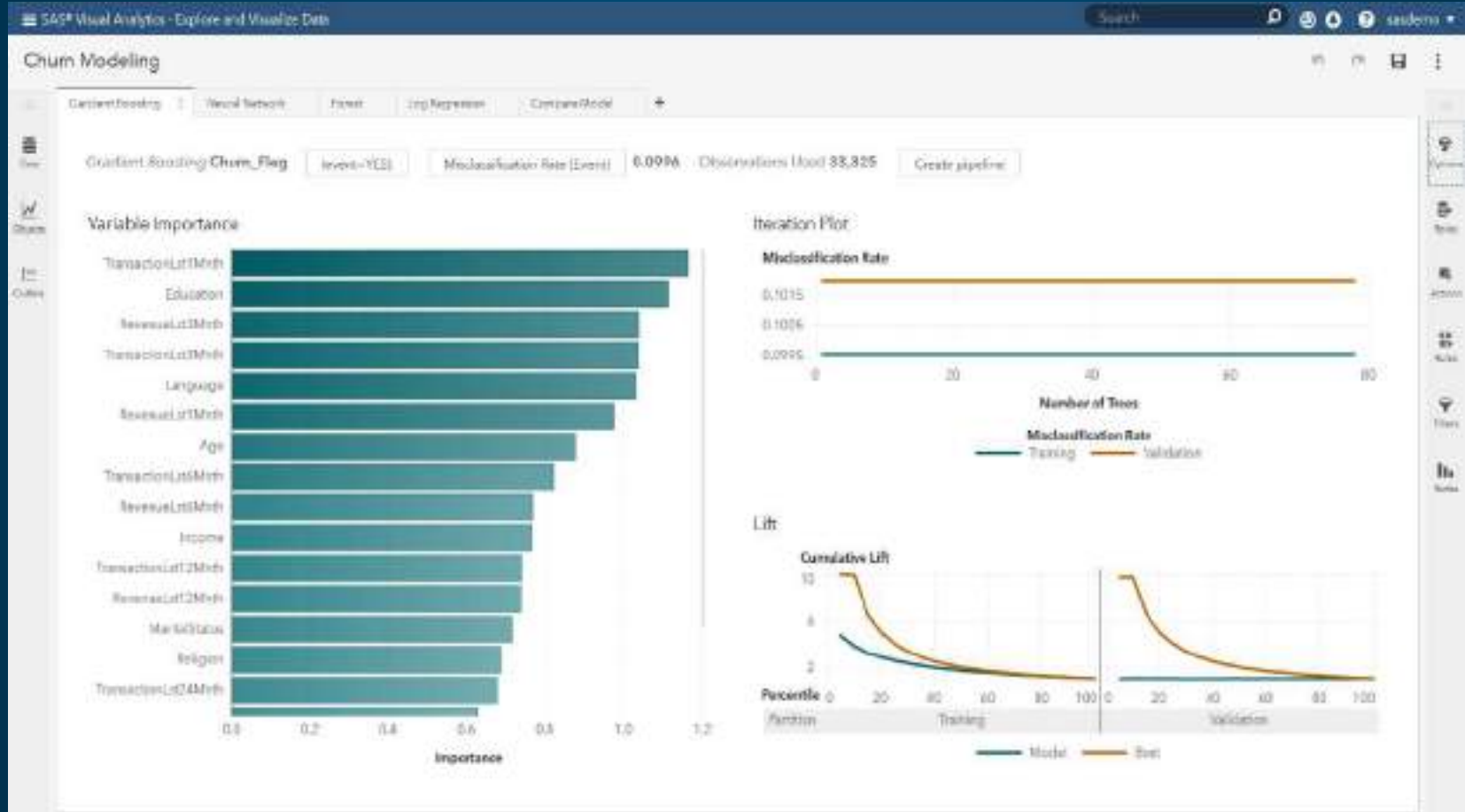


## Neural Network:

- A series of layers with at least one input layer, hidden layer and output layer
- Generally used in Natural Language Processing (NLP) and Pattern Recognition



# Build Models - Interactively

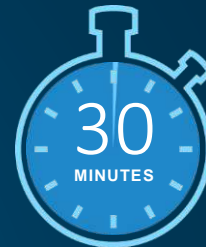




# Hands-On Exercise

## Tasks:

- 1 Build machine learning models
- 2 Assess and compare models




# What to Offer Different Customer and Anonymous Visitors?

Recommendation systems enable marketers and brands to help consumers:

- *Finding things that are interesting and useful*
- *Narrow a set of choices*
- *Explore options*
- *Discover new things.*

**Frequently bought together**




Total price: **\$400.97**

**Add all three to Cart**

**Add all three to List**

- ✓ **This item:** Acer Aspire E 15 E5-575-33BM 15.6-Inch Full HD Notebook (Intel Core i3-7100U Processor 7th... **\$349.99**
- ✓ Ballistix Sport LT 4GB Single DDR4 2400 MT/s (PC4-19200) SODIMM 260-Pin - BLS4G4S240FSD (Gray) **\$35.99**
- ✓ AmazonBasics 15.6-Inch Laptop and Tablet Bag **\$14.99**

**Customers who bought this item also bought:**



Page 1 of 11



# Factorization Machine

	Content A	Content B	Content C	Content D	Content E
Customer A	4		3	1	2
Customer B		5	3	4	
Customer C		5			3
Customer D	2		4		2
???		?	3	4	

Customer Segment  
Living at Bayview

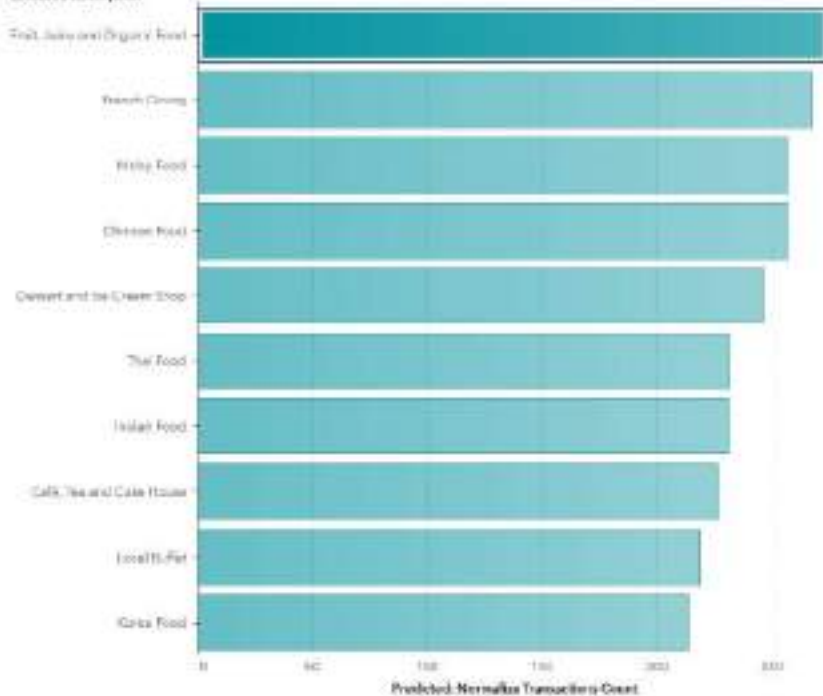
Economic Status  
Lower Middle

Gender  
S

Slider of Age  
70

## Predicted Ranking

### Food Item Description

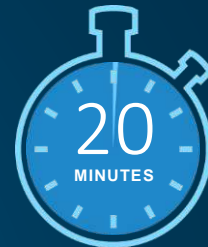


## Frequency Percent





# Hands-On Exercise



## Tasks:

- 1 Build a Factorization Machine model
- 2 Consume results from Factorization Machine model

## Quiz 1



**Risk taker, Upper middle, Male and 30-50 years old**

**What is the most recommended F&B?**



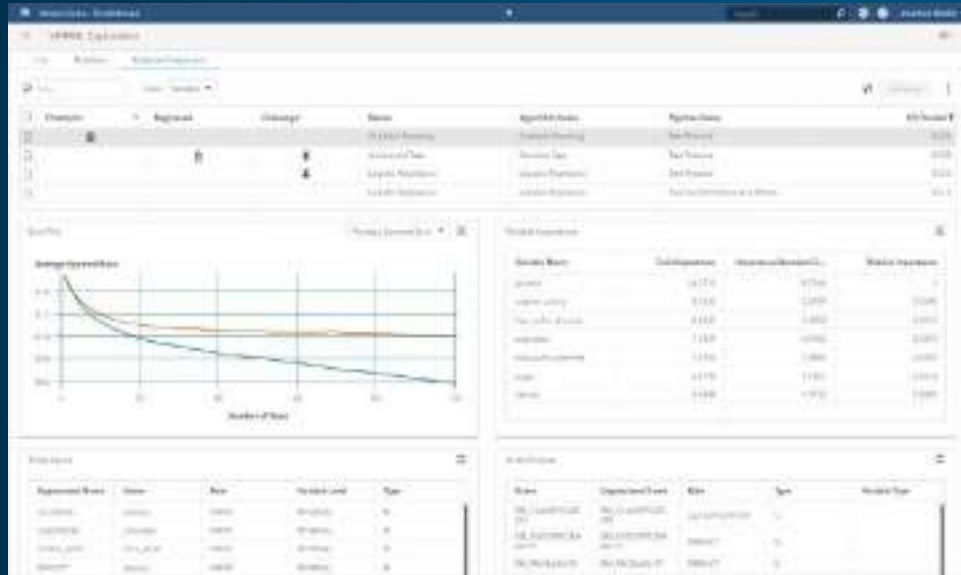
# Model Studio



- Pipeline of activities
- Drag and drop and access to code
- Nodes are run asynchronously
- Reproducibility
- SAS best practice toolkit



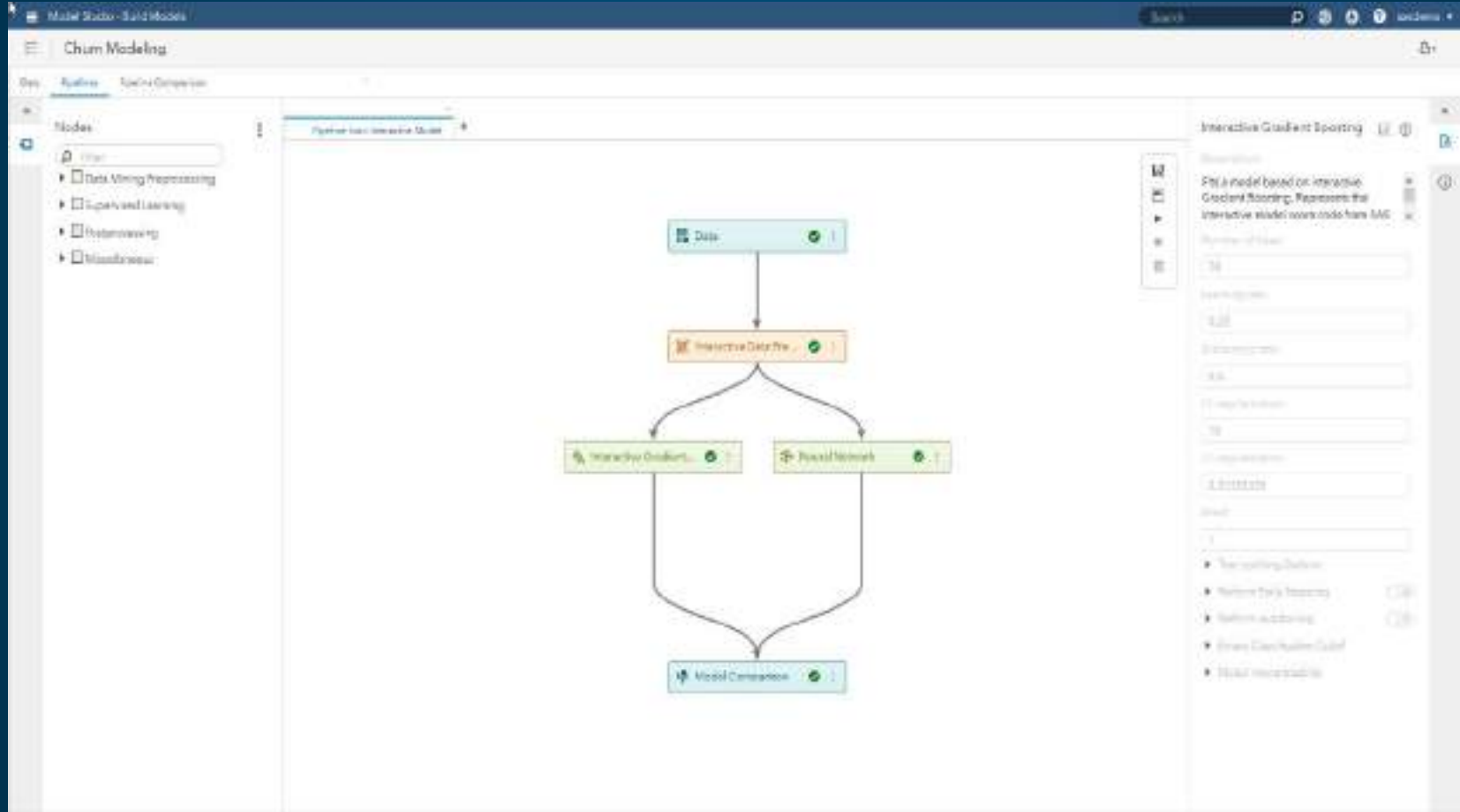
# Comparison and Deploy



- Model comparison summaries
- Interactively assess models
- Assessment charts for partitioned data
- Publish score code; batch, API call, in-database



# Build Models - Pipeline



# Build Models - Programming

The screenshot displays the SAS Studio - Develop SAS Code interface. The top menu bar includes 'New', 'Options', 'View', 'Open', and 'Save All'. The main workspace is divided into several panes:

- Left Pane:** Contains 'OUTPUT DATA' and 'TASK CONSOLE'. The 'OUTPUT DATA' section lists tables that must use a CAS engine and provides options to create scored data, computed factor parameters, or save the scoring model. The 'TASK CONSOLE' shows 'No items'.
- Center Pane:** Displays the 'The Factmac Procedure' results, including a list of output tables such as 'Model Information', 'Number of Observations', 'Interval Variables', 'Nominal Variables', 'Iteration History', 'Final Exact Loss', 'Name of Predicted Probability', 'Fit Statistics', 'Tuner Information', 'Tuner Results', 'Tuner Iteration History', 'Tuner Evaluation History', 'Best Configuration', 'Tuner Summary', 'Tuner Task Timing', and 'Tuner CAS Output Tables'.
- Right Pane:** Shows the 'Predicted Target Variable' (P\_selling) and a table of 'Fit Statistics'.

The 'Fit Statistics' table is as follows:

Number of Observations	Squared Error			Absolute Error		Squared Logarithmic	
	Deviance of Average	Average	Root Average	Mean	Root Mean	Mean	Root
10000	10000	0.582526	0.763235	0.598001	0.773124	0.348888	0

Below the 'Fit Statistics' table is the 'Tuner Information' table:

Tuner Information	
Model Type	Factorization Machine
Tuner Objective Function	Average Square Error
Search Method	ITS
Maximum Evaluations	50
Population Size	10
Maximum Iterations	0
Maximum Tuning Time in seconds	36000
Validation Type	Single Partition
Validation Partition Fraction	0.25
Log Loss	0
Seed	0
Number of Parallel Evaluations	4
Number of Workers per Subsession	1

At the bottom of the right pane is the 'Tuner Results' table, which shows the 'Default and Best Configurations'.

Tuner Results Default and Best Configurations					
Evaluation	Number of Factors	Maximum Number of Iterations	Learning Rate Size	Average Squared Error	Time in Seconds

The bottom status bar includes 'Document Recovery' and 'Submission Status'.

# Publish Models

The screenshot displays the 'Manage Models' interface in SAP Model Manager. The interface includes a search bar at the top left and a 'New Model' button at the top right. The main area is a table with the following columns: Name, Role, Model Function, Location, Project Model, Date Modified, and Modified By. The first row of the table is highlighted, showing the following data: Name: New Model, Role: Model Function, Location: Location, Project Model: Project Model, Date Modified: Date Modified, and Modified By: Modified By. The table is currently empty except for the header row.

Name	Role	Model Function	Location	Project Model	Date Modified	Modified By
New Model	Model Function	Location	Project Model	Date Modified	Modified By	



# Additional Information

# Links

- Free Trials
  - [https://www.sas.com/en\\_my/trials/software/visual-analytics/ep-form.html](https://www.sas.com/en_my/trials/software/visual-analytics/ep-form.html)
  - [https://www.sas.com/en\\_my/trials/software/data-mining-machine-learning/ep-form.html](https://www.sas.com/en_my/trials/software/data-mining-machine-learning/ep-form.html)
  - [https://www.sas.com/en\\_my/trials.html](https://www.sas.com/en_my/trials.html)
- eLearning
  - <https://support.sas.com/edu/elearning.html?ctry=us&productType=library>
  - <https://video.sas.com/category/videos/sas-viya>

# Links

- SAS Community
  - <https://communities.sas.com/>
- SAS on Github
  - <https://github.com/sassoftware>