GOVERNMENT ANALYTICS LEADERSHIP FORUM

SAS Canada & The Institute of Public Administration of Canada

April 26 | The Shaw Centre | Ottawa

sas
THE POWER TO KNOW.

The SAS® Platform

Diversity, Scale and Trust in an Open Analytics Platform

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sas
THE POWER TO KNOW.

Analytics Lifecycle

Trust

Defining an Analytics Platform

Forces Shaping the Analytics

SAS Viya

Analytic Personas

SAS & Open

Modern Analytics Platform

Scale

Diversity

Analytic Maturity

sas

DEFINING AN ANALYTICS PLATFORM

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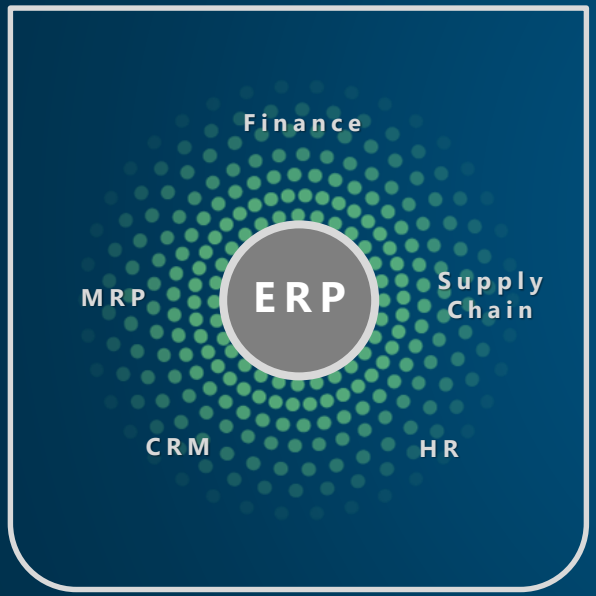
Enterprise platforms

Operational Platform



Analytics Platform

Productivity Platform

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Microsoft

Productivity Platform

Separate Tools
Word, Excel, PPT

MS Office

Office 365

1970 – 1980

1990 – 2000

2015 →

Analytics Platform

Programing
Procedures

Intelligence Platform

Viya

sas

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THE EVOLVING ANALYTICS PARADIGM

Client Server
Enterprise
Standardized

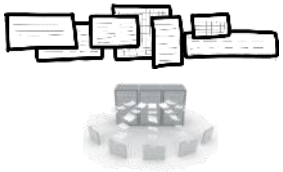
Publish Analytic Outputs

Organize Information
summaries, samples, data mart

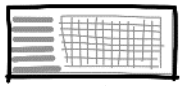
Add Business Context
calculations, hierarchies, algorithms

Deliver Information
dashboard, report, score, model

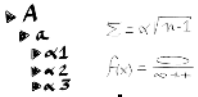
Data Sources
operational, transactional



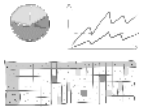
QUERY



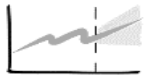
ANALYZE

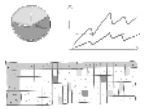


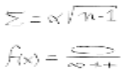
FORMAT



Perform & Deliver Analytic Insights
model, graphic, visualization, self-service

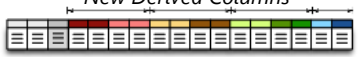






Analytic Data Preparation

New Derived Columns



method specific, external data, iterative

Enable Analytic Communities

Web/Mobile
In Memory
Cloud
Open

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SAS® Viya™
Our digital transformation
to power the analytics economy

FORCES SHAPING THE ANALYTICS ECOSYSTEM

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FORCES SHAPING THE ANALYTICS ECOSYSTEM

Cloud enabled analytics

Everyone is a data scientist

Changing data landscape

Machine learning and AI

Analytics of Things

The future of analytics is open

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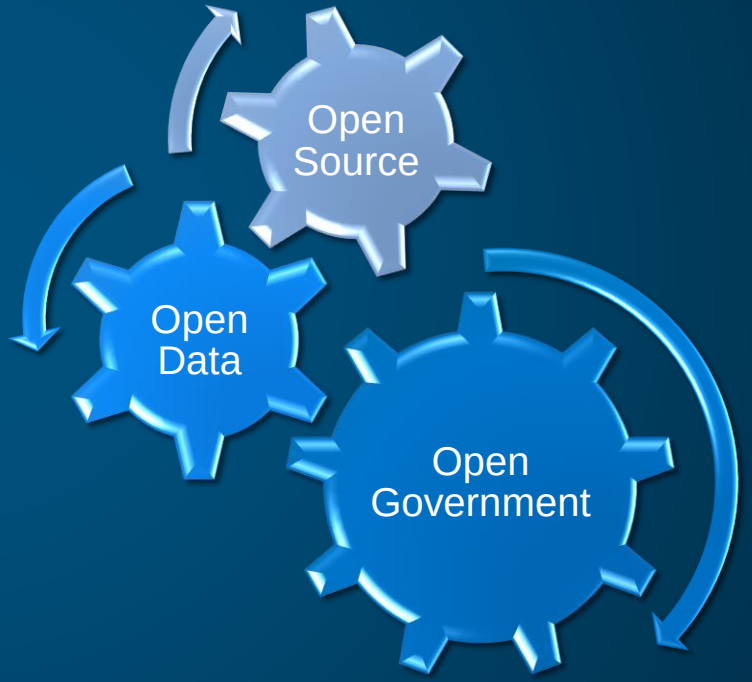
WHAT DOES "OPEN" MEAN TO YOU?



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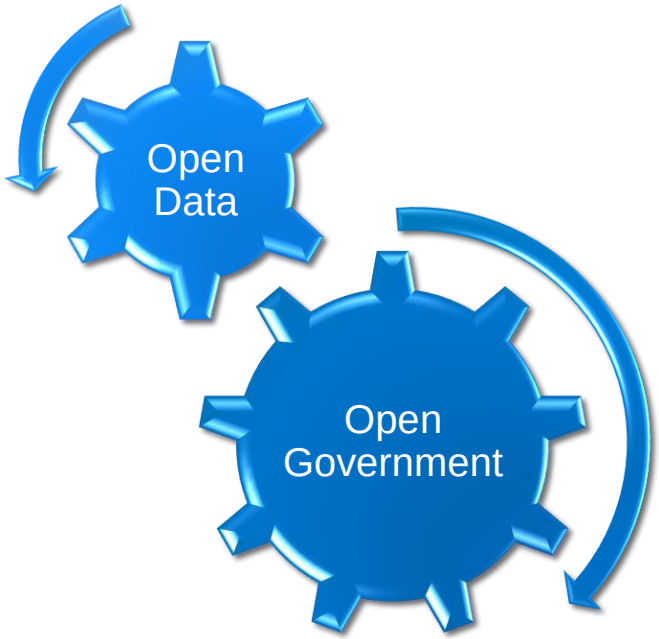
OPEN



> “Today, citizens expect to be able to access information and services electronically when and how they choose to do so.”

The Economist
November 2015

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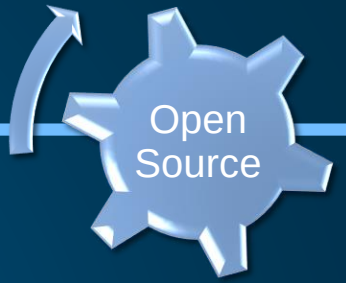
THE FUTURE OF ANALYTICS IS OPEN



Open Source

sas

AND

python Scala sas R Lua APACHE Spark

In the past…

- Limited analytics players (SAS)
- Analytics was back office or research
- Relied on a "Go-To" Guy aka the "Bottleneck"
- Disjointed silos of analytics expertise

Today…

- Common analytic languages– known to many
- Easier to get started and dabble with analytics
- Everyone is an analyst
- Analytics are mainstream

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SAS IS OPEN TO MORE USERS

Visual Interfaces

Programming Interfaces

Application Interfaces

REST API

CITIZEN DATA SCIENTIST

DATA SCIENTIST

DEVELOPER

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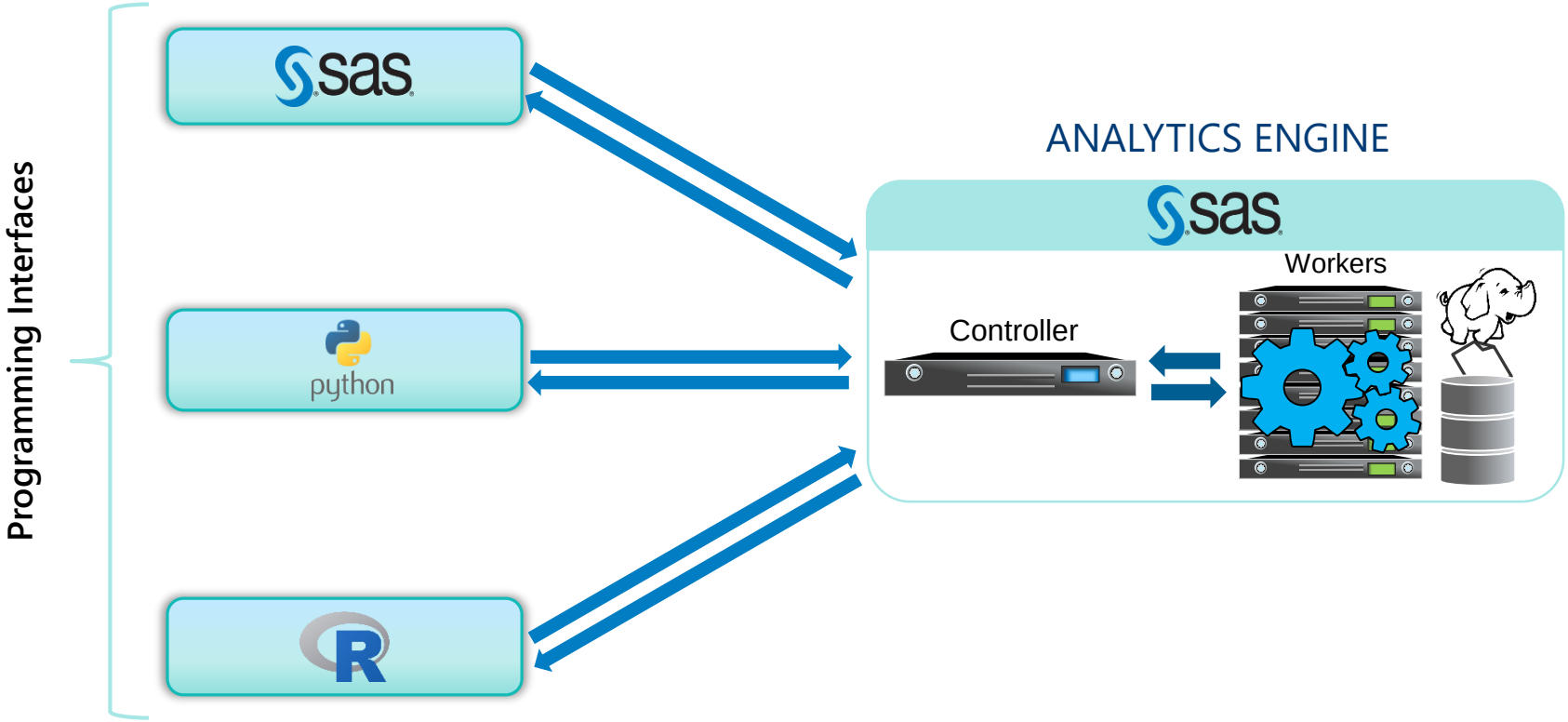
SAS IS OPEN



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SAS IS OPEN

Programming Interfaces

sas

```
proc print data = hmeq (obs = 10);
run;
```

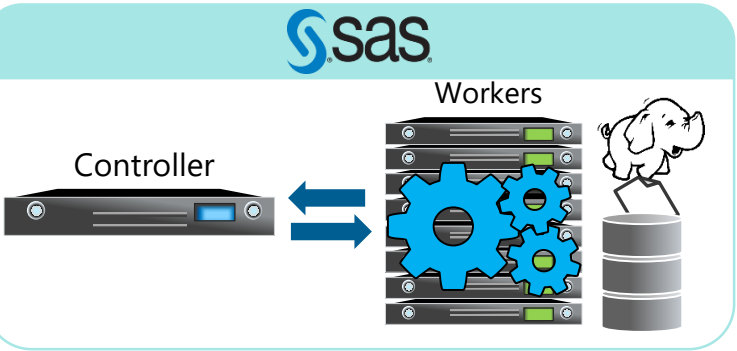
python

```
df = s.CASTable('hmeq')
df.head(10)
```

R

```
df <- defCasTable(s, 'hmeq')
head(df, 10)
```

ANALYTICS ENGINE



Translated Command

```
[table.fetch]
   table.name = "hmeq"
   from = 1 to = 10
```

sas Federal

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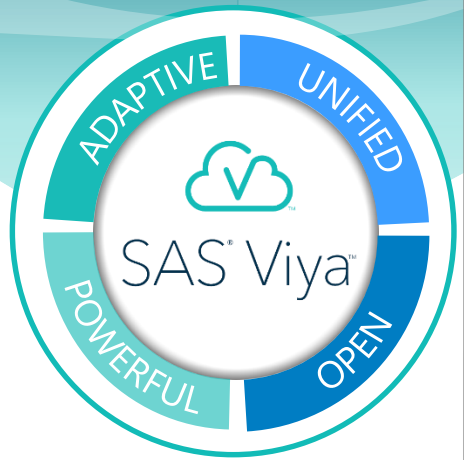
CLOUD FIRST STRATEGY FURTHER SUPPORTS OPEN

Programming | Visual applications | Solutions | APIs | Developer Edition | Apps

SAS Products & Solutions | **SAS API Ecosystem**

SAS Statistician or Data Miner



Computer Scientist

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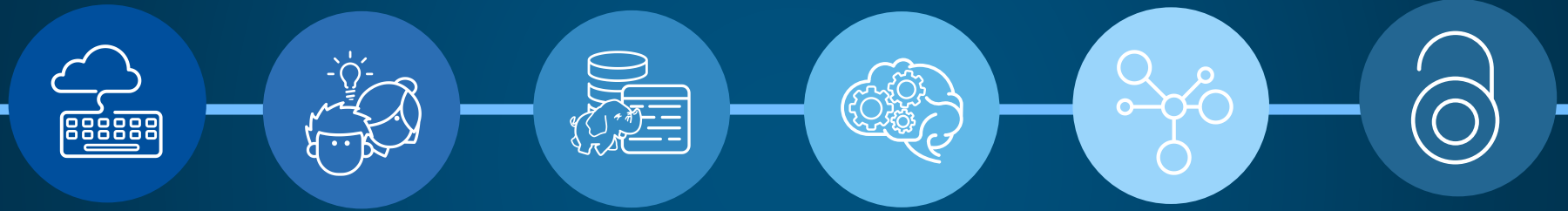
FORCES SHAPING THE ANALYTICS ECOSYSTEM



Cloud enabled analytics

Everyone is a data scientist

Changing data landscape

Machine learning and AI

Analytics of Things

The future of analytics is open

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WHO DOES THE PLATFORM ENABLE?

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ANALYTICS PERSONAS

1 BUSINESS ANALYST

WHAT DO THEY DO?

Focus on business context.

Answers questions.

Builds reports,

Interprets results.

WHAT DO THEY NEED?

Flexible, easy-to-use graphical user interfaces.

2 CITIZEN DATA SCIENTIST

WHAT DO THEY DO?

Explores advanced analytic techniques.

Needs easy to use and flexible.

Uses wizards and templates

WHAT DO THEY NEED?

Flexible, easy-to-use graphical user interfaces with some code.

3 DATA SCIENTIST

WHAT DO THEY DO?

Performs Complex models.

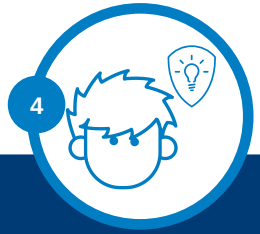
Leverages machine learning.

Integrates new data.

WHAT DO THEY NEED?

Primarily coding.
Need to scale methods without redefining code.

4 IT



WHAT DO THEY DO?

Facilitates production ready data and analytics.

Integrates analytics into business processes.

WHAT DO THEY NEED?

Uptime and reliability.

5 DEVELOPER

WHAT DO THEY DO?

Codes new applications.

Delivers embedded analytics.

Leverages APIs.

WHAT DO THEY NEED?

Portability and consistency.

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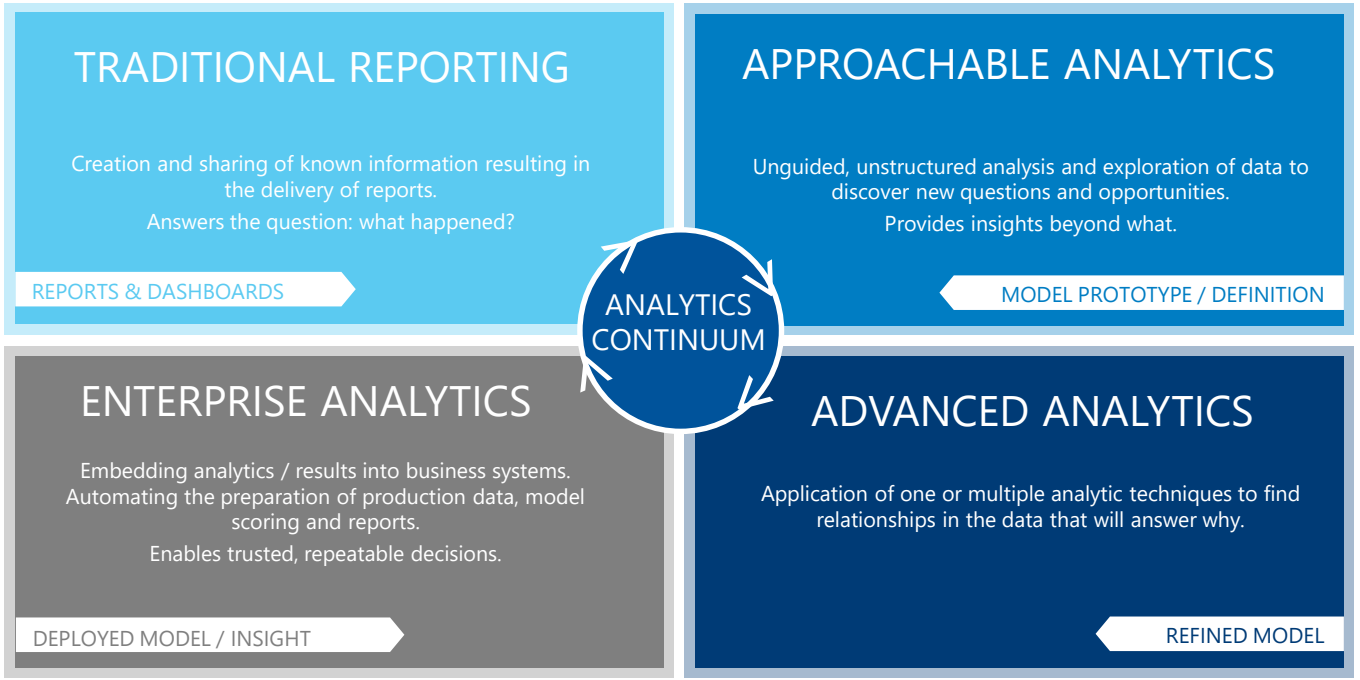
ANALYTIC MATURITY CONTINUUM

Needs a range of capabilities to enable an organization



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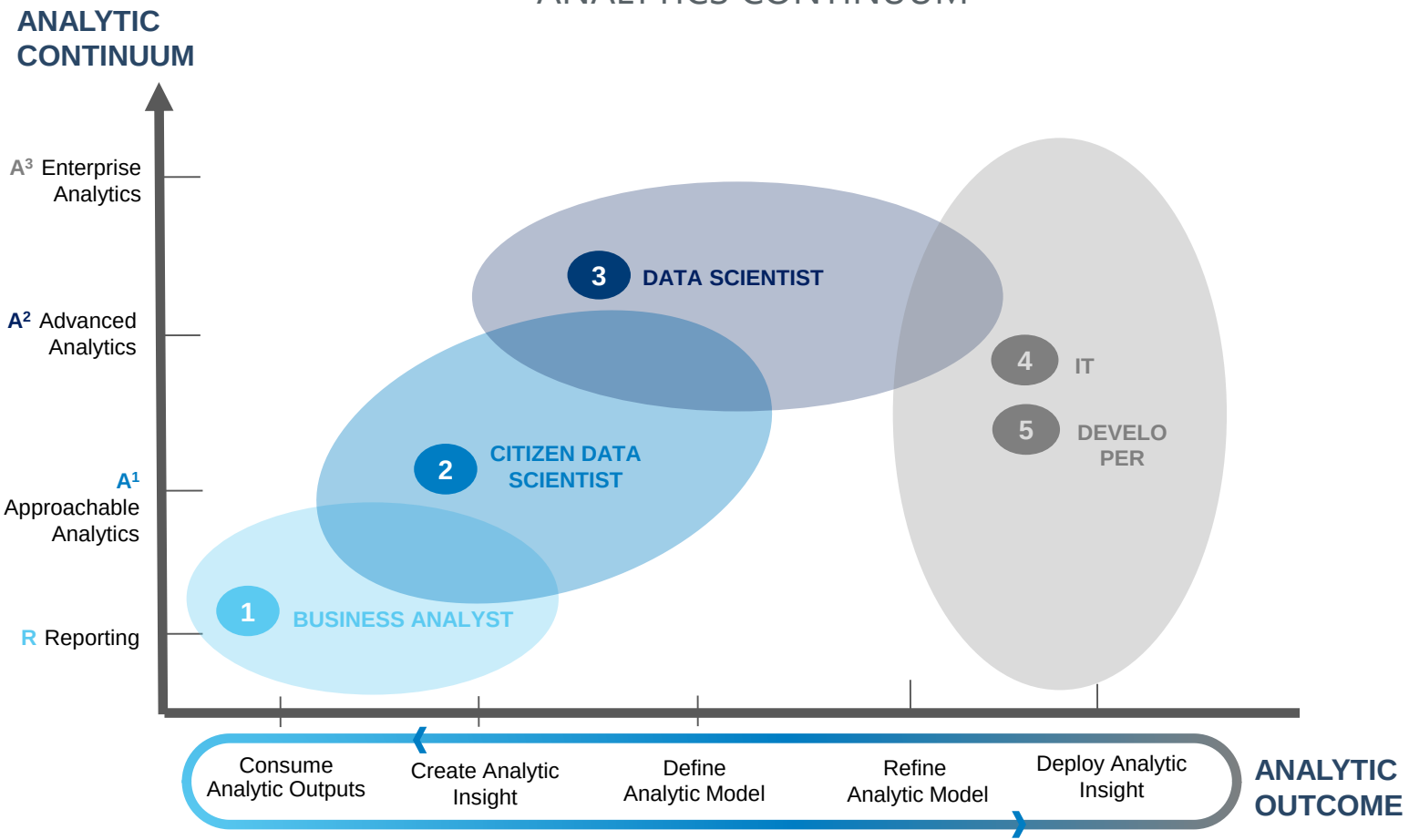
ANALYTICS CONTINUUM



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MODERN ANALYTICS ENVIRONMENT

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UNPACKING THE SAS® PLATFORM

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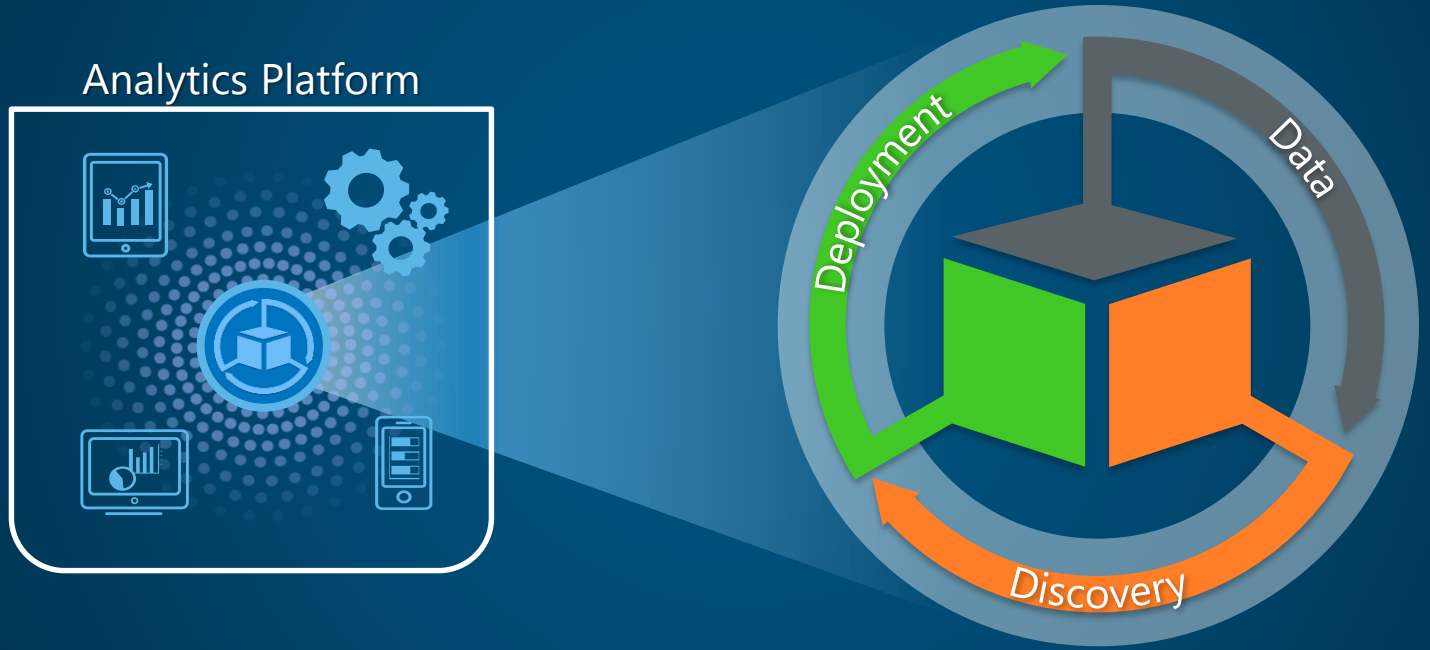
The Analytics Lifecycle



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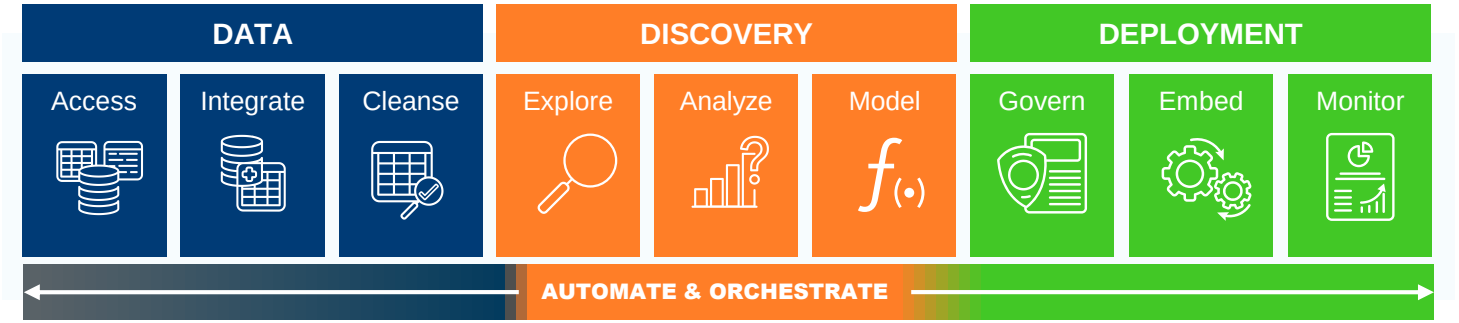
THE ANALYTICS LIFECYCLE



PROVIDES THE FOUNDATION FOR ANALYTICS.

REQUIRES A BROAD RANGE OF CAPABILITIES.

DELIVERS VALUE FROM YOUR ANALYTIC ASSETS.

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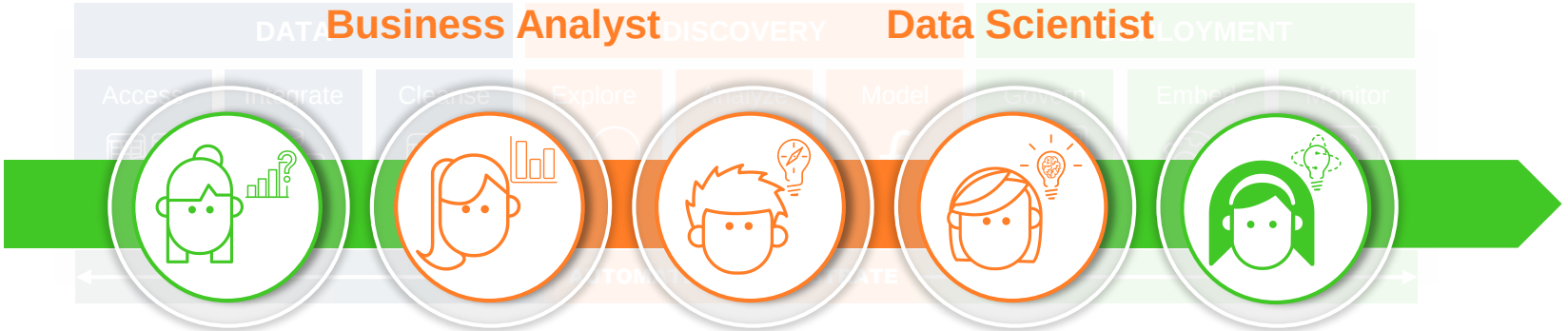
THE ANALYTICS LIFECYCLE

Many voices. Different needs.

Let me tell the story.

Show me the power.



Business Analyst

Data Scientist

Decision Maker

So what?

Citizen Data Scientist

Let me access all the data to ask different questions.

IT

I will operationalize the process.

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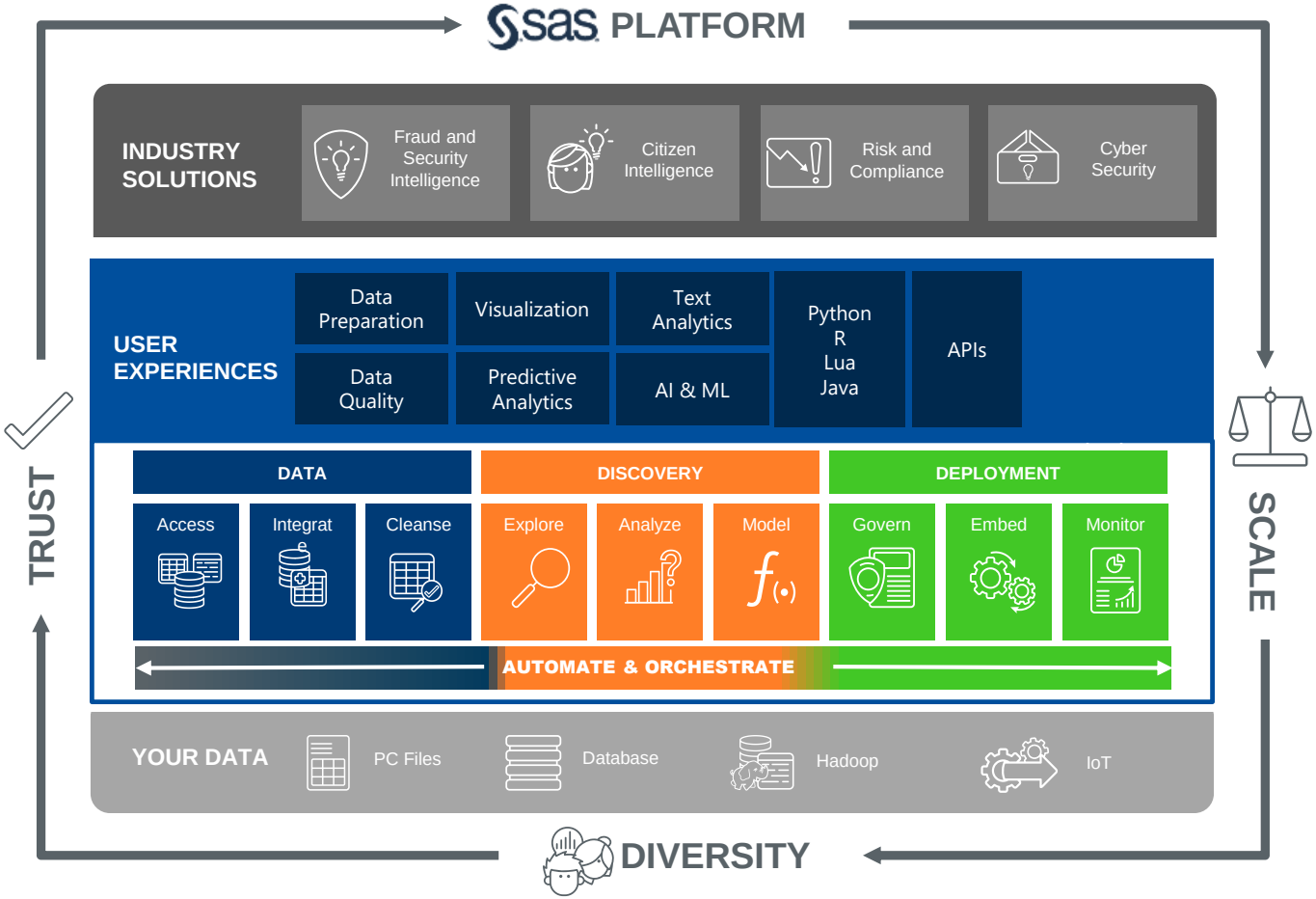

- Industry solutions powered by an enterprise analytics platform.
- Diverse, Scalable and Trusted Analytics.
- Augment open source initiatives
- Advanced Machining Learning and AI capabilities
- Data agnostic
- Hadoop enabled.
- Real-time.

SAS Federal

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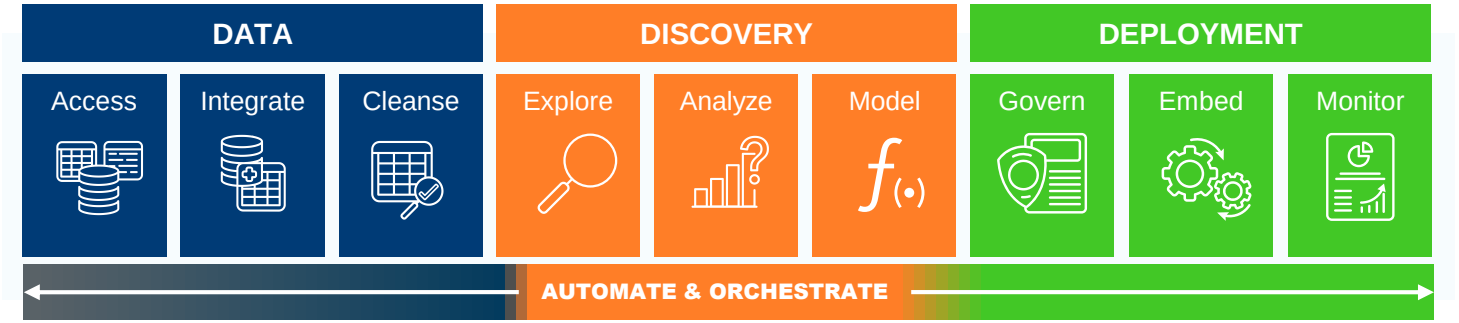
THE ANALYTICS LIFECYCLE



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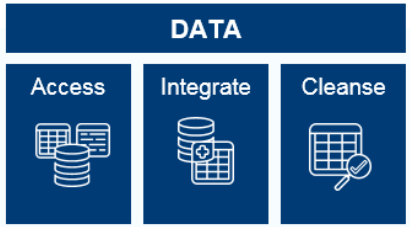
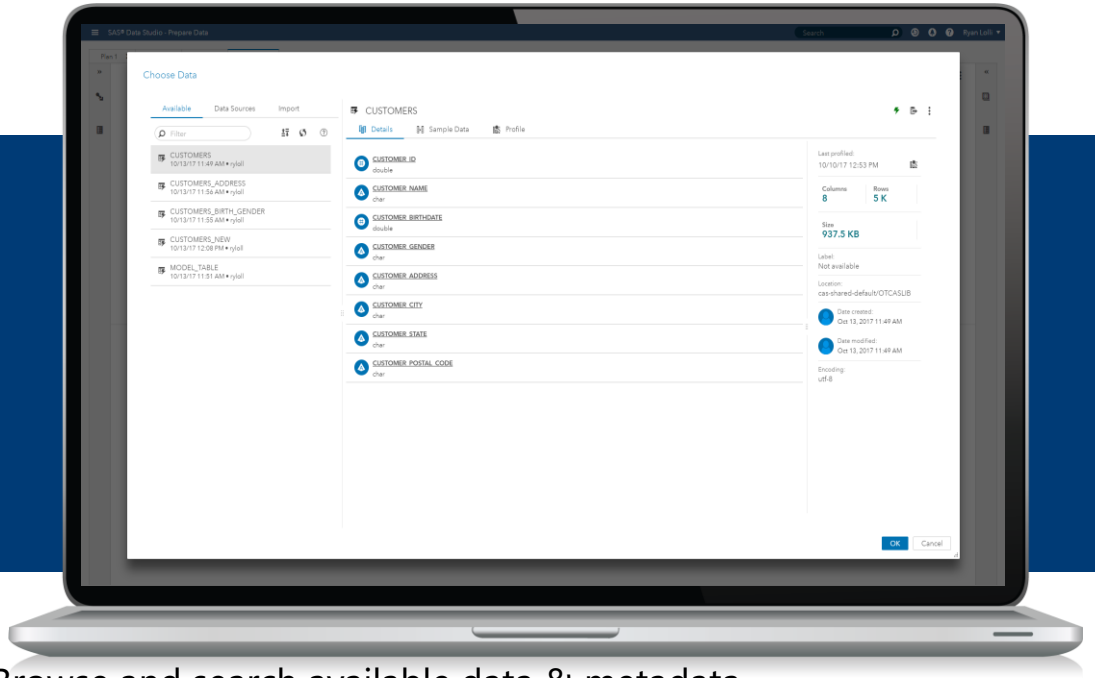


ACCESS

CONNECT TO DATA



- Browse and search available data & metadata
- Filter, copy & profile data
- Lift data into memory
- Access new data sources (files, social media, data connections)

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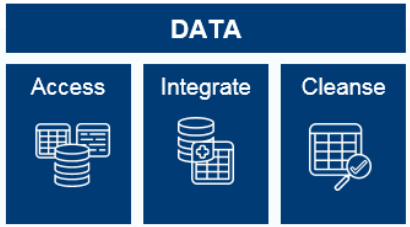
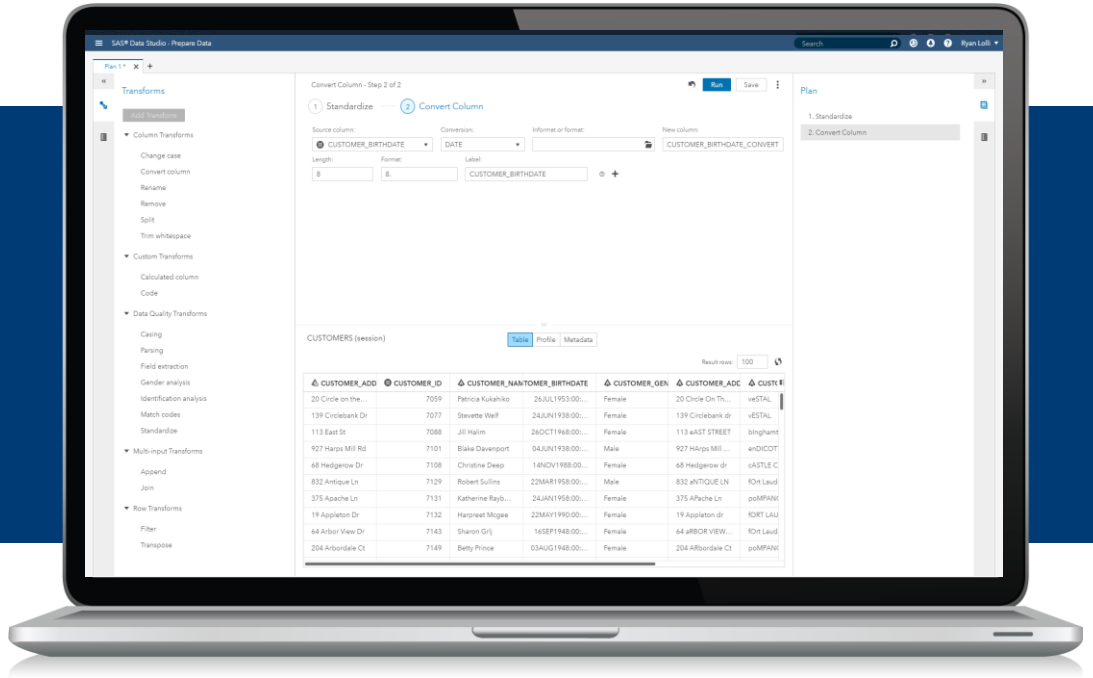


INTEGRATE

JOIN MERGE TRANSFORM



- Select columns & apply filters
- Calculate Columns
- Convert data types
- Append, join & transpose data
- Insert code
- Create jobs

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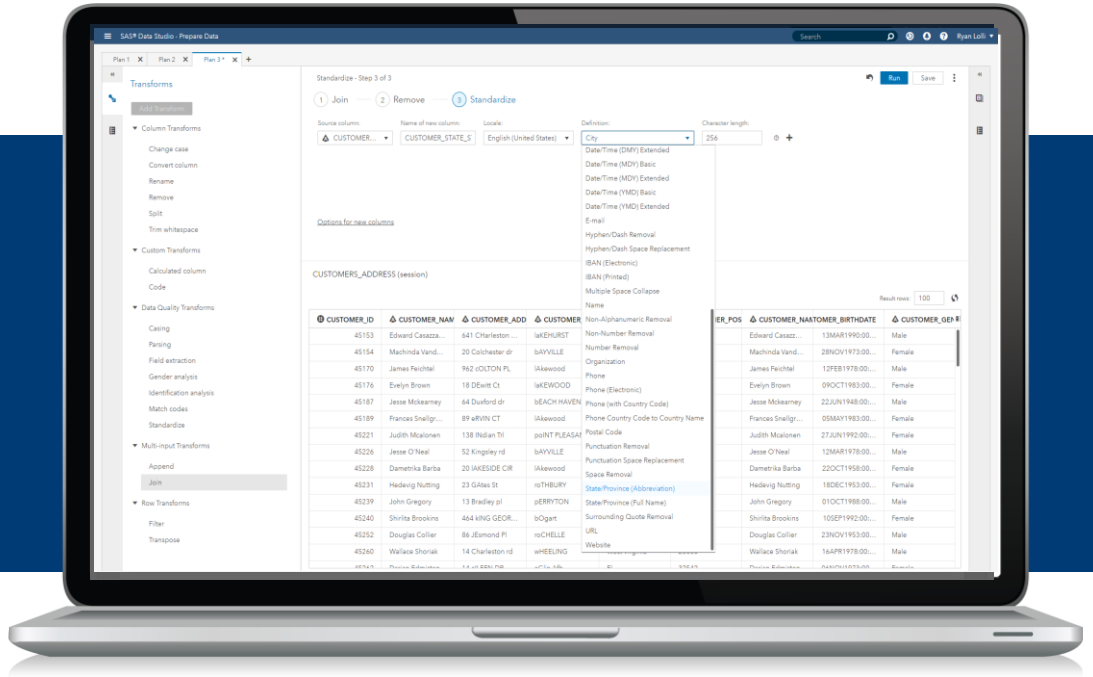
DATA

Access	Integrate	Cleanse

CLEANSE

PROFILE
STANDARDIZE
MATCH



- Parse
- Field Extraction
- Standardize
- Match

- Identification Analysis
- Change Case
- Gender Analysis

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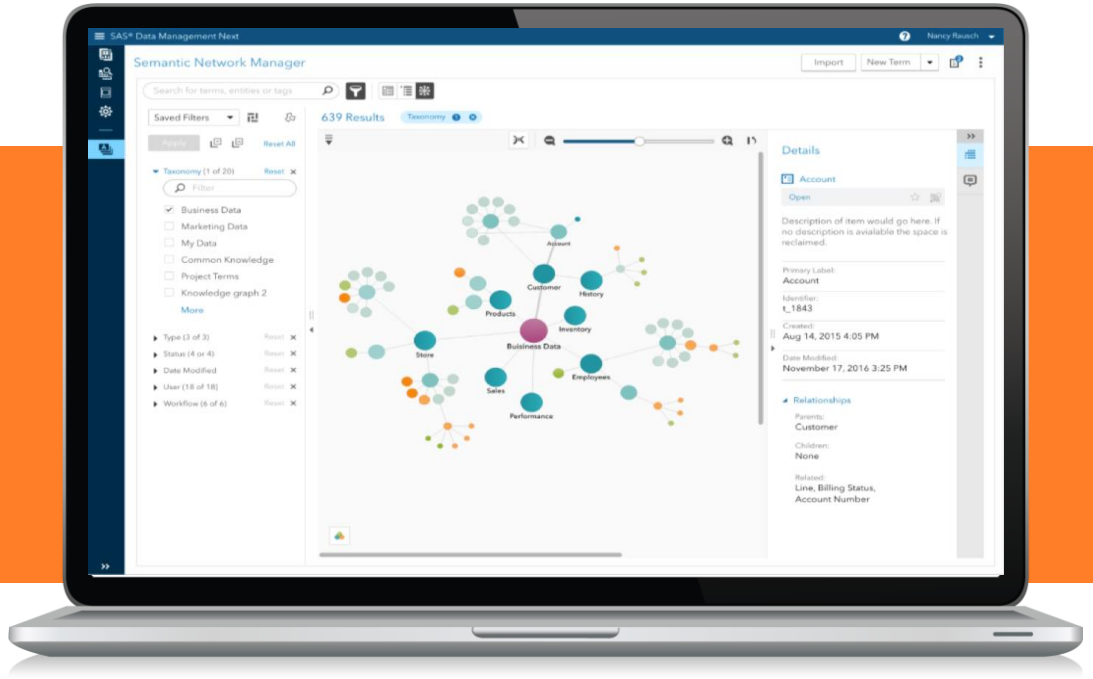
DISCOVERY

Explore	Analyze	Model

EXPLORE

DATA DISCOVERY



- Ad hoc exploration of data.
- Discover relationships, trends and outliers.
- Interactive maps and visualizations.
- Design & publish interactive visualizations.

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DISCOVERY

Explore | Analyze | Model

ANALYZE

STATISTICS

- Linear & logistic regression and generalized linear model.
- Classification trees.
- Clustering and segmentation.
- Model comparisons (lift / ROC charts, misclassification tables).

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DISCOVERY

Explore | Analyze | Model

MODEL

DATA MINING

- Advanced data mining pipelines and algorithms
- Data sampling including random, stratified and oversampling.
- Feature binning and partitioning
- Visual data exploration and feature engineering.
- Model ensembling

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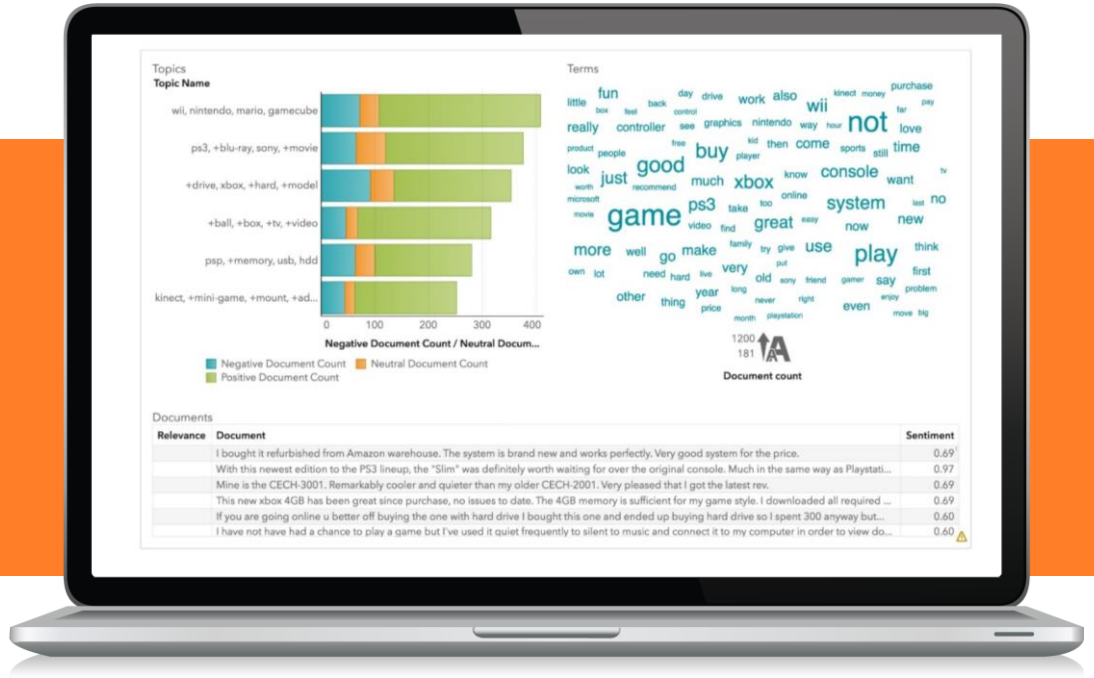
DISCOVERY

Explore | Analyze | Model

MODEL

TEXT MINING



- Text Analytics pipeline frame work for text modeling
- Text mining functions like Parsing, Concept and topic creation, Content Categorization and Sentiment Analysis.
- Textual Elements, Similar Terms, Create Rules wizard, predicate/fact matches displayed.

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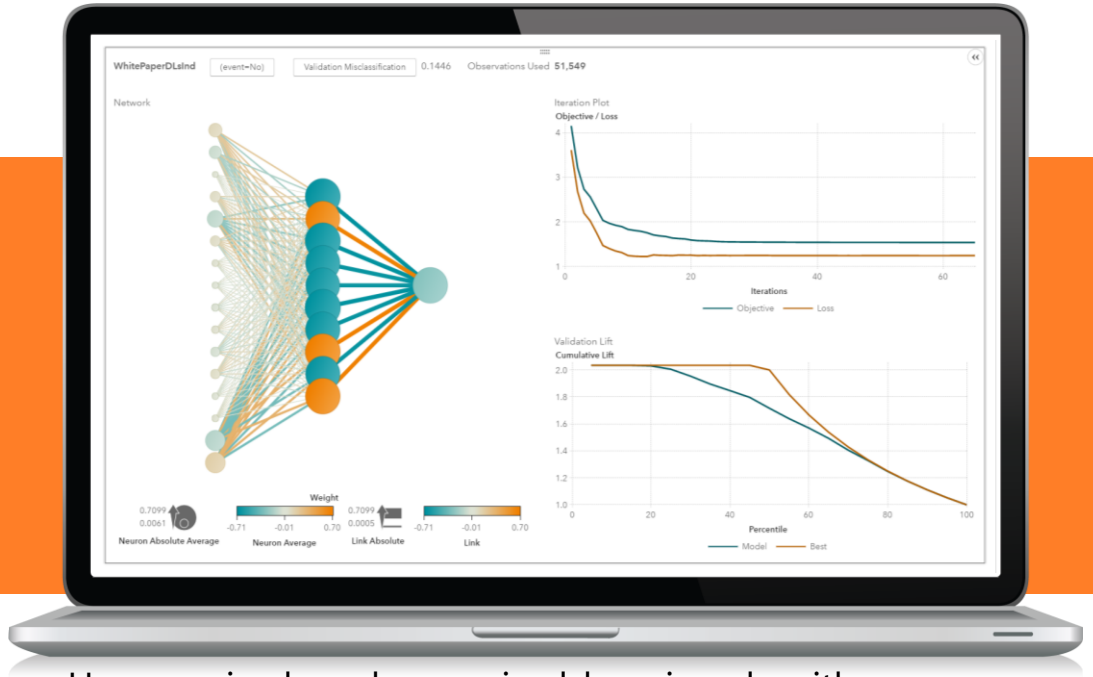
DISCOVERY

Explore | Analyze | Model

MODEL

MACHINE LEARNING & AI



- Unsupervised- and supervised-learning algorithms (principal component analysis, random forests, gradient boosting, neural networks and more)
- Automated model tuning
- Model assessment and scoring

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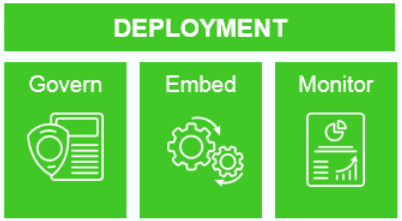
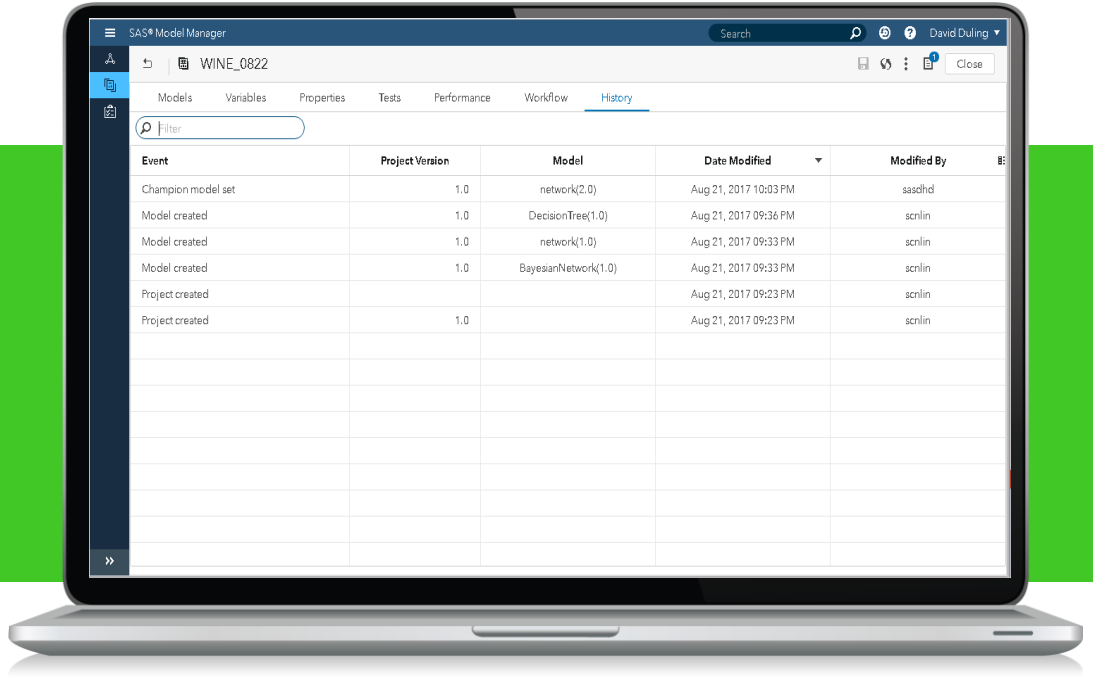


GOVERN

CENTRALLY MANAGE



- Central model management
- Repository for SAS Models and Open Source (R, Python, PMML)
- Model history, version control
- Model lineage and governance

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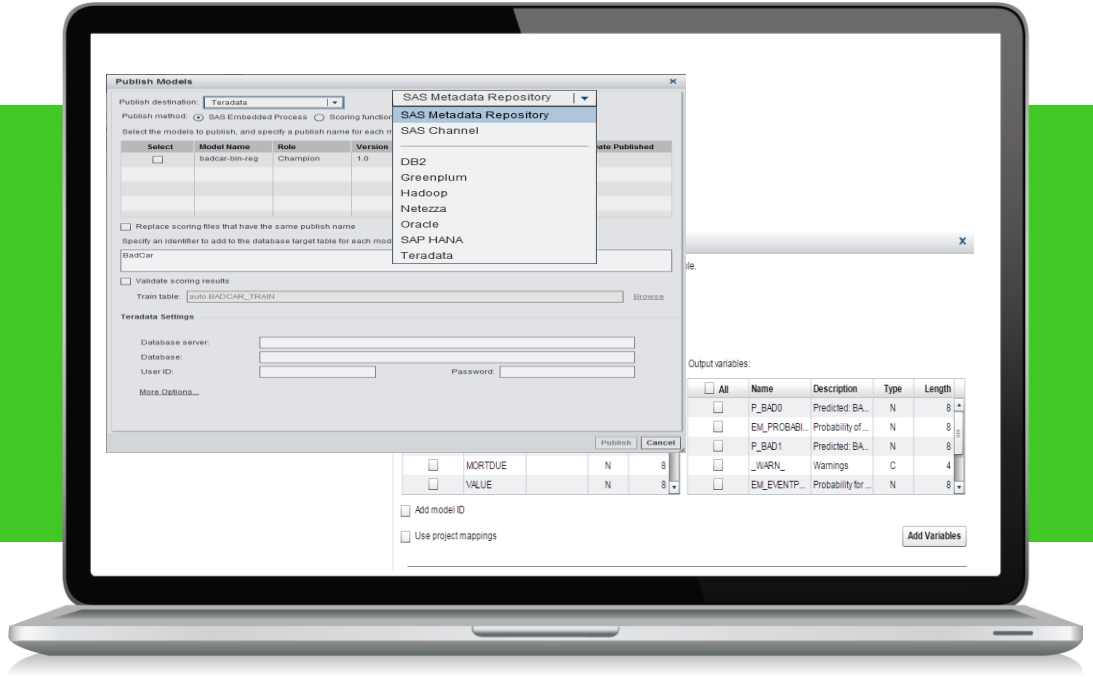
DEPLOYMENT

Govern | Embed | Monitor

EMBED

CREATE EFFICIENCIES



- Automate Model execution.
- Execute models in database/Hadoop.
- No Language Conversion.
- Generate score code for complex models.

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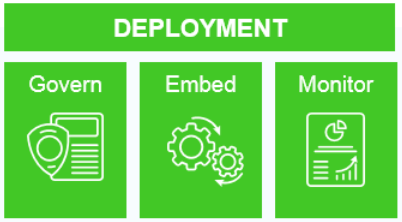
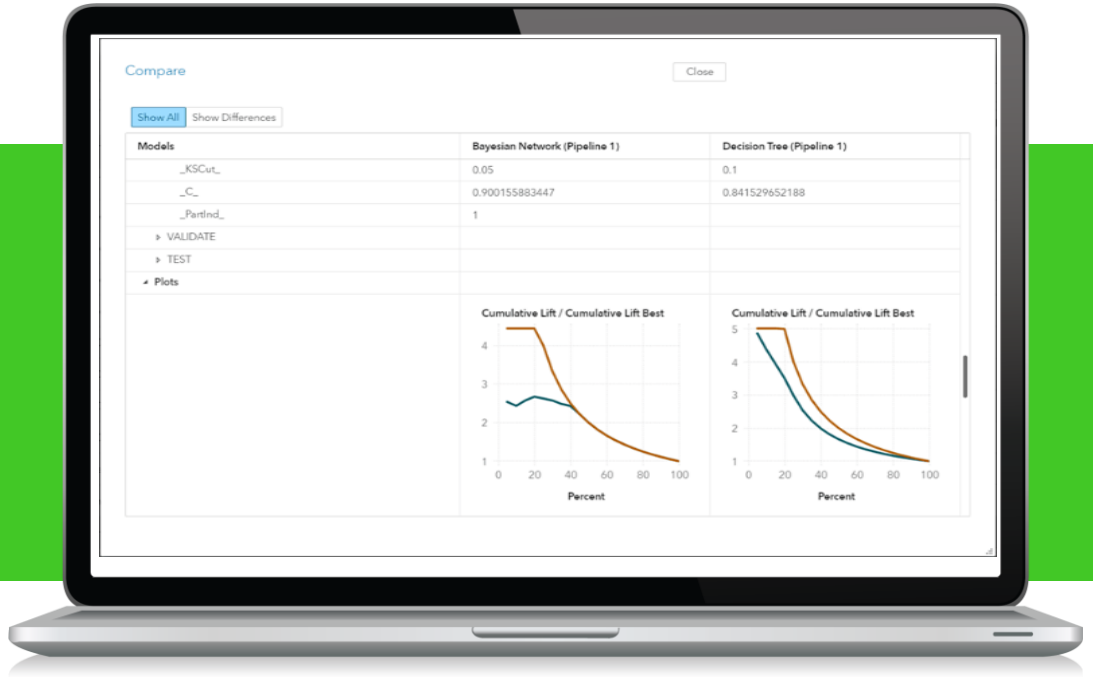


MONITOR

CONTROL & ADJUST



- Model performance platform to keep models “fresh”
- Compare Multiple Models at once
- Assess model accuracy (Lift, ROC, K-S)
- Champion/Challenger modeling
- Model retraining including open source

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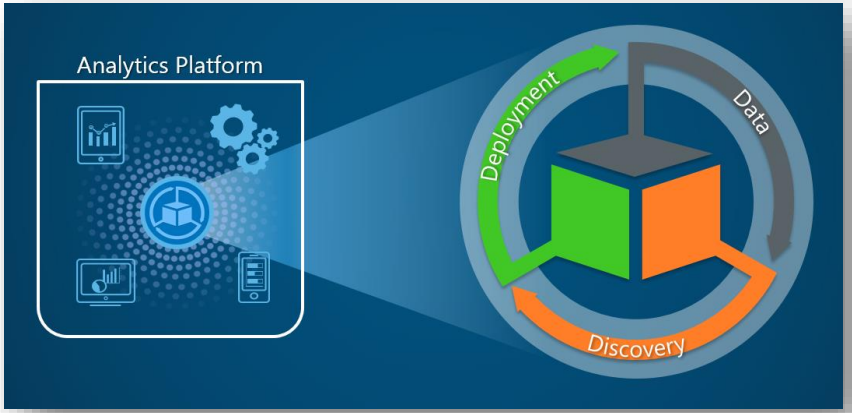
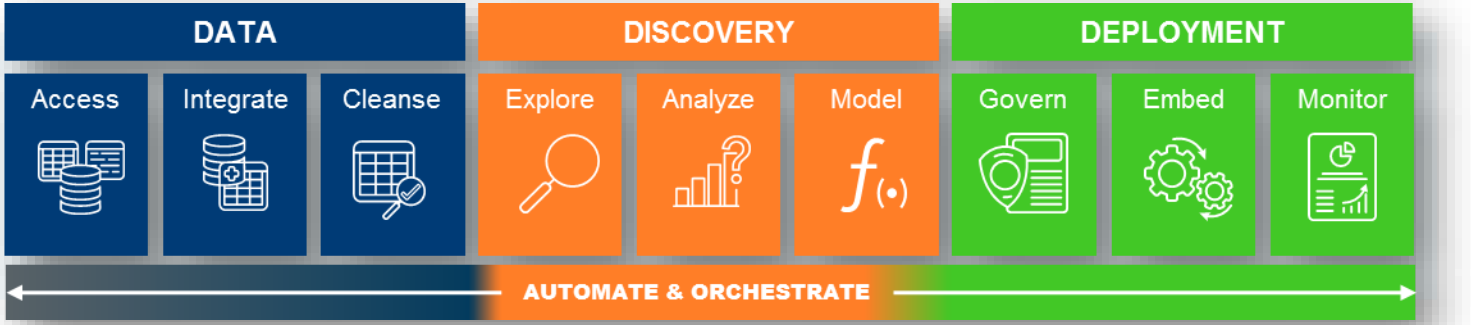
THE ANALYTICS LIFECYCLE DELIVERED THROUGH THE ANALYTICS PLATFORM





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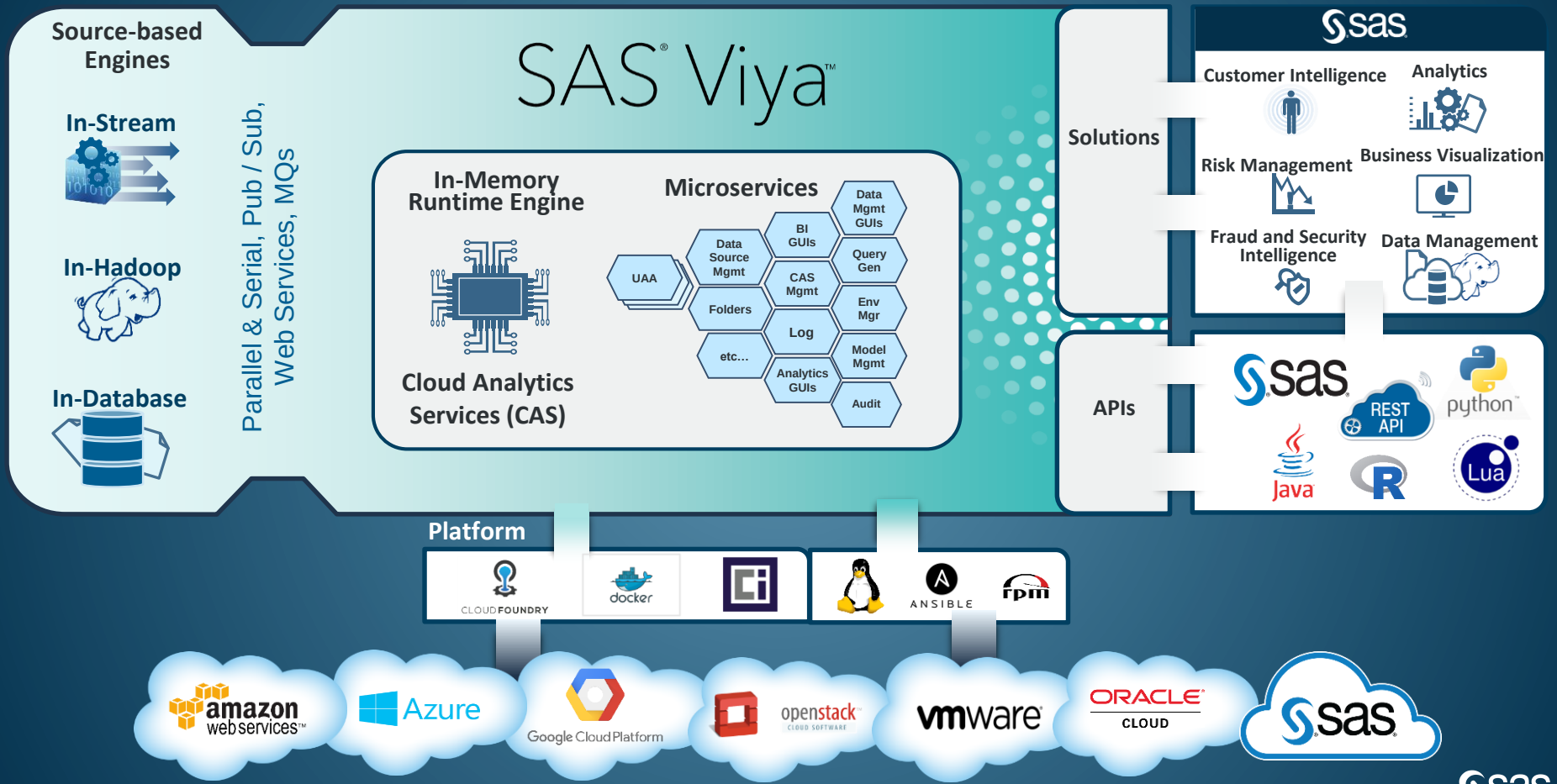

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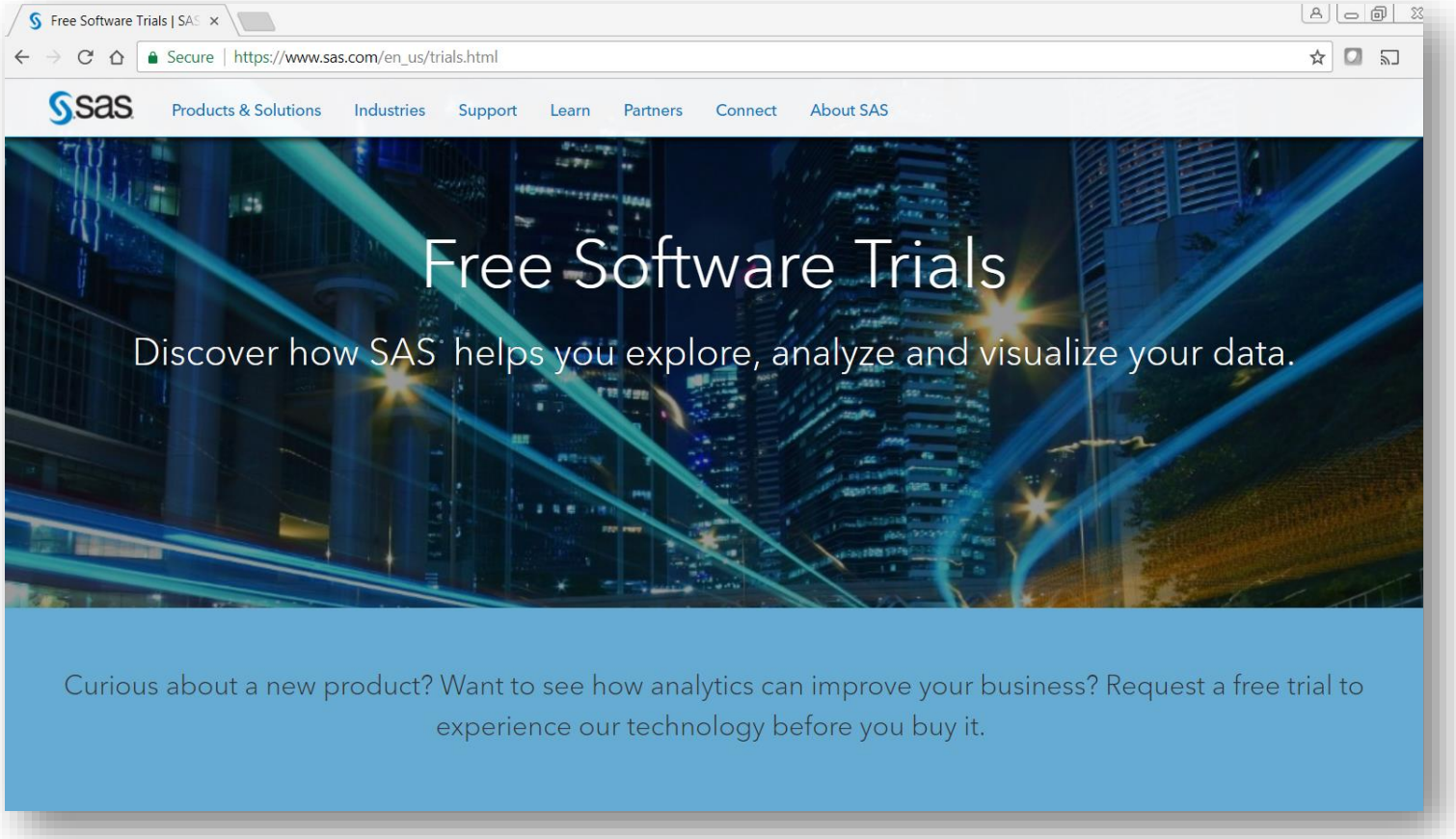
TRIAL PROGRAMS



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Let’s continue the conversation…

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