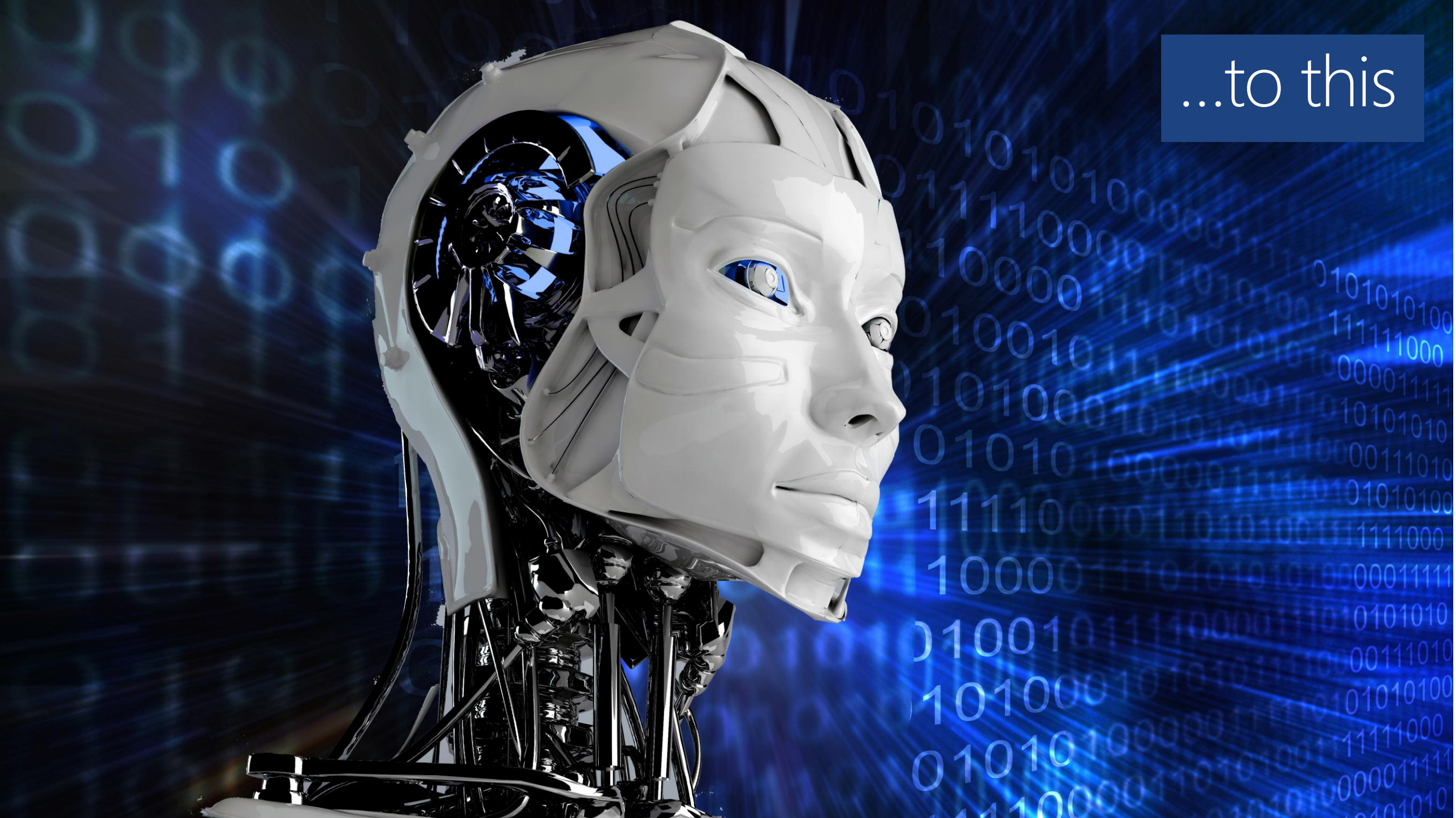
Microsoft

Microsoft Analytics: The Next Wave

Simon Lidberg
Benjamin Wright-Jones
Data Insights Center of Excellence

Microsoft Azure

How do we move from this…


...to this

> *Delivering on one of the old dreams of Microsoft co-founder Bill Gates: Computers that can see, hear and understand*

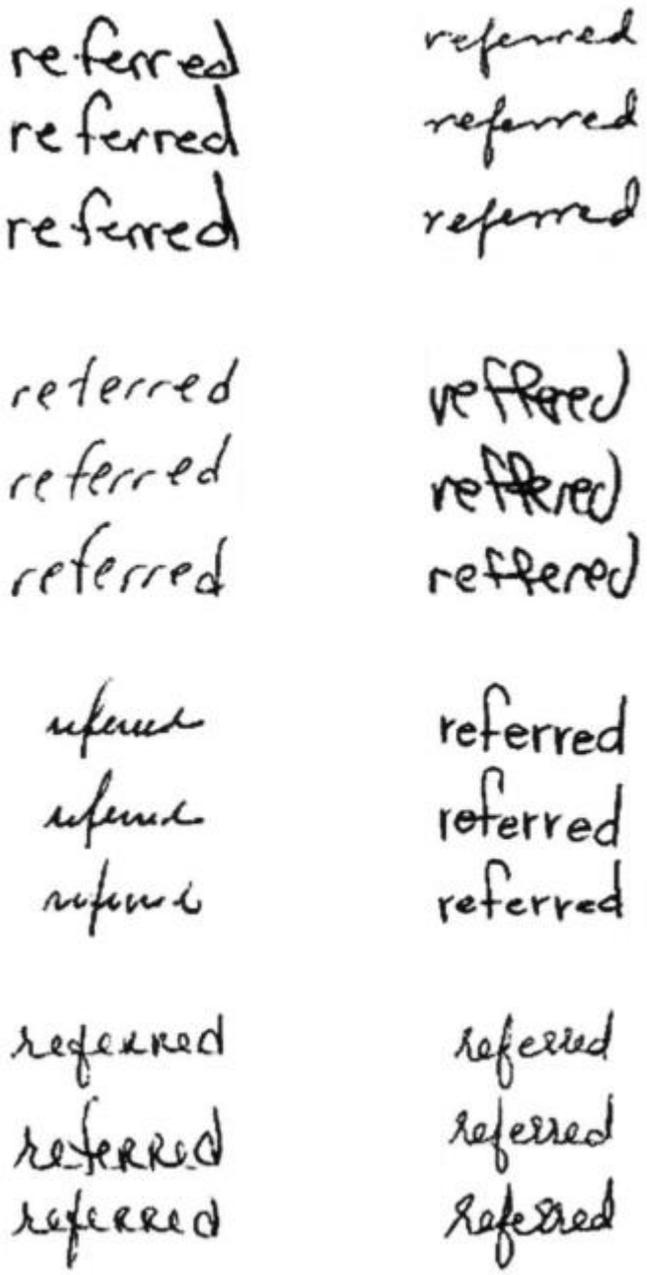
John Platt
Distinguished scientist at
Microsoft Research

What is Machine Learning?

Computing systems that improve with experience

The United States Postal Service processed 158.4 billion pieces of mail in 2013—far too much for efficient human sorting.

But as recently as 1997, only 10% of hand-addressed mail was successfully sorted automatically.



The challenge in automation is enabling computers to interpret endless variation in handwriting.

By providing feedback, the Postal Service was able to train computers to accurately read human handwriting.

Today, with the help of machine learning, over 98% of all mail is successfully processed by machines.

Microsoft & Machine Learning

20 years of realizing innovation

1999 — Computers work on users behalf, filtering junk email

2004 — Microsoft search engine built with machine learning

2005 — SQL Server enables data mining of databases

2008 — Bing Maps ships with ML traffic-prediction service

2010 — Microsoft Kinect can watch users gestures

2012 — Successful, real-time, speech-to-speech translation

John Platt,
Distinguished scientist at Microsoft Research

“Machine learning is pervasive throughout Microsoft products.”

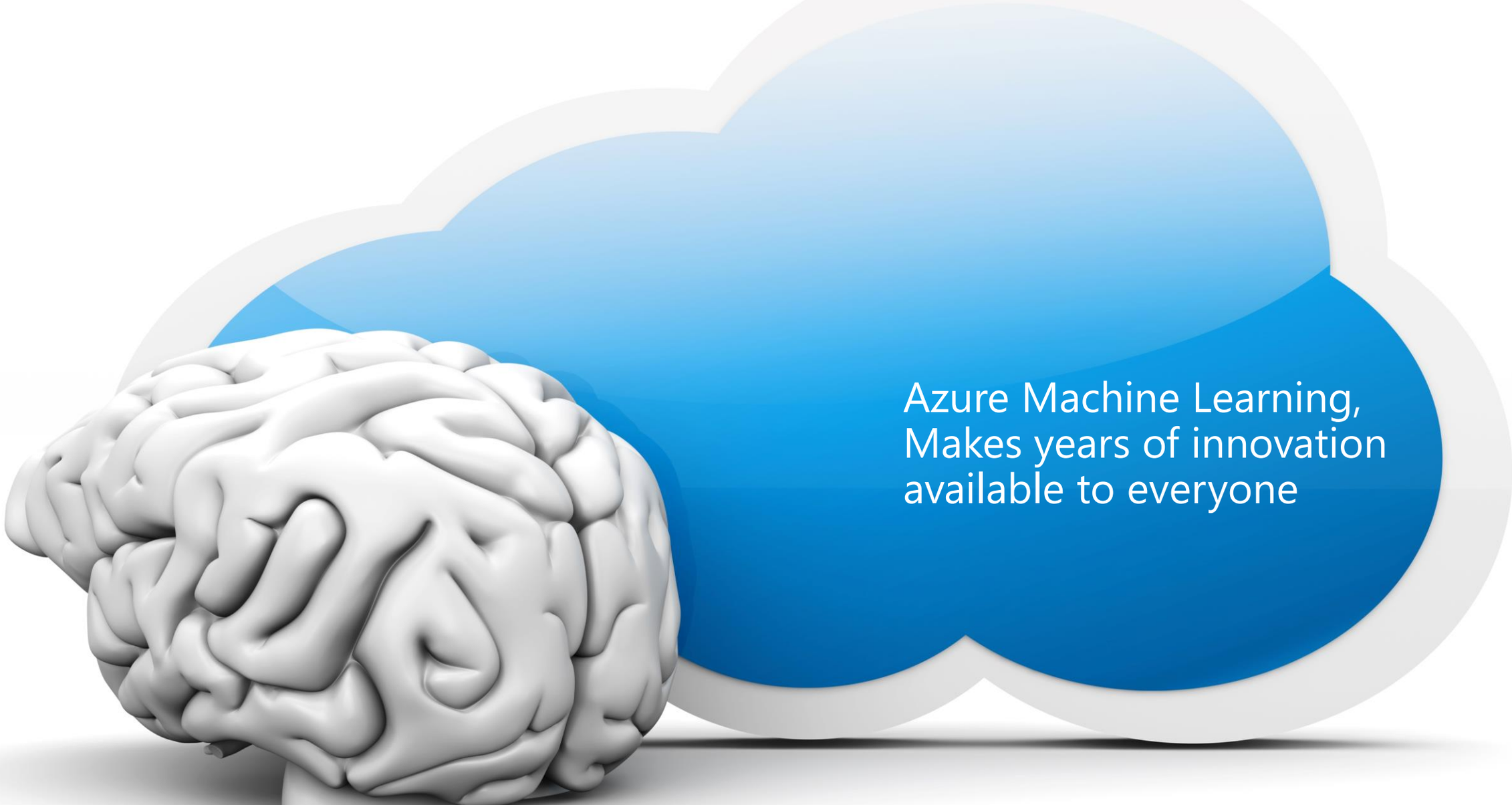
Data Science
Complexity

Data Science is far too complex today

- Access to quality ML algorithms, cost is high.
- Must learn multiple tools to go end2end, from data acquisition, cleaning and prep, machine learning, and experimentation.
- Ability to put a model into production.

This must get simpler, it simply won't scale!

Announcing Azure Machine Learning



Solutions at the speed of the market

Manage and deploy Machine Learning from the Azure portal

Easily manage and monitor

Streamline with one portal to view and update

Ensure enterprise-grade security

Peace of mind with best-in-class data and identity security features

Amplify your investments

Get more from your machine learning and Azure solutions

Operationalize in minutes

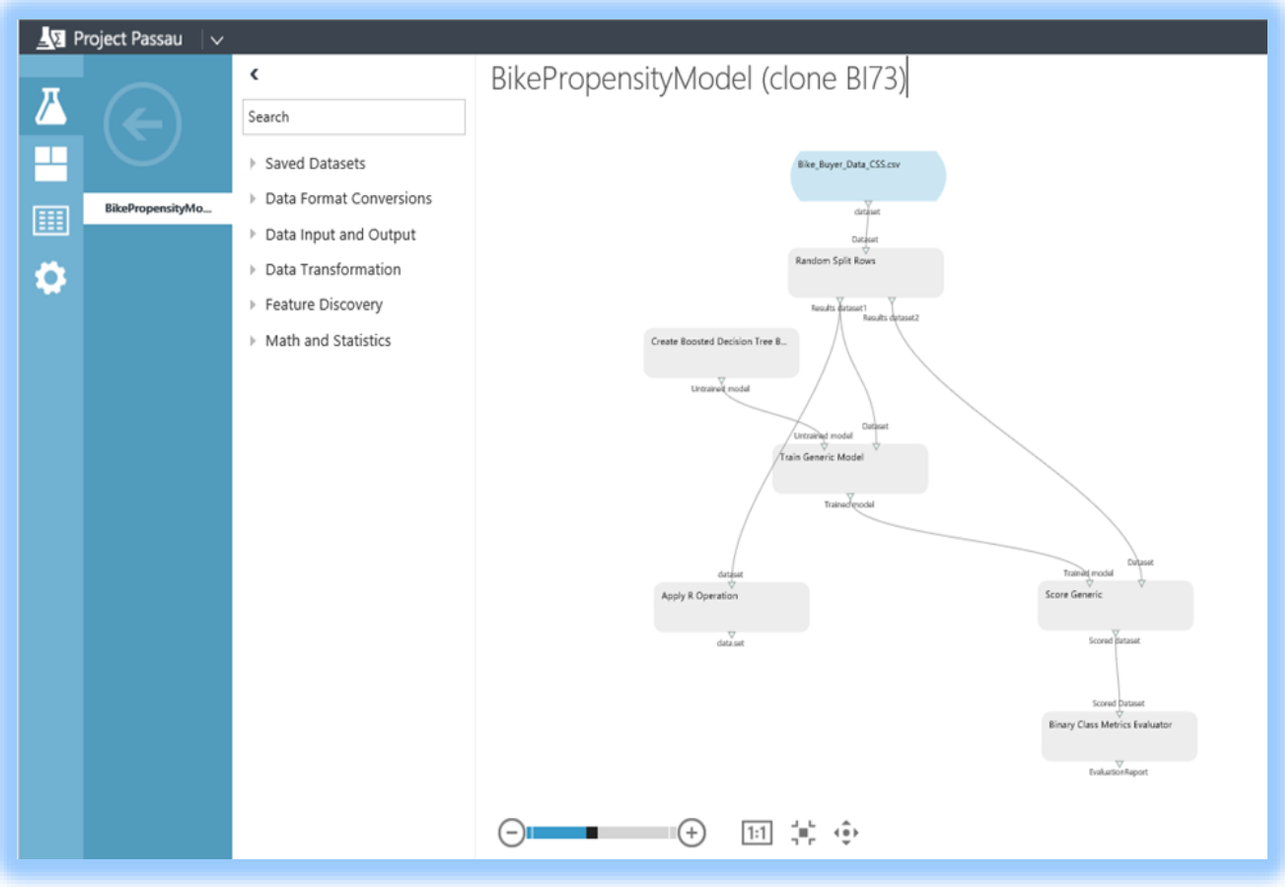
Tooled for quick deployment, hand-off and updates

Microsoft Azure Machine Learning

Features and Benefits

Reduce complexity to broaden participation

- Accessible through a web browser, no software to install;
- Collaborative work with anyone, anywhere via Azure workspace
- Visual composition with end2end support for data science workflow;
- Best in class ML algorithms;
- Extensible, support for R OSS.

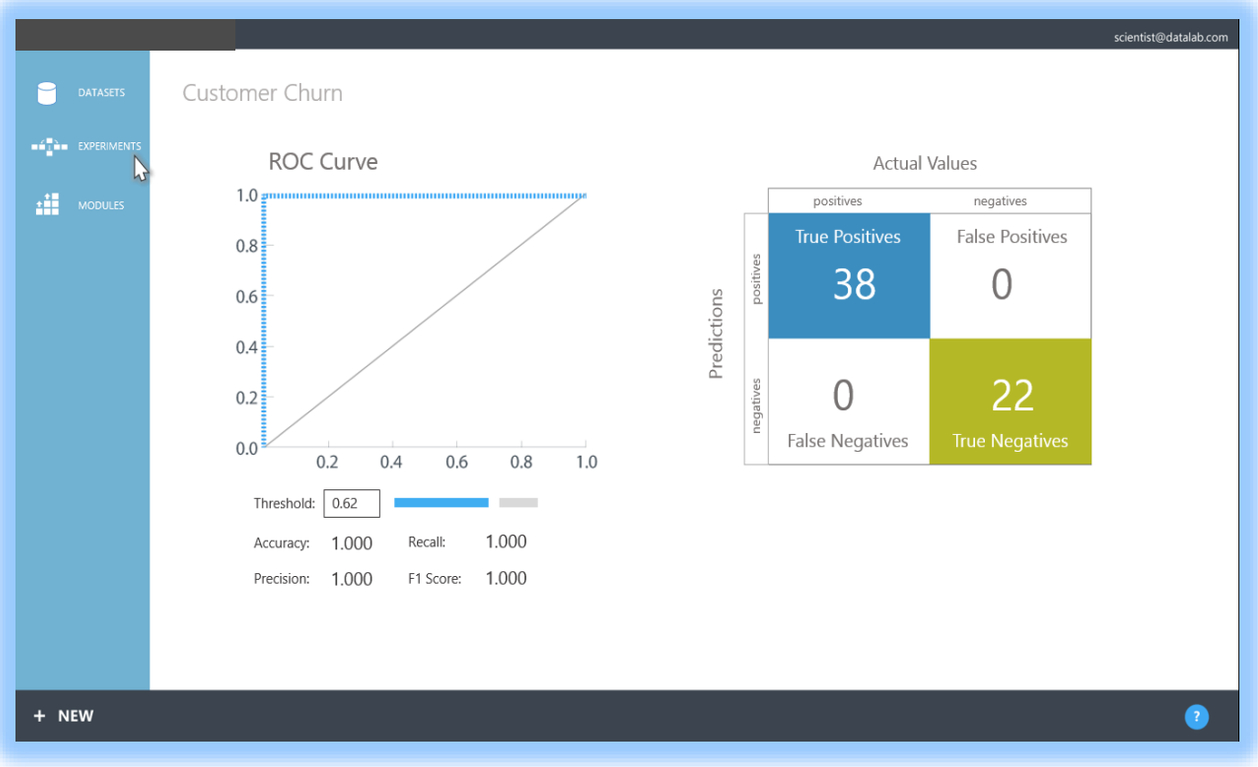


Microsoft Azure Machine Learning

Features and Benefits

Rapid experimentation to create a better model

- Immutable library of models, search discover and reuse;
- Rapidly try a range of features, ML algorithms and modeling strategies;
- Quickly deploy model as Azure web service to our ML API service.



Learn from experience to make better predictions

Imagine what machine learning could do for your business.

Churn analysis	Ad targeting	Image detection & classification
Equipment monitoring	Recommendations	Forecasting
Spam filtering	Fraud detection	Anomaly detection

demo

Customer recommendations with Azure Machine Learning

Pier 1 partnered with MAX451 to help loyalty customers by using historical and behavioral data to predict what products they want next.

Key Benefits

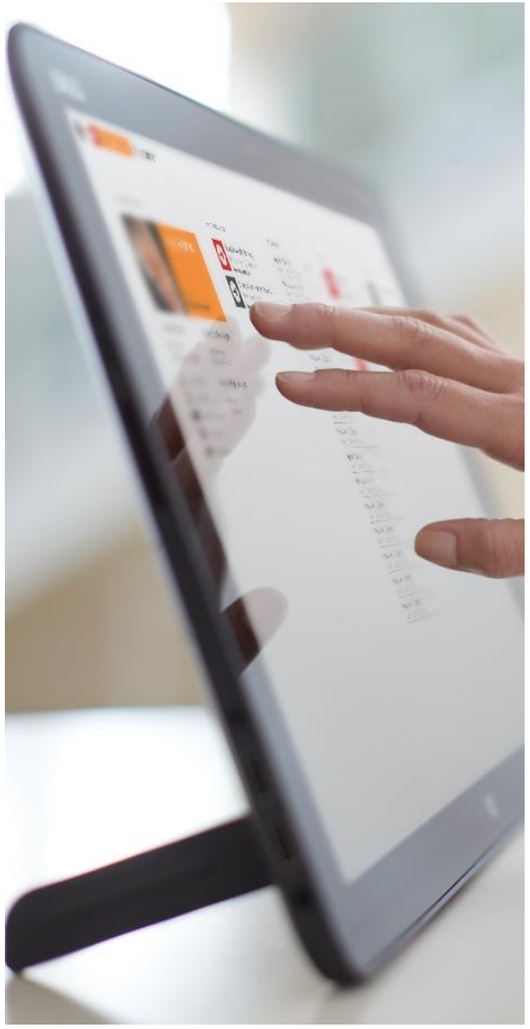
- Ease of use across skillsets
- Fast time to meaningful results
- Accessible via the cloud

“We are especially pleased that our analysts can focus on the results and not worry about the complex algorithms behind the scenes.”

Andrew Laudato
Pier 1 Imports

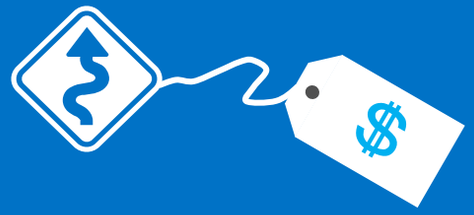

Azure ML Service

Segmentation based on driving habits

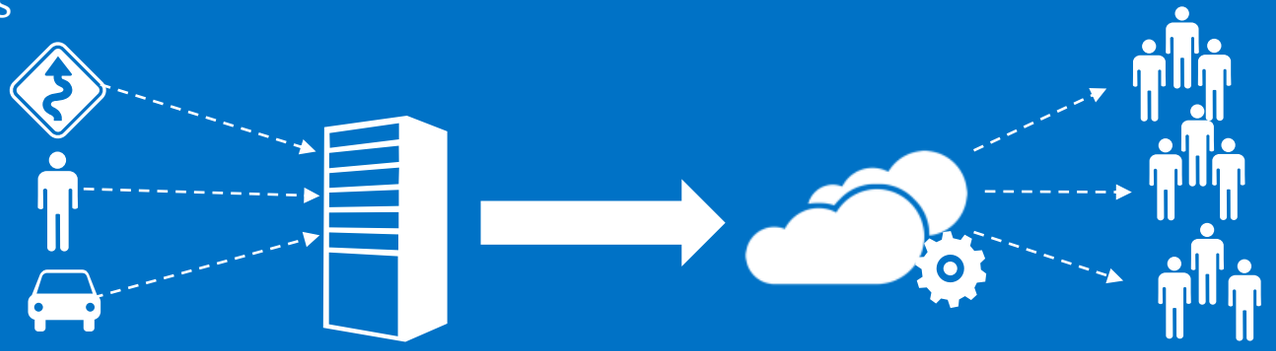


1 **Assign drivers into categories** - sports driver, Grandma/pa driver

2 **Provide special offerings based on driver type** - sports package for the sports driver
Make a special offer for the next car



3 **Analytical Task:** Cluster the relevant diagnostics data to find groups of drivers with common driving habits

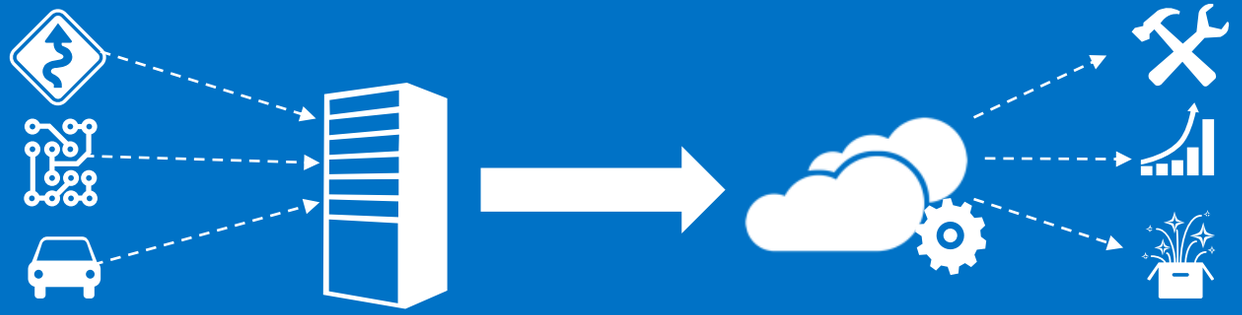


Break pad and tire replacement prediction

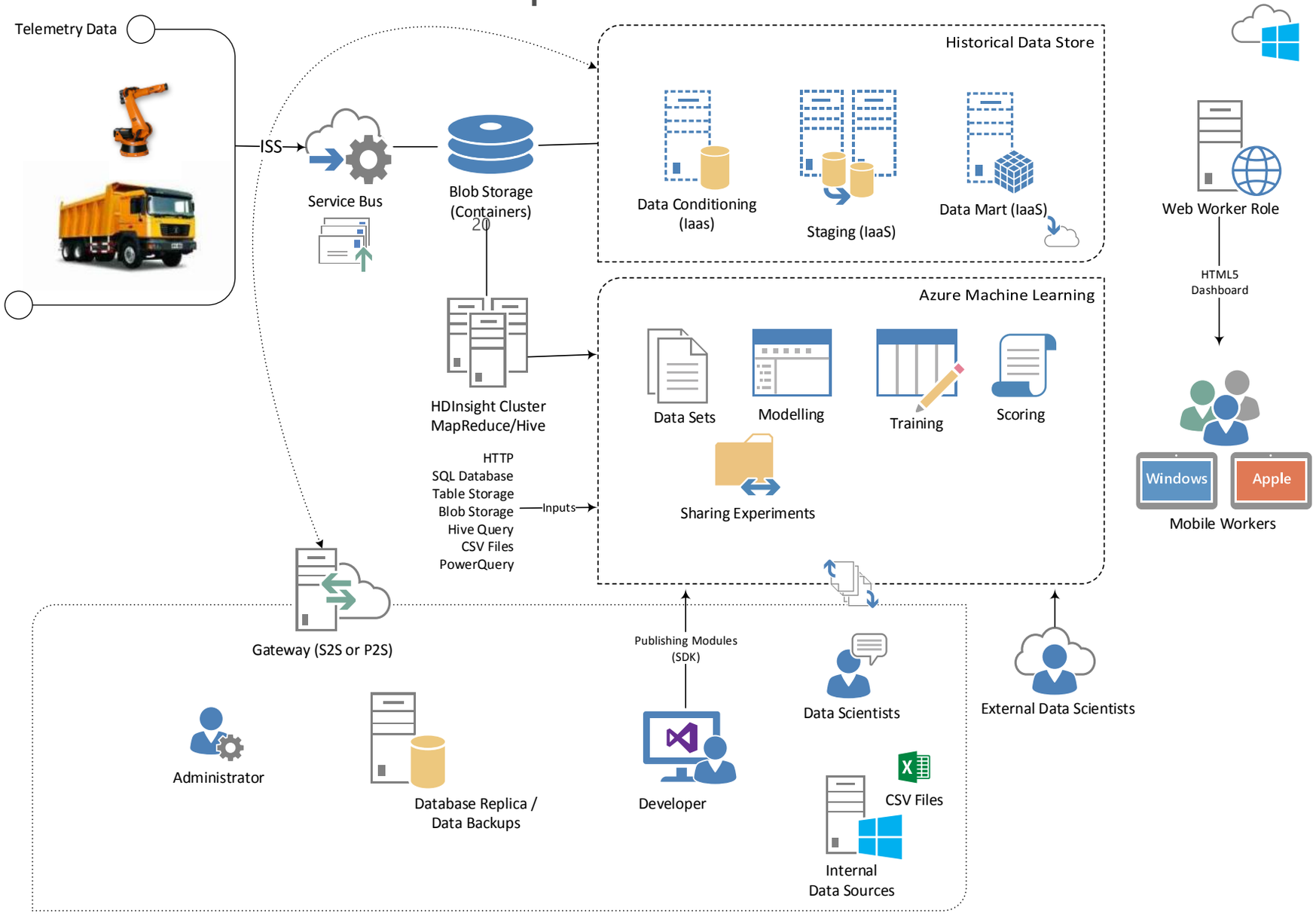
1 **No sensor for measuring the thickness of a brake disk or a tire -** Need to predict when a failure will occur.

2 **Inform the driver -** change of parts might be necessary in a few weeks
Order parts and prepare an individual maintenance package *before* the driver comes to the garage.
Tie customers to the dealer by offering them attractive maintenance and spare parts packages.

3 **Analytical Task:** Predict the possibility of next break pad failure using data collected from sensors and telemetry.



What does a possible solution look like?



Azure ML Lifecycle

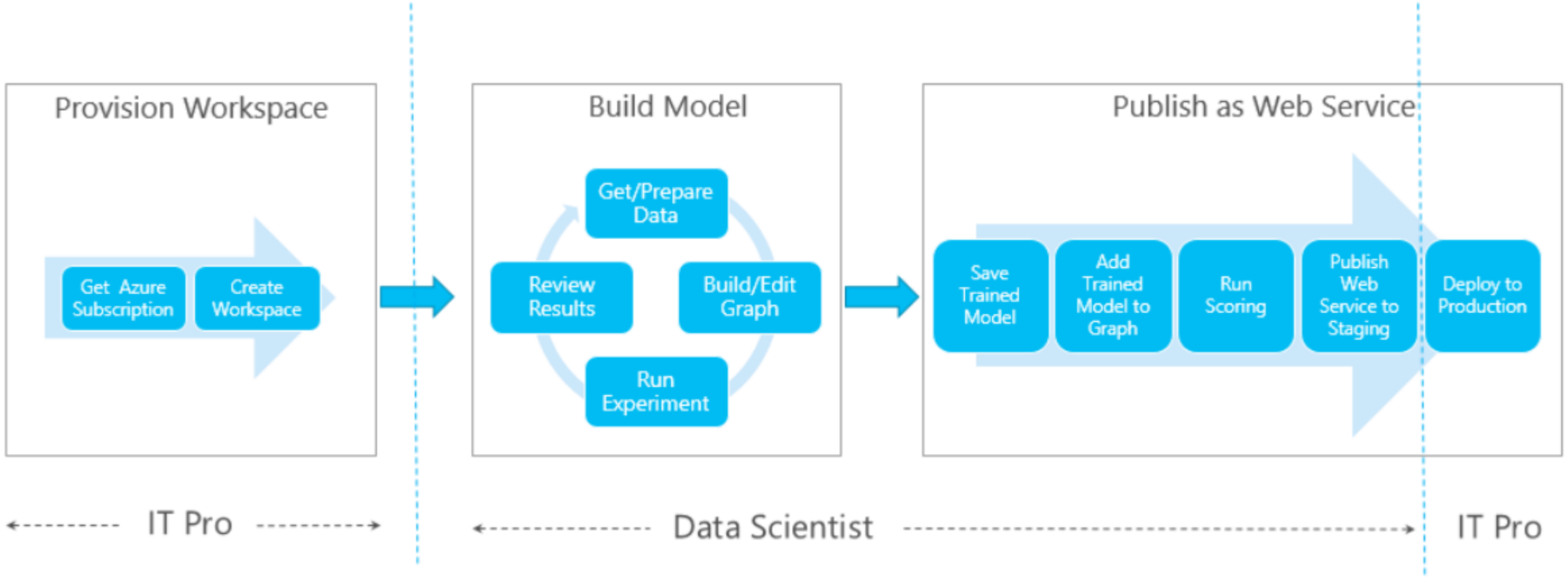


Figure 1: Provision, build, and publish a scoring Web Service

One solution for Machine Learning — from data to results

Business users easily access results: from anywhere, on any device

ML API service and the Developer

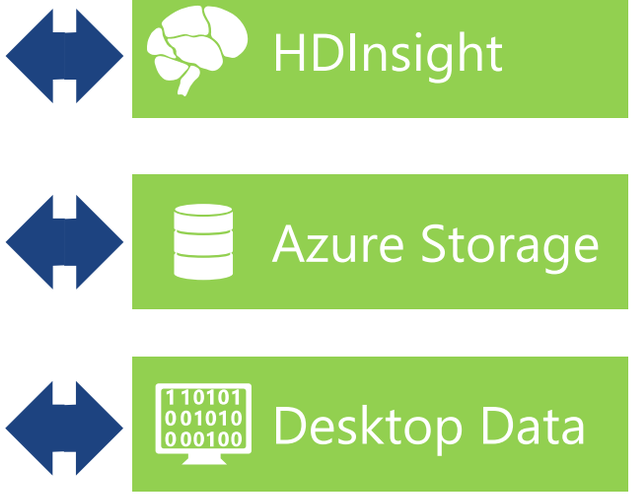
- Tested models available as an url that can be called from any end point

Azure Portal & ML API service
and the Azure Ops Team

- Create ML Studio workspace
- Assign storage account(s)
- Monitor ML consumption
- See alert when model is ready
- Deploy models to web service

ML Studio
and the Data Scientist

- Access and prepare data
- Create, test and train models
- Collaborate
- One click to stage for production via the API service



RRS Rest API

Web Service Code Sample C# (…also Python and R)

```
            const string apiKey = "abc123"; // You can obtain the API key from the publisher of the web service
            client.DefaultRequestHeaders.Authorization = new AuthenticationHeaderValue( "Bearer", apiKey);

client.BaseAddress = new Uri("https://rrslkg.cloudapp.net/workspaces/d96ce556f1a94644b95d2bf0cc6a67b6/services/b0f3a1565886448
HttpResponseMessage response = await client.PostAsJsonAsync("", scoreRequest);
if (response.IsSuccessStatusCode)
{
    string result = await response.Content.ReadAsStringAsync();
    Console.WriteLine("Result: {0}", result);
}
else
{
    Console.WriteLine("Failed with status code: {0}", response.StatusCode);
}
```

What R Packages are supported?

Today, there are 350+

"Execute R Package"

Option 1 – Results to Output Log

```
print(rownames(installed.packages()))
```

Returns results in "Visualize" or "View in Output logs" (currently 410 packages….)

Option 2 - Results to CSV

```
data.set = data.frame(installed.packages())
maml.mapOutputPort("data.set");
```

Preview Pricing

http://azure.microsoft.com/en-us/pricing/details/machine-learning/

Machine Learning PREVIEW Pricing Details

Microsoft Azure Machine Learning is a suite of offerings designed to enable customers to easily create, test, operationalize and manage predictive analytics solutions in the cloud.

Learn more ▸

Pay-as-you-go Plans | 6 or 12-month Plans

Pricing Details

Region: US South Central Currency: British Pound (£)

Machine Learning is currently in preview. The prices below include a preview discount.

	ML STUDIO SERVICE	ML API SERVICE
Hourly	**£0.25**/Experiment Hour	**£0.48**/Prediction Hour
Per Prediction	No Charge	**£0.12**/1,000 Predictions

Hourly charges only apply to active use of the service. Where both meters are present, hourly charge and per prediction charge are applied concurrently.

What skills do I need?

Where do I start?

Are you a developer or a DBA?

Are you a SQL Server developer or DBA and wish to broaden your knowledge and skills?

- Online courses (Coursera/Udacity)
- Hands-on learning (curiosity)
- Recommended reading
- Subscribe to dsc/kdnuggets
- Graduate and post-graduate study

Are you a business analyst?

Are you an analyst with a math's or stats background and business domain knowledge?

- Some of the online courses are specifically targeted at non-IT roles and do not have pre-requisite knowledge requirements

Are you a senior business stakeholder?

Are you a senior business stakeholder interested in the leveraging analytics to reduce time to value?

- Increased interest in organisations establishing a COE function
- Governance, information management, program management, strategy, solution validation, knowledge transfer, role readiness.

Are you an architect?

Are you a solution architect / application / data architect?

- Broad awareness of the data science domain and business value
- Encouraged to follow the same learning path as a DBA or developer

Observations

Microsoft Communities & Knowledge Transfer

Coursera offerings (Andrew Ng/John Hopkins) are recommended

Internal Communities Forming e.g. Data Platform / Business Analytics professionals (broadening skills), formal role definition

Specialist Data Science Division Group (DSDG)

Data Insights COE (focusing on analytics scenarios)

Where are the Data Scientists?

Summary
Azure Machine Learning

Algorithms

Classification, Clustering, Regression and Recommender methods

Extensibility

SDK for custom module development?

Execute R module

Rest API

Web Service endpoint for client connectivity

Collaboration

Easily collaborate on the same experiments, Store for modules

Contacts

Simon Lidberg
simonlid@microsoft.com

Benjamin Wright-Jones
benjones@microsoft.com

Getting Started

- Azure ML Tutorials
  http://azure.microsoft.com/en-us/documentation/services/machine-learning/tutorials/

- Analyzing Customer Churn using Microsoft Azure Machine Learning
  http://azure.microsoft.com/en-us/documentation/articles/machine-learning-azure-ml-customer-churn-scenario/

- RRS Web Service Code Samples (C#, Python, R)
  http://azure.microsoft.com/en-us/documentation/articles/machine-learning-overview-of-azure-ml-process/