Applying AI and Analytics to COVID-19

June 24, 2020

The session starts at 9:00am.

Applying AI and Analytics to COVID-19

Power of data. Simplicity of design. Speed of innovation.

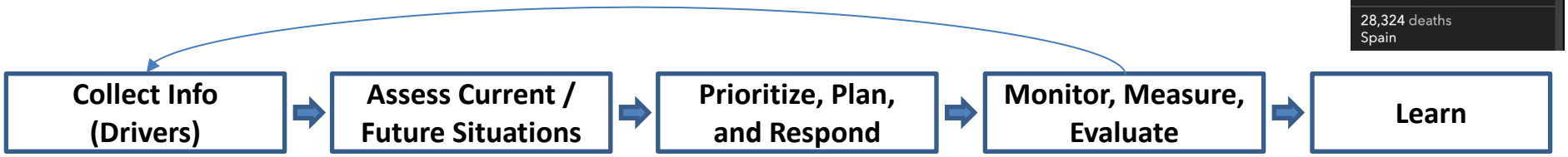
Asad Mahmood
Bernie Beekman
Lee Angelelli
Michael Cronk
Vishesh Javangula

Agenda

Time	Description
9:00am – 10:00am	Introduction to IBM Cloud, Watson Services, Watson Studio, and Decision Optimization
10:00am – 11:30am	Lab 1 – Develop pandemic and socioeconomic annotators to extract domain-specific information
11:30am – 12:00pm	Lab 2 – Create a knowledge management system (KMS), ingest data, train the KMS to generate knowledge, and analyze information to create a COVID-19 stability index
12:00pm – 12:30pm	Lunch
12:30pm – 1:00pm	Lab 2 – Create a KMS (continued)
1:00pm – 2:00pm	Lab3 – Develop a COVID-19 Chatbot Assistant
2:00pm – 3:30pm	Lab4 – Forecast COVID-19 outbreaks – find optimal ways to relocate sick people among areas
3:30pm – 5:00pm	Lab5 – Develop dashboards that display COVID-19 statistics
5:00pm – 5:15pm	Wrap up – Q&A

Introduction - Applying AI and Analytics to CoVID-19

- **Situation:** COVID-19 virus is causing global deaths and socioeconomic instability
- **Problem:** People scared about their livelihood; disengaged in economies and society
  - Leaders unable to collect/analyze information about COVID-19 virus, assess impacts, @speed/scale
- **Impacts:** Lack of insight into current/future situation and non-optimal decisions/responses
  - Minimal insight into coronavirus spread, inaccurate demographic info about infections/symptoms
  - Peoples fears/needs, inventory of essential products, supply-chains, necessary financial response
  - Shutdown of economies, community unrest, uncontrolled deficits expanding, etc.
- **Need**: Data-Driven environment supported by intelligent systems and processes that can:
  - Collect structured/unstructured data, create perception, understand, reason, and learn
  - Understanding current/future (predicted) COVID-19 surges/resurges
  - Identify current/future problems, obstacles, and impacts on societies, economies, etc.
  - Generate optimized decisions and response localized to areas



Training Session Goals

- **Teach attendees how to apply Artificial Intelligence (AI), Machine Learning (ML), and optimization to COVID-19 use cases**
- **Through a series of labs – attendees will develop capabilities that can:**
  - Ingest/extract information from text to create knowledge
  - Understand human language, concepts, tones, needs, etc. to inform planners
  - Analyze the information to create social health indexes
  - Create 'chat-bots' that act on this knowledge to answer peoples' questions
  - Analyze current drivers to forecast future conditions
  - Create decision optimization models based on current/future conditions
- **The above capabilities will enable planners to respond with speed at scale**

Outline

- **IBM Cloud Overview** 
- **Watson Services Overview**
- **Watson Studio Overview**
- **Labs**

What is IBM Cloud?

The IBM Cloud is an **open-standards**, cloud-based innovation platform for *building*, *managing*, and *running* applications **of all types** (web, mobile, big data, smart devices, and more).

Instant Environments
The developer can choose any language runtime or bring your own. Zero to production in one command.

DevOps
Development, monitoring, deployment, and logging tools allow the developer to run the entire application.

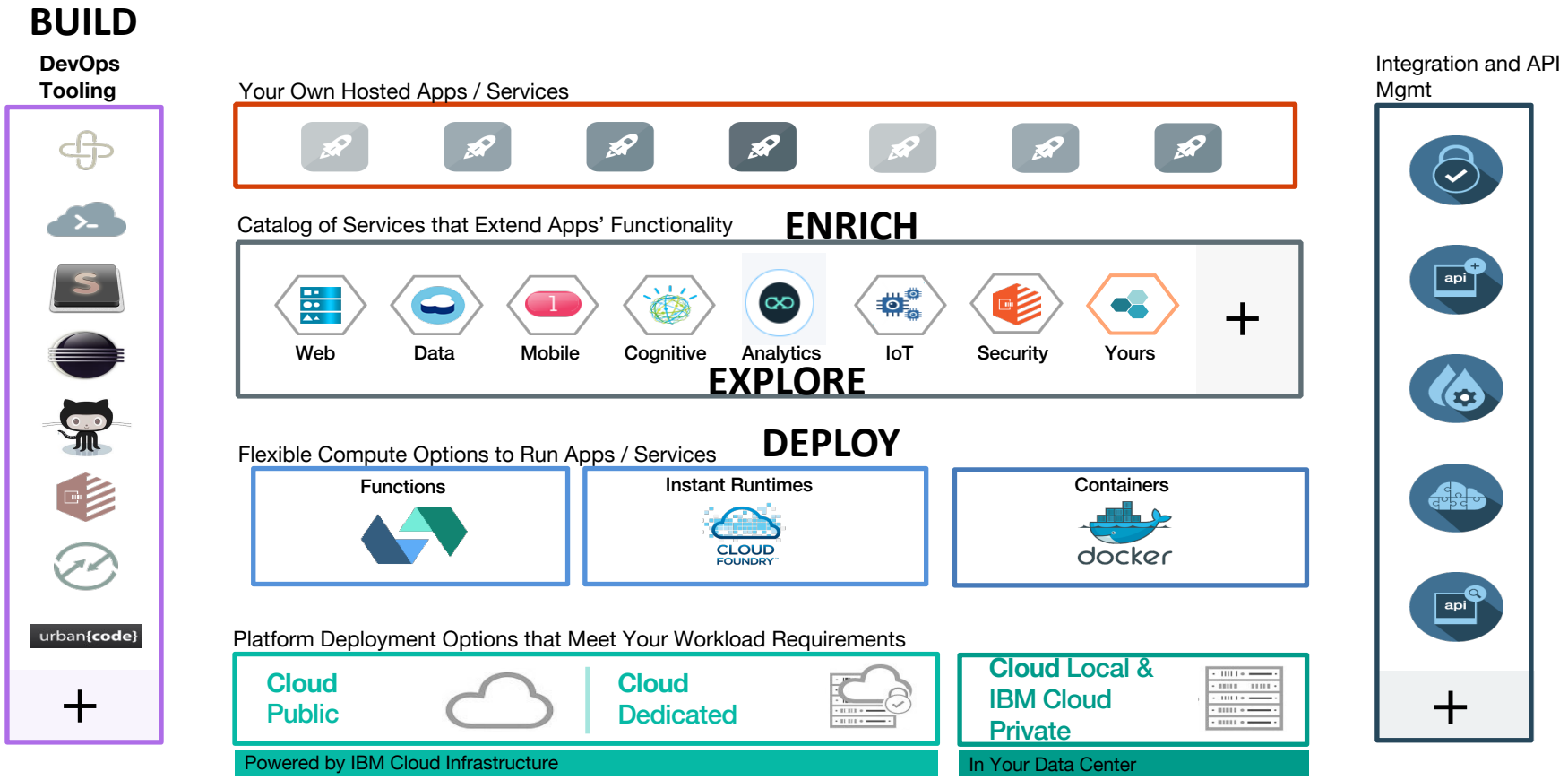
APIs and Services
A catalog of 125+ IBM, third party, and open source API services allow the developer to stitch an application together in minutes.

Build your apps, your way
Use the most prominent compute technologies to power your app: Cloud Foundry, Docker, Kubernetes.

On-Prem Integration
Build hybrid environments. Connect to on-premise assets plus other public and private clouds.

Flexible Pricing
Sign up in minutes. Pay as you go and subscription models offer choice and flexibility.

How Does IBM Cloud Work?



IBM Cloud DevOps Capabilities

Cloud.net/devops

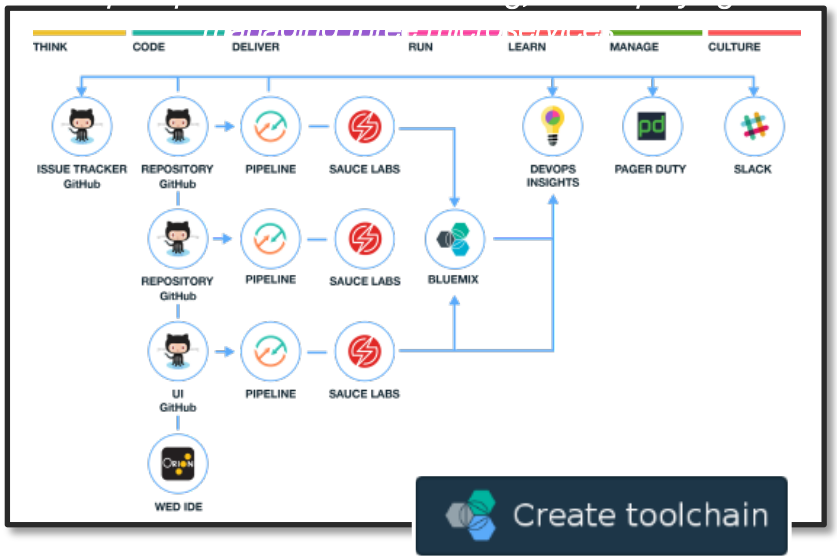
Deliver to market with speed, control, confidence and compliance

Cognitive DevOps Insights

Continuous Delivery	Continuous Availability	Continuous Security
Speed with control	*Always on* *Automated ops*	*Protect & defend*

Open Toolchain

Built on the Open Toolchain foundation

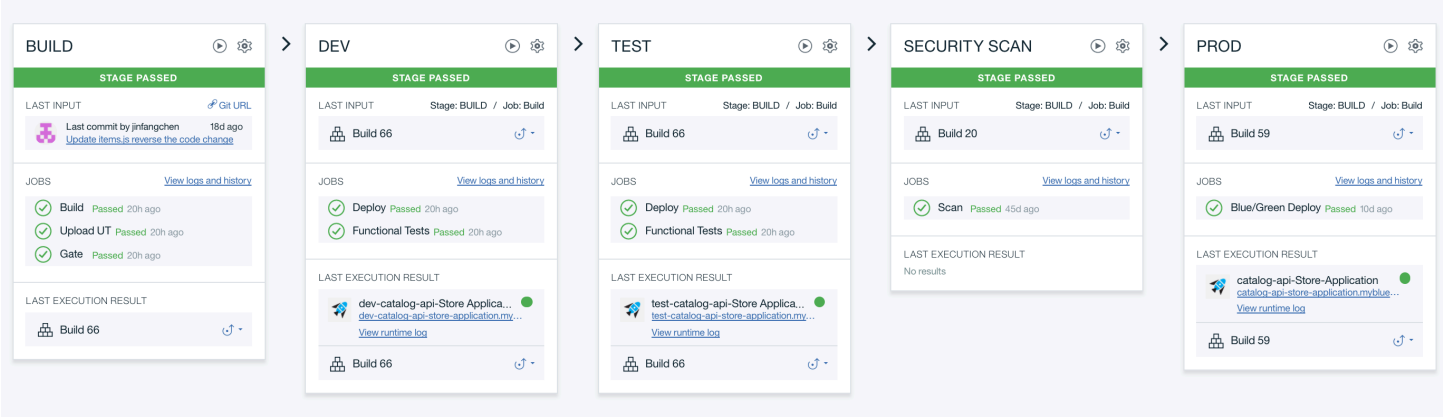


Toolchains provide an integrated set of tools that support the best practices to build, deploy and manage your apps

You can create toolchains that include Cloud services, open source tools, and third-party tools that make development and operations repeatable and easier to manage

Rapidly instantiate new toolchains from templates to on-board new teams quickly

Deliver Continuously using an Integrated Pipeline



Import Code

Import, build, and deploy an application from a GitHub repository in a few clicks

Continuous Integration

Automate builds and deployments for many types of code, running builds automatically when code changes

Continuous Testing

Drive automated unit tests, function tests, security scans, and more; with quality gates

Deliver to Multiple Platforms

Deploy applications to Cloud Foundry, Cloud, IBM Containers, other clouds, or on-premises systems

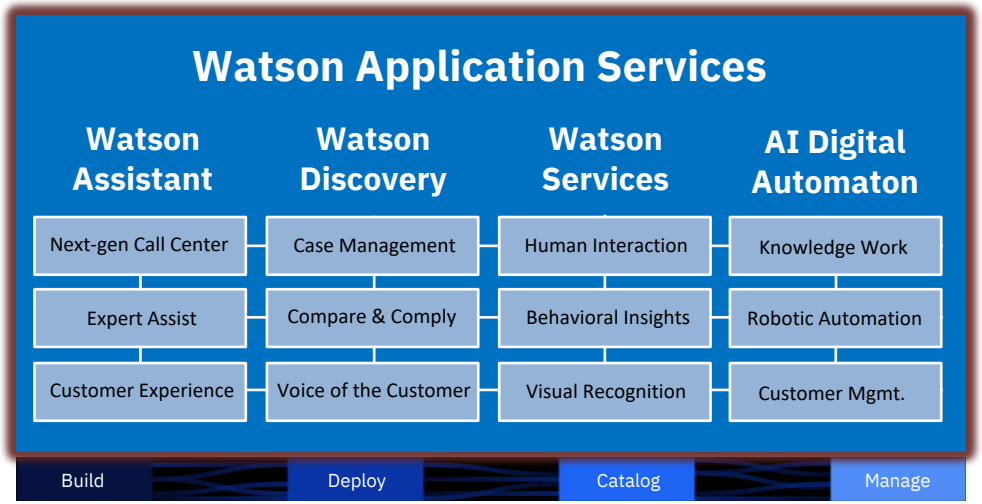
Outline

- IBM Cloud Overview
- Watson Services Overview 
- Watson Studio Overview
- Labs

IBM Watson AI Services

Use IBM AI capabilities to create cognitive systems that can:

- **Understand** – understand human language
- **Reason** - understand underlying concepts, forms hypothesis, and can infer based on present data
- **Learn** - value increases over time as AI improve with each new piece of information and with each new interaction
- **Interact** – the ability to talk, hear, and interact with humans in a natural way



Predict and shape future outcomes

Optimize labor to higher value work

Automate decision, processes & experiences

Reimagine new business models

Watson Services

Watson Assistant

Watson Discovery

Natural Language Classifier

Text-to-Speech

Tone Analyzer

Speech-to-Text

Compare & Comply

Personality Insights

Language Translator

Natural Language Understanding

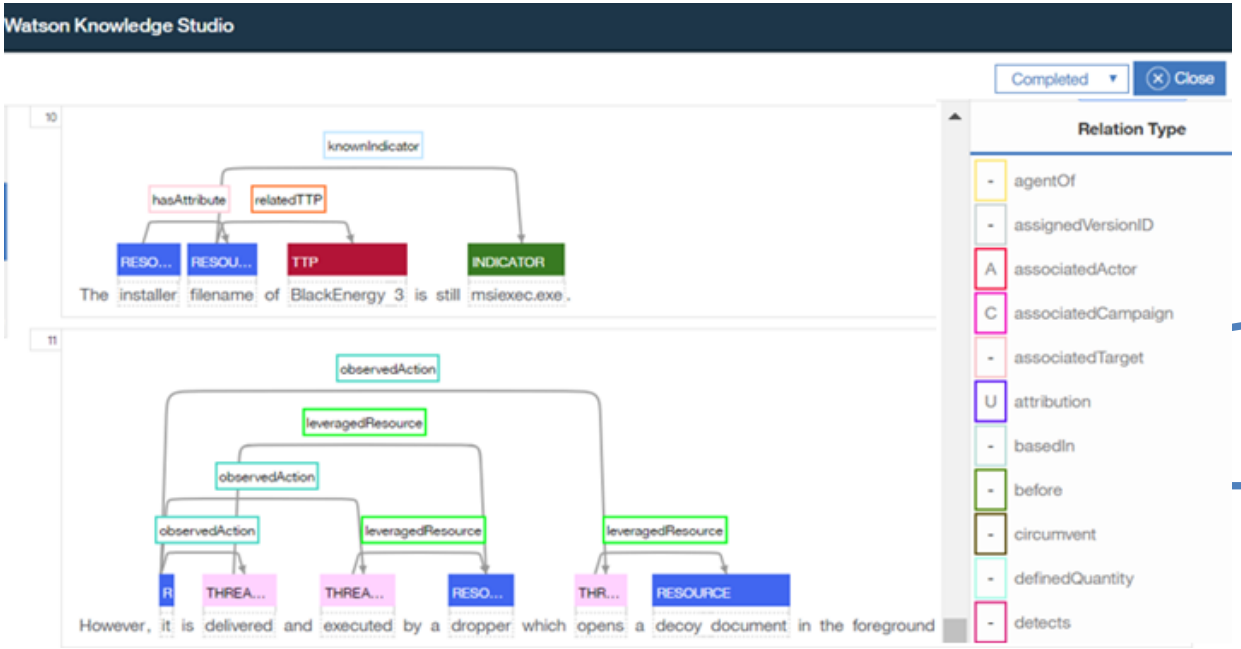
Knowledge Studio

Visual Recognition

https://cloud.ibm.com/catalog?category=ai

Watson Knowledge Studio

- Create a machine learning model
  - Understands the linguistic nuances, meaning, and relationships specific to an industry
- Create a rule-based model
  - Finds entities in documents based on rules that you define
- Build models without requiring deep technical skills or coding
- Apply curated model to multiple applications including Discovery and Assistant

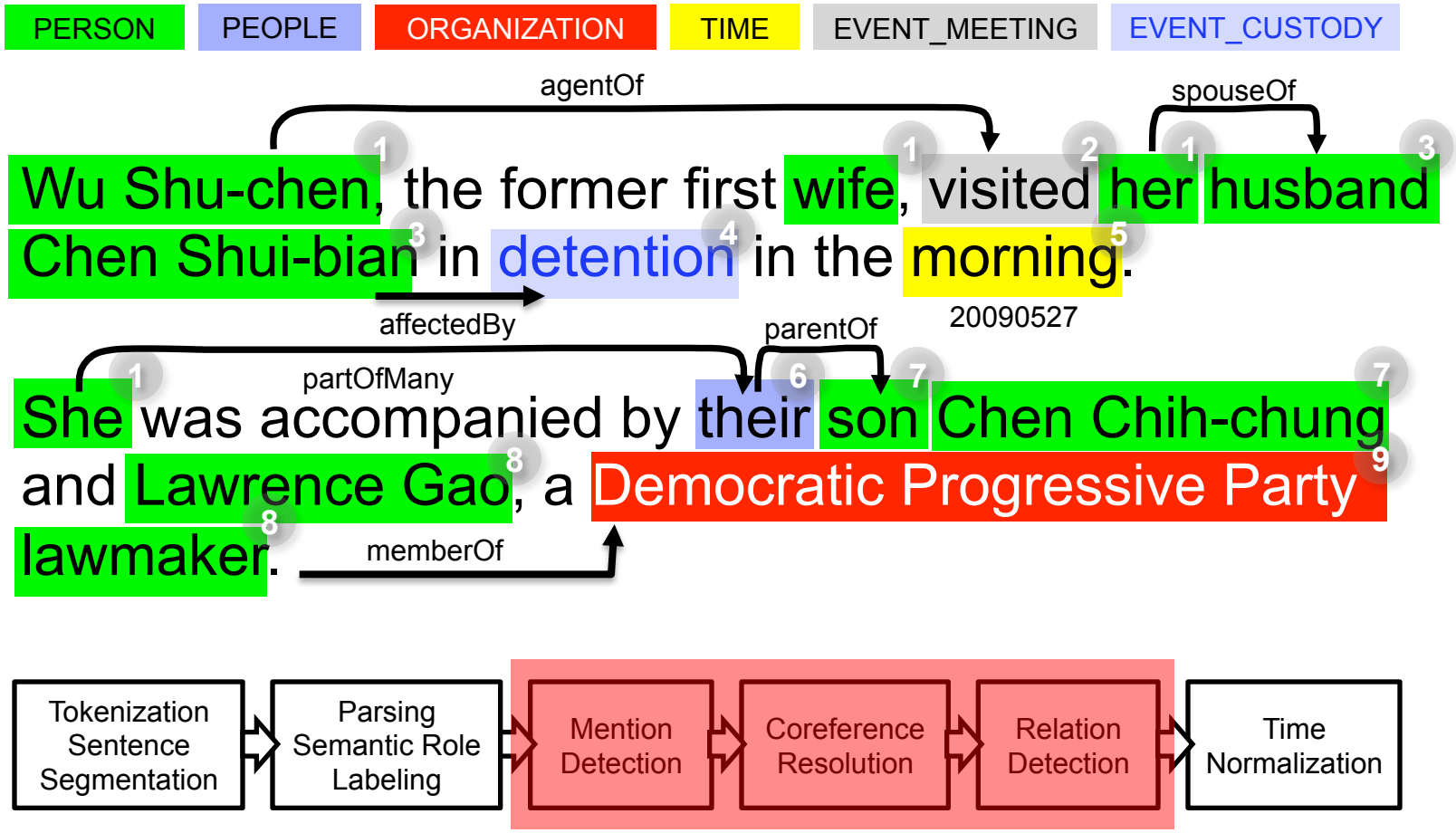


Discovery

Natural Language Understanding

WKS Annotation Example

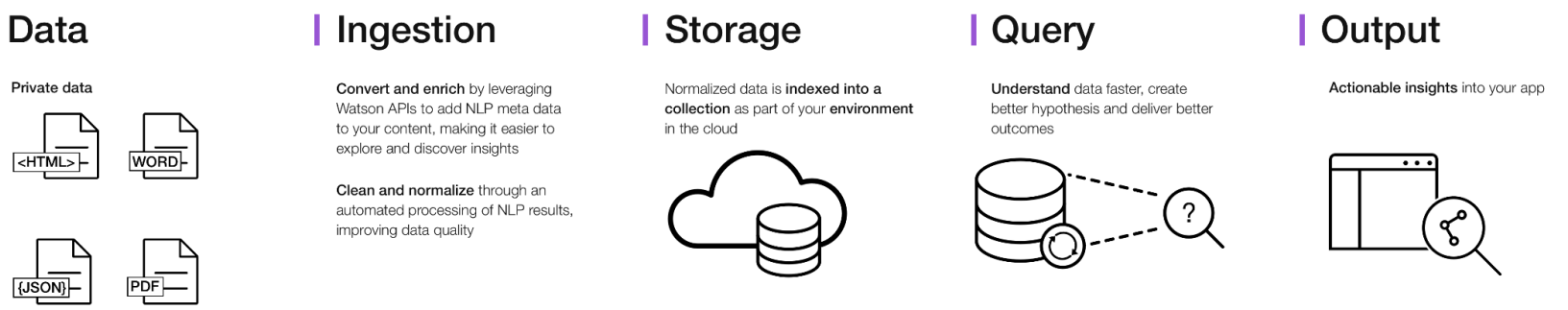
- Uses mention/relation detection and coreference to understand human language



Watson Discovery Service

Rapidly add a cognitive search and content analytics engine to applications to identify patterns, trends and actionable insights that drive better decision-making

- **Automate Data Ingestion** using the APIs, web upload or data crawler and feed through Document Conversion to deal with multiple file types
- **Apply enrichments** to make the raw data 'smarter' with easy Natural Language Processing and custom models to extract entities, relations, keywords, sentiment, etc.
- **Combine Diverse Content Sources** to create one-of-a-kind applications that leverage data from pre-enriched sources and private content from across the enterprise
- **Extract Insights** with simple but powerful queries that support multiple query types including boolean, filter, and aggregation queries to discover patterns, trends and answers
- **Extend conversation apps** to find answers without modeling intents



Watson Assistant

Solution

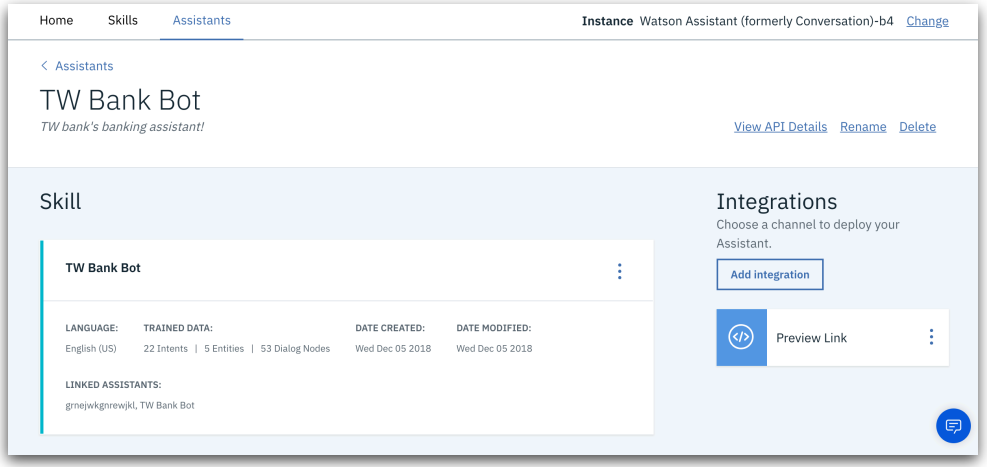
- Enables callers to converse in natural language to address questions or complete tasks in real-time via phone
- Leverages Watson Assistant, Watson Speech, and IBM Voice Agent with Watson

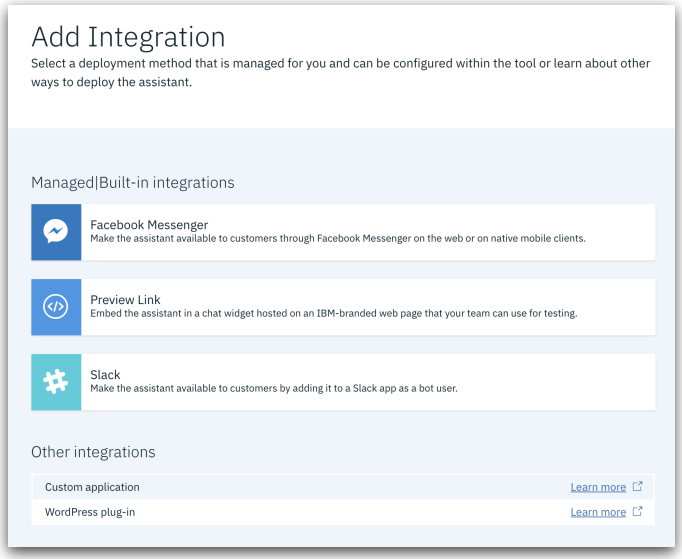
Assistant / Skills

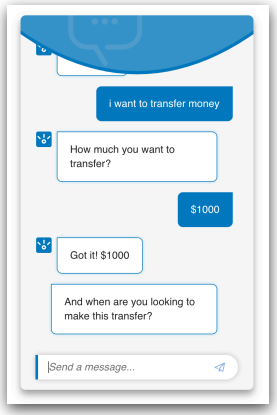
- Assistant maintains session context and can connect to a number of managed integrations
- Assistant references “skills” which contain reasoning logic and responses
- Preview link integration allows you to quickly share your bot internally before launching

Benefits

- Reduce cost of resolving customer query (deflection)
- Improve customer satisfaction by answer & resolve calls more quickly







AutoDesk - Watson Assistant Use Case

AUTODESK.

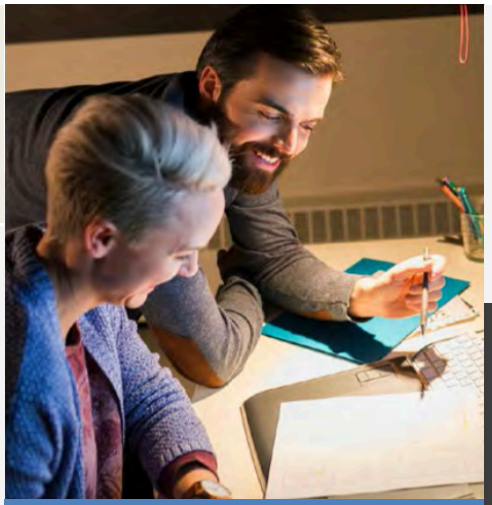
For more than 34 years, software giant Autodesk sold its popular 3D design, engineering and entertainment software under perpetual desktop licensing agreements. However, the way customers wanted to buy and access products changed. Recognizing that shifting to a subscription business model requires real-time customer service and support, Autodesk developed a virtual agent to interact with customers and improve their experiences.

99%

Improvements in customer response times for Autodesk by implementing Watson

5 – 10 min

Resolves cases in five to 10 minutes as opposed to a day and a half. And the only reason it takes five to 10 minutes is because that's how long a customer needs to type in or find specific information, such as matching a serial number to an entitlement or contract



60

Different use cases recognized to quickly resolve easy requests so that agents can focus on helping customer with complex issues

Connect

With IBM and Salesforce, you'll have the capability to seamlessly connect real-time insights found in unstructured data to discovery within customer data.

↑10pt

10-point increase in customer satisfaction levels because customers don't have to wait as long to have their questions answered

100,000

Supports 100,000 conversations per month, easing the burden on call center staff

14M

Analyzes a total of 14 million sentences for keywords, entities, phrases, clusters, and other speech and language patterns

5.4 min

Drastically reduces resolutions time from 1.5 days to just 5.4 minutes for most inquiries

Learn more
Read the full case study
Contact Us
https://www.ibm.com/watson/partnerships/

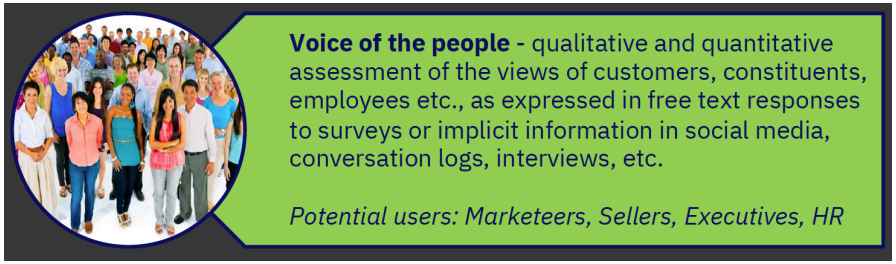
What is Project Debater?

- A grand challenge IBM Research project which demonstrated:
  - A computer system that successfully participated in a verbal, competitive debate against a human opponent
  - Our advancement and integration of Natural Language Understanding, Natural Language Generation and the emerging field of computational argumentation

- Try Project Debater at

https://ui.debater.res.ibm.com/domain/public

- Project Debater Applications



Project Debater Capabilities

Speech writing and delivery

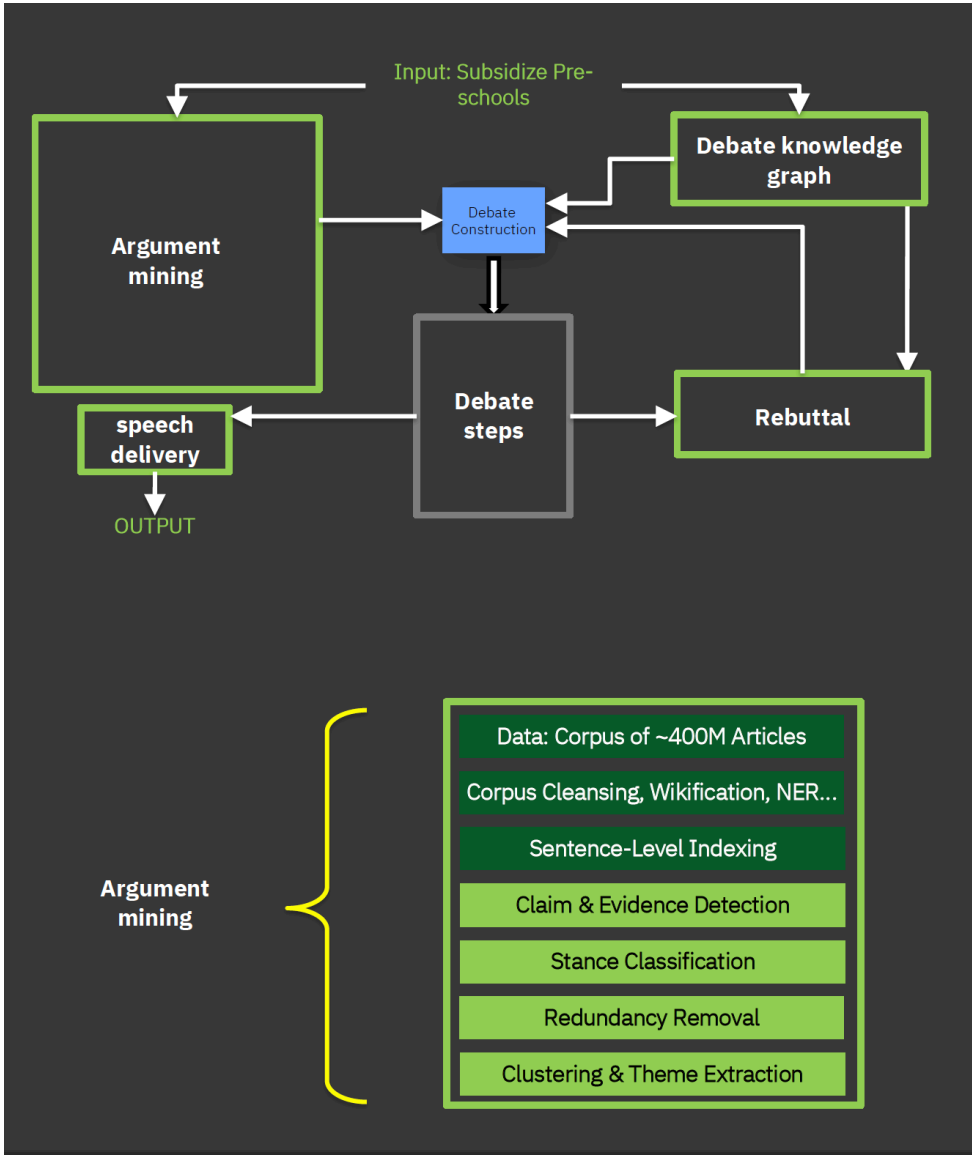
- Digest massive corpora
- Create a well-structured narrative
- Deliver with clarity and purpose

Listening with Comprehension

- Identify key arguments in long continuous spoken language

Modeling Human Dilemmas

- Model controversy
- Propose principled arguments



Outline

- IBM Cloud Overview
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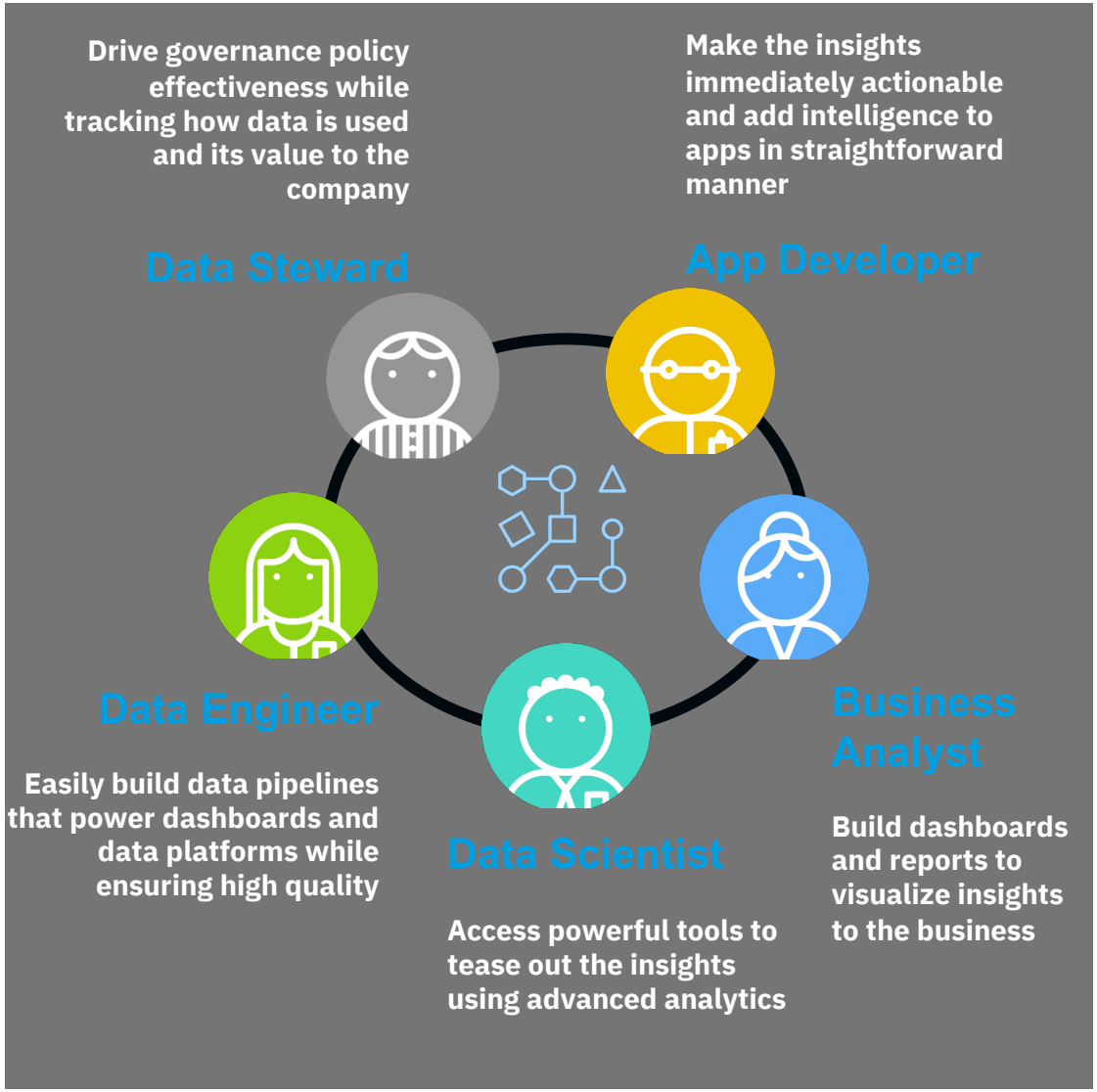
IBM Watson Studio Platform

An integrated platform of tools, services, data, and metadata that help companies or agencies accelerate their shift to be data-driven organizations.



Watson Studio Deployment Options

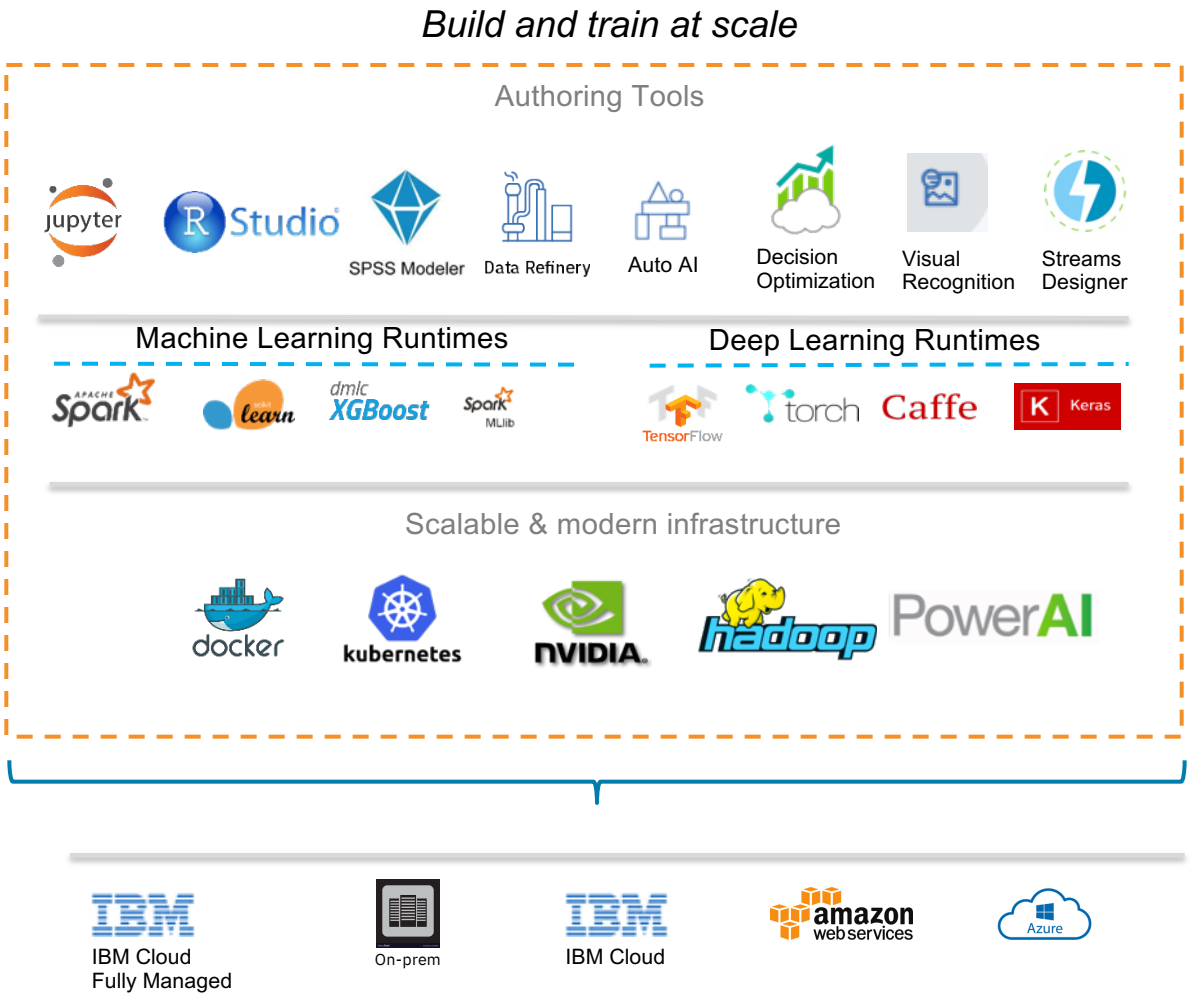
- Watson Studio on IBM Cloud
  - Managed offering provided by IBM
- Watson Studio Desktop
- IBM Cloud Private for Data
  - Watson Studio Local

Watson Studio Tools

- Using best of breed - Open source & IBM tools
- Code (R, Python or Scala) and no-code/visual modeling tools

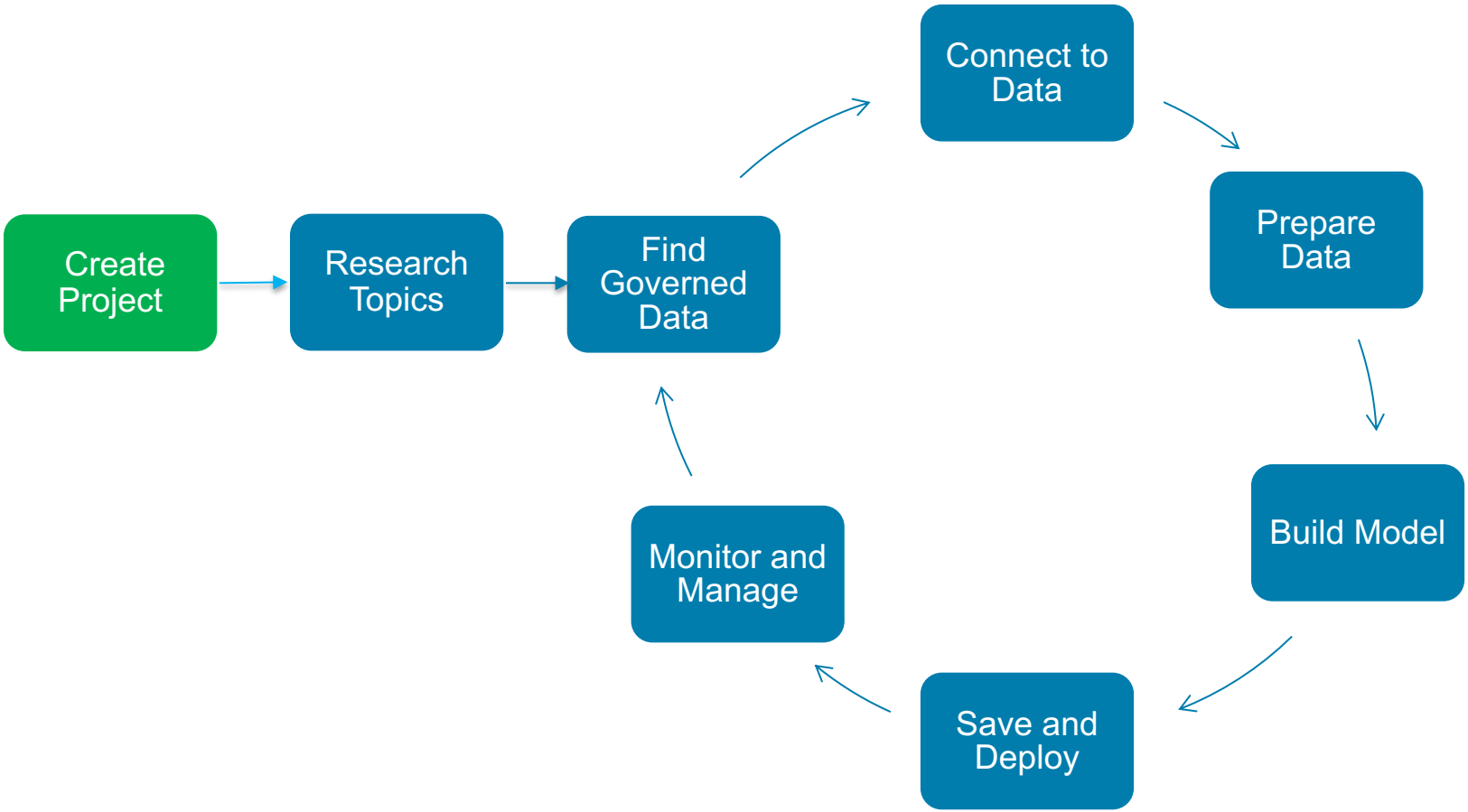
- Container-based resource management
- Elastic cpu/gpu power
- Run on x86, Power, zLinux
- Integrate with Hadoop/Spark Infrastructure

- Train and deploy where your data lives



Watson Studio supports the Data Science Lifecycle

Build, train, deploy, and monitor at scale ML/DL workflows to infuse AI into the enterprise to drive innovation.

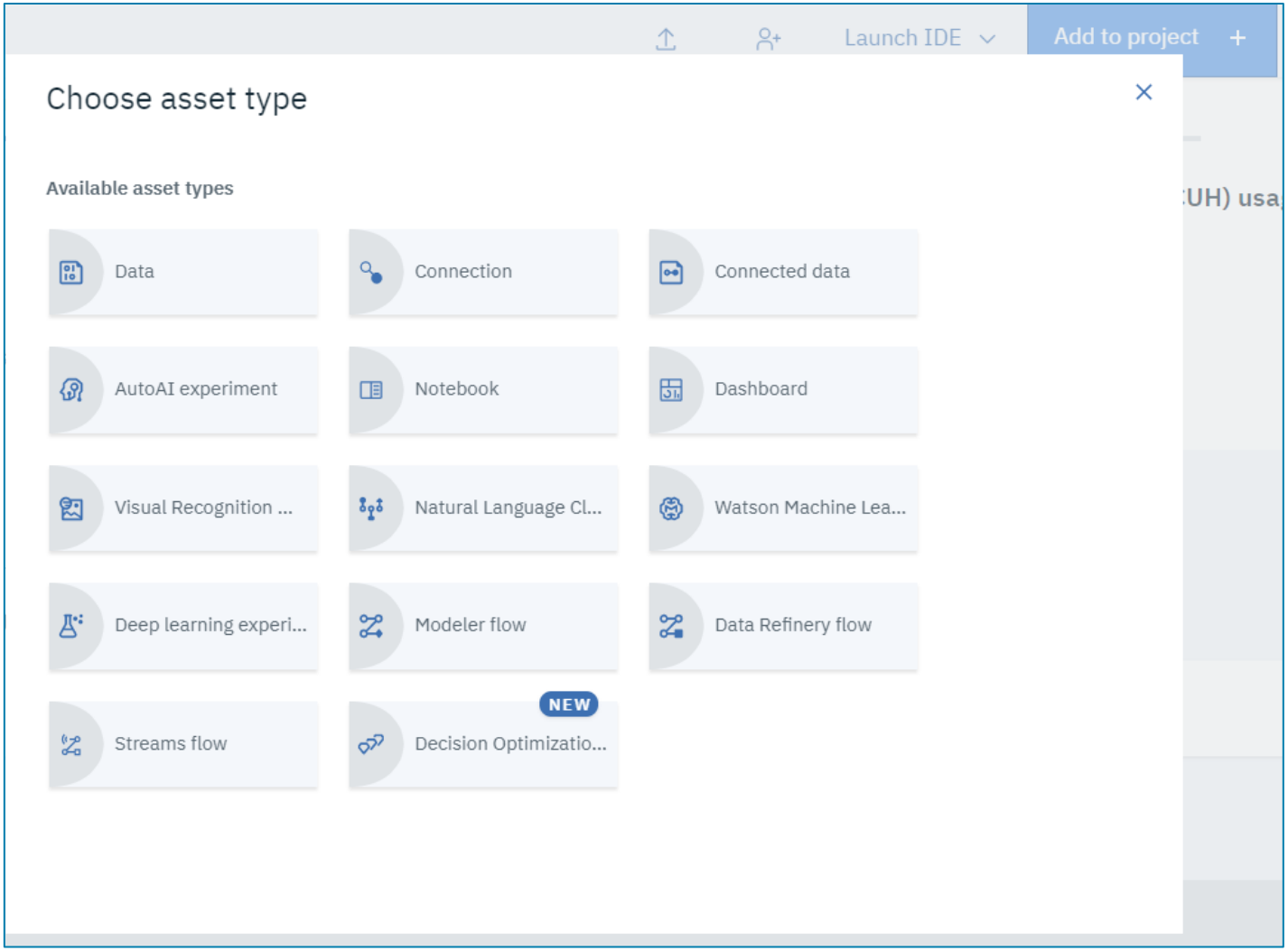


Watson Studio Project Features

Making Data Science a Team Sport

- Organizes resources to achieve a particular data analysis goal
- Support role-based collaboration (Admin, Editor, Viewer)
- Assets from all IDEs can be included in one Watson Studio project: notebooks, data sources, flows, models, etc.
- Export/Import Projects

Add to Project



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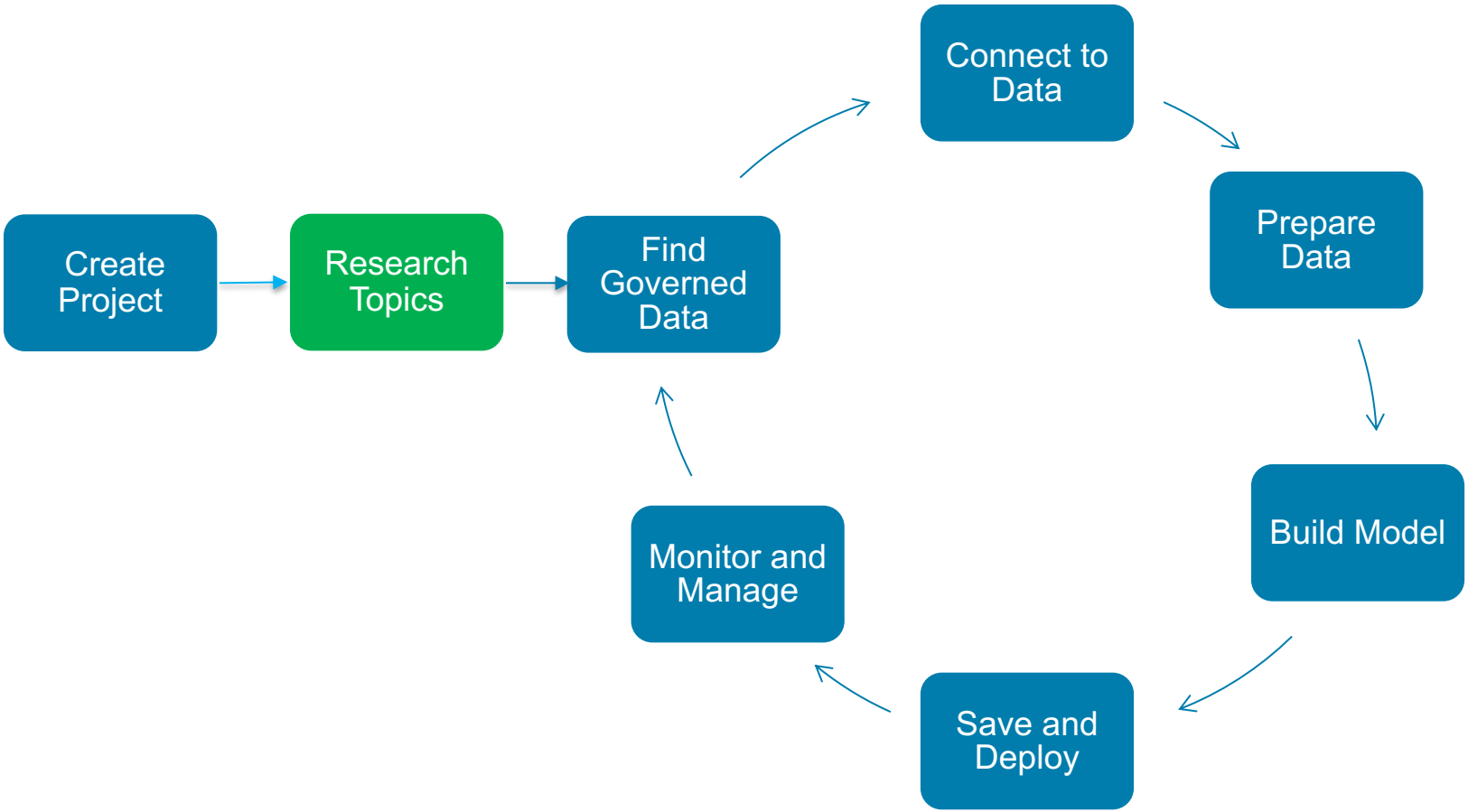


Watson Studio Gallery

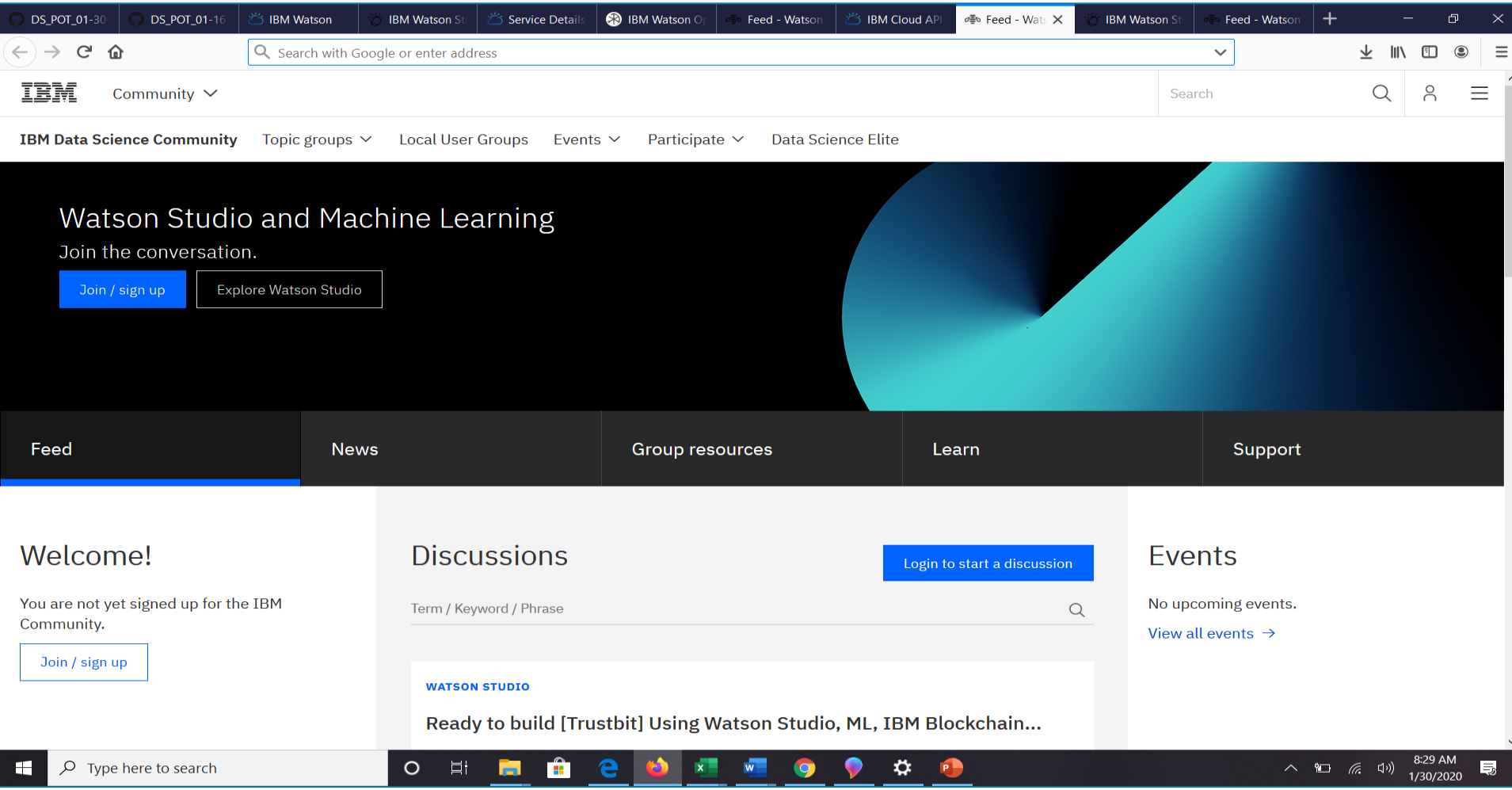
Built-in learning to get started

Research Topics

- The Gallery includes notebooks, and data sets
- Copy notebooks or Data Sets into projects
- Continuously updated in IBM's managed service

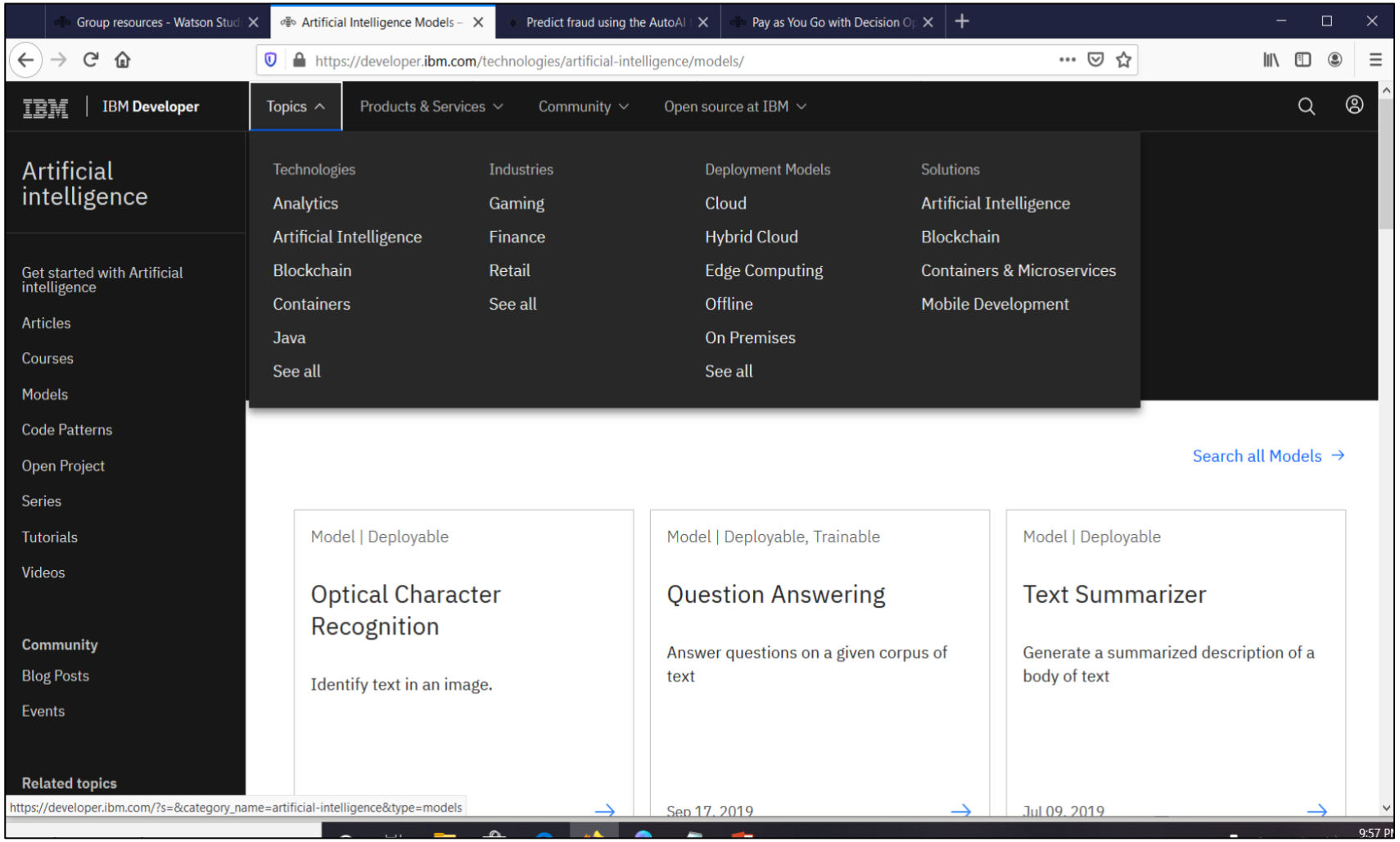
Watson Studio Community

Research Topics



developer.ibm.com

Research Topics



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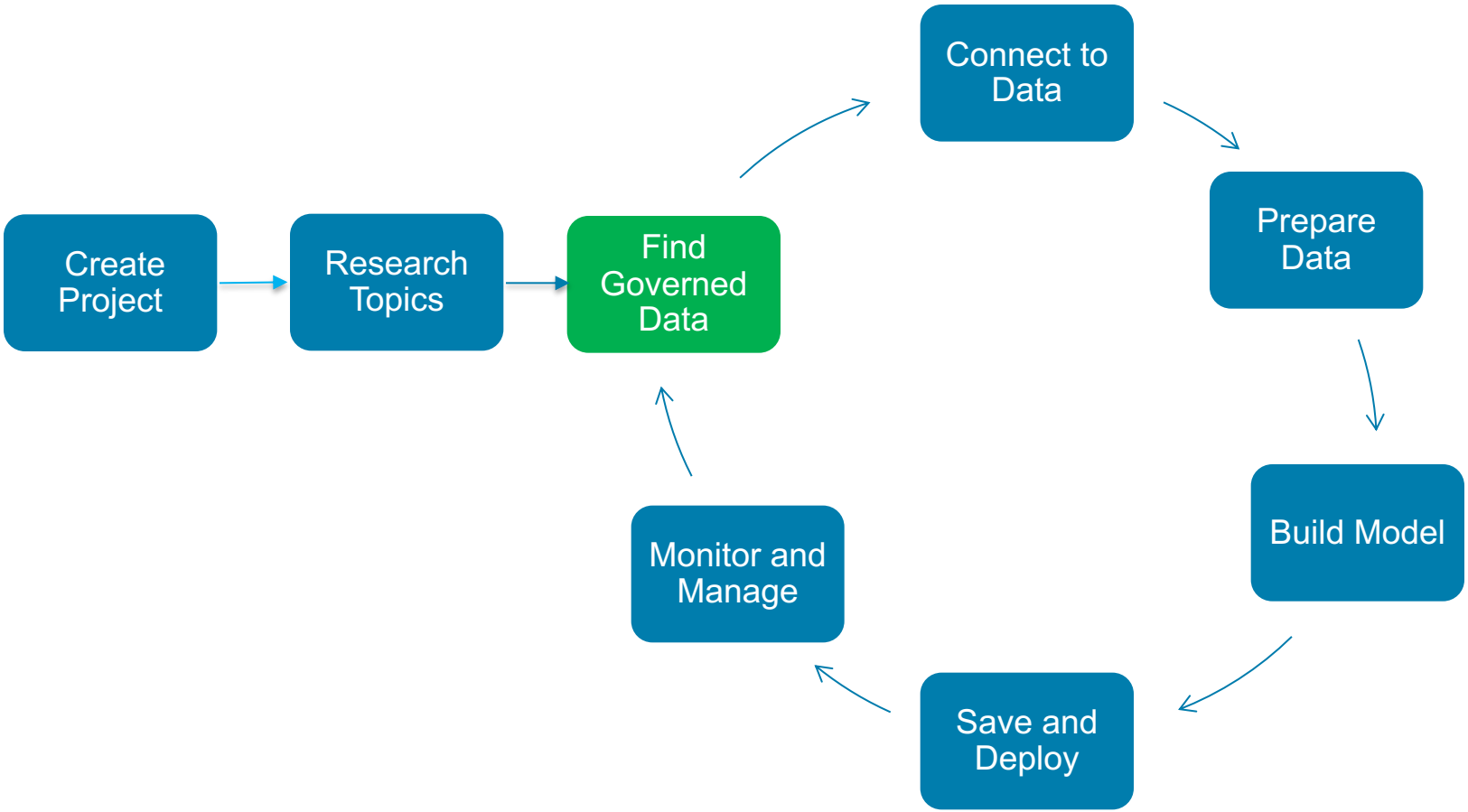


Watson Knowledge Catalog Features

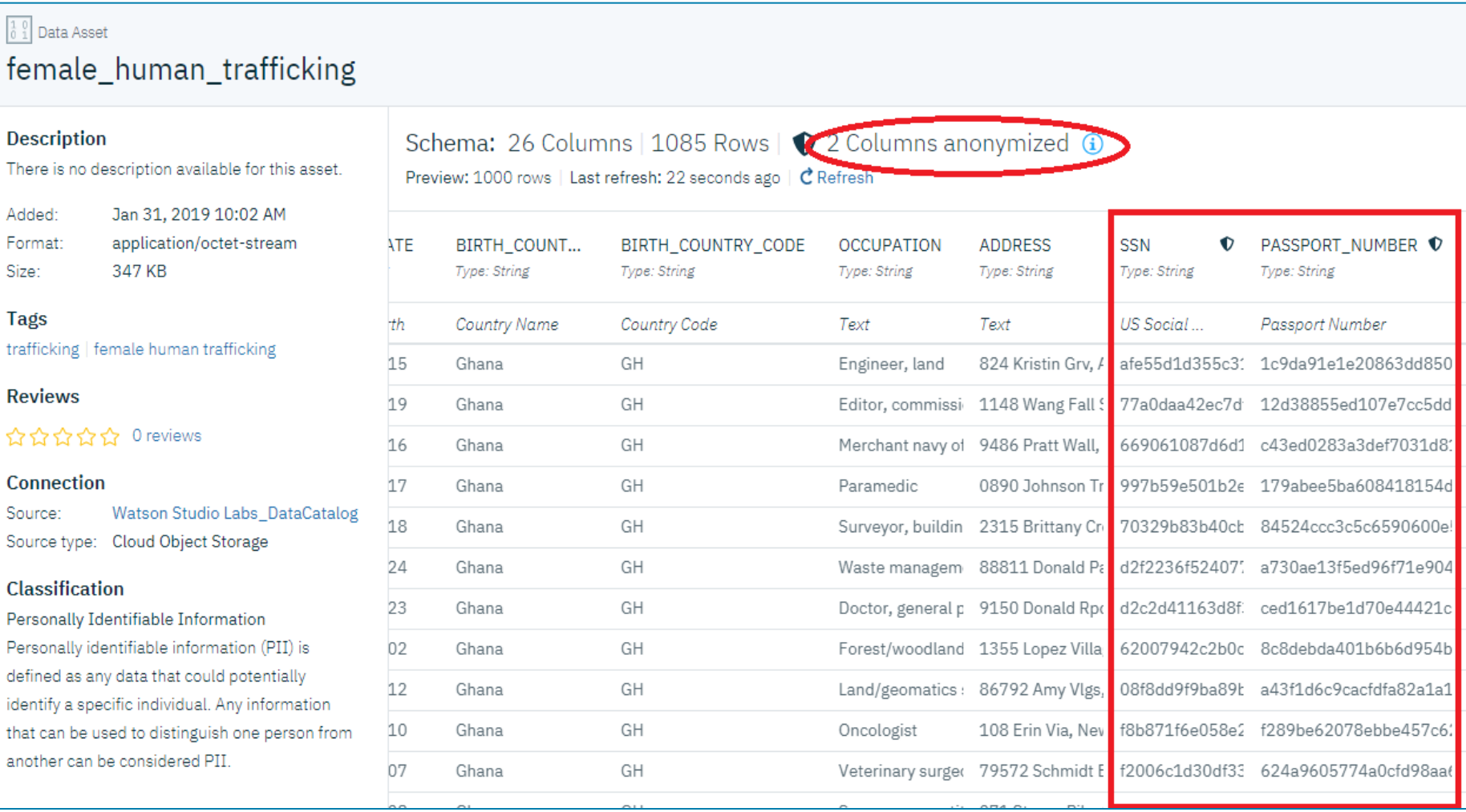
Find Governed Data

Unlock tribal knowledge and unleash knowledge workers

- **Find** data (structured, unstructured) and AI assets (e.g., ML/DL models, notebooks, Watson Data Kits) in the **Knowledge Catalog** with intelligent search and giving the right access to the right users.
- Discover assets, profiling, classification
- Policy, rule authoring
- Policy, rule enforcement
- Asset Usage Statistics

Watson Knowledge Catalog Features

Find Governed Data



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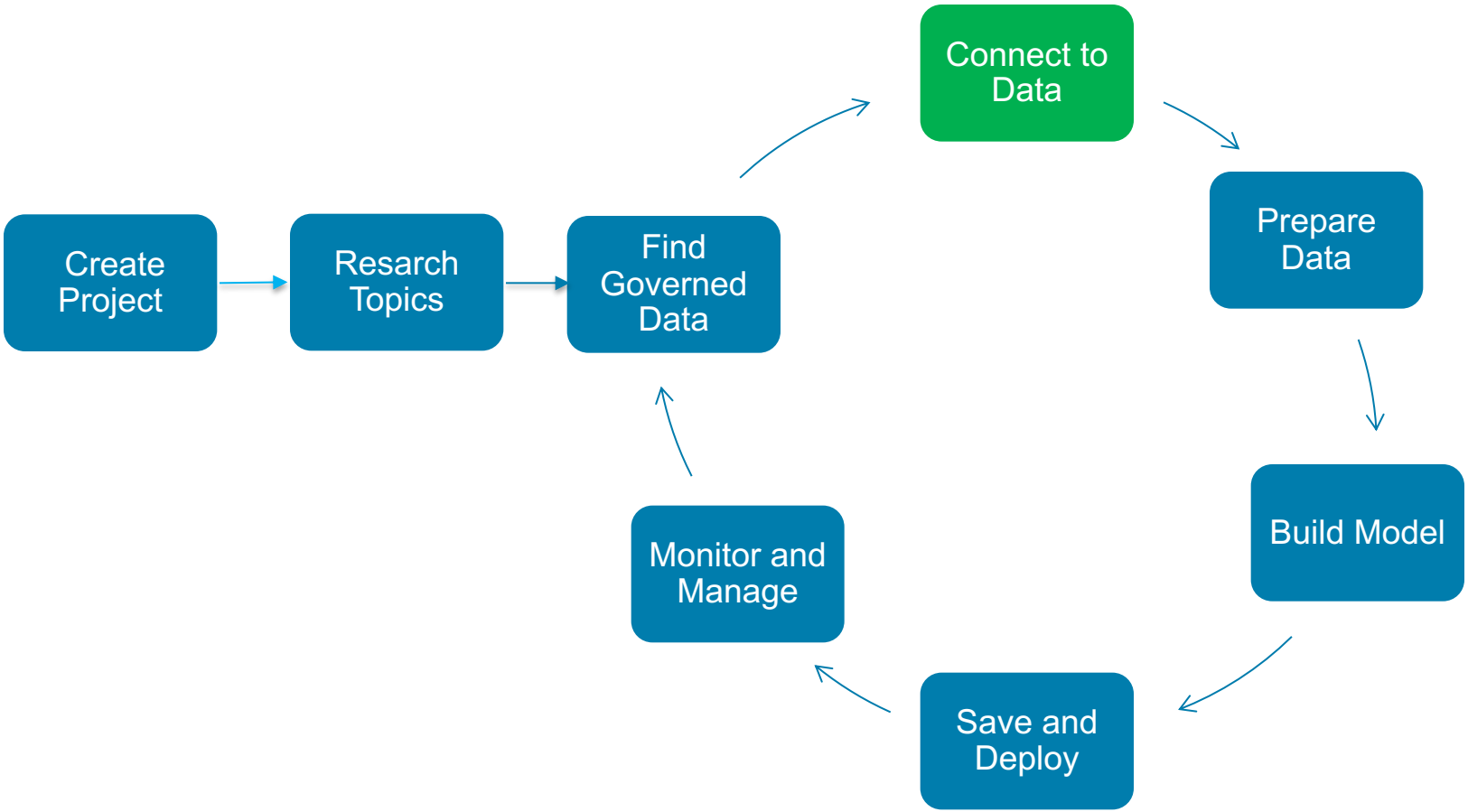
Build, train, deploy, and monitor at scale ML/DL workflows to infuse AI into the enterprise to drive innovation.



Watson Studio Connection Features

Connect to Data

- Upload files
- Connectors to Structured and Unstructured, On-prem and Cloud data sources.
- Wizard based connection definition and code generation

Connection Options

Connect to Data

New connection

IBM services

- BigInsights HDFS
- Cloud Object Storage
- Cloud Object Storage (infrastructure)
- Cloudant
- Cognos Analytics
- Compose for MySQL
- Compose for PostgreSQL
- Db2
- Db2 Big SQL
- Db2 for i
- Db2 for z/OS
- Db2 Hosted
- Db2 on Cloud
- Db2 Warehouse
- Informix
- Object Storage OpenStack Swift (infrastructure)
- PureData for Analytics
- Watson Analytics

Third-party services

- Amazon Redshift
- Amazon S3
- Apache Hive
- Cloudera Impala
- Dropbox
- FTP
- Google BigQuery
- Google Cloud Storage
- Hortonworks HDFS
- Looker
- Microsoft Azure Data Lake Store
- Microsoft Azure SQL Database
- Microsoft SQL Server
- MySQL
- Oracle
- Pivotal Greenplum
- PostgreSQL
- Salesforce.com
- Sybase
- Sybase IQ
- Tableau
- Teradata

Notebook Screenshot

Connect to Data

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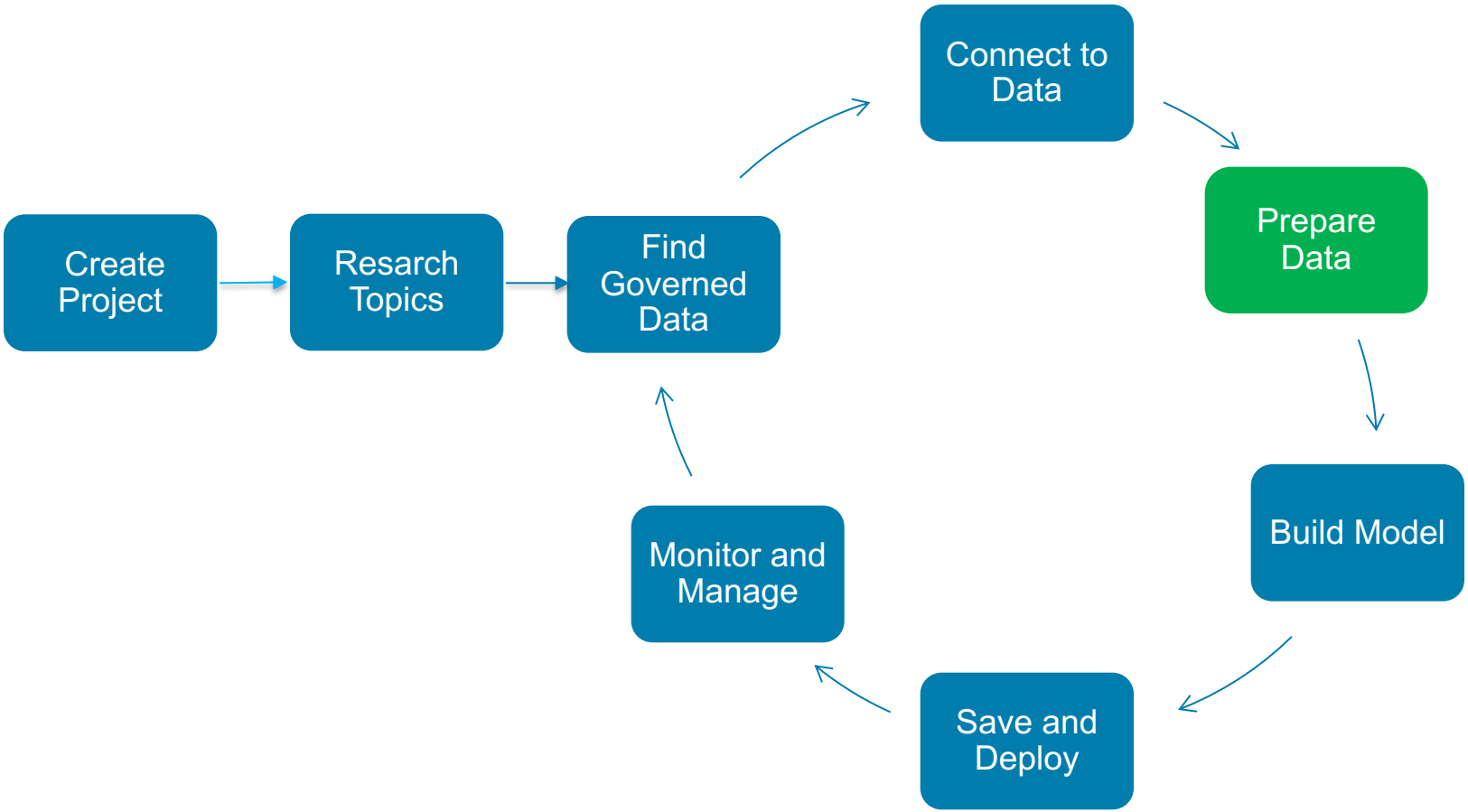

Watson Studio Data Refinery Features

Making Data fit for use

Prepare Data

- Data Refinery tool to profile, visualize, and shape data.
- Create data preparation pipelines via point and click capability on subset of data
  - ✓ Cleanse the data: fixing or removing data that is incorrect, incomplete, improperly formatted, or duplicated
  - ✓ Shape the data: customize data by filtering, sorting, combining, or removing columns, and performing operations
- Run the pipeline on all the data
  - Manually (on demand)
  - Automated (scheduled)

Watson Studio supports the Data Science Lifecycle

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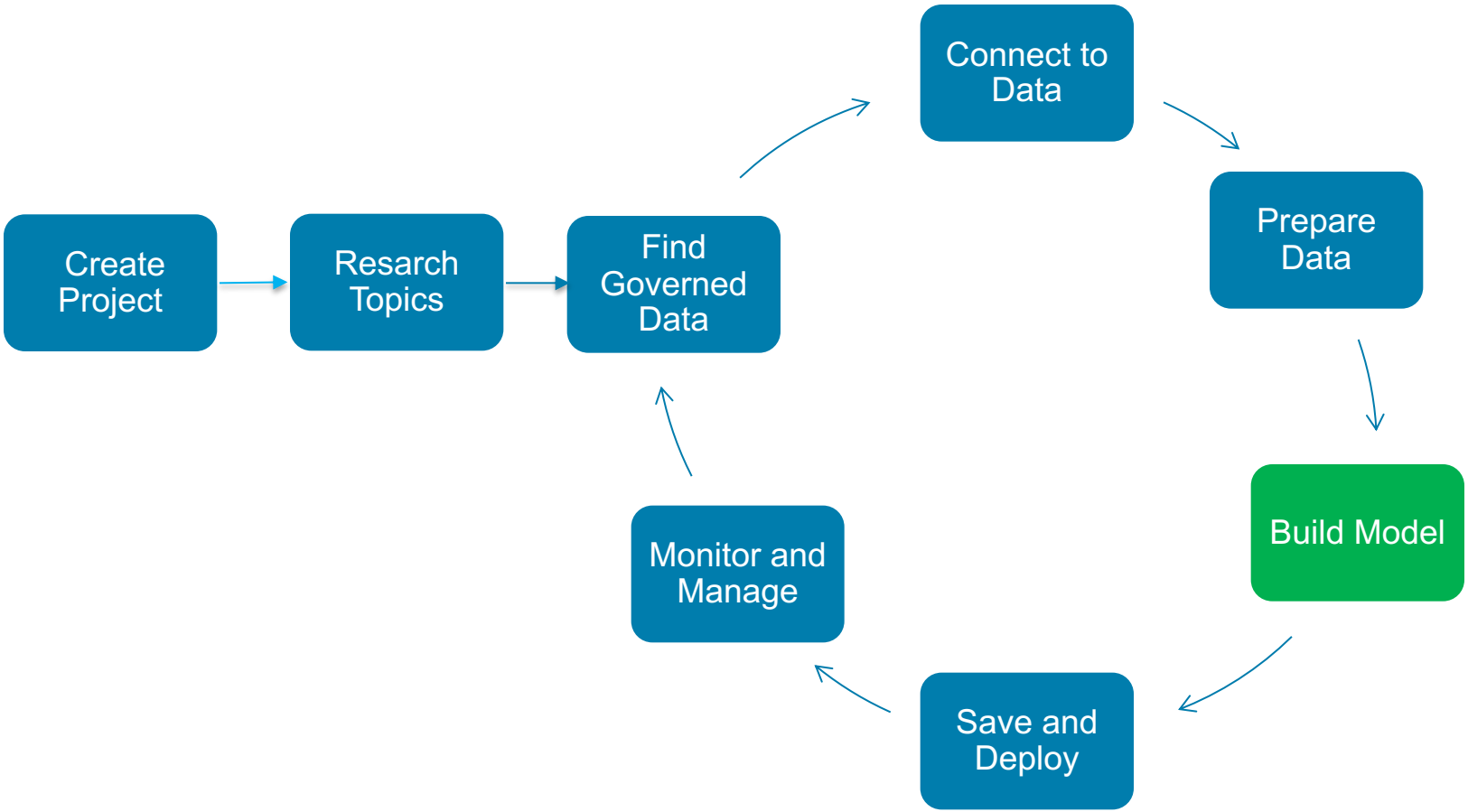


Watson Studio Model Building Features

The best of open source and IBM Watson tools to create start-of-the-art data products

Build Model

Open Source Tools

- Jupyter Notebooks **
- RStudio and Shiny
- Libraries- scikit-learn, XGBoost, Spark, TensorFlow, Caffe, Keras, PyTorch

IBM Tools

- AutoAI
- SPSS Modeler
- Neural Network Modeler
- Experiment Builder
- Natural Language Classifier Model
- Visual Recognition Model
- Decision Optimization **

** in hands-on labs

Jupyter Notebook

Build Model

My Projects / Watson Studio Labs / Machine Learning with SparkML

File Edit View Insert Cell Kernel Help

Not Trusted | Python 3.6 with Spark

Run Format Markdown

Read Data Asset - female_human_trafficking - See Lab Instructions ¶

In [ ]:
```
# Insert SparkSession DataFrame code in this cell after the comments.
# make CERTAIN to rename the default dataframe name (df_data_1 or df_data_2 or df_data_3, etc) to trafficking_df
# Put cursor on the next line to Insesrt to code.
```

Read Data Asset - Occupations - See Lab Instructions

The occupations listed in the female human trafficking file are too numerous to use as input to a machine learning model. We will categorize these occupations into 15 categories by joining with two other files. The Occupation.csv file contains a mapping of the occupations in the female human trafficking table to a category code. The Categories.csv file contains each code followed by the category name. This information needs to be joined to the female human trafficking table.

Follow the same procedure as above to insert a SparkDataFrame for Occupations

In [ ]:
```
# Insert SparkSession DataFrame code in this cell after the comments
# make CERTAIN to rename the default dataframe name (df_data_1 or df_data_2 or df_data_3,etc) to occupations
#Put cursor on the next line to Insert to code
```

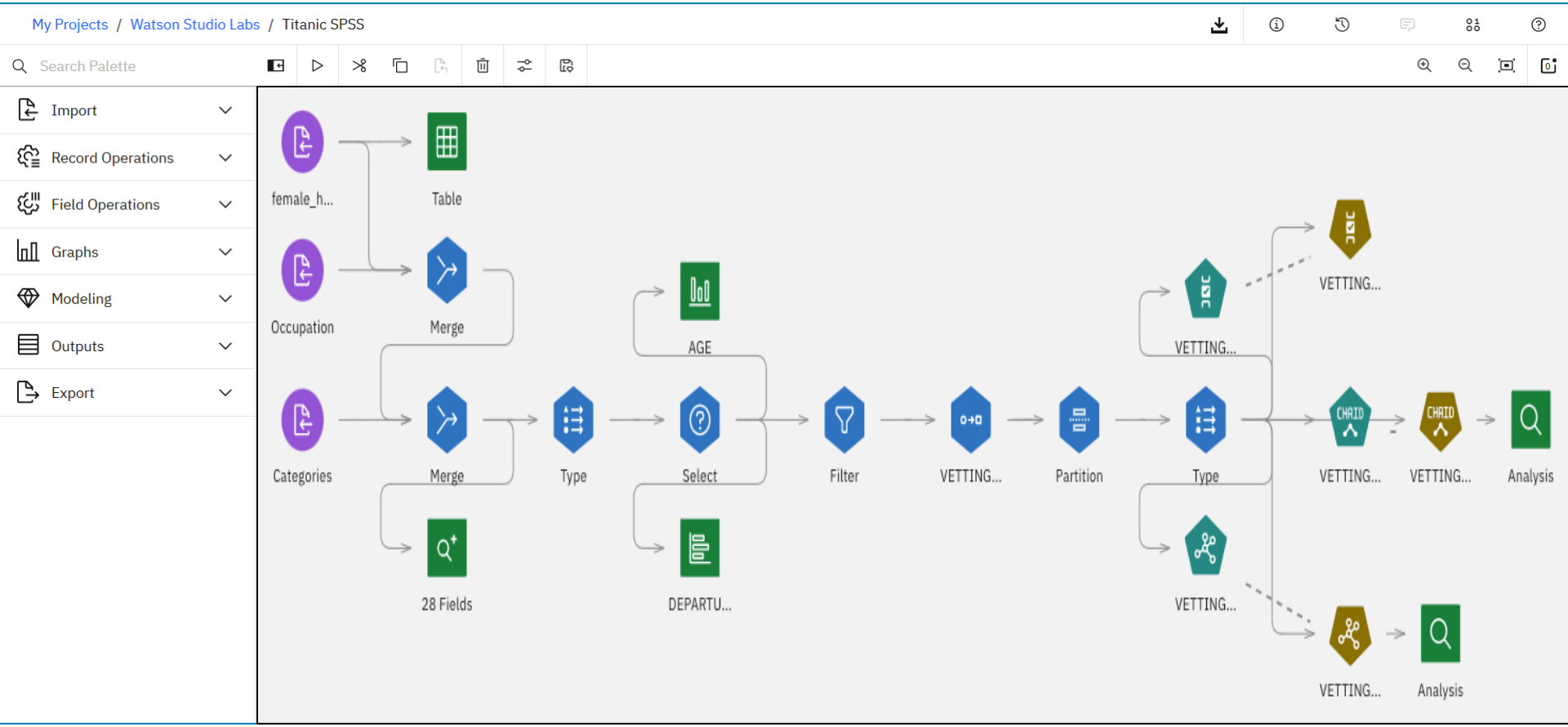
Read Data Asset - Categories - See Lab Instructions

Follow the same procedure as above to insert a SparkDataFrame for Categories

In [ ]:
```
# Insert SparkSession DataFrame code in this cell after the comments
# make CERTAIN to rename the default dataframe name (df_data_1 or df_data_2 or df_data_3,etc) to categories
#Put cursor on the next line to Insert to code
```

SPSS Modeler

Build Model



Neural Network Modeler

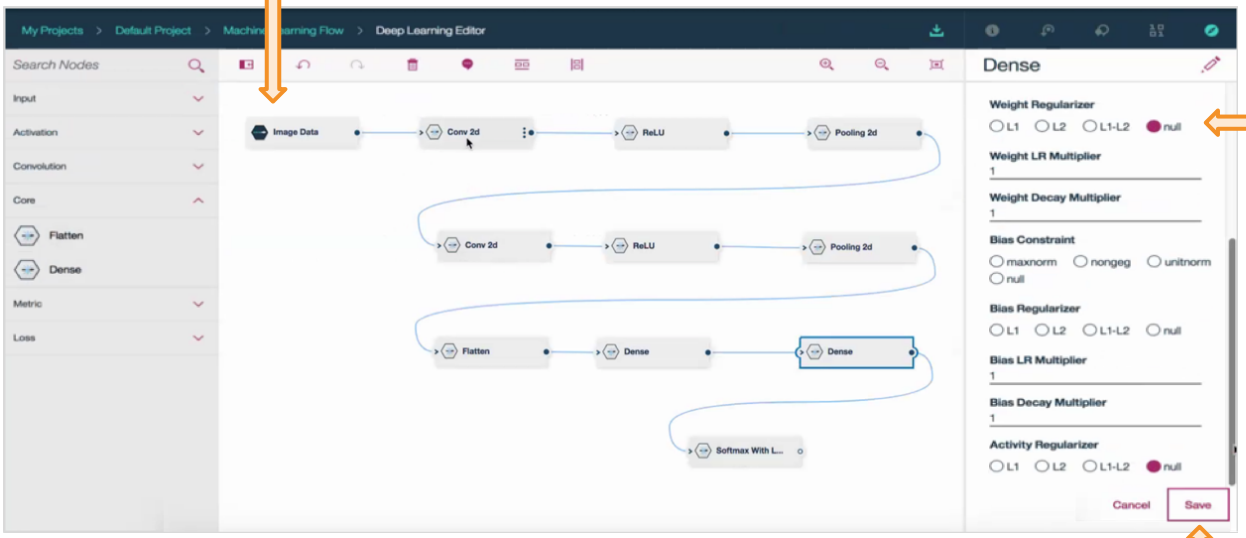
Build Model

An intuitive drag-and-drop, no-code interface for designing neural network structures using the most popular deep learning frameworks. Quickly capture your network design then single click export for experimental optimization.

Supported Frameworks

TensorFlow™ PYTORCH Caffe Keras

Real-time validation of network flow



Drag-and-drop network layers

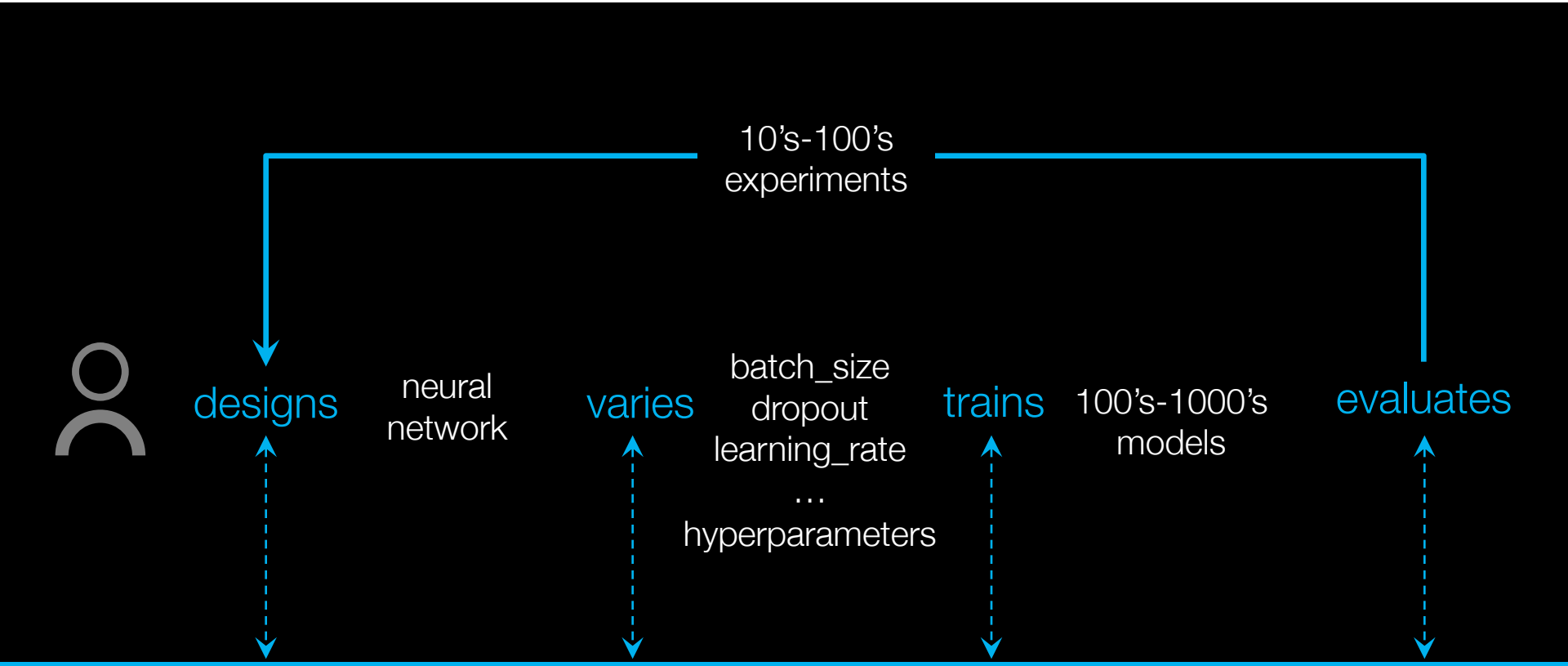
- Define layer configuration
- Choose optimizer params

- Generate CPU or GPU compatible code

- Save as popular framework code
- Export as a python notebook
- Execute as batch experiment

Experiment Builder

Build Model

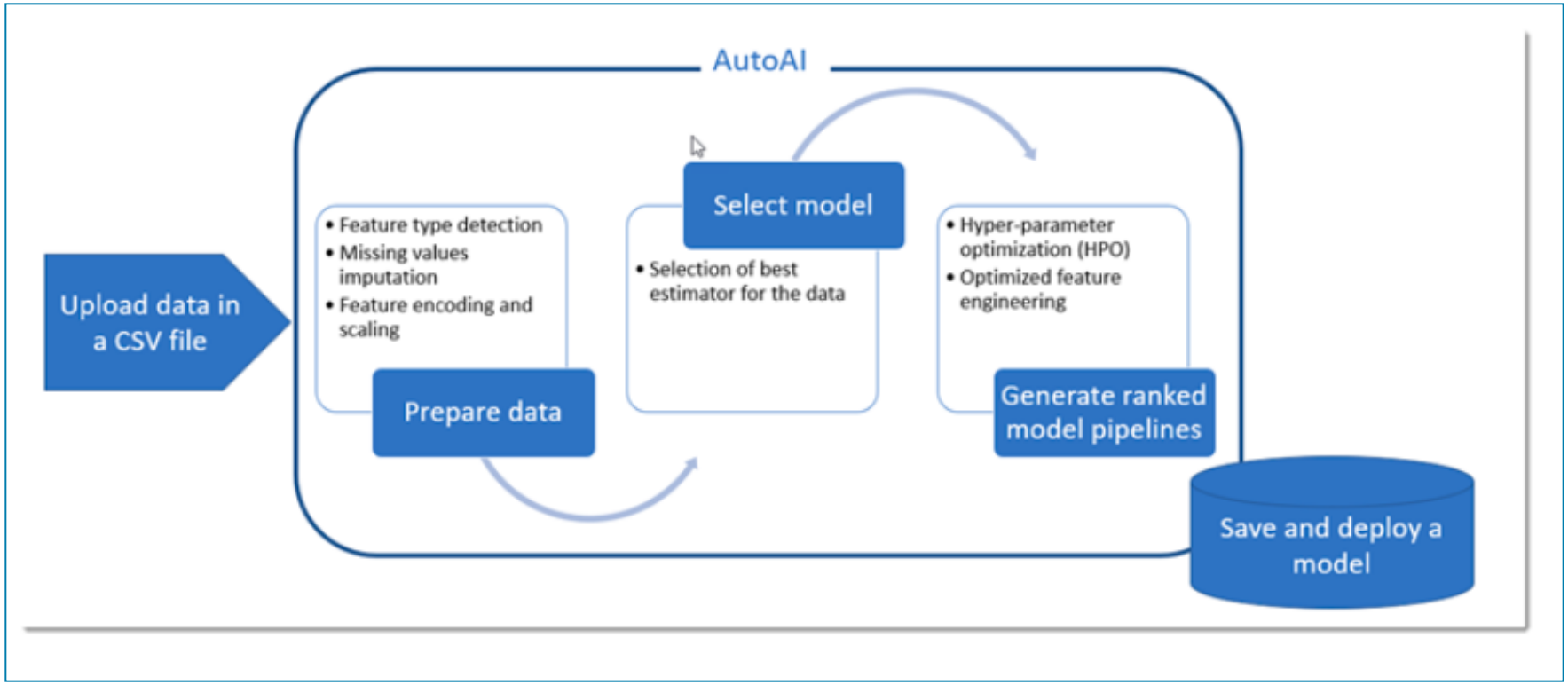


Experiment Builder

supports the end-to-end workflow

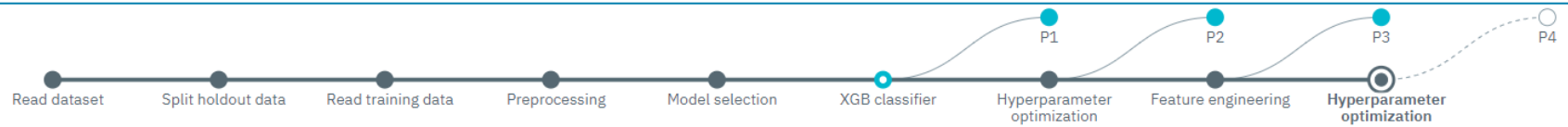
AutoAI

Build Model



AutoAI

Build Model



Pipeline leaderboard

Compare pipelines Ranking based on: Accuracy

	RANK	ACCURACY	PIPELINE INFORMATION		
>	1	0.897	P3 - XGB classifier estimator Transformers (8): Preprocessing > Standard scaler > Univariate feature selection > Sine > Univariate feature selection > Tangent > ...	View details	Save as model
>	2	0.884	P1 - XGB classifier estimator Transformers (2): Preprocessing > XGB classifier estimator	View details	Save as model
>	3	0.884	P2 - XGB classifier estimator Transformers (2): Preprocessing > XGB classifier estimator	View details	Save as model

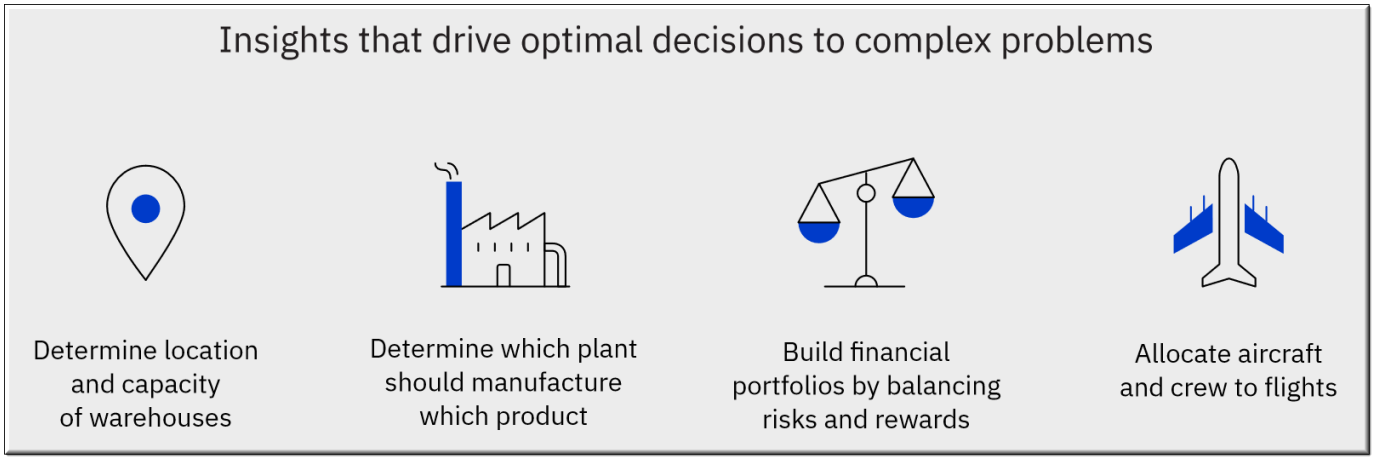
Decision Optimization

Build Model

Decision Optimization (DO) enables data science teams to capitalize on the power of *prescriptive analytics* and build solutions using a combination of techniques like optimization and machine learning.

Integrated with Watson Studio, Decision Optimization can combine optimization techniques with coding and non-coding tools, model management and deployment – as well as other data science capabilities.

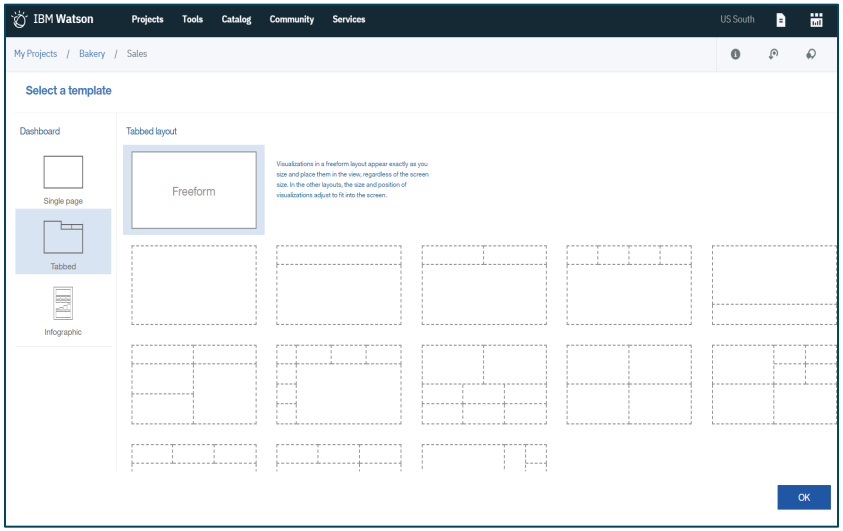
Decision Optimization evaluates millions of possibilities – balancing trade-offs and business constraints to find the best possible solution.

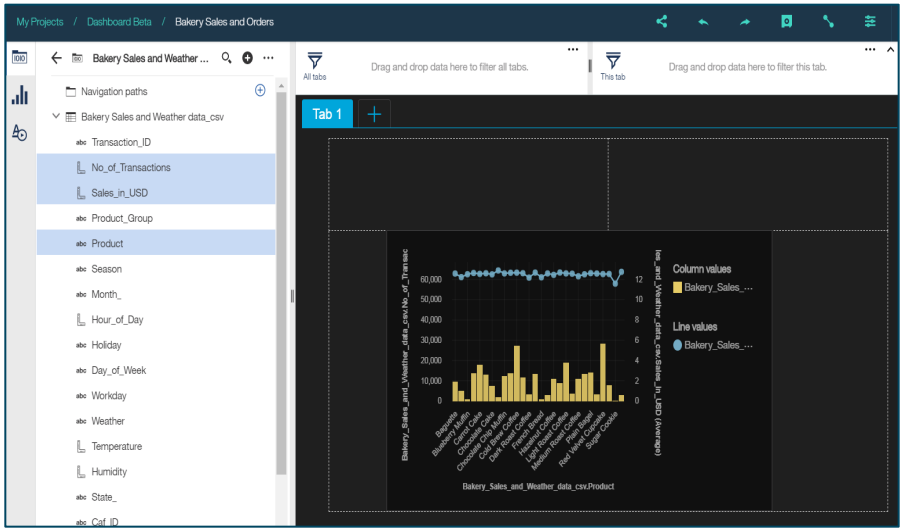


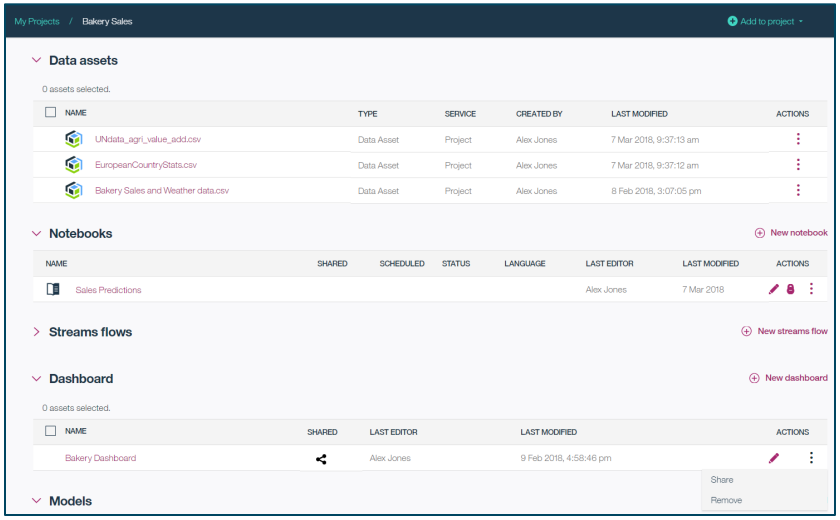
Watson Studio Dynamic Dashboards

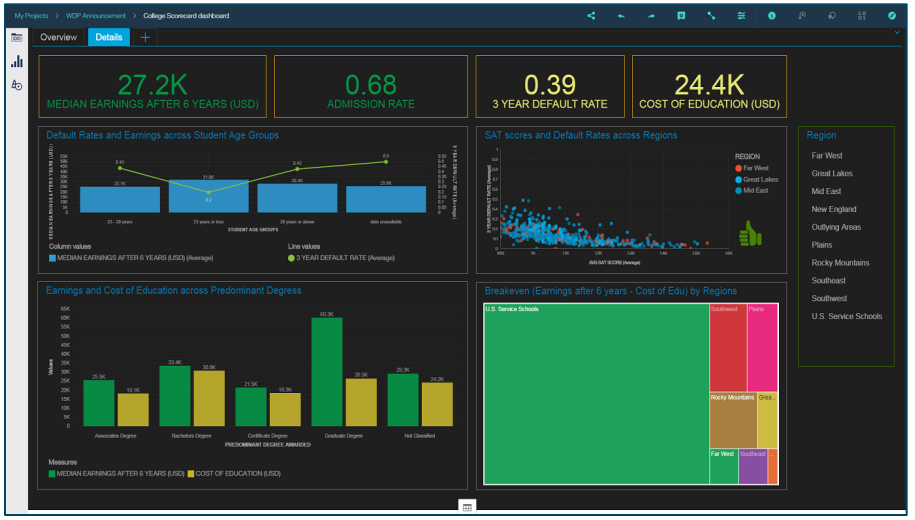
Making insights available to all

Build Model



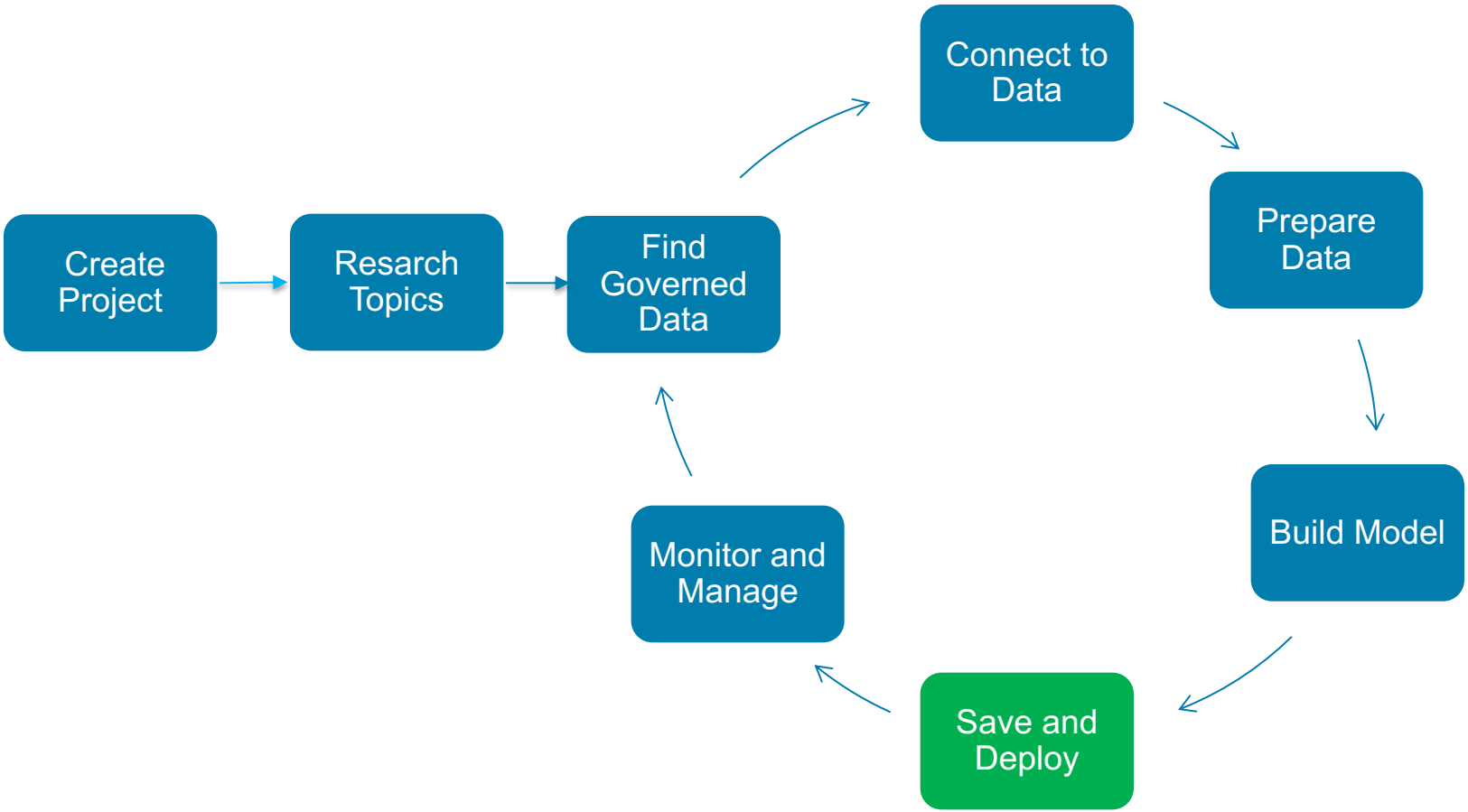






Watson Studio supports the Data Science Lifecycle

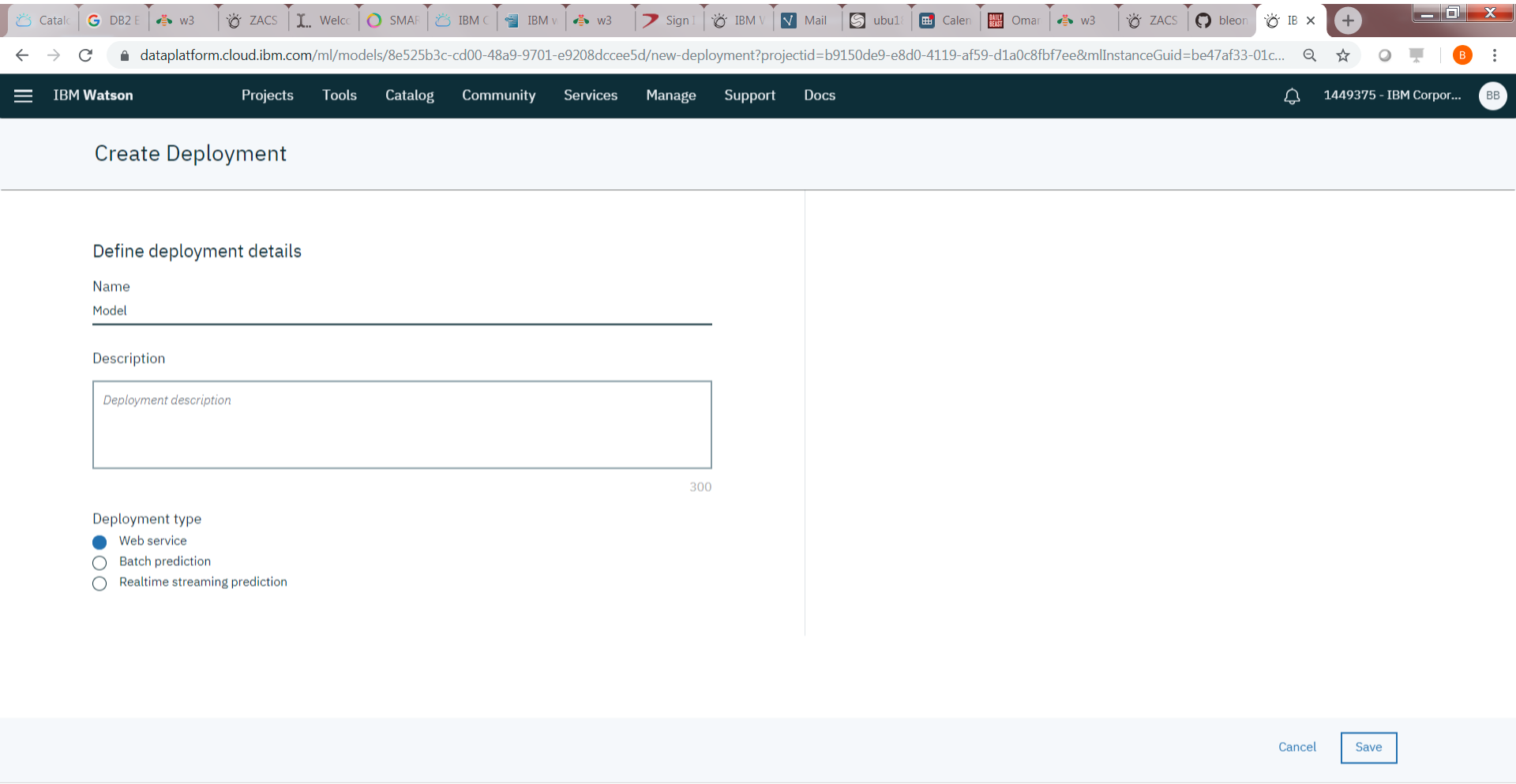
Build, train, deploy, and monitor at scale ML/DL workflows to infuse AI into the enterprise to drive innovation.



Watson Studio Save and Deploy Models

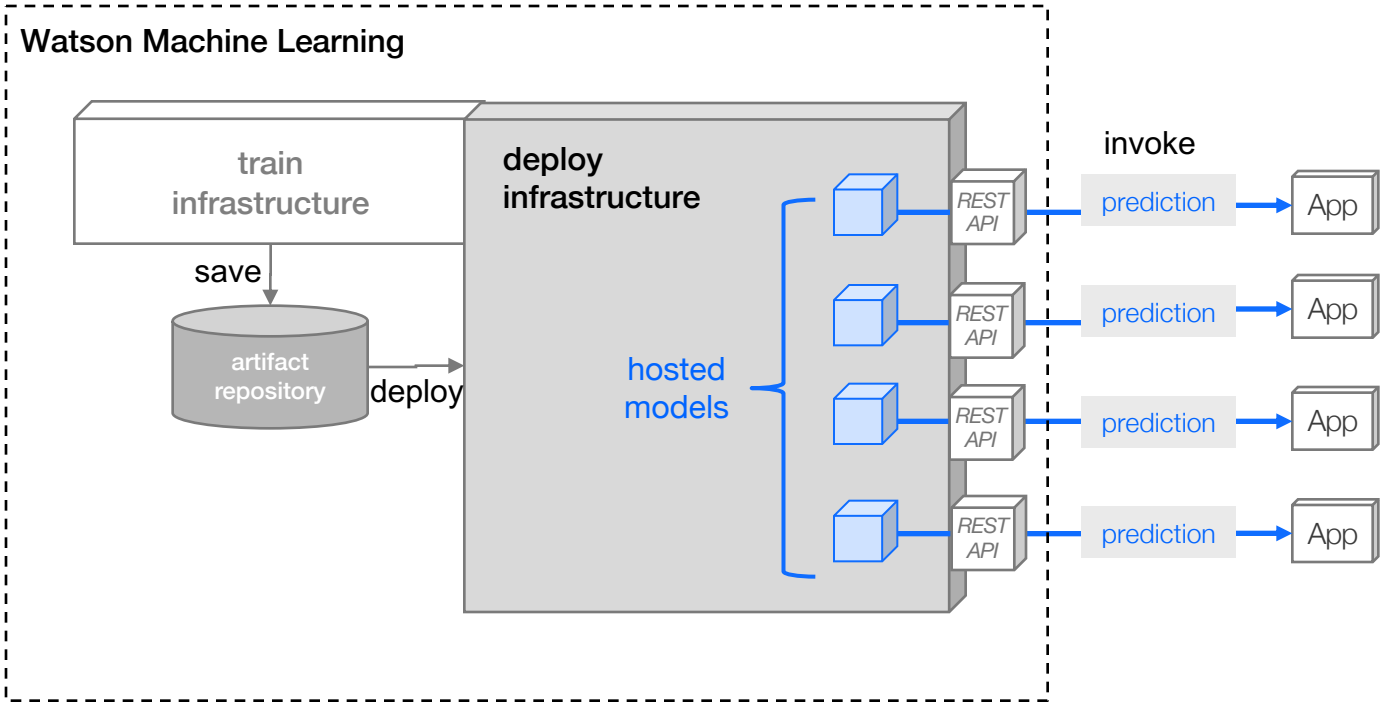
Save and Deploy Models with Watson Machine Learning

Save and Deploy



Watson Studio Save and Deploy Trained Models

Save and Deploy Models with Watson Machine Learning



Watson Studio Save and Deploy Features

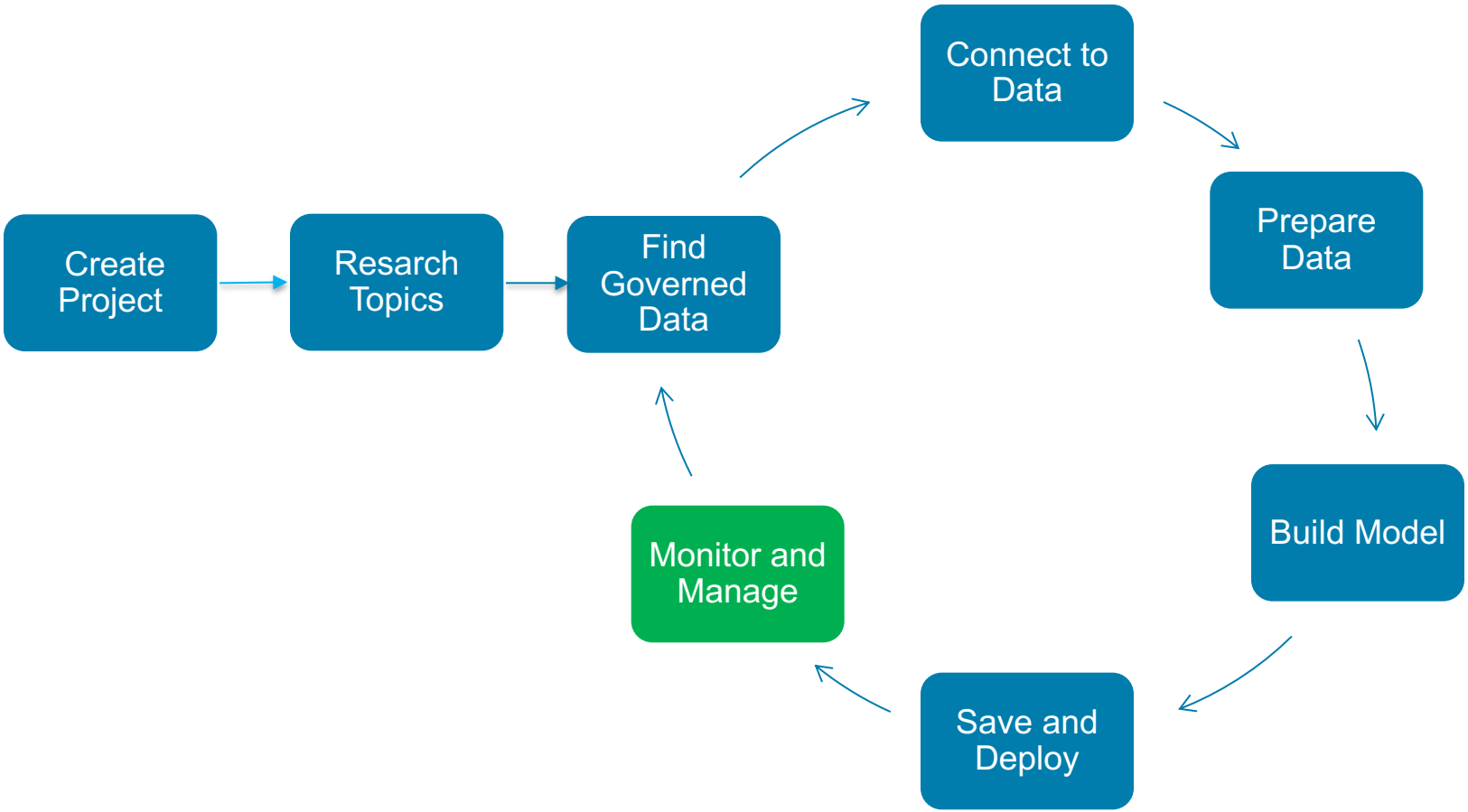
Save and Deploy

Save and Deploy Models with Watson Machine Learning

- Watson Machine Learning API to save/load models to/from repository
- Watson Machine Learning API to deploy saved models easily and have them scale automatically.
- Watson Machine Learning API to invoke deployed models

Watson Studio supports the Data Science Lifecycle

Build, train, deploy, and monitor at scale ML/DL workflows to infuse AI into the enterprise to drive innovation.



Our vision for Trusted AI

Pillars of trust, woven into the lifecycle of an AI application

Monitor and Manage

Is it accurate?

Is it fair?

Is it easy to understand ?

Did anyone tamper with it?

Watson OpenScale

Monitor and Manage

Trust and Transparency

- Intelligently delivers bias mitigation help
- Provides traceability & auditability of AI predictions made in production applications
- Tracks AI accuracy in applications
- Explains an outcome in business terms
- Drift Detection

Automation

- Automatically detects and mitigates bias in model output, without affecting currently deployed model or outcomes

Open By Design

- Monitor models deployed on third party model server engines
- Deploy behind enterprise firewall or on IaaS provider

Watson Studio Takeaways

Integrated Collaboration Environment

- Data Scientists, Subject Matter experts, Business Analysts & Developers all in one environment to accelerate innovation, collaboration and productivity
- Built-in learning to get started or go the distance with advanced tutorials

Choice of Tools for the full AI lifecycle

- Best in-breed open source and IBM tools that support the end-to-end AI lifecycle
- Choice of code or no-code tools to build and train your own ML/DL models or easily train and customize pre-trained Watson APIs

Support for all levels of expertise

- Use Watson smarts and recommendations for the best algorithms to use given your data, OR
- Use the rich capabilities and controls to fine tune your models

Multiple Deployment Options

- Watson Studio on IBM Cloud – Managed offering
- Watson Studio Local – Private Cloud, Public Cloud-(IBM, Azure, AWS)
- Watson Studio Desktop

Model lifecycle & management

- Deploy models into production then monitor them to evaluate performance.
- Capture new data for continuous learning and retrain models so they continually adapt to changing conditions.

Integrated with Knowledge Catalog

- Intelligent discovery of data and AI assets that enables reuse & improves productivity
- Seamlessly integrated for productive use with Machine Learning and Data science
- Powerful governance tools to control and protect access to data

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Outline

- IBM Cloud Overview
- Watson Services Overview
- Watson Studio Overview
- Labs 

Lab-1: Watson Knowledge Studio

Introduction:

In this lab, you will use Watson Knowledge Studio to develop socioeconomic annotators for COVID-19.

Objectives:

Upon completing the lab, you will know how to:

- Create and edit a type system
- Create a dictionary for each entity type
- Upload a training corpus
- Perform manual annotation
- Train and create a machine learning (ML) annotator
- Save and deploy the ML annotator to Watson Discovery

Applying AI and Analytics to COVID-19

Lab 1 in progress. We will return to the main room at 11:30 am.

Lab-2: Watson Discovery

Introduction:

In this lab, you will use Watson Discovery to develop a knowledge management system (KMS), train the KMS to generate knowledge and analyze information to create a COVID-19 vulnerability index.

Objectives:

Upon completing the lab, you will know how to:

- Create a collection and upload data
- Add the entity model from Knowledge Studio
- Perform custom entity extraction
- Retrieve the analyzed files using the Discovery API
- Calculate the COVID-19 vulnerability index
- Perform Smart Document Understanding on a COVID-19 publication
- Create and run Natural Language Queries
- Use relevancy training to improve the relevance of results

Applying AI and Analytics to COVID-19

Lab 2 in progress. We will return to the main room at 12 pm break for lunch.

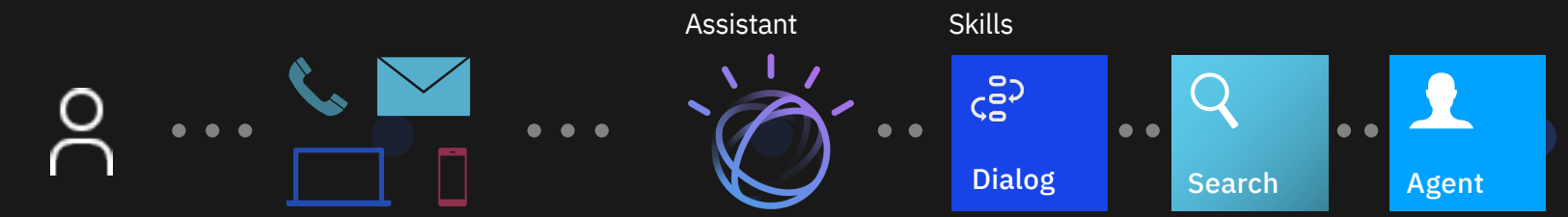
Continue working lab 2 at 12:30 pm

We will return to the main room at 1 pm

Watson Assistant

is the AI-powered foundation of smart customer experiences.

Centralize your customer communication and problem resolution	Get started fast with your existing logs and web content	Go live without needing a developer	Dynamically manage vague questions



Watson Assistant

Market Differentiation

Low-code platform

Intuitive building interface that helps you– from coders to the C-suite – to successfully build and deploy an assistant quickly.

Deploys anywhere

One of the only vendors in the market that allows you to deploy and run a virtual assistant on premises or on *any* public cloud.

Powered by best in class NLU

Best in class AI powers the underlying language models, so you can build the smartest assistant your business.

Seamlessly hands off to your agents

Connect to your existing service desk to transfer conversations to human agents

Connects to any channel

You have channels, applications, and content in place. Make the most of them. We make it possible to connect to (almost) *anything*.

Scales effortlessly

An enterprise can go from a single user to supporting millions of conversations across its organization with a single product.

Watson Assistant

Driven by intents, not rules

Watson Assistant **understands** the user's intent

- Handcrafted rules unable to scale and do not benefit from data
- State of the art NLU to derive intent
- Learns over time based on usage

Intent Password Reset

“ I forgot my password...”

“ How do I get a new password? ”

“ Can’t login into your site... ”

“ My login isn’t working, please help... ”

“ Can you reset my password? ”

“I’m frustrated, I haven’t been able to login into your online billing system”

Extract other key information from a question

Intent Password Reset

“I’m frustrated, I haven’t been able to login into your online billing system”

Extract other key information from a question

Intent	Password Reset
Entities	Online Billing System

“I’m frustrated, I haven’t been able to login into your online billing system”

Extract other key information from a question

Intent	Password Reset
Entities	Online Billing System
Emotional Tone	Anger → Leverages Watson Tone Analyzer

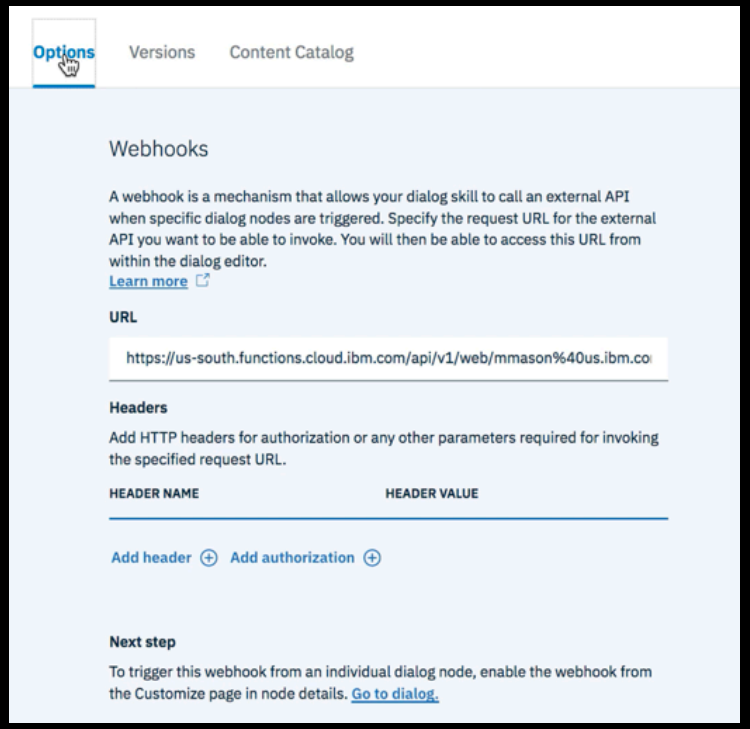
“I’m frustrated, I haven’t been able to login into your online billing system”

Extract other key information from a question

Intent	Password Reset
Entities	Online Billing System
Emotional Tone	Anger → Leverages Watson Tone Analyzer
Context	Bill Smith, 47 / Gold Member
Context	Mobile

Webhooks

Webhooks let you pull in user information to personalize answers, post transactions to internal systems, check other systems for answers to questions, you name it—all in-line within your dialog.



Lab-3: Watson Assistant – COVID-19 Chatbot

Introduction:

This lab will build a chatbot to respond to questions about COVID-19. Watson Assistant and Watson Discovery services from IBM will be used to build the chatbot.

Objectives:

The goal of this lab is to familiarize the user with the Watson Assistant service. Watson Assistant is IBM's AI offering that lets you build, train, and deploy conversation interactions into any application, device, or channel. Watson Assistant can be deployed on any cloud or on-premises environment.

After completing this lab, you will be familiar with these features of Watson Studio.

- Provision an instance of Watson Assistant
- Add a dialog skill to your Watson Assistant instance
- Connect your Watson Assistant with Watson Discovery
- Create Cloud Functions
- Integrate data sources via a Watson Assistant webhook

Applying AI and Analytics to COVID-19

Lab 3 in progress. We will return to the main room at 2 pm.

IBM Watson Studio

Enterprise Data Science platform that helps your team work together to build models to make better data driven decisions for your business

Analyze any data, no matter where it lives

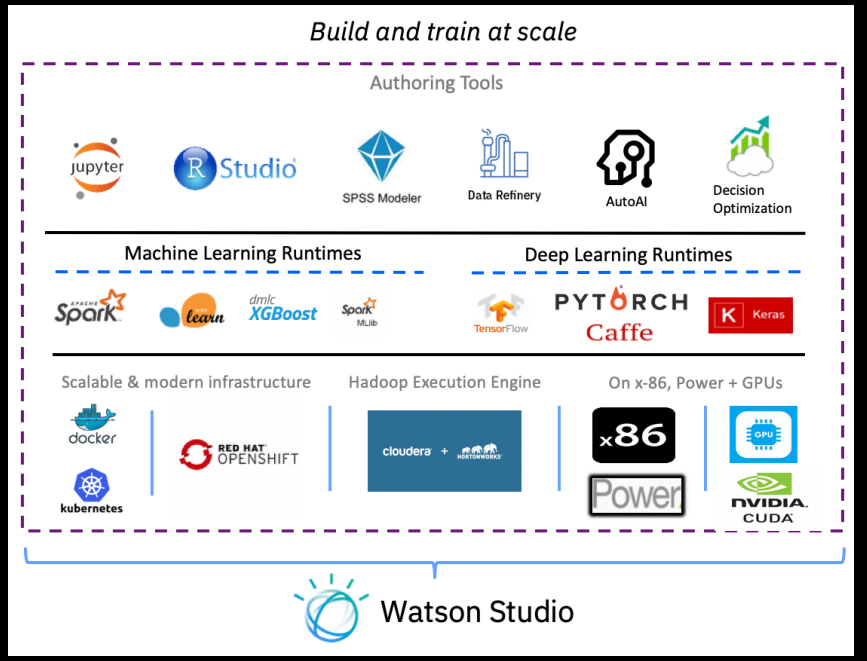
Connect to and analyze your data without moving a single byte through dozens of connectors and multiple deployment options

Empower your entire organization with notebooks, visual productivity, and automation tools

Leverage your entire organization with a variety of tools in a single integrated platform

One platform to rule them all from discovery to production

Analyze data, build predictive models, and seamlessly integrate Watson Machine Learning to deploy at scale



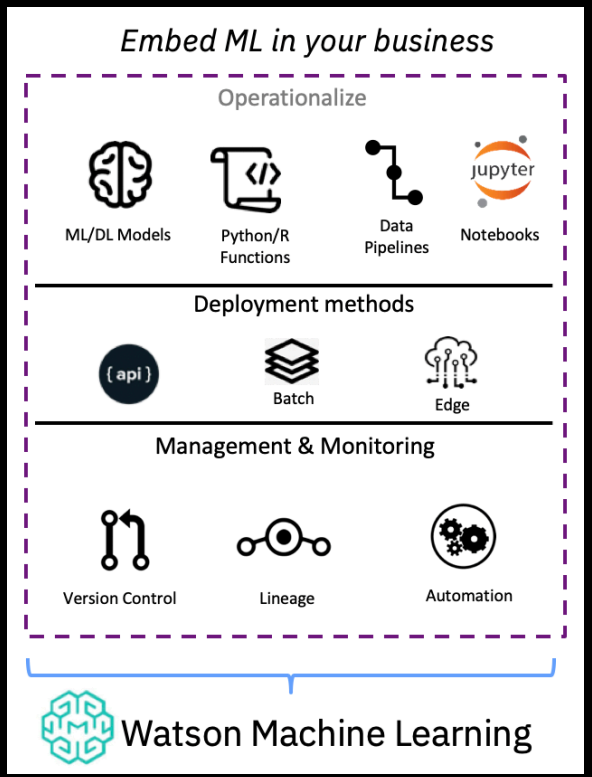
IBM Watson Machine Learning

Embed Machine Learning and Deep Learning in your Business

Deploy and Manage Models
Move models to production, in an easy, secure, and compliant way

Intelligent Model Operations
Embed intelligent training services, with feedback loops that constantly learn from new data, regardless where it resides

Accelerate Compute Intensive Workloads
Distribute your deep learning training and Hadoop/Spark workloads with multi-tenant job scheduling



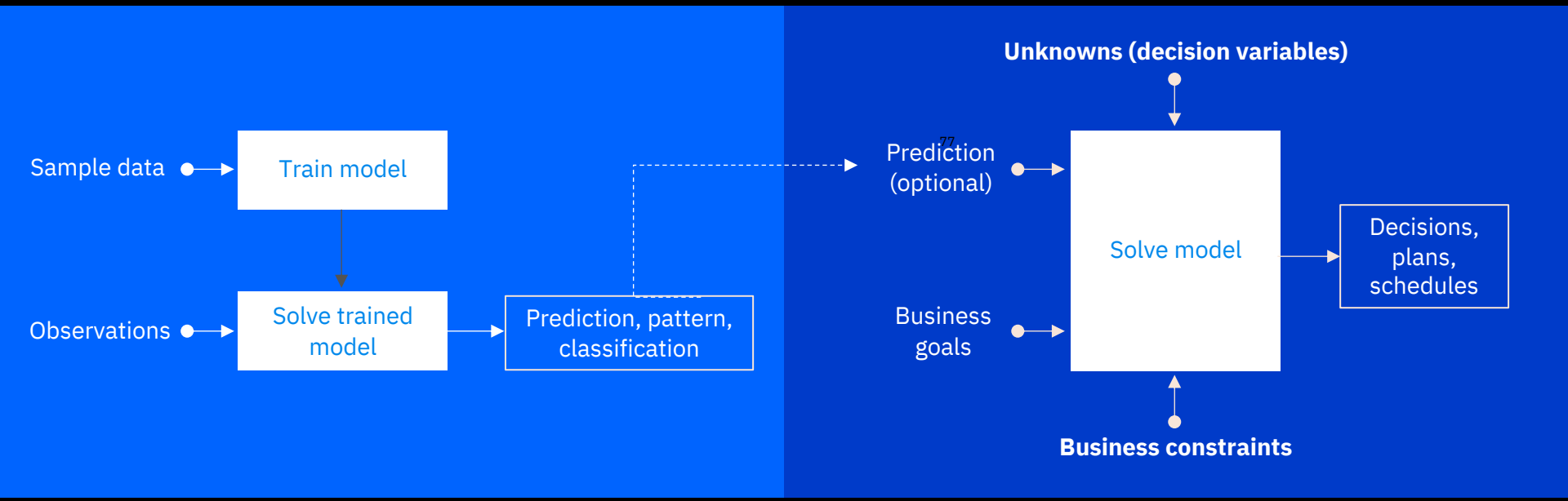
Machine learning and optimization: better together

Predictive analytics

- Basic (supervised): You **know the answer**, and you **train the machine how to find it**.
- Advanced: Unsupervised, reinforcement, deep learning

Prescriptive analytics

- You **don't know the answer**, and you **provide the machine the logic on what is a good and a bad solution**.
- Advanced: Robust, stochastic, etc



Capitalize on the power of prescriptive analytics with Decision Optimization

Create innovative solutions

Combine optimization technology with data science techniques such as machine learning

Improve productivity

Validate optimization models more quickly and easily using visual dashboards

Experience fast time to value

Solve optimization models quickly across domains using powerful solvers

Operationalize your projects

Deploy optimization models in production to drive business impact around real use cases

Lab-4: Watson Studio – Forecast COVID-19 Outbreaks

Introduction:

This lab will apply predictive analytics to analyze different factors among people to predict future COVID-19 infection rates in an area. Based on areas predicted to have high COVID-19 infections – this lab will apply optimization techniques to optimize the planning of transferring COVID-19 patients from hospitals located in epidemic areas to hospitals with less COVID-19 patients. Our hope is to educate people how to apply IBM's predictive and optimization technologies to help them improve planning and responding to COVID-19 cases.

Objectives:

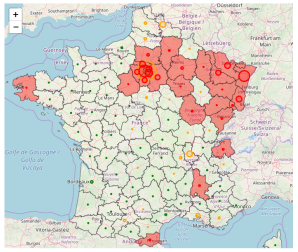
The goal of this lab is to educate user on how to apply IBM predictive analytics and optimization tools to different applications of COVID-19 like (1) predicting future infections and (2) optimizing response for better decision making. We intend students learn these skills.

- Load data form different places to be used for analysis
- Represent the current situation on a map using folium
- Use a LinearRegression to predict new cases to come for each department
- Use Decision Optimization to model and optimize plan transfers
- Use folium to display the optimized future patient transfers plan

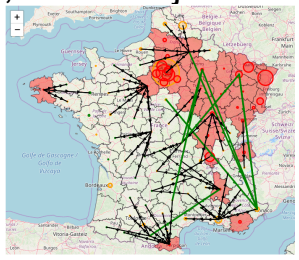
Lab-4 Overview

The Lab contains these parts:

- Upload data into your project
  - Use WS data import function (departements.csv)
- Create/import a notebook (FranceCovid19.ipynb)
- Load the data form different places (departements, current situation, etc)
  - We use data from the French government data.gouv.fr site in addition to some imported data on the different French administrative “departments” (GPS coordinates)



- Represent the current COVID-19 infection situation on a map
  - Circles show the number of reanimation cases in each department
- Predict new cases to come for each department
  - Illustrative purposes - train a simplistic predictive LinearRegression model (epidemy is not linear)
- Develop a plan transfers optimization model
  - Our hypothesis for the optimization model is that two different types of transfers can be done:
    - long distance transfers (planes, trains) with the number of transfers limited over the whole country, several people can be transferred at a time.
    - Short distance transfers (ambulances) with the number of transfers limited per area, and with just one person at a time



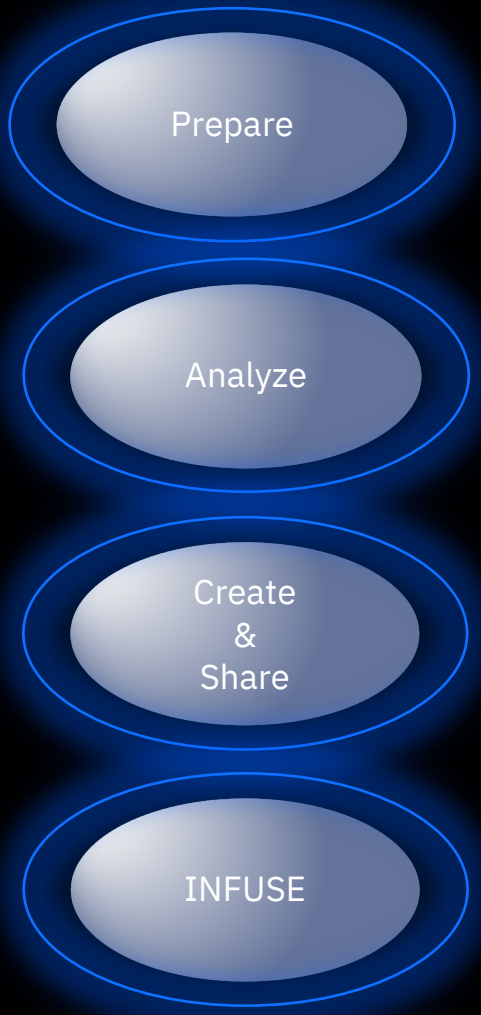
- Display all the transfers from the optimized patient transfer solution

Applying AI and Analytics to COVID-19

Lab 4 in progress. We will return to the main room at 3:30 pm.

Cognos Analytics

All the answers you need in one place



Automated data preparation and data modeling to easily cleanse and combine your data in minutes

Guided exploration infused with augmented intelligence and machine learning to uncover hidden patterns and insights

Interactive dashboards, storytelling and pixel-perfect reporting to collaborate and share across your organization

Technology integration that allows you to infuse analytics into your business process

IBM Cognos Analytics

Weather API

Tracking Global Progression of COVID-19

- Data collected from API:
  - Total cases up to May 20th
  - New cases added each day
  - Total Deaths up to May 20th
  - New deaths added per day
- Sourced from WHO, U.S. state and country government sources
- Bundled into 3 csv files

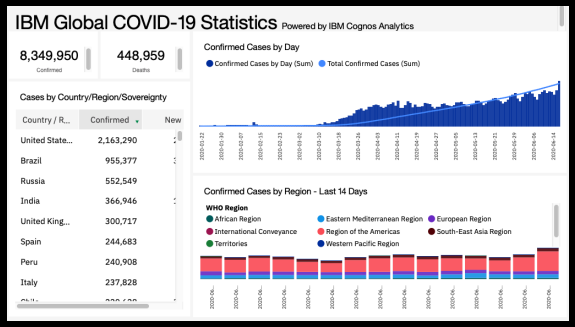
The Weather Company
An IBM Business

Lab 5

Developing Dashboards with Cognos

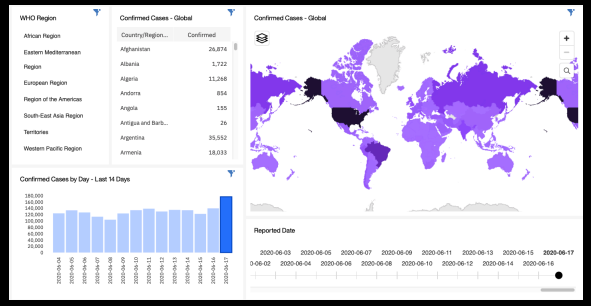
COVID-19 Cases

Global, country, region, and continent statistics



Global Map View

Change of over time on a country-by-country bases



Lab-5: Cognos - COVID-19 Statistics/Dashboard

Introduction:

This lab will build a series of Cognos Dashboards to display COVID-19 data.

Objectives:

The goal of the lab is to familiarize the user with the use of the Cognos Analytics web-based business intelligence suite. IBM Cognos Analytics contains integrated toolsets for reporting, analytics, and visualization. This lab will focus on the visualization component. We will be creating three tabs similar to those on the IBM & Weather Channel COVID-19 Dashboard. IBM created a data fabric pulled from state and local governments as well as the World Health Organization. Where the public dashboard updates dynamically based on daily data pulls, we will use extracted data tables for the lab to build visualizations for a specific set of dates.

After completing this lab you will be familiar with these features of Cognos Analytics:

- Access the Cognos free trial
- Create a "COVID-19 Cases Dashboard”
- Create a global map view
- Add a webpage tab.

Applying AI and Analytics to COVID-19

Lab 5 in progress. We will return to the main room at 5 pm.