5360 **Advanced Business Analytics**

Module 4 - MLOps – What it is , Why MLOps

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IBM

Objectives of This Module

Upon completion of this module, you will understand:

MLOps - What & Why

- Definition & People of MLOps - https://ml-ops.org/
- Key MLOps Features
  - Model Development
  - Monitoring
  - Productionalization & Deployment
  - Iteration & Lifecycle
  - Governance
- Lab: Intro to MLOps

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5360 Advanced Business Analytics

- This course will give students the language, knowledge, and actionable methods to work alongside technical and non-technical members of your team to create AI solutions.

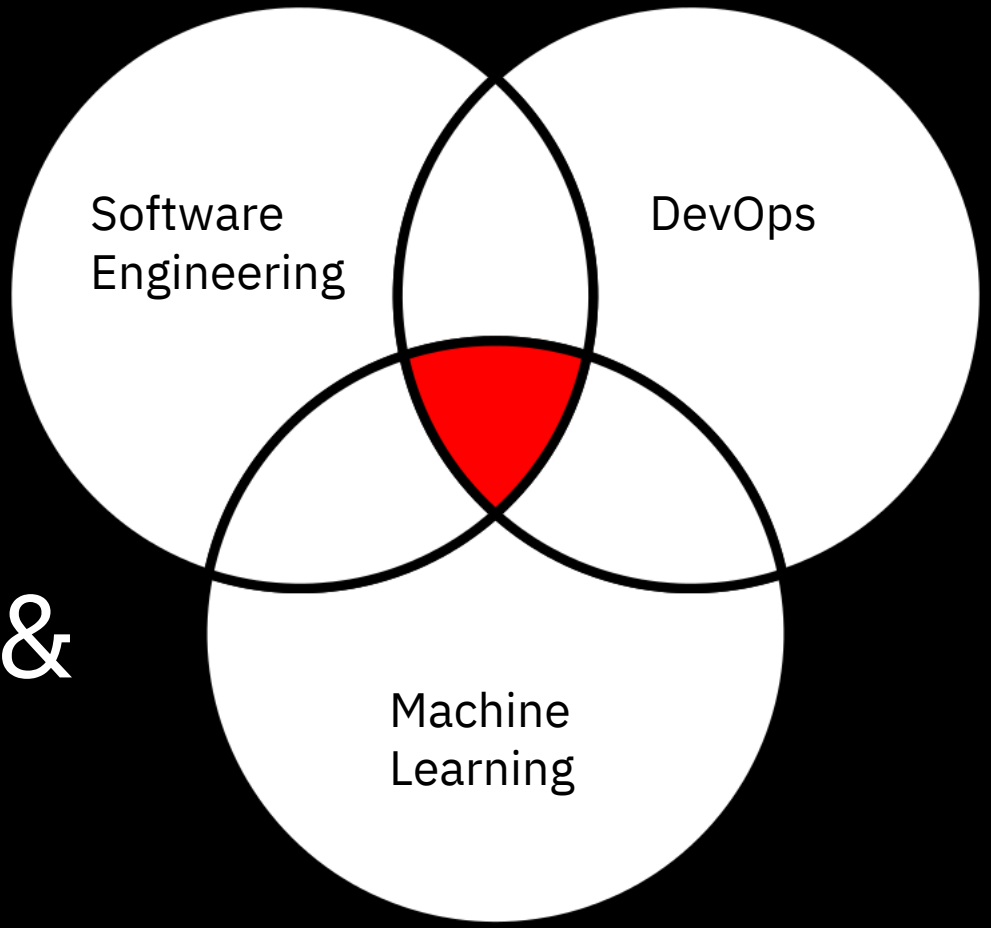
- Students will explore what it means to design artificial intelligence systems as a team, guided by a clear intent and a focus on people. This course will give you the framework and tools you need to recognize responsible AI design, align your team, and work with data sources to start building AI solutions.

- Students will learn the tools, technology, and practices that enable cross-functional AI teams to efficiently deploy, monitor, retrain, and govern models in production systems.

Re-cap

1. MLOps definition
2. Data Project Roles
3. AutoAI experiment

MlOps is the **convergence** of Software Engineering, Machine learning & DevOps



Requirements to Achieve MLOps

- ❑ Reproducible
- ❑ Accountable
- ❑ Collaborative
- ❑ Continuous

Must be able to re-train a 9-month-old model to within few %

Must be able to track back from model in Production to its provenance

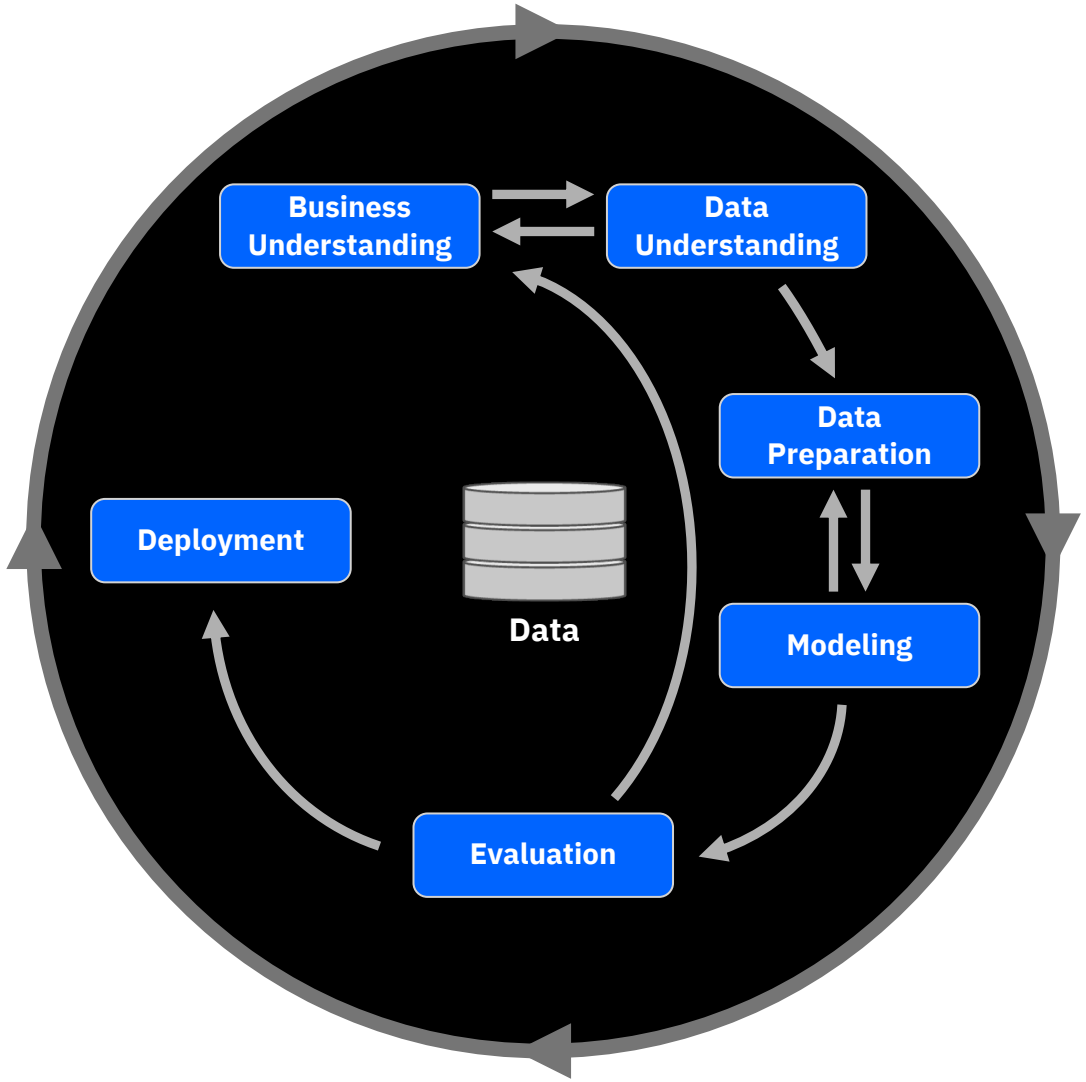
Must be able to do asynchronous collaboration

Must be able to deploy automatically & monitor statistically

https://mlops.community//

Solution Development Method Approach

CRossIndustry Standard Process for Data Mining (CRISP-DM)



Seven steps to successful Data Mining/Predictive Analytics

1. Define the business challenge in a precise statement
2. Define the data model and data requirements
3. Source data from all available repositories
4. Evaluate the data quality
5. Select the machine learning algorithm
6. Interpret the results and iterate to improve model
7. Deploy the model into your business

AI Project Roles

Drives governance policy effectiveness while tracking how data is used and its value to the company

Data Steward

Builds data pipelines that power dashboards and data platforms while ensuring high quality

Data Engineer

Prepares data to tease out the insights they're looking for, without IT involvement

Data Scientist

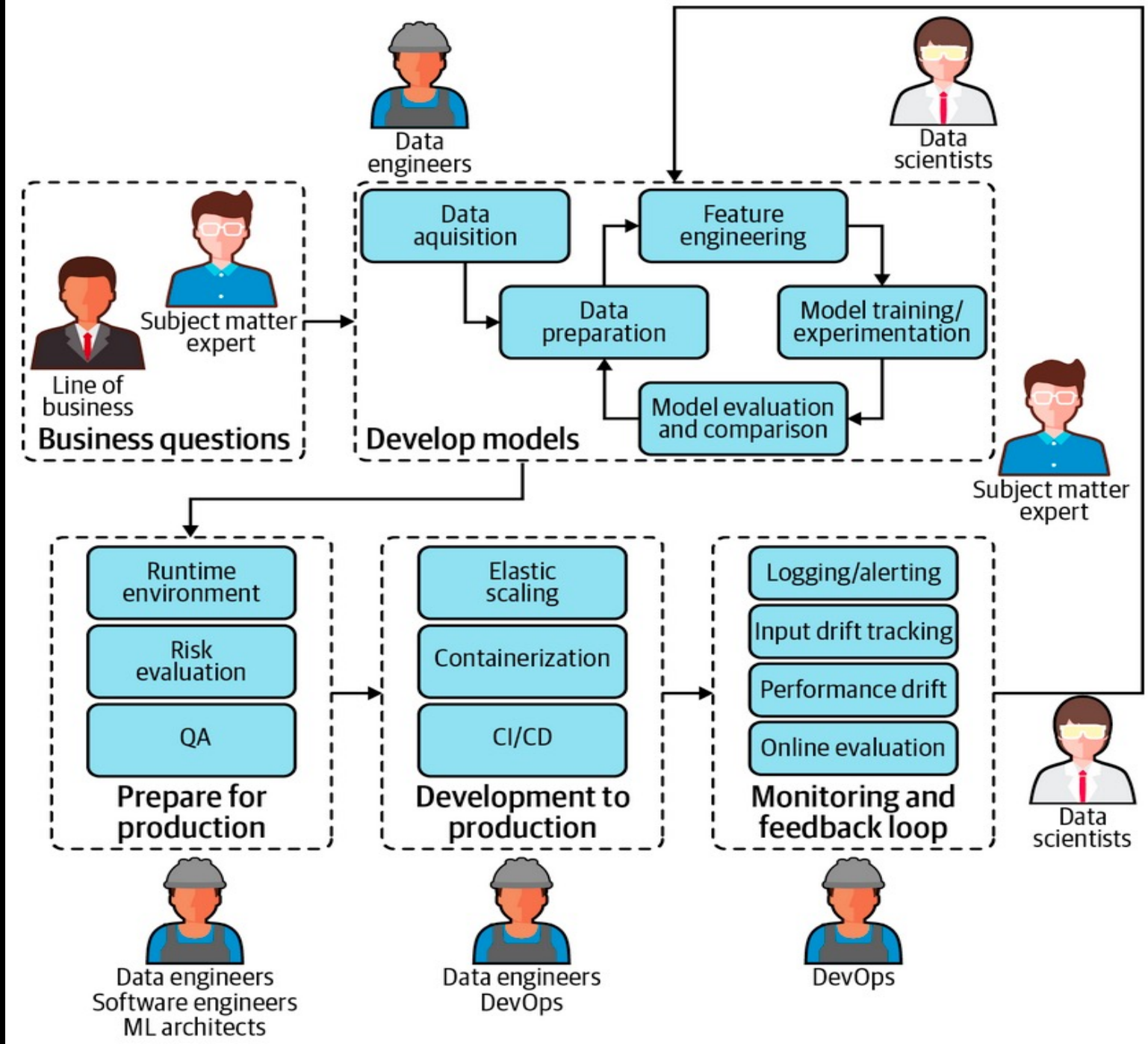
Business Analyst

Works with data to apply insights to the business strategy

App Developer

Makes insights immediately actionable and adds intelligence to apps in straightforward manner

Enterprise ML Lifecycle



Use case

1. Operationalized AI stages
2. Best practices

Stages in Operationalizing AI

Continuous integration / continuous delivery pipeline

Scope AI project(s)

Explore, prioritize, select use cases – feasibility vs impact

Detail selected use case(s) – KPIs, data, workflow, success criteria

Technical design: tools, infrastructure, data details, approach


Business


Data Scientist


IT/ Ops


Data provider

DataOps

All: Define sources & needs

Provider: Set up catalog for discovery, lineage, curation, access rules

Steward: Create data policies & access

Consumer: Find, understand, add, explore, review, share


Data provider


Data steward

Build AI assets

Connect data

Analyze data

Prepare data

Build models

Train models

Visualize & evaluate models

Test for Bias, Fairness


Data engineer


Data scientist

ML Ops – Deploy

Review, 3rd party oversight, unit tests, validation, approve deployable version

Deploy model to ML runtime engine

Monitor & evaluate model execution

Manage against thresholds

Validation reports


Software engineer


Data scientist


IT/ Ops

Manage and Trust

Configure monitoring
Configure integration with other systems

Monitor and manage:

1. Quality
2. Performance
3. Custom metrics
4. Bias/fairness
5. Accuracy & Data Drift

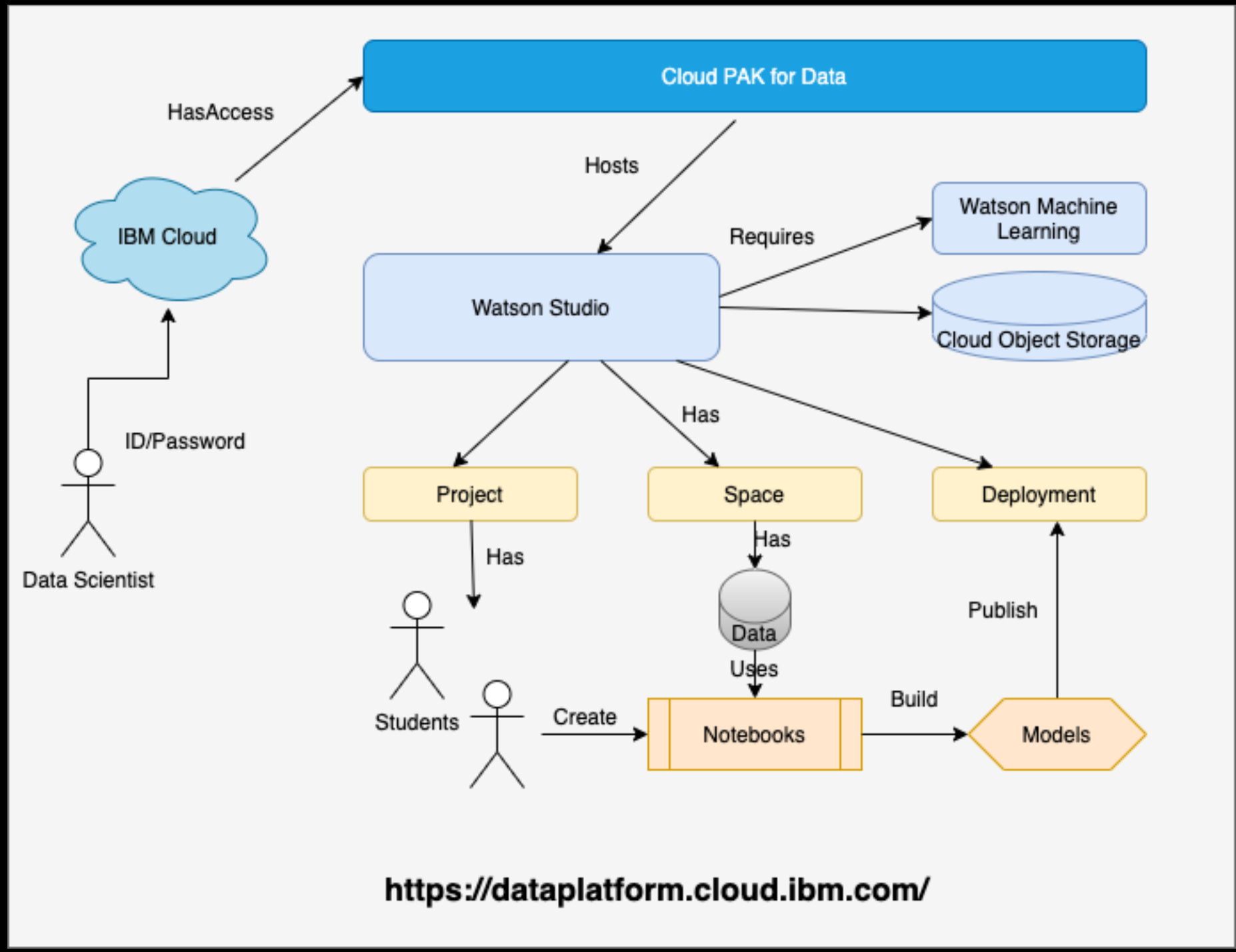
Explain on demand


Risk & Compliance


Business

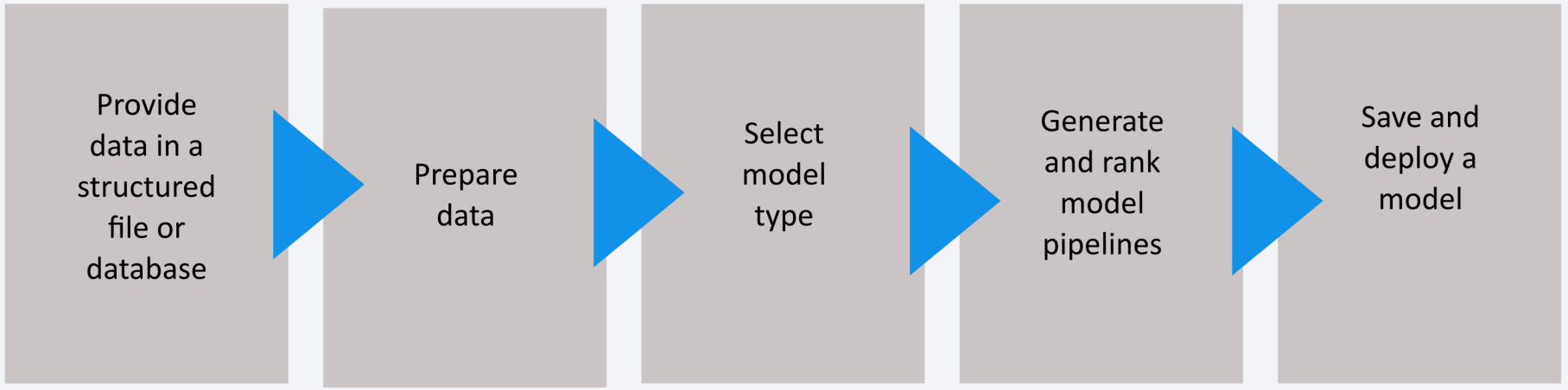
Demos - Lab

Watson Studio Model Deployment



Watson Studio Model Deployment

AutoAI



Feature type and detection

Missing values imputation

Feature encoding and scaling

Selection of best algorithm for the data

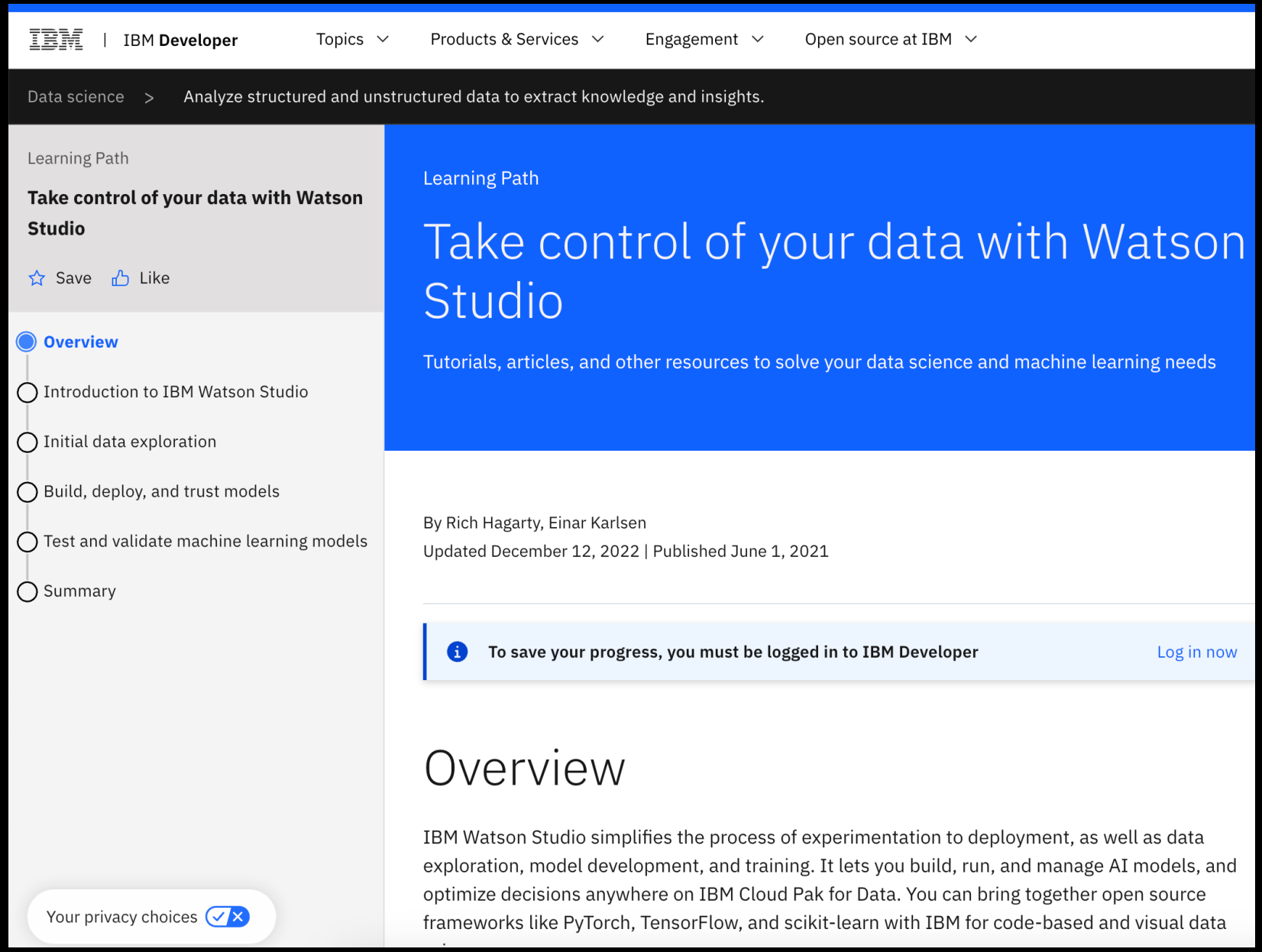
Hyper-parameter optimization

Optimized feature engineering

Ensemble for incremental learning

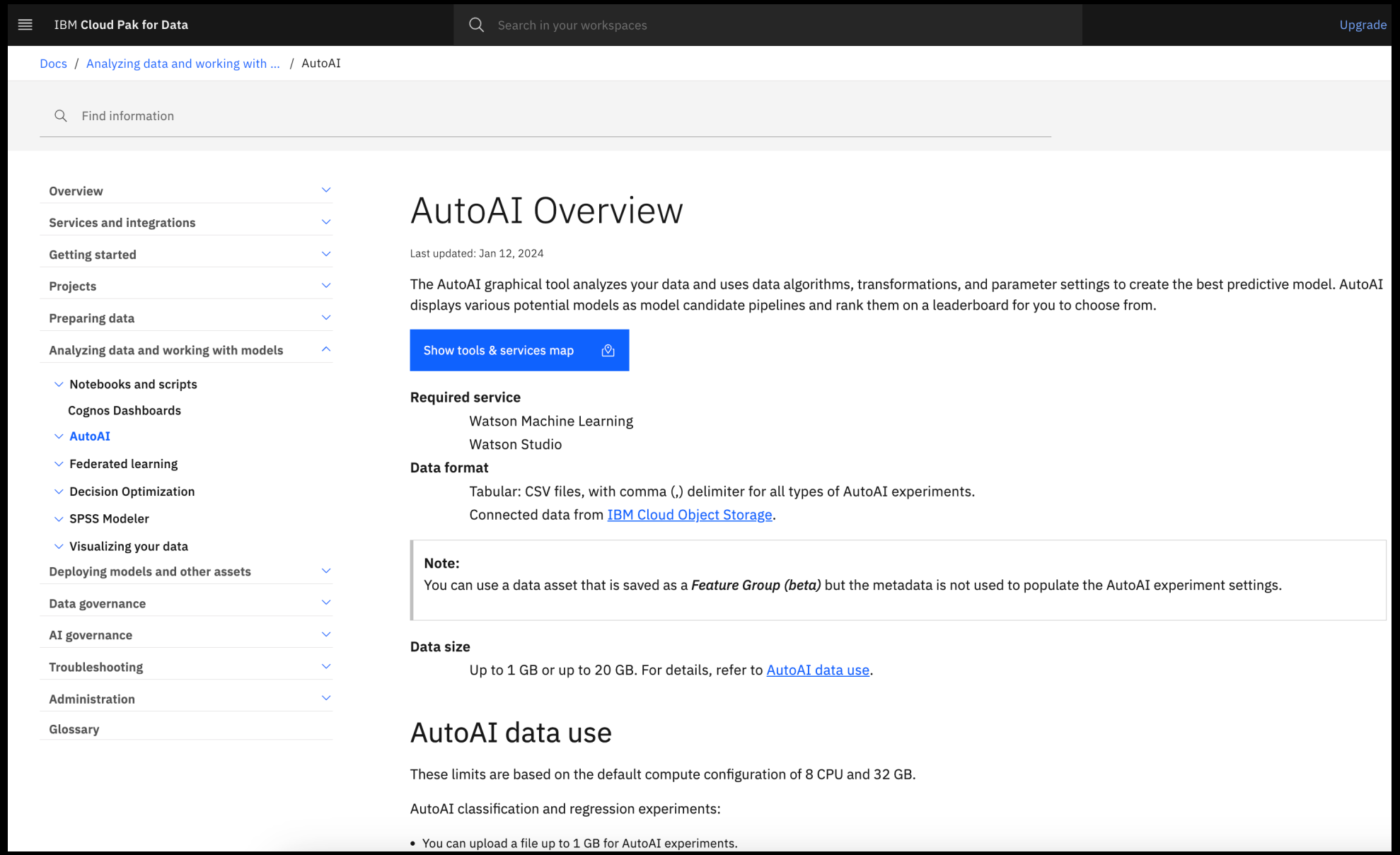
Watson Studio Model Deployment

https://developer.ibm.com/learningpaths/get-started-watson-studio/



https://dataplatform.cloud.ibm.com/docs/content/wsj/analyze-data/autoai-overview.html?context=cpdaas

Watson Studio Model Deployment



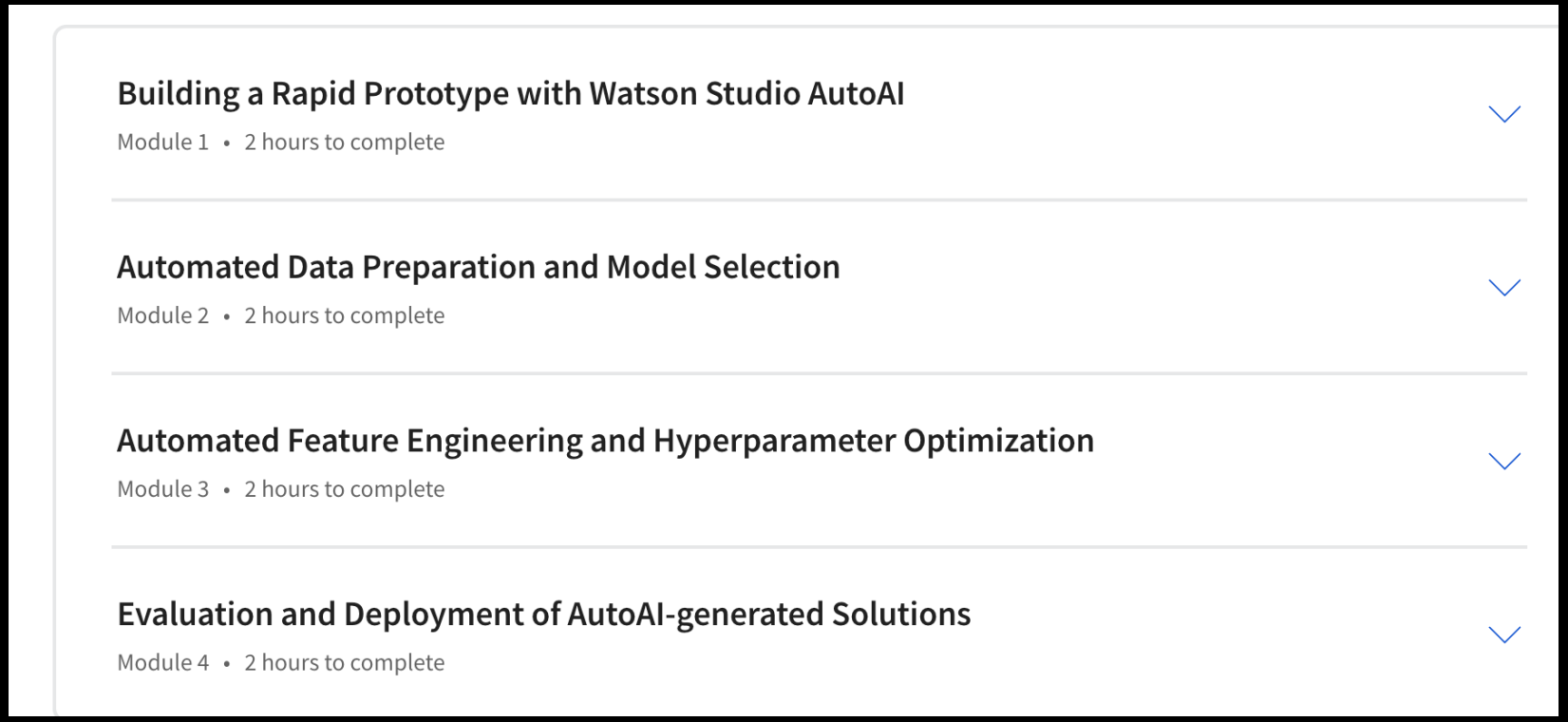
Watson Studio Model Deployment

https://www.ibm.com/downloads/cas/XGVY8QA5

https://arxiv.org/pdf/2007.01977.pdf

https://mediacenter.ibm.com/media/IBM+Watson+Machine+LearningA+Run+a+sample+AutoAI+experiment/1_6fl7dh43/99375561

https://www.coursera.org/learn/ibm-rapid-prototyping-watson-studio-autoai#modules



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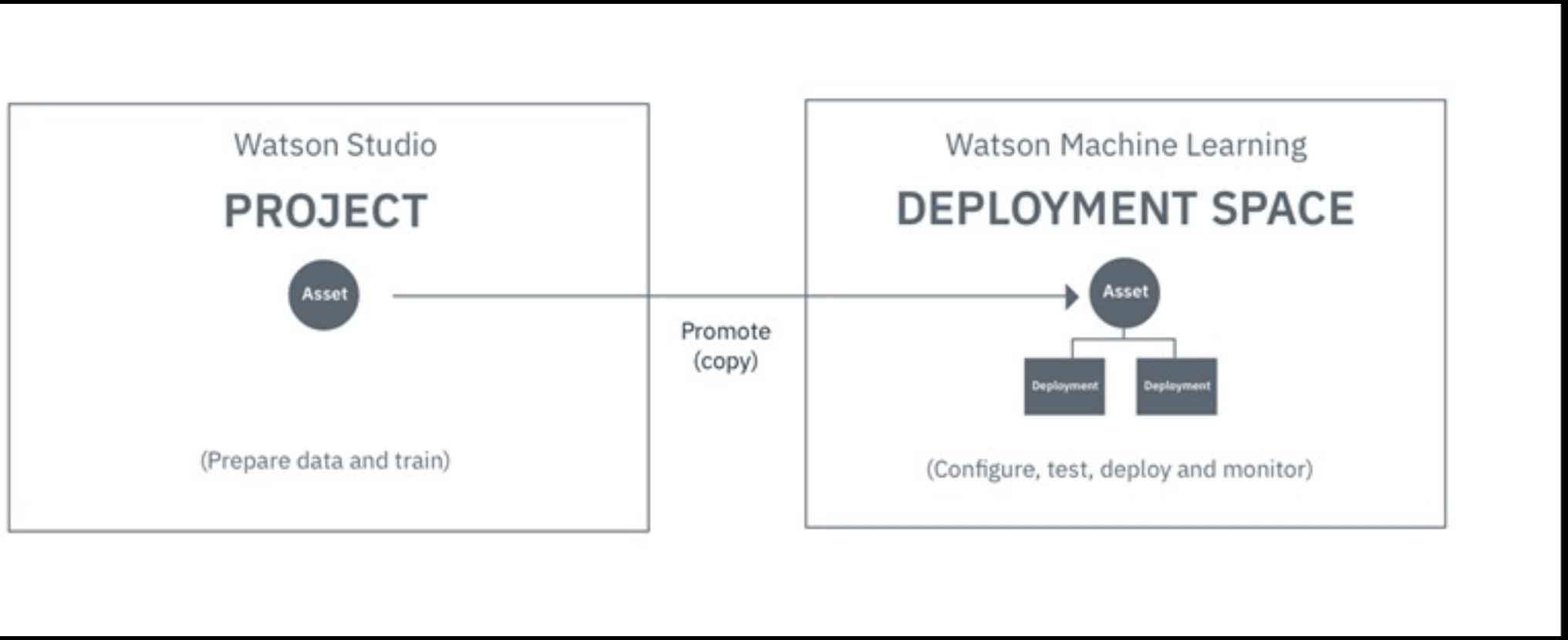

Q&A

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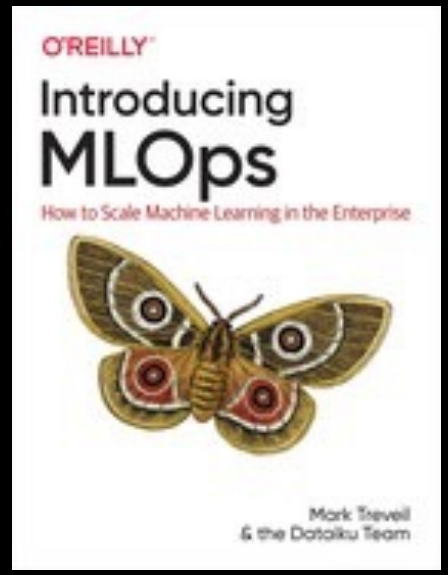

https://medium.com/inside-machine-learning/ai-ops-managing-the-end-to-end-lifecycle-of-ai-3606a59591b0