

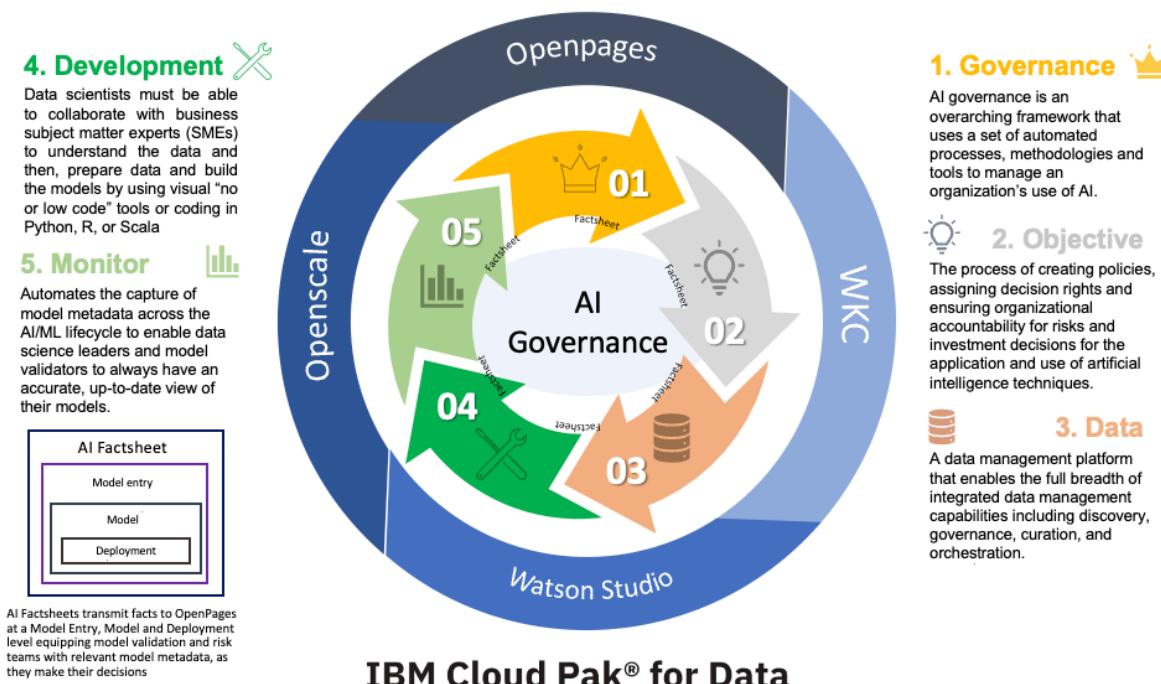
Lab - AI GOVERNANCE

Concept

AI Governance is a framework for organizations can manage AI through a set of automated processes and tools in accordance with that organization's standardized regulations and requirements. Organizations use AI Governance to track machine-learning models from request to production and to evaluate models to meet thresholds for fairness and accuracy. Using consistent principles throughout the model design, model development, model deployment, and model monitoring is critical for organizations to uphold responsible and trustworthy AI. IBM AI Governance is built on three crucial principles: -

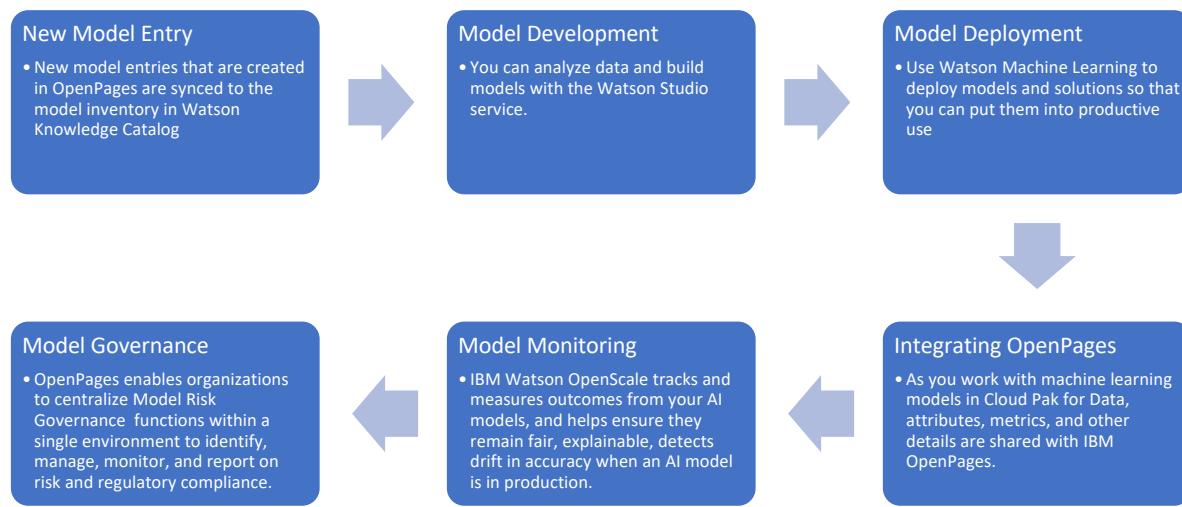
1. **Lifecycle Governance:** Monitor, catalog, and govern AI models from anywhere and throughout the AI lifecycle.
2. **Risk Management:** Manage risk and compliance according to business standards and through automated facts and workflow management.
3. **Regulatory Compliance:** Proactively help to ensure compliance with current and future regulations proactively.

IBM's Cloud Pak for Data is a modern data and AI platform that addresses the need for AI Governance through its integrated solution set. The chart below provides a summary of an AI model lifecycle through the structure of IBM's AI Governance. By following the number designations represented in the multicolor inner circle, we will first see how a model's lifecycle begins as a governable artifact. This artifact becomes a governed asset as it progresses through the AI Governance maturity cycle. The outer circle represents the cohesive set of IBM's technologies that accomplishes IBM's AI Governance methodology. In addition, we will see how AI [Factsheets](#) carry metadata throughout this lifecycle to operationalize, automate, and prove trustworthy outcomes.



Lab Workflow

Please refer to the graph below to review the activities within this AI Governance lab.



Steps & Technology

For AI projects to be successful, organizations need to focus on these fundamental approaches:

- 1) Focus on the right business case.
- 2) Realize that AI projects should be metadata driven.
- 3) Build a strong governance foundation.
- 4) Bridge gaps between all layers of organizational inputs.

The methodology of AI Governance seeks to resolve challenges organizations can have with successful AI implementation by leveraging the IBM technology stack. This lab begins with the model entry process in [OpenPages](#). From [OpenPages](#), we will define a business case and persona roles as part of that model input. We will then review various model development options, and for this lab, we will use IBM's AutoAI solution. Next, we will deploy the model and review how to manage these deployments within Cloud Pak for Data. We will build monitoring meters for that model using [OpenScale](#). Finally, we will return to [OpenPages](#) to see how AI Governance performs as a solution set.

[OpenPages](#) – Provides governance, risk, and compliance tools to help organizations manage risk and regulatory compliance.

[Watson Knowledge Catalog](#) - Catalogs curated assets to be accessible by other IBM technologies.

[FactSheets](#) - A FactSheets is a collection of relevant information (facts) about the creation and deployment of an AI model or service. Facts could range from information about the purpose and criticality of the model to measured characteristics of the dataset, model, or service, or actions taken during the creation and deployment process of the model or service.

[Watson Studio](#) - Provides data science tools for AI development.

[OpenScale](#) – Monitors AI models for bias, fairness, and trust with added transparency on how your AI models make decisions.

Lab - AI GOVERNANCE

1.1 Lab Overview

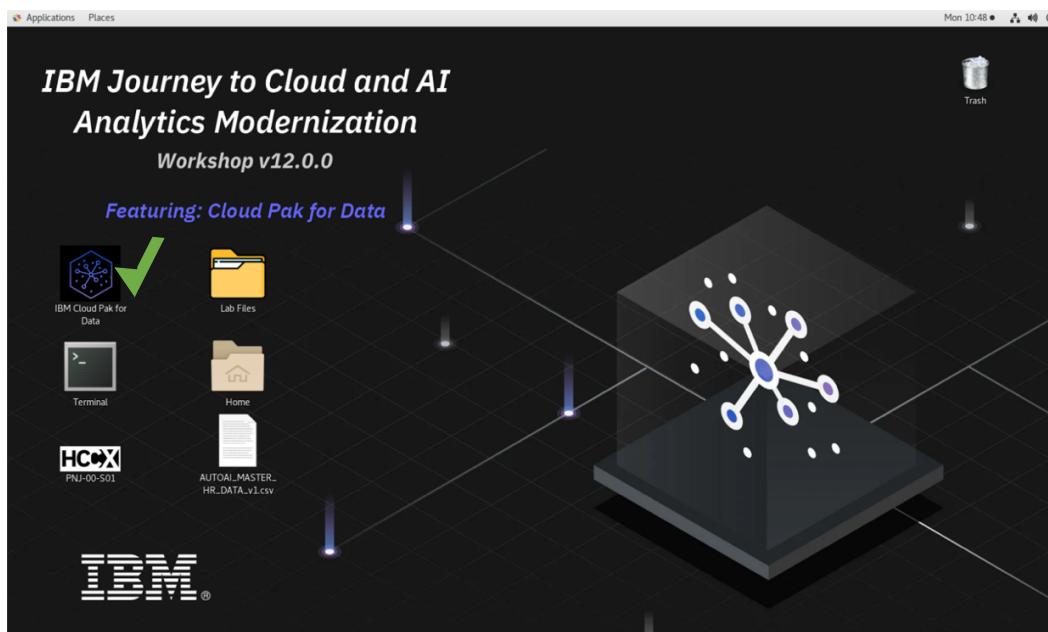
Throughout this lab, you will explore the practice known as AI Governance. This lab will demonstrate how IBM's Cloud Pak for Data platform applies governance tools to enable trust in AI-powered systems at every step of the AI development process. Each component of Cloud Pak for Data will show a solution set that ensures transparency and explainability throughout an organization's AI governance practice.

1.2 Personas represented in this lab.

Persona (Role)	Capabilities
 Administrator	Administrators set up and maintain the CPD environment itself. Note: while some of the Admin work can be done in the CPD web client, most of the Admin work on the cluster would be done in OpenShift which is outside the scope of this workshop. <i>The exercises in this first lab represent some typical CPD Administrator activities.</i>

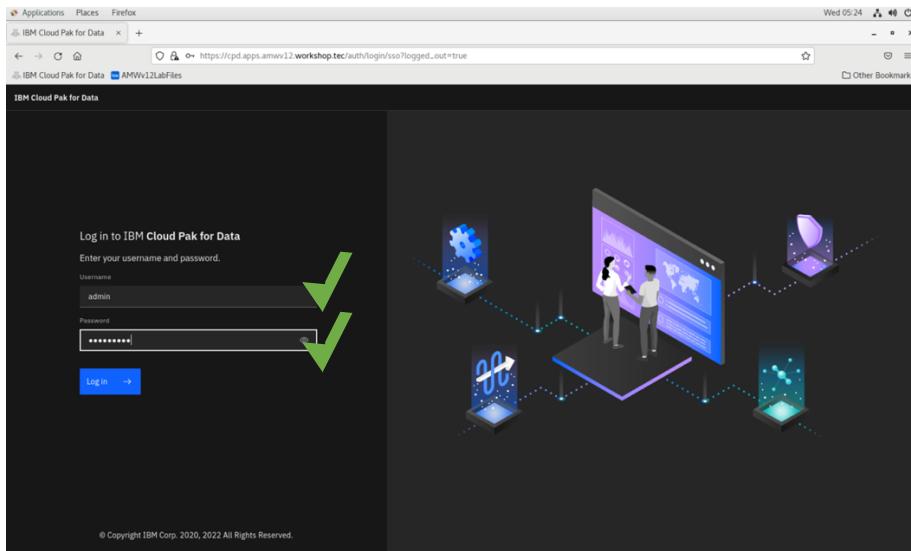
1.3 Navigate to the Cloud Pak for Data Home Page

1. Double-click the [IBM Cloud Pak for Data](#) icon to access Cloud Pak. *Please note there is a "Lab files" folder on the desktop which contains assets for later activity.*



2. Enter the following credentials when you at the [IBM Cloud Pak for Data](#) home screen.

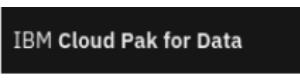
Username: admin
Password: cpdaccess

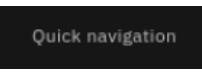


Click the blue **Login** button to enter the platform.

3. Here are some navigation pointers.

1)  the “Hamburger Menu” references the **IBM Cloud Pak for Data** main navigation menu.

2)  may be used to access the home screen at any point within an activity.

3)  use the quick navigation list to return to a favorite asset.

4)  use the ellipsis icon to view the menu for an asset.

1.4 OpenPages – Model Use Case

FOUNDATION

OpenPages brings together essential stakeholders, who often work independently on siloed and duplicate data. For the model developer, owner, validator, and business unit executive, OpenPages Model Risk Governance combines a flexible data model with overall document management, powerful workflow capabilities, and business intelligence. This supports a greater level of engagement and transparency in the overall model risk management processes.

OpenPages Model Risk Governance provides a configurable and customizable solution with key features that include:

Comprehensive model inventory - Creates and maintains a comprehensive model inventory. Organizes, documents, and maintains an enterprise-wide record of models and their usage.

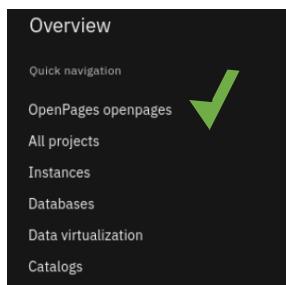
Model metrics - Documents and tracks issues and metrics associated with models.

Workflow management - Enables workflow management of the model and validation of life cycles.

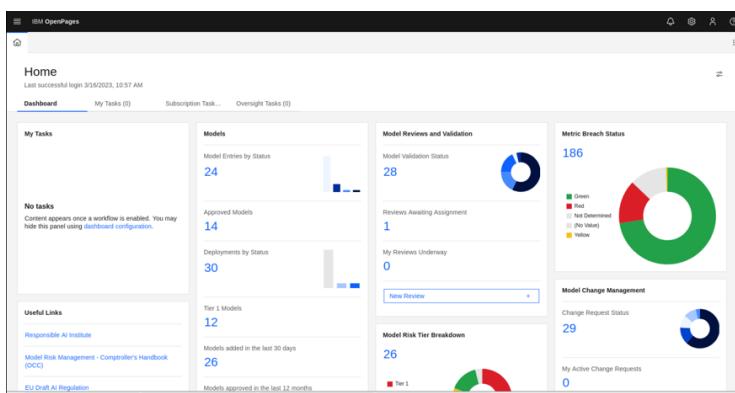
Model risk assessments - Conduct periodic model attestations and model risk assessments.

Audit and resource management - Provides the ability to monitor and manage the execution of the audit and the assignment and tracking of resources.

1. From the [IBM Cloud Pak for Data](#) homepage, navigate to the “Quick Navigation” section and click on OpenPages openpages

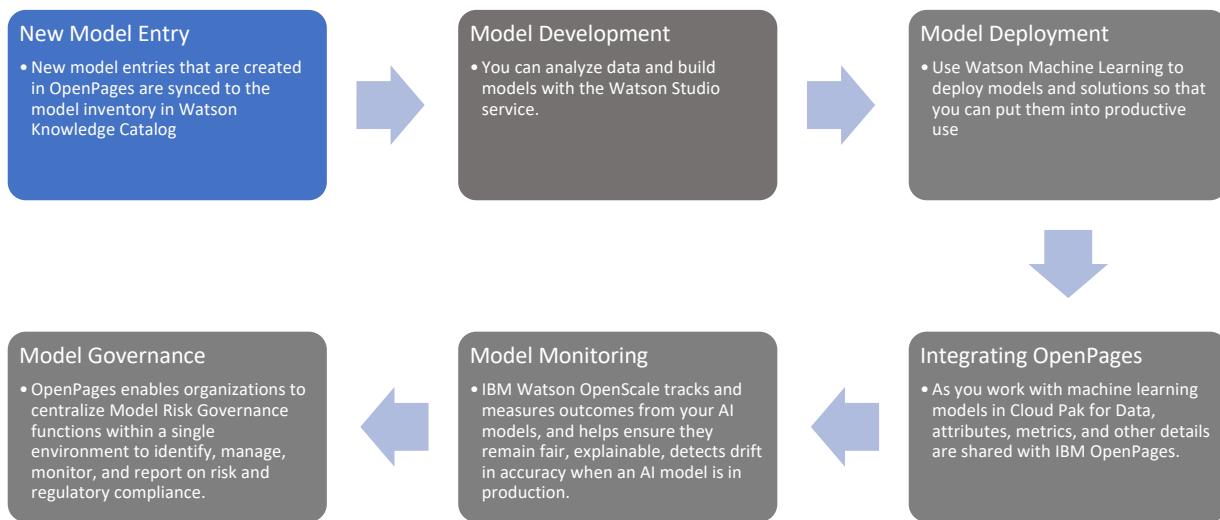


2. You will now land on the OpenPages home screen.



Read more here: <https://www.ibm.com/downloads/cas/5N39ZO2X>

3. The life of an AI model within AI Governance first begins as a business initiative. By using OpenPages, a model owner will collaborate with developers, validators, and business executives to develop inputs for this business initiative. This collaboration occurs within a [New Model Entry](#).



4. From the OpenPages home screen, scroll down and select [New Model Entry](#)

The screenshot shows the IBM OpenPages dashboard. On the left, there's a sidebar with 'Useful Links' including 'Responsible AI Institute', 'Model Risk Management - Comptroller's Handbook (OCC)', 'EU Draft AI Regulation', 'SR 11-7 Information', and 'E-23 Information'. The main dashboard area has several cards: 'Tier 1 Models' (12), 'Models added in the last 30 days' (26), 'Models approved in the last 12 months' (10), 'New Model Entry' (highlighted with a green arrow), and 'New Model'. To the right, there are two more cards: 'Model Change Management' (Change Request Status: 29) and 'Models by Provider' (IBM: 11, AWS SageMaker: 8, Azure: 4, DataRobot: 2).

5. A New Model Entry window will appear. Now that the collaborative business definitions for this model have been defined, some basic elements of this model will be inserted in the model entry.

For this lab, we will focus on an HR Attrition use case. Our goal is to create an AI model which can predict attrition based on employee demographics, survey data, and organizational structure.

The screenshot shows the 'New Model Entry' screen under 'Model Entry'. The title is 'New Model Entry' with a sub-link '[View Name : AI_FactsView-New-ModelEntry]'. The 'General' tab is selected. The 'Name' field contains 'Attrition Prediction Model - HR'. The 'Purpose' field contains 'To predict attrition within ABC Organization'. The 'Description' field contains 'Developed by Admin, HR Executive, DS Department, and Risk Officer'. A search bar and a 'Modified Required' indicator are also visible.

Name: Attrition Prediction Model – HR

Purpose: To predict attrition within ABC Organization

Description: Developed by Admin, HR Executive, DS Department and Risk Officer

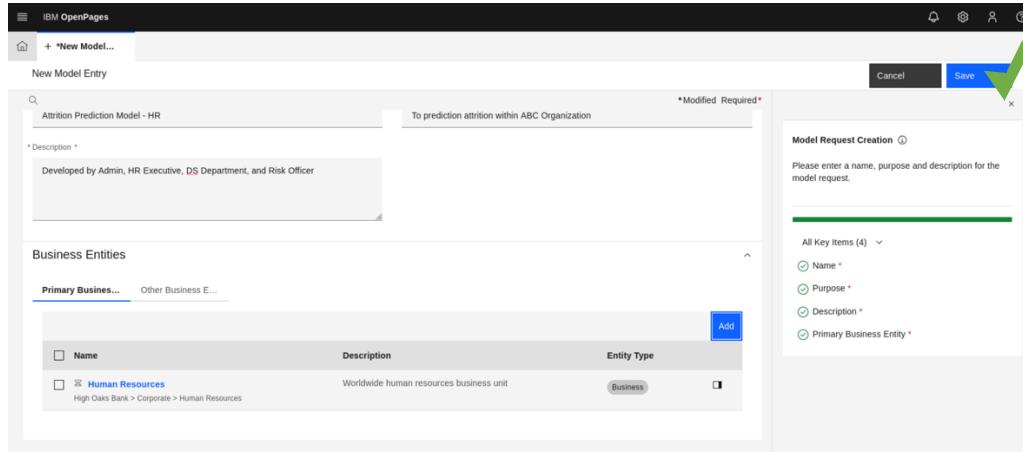
6. Assign a Business Entity to this model entry. Select **Add**.

The screenshot shows the 'Business Entities' screen. It has tabs for 'Primary Business...' (selected) and 'Other Business E...'. Below is a table with columns 'Name', 'Description', and 'Entity Type'. A green checkmark points to the 'Add' button at the top right of the table area.

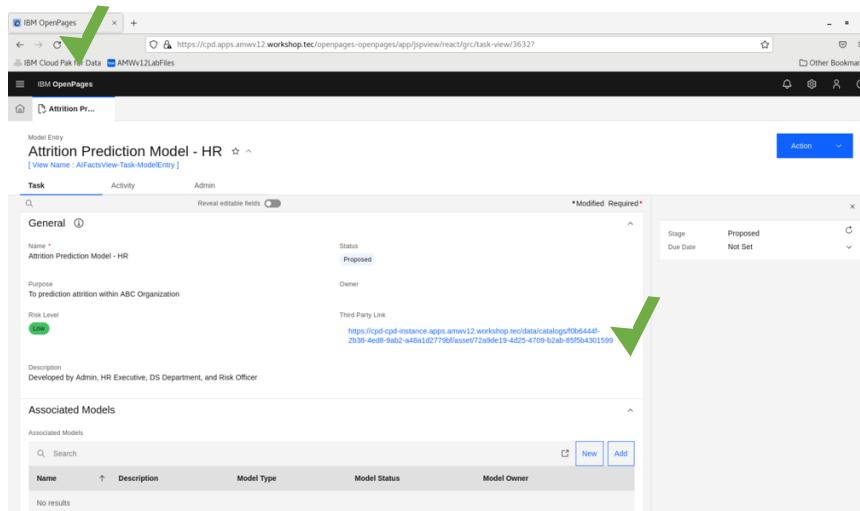
7. In the Add window, type “Human” and select enter. Select the Human Resource option which appears. Then select **Done**.

The screenshot shows the 'Add' dialog window. It displays a list with 1 total item, 'Human'. A green checkmark points to the 'Human' entry. Below is a table with columns 'Name', 'Description', and 'Entity Type'. A green checkmark points to the 'Human Resources' entry in the table. At the bottom, there are 'Cancel' and 'Done' buttons, with a green checkmark pointing to the 'Done' button.

8. Now that we have filled in specifics within our New Model Entry, select Save in the top right.



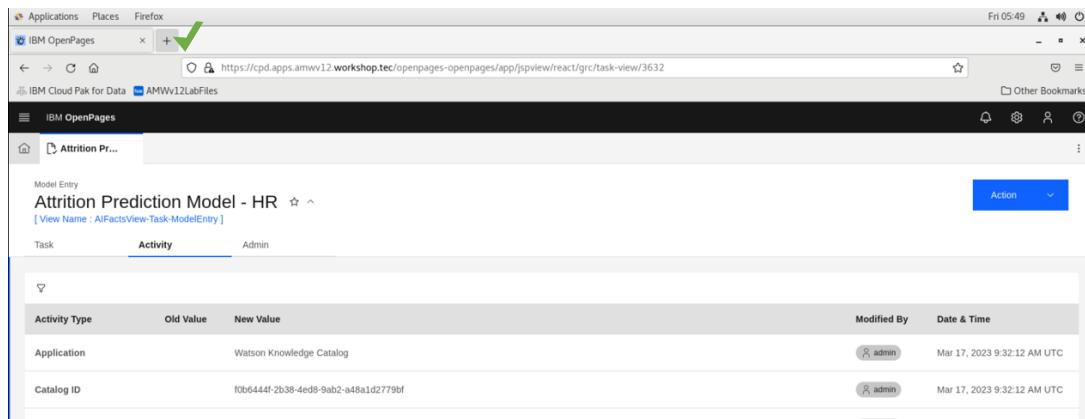
9. After 30 seconds, refresh the window. You will now see the Third-Party Link populated within the Model Entry. This link will be used by all other corresponding AI Governance technologies as we continue to build our Attrition Prediction Model.



10. Select the Activity tab, where we will see how the captured metadata of this model will automatically be saved in a model repository. Watson Knowledge Catalog has created a model entry within its Model Inventory and all model development work that occurs in Watson Studio will be associated with this model through a unique model ID.

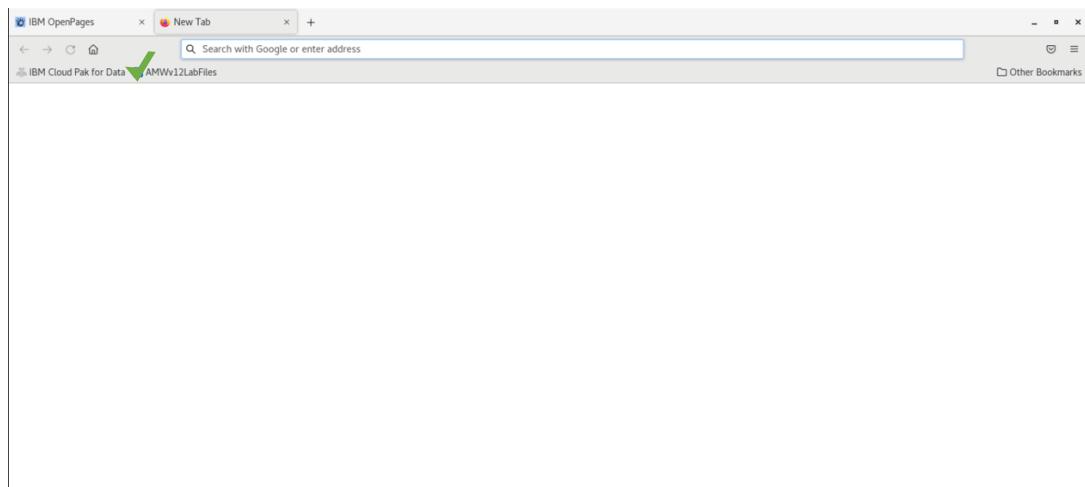
Model Entry																																							
Attrition Prediction Model - HR																																							
Task																																							
General																																							
Name *	Attrition Prediction Model - HR																																						
Purpose	To predict attrition within ABC Organization																																						
Risk Level	Low																																						
Description	Developed by Admin, HR Executive, DS Department, and Risk Officer																																						
Associated Models																																							
Associated Models																																							
Name	Description	Model Type	Model Status	Model Owner	Action																																		
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<table border="1"> <thead> <tr> <th>Activity Type</th><th>Old Value</th><th>New Value</th><th>Modified By</th><th>Date & Time</th></tr> </thead> <tbody> <tr> <td>Application</td><td>Watson Knowledge Catalog</td><td></td><td></td><td>Mar 17, 2023 9:32:12 AM UTC</td></tr> <tr> <td>Catalog ID</td><td>f0b644af-2b3b-4ed8-9ab2-a48a1d2779bf</td><td></td><td></td><td>Mar 17, 2023 9:32:12 AM UTC</td></tr> <tr> <td>External ID</td><td>72ade19-4d25-4709-b2ab-85f5b4301599</td><td></td><td></td><td>Mar 17, 2023 9:32:12 AM UTC</td></tr> <tr> <td>Last Update</td><td>3/17/23</td><td></td><td></td><td>Mar 17, 2023 9:32:12 AM UTC</td></tr> <tr> <td>Third Party Link</td><td>https://cpd-cpd-instance.apps.amewv12.workshop.tec/tecdatalib/catalogs/f0b644af-2b3b-4ed8-9ab2-a48a1d2779bfasset/72ade19-4d25-4709-b2ab-85f5b4301599</td><td></td><td></td><td>Mar 17, 2023 9:32:12 AM UTC</td></tr> <tr> <td>Workflow Stage (Status)</td><td>Proposed</td><td></td><td></td><td>Mar 17, 2023 9:32:00 AM UTC</td></tr> </tbody> </table>					Activity Type	Old Value	New Value	Modified By	Date & Time	Application	Watson Knowledge Catalog			Mar 17, 2023 9:32:12 AM UTC	Catalog ID	f0b644af-2b3b-4ed8-9ab2-a48a1d2779bf			Mar 17, 2023 9:32:12 AM UTC	External ID	72ade19-4d25-4709-b2ab-85f5b4301599			Mar 17, 2023 9:32:12 AM UTC	Last Update	3/17/23			Mar 17, 2023 9:32:12 AM UTC	Third Party Link	https://cpd-cpd-instance.apps.amewv12.workshop.tec/tecdatalib/catalogs/f0b644af-2b3b-4ed8-9ab2-a48a1d2779bfasset/72ade19-4d25-4709-b2ab-85f5b4301599			Mar 17, 2023 9:32:12 AM UTC	Workflow Stage (Status)	Proposed			Mar 17, 2023 9:32:00 AM UTC
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Third Party Link	https://cpd-cpd-instance.apps.amewv12.workshop.tec/tecdatalib/catalogs/f0b644af-2b3b-4ed8-9ab2-a48a1d2779bfasset/72ade19-4d25-4709-b2ab-85f5b4301599			Mar 17, 2023 9:32:12 AM UTC																																			
Workflow Stage (Status)	Proposed			Mar 17, 2023 9:32:00 AM UTC																																			
Items per page:	50	1–6 of 6 items		1	of 1 page																																		

11. Select the “+” sign from the browser window.



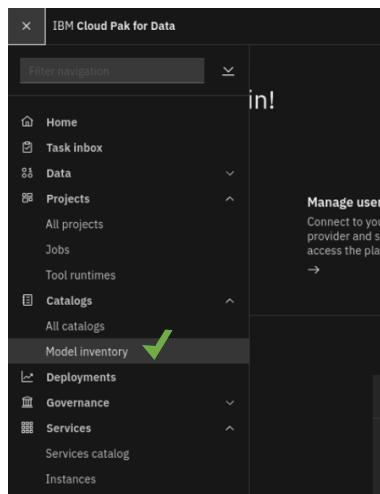
The screenshot shows a Firefox browser window with the title bar "Applications Places Firefox". The address bar displays the URL: "https://cpd.apps.amvw12.workshop.tec/openpages-openpages/app/jspview/react/grc/task-view/3632". The main content area is titled "Attrition Prediction Model - HR" and shows a table of activity entries. A green checkmark is overlaid on the "+" button located in the top right corner of the browser window.

12. When a new browser window opens, select the **IBM Cloud Pak for Data** bookmark.



The screenshot shows a browser window with several tabs open. One tab is titled "IBM OpenPages" and another is "New Tab". In the bookmarks bar, there is a bookmark for "IBM Cloud Pak for Data" with a green checkmark placed next to it. The main content area of the browser is currently blank.

13. When the **IBM Cloud Pak for Data** home screen appears, select the Hamburger Menu, and select Model inventory.



The screenshot shows the IBM Cloud Pak for Data home screen. On the left, there is a dark sidebar with a "Hamburger Menu" icon. The menu items include "Home", "Task inbox", "Data", "Projects", "Catalogs", "Model inventory", "Deployments", "Governance", "Services", and "Instances". A green checkmark is placed over the "Model inventory" item. The main content area on the right shows a "Manage user" section with a "Connect to your provider and sign in" button.

14. You will see an “Attrition Prediction Model – HR” tile created within the Model Inventory window. This screen will typically be accessible to the roles of model developer and validator. As users compile model details, associated assets, and business-relevant terminology to this model entry, this information will be viewable to the model owner in OpenPages.

The screenshot shows the IBM Cloud Pak for Data Platform assets catalog interface. At the top, there's a navigation bar with 'IBM Cloud Pak for Data' and a search bar. Below it, the path 'Catalogs / Platform assets catalog /' is shown. The main area displays a card for 'Attrition Prediction Model - HR'. The card has tabs for 'Overview' (which is selected), 'Asset', 'Access', and 'Review'. On the left, under 'Governance artifacts', there are sections for 'Business terms' and 'Classifications', both of which state 'No [type] added yet.'. Under 'Details', there are sections for 'Additional details', 'Model purpose' (set to 'To predict attrition within ABC Organization'), 'Supporting documentation' (which says 'No supporting documentation added yet.'), and 'Risk level' (set to 'Low'). On the right, there are sections for 'About this asset' (with 'Description' and 'Asset owner' fields), 'Privacy' (set to 'Public'), 'Asset details' (with size, columns, and rows dropdowns), 'Source' (with connection, type, and path dropdowns), and 'Tags' (which says 'No tags added yet.'). At the bottom right, there are creation and modification logs: 'Created by System, Mar 17 2023' and 'Modified by System, Mar 17 2023'.

Summary: This section illustrated how we have integrated a model inventory and [Factsheets](#) with [OpenPages](#) so that you can review machine learning models and related activity as part of enterprise risk and compliance monitoring. We have also demonstrated how persona collaboration and model lineage capture begin with [OpenPages](#). Now that we have established a business use case and created a compartment to contain AI assets, we will continue by creating an AI model and inputting that into this space.

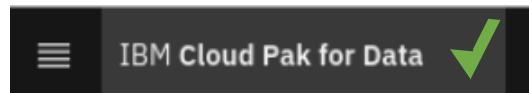
In the next section, we will understand how AutoAI builds AI models, and how [Factsheets](#) assists in promoting transparency.

1.5 Create an AI Governance Project

FOUNDATION

A project is a workspace where you can collaborate with others to create a data science project. From a project, you can add assets, prescriptive and predictive tools, and define a workspace to derive value through Data Science.

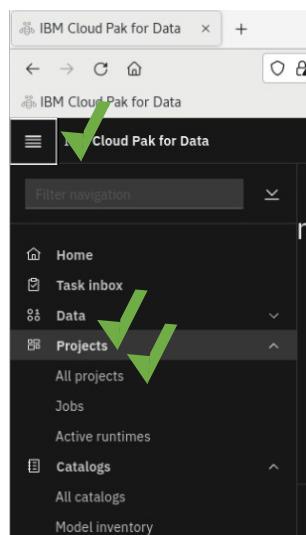
1. Select the [IBM Cloud Pak for Data](#) link at the top. This will place you on the home screen for Cloud Pak for Data.



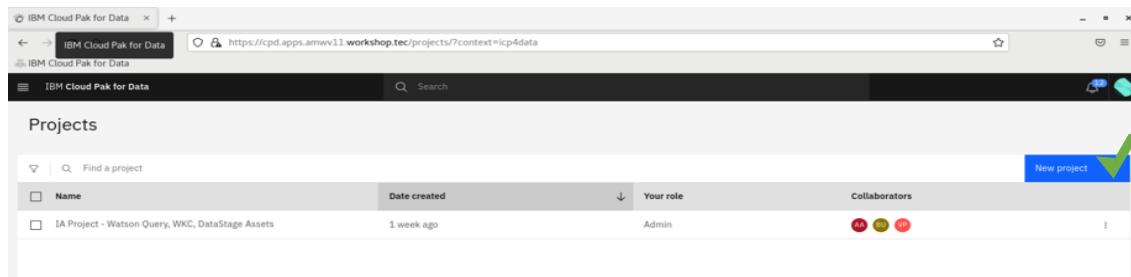
A screenshot of the IBM Cloud Pak for Data home screen. The top navigation bar includes a hamburger menu, search bar, and notification icons. The main area features a "Welcome, admin!" message and three informational cards: "Discover services", "Manage users", and "Stay Informed". Below this is an "Overview" section with links to "OpenPages", "All projects", "Instances", "Databases", "Data virtualization", and "Catalogs". On the right, there are sections for "Recent projects" (listing "IA Project - Watson Query, WKC, DataStage Assets" from Sep 13, 2022), "Requests" (0 data requests), and "Notifications" (two entries about publishing metadata enrichment results).

Projects are where the user develops assets – access Operational assets, Configuration assets, Environments, Jobs, Asset storage, Integrations, and on and on are all housed within a project during development.

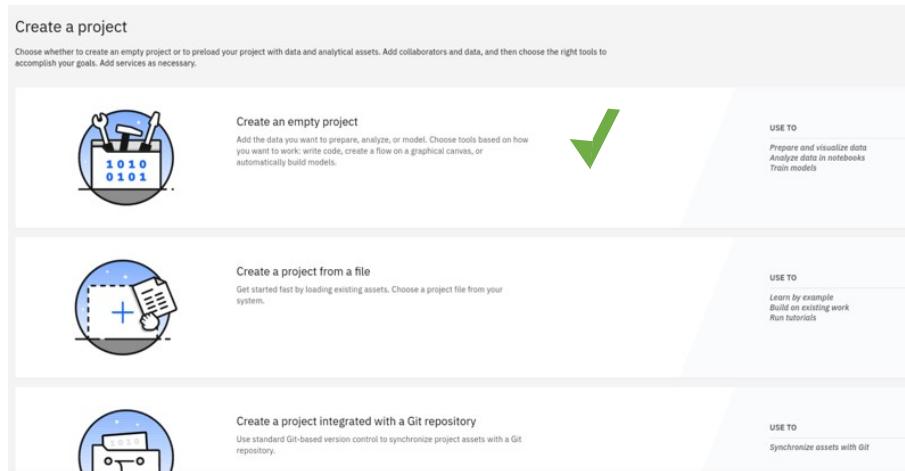
2. Select the [Hamburger Menu](#) (top left), then select “[Projects](#)”, and then “[All Projects](#)”.



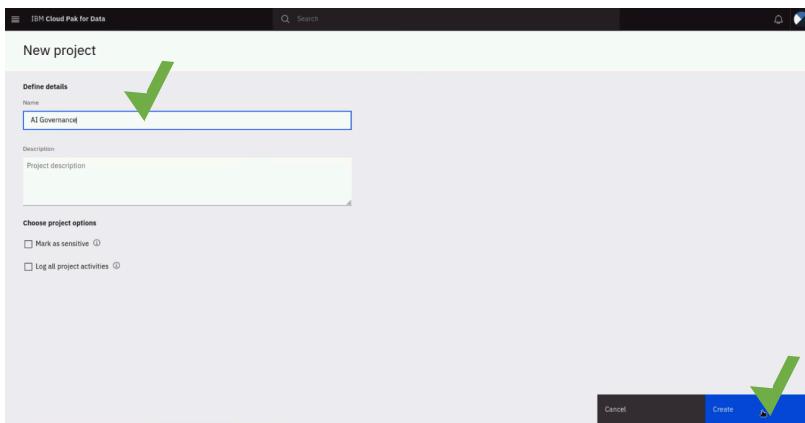
3. In the Projects window, select the “New Project” Button



4. Select “Create an empty project”.



5. Select the Name box and type “AI Governance”, then select the “Create” button (lower right).



Now that the project has been created, we will add a dataset to the AI Governance project for an AutoAI process.

Data fabric is an architectural approach that simplifies data access in an organization and facilitates self-service data consumption. [IBM Cloud Pak for Data](#) predicts outcomes faster using a platform built with the data fabric architecture. In this section, you will see how a modern data architecture ensures that data is accessible to relevant data users based on their unique workflows.

6. Select the “Assets” tab, then select “New Asset”.

The screenshot shows the 'Assets' tab selected in the navigation bar. The main area displays a summary of assets: 0 asset and All assets. A large green arrow points to the 'New asset' button, which is highlighted with a blue background and a white plus sign. To the right, there's a section titled 'Data in this project' with a placeholder for dropping or browsing files.

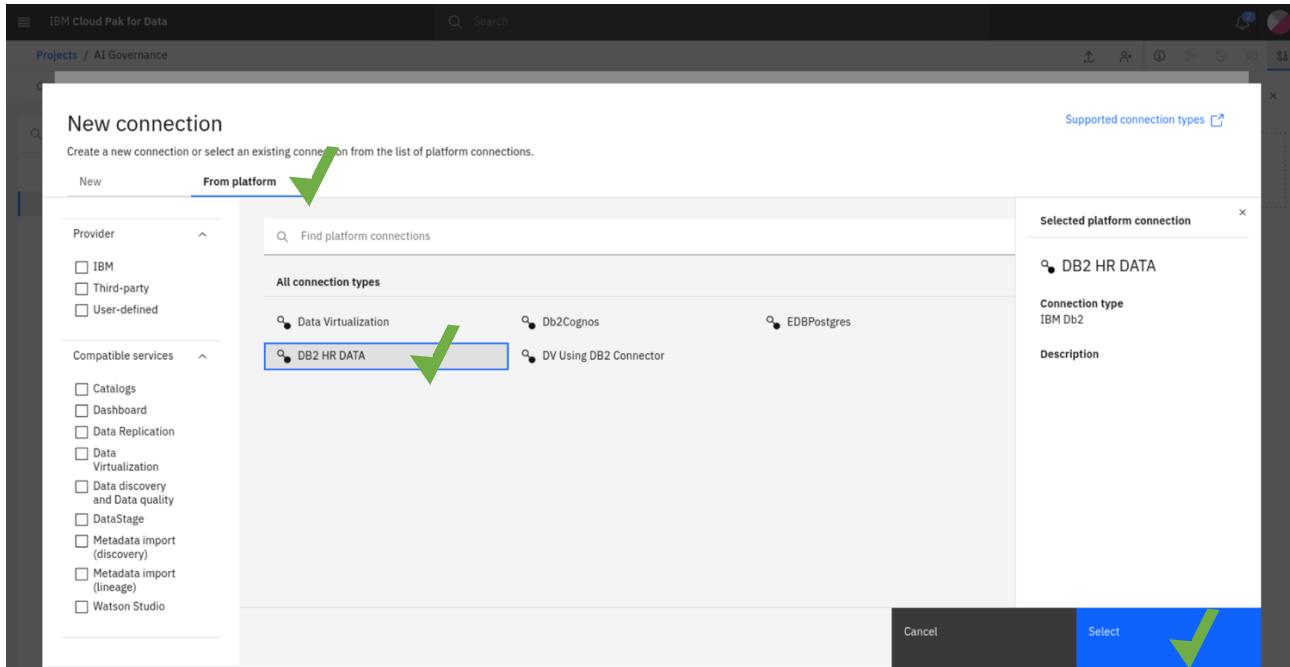
7. Scroll and click the “Connection” tile.

The screenshot shows the 'New asset' dialog box with 'All types' selected in the left sidebar. The main area contains three tiles: 'Connection', 'Metadata import', and 'Model'. A large green arrow points to the 'Connection' tile, which is described as supplying information to connect to a data source.

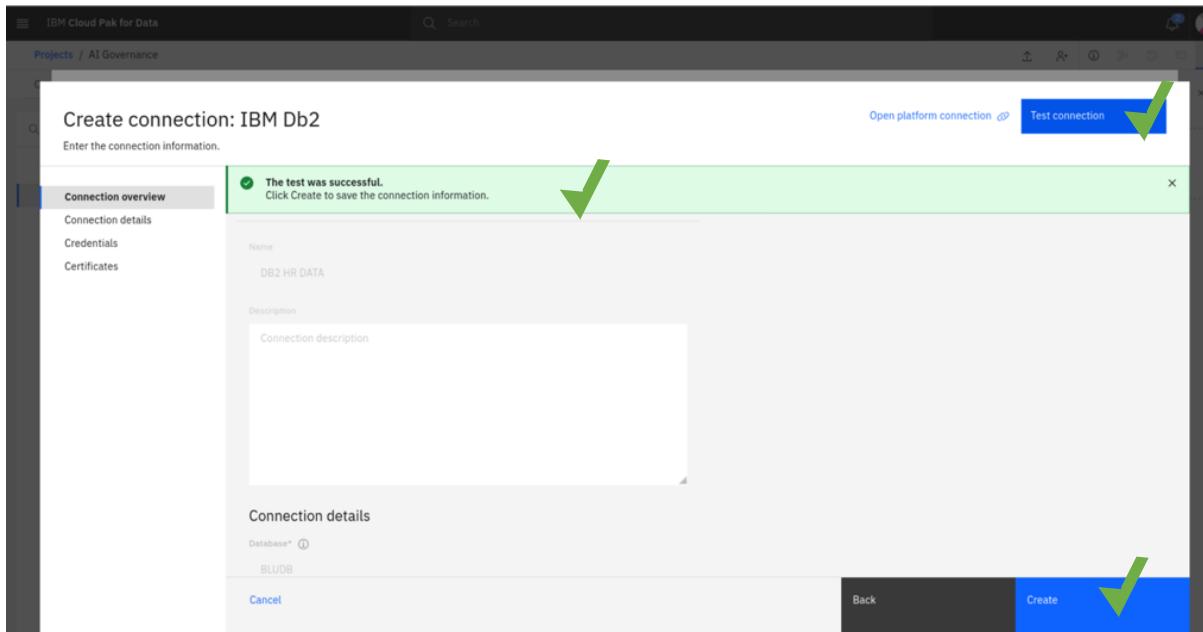
8. You can add connections to a broad array of data sources, which are listed below. If you need to create a connection to an unsupported data source, you can do so by using JDBC drivers. Some services can use connections that are defined at the platform level, while other services use connections that are specific to the service.

The screenshot shows the 'New connection' dialog box with the 'From platform' tab selected. On the left, there's a 'Provider' dropdown menu with options like IBM, Third-party, and User-defined. A large green arrow points to this dropdown. The main area lists various connection types, such as Amazon RDS for MySQL, Google Cloud Pub/Sub, IBM Db2 Warehouse, OData, and many others, each with a small circular icon and a descriptive name.

9. In general, platform-level connections simplify the process of creating and maintaining connections throughout your governance process. Once we create the connection, and then multiple services can refer to the connection. If you update a connection, the changes are automatically picked up by the analytics projects that use that connection. In this lab we will be using a dataset from IBM's Db2 Warehouse. Select “From Platform”, then select “DB2 HR DATA”, and click “Select”.



10. Click “Test Connection” to check if the connection to the warehouse is successful. Then click “Create.”



11. Within your “AI Governance” project you will see a connection “DB2 HR DATA” in the Assets tab.

The screenshot shows the 'Assets' tab in the IBM Cloud Pak for Data interface. On the left, there's a sidebar with '1 assets' and 'Asset types'. Under 'Data access', there's a table with one row for 'DB2 HR DATA' (Connection). The table columns are 'Name', 'Created by', and 'Last modified'. A green checkmark is placed over the 'DB2 HR DATA' entry.

12. To access data from this connection, select “Import assets”. Follow this path to retrieve the dataset for this section.

DB2 HR DATA > HR > MASTER_HR_DATA_AI_GOV

The screenshot shows the 'Import assets' dialog. It has three search results: 'DB2 HR DATA', 'HR', and 'MASTER_HR_DATA_AI_GOV'. A green checkmark is placed over 'MASTER_HR_DATA_AI_GOV' in the third column. At the bottom right, there are 'Cancel' and 'Import' buttons, with a green checkmark placed over the 'Import' button.

13. Now that MASTER_HR_DATA_AI_GOV is selected. Select the “Import” button.

The screenshot shows the 'Selected assets' dialog. It displays the details for the 'MASTER_HR_DATA_AI_GOV' asset, including its name, type (Table), path (/HR/MASTER_HR_DATA_AI_GOV), and column count (17). At the bottom right, there are 'Cancel' and 'Import' buttons, with a green checkmark placed over the 'Import' button.

14. Select the “Data” tab, you will now see the MASTER_HR_DATA_AI_GOV dataset ready to be used for your subsequent task.

The screenshot shows the IBM Cloud Pak for Data interface. The top navigation bar says "IBM Cloud Pak for Data". Below it, the "Projects / AI Governance" section has tabs for "Overview", "Assets" (which is selected), "Jobs", and "Manage". A search bar is at the top right. On the left, there's a sidebar with "2 assets" (All assets) and "Asset types" (Data access, Connections, Data). A green arrow points to the "Data" category under Asset types. The main area shows a table with one row for "MASTER_HR_DATA_AI_GOV" (application/x-ibm-rel-table). The table columns are Name, Last modified, and more options. At the top right of the main area are "Import assets" and "New asset" buttons.

Summary: You have successfully created a project and added a dataset to begin your attrition analysis. We will now use [AutoAI](#) to create a Machine Learning Model within our project and use the assets we just added to our project.

Optional: About the Data

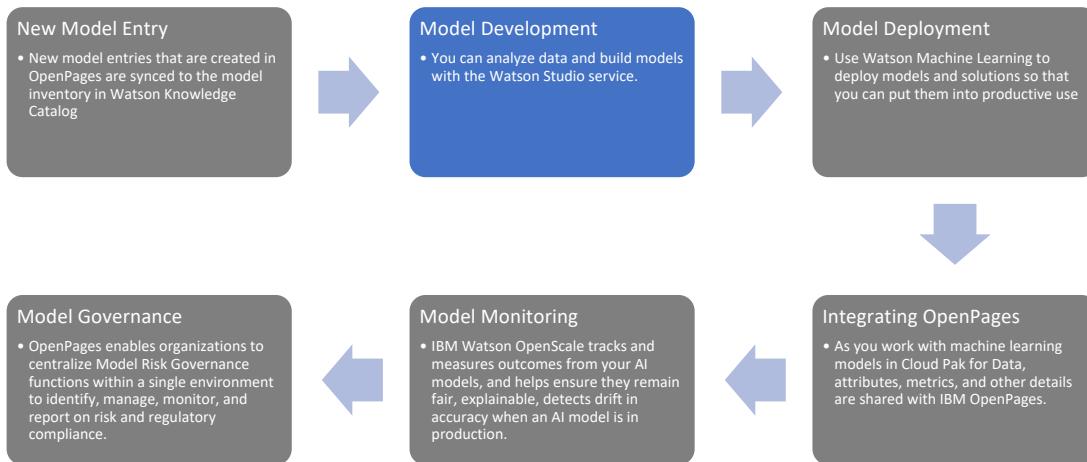
This screenshot is similar to the previous one, showing the IBM Cloud Pak for Data interface with the "Assets" tab selected. A green arrow points to the "Data" asset type in the sidebar. A modal window titled "Data in this project" is open on the right, containing a placeholder text "Drop data files here or browse for files to upload". The main table shows the same dataset row as before.

Data Refinery is a data-wrangling tool within [IBM Cloud Pak for Data](#). To access Data Refinery, click on the dataset while in a project. You can learn more about this tool here ~ <https://www.ibm.com/docs/en/cloud-paks/cp-data/4.6.x?topic=services-data-refinery>

This screenshot shows the Data Refinery interface for the dataset "MASTER_HR_DATA_AI_GOV". The top navigation bar includes "Projects / AI Governance / MASTER_HR_DATA_AI_GOV", "Preview asset" (selected), "Profile" (with a green arrow pointing to it), and "Visualization". The "Profile" tab displays a table with 17 columns and 10 rows of sample data. The columns include VIRTUAL_MASTER_HR_DATA_ST... (String), TITLE (String), VIRTUAL_MASTER_HR_DATA_DEPART... (String), FUNCTION (String), DIVISION (String), UNION_ST... (String), and EMPLOYMENT_CATEG... (String). The table also shows "Last refresh: 2 hours ago" and a "Prepare data" button. To the right, there are sections for "About this asset" (Name: MASTER_HR_DATA_AI_GOV, Description: "What's the purpose of this asset?", Tags: "connected-data"), "Asset details" (Version: 2, Attachment: MASTER_HR_DATA_AI_GOV), and "Last modified" (3 hours ago by admin, Created on: Mar 17, 2023 by admin).

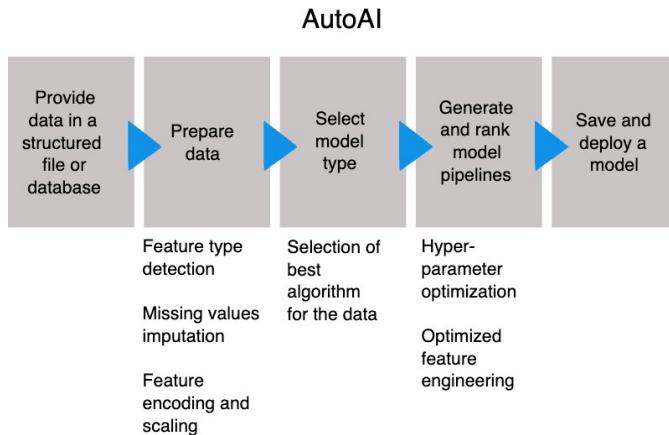
You can discover more about the data through a data profile job within Data Refinery. Select the Profile tab and run a profile job. It may take up to 3 minutes

1.6 Model Development



FOUNDATION

The AutoAI graphical tool in Watson Studio performs data analysis and discovers data transformations, algorithms, and parameter settings that work best for your predictive modeling problem. AutoAI displays the results as model candidate pipelines ranked on a leaderboard for your selection.



This section will showcase the AutoAI functionality in [Cloud Pak for Data](#) using the data assets we connected to predict employee attrition for the Human Resources department. [AutoAI](#) automates the entire machine learning model-building process. This solution allows organizations to accelerate their time to value in building and deploying effective AI models. For this activity, you will be using the provided dataset to predict the [VIRTUAL_MASTER_HR_DATA_STATUS](#) feature. This feature denotes if an employee is active or terminated from the organization.

[AutoAI](#) will develop a model pipeline, at which point, we will select the best-performing model for this use case. The goal is to have an AI model which will accept HR data, process employee-related changes (performance, demographic, survey), and predict attrition.

- Now that we have added our data asset to the AI Governance project, we will create an AutoAI experiment by selecting the “New asset” button. In the New asset window, Select the “AutoAI” tile.

The screenshot shows the IBM Cloud Pak for Data interface. At the top, there are tabs for 'Overview', 'Assets' (which is selected), 'Jobs', and 'Manage'. Below the tabs, there's a search bar labeled 'Find assets' and a button 'Import assets'. A prominent blue button labeled 'New asset' with a checkmark is visible. The main area shows a table with '2 assets' under the 'Data' category. One asset is named 'MASTER_HR_DATA_AI_GOV'. The 'Assets' section has a sidebar with 'Tool type' filters like 'Data access tools', 'Automated builders', 'Graphical builders', 'Code editors', and 'Component editors', with 'All types' selected. A large 'New asset' dialog box is open over the main content. It has a header 'New asset' and a sub-header 'Select a tool based on what type of asset you want and how you want to work.' It lists several tool categories: 'Connected data moved' (with a note 'To add connected data, close this dialog and click Import assets.'), 'Connection' (with a note 'Supply the information necessary to connect to a data source.'), 'Metadata import' (with a note 'Import asset metadata from a connection into a project or a catalog.'), and 'Model' (with a note 'Add an existing PMML (predictive model markup language) file (.xml) from your local system as a model.'). Below these, under 'Automated builders', there are three tiles: 'AutoAI' (selected and highlighted with a green checkmark), 'IBM Match 360 with Watson' (with a note 'IBM Match 360 with Watson (IBM Match 360) improves trust in AI pipelines by identifying duplicate records and providing reliable data about your customers, suppliers or partners.'), and 'Metadata enrichment' (with a note 'Enrich imported asset metadata with business context, data profiling, and quality assessment.'). A 'Show descriptions' toggle switch is at the bottom left of the dialog.

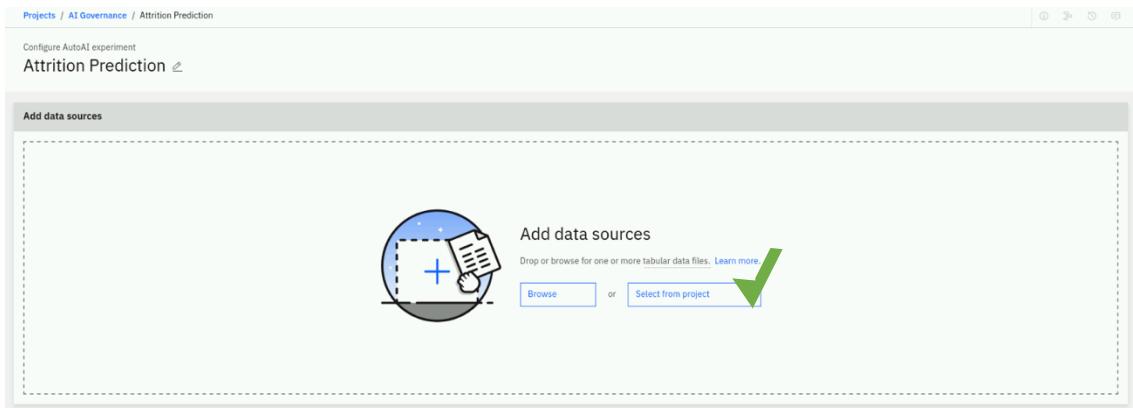
- When the “Create an AutoAI experiment” window appears, enter the information as shown in the image below.

Name = “Attrition Prediction”,
 Description = “To predict employee attrition within the enterprise”,
 Tags = “Attrition”. Select the “+” sign after typing in “Attrition” to assign the tag.
 Tags will allow you to quickly identify projects, assets, or inputs later.

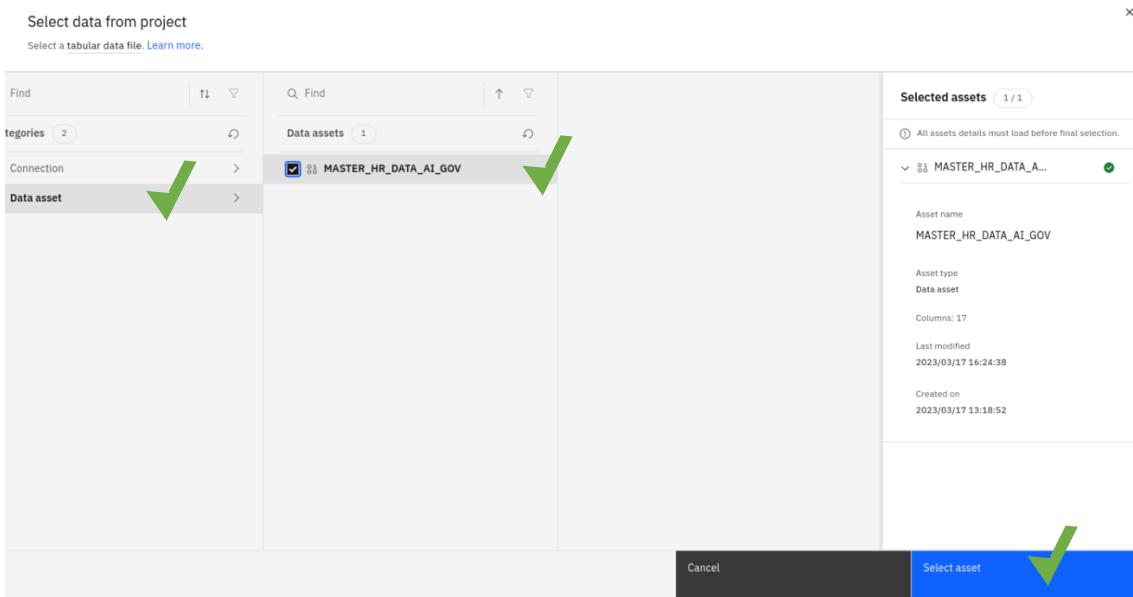
Then select “Create”.

The screenshot shows the 'Create an AutoAI experiment' dialog. On the left, there's a sidebar with a '+ New' button. The main area is divided into two sections: 'Define details' and 'Define configuration'. In 'Define details', the 'Name' field contains 'Attrition Prediction' (highlighted with a green checkmark). The 'Description (optional)' field contains 'To predict employee attrition within the enterprise' (highlighted with a green checkmark). The 'Tags (optional)' field has 'Attrition' typed into it, with a green checkmark next to it. In 'Define configuration', the 'Environment definition' dropdown is set to '4 vCPU and 16 GB RAM'. At the bottom right, there are 'Cancel' and 'Create' buttons, with the 'Create' button highlighted with a green checkmark.

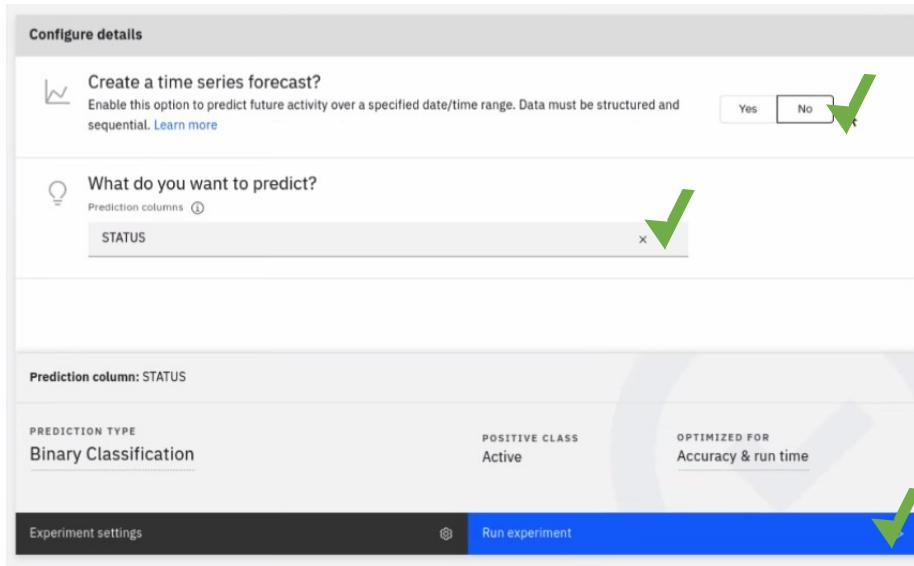
3. Select the “**Select from Project**” button to add the data source for this AutoAI experiment. We will use connected data from the section above.



4. Select the right of “**Data asset**” to open the path to the MASTER_HR_DATA_AI_GOV dataset. Select the **radio button** then select “**Select asset**”.



5. Select “No” in the “Create a time series forecast?” area. Then, select the drop-down arrow in the “What do you want to predict” section and select “VIRTUAL_MASTER_HR_DATA_STATUS”. Then, select the “Run experiment” button



6. When “VIRTUAL_MASTER_HR_DATA_STATUS” is selected as the prediction column, AutoAI will determine that a “Binary Classification” approach is appropriate for this analysis. To see this feature in action, you can try selecting different columns for prediction. Depending on the data type, AUTOAI automatically selects the appropriate prediction type.

In addition, AUTOAI selects the positive class which is “Active” in this case, and the optimized evaluation metric which is “Accuracy & run time”. We can see how AutoAI performs automated parametric tuning to progress the model development process.

Now that our prediction column is selected, we can further customize this model by selecting “Experiment Settings”.

*If you intend to explore AutoAI setting further, select “Experiment Settings”. If not, select “Run Experiment”.

***If you decide to explore “[Experiment Setting](#)”, here are the steps to follow:

Select “[Prediction](#)” on the left navigation menu.

Prediction

Prediction settings

General Fairness Time series

Prediction type

Change the prediction type based on data in the prediction column. Changing the type changes other prediction settings.

Binary classification (selected) Classify data into categories. Choose this if your prediction column contains two distinct categories.

Multiclass classification Classify data into categories. Choose this if your prediction column contains multiple distinct categories.

Regression Predict values from a continuous range of values. Choose this if your prediction column contains a large number of values.

Time series forecast Forecast future values in a series. Data must be timestamped and sequential.

Positive class Specify the value in your prediction column to measure performance in a confusion matrix.

Active

Optimized metric Choose the metric to optimize for the experiment.

Accuracy (Recommended)

Cancel Save settings

In “[Prediction](#)” settings, you can override the standard AutoAI settings made. For example, if you would like to experiment with Multiclass Classification based on your data science activity, you can change that setting here.

Additionally, you can specify the optimized metric for your activity. Select the metric which is pertinent to your data science activity.

There are many other options to fine-tune AutoAI experiments within these “[Prediction](#)” settings. This includes a feature in AutoAI where you can specify which specific algorithms to include in the experiment. As we can see, there are eleven different binary classification models that are supported within AutoAI.

During the experiment, [AutoAI](#) will process the selected algorithms, until it arrives at the best-fit algorithm for the data set provided.

For this activity, it was defaulted to “2”, indicating that the [AutoAI experiment](#) will choose the top two algorithms from your preselected list, create four different variations of each of those algorithms, and generate eight different models to choose from.

The screenshot shows a list of eight machine learning classifiers under the heading "Logistic Regression". Each classifier has a checked checkbox and a toggle switch. Below this list, a message states: "Algorithms to use 2 / 4" and "AutoAI will test the specified algorithms and use the top performers to create model pipelines. Choose how many top algorithms to apply. Each algorithm generates 4-5 pipelines and more algorithms increase the runtime." At the bottom, there is a horizontal navigation bar with four tabs labeled 1, 2, 3, and 4, where tab 2 is highlighted.

The next settings that can be changed are the Data source settings. We have the option to choose a subsample of rows and columns to be included for analysis. This could be particularly useful for large data sets where all the data is not necessary to gain accurate insights. Additionally, we can specify the holdout data split. Right now, it defaults to a 90:10 split, meaning 90% of the data will be used to train the model and 10% will be held back to test the model.

We can specify the columns to be included in our analysis. Columns which do not add value to the experiment can be excluded. We can see how different personas (business, executive, etc.) can provide input in the model development process and add value to [AutoAI](#).

The screenshot shows the "Data source" tab of the AutoAI configuration interface. Under the "General" tab, the "Number of vectors per column" is set to 20. In the "Final training data set" section, the "Training data and holdout data" option is selected. In the "Training and holdout method" section, the "Split one data source" option is selected. The "Training data split" slider is set to 95%, with a range from 5% to 95%. At the bottom, there are "Cancel" and "Save settings" buttons.

We can review runtime settings, where [AutoAI](#) provides insight into the various iterations that are processed as AutoAI engages in automated feature engineering and hyperparameter optimization.

Now that we are satisfied with the specific settings, we can save and re-run the experiment.

Click “[Save Setting](#)”, “[Run Experiment](#)”

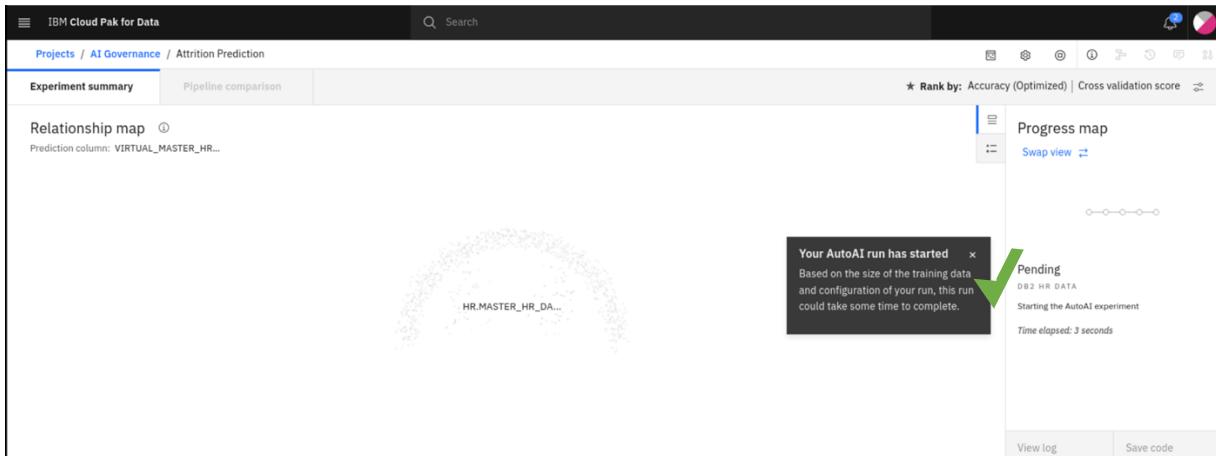
Experiment settings

The screenshot shows a user interface for 'Experiment settings'. On the left, there is a vertical navigation bar with three items: 'Prediction', 'Data source', and 'Runtime'. The 'Runtime' item is highlighted with a grey background. To the right of this bar is a main content area titled 'Runtime settings'. Inside this area, there is a section titled 'Experiment details' with the sub-instruction 'Review additional details about your experiment. These cannot be changed.' Below this, there are three horizontal lines, each containing a piece of configuration information: 'Initial model tuning iterations: 10', 'Feature engineering iterations: 30', and 'Final model tuning iterations: 25'.

If you decided to explore “[Experiment Settings](#)”, the steps end here

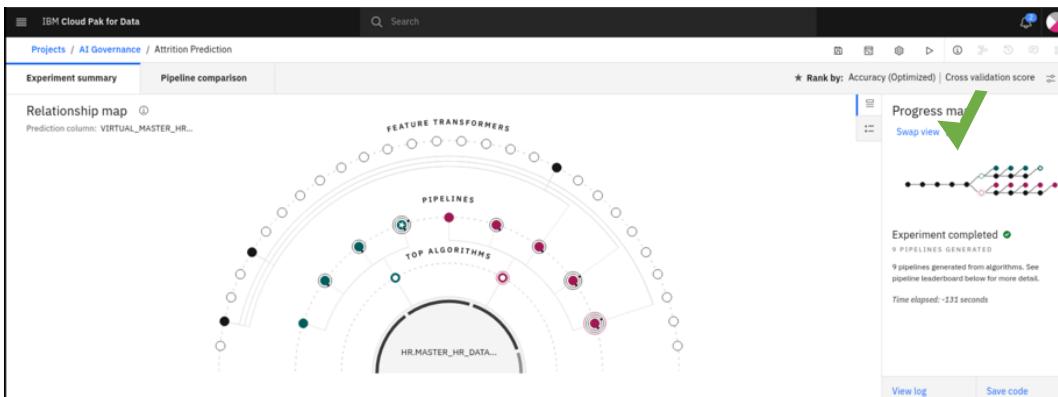
Continuation Step 6

7. AutoAI requires some time to process the experiment. During this time, AutoAI produces several pipelines including training/test data split, data preprocessing, feature engineering, model selection, and hyperparameter optimization. You can delve into any of the pipelines to better understand feature importance, the resulting metrics, the selected model, and any applied feature transformation. While waiting for AutoAI's run to complete, review IBM's Documentation on the [AutoAI's web page](#).



8. When the experiment completes, AutoAI displays the results as model candidate pipelines ranked on a leaderboard for your selection. Note that AutoAI has found multiple algorithms which we can use for our attrition prediction. We will focus on the top 2.

The “Relationship map” provides a visual representation of all the feature transformations that took place and how all pipelines were affected. By scrolling down, we can see the Pipeline leaderboard. In this experiment, Pipeline 4 is the top algorithm selected based on metrics. This pipeline stems from a “[Snap Decision Tree Classifier](#)” and scored 0.893. To get a better understanding of this pipeline, we can select the “Swap view” button on the “[Progress map](#)” on the right.

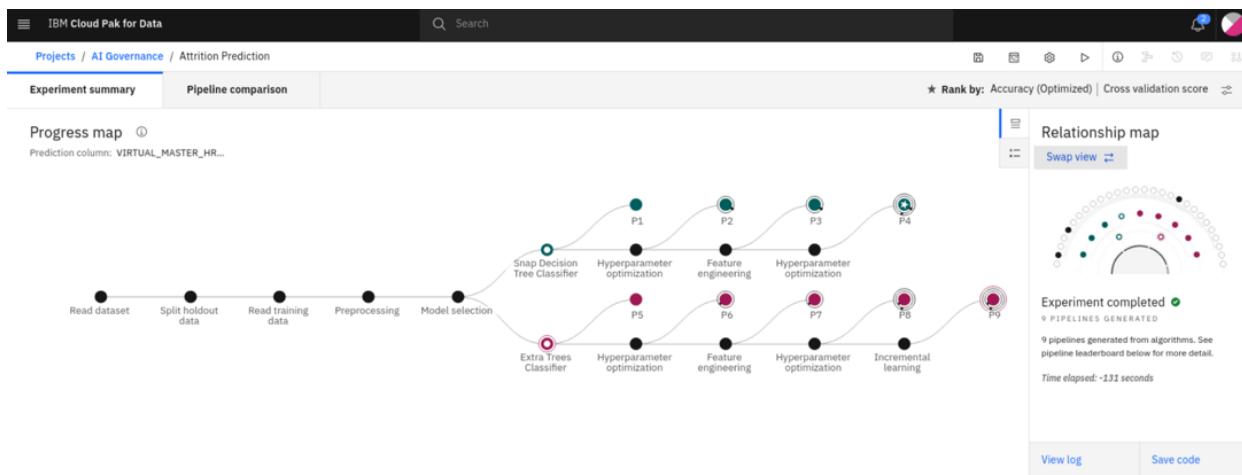


9. This is a visual representation of all the different steps that AutoAI took to arrive at the best-fit model for the data provided.

AutoAI Summary

- 1) Data inputted into an AutoAI experiment.
- 2) AutoAI splits the holdout data into testing and training data based on a 90-10 split.
- 3) AutoAI preprocesses data.
- 4) Model selection occurs.

AutoAI processes eleven algorithm options and produces a “Pipeline leaderboard”.



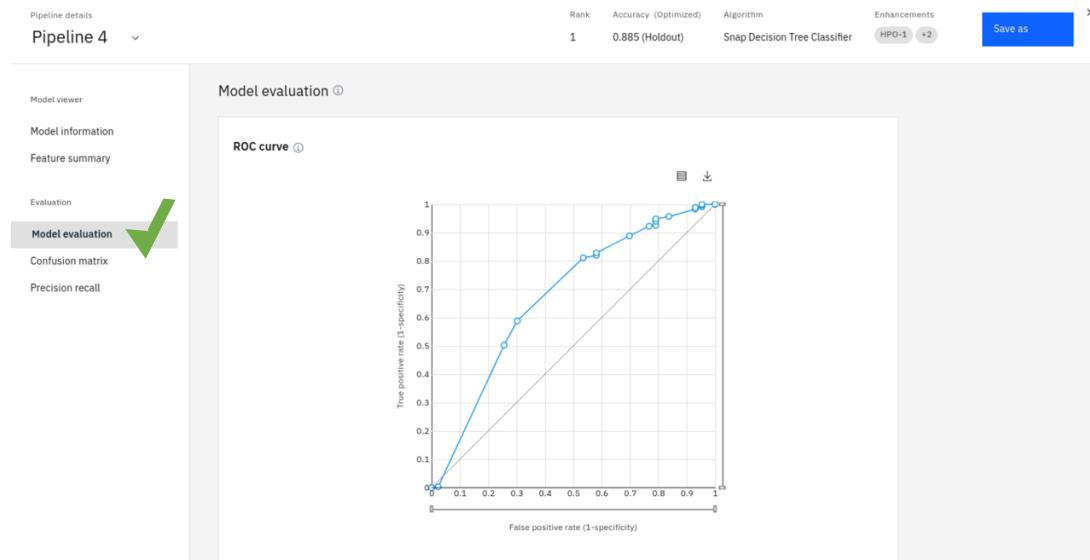
Leaderboard:

Pipeline leaderboard ▾

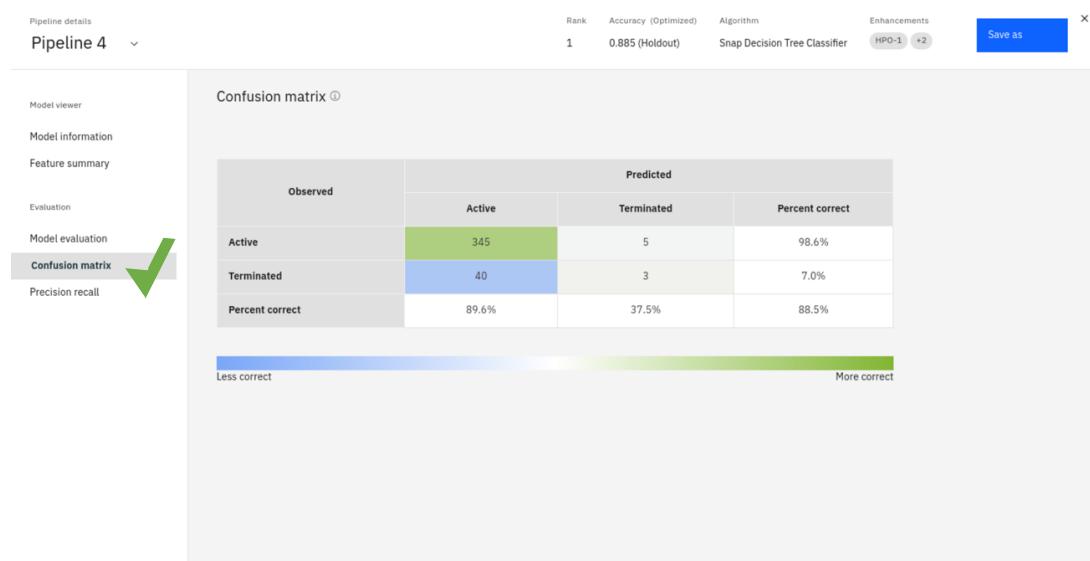
Rank	Name	Algorithm	Specialization	Accuracy (Optimized) Cross Validation	Enhancements	Build time
★ 1	Pipeline 4	● Snap Decision Tree Classifier		0.893	HPO-1 FE HPO-2	00:00:18
2	Pipeline 3	● Snap Decision Tree Classifier		0.893	HPO-1 FE	00:00:16
3	Pipeline 2	● Snap Decision Tree Classifier		0.893	HPO-1	00:00:02
4	Pipeline 9	● Batched Tree Ensemble Classifier (Extra Trees Classifier)	INCR	0.849	HPO-1 FE HPO-2	00:00:39
5	Pipeline 8	● Extra Trees Classifier		0.849	HPO-1 FE HPO-2	00:00:37
6	Pipeline 7	● Extra Trees Classifier		0.849	HPO-1 FE	00:00:20
7	Pipeline 1	● Snap Decision Tree Classifier		0.839	None	00:00:01
8	Pipeline 6	● Extra Trees Classifier		0.830	HPO-1	00:00:03
9	Pipeline 5	● Extra Trees Classifier		0.830	None	00:00:19

10. Select the top pipeline to review the leader model details. **AutoAI** reports multiple valuable evaluation criteria, such as several performance metrics (Accuracy, Area under ROC, Precision, Recall, and F1), a confusion matrix, Precision-Recall Curve, and feature importance. You can select these performance metrics on the left.

ROC Curve:



Confusion Matrix:



If this pipeline included feature engineering (or feature transformation) steps, the pipeline details will explain those transformations here.

Close the pipeline details window by clicking the X in the upper right of the window.

11. Select the first model in the “Pipeline leaderboard” list and Select “Save as”.

The screenshot shows the IBM Cloud Pak for Data interface. At the top, there's a navigation bar with 'IBM Cloud Pak for Data' and 'Projects / AI Governance / Attrition Prediction'. Below the navigation is a 'Relationship map' section with a circular diagram labeled 'FEATURE TRANSFORMERS', 'PIPELINES', 'TOP ALGORITHMS', and 'HR.MASTER_HR_DATA...'. To the right of the relationship map is a 'Progress map' showing pipeline status. Below these are sections for 'Experiment completed' and 'Experiment log'. The main focus is the 'Pipeline leaderboard' table, which lists one entry:

Rank	Name	Algorithm	Specialization	Accuracy (Optimized) Cross Validation	Enhancements	Build time
★ 1	Pipeline 4	Snap Decision Tree Classifier		0.893	HPO-1 FE HPO-2	00:00:18

A blue 'Save as' button is visible at the bottom right of the table. A large green checkmark is overlaid on the right side of the screenshot, indicating the successful completion of the save operation.

NOTE: Your Pipeline champion may differ from the above image

12. You can either save this model as a Cloud Pak Model asset or as a Jupyter notebook. The option to accelerate model development or to create a foundational model for further development represents where AutoAI can jumpstart AI initiatives.

Save as

The screenshot shows a 'Select asset type' dialog box. It has two main sections: 'Model' and 'Notebook'.

Model section:

- Model** is selected (indicated by a checked checkbox).
- Description: "Create a Watson Machine Learning model asset that you can test with new data, deploy to generate predictions, and trace lineage activity."

Notebook section:

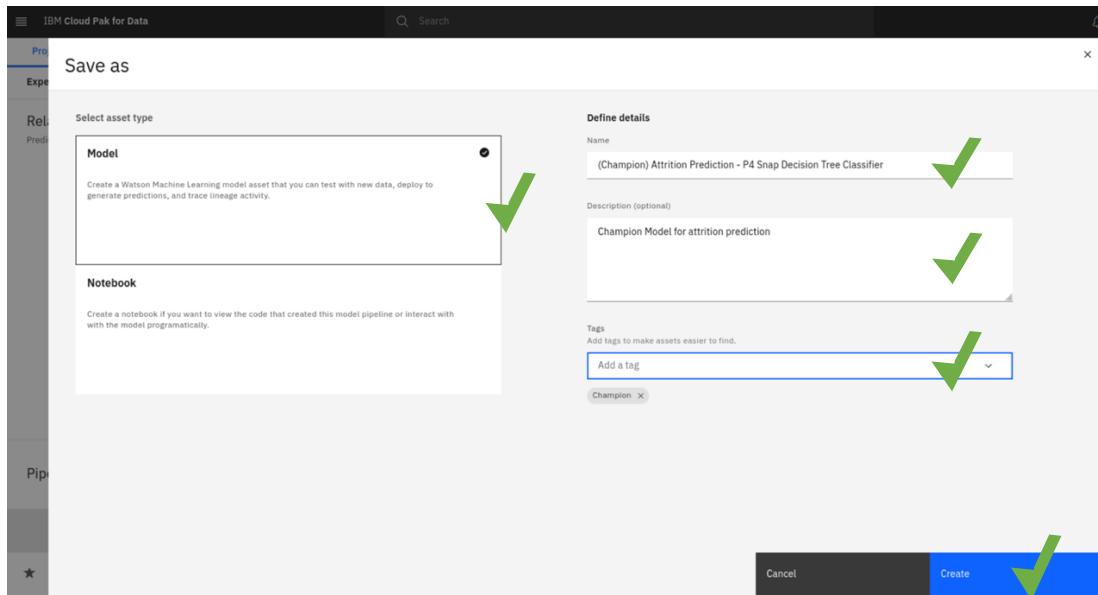
- Notebook** is unselected (indicated by an unchecked checkbox).
- Description: "Create a notebook if you want to view the code that created this model pipeline or interact with with the model programmatically."

13. AutoAI accelerates the time that it takes to create effective machine-learning models. Additionally, there are other model-building tools within Watson Studio that allow us to build models regardless of ability.

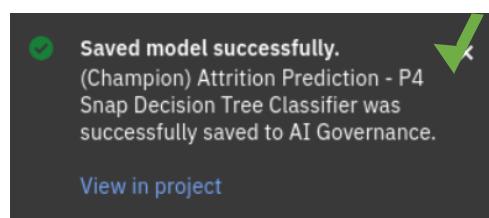
14. Select the “Name” field and insert “(Champion)” in front of “Attrition Prediction – P3 Snap Decision Tree Classifier”.

“Description” - “Champion Model for attrition prediction”.
“Tags” - “Champion”

Lastly, Select the “Create” button to save your model as a model asset in IBM Cloud Pak for Data.



Note: Select the “X” in the upper right corner of the “Saved model successfully” pop-up window



Summary: We have successfully created an AI model and will continue with deploying the model within IBM Cloud Pak for Data. The AutoAI graphical tool in Watson Studio analyzes data and uses data algorithms, transformations, and parameter settings to create the best predictive model. AutoAI displays various potential models as model candidate pipelines and ranks them on a leaderboard. Note that all processing steps are crucially documented as metadata and consumed by Factsheets.

IBM Cloud Pak for Data provides other options to create AI models through tools such as SPSS Modeler and Jupyter notebooks. These products are packaged within IBM Cloud Pak for Data and can be accessed through the Asset button.

1.7 FactSheets

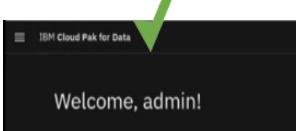
FOUNDATION



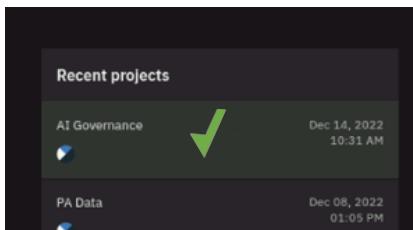
Proposals for higher quality and more consistent AI documentation have emerged to address ethical and legal concerns and the general social impacts of such systems. However, little is known about the needs of those who would produce or consume these new forms of documentation, as well as how to create this documentation. This is where IBM's **Factsheets** addresses gaps in current model development processes, and its purpose is to:

- Define the scope for policy creation which includes what information is collected on models, who can use the model and for what purpose, and the way it should operate.
- Automatically capture the model facts as detailed in the **Factsheets** template throughout the AI lifecycle.
- Offer extended knowledge on unapparent AI model development metrics in multiple formats depending on the preferences of the user and external audience.

1. Return to the “[IBM Cloud Pak for Data](#)” home screen ***if you are still within the model, go to step 3***



2. Select the “[AI Governance](#)” project folder to review our saved models.



- Select the “Assets” tab and then Select the “(Champion) Attrition Prediction – xxx” asset

The screenshot shows the 'Assets' tab selected in the top navigation bar. Below it, a table lists three assets. The first asset, '(Champion) Attrition Prediction - P2 XGB Classifier', is highlighted with a large green checkmark. The other two assets listed are 'Attrition Prediction' and 'AUTOAI_MASTER_HR_DATA_v1.csv'.

Name	Last modified
(Champion) Attrition Prediction - P2 XGB Classifier	Now admin (You)
Attrition Prediction	55 minutes ago admin (You)
AUTOAI_MASTER_HR_DATA_v1.csv	3 weeks ago admin (You)

- Review the AI **Factsheet** for your model. AI **Factsheets** capture model metadata across the model development lifecycle, facilitating subsequent enterprise validation or external regulation. **AI Factsheets** enable model validators and approvers to get an accurate, always up-to-date view of the model lifecycle details. In this example, we have retrieved the training scores of our model.

The screenshot shows the details of the '(Champion) Attrition Prediction - P2 XGB Classifier' factsheet. It includes sections for 'Training metrics' and 'Input schema'.

Training metrics

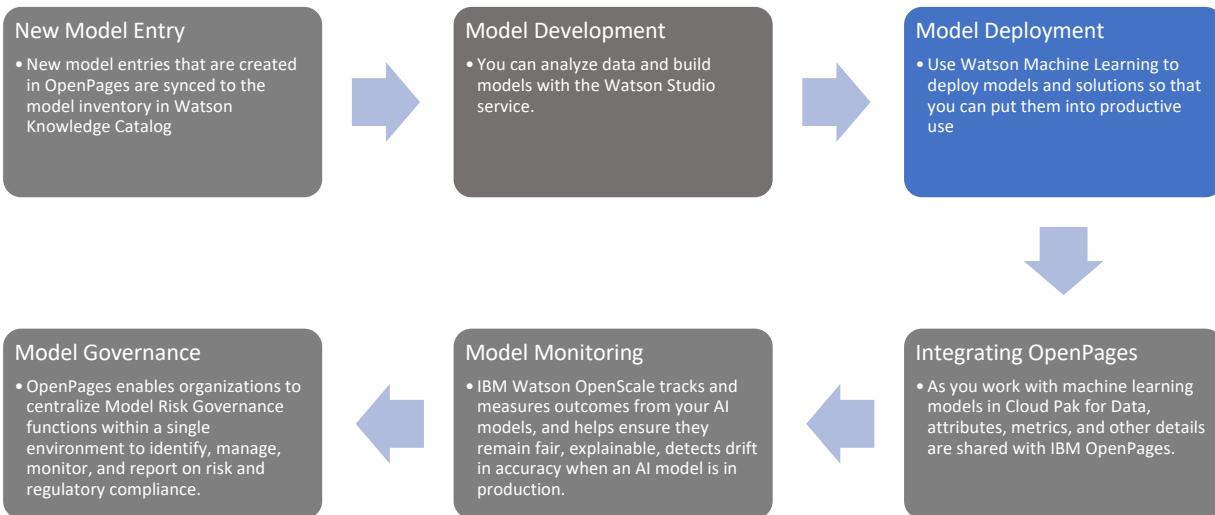
Metric	Training data	Holdout data
Accuracy	0.8965906	0.8810127
Average precision	0.9611343	0.8037983
Balanced accuracy	0.555334	0.53514796
F1	0.9447205	0.9360544
Log loss	-0.28834936	-0.29009596
Precision	0.90116274	0.8981723
Recall	0.99271923	0.97727275
Roc auc	0.78383374	0.7994186

Input schema

Feature	Data type	Description

Note: This integration with [Watson Machine Learning](#) and [OpenScale](#) results in the capture of deployment metadata and introduces critical monitors for bias detection and quality in the subsequent steps of IBM's AI Governance capabilities.

1.8 Deployments



FOUNDATION

IBM Cloud Pak for Data enables the deployment of models, scripts, functions, deployment management, and preparing your assets for model production. [Watson Machine Learning](#) is used to manage deployment spaces so that you can put models into production, then monitor these models for fairness and explainability.

Deployment spaces contain deployable assets such as deployments, deployment jobs, associated input and output data, and the associated environments. You can use this space to deploy models and manage your deployments. The deployments dashboard is an aggregate view of deployment activity available to you across spaces.

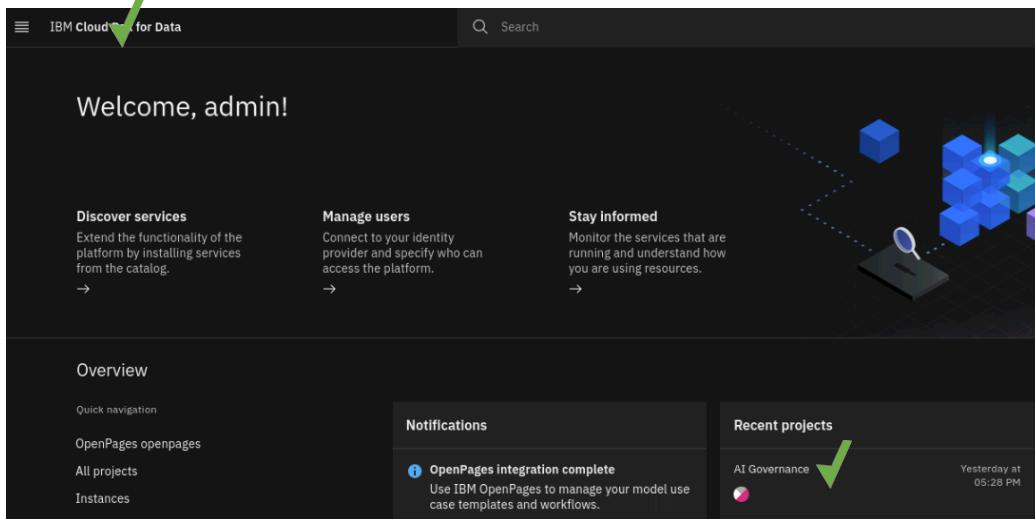
A deployment space is not associated with a project. You can deploy assets from multiple projects to a space, and you can deploy assets to more than one space. For example, you might have a test space for evaluating deployments, and a production space for deployments that you want to deploy in business applications.

In the previous section, you performed steps to prepare and train an [AutoAI](#) model to predict employee attrition. This section will take you through the steps to deploy that Champion model.

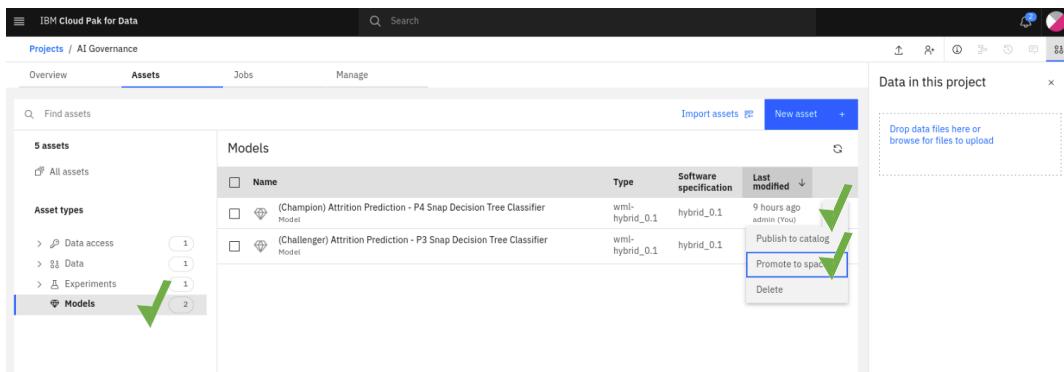
Deployment is the final stage of the lifecycle of a model or script, which is where you run your models and code. When you deploy your AI models, the models become available for applications to use for scoring and prediction all of which help drive actions.

1.8.1 Add the model into a Deployment space.

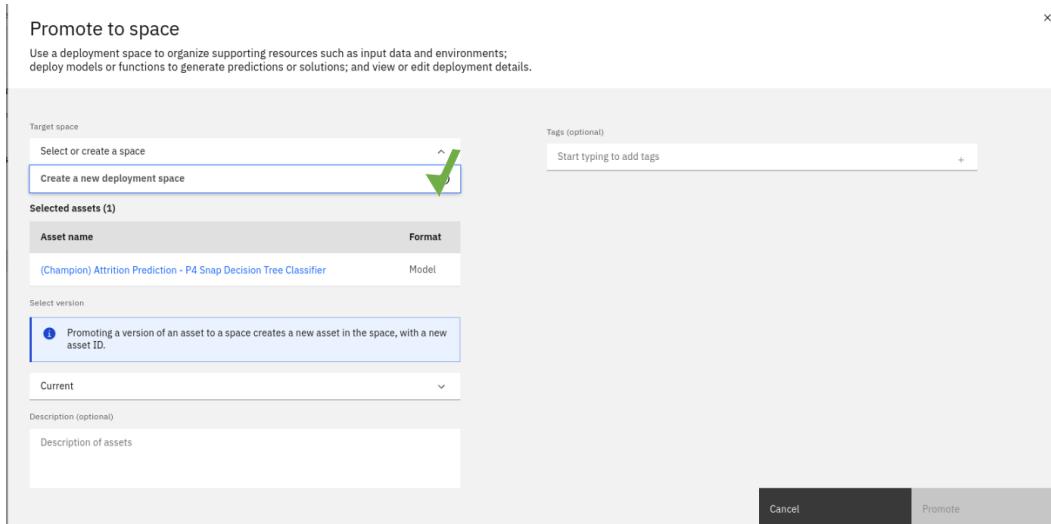
1. Begin at the Home Screen by Selecting “IBM Cloud Pak for Data” in the upper left of the window. Select the “AI Governance” Project by selecting it in the Recent projects area.



2. From the left pane of the project's Assets tab, select “Models”, then click the vertical ellipsis icon beside the Champion model and select “Promote to space”.



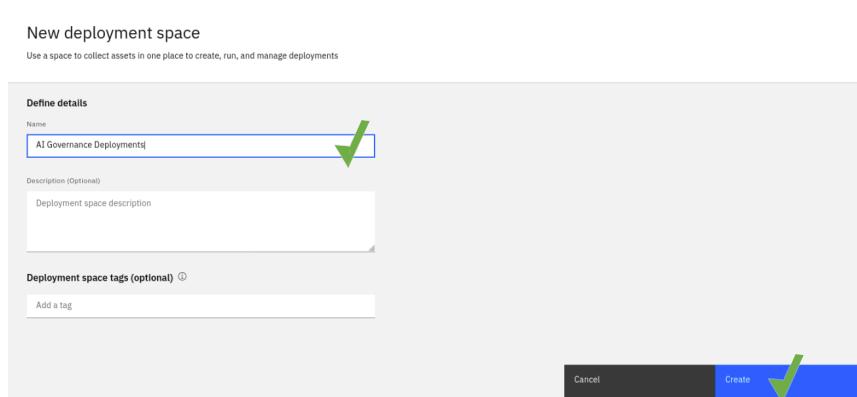
3. Create a new deployment space by selecting “Create a new deployment space” from the drop-down menu within the Target Space area.



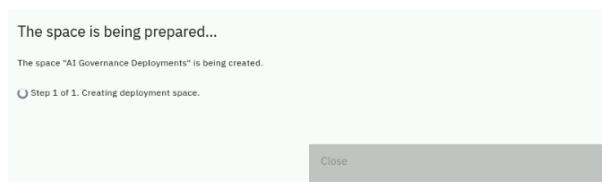
You can manage deployments in accordance with business requirements and can have multiple deployment spaces which may be segregated by the scope of deployment e.g., pre-production, production, or different line of business in your organization.

In this scenario, you want to create a deployment space for governed AI assets.

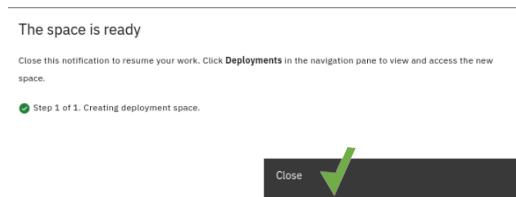
4. Name the space “AI Governance Deployments” and select the “Create” button.



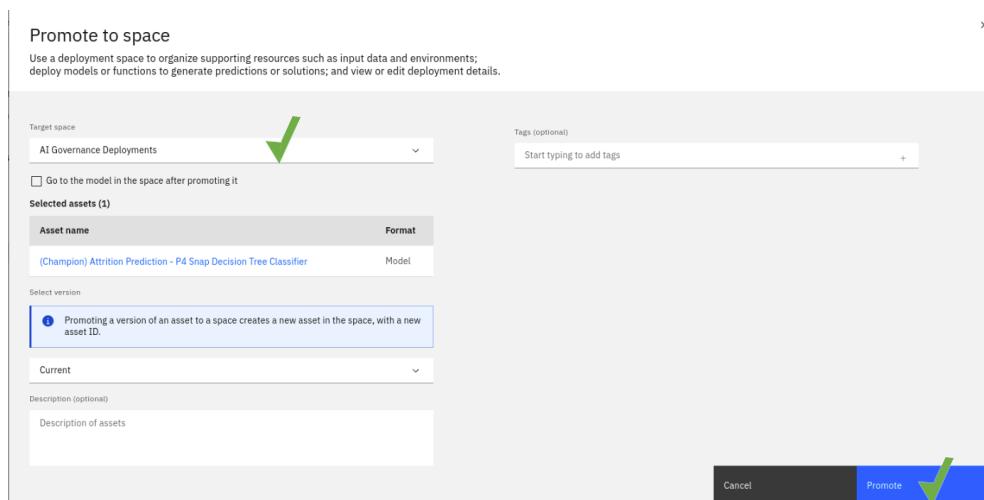
This notification window will appear.



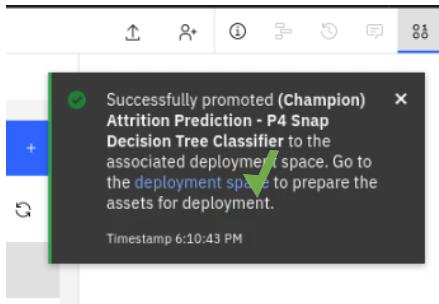
5. Close the “This space is ready” notification window. Select “Close”



6. Select the “Promote” button.

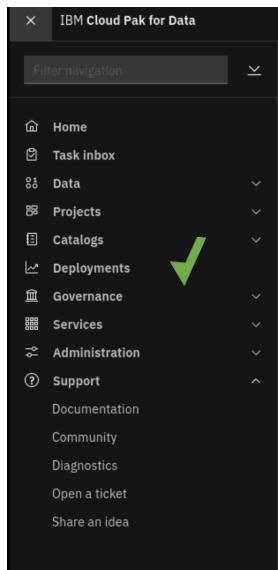


- Upon completion – select the “Deployment space” link from the notification window.

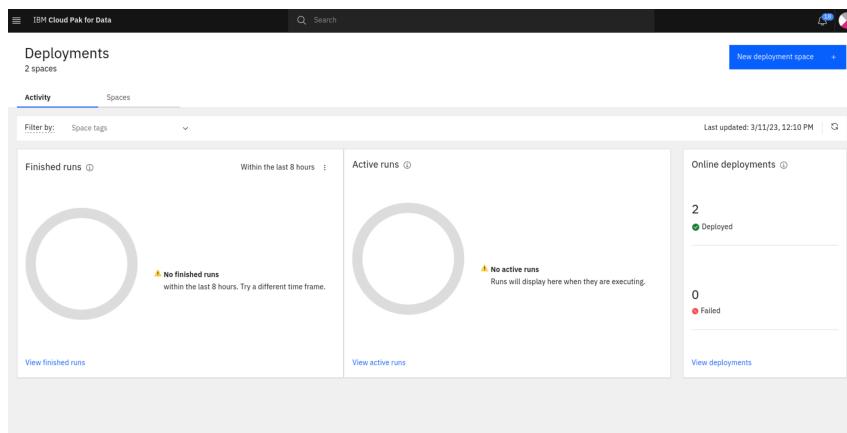


1.8.2 Manage Deployments

- Navigate to “Deployments” by clicking on the Hamburger menu  located at the upper left corner of the window.



- This will give you a view of the deployment dashboard. The deployments dashboard is an aggregate view of deployment activity available to you, across spaces. You can get a broad view of deployment activity such as the status of job runs or a list of online deployments. You can also use filters and views to focus on specific job runs or categories of runs such as failed runs. ModelOps or DevOps users can review and monitor the activity of an organization.



- Select the Spaces tab to view all the active deployment spaces then select AI Governance Deployments to view the deployment space you just created.

Deployments
2 spaces

Activity Spaces ✓

Filter by: All spaces Q Which deployment space are you looking for?

Name	Last modified	Your role	Collaborators	Tags	Online deployments	Jobs
AI Governance Deployments ✓	Mar 9, 2023, 6:06 PM	Admin	AA		1	0

New deployment space +

- Returning to the “AI Governance” deployment space, select the Asset tab. To deploy your model, select the vertical ellipsis button and then select “Deploy”.

Deployments /

AI Governance Deployments

Overview Assets ✓ Deployments Jobs Manage

Q Find assets

1 asset

All assets ✓

Asset types

Models ✓

Assets

Name ✓

(Champion) Attrition Prediction - P4 Snap Decision Tree Classifier

Last modified ✓

1 minute ago System

Import assets Import assets ✓

Deploy ✓

Delete

Deployment spaces are divided into two categories: online deployments, and batch deployments. For this activity, let's focus on online deployments and the capabilities that are contained within an online deployment. When an online deployment is created (also called Web service), the deployment is used to load a model or Python code and generate predictions online, in real-time.

Note: If a ‘Welcome to your deployment space’ box pops up, select ‘Maybe later’.

- Select “Online” in the “Create a deployment” window, then, select the Name field and Name it “Attrition Prediction” and then select the “Create” button.

Associated asset
(Champion) Attrition Prediction - P4 Snap Decision Tree Classifier

Deployment type

Online ✓

Run the model on data in real-time, as data is received by a web service.

Batch

Run the model against data as a batch process.

Name ✓

Attrition Prediction ✓

Serving name Deployment serving name

Description Deployment description

Create ✓

- While it is being deployed, you will be directed back to your AI Governance Deployments. select the “Deployments” tab to see the status. This will take 2-4 minutes to complete and the status to update.

The screenshot shows the 'AI Governance Deployments' interface. The 'Deployments' tab is selected. A deployment named 'Attrition Prediction' is listed. The status is 'Initializing' with a green checkmark icon. The asset is '(Champion) Attrition Prediction - P4 Snap Decision Tree Classifier'. The last modified time is '10 seconds ago' by 'admin (You)'.

- (Champion) Attrition Prediction – P4 Snap Decision Tree Classifier model has been successfully deployed. Select the “Attrition Prediction” Name

The screenshot shows the 'AI Governance Deployments' interface. The 'Deployments' tab is selected. The same deployment named 'Attrition Prediction' is listed, but its status is now 'Deployed' with a green checkmark icon. The asset is '(Champion) Attrition Prediction - P4 Snap Decision Tree Classifier'. The last modified time is '2 minutes ago' by 'admin (You)'.

- Select the “Test” tab.

The screenshot shows the deployment details for 'Attrition Prediction'. The 'Test' tab is selected. It displays the deployment status as 'Deployed' (green) and 'Online' (grey). Below the tabs are sections for 'API reference' (selected), 'Test' (with a green checkmark icon), and 'Deployment details'. Under 'Test', there is a 'Direct link' to the endpoint: <https://cpd.apps.amev12.workshop.tec/m1/v4/deployments/b43987b6-236c-4220-b1bc-1b790a18b854/predictions?version=2023-03-09>. The 'Code snippets' section includes a 'curl' example:

```
# TODO: manually define and pass values to be scored below
curl -X POST --header 'Content-Type: application/json' --header 'Accept: application/json' --header 'Authorization: Bearer $IAM_AUTH_TOKEN' -d '{"input": [{"fields": ["$ARRAY_OF_INPUT_FIELDS"], "values": ["$ARRAY_OF_VALUES_TO_BE_SCORED", "$ANOTHER_ARRAY_OF_VALUES_TO_BE_SCORED"]}], "url": "https://cpd.apps.amev12.workshop.tec/m1/v4/deployments/b43987b6-236c-4220-b1bc-1b790a18b854/predictions?version=2023-03-09"}'
```

Note: “Test” provides a place to test the AI model. In the form, you can enter data in one of these ways:

- 1) You could enter data directly in the form – OR...

The screenshot shows the 'Attrition Prediction' deployment page. At the top, there are tabs for 'API reference', 'Test' (which is selected), and 'Deployment details'. Below this is a section titled 'Enter input data' with two tabs: 'Text input' and 'JSON input' (both highlighted with green checkmarks). A note says 'Enter data manually or use a CSV file to populate the spreadsheet. Max file size is 50 MB.' Below this is a table with columns: TITLE (other), VIRTUAL_MASTER_HR_DATA_DEPARTMENT (other), FUNCTION (other), DIVISION (other), UNION_STATUS (other), EMPLOYMENT_CATEGORY (other), AGE (integer), and GENERATION (other). There is a 'Download CSV template' button with a green checkmark, a 'Browse local files' button, and a 'Search in space' button. A 'Predict' button is at the bottom right.

Select the JSON tab and enter your input data as JSON code. Regardless of method, the input data must match the schema of the model. Submit the input data via browsing the file or searching the deployment and get a score, or prediction, back. –OR...

- 2) You could enter data directly in the form – OR...

The screenshot shows the 'Attrition Prediction' deployment page. At the top, there are tabs for 'API reference', 'Test' (selected), and 'Deployment details'. Below this is a section titled 'Enter input data' with two tabs: 'Text input' and 'JSON input' (highlighted with a green checkmark). A note says 'Manually enter or upload a file containing input data in JSON format. Max file size is 50 MB.' Below this are 'Browse local files' and 'Search in space' buttons.

You can test the Attrition Prediction Model by inserting this JSON code chunk in the “Enter input data screen” and clicking on “Predict”. It will return a prediction and the probability of the prediction.

The screenshot shows the 'Attrition Prediction' deployment page. At the top, there are tabs for 'API reference', 'Test' (selected), and 'Deployment details'. Below this is a section titled 'Enter input data' with two tabs: 'Text input' and 'JSON input' (highlighted with a green checkmark). A note says 'Manually enter or upload a file containing input data in JSON format. Max file size is 50 MB.' Below this are 'Browse local files' and 'Search in space' buttons. A large JSON code block is pasted into the 'JSON input' box:

```
{
  "input_data": [
    {
      "fields": [
        "TITLE",
        "VIRTUAL_MASTER_HR_DATA_DEPARTMENT",
        "FUNCTION",
        "DIVISION",
        "UNION_STATUS",
        "EMPLOYMENT_CATEGORY",
        "AGE",
        "GENERATION",
        "GENDER",
        "ETHNIC_ORIGIN",
        "LAST_PERFORMANCE_RATING",
        "LAST_POTENTIAL_RATING",
        "EMPLOYEE_PAY_FREQUENCY",
        "EXEMPTIF"
      ]
    }
  ]
}
```

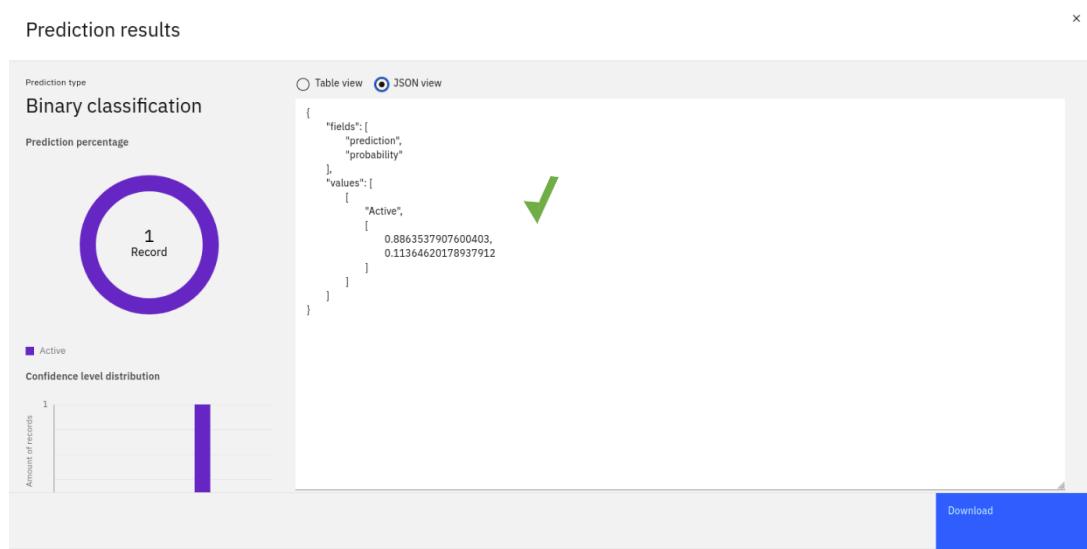
A 'Predict' button is at the bottom right.

Open a new browser tab within your Firefox browser. Go to <https://raw.githubusercontent.com/cwong79/CPD4.5.0Lab/main/model-payload.json>. Copy the JSON code from here and paste it into the “Enter input data” box (shown above).

- Once you have copy/pasted the code, select the “Predict” button



Results



The results will appear in the pop-up window. In this instance, the Attrition Model has predicted that this employee will leave the organization with 89% accuracy. Note that your results may differ from other participants in the workshop based on environmental variances.

Summary: In this deployment space, you can record a model’s production lifecycle and manage its interactions with its creator and contributors. Deployment spaces contain deployable assets, deployments, deployment jobs, associated input and output data, and the associated environments. You can use spaces to deploy models and manage your deployments.

As a best practice, all deployed models within an Enterprise should be effectively managed in a single location. This way all risk and governance guidelines can be applied to all AI usage within that Enterprise. CPD automatically packages models within a production space as an available API, eliminating the typical manual process of deploying a containerized model.

The advantages of deploying a model in CPD are primarily twofold.

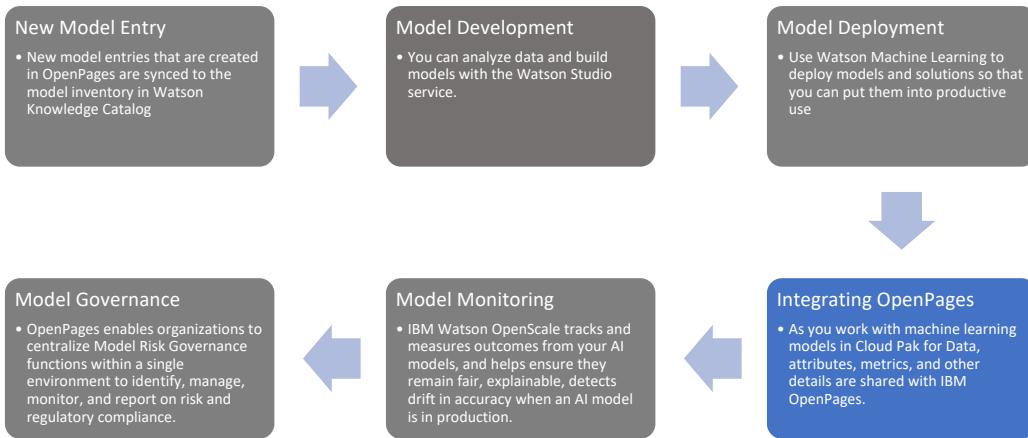
- Multiple data access points can be established in CPD through its data fabric capabilities. Therefore, removing manual processes around recording model training and testing metrics.
- In later steps, you will see how model performance decay impacts model deployment and allows the model owner to create guardrails to rectify the decay through mediation automation.

Thus far, you have:

- Created a collaborative working space.
- Created a model using an automated model creation tool.
- Created a deployment space to manage the model’s production.

We will now continue our journey by showing CPD’s AI Governance capabilities through [OpenScale](#).

2.0 Linking Deployment to a Model Use Case



FOUNDATION

By integrating a Model Use Case in [OpenPages](#) with an accompanying deployment space in Watson Knowledge Catalog, we can gather and share facts about model lineage through this machine learning pipeline. This mechanism provides a consistent approach to model provenance recording and complete metadata capture, improves process reliability, and maximizes operational efficiency in AI production.

- From the AI Governance Deployments window, select the Deployments tab. Select the “[\(Champion\) Attrition Prediction – P4 Snap Decision Tree Classifier](#)” previously deployed model.

The screenshot shows the AI Governance Deployments interface. The top navigation bar includes "IBM Cloud Pak for Data", a search bar, and a "Deployments /" link. Below the navigation is a header "AI Governance Deployments". The main content area has tabs: "Overview", "Assets", "Deployments" (which is underlined in blue), "Jobs", and "Manage". Under the "Deployments" tab, there is a search bar and a table. The table columns are "Name", "Type", "Status", "Asset", and "Last modified". A row for "Attrition Prediction" is shown with "Online" Type, "Deployed" Status, "(Champion) Attrition Prediction - P4 Snap Decision Tree Classifier" Asset, and "35 minutes ago" Last modified. A green checkmark is placed next to the "Attrition Prediction" entry.

- Select “[Model details](#)” within the “[\(Champion\) Attrition Prediction – P4 Snap Decision Tree Classifier](#)” model window.

The screenshot shows the "Model details" page for the "(Champion) Attrition Prediction - P4 Snap Decision Tree Classifier". The top navigation bar includes "IBM Cloud Pak for Data", a search bar, and a "Deployments / AI Governance Deployments /" link. The title is "(Champion) Attrition Prediction - P4 Snap Decision Tree Classifier". Below the title, there are tabs: "Deployments" (underlined in blue) and "Model details". A green checkmark is placed next to the "Model details" tab. The main content area shows a table titled "DEPLOYMENT TYPES" with rows for "Online" (1) and "Batch" (0). To the right of the table, it says "1 Online Deployment(s)". Below this, another table lists "Name", "Status", and "Last modified". A single row is shown: "Attrition Prediction", "Deployed", and "Mar 19, 2023, 8:54 PM". A blue button "New deployment" is located at the top right of the deployment table section.

- Select the “Track this model” button from the Model details screen.

(Champion) Attrition Prediction - P4 Snap Decision Tree Classifier

Deployments Model details

Track this model

The model will be added to your model inventory for activity tracking and model comparison.

Model tracking available

Track this model

Model inventory

Export report

Model use case Track this model

Model use case status Track this model

Model information

Model description Description not added

Tags

Model ID 74a1c696-dd5a-4904-9c9f-db04cacf5519

Last modified Mar 19, 2023, 09:34 PM

- Select the “Attrition Prediction Model – HR” which was created as a “New Model entry” in OpenPages at the beginning of this workshop.

Track this model

Associate the model with a model use case. To appear in this list, a model use case must be stored in a catalog you can access.

Select the related model use case

Model use case	Description	Parent entity	Catalog	Status
Credit Risk Sagemaker Model	AI Model developed in Sagemaker and governed by Cloud Pak	Finance	Platform assets catalog	Approved
Attrition Prediction Model - HR	Developed by Admin, HR Executive, DS Department, and Risk Officer	Human Resources	Platform assets catalog	Proposed
Credit Risk Sagemaker	Credit Risk Dept	Finance	Platform assets catalog	Approved
Stressed period selection	Calibration of stressed period selection for VaR calculation	Investment Banking	Platform assets catalog	Rejected
Black model for IR derivatives	Black Linear-Nonlinear model on IR process	Investment Banking	Platform assets catalog	Approved
Commodity Options VaR	Stochastic VaR at 99.97%, Pricing model Mapping: Asian Commodities: Cost; ...	Investment Banking	Platform assets catalog	Approved
Banking book HTM corporate bond -...	ALM based income forecast for the HTM portfolio, initially for the CCAR 2013 ...	Corporate Banking	Platform assets catalog	Awaiting...
Simulation of event risk	Simulation of low-probability events and their impact into VaR model	Investment Banking	Platform assets catalog	Proposed
Taylor series expansion for equity st...	Delta/gamma approach for structured equities	Investment Banking	Platform assets catalog	Proposed

Cancel **Back** **Next**

- In the “Track this model” window, select “Create a new model record” and select “Track”.

Track this model

Associate the model with a model use case. To appear in this list, a model use case must be stored in a catalog you can access.

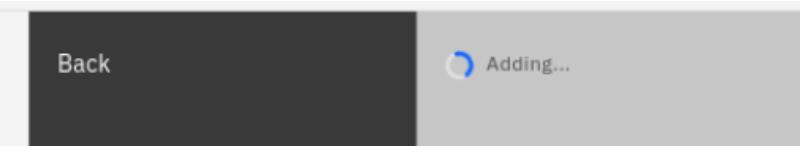
Associate the trained model with an existing model use case or create a new one.

Create a new model record

Select an existing model record

Cancel **Back** **Track**

- In a few moments, “(Champion) Attrition Prediction – P4 Snap Decision Tree Classifier”, will be added as a new model record within the OpenPages model entry.



- You will return to the “(Champion) Attrition Prediction – P4 Snap Decision Tree Classifier” window. Note that this model is now being tracked.

(Champion) Attrition Prediction - P4 Snap Decision Tree Classifier

Model details

Track this model
The model will be added to your model inventory for activity tracking and model comparison.

Model tracking is active **Deactivate** **Open in model inventory**

Model inventory **Export report**

Model use case	Attrition Prediction Model - HR
Model use case status	Proposed
Model information	
Model description	Description not added
IBM OpenPages model	(Champion) Attrition Prediction - P4 Snap Decision Tree Classifier
IBM OpenPages model status	Proposed
Tags	
Model ID	74a1c696-dd5a-4904-9c9f-db04cacf5519

- All model metadata will automatically flow to the OpenPages through this synchronization that you have created. You can return to different states of this model by opening new browser windows and reviewing the deployment and OpenPages model entry.

- You will see that the model is being tracked across different lifecycle points.

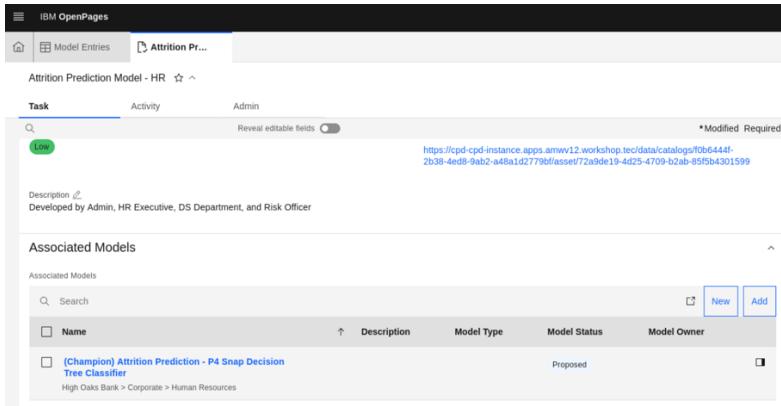
Attrition Prediction Model - HR **Remove** **Add to project**

Asset

Model tracking
Follow your model through each stage of the model lifecycle. Each row represents a unique champion or challenger model associated with the model use case.

Model use case status	IBM OpenPages model use case	Export report	Show deleted assets
Proposed	Attrition Prediction Model - HR		No
Develop Undeployed models in a project or external machine learning provider.	→ Deploy Models deployed or ready to be deployed for testing.	→ Validate Models deployed or ready to be deployed for validation.	→ Operate Models deployed or ready to be deployed for operation.
No models developed. Add a model from a project.	→ AI Governance Deployments ↳ (Champion) Attrition Prediction - P4 Snap Decision Tree Classifier ↳ Attrition Prediction (Pending Evaluation)	→ No models promoted to a pre-production space.	→ No models promoted to a production space.

- b) You will see that the model is actively governed by OpenPages.



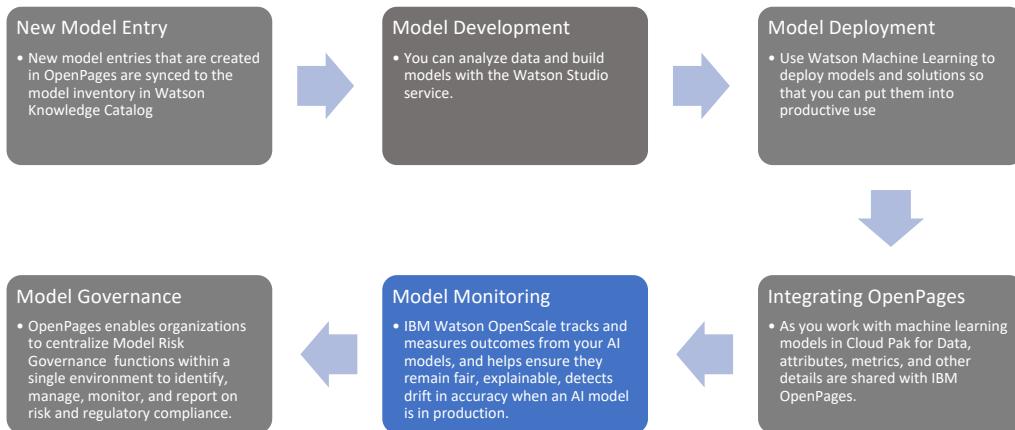
The screenshot shows the IBM OpenPages interface with the title "Attrition Prediction Model - HR". The top navigation bar includes "IBM OpenPages", "Model Entries", and "Attrition Pr...". Below the title, there are tabs for "Task", "Activity", and "Admin", with "Task" selected. A search bar and a "Reveal editable fields" button are present. A URL is displayed: <https://lcpd-cpd-instance.apps.amwv12.workshop.tecdata/catalogs/0b6444f1-2b38-4ed8-9ab2-a48a1d2779bfasset/72a9de19-4d25-4709-b2ab-85fb4301599>. The main content area shows a "Description" section with a link to the Watson Knowledge Catalog entry. Below it, a note states "Developed by Admin, HR Executive, DS Department, and Risk Officer". A "Associated Models" section is shown, containing a table with one row:

Name	Description	Model Type	Model Status	Model Owner
(Champion) Attrition Prediction - P4 Snap Decision Tree Classifier	High Oaks Bank > Corporate > Human Resources		Proposed	

Buttons for "New" and "Add" are visible at the bottom of the table.

Summary: We have integrated AI Governance components (Watson Knowledge Catalog and Watson Studio) into your Attrition Prediction through the platform catalog. You have also enabled **Factsheets** to record metadata every all stages of a model lifecycle. This process will allow all model activity to be available to an AI Governor in **OpenPages**. We will continue this journey by setting **OpenScale** monitors for the next activity.

2.1 Openscale



FOUNDATION

Successful deployment of an ML model not only enables downstream applications/use cases but also empowers several personas (e.g. Data Science Managers) to monitor the performance of the deployed model(s).

Model monitoring is one of the essential steps to developing a successful and sustainable model operations lifecycle. Therefore, after models are deployed, it is important to monitor them to make sure that they are performing well. Data scientists and managers must watch for model performance and data consistency issues.

A key component of the [IBM Cloud Pak for Data](#) AI Governance solution is its ability to monitor M/L models for accuracy, fairness, explainability, and drift. Through OpenScale's operations console, users can track and measure AI outcomes allowing alignment with business outcomes and organizational KPI's, enabling users to adjust and respond to business changes.

The platform provides out-of-the-box metrics as well as the option of customized metrics for tracking model performance. Model outcomes are tracked and measured across its lifecycle, allowing adaptation to changing business needs. CPD detects and mitigates risk and harmful bias, providing businesses with actionable insights for business development and change planning.

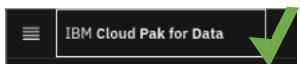
In the previous section, you successfully deployed the Attrition Prediction model into the AI Governance Deployment space.

In this section, we will monitor the deployed model by:

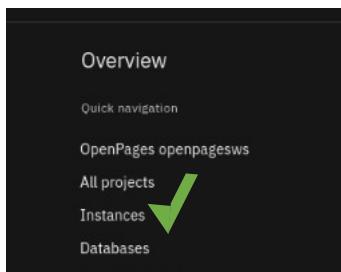
- Creating a service provider and subscription for the machine learning service.
- Fetch the model and deployments.
- Configure the explainability monitor.
- Configure the fairness monitor.
- Configure the quality monitor.
- Configure the drift monitor.
- Observe the model monitors.

Create the service provider and subscription for your machine learning service.

1. Return to the CPD Home screen.



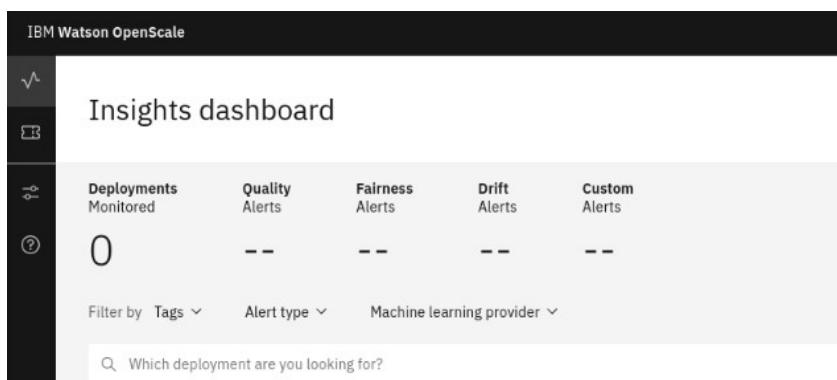
2. Select Instances



3. Scroll down in the “Instances” window, find the “openscale-defaultinstance” and select the vertical ellipsis button and then Select “Open”. Note: wait for all Status indicators to turn green before proceeding.

A screenshot of the "Instances" page. A context menu is open over the row for "openscale-defaultinstance". The menu options are "Open", "Manage access", and "Delete". A green checkmark is placed over the "Open" button. The "openscale-defaultinstance" row is also highlighted with a green checkmark.

4. You are now in [IBM Cloud Pak for Data OpenScale](#) viewing your “Insights dashboard”.



Components of OpenScale

Insights Dashboard

The Insights dashboard displays the models that you are monitoring and provides status of model evaluation results.

IBM Watson OpenScale

Insights dashboard

Deployments Monitored: 0

Quality Alerts: --

Fairness Alerts: --

Drift Alerts: --

Custom Alerts: --

Filter by: Tags, Alert type, Machine learning provider

Q Which deployment are you looking for?

Explain a transaction

Explanations describe how the model determined a prediction. It lists model utilization on a transactional basis. This inventory contains important factors that led to the predictions, providing confidence in the AI Model.

IBM Watson OpenScale

Find a transaction

Explained transaction

Selected

Configure

You will use the “Configure” tab to configure storage, machine learning providers, and users.

IBM Watson OpenScale

System setup

Connect to a database, machine learning providers, and integrated services. Optionally enable batch support.

Required

Configure Database

Description: For online and batch deployments the database stores model evaluation results. It also stores model transactions. Model transactions for batch database (see Batch support settings).

Machine learning providers

Users & roles

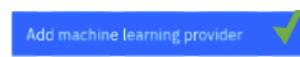
Optional

- Select “Configure” from the menu on the left. Then Select “Machine learning providers”. Note the Database information is displayed in the box on the right. This database stores the information of every model run as a transaction capturing information on model payload, predictions, and calculated quality metrics. In this example, we see a Db2 database. However, the database type can be configured based on the database technologies you prefer.

The screenshot shows the 'System setup' section of the IBM Watson OpenScale interface. On the left, a sidebar lists 'Configure' (selected), 'Database' (highlighted with a green checkmark), 'Machine learning provider' (selected), 'Users & roles', and 'Optional' (Metric groups, Metric endpoints, Batch support, Integrations). The main panel is titled 'Database' and contains a 'Required' section with a 'Description' field and a detailed 'Description' for online and batch deployments. To the right is a 'Database' configuration card with the following details:

Database	
Database type	Db2
Instance ID	worker2.amwv12.workshop.tec
Database	BLUDB
Schema	aiopenscale00
Hostname or IP address	worker2.amwv12.workshop.tec
Port	31953

- Select the “Add machine learning provider” button.



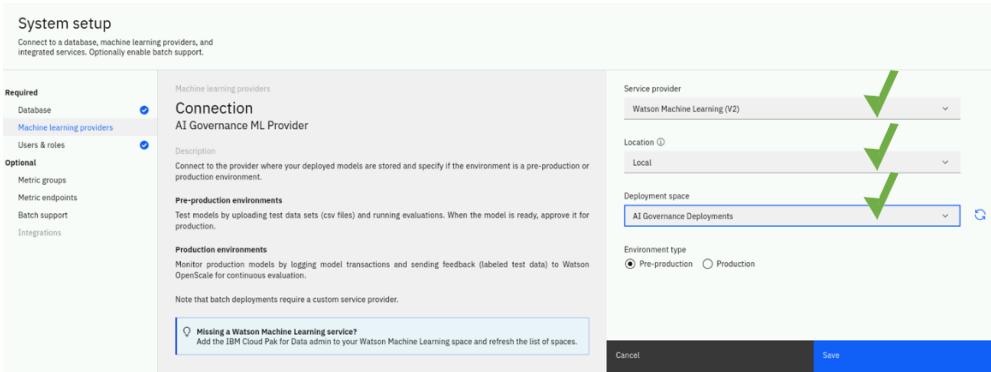
- In the **New Provider** screen select the Edit Pencil by Machine Learning providers. Name this instance “AI Governance ML Provider”. Select the “Apply” button.

The screenshot shows the 'New Provider' screen. At the top, there's a back arrow and a 'Back to all providers' link. Below it, a search bar contains 'AI Governance ML Provider'. Underneath are 'Apply' and 'Cancel' buttons. A 'Description' section with a placeholder 'Click edit to enter provider description.' has an 'Edit' button with a green checkmark above it.

- Select the “Edit pencil” in the “Connection” box to the right.

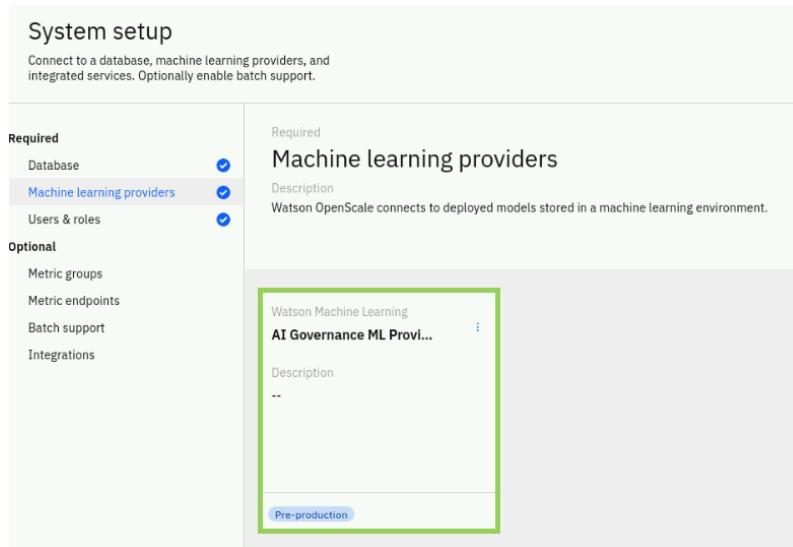
The screenshot shows a large 'Connection' edit box with a blue border. Inside, it says 'Click edit to enter the connection information.' and has an 'Edit' button with a green checkmark to its right.

- Select the drop-down arrow in the “Service provider” and select “Watson Machine Learning (V2)”, then select the drop-down arrow in “Location” box and select “Local”. Then select the drop-down arrow in the “Deployment space” box and select “AI Governance Deployments”. Finally, click the “Save” button.



Machine Learning Providers

You have now created a Machine Learning provider access point which is now visible as a tile in the screen you are currently viewing (the “AI Governance ML Provider” tile)

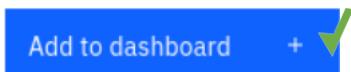


Machine learning providers incorporate artificial intelligence engines, pre-trained machine learning models, and a variety of ML tools designed to create and train custom ML models at scale. Examples of Machine Learning providers include IBM Watson Machine Learning, Amazon SageMaker, Microsoft Azure ML Studio, and Microsoft Azure ML Service. In the above activity, we used IBM's in-house Watson Machine Learning as the service provider.

10. Select the “[Insights dashboard](#)” icon on the left menu to begin building a Model Monitor for our Insights Dashboard.

The screenshot shows the IBM Watson OpenScale interface. At the top, there's a dark header bar with the text "IBM Watson OpenScale". Below it is a navigation sidebar on the left containing icons for "Deployments", "Quality Alerts", "Fairness Alerts", "Drift Alerts", "Custom Alerts", and a question mark. The main area is titled "Insights dashboard". It displays five metrics in a grid: "Deployments Monitored" (0), "Quality Alerts" (--), "Fairness Alerts" (--), "Drift Alerts" (--), and "Custom Alerts" (--). Below these metrics are three dropdown menus: "Filter by Tags", "Alert type", and "Machine learning provider". A green checkmark icon is placed over the "Insights dashboard" title.

11. Select the “[Add to dashboard](#)” button.



12. Select the drop-down arrow in the “Machine learning Provider” drop-down box select the “[AI Governance ML Provider](#)” option, then select the “[Attrition Prediction](#)” radio button. Finally, select “[Configure](#)”.

This screenshot shows a modal dialog box titled "Select a model deployment". It has a sub-instruction "Choose a machine learning provider and provide deployment details." and a "Machine learning Provider" dropdown set to "AI Governance ML Provider (Pre-production)". Below is a table with columns "Deployment" and "Description". A single row is shown with a green checkmark icon next to it, indicating selection. The row details are: Deployment "Attrition Prediction", Description "", and Created "Thu, Mar 9, 2023, 6:25 PM EST". At the bottom are "Cancel" and "Configure" buttons, with the "Configure" button highlighted by a green checkmark icon.

This message will appear:

Select a model deployment

Choose a machine learning provider and provide deployment details.

A light gray progress dialog box with a circular loading icon and the text "Saving deployment selection...".

13. Upon completion, select the “Configure monitors” button in the bottom right of the window.



14. In the “Attrition Prediction” window select “Model input” then select pencil edit button

A screenshot of the 'Attrition Prediction' window. On the left is a sidebar with 'Model Info' and 'Evaluations' sections. The main area shows 'Model details' with a description about training data and deployed model output. Below it are 'Model transaction' and 'Model output details' sections. A green arrow points to the 'Edit' pencil icon in the 'Model input' section header.

15. Select Numeric/categorical from the drop-down arrow listing under Data Type. Select Binary classification from the Algorithm type drop-down arrow listing. Select Save and continue.

A screenshot of the 'Attrition Prediction' window. It shows the 'Specify model input' configuration. Under 'Data type', 'Numeric/categorical' is selected. Under 'Algorithm type', 'Binary classification' is selected. A green arrow points to the 'Save and continue' button at the bottom right of the configuration panel.

16. After the model input selections are saved, select the Edit pencil in the Training data window

A screenshot of the 'Training data' window. It contains a single text line: 'To connect to the training data, click the edit icon.' A green arrow points to the 'Edit' pencil icon located next to the text.

17. Under the Storage Type drop down menu, Select Database or cloud storage. Then under Location select “Db2”. Now enter the following information in the corresponding fields below:

- "Hostname": worker1.amwv12.workshop.tec
- "port": 31953
- "Database": BLUDB
- "username": admin
- "password": cpdaccess

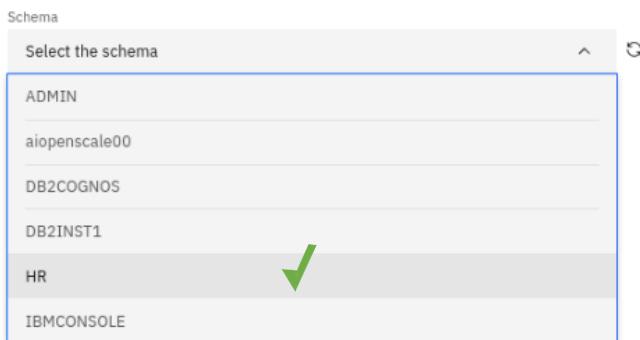
The screenshot shows a configuration interface for a database connection. The fields and their values are as follows:

- Storage type: Database or cloud storage (marked with a green checkmark)
- Location: Db2 (marked with a green checkmark)
- Credential values: Enter manually (marked with a green checkmark)
- Hostname or IP address: worker1.amwv12.workshop.tec (marked with a green checkmark)
- Port: 31953 (marked with a green checkmark)
- Database: BLUDB (marked with a green checkmark)
- Username: admin (highlighted with a yellow background and marked with a green checkmark)
- Password: (redacted) (marked with a green checkmark)

18. Scroll down and select “Connect”.



19. When the connection is made, the drop-down arrow menu in the “Schema” box will become available. Scroll down within the select the schema drop-down list and select “HR”.



20. Select MASTER_HR_DATA_AI_GOV from the table list.

Hostname or IP address
worker1.amwv12.workshop.tec

Port
31953

Database
BLUDB

Username
admin

Password

Schema
HR

Table
MASTER_HR_DATA_AI_GOV

Cancel Next

21. Select the Next button.

Table
MASTER_HR_DATA_AI_GOV

Cancel Next

22. Scroll down and select the Label VIRTUAL_MASTER_HR_DATA_STATUS, then select the Next button.

ETHNIC_ORIGIN	▲
EXEMPTFF	▲
FUNCTION	▲
GENDER	▲
GENERATION	▲
LAST_PERFORMANCE_RATING	▲
LAST_POTENTIAL_RATING	▲
MANAGER_ID	▲
TITLE	▲
UNION_STATUS	▲
VIRTUAL_MASTER_HR_DATA_DEPARTMENT	▲
VIRTUAL_MASTER_HR_DATA_STATUS	▲ ✓

Back Next

23. In the “Select the training features” window, select the check box for all “Features (16)” to select all items in the list, then select the Next button.

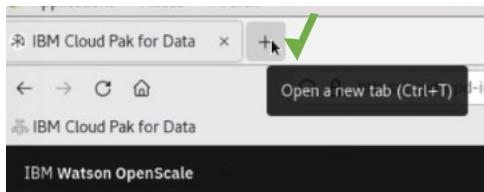
24. You will return to the Attrition Prediction window.

25. Logging can only occur once the first transaction activates. We will perform this step in the next section.

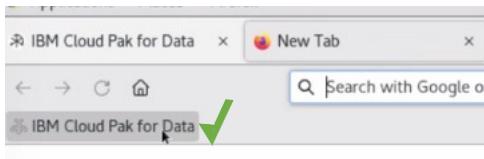
Fetching the model and deployments

Now that the WML service has been bound and the subscription has been created, you need to send a request to the model before you configure OpenScale monitors. This allows OpenScale to create a payload log in the datamart with the correct schema, so it can capture data coming into and out of the model. First, the code gets the model deployment's endpoint URL, and then sends sample records for predictions.

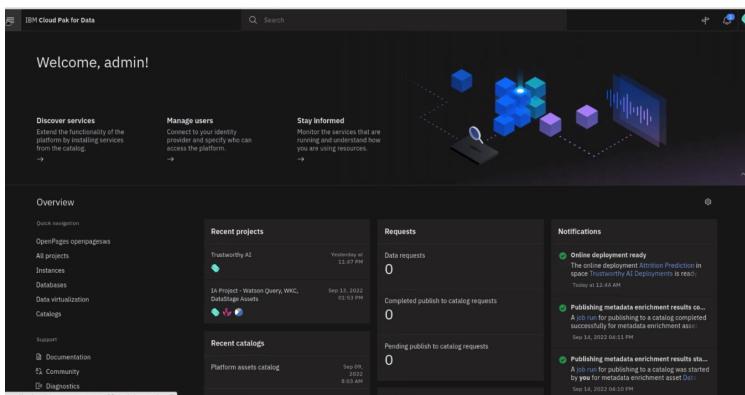
1. You will now open another instance of CPD. Go to the Firefox menu bar and select the + (plus) sign to open a new tab-instance on the browser in your image. Note: Do not open another Firefox tab on YOUR machine.



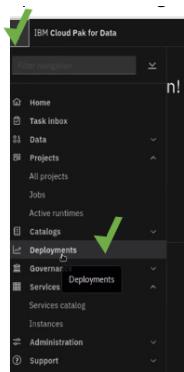
2. Select the Firefox bookmark link “IBM Cloud Pak for Data”.



3. A new “IBM Cloud Pak for Data” home screen appears.



4. Open the **Hamburger menu** and select “Deployments”.



5. Select “AI Governance Deployments”.

Name	Last modified	Your role	Collaborators	Tags	Online deployments	Jobs
AI Governance Deployments	Jan 4, 2023 1:38 PM	Admin	AA		1	0
AI Governance Deployments	Nov 21, 2022 11:41 AM	Admin	AA		0	1
No description provided.						

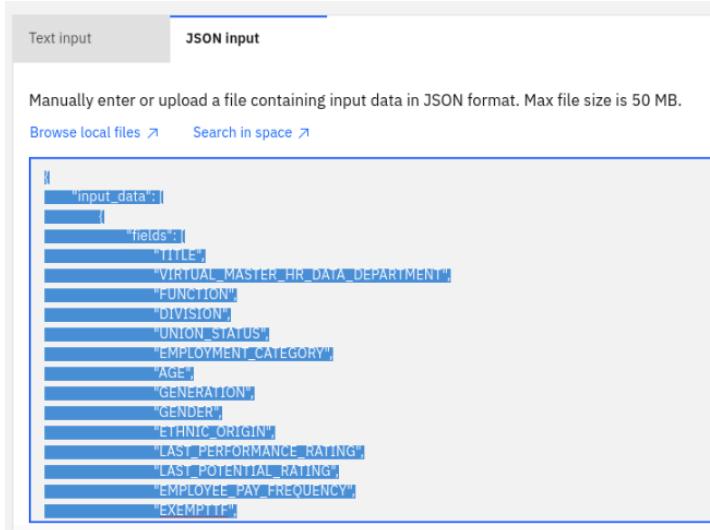
6. Select the “Deployments” tab and then “Attrition Prediction”.

Name	Type	Status	Asset
Attrition Prediction	Online	Deployed	(Champion) Attrition Prediction - P2 XGB Classifier
No description provided.			

7. Select the “Test” tab.

```
{
  "input_data": [
    {
      "fields": [
        "TITLE",
        "VIRTUAL_MASTER_HR_DATA_DEPARTMENT",
        "FUNCTION",
        "DIVISION",
        "UNION_STATUS",
        "EMPLOYMENT_CATEGORY",
        "AGE",
        "GENERATION",
        "GENDER",
        "ETHNIC_ORIGIN",
        "LAST_PERFORMANCE_RATING",
        "LAST_POTENTIAL_RATING",
        "EMPLOYEE_PAY_FREQUENCY",
        "EXEMPTTF"
      ]
    }
  ]
}
```

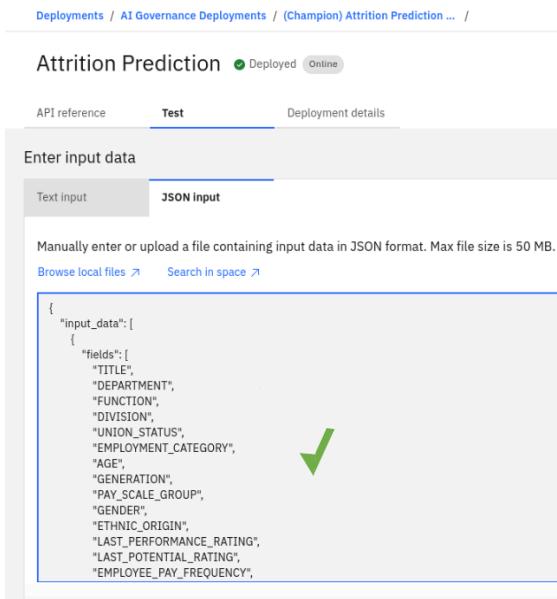
8. Select the Paste JSON tab and highlight the entire input data as shown below:



The screenshot shows a JSON input field with a large block of JSON code. The code defines an array of input fields, each with a title and a corresponding department. Fields include TITLE, VIRTUAL_MASTER_HR_DATA_DEPARTMENT, FUNCTION, DIVISION, UNION_STATUS, EMPLOYMENT_CATEGORY, AGE, GENERATION, GENDER, ETHNIC_ORIGIN, LAST_PERFORMANCE_RATING, LAST_POTENTIAL_RATING, EMPLOYEE_PAY_FREQUENCY, and EXEMPT_TFM.

```
[{"input_data": [{"fields": [{"TITLE": "VIRTUAL_MASTER_HR_DATA_DEPARTMENT", "FUNCTION": "FUNCTION", "DIVISION": "DIVISION", "UNION_STATUS": "UNION_STATUS", "EMPLOYMENT_CATEGORY": "EMPLOYMENT_CATEGORY", "AGE": "AGE", "GENERATION": "GENERATION", "GENDER": "GENDER", "ETHNIC_ORIGIN": "ETHNIC_ORIGIN", "LAST_PERFORMANCE_RATING": "LAST_PERFORMANCE_RATING", "LAST_POTENTIAL_RATING": "LAST_POTENTIAL_RATING", "EMPLOYEE_PAY_FREQUENCY": "EMPLOYEE_PAY_FREQUENCY", "EXEMPT_TFM": "EXEMPT_TFM"}]}]
```

You will now need to open another Firefox tab and copy the JSON code from <https://raw.githubusercontent.com/cwong79/CPD4.5.0Lab/main/model-payload.json>



The screenshot shows the Attrition Prediction API test interface. It has tabs for API reference, Test (which is selected), and Deployment details. Under the Test tab, there is an 'Enter input data' section with a JSON input field containing the same JSON code as the previous screenshot. A green checkmark is placed over the JSON code in this field.

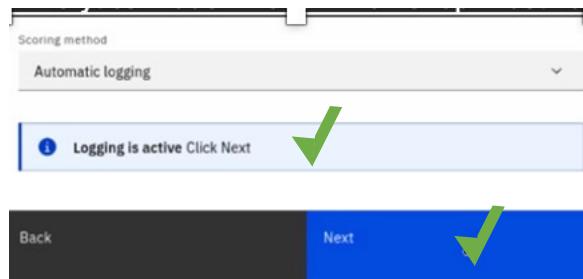
9. After successfully pasting the code – Select the “Predict” button in the lower right.



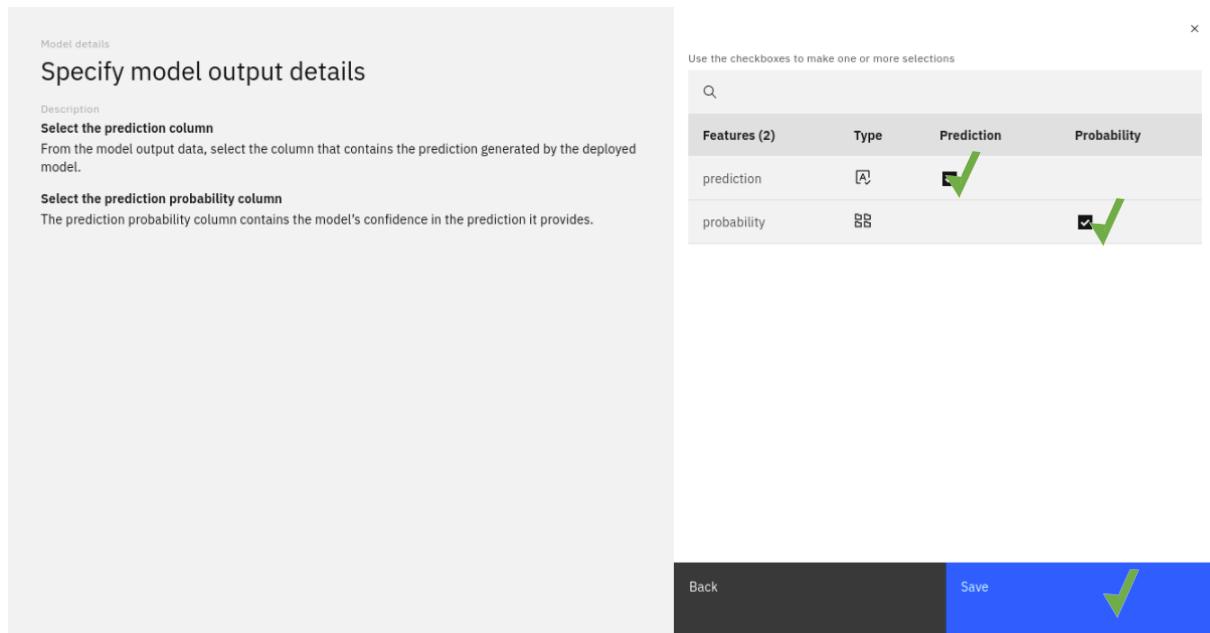
10. Wait about 60 seconds, and then in the Attrition Prediction window (in your original Firefox tab), Select the “Check now” button in the right window.



11. Note that the message “[Logging is active Click Next](#)” appears in the left pane of the Attrition Prediction window, Select the [Next](#) button.



12. When the Attrition Prediction window appears, select the [Prediction](#) check box for the “[Prediction](#)” feature and select the [Probability](#) check box for “probability” feature, then “[Save](#)” button.

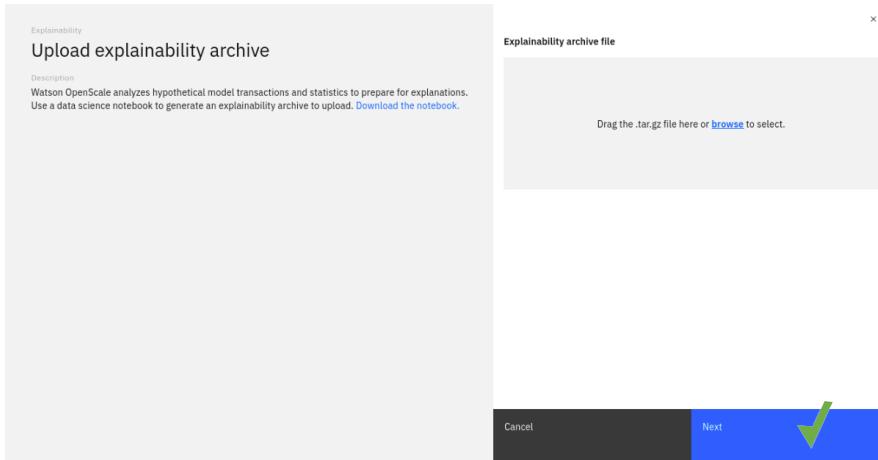


Configure Explainability

It is important to understand how the model came to its decision. This understanding is required both to explain model predictions and to ensure model owners that the decisions are valid. To understand these decisions, follow these steps to observe the model's explainability.

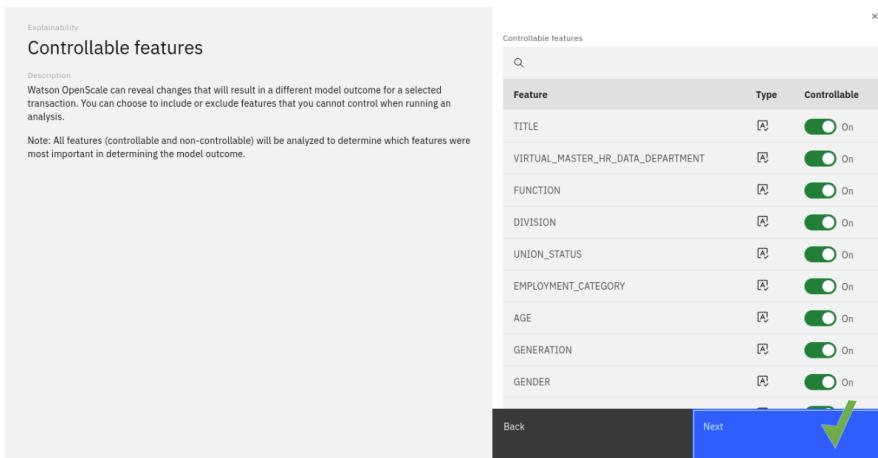
In the Explainability section of your model configuration page, configure explainability to analyze the factors that influence your model outcomes. You can choose to configure local explanations to analyze the impact of factors for specific model transactions and configure global explanations to analyze general factors that impact model outcomes.

1. On the General settings tab, you can configure explainability settings manually or you can run a custom notebook to generate an explainability archive. In this case, you will be configuring the metrics manually. Select **Next**.



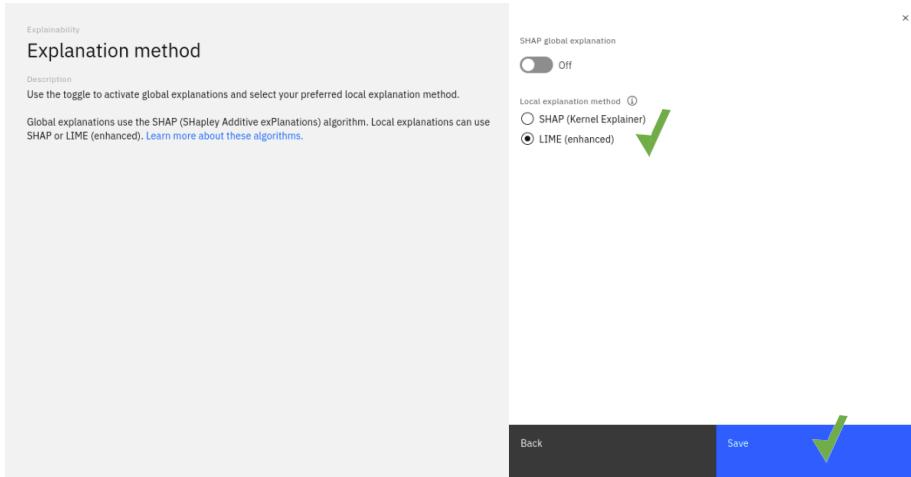
2. You can also choose to specify **Controllable Features** and enable language support. Controllable features are features that can be changed and have a significant impact on your model outcomes. **OpenScale** analyzes the controllable features that you specify to identify changes that might produce different outcomes.

Select all features as **Controllable** and click **Next**.

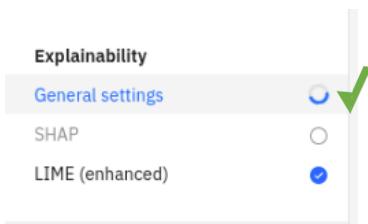


You can choose to configure local explanations to analyze the impact of factors for specific model transactions and configure global explanations to analyze general factors that impact model outcomes.

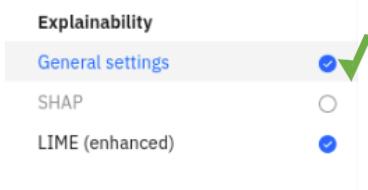
3. Select **LIME** and **Save** the configurations.



Note that as it is saving, you will see Explainability running/spooling in the left menu.



Once it finishes, the running/spooling animation will stop, and a blue dot will appear.

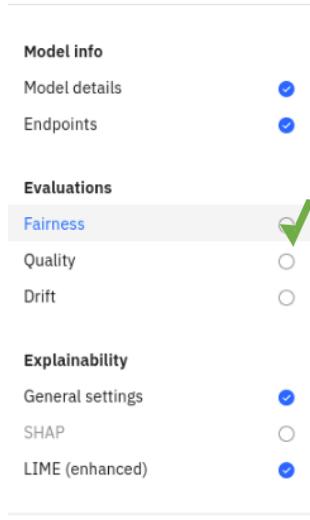


Configure Fairness

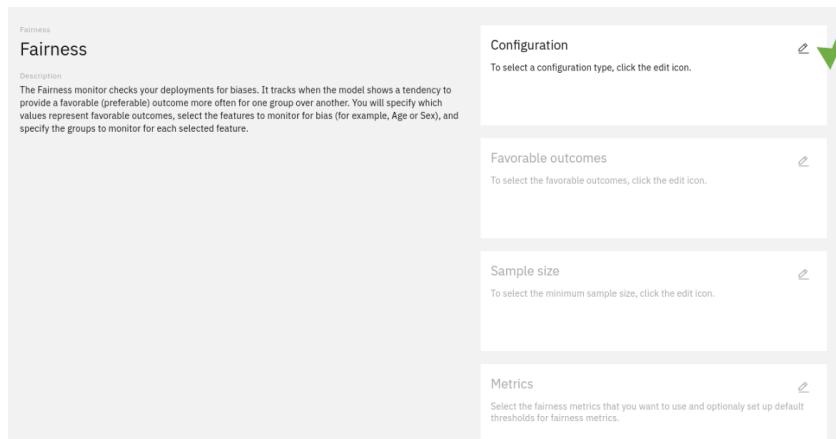
The Fairness monitor checks your deployments for biases. It tracks when the model shows a tendency to provide a favorable (preferable) outcome more often for one group over another. You will specify which values represent favorable outcomes, select the features to monitor for bias (for example, Age or Sex), and specify the groups to monitor for each selected feature.

1. Select “**Fairness**” from the Evaluations menu.

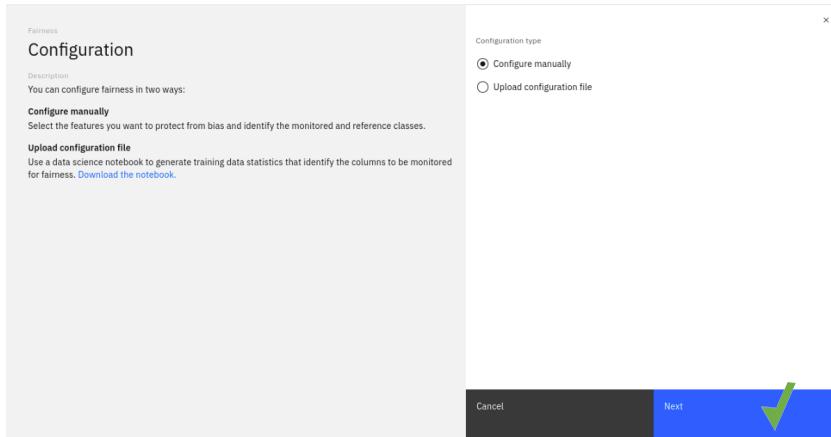
Attrition Prediction



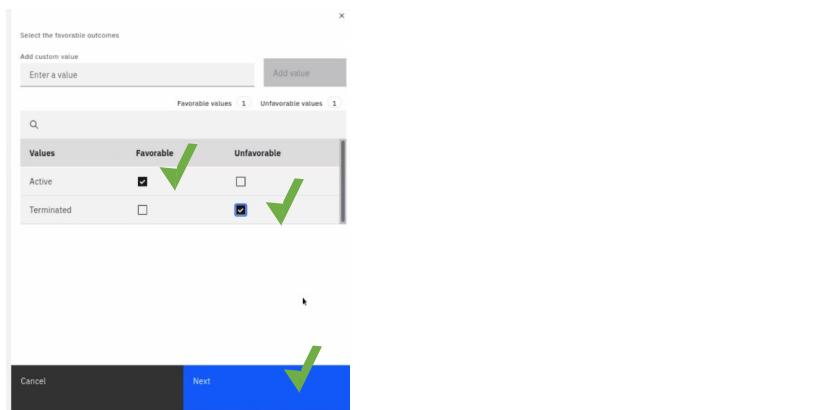
2. Select the “**Pencil**” icon in the Configuration window.



3. Select **Configure manually** and click **Next** to proceed.



4. Select **Favorable** for the Active value and select **Unfavorable** for the Terminated value. Select the **Next** button.

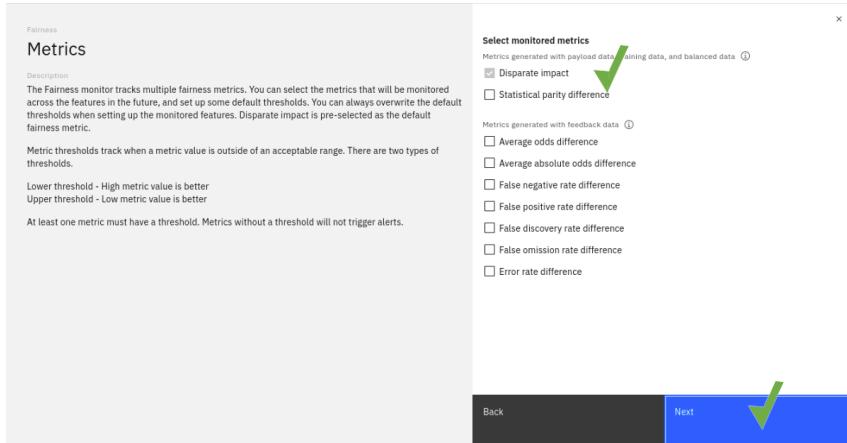


5. Enter “10” into the “Minimum sample size” and select the **Next** button.



When you configure fairness evaluations in IBM Watson OpenScale, you can generate a set of metrics to evaluate the fairness of your model. You can use the fairness metrics to determine if your model produces biased outcomes. You can find more information about the various metrics here. In this tutorial, we will be select Disparate Impact as the evaluate the fairness score for different groups. Disparate impact compares the percentage of favorable outcomes for a monitored group to the percentage of favorable outcomes for a reference group.

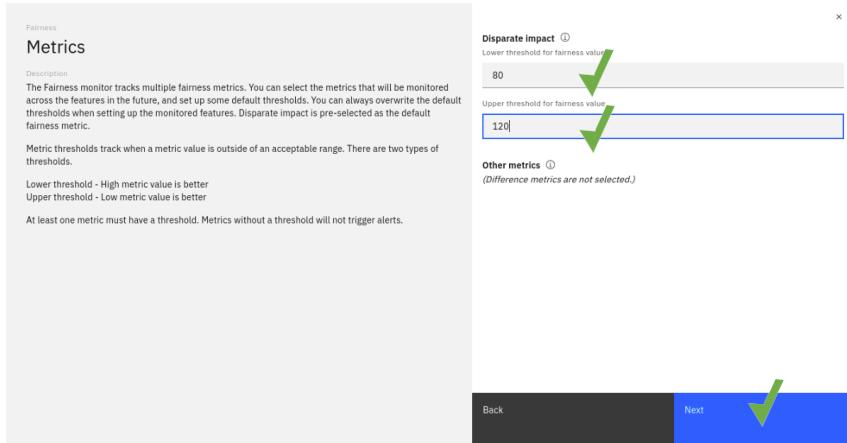
6. Check “Disparate impact” and click Next.



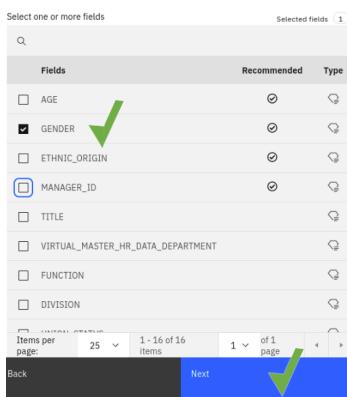
The fairness monitor tracks multiple fairness metrics. You can select that will be monitored across the features in the future and set up the default fairness metrics. Metric thresholds track when a metric value is outside of an acceptable range.

In this scenario, women are identified as the monitored group for whom fairness is being measured and the threshold for fairness is to be at least 80%.

7. Insert 80 and 120 and click Next.



8. Select Gender, and then select the Save button.



9. Select Monitored for the Female value and Reference for Male value. Then select the Next button.

Values	Monitored	Reference	Recommended
Female	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Monitored
Male	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Reference

10. Select Use default thresholds for the Female value and then select Save button

Fairness

Specify the monitored groups for [GENDER]

Description

Select the groups to monitor.

The percentage of favorable outcomes delivered to the monitored groups will be compared to the percentage of favorable outcomes delivered to the remaining groups (the reference groups) to check for potential bias.

A fairness score of 100% implies that the monitored group and reference group received an equal number of favorable values. Likewise, a fairness score of 50% implies that the monitored group received half as many favorable outcomes as the reference group.

Set the fairness alert threshold to track when the fairness value falls below an acceptable level.

FAQ Recommended groups

Watson OpenScale analyzed this feature to recommend which groups should be monitored for fairness. These groups are identified in the Recommended column.

Set up threshold for feature [GENDER]

Use default thresholds

Set up different thresholds

Disparate impact 80 - 120

Back Save

Notice Fairness is Spooling/Running

Attrition Prediction

Model info

Model details

Endpoints

Evaluations

Fairness

Quality

Drift

Explainability

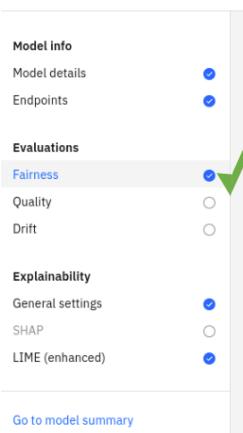
General settings

SHAP

LIME (enhanced)

When it completes the spooling stops

Attrition Prediction

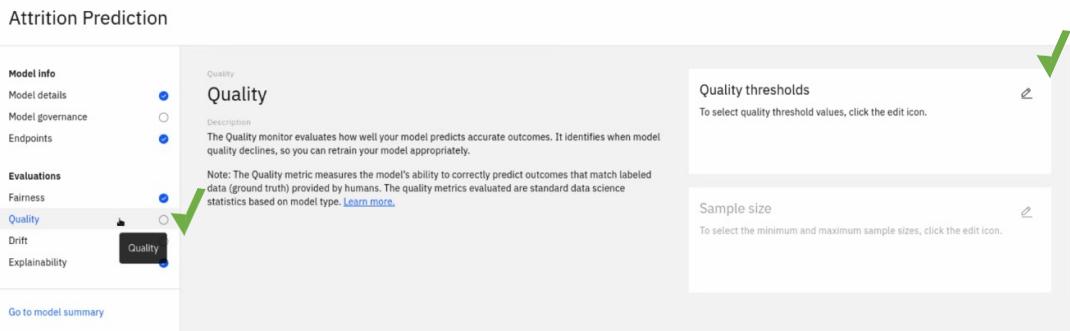


Quality

Quality evaluations monitor how well your model predicts accurate outcomes. It identifies when model quality declines, so you can retrain your model appropriately. To evaluate the model, you provide feedback data, which is labeled data where the outcome is known. Quality evaluations use a set of standard data science metrics to evaluate how well the model predicts outcome that matches the actual outcomes in the labeled data set.

You can set acceptable quality thresholds for the metrics used to evaluate your model. You can also set the sample size, which is the number of rows of feedback data, to consider for the evaluation.

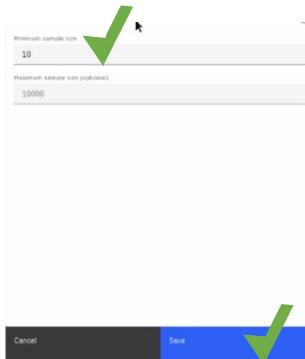
1. Select the Quality menu item and then select the “Pencil” icon to configure the quality monitor in [OpenScale](#). As explained on the Quality page, [OpenScale](#) can monitor the Quality metric which measures the model’s ability to correctly predict outcomes that match labeled data.



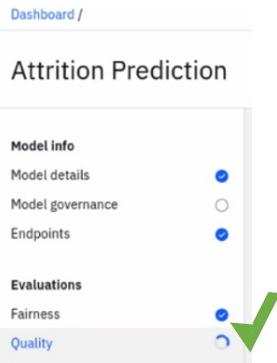
2. This window enables us to enter custom threshold values. For this demo, we will not change the default thresholds. Select the Next button.



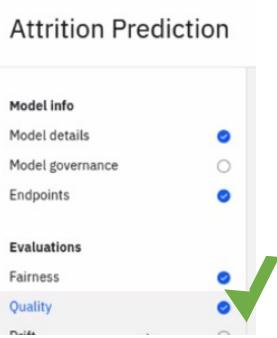
3. Enter 10 and then select the Save button.



4. The Quality job will spool and run for a few minutes.



5. When it completes and displays a solid blue dot, we will set up the Drift monitor



Drift

When configuring Drift in [OpenScale](#), you must specify the tolerable accuracy drift magnitude. The drift is measured as the drop in accuracy as compared to the model accuracy at training time. For example, if the model accuracy at training time was 90% and at runtime the estimated accuracy of the model is 80%, then the model is said to have drifted by 10%.

1. Select Drift from the Evaluations menu and then select the “[Pencil](#)” icon from Drift Model

The screenshot shows the 'Attrition Prediction' dashboard. On the left, a sidebar lists 'Model info', 'Evaluations' (with 'Drift' selected), and 'Explainability'. The main content area shows the 'Drift' configuration. A modal window titled 'Drift model' contains fields for 'Drift thresholds' and 'Sample size', each with an 'Edit' button. A green arrow points to the 'Edit' button in the 'Drift model' modal.

2. Select Trust in [OpenScale](#) radio button and select the Next button.

The screenshot shows the 'Attrition Prediction' dashboard. The 'Drift' section in the sidebar is highlighted. The main content area shows the 'Train a drift model' configuration. A modal window titled 'Training option' shows two radio buttons: 'Train in Watson OpenScale' (selected) and 'Train in a data science notebook'. A green arrow points to the 'Train in Watson OpenScale' radio button. At the bottom right of the configuration panel, there is a 'Cancel' button and a blue 'Next' button, which has a green checkmark icon next to it.

For details on Drift monitors, check the [Drift documentation page](#).

3. Set the drift thresholds at the **10%** range for both Drop in accuracy and data consistency, then select the **Next** button.

Attrition Prediction

Model info

- Model details
- Endpoints

Evaluations

- Fairness
- Quality
- Drift**

Explainability

- General settings
- SHAP
- LIME (enhanced)

Go to model summary

Drift thresholds

Description

Drift metrics track the degree of change in accuracy and data consistency based on the accuracy and data consistency at training time. There is one type of threshold:

- Upper threshold - Low metric value is better

The drift calculation is based on the environment type.

Pre-production models

Production models

Upper thresholds

Drop in accuracy: 10

Drop in data consistency: 10

Back Next

4. Enter **10** into the Maximum sample size and select the **Save** button.

Minimum sample size

10

Maximum sample size (optional)

10000

Cancel Save

5. Wait for Drift evaluation to complete, then select the Go to model summary link.

Attrition Prediction

Model info

- Model details
- Endpoints

Evaluations

- Fairness
- Quality
- Drift**

Explainability

- General settings
- SHAP
- LIME (enhanced)

Go to model summary

Observe the model monitors.

- When you return to the Attrition Prediction window, Select the drop-down arrow in the Actions section, then select Evaluate now.

The screenshot shows the Attrition Prediction dashboard. At the top, there's a navigation bar with 'Dashboard /' and a status indicator 'Pre-production'. Below it, the main area has a heading 'Attrition Prediction'. On the left, there's a summary section with 'Last evaluation: --', 'Test data set: --', and 'Number of explanations: 0'. In the center, there's a large circular progress indicator with '0 Tests run' inside. To the right, there are two sections: 'Tests passed' (green dot, 0) and 'Tests failed' (red dot, 0). At the bottom right of the dashboard, there's an 'Actions' dropdown menu with options: 'Evaluate now' (highlighted with a green arrow), 'Configure model', and 'View model information'.

- Select the dropdown on Import Test Data file and select the “from CSV file” link, then Select browse.

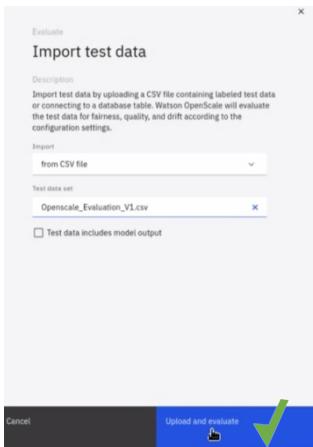
The screenshot shows the 'Import test data' dialog box. It has a title 'Evaluate' and a sub-section 'Import test data'. Under 'Description', it says: 'Watson OpenScale evaluates production models for fairness and drift using logged scoring requests received by the model. Scoring requests are logged using the payload logging endpoint. Watson OpenScale evaluates production models for quality using labeled test data. Labeled test data is provided using the feedback endpoint or file upload.' Below this, under 'Import', there's a dropdown menu titled 'Choose an option' with two options: 'from database or cloud storage' and 'from CSV file'. The 'from CSV file' option is highlighted with a green arrow.

- Select the “Openscale_Evaluation.csv” line item and then Select the Open button.

The screenshot shows a 'File Upload' dialog box. On the left is a sidebar with recent locations: 'Recent', 'Home', 'Documents', 'Downloads', 'Music', 'Pictures', 'Videos', and '+ Other Locations'. The main area shows a file list with three items: 'AUTOAI_Master_HR_Data_V1.csv', 'Master_HR_Data_V1.csv', and 'Openscale_Evaluation_V1.csv'. The 'Openscale_Evaluation_V1.csv' file is highlighted with a green arrow and selected. At the top right of the dialog, there's a 'File Upload' button with a magnifying glass icon and an 'Open' button.

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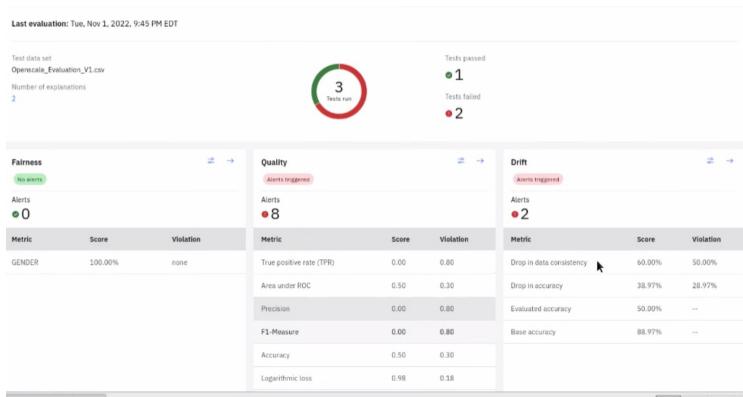
4. Select the Upload and Evaluate button.



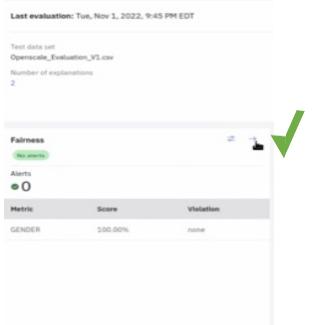
You will see the Evaluation running/loading. This can take up to 3 minutes.



When the Evaluation completes, you will see this screen.

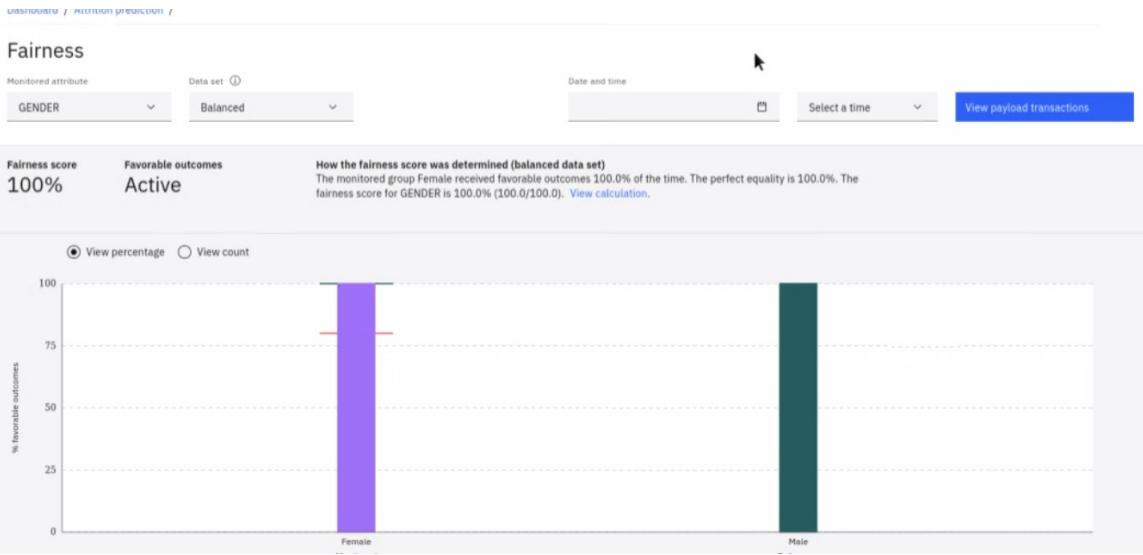


We have successfully completed the [OpenScale](#) evaluation for fairness, quality, and drift for our attrition prediction model. Note that by selecting the right-facing arrow within each monitor, additional details regarding that monitor's observations are available.



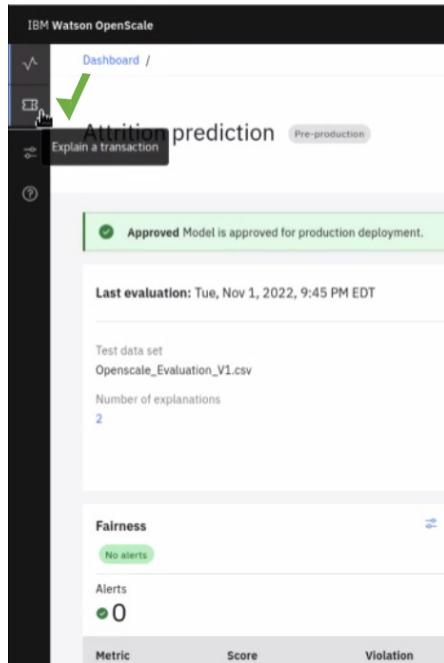
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See details:



In production, as your machine learning model is deployed in an end-user application, Cloud Pak for Data will monitor scoring events via APIs and display a dashboard that business/AI Ops users can leverage to detect undesirable behavior(s) and establish trust in the AI monitors. [OpenScale](#) uploads evaluation data runs scoring against it and compares the model prediction to the labeled result to compute an overall quality score. Once the evaluation completes, you can investigate your results further.

5. You can search for specific model transactions using [OpenScale](#). Explain a transaction by, Select the Explain a transaction menu button.



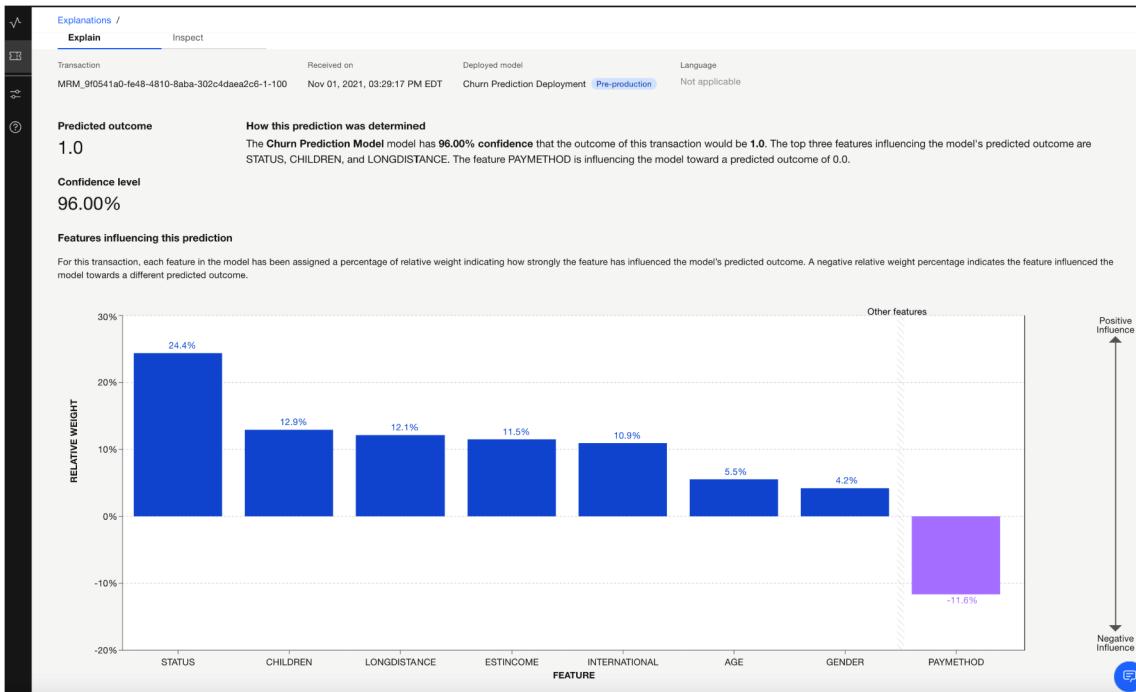
Lab – IBM Modular Workshop – AI Governance

- On the Transactions page, review the results. Select the Explain link under the Actions column for one or more of these transactions to better understand how the model reached the output prediction.

The screenshot shows the 'Transactions' page in IBM Watson OpenScale. The 'Deployed model' dropdown is set to 'Attrition prediction'. Below it, a table lists three recent transactions:

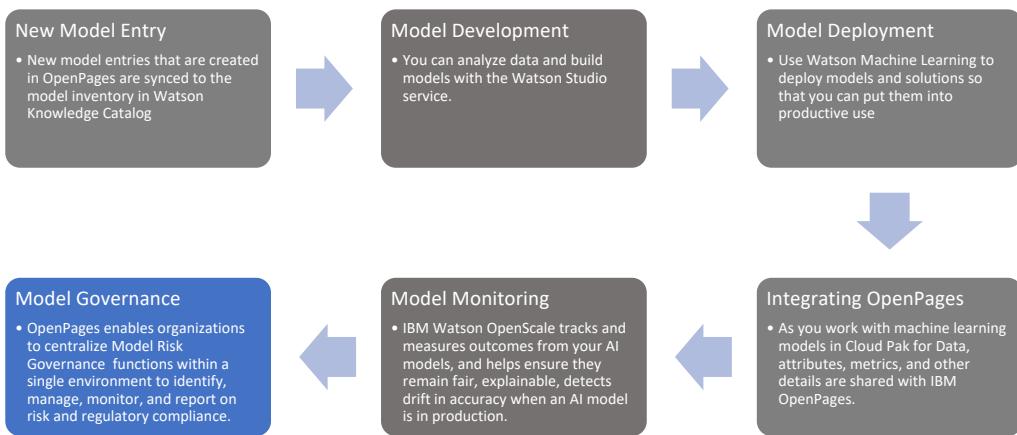
Transaction ID	Timestamp	Prediction	Confidence	Actions
MRM_692fa8f8-59ff-4b70-ef21-3990afb8a0e2-1-1	Nov 1, 2022, 9:45:32 PM	Active	61.07%	Explain
MRM_692fa8f8-59ff-4b70-ef21-3990afb8a0e2-1-10	Nov 1, 2022, 9:45:32 PM	Active	88.39%	Explain
MRM_692fa8f8-59ff-4b70-ef21-3990afb8a0e2-1-2	Nov 1, 2022, 9:45:32 PM	Active	87.82%	Explain

- On the Explanations page, review the various features and how they contributed to the output prediction for these records.



Summary: This section illustrated how you can leverage [OpenScale](#) capabilities to deliver AI Governance by running model evaluation to validate that Quality, Fairness, and Drift metrics are within the configured thresholds. Additionally, AIOps engineers, data scientists, and business users can trigger explanations of individual transactions to gain confidence in the predictions of the model.

2.2 AI Governance

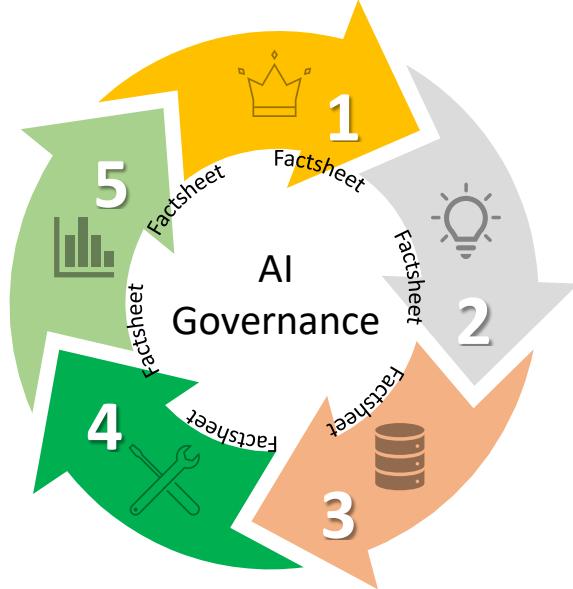


FOUNDATION

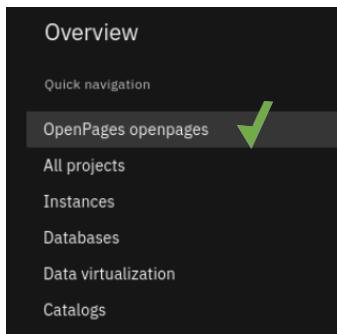
Congratulations! We are nearly at the end of this AI Governance workshop. We will now review features of OpenPages and how a Model Governor can instill a trusted AI practice using Cloud Pak for Data.

We have built a model, deployed that model, integrated that model into an AI Governance workflow and created monitors to ensure it operates with transparency and trust.

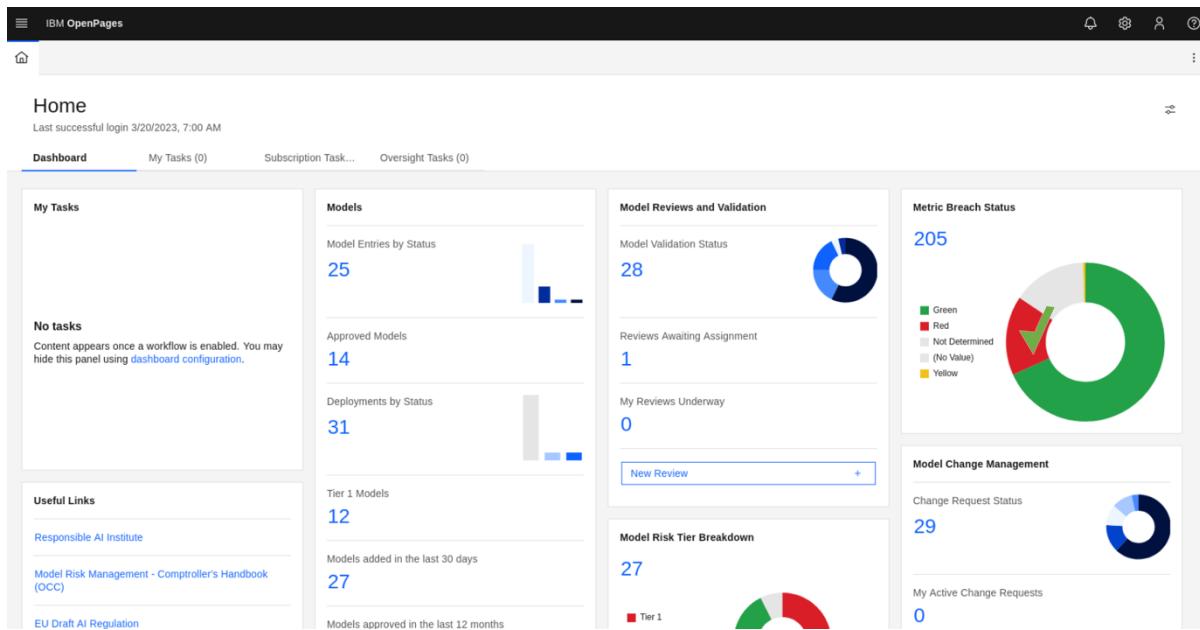
We will now review features in OpenPages which will allow one to govern models, build workflows to automate processes, assign model remediation tasks, and ensure operational validity of models in production.



1. Open a new browser window and access Cloud Pak for Data. Select “OpenPages openpages” instance from the “Quick navigation” menu.



2. Here is a quick overview of this custom Model Risk Governance dashboard within OpenPages.



AI Models are cataloged by multiple metric indicators and lifecycle stages. For instance, select “Red” Metric Breach Status.

3. You will see which metric for which model breached a monitoring threshold set in OpenScale.

<input type="checkbox"/>	Name	Description	Owner	Status	Breach Status	Indicator Trend	<input type="checkbox"/> Active Only	<input type="button" value="New"/>
<input type="checkbox"/>	accuracy	Watson OpenScale quality metric for 'accuracy'	High Oaks Bank > Corporate > Finance	Active	Red	Not Determined	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	area_under_pr	Watson OpenScale quality metric for 'area_under_pr'	High Oaks Bank > Corporate > Finance	Active	Red	Not Determined	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	area_under_pr	Watson OpenScale quality metric for 'area_under_pr'	High Oaks Bank > Corporate > Human Resources	Active	Red	Not Determined	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	area_under_roc	Watson OpenScale quality metric for 'area_under_roc'	High Oaks Bank > Corporate > Finance	Active	Red	Not Determined	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	area_under_roc	Watson OpenScale quality metric for 'area_under_roc'	High Oaks Bank > Corporate > Human Resources	Active	Red	Not Determined	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	f1_measure	Watson OpenScale quality metric for 'f1_measure'	High Oaks Bank > Corporate > Human Resources	Active	Red	Not Determined	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	MET_0000003	Watson OpenScale quality metric for 'area_under_roc'	High Oaks Bank > Corporate > Finance	Active	Red	Not Determined	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	MET_0000004	Watson OpenScale quality metric for 'precision'	High Oaks Bank > Corporate > Finance	Active	Red	Not Determined	<input type="checkbox"/>	<input type="checkbox"/>

4. Select ‘area_under_pr’ under Metrics “Name” for the High Oaks Bank > Corporate > Human Resources category. A metric model window will open. *If you recollect, this metric represents a quality monitor for our Attrition Prediction model. This step is located step 7 on page 7 where we assigned the model entry to this organizational space.*

The screenshot shows the 'IBM OpenPages' interface with the 'Metrics' tab selected. In the search bar, 'area_under...' is typed. Below the search bar, the metric 'area_under_pr' is displayed with its name and description. The 'Breach Status' is shown as 'Red'. The 'Metric Type' is 'Watson OpenScale'. Under 'General' settings, the 'Name' is 'area_under_pr' and the 'Description' is 'Watson OpenScale quality metric for 'area_under_pr''. The 'Metric Capturer' is 'Active'. In the 'Watson Studio Information' section, the 'OpenScale Category' is 'Quality', 'Subcategory' is 'Area under pr', and 'Description' is 'Watson OpenScale quality metric for 'area_under_pr''. The 'OpenScale Subscription Name' is 'pre-production' and the 'Subscription Type' is 'pre-production'. The 'OpenScale Metric' URL is provided.

5. By scrolling down this Metric window, one can quickly determine how and why this breach occurred. In this case, the “area_under_pr” for our Attrition Prediction model fell under our OpenScale set quality metric of 0.80.

The screenshot continues from the previous window. It shows the 'Monitored Items' section, which includes an 'Associated Deployment' tab and a table for 'Attrition Prediction' items. The 'Deployment Status' for this item is 'Collected' with a green checkmark icon. The 'Breach Status' is 'Red'. The 'Value' is 0.1764706 and the 'Value Date' is 3/20/2023. Below this, the 'Metric Measurement Information' section is visible, showing 'Nature' as 'Current', 'Frequency' as 'Multiple times a day', and 'Unit of Measure' as 'Direction Information'.

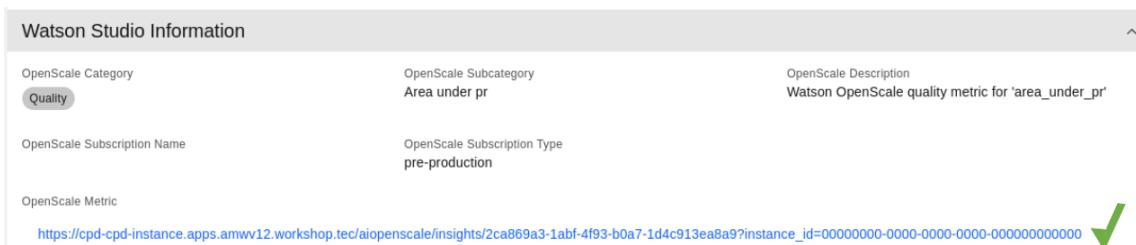
Note: What is Area Under PR?

Area under Precision Recall gives the area under the precision and recall curve, which can be useful when classes are particularly imbalanced.

Precision is a ratio of the number of true positives divided by the sum of the true positives and false positives. It describes how good a model is at predicting the positive class. Precision is referred to as the positive predictive value.

Recall is calculated as the ratio of the number of true positives divided by the sum of the true positives and the false negatives. Recall is the same as sensitivity.

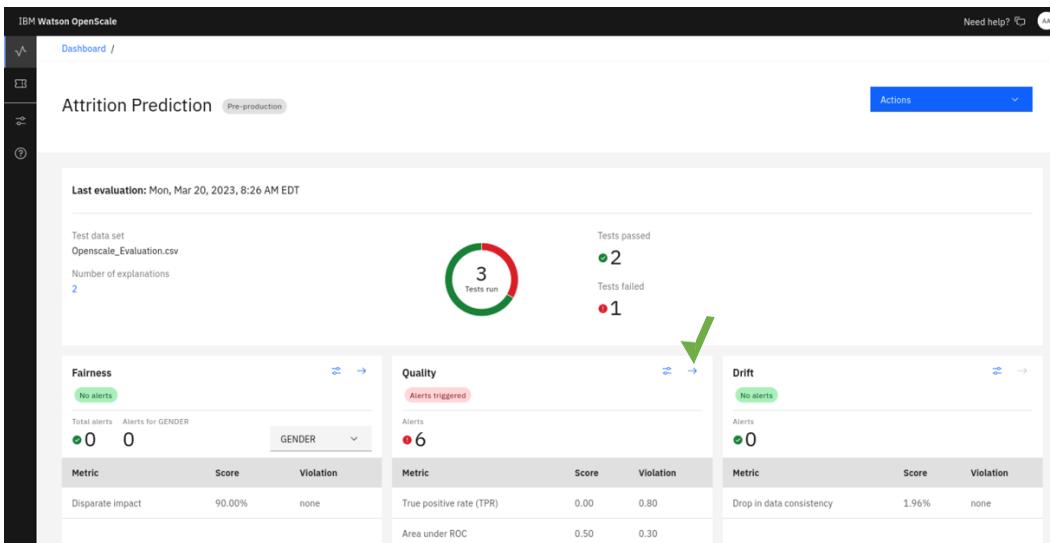
- One of the methods to identify how this metric exceeded its threshold is to review how the monitor set in OpenScale provided an alert. You can do this within OpenPages by scrolling to the “Watson Studio Information” section and selecting the OpenScale link.



The screenshot shows the "Watson Studio Information" page. It displays the following details:

- OpenScale Category:** Quality
- OpenScale Subcategory:** Area under pr
- OpenScale Description:** Watson OpenScale quality metric for 'area_under_pr'
- OpenScale Subscription Name:** (empty)
- OpenScale Subscription Type:** pre-production
- OpenScale Metric:** https://cpd-cpd-instance.apps.amvv12.workshop.tec/aiopenscale/insights/2ca869a3-1abf-4f93-b0a7-1d4c913ea8a9?instance_id=00000000-0000-0000-0000-000000000000

- An OpenPages instance will open, select the “Arrow” Icon under the “Quality” tile.



The screenshot shows the IBM Watson OpenScale dashboard for the "Attrition Prediction" model in "Pre-production" mode. The "Quality" section is highlighted with a green arrow pointing to the "Alerts triggered" section, which shows 6 alerts. Other sections visible include "Fairness" (0 alerts), "Drift" (0 alerts), and various metrics like Disparate Impact (90.00%, none) and Area under ROC (0.50, 0.30).

8. A Confusion Matrix will be generated, we can see that our Attrition Prediction model incorrectly predicted Terminated employees as still Active. This is why the “Area under PR” score violated the set threshold and reported that breach in OpenPages.

Quality

Mon, Mar 20, 2023, 8:26 AM EDT

Area under ROC	Area under PR	Accuracy	True positive rate (TPR)	False positive rate (FPR)	Recall	Precision	F1-Measure	Logarithmic loss
0.5 0.30 lower threshold violation	0.18 0.62 lower threshold violation	0.82	0 0.80 lower threshold violation	0	0 0.80 lower threshold violation	0 0.80 lower threshold violation	0 0.80 lower threshold violation	0.52
		Prediction						
		Active		Terminated		Total		
Actual	Active	42	9	0	0	42	9	51
	Terminated							
	Total	51			0			

9. Return to OpenPages to perform the next task. You can do this by switching to the OpenPages browser window.

IBM OpenPages ✓ x IBM Cloud Pak for Data x +

Dashboard / Attrition Prediction /

Quality

Area under ROC	Area under PR	Accuracy	True positive rate (TPR)
0.5 0.30 lower threshold violation	0.18 0.62 lower threshold violation	0.82	0 0.80 lower threshold violation

10. Let us assign a ticket for a resolution of the above metric breach. We will do so by, first retrieving the model entry. From the “area_under_pr” window, scroll down to “Monitored Items”. Select the “Attrition Prediction” deployment.

Monitored Items

Associated Deployment	Associated Models	
Search	Add	
Name	Description	Deployment Status
Attrition Prediction High Oaks Bank > Corporate > Human Resources		

11. Scroll down in the Attrition Prediction window on OpenPages to the “Issues and Documents” category. Select “New”.

The screenshot shows the IBM OpenPages interface. At the top, there's a navigation bar with icons for Home, Metrics, area_under_..., Attrition Pr..., and Attrition Prediction. Below the navigation bar is a table titled "Attrition Prediction" showing three rows of data:

			Modified Required
log_loss	Watson OpenScale quality metric for 'log_loss'	0.5162713	Green
precision	Watson OpenScale quality metric for 'precision'	0.00	Red
recall	Watson OpenScale quality metric for 'recall'	0.00	Red

Below the table, it says "Items per page: 10 1–10 of 11 items". To the right, there are navigation arrows and a page number "1 of 2 pages".

On the left side, there's a sidebar titled "Issues and Documents" with a "Issues" tab selected. A blue arrow points to the "New" button in the "Issues" section. The table below shows columns for Name, Description, Issue Owner, and Issue Status, with a message "No results".

At the bottom of the sidebar, there's an "Administration" section with a help icon.

12. A “New Issue” sidebar will open. Set the following fields as follow:
- Priority: High
 - Issue Type: Test Failure
 - Issue Owner: Missy Danforth
 - Due date: ***Please select any entry available***

Select “Save”.

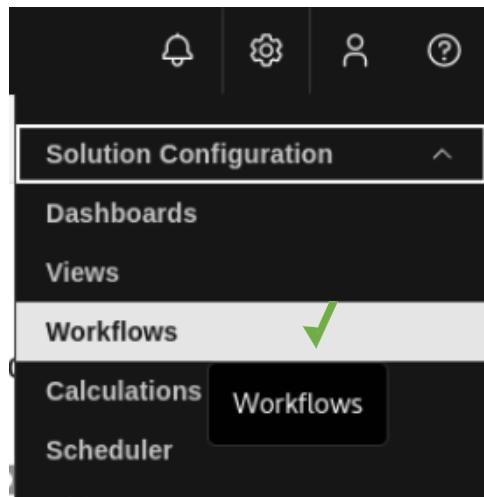
The screenshot shows the "New Issue" dialog box. It has fields for "Issue Owner" (Missy Danforth), "Identified By Individual" (Search users), "Identified By Group" (dropdown menu), and "Due Date" (3/17/2023). At the bottom, there's a note: "What is this Issue related to? Issues can be related to several other GRC components. Select the primary component concerned." A blue arrow points to the "Save" button at the bottom right.

13. You have now created a ticket for an issue for an assigned model developer to resolve.

The screenshot shows a table with columns: Name, Description, Issue Owner, and Issue Status. The 'Name' column contains 'Attrition Prediction_ISS_0000023'. The 'Issue Owner' column shows 'Missy Danforth'. The 'Issue Status' column shows 'Open' with a green checkmark icon next to it. A green checkmark icon is also placed over the entire row.

Name	Description	Issue Owner	Issue Status
Attrition Prediction_ISS_0000023		Missy Danforth	Open ✓

14. One of the primary features of OpenPages is the capability to build AI workflows. Through an embedded GRC workflow editor within OpenPages, one can design process automation. We will not be building a workflow; we will just review a prebuilt one to understand some basic concepts of the tool. The idea one should takeaway is that scalable model production can be achieved through a customized workflow. This feature enables the oversight of an entire AI factory.



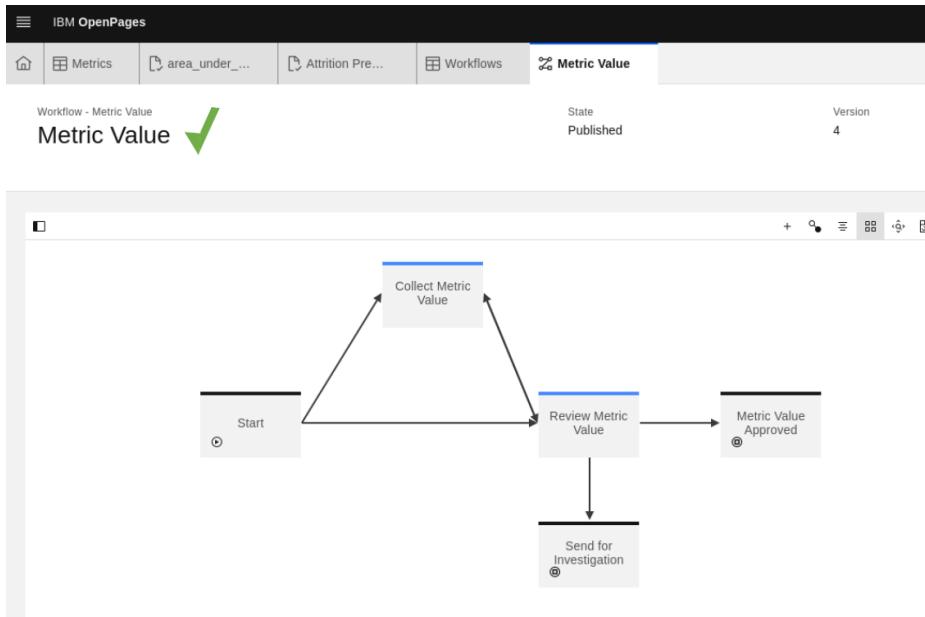
15. In the “[Workflows](#)” window, select “[Metric Value](#)” Label.

Workflows (20) [Workflow Instances](#)

The screenshot shows a list of workflows. The 'Metric Value' entry is highlighted with a green checkmark icon. The columns are 'Label' and 'Name'. The entries are:

Label	Name
Action Item Approval Workflow	Action Item Approval Workflow
FCM Certification - Business Level	Business Level SOX Certification
Challenge	Challenge
Issue Review Workflow	Issue Review Workflow
Metric Value ✓	Metric Value

16. The “Metric Value” workflow was designed to send a Model for investigation when a “Metric Value” is breached.

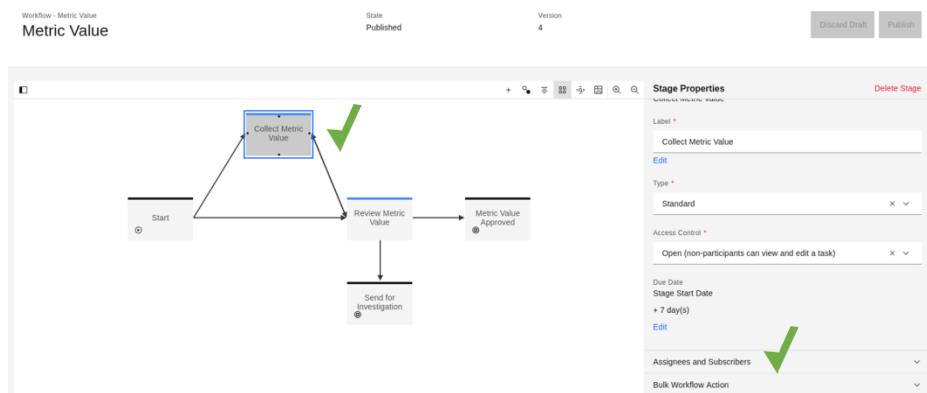


17. Review “Workflow Properties” sidebar on the right. Scroll down to “Oversight”. An oversight person can be designated specifically for workflow processes. In this case, the model owner, will be overseeing any Metric Value violation. This person will be notified of any progress or breach in this workflow. The “Applicability” section enables users to configure under what conditions the workflow should start.

User	Object
Owner (MRG-Metric:Owner)	Primary Parent Only Metric

ID	Field	Operator	Value
No results			

18. Click on the “Collect Metric Value” stage and expand the “Assignees and Subscribers” section. Notice how each stage of the workflow can have different assignees and subscribers.



19. This feature shows how specific overseers can be embedded in different portions of a workflow. In this instance, the Metric Capturer is assigned to Collect Metrics and manage the process around Metric Capture. This role is overseen by a Metric Owner who subscribes to the process and can be notified via reminders.

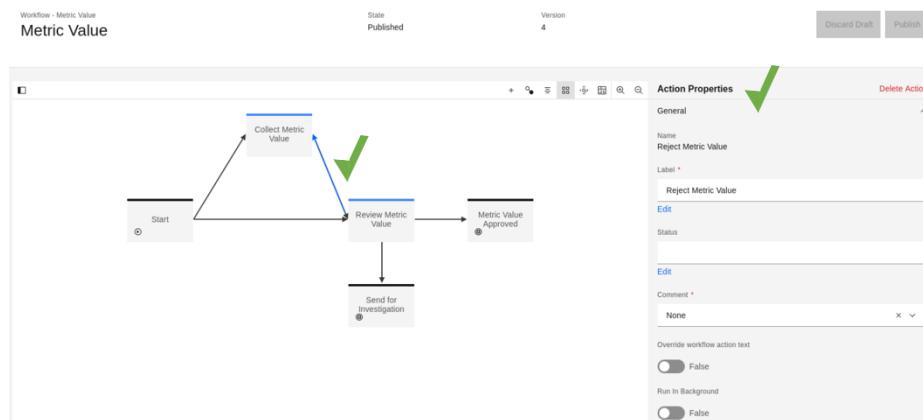
Assignees	
User	Object
Metric Capturer (MRG-Metric-Shared:Metric Capturer)	Metric Value

Subscribers	
User	Object
Metric Owner (MRG-MetricVal:Metric Owner)	Metric Value

Enable Reminders

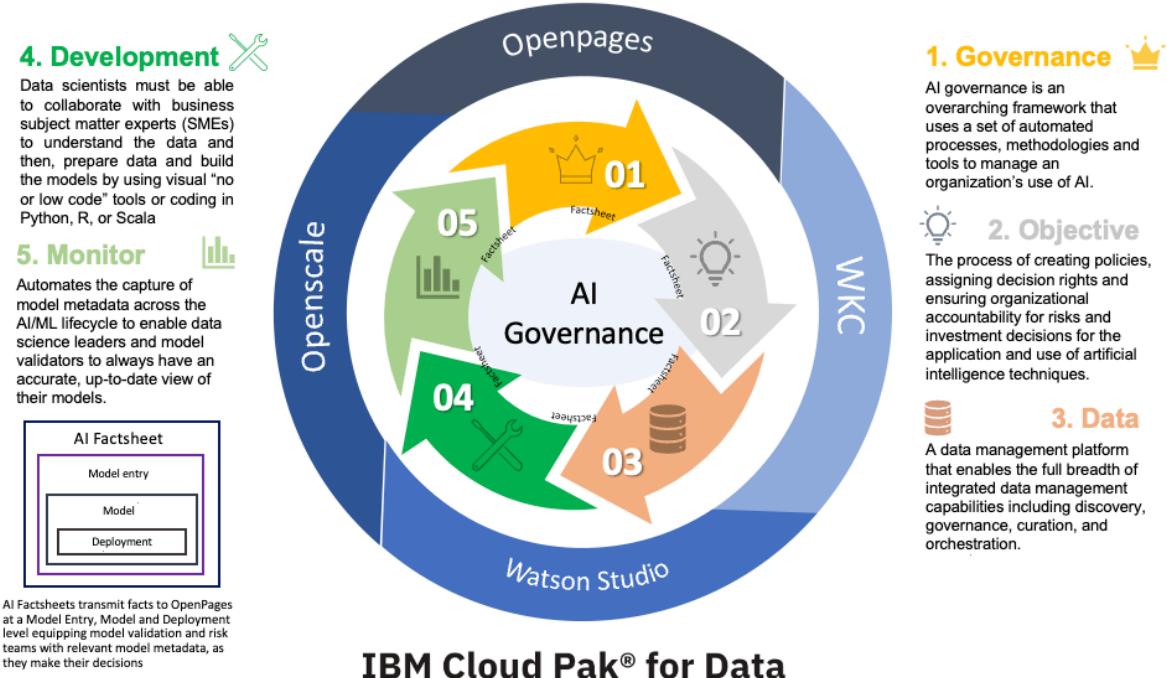
False

20. Click on one of the arrows. Arrows represent actions, which is how you move from one stage to another. Notice how different conditions, validations, and operations can be configured as you move from one stage to another. This enables you to automate tasks (such as updating field values) as an object moves through a workflow. Custom actions can also be configured using a custom java class.



21. You have completed a basic exploration of some OpenPages capabilities.

Congratulations! You have built an AI governance solution to drive responsible, transparent, and explainable AI workflows. Through this journey, you have provided an AI solution to a business challenge, created monitors to ensure fair and unbiased considerations are taken, and created a governance framework to your AI solution.



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