



Governed MLOps Workshop

AI Governance

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Introduction

As artificial intelligence (AI) becomes mainstream across enterprises, AI governance is emerging as the top priority for organizations. AI governance consists of a set of tools and methods designed to deliver trust in AI so business leaders can confidently embed AI models in their business processes and customer interactions.

AI governance enables data science teams and business leaders to operationalize, at scale, AI models developed in heterogeneous environments while adhering to compliance and regulatory requirements by enforcing approval steps and recorded facts at every stage of AI model lifecycle.

Figure 1 illustrates a typical flow for AI model governance which starts with creating a model entry to capture the need for developing an AI model to address a business problem and ends with continuous monitoring of the model deployed in production. Owners, approvals, and recorded facts are recorded throughout the lifecycle of the model. In Figure 1, boxes with solid fill colors denote user actions while boxes with dashed outlines illustrate automation via integrated tooling in Cloud Pak for Data.

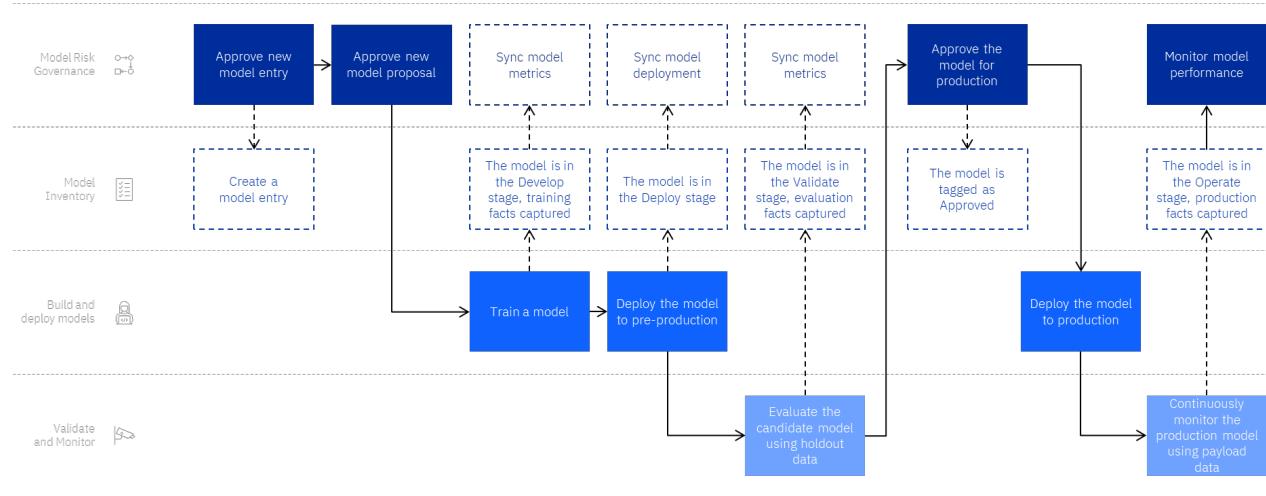


Figure 1: AI Governance Flow

AI Model Lifecycle

Figure 2 illustrates a typical lifecycle of an AI model. It is important to recognize that governance happens throughout – from the moment someone has a good idea for a new model to help solve a business problem, to the point where a model might become obsolete and is retired.

Model Lifecycle

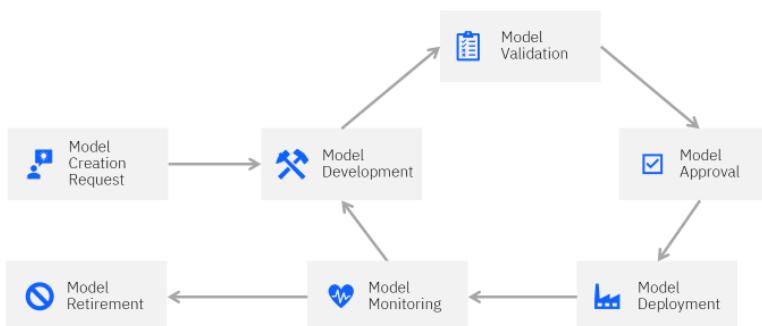


Figure 2: AI Model Lifecycle

In this and the next couple of modules you will step through the various stages in this flow to learn how Cloud Pak for Data supports AI Governance to help organizations develop, deploy, and trust AI models. Specifically, in this module, we start by exploring the AI Governance dashboard in OpenPages. Afterwards, we step through the tasks to create a new model entry request for developing AI models for customer churn prediction.

(Note: the terms *Model Use Case* and *Model Entry* are used interchangeably in this document – they are just different names for the same object. The latter term, *Model Entry*, is being phased out but is still visible here and there.)

AI Governance Dashboard

This section takes you through an overview of the AI Governance dashboard which comes out-of-the-box with the IBM AI Governance solution. For this workshop, we have populated the dashboard with content that relevant for the Telco Churn use case we have been discussing so you can get a better understanding of how OpenPages enables AI model owners to understand the status of their various AI models from a governance perspective. To do so:

- 1- If logged out from Cloud Pak for Data, log back in using your **admin** credentials.
- 2- Navigate to installed service instances by clicking the Navigation menu (top left hamburger icon), expanding the **Services** collection, and clicking **Instances** (annotated with red arrow).

- 3- Click **openpages-instance** (annotated with red rectangle) to load the details view for the OpenPages with Watson instance which is installed and configured on your Cloud Pak for Data cluster.

Name	Type	Created by	vCPU requests	Memory requests (GiB)	Users	Status	Created on
Db2-1 Service instance for db2oltp-1681603303498757	db2oltp	admin	2.20	5.75 Gi	1	green	Apr 15, 2023
openpages-instance OpenPages Instance	openpages	admin	3.25	14.20 Gi	1	green	Feb 26, 2023
data-virtualization	dv	admin	11.50	38.50 Gi	1	green	Feb 26, 2023
ca-metastore Service instance for db2oltp-1677416247069430	db2oltp	admin	0.60	4.25 Gi	1	green	Feb 26, 2023
ProfHbIntrnl	spark	__internal_profiler__	-	-	1	green	Feb 26, 2023
data-management-console Data Management Console	dmc	admin	4.20	10.62 Gi	1	green	Feb 26, 2023
openscale-defaultinstance IBM Watson OpenScale	aios	admin	-	-	1	green	Feb 26, 2023

- 4- On the OpenPages instance details page, click the Launch OpenPages icon (annotated with red arrow) to launch OpenPages in a new browser tab. As you go through the rest of the instructions, it is generally helpful to keep two browser tabs or windows open at the same time to better appreciate how integration works between the various services in Cloud Pak for Data.

Please note that in general, it is not recommended to use the same browser window if you log in with different users as that may cause some conflicts due to browser caching. It is recommended to either use Private or Incognito tabs or use different browsers when you need to log in as a different user.

The screenshot shows the 'Instances /' section of the IBM Cloud Pak for Data interface. It displays detailed configuration for an 'openpages-instance'. Key settings include:

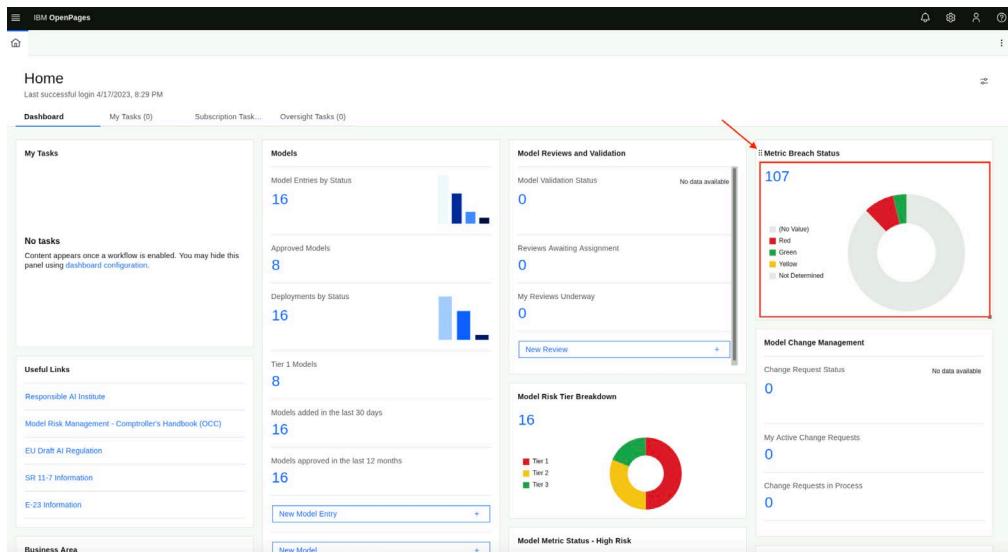
- About this instance:** Version 8.302.0, Created on Sunday, February 26, 2023, Status Running.
- OpenPages configuration:** Application file storage class managed-nfs-storage.
- Database configuration:** Database type Internal database.
- Access information:** URL <https://cpd-cpd.apps.ocpinstall.gym.lan/openpages-openpages-instance/>, a red arrow points to the 'Launch OpenPages' button.
- Size:** Extra Small - 4 vCPUs - supports up to 5 concurrent users.
- Storage:** Data storage class managed-nfs-storage, Metadata storage class managed-nfs-storage, Backup storage class managed-nfs-storage.
- Database secret name:** Database secret name.

- 5- When OpenPages launches, you should be at the **Home** page (annotated with red oval) and viewing the Dashboard of AI models which was populated with content relevant to Telco Churn use.

The screenshot shows the IBM OpenPages Home dashboard. The main features include:

- My Tasks:** No tasks.
- Models:** Model Entries by Status 16, Approved Models 8, Deployments by Status 16, Tier 1 Models 8.
- Model Reviews and Validation:** Model Validation Status 0, Reviews Awaiting Assignment 0, My Reviews Underway 0.
- Metric Breach Status:** 107, a red rectangle highlights this tile. A red arrow points to it.
- Model Risk Tier Breakdown:** 16, showing a donut chart with segments for Tier 1 (red), Tier 2 (yellow), and Tier 3 (green).
- Model Change Management:** Change Request Status 0, My Active Change Requests 0, Change Requests in Process 0.
- Business Area:** Useful Links including Responsible AI Institute, Model Risk Management - Comptroller's Handbook (OCC), EU Draft AI Regulation, SR 11-7 Information, E-23 Information.
- AI Use Cases By Lifecycle Phases:** A chart showing the distribution of AI use cases across lifecycle phases.

- 6- From this dashboard, you can get an easy overview of everything related to the governance of the models in the organization. You can configure this dashboard to your liking by adding, removing, and reordering the widgets. As an example, hover over the **Metric Breach Status** tile (annotated with red rectangle), select the tile **handle** (annotated with red arrow) and drag the tile anywhere on the dashboard to reposition it.



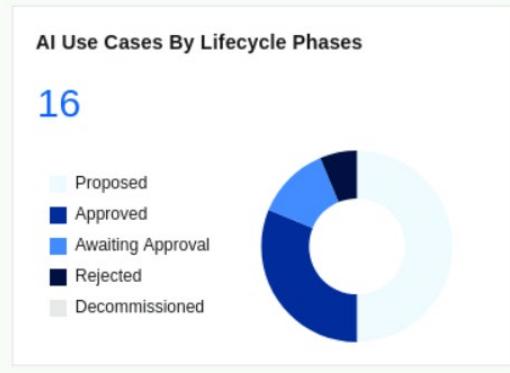
1. Using the dashboard

The dashboard is your launching point for all activities related to model governance: to get insight, to take action, and for quick navigation. We'll review each of these in turn in this chapter.

Insight

First, the dashboard gives you a quick view of the state of affairs of your inventory of models and the governance activities around those models. For example:

- The *AI Use Cases by Lifecycle Stage* panel shows you the number of Model Use Cases that have been registered, broken down by their lifecycle stage.



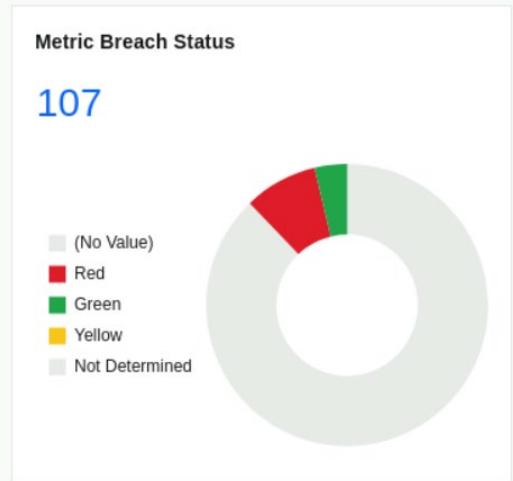
In one view you see the entire pipeline of use cases, from those that are in their initial stages (“Proposed”) all the way through to the end of the lifecycle (“Decommissioned”).

- The *Model Risk Tier Breakdown* panel shows the number of Models that have been registered, broken down by their risk level (based on the associated Risk Scorecard).

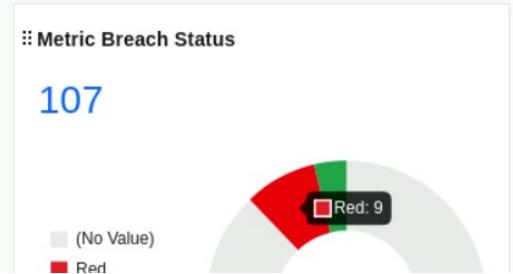


Half of the models are Tier 1, the highest risk tier. Those are the ones where we'll want to apply the “heaviest” governance touch to.

- The *Metric Breach Status* panel shows all recorded metrics, broken down by whether they have a metric value that breaches a threshold value.



You can see there are some “Red” breaches that need to be dealt with. Hover your mouse over the red portion of the donut chart to see the number of red breaches.



Action

Secondly (and maybe more importantly), you can take governance *action* directly from the dashboard. For example:

- Across the top of your dashboard, you will find tabs to access different types of tasks that you have to perform. Each one shows a list of tasks, with a summary chart.

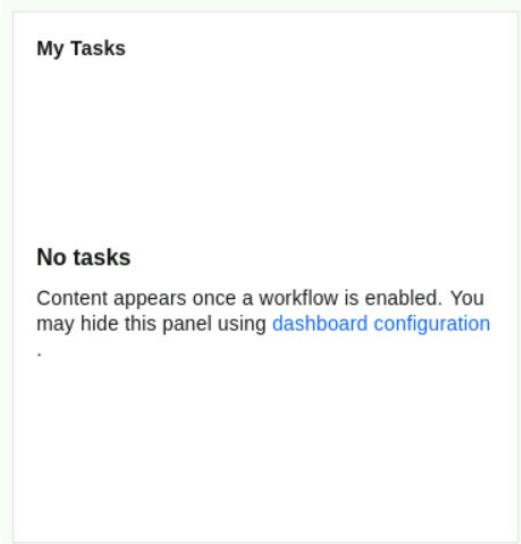
Home

Last successful login 5/30/2023, 7:49 PM

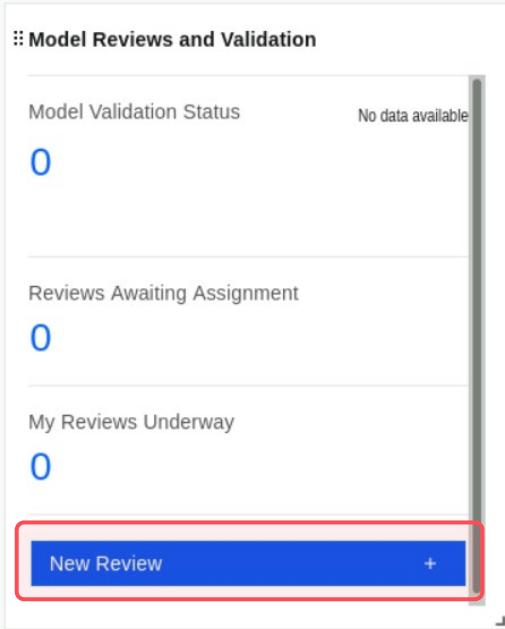
Dashboard My Tasks (0) Subscription Task... Oversight Tasks (0)

- My Tasks: Tasks that are assigned to you to do
- Subscription Tasks: Tasks that you are monitoring, but not doing yourself.
- Oversight Tasks: Tasks for which you have oversight responsibility (for example, tasks that your team members are working on)

- The *My Tasks* panel organizes/color-codes tasks that are assigned to you by due date, relative to a *due soon* timeframe that is set in the panel's configuration. There aren't any tasks showing at the moment.



Panels can have a “New XXXXX” button, such as this *Model Reviews and Validation* panel. From here, you can directly create a new Review object from your home page.



- You can click on the actionable elements (numbers, charts, links etcetera) in any panel to quickly drill down to what you want to work on or view. Let's try this.
 - In the *AI Use Cases by Lifecycle Phase* panel, click on the donut slice that represents the Approved models.



- This opens up a grid view of all Model Use Cases with the status Approved. You can see that filter at top, next to the word Model Entries. This filter is automatically applied based on the slice in the donut chart that you clicked on.

Name	Purpose	Description	Status	Risk Level
<input type="checkbox"/> MODEN-003 Global Telco Company	AI-driven predictive analytics are helping telecoms provide better services by utilizing data, sophisticated algorithms, and machine learning techniques to predict future results based on historical data. This means operators can use data-driven insights to monitor the state of equipment and anticipate failure based on patterns. Implementing AI in telecoms also allows CSPs to proactively fix problems with communications hardware, such as cell towers, power lines, data center servers, and even set-top boxes in customers' homes. In the short term, network automation and intelligence will enable better root cause analysis and prediction of issues. Long term, these technologies will underpin more strategic goals, such as creating new customer experiences and dealing efficiently with emerging business needs.	Predictive Maintenance Model	Approved	Medium
<input type="checkbox"/> MODEN-007 Global Telco Company > Asia Pac > Personnel Connection > Home Internet	AI has a powerful ability to unify and make sense out of a wide range of data, such as devices, networks, mobile applications, geolocation data, detailed customer profiles, service usage, and billing data. Using AI-driven data analysis, telecoms can increase their rate of subscriber growth and average revenue per user (ARPU) through smart upselling and cross-selling of their services. By anticipating customer needs using real-time context, telecoms can make the right offer at the right time over the right channel.	Revenue Growth	Approved	Low

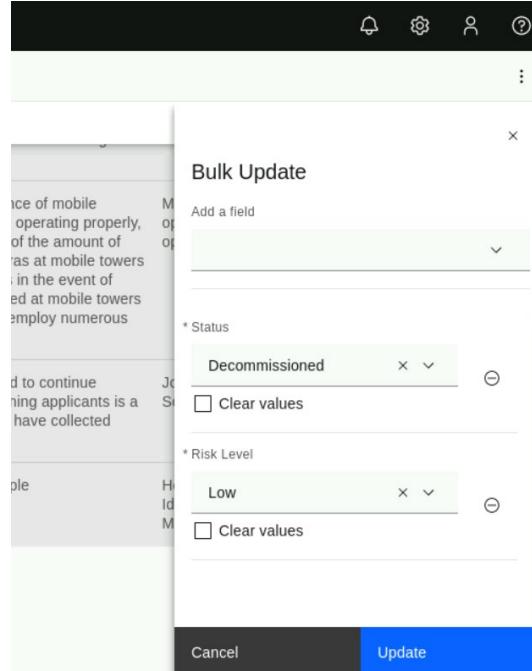
- From here, you can open an individual Model Use Case you want to work on. But you can also take an action on multiple entries.
- Click the **Select All** box to select all Model Use Cases in this view.

Name	Purpose	Description	Status	Risk Level
<input type="checkbox"/> MODEN-003 Global Telco Company	AI-driven predictive analytics are helping telecoms provide better services by utilizing data, sophisticated algorithms, and machine learning techniques to predict future results based on historical data. This means operators can use data-driven insights to monitor the state of equipment and anticipate failure based on patterns. Implementing AI in telecoms also allows CSPs to proactively fix problems with communications hardware, such as cell towers, power lines, data center servers, and even set-top boxes in customers' homes. In the short term, network automation and intelligence will enable better root cause analysis and prediction of issues. Long term, these	Predictive Maintenance Model	Approved	Medium

- In the *menu bar*, click on the **Bulk Update** button that has appeared.

5 items selected					Delete	Bulk Update	Move	Export	Cancel
<input checked="" type="checkbox"/> Name	Purpose	Description	Status	Risk Level					
<input checked="" type="checkbox"/> MODEN-003 Global Telco Company	AI-driven predictive analytics are helping telecoms provide better services by utilizing data, sophisticated algorithms, and machine learning techniques to predict future results based on historical data. This means operators can use data-driven insights to monitor the state of equipment and anticipate failure based on patterns. Implementing AI in telecoms also allows CSPs to proactively fix problems with communications hardware, such as cell towers, power lines, data center servers, and even set-top boxes in customers' homes. In the short term, network automation and intelligence will enable better root cause analysis and prediction of issues. Long term, these	Predictive Maintenance Model	Approved	Medium					

- This feature lets you change multiple options with one action as shown in this screenshot:



- In the *Bulk Update pane*, click on **Cancel** without making any changes.
- In the *menu bar*, click on **Cancel** to unselect all Model Use Cases.

The screenshot shows a list of 'Model Entries' with 5 items selected. The toolbar at the top includes 'Delete', 'Bulk Update', 'Move', 'Export', and a red-boxed 'Cancel' button. The list table has columns for Name, Purpose, Description, Status, and Risk Level. One entry is highlighted: MODEN-003 (Global Telco Company) with a description about AI-driven predictive analytics.

- In the *menu bar*, click on the **Toggle side bar** button.

The screenshot shows the same 'Model Entries' list view, but the 'Filter side bar' is open. A red box highlights the 'New' button in the toolbar. The filter sidebar shows a single public filter named 'Default Filter'.

- This opens the Filter side bar where you can select and manage filters to apply throughout the solution. As you can see there is currently one public filter available. Let's add a second one.

- In the *My Filters* section, click on the **New Filter +** link.

- For *Name*, enter “Recently Updated” then click on **New Condition +**.

- In the *New Condition* screen, for *Field*, select “Last Modification Date” and for *Days*, enter “30”, then click on **Done**.

- On the *New Filter* pane, click on **Save**.

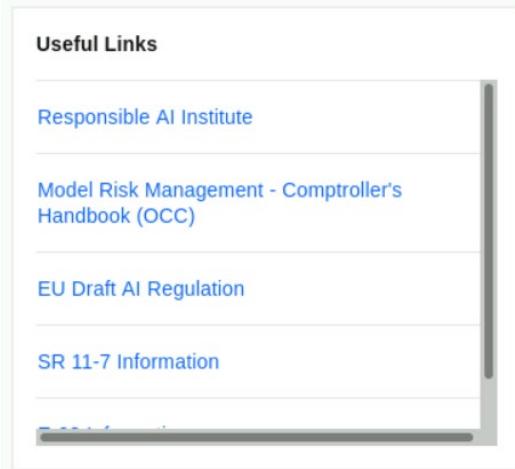
The screenshot shows the IBM OpenPages interface. On the left, a sidebar titled 'New Filter' contains fields for 'Name' (set to 'Recently Updated'), 'Conditions' (with a single condition: 'Last Modification Date is within the last 14 days'), and 'Advanced Logic' (set to 'False'). On the right, a main panel titled 'Model Entries (5)' displays a list of entries. The first entry is 'MODEN-003' (Global Telco Company), which is described as an AI-driven pre-telecoms prediction model using sophisticated learning techniques based on historical data. The list includes other entries like 'AI-Driven Predictive Maintenance' and 'Predictive Power Line Failure'. A red box highlights the 'Save' button at the bottom of the 'New Filter' pane.

- We'll use this filter again later.
- **Leave** the Model Entries tab open, we'll come back here later in the exercise.
- Go back to the **dashboard** on the homepage.

2. Quick navigation

Lastly, the dashboard helps you quickly get to information you need. For example:

- The “Useful Links” panel contains links to information such as regulations or company policies that might be relevant for you.



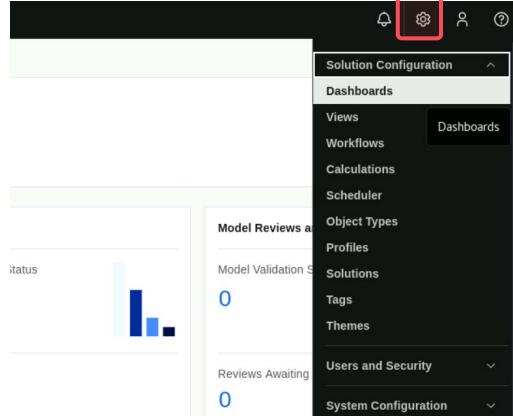
- In the next section of this workshop, we will create a “My Favorites” panel that will show any objects that you “favorite”, perhaps the Model you are currently working on, or a particularly troublesome Use Case you need to access quickly.

3. Configuring the dashboard

Now that we've explored how to use the governance dashboard, let's try making some edits to the dashboards.

Note that your personal dashboard is based on a *dashboard template* that is associated with your user profile. Any changes that you make from the dashboard are changes to your local version of that template.

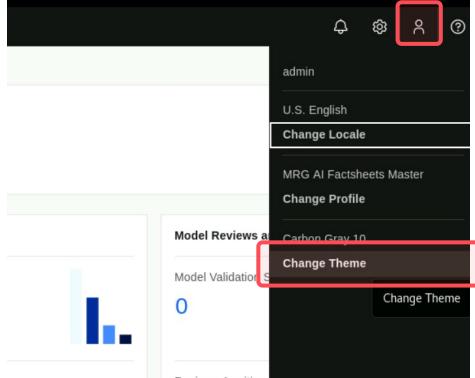
If you wanted to change the dashboard for all users, you will need to have admin rights. Open the *Administration* menu at the top right, expand the *Solution Configuration* section and click on *Dashboards*. From there, select the dashboard you want to change.



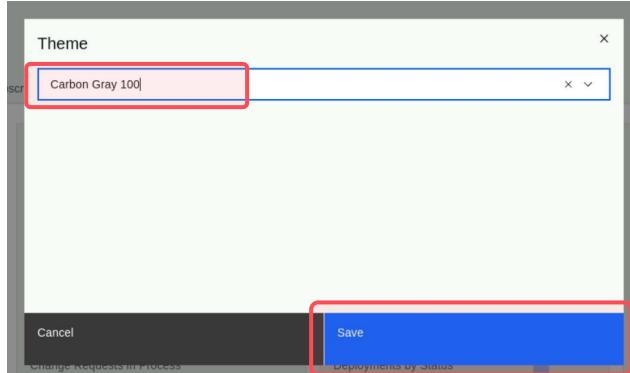
Change the UI theme

Before we change the dashboard itself, let's first change the theme for the UI overall.

- Open your User menu, then select Change Theme.



- From the pulldown menu, select one of the available themes and click on **Save**.



- Notice the UI changing. Keep the changes or revert back to the default theme (Carbon Gray 10).
- The themes available currently are system themes that come with the product and are based on the IBM Carbon design standards. An admin user can create custom themes, for example to reflect a customer's brand style.

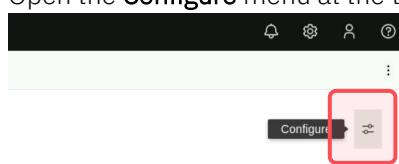
Move and hide panels

- To move a panel:
 - Select one of the panels and drag it one column to the left.

The screenshot shows the IBM OpenPages Home dashboard. The 'Model Change Management' panel is being moved from its current position in the second column to the first column. Red arrows indicate the movement path. The dashboard includes sections for 'My Tasks', 'Models', and 'Model Reviews and Validation'.

Panel	Current Status
Model Change Management	In second column
My Tasks	In first column
Models	In second column
Model Reviews and Validation	In third column

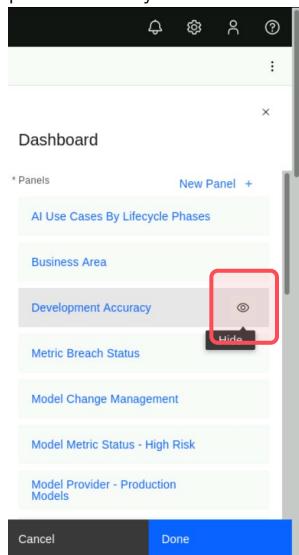
- Notice that the existing content in the panel is pushed down in the column.
- To hide a panel:
 - Open the **Configure** menu at the top right of the dashboard.



The screenshot shows the flyout pane from the 'Configure' menu, displaying all the panels on the dashboard. The panels listed are 'Model Change Management', 'My Tasks', 'Models', and 'Model Reviews and Validation'.

- The flyout pane shows all the Panels on your dashboard.

- Scroll down to the *Development Accuracy* panel and click on the **eye icon** to hide this panel from your dashboard.



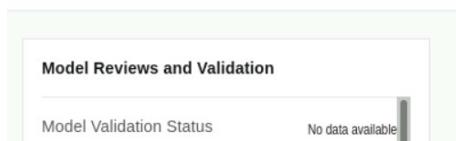
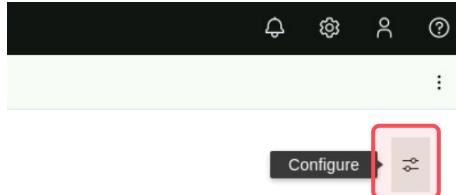
- Note that since this panel is part of the dashboard template, you can only *hide* the panel, but not delete it from the dashboard entirely.
- Click on **Done** to save your change.

Create a new panel

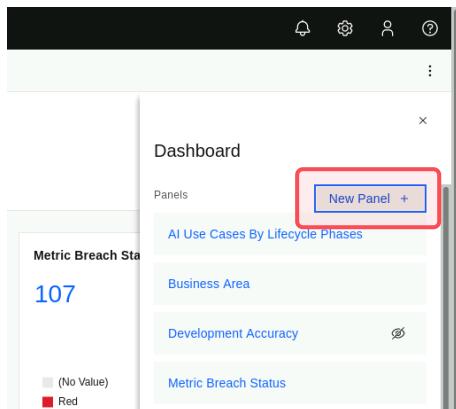
My Favorites panel

As mentioned in the Quick navigation paragraph, it is helpful to have a My Favorites panel on your dashboard so you can jump to your favorite items quickly.

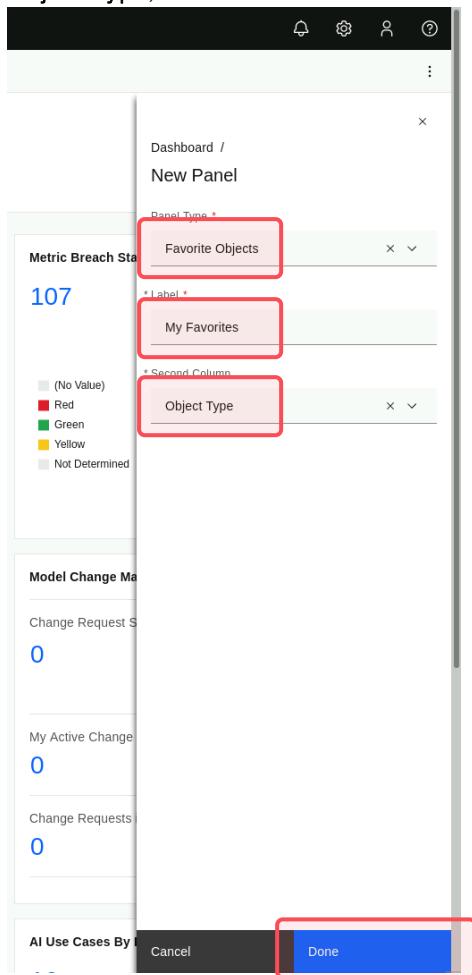
- Open the **Configure** menu at the top right of the dashboard.



- Click on **New Panel +**.



- For **Panel Type**, select **Favorite Objects**, for **Label**, enter “**My Favorites**”, for **Second Column** select **Object Type**, then click on **Done**.



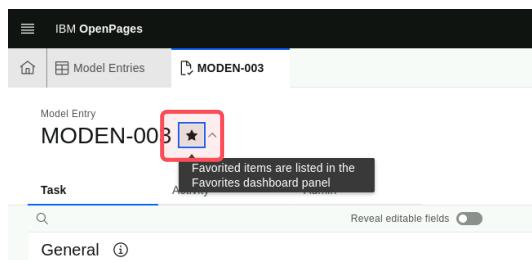
- In the **Configure** menu, also click on **Done** to save your changes.

- On the dashboard, find your new panel.



- As noted, you have not favorited any items yet. Let's try one to see it show up here.

- Go back to the **Model Use Case tab** you viewed in an earlier step.
 - Click on one of the use case entries to open it.
 - Click on the **Star** icon next to model name to mark it as a favorite.



- Go back to your **Homepage** and scroll back down to your Favorites panel. Voila!

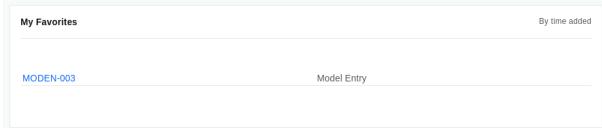


Chart panel

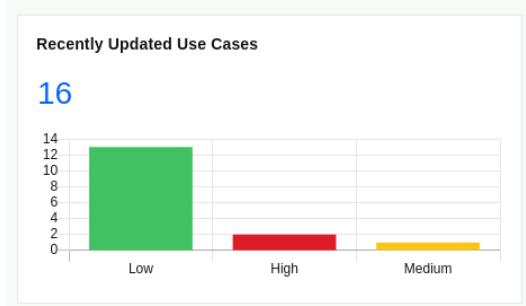
- Open the dashboard's **Configure** menu again and click on **New Panel +**.

- Fill in the screen as follows:

- Panel Type = Chart
- Label = “Recently Updated Use Cases”
- Object Type = Model Entry
- Filter = Recently Updated
(the filter you created earlier)
- Chart Type = Bar
- Chart Data Field = Risk Level
- Method Type = Count

The screenshot shows the configuration interface for a new chart panel. The 'Panel Type' is set to 'Chart'. The 'Label' is 'Recently Updated Use Cases'. The 'Object Type' is 'Model Entry'. The 'Filter' is 'Recently Updated'. The 'Chart Type' is 'Bar'. The 'Chart Data Field' is 'Risk Level'. The 'Method Type' is 'Count'.

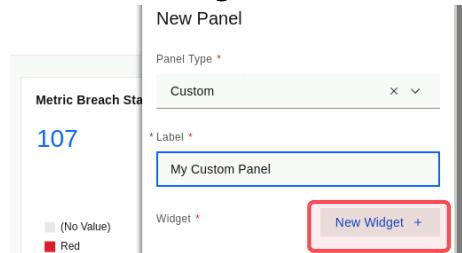
- Click on **Done** to save the panel settings
- Click on **Done** to save the configuration changes.
- You should now have a bar chart that shows the count of use cases updated in the last 30 days, broken down by their risk level.



Custom panel

The custom panel is a highly flexible panel type. It can contain multiple widgets of different types.

- Open the dashboard's **Configure** menu again and click on **New Panel +**.
- For *Panel Type*, select **Custom**, for *Label*, enter “**My Custom Panel**”.
- Click on **New Widget +**.



- Fill in the screen as follows:

- Type = Static Link
- Label = “IBM AI Governance”
- Link = <https://www.ibm.com/products/cloud-pak-for-data/ai-governance>

- Click on **Done** to save the widget settings

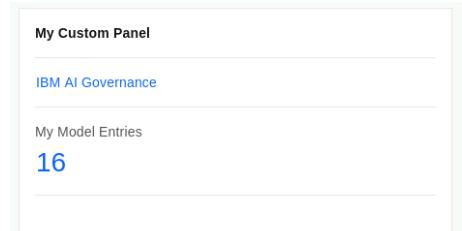
- Click on **New Widget +** to add a second widget

- Fill in the screen as follows:

- Type = Filter Count
- Object Type = Model Entry
- Filter = My Model Entries

- Click on **Done** to save the widget settings

- In the Panel window, click on **Done** to save the panel settings
- In the Configure pane, click on **Done** to save all your settings
- You will now see your custom panel with a hyperlink and a count.



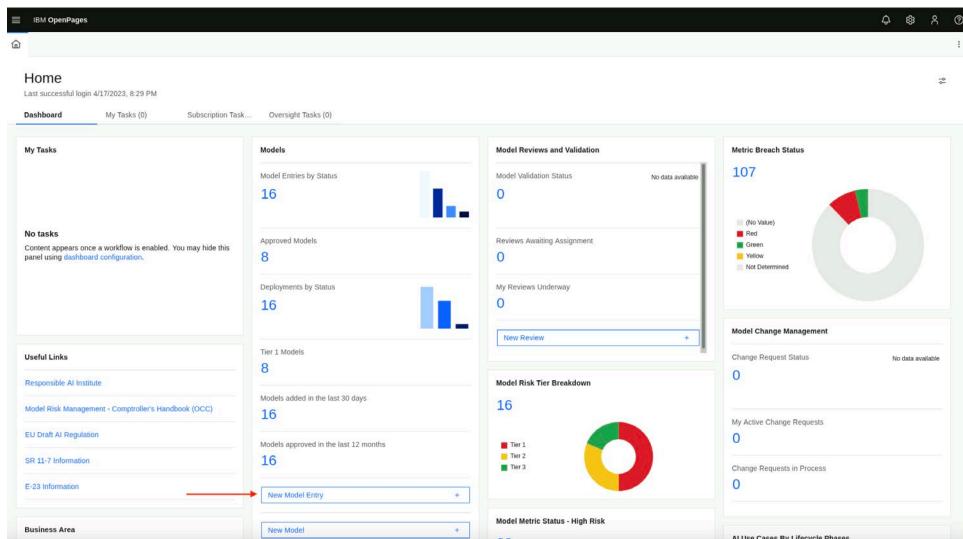
Customer Churn Model Use Case

Now that you've explored the AI Governance dashboard, we will step through creating a new model use case for purposes of predicting customer churn.

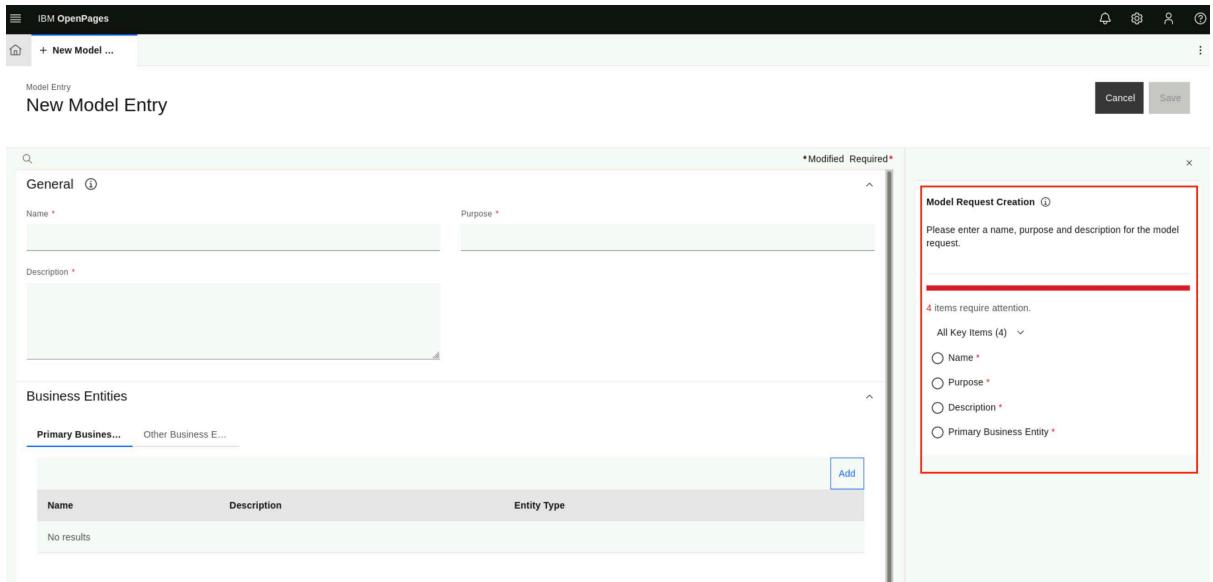
Model Creation Request Workflow

The first set of activities involve creating a model request and getting approval from model owners to proceed with model development.

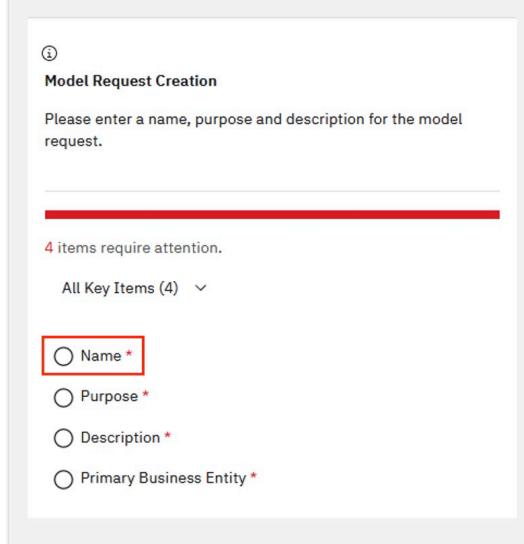
- 1- Navigate back to your Home page where you have the overall AI Governance dashboard. As explained earlier, this dashboard is not just your central source for business intelligence, but it's also the place where you can *take action*. Let's add a new model entry to this inventory for our new churn prediction use case. Scroll down to the **Models** widget and on that widget, click on the **New Model Entry** button (annotated with red arrow).



- 2- On this *New Model Entry* page, there are several fields you can fill in. On the right-hand side, there is a Helper panel (annotated with red rectangle) that shows which fields are mandatory and it also offers some other guidance for this task. Note also that the **Save** button is deactivated (grayed out). It becomes active only after you have provided the required fields on this page.



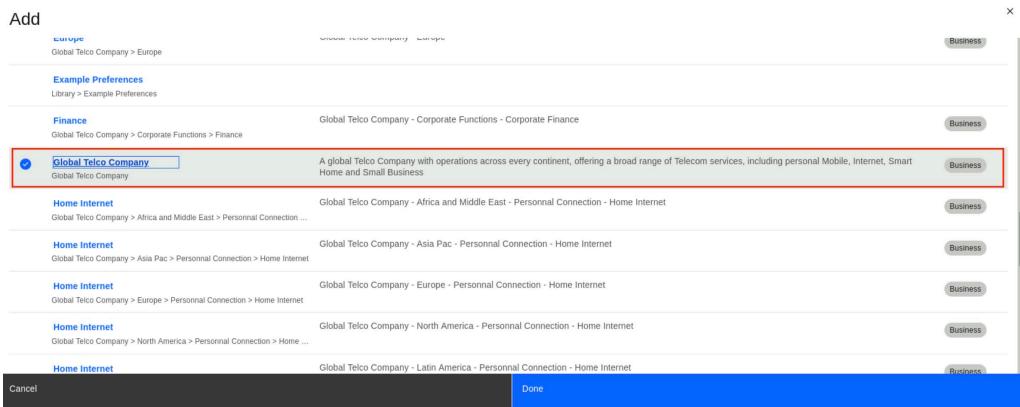
- 3- In the Helper panel, click on **Name** (annotated with red rectangle).



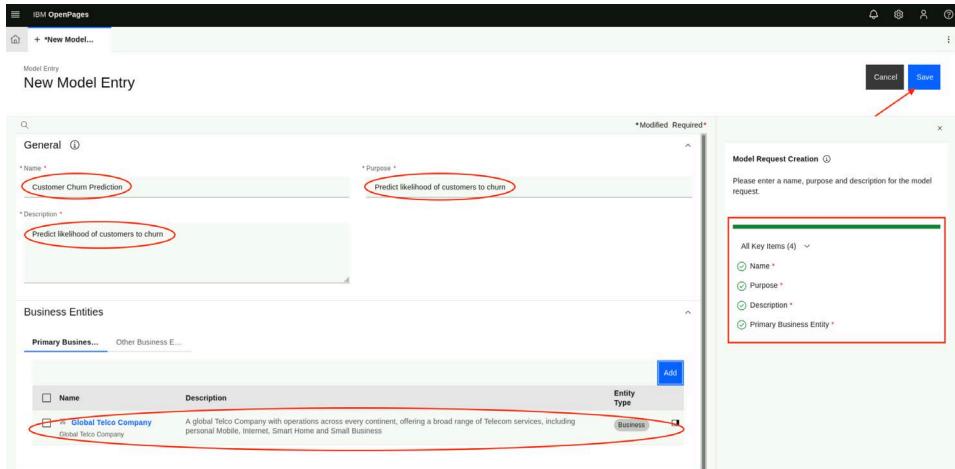
- 4- In the **Name** field, enter “Customer Churn Prediction”.
- 5- Also fill in the **Purpose** and **Description** fields (for example: use “Predict likelihood of customers to churn” for both). Note that as you fill in these fields, the items in the Helper panel are marked as completed and the progress bar moves towards 100%.
- 6- To make sure we have accountability for our models, we must assign this model entry to one of our business entities. Someone must own this new model. On the Business Entities panel, click on **Add** (annotated with red arrow).



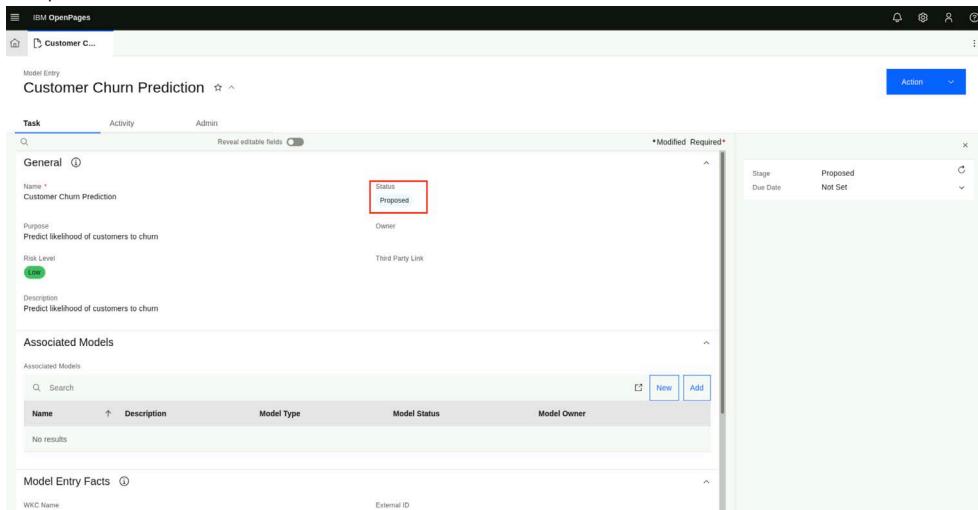
- 7- Scroll down the list and select the **Global Telco Company** entity (annotated with red rectangle) and click the **Done** button.



- 8- Now that you have provided all required information (fields annotated with red ovals), note that the Helper panel shows all green (annotated with red rectangle) since all required fields are completed. Click on the **Save** button (annotated with red arrow) to save this new model entry.



- 9- Note that the Model Entry is now in **Proposed** state (annotated with red rectangle) which effectively means that someone proposed creation of this model to help with the identified Purpose (Predict likelihood of customers to churn).



- 10- Behind every object in IBM AI Governance, like this Model Entry, is a governance workflow which defines the order of tasks and owners. Click on the **Action** button (without selecting any of the options) and observe that the only option is **Submit for Approval** (annotated with red rectangle).

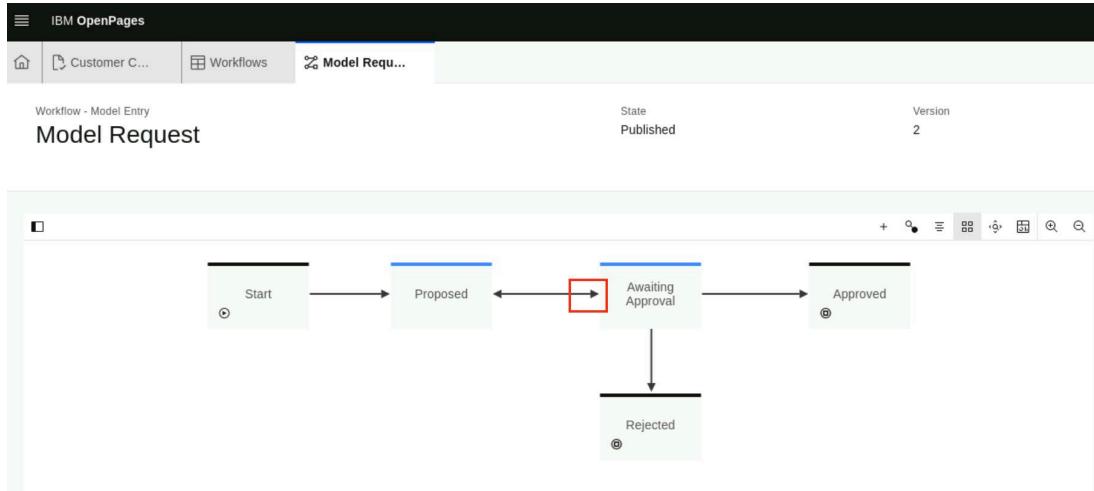
- 11- Before submitting the model for approval, let's have a quick look at that workflow. Open the **Administration** menu (annotated with red arrow), expand the **Solution Configuration** section (annotated with red rectangle) and click on **Workflows** (annotated with red oval).

- 12- Scroll down to find, and click on the **Model Request** workflow (annotated with red rectangle).

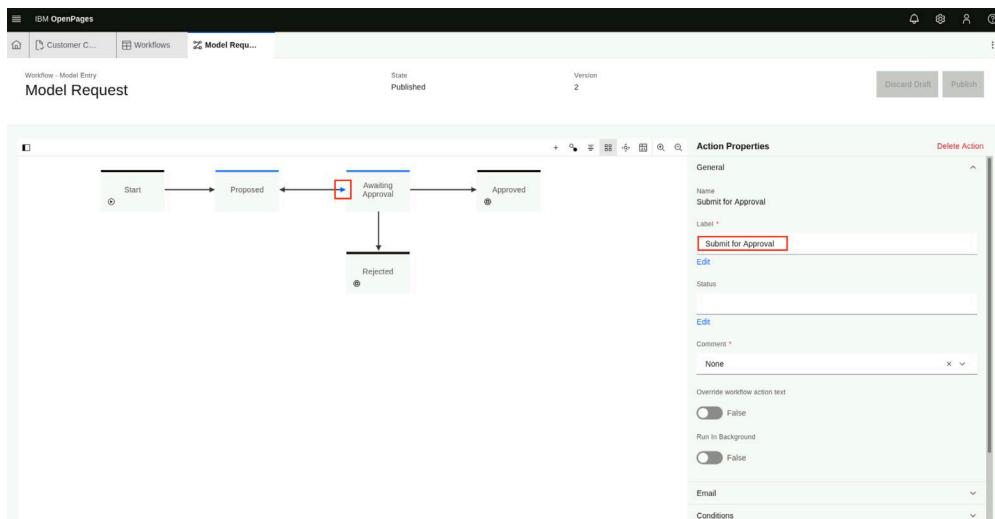
Workflow	Description	Type	Start Type	Owner	Approver	Reviewer
ESG Applicability Assessment - Mandate	ESG Applicability Assessment - Mandate	Mandate	Manual Start	X	✓	✓
ESG Compliance Assessment - Launch	ESG Compliance Assessment	Mandate	Manual Start	X	✓	✓
ESG Compliance Assessment - Requirement	ESG Compliance Assessment Requirement	Requirement	Manual Start	X	✓	✓
Issue Review Workflow	Issue Review Workflow	Issue	Auto Start	X	✓	✓
Metric Value	Metric Value	Metric Value	Auto Start	X	✓	✓
Metric Value Creation	Metric Value Creation	Metric	Manual Start	X	✓	✓
Model Attestation	Model Attestation	Model Attestation	Auto Start	X	✓	✓
Model Candidate	Model Candidate	Model	Auto Start	X	✓	✓
Model Change Request	Model Change Request	Change Request	Manual Start	X	✓	✓
Model Decommission	Model Decommission	Model	Manual Start	X	✓	✓
Model Development	Model Development	Model	Manual Start	X	✓	✓
Model Request	Model Request	Model Entry	Auto Start	X	✓	✓
Model Risk Assessment	Model Risk Assessment	Model Risk Scorecard	Auto Start	X	✓	✓
Policy Review and Approval	Policy Review and Approval	Policy	Auto Start	X	✓	✓
Policy Review Workflow	Policy Review Workflow	Policy	Auto Start	X	✓	X

- 13- As you can see, this is a pretty straight-forward process, and no matter who builds the model, and with what technology, this approval process is always the same. Click on the **arrow head**

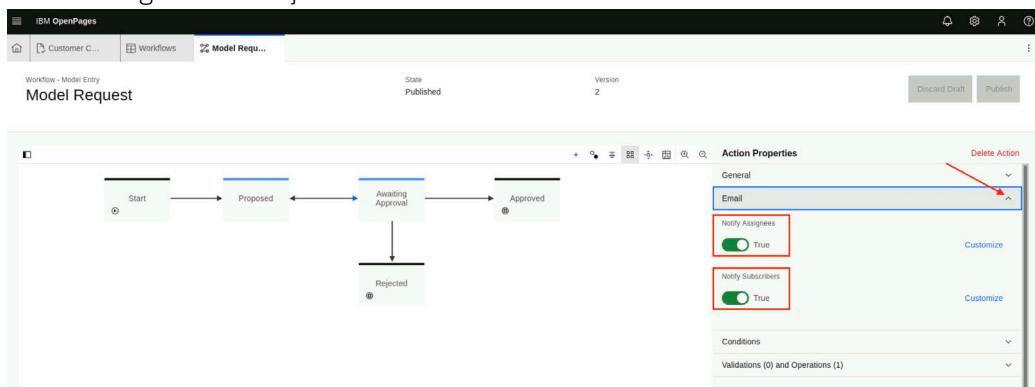
going into the Awaiting Approval box (annotated with red rectangle).



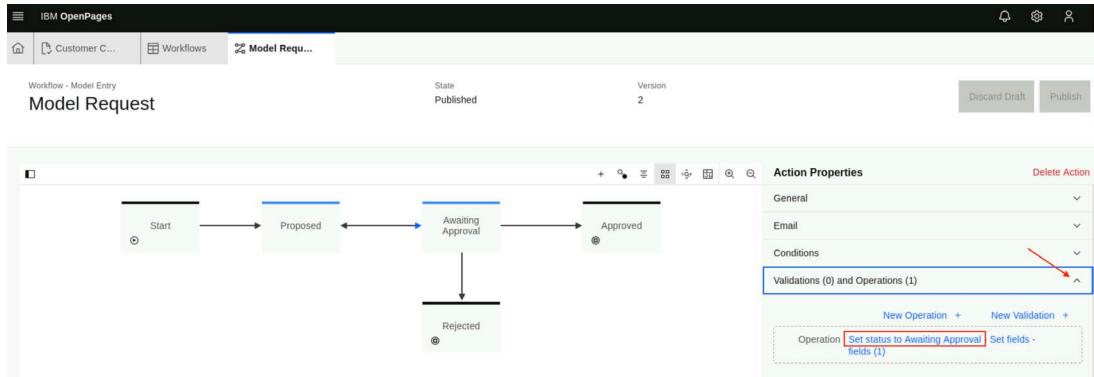
14- You can see in the workflow that when the model entry is in the proposed state (as our demo entry is), there is one action possible. Note in the Action Properties pane the label “Submit for Approval”. These are literally the words that show up under that Action button as illustrated earlier.



15- **Collapse** the General section and **expand** the Email section. Note that Notify Assignees and Notify Subscribers are both set to true (annotated with red rectangles). This means that if you were to click on Submit for Approval, an email is sent to the Assignee(s) of the model entry, as well as any interested Subscribers. This way, all relevant parties are automatically informed about changes to the objects relevant for them.



- 16- **Collapse** the *Email* section and **expand** the *Validations and Operations* section. Also, when you take the submit action, the *status* field is automatically set to *Awaiting Approval*. No more trying to keep spreadsheets or other documents updated manually!



- 17- The workflow we just reviewed is already pre-configured with IBM AI Governance solution but can be adapted to the organization's needs as desired. In addition to the Model Entry Request workflow, there are several other key workflows that are pre-configured as part of IBM's AI Governance solution as illustrated in Figure 3. We're not going to go through all of them in this module, but as you can see, it covers the entire lifecycle from the first idea for a model to final decommissioning when the model is no longer needed. While depicted in a certain left-to-right order here, the actual governance is not strictly linear (especially once a model is approved and deployed). Finally, note that these are the *governance* workflows along a model's lifecycle, not *data science execution* workflows. This doesn't dictate how the data scientists do their job.

Governance Workflows (includes key workflows – not strictly linear)

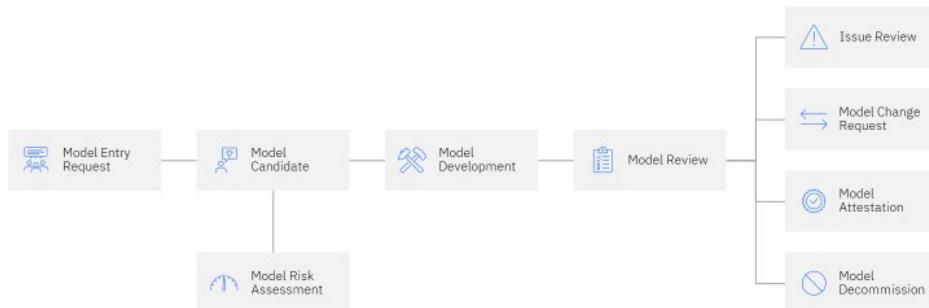


Figure 3: AI Governance Workflows

- 18- Next, in OpenPages, close the tabs for **Model Request workflow** and the **Workflows list**.

Synchronization with data science tooling

- 19- Navigate back to the Model Entry page by clicking on the **Customer Churn Prediction** tab (annotated with red arrow). Notice that the solution auto-generated the **Third Party Link** which links to the corresponding model entry in our data science tooling, which was also auto-generated when you created the model entry in the governance tooling (**automation**). If you don't see that link populated, try refreshing the browser page.
Click on the hyperlink – the model entry in Cloud Pak for Data will open in a separate browser tab.

- 20- You've now switched over to a more technical view of the model entry, more suitable for a data science audience. You'll see more of this at various points in this demo, but for now, notice that the model use case **name**, **description**, **purpose**, **risk level** (annotated with red rectangles) and other characteristics are carried over from the governance tooling – no need to retype or copy/paste all of that (automation, integration).

- 21- The two will stay synchronized from here on out. To illustrate, navigate back to the browser tab with **OpenPages** (annotated with red rectangle) and click the **Customer Churn Prediction** tab (annotated with red oval) to view the model entry page. Click the pencil icon (annotated with red arrow) to edit the Risk Level or the model and change it from Low to **High**. Click **Save**.

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22- Navigate back to the **IBM Cloud Pak for Data** browser tab (annotated with red rectangle) and refresh the browser page. Notice that the **Risk level** has been automatically updated to **High** (annotated with red arrow).

Audit trail

23- Navigate back to the **Customer Churn Prediction** model entry page in OpenPages and go to the **Activity** tab (annotated with red oval). Notice how the platform automatically logs all changes to the model entry giving you a full audit trail of the object. For each activity, you can see what activity was done, who performed that activity and when it was done. Take a minute to review the various recorded activities and how they correlate to the actions you've taken.

The screenshot shows the IBM OpenPages interface with the URL <https://cpd-cpd.apps.ocpinstall.gym.lan/openpages-openpages-instance/app/jspview/react/grc/task-view/30037>. The page title is 'Customer Churn Prediction'. The 'Activity' tab is selected. A red oval highlights the 'Activity' tab, and a red rectangle highlights the 'Action' button. A red arrow points to the 'Submit for Approval' link.

Activity Type	Old Value	New Value	Modified By	Date & Time
Last Update	4/26/23	4/26/23	admin	Apr 26, 2023 9:19:04 PM UTC
Risk Level	Low	High	admin	Apr 26, 2023 9:18:59 PM UTC
Application	Watson Knowledge Catalog		admin	Apr 26, 2023 9:45:50 PM UTC
Catalog ID	545cf64d-ed3d-4424-ab58-8c2edff04476		admin	Apr 26, 2023 9:45:50 PM UTC
External ID	5ae4423b-b1e3-44db-9e10-b351c87a053d		admin	Apr 26, 2023 9:45:50 PM UTC
Last Update	4/26/23		admin	Apr 26, 2023 9:45:50 PM UTC
Third Party Link	https://cpd-cpd.apps.ocpinstall.gym.lan/data/catalogs/545cf64d-ed3d-4424-ab58-8c2edff04476/assets/5ae4423b-b1e3-44db-9e10-b351c87a053d		admin	Apr 26, 2023 9:45:50 PM UTC
Workflow Stage (Status)	Proposed		admin	Apr 26, 2023 9:45:37 PM UTC

Items per page: 50 1–8 of 8 items

24- Switch back to the **Task** tab (annotated with red oval), click **Action** menu (annotated with red rectangle) and select **Submit for Approval** (annotated with red arrow).

The screenshot shows the IBM OpenPages interface with the URL <https://cpd-cpd.apps.ocpinstall.gym.lan/openpages-openpages-instance/app/jspview/react/grc/task-view/30037>. The page title is 'Customer Churn Prediction'. The 'Task' tab is selected. A red oval highlights the 'Task' tab, and a red rectangle highlights the 'Action' button. A red arrow points to the 'Submit for Approval' link.

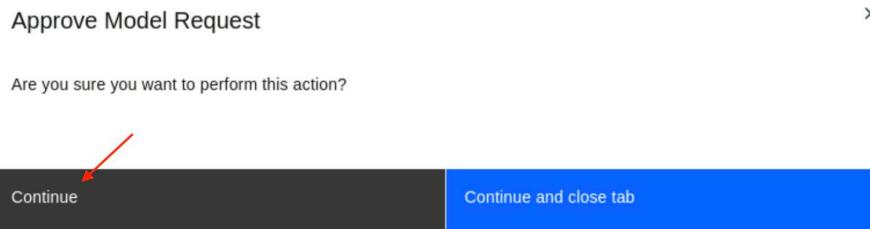
25- On the confirmation screen, select **Continue** (annotated with red arrow).

The screenshot shows a confirmation dialog titled 'Submit for Approval'. The question 'Are you sure you want to perform this action?' is displayed. At the bottom, there are two buttons: 'Continue' (highlighted with a red oval and a red arrow) and 'Continue and close tab'.

26- Notice that the status has been changed to **Awaiting Approval** (annotated with red oval), per the workflow definition we reviewed earlier. Also, the relevant parties would be notified by email (as defined in the workflow) and the next person in the chain would have the task to review the request and reject it, approve it, or request additional information as described in the Actions drop-down menu. In this workshop, you are assuming the role of the admin user who has all permissions and as such, you can take on the next action for this model request. In practice, you would expect the Model Approver to represent the entity who will own this model and they would have the task to review the model and decide whether to approve or

request additional information. Click the **Actions** menu (annotated with red arrow) and select **Approve Model Request** (annotated with red rectangle).

27- On the confirmation page, select **Continue** (annotated with arrow).



28- Great! The status has changed to **Approved** (annotated with red oval) and we're done with this step.

Create and approve the Model Candidate

Next, you will go through the steps to create and approve a Model Candidate. Note that what you created already is a Model Entry, or Model Use Case, which is a container for one or more models. The process for creating a Model Candidate is similar to what you've done already and it would consist of the tasks defined by the Model Candidate workflow.

- 29- On the Customer Churn Prediction Model Entry page (annotated with red oval), scroll down to the **Associated Models** section (annotated with red rectangle) and click **New** (annotated with red arrow) to create a new model candidate.

The screenshot shows the 'Customer Churn Prediction' model entry page. At the top, the title 'Customer Churn Prediction' is circled in red. Below it, the 'Associated Models' section is highlighted with a red rectangle. A red arrow points to the 'New' button in the 'Associated Models' panel, which is part of a modal window titled '*Modified Required*'. The modal contains fields for 'Name', 'Description', 'Model Type', 'Model Status', and 'Model Owner'.

- 30- On the Model page, you will see guidance on the right side to assist you with filling out the form including the set of required fields. Fill out the form with the following values.

Description: *Initial customer churn prediction model*

Model Status: *Proposed*

Model or Non-Model: *Model*

Machine Learning Model: *Yes*

Model Owner: *Missy Danforth (ModelDeveloper@ibm.com)*

Monitored with Watson Studio: *Yes*

Parent Entity: *Global Telco Company*

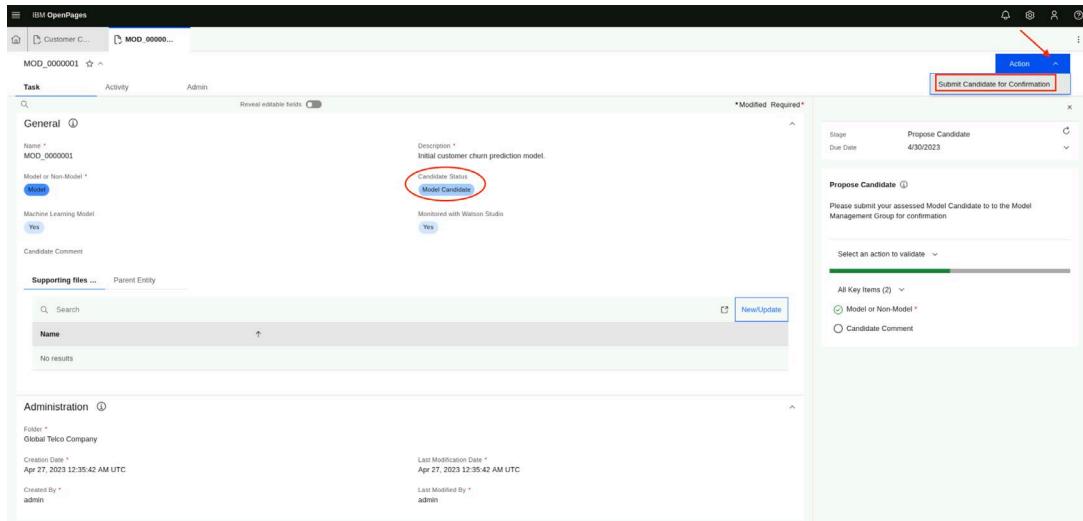
Once you've filled out all these fields, you should see the progress bar all green and all required fields with green check marks (annotated with red rectangle). Click **Save** (annotated with red arrow).

The screenshot shows the 'New Model' page. The top right corner has a status bar with 'Required' highlighted in red. To the right of the main form, there is a sidebar with a red rectangle around the 'All Key Items (3)' section, which lists 'Description', 'Model Owner', and 'Parent Entities'. A red arrow points to the 'Save' button in the top right corner of the main form area.

- 31- Notice the Candidate status is **Model Candidate** (annotated with red oval). Just like the Model Entry, the creation of the Model Candidate has kicked off a workflow and all actions on it are being tracked on the Activity tab.

Optional: If you'd like, you can review the Model Candidate workflow by clicking the

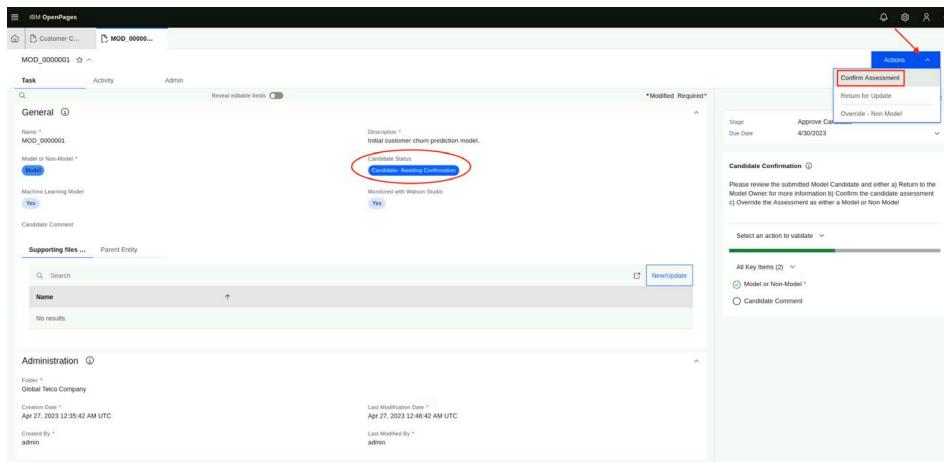
Administration menu (gear icon) and selecting Workflows like you did before. Click the **Action** drop down menu (annotated with red arrow) and select **Submit Candidate for Confirmation** (annotated with red rectangle).



32- On the confirmation page, select **Continue** (annotated with arrow).



33- Notice the status changed to **Candidate – Awaiting Confirmation** (annotated with red oval). Click **Actions drop-down menu** (annotated with red arrow) and select **Confirm Assessment** (annotated with red rectangle).



34- On the confirmation page, select **Continue** (annotated with red arrow).



35- From the Helper panel (annotated with red rectangle), observe there are a few required fields that need to be provided before you can proceed further.

36- Fill out the required fields with the details outlined below.

Proposed Original Date: Today's date

Definition Original Date: Two weeks from today's date

Development Original Date: Four weeks from today's date

Approval Original Date: Two months from today's date

Click **Save** to save the Model Candidate details. Please note that you can always click on the required fields in the Helper panel (annotated with red arrows) to quickly get to the actual field in the form.

37- Scroll up a bit until you see the Model's graphical tree of related objects. This graphic shows all objects related to this model. At the moment, there are two objects: the model entry where we started (annotated with red rectangle) and the business entity for this model (annotated with red oval). As you continue to work on this model, this tree will be expanded

automatically. We will come back here a few times during the rest of the workshop.



Add a Model Risk Scorecard

Before you proceed to kick off the Model development process, there is one more important governance element to discuss: the model risk scorecard. A model risk scorecard provides a consistent and structured way to document the risks associated with a model, regardless of where it will be created. The IBM AI Governance solution comes with a risk methodology out-of-the-box, which can be adjusted to your specific situation.

- 38- On the **Associations** section of the *Model* page, go to the **Model Risk Scorecard** tab (annotated with red oval) and click on **New** (annotated with red arrow).

The screenshot shows the 'Associations' section of the Model page. The 'Model Risk Score...' tab is highlighted with a red oval. To its right, there is a 'New' button with a red arrow pointing to it. The 'Metrics', 'Change Requests', and 'Deployments' tabs are also visible. On the right side of the screen, there is a sidebar titled 'Vista generale del modello' (General view of the model) which lists various key items.

- 39- Fill in the Scorecard with the values as outlined in the screenshot below.

Description: Initial risk scorecard for customer churn prediction model.
When all fields are provided, click **Save**.

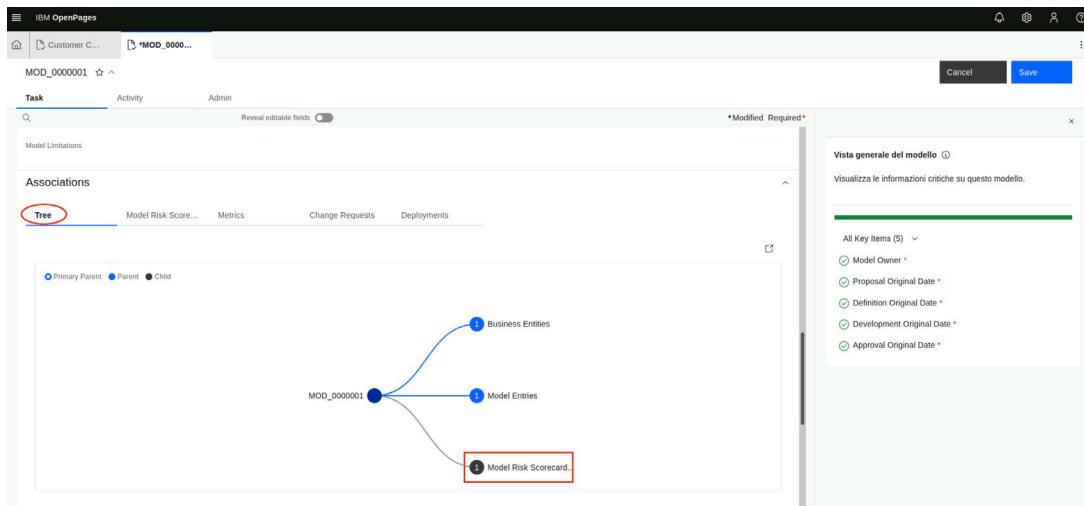
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The screenshot shows the 'New Model...' screen in IBM OpenPages. The 'Scorecard' tab is selected. The 'Assessed Model' section lists a single model entry: MOD_0000001_MTS_0000001. The 'Complexity', 'Materiality', 'Operational', and 'Regulatory' sections contain various component status entries. The 'Model Scoring' section on the right lists 14 items, with a red arrow pointing to the close button ('X') in the top right corner.

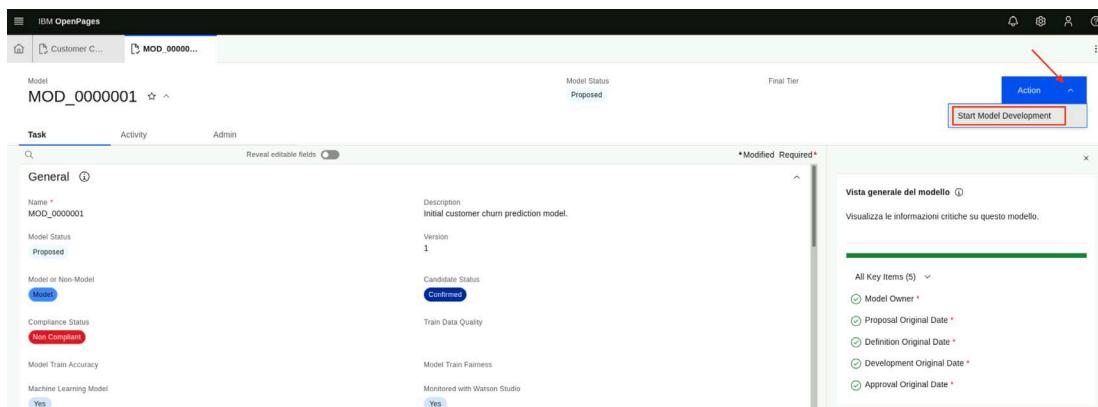
- 40- The Scorecard is initially created in Draft status (annotated with red rectangle). The scorecard itself has an approval workflow associated with it. In the interest of time, we won't go through that now, but this gives you further oversight of how your model risk framework is applied in practice. Close the Scorecard tab by hovering over it and clicking the x icon (annotated with red arrow).

The screenshot shows the Model page with the 'Scorecard' tab selected. A red rectangle highlights the 'Status' field, which is currently set to 'Draft'. A red arrow points to the close button ('X') in the top right corner of the tab. The right panel shows the 'Capture Risk Assessment' section, with a red oval highlighting the 'Tree' tab.

- 41- Back on the Model page, scroll down to the Associations section and specifically, the Tree tab (annotated with red oval). Note the Model Risk Scorecard (annotated with red rectangle) is now shown as an element of this model and would be tracked as model progresses through various stages.



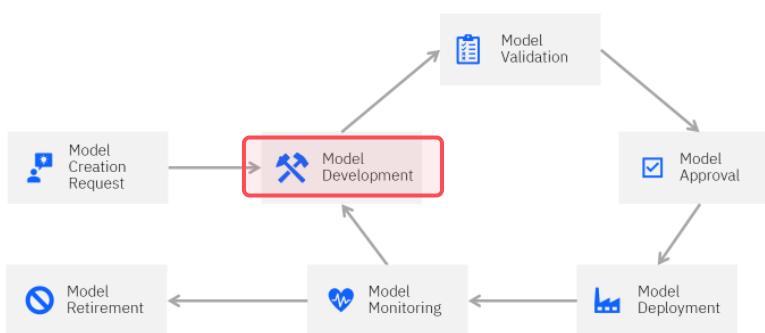
42- Click the **Action** drop-down menu (annotated with red arrow) and select **Start Model Development** (annotated with red rectangle). This would trigger a notification to be sent out to the model developer (or development lead) informing them that model is approved and ready for development. Note you can always review the details of the workflow to understand the various tasks and next steps.



This concludes the Model Creation Request component of the overall Model Lifecycle workflow. Next you will step through the initial stages of the Model Development workflow in OpenPages.

Model Development Workflow

Model Lifecycle



43- To proceed with model development, the workflow dictates notifying the model developer and providing key dates as explained in the Helper panel (annotated with red rectangle). Click on the various required fields in the Helped panel to fill out the required details. Click **Proposal Expected Date** (annotated with red arrow) and provide a target date for proposal. Repeat for the other required dates.

The screenshot shows the IBM OpenPages interface with the 'MOD_000001' model selected. The 'Model Definition' tab is active. On the right, a 'Proposal Checklist' panel is open, specifically the 'Definition and Planning' section. This section includes a note about ensuring a Model Developer is nominated and key dates are set. It lists several items for validation, with the 'Proposal Expected Date' checkbox highlighted by a red arrow.

44- Next, click on Developer field (annotated with red arrow) and select a developer (annotated with red rectangle). At this point, all required information is provided. Click **Save**.

The screenshot shows the 'Model Development' panel. The 'Developer' field is populated with 'Missy Danforth ModelDeveloper@ibm.com'. On the right, the 'Proposal Checklist' panel is shown again, with the 'Developer' checkbox highlighted by a red arrow.

45- Next, click the **Actions** drop down menu (annotated with red arrow) and select **Assign to developer** (annotated with red rectangle). Note that you could have chosen to select Place Planning on Hold if for some reason you chose not to proceed with model development.

The screenshot shows the 'Model Development' panel. The 'Actions' dropdown menu is open, with 'Assign to Developer' selected. A red arrow points to this option. The main panel shows the developer 'Missy Danforth' assigned to the model.

46- On the confirmation page, select **Continue** (annotated with arrow).



47- Next, review the details for Model Development and Documentation provided in the Helper panel (annotated with red rectangle) and then click Model Risk Scorecards (annotated with red arrow) to create or verify a score card had been associated with the model.

The screenshot shows the IBM OpenPages interface for a model development record. The main area displays various model details like category, owner, type, and last updated scorecard. To the right, a large red box highlights the 'Model Development and Documentation' section, which contains instructions for development and documentation status. Below it, another red box highlights the 'Model Risk Scorecards' option in the 'Select an action to validate' dropdown menu.

48- Note how clicking the Model Risk Scorecards redirects you to the Associations section and specifically the Model Risk Scorecard tab (annotated with red oval). Verify you see a model risk score card is already created (annotated with red rectangle) since you had created that earlier in this module. At this point, select the Actions drop down menu and select **Submit for Pre Implementation Review** (annotated with red arrow).

Note the different action items you could take at this point such as:

- Place Development on Hold: This action may be driven by other competing business priorities.
- Return to Model Owner: This may be necessary if the requirements are not clear.
- Cancel Model Development: If it is deemed such a model is no longer required.

The screenshot shows the IBM OpenPages interface for a model entry named MOD_0000001. The 'Actions' dropdown menu is open, highlighting the 'Submit for Pre implementation Review' option. Other options include Place Development on Hold, Return to Model Owner, and Cancel Model Development.

49- On the confirmation page, select **Continue** (annotated with arrow).



At this point, the model has gone through the review and required approval workflow for development to start. Next, you will go through the process of developing this customer churn prediction model using data science tools (Watson Studio) in Cloud Pak for Data.

Summary

In this module, you have setup and configured a model entry (model use case) indicating the need for an AI model to predict the likelihood of a customer to churn. Model has been progressed through the approval by the right owners with all activity tracked and audit-ready. At this time, the model is ready to be developed and that task is owned by the data science team who will go through developing that model in the next module using Watson Studio capabilities in Cloud Pak for Data.