

# Predictive decisioning

300-level live demo script



## Introduction

Thank you for attending this predictive decisioning demonstration.

Today I'll show how IBM Cloud Pak for Business Automation uses machine learning (ML) to enhance customer retention offers. You will learn how to integrate Watson Studio Machine Learning with the Cloud Pak to predict business outcomes. These predictions are used by automated decision services to customize retention offers, lower customer retention costs, and eliminate many paper-based processes.

Business users can quickly start creating and using predictions to improve their everyday processes.

Let's get started!

# 1 - Reviewing the manual call center process

## 1.1 - Show SkyTalk's current manual process

### Narration

SkyTalk, a telecommunications provider, is losing many of its best customers to competitors. SkyTalk needs to reduce customer churn. Let's review the written customer retention policies call center management implemented.

### Action 1.1.1

- Show SkyTalk's Retention Offer document, which was opened during demo preparation.

The screenshot shows a PDF document titled "Retention Policy.pdf" with two pages visible. The first page is titled "SkyTalk marketing division – 2019 Retention offers". It contains two tables. The first table, under "Eligibility", lists: When eligible retention offer, Customer facing for service or operations problems, No specific contract condition, and No customer condition. The "Next Steps" column lists: Confirm the customer's email address, Open latest survey version on [internet.skytalk.com/customerRetentionSurvey/](http://internet.skytalk.com/customerRetentionSurvey/), Enter the customer email in the "submit survey" recipient field, and Click send. The second table, under "Cost", lists US\$ 0. The "Exceptions" column lists: Customer has been surveyed in the last 12 months (Refer to customer history). The second page continues the "Customer upgrade" section, mentioning "Rate plan upgrade - Upgrade the customer from their actual plan to the upper one to provide them with more services and customer advantages". It also includes another table for "Upgrade conditions" with columns for "Customer conditions" and "Upgrade to".

### Narration

Call center agents were asked to understand various retention offers and manually pick the 'best' option to retain the client.

Agents could not make insightful real-time decisions based on SkyTalk's existing customer information. The guidelines were also implemented inconsistently.

SkyTalk's customer retention costs skyrocketed, while attrition remained steady. Management decided to create a new call center application leveraging decision automation and machine learning to provide customer retention offers.

## 2 - Modeling the business rules

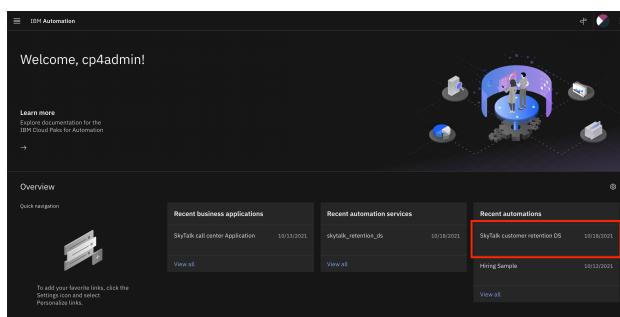
### 2.1 - Review the components of SkyTalk's retention decisions

#### Narration

A business analyst in the customer care division uses machine learning and decision automation technologies to configure the call center's new retention offer application. The business analyst writes the business rules to generate retention offer recommendations.

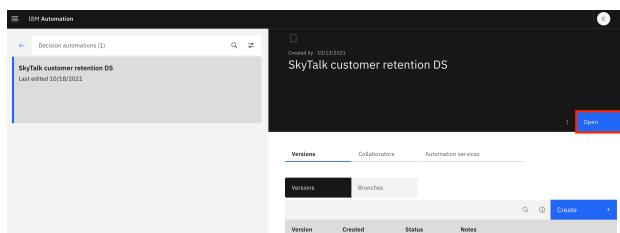
#### Action 2.1.1

- Access the Business Automation Studio on the IBM Automation home page window, opened during demo preparation. Then click **SkyTalk customer retention**.



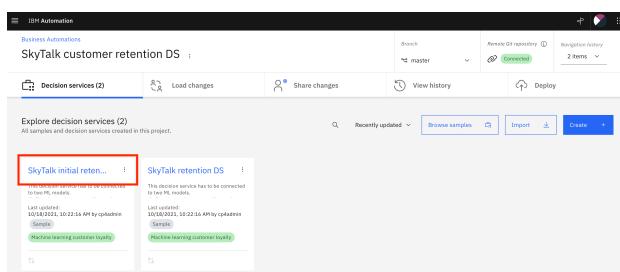
#### Action 2.1.2

- Click **Open**.



#### Action 2.1.3

- Click the **Initial retention**.



## Action 2.1.4

- Click **Retention offer**.

The screenshot shows the IBM Automation interface with the title 'IBM Automation' at the top. Below it is the URL 'Business Automation / SkyTalk customer retention DS'. The main area is titled 'SkyTalk initial retention DS :'. There are tabs for 'Models', 'Data and libraries', and 'Decision operations'. Under 'Models', there is a search bar and a table with one item: 'Retention offer' (last updated by cpadmin on 10/18/2021 at 10:22:16 AM). The table includes columns for 'Name', 'Last updated by', and 'Last updated at'. At the bottom of the table are pagination controls: 'Items per page: 100', '1-1 or 1 items', and '1 of 1 pages'.

## Narration

The diagram shows a hierarchical model of SkyTalk's retention offer business rules, which is called a decision service. Each blue box represents a sub-decision. The green rounded boxes represent the input data.

The 'Determine retention offer' decision service requires two sub-decisions: 'Ranked retention offers' and 'Retention budget.' The retention budget decision will be enhanced with predictions to customize retention offers.

Let's take a closer look at one sub-decision to see how the decision logic defines decision-making.

## Action 2.1.5

- Review the **Decision Model** of the **Retention offer**.

The screenshot shows the IBM Cloud Pak for Integration interface with the title 'IBM Cloud Pak | Automation' at the top. Below it is the URL 'Business Automation / Customer retention / Initial retention / Retention offer'. The main area is titled 'Retention offer Decision model'. It shows a hierarchical decision tree with nodes: 'Determine retention offer offer' (blue box), 'Ranked retention offers List of offer' (blue box), 'Retention budget number' (blue box), 'Upgrade policy string' (blue box), 'Subscription subscription' (green rounded box), and 'Customer customerRecord' (green rounded box). The 'Upgrade policy string' node is highlighted with a red box. On the right side, there is a detailed view of the 'Retention offer' decision model with its descriptive comment: 'Recommend the best offer to make to a customer in order to prevent churn.'

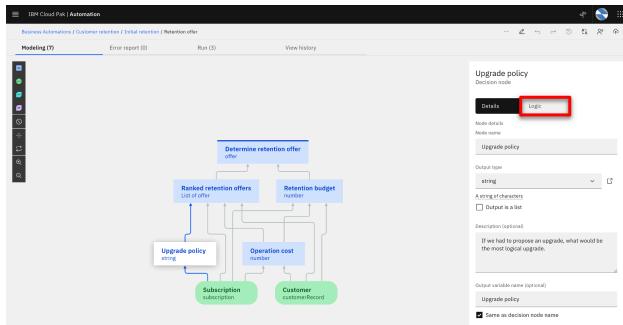
## Action 2.1.6

- Click the **Upgrade policy** box.

The screenshot shows the IBM Automation interface with the title 'IBM Automation' at the top. Below it is the URL 'Business Automation / SkyTalk customer retention DS / SkyTalk initial retention DS'. The main area is titled 'Retention offer Decision model'. It shows the same hierarchical decision tree as the previous screenshot, with the 'Upgrade policy string' node highlighted with a red box. The 'Subscription subscription' and 'Customer customerRecord' nodes are also visible.

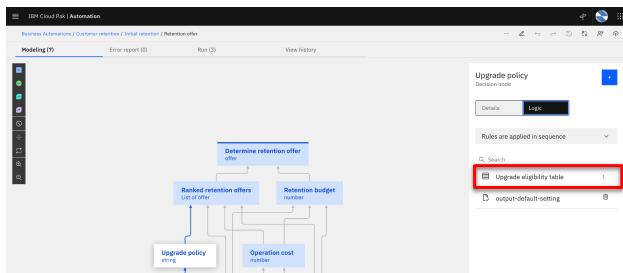
### Action 2.1.7

- Click the **Logic** tab.



### Action 2.1.8

- Click **Upgrade eligibility table**.



### Narration

The upgrade eligibility criteria are expressed in a decision table. Each row corresponds to a specific eligibility business rule.

By hovering the cursor on a row, the analyst can review the business rule in natural language. In this example, a SkyTalk Gold customer must have a subscription amount of at least \$160 USD to be eligible for a Premium upgrade.

### Action 2.1.9

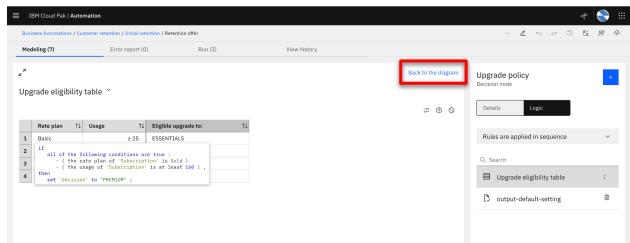
- Show the **Upgrade eligibility table** decision table. Move the cursor over **row 3** to show the equivalent rule in natural language.

This screenshot shows the 'Upgrade eligibility table' decision table. The table has columns: 'Rate plan', 'Usage', 'Eligible upgrade to', and 'T1'. Row 3 is highlighted with a red arrow pointing to its first column. The natural language rule for Row 3 is: 'If all of the following conditions are true: 1. the rate plan of 'customer' is Gold ; 2. the usage of 'subscription' is at least 160 ; then set 'upgrade\_to' to PREMIUM ;'. The rest of the rows are also visible in the table.

Rate plan	Usage	Eligible upgrade to	T1
1	>25	ESSENTIALS	
2	All of the following conditions are true:		
	1. the rate plan of 'customer' is Gold ;		
	2. the usage of 'subscription' is at least 160 ;		
3		PREMIUM	

## Action 2.1.10

- Click **Back to the diagram**.



## Narration

The ‘Ranked retention offers’ top-level decision cycles through the list of eligible offers and selects the least expensive one that does not exceed the calculated retention budget for the given customer.

The analyst will enhance the ‘Retention budget’ sub-decision by incorporating an estimate of the maximum amount SkyTalk should spend to keep the customer. The estimate is calculated using two predictions: (1) the customer’s lifetime value, and (2) the customer’s propensity to churn.

In the next section, the business analyst uses IBM Watson Studio to create these two predictions.

## 3 - Creating the predictive models

### 3.1 - Show the data sources used for prediction

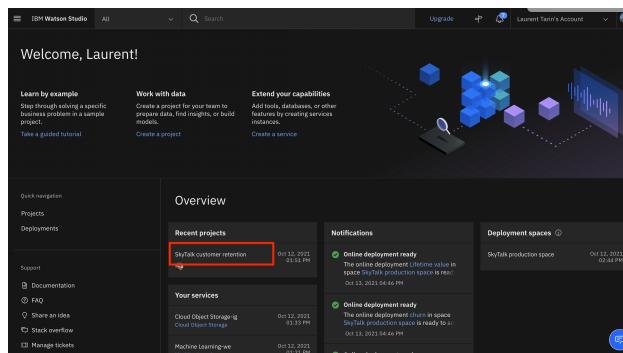
#### Narration

The business analyst creates and deploys the machine learning models used for the predictions.

Five years of data from SkyTalk's customer database has been loaded into IBM Watson Studio. The analyst will use this data to develop predictions for customer lifetime value and churn.

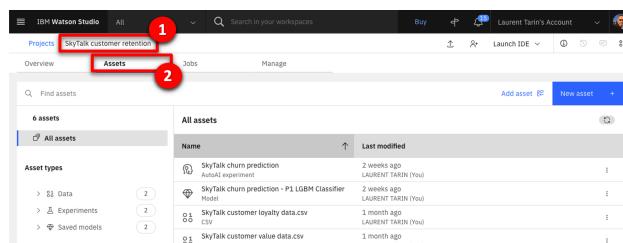
#### Action 3.1.1

- Click the **SkyTalk customer retention** project, which was opened during the demo preparation.



#### Action 3.1.2

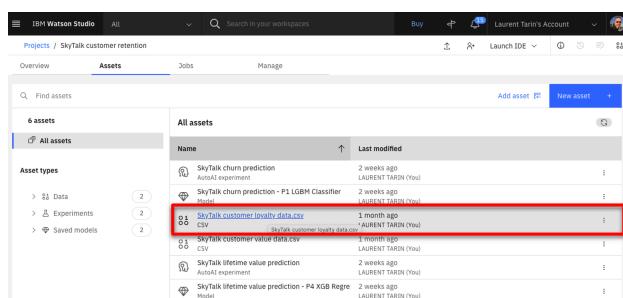
- Click **SkyTalk customer retention** (1). Then, click the **Assets** tab (2).



Name	Last modified
SkyTalk churn prediction	2 weeks ago
SkyTalk churn prediction - P1 LGBM Classifier	2 weeks ago
SkyTalk customer loyalty data.csv	1 month ago
SkyTalk customer value data.csv	1 month ago

#### Action 3.1.3

- Open the **SkyTalk customer loyalty data.csv** file.



Name	Last modified
SkyTalk churn prediction	2 weeks ago
SkyTalk churn prediction - P1 LGBM Classifier	2 weeks ago
SkyTalk customer loyalty data.csv	1 month ago
SkyTalk customer value data.csv	1 month ago

## Narration

Watson Studio generates models that predict customer churn. Model generation is referred to as an ‘AutoAI experiment.’

The business analyst reviews the uploaded historical data file to make sure it contains the data required to predict customer churn.

T (true) in the Churn column indicates the customer closed their SkyTalk account. F (false) indicates the customer remained with SkyTalk.

### Action 3.1.4

- Review the displayed **SkyTalk customer loyalty data.csv** file.

CHURN (String)	Gender (String)	Status (String)	Household (String)	Est Income (String)	Car Owner (String)	Age (String)	Payment method (String)	Usage (String)	Rate (Rate)
F	S	1	38000	N	24.393333	CC	239.64	3	
F	M	M	2	29616	N	49.426667	CH	75.29	2
F	M	M	0	19732.8	N	50.473333	CC	47.25	3
F	M	S	2	96.33	N	56.473333	CC	59.01	1
F	F	M	2	52004.8	N	25.14	CH	28.14	1
F	M	M	2	53010.8	N	18.84	CC	58.87	1
F	M	M	1	75004.5	N	64.8	CC	58.72	1
F	M	M	0	19745.3	N	60.366667	CC	34.17	3
F	M	S	1	57626.9	Y	43.906667	CC	48.35	2
F	M	M	2	20078	N	32.846667	CC	15.98	4
F	F	M	2	47902	N	26.033333	Auto	72.31	2
T	M	M	1	7545.96	Y	16.753333	CC	200.75	3
T	F	S	0	78851.3	N	48.273333	CC	29.04	4
T	F	S	1	17460.7	Y	62.786667	Auto	36.2	
T	F	M	0	83891.9	Y	63.02	CH	74.4	

### Action 3.1.5

- Click **SkyTalk customer retention** in the breadcrumb navigation.

CHURN (String)	Gender (String)	Status (String)	Household (String)	Est Income (String)	Car Owner (String)	Age (String)	Payment method (String)	Usage (String)	Rate (Rate)
F	M	H	1	38000	N	24.393333	CC	239.64	3
F	H	H	0	29616	N	49.426667	CH	75.29	2
F	H	H	2	19732.8	N	50.473333	CC	47.25	3
F	H	S	2	96.33	N	56.473333	CC	59.01	1

## Narration

The business analyst starts an AutoAI experiment to create models that predict customer churn. Models are referred to as ‘pipelines.’

The AutoAI tool analyzes historical data to generate multiple pipelines.

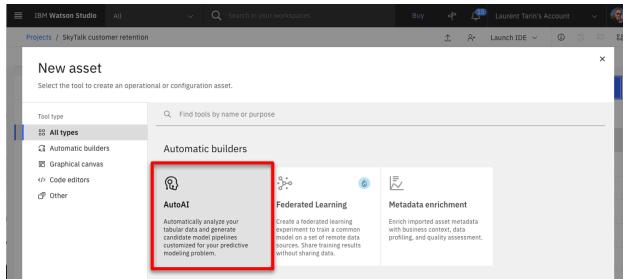
### Action 3.1.6

- Click **New asset**.

Name	Last modified
SkyTalk churn prediction	2 weeks ago LAURENT TARIN (You)
SkyTalk churn prediction - P1 LGBM Classifier Model	2 weeks ago LAURENT TARIN (You)
SkyTalk customer loyalty data.csv	1 month ago

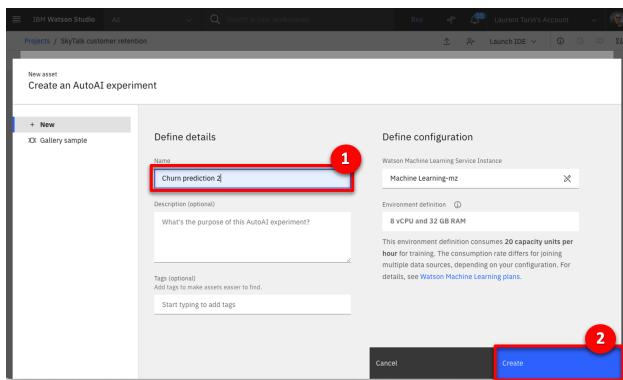
### Action 3.1.7

- Select **AutoAI**.



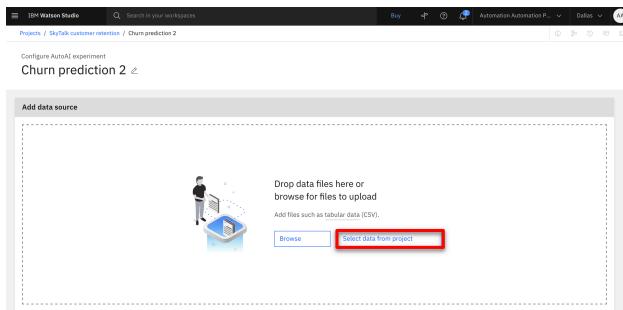
### Action 3.1.8

- Name the experiment '**Churn prediction 2**' (1) and click **Create** (2).



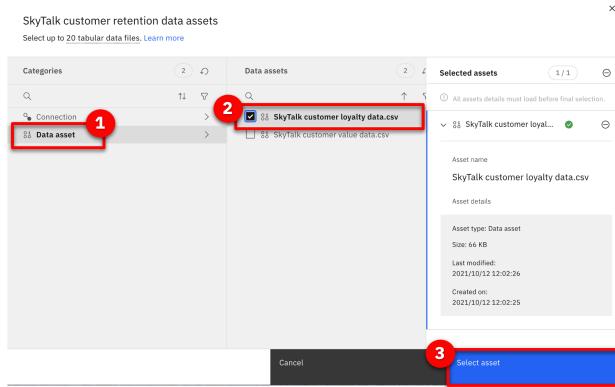
### Action 3.1.9

- Click **Select data from project**.



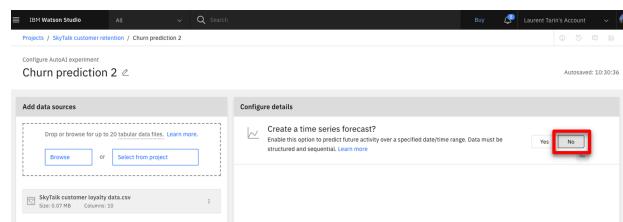
### Action 3.1.10

- Click **Data asset** (1) and select the **SkyTalk customer loyalty data.csv** file (2). Click **Select asset** (3).



### Action 3.1.11

- Click **No** in the **Configure details** section.



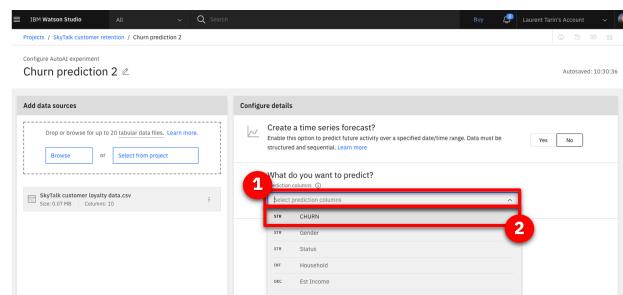
### Narration

The analyst chooses the customer loyalty data file and selects Churn in the ‘What do you want to predict’ dropdown menu.

The AutoAI tool analyzes historical data and automatically generates various pipeline choices. It also tests the pipelines’ predictions so the business analyst can easily compare them across several accuracy measures.

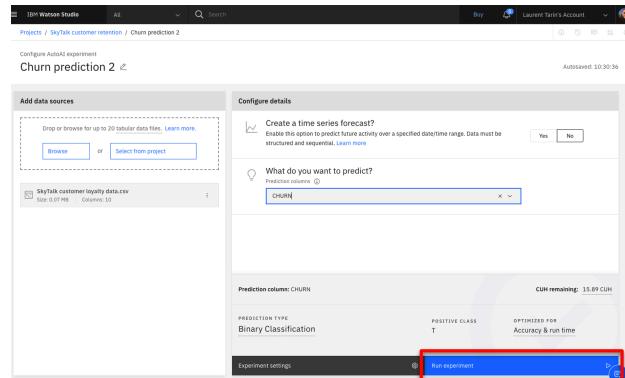
### Action 3.1.12

- Click **Select prediction columns** (1) and select **CHURN** (2) as the measure to predict.



### Action 3.1.13

- Click **Run experiment**.



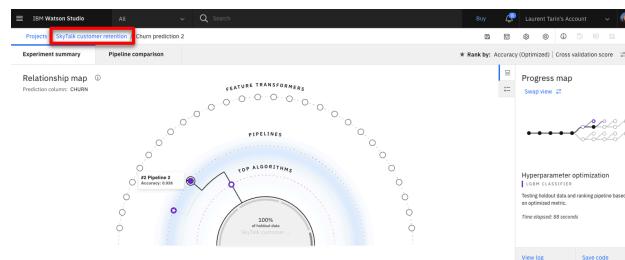
### Narration

The results automatically suggest eight different pipelines. The pipelines use different ML optimization approaches to make predictions.

The business analyst evaluates the pipelines' various prediction accuracy measures.

### Action 3.1.14

- Click **SkyTalk customer retention** in the breadcrumb menu.



### Narration

Let's jump to a finalized experiment corresponding to the same data set.

### Action 3.1.14

- Click the **SkyTalk churn prediction** AutoAI experiment.

A screenshot of the IBM Watson Studio interface showing the 'Assets' tab. The table lists six assets under the 'All assets' section. The asset 'SkyTalk churn prediction - P1 LGBM Classifier' is highlighted with a red box. The table columns include 'Name', 'Last modified', and a delete icon.

All assets	Name	Last modified
0 Data	SkyTalk lifetime value prediction - P4 XGB Regressor	59 minutes ago LAURENT TARDI (You)
1 Experiments	SkyTalk lifetime value prediction	1 hour ago LAURENT TARDI (You)
2 Saved models	SkyTalk customer value data.csv	1 hour ago LAURENT TARDI (You)
	SkyTalk churn prediction - P1 LGBM Classifier	1 hour ago LAURENT TARDI (You)
	SkyTalk churn prediction - final experiment	1 hour ago LAURENT TARDI (You)
3 CSV	SkyTalk customer loyalty data.csv	1 hour ago LAURENT TARDI (You)

## 3.2 - Choose the best predictive model

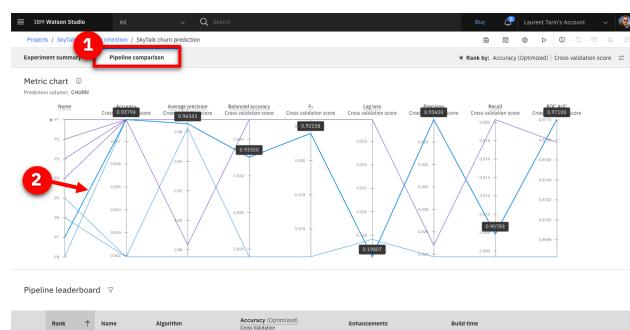
### Narration

On the ‘Pipeline Comparison’ chart, the business analyst examines how each pipeline ranks by various measures of accuracy.

For example, Pipeline 7 has the highest accuracy in differentiating useful data from noise. This is determined by the area under the ROC (receiver operating characteristic) curve and displayed on this chart in the ROC AUC column.

#### Action 3.2.1

- Click **Pipeline comparison** (1) and move the cursor over the pipeline 7 line (2) (P7 on the left of the graph) to highlight the different values for this pipeline.



### Narration

Scrolling down and selecting a Pipeline provides additional details.

#### Action 3.2.2

- Note which pipeline has a **star** icon (1) in its row, which indicates it has the highest overall accuracy. Scroll down and click **Pipeline 7** (2) in the **Pipeline leaderboard**.

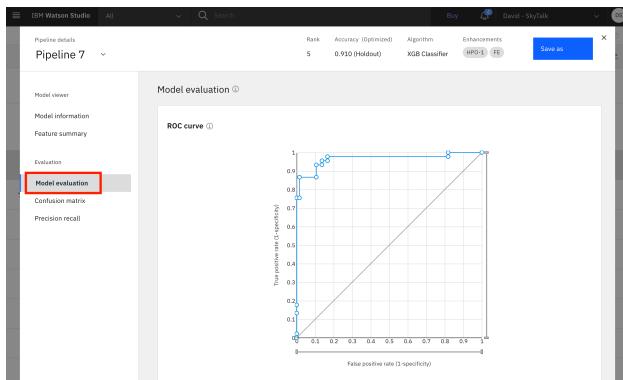
Rank	Name	Algorithm	Accuracy (Optimized) Cross Validation	Enhancements	Build time
1	Pipeline 1	LGBM Classifier	0.938	None	00:00:01
2	Pipeline 2	LGBM Classifier	0.938	HPO-1	00:00:16
3	Pipeline 3	LGBM Classifier	0.938	HPO-1 FE	00:00:27
4	Pipeline 4	LGBM Classifier	0.938	HPO-1 FE HPO-2	00:00:23
5	2 Pipeline 7	XGB Classifier	0.938	HPO-1 FE	00:00:24

### Narration

The ‘Model evaluation’ view shows Pipeline 7’s actual ROC curve. Pipeline 7’s ROC curve arcs upward, indicating that as more predictions are made during the test, the model becomes increasingly accurate.

### Action 3.2.3

- Click the **Model Evaluation** tab.



### Narration

The 'Confusion matrix' shows a different accuracy measure. It compares the actual attrition data with the pipelines' predictions.

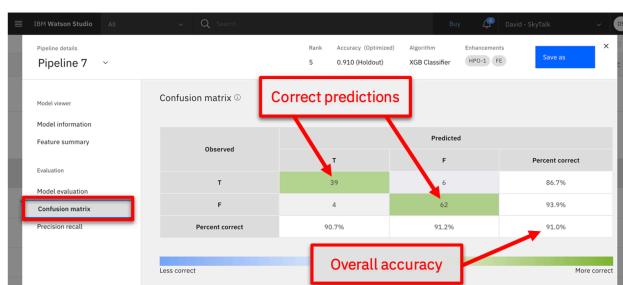
Earlier in the demo, we looked at how customer churn is indicated in SkyTalk's data as T (true) for customers that closed their account and F (false) for customers that remained with SkyTalk.

Correct predictions in the 'Confusion matrix' below are indicated in the green T/T and F/F boxes. There were 39 T/T results and 62 F/F results. Summarizing those results shows us that Pipeline 7 made 101 correct predictions. The six T/F and four F/T represent ten incorrect predictions.

Therefore, Pipeline 7 made 101 correct predictions out of 111 chances. This translates to 91% accuracy, which is displayed in the bottom right box of the matrix.

### Action 3.2.4

- Click the **Confusion matrix** tab.



### Narration

The analyst compares Pipelines 1 and 7 to understand why Pipeline 1 is rated the best overall.

### Action 3.2.5

- Click the **Pipeline details** drop-down list (1) and select the starred pipeline you previously noted had the highest overall accuracy. (2).

The screenshot shows the 'Pipeline details' view for Pipeline 7. At the top, there's a dropdown menu labeled 'Pipeline details' with 'Pipeline 7' selected. Below it is a list of pipelines: Pipeline 1, Pipeline 2, Pipeline 3, Pipeline 4, Pipeline 5, Pipeline 6, and Pipeline 7. Pipeline 1 is highlighted with a blue background. To the right, there's a 'Confusion matrix' section with columns for 'Observed' and 'Predicted' (T, F), and rows for 'Percent correct'. At the bottom right of the view is a 'Save as' button.

### Action 3.2.6

- Click **Confusion matrix** on the left.

The screenshot shows the 'Model evaluation' section for Pipeline 1. On the left, there's a sidebar with links: Model viewer, Model information, Feature summary, Evaluation, Model evaluation (which is selected and has a red box around it), Confusion matrix (also with a red box around it), and Precision recall. The main area displays an ROC curve graph.

### Action 3.2.7

- Review the **Confusion matrix**. Highlight that the overall correct percentage is higher using Pipeline 1.

The screenshot shows the 'Confusion matrix' view for Pipeline 1. The sidebar shows 'Evaluation' selected. The main area displays a confusion matrix table with columns for 'Observed' (T, F) and rows for 'Predicted' (T, F). The 'Percent correct' row shows values: 95.3% for T-T, 94.1% for F-T, and 94.6% for the overall correct percentage (highlighted with a red box). Below the table is a horizontal bar chart with a green segment labeled 'More correct'.

### Narration

Pipeline 1 has a 94.6% accuracy, which is higher than Pipeline 7's 91.0%. The analyst chooses Pipeline 1 as the model to deploy in production.

### Action 3.2.8

- Click the **X** on the upper right corner to close the **Pipeline details** view.

The screenshot shows the 'Pipeline details' view for Pipeline 1. The top right corner features a close button (an 'X' icon). The sidebar shows 'Evaluation' selected. The main area displays Pipeline details: Rank 1, Accuracy (Optimized) 0.946 (Holdout), Algorithm LGBM Classifier, and Enhancements None. There's also a 'Save as' button.

### Action 3.2.9

- Click **Save as** on the right side of the Pipeline 1 row.

The screenshot shows the IBM Watson Studio interface. In the center, there's a 'Pipeline leaderboard' table. The first row, labeled 'Pipeline 1', contains the following information: Rank (★ 1), Name (Pipeline 1), Algorithm (LGBM Classifier), Accuracy (Optimized) (0.938), Enhancements (None), and Build time (00:00:01). At the bottom right of this row, there is a blue 'Save as' button with a white outline, which is highlighted with a red box.

### Narration

The analyst can now generate a machine learning model using the pipeline from the AutoAI experiment. We will click cancel and review the model that was previously created.

### Action 3.2.10

- Select **Model** (1) and then click **Cancel** (2).

This screenshot shows a 'Save as' dialog box. At the top left, there is a section titled 'Select asset type' with a dropdown menu. The 'Model' option is selected and highlighted with a red box, labeled with a red '1'. Below this, there is a 'Define details' section with fields for 'Name' (set to 'SkyTalk churn prediction - P1 LGBM Classifier') and 'Description (optional)'. Further down, there is a 'Tags' section with a 'Add tag' input field. At the bottom of the dialog, there are two buttons: 'Cancel' (highlighted with a red box, labeled with a red '2')) and 'Create'.

### Action 3.2.11

- Click **SkyTalk customer retention** project in the breadcrumb navigation.

This screenshot shows the IBM Watson Studio interface with the breadcrumb navigation bar at the top. The 'SkyTalk customer retention' project is selected, indicated by a red box. Below the navigation bar is a 'Pipeline leaderboard' table. The first row, 'Pipeline 1', is highlighted with a green box and has a small green circular icon next to it. A toast notification at the top right of the screen says 'Saved model successfully. Pipeline 1 LGBM Classifier was successfully saved to SkyTalk customer retention.' At the bottom right of the table, there is a 'Feedback' button.

### 3.3 - Prepare the churn prediction model for production use

#### Narration

The analyst has created a churn prediction service for the model. Then, an AutoAI experiment was invoked to automatically generate pipeline options for the churn prediction service. The analyst chose a pipeline for production use and saved it as a churn prediction model in the SkyTalk's customer retention project.

In Watson AI, promoting a prediction model to a production space makes it available for use in production. Let's complete this final step to make SkyTalk's new churn prediction model available in the SkyTalk production space.

#### Action 3.3.1

- Click **Saved models**.

This screenshot shows the 'Assets' tab in the IBM Watson Studio interface. In the left sidebar, under 'Asset types', the 'Saved models' section is highlighted with a red box. It contains two items: 'SkyTalk churn prediction - P1 LGBM Classifier' and 'SkyTalk lifetime value prediction - P4 XGB Regressor'. Both items were last modified 2 weeks ago by Laurent Tarin (Yael).

#### Action 3.3.2

- Display the menu on the right side of one of the models and click **Promote to space**.

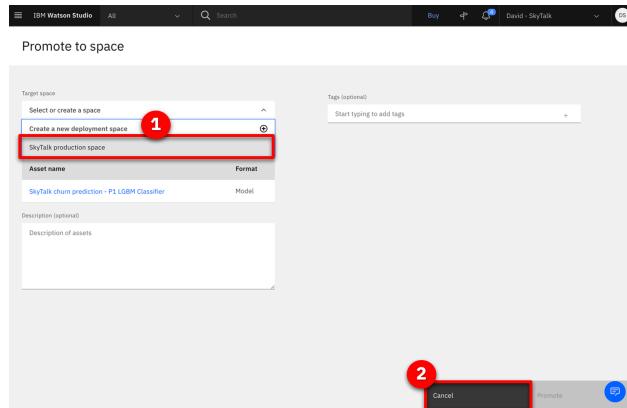
This screenshot shows the same 'Assets' tab in IBM Watson Studio. The 'Saved models' section is again highlighted with a red box. A context menu is open over the first item, 'SkyTalk churn prediction - P1 LGBM Classifier'. The 'Promote to space' option is visible in the bottom right corner of the menu, also highlighted with a red box.

#### Narration

In practice, the analyst would promote the churn model to the deployment environment here. For this demo, it has already been promoted.

### Action 3.3.3

- Show the **SkyTalk production space** (1) option. Click **Cancel** (2) to avoid promoting the model.
- **NOTE:** Do not click **Promote**.

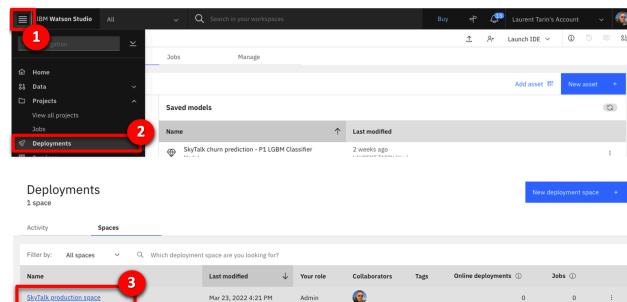


### Narration

The two prediction services are now ready for deployment.

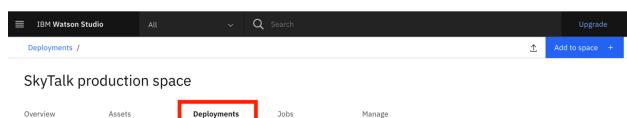
### Action 3.3.4

- Click the **IBM Watson Studio** menu (1), click **Deployments** (2), and then click the **SkyTalk production space** (3).



### Action 3.3.5

- Click the **Deployments** tab.



### Narration

The two services have been deployed.

Copy and save the service endpoint URL. It will be required to configure a machine learning provider that will establish the link between Watson Studio and the Cloud Pak later in the demo.

### Action 3.3.6

- Click the **Churn** service.

The screenshot shows the IBM Watson Studio interface. At the top, there's a navigation bar with 'IBM Watson Studio', 'All', 'Search', and 'Upgrade' buttons. Below it is a breadcrumb navigation bar with 'Deployments /' and 'SkyTalk production space'. The main area is titled 'Deployments (2)'. There are tabs for 'Overview', 'Assets', 'Deployments' (which is selected), 'Jobs', and 'Manage'. A search bar says 'What deployments are you looking for?'. Below the search bar is a table with columns: Name, Type, Status, Asset, Tags, and Last modified. The first row is 'Lifetime value' (Online, Deployed, 'SkyTalk lifetime value prediction - P1 XGB Regressor', Oct 19, 2021 5:26 PM). The second row is 'churn' (Online, Deployed, 'SkyTalk churn prediction - P1 LGBM Classifier', Oct 19, 2021 5:25 PM). The 'churn' row is highlighted with a red box.

### Action 3.3.7

- Keep the first portion of the **Endpoint** URL to use later in the demo. Only highlight from the beginning through 'v4,' as shown in the image.

The screenshot shows the API reference for the 'churn' service. At the top, it says 'churn' (Deployed, Online). Below that is the 'API reference' tab. Under 'Direct link', it says 'Endpoint' and shows the URL 'https://eu-de.ml.cloud.ibm.com/v4/deployments/caeedee5-86a8-4443-897a-edb3ee834dff/predictions?version=1'. This URL is highlighted with a red box.

### Narration

The deployment space identifier will also be required to configure the machine learning provider.

### Action 3.3.8

- Click the **SkyTalk production space** in the breadcrumb navigation bar.

The screenshot shows the IBM Watson Studio interface with a breadcrumb navigation bar. It starts with 'Deployments /' followed by 'SkyTalk production space' (which is highlighted with a red box) and 'SkyTalk churn prediction - P1 LG... /'. Below the breadcrumb is a table with columns: Name, Status, Asset, and Last modified. The first row is 'churn' (Deployed, Online). At the bottom, it says 'Created Nov 15, 2021 2:52 PM'.

### Action 3.3.9

- Click the **Manage** tab (1) and keep the **Space GUID** (2) for use later in the demo.

The screenshot shows the management page for the 'SkyTalk production space'. At the top, it says 'IBM Watson Studio' and 'SkyTalk production space'. Below that is a 'Manage' tab (marked with a red circle 1). To the right is a 'Cloud Object Storage' section with a 'Manage' button (marked with a red circle 2). The 'Space Details' section shows the name 'SkyTalk production space', a 'Description' field with 'No description provided.', and a 'Space GUID' field containing 'e97d617-8907-de2e-b0b6-97822d727...'. Below that are 'Data created' and 'Last updated' fields. On the right, there's a 'Cloud Object Storage' section with a 'Manage' button.

## 4 - Calling the prediction services from the business rules

### 4.1 - Configure the customer retention decision service to use the new predictive

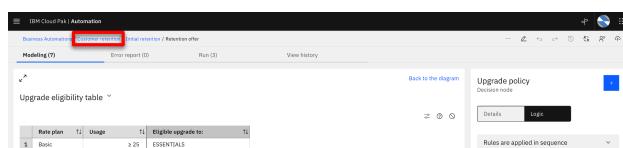
#### Narration

The ‘Retention budget’ sub-decision uses the ‘churn’ and ‘lifetime value’ predictive services. A machine learning provider establishes the link between the sub-decision and the predictive services.

The business analyst now sets up a machine learning provider for the SkyTalk ‘customer retention decision service.’

#### Action 4.1.1

- Return to the **SkyTalk customer retention DS** using the breadcrumb navigation menu.



#### Action 4.1.2

- Open the **Settings** menu.



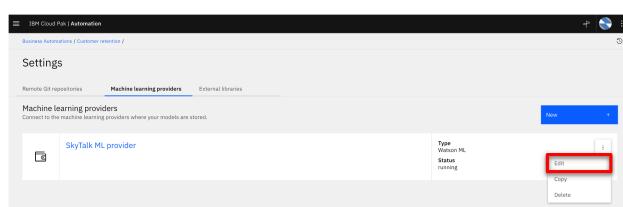
#### Action 4.1.3

- Click the **Machine learning providers** tab.



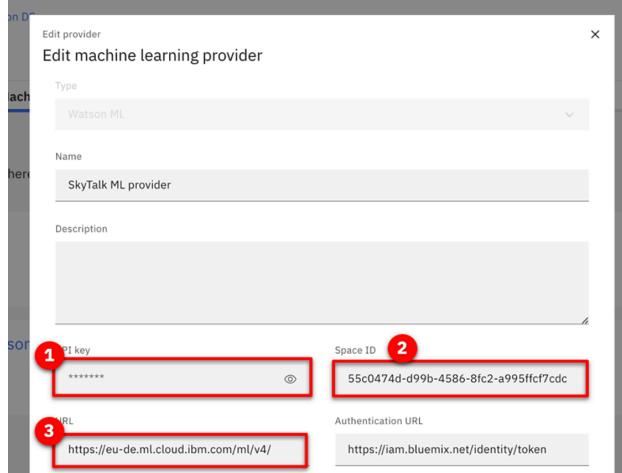
#### Action 4.1.4

- Click **Edit** on the right side of the **SkyTalk ML Provider** box.



#### Action 4.1.5

- Show the **API key** (1), the **Space ID** (2), and the Endpoint **URL** (3) obtained during the demo preparation instruction (step 5.8).
- **NOTE:** The Space GUID saved earlier in the demo is called the Space ID on this interface.

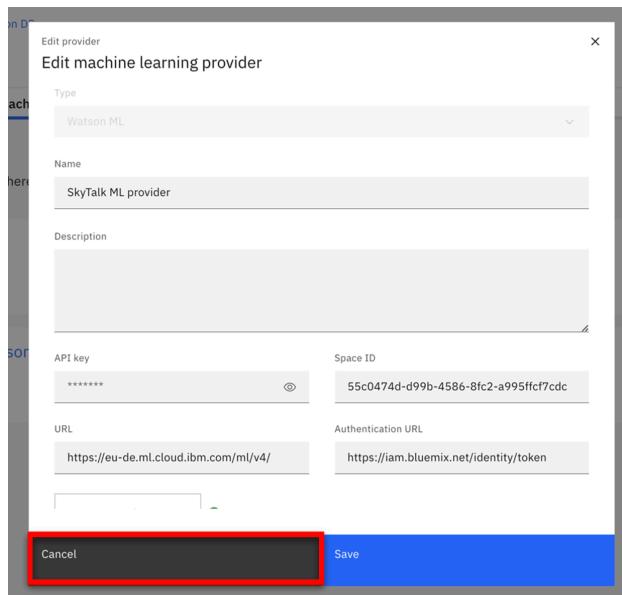


#### Narration

Now that the interface between the Cloud Pak and Watson Studio is set up, the analyst can create two predictive models and make the predictions available for use within business rules.

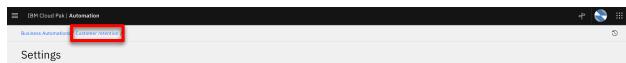
#### Action 4.1.6

- Click **Cancel** and explain that the provider has been pre-configured during demo preparation.



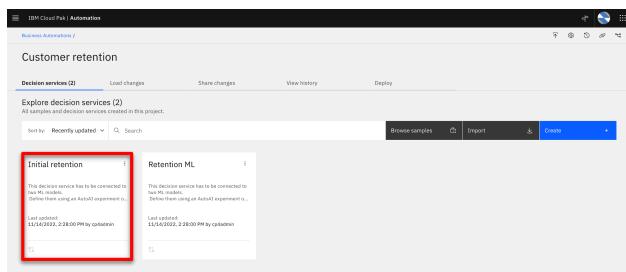
### Action 4.1.7

- Return to the **Customer retention** tab using the breadcrumb navigation menu.



### Action 4.1.8

- Click the **Initial retention** tile.



### Action 4.1.9

- Click **Create**.

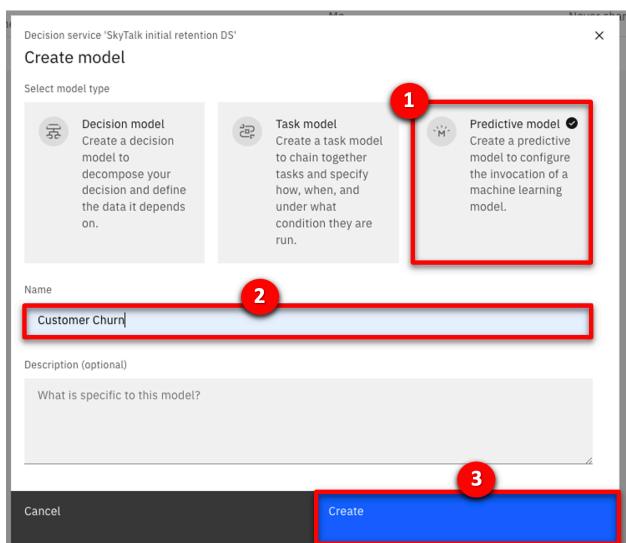


### Narration

The business analyst creates a predictive model to map the customer churn prediction parameters.

### Action 4.1.10

- Select **Predictive model** (1) and name it '**Customer Churn**' (2). Click **Create** (3).



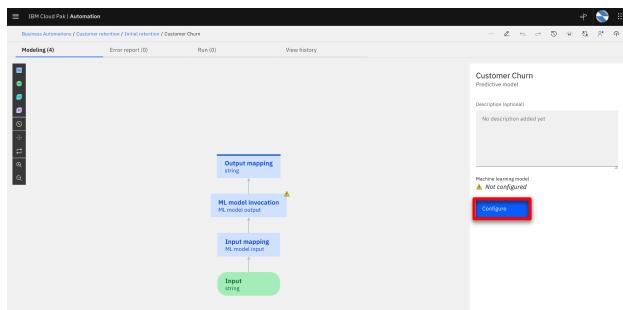
## 4.2 - Map the predictive service to the predictive model

### Narration

A new predictive model is automatically created. This model needs to be configured to map the churn prediction parameters.

### Action 4.2.1

- Click **Connect**.

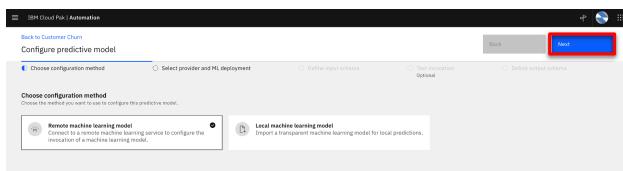


### Narration

The analyst selects the SkyTalk machine learning provider to establish the link to the deployed prediction service.

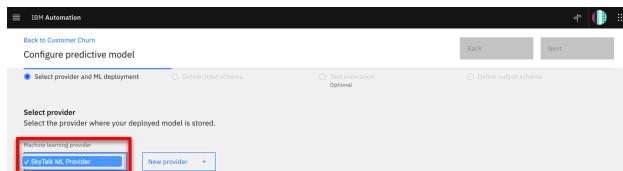
### Action 4.2.2

- Click **Next**.



### Action 4.2.3

- Select the **SkyTalk ML Provider**.



#### Action 4.2.4

- Expand the **SkyTalk churn prediction - P1 LGBM Classifier** machine learning model (1).
- Select the **churn** deployment name (2).
- The prediction is now connected to the customer lifetime value.

The screenshot shows the 'Configure predictive model' step of the IBM Automation wizard. The 'Select provider and ML deployment' section is active. A red box highlights the 'ML model name' dropdown, which contains 'SkyTalk churn prediction - P1 LGBM Classifier'. Another red box highlights the 'Deployment name' dropdown, which contains 'churn'. The 'Next' button at the top right is also highlighted with a red box.

#### Narration

Now we will complete the predictive model. A wizard is used to complete the mapping.

#### Action 4.2.5

- Click **Next**.

The screenshot shows the 'Configure predictive model' step of the IBM Automation wizard. The 'Test invocation' section is active. The 'Next' button at the top right is highlighted with a red box.

#### Action 4.2.6

- Click **Next** again.

The screenshot shows the 'Configure predictive model' step of the IBM Automation wizard. The 'Test invocation' section is active. The 'Next' button at the top right is highlighted with a red box.

#### Narration

The input data structure is automatically created.

#### Action 4.2.7

- Click **Run**.

The screenshot shows the 'Configure predictive model' step of the IBM Automation wizard. The 'Test invocation' section is active. The 'Run' button at the bottom right is highlighted with a red box.

#### Narration

The connection is tested to ensure the predictive service is working.

#### Action 4.2.8

- Click **Next**.

The screenshot shows the 'Configure predictive model' step of the IBM Automation wizard. The 'Test invocation' section is active. The 'Next' button at the top right is highlighted with a red box.

### Action 4.2.9

- Click **Generate from test output**.



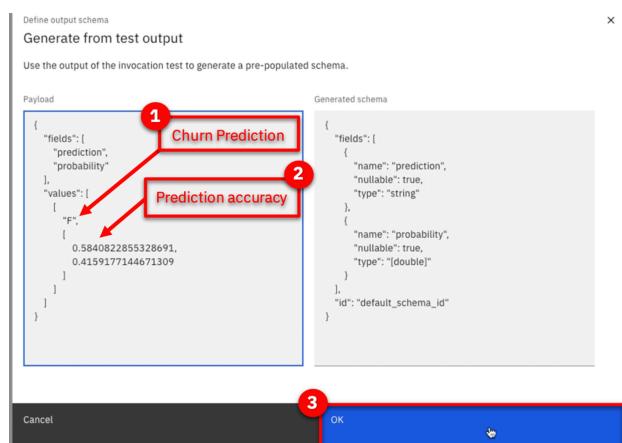
### Narration

The churn predictive service returns true or false and the prediction accuracy. In this example, the prediction result is F (false), meaning the customer will not leave SkyTalk. The prediction accuracy results are expressed as a probability out of 1. It is shown below the prediction. In this case the accuracy is 58.4% for this model.

This is working as expected. The predictive model is now mapping the input and output parameters of the 'Retention budget' sub-decision.

### Action 4.2.10

- Indicate the **F** (false) prediction (1) and the **probability that the prediction is correct** (2) in the prediction output. Click **OK** (3).



### Action 4.2.11

- Click **Apply**.



### Narration

Now let's return to the SkyTalk initial retention DS using the breadcrumb navigation menu.

### Action 4.2.12

- Click **SkyTalk initial retention DS** using the breadcrumb navigation menu.



## 4.3 - Assign the predictive model to the ‘Retention budget’ sub-decision

### Narration

Let's improve the ‘Retention budget’ sub-decision by incorporating the churn predictive model.

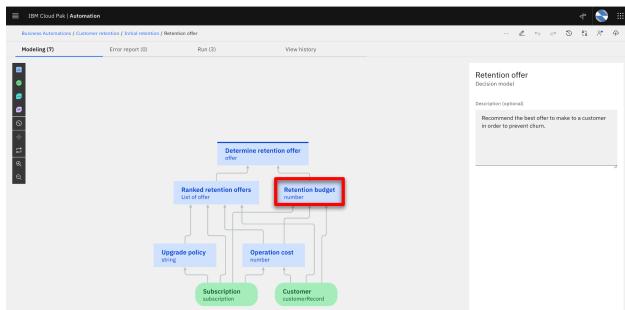
#### Action 4.3.1

- Click **Retention offer**.



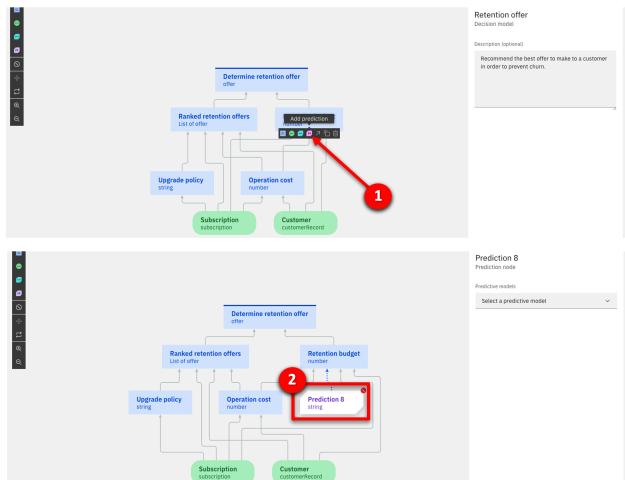
#### Action 4.3.2

- Hover your cursor over the **Retention budget** decision box on the screen.



#### Action 4.3.3

- A black choice box appears over the **Retention budget** decision box. Click the **purple box** to **Add prediction** (1). **Prediction 8** (2) will be added to your model.



### Narration

The analyst assigns the churn predictive model to the newly-created predictive node.

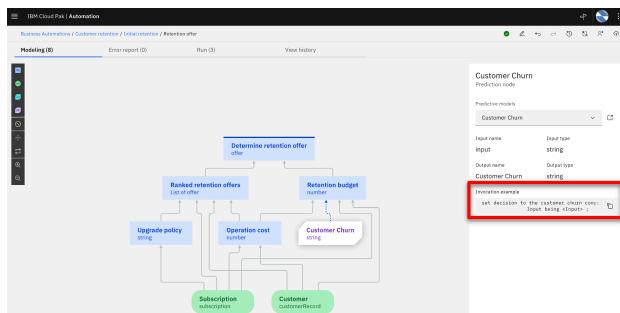
#### Action 4.3.4

- Click the **Prediction 8** node (1) and then select the **Customer Churn** predictive model (2).



#### Action 4.3.5

- Highlight the predictive model invocation rule.



#### Narration

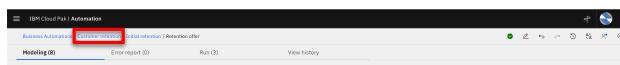
Now the machine learning prediction can be invoked from the retention budget sub-decision using a simple business rule.

In practice, the same steps would be repeated to create another prediction service for the customer lifetime value predictive model. For our demo, this has already been created.

Let's look at the final decision model.

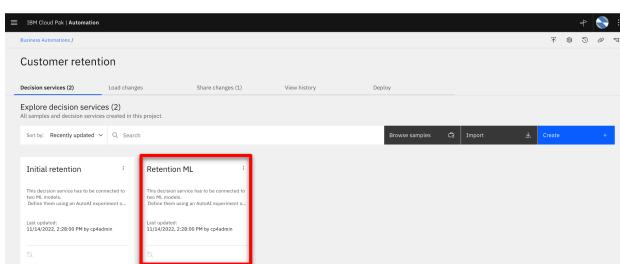
#### Action 4.3.6

- Return to **Customer retention** using the breadcrumb navigation menu.



#### Action 4.3.7

- Click the **Retention ML** tile.
- NOTE:** The **Initial retention** tile will not be used any more during the demo.



## Action 4.3.8

- Click **Retention offer**.

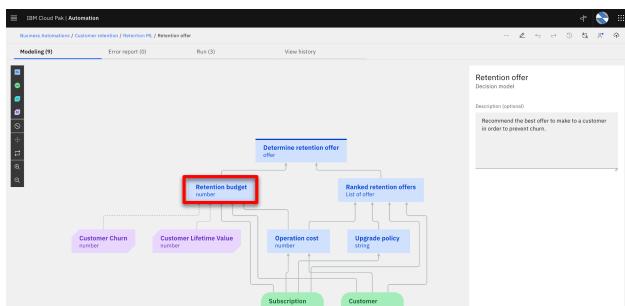
The screenshot shows the 'IBM Cloud Pak for Automation' interface with the 'Models' tab selected. A list of models is displayed, including 'Customer Offer', 'Customer Lifetime Value', and 'Retention offer'. The 'Retention offer' model is highlighted with a red box. The description for 'Retention offer' states: 'This predictive model has to be connected to a provider where a ML model built with the dataset...'. The 'Last updated by' column shows 'cgAdm1s' for all three models, and the 'Last updated at' column shows '1/14/2022, 2:28:00 PM'.

## Narration

The analyst can now review the 'Retention offer' business logic.

## Action 4.3.9

- Click the **Retention budget** box.



## Narration

The retention budget is calculated using the three sequential rules that will be applied in the order shown in the dropdown menu.

## Action 4.3.10

- Select the **Logic** tab.

The screenshot shows the 'IBM Cloud Pak for Automation' interface with the 'Business Automation / Customer retention / Retention M / Retention offer' path selected. The 'Modeling (1)' tab is active. The 'Retention budget' decision node is selected. The 'Logic' tab is highlighted with a red box. The 'Logic' tab displays the rule sequence: 'Details' (selected), 'Mode details', 'Node name', and 'Retention budget'.

## Narration

The 'Estimated retention cost' rule calculates how much we are willing to spend to keep this customer.

## Action 4.3.11

- Click **Estimated retention cost** to review the retention budget rule.

The screenshot shows the 'IBM Cloud Pak for Automation' interface with the 'Business Automation / Customer retention / Retention M / Retention offer' path selected. The 'Modeling (1)' tab is active. The 'Retention budget' decision node is selected. The 'Logic' tab is active, showing the rule sequence: 'Rules are applied in sequence'. The first rule is 'B Estimate retention cost' (highlighted with a red box), followed by 'Include operation cost'.

## Narration

These are the business rules used to calculate the retention cost.

At the start of the rules the definition of the ‘LifeTimeValue’ variable, which is used in many calculation rules below, includes invoking the customer lifetime value predictive service. Similarly, the Churn variable definition includes invoking the churn predictive service.

### Action 4.3.12

- Review the **Estimated retention cost** business rule.

```
1. definitions
2. 
3.   getChurnFromPredictiveModel()
4.   setLifeTimeValueToTheCustomerLifeTimeValueComputedFrom
5.   CustomerBeingCustomerSubscription;
6.   SubscriptionBeingSubscription;
7. 
8.   getChurnPredictionFromPredictiveModel()
9.   setChurnToTheCustomerChurnComputedFrom
10. SubscriptionBeingSubscription;
11. SubscriptionBeingSubscription;
12.
```

## Narration

Scrolling further down in the definition, the analyst can review how the results are calculated using the predictions.

### Action 4.3.13

- Scroll down in the business rule pane to show more detail.

```
18. --Integrate margin
19. if Churn is less than 0.7 then
20.   set decision to "adjusted value" <= 50% of the monthly customer value
21.   set adjustedValue = "LifeTimeValue";
22.   print "Churn: " + Churn;
23.   print "Churn: " + adjustedValue;
24. else
25.   set decision to "adjusted value" > 0.7;
26.   set adjustedValue = "LifeTimeValue";
27.   print "Churn: " + Churn;
28.   print "Churn: " + adjustedValue;
29.   print "Churn: " + Churn;
```

## Narration

Before deployment, the decision logic can be tested to ensure the results are as expected.

## 4.4 - Test the decision services

### Narration

The retention budget is based on the customer probability to churn and the customer estimated lifetime value.

To validate the retention budget decision, three pre-defined customer profiles are used.

The first one is a low value profile. It corresponds to the customers on which SkyTalk is not willing to spend a big retention budget.

#### Action 4.4.1

- Click the **Run (3)** tab.



#### Action 4.4.2

- Select **Low value profile** (1) and click **Run** (2).
- Click **Show more** (3) when the result is displayed.

1. The 'Low value profile' option in the dropdown menu is highlighted with a red circle.

2. The 'Run' button is highlighted with a red circle.

3. The 'Show more' link in the 'Result' section is highlighted with a red circle.

The results page shows the following details:

- Decision output**:
  - Node Name**: Determine retention offer
  - Result**:

```
{"estimated_cost":0.0,"message":"Send John a customer satisfaction survey."}
```
- Messages**:

Message	Node name	Rule name
Lifetime value: 3828.366455078125	Retention budget	Estimate retention cost
Churn: 0.04344644449826507	Retention budget	Estimate retention cost
Maximum retention budget: 1.2474668303217866	Retention budget	Include operation cost

### Narration

The decision works as expected. SkyTalk will spend no retention budget for this customer and will just send a satisfaction survey. This is due to a limited estimated lifetime value of \$3,828 and a low churn probability of 4.3%.

The same decision is now tested against Medium Value profiles. SkyTalk is willing to spend a limited budget to retain these customers.

#### Action 4.4.3

- Select **Medium value profile** (1) and click **Run** (2).
- Click **Show more** (3) when the result is displayed.

The screenshot shows the IBM Cloud Pak for Automation interface. In the top navigation bar, under 'Business Automation / Customer retention / Retention M1 / Retention offer', the 'Run (1)' tab is selected. A red circle labeled '1' highlights the 'Medium value profile' dropdown menu. A red circle labeled '2' highlights the 'Run' button. A red circle labeled '3' highlights the 'Show more' link in the 'Result' section, which displays the JSON output: `{"estimated_cost":8.0,"message":"Offer Peter a 10% discount on his current PREMIUM with 1"}`.

#### Narration

Here again, the decision works as expected.

Only \$8 are spent to offer a 10% discount to this customer having an 92% propensity to churn. Finally, the decision is tested on the high value profiles on which SkyTalk is willing to invest retention money.

#### Action 4.4.4

- Select **High value profile** (1) and click **Run** (2).
- Click **Show more** (3) when the result is displayed.

The screenshot shows the IBM Cloud Pak for Automation interface. In the top navigation bar, under 'Business Automation / Customer retention / Retention M1 / Retention offer', the 'Run (1)' tab is selected. A red circle labeled '1' highlights the 'High value profile' dropdown menu. A red circle labeled '2' highlights the 'Run' button. A red circle labeled '3' highlights the 'Show more' link in the 'Result' section, which displays the JSON output: `{"estimated_cost":34.35,"message":"Upgrade Sarah Miller to PREMIUM with 1"}`.

#### Narration

The retention budget is higher to retain this customer having a high lifetime value and a very high propensity to churn.

The decision works as expected in the three situations. It can now be deployed and used in the customer call center application.

Let's see it in action.

## 5 - Using the automated call center application

### 5.1 - Generate a real-time retention offer that best allocates SkyTalk's retention budget

#### Narration

SkyTalk developed an automated call center application. The application provides agents with customer-specific retention offers in real time.

Let's look at how an agent now handles a customer call using this application.

#### Action 5.1.1

- Show the **SkyTalk call center Application** preview window, which was opened during the demo preparation (see step 10 in the demo preparation instructions).

#### Action 5.1.2

- Enter "Peter Carter" in the **Search Customer** field (1) and click **Search** (2).

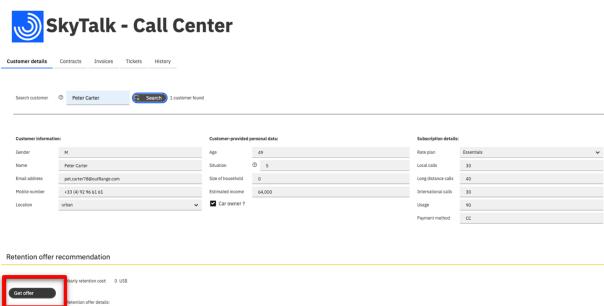


#### Narration

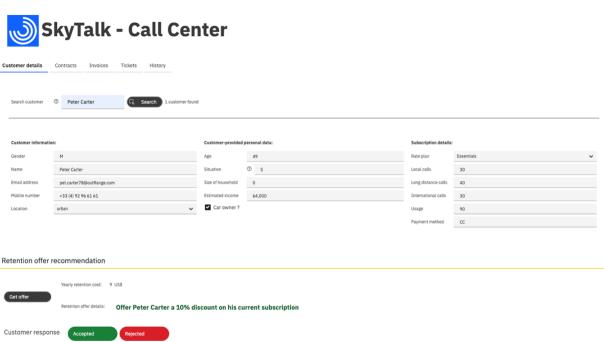
A customer-specific retention offer displays. The agent suggests this offer to the customer in real time.

#### Action 5.1.3

- Click **Get offer**.



- The offer displays:



## Summary

In this demo, I showed how business users can easily build business rules that incorporate predictive decisions. The predictions help retain SkyTalk's profitable customers by providing customized offers at the lowest cost to SkyTalk.

The new retention process also improved productivity by eliminating manual procedures. Customer satisfaction will increase with speedier and more relevant service.

Thank you for attending today's presentation.

## Note - After the demonstration

When you are done with your demonstration, don't forget to proceed with the instructions in the **After each demo** section of the **Demo preparation**.

These instructions will explain you how to un-deploy the two ML services to suspend the billing process and save your free Watson ML Lite quota.