Intelligent Contracts Workshop Guide

Contents

AI Ladder & ModelOps

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IBM Cloud Pak For Data provides a stack of capabilities broken down into these 4 areas known as the AI Ladder.
ModelOps is an end to end process for developing and deploying data science assets to production that are monitored for bias.

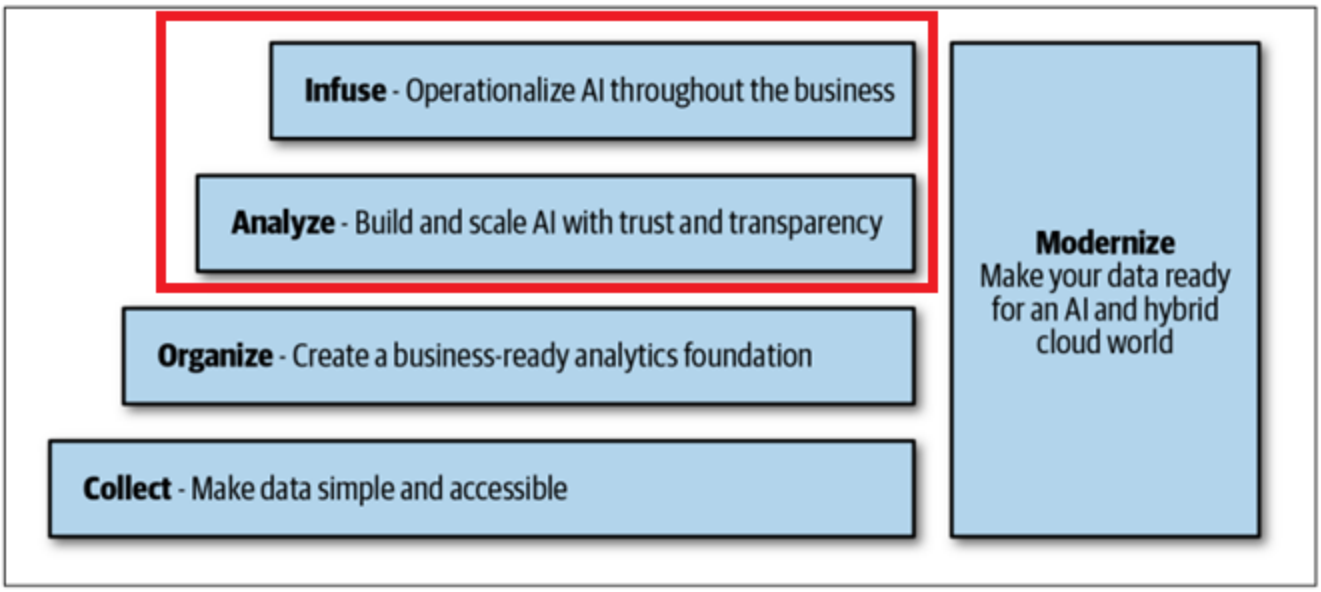


Figure 1 AI Ladder - Collect, Organize, Analyze, and Infuse AI into downstream applications.

Intelligent Contracts Workshop Scenario

(top)

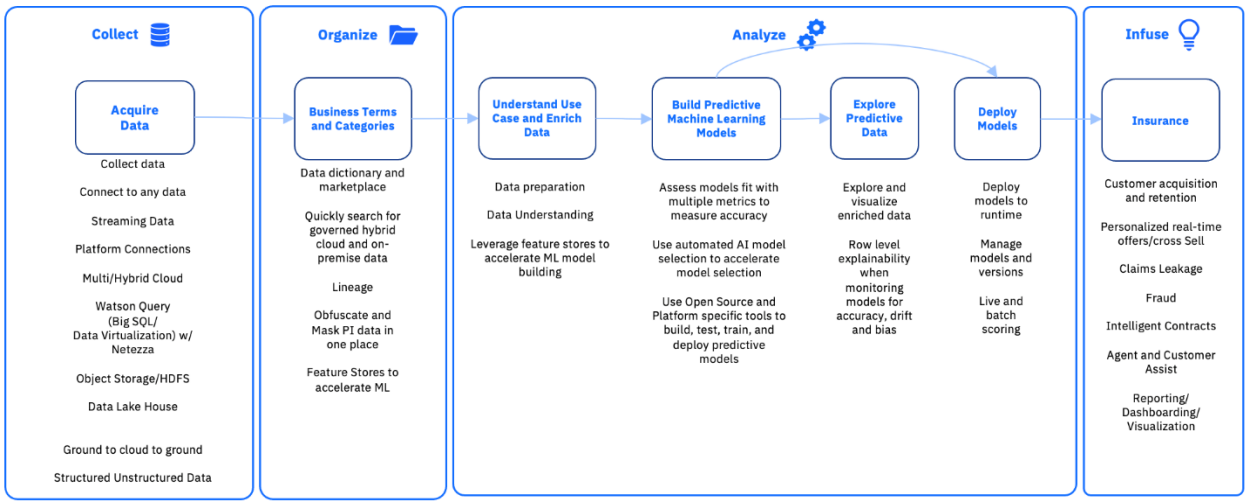
In this workshop, we'll learn how to **infuse** an AI deployed model in an automated business workflow to gain prescriptive suggestions improving the likelihood of contract success.
We'll be using IBM Watson Studio, to **analyze**, build, test and deploy the machine learning models built on structured and unstructured data used to score contracts and make prescriptive suggestions.
Using Watson Discovery, we'll see how we extracted and merged unstructured textual concepts coming from many contracts with structural contract data to improve the accuracy of our AI model.

Business Automation Workflow Workshop

(top)

Introduction

IBM AI has 4 primary capability areas – Collect, Organize, Analyze and Infuse:



The Infuse capability (on the RHS) is all about how other applications can use ML models - how the models are *infused* into these applications. This part of the demonstration illustrates how an application – Business Automation Workflow – can be infused with ML capabilities. This script will show how to install the demonstration on a BAW environment of your choice and then how to run through the demo.

Note that the demonstration is a “vision demo”, there is no actual call into a ML service. This is convenient as it means that the demo assets can be installed on any BAW environment without the need to integrate with some other system. No prior knowledge of IBM BAW is required in order to install or run the demo.

Following the Demo instructions below, there is information on how to install the demo in a BAW environment.

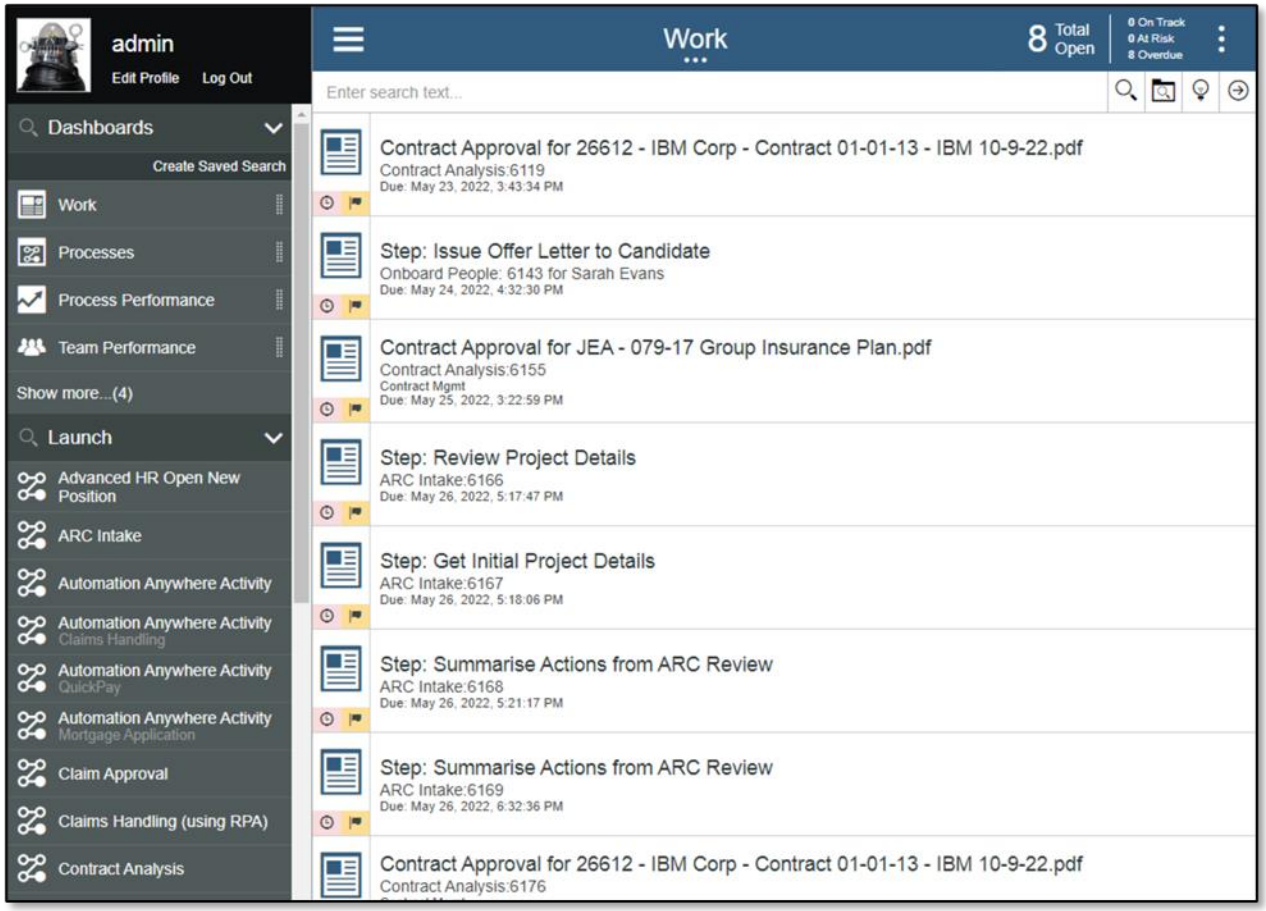
Running the Demo

The demo consists of a set of UIs that show how a contract might be assessed.

Business Automation Workflow has a user portal that enables user activities to be executed, known as the Process Portal. It is an out of the box application provided by the BAW product.

- Log on to the Process Portal Environment. For many BAW environments (e.g. SaaS) a Process Portal tile is provided, for Skytap a browser bookmark is often available. The form of the URL is https://host:port/ProcessPortal/, e.g. https://ibmbaw:9443/ProcessPortal/. There will be a Sign In screen as follows:

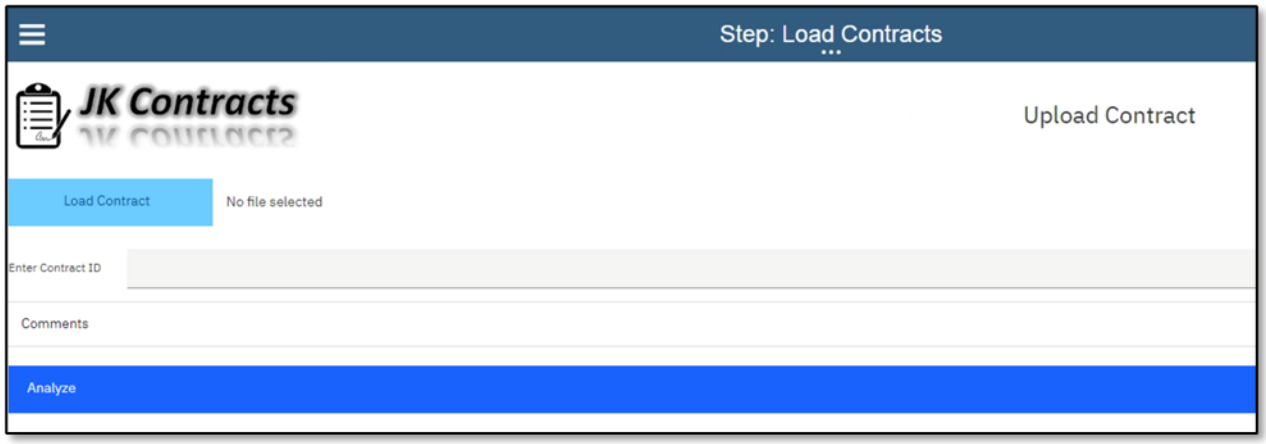
  Enter a userid/pwd as appropriate and click on Continue. (admin/admin is usually available.)
- The main page for Process Portal is presented:



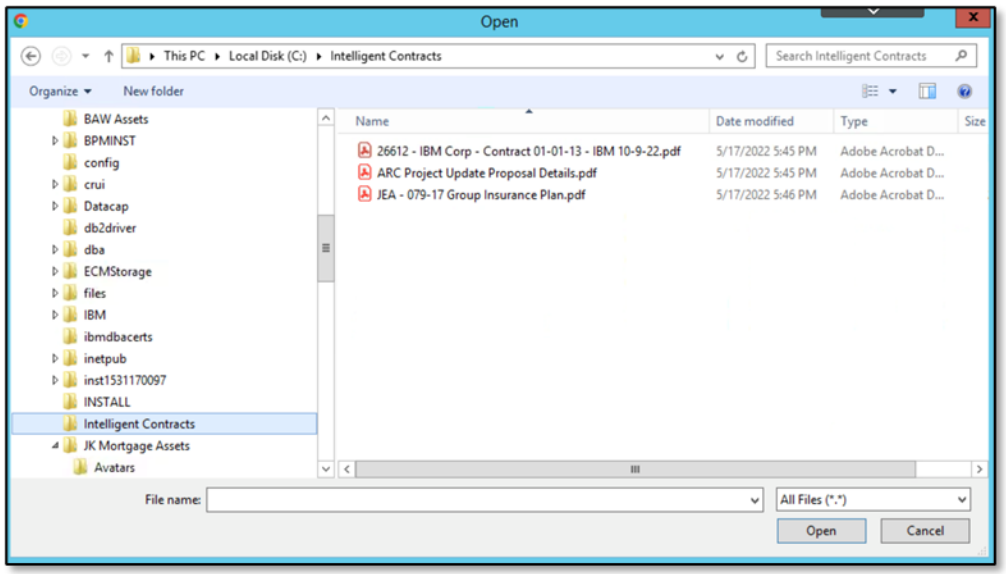
There are 3 primary sections to the page:

- The Dashboards section, top left, shows the different dashboards that are available. The selected dashboard is shown in the main space of the portal. Work is the default setting.
- The Launch section, bottom left, is a list of processes that this user can start. Notice, in the bottom left corner of the screenshot, Contract Analysis, the process that we wish to start
- The majority of the screen is taken up with the current dashboard or current activity UI.

- To start a new process instance, click on Contract Analysis, in the Launch list. The first user activity in the process automatically opens:

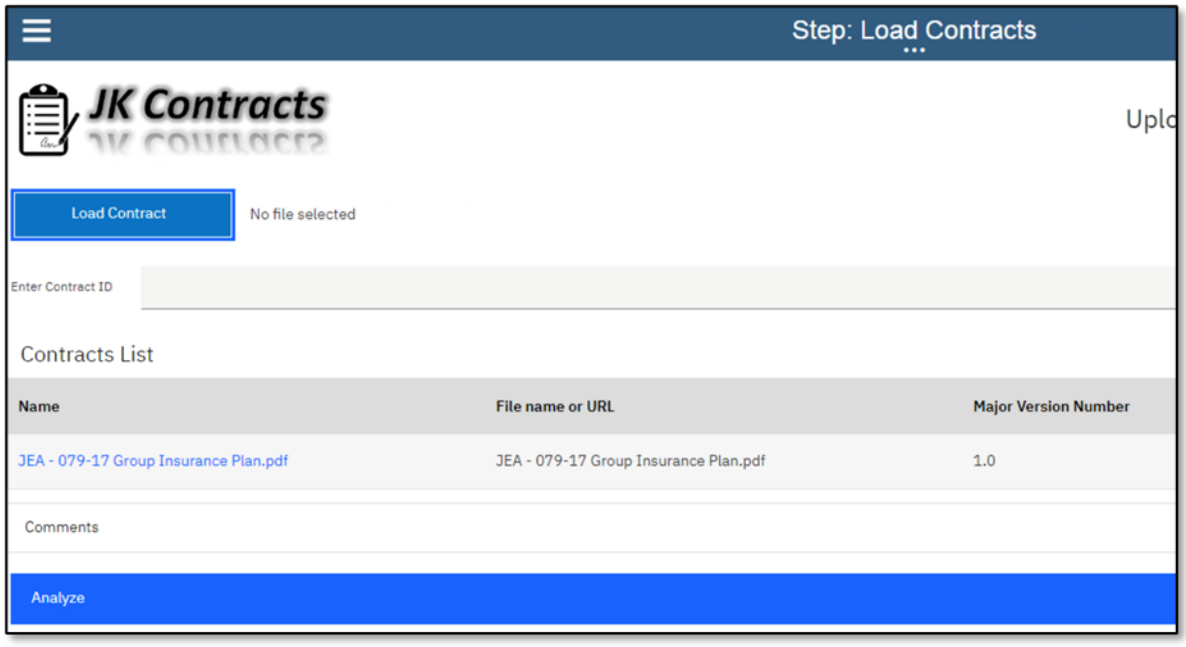


- Click on *Load Contract*. This will open a file explorer from which a contract file can be selected. Navigate to where your sample contracts are available, e.g.



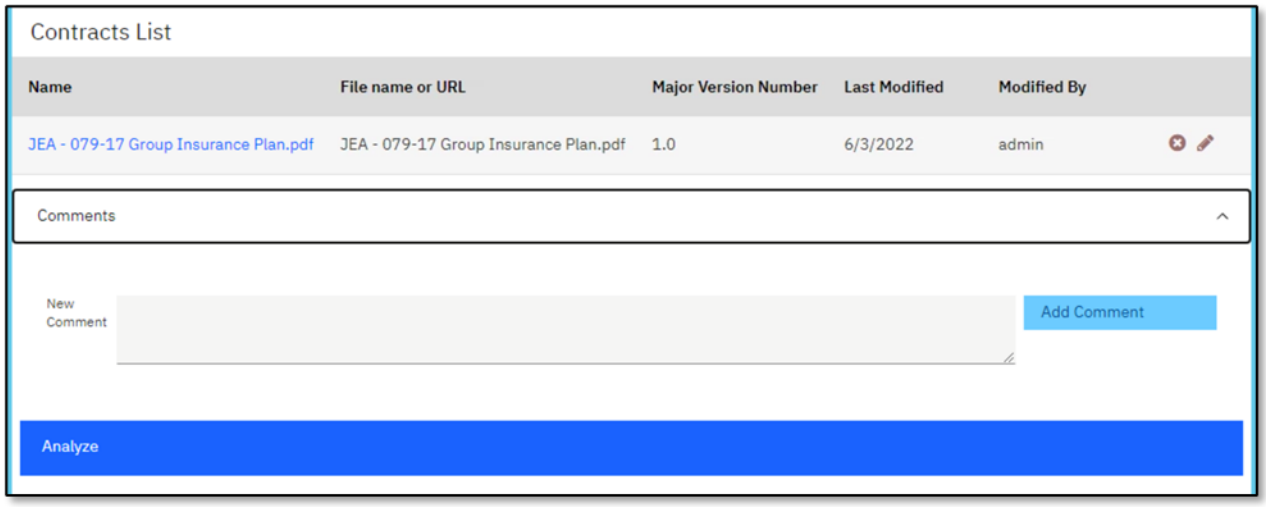
The screenshot above shows 3 samples, you might have others. The default processing for the file is that a contract with name beginning “26612” will be predicted as successful. All other files will be predicted as unsuccessful. Select the contract file according to the result that you wish to illustrate and click on open.

Note: in testing, the upload sometimes fails but succeeds on a second attempt. The uploaded file is now available to the process and can be seen in the Contracts List which becomes visible when there are contract documents available:



Enter a Contract ID in the **Enter Contract ID** text box. Any ID is acceptable. If appropriate click on the document and it will open in a new browser window. Note that the documents do not contain contracts and so it might not be appropriate to open the document. If you need a document that is more contract oriented, be sure to have this available as a sample document.

- Click on the Comment bar to expand the comments section:

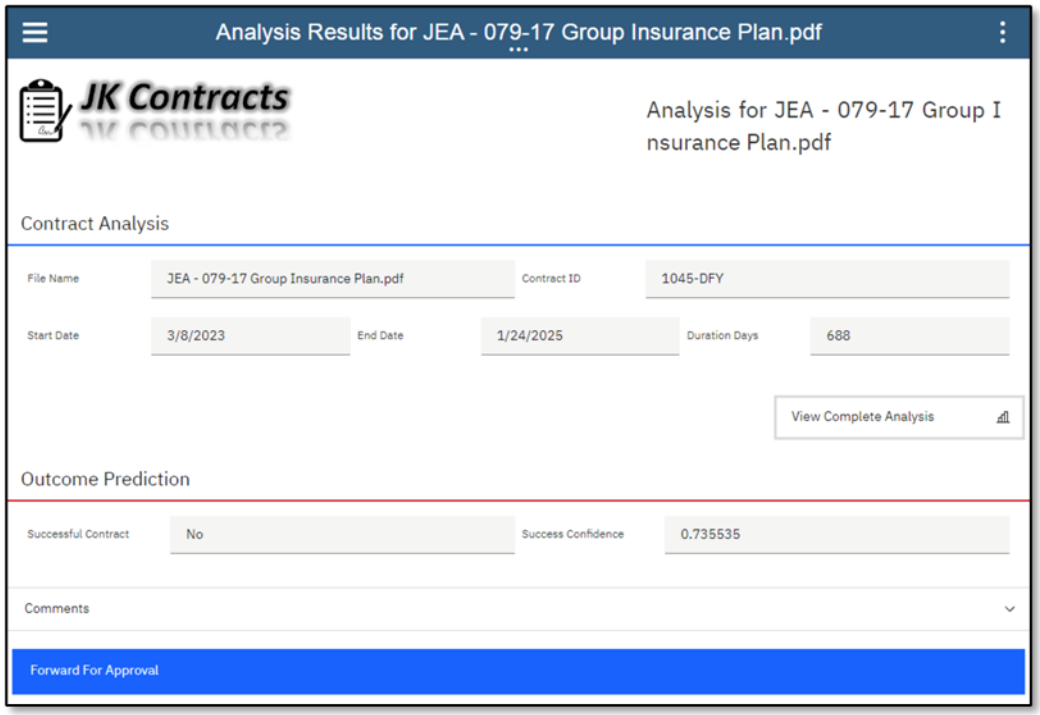


Enter comment in the *New Comment* text area and click on “Add Comment” to add the comment to the process. The comment will appear in the comment log:

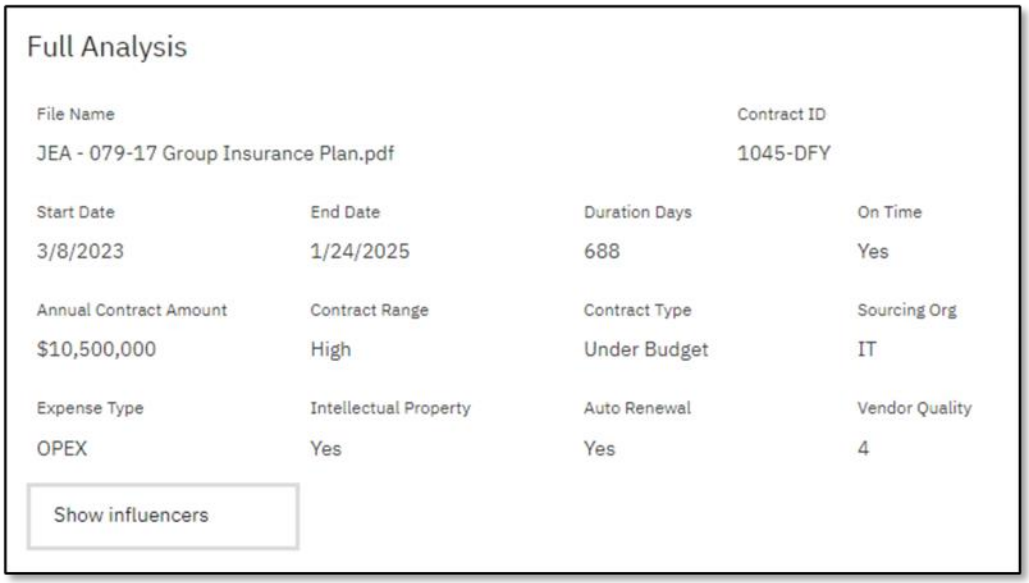
(The contents of the comment are not used in processing.) Click on **Analyze** to proceed to the next activity.

- This will take you back to the process Portal Work page:

Note that there is a new Activity available – "Analysis Results for *<filename>*". Select this task to see the results of the ML analysis:

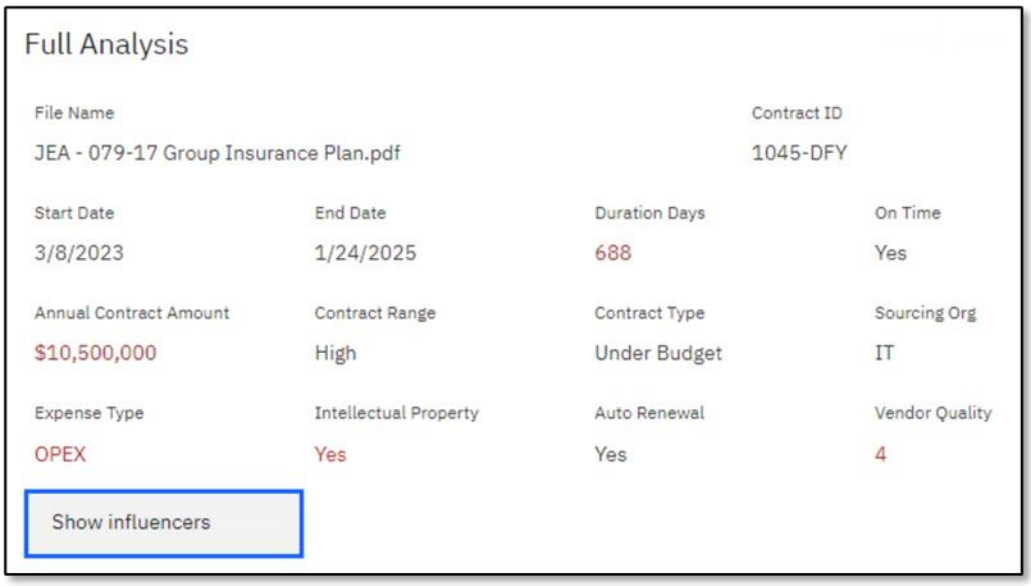


- Items to note on this page:
  - The Contract Analysis section shows some summary information regarding the contract.
  - The Outcome Prediction section shows that the predicted outcome is that this contract will not be successful and there is a confidence value provided with that prediction
- 'Explainability' is a key tenet of IBM AI and the next step of the demo is focused on this.
  - Click on the **View Complete Analysis** button, middle right of the page. A modal will pop up:



This shows all of the Contract properties used in the ML model that have an effect on the un/successful outcome of a contract, on an historical basis.

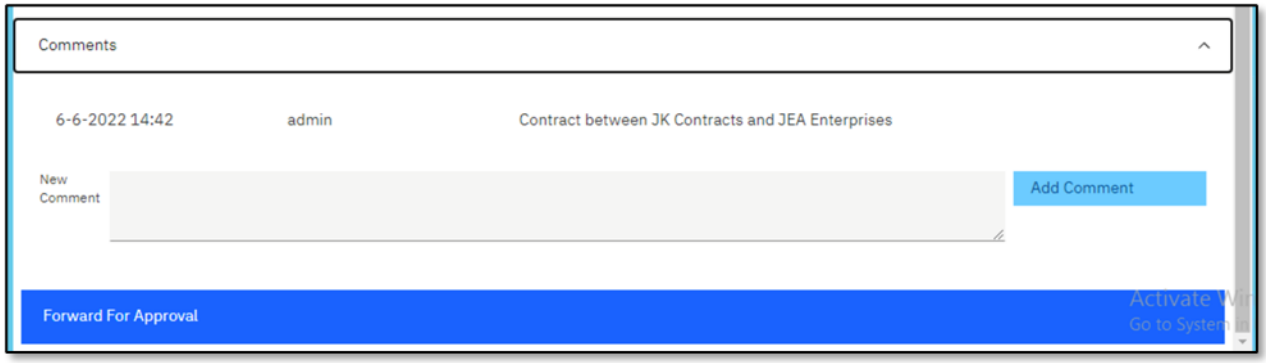
- Now click on the **Show Influencers** button:



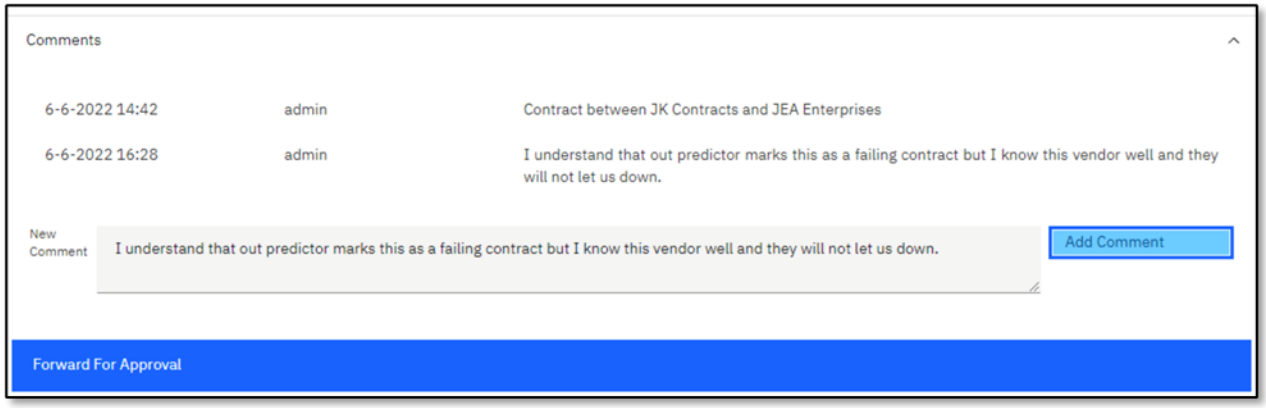
We now show, in red, the contract properties that were most influential in the prediction. For this contract, these properties are Duration Days, Annual Contract Amount, Expense Type, Intellectual Property and Vendor Quality. Dismiss the modal by clicking elsewhere on the page.

Again, note that this data is all part of a vision demo, this is not the result of calls to the ML model.

- Click on the (collapsed) **Comments** section

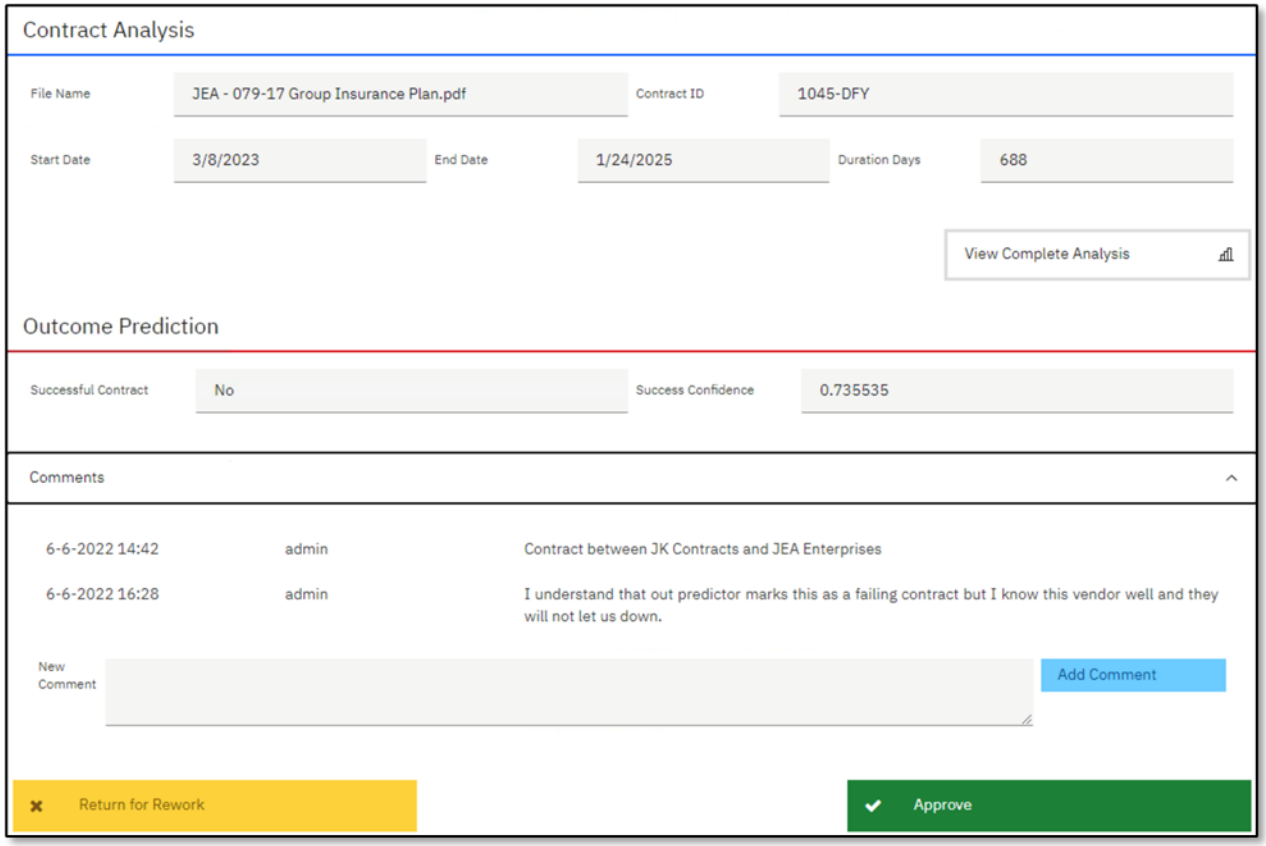


You will see the existing comment, made in a previous section, carried through to this step. The next Activity in the process is for a Contracts Approver to review the contract and either approve or send back for re-work. Enter and appropriate comment here for the approver.



Then click on **Forward For Approval**.

- The flow returns to the Process Portal Work page. Click on the Contract Approval activity



This presents a summary and approval page for a Procurement Reviewer/Approver role. The contract can be approved or returned to the Procurement Analyst.

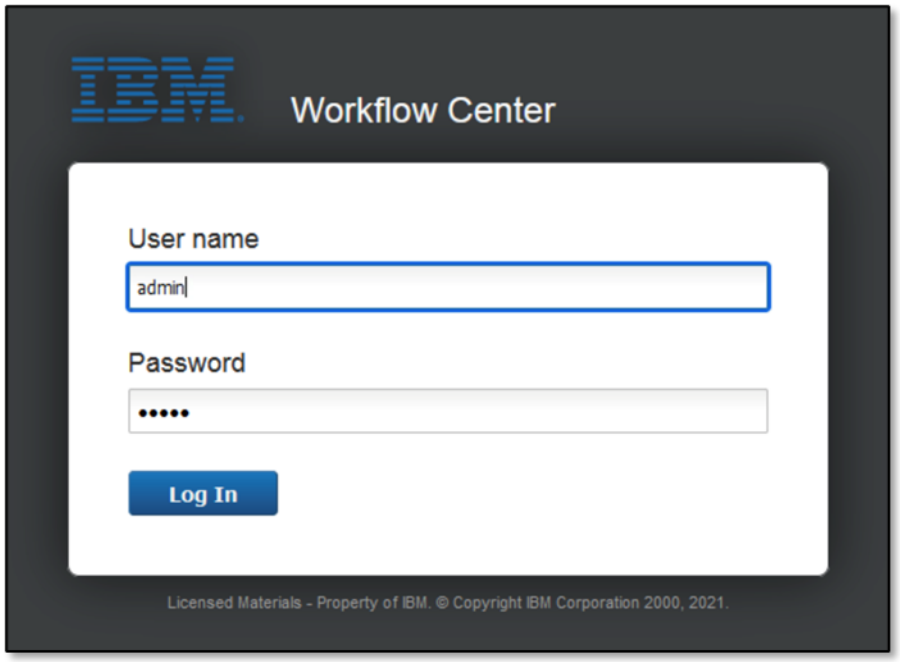
- Click on Approve to end the demo.

Demo Installation

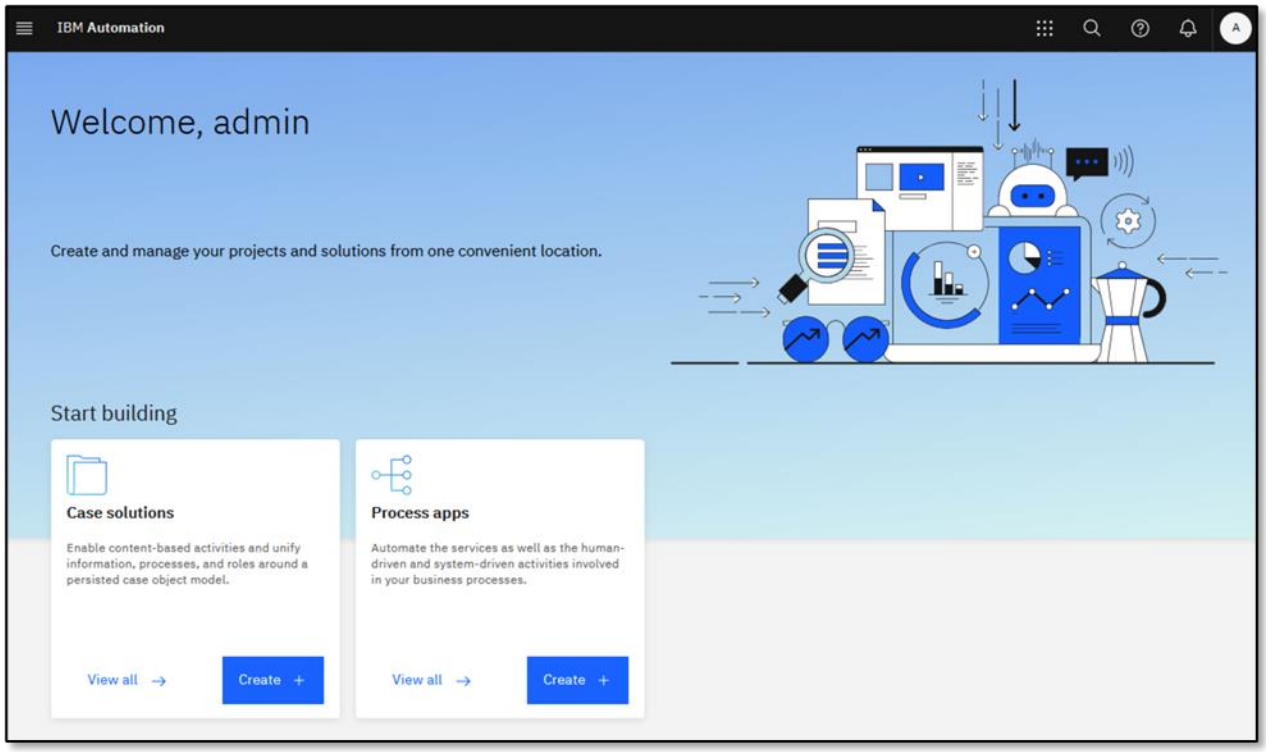
(top)

The demo workflow is provided in a file with a .twx extension and is installed into the Workflow Center component of BAW. The demo was created with BAW v21.0.3 and so will require an environment at this level or later. Any BAW 21.0.3+ environment will be suitable – a local VM, a Skytap environment, BAW on Cloud, CP4BAaaS or a BAW container deployment.

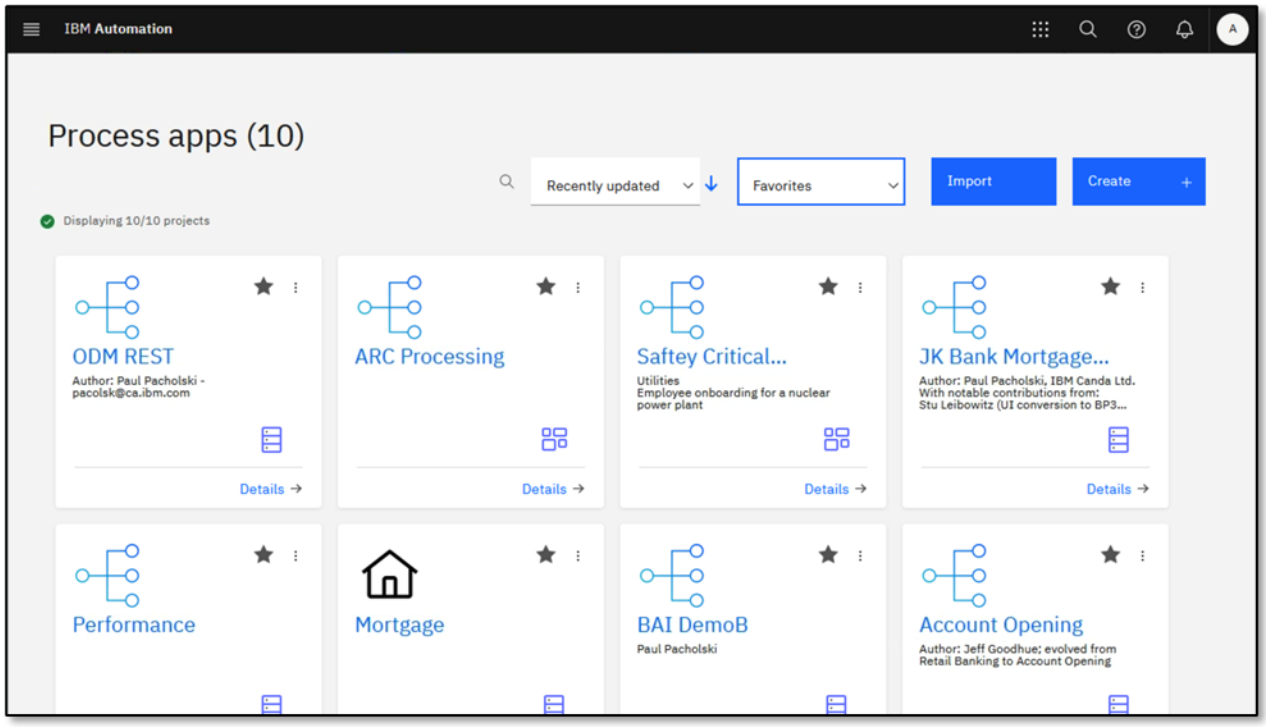
- Open the BAW Workflow Center environment. For many BAW environments (e.g. SaaS) a Workflow Center tile is provided, for Skytap a browser bookmark is often available. The form of the URL is https://host:port/WorkflowCenter/, e.g. https://ibmbaw:9443/WorkflowCenter/.
  If the BAW environment is OCP based then Workflow Center is replaced by BA Studio. The initial access to BA Studio is a little different than to Workflow Center and is described in Appendix A.
  Log into the environment with suitable credentials, admin/admin is often available



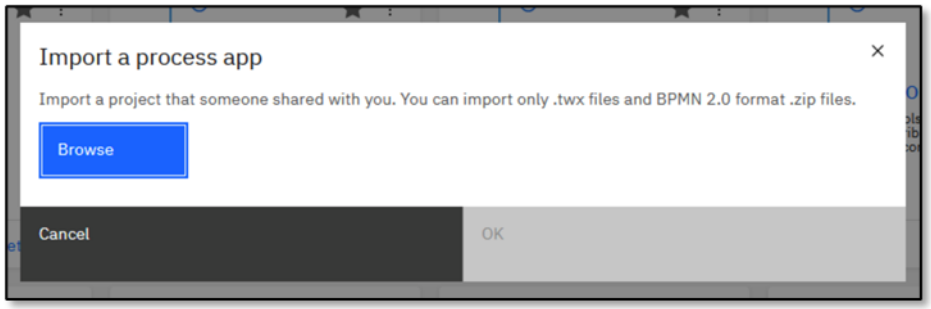
  The following page will be displayed:



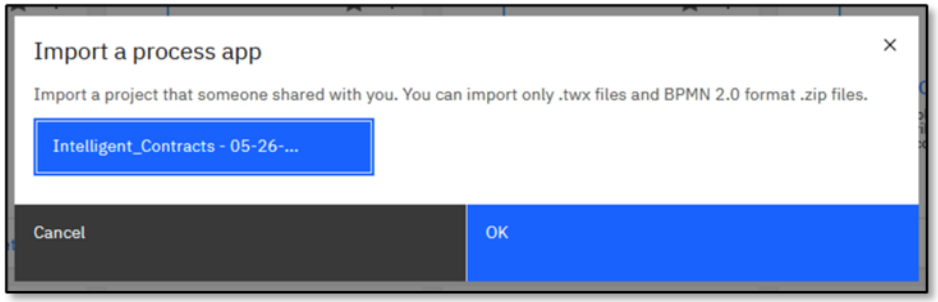
- Click on the Process apps tile. A page showing all of the available Process Applications is shown. Your page will differ according to the applications installed in your chosen BAW environment:



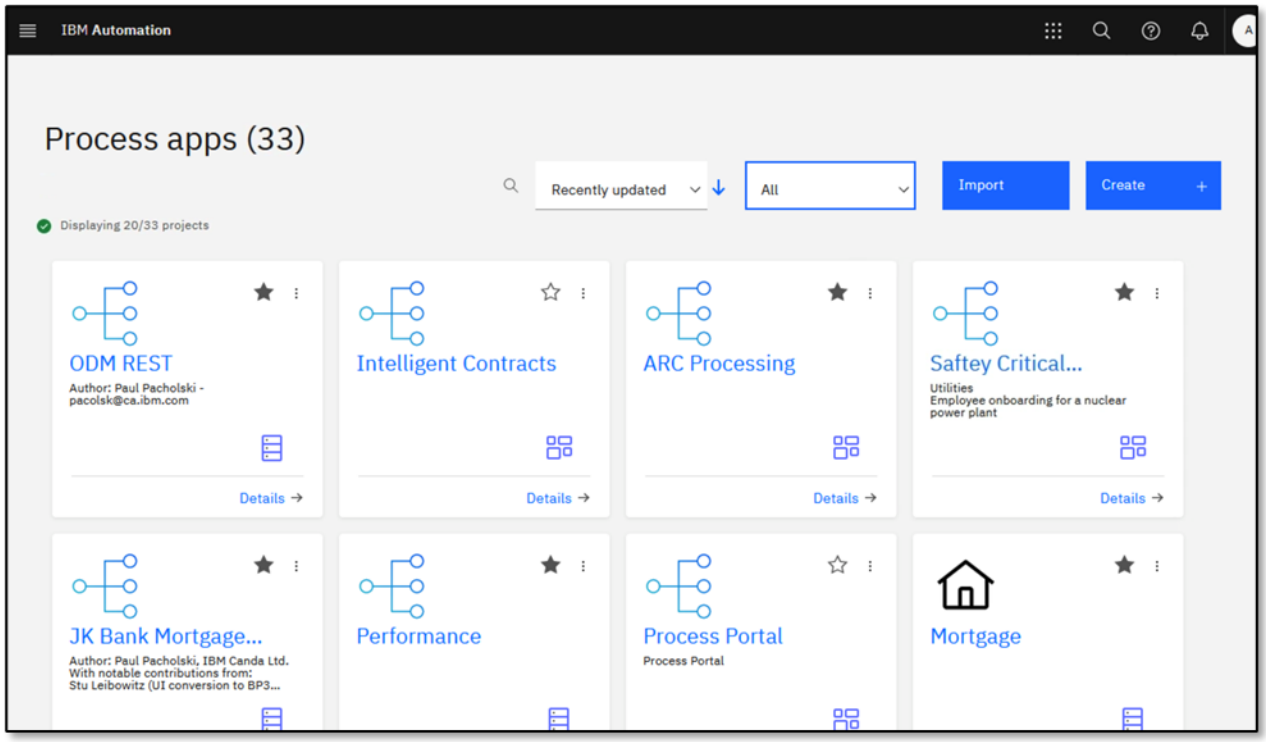
- Note the blue button in the top right labeled Import. Click on this:



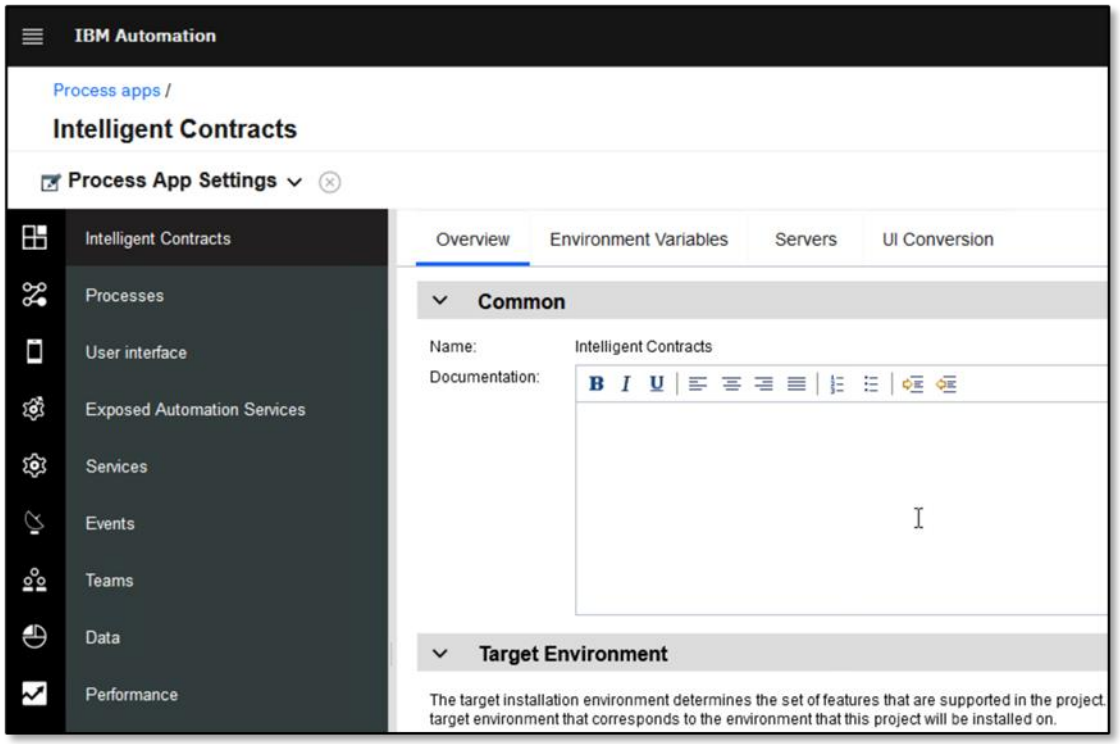
Click on Browse and navigate to where you have placed the import file with the .twx extension. For our example, this is named “Intelligent_Contracts - 05-26-2022-1.twx”, you may have a file with a later date in the name.



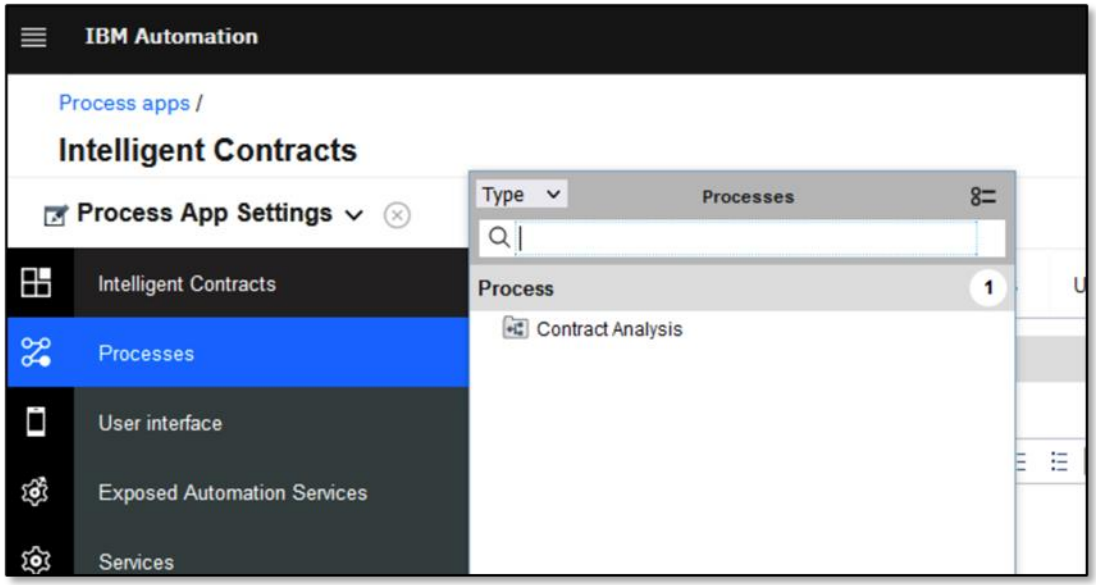
Select the file and then click on the blue OK button. The Process Application will be imported into the Workflow Center, which will be refreshed to show the imported project.



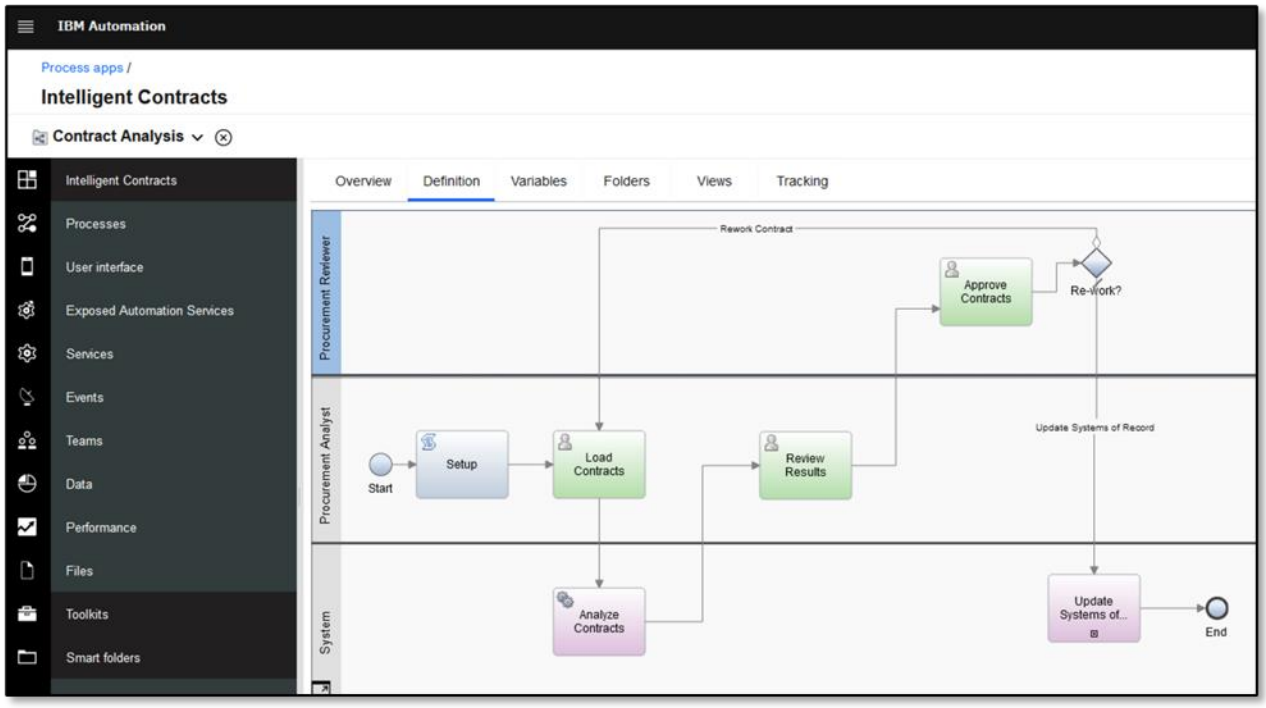
- Click on the Intelligent Contract tile and the Process Designer tool will open:



Click on Processes and the list of processes will appear.



Click on Contract Analysis:

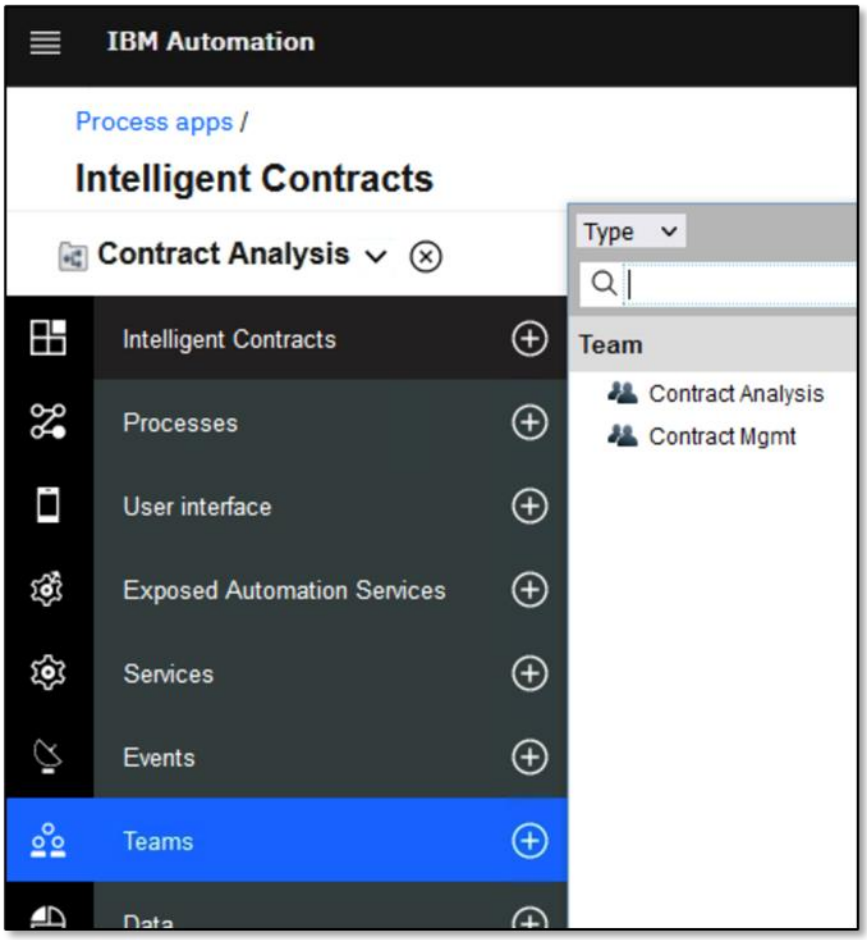


- There are 6 activities in this process:
  - **Setup** is for initialization steps. This is currently limited to setting up some date information.
  - **Load Contracts** is to load a specific file to be analyzed and to enter any necessary comments
  - **Analyze Contracts** is to call the ML service that analyzes the contract file and returns an opinion on the likely success of the contract plus a set of significant criteria that are relevant to the opinion.

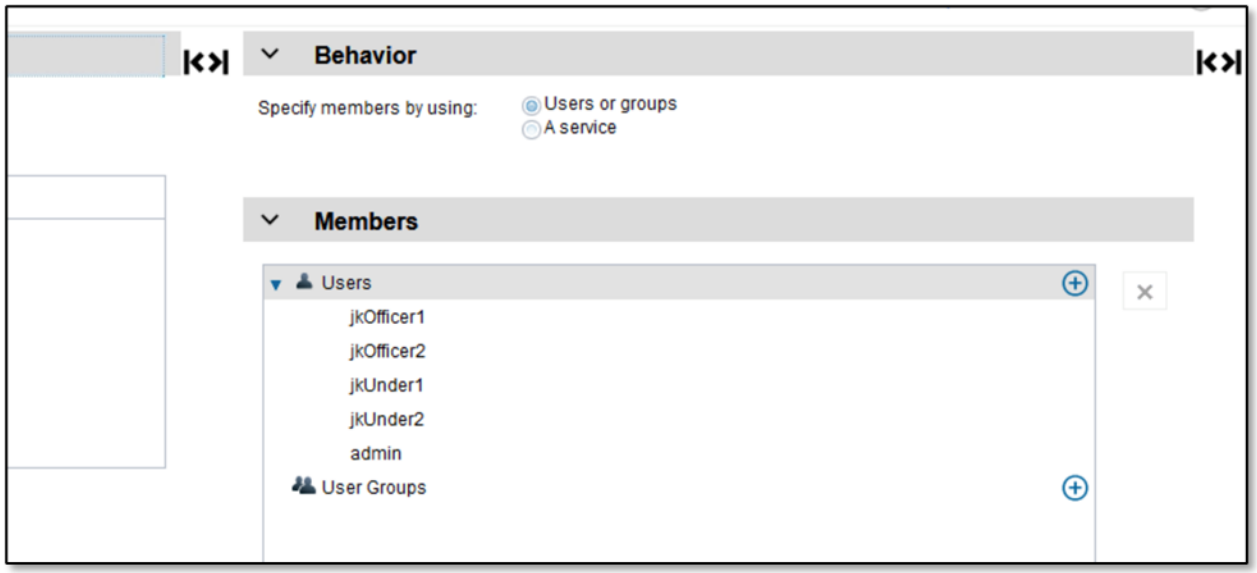
NOTE: In this demo the call to the ML service is not implemented. Instead, a set of default values is provided. This is OK, as this is a "vision demo" and not a proof of capabilities.

- **Review Results** shows the information returned by the ML service call. It shows information on the likelihood of a successful contract. It also shows the contract characteristics that influence contract success (as derived during ML modeling) and the particular characteristics that affected this opinion.
  The next steps is an approval step and there is the opportunity to enter more comments for the approver.
- **Approve Contract** is for an approver to 'accept' the contract or return it to be re-worked.
- **Update Systems of Record** is a no-op step included to represent a next step after a contract approval.

- The 3 user activities are contained within 2 swim lanes named **Procurement Analyst** and **Procurement Reviewer**. Each swim lane has a set of authorized users in a Team. The **Contract Analysis** Team is associated with the **Procurement Analyst** swim lane and the **Contract Mgmt** team is associated with the **Procurement Reviewer** swim lane. You may associate any set of users/groups with each team. The simplest way to run the demo is to ensure that there is a user common to both teams so that all 3 activities can be run by the same user.
  - On the left side of the Process Designer page, click on Teams and select Contract Analysis from the list:



- The members of the team are shown on the right side of the page:



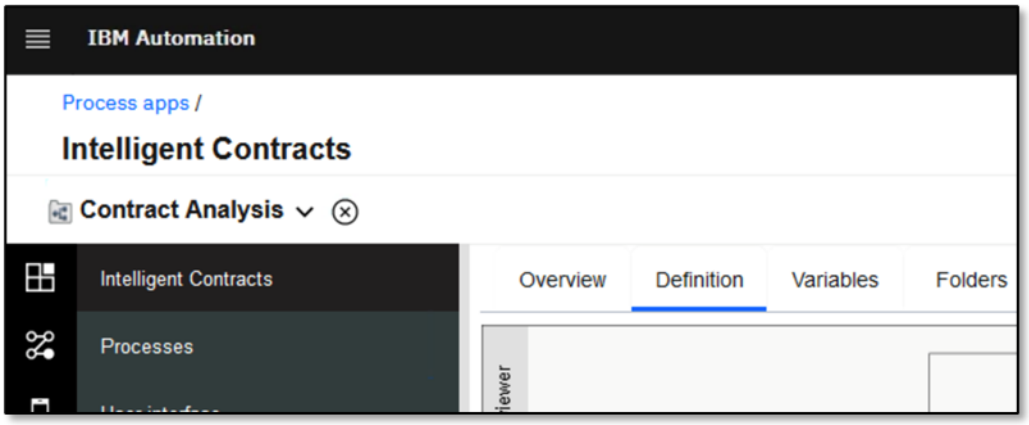
There are 5 users and no groups shown above. You can use any user that is available to

your system. With the exception of SaaS (where your SaaS user is the best option), admin is the most commonly available/simplest user to use. If your preferred user is not present click on the blus “+” to the right of users and add the appropriate user.

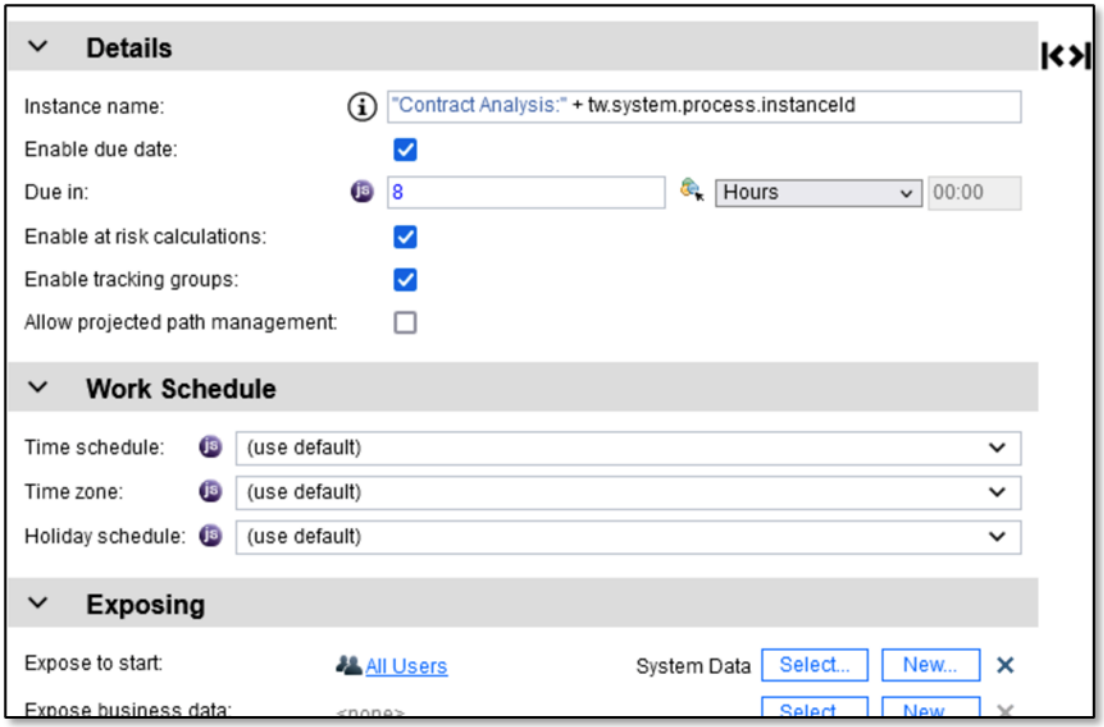
- Repeat the above steps for the **Contract Mgmt** team.

- Lastly, ensure that any user can start an instance of the **Contract Analysis** process.
  - Navigate back to the **Contract Analysis** process definition:

  - Select the Overview tab:



  - Under the Exposing section on the RHS, ensure that ‘Expose to start’ is set to All Users:



This ensures that any user can start an instance of the **Contract Analysis** process.

Note that there are just 3 user activities in this process, those colored green. In the next section there is a description of how to run the demo and what points to emphasize.

Watson Discovery Contracts Intelligence Workshop

(top)

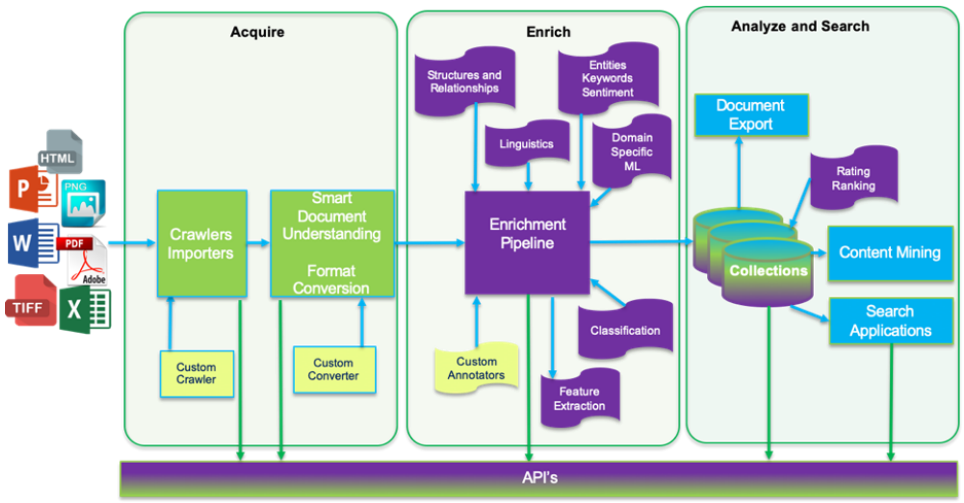
Watson Discovery Data Flow

Watson Discovery provides multiple methods of acquiring and enriching documents of various type. In the diagram below you can see three phases Acquire, Enrich, Analyze and Search.

In the Acquire stage, data is ingested from one or more data sources, stripped of unnecessary content (such as graphics and formatting) and then passed to the Enrich stage.

In the Enrich stage, the data (typically a mix of structured and unstructured text) is processed using techniques such as Natural Language Processing and Machine learning to provide meaning and context to the raw text. This enriched data is stored as a Collection.

The Analyze and Search stage uses the enriched data from one or more Collections to conduct discovery and exploration or to enable expert assistance through search-based applications.

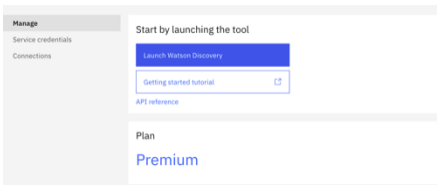


Watson Discovery uses Natural language queries as well as structured queries to find relevant results using passages and highlights across data that has been enriched and ingested. In this particular demo the data ingested is a small amount of procurements contracts. We have chosen to apply a pre-built Contracts Intelligence enrichment model during ingestion in order to leverage Watson's understanding of contractual data.

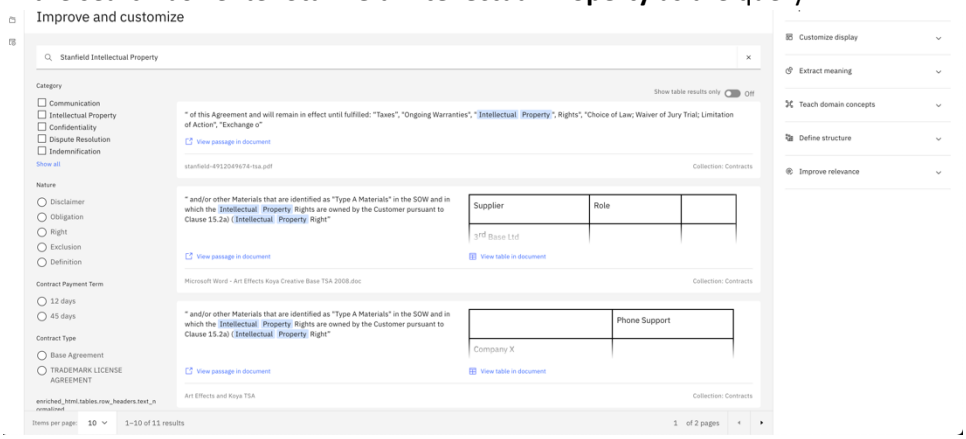
Demonstration

(top)

1. Launch Watson Discovery Tooling from Services and Software Resource List in ibm.cloud.com.

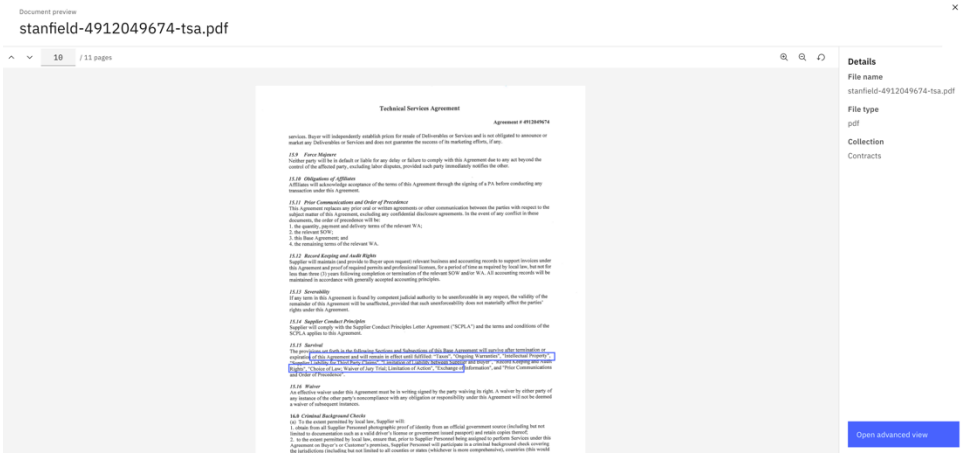


2. Select the **Contract Intelligence** Project from the **My Projects** list. You will now be in the **Improve and customize** panel of Discovery Tooling and ready to demo.
3. In the search box enter **Stanfield Intellectual Property** as the query.

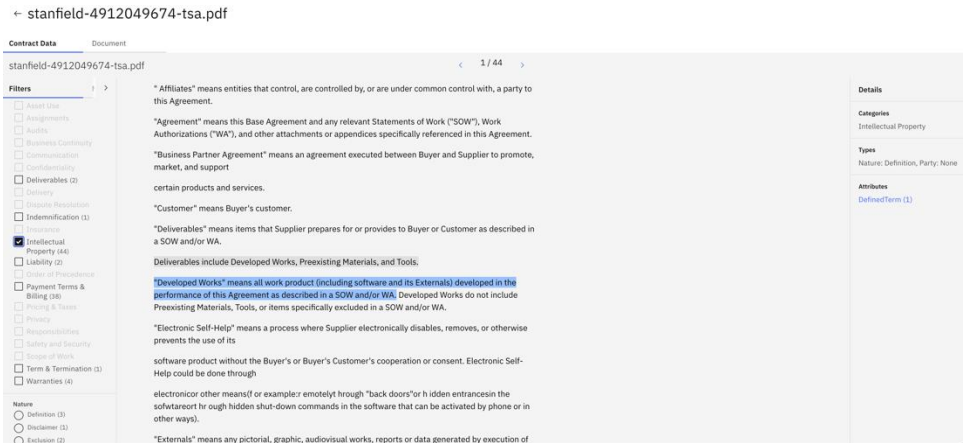


In the return results you will see that not only results have been displayed, but also enriched structure from the document now exists in order to use for digging deep into the exact areas of the contract we are interested in.

4. Click on **view passage in document** for the first result in the list. This will show the natural understanding of the concept we queried highlighted within the original document.

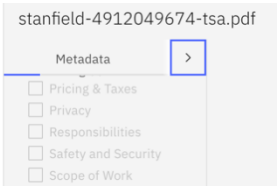


5. Click on **Open advanced view** in the bottom right of the window. This is a Contracts specific User Interface designed to expose the full gambit of the Contracts Intelligance. You can see in this screen, we now have more structured enrichments that have been exposed from the specific document.
6. Click on the **Category**, **Intellectual Property**.

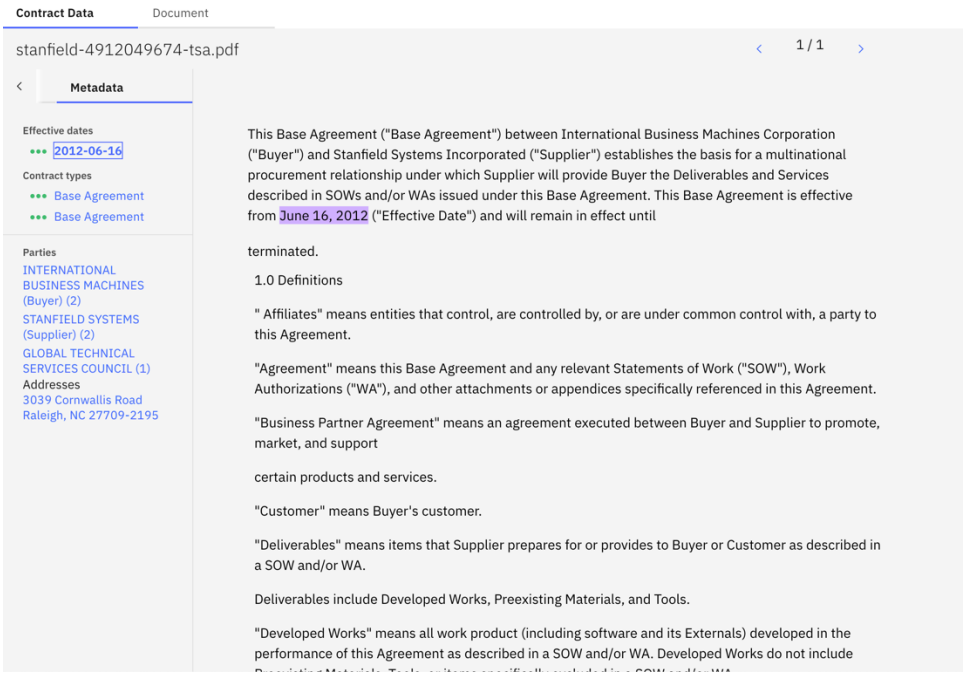


Now every concept from the contract around Intellectual Property has been identified and highlighted in the document. You can use the top navigation to jump from highlighted passage to highlighted passage.

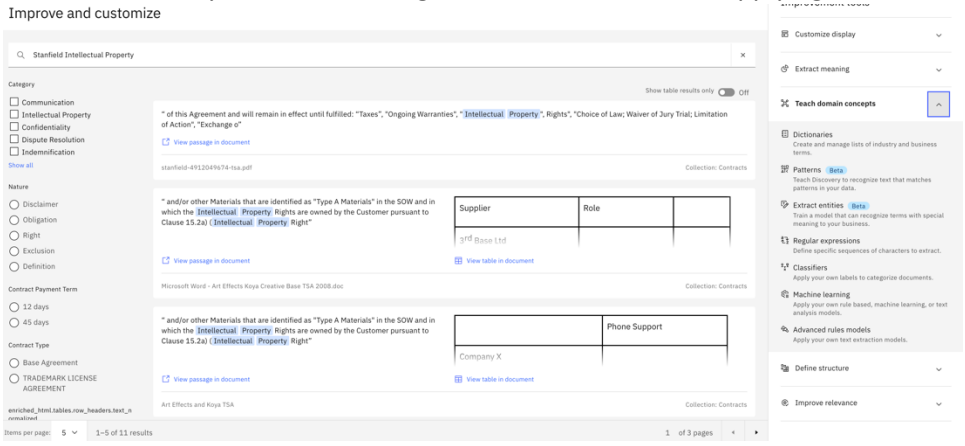
7. With Intellectual Property still selected, now click on the **Buyer** radio button under the **Party** category. We have now intersected the one area in the contract where Intellectual Property is discussed in regards to the Buyer.
8. Other metadata is extracted as well and can be used to enrich models built with Machine Learning. Click on the **Metadata** tab above the categories.



This will expose other metadata, such as the effective date of the contract.



9. You can also add custom enrichments assisted by Watson AI through the Discovery tooling as well. Click on the / Improve and customize / hyperlink located at the top left of the window to go back into the main Improve and customize screen. On the right side, click on the **Teach Domain concepts**. This opens more AI assisted tools to further enrich you contracts data by adding custom Dictionary terms, extracting custom entities or even applying custom Machine Learning.



Watson Studio With Watson Discovery To Build And Deploy a Contract Success AI Model

(top)

In our previous demo with Watson Discovery, we learned how it was able to provide Domain Concepts like “Intellectual Property” from many contractual documents.
When building our machine learning model to predict contact success, we’re going to merge the unstructured concepts like “Intellectual Property” with the historical contract history to build and deploy a more robust machine learning model to predict contract success.

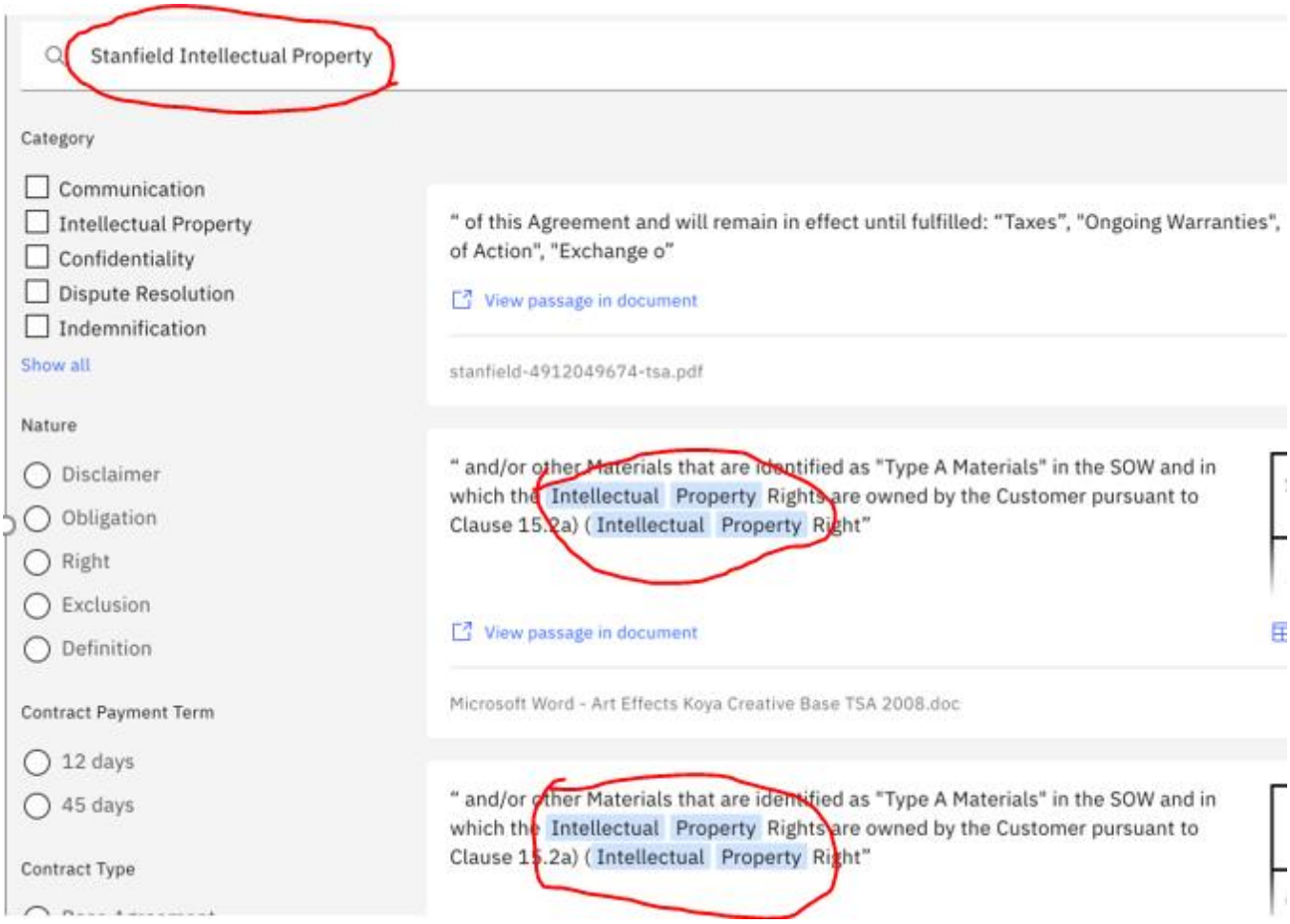


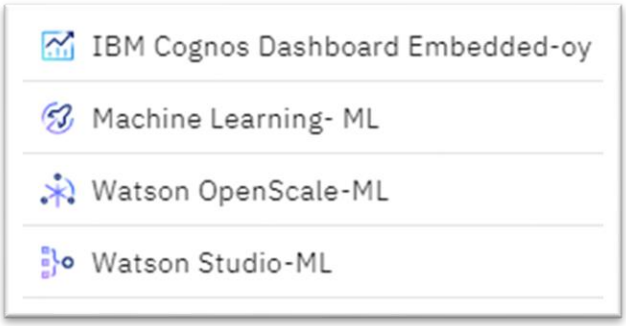
Figure 2 Example of using Watson Discovery To Uncover Common Categories

Required software, access, and files

(top)

1. To complete this lab, you will need a **Cloud Pak for Data as a Service** (**CPDaaS**) account: https://dataplatform.cloud.ibm.com
   If you don’t have a CPDaaS account, use the same URL to sign up for a free trial. The account will be activated in approximately 5 minutes.
2. If you already have an **IBM Cloud** account, make sure that you provisioned the required services
   a. **Watson Studio**
   b. **Watson Machine Learning (WML)**
   c. **Watson OpenScale**
   d. **IBM Cognos Dashboard Embedded.**
3. Navigate to your *Resource list* in your **IBM Cloud** dashboard: https://cloud.ibm.com/resources

4. Check if the mentioned services are displayed under **Services**. If not, search for the services in the **Catalog** and add them.



NOTE: You will likely not have the same endings. (IE. '-oy' and '-ML')

5. Download the **project zip file** to your machine. It will be imported into a Cloud Pak For Data Project.

6. Please visit this git repository to download all the files for this workshop.

7. STOP Watch this recording before you proceed! It will step you through the demo in approx. 9 minutes.

Download These Files From Git

(top)

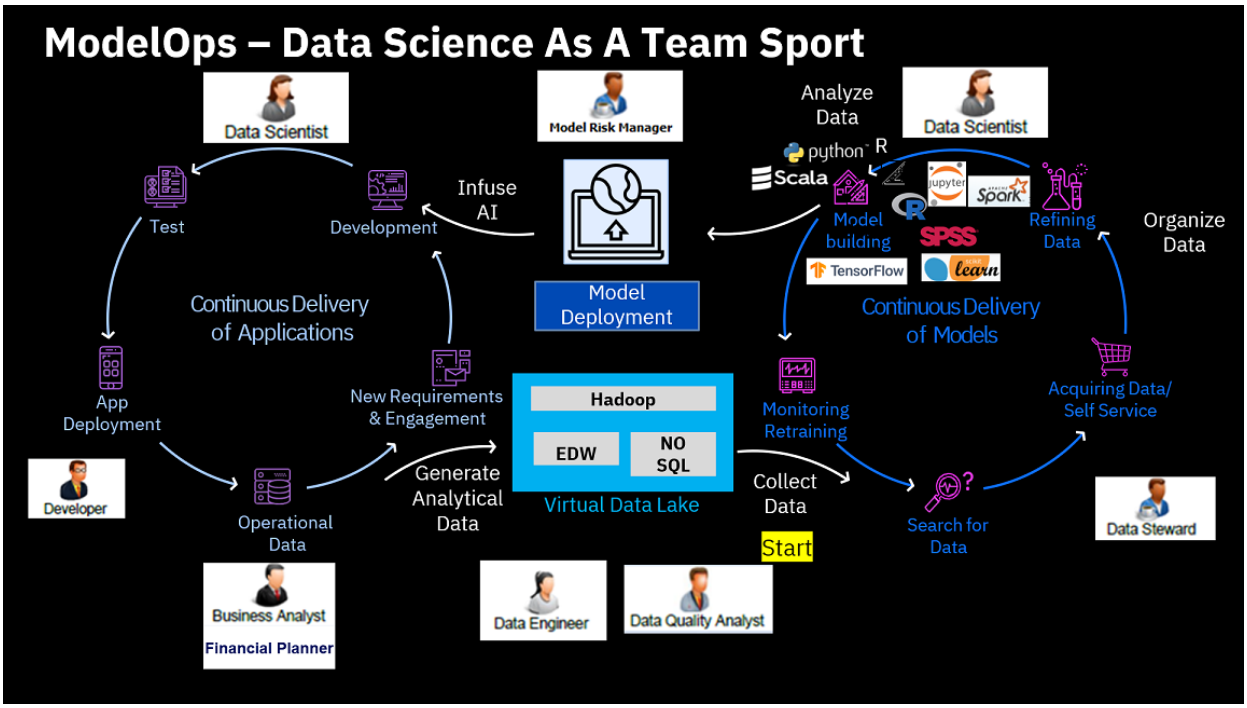
1) **Intelligent-Contracts.zip**
Import this zip file when creating a new IBM Watson Studio Project
It will include the following project assets:

- 3 CSV files - Scored_Contracts.csv, Contract_Analysis.csv, Unscored_Contracts.csv
- Python Notebook - ContractSuccessRandomForest-Py38 Using Sklearn - Using Open Source SkLearn Python with a Random Forest Model deployed to IBM Platform
- Modeler Flow - Build and deploy the same Python model without the need fof coding
- Dashboard - Historical and Predictive Visualizations using structured and unstructered contract data
- Model - Contract Success Using AutoAI - P3 Snap Random Forest Classifier - This model was generated by AutoAI. We will deploy in the workshop.

2) **Intelligent-Contracts-Workshop-Guide.pdf (CURRENT DOCUMENT)**
Use this step-by-step workbook to:

- Automate Contract Workflow (Ingestion, Analysis, Approvals)
  Uses Cloud Pak For Business Automation
- b) Enrich Intelligence Accuracy (Extracting Information from Contracts)
  Uses Cloud Pak For Data Watson Discovery
- c) Integrate Continuous Improvement (Infusing AI into the Operation)
  Uses Cloud Pak For Data Watson Studio

3) **data_science_modelops_team_sport.png**
ModelOps as a Team Sport image depicting all those involved in delivering AI models and how IBM has them all collaborate together on one platform.



4) **contracts.zip [Already used in previous workshop]**
Sample contracts used in demo with Watson Discovery and used in the modelOps workflow.

5) **modelOpsForContractSuccess.mp4**
A recording of the end to end modelOps demo.

6) **csv_files.zip**
(Optional) Start a new Project in Cloud Pak For Data, import these CSV files and create all the project assets yourself from scratch.
Watch the video as a guide.

7)**Trustworthy AI.mp4**
(Optional) In this 9 minute recording, learn how IBM provides AI guardrails by monitoring key model metrics on and off our platform using OpenScale to avoid data bias or drift with model risk workflow to adhere to regulator guidelines like SR 11–7 that requires model risk management for all models in financial services using OpenPages.

8)**ContractSuccessRandomForest-Py38 Using Sklearn.ipynb**
(Optional) Import this Python notebook using Open Source Sklearn and Random Forest Model.

Required skills
(top)

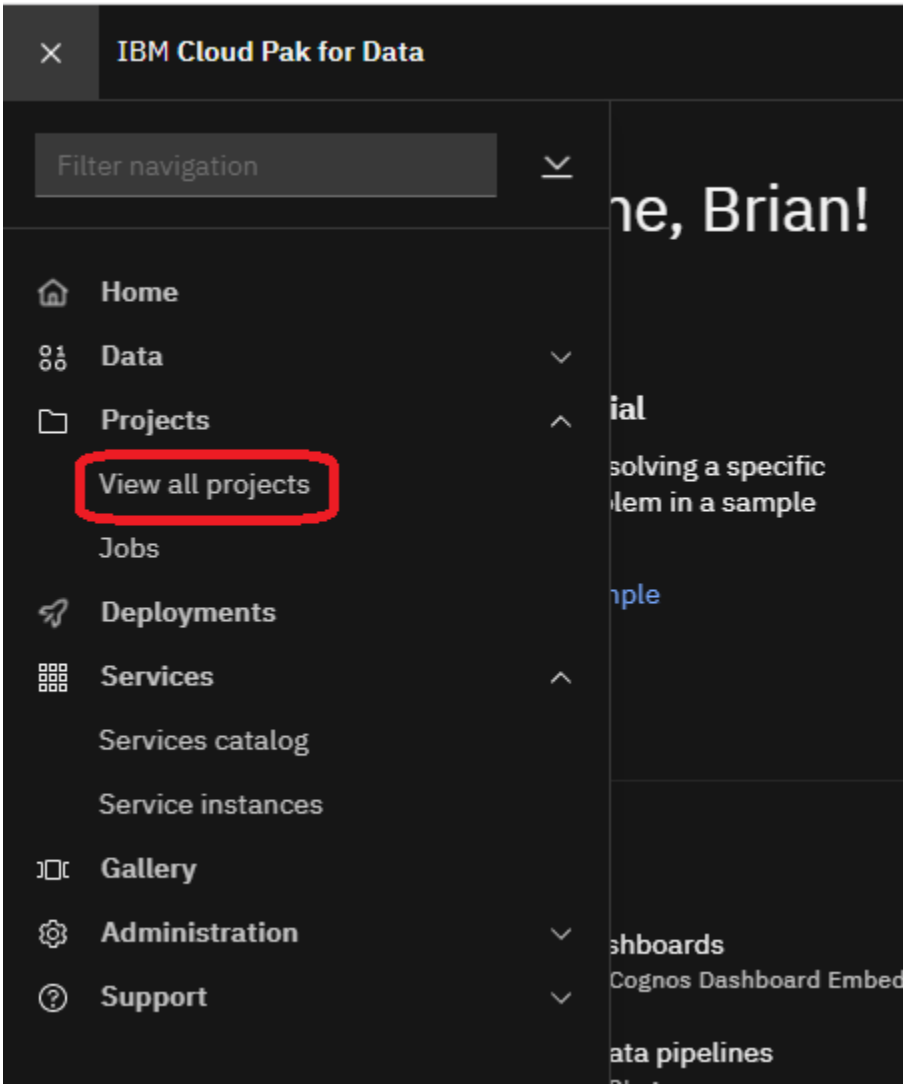
We recommend that users who work through this lab:

- Understand the data science model lifecycle
- Have at least beginner knowledge of different methods for creating models

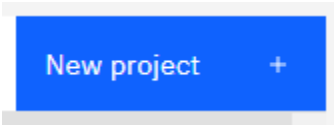
Step 1: Create New Project Importing Intelligent-Contracts.zip

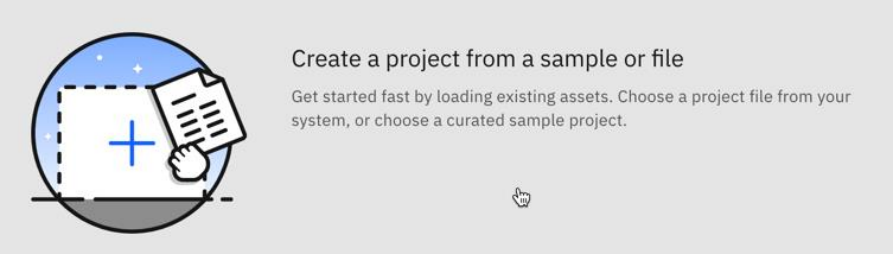
(top)

1. Sign into Watson Studio. From the quick navigation on the left, select **Projects → View all projects**.



2. On the far right, click the **New project**, then select **Create a project from a sample or file**.





3. Drag the *project zip* file (downloaded from Git) from your machine to the **Upload file** section.
   Name your project **Intelligent Contracts**
   Select a **Cloud Object Storage** service
   Select **Dashboard Service** from the dropdown list
   Click **Create**.

4.