Recommendation and Feedback for Sourcing

SESAP ZG629T PROJECT WORK

by

Akhil M S
2018SP93010

Project work carried out at
SAP Labs India Pvt Ltd, Bangalore

BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE
Pilani (Rajasthan) INDIA
June, 2020

SE SAP ZG629T PROJECT WORK

Recommendation and Feedback for Sourcing

Submitted in partial fulfilment of the requirements of the

M. Tech. Software Engineering Degree programme

By

Akhil M S
2018SP93010

Under the supervision of

Kumaraswamy Gowda,
Principal Software Engineer,
SAP Ariba Technologies

Project work carried out at

SAP Labs, Bangalore

BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE
PILANI (RAJASTHAN)

June 2020

BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, PILANI

CERTIFICATE

This is to certify that the Project Work entitled **Recommendation and Feedback for Sourcing** and submitted by **Akhil M S** ID No **2018SP93010** in partial fulfillment of the requirements of **SESAP ZG629T Project Work** embodies the work done by him under my supervision.

Kumaraswamy Gowda

Signature of the Supervisor

Name: **Kumaraswamy Gowda**

Designation: **Principal Software Engineer, SAP**

Date: 16-06-2020

ACKNOWLEGDEMENTS

“Being with the wise is the first sign of wisdom”

I would like to take this opportunity to express my gratitude to my supervisor **Kumaraswamy Gowda**, who gave me the golden opportunity to do this wonderful project, lending me his experience and counsel. He was a tremendous help in the research and development related to this project.

Many thanks to Internal Supervisors **Debashis Banerjee** and Professor **Neha Garg** for guiding me throughout the effort of this project. Their continuous feedback and direction have helped this project reaches its best form. Many thanks to my Professor **Vadivelan** for giving timely feedback on the project.

I would also like to thank my friends and family who helped me a lot in finalizing this project and supporting me in my endeavours in ways both big and small, but always significant.

BIRLA INSTITUTE OF TECHNOLOGY & SCIENCE, PILANI
FOURTH SEMESTER 2019-20

SESAP ZG629T DISSERTATION

Dissertation Title : Recommendation and Feedback for Sourcing

Name of Supervisor : Kumaraswamy Gowda

Name of Student : Akhil M S

ID No. of Student : 2018SP93010

Abstract

(***Note:*** *The Abstract should briefly describe the work done with respect to the goals, in about 500 words.)*

There are number of machine learning use cases that already exists for mapping user terms to system terms, recommending suppliers, etc. using the historical data and details about the system. The infrastructure and framework already exist for running the machine learning model. Not all interpretations or recommendations are accurate, or it could start losing the predictive power over a period of time due to changing data or newer features. How do we handle the rising in error?

Because you want to see how the model behaves over time, setting up a feedback loop that continues to compare the model's predictions with actual prediction.

Creating feedback opportunities in product, instrumenting and capturing these feedbacks, and integrating it back into model development is important for both improving user experience as well as optimizing the companies' business objectives and bottom lines.

The idea is to build a generic feedback service that will collect the user feedback and can be used in the machine learning model for improving prediction accuracy. As part of this project we are building generic feedback framework, ability to review and revise any incorrect interpretations, a small portion of dynamic UI by leveraging the intelligent forms. As we collect the feedback from the user for the predictions / recommendations, the user feedback is stored within the feedback database for re-training the machine learning model with the data obtained that will make the model accurate than ever before.

Please note that Custom forms/Intelligent forms is an extension mechanism utilizing UI, APIs and data. Forms is customer-centric self-service UI which is integrated with a number of Ariba solutions. Business intelligence can be incorporated in Forms and delivered to customers directly or through other Ariba solutions.

The following use cases are implemented in this current dissertation project:

- Smart excel import using unstructured excel.
- Supplier Recommendation in Minerva.
- Question Recommendation in Minerva.
- Qualtrics Feedback with frequency to understand our implementation better.
- POC on the custom forms for supplier recommendation.

The following capabilities are envisioned in our microservice:

- Collection and storage of feedback data
- Train the model with the feedback data at global or realm or user level
- Manual feedback UI and dynamic UI using Intelligent forms to collect the feedback from users
- Adopt newer use case from recommendation to feedback to retrain

This project concentrates mainly on building a generic feedback microservice with API for prediction, storage and processing of feedback data. We also leverage intelligent forms that helps in collecting user feedback, which can be given back to our machine learning model for improving the accuracy of the model. Also Qualtrics feedback is being implemented to understand our users better with the help of the frequency concept which will invoke the feedback for a specific user at the specific interval of time.
Note: There would be no development/training done on any machine learning model. It is not in the scope of the current project.

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Key Words:

S4 - Shared Services Strategic Sourcing

ADE - Advanced Data Enrichment

AIF – Apps Intelligent Framework

API - Application Programming Interface

UI – User Interface

FRD - Functional Requirements Document

CHAPTER 1

Introduction & Background (Including Business process flow, if any):

SAP Ariba is an American software and information technology services company located in Palo Alto, California. It is a cloud-based innovative solution that allows suppliers and buyers to connect and do business on a single platform. It improves over all vendor management system of an organization by providing less costly ways of procurement and making business simple. Ariba acts as supply chain, procurement service to do business globally. SAP Ariba digitally transforms your supply chain, procurement and contract management process. We can consolidate and control all spending from source to pay. It is an intelligent digital supply chain. With SAP Ariba spend management solutions, we can digitalize and simplify all our processes end-to-end, on a single, integrated platform in the cloud.

Key features of procurement tool offered by SAP Ariba:

- It is a B2B solution that allows you to connect to the world's largest network of vendors and suppliers and enhance business collaboration with the right business partners.
- It allows organizations to connect with the right suppliers with deep visibility to your inside vendor and procurement management processes giving way to error free business transactions.
- You can directly connect Ariba network with millions of suppliers meeting your business needs and managing supply chain.
- Ariba network removes overall complexity in procurement process and suppliers and buyers can manage all key terms of vendor management on a single network.
- We can easily integrate master and transactional data from different ERP solution to Ariba processes.

Different Modules offered by SAP Ariba:

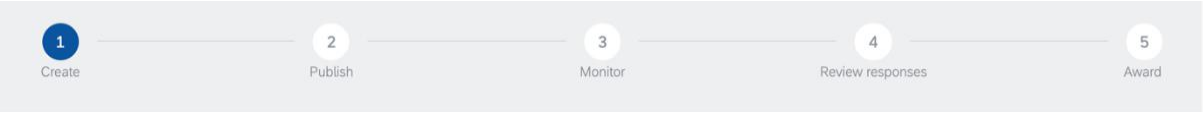
- Catalog Management
- Strategic Sourcing
- Contract Management
- Ariba Network
- Supplier Management
- Invoice Management
- Spend Visibility
- Operational Sourcing

Strategic Sourcing Module by SAP Ariba:

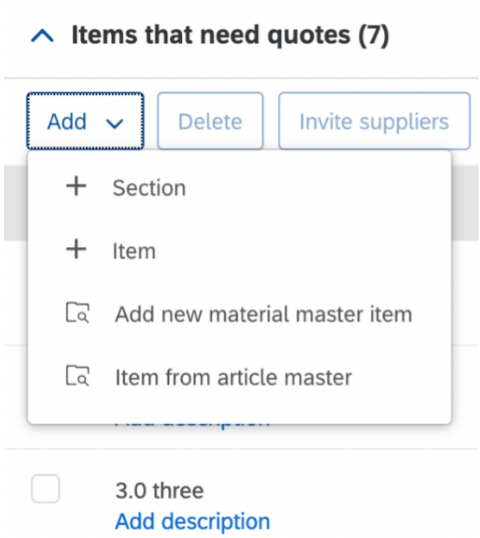
This is the module where we are trying to fit our generic feedback service framework to give a good user experience while creating an event. Once purchase order is placed, the control moves to sourcing module where we as a buyer can create the event, monitor the event, supplier can bid the line items in the event. Once the bidding period is done the event will move to pending selection state where the buyer can create optimized custom scenarios and can award the event to the supplier based on the preference.

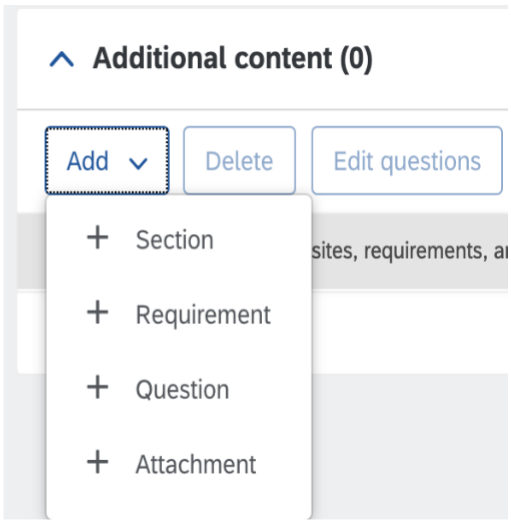
The sourcing process flow is as follows:

- Create
- Pending publish approval
- Publish
- Monitor
- Review responses
- Pending award approval
- Award

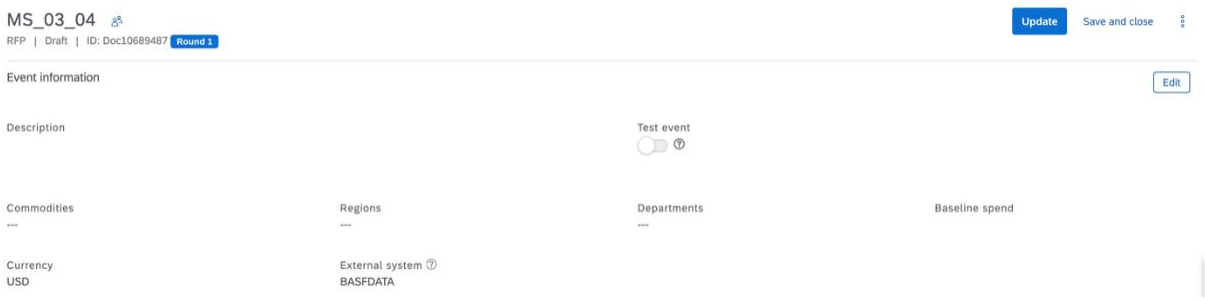


Here in the create flow, you can create an event by specifying the details such as name, description, commodity, region, template, department, type of event, currency. Then you can add line item/section/lot/master data along with questions, attachment, requirement. Once all these are added we can invite supplier to take part in the event which we have created. Every step in the sourcing flow is time bound and will move to the next state once time is over.



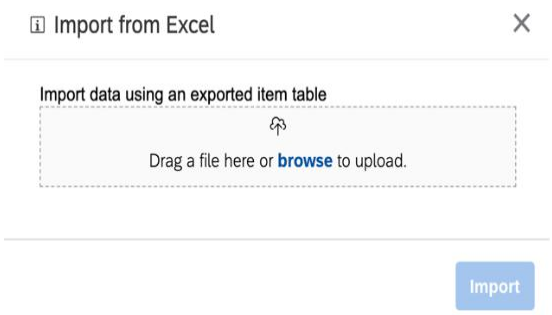


Header Information for event creation:

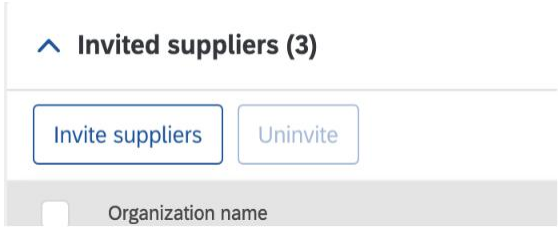


Few important business use cases:

When there are multiple of line items say 100 manual creation is very difficult, so we have the process of Excel import to ease the item creation. There are some standard terms defined by Ariba like Price, Quantity and so on. Apart from them, if customer has his own custom terms then he needs to manually change to else the import fails.



After line items are created, he needs to invite the supplier for participating in the event. There is no intelligent recommendation of the supplier based on the event level parameters like commodity code, region, department. He can't filter based on the region and invite as best supplier for an event is determined by a lot more parameters than just region which was found out after analysing the past event history.



Same holds good for question recommendation as well.

CHAPTER 2

Problem statement (What is Problem we are trying to solve):

There are number of machine learning use cases that already exists for prediction of pricing, terms, etc using the historic data and details about the system. The infrastructure and framework already exist for running the machine learning model. Not all predictions or recommendations are accurate, or it could start losing the predictive power over a period of time due to changing data or newer features. How do we handle the rising in error?

Apps Intelligent Framework (AIF, formerly ADE) is an existing SAP Ariba Product used to Classify or Enrich Invoice Data with Commodity code. An experiment was conducted by Data Science team to develop a Machine learning model to predict the Commodity Classification for Invoices which was better in both Quality and Quantity w.r.t Classification. This has reduces the turnaround time to few days.

The core concepts of new approach are

- A new UI is developed in existing Upstream App to generate Training Data, i.e. we extract 'Classified' Data from existing Invoice Fact table and send this to Enrichment App Microservice for Training.
- For training process we use CNN based 'bag of words' algorithm to come up with a Machine learning model.
- Later from Analytics report we send the data to be classified.
- The csv file send for classification used the model generated by Machine Learning to predict the Commodity Classification along with Confidence level.
- A Classification Report is generated using SLA and metrics to check the quality of Classification.
- If we meet the SLA the file is posted to Analytics for Enriched Data Load. Else, the classified file is sent to traditionally ADE for further Enrichment.

Because you want to see how the model behaves over time, setting up a feedback loop that continues to compare the model's predictions with actual prediction.

Creating feedback opportunities in product, instrumenting and capturing these feedbacks, and integrating it back into model development is important for both improving user experience as well as optimizing the companies' business objectives and bottom lines.

The idea is to build a generic feedback service that will collect the user feedback and can be used in the machine learning model for improving prediction accuracy. As part of this project we would also build dynamic UI by leveraging the intelligent forms where we collect the feedback from the user for the predictions / recommendations. The user feedback will be stored within the feedback database for training the machine learning model with the data obtained that will make the model accurate than ever before.

Also, we would like to understand how this smart prediction is helping our customers do their business better in terms of excel import, supplier recommendation, question recommendation through the experience management system of SAP i.e. Qualtrics Feedback.

Please note that Custom forms/Intelligent forms is an extension mechanism utilizing UI, APIs and data. Forms is customer-centric self-service UI which is integrated with a number of Ariba solutions. Business intelligence can be incorporated in Forms and delivered to customers directly or through other Ariba solutions.

CHAPTER 3

Objective of the project (What are the expected outcomes):

The purpose of Feedback service is to build a common platform for capturing, storing, processing the user feedback. The user feedback is fed to the ADE to retrain the machine learning model for better predictions in the future.

Use case adopted in our feedback framework:

- Unstructured Excel Import into Sourcing.
- Intelligent Supplier Recommendation for the items based on the regions, commodity and other header fields.
- Intelligent Question Recommendations based on the previous event experience.
- Collecting the feedback in all these scenarios and send it back to the AIF Microservice.
- Qualtrics experience management integration to understand the impact of these intelligent services on our end users.

The following capabilities are envisioned in our microservice:

- Generic feedback APIs
- Collection and storage of feedback data
- Train the model with the feedback data at global or realm or user level.
- Feedback UI using Intelligent forms to collect the feedback from users.
- Adopt newer use case from recommendation to feedback to retrain.
- Capturing user experience through the SAP's Qualtrics tool.

Goals of the project:

- For better predictions in the machine learning model.
- Common framework for the user feedback.
- User experience capture using Qualtrics tool for Product team

CHAPTER 4

Uniqueness of the project:

- The uniqueness of the Feedback service is, it serves as a common platform for capturing, storing, processing the user feedback in terms of unstructured excel import, supplier and question recommendation. The user feedback is fed to the AIF to retrain the machine learning model for better predictions in the future.

- Now customer doesn't have to manually map the custom terms to the application specific terms. It will be taken care by the unstructured excel feature of this project. If he is not okay with the mapping of terms done by us, he can go ahead and reassign the mapping of custom terms which will be stored in our application as a preference and will be taken care of while retraining the model.

- Customer doesn't have to manually invite the supplier to participate in the event instead it will be taken care of by the supplier recommendation feature of this project based on the header fields such as commodity code, region, country.

- Customer once he fills the necessary fields for the event, he will recommended a specific set of questions based on the previous usages by others in that particular realm.

- As the feedback data needs to be fed into the machine learning model training set, a scheduler would be needed that runs every X minutes|hours|days to push the data to Apps Intelligent Framework for training with the updated set. The scheduler framework would be reused for all the different use cases of pushing the data to AIF.

- As we retrain the machine learning model along with feedback data, the predictions would be more accurate.

- Highly Available - Generic feedback service is highly available as we will deploy this in the cobalt infrastructure. These number of containers will be tracked for live-ness using heartbeats by pinging a REST service end point.

- Highly Scalable - This project is highly scalable in nature as horizontal scaling is provided by Cobalt infrastructure. Also, the solution should be scalable even when 100's of users are using our service. Hence the user feedback collection would be on the UI node and send the data for retraining would be on the task nodes.

- Secured Application - Our microservice is security complaint as the infrastructure provides the security at application infrastructure level such as Firewall, HTTPS tunnelling.

- Disaster Recovery Support - The service will be deployed in primary and DR site for a region. When services that it relies on are not reachable, it would fail gracefully and notify the service that depend on it. When those services become available, optimization service would become functional without the need to restart it. When primary site goes down, the DR site will be able to provide the functionality once its dependencies are brought up in the DR site.

- Experience Management using the SAP's Qualtrics tool which captures user feedback about the process, recommendation and product which will help the product management team understand this use case better

CHAPTER 5

Benefit to the organization:

- Organization now has a common platform ‘Feedback Service’ for capturing, storing, processing the user feedback.
- Organization gets a better predictions in the machine learning model which gives an edge over its competitors in the market.
- Customer retention rate will be more because of the smooth experience he gets while creating an event in terms of adding line items through the unstructured excel import, getting the good recommendation of suppliers and questions.
- This framework doesn’t force the customer to use the given recommendation, instead it is open to the feedback given by the customers of that specific realm which will be incorporated in the coming days.
- This framework is written in a generic way so that it can be integrated with any other SAP or non SAP application.
- The framework follows the SOLID design principle to make the application more understandable, flexible and maintainable.
- The framework is highly available, scalable, secured, disaster recovery support in nature.
- Since this framework creation requires the communication and support of multiple teams like Sourcing, ADE. It brings a better inter team coordination and communication which is very much required in current day scenario.
- Product management team can capture the user feedback on the process, product and its offering such as smart excel import, smart recommendations through the Qualtrics

CHAPTER 6

Scope of work:

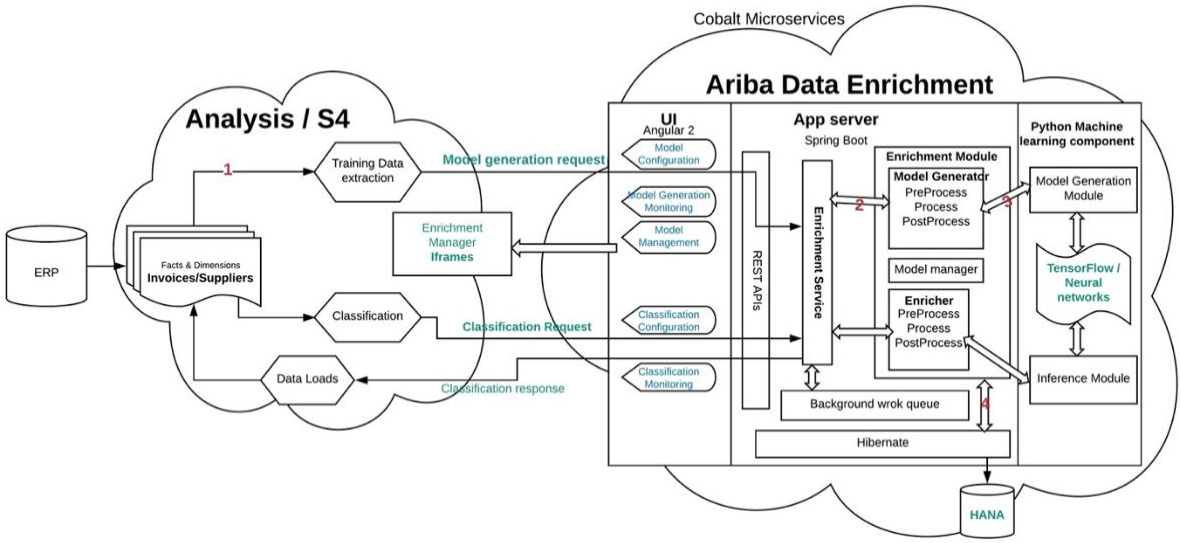
This application is being developed with Spring Boot microservice for business logic processing and uses HANA for data storage and Angular 5 for UI rendering. This will send/receive the prediction data from AIF. It stores the feedback given by the user and will send it to AIF through a scheduled task that runs at a frequency of X minutes/hours/days. We integrate our framework with the legacy Sourcing and new sourcing application where unstructured excel import, intelligent supplier/questions recommendation, etc will take place.

This framework is designed as an independent application with loosely coupled API's and can be deployed in any cloud-based web service platform as a container. Generic feedback service is deployed using Docker based container in the cobalt infrastructure. It will be highly available, secured, scalable, good performance, reliable (Disaster Recovery Support) in nature.

CHAPTER 7

Solution architecture (Architectural components & how does it work):

1. Generic Enrichment Framework (Existing solution):



For inference file request for unstructured excel import use case, following call backs are used by our framework to communicate to ADE:

- validateInferenceRequest
- preQueueModelEnrichmentRequest
- queueModelEnrichmentRequest
- postQueueModelEnrichmentRequest

For enrichment process, following call backs are provided:

- enrichmentSetup
- preEnrichData
- enrichData
- postEnrichData
- enrichmentDestroy

Feedback Use cases

Unstructured Excel Import Use case:

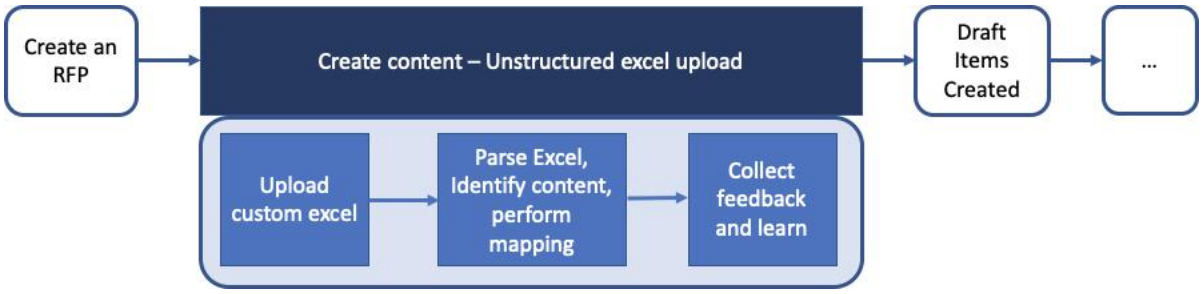
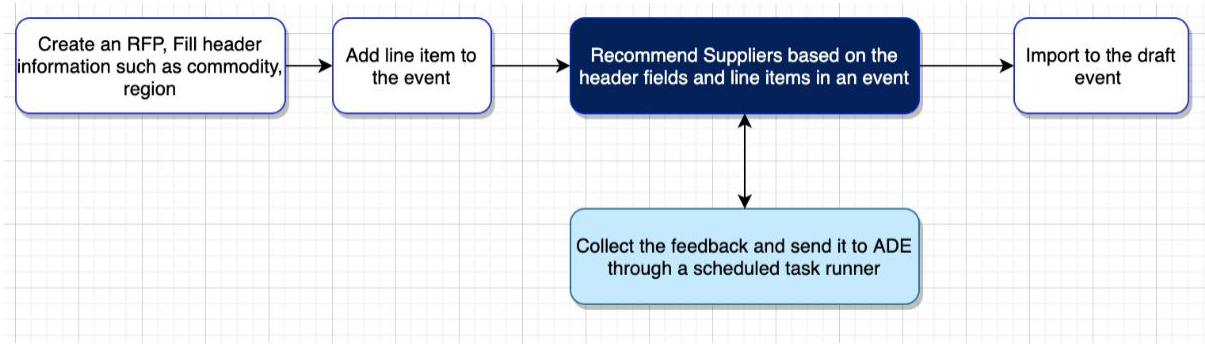
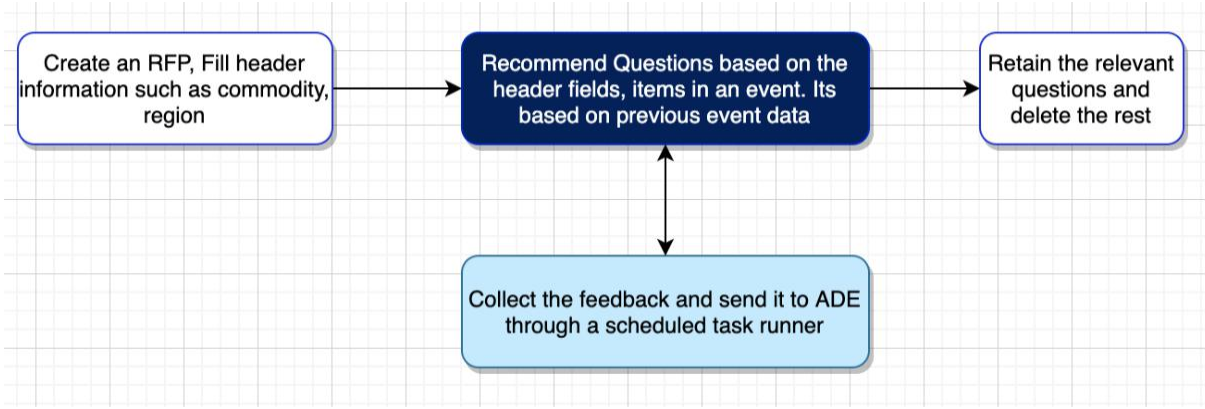


Figure 1: Use case diagram for Unstructured Excel import

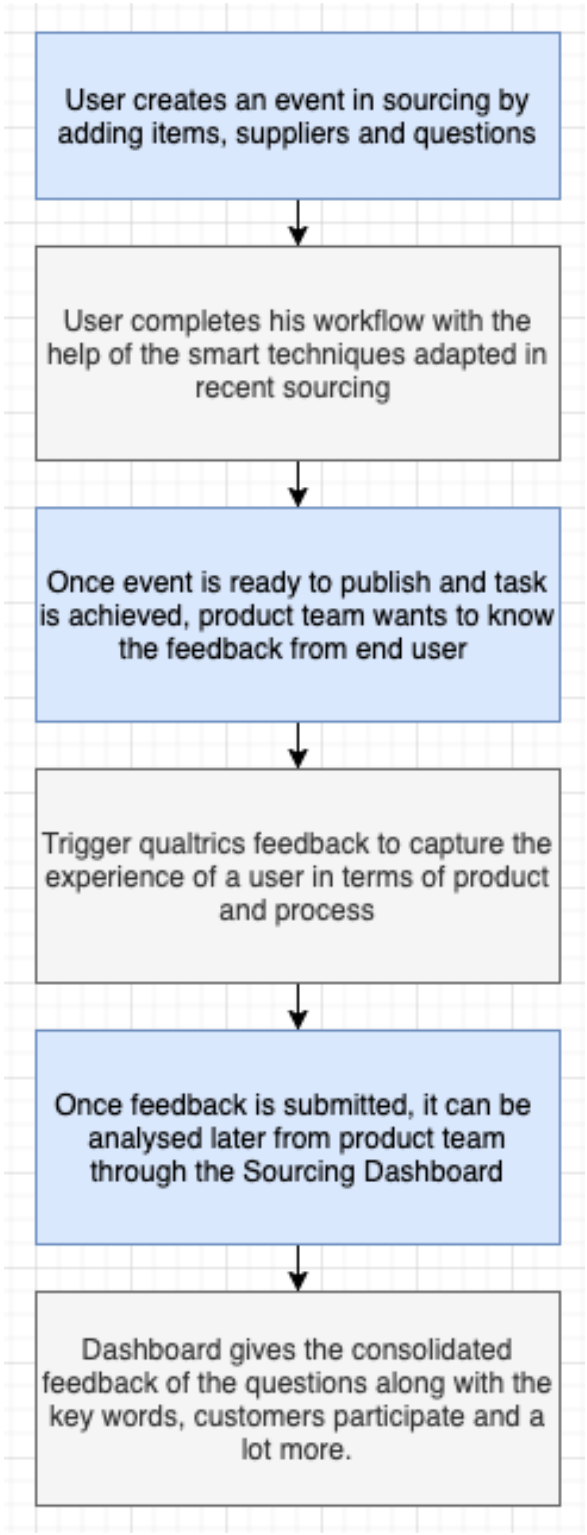
Supplier Recommendation Use case:



Question Recommendation Use case:



Qualtrics Implementation Use case:



Component Diagram:

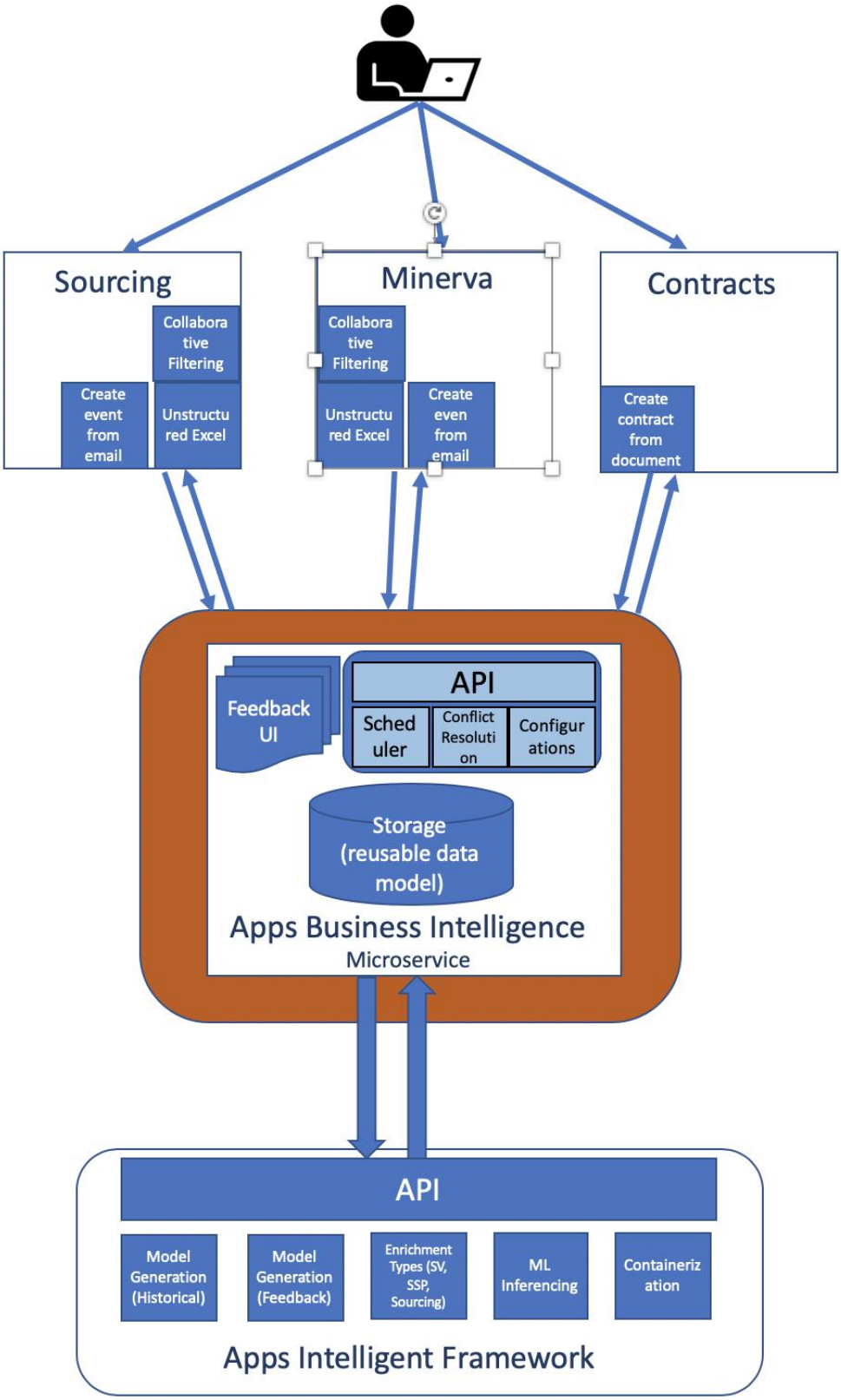
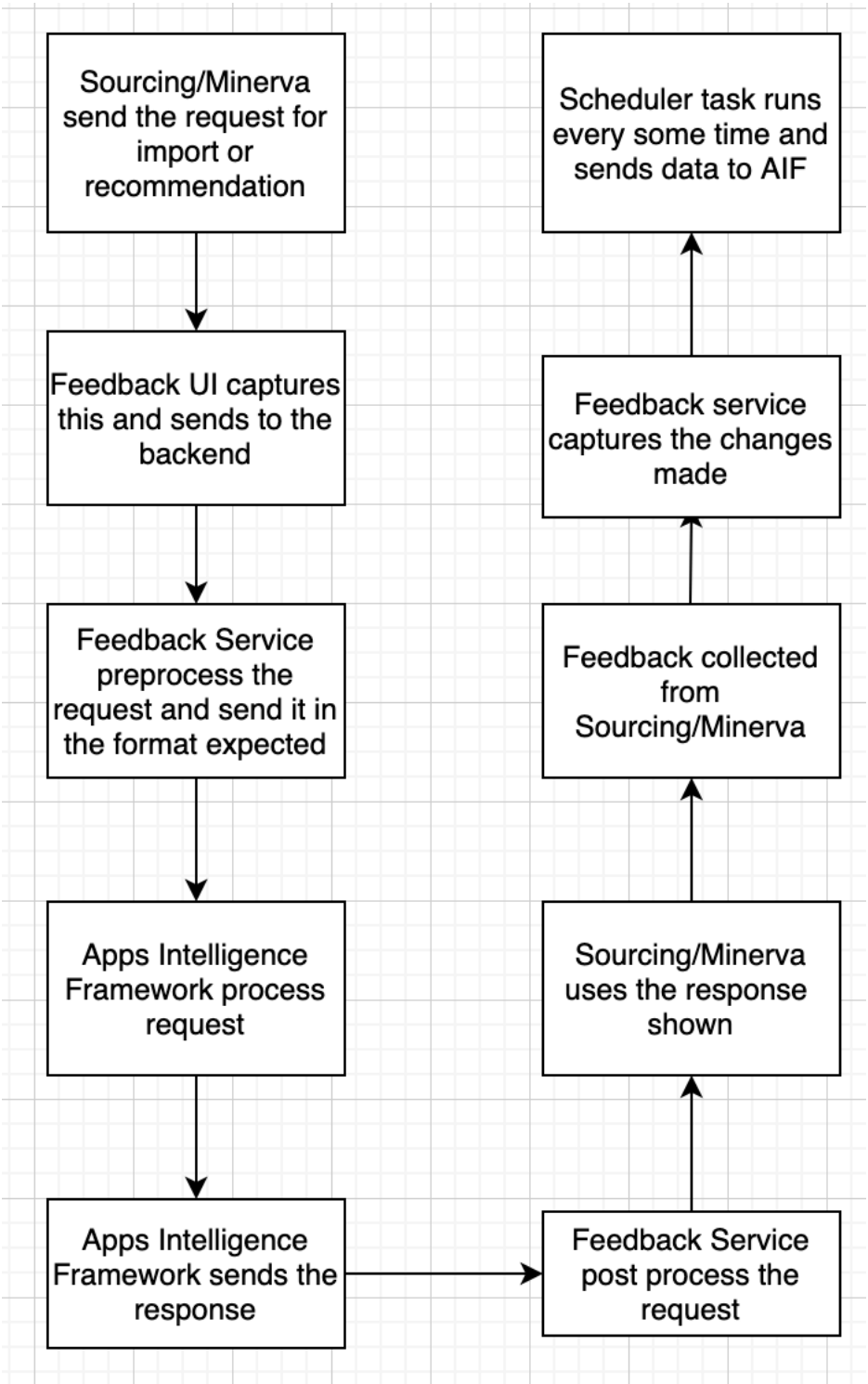
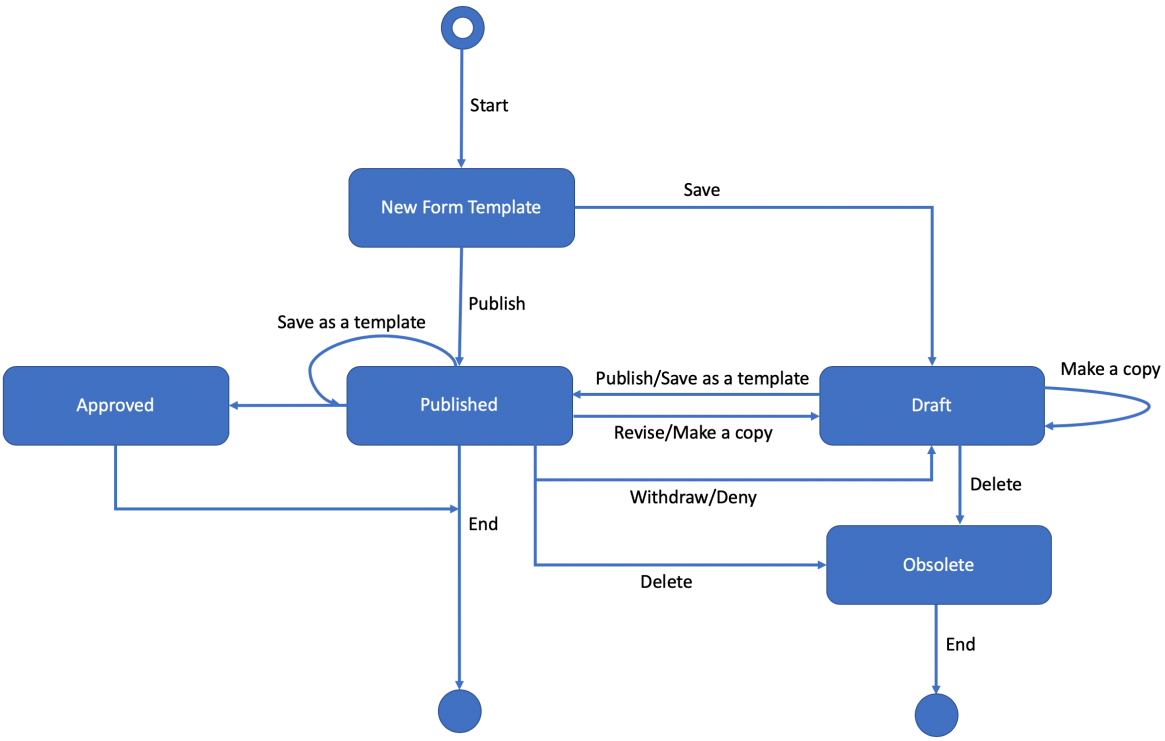


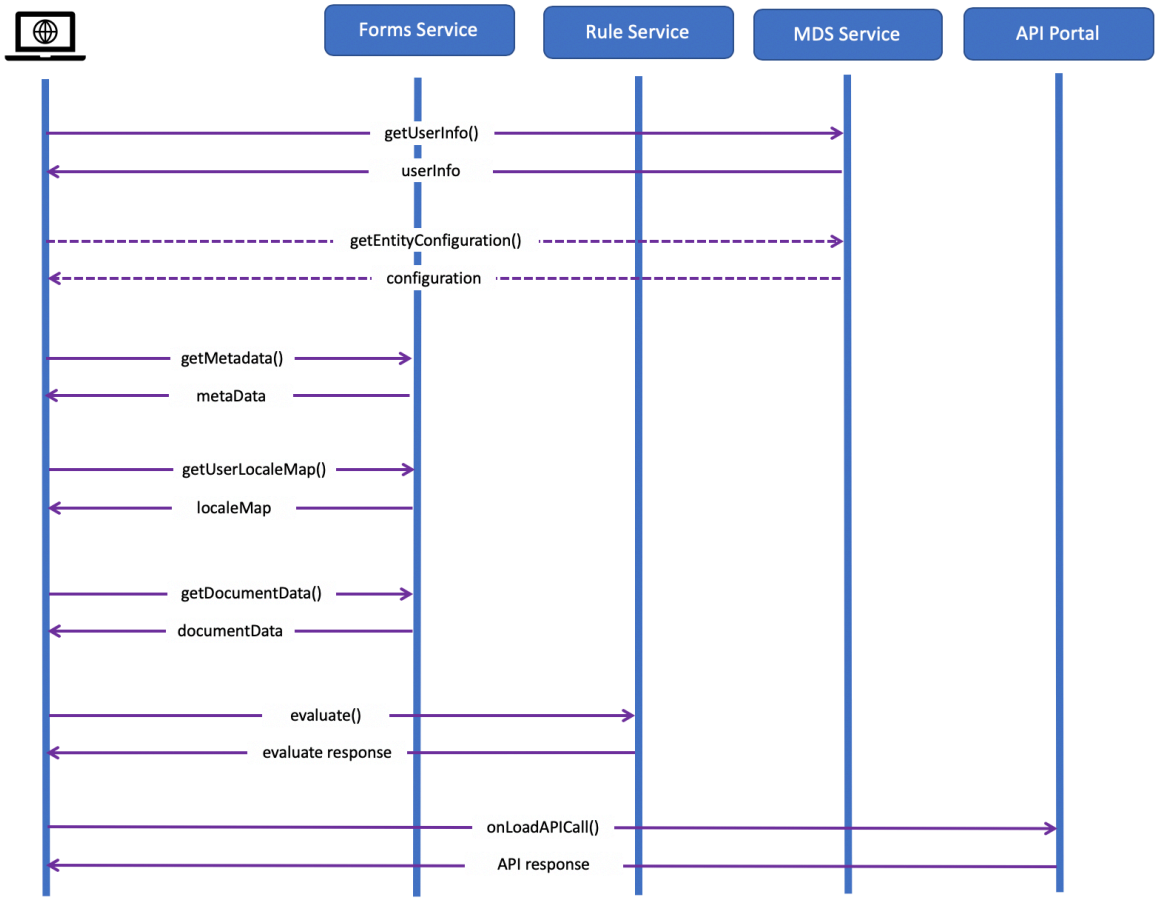
Figure 2: Component Diagram

Overall flow:

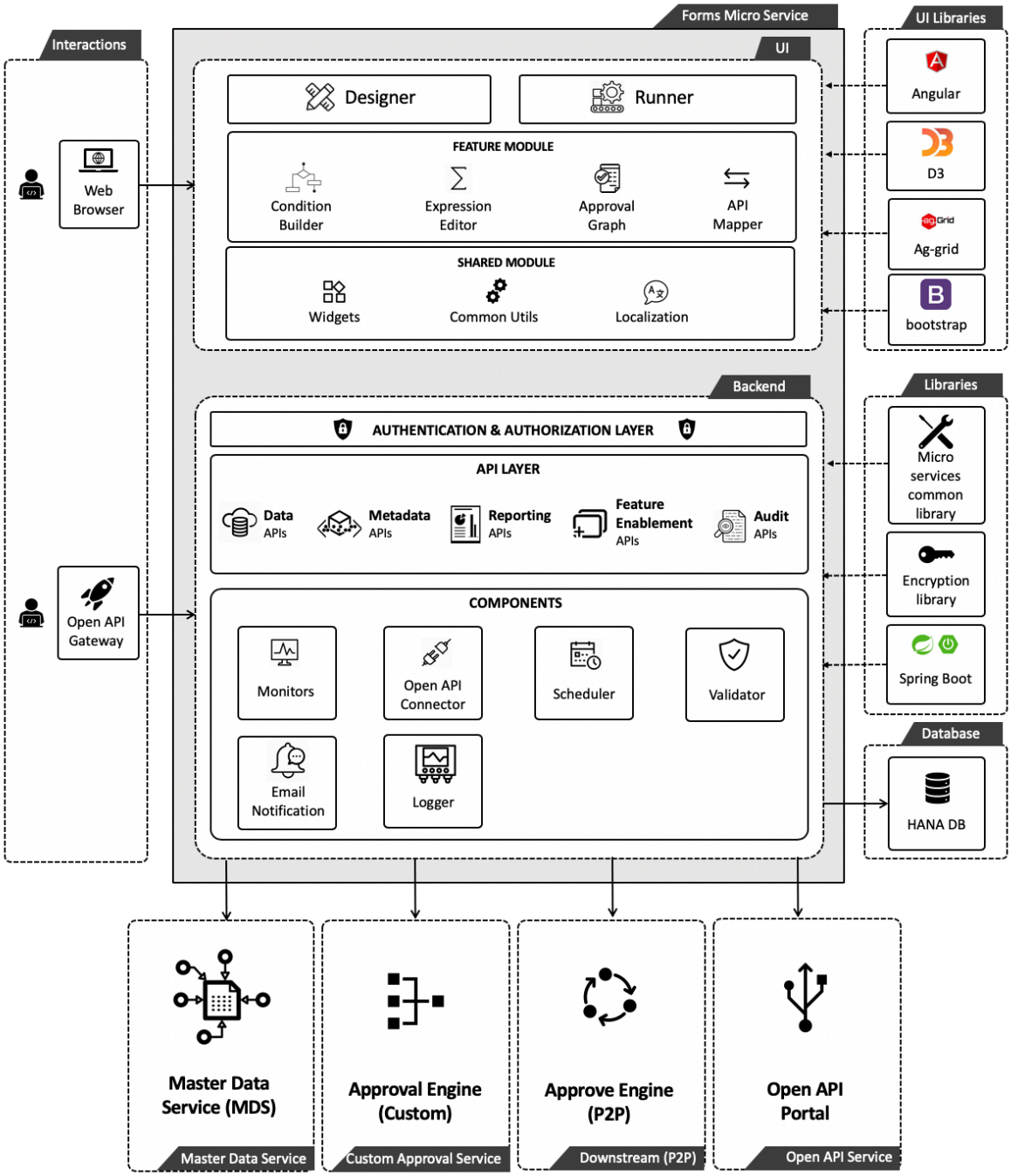


Custom forms POC for Sourcing:





Component Architecture:



API's used for the Use cases:

Smart import from Excel – POST Call with a file as input
http://localhost:9090/bifeedback/api/v1/prediction/runInferenceWithFile?realm=BASF&ignoreHeader=true&passwordAdapter=PasswordAdapter1&user=taikman&ignore_oauth=true

Supplier Recommendation – POST Request in the specified format
http://localhost:9090/bifeedback/api/v1/prediction/runInference?realm=BASF&ignoreHeader=true&passwordAdapter=PasswordAdapter1&user=taikman&ignore_oauth=true

Question Recommendation - POST Request in the specified format
http://localhost:9090/bifeedback/api/v1/prediction/runInference?realm=BASF&ignoreHeader=true&passwordAdapter=PasswordAdapter1&user=taikman&ignore_oauth=true

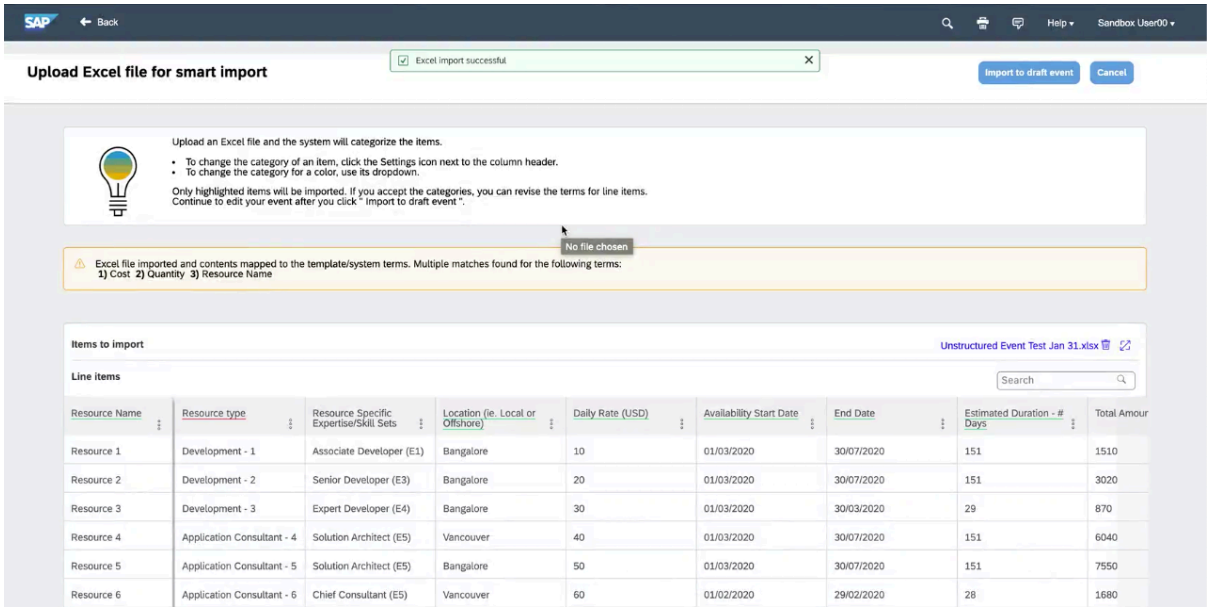
To store the feedback into Intelligence frame work – POST call
http://localhost:9090/bifeedback/api/v1/prediction/create?realm=BASF&ignoreHeader=true&passwordAdapter=PasswordAdapter1&user=taikman&ignore_oauth=true&token=9080822d-d829-4ff5-814b-4166cc20cb7d

Invoking Qualtrics feedback:
https://zn5jlmwfvlkg1zc4l-sapproduction.siteintercept.qualtrics.com/SIE/?Q_ZID=ZN_5jLMwfvlkg1Zc4l")).start()

CHAPTER 8

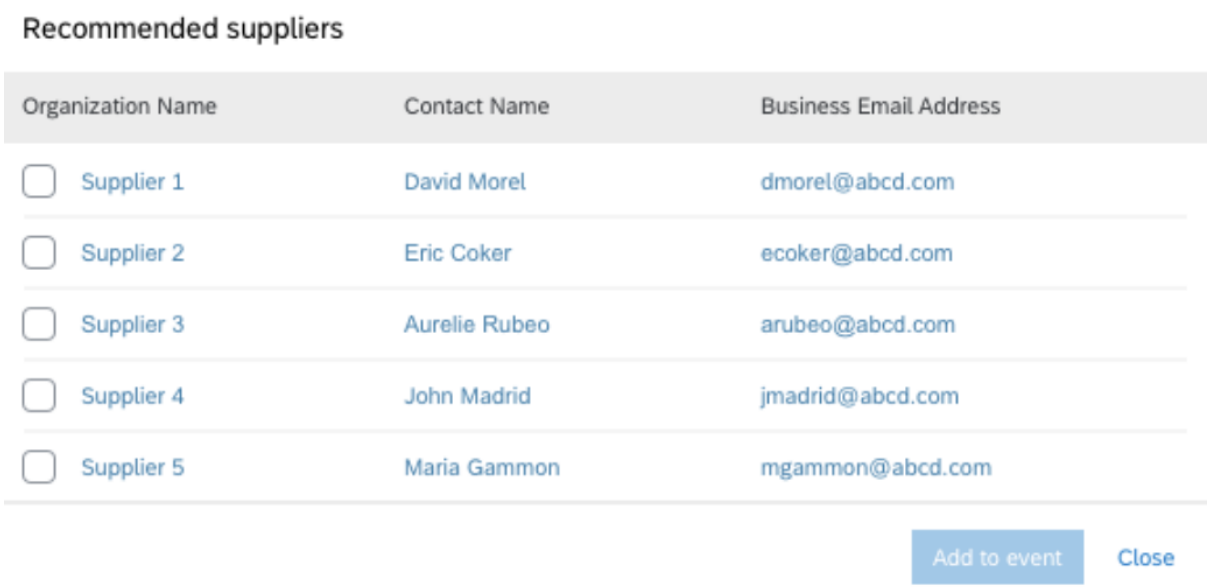
Screenshots of the result:

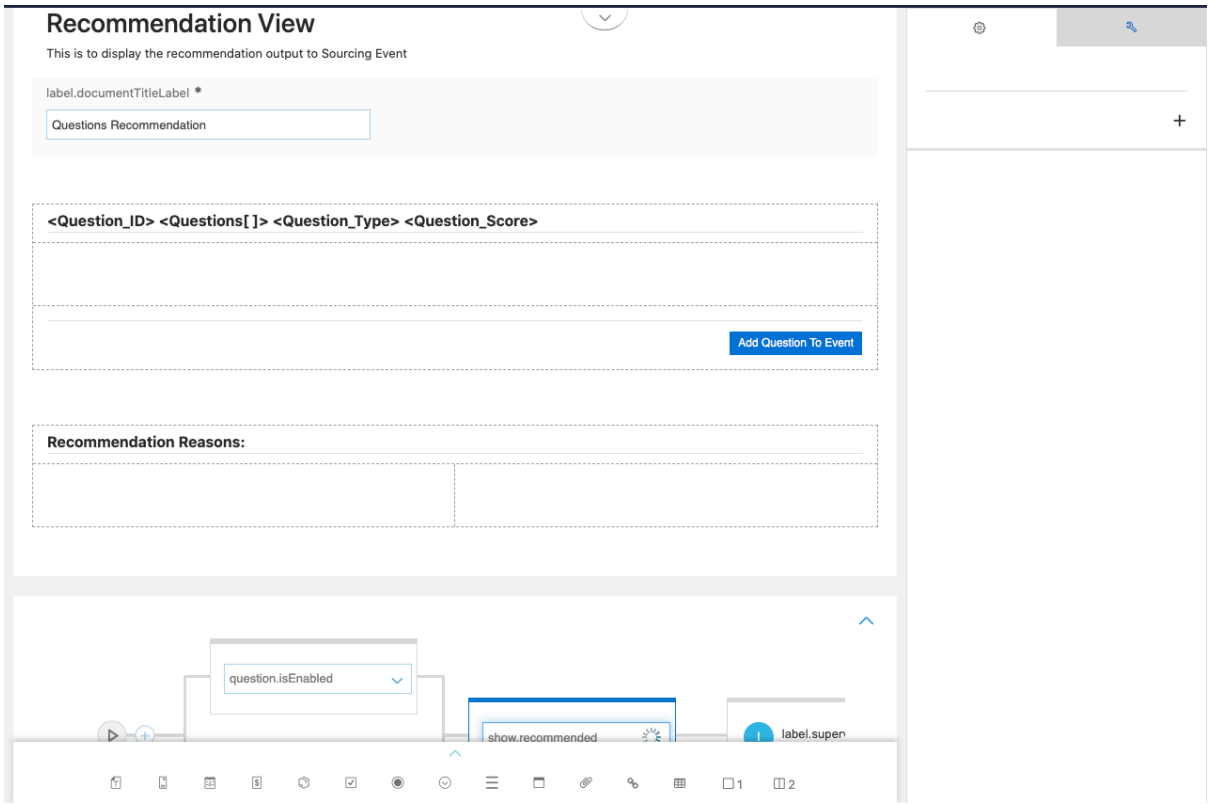
Smart Excel Import:

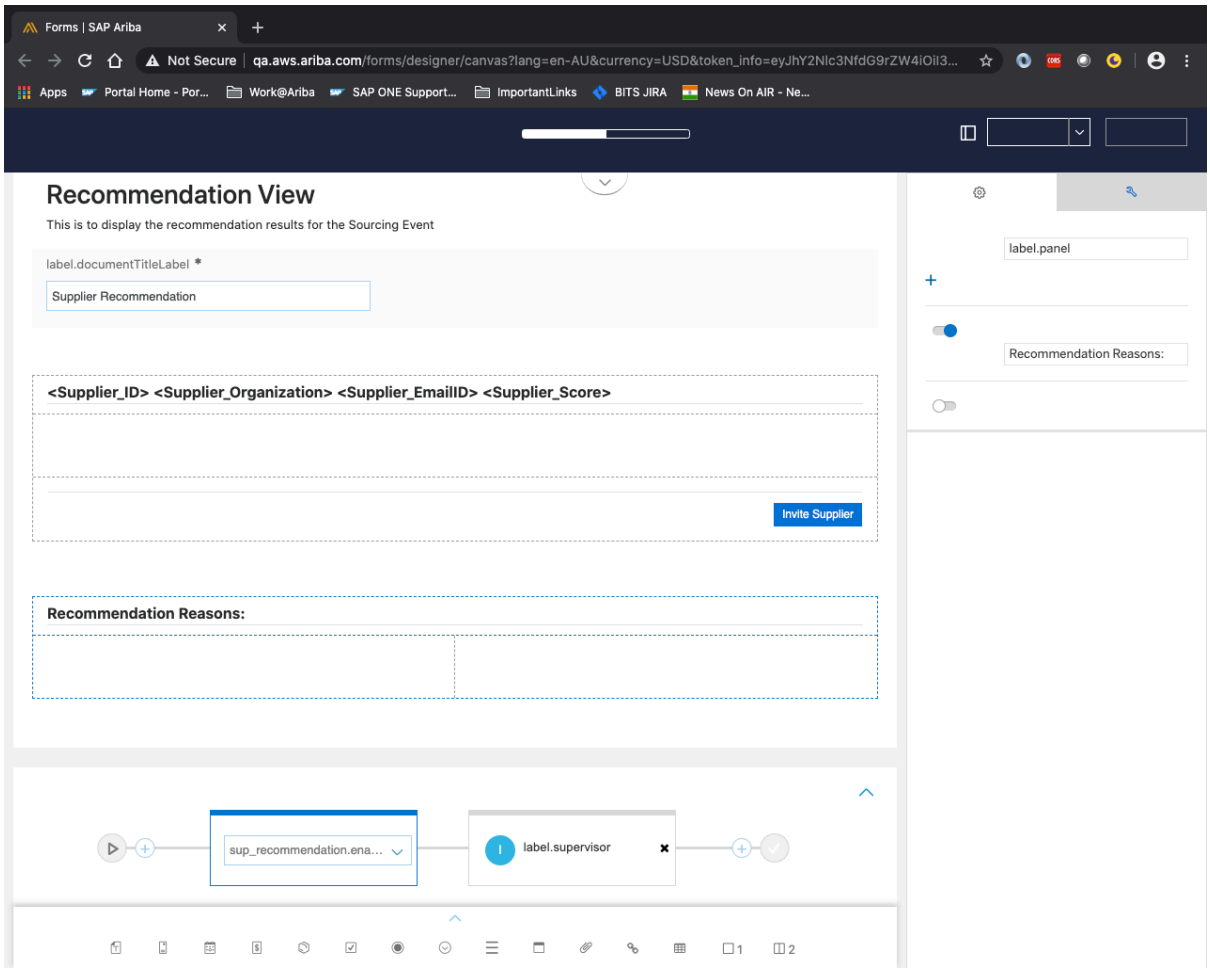


Resource Name	Resource type	Resource Specific Expertise/Skill Sets	Location (ie. Local or Offshore)	Daily Rate (USD)	Availability Start Date	End Date	Estimated Duration - # Days	Total Amour
Resource 1	Development - 1	Associate Developer (E1)	Bangalore	10	01/03/2020	30/07/2020	151	1510
Resource 2	Development - 2	Senior Developer (E3)	Bangalore	20	01/03/2020	30/07/2020	151	3020
Resource 3	Development - 3	Expert Developer (E4)	Bangalore	30	01/03/2020	30/03/2020	29	870
Resource 4	Application Consultant - 4	Solution Architect (E5)	Vancouver	40	01/03/2020	30/07/2020	151	6040
Resource 5	Application Consultant - 5	Solution Architect (E5)	Bangalore	50	01/03/2020	30/07/2020	151	7550
Resource 6	Application Consultant - 6	Chief Consultant (E5)	Vancouver	60	01/02/2020	29/02/2020	28	1680

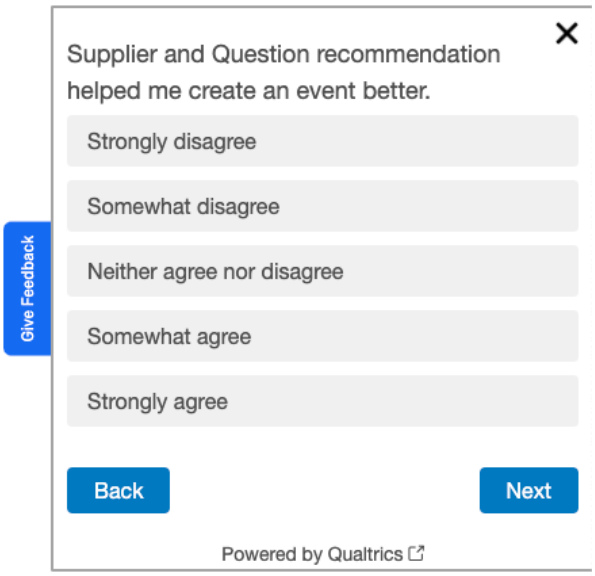
Recommendation:

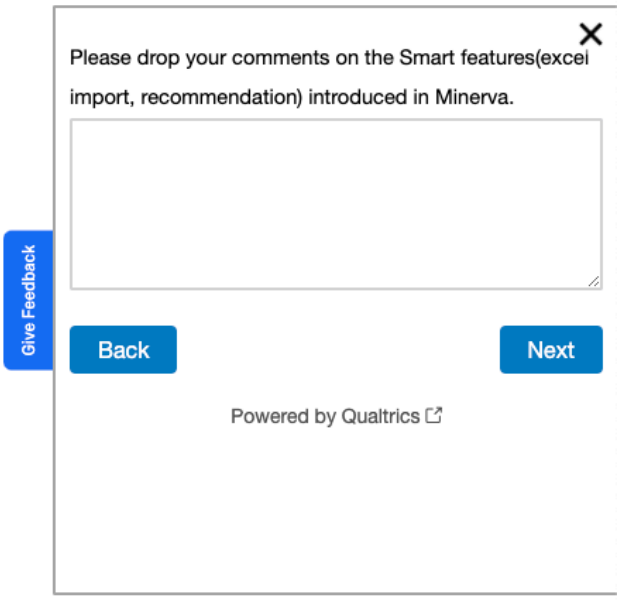



Recommendation View
This is to display the recommendation output to Sourcing Event
label.documentTitleLabel *
Questions Recommendation
<Question_ID> <Questions[ ]> <Question_Type> <Question_Score>
Add Question To Event
Recommendation Reasons:
question.isEnabled
show.recommended
label.supen

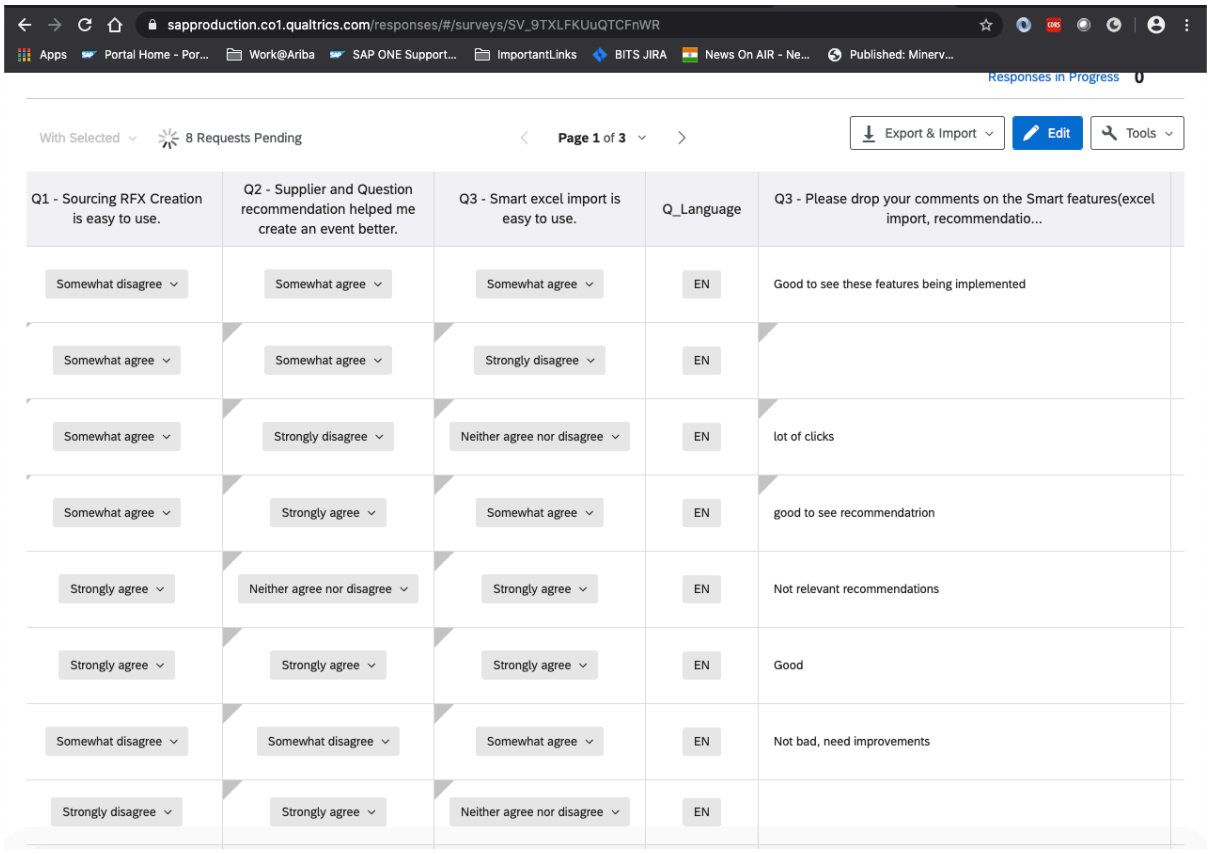

Forms | SAP Ariba
Not Secure | qa.aws.ariba.com/forms/designer/canvas?lang=en-AU&currency=USD&token_info=eyJhY2Nlc3NfdG9rZW4iOiI3...
Apps
Portal Home - Por...
Work@Ariba
SAP ONE Support...
ImportantLinks
BITS JIRA
News On AIR - Ne...
Recommendation View
This is to display the recommendation results for the Sourcing Event
label.documentTitleLabel *
Supplier Recommendation
<Supplier_ID> <Supplier_Organization> <Supplier_EmailID> <Supplier_Score>
Invite Supplier
Recommendation Reasons:
label.panel
Recommendation Reasons:
sup_recommendation.ena...
label.supervisor

Qualtrics Feedback:





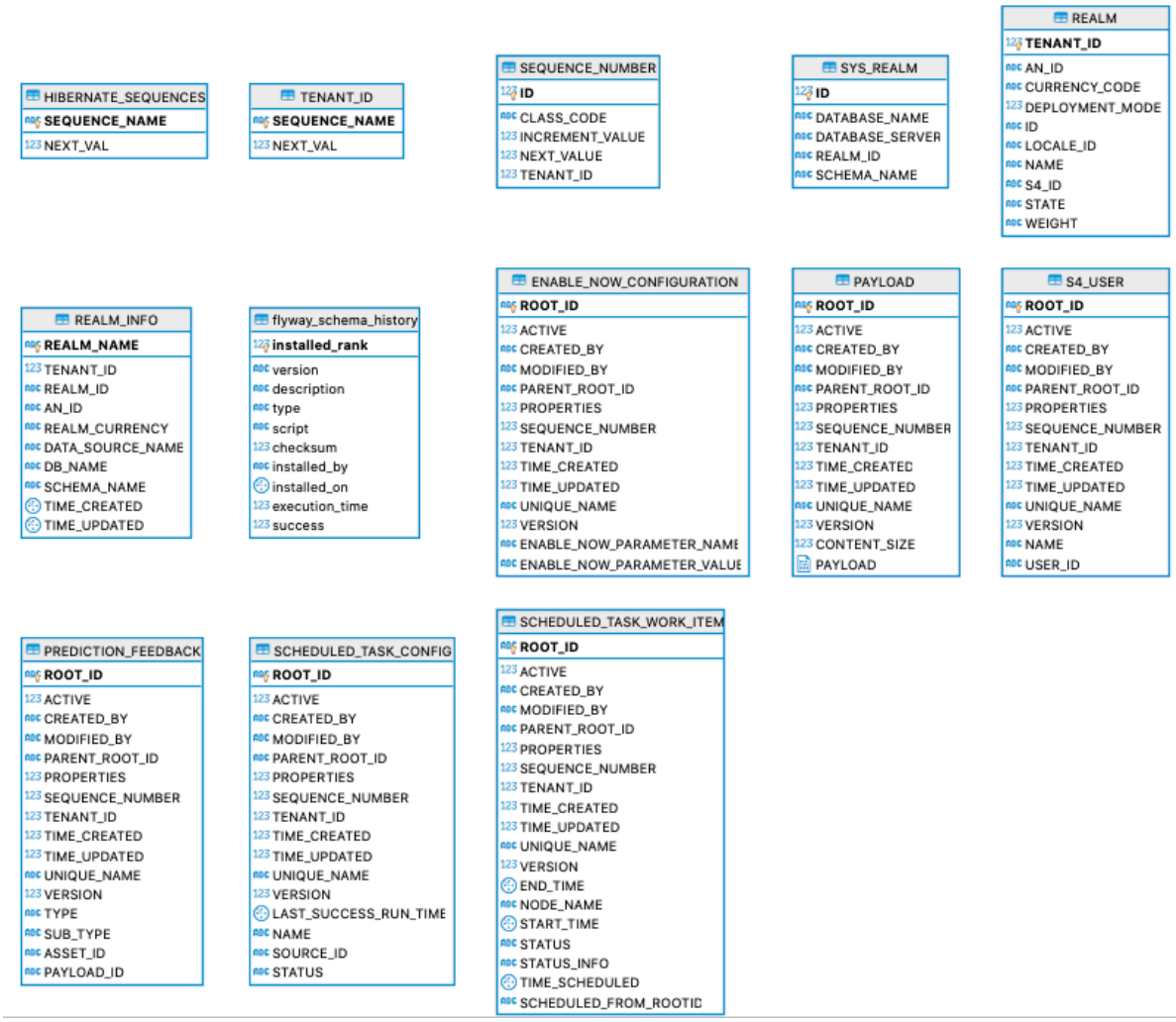
Sample Qualtrics response:



Q1 - Sourcing RFX Creation is easy to use.	Q2 - Supplier and Question recommendation helped me create an event better.	Q3 - Smart excel import is easy to use.	Q_Language	Q3 - Please drop your comments on the Smart features(excel import, recommendatio...
Somewhat disagree	Somewhat agree	Somewhat agree	EN	Good to see these features being implemented
Somewhat agree	Somewhat agree	Strongly disagree	EN	
Somewhat agree	Strongly disagree	Neither agree nor disagree	EN	lot of clicks
Somewhat agree	Strongly agree	Somewhat agree	EN	good to see recommendatrion
Strongly agree	Neither agree nor disagree	Strongly agree	EN	Not relevant recommendations
Strongly agree	Strongly agree	Strongly agree	EN	Good
Somewhat disagree	Somewhat disagree	Somewhat agree	EN	Not bad, need improvements
Strongly disagree	Strongly agree	Neither agree nor disagree	EN	

Qualtrics Dashboard:

Schema:


HIBERNATE_SEQUENCES
SEQUENCE_NAME
NEXT_VAL
TENANT_ID
SEQUENCE_NAME
NEXT_VAL
SEQUENCE_NUMBER
ID
CLASS_CODE
INCREMENT_VALUE
NEXT_VALUE
TENANT_ID
SYS_REALM
ID
DATABASE_NAME
DATABASE_SERVER
REALM_ID
SCHEMA_NAME
REALM
TENANT_ID
AN_ID
CURRENCY_CODE
DEPLOYMENT_MODE
ID
LOCALE_ID
NAME
S4_ID
STATE
WEIGHT
REALM_INFO
REALM_NAME
TENANT_ID
REALM_ID
AN_ID
REALM_CURRENCY
DATA_SOURCE_NAME
DB_NAME
SCHEMA_NAME
TIME_CREATED
TIME_UPDATED
flyway_schema_history
installed_rank
version
description
type
script
checksum
installed_by
installed_on
execution_time
success
ENABLE_NOW_CONFIGURATION
ROOT_ID
ACTIVE
CREATED_BY
MODIFIED_BY
PARENT_ROOT_ID
PROPERTIES
SEQUENCE_NUMBER
TENANT_ID
TIME_CREATED
TIME_UPDATED
UNIQUE_NAME
VERSION
ENABLE_NOW_PARAMETER_NAME
ENABLE_NOW_PARAMETER_VALUE
PAYLOAD
ROOT_ID
ACTIVE
CREATED_BY
MODIFIED_BY
PARENT_ROOT_ID
PROPERTIES
SEQUENCE_NUMBER
TENANT_ID
TIME_CREATED
TIME_UPDATED
UNIQUE_NAME
VERSION
CONTENT_SIZE
PAYLOAD
S4_USER
ROOT_ID
ACTIVE
CREATED_BY
MODIFIED_BY
PARENT_ROOT_ID
PROPERTIES
SEQUENCE_NUMBER
TENANT_ID
TIME_CREATED
TIME_UPDATED
UNIQUE_NAME
VERSION
NAME
USER_ID
PREDICTION_FEEDBACK
ROOT_ID
ACTIVE
CREATED_BY
MODIFIED_BY
PARENT_ROOT_ID
PROPERTIES
SEQUENCE_NUMBER
TENANT_ID
TIME_CREATED
TIME_UPDATED
UNIQUE_NAME
VERSION
TYPE
SUB_TYPE
ASSET_ID
PAYLOAD_ID
SCHEDULED_TASK_CONFIG
ROOT_ID
ACTIVE
CREATED_BY
MODIFIED_BY
PARENT_ROOT_ID
PROPERTIES
SEQUENCE_NUMBER
TENANT_ID
TIME_CREATED
TIME_UPDATED
UNIQUE_NAME
VERSION
LAST_SUCCESS_RUN_TIME
NAME
SOURCE_ID
STATUS
SCHEDULED_TASK_WORK_ITEM
ROOT_ID
ACTIVE
CREATED_BY
MODIFIED_BY
PARENT_ROOT_ID
PROPERTIES
SEQUENCE_NUMBER
TENANT_ID
TIME_CREATED
TIME_UPDATED
UNIQUE_NAME
VERSION
END_TIME
NODE_NAME
START_TIME
STATUS
STATUS_INFO
TIME_SCHEDULED
SCHEDULED_FROM_ROOTID

CHAPTER 9

Resources needed for the project, including people, hardware, software, etc.

Technology Stack:

- **UI tier:** Intelligent Forms UI tier is built on Angular platform and Bootstrap based styling. UI rendering is driven by metadata that gets generated during design phase of form templates.
- **Middle tier:** This is a spring-boot based java application built on the principles of micro services architecture. It leverages few open source tools to achieve very well-known design principles.
- **Persistent tier:** HANA DB is the persistent store to save customer data (transactional), forms templates metadata and configuration
- **Deployment:** Cobalt (AWS) Infrastructure
- **Software Resource:** Angular CLI, Java, DBeaver
- **Hardware Resource:** Any Windows/Mac Machine
- **Key People involved**: Kumaraswamy Gowda – Principal Engineer of SAP Ariba Sourcing team & Supervisor for the project, ADE/AIF Team for exposing their API's and building the model for the prediction, accepting the feedback sent back for retraining the model for a better prediction accuracy.

CHAPTER 10

Project plan & Deliverables (What are the high-level steps in the project): (Figure 1)

Serial Number of Task	**Tasks or subtasks done** (being precise and specific)	Planned duration in weeks	Specific Deliverable in terms of the project
1.	Research, literature survey and feasibility validation	20-02-2020	Research
2.	Unstructured Excel Import Feature for smart import of the excel to a Sourcing Event	20-03-2020	Feedback service
3.	Recommend Questions and Suppliers	20-04-2020	Better accuracy of the model by incorporating feedback
4.	Dynamic UI by leveraging the intelligent forms and integrating the forms in Sourcing POC	20-05-2020	Custom form
5.	Qualtrics to collect the user feedback. Leveraging SAP Hana to store and process data, cobalt for the deployment of the application	20-05-2020	Feedback and Data Persisted
6.	Demo of the end to end solution, deployment in the service, monitoring application, report generation	20-06-2020	Project up and running

CHAPTER 11

Work accomplished so far:

Till Mid Semester:

- Understanding the requirements as specified in the FRD document.
- Understanding the business use case, business flow and the impact this framework is going to have on our customers.
- Preparing a high-level design document which comprises of the design methodology, use cases to be adopted by the framework, non-functional requirements that our framework has to achieve, high level module diagram, interaction between the feedback service and ADE service.
- Initial outline framework for capturing, storing and processing the feedback.
- Analysing how to fit this use case/framework in our legacy sourcing application and New Sourcing application where we can utilize these features.
- Backend support for Unstructured Excel import use case.
- Localization support for the framework.

Post Mid Semester:

- Finishing up the UI for smart excel import use case.
- Backend support for Supplier and Question Recommendation.
- UI for the Supplier and Question Recommendation.
- Qualtrics feedback for capturing user feedback on Recommendation in Sourcing.
- POC on the forms for integration into Sourcing, which apparently has its own limitations

CHAPTER 12

Key challenges faced during the project:

- Understanding the need of a generic feedback service framework and the need to collect and send back the feedback data to the ADE model.
- Understanding the actual business use case mentioned in FRD.
- Analysing the structure of Ariba data enrichment.
- Understanding the painful experience of mapping the custom terms to Ariba specific terms while importing an excel.
- Understanding the custom forms concept which we use it to build the dynamic UI for the recommendation reason.
- Building a generic feedback service which can be integrated for any product across SAP.
- Designing the framework which should be easy to extend for the newer use cases which might come in the future (SOLID design principle of OOAD).

CHAPTER 13

Potential risks and mitigation plan:

- The scheduler task should run at the specific time to transfer the data from feedback service to the ADE model.
- The recommendation provided to the customer sometimes might be totally different than what he expects which in such case he might end up not selecting any of the shown ones.
- The model which suits best for one customer might be totally irrelevant for another one. It will be realm specific. Maintaining a customer specific is a costly process.
- It’s difficult to pick recommended suppliers if they are more in number.

CHAPTER 14

Plan for remainder of the project (Tasks, Target dates, Deliverables):

Task	Target Date	Deliverables
Supplier Recommendation Testing	12-06-2020	Recommends supplier based on commodity, region, line items
Question Recommendation Testing	12-06-2020	Recommend questions based on previous events
Qualtrics feedback integrated test scenario	14-06-2020	Dynamic UI to collect the recommendation output feedback
Integration test to the Sourcing application	17-06-2020	Actual usage of these use cases can be seen in Sourcing
E2E Demo of the solution	17-06-2020	End to End Demo
Documentation pending task	17-06-2020	To understand the feature/Dissertation work

Figure 2: Plan for reminder of the work.

CHAPTER 15
CONCLUSION

This framework which we developed for the intelligent business use cases such as unstructured excel import, supplier recommendation, question recommendation and a lot more use cases to come in the near future. The framework is written in a very generic way which can be used by any application. Also, the framework can be extended very easily to any other use cases apart from the above mentioned one's. The framework takes care of end to end responsibility of initiating the feature, getting the feedback from the intelligent business models, map it to the existing use case, help user better select things as per his need, once he selects the frame work will store the prediction feedback along with the user selected preference which will later be sent to model for better predictions.

Also, would like to mention that the forms didn't prove to be an efficient solution for any of our use case. The versioning issues, costly implementation in terms of time and money. So we are dropping the forms use case from our project. This framework allows the easy integration of the other software like Qualtrics and Enable Now to enhance the user experience and to get a better product experience.

CHAPTER 16

Recommendations/ Directions for future work

- The prediction feedback data along with the user preference is stored in the database. A Scheduler program has to be written to send the data from the feedback system to ABI system periodically.

- Custom forms is not a viable approach for our use case. So we need to find better alternatives for showing the dynamic UI.

- Qualtrics feedback captures the actual user experience along with the information on the usage of these new features. We can leverage this to make the Sourcing a better place for the buyer to work with.

- Enable Now Integration is pending for this framework, as this offers an in context help and support for the users.

CHAPTER 17

Appendices

List of Tables

List of Figures

List of Output Screens

CHAPTER 18

Bibliography / References:

Reference	Link
SAP	https://www.sap.com
SAP Ariba	https://www.ariba.com/
SAP HANA	https://www.sap.com/products/hana.html
Spring Boot	https://spring.io/projects/spring-boot
Angular	https://angular.io/
Internal Information	https://wiki.ariba.com/
Sourcing GitHub link	https://github.wdf.sap.corp/Ariba-Sourcing/minerva
Intelligence App Link	https://github.wdf.sap.corp/Ariba-Apps-Intelligence/IntelligenceApp
Hana SQL Database	https://help.sap.com/viewer/7c78579ce9b14a669c1f3295b0d8ca16/Cloud/en-US/20ff532c751910148657c32fe3431a9f.html
SAP Ariba Live	https://events.sap.com/aribalive-events/en/session/52973

CHAPTER 19

List of Publications/ Conference Presentations:

The features listed above were presented to the

- Team members during weekly demo
- Management for the demonstration of Smart features in Sourcing
- SAP Ariba Live Virtual Experience
- Other peer teams who wish to implement such intelligent features

CHAPTER 20:

Check list of items for final report (with Yes or No marked, as applicable)

a) Is the Cover page in proper format? **Y** / N

b) Is the Title page in proper format? **Y** / N

c) Is the Certificate from the Supervisor in proper format? Has it been signed? **Y** / N

d) Is Abstract included in the Report? Is it properly written? **Y** / N

e) Does the Table of Contents' page include chapter page numbers? **Y** / N

f) Is Introduction included in the report? Is it properly written? **Y**/N

g) Are the Pages numbered properly? **Y** / N

h) Are the Figures numbered properly? **Y** / N

i) Are the Tables numbered properly? **Y** / N

j) Are the Captions for the Figures and Tables proper? **Y** / N

k) Are the Appendices numbered? **Y** / N

l) Does the Report have Conclusions/ Recommendations of the work? **Y** / N

m) Are References/ Bibliography given in the Report? **Y** / N

n) Have the References been cited in the Report? **Y** / N

o) Is the citation of References/ Bibliography in proper format? **Y** / N