AI BASED DISCOURSE FOR BANKING INDUSTRY

PROFESSIONAL READYNESS PROJECT REPORT

Submitted By

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TABLE OF CONTENTS

CHAPTER 1

` INTRODUCTION

1.1 Project Overview

The Internet Banking Industry has seen tremendous growth in recent years mainly due to the massive advancement in technology. The thing with the internet is that everyone connected to it can access almost anything around the world. The involvement of the internet in the banking sector has made it more viable and user friendly than ever before. Customers of any bank could access their account details and the transactions across the world with ease and can work with ease around any branches. So, an enhanced and smarter way of interaction with the customers has to be built to ensure efficient delivery of service. In order to overcome the user satisfaction issues associated with banking services, a chatbot will provide personal and efficient communication between the user and the bank. It is built to be the overall virtual assistant that can facilitate customers to ask banking- related questions without visiting the bank or calling up customer service centres as well as providing them with relevant suggestions.

1.2 Purpose

Banking is an important sector to provide financial services to the customers, which will definitely have an impact on the economy of a country. Essential needs like food, shelter requires exchange of money between people. In order to guide the customers throughout all the financial services provided by the bank, an intelligent system has to be introduced to provide people with the best solution possible.The user is a bank customer who needs 24/7 service to clear all his queries and guide him through all the banking processes. So, an enhanced and smarter way of interaction with the customers has to be built to ensure efficient delivery of service. In order to overcome the user satisfaction issues associated with banking services, chatbot will provide personal and efficient communication between the user and the bank.

CHAPTER 2

LITERATURE SURVEY

2.1 Existing problem

The involvement of the internet in the banking sector has made it more viable and user friendly than ever before. Customers of any bank could access their account details and the transactions across the world with ease and can work with ease around any branches. Online banking is an electronic payment system that enables customers of a bank or other financial institution to conduct a range of financial transactions through the financial institution's website. The online banking system will typically connect to or be part of the core banking system operated by a bank and is in contrast to branch banking which was the traditional way customers accessed banking services. The problem with the above existing solution is that though it almost it lets you do every banking process virtually, it fails to deliver the information which is the core purpose of the customer visiting a bank. The customers are to be guided properly through all the procedures and make them feel like they are doing the right thing.

2.2 References

S.no	Title	Author	Abstract
1.	BANKING WITH A CHATBOT – A STUDYON TECHNOLO GY ACCEPTAN CE	Mónika-Anetta Ibolya VIZELI ZSUZSA SĂPLĂCAN	The implementation of chatbot technology is evolving rapidly inthe banking industry, yet customer acceptance is behind. The aim of the presentpaper is to identify the factors that influence consumers' intention to use chatbot technology applied in the banking industry. The measurement developmentand hypotheses were based on the technology acceptance modelextended with compatibility, customers' perceived privacy risk and awareness of the service. The sample contains 287respondents, out of whom 24% have previously used a banking chatbot. The measure items werevalidated by a measurement model and hypotheses were tested using Partial Least Squares-Structural Equation Modeling (PLS-

			SEM). The findings highlight the importanceof perceived compatibility and perceived usefulness in the adoption of banking chatbot technology.
2.	Banking Chatbot (B-bot)	Dr. C. Punitha Dr.S.Geetha, N. Nagalakshmi S. Karthiga V. Suvedha	Chatbots square measure intelligent systems that perceivea user's tongue queries and respond consequently during a conversation, that is the focus ofthis study. It'san additional sort of a virtual assistant, folks want they're talking with a real person.They speak a constant language we have a tendency to do, and will answer all queries. In banks,at customer care centers and enquiry desks, humans are lean and usually takevery long time to methodthe only request whichends up in wastage of your time and additionally cut back quality of client service. In this paper we introduce a more efficient way toresolve customer queries. Today’s customers have high expectations andthey want quickand accurate responses, completeand robust resolution, service that is available anywhere and anytime

3.	CHATBOTS IN BANKINGINDUSTRY:A CASE STUDY	Dr. Shalini Sayiwal	Conversational Banking is a smarter way to retain the loyal customers by offering them a quick response to their queries. Technology has helped humans to evolve from the Stone Age to the modern digital era. The pace of the shift in consumerism behavior from a serviceseeker toa game-changer is quite quick. Gone are the days, when a business could afford to prioritize the customers' needs ata later stage. With the customer becoming the ultimate decision-maker for a business to stay or go, it had become the priority of every business to ensure that customer satisfaction is achievedat any extent. Speaking about thebanking sector, technology has gifted many exclusive ways to allow the industry to gain customer's satisfaction to the maximum. One such smart strategy is to introduce the chatbots to its customers. Chatbots designed with AI are one of the most promising strategies of a banking business that can lead the bank to win thesatisfaction vote of their loyal customers.

4.	Conversation to Automation in Banking Through Chatbot Using Artificial Machine Intelligence Language	Sasha Fathima Suhel Vinod Kumar Shukla Sonali Vyas Ved Prakash Mishra	Artificial Machine Intelligence isa very complicated topic. It involves creating machines that are capable of simulating knowledge. This paper examinessomeof the latest AI patternsand activities and then provides alternative theory of change in some of the popular and widely accepted postulates of today.Based on basic A.I. (Artificial Intelligence) structuring and working for this, System- Chatbots are made (or chatter bots). The paper shows that A.I is ever improving. As of now there isn't enough information on A.I. however this paper provides a new concept which addresses machine intelligence sheds light on the potential of intelligent systems. The rise of chatbots in the finance sector is the latest disruptive force that has changed the way customers interact. In the banking industry,the introduction of Artificial Intelligence has driven chatbots and change d the face of the interaction between bank and customers. The banking sector plays an important role in development into any country. Italso explores the existing usability of chatbot to assess whether it can fulfillcustomers ever-changing needs.

5.	Artificial intelligence in banking A case study ofthe introduction of a virtual assistant into customer service	Mehmet Ates	The usage of artificial intelligence in banking is animportant theme within entrepreneurial research. The purpose of the study was to analyse the motivations, challenges and opportunities forSwedish banking institutes to implement artificial intelligencebased solutions into their customer service process. The research is based on a case studyof the Swedish banking institute Swedbank AB, who introduced an AI based virtual assistant (Nina) to deal with customer requests. For the qualitative study, interviews with Swedish banking customer and experts were conducted. Further, to understand the managerial motivations of Swedbank, a theory of Moore(2008) regarding innovation management was applied. The findings display that Nina improved the service spectrum of Swedbank with the potential of decreasing costs, while maintaining customer satisfaction. Further, the results displayed a high acceptance of new technologies from the customer perspective. This provides the foundation for Swedbank to introduce further artificial intelligence based services. Banking institutes and other service oriented organisations with high customerinteraction can use the implications of the thesis when considering to more effectively handle customer requests

6.	Intelligent Chat Bot forBanking System	Mr. Aniket DoleMr. Hrushikesh Sansare , Mr. Ritesh Harekar, Mrs. Sprooha Athalye	An intelligent chat bot will be used to give information or answersto any question asked byuser related to bank. Our Intelligent system will first take input from bank customer. This input will be taken as voice or written format. According to input, intelligent system will processes the query and give response to user. An artificial intelligence is most important and helpful part of our project. Intelligent system is automationof activities associated with human thinking, decision making, and problem solving process. This system will be available on web. Our system will represent the design and development of an intelligent chat bot. It will present a technology demonstrator to verify a proposed framework required to support such a bot (aweb service). While a black box approach is used, by controlling the communication structure, to and from the web-service, the web-service allows all types of clients to communicate to the server from any platform. The service provided will be accessible through a generated interface which allows for seamless XML processing; wherebythe extensibility improves the lifespan of such a service. By introducing an artificial brain, the webbased bot generates customized user responses, alignedto the desired character

2.3 Problem Statement Definition

Banking is a crucial sector, it deals with financial transactions which can be availed by everyone, but banks are not able to resolve the queries of customers at all times related to the products or services in satisfactory way which in turn hinders the customer satisfaction. In order to guide the customers throughout all the financial services provided by the bank, an intelligent system has to be introduced to provide people with the best solution possible. The users are bank customers who need a service, available 24/7, to clear all their queries and guide them through the various banking processes. So, an enhanced and smarter way of interaction with the customers has to be built to ensure efficient delivery of service. In order to overcome the user satisfaction issues associated with banking services, a chatbot will provide personal and efficient communication between the user and the bank. It is built to be the overall virtual assistant that can facilitate customers to ask banking- related questions without visiting the bank or calling up customer service centres as well as providing them with relevant suggestions.

CHAPTER 3

IDEATION & PROPOSED SOLUTION

3.1 Empathy Map Canvas

An empathy map canvas helps brands provide a better experience for users by helping teams understand the perspectives and mindset of their customers. Using a template to create an empathy map canvas reduces the preparation time and standardizes the process so you create empathy map canvases of similar quality

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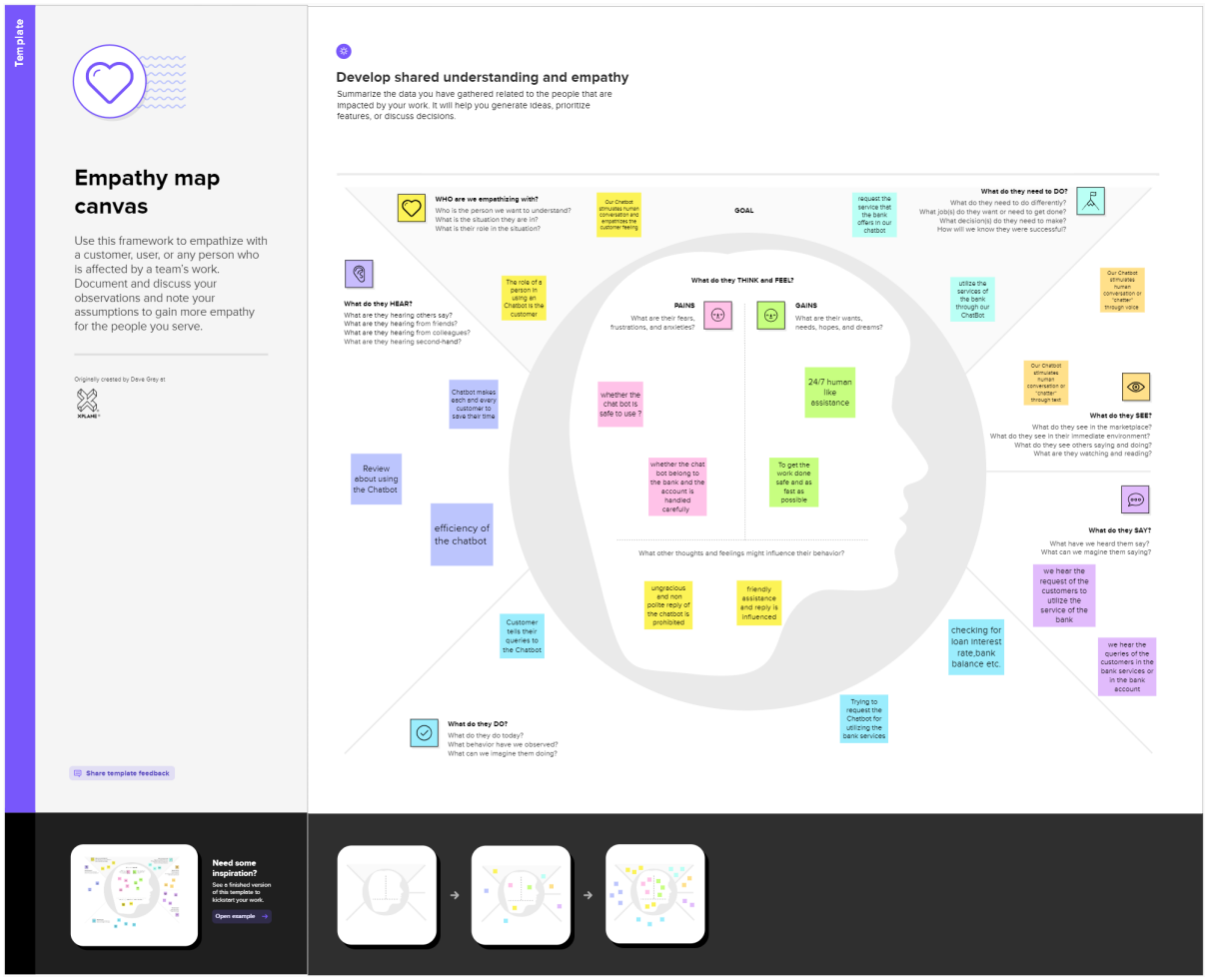
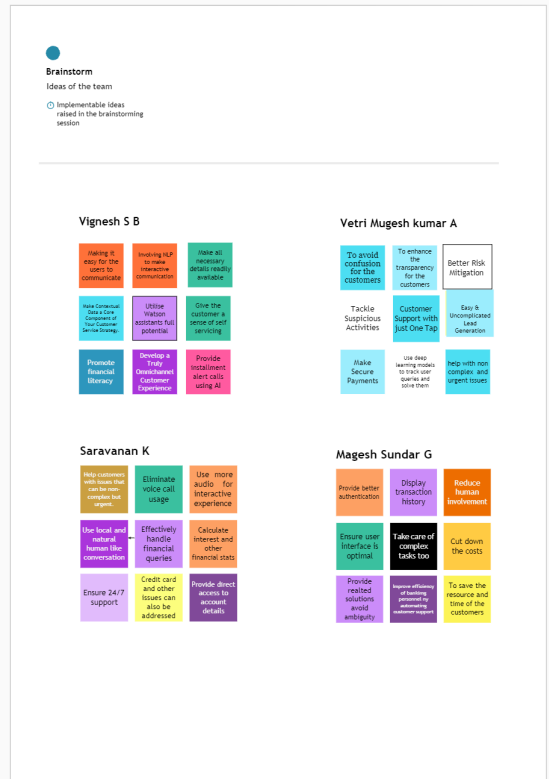


3.2 Ideation & Brainstorming

Ideation is often closely related to the practice of brainstorming, a specific technique that is utilized to generate new ideas. A principal difference between ideation and brainstorming is that ideation is commonly more thought of as being an individual pursuit, while brainstorming is almost always a group activity. Brainstorming is usually conducted by getting a group of people together to come up with either general new ideas or ideas for solving a specific problem or dealing with a specific situation.



3.3 Problem Statement & Proposed Solution

Proposed Solution Template:

S.No.	Parameter	Description
1.	Problem Statement (Problem to besolved)	Banking is a crucial sector, it deals with financialtransactions which can be availed by everyone. In order to guide the customers through various suchbanking process an intelligent system must be designed
2.	Idea / Solution description	To Create an intelligent assistant like a mobile application or web application to guide the customers in their issues. Using IBM Watson assistant.
3.	Novelty / Uniqueness	This is a unique idea as there are numerous banking assistants now but they lack in specific skills which makes the customer not fond of using them. Thisshould be avoided
4.	Social Impact / Customer Satisfaction	Customers will be highly satisfied as while designing an interactive system, the assistant is very interactive with the customer which gives thecustomer a sense of satisfaction.
5.	Business Model(Revenue Model)	This is customer query and response service. While our bank is providing excellent customer service 24/7, customers will be drawn to it and the bankwill gain a very largecustomer base with a hugemoney flow
6.	Scalability of the Solution	The solution is highly scalable as the ability of the agent can be increased multiple fold. It can be commercially sold or distributed to other banks.

3.4 Proposed Solution Fit

Project Title: AI based discourse for banking systems | **Project Design Phase-I - Solution Fit Template** | **Team ID:** PNT2022TMID2078

Define CS, fit into CC

1. CUSTOMER SEGMENT(S) CS

i Our customers are bankers who need a intelligent system for handling customer Queries

6. CUSTOMER CONSTRAINTS CC

Customer constraints include ambiguity in information,unavailability of agents and many other 24/7 service issues

5. AVAILABLE SOLUTIONS AS

Which solutions are available to the customers when they face the problem

There are a lot of chatbots available presently. People have tried appointing real time customer agents but there are a lot of issues

Explore AS, differentiate

Focus on J&P, tap into BE, understand RC

2. JOBS-TO-BE-DONE / PROBLEMS J&P

Effectively handle financial queries.

Use local and natural human like Conversation

Ensure user interface is optimal

9. PROBLEM ROOT CAUSE RC

The problem mainly is because that since the element of money is involved customers feel pretty unreliable using a digital agent for transactions

7. BEHAVIOUR BE

.i.e. directly related: find the right solar panel installer, calculate

The customer visits their bank branch every time they have some issue or query

Focus on J&P, tap into BE, understand RC

Identify strong TR & EM

3. TRIGGERS TR

Fancy user interface and comfortable transfer and updating of information is the only trigger that we can account here

10. YOUR SOLUTION SL

There are a lot of banking bots owned by banks. We can use the already available user information and design an intelligent agent for delivering a perfect discourse system

8. CHANNELS of BEHAVIOUR CH

8.1 ONLINE

Customers try the website of the bank and try calling the customer support people.
They try raising queries if a terminal is present

Identify strong TR & EM

4. EMOTIONS: BEFORE / AFTER EM

They feel scared about their account if the data is inaccurate
They might feel frustrated if their queries are unsolved
After Usage:
They'll feel confident about the discourse system.

CHAPTER 4

REQUIREMENT ANALYSIS

4.1 Functional Requirements:

Following are the functional requirements of the proposed solution.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration/Login	Registration through Form Registration through Gmail Registrationthrough LinkedIN
FR-2	User Confirmation	Confirmation via Email Confirmation via OTP
FR-3	Query formation	A valid API queryis a single URL parameter containing one sentence that is a question in standard English
FR-4	Admin functions	Encoding and decoding data, tokenization, wordnet model, Feedback system.
FR-5	Response generation	The server will reply with either data or an error.The client will be able to parse the JSON and determine if there was an error
FR-6	Delivering response to user	This unit willgenerate a genericanswer sentence using the input.

4.2 Non-functional Requirements:

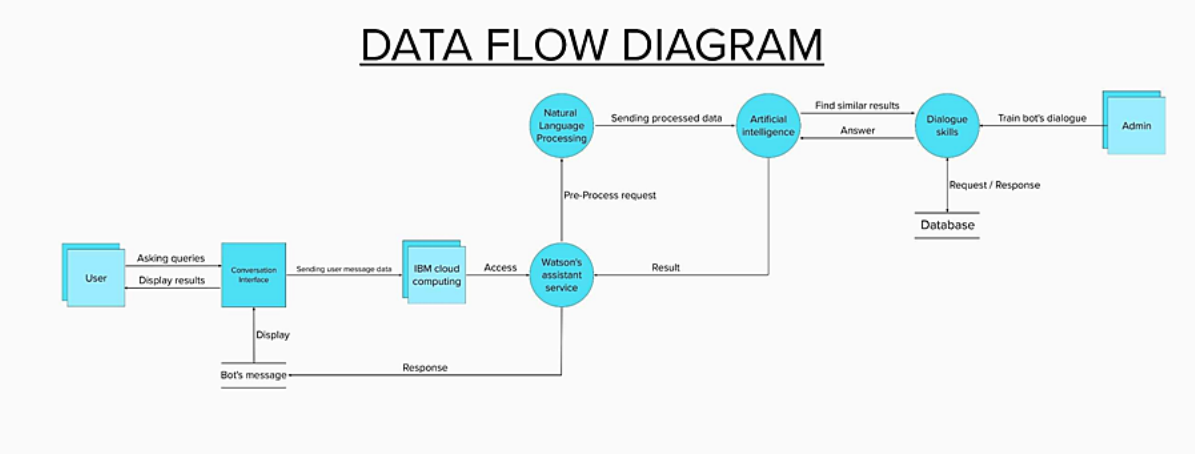
Following are the non-functional requirements of the proposed solution.

FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	Providing assistance overnet banking relatedissues, detailed and personalized conversation with chatbotuser.
NFR-2	**Security**	Helping to lock the account duringtheft related situations.
NFR-3	**Modularity**	The system willbe designed in such a way thatthe algorithms willbe able to be easily swapped out.
NFR-4	**Performance**	Never forgets anything, never gets sick, never getsunproductive. AI chatbot is installed for daily operations and enhance customer experience in digital banking sector.
NFR-5	**Availability**	Provide exceptional customer services available 24/7. Providing round the clocksupport.
NFR-6	**Scalability**	Can be increased and decreased according to the usage or number of requests.

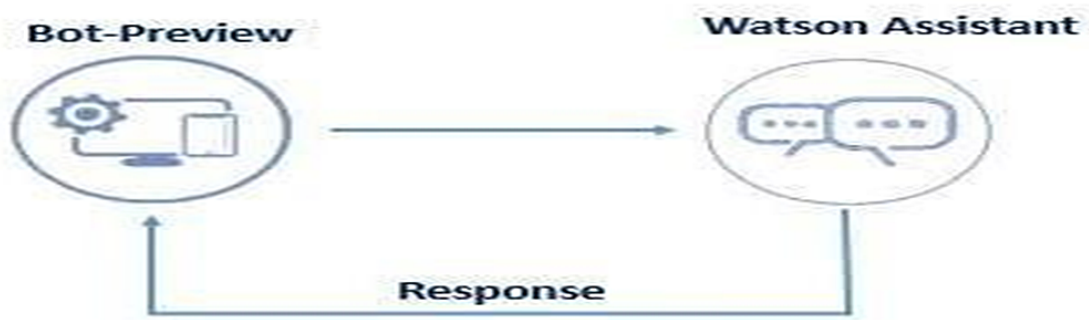
CHAPTER 5

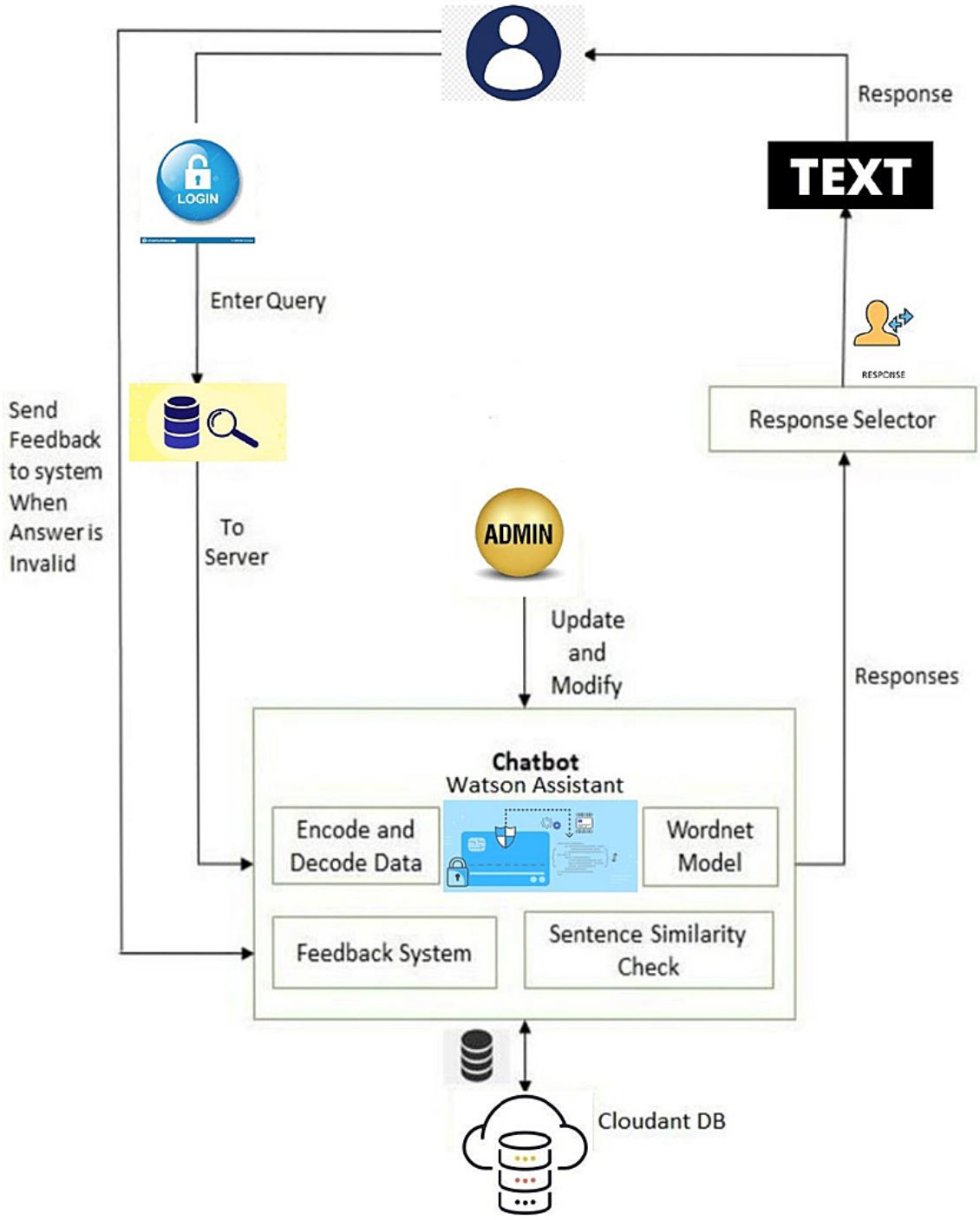
PROJECT DESIGN

5.1 Data Flow Diagrams

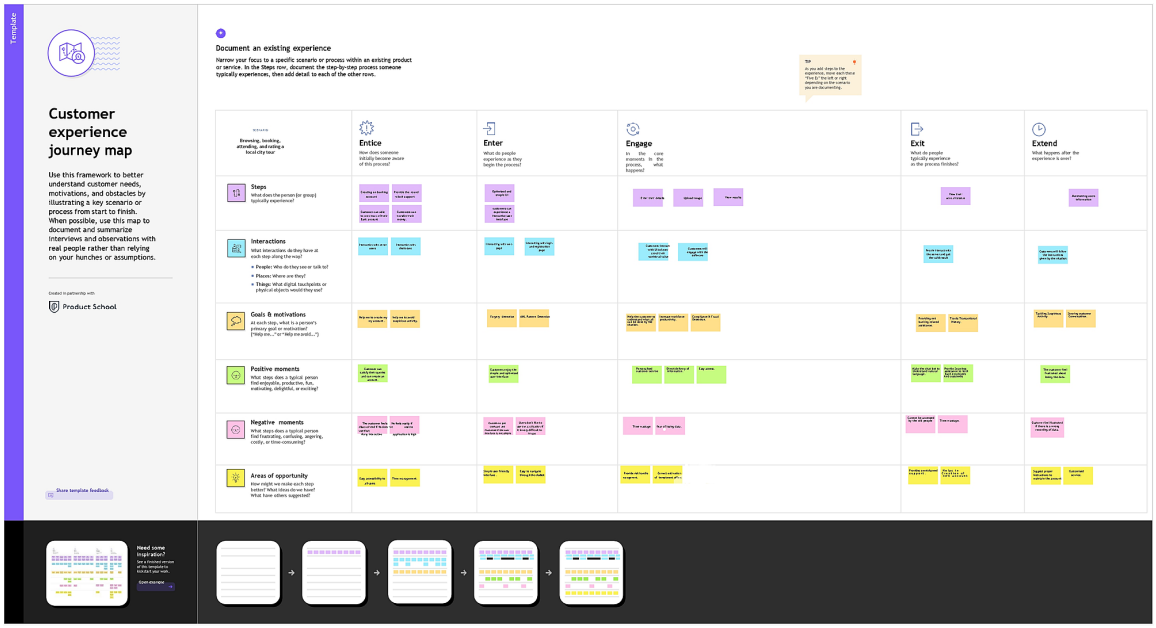


5.2 Solution & Technical Architecture




Response
TEXT
LOGIN
Enter Query
RESPONSE
Response Selector
Send Feedback to system When Answer is Invalid
To Server
ADMIN
Update and Modify
Responses
Chatbot
Watson Assistant
Encode and Decode Data
Wordnet Model
Feedback System
Sentence Similarity Check
Cloudant DB

5.3 User Stories



User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority
Customer (Mobile user)	Download the database	USN-1	As a user, I can register for the application by entering my email, and password, and confirming my password.	I can access my account / dashboard	High
	Register	USN-2	As a user, I can register for the application by entering my email, and password, and confirming my password.	I can receive a confirmation email & click confirm	High
	Login	USN-3	As a user, I will receive a confirmation email once I have registered for the application	I can register & access the dashboard with Facebook Login	Low
	Querying	USN-4	User query with a chatbot for clarifications.		Medium
Customer (Web user)	The functional requirements are same as a mobile user	Same as a mobile user	Same as a mobile user	Same as a mobile user	High when compared to mobile users

CHAPTER 6

PROJECT PLANNING & SCHEDULING

6.1 Sprint Planning & Estimation

Sprint	Functional Requirement (Epic)	User Story Number	User Story/ Task	Story Points	Priority	Team Members
Sprint-1	Building of Assistant	USN-1	Creation of Banking Chatbot or Assistant usingIBM Watson Assistant/ As a user, I can see a Banking Assistant.	12	High	Magesh Sundar G VigneshS B
Sprint-1		USN-2	Understanding Customer's Banking RelatedQueries and skills/ As a user, I can see a Chatbot with Bankingskills.	8	Moderate	Vetri mugesh Kumar A SaravananK
Sprint-2	Modelling of Assistant	USN-3	Building action and Adding responses to Account Creation/As a user, I can see a Chatbot whichhelps to createan account	5	High	Magesh Sundar G VigneshS B

Sprint-2		USN-4	Building action and Adding responses to Banking related queries/As a user, I can see aChatbot which helps to solve the banking queries.	5	High	Magesh Sundar G VigneshS B
Sprint-2		USN-5	Building action and Adding responses to Net Banking/As a user, I can see a Chatbot whichhelpsto access Net Banking	5	High	Magesh Sundar G

						Vignesh S B
Sprint-2		USN-6	Building action and Adding responses to Loan Queries/As a user, I can see a Chatbot which helps in Loan related Queries.	5	High	Vetri mugesh Kumar A SaravananK
Sprint-3	Testing & Deployment Phase-I	USN-7	Testing thechatbot performance withthe trained banking functionalities or conversations/As a user,I can know the chatbots performance level	10	High	Magesh Sundar G VigneshS B
Sprint	**Functional Requirement (Epic)**	**User Story Number**	**User Story/ Task**	**Story Points**	**Priority**	**Team Membe rs**
Sprint-3		USN-8	Integration of Flask webpage with the chatbotassistant to provide a framework/As a user, I can see a webpageto access the chatbot.	10	High	Vetri mugesh Kumar A VigneshS B
Sprint-4	Deployment Phase-II& Model Improvement	USN-9	Deployment of AI based chatbot for banking Industry or Running the Chatbot service/As a user, I can see and use a 24*7 banking chatbot.	15	High	Magesh Sundar G SaravananK
Sprint-4		USN-10	Improving the model efficiency whenever needed/As a user, I can see new updated chatbot in Future days.	5	Moderate	Magesh Sundar G VigneshS B

Project Tracker, Velocity & BurndownChart:

Sprint	Total Story Points	Duration	Sprint StartDate	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date (Actual)
Sprint-1	20	6 Days	24 Oct 2022	29 Oct 2022	20	29 Oct 2022
Sprint-2	20	6 Days	31 Oct 2022	05 Nov 2022	20	05 Nov 2022
Sprint-3	20	6 Days	07 Nov 2022	12 Nov 2022	20	12 Nov 2022
Sprint-4	20	6 Days	14 Nov 2022	19 Nov 2022	20	19 Nov 2022
Sprint	**Total Story Points**	**Duration**	**Sprint StartDate**	**Sprint End Date (Planned)**	**Story Points Completed (as on Planned End Date)**	**Sprint Release Date (Actual)**

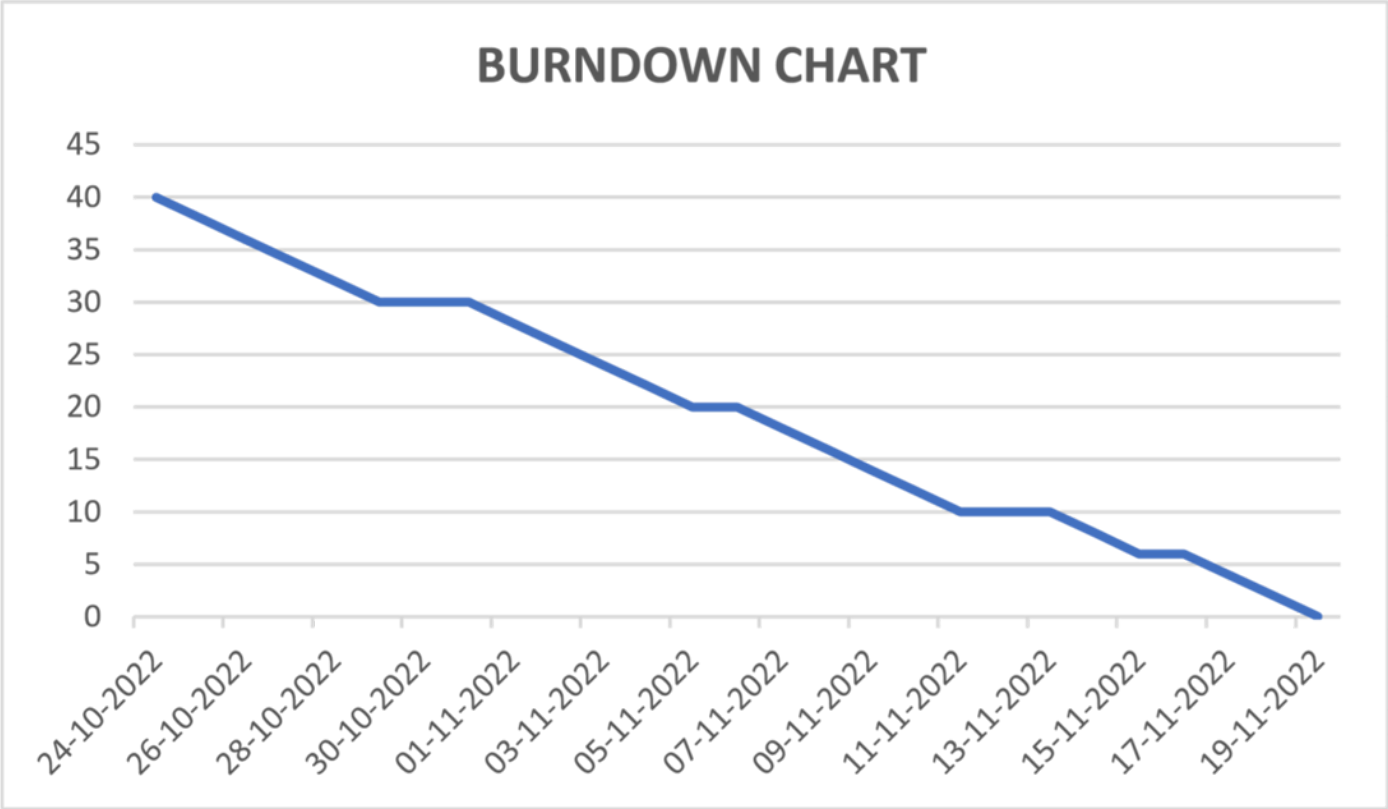
Velocity:

The team's average velocity(AV) per iterationunit (story pointsper day)

$$AV = 25/6 = 4.16$$

Burndown Chart:

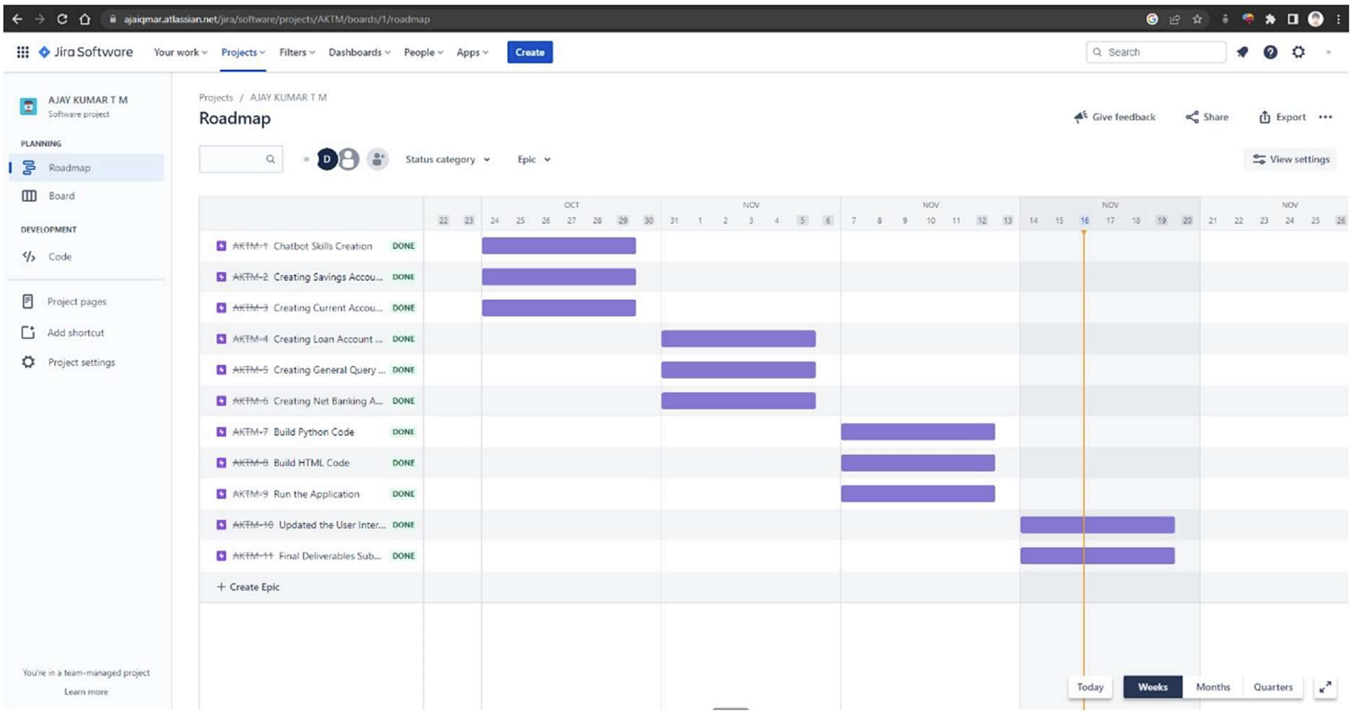
A burn down chart is a graphical representation of work left to do versus time. It is often used in agile software development methodologies suchas Scrum. However, burn down charts can be applied to any project containing measurable progress over time.



6.2 Sprint Delivery Schedule

Milestone	Task	Starting Date	Ending Date	Project Completion Status	Team Members
Create IBM Service	Creation of Banking Chatbot or Assistant using IBM Watson Assistant	24 Oct 2022	25 Oct 2022	9%	Magesh Sundar G Vignesh S B
	Understanding Customer's Banking Related Queries and skills	25 Oct 2022	29 Oct 2022	15%	Magesh Sundar G Vignesh S B
Create Skills and Assistant for Chatbot	Training the Chatbot with Banking related dataset.	31 Oct 2022	01 Nov 2022	24%	Saravanan K Vetri mugesh kumar A
	Building action and Adding responses to Account Creation	01 Nov 2022	02 Nov 2022	29%	Saravanan K Vetri mugesh Kumar A
	Building action and Adding responses to Banking related queries	02 Nov 2022	03 Nov 2022	34%	Magesh Sundar G Vignesh S B
	Building action and Adding responses to Net Banking	03 Nov 2022	04 Nov 2022	39%	Saravanan K Vetri mugesh Kumar A
	Building action and Adding responses to Loan Queries	04 Nov 2022	05 Nov 2022	44%	Saravanan K Vetri mugesh Kumar A
Testing Assistant & Integrate with Flask webpage	Testing the chatbot performance with the trained banking functionalities or conversations	07 Nov 2022	09 Nov 2022	60%	Magesh Sundar G Vignesh S B,

6.3 Reports from JIRA



7. CODING & SOLUTIONING

7.1 List of Features

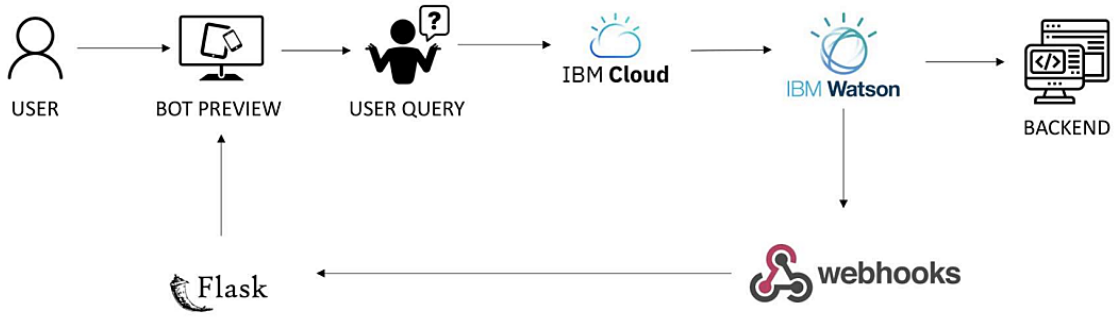
Check the below table for the list of features in our Banking Bot

New action +

Name	Last edited	Examples Count	Status
Book a meeting	18 hours ago	12	
Add authorized user	18 hours ago	20	
Make a payment	a day ago	10	
Request contact information	18 hours ago	16	
Set up autopay	18 hours ago	6	
Transfer funds	18 hours ago	16	
What can you do?	18 hours ago	32	
Create an account	18 hours ago	19	
Check upcoming payment	18 hours ago	25	
Access customer records	18 hours ago	8	
Connect to a live agent	18 hours ago	50	

Items per page: 50 | Showing 1–11 of 11 actions | 1 | 1 of 1 pages

7.3 Database Schema



8. TESTING

8.1 Test Cases

S.No	Test Cases	Passed/ Failed
1.	Providing List of Queries	Passed
2.	Creating a Bank Account	Passed
3.	Prerequisites for Services	Passed
4.	Loan Offers	Passed
5.	Timings and Venue	Passed
6.	Troubleshooting Help	Passed
7.	Login/ Logout	Passed

8.2 User Acceptance Testing

S.No	Test Cases	Yes/ No
1.	Keyword driven	Yes
2.	Responds in manually drafted rules	Yes
3.	Manages multiple users	Yes
4.	Conversational Paradigm	Yes
3.	Learns from real interactions	No
4.	Training via historical data	No
5.	Has decision-making skills	No

10. ADVANTAGES

1. Available 24/7 across the globe
2. Direct connection with the bank agents
3. No queueing in responses
4. Latest queries are answered with ease
5. Updated to the latest details
6. Easy to setup and communicate

DISADVANTAGES

1. Limited Response Scaling
2. Frequent Maintenance
3. Misreading of Queries
4. Connectivity Issues

11. CONCLUSION

The solution to almost all the querying applications has become chatbot for assistance and resolving. We believe that the same technology can be in banking queries as it was meant for that purpose. Though the bot would not be able to solve or satisfy all the queries for customer, it can certainly resolve issues that the user might be facing often and help the banking sectors maintain great relationships with their customers.

12. FUTURE SCOPE

The future of project lies entirely on how the customers get benefitted from the interaction and the interface. We would have to make improvements in the bot to make it as user-friendly as possible. The following areas could have a serious impact on our scope:
i. Support for multiple languages
ii. Low latency in fetching responses
iii. Voice and video instructions

13. APPENDIX

Source Code :

```
<script>
  window.watsonAssistantChatOptions = {
    integrationID: "4c3a7e57-b7e1-4287-a6b8-bdb2406595e4", // The ID of this integration.
    region: "us-south", // The region your integration is hosted in.
    serviceInstanceID: "11107dfa-248d-4aca-a882-4e925f6c0e40", // The ID of your service instance.
    onLoad: function(instance) { instance.render(); }
  };
  setTimeout(function(){
    const t=document.createElement('script');
    t.src="https://web-chat.global.assistant.watson.appdomain.cloud/versions/" + (window.watsonAssistantChatOptions.clientVersion || 'latest') + "/WatsonAssistantChatEntry.js";
    document.head.appendChild(t);
  });
</script>
```

GitHub : https://github.com/IBM-EPBL/IBM-Project-19272-1659695072

Project Demo Link : https://youtu.be/SvE0NDZWrjY

```
1
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