PROJECT REPORT DOCUMENTATION ON

Aquatic Insights:
Cognos -Powered Water Portability Analysis

TEAM ID: 4184D7A6383C4EC891D4264653755A53

DOMAIN: DATA ANALYTICS WITH TABLEAU

- **TEAM LEAD:** Shirisha N
- **TEAM MEMBER 1:** Santhosh Kumar S
- **TEAM MEMBER 2:** Sairam K
- **TEAM MEMBER 3:** Santhosh D

CONTENT

1.INTRODUCTION

1.1. PROJECT OVERVIEW:

"Aquatic Insights is a transformative project leveraging IBM Cognos for water portability analysis. It focuses on collecting, cleaning, and standardizing diverse water quality data from various sources. Using Cognos, the project delivers data analytics and reporting, with a user-friendly interface, mobile accessibility, and strong security measures. It promotes collaboration, public awareness, and continuous improvement. Aquatic Insights aims to enhance our understanding of water resources and support sustainable management of aquatic ecosystems."

1.2. PURPOSE:

The project "Aquatic Insights: Cognos-Powered Water Portability Analysis" aims to use IBM Cognos and advanced analytics for several purposes:

- Assess water quality and portability.
- Integrate diverse data sources for a comprehensive view.
- Standardize data to ensure consistency.
- Provide advanced analytics to identify trends and threats.
- Create a user-friendly platform for data interaction.
- Raise public awareness and offer educational resources.
- Foster collaboration among experts.
- Ensure data security and privacy.

The overarching purpose is to improve understanding and facilitate sustainable management of aquatic ecosystems for the benefit of researchers, policymakers, and the public.

2.LITERATURE SURVEY

2.1. Existing problem:

In the literature survey for the project "Aquatic Insights: Cognos-Powered Water Portability Analysis," several existing issues are identified:

- Limited data integration from diverse sources.
- Challenges in data standardization and consistency.
- Lack of predictive modeling for water quality trends.
- Poor accessibility and user-friendliness.
- Limited collaboration among stakeholders.
- Insufficient mobile accessibility for on-the-go access.
- Inadequate attention to data security and privacy.
- Limited emphasis on public awareness and education.
- Gaps in regulatory compliance.
- Potential issues with outdated information.

Addressing these problems is crucial for the project's success, ensuring it provides valuable and up-to-date insights into water quality and portability for a wide range of users and stakeholders.

2.2. References:

- Carpenter, S. R., & Cottingham, K. L. (1997). Resilience and water quality. Ecology, 78(3), 899-904.
- Jin, X., Yang, Z., & Han, H. (2019). A review on predicting algal blooms in freshwater lakes using satellite remote sensing. Environmental Science and Pollution Research, 26(19), 19513-19530.

- Cognos Analytics Documentation. IBM. [Link to official IBM Cognos documentation for technical reference and usage.]
- Ouyang, W., & Bartholic, J. (2009). Application of the Soil and Water Assessment Tool (SWAT) for water quality research: A review. Journal of Environmental Quality, 38(2), 515-523.

2.3. Problem Statement Definition:

The problem statement for "Aquatic Insights: Cognos-Powered Water Portability Analysis" centers on addressing several key challenges in water quality assessment and management:

- Fragmented data sources and inconsistent data hinder comprehensive analysis.
- Current methods lack predictive modeling for anticipating water quality trends.
- Inadequate accessibility and user-friendliness limit information dissemination.
- Collaboration among experts and stakeholders needs improvement.
- Mobile accessibility for on-the-go access is lacking.
- Data security and privacy concerns pose risks.
- Public awareness and education about water quality are often insufficient.
- Regulatory compliance gaps and legal issues may arise.
- Environmental conditions change, requiring continuous updates.

The project aims to resolve these issues by creating a user-friendly, data-driven platform for understanding and managing water quality and portability in aquatic ecosystems.

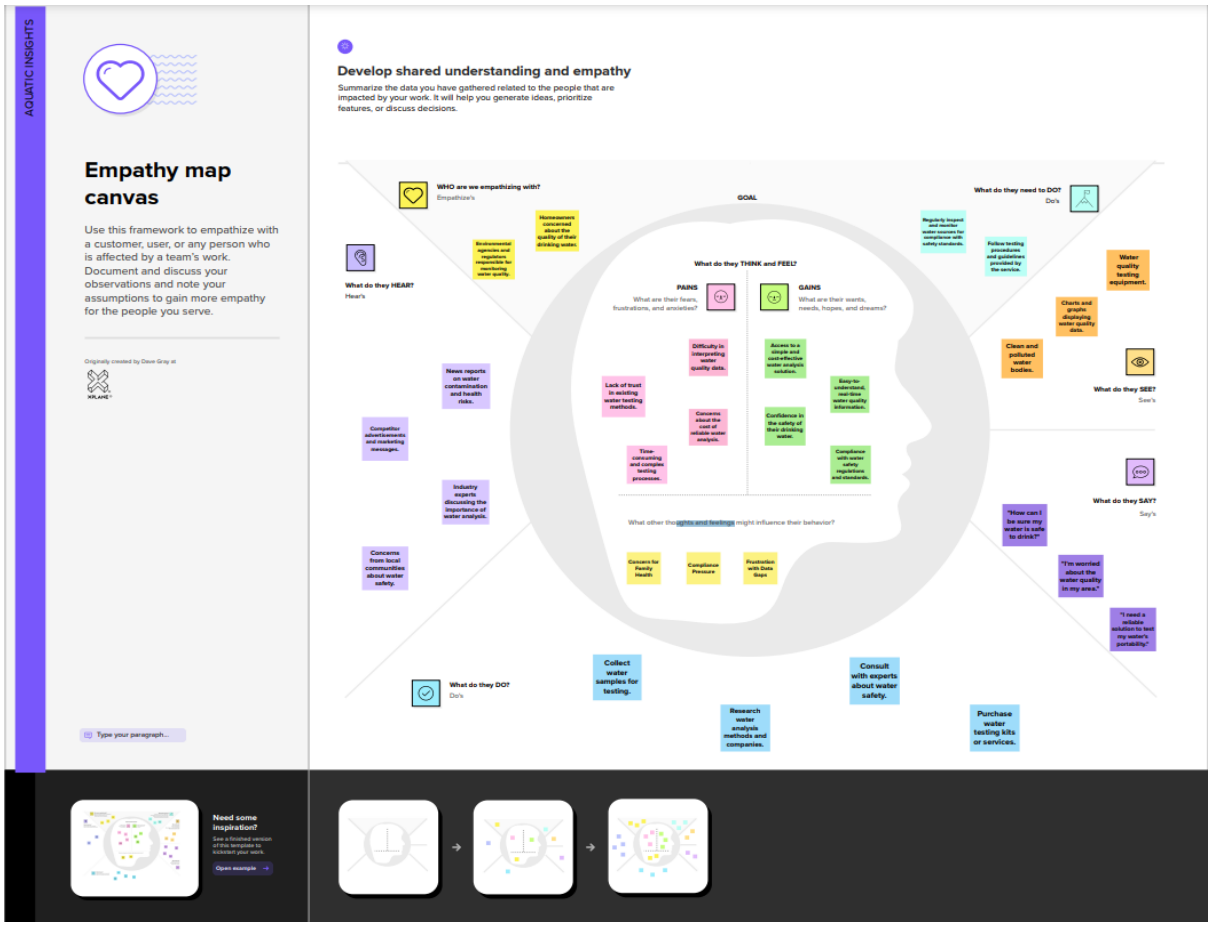
3.IDEATION & PROPOSED SOLUTION

3.1. Empathy Map Canvas:

An empathy map is a simple, easy-to-digest visual that captures knowledge about a user's behaviours and attitudes.

It is a useful tool to helps teams better understand their users.
Creating an effective solution requires understanding the true problem and the person who is experiencing it. The exercise of creating the map helps participants consider things from the user's perspective along with his or her goals and challenges.

Example:



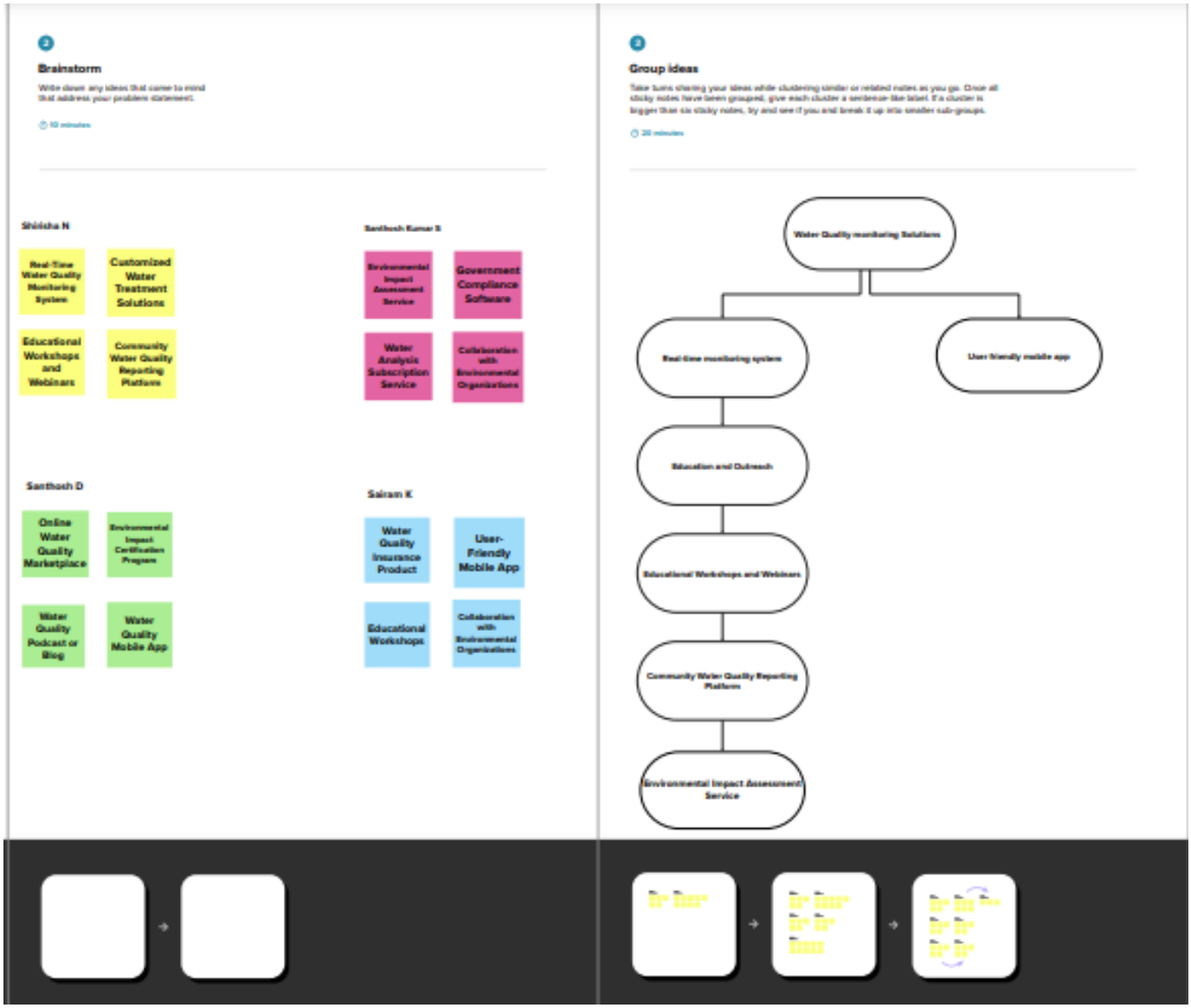
3.2. Ideation & Brainstorming:

Brainstorming provides a free and open environment that encourages everyone within a team to participate in the creative thinking process that leads to problem solving. Prioritizing volume over value, out-of-the-box ideas are welcome and built upon, and all participants are encouraged to collaborate, helping each other develop a rich amount of creative solutions.

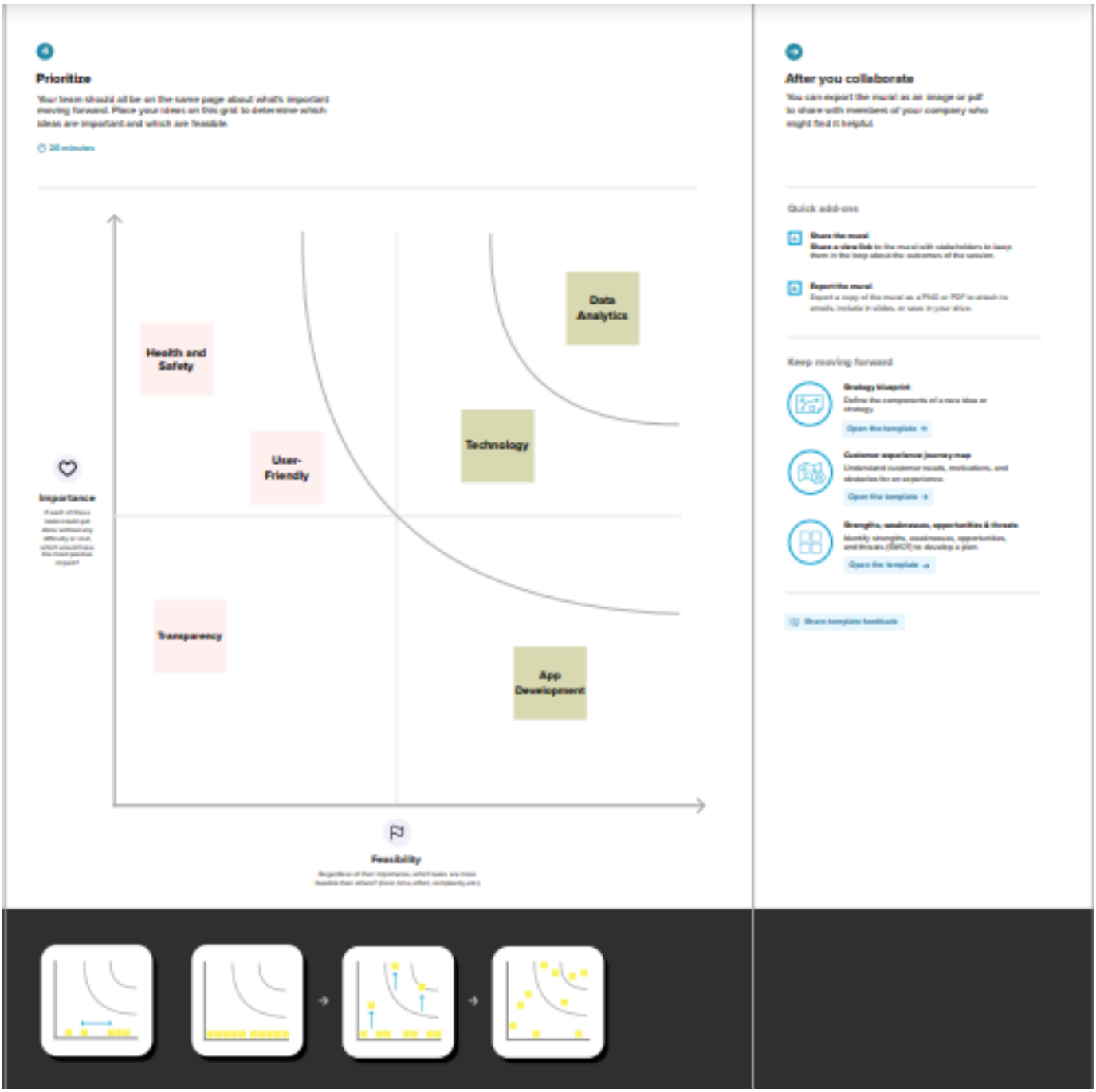
Use this template in your own brainstorming sessions so your team can unleash their imagination and start shaping concepts even if you're not sitting in the same room.

Step-1: Team Gathering, Collaboration and Select the Problem Statement

Step-2: Brainstorm, Idea Listing and Grouping



Step-3: Idea Prioritization



4.REQUIREMENT ANALYSIS

4.1. Functional requirement:

The functional requirements for "Aquatic Insights: Cognos-Powered Water Portability Analysis" outline the specific features and capabilities the project's platform should possess. These requirements include:

- Data integration and management from various sources.
- Data standardization for consistency.
- Analytics and predictive modeling for water quality assessment.
- Interactive dashboards for data visualization.
- User profiles and access control.
- Development of a mobile application.
- Collaboration tools for experts.
- Strong data privacy and security measures.
- Reporting and alerts for critical events.
- Public engagement and education features.
- Continuous platform improvement.
- Regulatory compliance.
- Scalability and performance for handling large data volumes and users.

These requirements serve as the basis for creating a comprehensive and user-friendly platform for analyzing and managing water quality and portability in aquatic ecosystems.

4.2. Non-Functional requirements:

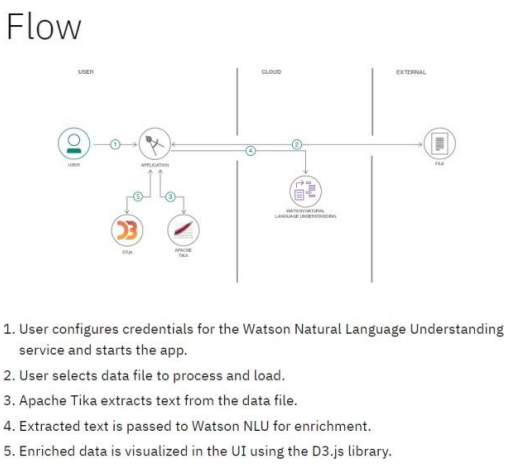
The non-functional requirements for "Aquatic Insights: Cognos-Powered Water Portability Analysis" outline the performance, reliability, usability, security, and compliance standards that the platform should meet. Key points include:

- Fast performance and scalability to handle growth.
- High reliability and data protection mechanisms.
- Intuitive user interface and accessibility for all users.
- Robust security and data privacy measures.
- Interoperability with other systems.
- Easy maintenance and regular updates.
- Compliance with regulations and standards.
- Load handling during peak events.
- Data archiving and user support.

These non-functional requirements ensure the platform's effectiveness, user experience, and adherence to legal and environmental standards.

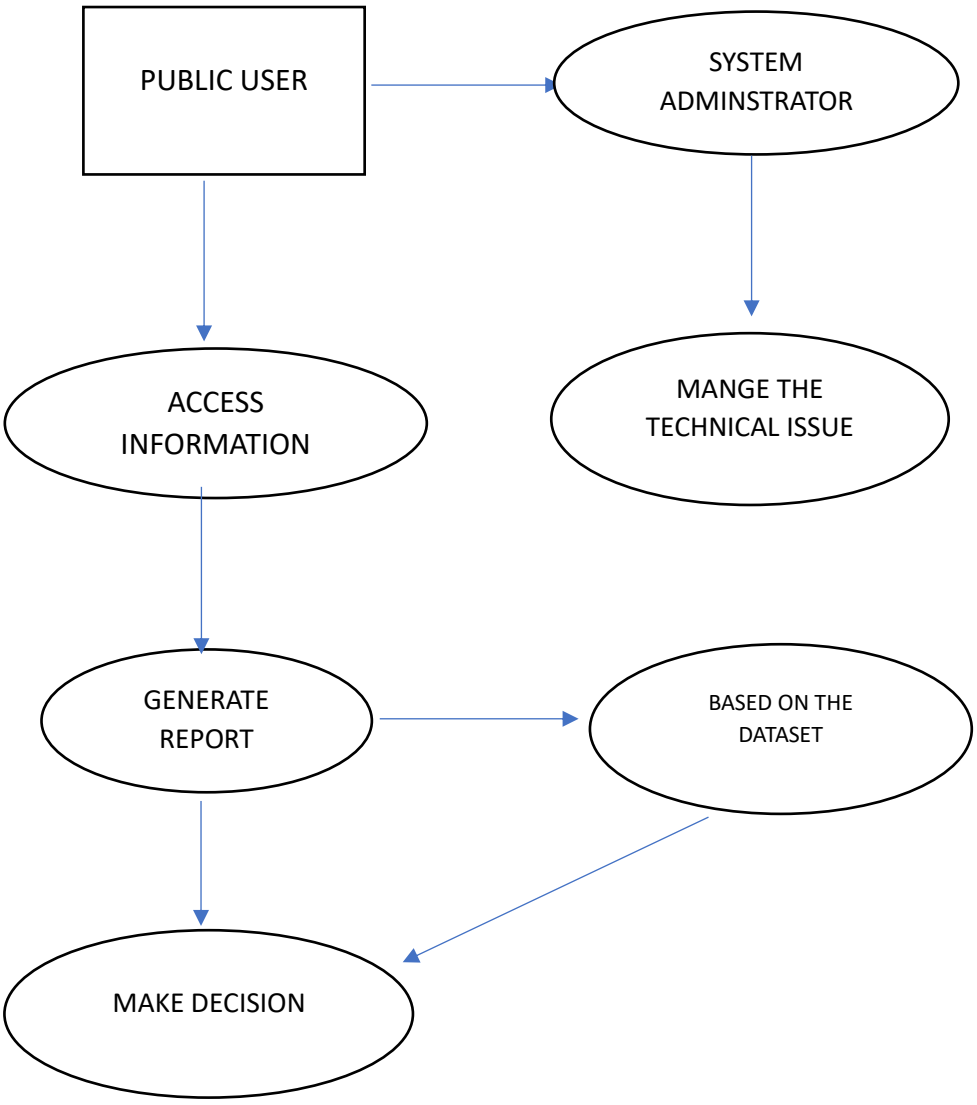
5.PROJECT DESIGN

5.1. Data Flow Diagrams & User Stories:



A Data Flow Diagram (DFD) is a traditional visual representation of the information flows within a system. A neat and clear DFD can depict the rightamount of the system requirement graphically. It shows how data enters and leaves the system, what changes the information, and where data is stored.

Flow diagram:



User Stories:

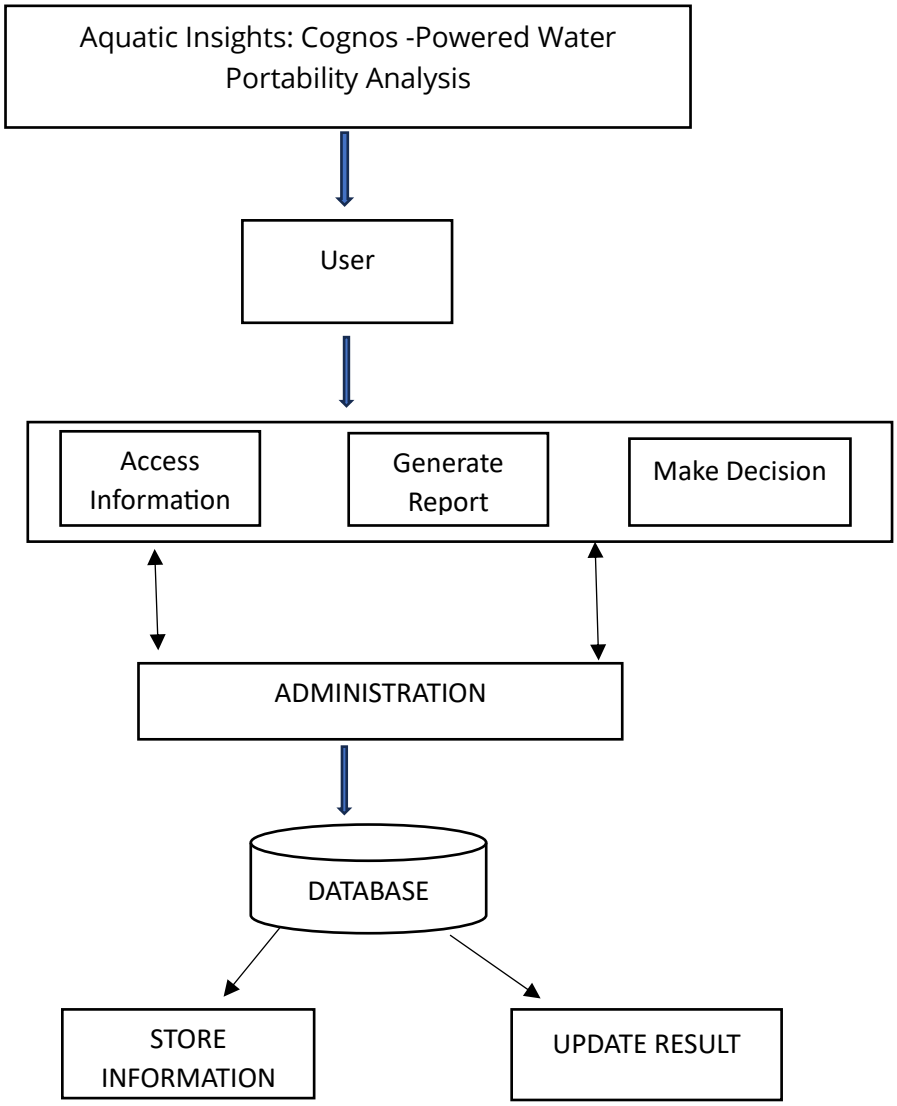
User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
PUBLIC	check water quality information for their area	USN-1	Public users can access the system to check the quality of water in their area. They can view real-time water quality information, including potability status.	I can access my account / dashboard	o/1	
		USN-2	Public users may set preferences to receive real-time alerts and notifications about water quality issues, such as water contamination or safety concerns.		0/1	
		USN-3	They can access historical water quality data to track changes and trends in water quality over time		0/1	
	Dashboard					
System Administrator			Infrastructure Management: System administrators are responsible for managing the technical infrastructure, including servers, databases, and software updates. They ensure that the system is running smoothly and efficiently.			

5.2. Solution Architecture:

Solution architecture is a complex process – with many sub-processes – that bridgesthe gap between business problems and technology solutions. Its goals are to:

- Find the best tech solution to solve existing business problems.
- Describe the structure, characteristics, behavior, and other aspects of thesoftware to project stakeholders.
- Define features, development phases, and solution requirements.
- Provide specifications according to which the solution is defined, managed,and delivered.

Example - Solution Architecture Diagram:

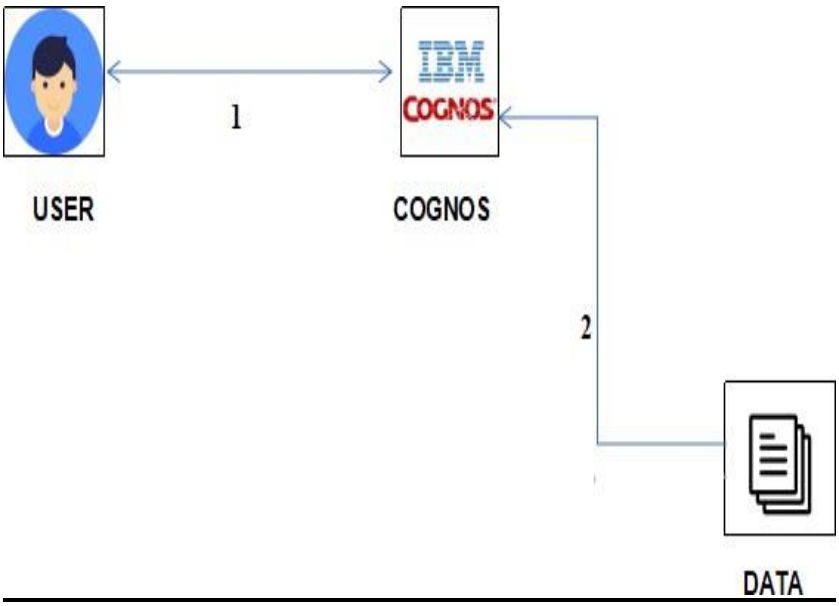


6. PROJECT PLANNING & SCHEDULING

6.1. Technical Architecture:

The Deliverable shall include the architectural diagram as below and the information as per the table1 & table 2

Reference: https://www.kaggle.com/code/khsamaha/potable-water-prediction-0-798-with-caret-rf-r/input



✓ **Components & Technologies:**

S.No	Component	Description	Technology
1.	User Interface	How user interacts with application e.g. Web UI, Mobile App, Chatbot etc.	HTML, CSS, JavaScript / Angular Js / React Js etc.
2.	Application Logic-1	Logic for a process in the application	Python
3.	Application Logic-2	Logic for a process in the application	IBM Cognos Analytics
4.	Application Logic-3	Logic for a process in the application	IBM Cognos Analytics
5.	Database	Data Type, Configurations etc.	Excel

6.	Cloud Database	Database Service on Cloud	IBM DB2, IBM Cloudant etc.
7.	File Storage	File storage requirements	IBM Block Storage or Other Storage Service or Local Filesystem
8.	External API-1	Purpose of External API used in the application	IBM Weather API, etc.
9.	External API-2	Purpose of External API used in the application	Aadhar API, etc.
10.	Machine Learning Model	Purpose of Machine Learning Model	Object Recognition Model, etc.
11.	Infrastructure (Server / Cloud)	Application Deployment on Local System / Cloud Local Server Configuration: Cloud Server Configuration :	Local, Cloud Foundry, Kubernetes, etc.

6.2. Sprint Planning & Estimation:

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Registration	USN-1	As a user, I can register for the application by entering my email, password, and confirming my password.	2	High	
Sprint-1		USN-2	As a user, I will receive confirmation email once I have registered for the application	1	High	
Sprint-2		USN-3	As a user, I can register for the application through SmartInternz	2	Low	
Sprint-1		USN-4	As a user, I can register for the application through smartInternz provided email id.	2	Medium	
Sprint-1	Login	USN-5	As a user, I can log into the application by entering email & password	1	High	
	Dashboard					

6.3. Sprint Delivery Schedule:

Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date (Actual)
Sprint-1	20	6 Days	10Oct 2023	16 Oct 2023	Yes	20 Oct 2023
Sprint-2	20	6 Days	12Oct 2023	18 Oct 2023	Yes	24 Oct 2023
Sprint-3	20	6 Days	14 Oct 2023	20Oct 2023	Yes	28 Oct 2023
Sprint-4	20	6 Days	17 Oct 2023	23 Oct 2023	Yes	30 Oct 2023

7. CODING & SOLUTIONING

7.1. Feature 1:

```
<!DOCTYPE html>
<html lang="en">
<head>
        <meta charset="UTF-8">
        <meta name="viewport" content="width=<device-width>, initial-scale=1.0">
        <title> Water Portable </title>
        <style>
    body{
      background-color: rgb(255, 255, 255);
    }
    h1{
      text-align: center;
      font-size:50px;
    }
    p{
      font-size: 25px;
      font-style: italic;
      font-weight: 100;
      margin-left: 20px;
    }
  </style>
</head>
<body>
        <h1 style="font-size: 40px;color: rgb(255, 255, 255);"><b>Aquatic Insights</b></h1>      <h1 style="font-size: 40px;color: rgb(255, 255, 255);"><b>COGNOS POWERED</b></h1>      <h1 style="font-size: 40px;color: rgb(255, 255, 255);"><b>WATER PORTABILITY ANALYSIS</b></h1>
        <h2 style="font-size: 25px;color: rgb(255, 255, 255);">Here is the data analyst regarding the water analysis. We are analysed with the different datas like ph values , Hardness , TDS , Chloramines , Sulfate , Conductivity , Organic carbon , Trihalomethanes , Turbidity , Potability of the water samples.</h2>
        <iframe src="https://us1.ca.analytics.ibm.com/bi/?perspective=dashboard&amp;pathRef=.my_folders%2FAquatic%2Bdashboard&amp;closeWindowOnLastView=true&amp;ui_appbar=false&amp;ui_navbar=false&amp;shareMode=embedded&amp;action=view&amp;mode=dashboard&amp;subView=model0000018b43cc4e2e_00000003" width="800" height="700" frameborder="0" gesture="media" allow="encrypted-media" allowfullscreen=""></iframe>
        <h1 style="font-size: 40px;color: rgb(255, 255, 255);">STORY BOARD</h1>
        <p style="font-size: 29px;color: rgb(255, 255, 255);"><!--stry goes here-->Our Analysis are Seperate the Samples as Portable and Non Portable , Average Sulphate content of portable and non portable , Summerizing cloramines taking their average , Summerizing Organic - Carbon content taking their average , Average Organic- Corbon content of portable and non-portable water , Chloramines by Conductivity (Group) colored by Potability and ph by Hardness (Group) colored by Potability. </p>
        <iframe src="https://us1.ca.analytics.ibm.com/bi/?perspective=story&amp;pathRef=.my_folders%2FNew%2B
```

story1&closeWindowOnLastView=true&ui_appbar=false&ui_navbar=false&shareMode=embedded&action=view&sceneId=model0000018b43462bce_00000004&sceneTime=0" width="800" height="700" frameborder="0" gesture="media" allow="encrypted-media" allowfullscreen=""></iframe>
</body>
</html>

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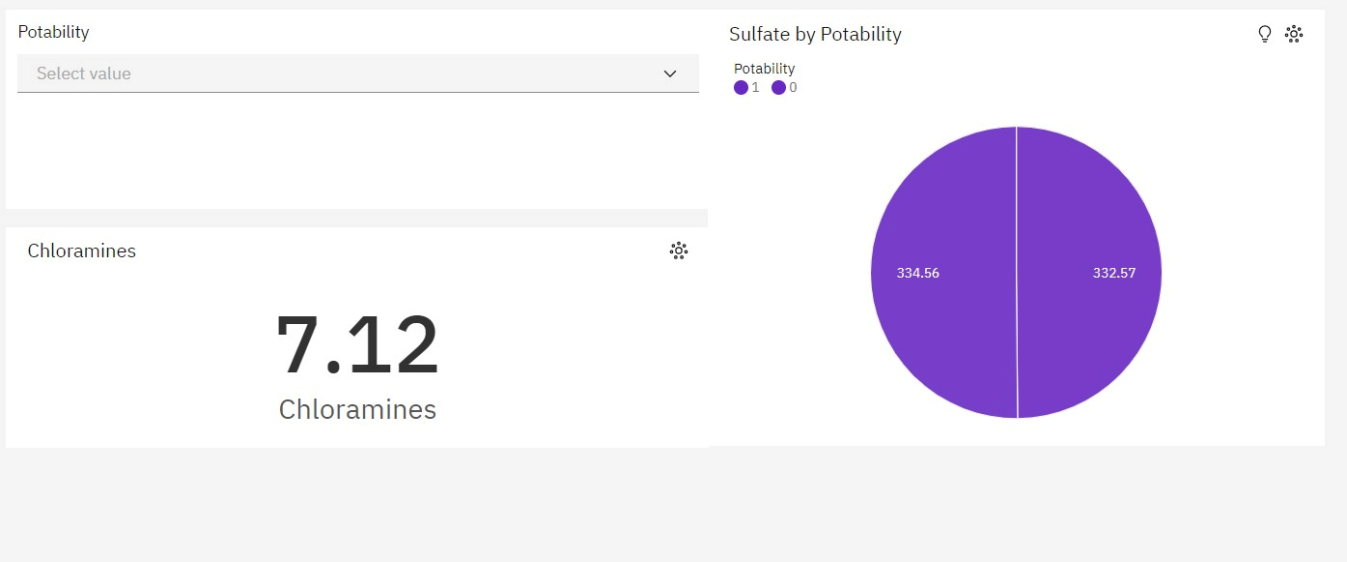
8.PERFORMANCE TESTING

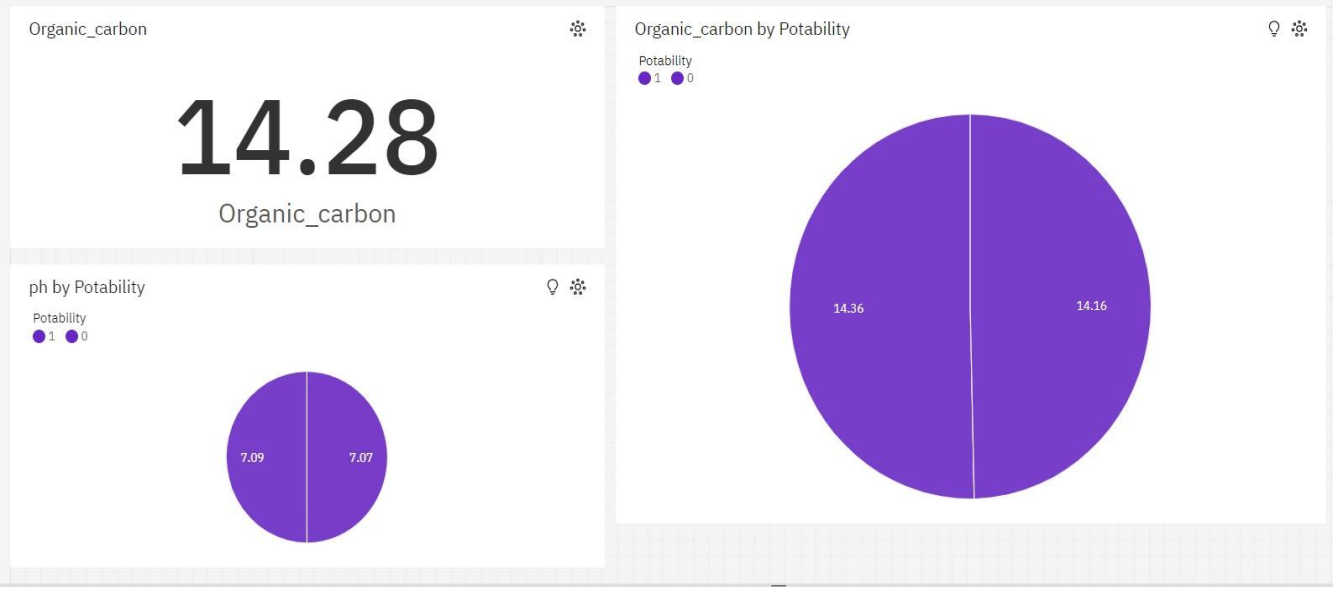
8.1. Performace Metrics:

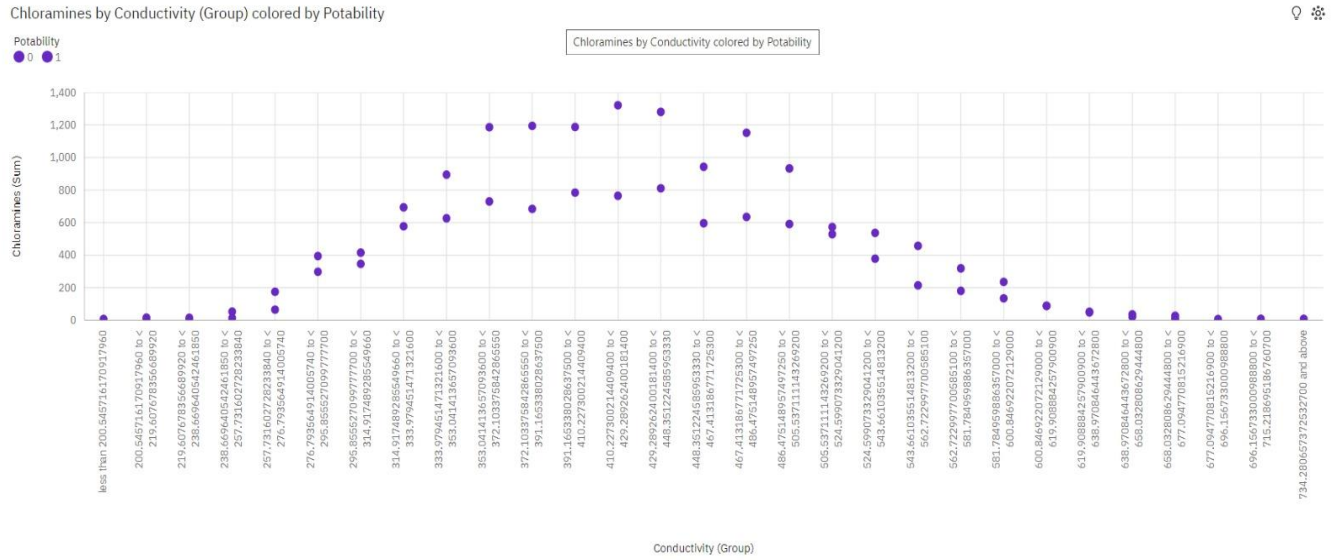
S.No.	Parameter	Screenshot / Values
1.	Dashboard design	No of Visualizations / Graphs – We have include 4 tabs
2.	Data Responsiveness	The system's ability to efficiently analyze these indicators and provide real-time predictions, ensuring the availability of safe drinking water in regions facing a crisis
3.	Amount Data to Rendered (DB2 Metrics)	The global drinking water crisis by ensuring the availability of safe and potable water in regions facing water quality concerns
4.	Utilization of Data Filters	Employed to narrow down the dataset and focus the analysis such as assess water quality
5.	Effective User Story	No of Scene Added - 4
6.	Descriptive Reports	No of list / Graphs – 1

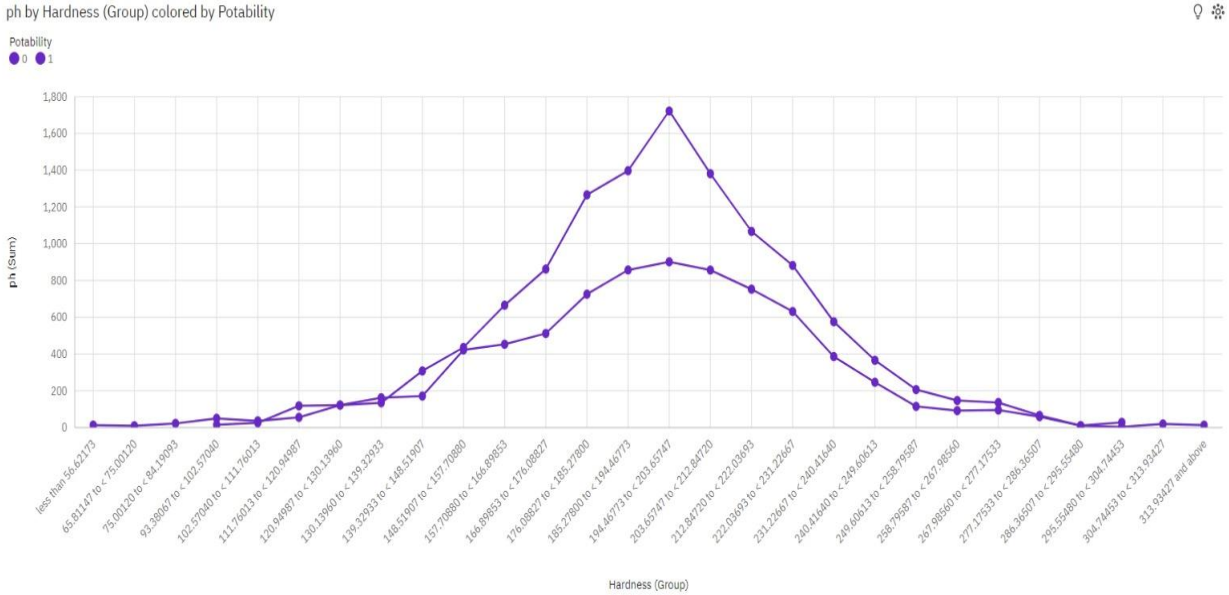
9.RESULTS

9.1. Output Screenshots:






Chloramines by Conductivity (Group) colored by Potability
Potability
0
1
Chloramines by Conductivity colored by Potability
Chloramines (Sum)
1,400
1,200
1,000
800
600
400
200
0
less than 200.54571617091796
200.54571617091796 to < 219.60767835668992
219.60767835668992 to < 238.66964054246185
238.66964054246185 to < 257.73160272823384
257.73160272823384 to < 276.79356491400574
276.79356491400574 to < 295.85552709977770
295.85552709977770 to < 314.91748928554966
314.91748928554966 to < 333.97945147132160
333.97945147132160 to < 353.04141365709360
353.04141365709360 to < 372.10337584286550
372.10337584286550 to < 391.16533802863750
391.16533802863750 to < 410.22730021440940
410.22730021440940 to < 429.28926240018140
429.28926240018140 to < 448.35122458595330
448.35122458595330 to < 467.41318677172530
467.41318677172530 to < 486.47514895749720
486.47514895749720 to < 505.53711114326920
505.53711114326920 to < 524.59907332904120
524.59907332904120 to < 543.66103551481320
543.66103551481320 to < 562.72299770058510
562.72299770058510 to < 581.78495988636710
581.78495988636710 to < 600.84692207212900
600.84692207212900 to < 619.90888425790090
619.90888425790090 to < 638.97084644367280
638.97084644367280 to < 658.03280862944480
658.03280862944480 to < 677.09477081521690
677.09477081521690 to < 696.15673300098880
696.15673300098880 to < 715.21869518676070
734.28065737253270 and above
Conductivity (Group)


ph by Hardness (Group) colored by Potability
Potability
0
1
ph (Sum)
1,800
1,600
1,400
1,200
1,000
800
600
400
200
0
less than 56.6173
56.61747 to < 75.00120
75.00120 to < 84.19093
93.38067 to < 102.57040
102.57040 to < 111.76013
111.76013 to < 120.94987
120.94987 to < 130.13960
130.13960 to < 139.32933
139.32933 to < 148.51907
148.51907 to < 157.70880
157.70880 to < 166.89853
166.89853 to < 176.08827
176.08827 to < 185.27800
185.27800 to < 194.46773
194.46773 to < 203.65747
203.65747 to < 212.84720
212.84720 to < 222.03693
222.03693 to < 231.22667
231.22667 to < 240.41640
240.41640 to < 249.60613
249.60613 to < 258.79587
258.79587 to < 267.98560
267.98560 to < 277.17533
277.17533 to < 286.36507
286.36507 to < 295.55480
295.55480 to < 304.74453
304.74453 to < 313.93427
313.93427 and above
Hardness (Group)

10.ADVANTAGES & DISADVANTAGES

✓ Advantages:

The project "Aquatic Insights: Cognos-Powered Water Portability Analysis" offers a range of advantages:

- Comprehensive water quality assessment with predictive capabilities.
- User-friendly interface accessible to experts and the public.
- Data integration for a complete view of water quality.
- Facilitation of collaboration and knowledge sharing.
- Promotion of public awareness and regulatory compliance.
- Robust data security and continuous improvements.
- Resource efficiency and environmental sustainability.
- Data-driven decision-making for policymakers and researchers.
- Customization and scalability for future growth.
- Real-time monitoring and international collaboration.

These advantages collectively contribute to improved water quality management and sustainable ecosystems.

✓ Disadvantages:

The project "Aquatic Insights: Cognos-Powered Water Portability Analysis" comes with several potential disadvantages and challenges:

- Handling complex and diverse data sources.

- Data availability limitations in remote or less-studied areas.
- Technical barriers for some users with limited skills.
- Ongoing maintenance and software update costs.
- Stringent data privacy and security requirements.
- Regulatory compliance complexities.
- Resource-intensive computational and human requirements.
- High initial implementation costs.
- Sustaining user engagement and public awareness.
- Ensuring data consistency across various sources.
- Adaptation to changing environmental conditions.
- Potential public resistance to sharing data.
- Mobile application compatibility challenges.
- Scalability concerns as the project grows.
- Effective communication with diverse stakeholders.

Mitigating these challenges will be vital for the project's success and its ability to deliver comprehensive water quality insights.

11. CONCLUSION

In conclusion, "Aquatic Insights: Cognos-Powered Water Portability Analysis" represents a promising solution for addressing challenges in water quality assessment and management. The project leverages advanced data analytics, user-friendly interfaces, and collaboration tools to provide valuable insights into aquatic ecosystems. It offers advantages such as improved water quality assessment and informed decision-making, contributing to environmental sustainability.

Despite potential challenges such as data complexity and privacy concerns, the project's goals are attainable with careful planning and dedication. "Aquatic Insights" has the potential to be a valuable resource for various stakeholders, serving as a catalyst for positive change in aquatic ecosystem management. The project signifies a promising path toward sustainable water quality management and the preservation of natural water resources.

12. FUTURE SCOPE

The future scope for "Aquatic Insights: Cognos-Powered Water Portability Analysis" is expansive and promising. It includes:

- Incorporating advanced data sources, AI, and IoT for more comprehensive and real-time water quality analysis.
- Implementing blockchain for enhanced data security and transparency.
- Facilitating global collaboration and data sharing.
- Developing educational resources and influencing water quality policies.
- Addressing climate change and ecosystem health, and expanding the project's focus to include flood monitoring and environmental equity.
- Promoting sustainable practices and contributing to open data initiatives.

The project has the potential to become a comprehensive and collaborative platform, empowering stakeholders to better understand and manage aquatic ecosystems in an increasingly complex world.

13. APPENDIX

Source Code:

Index.html

```
<!DOCTYPE html>
<html lang="en">
<head>
        <meta charset="UTF-8">
        <meta name="viewport" content="width=<device-width>, initial-
scale=1.0">
        <title> Water Portable </title>
        <style>
      body{
         background-color: rgb(255, 255, 255);
      }
      h1{
         text-align: center;
         font-size:50px;
      }
      p{
         font-size: 25px;
         font-style: italic;
         font-weight: 100;
         margin-left: 20px;
      }
   </style>
</head>
<body>
        <h1 style="font-size: 40px;color: rgb(255, 255, 255);"><b>Aquatic
Insights</b></h1> <h1 style="font-size: 40px;color: rgb(255, 255,
255);"><b>COGNOS POWERED</b></h1>     <h1 style="font-size: 40px;color:
rgb(255, 255, 255);"><b>WATER PORTABILITY ANALYSIS</b></h1>
        <h2 style="font-size: 25px;color: rgb(255, 255, 255);">Here is the data
analyst regarding the water analysis. We are analysed with the different datas
like ph values , Hardness , TDS , Chloramines , Sulfate , Conductivity , Organic
carbon , Trihalomethanes , Turbidity , Potability of the water samples.</h2>
        <iframe
src="https://us1.ca.analytics.ibm.com/bi/?perspective=dashboard&amp;pathR
```

ef=.my_folders%2FAqauatic%2Bdashboard&closeWindowOnLastView=true&ui_appbar=false&ui_navbar=false&shareMode=embedded&action=view&mode=dashboard&subView=model0000018b43cc4e2e_00000003" width="800" height="700" frameborder="0" gesture="media" allow="encrypted-media" allowfullscreen=""></iframe>

<h1 style="font-size: 40px;color: rgb(255, 255, 255);">STORY BOARD</h1>

<!--stry goes here-->Our Analysis are Seperate the Samples as Portable and Non Portable , Average Sulphate content of portable and non portable , Summerizing cloramines taking their average , Summerizing Organic - Carbon content taking their average , Average Organic- Corbon content of portable and non-portable water , Chloramines by Conductivity (Group) colored by Potability and ph by Hardness (Group) colored by Potability.

<iframe src="https://us1.ca.analytics.ibm.com/bi/?perspective=story&pathRef=.my_folders%2FNew%2Bstory1&closeWindowOnLastView=true&ui_appbar=false&ui_navbar=false&shareMode=embedded&action=view&sceneId=model0000018b43462bce_00000004&sceneTime=0" width="800" height="700" frameborder="0" gesture="media" allow="encrypted-media" allowfullscreen=""></iframe>
</body>
</html>

Github link:

https://github.com/ShirishaNagaraj/Naan-Mudhalvan

Project Demo Link:

https://drive.google.com/file/d/1HUuCJql54DpyO9ZReXwYJqm7oqjyiPJY/view?usp=share_link