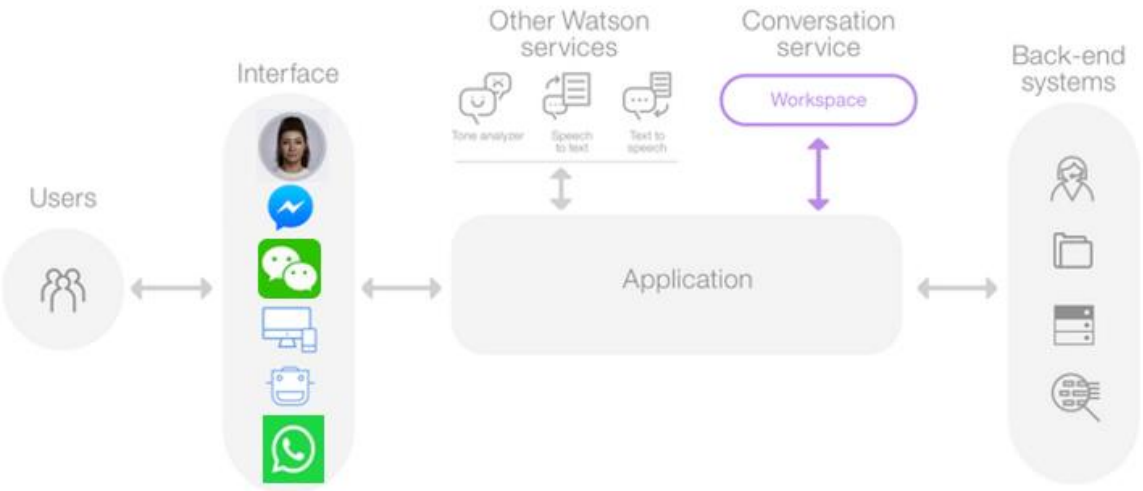
WHO Digital Healthworker
Sample Executive Summary

Bid Ref: 02

To further the mission of the World Health Organization, we are creating an AI-powered Digital Healthworker that speaks with fluency and accuracy in English, French, Spanish, Russian, Chinese Arabic, and Hindi - as well as their respective dialects. This Digital Healthworker will be utilized to benefit a global audience by helping spread awareness on essential health topics such as tobacco use prevention; alcohol consumption reduction; mental wellness activism; physical activity guidelines promotion; healthy lifestyle habits education and more.

This project requires us to use the best of several cloud-based services--IBM Watson's Discover search and Assistant conversation engines, AWS for global hosting, AWS Pinpoint for messaging users through email or other platforms, AWS QuickSight for business intelligence analytics, and AdRoll for targeted advertisement. Additionally, we are blending AI/machine learning technologies with Natural Language Processing models to better comprehend dialects from various regions around the world on the UneeQ Digital Human Platform.

We believe this AI-powered Digital Healthworker will have the ability to reach millions of people cost-effectively, while also offering detailed analytics and insights into how successful our efforts are in terms of health literacy improvement. Through data gathering, research studies, and surveys, we hope to measure the effectiveness of this AI-fueled project on a global scale.



Approach/Methodology

The AWS Well-Architected Framework is a set of guidelines and best practices for designing, operating, and maintaining systems in the AWS Cloud. The framework provides a way to review and improve the architectural quality of a workload, and to identify and prioritize areas for improvement. The framework consists of five pillars:

Operational Excellence: Ensuring that the systems are scalable, secure, and highly available.

- **Security:** Protecting data, systems, and applications by implementing security best practices and policies.
- **Reliability:** Designing systems that can recover quickly from failures and that can handle unexpected traffic spikes.
- **Performance Efficiency:** Designing systems that are fast, efficient, and cost-effective.
- **Cost Optimization:** Managing costs by using resources efficiently and choosing cost-effective services and technologies.

The IBM Well-Architected Principles, on the other hand, provide a comprehensive set of guidelines for designing, building, and operating IBM Cloud solutions. The IBM Well-Architected Principles consist of the following components:

- **Business Value**: Ensuring that the solution meets the business requirements and objectives.
- **Operational Readiness:** Ensuring that the solution is ready for deployment, operation, and maintenance.
- **Security:** Ensuring that the solution is secure and that the data and systems are protected.
- **Resilience:** Ensuring that the solution is highly available and that it can recover quickly from failures.
- **Scalability:** Ensuring that the solution can handle increasing demand and traffic.
- **Manageability:** Ensuring that the solution can be managed and monitored effectively.

Key Components

IBM Watson Discovery - Plus:

IBM Watson Discovery can improve chatbots by providing them with advanced natural language processing capabilities that allow them to understand the context and meaning of user requests. With Watson Discovery, chatbots can:

- Watson Discovery can be used to index and search large amounts of unstructured data, such as FAQs and customer service records, quickly finding relevant information in response to user requests.
- Improving Intent Recognition: Watson Discovery can be used to train machine learning models that can accurately predict the intent behind a user's request, making it easier for chatbots to provide relevant and personalized responses.

- Enhance Knowledge Management: Watson Discovery can be used to extract insights and relationships from unstructured data, which can help chatbots provide more informed and accurate responses, thus improving their overall knowledge and understanding.
- Watson Discovery Web Crawling uses advanced Natural Language Processing (NLP) and machine learning algorithms to extract and structure information from web pages and other sources, which can be customized to meet the specific needs of an organization. The extracted data can then be used for a variety of purposes, such as content analysis, text analytics, and knowledge management, among others.

Google Dialogflow Enterprise Edition

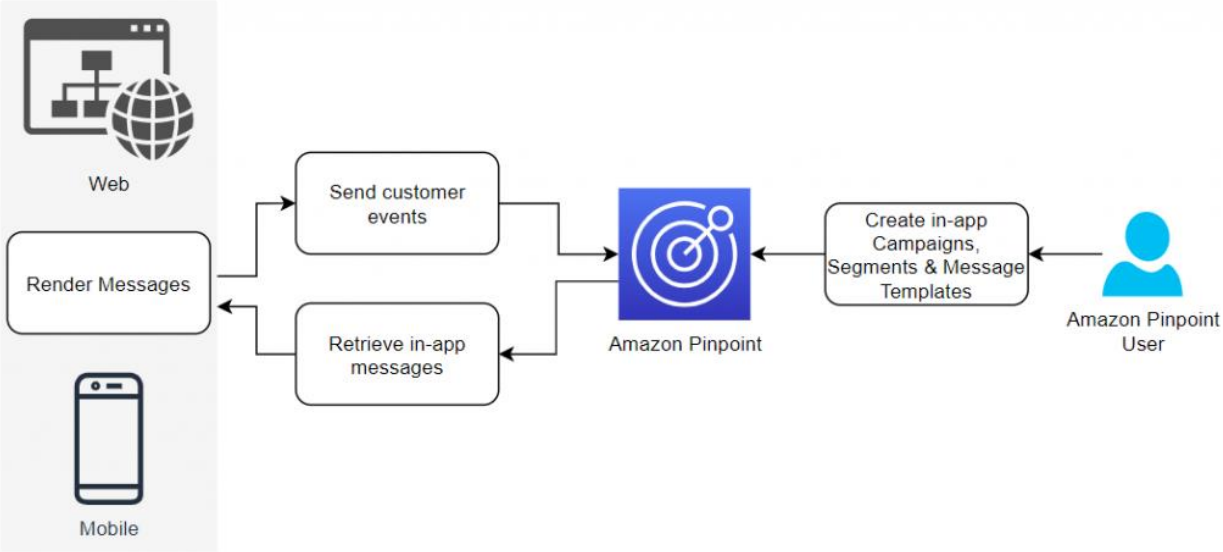
Dialogflow Enterprise Edition (Dialogflow ES) can consume and ingest data from a variety of sources, including structured data, unstructured data, and even multimedia. It can also perform data enrichment using techniques such as entity recognition, sentiment analysis, and intent classification. However, it does not have built-in web crawling capabilities similar to Watson Discovery. If you need to crawl websites and extract data, you can write custom code to do so and then ingest the resulting data into Dialogflow ES.

AWS Pinpoint

Amazon Web Services (AWS) Pinpoint is a customer engagement and communication service that allows you to send targeted and personalized messages to your customers across multiple channels, including SMS (Short Message Service), email, voice, mobile push notifications, and web push notifications. AWS Pinpoint enables you to send messages to your customers through these channels and track the performance of your campaigns. With AWS Pinpoint, you can create targeted campaigns, track customer engagement, and gain insights into customer behavior.

Custom Channels in AWS Pinpoint

It is possible to send messages to popular messaging platforms such as WhatsApp, Facebook, Twitter, Instagram, VK, Odnoklassniki, Weibo, ICQ, QIP, and Viber using custom channels in AWS Pinpoint. Custom channels allow you to send messages to your customers through channels that are not natively supported by Pinpoint. To do this, you need to create custom channel endpoints for each recipient and use Pinpoint's APIs to send messages to these endpoints.



Generalized Components

- **Digital Human Platform:** This is the core component of the service that enables the creation, deployment, and management of digital healthworkers. It includes tools and APIs for creating, customizing, and deploying digital healthworkers that can interact with users in natural language.
- **NLP (Natural Language Processing) Engine:** This component of the service is responsible for processing and understanding the user's input and generating an appropriate response. It includes advanced algorithms and machine learning models that are trained on large datasets to understand human language and context.
- **Knowledge Database:** This component of the service is a database of information that the digital healthworker can access to provide users with relevant and accurate information. It includes information on health topics such as the harmful use of tobacco, and alcohol, mental health, physical activity, maintaining a healthier lifestyle, and other health-related topics.

- **Engagement Messaging:** This component of the service is responsible for delivering engagement messages to users and is integrated with AWS Pinpoint. It enables the delivery of messages to various channels including WhatsApp, Facebook, Twitter, Instagram, VK, Odnoklassniki, Weibo, ICQ, QIP, Viber, and others.
- **Analytics and Metrics:** This component of the service is responsible for collecting and analyzing data about user interactions with the digital healthworker. It includes analytics and metrics that provide insight into user engagement, user satisfaction, response time, message delivery rate, and other performance indicators.
- **Administration and Management Console:** This component of the service provides a centralized interface for managing and administering the digital healthworker service. It includes tools for creating and managing digital healthworkers, monitoring performance, and configuring and customizing the service.

Localization Considerations

Multi language Support

For a chatbot used for global public health across topics such as smoking, COVID-19, and general wellness, it is recommended to support the following languages:

- **English**: As English is a widely used language for international communication, it would be beneficial for the chatbot to support American English and British English, as well as other dialects if possible. 2
- **Spanish**: Spanish is widely spoken in many countries and is the second most widely spoken language in the world, so it would be beneficial to support Mexican Spanish and other Spanish dialects if possible. 1
- **French**: French is widely spoken in many countries, including France, Canada, and several African countries, so it would be beneficial to support French dialects such as Belgian French, Quebec French, and African French if possible. 2
- **Mandarin** Chinese: Mandarin Chinese is the most widely spoken language in China and among Chinese-speaking populations around the world, so it would be beneficial to support Mandarin Chinese and other dialects such as Cantonese if possible. 2
- **Arabic**: Arabic is widely spoken in many countries, including the Middle East and North Africa, so it would be beneficial to support Arabic dialects such as Gulf Arabic, North African Arabic, and Levantine Arabic if possible. 4
- **Hindi**: Hindi is widely spoken in India, so it would be beneficial to support Hindi and other dialects such as Bhojpuri, Rajasthani, and Haryanvi if possible. 4
- **Russian**: Russian is widely spoken in Russia and several other countries, so it would be beneficial to support Russian and regional dialects such as Central Russian, Northern Russian, and Southern Russian if possible. 1

Up to different languages 16 (Exact number to be defined during discovery)

High-level work plan:

This comprehensive plan outlines the task of creating a digital healthworker using IBM Watson services and AWS Pinpoint to engage users from developing countries on various healthcare topics.

- **Project initiation:**
  - Define project goals and objectives
  - Identify stakeholders and project team members
  - Develop a project timeline
  - Allocate resources and budget
- **Requirements gathering and analysis:**
  - Conduct user research and gather requirements from stakeholders
  - Define the scope of the project
  - Identify the communication channels to be used
  - Determine the languages to be supported
- **Solution design:**
  - Choose IBM Watson services to be used for NLP, TTS, and STT capabilities
  - Choose AWS Pinpoint for targeted engagement messages
  - Define the user interface and user experience for the digital healthworker
  - Identify the data sources for health information
  - Design the conversational AI logic for the digital healthworker
- **Development:**
  - Set up the Google, IBM Watson services and AWS Pinpoint
  - Develop the user interface and user experience for the digital healthworker
  - Integrate the IBM Watson services and AWS Pinpoint with the user interface ***(See AWS Pinpoint messaging platform integration Workplan in the next section)***
  - Develop the conversational AI logic for the digital healthworker
  - Integrate data sources for health information
- **Testing:**
  - Conduct unit testing of individual components
  - Conduct integration testing to ensure seamless integration of the components
  - Conduct user acceptance testing with a sample group of users to validate the solution
- **Deployment:**
  - Prepare the solution for deployment
  - Deploy the solution

AWS Pinpoint messaging platform integration (continued from High-level work plan)

Here are the general steps to develop an integration between AWS Pinpoint and messaging platforms, such as WhatsApp, Facebook, Twitter, Instagram, VK, Odnoklassniki, Weibo, ICQ, QIP, and Viber:

1. Review the terms of service and technical requirements of the messaging platform you want to integrate with AWS Pinpoint.

2. Choose a suitable method to communicate with the messaging platform. This could involve using a third-party API, or creating a custom integration using the platform's APIs.
3. Create custom channel endpoints in AWS Pinpoint for each recipient you want to send messages to.
4. Use Pinpoint's APIs to send messages to the custom channel endpoints. You may need to write custom code to communicate with the messaging platform and format the messages you want to send.
5. Test the integration to ensure that messages are delivered successfully and that the integration is in compliance with the terms of service of the messaging platform.
6. Monitor the status of messages sent through the integration and implement error handling to ensure that messages are delivered successfully.
7. Continuously monitor the integration to ensure that it is functioning correctly and to ensure that it remains in compliance with the terms of service of the messaging platform.

Performance indicators:

- **User engagement:** Number of users who actively engage with the digital healthworker and the frequency of their interactions.
- **User satisfaction:** Feedback from users on their satisfaction with the digital healthworker's performance and the relevance of the information provided.
- **Message delivery rate:** Percentage of messages that are successfully delivered to users.
- **Response time:** Time is taken by the digital healthworker to respond to user inquiries.
- **Accuracy of information:** Feedback from stakeholders on the accuracy and relevance of the information provided by the digital healthworker.

Quality control methods:

- **User Acceptance Testing:** Conduct user acceptance testing with a representative sample of users to ensure that the digital healthworker meets their needs and expectations.
- **Code Review:** Conduct code review to ensure that the code is well-written, maintainable, and scalable via Git pull requests.
- **Functional Testing:** Conduct functional testing to ensure that the digital healthworker performs as expected and meets the functional requirements.
- **Performance Testing:** Conduct performance testing to ensure that the digital healthworker can handle high volumes of user traffic and meet performance requirements.
- **Continuous Integration and Deployment:** Implement continuous integration and deployment to ensure that changes to the code are automatically tested and deployed to production.
- **Monitoring and Feedback:** Implement monitoring and feedback mechanisms to continuously monitor the performance of the digital healthworker and receive feedback from users and stakeholders.

Assumptions & Estimated Platform Costs

Engagement Assumptions:

1 Unique Digital Human handling 5,000 monthly unique users averaging 5 minutes per session interacting in up to 16 languages/dialects and messaging across 2 channels emails and 9 in-app messaging platforms.

Technical Assumptions:

WHO will acquire these resources and provide access to the bidder

<table>
<tr><th>Personalized Journeys (Amazon Pinpoint)</th><th>Reporting Dashboard (Amazon QuickSight)</th></tr>
<tr><td>300,000 emails, push-notifications, and in-app messages (100k each) per month
10,000 Monthly Targeted Audience (MTA) interacting with 10k patients per month
Tracking 500,000 events per day
11 Pinpoint custom channels for WhatsApp, Facebook, Twitter, Instagram, VK, Odnoklassniki, Weibo, ICQ, QIP, and Viber</td><td>50 readers (clients)
2 authors data scientists</td></tr>
<tr><td colspan="2">NLP modeling, ingestion, storage, and data pipeline</td></tr>
<tr><td colspan="2">IBM Watson
10,000 documents and queries
500,000 documents and queries limited
1,000 websites can be crawled
Google Dialogflow ES Knowledge connectors (Beta)
Max 10 MB document size
1,000 requests per month
100 request per day</td></tr>
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Estimated Platform Costs

Provider	Service	Monthly Cost	Estimated Usage
Google	Google Dialogflow ES Knowledge connectors (Beta)	No charge	100 requests daily
IBM	Watson Discovery	$500.00	-
IBM	Watson Assistant Chatbot (starts at $140.00/monthly)	$1,190.00	5k user mthly
AWS	Amazon Pinpoint	$73.35	50,000 users mthly 500,000 events 300,000 messages
AWS	Amazon QuickSight	$118.00	50 reader, 2 authors
AWS	Amazon Lambda (custom channel to send in-app message)	$0.89	100000 requests mthly
UneeQ	Option 2: UneeQ Platform Access - One Single Exclusive Digital Human:	$12,500.00	200k sessions mthly
Totally Monthly Platform Cost			**$14,382.24**

Platform Implementation Timeline

Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Jul
Project initiation								
	Requirements gathering and analysis							
		Solution design						
		Development: HTML emails, landing pages, 16 (lang) digital human pages						
		Development: Dialogflow ES to Watson: AI model training						
		Development: Pinpoint journey and API calls from DH						
		Development: Pinpoint 11 custom channels to/from in-app messages						
		Development: API call across all services (20 to 30 endpoints)						
			Development: Reporting dashboard feed setup					
		Testing Planning			**Testing**			
					LAUNCH			
						Monitor Measure		