Automated virtual agent saves cost and time for large water supply and utility company

Project experience and testimonials

Hello World!
I am AVA 💛

This presentation is all about our experience and testimonials from the client.

AVA stands for Automated Virtual Agent which handles water quality related enquiries and is live on Facebook
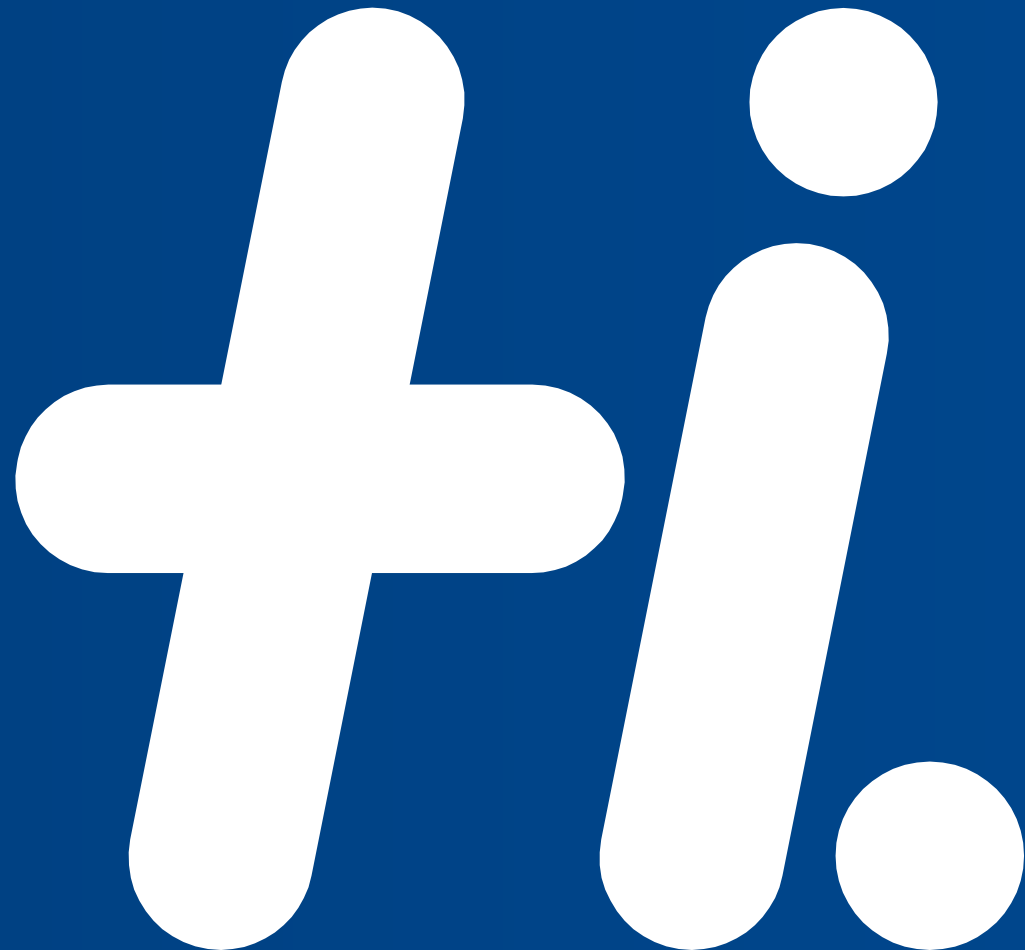
#FacebookChatbot

"The key to artificial intelligence has always been the representation"

- Jeff Hawkings

Taking Flight

#ChallengeAccepted

Project Phases

PLANNING
We begin with our planning and sketchups to better visualise the use cases and design a logical flow to suit it

DEVELOPMENT
We start development of the bot and having different enviroements setup for CI-CD

DEPLOYMENT & PUBLISHING
The bot is then published to the required social channel and applied for the channel deployment review and certification

PROJECT REQUIREMENTS
We collaborate with the client to identify key use cases , the problem statements , factors and pre-requisites

CONVERSATION DESIGN
We import the conversational flows into a protoype where the client can test and give a feedback

TESTING
The bot then goes through several layers of automation testing, and manual testing until it reaches the sweet spot

Keeping on your toes, being **Agile!**

- The pilot was for **4 sprints** during which we treated it like a decathlon.

- The entire team focused on extreme programming practices to watch each other's backs.

- Regular status updates and extensive time management.

We chose to be truly Agile since it advocates adaptive planning, evolutionary development, early delivery, and continuous improvement, and it encourages rapid and flexible response to change.
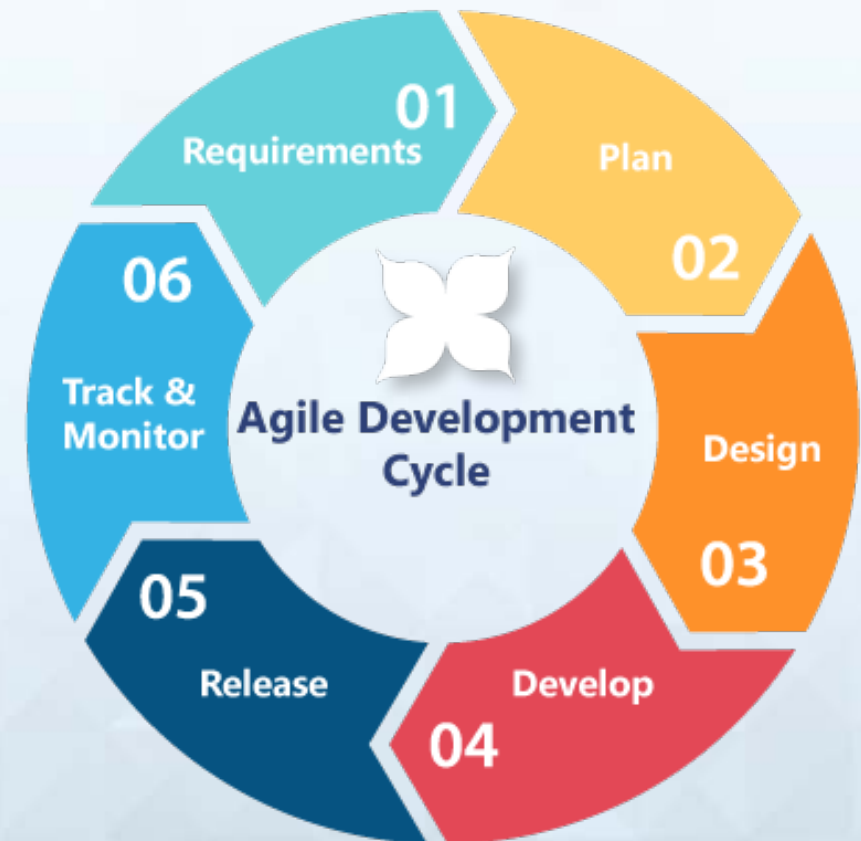
1. **Requirements**

2. **Planning**

3. **Designing**

4. **Development**

5. **Releasing**

6. **Monitoring**

|

The Dream Team

- Every project needs the best combination of team members possible.

- So instead of choosing the best people for the entire project, we chose the best man for the best job.

- This increased project quality and project speed as individual tasks and the project as a whole.

- Also, the entire team was made of geeks ☺

Conversational AI Developer

Conversational AI Architect

The Artist

The Time-Keeper

THE GEEK SQUAD

The Lookout

The Scientist

Conversational AI Specialist

NLP Engineer

Managing Long Distance Relationships

Sometimes its good to stop thinking the location and time-zone barrier and just setup **regular calls** with **regular deliverables.**

"Mi casa es su casa" is the best way to keep clients happy. Trust us, they enjoy it.

Client

Hexaware

THE BRAINSTORMING

Arguments are the key. Fight to the point when you want to rage quit. Only then you notice the simplest ideas that make all the difference.

Knowing the Unknown

Channel Selection and Use-case adaptability

The primary decision was around **selecting the right channel** for the right location.

The base demographics for the customer showed that there are more iOS users and the **preferred channel was Facebook.**

Facebook guidelines were then taken and the use-case flow was adapted to that to ensure maximum UX with minimum failure possibilities.

Shadow Hunting

We conversed as the client users with thein customer agents and **monitored their posts and activity on Facebook** to understand how they reach out to their customers.

We incorporated that into the pilot to make **the bot to have a personality** best suited to the use-case.

The client's users have a different vocabulary for **common words localised to the region**. That was also studied and taken into the utterance training of the A.I engine.

Business Logic

The Client is more focused towards quality of their services. **The pilot was for water appearance and water taste/smell related issues.**

This meant going back to high school chemistry for basic questions users may ask, and then extending the knowledge base by **actual chat logs from their consultants**.

Finally, a detailed knowledge base approved by the customer Client was added to **make the brand talk as the chatbot** in this pilot.

Splitting up the Problem Statement

- We used the Divide and Conquer method to bring down the project complexity to the lowest level possible

- This helped in understanding it better and helped create more ideas

The pilot was regarding Water Quality Issues.

The first step was to split up the use case to smaller segments. We started down up ☺

Water Appearance

This segment only covered '**n**' number of user conversations saying that his water looked funky.

Water Taste or Smell

The rest was for conversations regarding freaky smelling or tasting water.

Visualizing the Flow

- Each idea went to the drawing board until one was finalized

- The consultants were always in the loop for every change as they had visuals to see how the pilot would proceed.
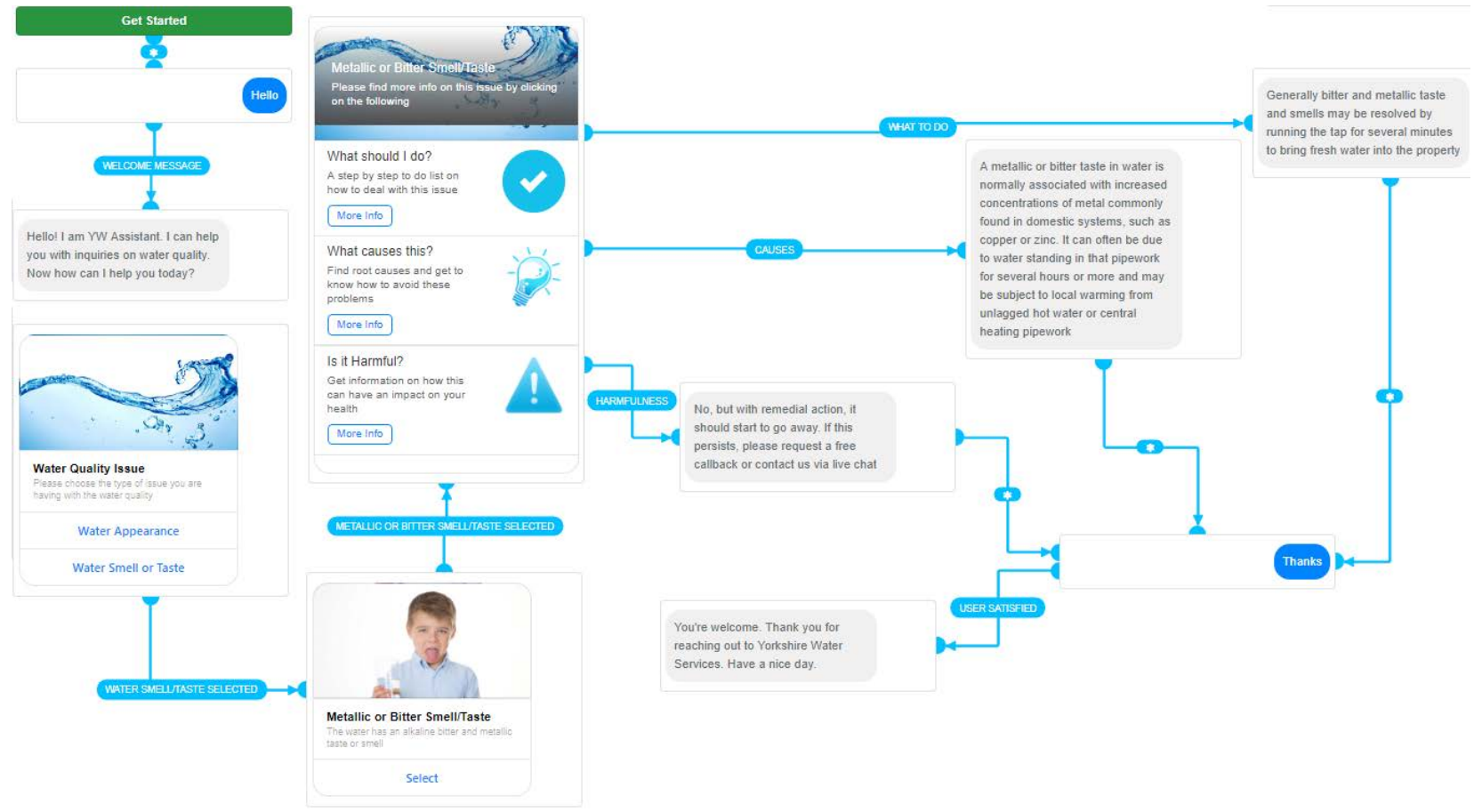
The Wordplay

- Having intent models pre-estimated is always useful for approaching chat-bot projects.

- The linguistic skills came into play here and more focus was put into framing utterances and responses.

1300+
Test Utterances

Agent Intents
64

200+
Entities & Synonyms

600+
Trained Utterances

40
Peculiar Domain Terms

Getting the facts right before going **"Hakuna matata"**

- Everybody has a need, so find the everybody. Project requirements are never easy, so you keep digging.

- Changes will always flow in, so the team always has to be on the edge. Literally.

Moving to Development

The real geeky stuff starts from here

The Circle of Life

- Its important to have the entire lifecycle for the bot as the first step into bot development

- We decided to have a standard for out bot builds to decrease development time and focus more on specifics.

The Bot Lifecycle

Conversation analytics usage analytics — Analyze — Requirement — Spec

Default Behaviour — Script

X – platform APIs Data persistence — Architect

Code abstractions Standard libraries — Dev

X – platform testing — Test

Automated Hosting — Deploy

Identity Management — Publish

Conversational and System monitoring — Monitor

Listing on Bot Stores — Promote
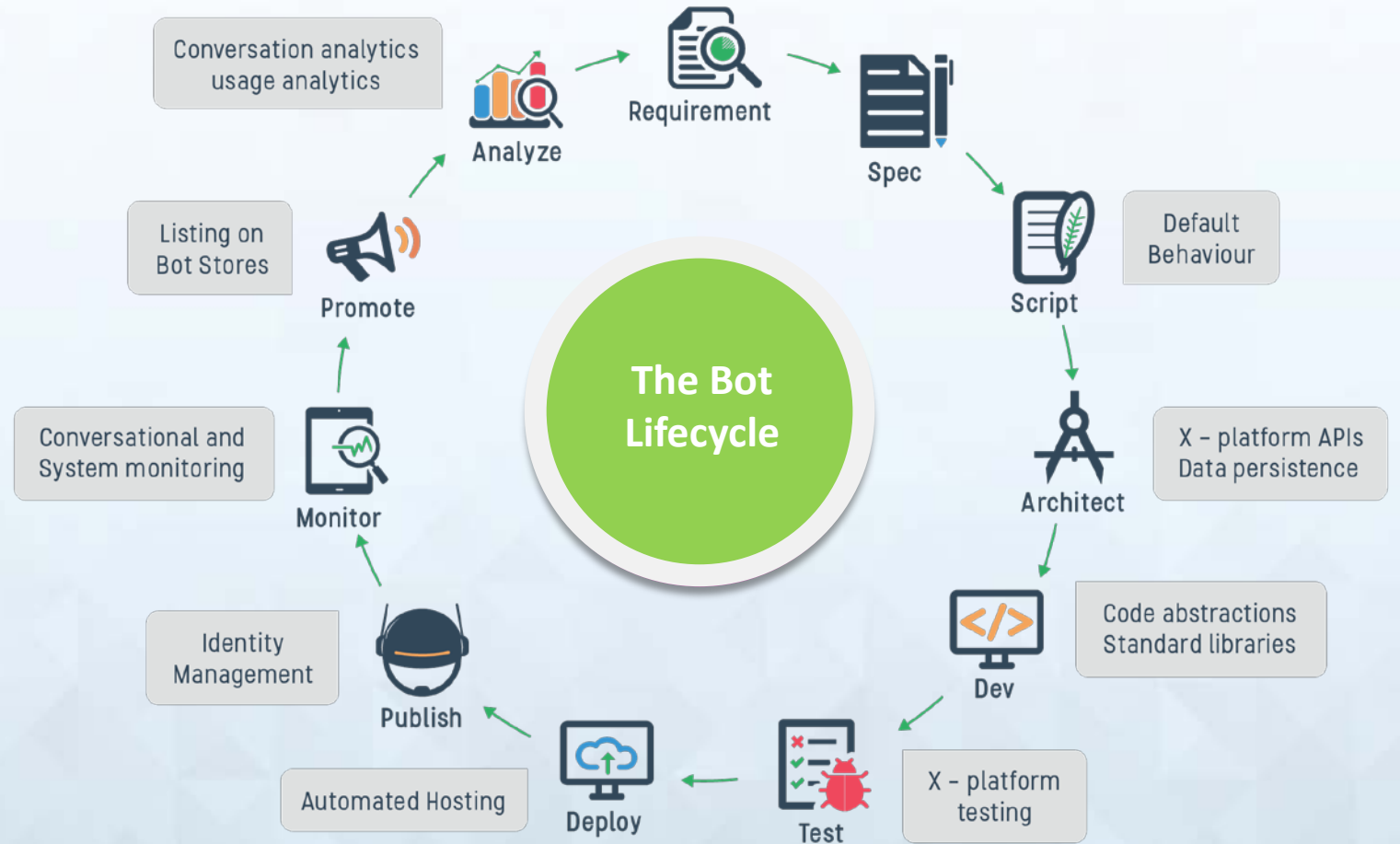
The Strategy

Pain Points

- Generating utterances to improve cognitive skills of Chat Bot

- Extensive training to capture contextual properties

- Map utterances from chat transcripts to intentions

- Training it to expect random utterances made by end user to chat bot

- Identify use-case specific words to personalize bot utterance generation for training

- Customary to hand pick words from chat logs
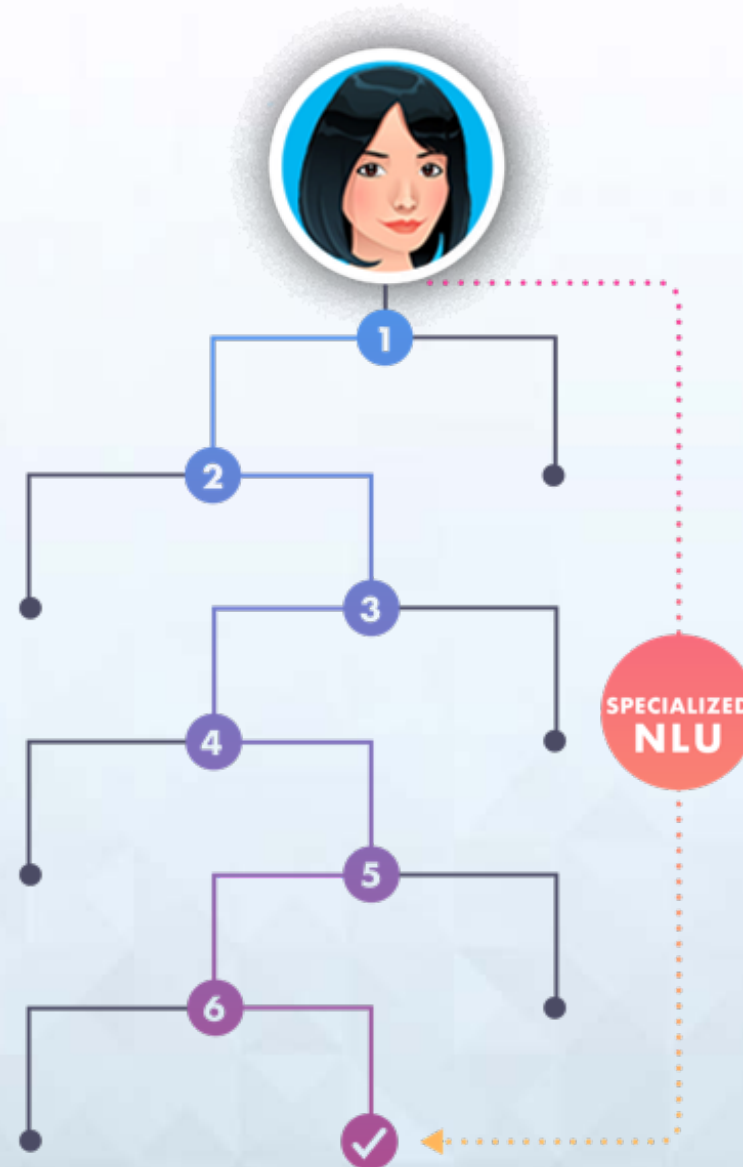
- Requires domain expertise and extreme brainstorming

Natural Language Processing

Text Mining

Clustering

Graph Analysis

Represent-ation Learning

Computer Linguistics

Supervised Learning

Deep Learning

Data going in

NLU (Natural Language Understanding)

AI

ML (Machine Learning)

Data coming out (optimization with inferences)
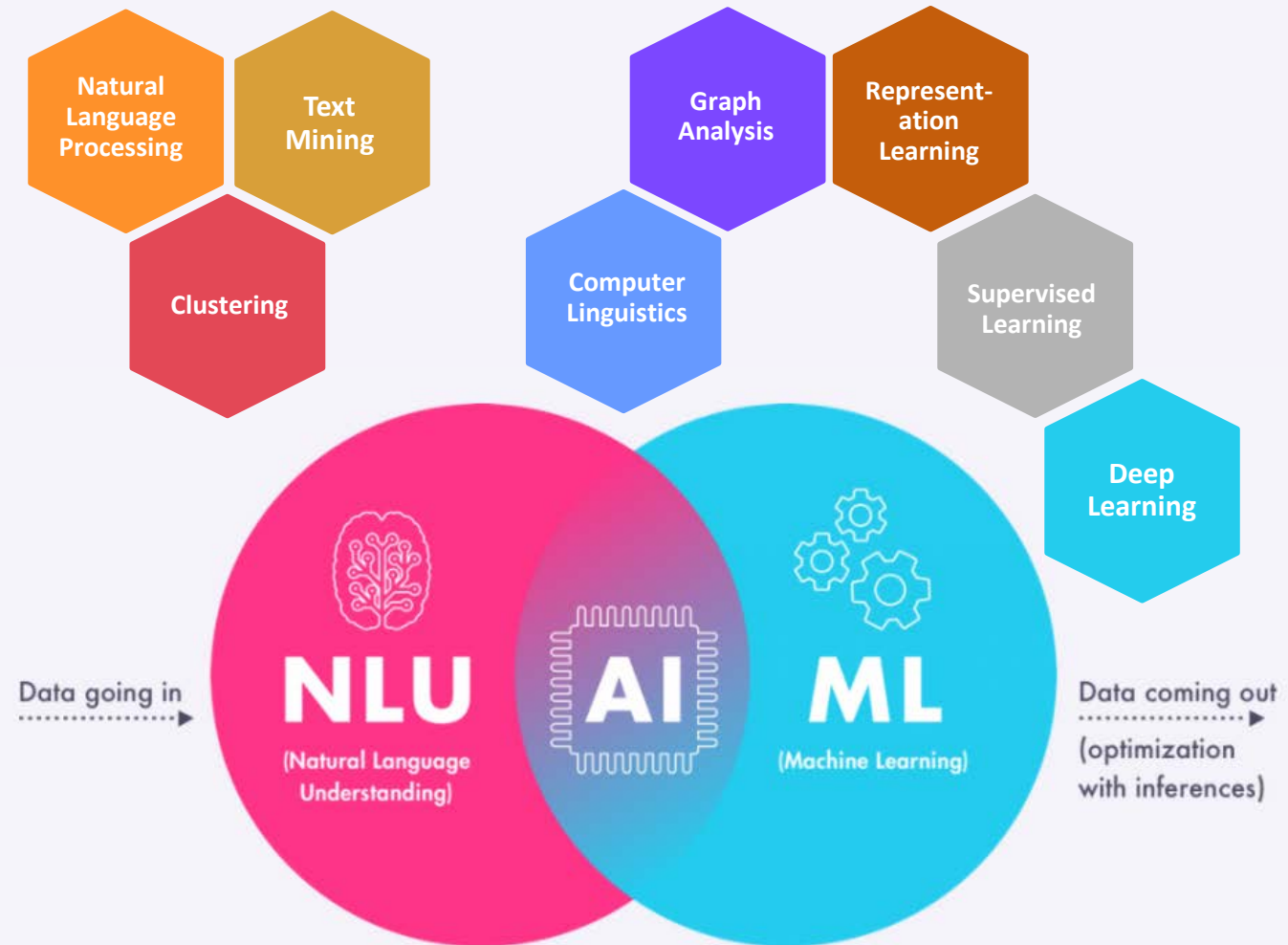
Graph Analysis for customer contexts

- We mapped out keywords used in the customer contexts from real chatlogs using algorithms.

- The graph helped in understanding of correlations between use-cases.

- This knowledge was used to design utterances for training the AI engine for the pilot.
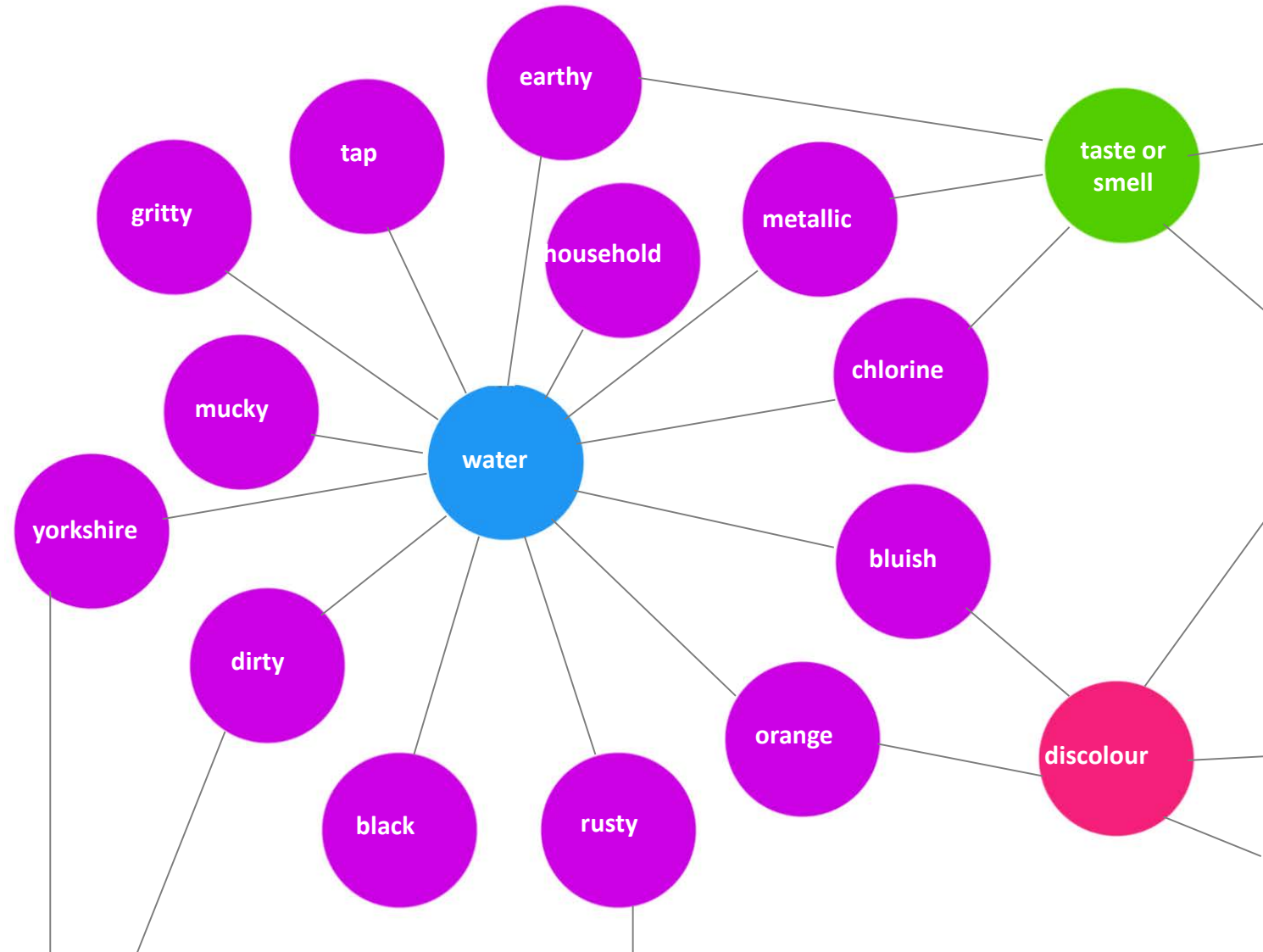
LINEAR ORDER FLOW

User completes flow in a step-by-step linear flow

↓

WATER ISSUE

↓

APPEARANCE

↓

BLUISH WATER

↓

WHAT TO DO

↓

WATCH A VIDEO

↓

CONTACT NUMBER

↓

THANK YOU

↓

✓ **FLOW COMPLETE**

SPECIALIZED NLU

NATURAL LANGUAGE UNDERSTANDING (NLU)

User types:
My water looks freaky and disgusting since morning

↓

{skips linear flow}

↓

I see that you are having issues with water appearance. Here are some options, please choose the one with the nearest match

BLUISH WATER

↓

*Blue water is caused by excessive copper residue. *Gives FAQ anwers*

✓ **FLOW COMPLETE**

Training the Bot

It has to grow up and become **Big and Strong**

- The bot was trained with generated utterances.

- Rigorous testing every single day.

- Consecutive and iterative corrections on the go on even the smallest of changes.
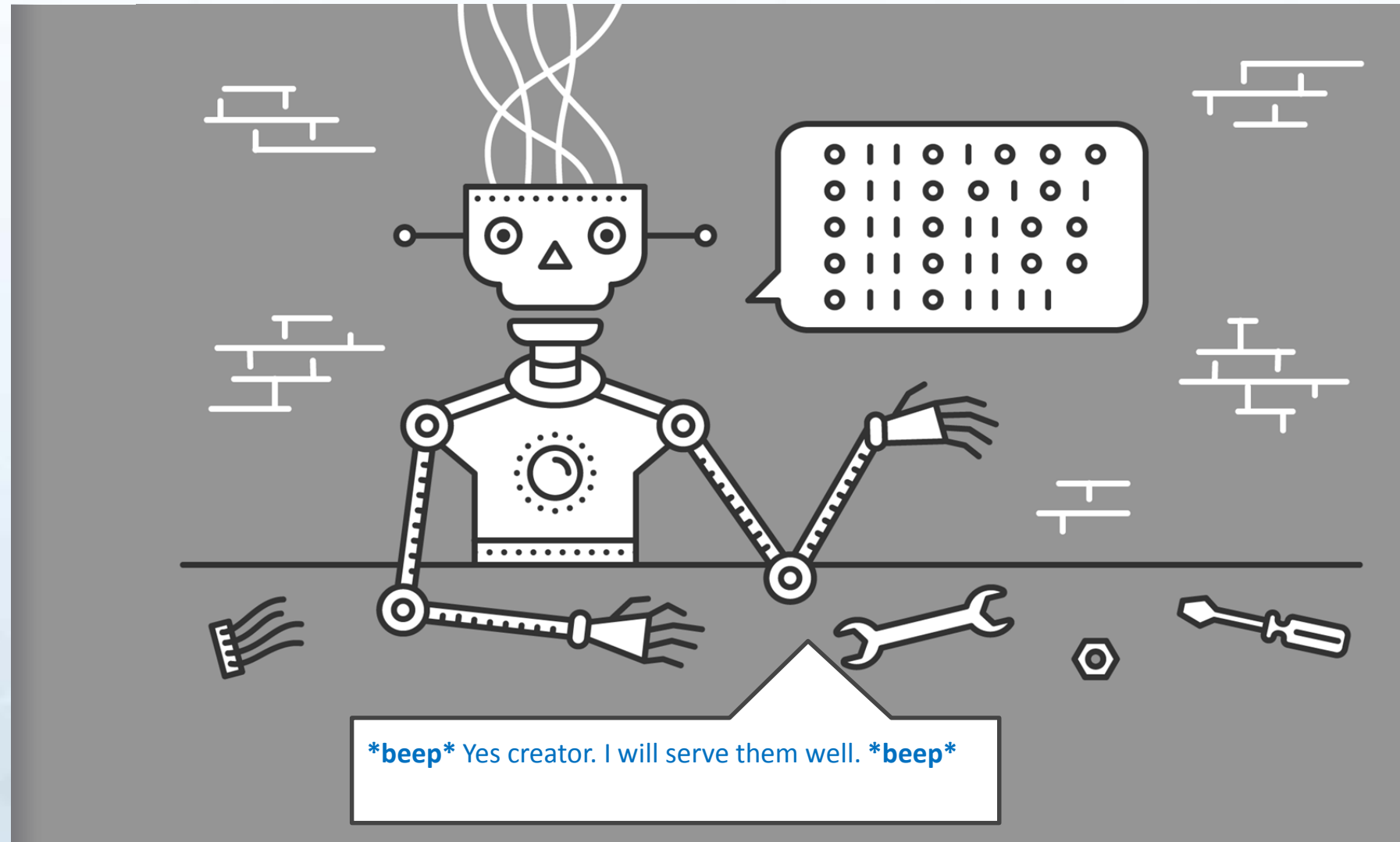
The **Missing** Piece

- After intensive training, we had people try our bot to get some verdict on it.

- It turns out that the bot was still not ready to be public because it was not ready to respond to the way people **ACTUALLY** talk. Especially on Facebook and other social channels.
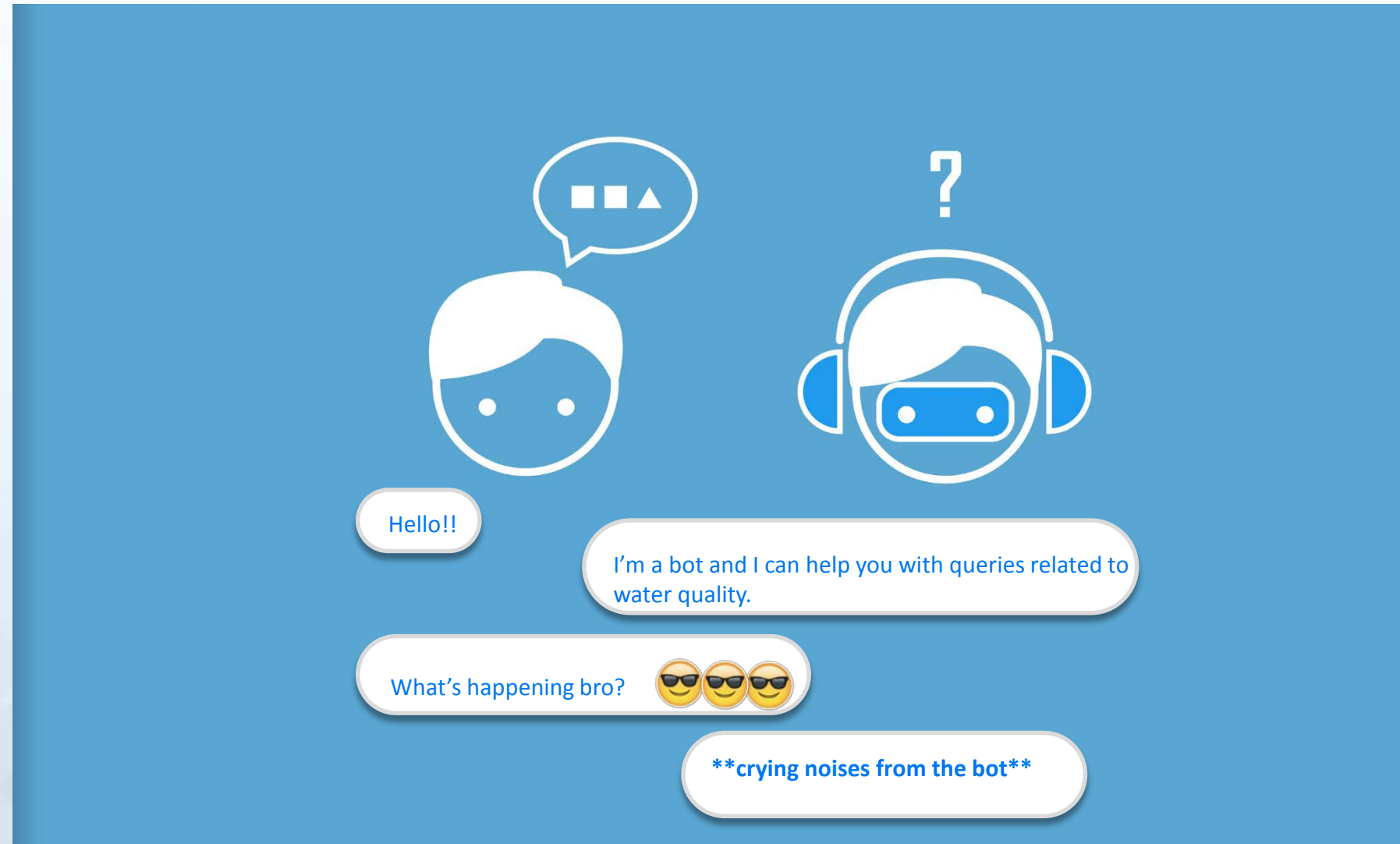
Looking for that **Missing** Piece

- We went back to our theories and designs to realize that we missed the human factor in a normal conversation like greetings and small talk.

- After that, we started discussing and reading about **LIBERAL ARTS** and dialects, body language and verbal communication styles and tried to implement that into the bot.

Human behavior is incredibly pliable, plastic.

Philip Zimbardo

Liberal Arts

- We had extremely creative people in the team who understand liberal arts. We used those skills to observe emotions and reactions of people.

- This was necessary since we could not actually **SEE** the Yorkshire crowd reactions and the way they speak due to topographical distances.

- This made us think through way of conversation rather then just blurting out words in the bot responses.
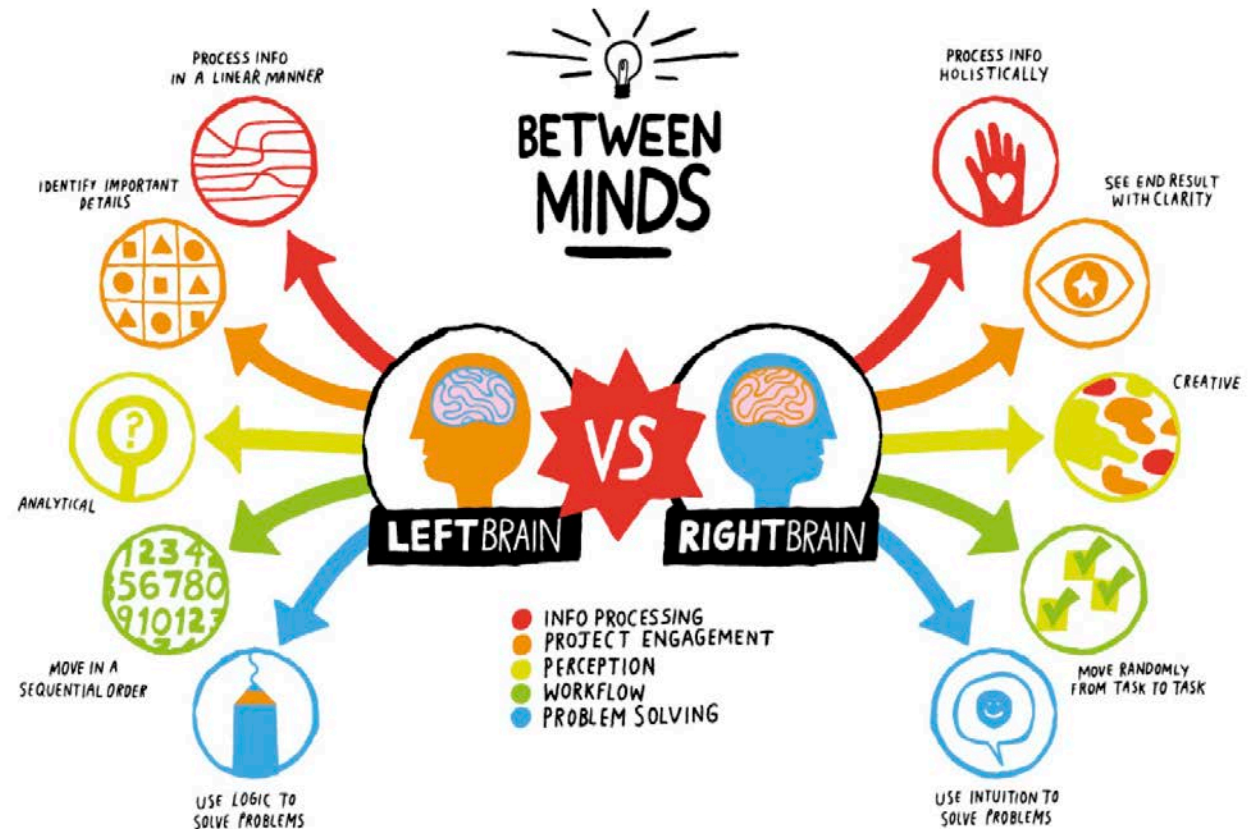
The Human Connection

- People have various needs and moods. To understand how our bot should talk, we took to observing human behavior.

- We found **people don't really care if the bot treats them like friends.** They just need their requirement fulfilled.

- People also tend to do **small talk, greetings and send emojis**. Our bot needed to handle all that.

- People prefer their social channel experience to be the way they use it.

- Alongside all this, **the bot has to maintain brand value** of its existence. It truly is a very thin line,

Getting the Bot into Character

- The bot needed a face, a name and an introduction.

- We thought it was better to have a bot characterized as a human than having a bot pretending to be human.
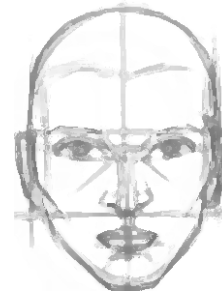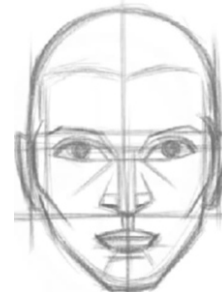
3,93,657 bytes

That's the size of the AI agent. Whoa!

#ThinkingSmall
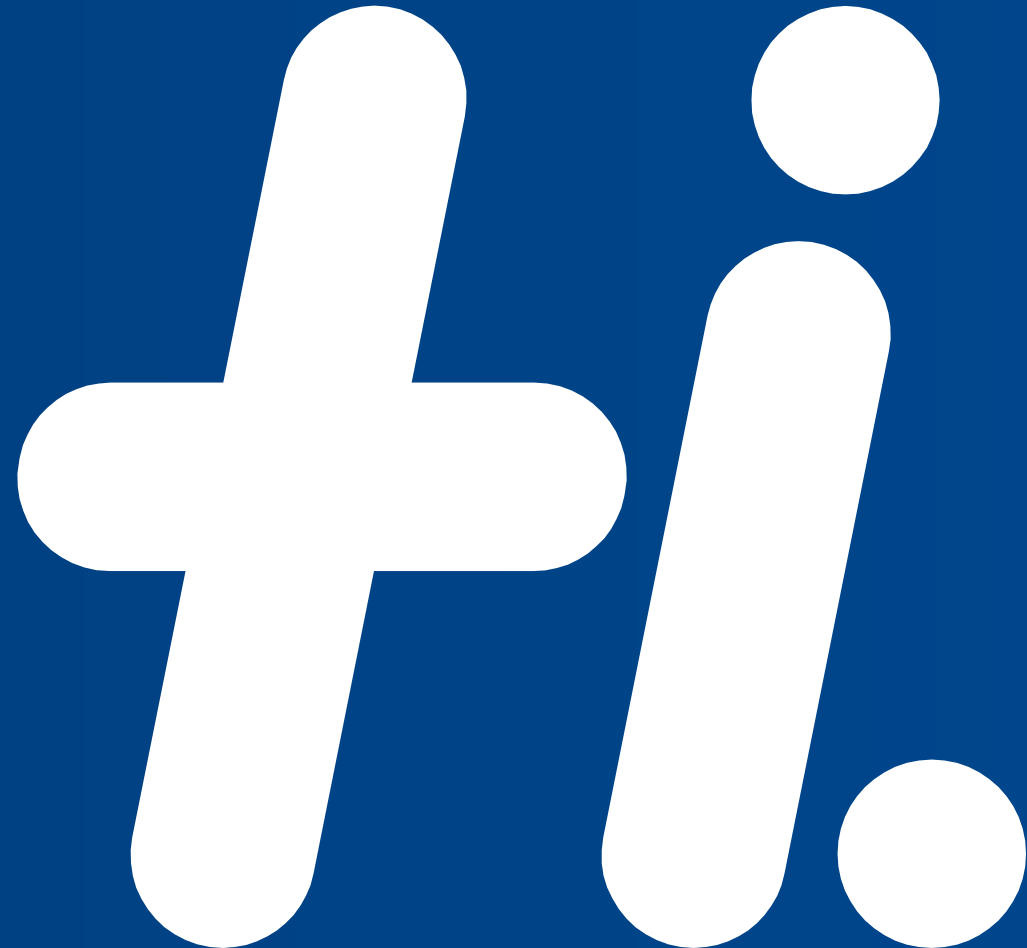
And some more numbers ☺

36,000s
Total call time with the customer

49,960 phrases
No. of sentences thrown at bot

100%
Testing success rate

The Outcome

Efficient Text Mining
Minimized manual efforts to segregate utterances from chat logs.

Business Context Handling
Novel approach to mine peculiar words.

Disruptive Technology
Improved productivity of developing chat bot solutions using ML and NLP

Automation
The chatbot can decrease Business expenses and workloads on repeatative FAQ based query handling given by Customer Support agents upto 30%

Highly Responsive
The chatbot is capable of understand contextual coversations accurately with the ability to understand unique business context-based keywords.

Accessibility on Social Channels
Device and app independent conversational bot that is available on the go to all users public on Facebook 24x7.

Going to the stage
live @facebook

- We reached out to facebook's developer platform to have the bot published **for the entire world to use**.

- Facebook was happy that we met all their guidelines and the bot was publish in only **15hours.**
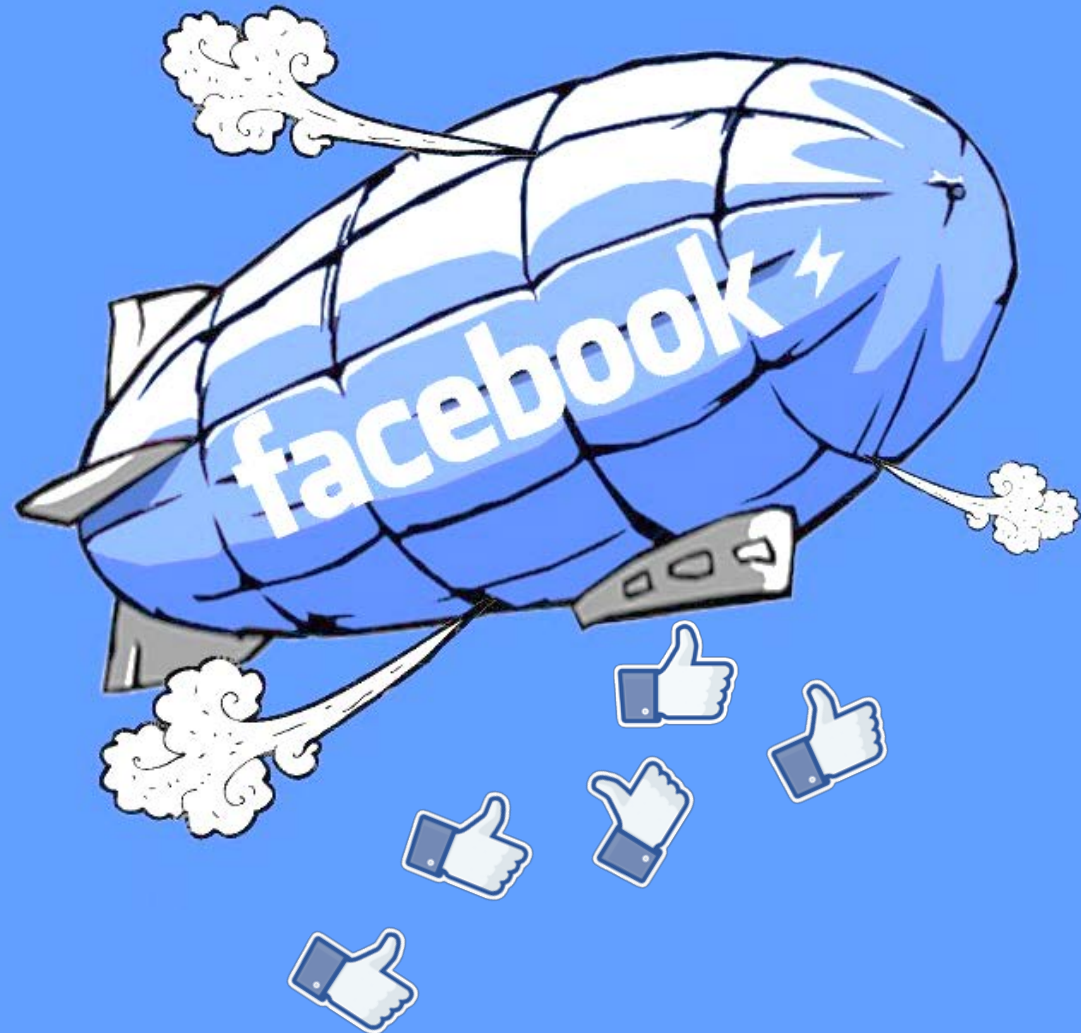
Keeping it
@simple

Minimalism is vital
Chatbots aren't friends.
Users need to get their
queries resolved as fast
as possible. Not everyone
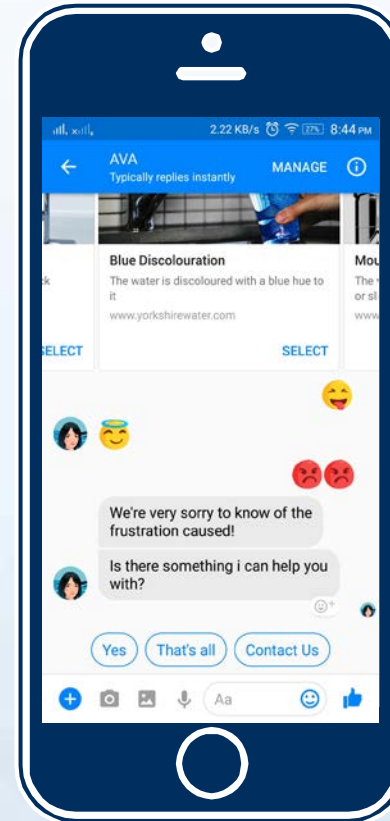is a techie, but everyone
is a critic.
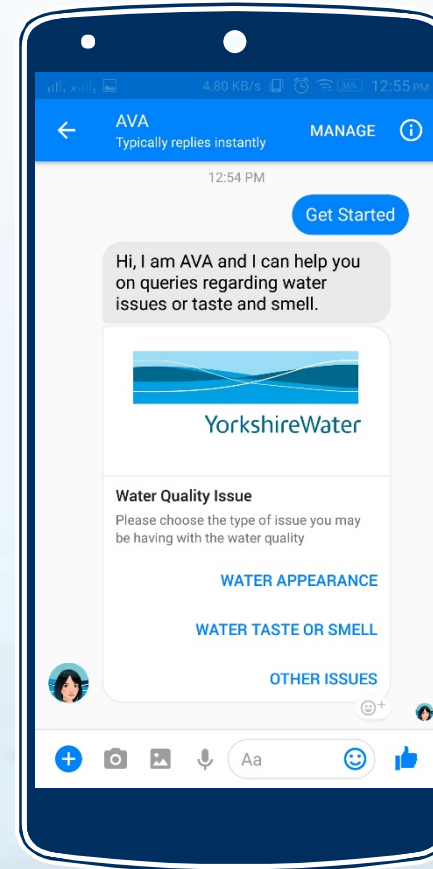
Elegant and clean UI with Rich responses

Keeping it @trendy

Its important for the developers to keep all the user's preferences into account. The UX differs with location as well.

Demographic Preferences are IMPORTANT

Emoji support and emoji context understanding

Making the solution @selfexplanatory

Branding is crucial. The Solution has to be personified as the client business talking to the user. People need to get the best experience every single time. PERIOD.
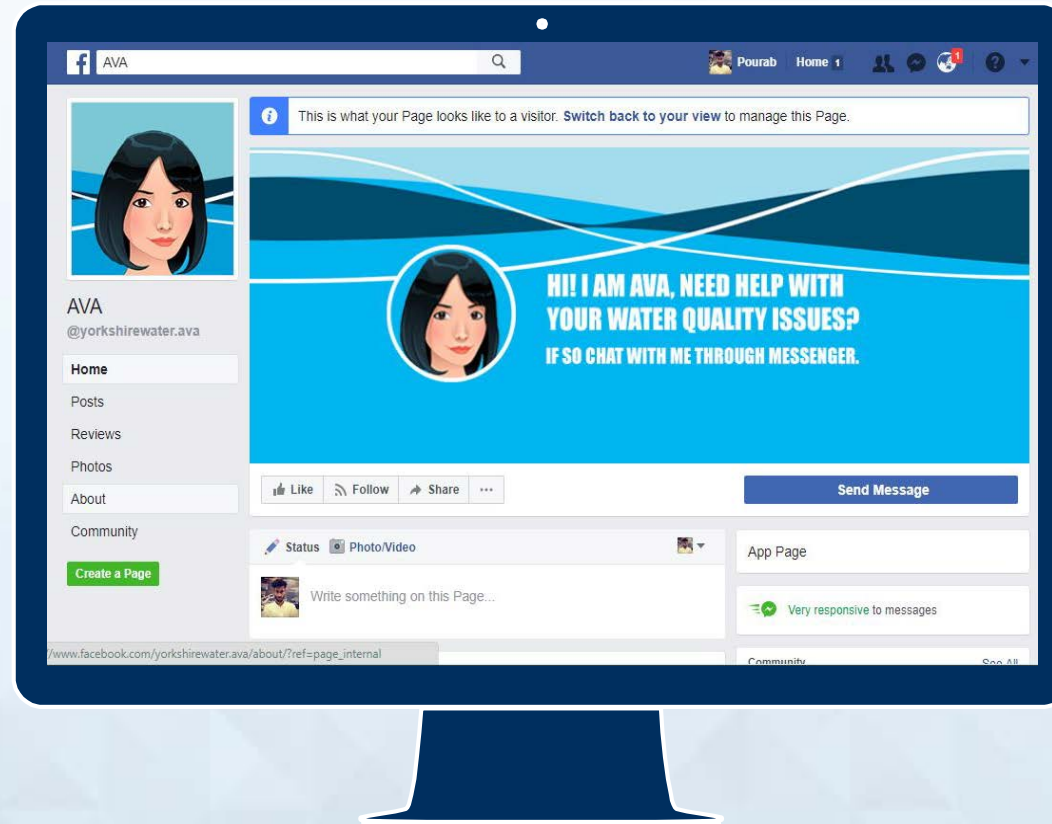
Real-Time Analytics

- This allows continuous monitoring of the performance and behavior of the chatbot in its live state

- The metrics help understand how the users converse, what they expect and their verdict about the bot,
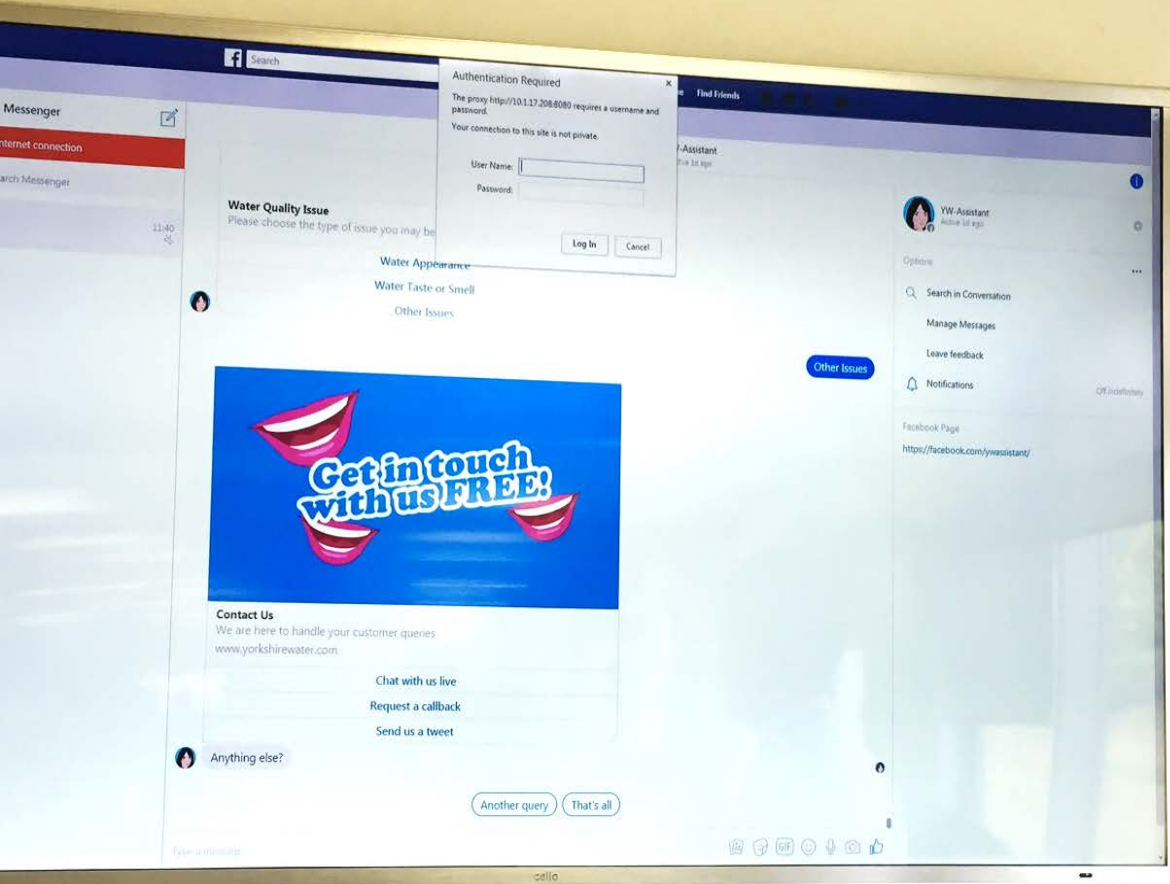
Happy Smiles!

Just wanted to give some feedback on how our Chatbot project is going so far.

Immanuel's team have great work ethics and the passion for delivering a great service. They have reacted quickly to customer demands and challenged our thinking to create a even better product. The team is well organised and a pleasure to work with particularly where there is ambiguity in the requirements. We started with the mind-set of 'think big, start small, scale fast. So far we are living up to that expectation.

"It was really fun working with you. The bot looks really good and it was a good experience"

- Consultant