Chatbot Assistant for CRM

at Pepper Cloud

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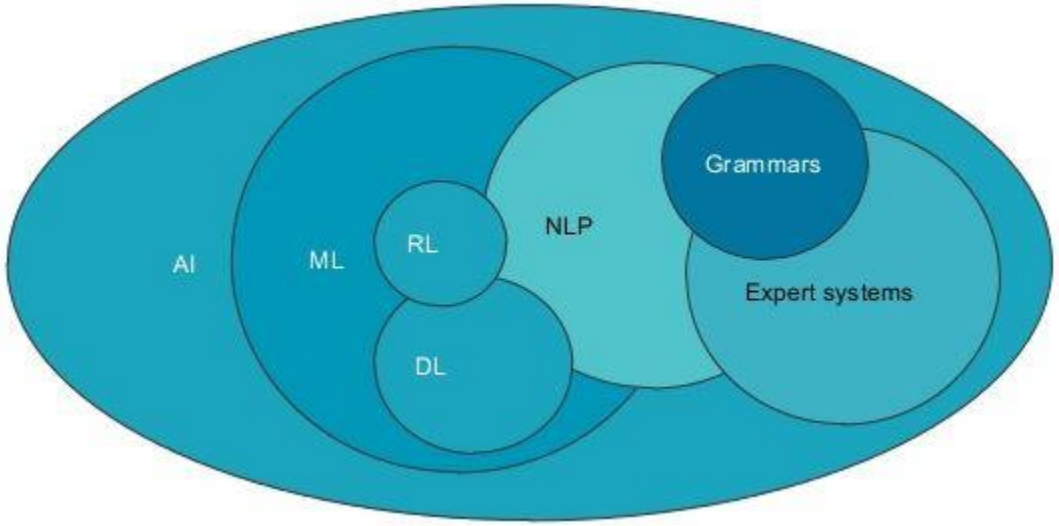
Background

- **Artificial Intelligence** (AI) – Machines that can carry out tasks using human-like intelligence
  - AI can be *applied* or *general*
- **Machine Learning** (ML) – Statistical algorithms that allow a computer to *learn*
  - Supervised ML – Training data is **labelled**

Background

- **Natural Language Processing** (NLP): Linguistic application of ML



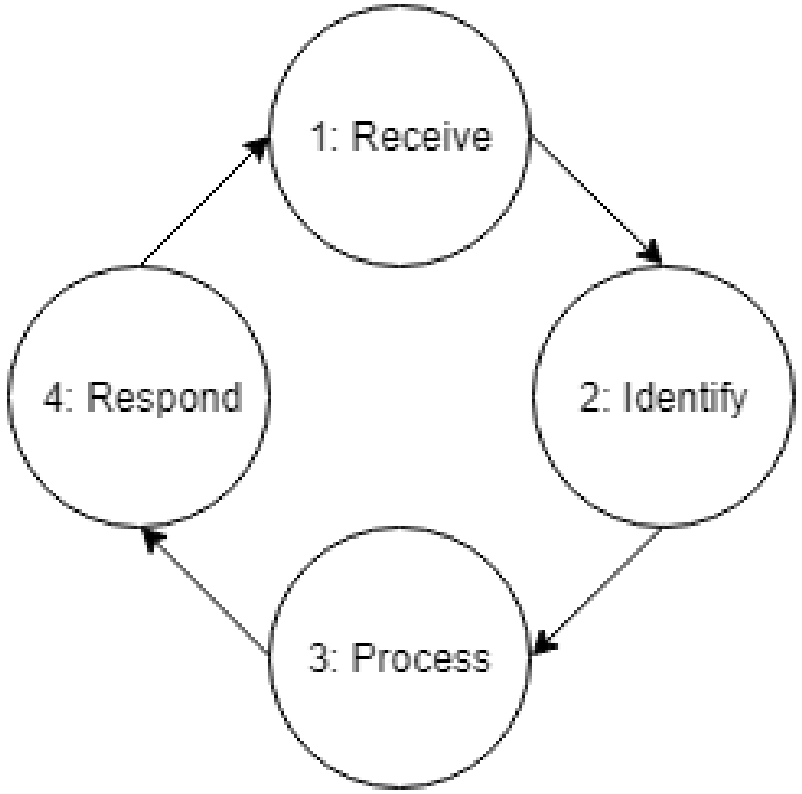
Background

- **Chatbots** – Mimic human conversation
  - **Advantages** – engage users, automate tasks, 24x7 availability
  - **Disadvantages** – cost, limited functionality
  - **Types** – Menu-based, keyword recognition, contextual

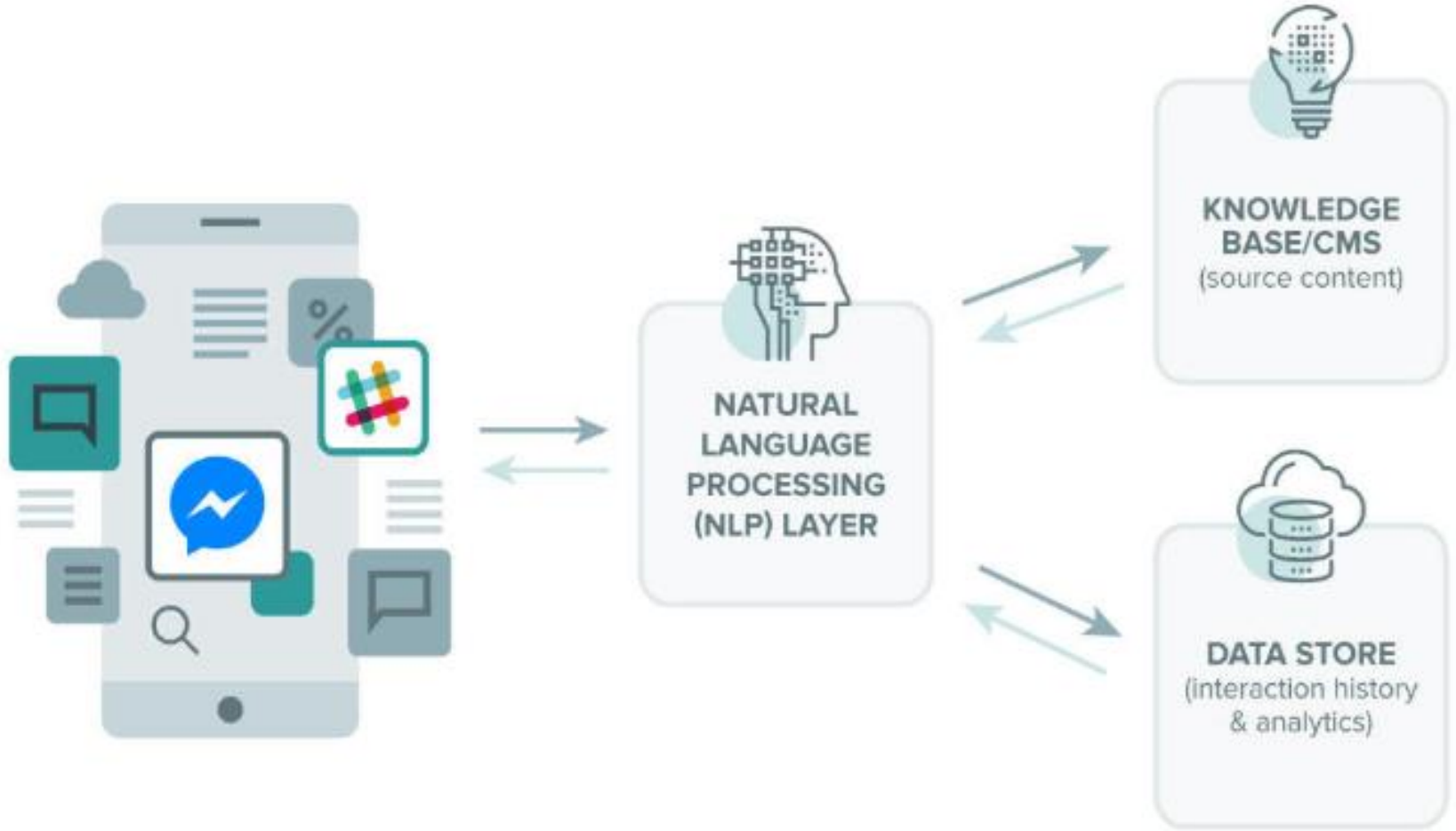
Background

Utterance: '*show high priority tasks*'

- Intent: *display tasks*
- Entity: *high priority*



Background

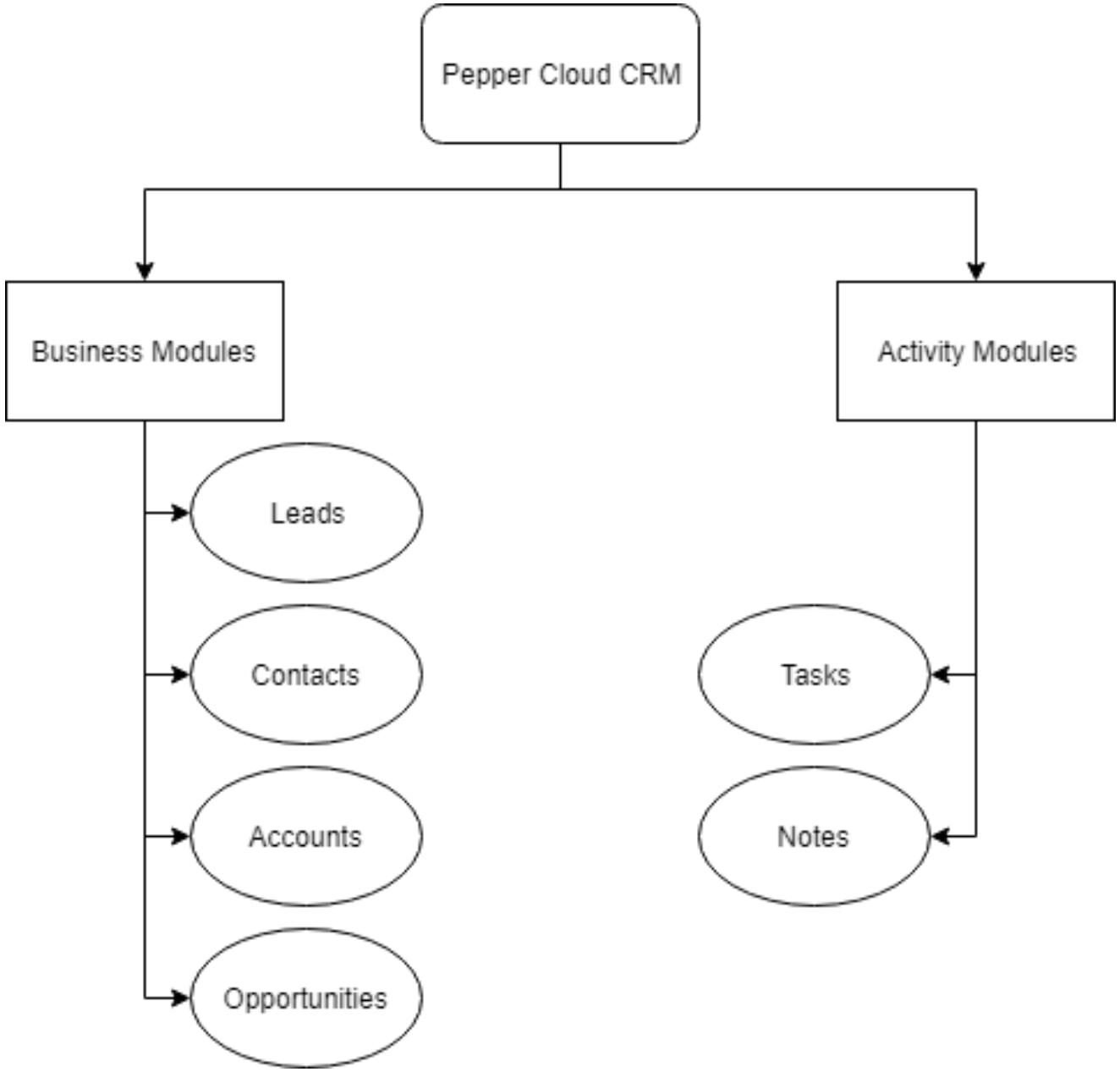


Front end

Back end

Background

- **Pepper Cloud Customer Relationship Management** (CRM) **system**
  - Click-based system
  - Divided into BM and ACTM



Background

CRM associations:

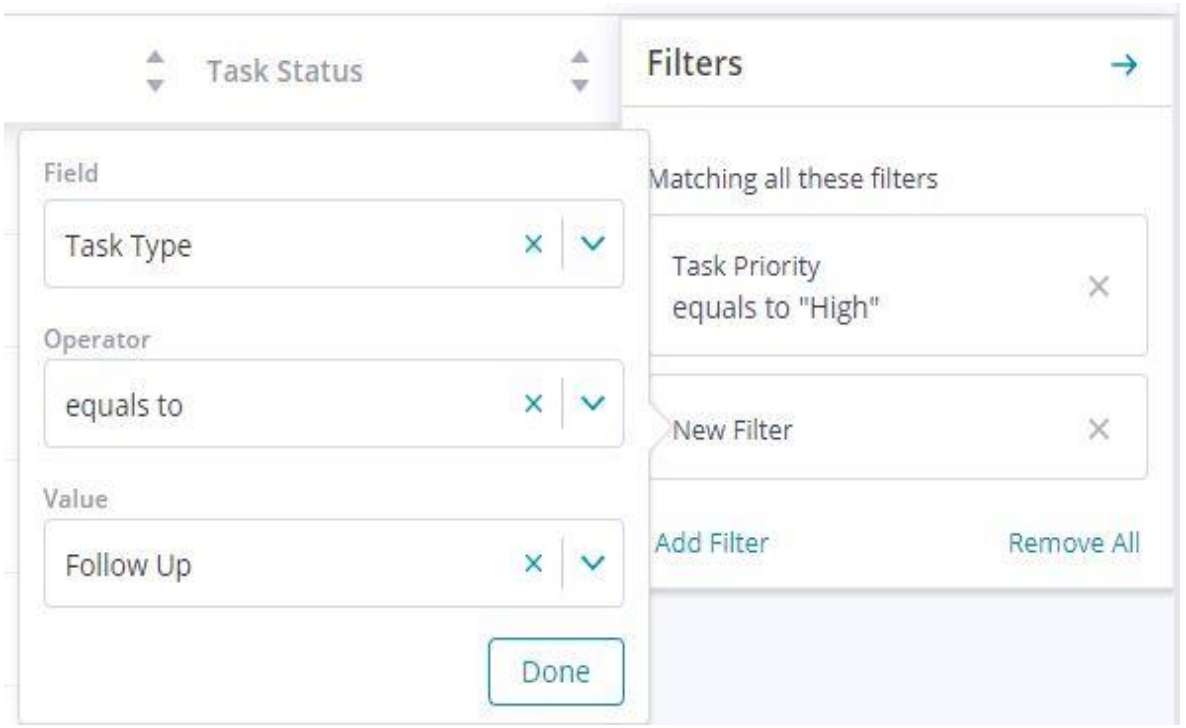
Sr. No.	Association Type	Relationship
1	ACTM – BM	Many-to-one
2	BM – BM	One-to-one or One-to-many (case dependent)

CRM permissions:

1. Read
2. Create
3. Update
4. Delete

The Problem

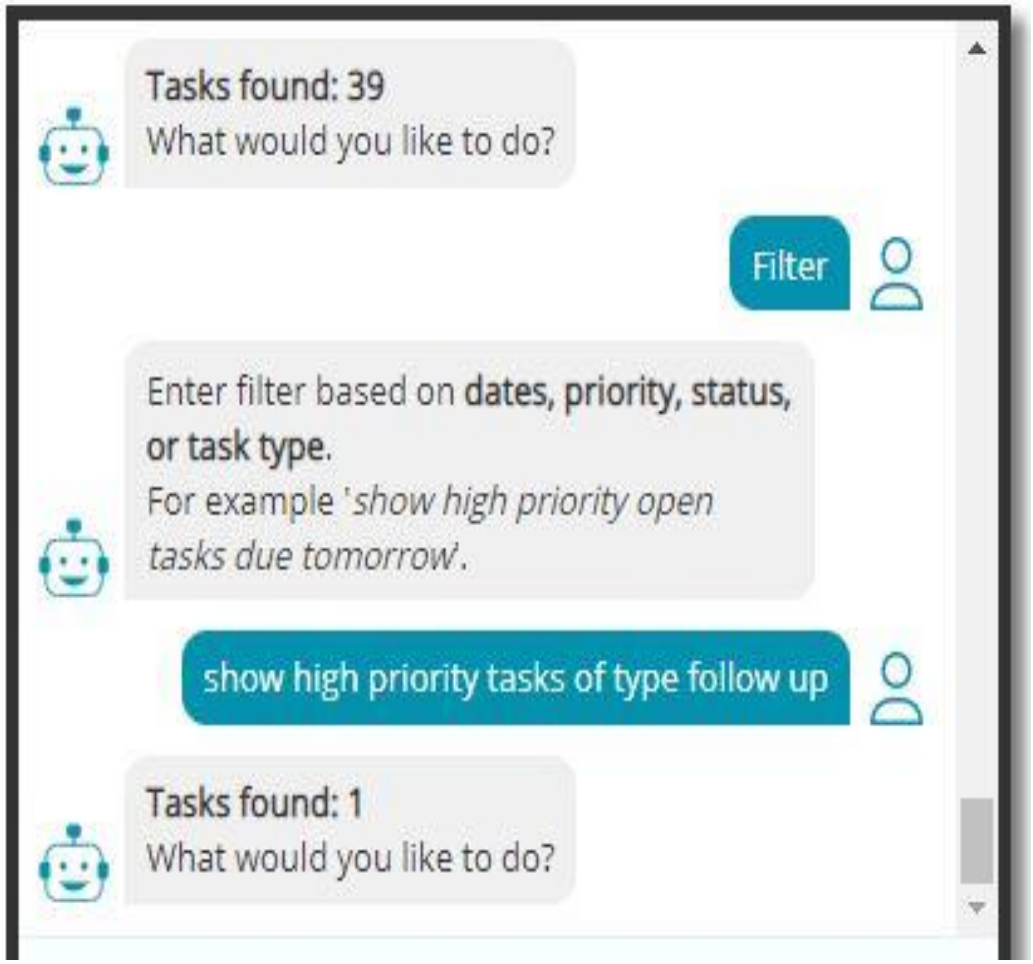
- Click-based CRM → **non-trivial functions require multiple actions/clicks** → time taken ↑ → **user efficiency ↓**



The Solution

- **Chatbot**
  - Can understand a user's text input
  - Multiple clicks **reduced to**

  1 sentence



What should the chatbot do?

Domain of operation: **B2B CRM**

Bot features:

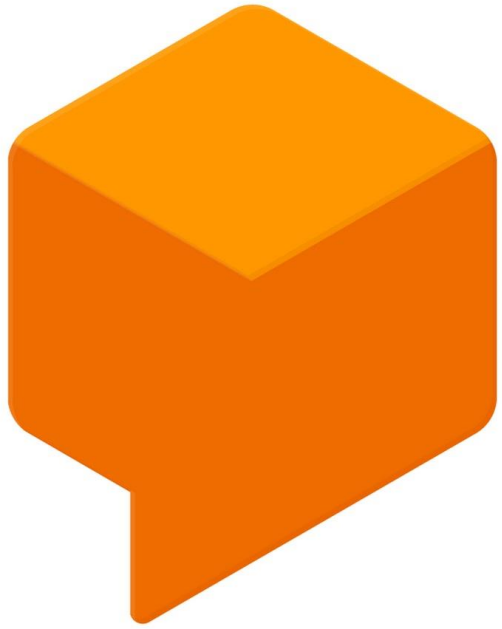
- Quick **display** of records
- **Filter** data (on attribute values)
- **Analyse** and count data (on an attribute)
- Data **visualisation** – graphs

These need to be implemented such that **number of actions required is minimised**.

Technology Stack

Botkit

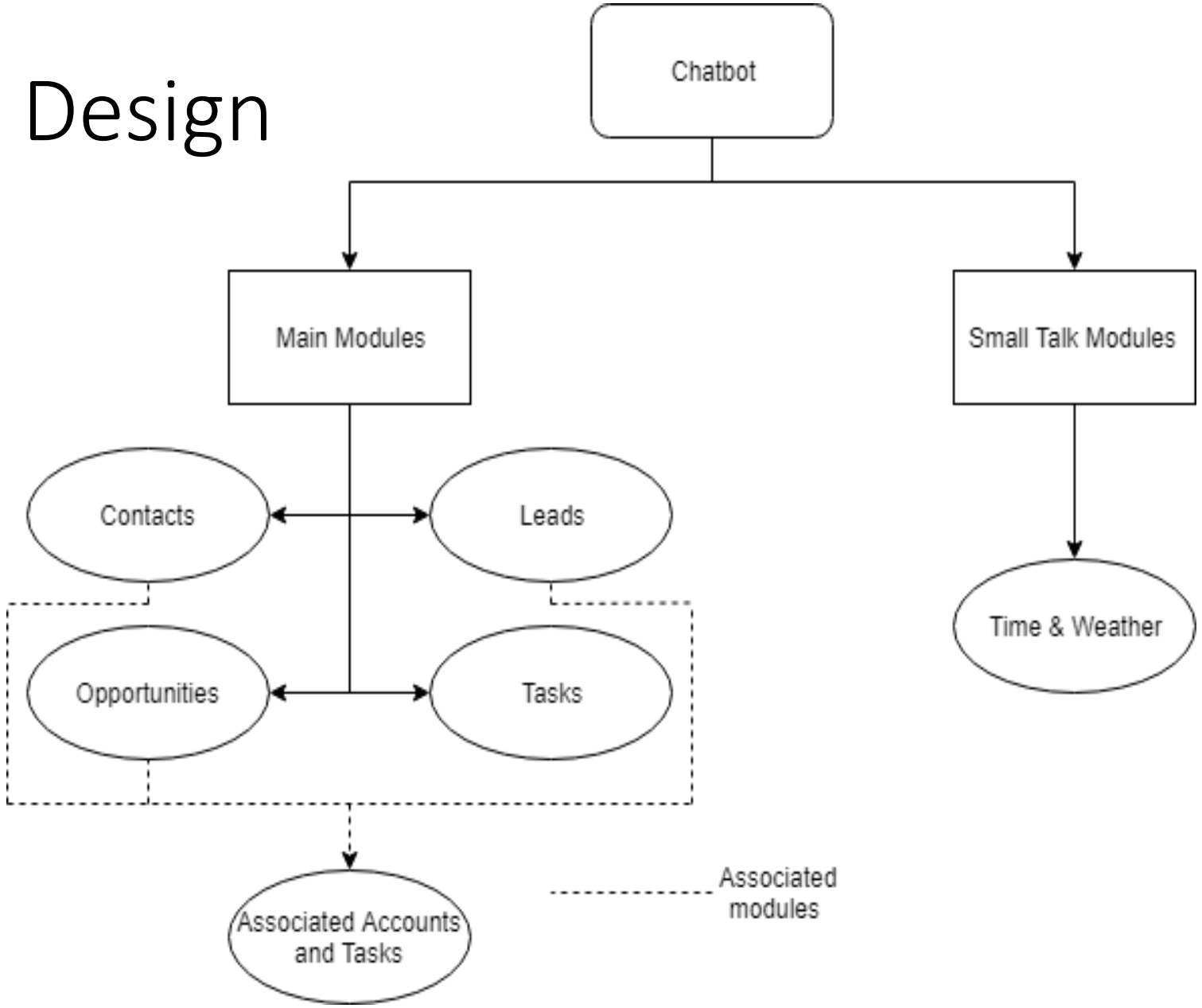
JS-based chatbot framework



Dialogflow

NLP Agent

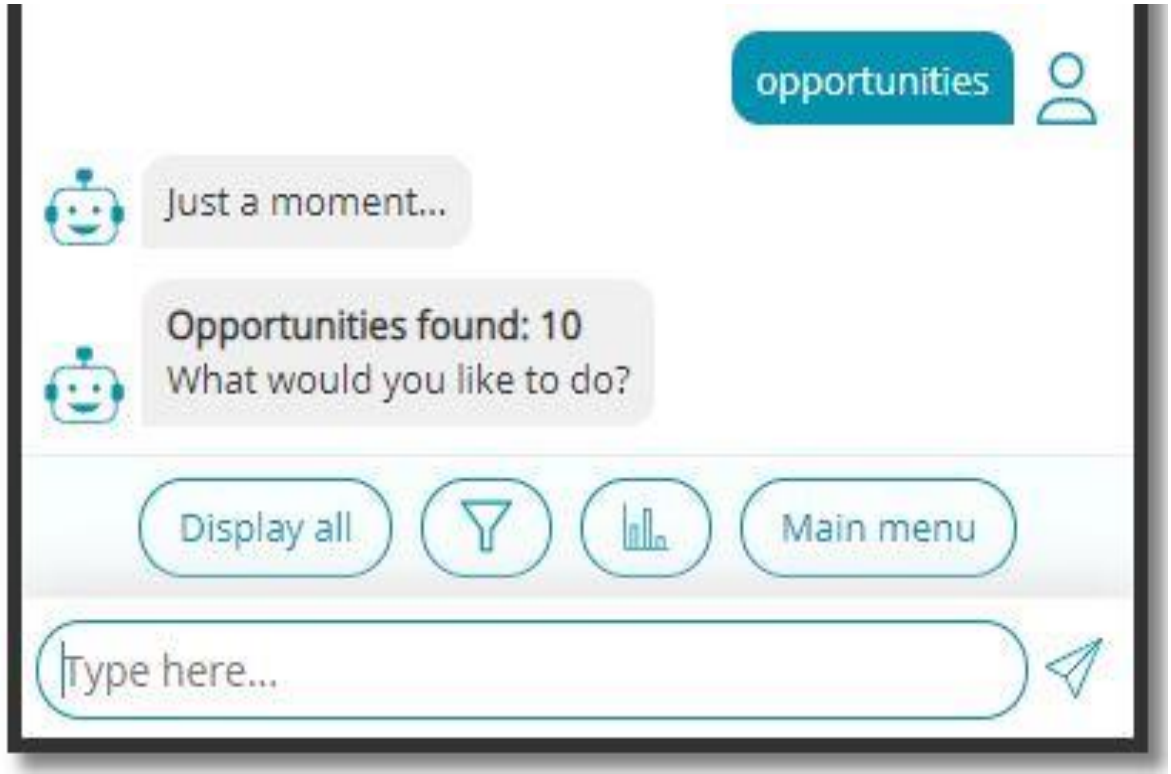
Design



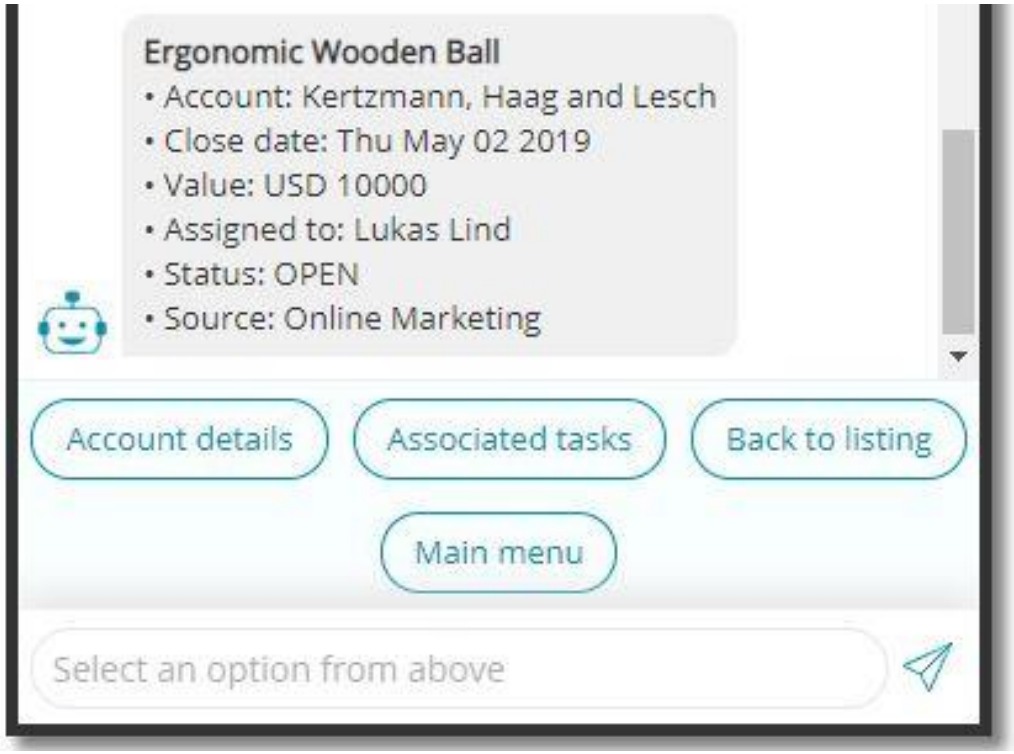
- Main modules
  - **Complements the CRM**
  - Added functionality – data analysis, graphical visualisation
- Associated modules:
  - Handles **associated data**
- Small talk modules:
  - Handles **non-critical functions**
  - Functionality to get time/weather data of a place

Development – Main Modules

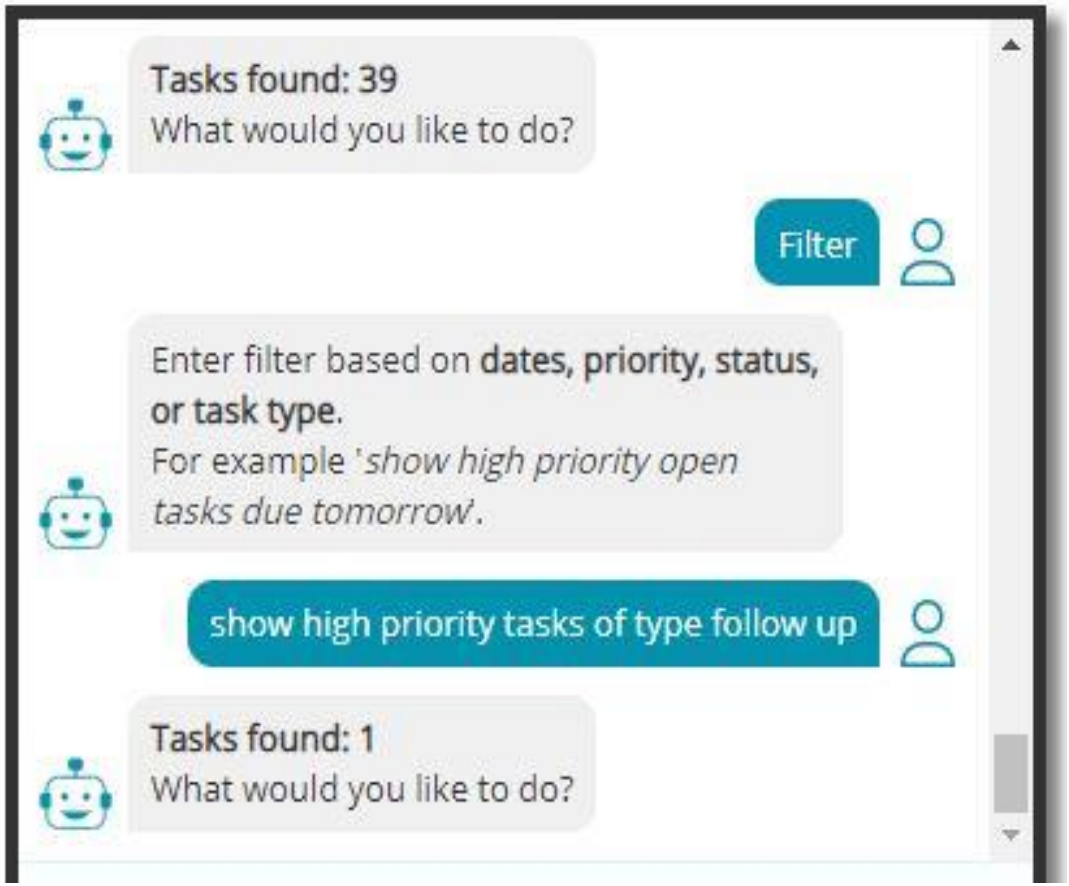
- **Display**, **filter**, **analyse** + **visualise** data



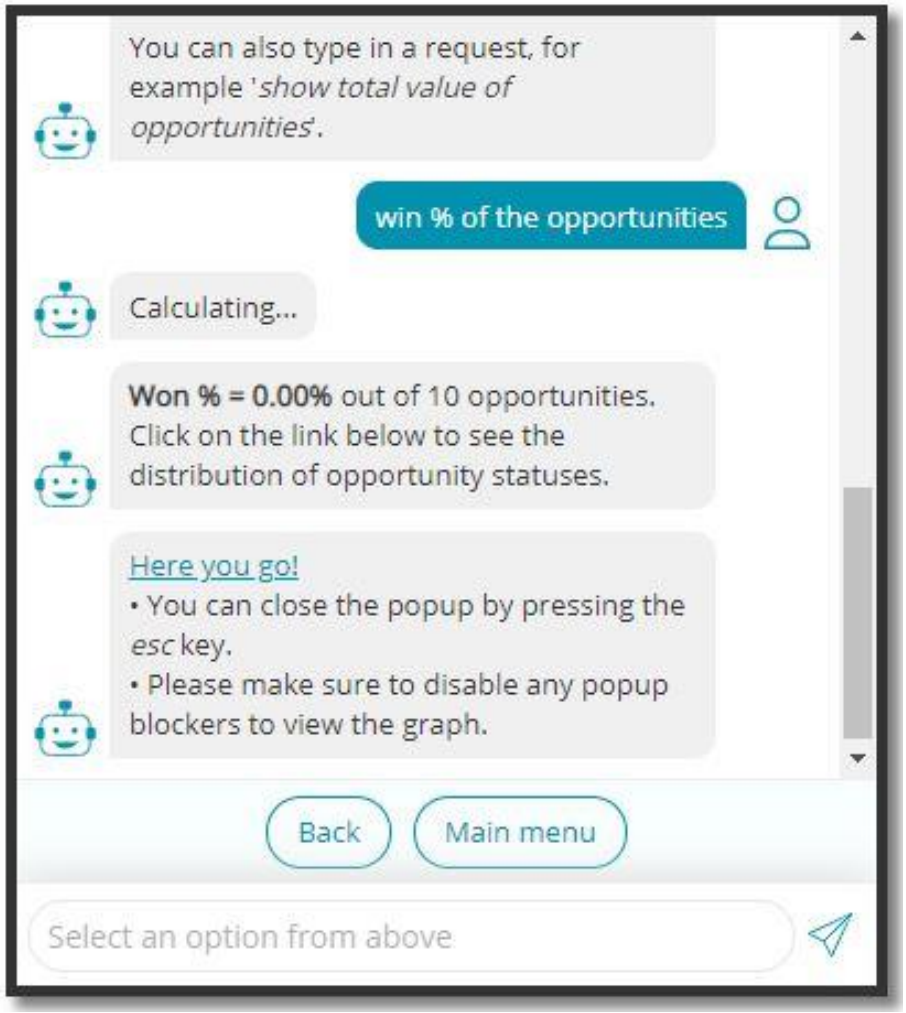
Development – Main Modules (Display)

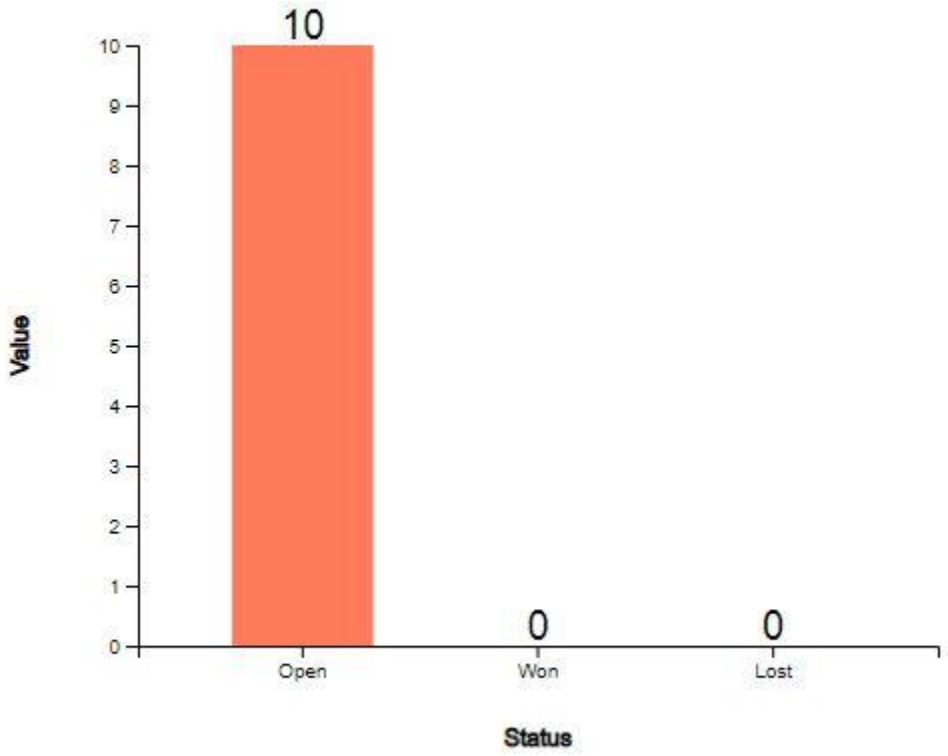


Development – Main Modules (Filter)



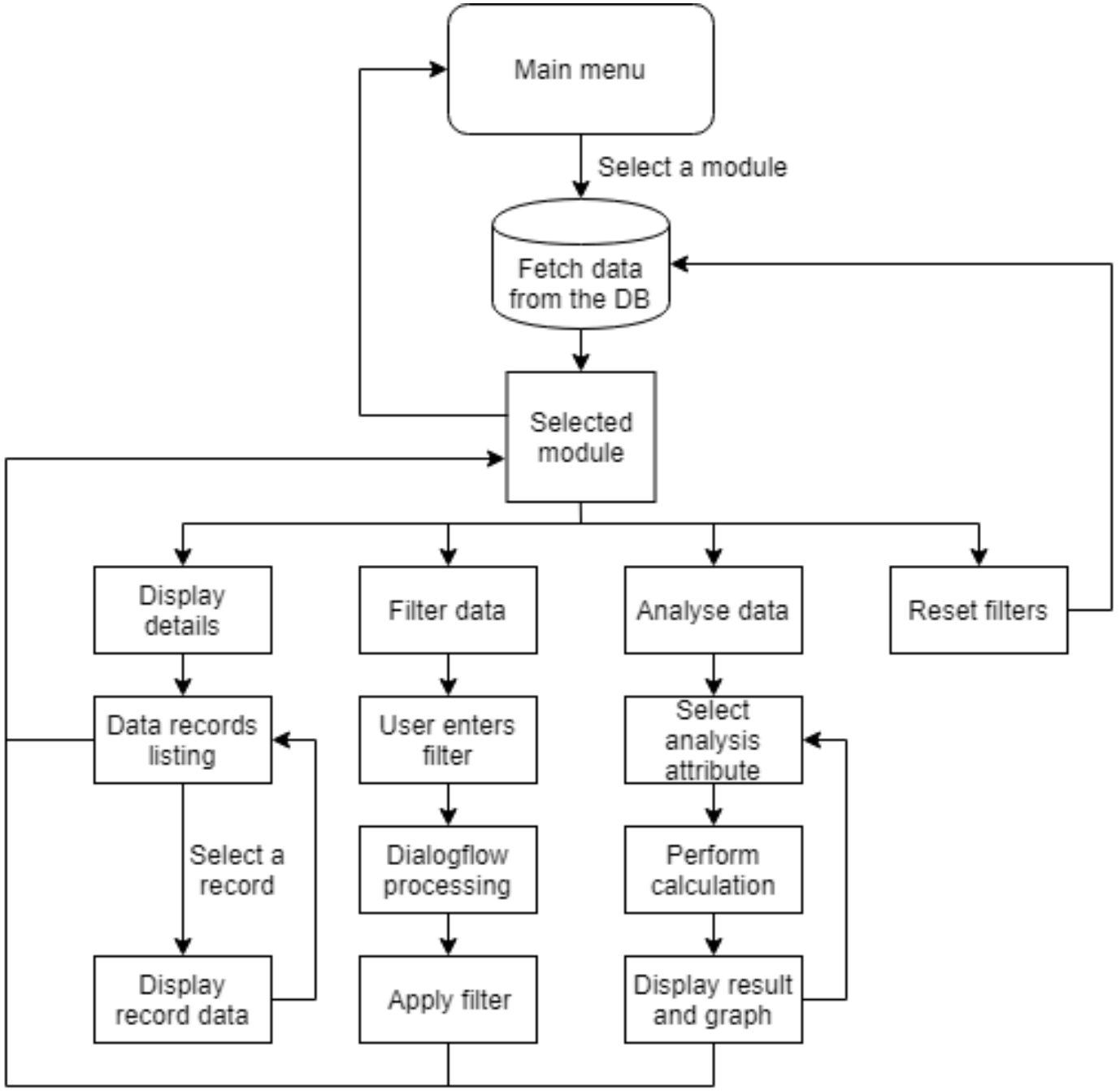
Development – Main Modules (Analyse)





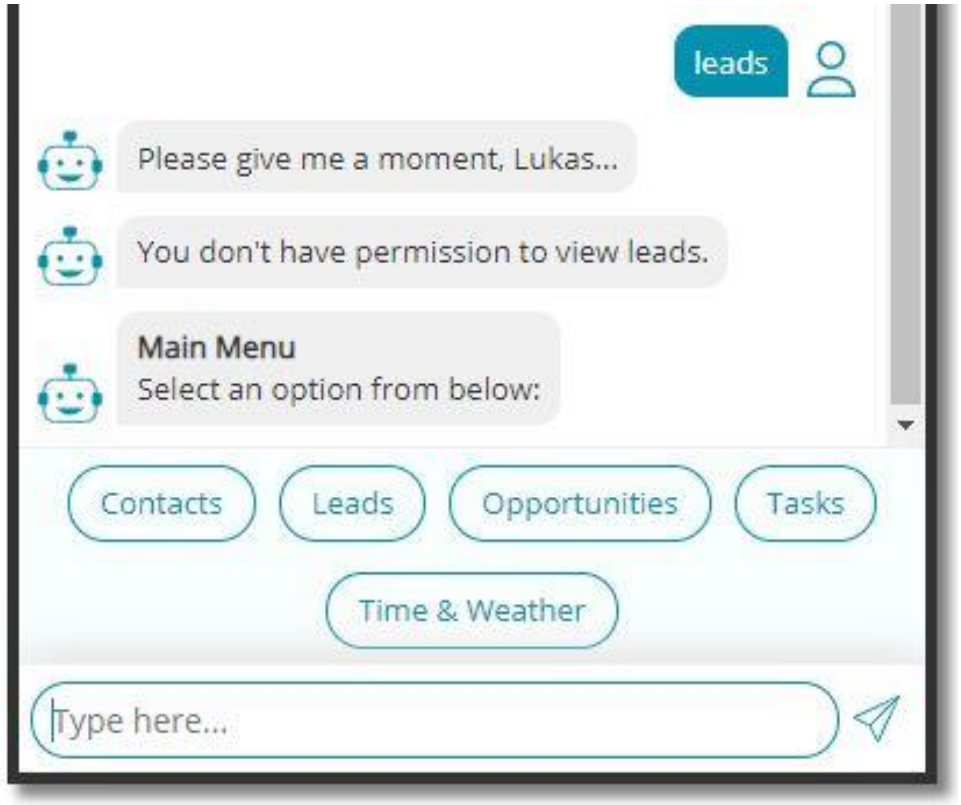
Development – Main Modules

- Simplified conversational structure:
- **Circular conversation**

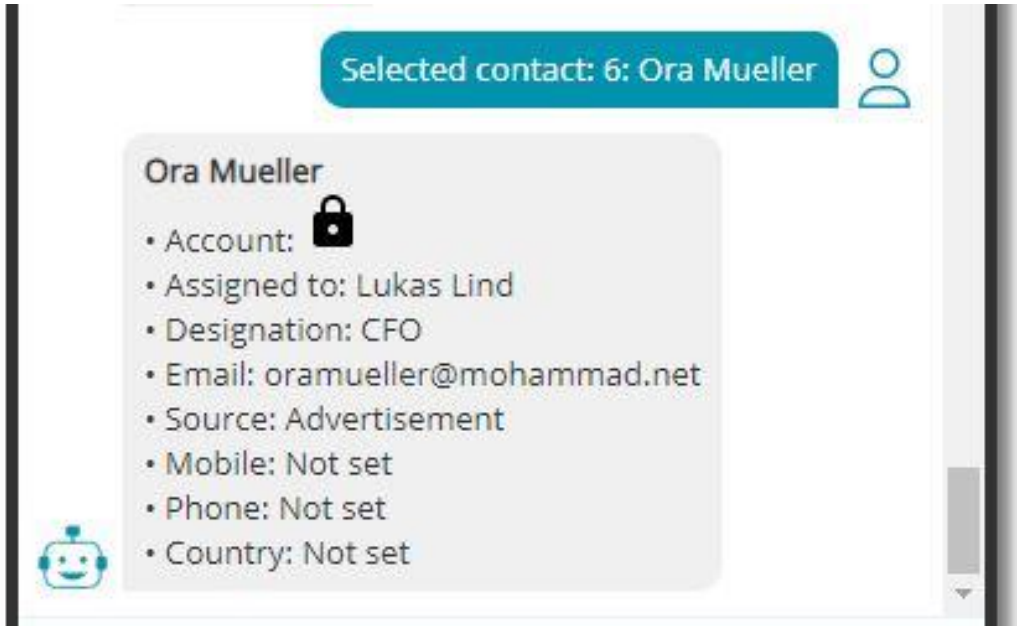


Development – Permissions

- **Prevent unauthorised** data access OR data leak
- Cases:



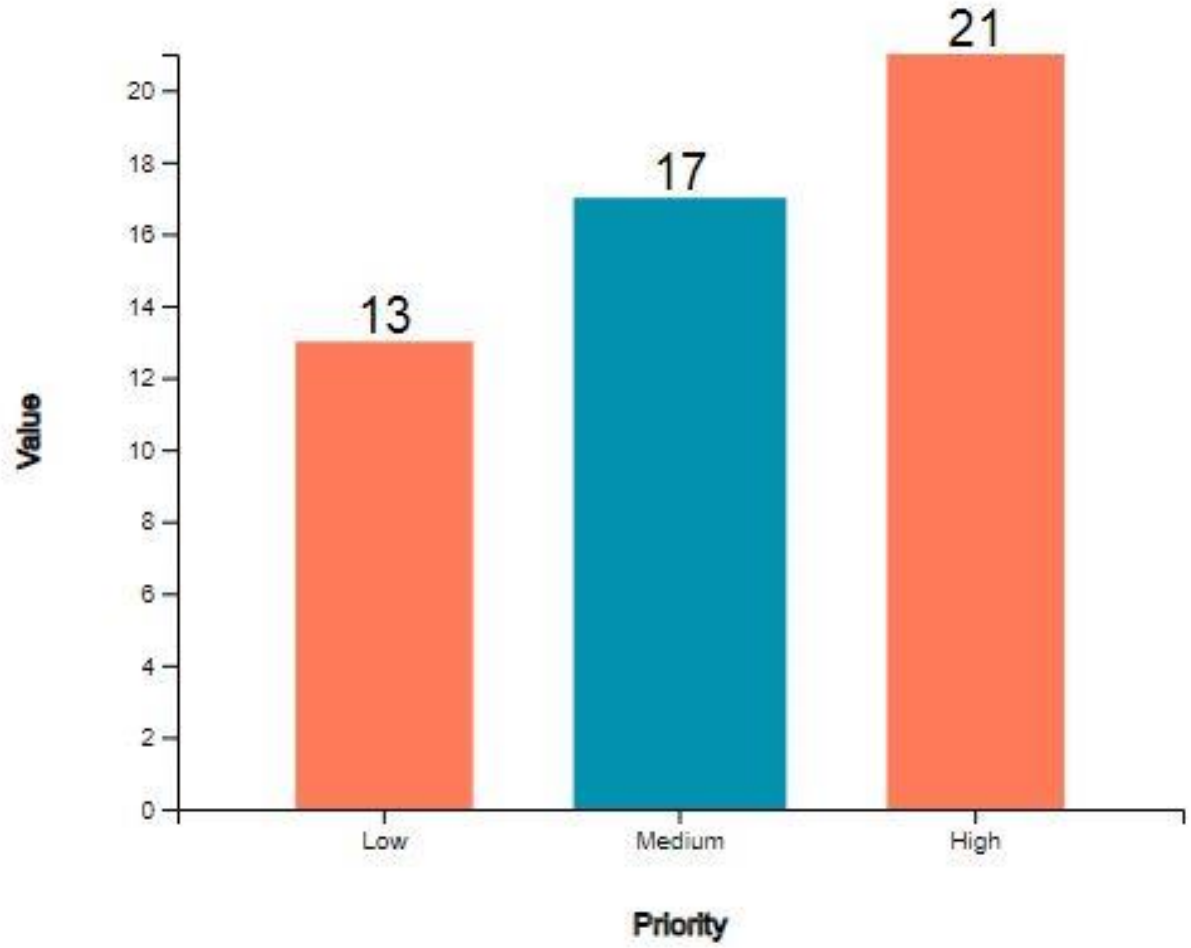
1. No data shown



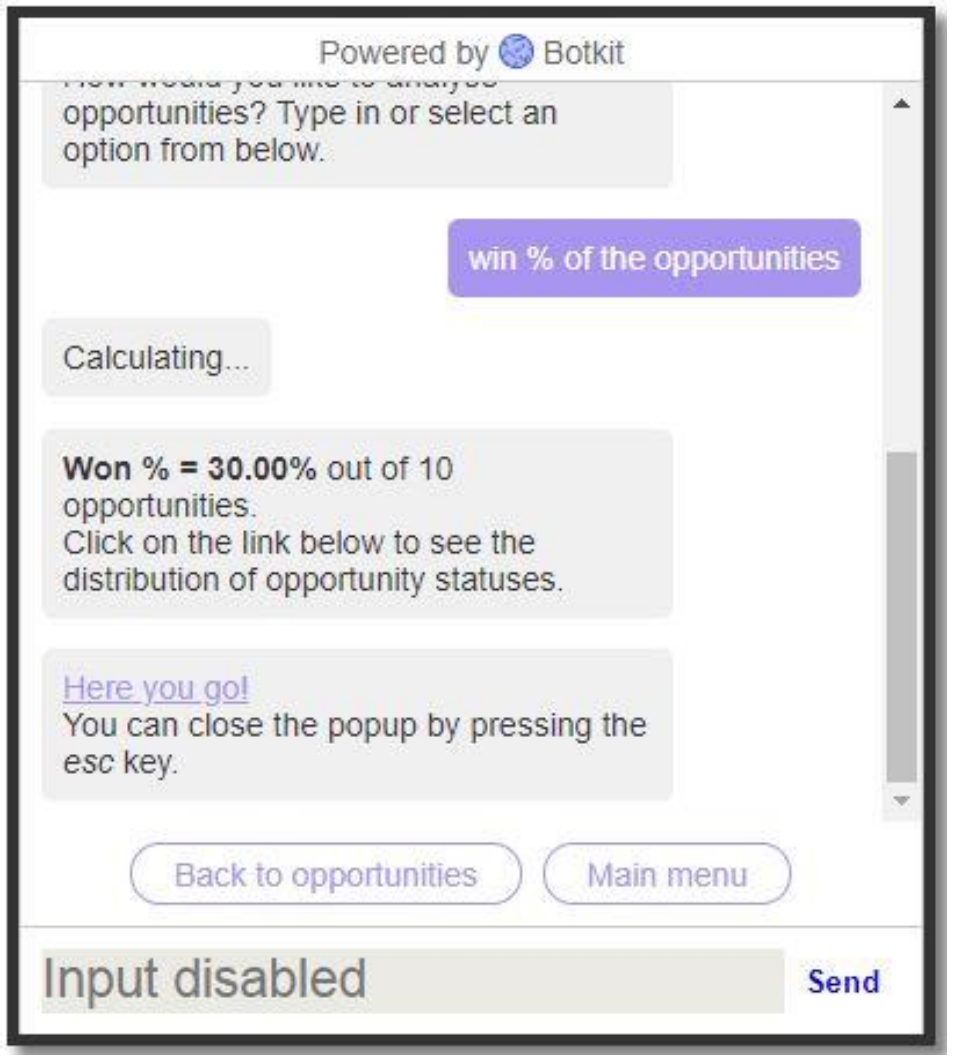
2. Information redaction

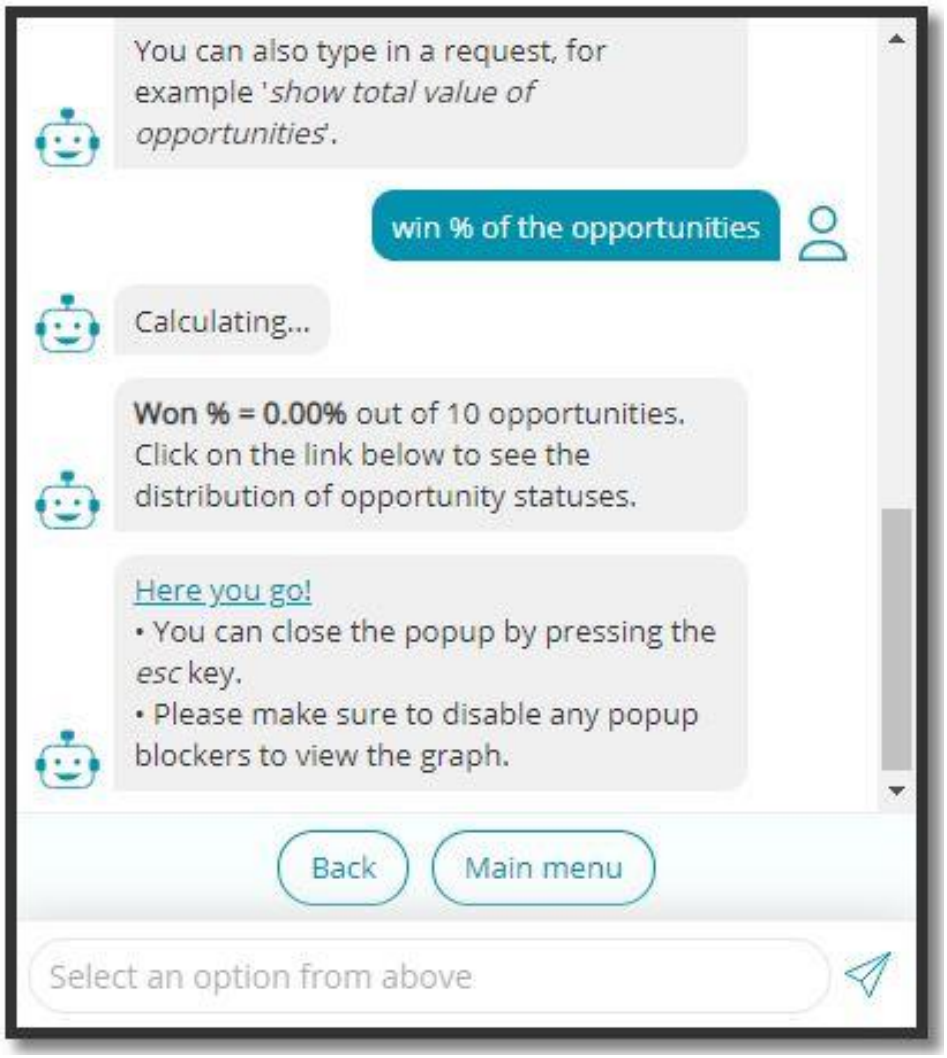
Development – UI

- UI consistency:
  - Reduced learning
  - Eliminates confusion
- Implemented through:
  - Same colour combinations
  - Same icons, button shapes, and font



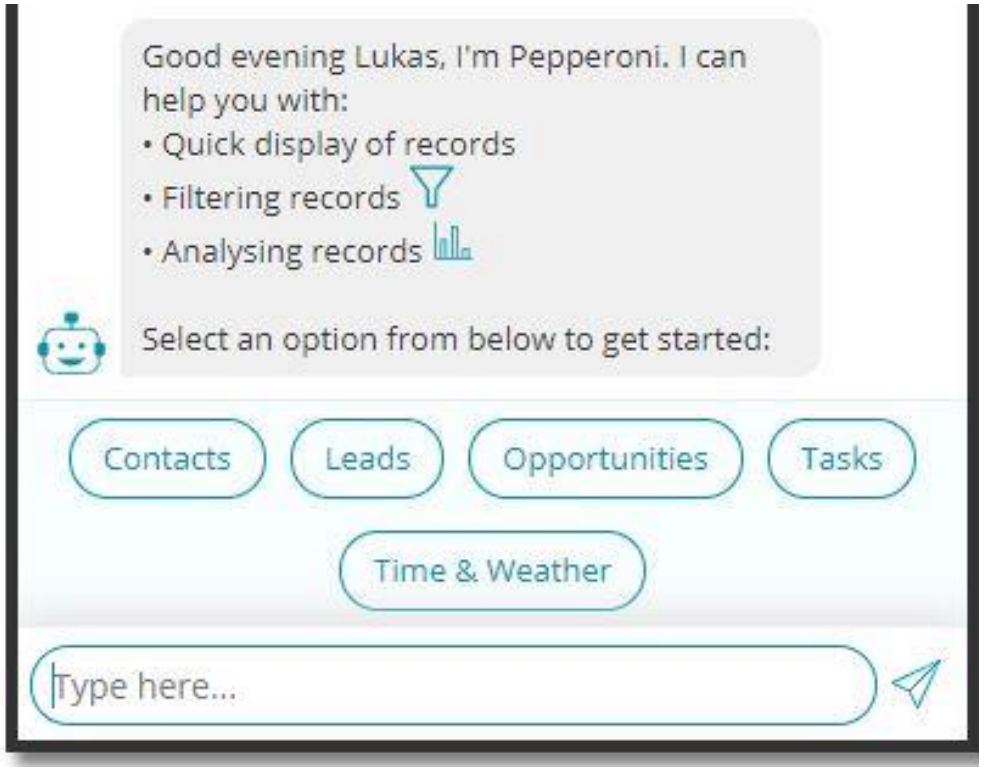
Development – UI

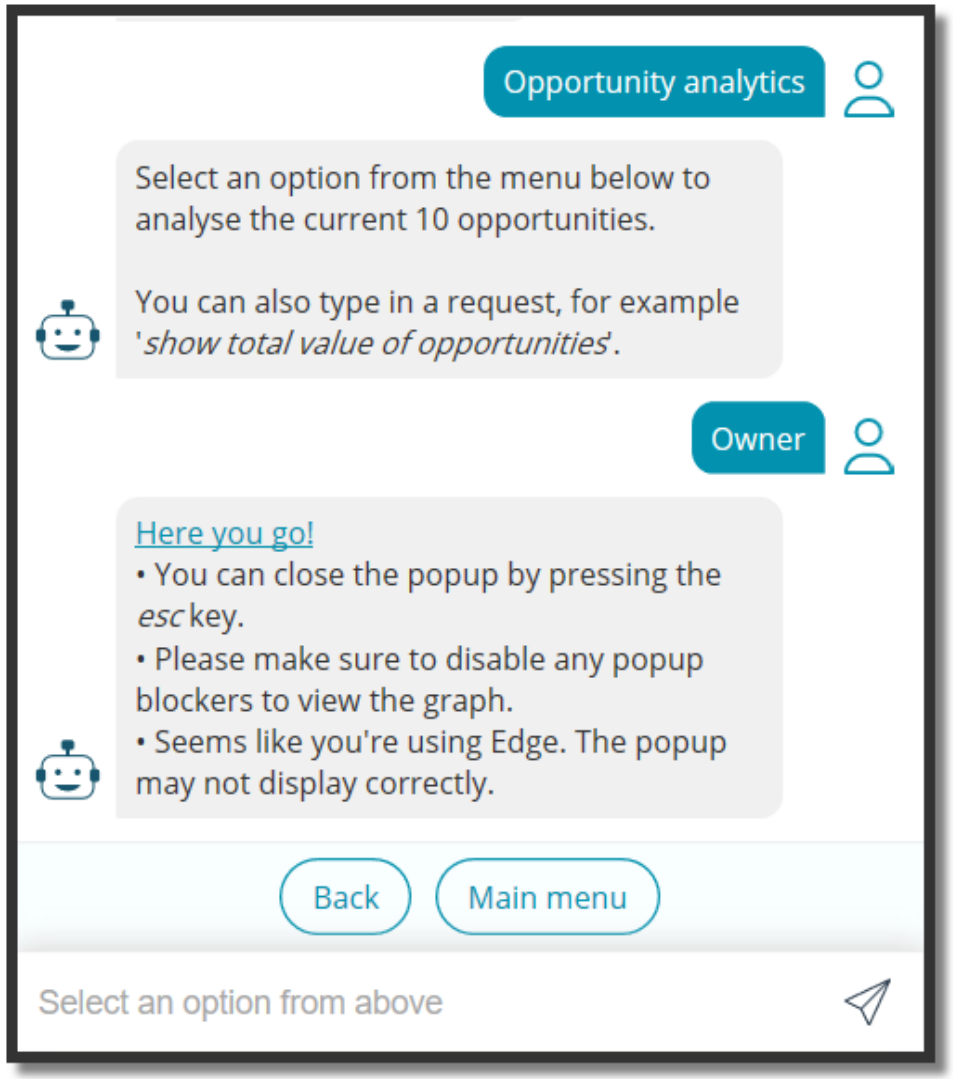




Development – Personalisation

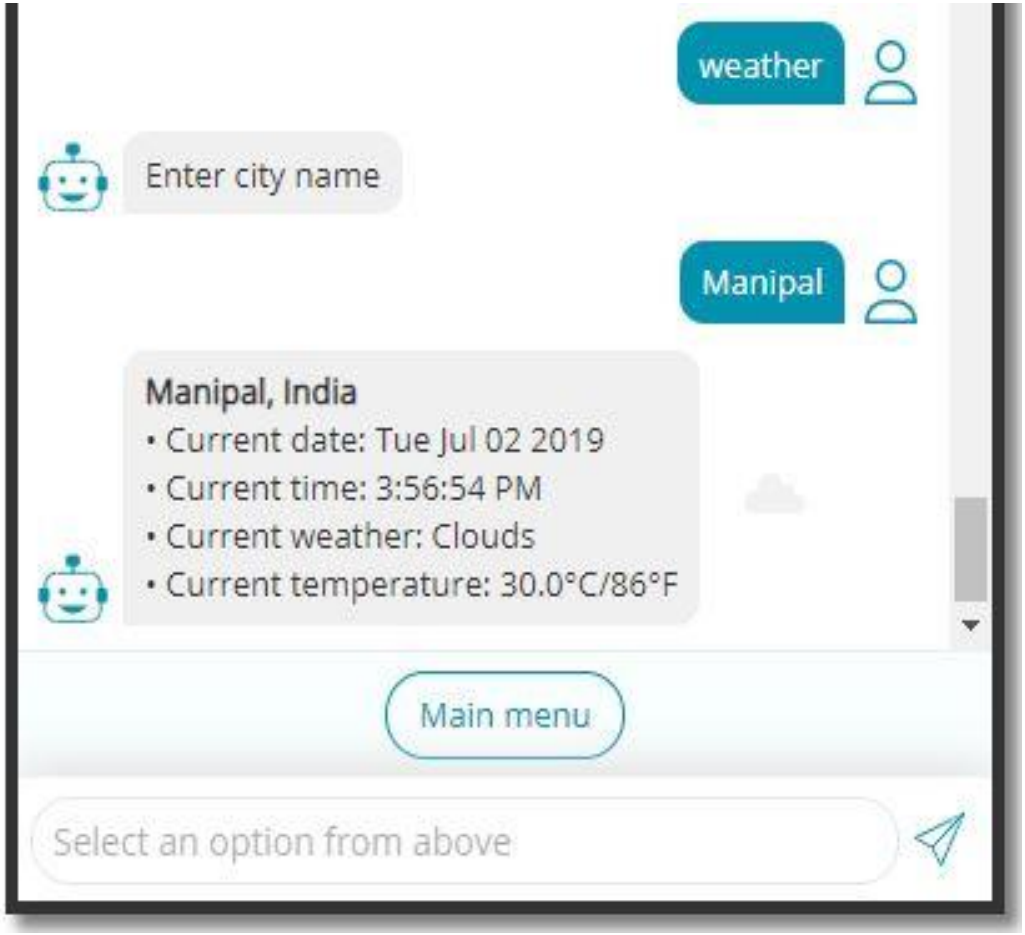
- Chatbot personalisation:
  - **Engages** users
  - Gives the *simulation* a **'real feel'**





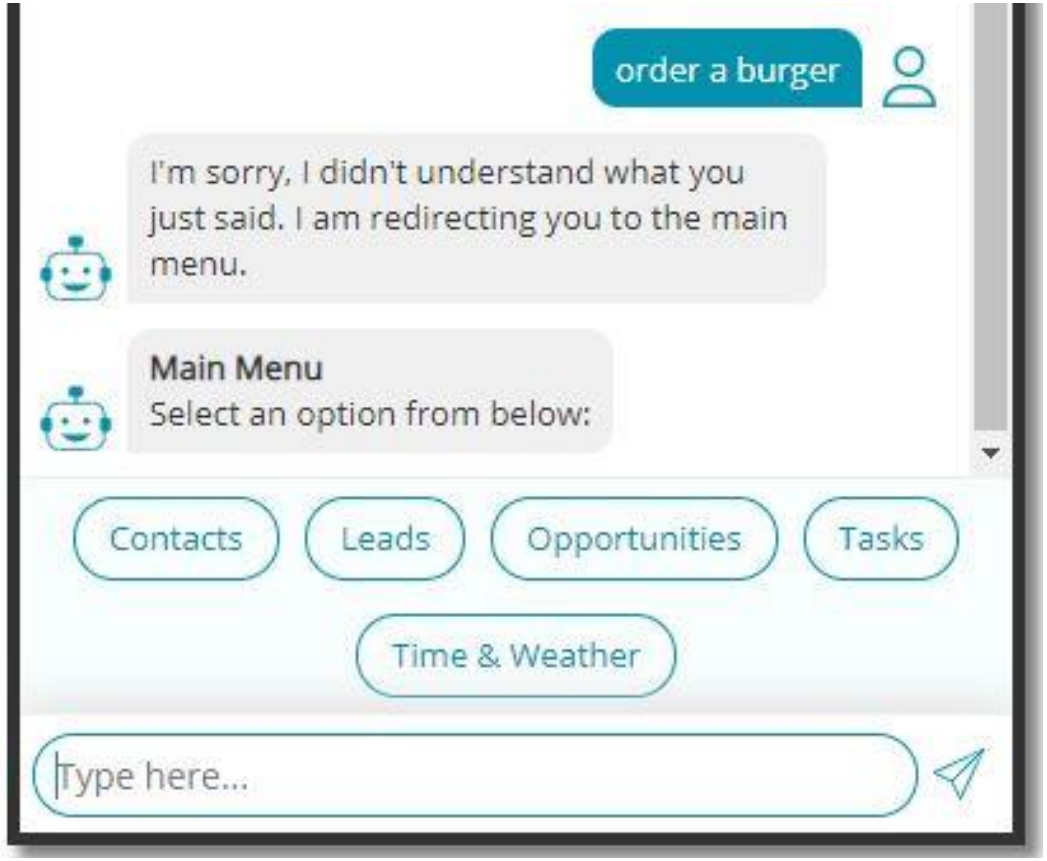
Development – Small Talk Module

- **Time and weather data** from the OpenWeatherMap API



Development – Fallback Modules

- Triggered ONLY IF the bot **doesn't understand what the user wants to do**
- Prevents the bot from being unresponsive



Development – NLP Agent Training

- tasks with type update, status complete & due on 3rd sept
- low priority completed tasks for this week
- tasks due over next 3 weeks that are open with low priority
- tasks of type custom
- show medium priority tasks due tomorrow of type meeting
- incomplete high priority tasks due this week
- high priority tasks with type update
- show incomplete tasks
- low priority tasks due tomorrow
- tasks due for next 8 weeks of type to do and priority high

- Intent matching:
  - Each intent is assigned a confidence score between 0 & 1
  - Intent with the highest score is returned

- Eg.: '*show high priority tasks*'

```
Filter text: show high priority tasks
Detected intent: task-filter
Confidence: 1
Processed response: { priority: 'high',
  status: null,
  type: null,
  endDate: null,
  startDate: null,
  conf: 1,
  detected: { date: false, priority: true, status: false, type: false } }
```

Testing and Deployment

- Human conversation increases the number of possible test cases as each user types differently
- **Unit** testing – small components of code eg. permissions checks
- **Integration** testing – expose flaws in the interaction between units eg. backend API requests
- **System** testing – testing the complete bot + CRM together

- **Deployment** – using the Botkit Web Connector

Future Work

- Replace Dialogflow with an **in-house NLP model**
  - Can be done ONLY AFTER the CRM has a **minimum number of unique users**
- **Speech recognition**
  - **Talking is faster** than typing
- Add **more associated modules**
  - Eg. associated contacts/opportunities

Thank You