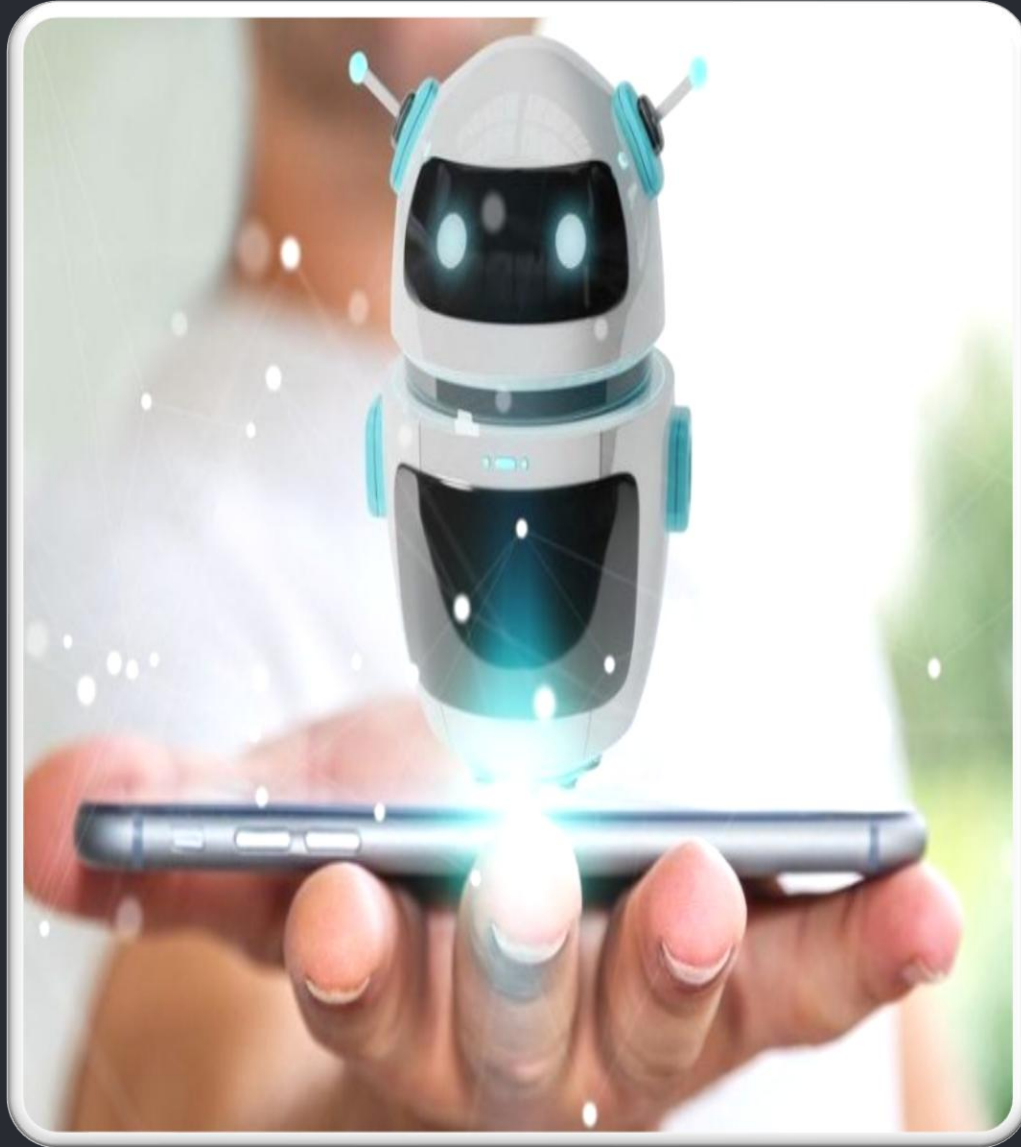




Chatbots

Creating our first chatbot

CHARTING THE FUTURE OF ACCOUNTANCY WITH AI

CLARENCE GOH, GARY PAN, SEOW POH SUN,
BENJAMIN LEE, MELVIN YONG

Introduct

Chatbots are co
conversation. Th
understand and
are commonly u
and productivity

THE FUTURE OF EMPLOYMENT: HOW SUSCEPTIBLE ARE JOBS TO COMPUTERISATION?*

Carl Benedikt Frey[†] and Michael A. Osborne[‡]

September 17, 2013

Abstract

We examine how susceptible jobs are to computerisation. To assess this, we begin by implementing a novel methodology to estimate the probability of computerisation for 702 detailed occupations, using a Gaussian process classifier. Based on these estimates, we examine expected impacts of future computerisation on US labour market outcomes, with the primary objective of analysing the number of jobs at risk and the relationship between an occupation's probability of computerisation, wages and educational attainment. According to our estimates, about 47 percent of total US employment is at risk. We further provide evidence that wages and educational attainment exhibit a strong negative relationship with an occupation's probability of computerisation.

Keywords: Occupational Choice, Technological Change, Wage Inequality, Employment, Skill Demand

JEL Classification: E24, J24, J31, J62, O33.

*We thank the Oxford University Engineering Sciences Department and the Oxford Martin Programme on the Impacts of Future Technology for hosting the "Machines and Employment" Workshop. We are indebted to Stuart Armstrong, Nick Bostrom, Eris Chinellato, Mark Cummins, Daniel Dewey, David Dorn, Alex Flint, Claudia Goldin, John Muellbauer, Vincent Mueller, Paul Newman, Seán Ó hÉigeartaigh, Anders Sandberg, Murray Shanahan, and Keith Woolcock for their excellent suggestions.

[†]Oxford Martin School, University of Oxford, Oxford, OX1 1PT, United Kingdom, carl.frey@oxfordmartin.ox.ac.uk.

[‡]Department of Engineering Science, University of Oxford, Oxford, OX1 3PJ, United Kingdom, mosb@robots.ox.ac.uk.

Types of Chatbots

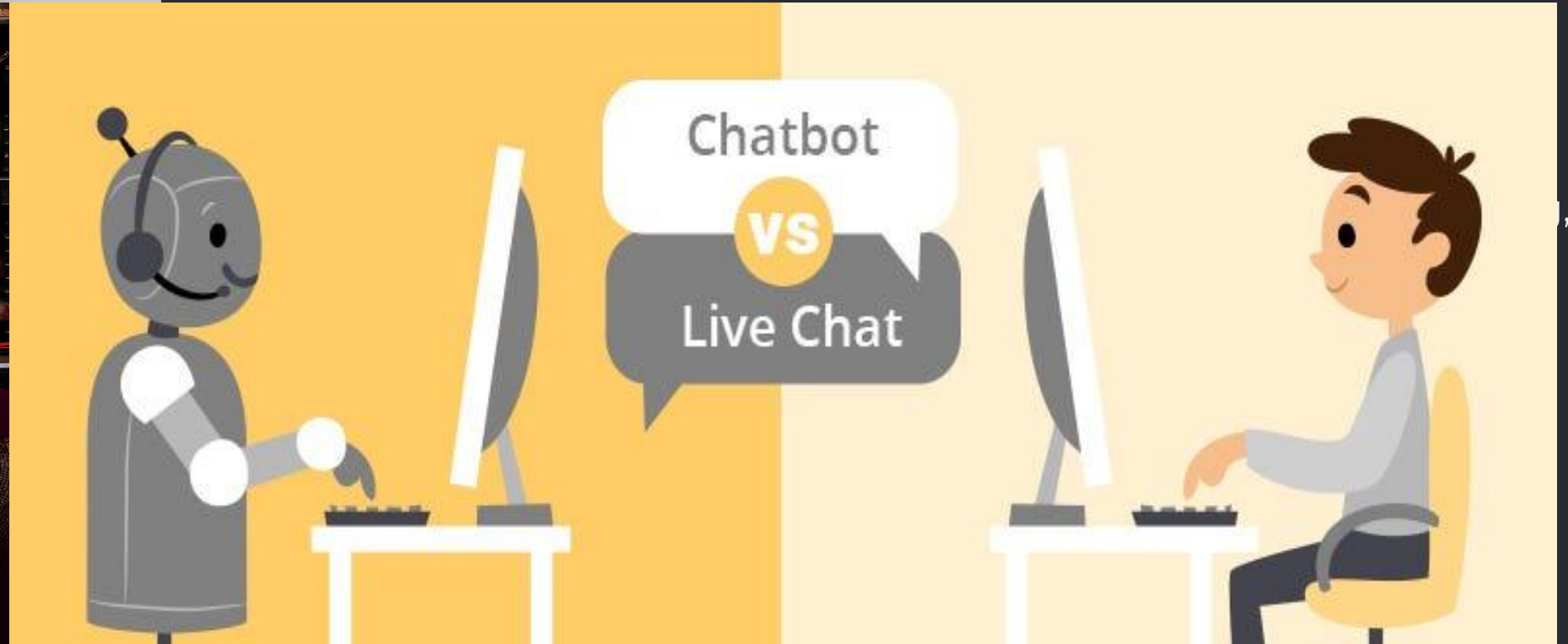
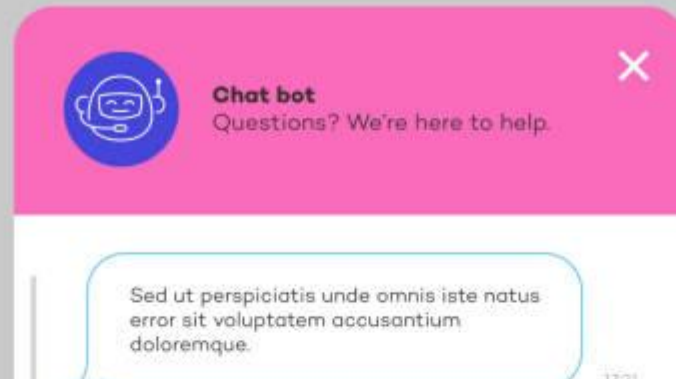
Rule-Based Chatbots

- Operate on predefined scripts and decision trees.
- Limited to specific commands and responses.
- Example: "Press 1 for billing, Press 2 for support."

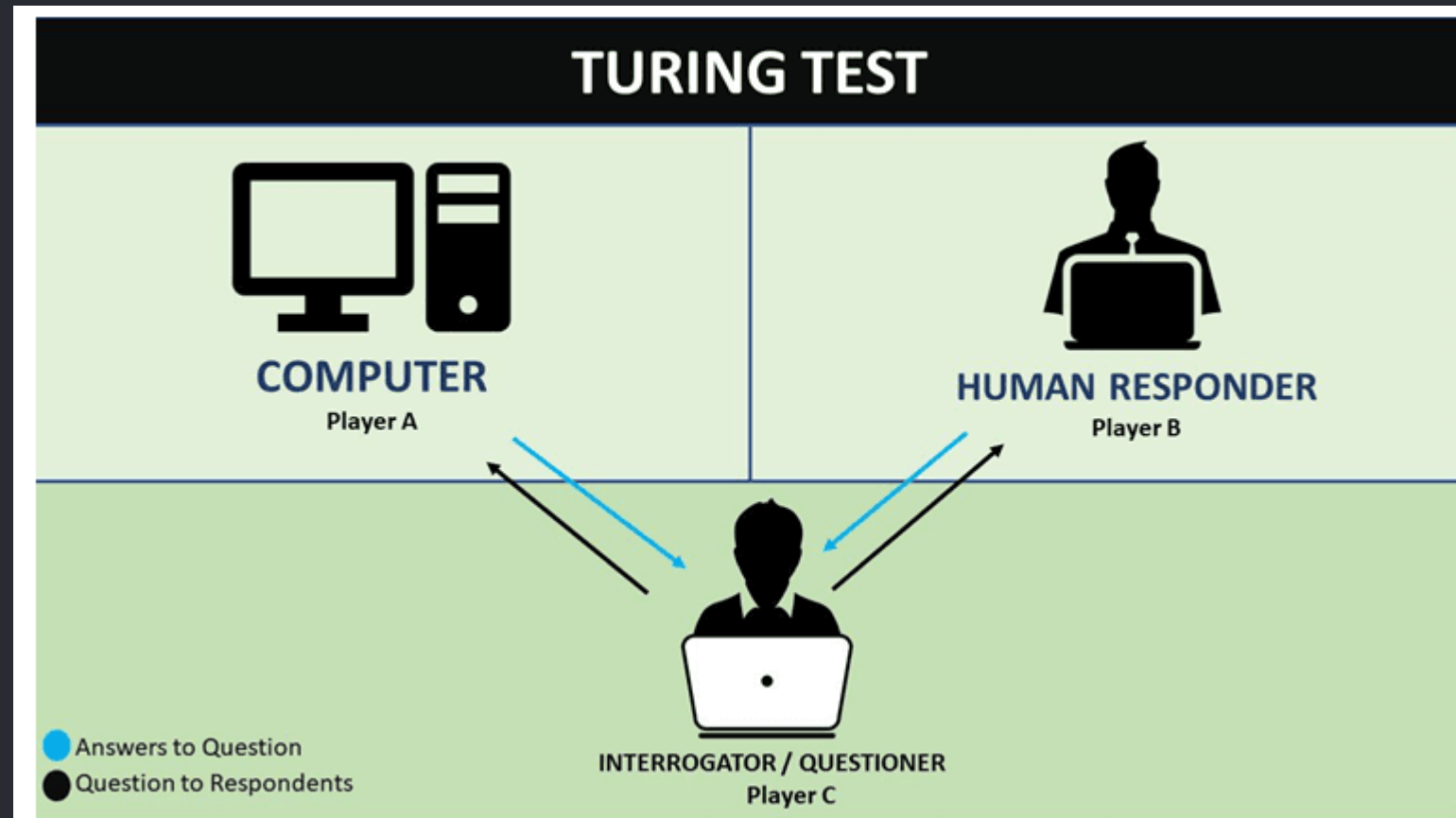
AI-Powered Chatbots

- Use machine learning and NLP to understand context and learn over time.
- Capable of engaging in more natural, dynamic conversations.
- Example: ChatGPT, Google Assistant.

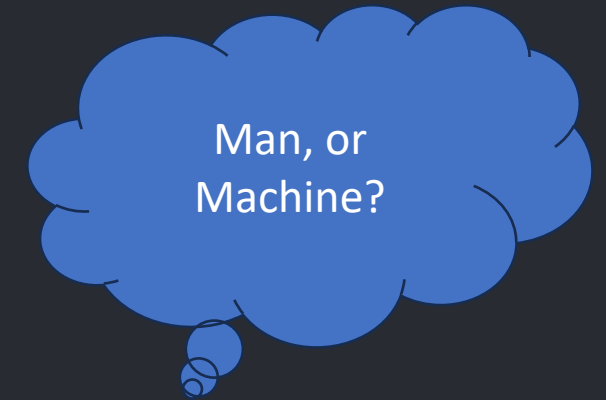
Introduction to Chatbots



Do you think you are chatting with a human?(Turing test)



“The imitation game involves three participants: a computer, a human interrogator and a human. The interrogator attempts to determine ,by asking questions of the other two participants, which of them is a computer”-Copeland on Turing test



➤ **First Chatbot build in 1960s**

➤ **Now a billion-dollar industry, booming around 2015**

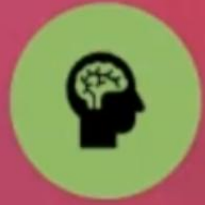
Welcome to

EEEEEE LL IIII ZZZZZZ AAAAA
EE LL II ZZ AA AA
EEEEEE LL II ZZZ AAAAAA
EE LL II ZZ AA AA
EEEEEE LLLLLL IIII ZZZZZZ AA AA

Eliza is a mock Rogerian psychotherapist.
The original program was described by Joseph Weizenbaum in 1966.
This implementation by Norbert Landsteiner 2005.

ELIZA: Is something troubling you ?
YOU: Men are all alike.
ELIZA: What is the connection, do you suppose ?
YOU: They're always bugging us about something or other.
ELIZA: Can you think of a specific example ?
YOU: Well, my boyfriend made me come here.
ELIZA: Is it important to you that your boyfriend made you come here ?
YOU: He says I'm depressed much of the time.
ELIZA: I am sorry to hear that you are depressed.
YOU: It's true. I am unhappy.
ELIZA: Can you explain what made you unhappy ?
YOU:

AI APPLICATIONS



Chatbots

Real-life examples:

Apple's Siri, Microsoft's Cortana, Amazon's Alexa and Google's new Assistant [1]

Accounting examples:

Assist clients file taxes.
Audit/Tax firms offer both live chat and chatbot support

Auditing examples:

Assist audit professionals.
One audit firm mentions chatbot answered over 500,000 questions.

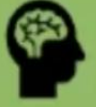
Finance examples:

In banking, chatbots help customers in making transfers, paying bills

Chatbots are used to enhance

- employee performance
- customer satisfaction
- cost savings on customer support

AI APPLICATIONS

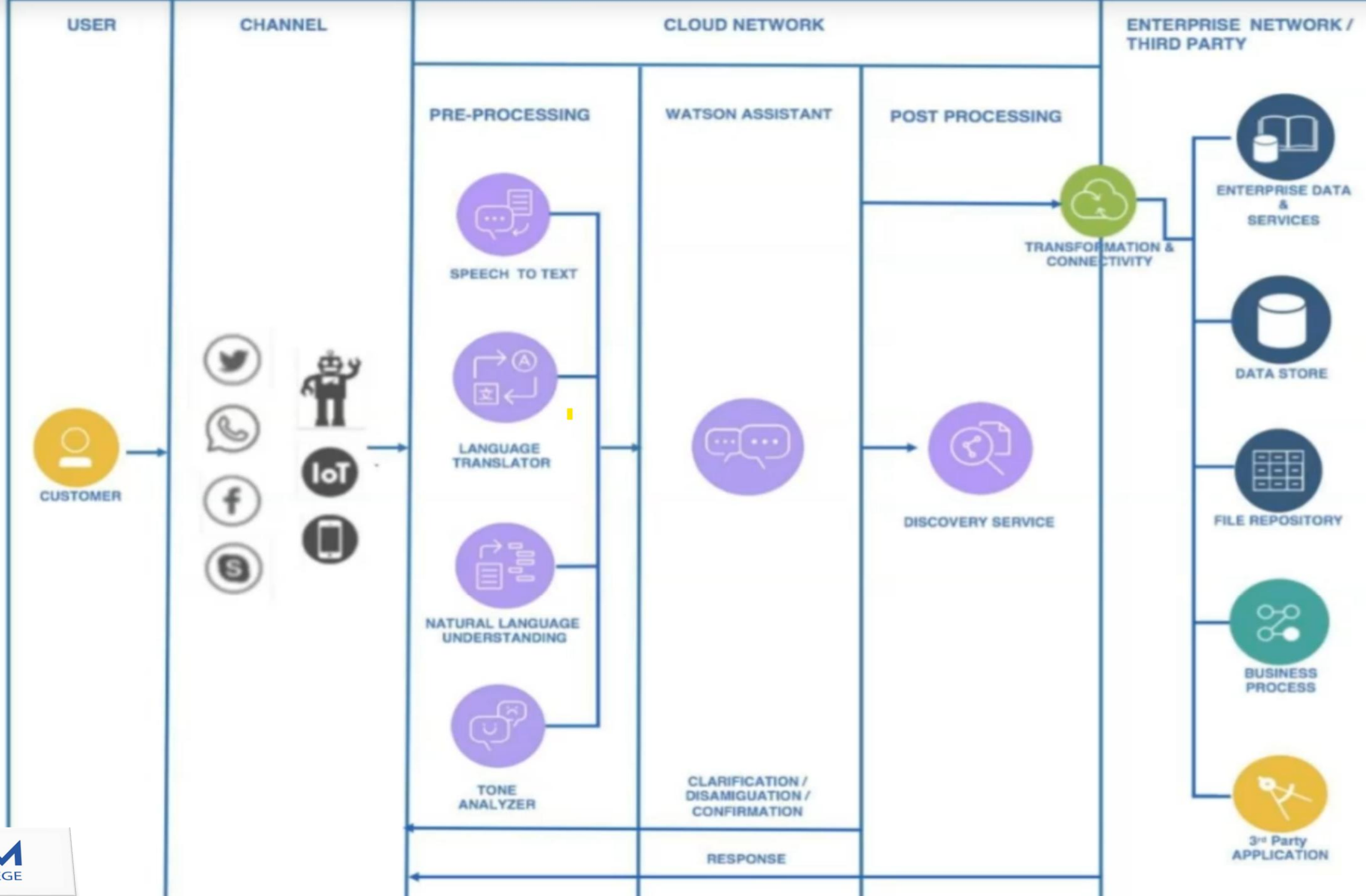


Chatbots

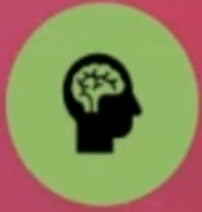
Software

No programming skills initially required:

- IBM Watson (has many other capabilities)
- Engati (intergrates with Skype, Slack and other messaging platforms)
- MobileMonkey
- Bostify
- Chatfuel
- ManyChat (intergrates with facebook, fast and easy bot building in 2 minutes)
- And many more...



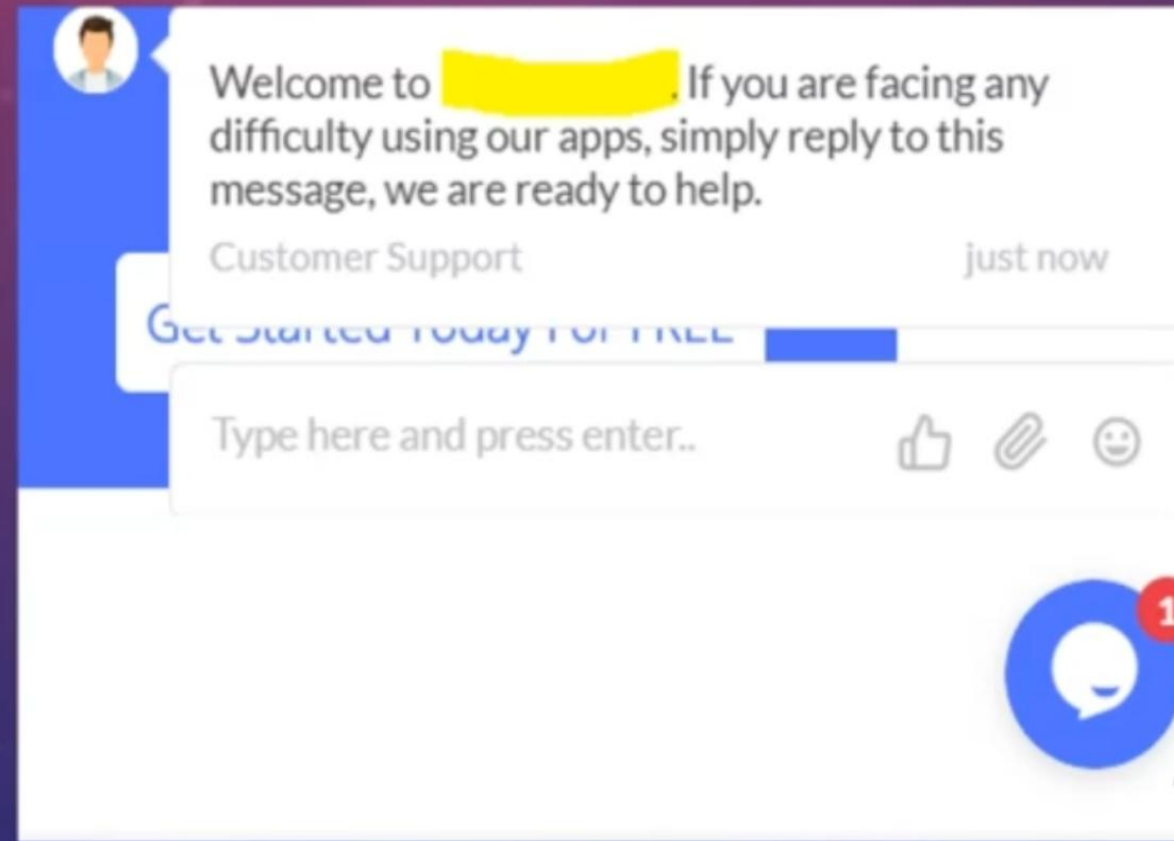
AI APPLICATIONS



Chatbots

➔ Chatbots are intelligent virtual assistants

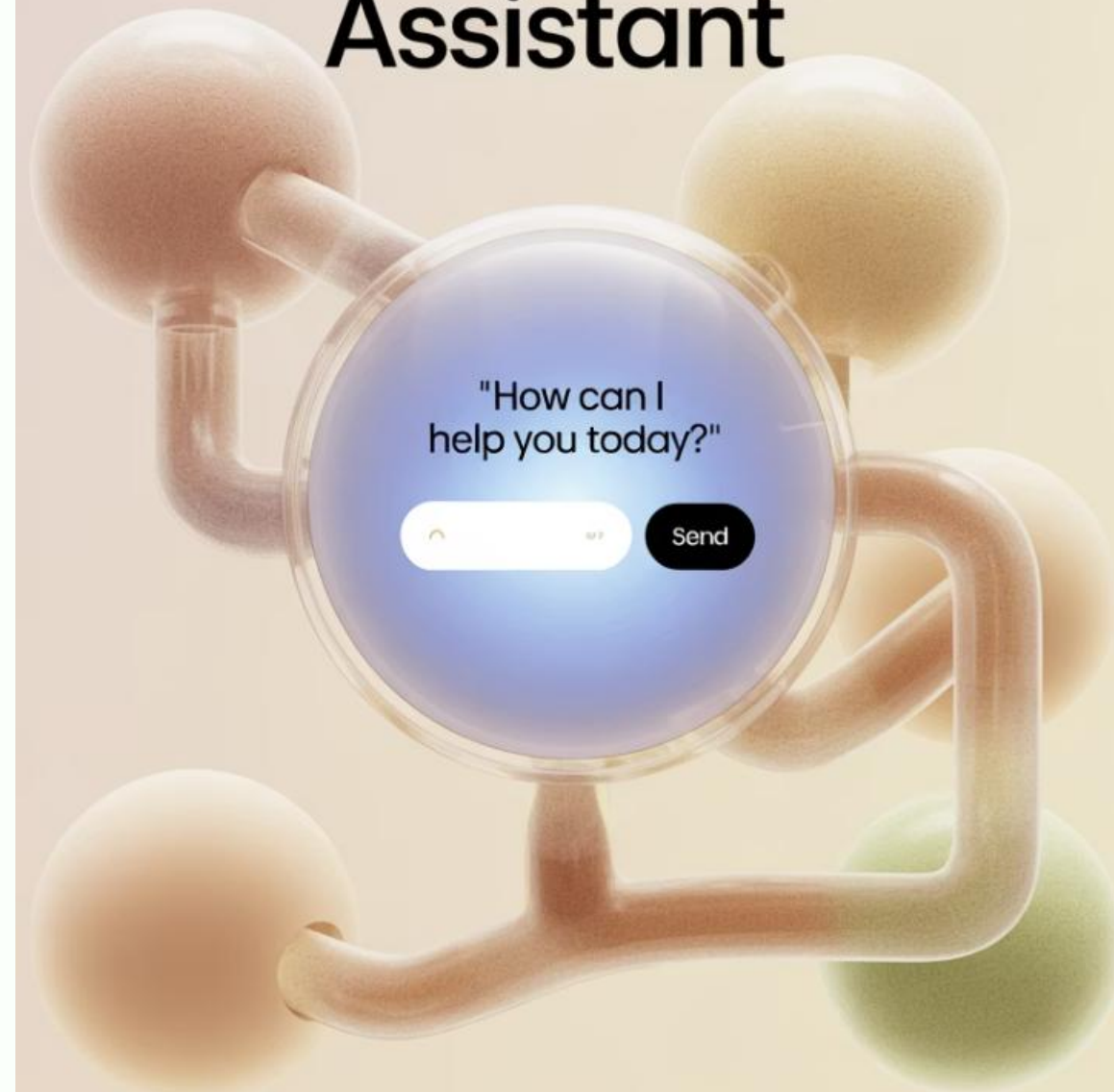
- Dialog in natural language /voice



Building a Chatbot with IBM Watson Assistant

Building a Chatbot with IBM Watson Assistant

IBM Watson Assistant



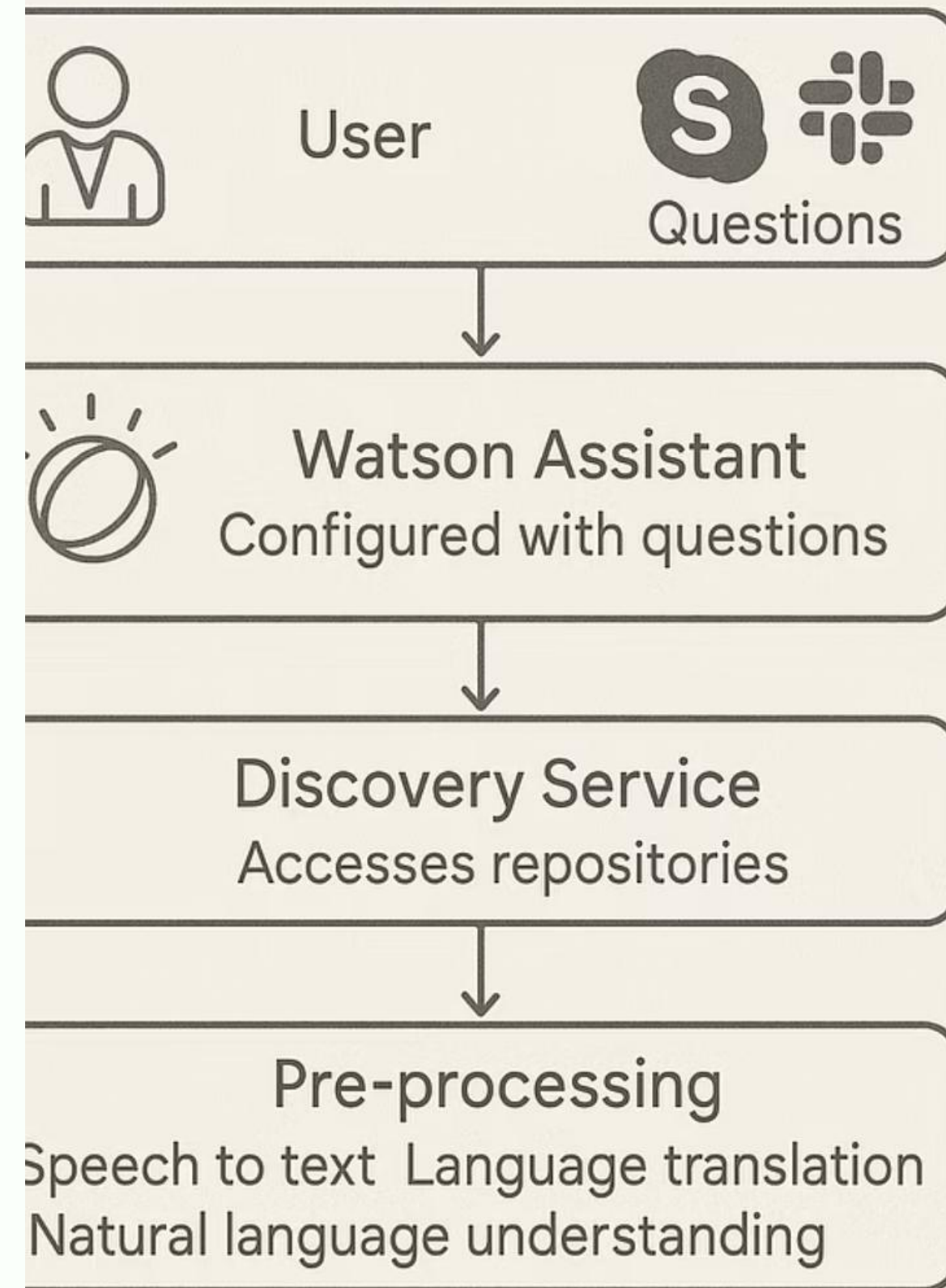
Overview of Today's Session

Goal

Learn how to build an intelligent chatbot using IBM Watson Assistant that can help new team members get information and support.

Key Focus

Understanding the multi-layered architecture and how each component works together to create a seamless user experience.



Architecture Overview - The Four-Layer System

Think of this chatbot architecture like a restaurant with specialized departments:

Layer 1: User Interface (The Front of House)

What it is: The channels where users interact with the chatbot

Available Channels: Skype, Slack, Facebook, Twitter, and other messaging platforms

Analogy: Like having multiple entrances to a restaurant - customers can come through the main door, drive-through, or delivery apps, but they all get the same great service

Layer 2: Watson Assistant (The Head Waiter)

What it is: The brain that's "configured with questions" - trained to understand and respond

Key Function: Natural Language Understanding (NLU)

Analogy: Like an experienced head waiter who knows the menu inside-out, understands when customers say "I want something spicy" or "surprise me," and can handle requests even when they're not perfectly clear

Layer 3: Discovery Service (The Kitchen & Storage)

What it is: "Accesses repositories" - searches through your company's data and documents

Key Function: Information retrieval from databases, documents, and knowledge bases

Analogy: Like having access to the restaurant's entire pantry, recipe collection, and supplier information - it can find exactly what's needed from vast amounts of stored information

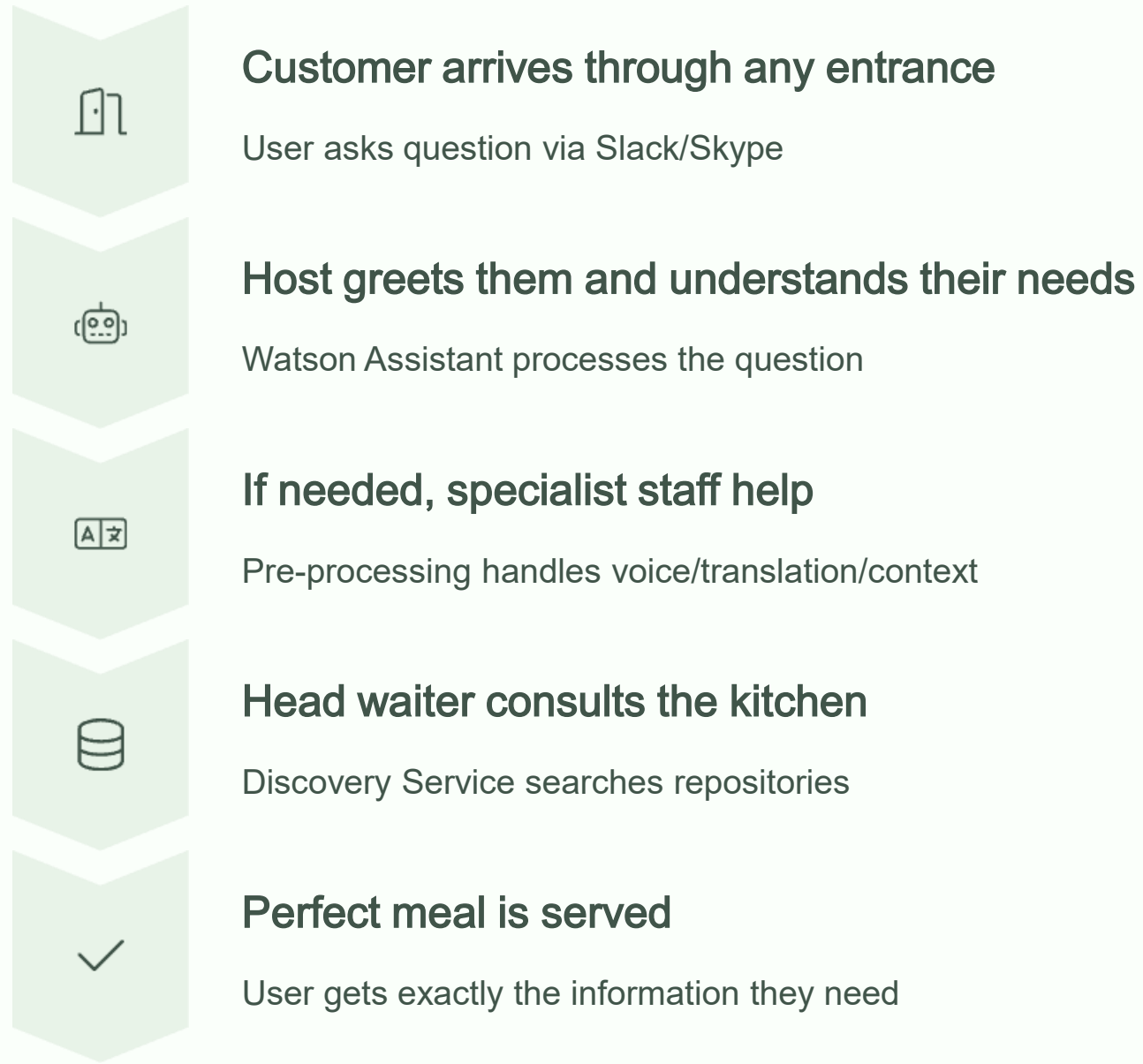
Layer 4: Pre-processing Services (The Specialized Staff)

This layer handles three main functions:

- Speech to Text: Converts voice messages to written text
- Language Translation: Handles multiple languages
- Natural Language Understanding: Interprets context, tone, and intent

Analogy: Like having specialized staff - a translator for international guests, someone who can read handwritten notes, and a host who understands when someone says "I'm starving" (they don't mean literally, they just want food quickly)

How It All Works Together



The Complete Flow (using our restaurant analogy)

Key Capabilities and Business Value



Multi-Channel Integration

Users don't need to learn new tools - they can ask questions in Slack, Skype, or any platform they already use

Real-world benefit: New team members can get help without disrupting their normal workflow



Intelligent Understanding

Handles variations like "When's the next meeting?" vs "What's on my calendar?" vs "Any team events coming up?"

Analogy: Like a good friend who understands you whether you say "I'm hungry," "Let's grab food," or "Where should we eat?"



Scalable Knowledge Base

Can access and search through thousands of documents instantly

Business Impact: One chatbot can replace dozens of "Where do I find...?" emails



Global Accessibility

Voice input for hands-free use

Language translation for international teams

Practical Example: A team member in Japan can speak Japanese to the bot and get English documentation translated back

Technical Setup Process



Define Intents

What users want to accomplish



Create Entities

Important pieces of information



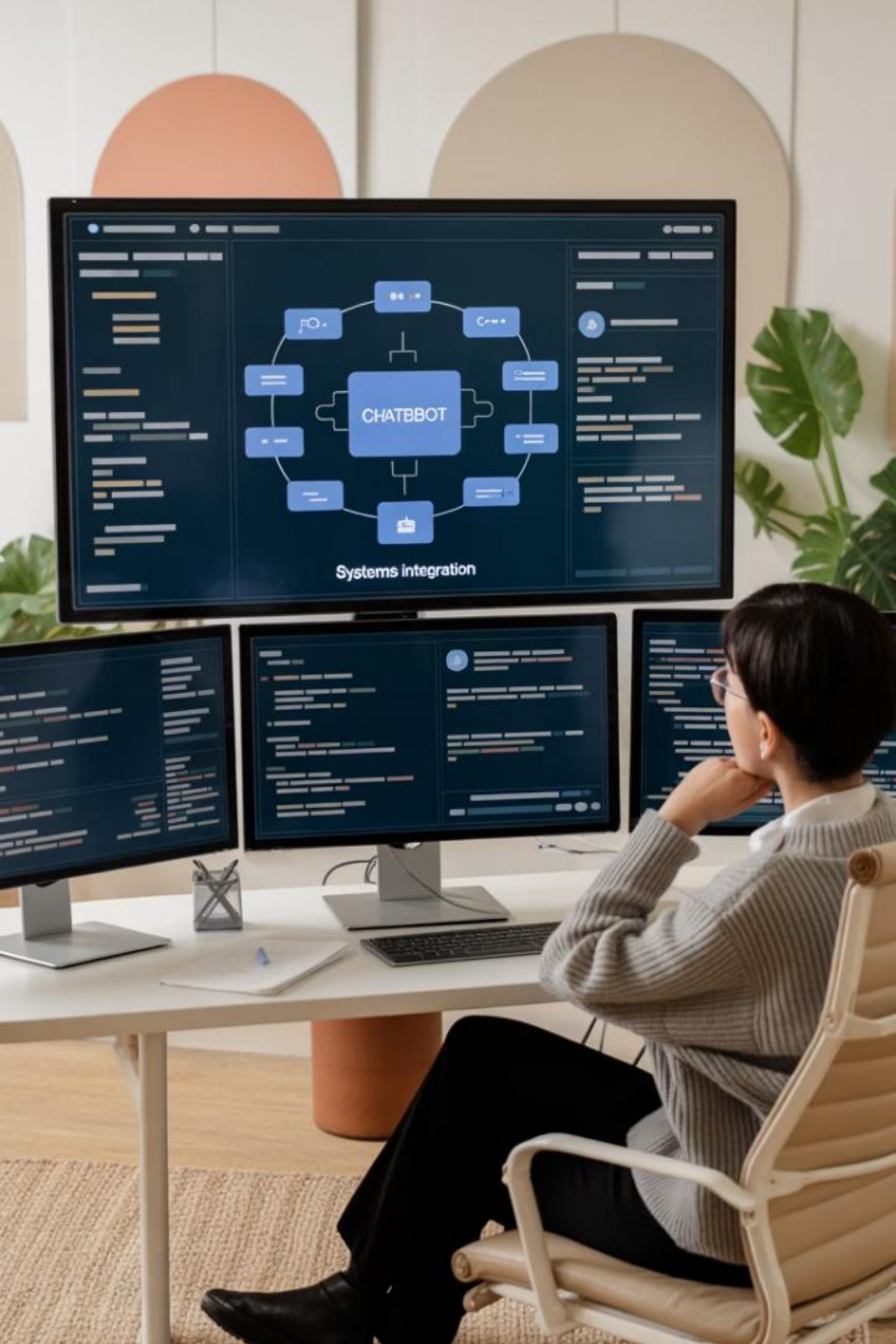
Build Dialog Flow

Conversation structure

Phase 1: Watson Assistant Configuration

- Example Intents: #get_calendar, #find_documents, #contact_team
- Example Entities: @person, @date, @document_type
- Analogy: Like writing a script for customer service, but one that can handle unexpected questions

Integration and Deployment Phases



1

Phase 2: Discovery Service Integration

- Connect to company repositories (SharePoint, databases, file systems)
- Configure search and indexing
- Result: Chatbot can find needle-in-haystack information instantly



Phase 3: Channel Deployment

- Connect to Slack, Microsoft Teams, etc.
- Test across different platforms
- User Experience: Seamless - they just type questions naturally



Phase 4: Pre-processing Enhancement

- Enable speech-to-text for voice queries
- Add translation capabilities
- Fine-tune natural language understanding

Real-World Use Cases for New Team Members

Common Questions the Chatbot Can Handle

- "Who should I contact about IT issues?"
- "Where is the team calendar?"
- "What's the dress code?"
- "How do I submit expenses?"
- "When is the next all-hands meeting?"

Advanced Capabilities

- "Find me documents about project Phoenix from last quarter"
- Voice query: "Show me everyone who's out of office this week"
- "Translate this policy document to Spanish"

Best Practices for Implementation



Start small

Begin with 20-30 common questions

Regular updates

Monitor logs and improve based on feedback



Use real language

Train with actual questions from team members

Test extensively

Try to break it with unusual phrasings

Training Your Watson Assistant is like training a new employee - start with basics, use real scenarios, and practice until they're confident

Maintaining the System requires regular updates to knowledge base, monitoring conversation logs for missed questions, and continuous improvement based on user feedback



Next Steps and Hands-On Practice

Today's Lab Session

- Create Watson Assistant instance
- Build first intent and dialog
- Connect to Slack for testing
- Add Discovery Service integration

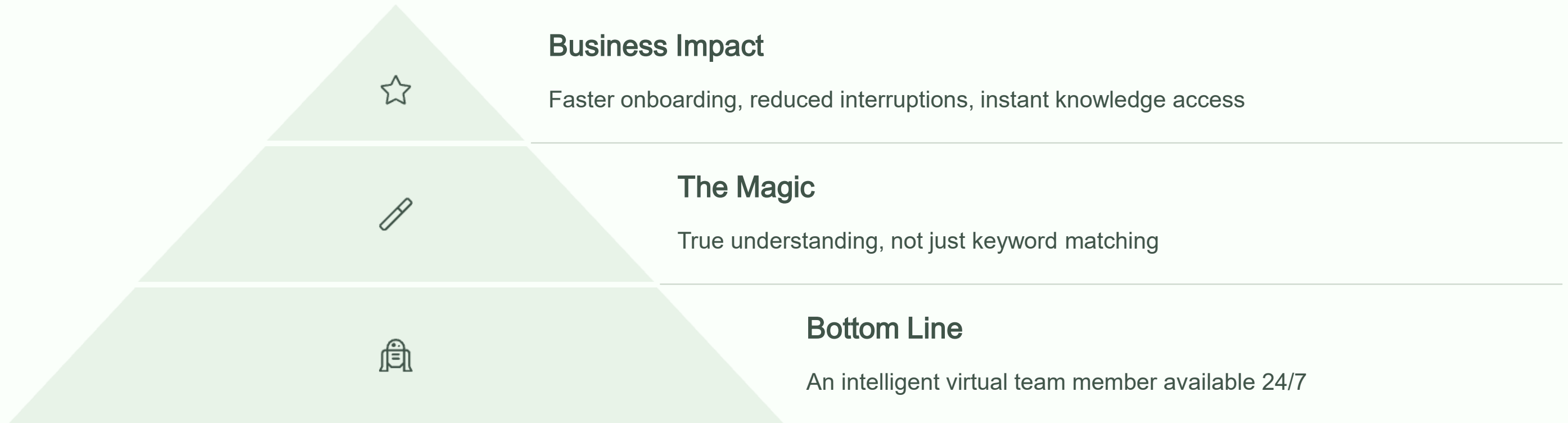
Homework Assignment

Design a chatbot for a specific use case in your organization.

Consider:

- What questions would users ask?
- What information sources would you need?
- Which channels would be most valuable?

Key Takeaways



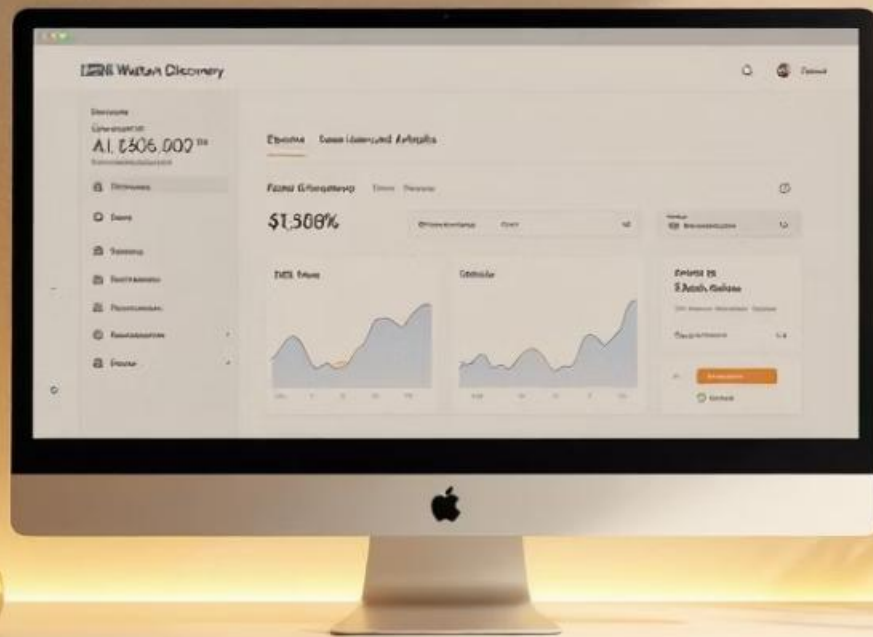
Bottom Line: IBM Watson Assistant lets you build a intelligent virtual team member that can help with information and tasks 24/7, using the same communication tools your team already knows and loves.

The Magic: It's not just keyword matching - it truly understands what people are asking for and can find information from anywhere in your organization's knowledge base.

Business Impact: Faster onboarding, reduced interruptions for senior team members, and instant access to company knowledge for everyone.

IBM Watson Discovery

An Introduction to Cognitive Search and Content Analytics



What is IBM Watson Discovery?

IBM Watson Discovery is an AI-powered search and content analytics platform.

It extracts meaningful insights from large volumes of structured and unstructured data.

The platform uses NLP and machine learning to understand and analyze content.



Key Features



Natural Language Processing (NLP)

Understands human language and context



AI-Powered Search

Delivers relevant results based on intent



Customizable Data Enrichment

Tailors analysis to specific domains



Smart Document Understanding

Identifies document structure automatically



Pre-trained Models

Ready-to-use AI capabilities

Typical Use Cases

Customer service automation

Automate responses to common inquiries and extract insights from customer feedback to improve service quality.

Legal document analysis

Quickly analyze contracts, identify clauses, and extract key information from large volumes of legal documents.

Research and literature review

Accelerate research by analyzing scientific papers and identifying relevant information across large document collections.

Financial services insights

Extract trends and patterns from financial reports, news, and market data to support investment decisions.



IBM Watson Discovery Architecture



Data Sources

Documents, websites, databases



Ingestion

Data collection and normalization



Enrichment

AI processing and analysis



Query

Natural language search



Insights

Actionable information

Getting Started with Watson Discovery

Sign up for IBM Cloud

Create an IBM Cloud account to access Watson services

Create Watson Discovery instance

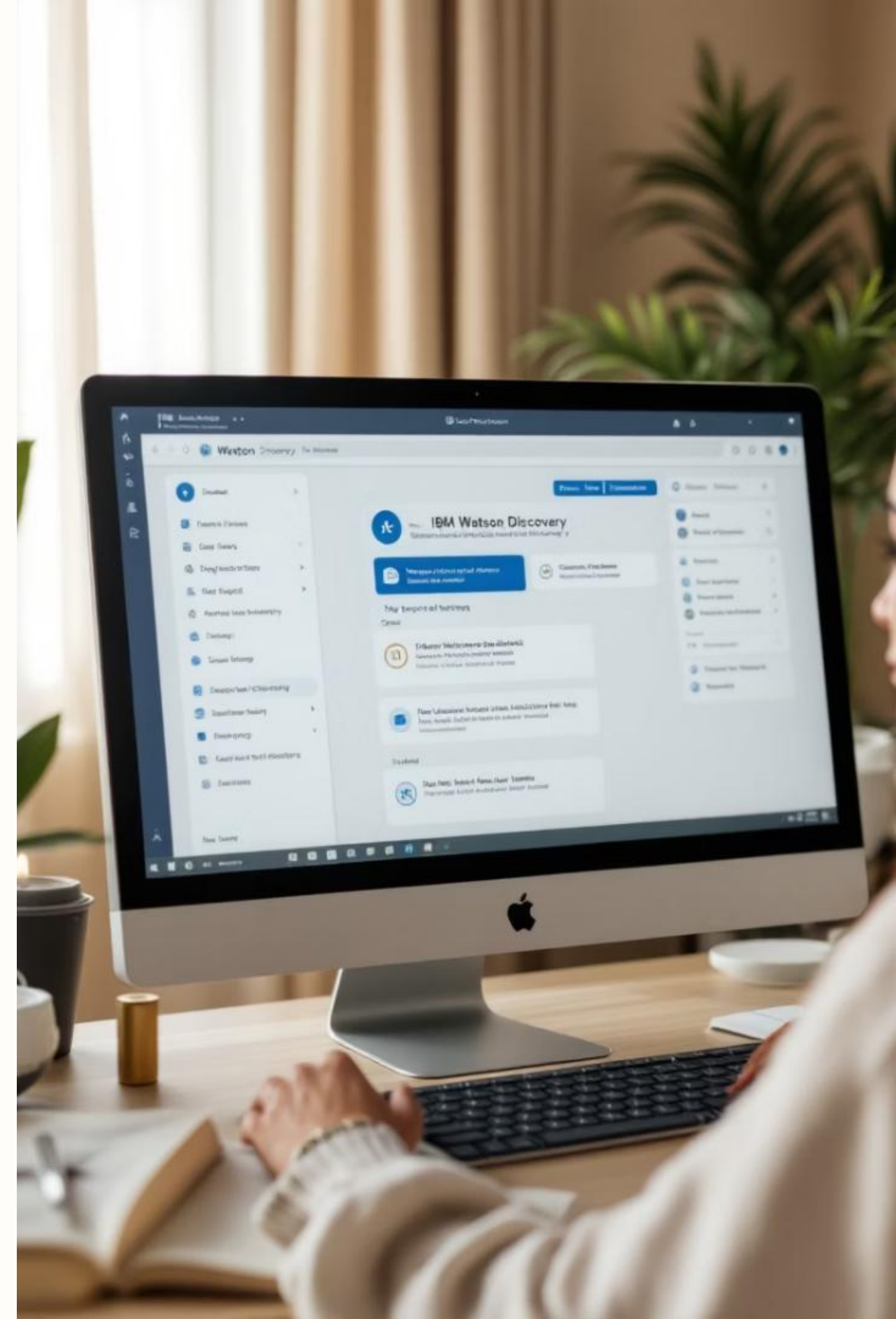
Set up a new instance with appropriate plan and configuration

Upload data (PDFs, Word, JSON, etc.)

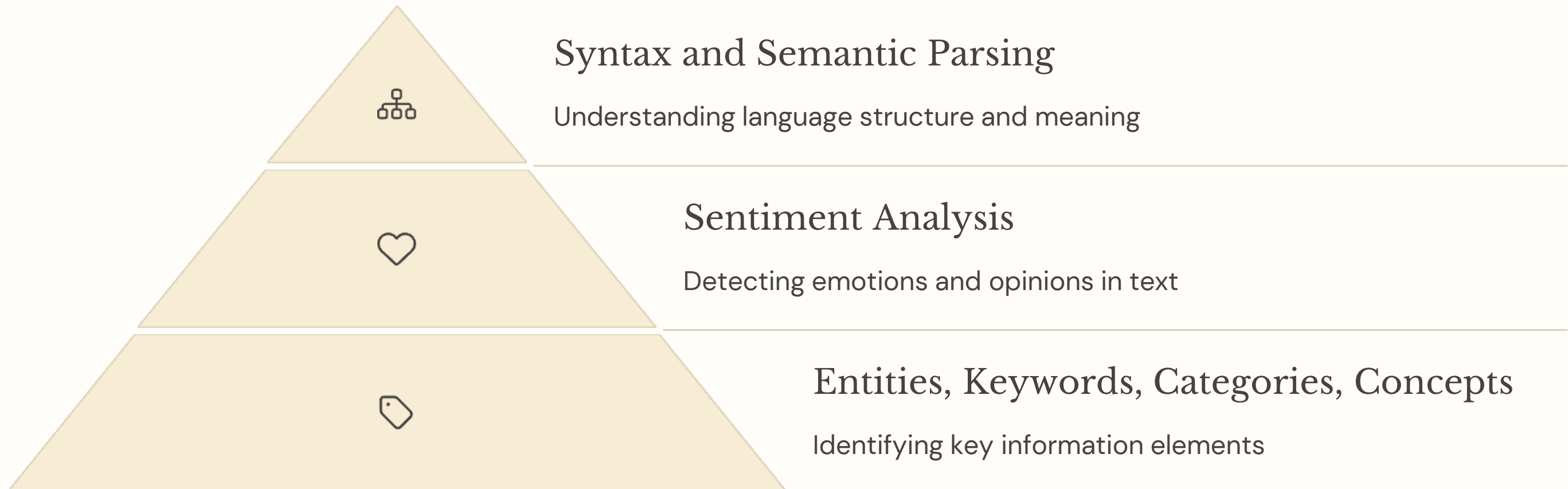
Import your documents into the platform for analysis

Configure enrichments

Set up the AI processing options for your specific needs



Enrichment Pipelines



Querying Data & Best Practices

Querying Data

Use Discovery Query Language (DQL)

Example: `natural_language_query="revenue trends in Q4"`

Filtering and aggregating results

Best Practices

- Clean and structure your data
- Use custom enrichments wisely
- Leverage relevance training



Log in to IBM Cloud

Don't have an account? [Create an account](#)

Sign in with

IBMid

▼

Continue

→

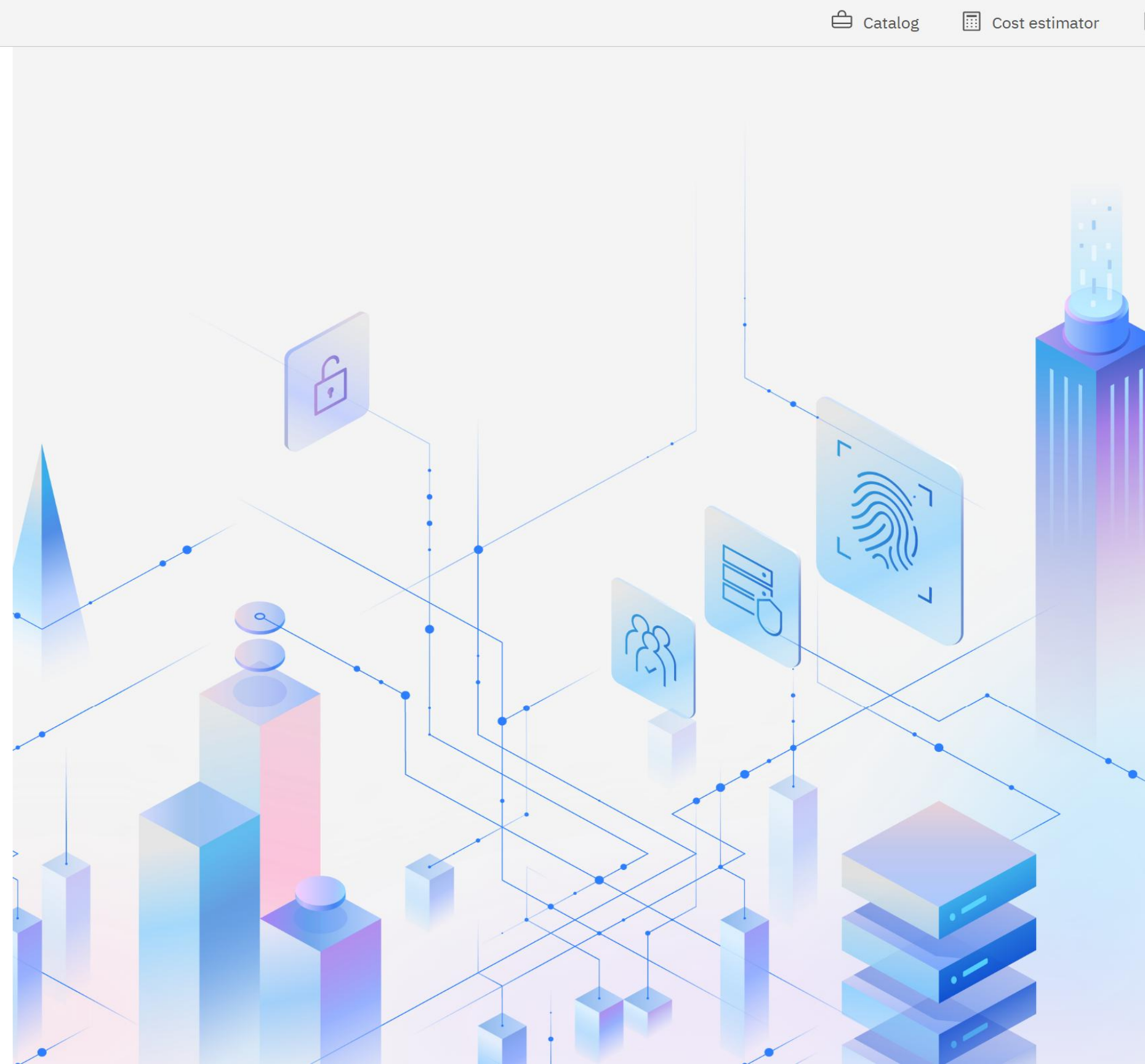
Forgot ID?

☐ Remember ID

Or

Continue with Google





Type

Service

Provider

IBM

Last updated

12/12/2024

Category

AI / Machine Learning

Compliance

EU Supported
HIPAA Enabled
IAM-enabled

Location

Sydney (au-syd)
Frankfurt (eu-de)
London (eu-gb)
Tokyo (jp-tok)
Washington DC (us-east)
Dallas (us-south)

Related links

[API docs](#)
[Docs](#)
[Terms](#)

Select a location

Sydney (au-syd)

Select a pricing plan

Prices shown are for country or location: [United States](#)

Plan	Features and capabilities	Pricing
Lite	Everything you need to get started, free for as long as you need it Up to 1,000 unique monthly active users (MAUs) chatting with your assistant Up to 10,000 messages per month --- Features --- - World-class conversational AI - Make your website assistant your own with Webchat - deploy Webchat in minutes, or use our fully extensible architecture - Keep your assistant up-to-date by automatically scanning existing webpages and documents or by using some of our prebuilt dialog content - Connect to any application or database with a prebuilt integration, or build your own custom integration on top of API endpoints - Create engaging user interactions using images, buttons, and more - Analyze and enhance your assistant with our analytics dashboard - Take comfort knowing your assistant is reliably hosted on IBM Public Cloud --- Limits --- Actions: - 3 assistants per instance - Up to 100 actions - 3 custom extensions per assistant - 7 days of usage analytics - Session inactivity timeout 5 minutes - Services are deleted after 30 days of inactivity Dialog: - Upto 5 Skills (Dialog, Action, Search) - 7 days of usage analytics - Session inactivity timeout 5 minutes - Services are deleted after 30 days of inactivity	Free

Summary

watsonx Assistant

Location: Sydney (au-syd)

Plan: Lite

Service name: watsonx Assistant-xm

Resource group: Default

☐ I have read and agree to the following lic
agreements:

[Terms](#)

Create



Resource list /

watsonx Assistant-qx

Active

Add tags

Details

Actions

Manage

- Service credentials
- Plan

Start by launching the tool

Launch watsonx Assistant

Getting started tutorial

API reference

Plan

Lite

Upgrade

Credentials

Download Show credentials

API key:

.....

URL:

https://api.au-syd.assistant.watson.cloud.ibm.com/instances/bc1c756c-89cf-4c8f-b22e-a2a7



🏠

View all assistants [🔗](#)

What's new [☆](#)

Documentation [💡](#)

Assistant Builder Home

RCM student Inquiry

Last updated on May 10, 2025 1:02:11 PM GMT+3

📘

Your assistant now has new watsonx generative AI features! [Learn more](#) about intelligent information gathering.

Enable in settings

Enhance your assistant

Further improve and customize your assistant with these recommendations.

🛠️

Build actions

Enhance and improve your assistant's actions.

→

🗨️

Customize your greeting

Welcome your users in a unique way that aligns with your brand.

→

📋

Create a fallback plan

Train your assistant to adapt to specific situations.

→

🔍

Set up search

Determine how your assistant extracts answers for your users' questions.

→

🐞

Preview & debug

Enable debug mode when you preview your assistant.

→

🗨️

Customize web chat

Design how your assistant shows up in your live environment.

→

⚙️

Set up...

Select t... want to... assista...

Assistant architecture

Here's an overview that depicts the structure of your assistant.

RCM student Inquiry

Default behavior

Conversational search

No content [Add →](#)

Search

Actions

[View →](#)

Custom-built

1 action [Add →](#)

RCM ONLINE COLLEGE

🏠

View all assistants [🔗](#)

What's new [☆](#)

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No content [Add →](#)

Search

Actions

[View →](#)

Custom-built

1 action [Add →](#)

RCM ONLINE COLLEGE

Customer starts with:

Example: I want to pay my credit card bill.



Conversation steps

This step has no content

1

↓ Continue to next step

Display name

Set a display name to overwrite the action title that appears as the button text in disambiguation.

Enter display name

Get help on ACME bill

Add example phrases

Enter phrases that a customer might say about a specific topic. This helps the system question your customer's intent.

The more phrases you add, the better the system understands what the customer wants.

Enter phrases your customer might say

Example: I want to pay my credit card bill.

New action



What does your customer say to start this interaction?

Example: I want to pay my credit card bill.

Cancel

Save

Getting Locations to RCM office

Editor

Visualization

Customer starts with:

Getting Locations to RCM office

1

total step

0

end steps ⓘ

0

re-ask steps ⓘ

Conversation steps

1

This step has no content

↓ Continue to next step

Set a display name to overwrite the action title that appears as the button text in disambiguation.

Enter display name

Get help on ACME bill

Add example phrases:

Enter phrases that a customer types or says to start the conversation about a specific topic. These phrases determine the task, problem, or question your customer has.

The more phrases you enter, the better your assistant can recognize what the customer wants.

Enter phrases your customer might use to start this action

Total: 6

Enter a phrase

Kindly assist in giving directions to RCM offices

Where in Westlands is RCM located?

Could you assist in sending the pin to the office?

What are the directions to RCM college?

Where is the office?

Getting Locations to RCM office

New step

+

I want to pay my credit bill

Editor

Visualization

Customer starts with:

I want to pay my credit bill

Conversation steps

1

Kindly confirm your names

↓ Continue to next step

Step 1



Is taken

without conditions

Set variable values

fx

Assistant says

B I @ fx ↻ 🖼️ 🎵 + 📺 00 </>

Kindly confirm your names

Define customer response

System

Options

Confirmation

Free text

Regex

Number

Date

Time

Saved

Options

Enable customers to select from a set of choices. If more than 4, options show as a list.

As buttons

Checking

Savings

401 (k)

Roth IRA

As a list

Pay Bill

New step

+

Example of Chatbot Questions for an Accountant Audit



1. **"Can you provide the general ledger and trial balance for the audit period?"**

Purpose: To obtain core financial records as a starting point.

2. **"Have there been any significant changes in accounting policies or estimates this year?"**

Purpose: To identify adjustments that could impact financial reporting.

3. **"Please upload documentation for all transactions over \$10,000 in the audit period."**

Purpose: To verify material transactions and assess risk.

4. **"Are there any pending or ongoing legal cases that could affect financial statements?"**

Purpose: To uncover potential liabilities or disclosures.

5. **"Can you confirm whether all bank reconciliations have been completed and reviewed?"**

Purpose: To ensure accuracy of cash balances and internal controls.

AI APPLICATIONS



Chatbots

- First chatbot built in 1960s
- Now a billion dollar industry, booming around 2015

```
Welcome to

      EEEEE LL      IIII ZZZZZZZ AAAA
      EE      LL      II      ZZ AA  AA
      EEEEE LL      II      ZZ AAAAAA
      EE      LL      II      ZZ AA  AA
      EEEEE LLLLLL IIII ZZZZZZZ AA  AA

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ELIZA: I am sorry to hear that you are depressed.
YOU:   It's true. I am unhappy.
ELIZA: Can you explain what made you unhappy ?
YOU:   █
```

The Story of ELIZA

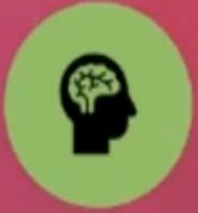
The AI That Fooled the World

When we think about artificial intelligence today, our minds often jump to sophisticated systems like Siri, Alexa, or ChatGPT. But the roots of AI go back much further, to a simpler yet profoundly influential program called ELIZA. Created in the mid-1960s by Joseph Weizenbaum at MIT, ELIZA was an early natural language processing program that amazed people with its ability to mimic human conversation, even though it had no real understanding of the words it processed. Let's dive into the fascinating story of ELIZA, the world's first chatbot, and explore why it remains relevant today.

What is ELIZA?

ELIZA was one of the first computer programs designed to process natural language, allowing it to engage in conversations with humans. Developed by Joseph Weizenbaum in 1966, ELIZA was not intended to understand conversations genuinely. Instead, it was designed to mimic a human-like conversation using simple pattern matching and substitution rules to generate responses. Despite its simplicity, ELIZA captured the imagination of users and set the stage for future AI development.

AI APPLICATIONS



Chatbots

Today's exercise

Exercise description:

- Think about your team (e.g. at work, school, home or community).
- Every time a new member joins your team, they need to learn how the team works.
- We are going to help build a chatbot that will support new team members by answering their general questions.

Goal: Quickly Build a Chatbot

Software: IBM Watson (free online account to do this demo)

What you need to do:

- Download the workbook with instructions
- Watch the following lectures
- Follow along and build your bot

Key Technologies Behind Chatbots



Natural Language Processing (NLP)

Helps chatbots understand user input.



Machine Learning (ML)

Allows bots to improve from interactions.



APIs and Integrations

Connect bots with databases, CRMs, and other tools.

Common Use Cases

Customer Service

24/7 support via websites or messaging apps.

E-commerce

Product recommendations and order tracking.

Healthcare

Appointment scheduling, symptom checkers.

Banking

Balance inquiries, transaction summaries.

Benefits of Chatbots

