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Digital

Chatbots Point of View

Deloitte Artificial Intelligence

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Introduction

Dear Reader,

Chatbots are a clear manifestation that Artificial Intelligence (AI) is moving the hype. We see more and more business applications where chatbots with self-learning capabilities can interact with humans in a more natural way. We can also observe growing sophistication and accuracy of AI which makes chatbots more robust and suitable for a broader range of applications. At the same time, there are also still challenges to overcome. Improvements in natural language understanding or moving towards a more flow-based conversations instead of only "single shot" dialogues are steps that will require more time, investment and research.

In this point of view we want to discuss the latest developments in the chatbot technology domain and provide you with example applications.

We hope you enjoy reading our Chatbot Point of View,

On behalf of Deloitte AI Team,

Naser Bakhshi
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"By 2020, the average person will have more conversations a day with bots than they do with their spouse"

L. HEATHER PEMBERTON | GARTNER

Value throughout your organization

Chatbots are key in your organization's digital journey and in delivering next generation intelligent customer service.

Improve customer acquisition

Show your potential customers your **advanced digital capabilities** and experience with cognitive technologies.

Rapidly scale up and down, always being **able to serve new customers.**

Chat interfaces are everywhere. **customers are ready** for the next step: automated chatting.

Reduce churn

24/7 customer support

High degree of **accuracy** and **high-throughput.** Provide high quality support, whenever the customer demands it.

Increase customer satisfaction by effectively solving their issues

Increase revenue per user

The supporting tasks will be performed by the Chatbot. **Use your people to do what they do best;** sell products and services.

Gather, analyze and act on the customer's preferences and irritations.

Minimize cost to serve

15 – 90% cost reduction opportunity depending upon the characteristics of the functions selected for automation.
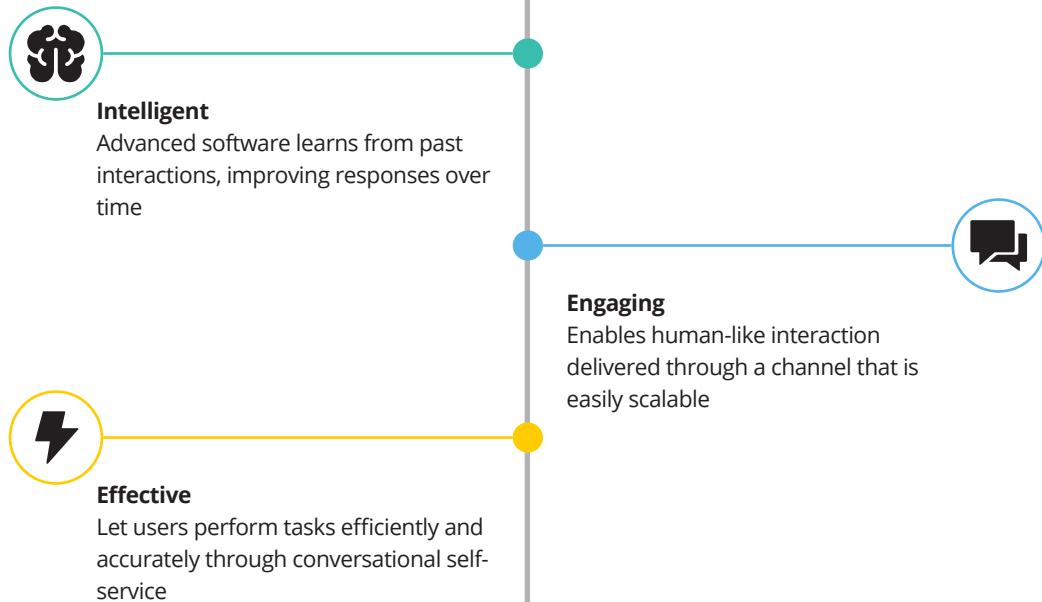
Short payback period with low integration costs and **high potential ROI.**

Mitigate security risks
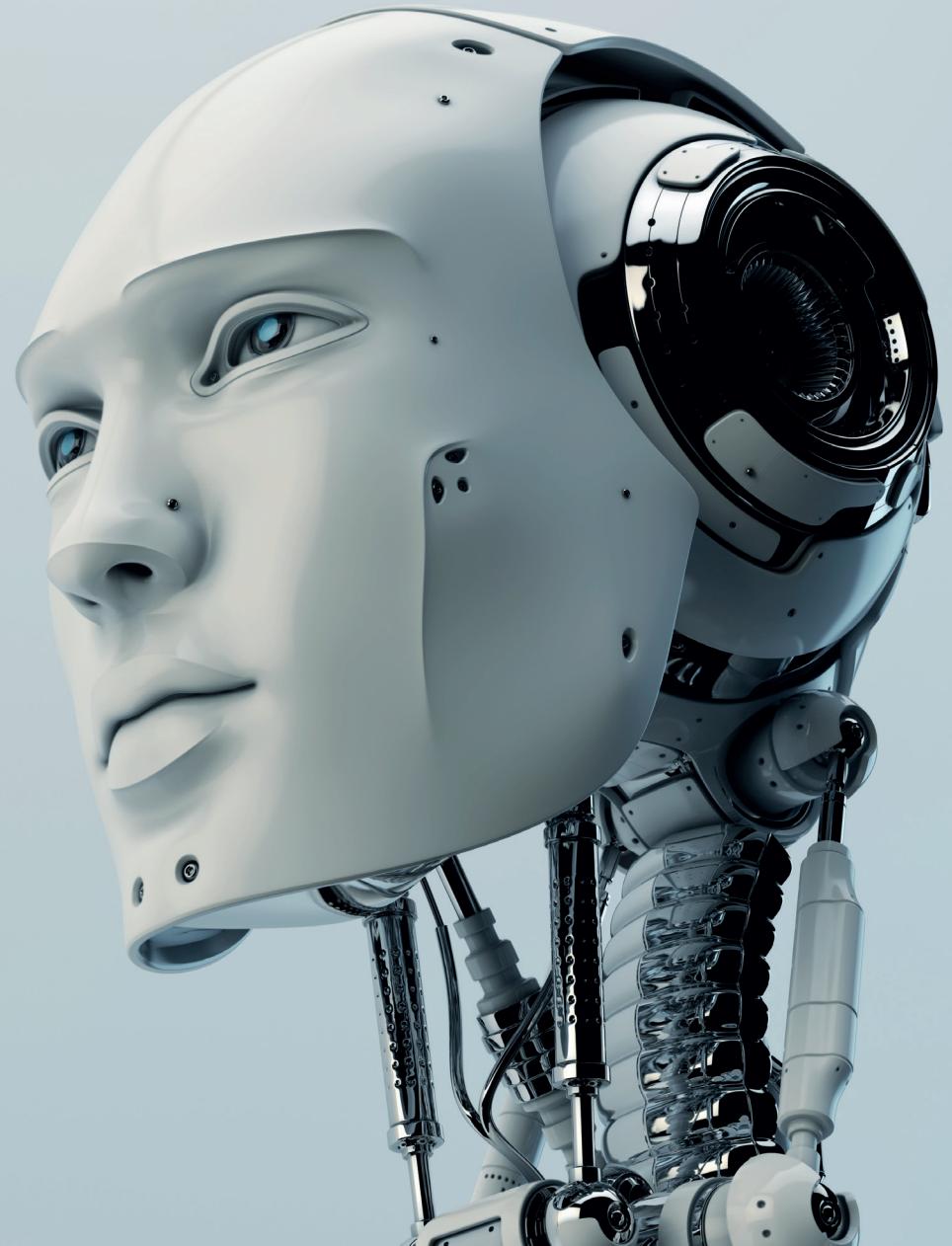
Easily scale up and down depending on customer's demand.

What is a Chatbot?

Chatbots offer a conversational experience using artificial intelligence and natural language processing to mimic conversations with real people.

Intelligent
Advanced software learns from past interactions, improving responses over time

Engaging
Enables human-like interaction delivered through a channel that is easily scalable

Effective
Let users perform tasks efficiently and accurately through conversational self-service

Rise of the Chatbot

Computer power driving Enterprise Intelligence

Systems have evolved from mechanical computation & tabulation devices to intelligent systems that can emulate human cognition.

1900s	1950s	2010s	2020s

Tabulating system era

Mechanical devices assisted in organizing data and e.g. making calculations for employee sales performances evaluation purposes. Ex. Hollerith Tabulating Machine.

Programmable system era

Programmable systems enabled Space Exploration and the development of the internet. This era will continue indefinitely, and will underpin the era of computing that we are in now. E.g. Windows Desktops / ERP Systems.

Cognitive era systems

Cognitive systems are computer systems that have capabilities to emulate the human brain. Ex. Self-driving cars, Chatbots, Virtual Agents...

Amplified Intelligence

Future systems will be able to mimic human intelligence and entirely replicate human interactions.

Welcome to the Cognitive Era!

Big data technologies in conjunction with **cognitive computing** enable us to extract insight from data that was previously unused.

Key drivers

Exponential growth of Data

Smarter algorithms

Faster processing speed

Market forces driving Chatbot opportunities

Developments at both the side of supply and demand drive the added value of Chatbot technology.

Demand

Supply

Increasing pressure on contact centers

High turnover rates, increased need for training and the necessity for reducing operating cost are putting pressure on the traditional contact center.

Technological advances in AI and NLP

Chatbots are going beyond keyword matching. Advancements in Natural Language Processing, processing speed, machine learning models and data availability have made this possible.

The Rise of the Chatbot

Rising demand for self-service

Customers are demanding self-service. No longer are they prepared to wait weeks, days, hours or even minutes for an employee to help them. They need their problem fixed and they need it fixed now!
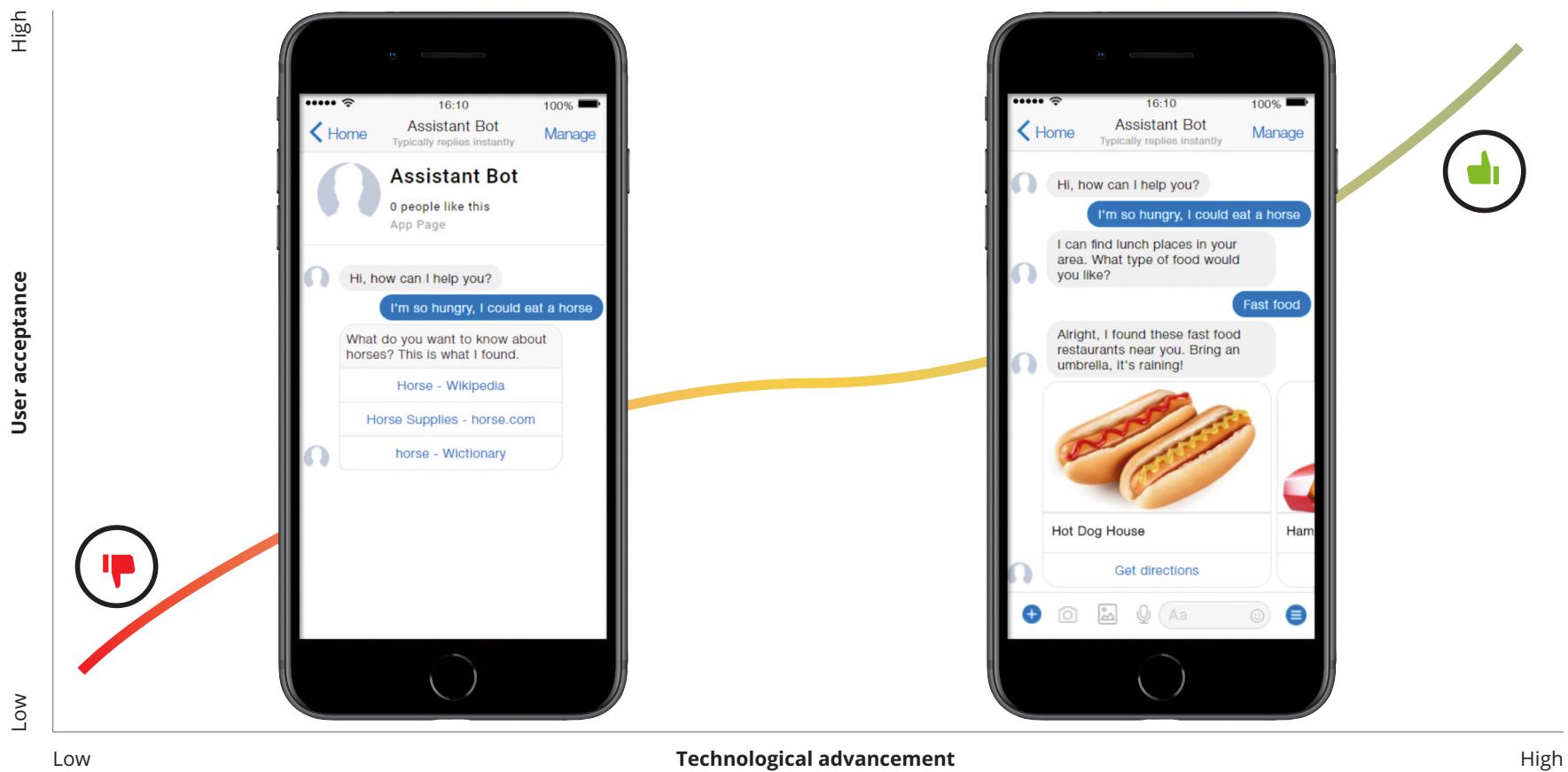
Chatbot platforms maturing

As Chatbot technology becomes more popular, their development platforms become more mature. They come with easy to grasp drag-and-drop interfaces, allowing business users to build and manage Chatbots themselves.

Towards user acceptance

Due to improvements in Natural Language Processing, Chatbots are shifting from command-driven towards more intelligent, conversational driven 'Virtual Assistants', which are much better at determining context and user intent.


User acceptance (vertical axis, Low to High)

Technological advancement (horizontal axis, Low to High)
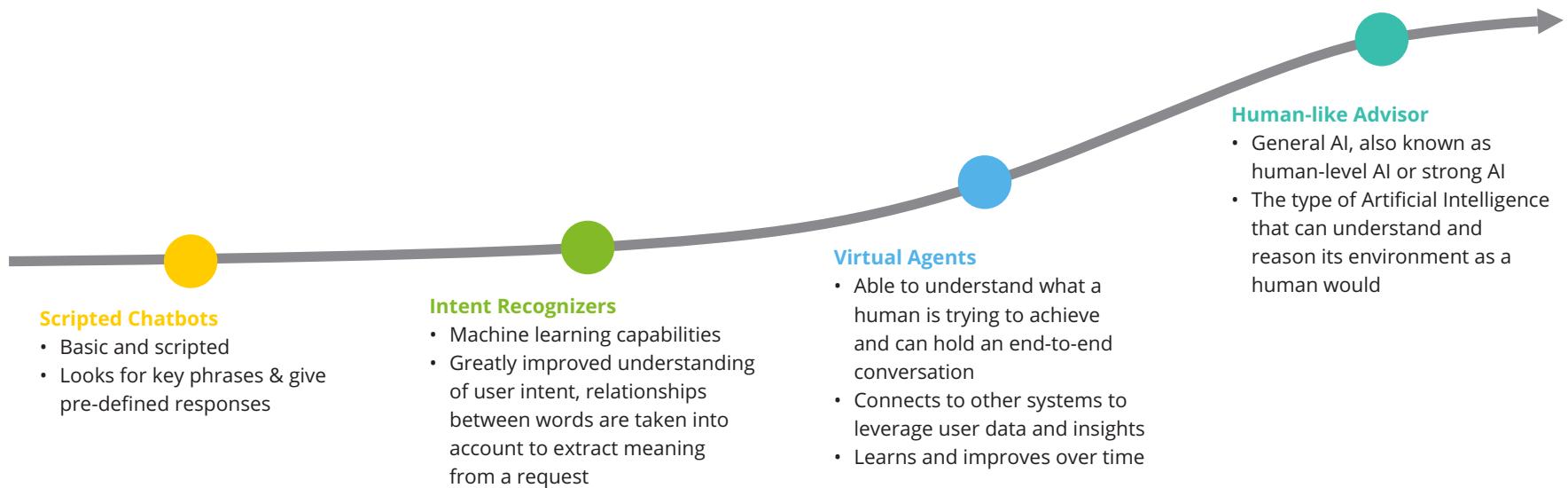
Chatbot Types

Evolution of Conversational AI

Chatbots are like apps that users interact with in a conversational way, through text or speech. As technology advances, Chatbots are able to better understand both written and spoken text.

A Chatbot may be as **simple as basic pattern matching** with a response, or it may be a sophisticated weaving of **artificial intelligence techniques** with complex conversational state tracking and **integration into existing business services.**

Scripted Chatbots
- Basic and scripted
- Looks for key phrases & give pre-defined responses

Intent Recognizers
- Machine learning capabilities
- Greatly improved understanding of user intent, relationships between words are taken into account to extract meaning from a request

Virtual Agents
- Able to understand what a human is trying to achieve and can hold an end-to-end conversation
- Connects to other systems to leverage user data and insights
- Learns and improves over time

Human-like Advisor
- General AI, also known as human-level AI or strong AI
- The type of Artificial Intelligence that can understand and reason its environment as a human would

Chatbots have different levels of intelligence...

There is no clear separation between Chatbots and Virtual agents, as they operate within a large range of complexity in both dialog and processes. Both sides of the spectrum have valuable applications. Below are two examples of applications of different complexity and intelligence.

The user's intent is recognized.

In a FAQ knowledge base, the question is linked to a standardized answer.

The chatbot provides extra information to improve the customer experience.

The entities 'amount', 'recipient' and 'description' are recognized.

The chatbot asks for confirmation based upon the recognized entities.

The chatbot transfers money from the user's checking account using the integrated back-end systems.

The user's intent is recognized.

The Virtual Agent knows which accounts exist and asks the user from which account the money should be transferred.

Left phone (Concert):

●●●●● AT&T 4G — 4 41 PM — 100 %

‹ Messages — Concert — Contact

Today 8:32 AM

Hi there. At what time are the doors open?

Hello! The doors are open at 8:00 PM. Don't be late, the concert has been sold out! Check the entire line-up here:

8:00 PM	Doors Open
9:00 PM - 10:30 PM	The Black Keys
11:00 PM - 0:30 AM	Coldplay

Text Message — Send

Right phone (My Bank):

●●●●● AT&T — 9:41 AM — 91 %

‹ Messages — My Bank

Please transfer 100$ to George for yesterday's dinner.

Do you want to transfer 100$ to George Smith with the description 'Yesterday's dinner'?

Yes please!

Shall I send it from your checkings account?

Sure

Done!

Text Message — Send

...and there is a large range of valuable solutions

Chatbots come in various degrees of intelligence and range from answering questions to having the full capabilities of a service employee. The right level of intelligence should be picked depending on the use case.

FAQ Chatbot
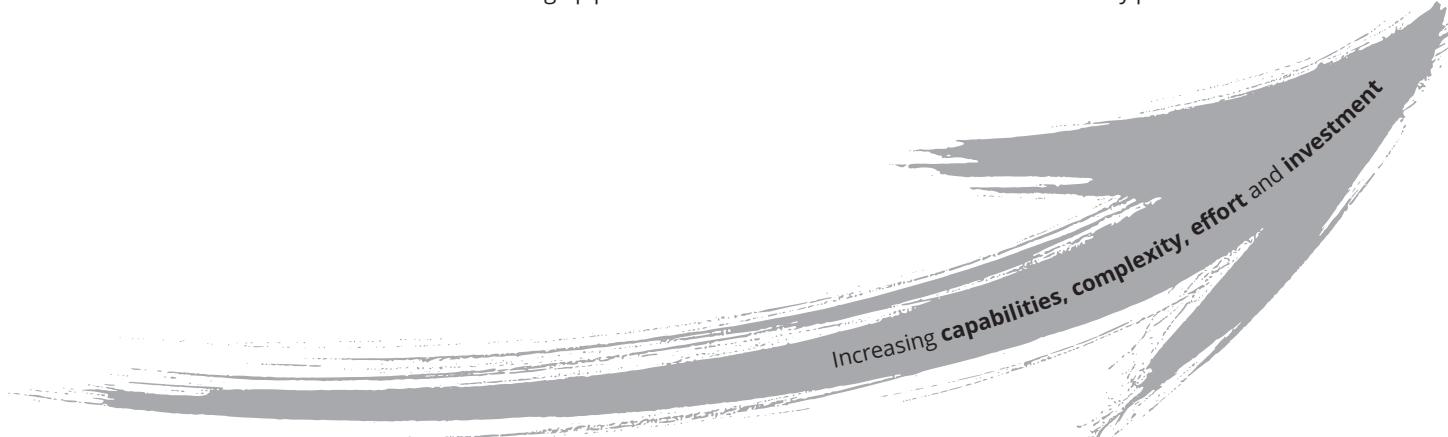
FAQ Chatbots are perhaps the most simple form of a Chatbot, which can already bring plenty of value. It can understand questions and gives the user the most relevant answer.

Virtual Assistant

With slightly higher intelligence we find the Virtual Assistant, which has more integration with enterprise systems and therefore can perform basic actions, such as looking up personal information.

Virtual Agent

The most intelligent Chatbots are Virtual Agents, which can completely replace an employee. These bots can handle the most complex dialogs, processes and security protocols.

Increasing capabilities, complexity, effort and investment
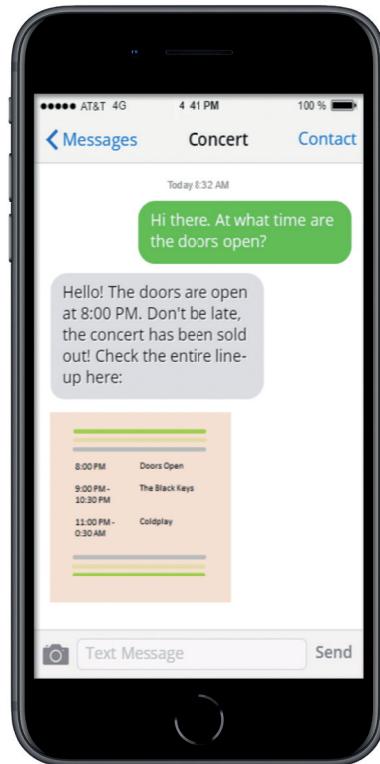
Self-learning Chatbots placed on a webpage can decrease the amount of phone calls to a service desk dramatically answering the most frequently asked questions.

Virtual Assistants decrease service desk workload by, for example, looking up vacation days of an employee, or enabling an employee to buy vacation days through the Chatbot.
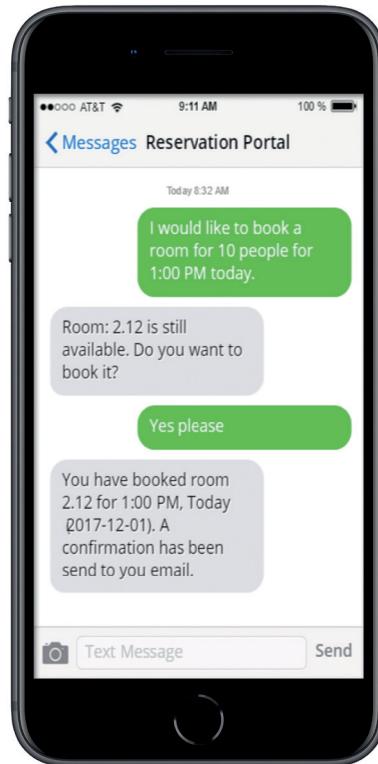
Virtual Agents can handle complex processes, such as walking a client through making a bank transfer or making changes to their personal information, effectively replacing an employee.

Chatbot applications
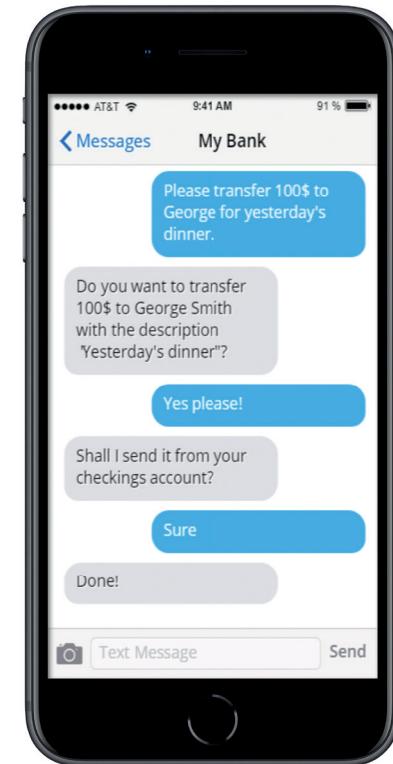
Chatbots have a broad range of applications; they help users with information requests, reservations or personalized tasks like money transfer.

You are in a hurry to catch a train to bring you to the concert of your favorite band. Quickly check if you are going to make it!

You have just heard about an important meeting but are not at the office. Use the Chatbot to quickly identify free rooms and book it instantly.

Instantly transfer money. Use a familiar interface to transfer money, request account information and much more…

Architecting a Chatbot
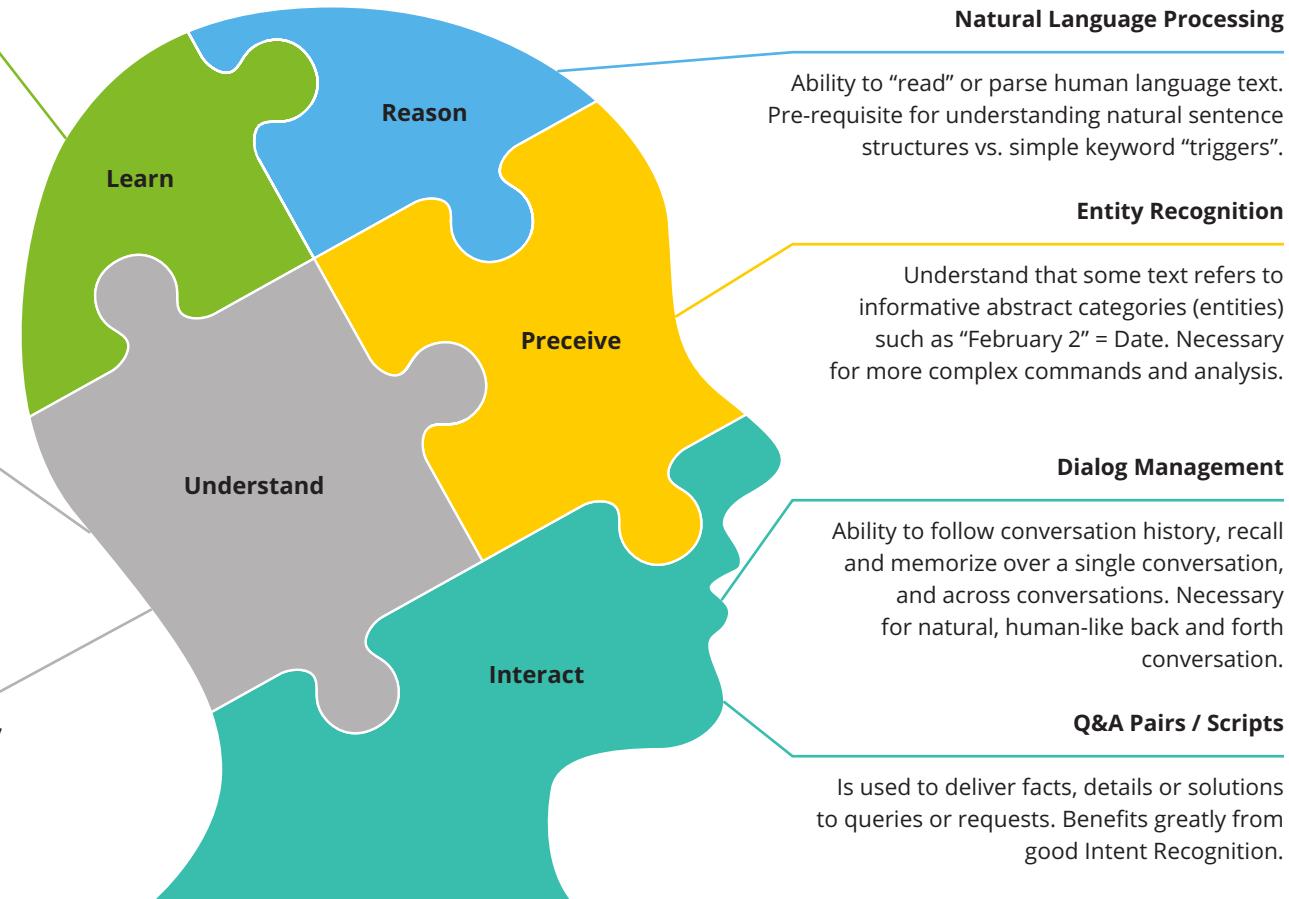
Understanding Language & Context

Chatbots mimic different functions of the human brain.

Reinforcement Learning

Ability to accept user "corrections" over time to improve suitability of responses. Allows the Chatbot to improve and learn off of user inputs.

Machine Learning

Learn how to respond to the user by analyzing human agent responses. Necessary for qualitative intent recognition.

Intent Recognition

Ability to "guess" what the user is requesting, even if phrased unexpectedly. Necessary to enable natural conversation, reduce user frustration and enable the virtual agent to start a relevant dialog.

Learn

Reason

Preceive

Understand

Interact

Natural Language Processing

Ability to "read" or parse human language text. Pre-requisite for understanding natural sentence structures vs. simple keyword "triggers".

Entity Recognition

Understand that some text refers to informative abstract categories (entities) such as "February 2" = Date. Necessary for more complex commands and analysis.

Dialog Management

Ability to follow conversation history, recall and memorize over a single conversation, and across conversations. Necessary for natural, human-like back and forth conversation.

Q&A Pairs / Scripts

Is used to deliver facts, details or solutions to queries or requests. Benefits greatly from good Intent Recognition.

Chatbot Characteristics

There is a big variety in Chatbot development platforms. Below are a number of characteristics that should be taken into account when choosing the suitable platform to implement with your Chatbot.

Intent Recognition
Ability to "guess" what the user is requesting, even if phrased unexpectedly. Good intent recognition is vital if you don't want to annoy your users.

Dialog Management
Go beyond simple Q&A and enable your Chatbot to have complex and meaningful conversations with the user.

Humanization
Users get more engaged in conversation if a Chatbot acts more human-like. Some Chatbots are able to detect and show emotions.

Interaction Channels
How will users interact with your Chatbot? Choose a platform that connects easily with your webchat, app, social media platform or voice interface.

Task Automation Capability
Does your Chatbot need to perform tasks for users? Make sure it has enough dialog capabilities and that it can connect to your back-end systems

Reporting & Monitoring
Are your customers being helped? Are they happy? Does your contact center get less calls? Choose a Chatbot platform that tells you how it's performing.

Ease of Implementation
Some platforms require custom software development, while others allow business users to configure the Chatbot themselves.
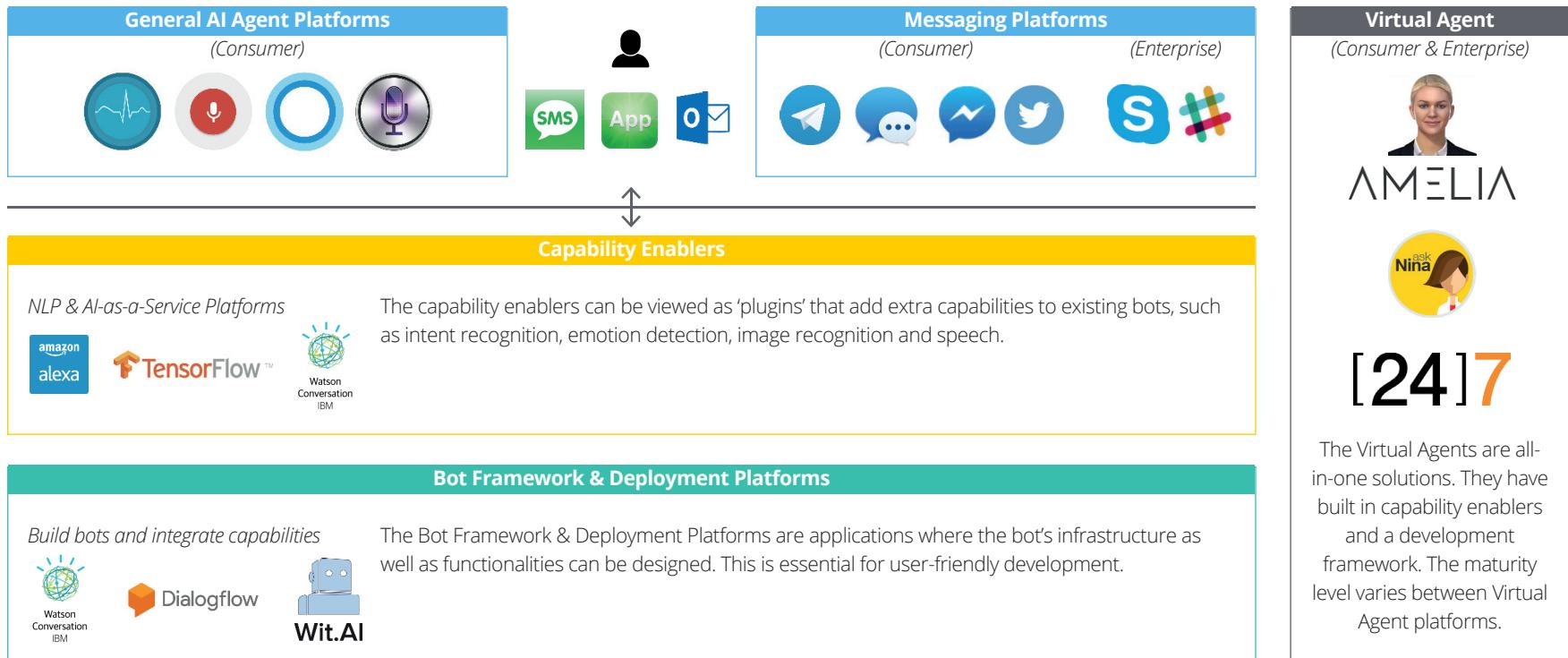
Security & Compliance
Do you have extra security requirements? Or do you need to be compliant with audit regulations? Security and logging capabilities vary amongst platforms.

Understanding the vendor landscape

A Chatbot is often built up from different components. There is a large landscape of vendors of frameworks, capability enhancers and messaging platforms that all provide slightly different functionalities. Some vendors provide all-in-one solutions.

General AI Agent Platforms
(Consumer)

Messaging Platforms
(Consumer)   *(Enterprise)*

Virtual Agent
(Consumer & Enterprise)

AMELIA

ask Nina

[24]7

Capability Enablers

NLP & AI-as-a-Service Platforms

amazon alexa   TensorFlow™   Watson Conversation IBM

The capability enablers can be viewed as 'plugins' that add extra capabilities to existing bots, such as intent recognition, emotion detection, image recognition and speech.

Bot Framework & Deployment Platforms

Build bots and integrate capabilities

Watson Conversation IBM   Dialogflow   Wit.AI

The Bot Framework & Deployment Platforms are applications where the bot's infrastructure as well as functionalities can be designed. This is essential for user-friendly development.

The Virtual Agents are all-in-one solutions. They have built in capability enablers and a development framework. The maturity level varies between Virtual Agent platforms.

Our approach

When to use? How to use?
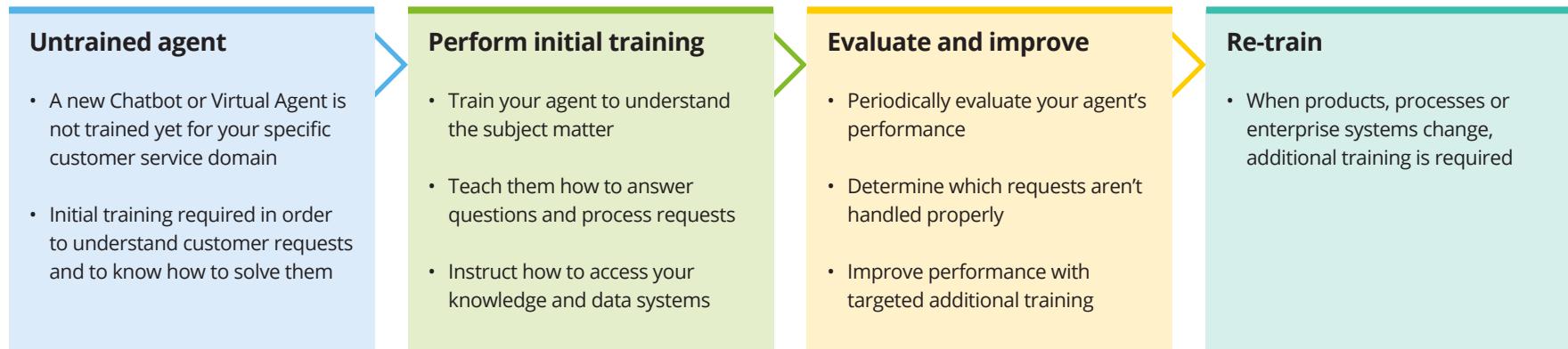
There are a lot of aspects to consider when implementing a Chatbot. The large variety of vendors complicates this process further. It is important to find the Chatbot that fits your particular needs, which means you need to do research before implementing.

|		
	Do your research	Researching Chatbots before deciding to implement one will give the highest return on your investment
	Represent your organization	Chatbots are often a customer facing application, so it is important that it represents your organization in a proper manner.
	Fit your needs	Make sure the solution fits your needs. Don't let a simple Chatbot do complex tasks, don't let a Virtual Agent do simple tasks.
	It's a journey	A Chatbot changes the way you interact with customers. Make sure they see the added value.
	Connect	A Chatbot increases in value when it is well connected to back-end systems, so that it can make changes and request information.
	Augmentation	Use it to make your current services smarter and increase the employee efficiency.
	Easy does it	Start with a MVP to prove value, and add complexity in steps.
	Know your customer	Find out if your customers are ready for the change. If so, what are their expectations?

Train your chatbot

Training a Chatbot or Virtual Agent is not so different from training a human employee: it requires time and investment. Retraining is required when processes or products change.

Untrained agent

- A new Chatbot or Virtual Agent is not trained yet for your specific customer service domain

- Initial training required in order to understand customer requests and to know how to solve them

Perform initial training

- Train your agent to understand the subject matter

- Teach them how to answer questions and process requests

- Instruct how to access your knowledge and data systems

Evaluate and improve

- Periodically evaluate your agent's performance

- Determine which requests aren't handled properly

- Improve performance with targeted additional training

Re-train

- When products, processes or enterprise systems change, additional training is required

Training many human agents with high turnover   **VS**   **Training a single Virtual Agent**

We assist our clients all the way

Deloitte provides support in different stages of implementing a bot within your organization: all the way from the exploration phase to a fully working and integrated solution.

Explore

- Exploring the business value and technological feasibility of applying Conversational AI.

- Understanding the vendor landscape.

Create a Vision

- Set a vision by defining the future channel strategy & mix introducing automated chat

- (Re)design the customer journey across all touchpoints to optimize the experience

Build an MVP

- Mobilize the right team to engage in building a Minimal Viable Product solution to start the learning experience together with all stakeholders (customers, operations, IT, organizational design, …)
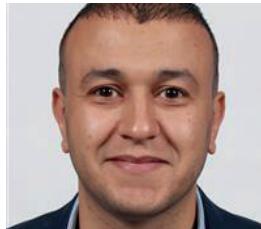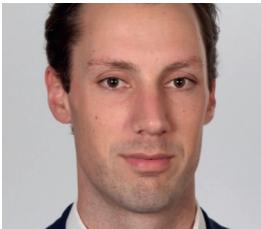
Deloitte Accelerators & Capabilities

- Cognitive Value Assessment
- Vendor Landscape Analysis & Selection Framework
- Chatbot Prototyping Bootcamp

- Channel strategy design
- Customer journey design
- AI solution architecture expertise

- Chatbot MVP Approach
- AI Engineering Capability
- AI Solution Architecture Expertise
- UX/UI design experts

Thank you

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