KPMG

"How may A.I. assist you?"

Conversational AI agents can boost employee performance, productivity and outcomes

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Conversational agents: The next frontier of business productivity

In the past, an employee with a question about how to get something done would ask a knowledgeable colleague for an answer. In the future, they'll ask a conversational agent, and -artificial intelligence will answer their question.

Artificial intelligence (AI) is racing out of the lab and onto the front lines of business, driving companies around the globe to reinvent how they operate. AI has become essential to competing in today's marketplace, for predicting what internal and external customers want and discovering how to serve them with more rewarding and personalized experiences.

One of the most visible applications of AI are "conversational agents"—chatbots and intelligent assistants that interact with people via voice or text channels, on devices such as smartphones, automotive infotainment consoles, and smart speakers. Having conversations with AI is becoming routine for consumers— and soon it will be for employees, too. In the workplace, conversational agents can help workers interact more seamlessly with each other, streamline office operations, execute internal process, and deliver data more efficiently. We believe the next frontier for business productivity is for organizations to embrace conversational agents to better assist employees.

This paper was created for those individuals who are considering embedding conversational agents inside their organization to streamline and enhance internal operations.

This paper includes insights on:

– Where and why to use conversational agents

– How to drive enterprise adoption of conversational agents

– The building blocks of successful conversational agent deployment

– How to grow conversational agent capabilities as technology evolves

AI applications will grow from $644M in 2016 to **$37B** by 2025, **a factor of 56**

IDC expects smart speaker sales to approach $12 billion in 2018 and reach **$28B** in 2022

Where and why to use conversational agents

While customer-facing conversational agents have grabbed attention, leading companies are interested in how bots can streamline and enhance internal operations. Automation has been a lever for business process improvement for some time, but the advent of conversational agents now makes automation naturally accessible to the worker as part of their day-to-day.

**Conversational agents can provide the most significant benefit in three areas:**

Assisting the team: The conversational agent—trained to observe and capture team interactions—accumulates important institutional knowledge. As the bot learns more about the group's patterns and activities, it becomes like a virtual team member, with a photographic memory for past discussions, action items, tasks and reminders. This type of bot is often deployed on collaboration platforms. For example, conversational agents on platforms like Slack, known as "Slackbots," are widely in use as office assistants to complete tasks like scheduling meetings, translating text, and ordering lunch[1].

Streamlining office operations: A task-oriented conversational agent can enable self-service of administrative tasks, alleviating office tedium and making it faster and easier to complete basic work. A classic example is the IT helpdesk bot, which leads employees through common, multistep procedures such as password resets, without human intervention. More sophisticated intelligent assistants allow users to book meeting rooms, or guide employees on content searches. Conversational agents also provide a cost-effective way to thoroughly engage sales leads because it can understand intent, sentiment and urgency and have shown the ability to set 20–30% more appointments than human teams working alone.[2]

Delivering information: This type of conversational agent provides on-demand information and guidance on matters important to the team. The bot alleviates the pain of scaling response teams to address increased demand for company data. For example, a "financial reporting bot" can provide granular fiscal figures at month-close, reducing the demand on financial analysts to craft custom reports. As a portal for vast amounts of information, this type of bot also allows faster ramp up and repurposing of resources between areas, thus reducing retraining.

1 Slack Is Overrun With Bots. Friendly, Wonderful Bots (WIRED, 8.21.15)

2 Conversational Artificial Intelligence – The Final Phase Of The Information Revolution (Forbes.com, Aug. 16, 2018)
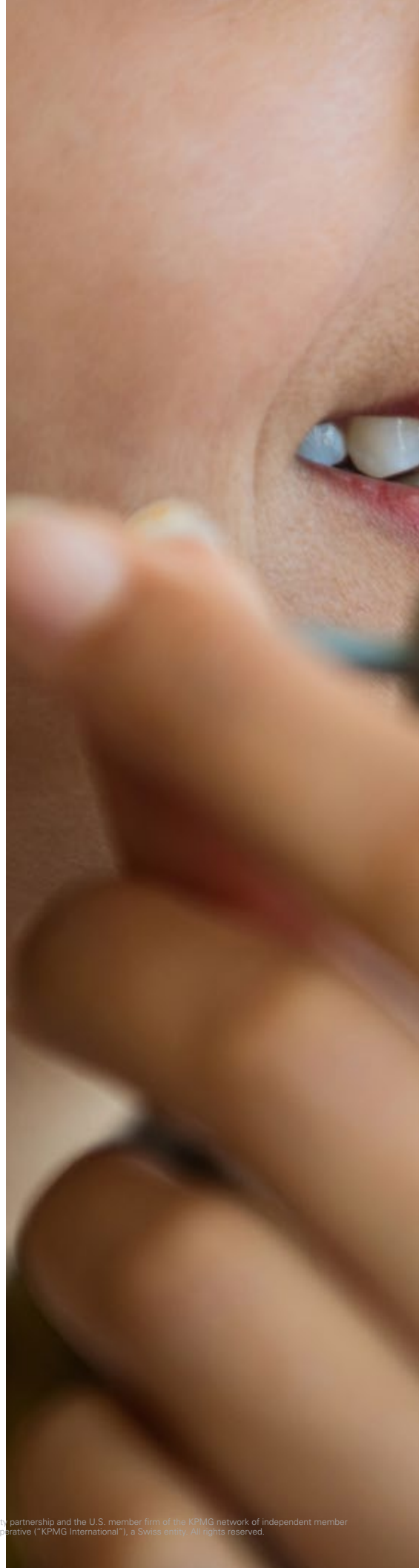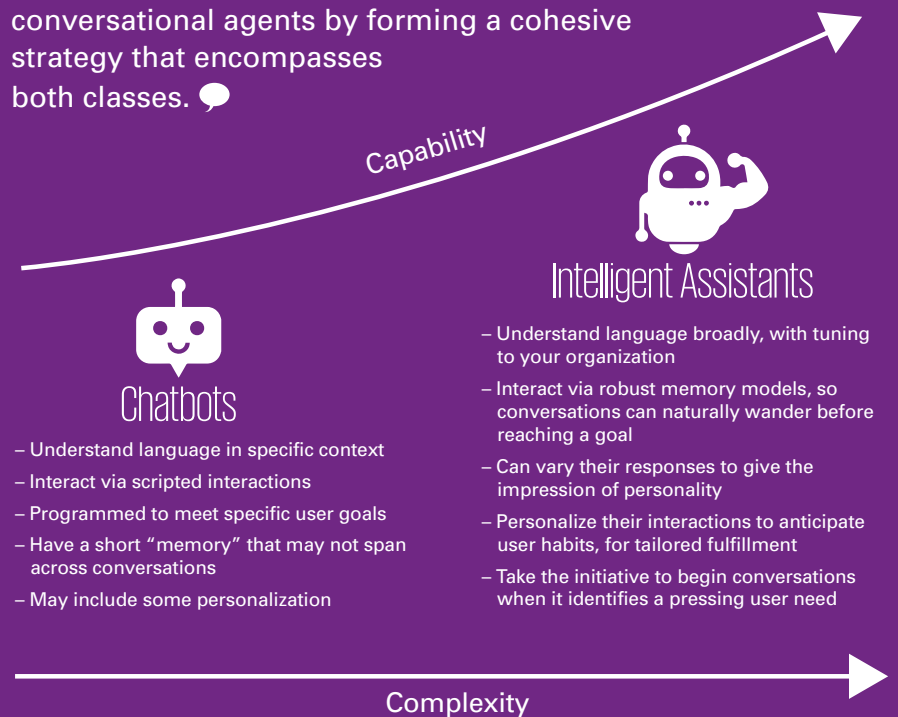
Conversational agents: What makes them intelligent?

Like earlier forms of AI and predictive analytics, conversational agents leverage machine learning algorithms to glean signals from large data sets. But conversational agents are different in that they are engineered to be exceptionally robust and adaptive.

When conversational agents are built properly, end users do not have to speak any differently to the machine than they would to a human. The agent uses Natural Language Understanding technology to parse requests even if they are phrased in the internal jargon of the organization. In addition, the answers that conversational agents give are appropriate—and ideally, useful, constructive, and accurate—even when new situations present themselves.

Conversational agents are often placed in one of two categories: chatbots and intelligent assistants. These classes of agents have different levels of sophistication and capability to help employees, but they both require a similar supporting technology infrastructure. Businesses will achieve the most value from conversational agents by forming a cohesive strategy that encompasses both classes. 💬

Capability

Chatbots

– Understand language in specific context
– Interact via scripted interactions
– Programmed to meet specific user goals
– Have a short "memory" that may not span across conversations
– May include some personalization

Intelligent Assistants

– Understand language broadly, with tuning to your organization
– Interact via robust memory models, so conversations can naturally wander before reaching a goal
– Can vary their responses to give the impression of personality
– Personalize their interactions to anticipate user habits, for tailored fulfillment
– Take the initiative to begin conversations when it identifies a pressing user need

Complexity

Driving enterprise adoption of conversational agents

Classic employee-facing technology initiatives don't exist in a vacuum, and neither will conversational agents. Their development and deployment—and ultimately, their capabilities—will be driven by employee expectations about what they should do, and those will in turn be shaped by the external environment.

Employee expectations for conversational agents at work are undoubtedly shaped by their experiences in the consumer world. Google Home, Microsoft Cortana, and Amazon's Echo platforms have already placed smart appliances—with conversational agents at their core—in thousands of homes, with analyst forecasts[3] predicting 50% annual growth. Even more ubiquitous is the mobile phone as a platform for AI, where the Google Assistant is present on 95% of eligible Android devices worldwide[4], and Apple's Siri is on every modern iPhone device. Nearly all conversational AI platform providers have initiatives in place to expand their platforms into the realm of the enterprise.

To keep pace with AI market leaders, enterprise conversational agent adopters should take a page from their book. Four capabilities stand out as foundational to all conversational agents deployed in the workplace.

1 **Conversational agents must learn.** Employee roles grow all the time. A conversational agent would be useless if it could not grow alongside its employee counterparts. Without some signs of learning, employees will build mental walls around what the conversational agent can and can't do, potentially shrinking its user base and reducing its overall impact. But a conversational agent that continually learns and adapts to meet evolving needs should attract new users and capture more interactions, growing its knowledge base and utility.

3 Smart Speaker users Growing 48% Annually, to hit 90M in USA this year (Forbes, May 29, 2018)

4 Actions on Google gets deeper app integrations and better support for international developers (Tech Crunch, Feb. 26, 2018)

Do bots have personality? Yes.

The **conversational agent's persona** defines how it interacts with users and will significantly impact how users perceive the agent's value. Just like a human employee, the conversational agent's persona should align with the organization's culture. It will also depend on how the bot will be used and the characteristics of the majority of its users.

The conversational agent's persona should be defined at the earliest stages of bot development, but it will change and grow over time as enterprise adoption grows and the bot is refined by user habits.

Enterprises that are adopting conversational agents need to consider that different segments of employees—different **user personas**—will interact with the conversational agent in widely varying fashions:

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2 **Conversational agents must fail usefully.** The conversational agent must know when a conversation is verging past the limits of its understanding. When those limits are reached, it must still provide a constructive response, even if not fully satisfying to the employee. At the same time, it must continually capture and catalogue such events to ensure capability gaps are closed in the next round of training.

3 **Conversational agents must be personalized** and provide assistance that not only meets employee needs, but meets them in a familiar way. Employees are most likely to reuse a conversational agent that is accommodating—i.e., using appropriate language and tone and identifying the same priorities when making decisions. This means empathy for the user when it's needed and efficiency when it's demanded. Developing a conversational agent persona—with language, vocabulary and mannerisms customized to employee's interaction style—is key to building user rapport (see sidebar below).

4 **Conversational agents must prioritize user experience.** At one time or another, conversational agents will be exposed to unexpected kinds of situations. In such events, the conversational agent's response must go beyond simple exception handling in order to preserve user rapport and repeat adoption. Even if its response is at first unsatisfactory, the conversational agent must be able to communicate the limits of its understanding, preventing alienation of the employee to the agent.

These four capabilities help ensure that the conversational agent finds adoption within the organization, and sustainably delivers return on the investment put into its development. Tying adoption metrics back to the initial business case for deploying the conversational agent substantiates the impact that the agent has on overall operations.

User personas

The **newbie**, who is trying to get up to speed, won't always know what he is asking for, let alone what to call "stuff." He may not even be comfortable with workplace technology.

The **worker bee** has a good base of knowledge and is primarily looking for ease of use. She wants to get things done in rapid order and uses a moderate degree of jargon.

The **boss** wants current data and crisp answers quickly, and expects the bot to speak company vernacular.

By characterizing each employee and matching them to a user persona, the bot can tailor the interaction to each individual's needs. Wrong persona assignments will happen, but they are not insurmountable. The AI system just needs to periodically rematch employees to persona types, and add new, more granular personas as needed.

Developing building blocks of successful conversational agent deployment

To ensure conversational agents deployed in the workplace deliver value and can be sustained, organizations must master three key areas: technology strategy, organizational capabilities, and organizational culture. Based on KPMG's work helping organizations leverage and gain significant long-term value from conversational agents, we provide some important tips for investing in these three areas.

Technology strategy

Deploying conversational agents requires a clear understanding of the technology underpinning the bot interface, task fulfillment, and knowledge curation and governance.

Bot interface: The bot interface defines how employees interact with the conversational agent and is the key driver for fostering adoption. Usability and user experience should be assessed, defined and validated as early as possible in the development process. For example, if employees traditionally send topical questions to a central email inbox, then the bot should communicate via that same email address. Harmonization will reduce the need for user retraining and make it easier for employees to start interacting with the bot.

Task fulfillment: Task fulfillment is how the bot interfaces with other systems to take in information and initiate processes. The bot must be able to consult existing sources of truth, acting as a portal to existing sources of record. In addition, tasks must run in a manner independent from bot operation, allowing the user to pick up new conversation arcs with the bot while other tasks are completing, and realizing promised productivity gains.

Knowledge curation and governance: As the conversational agent learns and adapts, the organization must curate and organize the data it is trained on, the responses it provides, and how its persona is tuned. These processes provide vital data for assessing bot performance and user experience and are crucial to both the development and governance of the bot's overall capabilities and providing insights into the voice of the customer.

Enterprise adoption challenges

Deploying conversational agents internally is in many ways easier than in the consumer world. Scope is more easily controlled, and there are fewer expected personas to design for. Indeed, many organizations deploy conversational agents internally first—using them as kind of a testing ground before rolling them out to customers—as internal failures often have softened consequences.

However, organizations do face challenges in adopting conversational agents in the workplace.

Scarce training data. Even in very large organizations, an internal workforce will have a smaller user base, providing fewer interactions, than a bot deployed to the general public. This is particularly the case for bots built to automate niche functions.

Risk concerns. Even conversational agents deployed for internal consumption can introduce risk. In domains where the agent provides guidance, such as HR or Compliance, the organization may wish to review and vet all responses before bot deployment.

Accessibility. From a UX standpoint, the organization should also utilize inclusive design practices to ensure the bot interface is accessible to all potential users, regardless of working situation, capability, or language proficiency.

Privacy concerns. Just like customer-oriented virtual assistants, conversational agents in the workplace learn by collecting feedback and behavioral data. To manage privacy concerns, organizations should be transparent about how data may be used, and give employees an opportunity to choose to participate. After opting-in, employees should be able access their conversation history and have the ability to temporarily turn off the bot's listening capabilities if needed.

Developing building blocks of successful conversational agent deployment (continued)

Organizational capabilities

Analysts forecast that conversational agents will disrupt how organizations do work, as well as the kinds of work people do on the job. Offerings in the technology marketplace have already started to examine how conversational agents can improve business functions ranging from sales screening, to recruiting, to scheduling meetings and resources[5]. At KPMG, we believe the range of solutions accessible by conversational interfaces will only continue to grow across the array of enterprise functions and verticals.

Organizations will need to onboard new skillsets to support the deployment of conversational agents. They will also need to redefine operations to get the most value from human employees and bots, based on their distinct capabilities.

Let's examine some of the specific roles both technical and non-technical people will play—and skillsets needed—to enable enterprise adoption of conversational agents:

Subject matter experts from the areas where conversational agents will be deployed and will document the context surrounding their day-to-day task completion: the language they use, the procedures they follow, the data they leverage, and how they measure success.

User experience designers, data scientists and data engineers will develop processes for logging data from subject matter experts, and in the future, bot users.

Ontology managers and knowledge management experts will build a system that not only speaks the language of the organization, but can tie words and phrases to meaningful entities, and create context within the organization.

Communications staff members will write task-oriented dialogue flows to define how the conversational agent will converse and interact with users. These scripts must cover the multiple different paths a user might take to reach an end goal.

Organizational culture

Bringing on bot employees is a major change for any workplace—and it's rarely without opponents. There are those who think technology can't get the job done and those who worry it will eliminate their role. In such a strained environment, how can humans and bots hope to work together effectively?

Change management and governance are crucial but often overlooked areas of implementing conversational agents. They are essential in creating a culture where conversational agents can flourish alongside humans.

Interestingly, the bot can actually do a lot of the change management and governance work itself, driving long-term adoption and ROI.

Advertising bot benefits: The conversational agent should be engineered to continually advertise what it can do. By keeping users informed of its evolving capabilities, the conversational agent will inspire employees to repeatedly return to it for more information and more assistance. Without this proactive cheerleading, employees may assume that there's no reason to turn to it for untested capabilities or unanswered questions.

Preventing misuse: The conversational agent's longevity in the organization will in part be determined by its durability. The bot's design should not be constrained by the undermining actions (intentional or unintentional) of those who are fearful of it or those who lack understanding of how it operates. With proper control mechanisms in place, the conversational agent should be able to filter out training data which would otherwise inhibit its learning, and tolerate bad data when it does get through.

5 The AI Disruption Wave (TechCrunch, 2016)

Conversational agent case study:
Trust drives bot adoption

A financial services company implemented a conversational agent to deliver automated responses over an email interface to its associates. The conversational system realized full automation of more than 50 previously manual processes which had occupied the efforts of an entire reporting team. But the company became concerned about the bot's trustworthiness. How could company leadership be sure the bot always provided the proper response? How would associates learn to trust machine-provided guidance?

KPMG developed guidelines for successful bot development:

If the bot will replace humans at some tasks, tell the humans first. Waiting until the bot demonstrates that it can stand in for humans is too late. Informing people at the outset allows the organization to focus on shifting people's time to higher value work and training the bot to augment people's capabilities, serving as a helpful extension of their own intelligence.

Tell people if a bot is a bot. When designing for trust, it is counterproductive to hide from employees the fact that they are talking to a bot. Organizations will lose the opportunity to capture training data and to get users comfortable working with a bot coworker. Working with a bot should be viewed as a value add, not a dark secret.

Make the bot sensitive to employee information. When a conversational agent is an interface to sensitive data, the design must be sensitive to how that data is delivered. This consideration extends beyond security and user authentication. For example, instead of reading aloud a confidential quarterly report to everyone within earshot, a more appropriate conversational experience would send the report to the user's smart device. Knowledge management keeps track of which data are sensitive, to whom, and in what context.

Show users when the bot has learned. Employees are far more accepting of a bot's failures to understand if they are able to see that the bot is improving. Incrementally adding new capabilities instills a sense of trust that the bot will be able to assist with their future requests. If employees understand that the system is adaptive, it will foster a sense of dependability and encourage continued adoption. 💬

Growing conversational agent capabilities as technology evolves

Successful initial deployment is only the first step on the conversational AI journey. Continual learning and feature expansion are table stakes to keep relevant in the current market.

While many vendors advertise an integrated, end-to-end conversational solution, our experience is that a single-source approach can be overly restrictive. Instead, deploying supporting components as "micro services" allows configurability, without vendor lock-in.

Organizations should consider the following factors in designing a data infrastructure for conversational agent deployment.

Support for data-driven testing and planning: The AI platform should provide the groundwork for making data-driven decisions about how conversational agents will evolve over time. For example, A/B testing and metrics will enable the organization to monitor and act on data coming in from users.

Integration with enterprise knowledge management systems: The AI technology architecture should allow the conversational agent to tap into the organization's collective knowledge. Integration with other enterprise systems will help the bot curate data from different functions, learn domain-specific language, and acquire new capabilities.

Availability: The conversational agent has to be working any time employees are working. But it's not just about live time. The bot must maintain the highest quality service during all interactions, regardless of when they occur or from which platform they arise.

Policy bots working hand in hand with internal risk

KPMG worked with a large multinational financial institution to design a conversational agent to help improve company-wide regulatory compliance. Like all financial institutions, the client is required by regulatory bodies to ensure that their employees avoid independence conflicts in their personal account dealing, a challenging task due to frequent policy changes and interactions between policies of the various regulatory bodies.

The client's request was for the conversational agent to handle simpler questions, thus freeing up time for the risk personnel to investigate more complex issues. In just four weeks, KPMG went beyond a simple 'FAQ-bot' approach, to demonstrate scalable handling of policies. 💬

Key insight

Dialogflow is a Google-owned developer of human–computer interaction technologies based on natural language conversations. Tools like Dialogflow can be quickly built to handle 1) short 2-to-4-turn exchanges that are not expected to evolve, 2) small talk, and 3) direct Q&A lookup.

However, applications like regulatory compliance require that the agent adapt to changing policies to answer even simple-seeming questions, for example 'do I need approval to purchase stock?'. They also need the agent to be able to discuss the policy changes, for instance 'when did that change?" or 'was this the policy last year?.'

Despite this complexity, the agents must also be both exact and consistent in the answers they provide to avoid causing people to act in violation of policy. If the goal is for the agent to provide specific policy-based guidance like this, clients will need to invest the time and energy up-front to build a dialog manager built on a scalable, dynamic business rules engine. The rules engine will allow the agent to reason about policies and how they interact to generate flows that are correct, exact, and consistent, all dynamically and within context. 💬

KPMG's approach to deploying conversational agents at work

As organizations recognize conversational agents to be the next innovative technology to shape how we work, KPMG has the knowledge and experience to help them seize the benefits.

We've joined organizations at various points on their journey toward enterprise adoption of conversational agents, and our approach is relevant regardless of the starting point. This is because we work to define an approach based on a careful assessment of the organization's existing capabilities and desired outcomes.

Our approach helps set up conversational agent projects for quick wins. It then drives success by readily addressing common enterprise adoption pitfalls and putting in place the building blocks for iterative improvement and expansion.

This approach has helped numerous organizations–from major retail banks, to mortgage lenders, healthcare payers, insurance and investment firms–successfully leverage conversational agents to improve internal operations and deliver information and data more efficiently and effectively.

1	Define conversational AI strategy ▼	• Identify where and why a conversational interface could be used within existing organizational roles and processes • Define platform strategy and guiding principles • Define business value metrics aligned to organization strategy, and tied to usage
2	Assess current capabilities ▼	• Profile any existing use of conversational AI within organization • Assess supporting data science and technical roles • Inventory available knowledge bases and data sources
3	Use-case focused design ▼	• Create personas for both users and AI agents • Design user experience: voice, text, multimodal, conversation medium • Feasibility testing campaign with preliminary conversation designs
4	Minimum viable product (MVP) creation ▼	• Prioritize "core" capabilities and features to realize useful state • Begin user experience and adoption tracking, and optimize design choices on metrics • Hone human-in-the-loop training and design roles to illustrate how subject matter experts will provide feedback to the bot
5	Iterative learning and growth ▼	• Push learning strategy to feature growth initiatives • Capture user dialogues and feedback, and exercise next-best-feature discovery • Sustain AI feature alignment through bot governance and curation • Change management and training to drive usage adoption and continued improvement

About the KPMG Lighthouse

The KPMG Lighthouse combines data-driven technologies and capabilities alongside deep-rooted domain expertise to accelerate innovation and to drive speed and relevance to our client's businesses.

Our people leverage data, analytics, and artificial intelligence solutions to accelerate digital transformation at a global scale.

KPMG has received a Leader ranking among Insights Service Providers in The Forrester Wave™: Enterprise Insights Service Providers, Q3 2018 report.

Noted among four service providers standing out as "clear leaders", KPMG is among those who deliver "comprehensive data and analytics services, effective insights-to-execution support and impressive partner ecosystems."

For more information,
visit kpmg.com/datadriven

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Dr. Arthur J. Franke is a data scientist in the KPMG Lighthouse. Arthur leads teams across all phases of conversational AI development, adoption and evolution, from virtual agent technology architecture assessments, to task-oriented virtual assistant builds, to bot-of-bots knowledge management initiatives.

With his focus on conversational systems and unstructured data, he has helped build client solutions across several industry verticals.

In his spare time, Arthur develops voice-first conversational applications for astronomy and science outreach.

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