PwC DeNovo Strategy-on-Demand
Artificial Intelligence/Voice assisted commerce in Banking

“Could you provide a landscape and adoption of Artificial Intelligence/Voice assisted commerce solutions by banks?”

Sample deliverable
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Conversational commerce solutions in banking have emerged by utilizing chat, messaging and natural language interfaces to engage with customers

**Conversational Commerce**

- **Conversational commerce** combines chat, messaging or other natural-language interfaces with natural language processing, speech recognition and voice recognition to process human language input and converts it into understandable representations.
- Banks adopt conversational commerce solutions to allow customers to transfer funds, check account balances and receive answers to queries.

**Key conversational commerce solutions and their adoption by banks**

<table>
<thead>
<tr>
<th><strong>Interactive Voice Response (IVR)</strong></th>
<th><strong>Chatbots</strong></th>
<th><strong>Virtual Personal Assistants</strong></th>
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<tr>
<td>Automated telephony system that interacts with callers, gathers information and routes calls to the appropriate recipient. IVR primarily uses rules-based advance decision trees.</td>
<td>Easy-to-use applications which interact with users via conversational text or voice (i.e., text-based or voice-based chatbots) and are normally used for a single function (such as a help desk). Chatbots use rules-based regular expression matching, deep learning or deep Q&amp;A and discourse understanding to provide “human-like” responses.</td>
<td>Computer programs that interact with users and simulate conversation based on natural language processing and machine intelligence. Assistance can be derived across multiple applications from user input, location, and patterns of behavior to provide real-time relevant information.</td>
</tr>
<tr>
<td>CitiPhone Banking allows clients to partake in virtual banking by responding to automated voice prompts.</td>
<td>American Express launched a Facebook Messenger chatbot to send customers real-time purchase alerts and key information about American Express benefits.</td>
<td>Bank of America has developed virtual assistant, Erica, which analyzes the financial state of clients through text and voice-based interactions.</td>
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</table>
Conversational commerce solutions rely on Natural Language Processing and speech recognition to transform human interactions into discernible insights

### Key conversational commerce solutions

<table>
<thead>
<tr>
<th>Technology</th>
<th>Description</th>
<th>Example</th>
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<tbody>
<tr>
<td>Interactive Voice Response (IVR)</td>
<td></td>
<td></td>
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<tr>
<td>Chatbots</td>
<td>Ability of computer programs to understand text and voice based human interactions as well as derive meaningful insights from the interactions</td>
<td>Goldman Sachs has invested in Kensho Technologies, which makes robots that can answer complex financial questions</td>
</tr>
<tr>
<td>Virtual Personal Assistants</td>
<td></td>
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</tr>
</tbody>
</table>

### Technologies that enable conversational commerce

<table>
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<th>Technology</th>
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<tbody>
<tr>
<td>Natural Language Processing (NLP)</td>
<td>A sub-topic of Natural Language Processing that follows business rules and algorithms to analyze and interpret data to produce logical human understood sentences</td>
<td>Virtual personal assistants such as Amazon’s Alexa, Microsoft’s Cortana, Apple’s Siri, and more, utilize NLG to communicate back with the user</td>
</tr>
<tr>
<td>Natural Language Generation (NLG)</td>
<td>Software applications based on Robotic Process Automation (RPA) that use advanced analytics to make predictions and suggestions. Applications proactively initiate actions without prompting users</td>
<td>BoA’s chatbot “Erica” scans the financial state of clients and offers opportunities to optimize their banking functions</td>
</tr>
<tr>
<td>Proactive Software Agents</td>
<td>System that recognizes the spoken word so that it can be processed into text or an input or output</td>
<td>Capital One customers can use Amazon Alexa-enabled devices to check balances</td>
</tr>
<tr>
<td>Speech Recognition / Speech Synthesis</td>
<td>Method of computer translation that translates natural spoken language in real-time from one language into another language</td>
<td>Caixa Bank has partnered with IBM to develop a cognitive system based on IBM’s Watson that is able to understand Spanish</td>
</tr>
<tr>
<td>Voice Recognition / Voice Biometrics</td>
<td>Method of authentication which uses an individual’s unique voiceprint to ascertain identity</td>
<td>Citibank has launched voice biometrics authentication from NICE for its Asia Pacific consumer banking customers</td>
</tr>
<tr>
<td>Intelligence Engines</td>
<td>Complex rules engines that combine rules, predictive and prescriptive analytics based on user data, profiles and history that provide real-time “intelligence” through search, dashboards, or applications</td>
<td>Ally Bank’s Ally Assist is a virtual assistant that responds to customer inquiries using automated intelligence and customer profiles</td>
</tr>
<tr>
<td>Rules-Based Regular Expression Matching</td>
<td>Rules and searching algorithms that select an appropriate response from a repository of predefined response based on user input and context</td>
<td>Dyme’s Facebook Messenger chatbot converses with customers by providing options to answer linked to predefined responses</td>
</tr>
<tr>
<td>Deep Learning</td>
<td>A method based on learning representations of data that attempt to model high-level abstractions in data by using multiple processing layers, with complex structures or otherwise, composed of multiple non-linear transformations</td>
<td>Microsoft’s AI chatbot on Twitter generates responses based on overall context and commands</td>
</tr>
<tr>
<td>Deep Q&amp;A and Discourse Understanding</td>
<td>Process of building meaning from segments of language such as conversations, articles and textbooks to enable ‘intelligent conversation’ and discourse with the machine</td>
<td>Clinc’s voice-powered AI platform for banking, Finie, moves away from rules-based commands to support unbounded and unconstrained speech to answer common and complex queries</td>
</tr>
</tbody>
</table>

Sources: PwC Analysis, PwC Emerging Technologies Lab, Company Websites, Crunchbase
Banks are adopting conversational commerce solutions to provide personalized solutions, improved customer experience and circumvent high costs associated with manual systems

**Drivers of trends in conversational commerce solutions**

1. Clients are increasingly demanding user-friendly banking solutions that cater to individual needs as well as provide quick answers to questions

2. There are high costs associated with human-based systems that cater to banking customers

3. There are security risks associated with authenticating users through traditional systems that require passwords

4. Advances in Natural Language Processing, voice recognition and software development technologies facilitate faster development of conversational commerce solutions

**Impact on banks from trends**

- Banks are providing personalized solutions such as chatbots, IVR and virtual assistants that allow clients to:
  - Carry out transactions without opening or logging into a separate application
  - Receive answers to queries in real-time

- Banks are replacing human-based customer servicing systems with self-service systems that allow them to save on human resource costs

- Banks are adopting conversational commerce-based authentication systems such as IVR and voice biometrics that secure the identity of clients, thereby reducing the risks associated with passwords

- Banks are increasingly developing conversational commerce solutions in-house instead of relying on vendors for these solutions

# Voice and text-based conversational commerce solutions are deployed to facilitate processes across banking functions

<table>
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<tr>
<th>Application across banking functions</th>
<th>Use Cases</th>
<th>Enabling Technologies</th>
<th>Illustrative Example</th>
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</thead>
</table>
| Loan Servicing                       | • Banking chatbots help customers manage and track loan accounts  
• Use text analytics to send monthly loan statements and reminders and collects principal, interest, and escrow payments on preferred dates | • Natural Language Processing | Avaamo provides a loan service agent that sends monthly loan statements and reminders to clients and collects principal, interest, and escrow payments on clients’ preferred dates |
| Authentication / Fraud Detection     | • Interactive Voice Response (IVR) and voice identification services authenticate customers based on their speech patterns and allow them to execute banking transactions more securely, eliminating the need for passwords | • Voice biometrics  
• Natural Language Processing | Voicepin provides advanced voice biometrics solutions for companies and their customers. Its flagship product, VoicePIN, is a biometric system for secure user authentication, based on voice analysis |
| Sales and Marketing                  | • Banks use sentiment analysis to target clients with products that align to their choices and needs  
• Voice-based systems such as virtual personal assistants and IVR are used to augment the sales process  
• Text and social media analytics are used by banks to understand market trends and customer sentiment | • Proactive software agents  
• Natural Language Processing | Elafris develops NLP enabled chatbots that allow banks to reduce sales costs by automating sales promotions and lead generation |
| Distribution and Customer Servicing  | • Virtual personal assistants, chatbots and IVR allow banks to enhance the delivery of products to clients, reducing the need for carrying out processes manually through call centers  
• Virtual personal assistants and IVR solutions allow banks to deliver personalized experiences to customers. These solutions automatically process and redress client queries without any human intervention | • Speech recognition  
• Proactive software agents  
• Intelligence engine  
• Natural Language Processing | Through software development kits, Kasisto provides conversational virtual assistants for enterprise mobile applications. The solution helps consumers complete complex tasks (using voice, text) which require the presence of live agents |

**Sources:** PwC Analysis, PwC Report – Top issues Artificial Intelligence, DeNovo, Venture Scanner
Competitive Landscape
Most companies offer solutions focused on sales and marketing and customer servicing to deliver more value to customers

<table>
<thead>
<tr>
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<th>Authentication / Fraud Detection</th>
<th>Sales and Marketing</th>
<th>Distribution and Customer Servicing</th>
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## Key emerging conversational commerce solution providers (1/6)

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<th>Funding to-date</th>
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<th>Key Investors</th>
<th>Key Solutions</th>
<th>Technologies</th>
<th>Use Cases / Potential Banking Solutions</th>
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</thead>
</table>
| KASIST@ | $8.2MM         | Spain | Alam Mundi Ventures | • Provides a speech and text-enabled **intelligent personal assistant platform** for smartphones  
• Offers prioritized and personalized information and interacts with digital services using **speech recognition and a natural language interface** | • NLP  
• NLG  
• Proactive Software Agents  
• Speech Recognition / Speech Synthesis  
• Deep Learning | • **Problem**: Mastercard wanted to provide personalized experiences to customers and allow them to transact, manage finances and shop via messaging platforms  
• **Solution**: Mastercard partnered with Kasisto to develop a conversational commerce platform through which consumers will be able to shop and transact on messaging platforms |
| Abe     | N/A            | US  | N/A           | • Financial management chatbot that links user's bank accounts and designs a **custom-made budget**, after monitoring the income/expenses pattern  
• Works on the **short message service** (SMS) and **Slack messaging platforms** | • NLP  
• NLG  
• Proactive Software Agents  
• Deep Learning | • Abe provide a white-label conversational banking solution for community banks and credit unions |
| KORE    | $2.25MM        | US  | N/A           | • Provides a **bot-based messaging platform** enabled through its SAP cloud technology  
• Its chatbots review and approve requisitions and get treasury, credit and accounts payable information from transactions | • NLP  
• NLG  
• Proactive Software Agents  
• Deep Learning | • **Problem**: Retail banks and credit unions were looking for methods to attract and retain millennial customers  
• **Solution**: The financial institutions launched Kore Smart Bot which helps customers of banks and credit unions pay bills, find an ATM, transfer funds and talk to Smart Bot via SMS, e-mail, or chat platforms like Facebook Messenger |

Sources: PwC Analysis, Company Websites, DeNovo, Tracxn, Crunchbase  
Note: N/A refers to information that was not available through public sources
## Key emerging conversational commerce solution providers (2/6)

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<tbody>
<tr>
<td>Avaamo</td>
<td>$9.3MM</td>
<td>India</td>
<td>• Wipro Ventures</td>
<td>• Provides banking bots to manage accounts, find ATMs, track expenses and support credit applications&lt;br&gt;• Uses Natural Language Processing (NLP) to execute conversations with customers and records responses through text recognition to match requested services</td>
<td>• NLP&lt;br&gt;• NLG&lt;br&gt;• Deep Learning</td>
<td>• Problem: Bank ABC Brazil wanted to personalize customer engagement and decrease the time to respond to customer queries&lt;br&gt;• Solution: Banks ABC Brazil partnered with Avaamo to deploy chatbots for the retail banking vertical where more than 200 users now use Avaamo to manage their accounts</td>
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<tr>
<td>Chip</td>
<td>N/A</td>
<td>US</td>
<td>N/A</td>
<td>• Provides a micro-saving money management chatbot app that creates a Chip savings account and integrates it with the user’s current account&lt;br&gt;• Chip proactively transfers money from a user’s current account to the Chip savings account on a periodic basis, without requiring the user’s intervention&lt;br&gt;• Also allows transfer of money from the Chip savings account to the current account through a single-tap withdraw button</td>
<td>• NLP&lt;br&gt;• NLG&lt;br&gt;• Proactive Software Agents&lt;br&gt;• Rules-Based Regular Expression Matching</td>
<td>• Chip offers its money management app in partnership with banks such as Barclays, Lloyds, NatWest, Nationwide, Halifax, HSBC, TSB, Santander, First Direct, RBS and Co-operative Bank</td>
</tr>
<tr>
<td>Penny</td>
<td>$1.2MM</td>
<td>US</td>
<td>• Social Capital</td>
<td>• Provides a personal financial management application that chats with the user and provides real-time feedback on savings performance</td>
<td>• NLP&lt;br&gt;• NLG&lt;br&gt;• Proactive Software Agents&lt;br&gt;• Deep Learning</td>
<td>• Penny can help banks better engage with customers and provide personal financial management solutions through chatbots</td>
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## Key emerging conversational commerce solution providers (3/6)

<table>
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</thead>
</table>
| Dyme    | N/A             | US | N/A           | • Provides chatbots through Facebook Messenger to increase customer engagement and education  
• Helps customers define their savings initiatives through their historical account statements | • NLP  
• NLG  
• Proactive Software Agents  
• Rules-Based Regular Expression Matching | • Dyme can integrate its offering with banks to offer customers personalized solutions and savings initiatives as per their historical spending patterns as a part of personal financial management solutions |
| Nuance  | Public*         | US | Went public in 2000 | • Provides solutions that use voice biometrics and detect unique characteristics of a person’s voice to create a voiceprint  
• Detects call center fraud by matching voice patterns to the voiceprints  
• Nina, Nuance’s virtual assistant provides customer servicing solutions through chat | • Voice Recognition / Voice Biometrics  
• Speech Recognition / Speech Synthesis  
• Deep Learning | • Problem: Barclays wanted to enable authentication through voice recognition  
• Solution: Barclays deployed Nuance’s FreeSpeech voice biometrics solution to securely and automatically confirm the identity of Barclays’ customers  
• Problem: Swedbank Group wanted to enhance its customer service experience by enabling self-service capabilities  
• Solution: Swedbank deployed Nuance’s virtual customer service agent, Nina, which resolved 78% of the queries during the first touchpoint with customers |
| NICE    | Public*         | Israel | Went public in 2016 | • Specializes in telephone voice recording, data security, and surveillance, as well as systems that analyze this recorded data  
• NICE Voice of the Customer (VoC) solutions identify changes in customer behavior as well as hidden operational inefficiencies | • Voice Recognition / Voice Biometrics  
• Speech Recognition / Speech Synthesis | • Problem: Citi wanted to upgrade its authentication and fraud detection technologies  
• Solution: Citi launched voice biometrics authentication from NICE for its Asia Pacific consumer banking customers |

*Denotes relevant established enterprise software companies that have conversational commerce solutions as a part of their core business

Sources: PwC Analysis, Company Websites, DeNovo, Tracxn, Crunchbase
Note: N/A refers to information that was not available through public sources
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</thead>
</table>
| Inbenta   | $14MM           | Spain | • Plug and Play Ventures • Scale Capital • Amasia Ventures | • Provides a chatbot-based online customer support platform through its NLP platform supported by **cloud technology**  
• The chatbot development platform allows developers to build and deploy bots for **Skype, Facebook Messenger** and provides flexibility to **integrate** with any outside websites such as **Google** | • NLP  
• NLG  
• Deep Learning | • **Problem**: BBVA wanted to enhance its online customer support by reducing the time to resolve customer issues  
• **Solution**: BBVA partnered with Inbenta. Inbenta’s AI-powered interface provides structured and specific responses to frequently asked questions by customers |
| Elafris   | N/A             | US    | N/A                                | • Provides **NLP-powered** chatbots that enable companies to **automate** their responses to inquiries related to **insurance policies**, claim settlement status and **bank account information**  
• Helps its clients to reduce **underwriting risk** by analyzing **social data** of customers and providing automated customer support | • NLP  
• NLG  
• Rules-Based Regular Expression Matching | • Elafris can potentially help banks and credit card companies by providing social data to access customers and reduce underwriting risks |
| Personetics | $18MM           | US    | • Lightspeed Venture Partners • Carmel Ventures • Sequoia Capital | • Offers a **predictive interaction** solution for financial institutions to deliver **personalized customer experiences**  
• Supports multiple messaging platforms such as **Facebook Messenger, WeChat, Amazon Alexa and Skype** | • NLP  
• NLG  
• Proactive Software Agents  
• Deep Learning | • Personetics allows banks to deploy chatbots which provide AI-powered personalized guidance to customers and connect them to the most suitable solutions |

Sources: PwC Analysis, Company Websites, DeNovo, Tracxn, Crunchbase
Note: N/A refers to information that was not available through public sources
### Key emerging conversational commerce solution providers (5/6)

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</tr>
</thead>
</table>
| Smartly.ai | $0.45MM        | France    | • BNP Paribas  
• FaDièse  
• NUM | • Provides an AI-powered platform that allows developers to build and deploy **chatbots** and **voice applications**  
• Chatbots support several mediums such as Slack, SMS, Skype, Webchat, and Facebook Messenger, while the voice applications support Amazon Alexa and Apple Siri | • NLP  
• NLG  
• Proactive Software Agents  
• Speech Recognition / Speech Synthesis  
• Deep Learning | • Smartly.ai is used by banks to build and deploy chatbots and voice applications which could facilitate banks’ sales and customer servicing functions |
| SecondEgo | N/A             | Slovenia  | N/A                                    | • Develops **chatbots** that offer a real-time chat experience  
• Chatbots act as a **virtual chat agent** for clients who offer pre- and post-sales support. They enable clients to **reduce costs and time** spent and robotize workflows while responding to similar questions | • NLP  
• NLG  
• Proactive Software Agents  
• Deep Learning | • SecondEgo is used by banks to deploy chatbots which serve as virtual chat agents and provide pre- and post-sales support to banks’ clients |
| Clinc | $1.2MM          | US        | • Elab Ventures  
• Ventures | • Provides an open source platform for building artificial intelligence (AI) and deep-learning-based **virtual personal assistants** for the financial services industry  
• Finie, its mobile **voice-powered AI platform** for banking, moves away from rules-based commands to support unbounded and unconstrained speech to answer common and complex queries related to banking | • NLP  
• NLG  
• Speech Recognition / Speech Synthesis  
• Intelligence Engines  
• Deep Q&A and Discourse Understanding | • Clinc’s Finie solution can be integrated into banks’ mobile banking applications and act as a voice-powered virtual personal assistant that is able to answer financial questions unique to individual consumers, offer personalized spending advice, and fulfill additional banking tasks |

**Sources:** PwC Analysis, Company Websites, DeNovo, Tracxn, Crunchbase  
**Note:** N/A refers to information that was not available through public sources
## Key emerging conversational commerce solution providers (6/6)

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</table>
| Digit   | $36.3MM        | US | • Ribbit Capital  
          • General Catalyst Partners  
          • Baseline Ventures | • Provides a chatbot solution through **SMS text** that helps consumers manage savings in Digit’s digital savings account  
• Chatbot sends consumers text notifications regarding automatic savings that Digit sets aside by analyzing spending and income history of checking account to predict cash flow | • NLP  
• NLG  
• Proactive Software Agent  
• Rules-Based Regular Expression Matching | • Digit’s chatbot is a part of its automatic savings solution that can integrate with banks’ existing products (e.g., checkings accounts) to create additional personalized personal finance management solutions for consumers |
| Plum    | $0.5MM         | UK | • 500 Startups | • Provides a chatbot solution through **Facebook Messenger** that helps consumers manage savings in Plum’s digital savings account  
• Chatbot sends consumers notifications through Facebook Messenger about automatic savings that Plum sets aside by analyzing spending and income history to predict cash flow; chatbot also allows consumers to request savings balance and make withdrawal | • NLP  
• NLG  
• Proactive Software Agent  
• Rules-Based Regular Expression Matching | • Plum’s chatbot is a part of its automatic savings solution that can integrate with banks’ existing products (e.g., checkings accounts) to create additional personalized personal finance management solutions for consumers |

**Sources:** PwC Analysis, Company Websites, DeNovo, Tracxn, Crunchbase

**Note:** N/A refers to information that was not available through public sources
Tech giants are increasingly offering their voice and text-based conversational commerce solutions to leading global banks and FinTech startups

- Apple’s virtual assistant software, Siri, is automated to take banking clients’ voice input and process the language to perform tasks specified by clients.
- Digital bank Monzo, uses Siri to allow users to send secure payments through voice.

- IBM’s Watson is a Q&A computer system which can find solutions to questions posed by banking clients in an unstructured format in natural languages.
- South Africa’s Standard Bank uses IBM Watson to speed up handling of customer queries.

- Cortana is a virtual digital assistant that is built into select Microsoft phones. It allows banking clients to carry out banking transactions.
- Bank of America’s new mobile app allows individuals to use Cortana’s voice commands to carry out banking transactions and avail of customer service.

- Amazon’s voice service Alexa, provides capabilities that enable banking clients to interact with devices in a more intuitive way using voice-based commands.
- Capital One customers can use Alexa-enabled devices to check balances.

- Banks can embed their chatbots into WeChat and/or Facebook Messenger and interact with clients through the WeChat and Facebook interfaces.
- WeChat integrates with several banks including Citi, ICBC China, and China Merchant Bank.
- Yes Bank allows clients to download the chatbot, Yes Tag, and use “Chat Banking” on Facebook Messenger.

- Samsung has acquired Viv, a voice assistant which understands the intent of the user through speech recognition and creates dynamic programs to connect the different components of a desired service.
- Bank of America plans to transform its virtual assistant Erica into a virtual system that will work on Viv’s voice platform.

Sources: Company Websites, PwC Analysis, PwC Report – Top issues Artificial Intelligence, Forbes
Note: Several tech giants are developing their own software and others offers solutions that foster technology development from third parties.
Perspectives from the Field
We interviewed several subject matter experts in the innovation ecosystem for additional perspective on conversational commerce in banking

<table>
<thead>
<tr>
<th>Accelerators / Incubators</th>
<th>FinTech Innovators</th>
<th>PwC R&amp;D</th>
<th>Author</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Co-Founder</strong>, Chatbot Accelerator in Europe</td>
<td><strong>VP of Strategy</strong>, Chatbot Portfolio Company in Accelerator</td>
<td><strong>Senior Director</strong>, Financial Services Virtual Personal Assistant Solution</td>
<td><strong>Lead Researcher</strong>, PwC Emerging Technology Lab</td>
</tr>
<tr>
<td><strong>VP of Strategy</strong>, Chatbot Portfolio Company in Accelerator</td>
<td><strong>Chief Marketing Officer</strong>, Banking Chatbot Solution</td>
<td><strong>Director</strong>, PwC New Ventures</td>
<td><strong>Author</strong>, “Developing Alexa Skills for Amazon Echo” Course</td>
</tr>
</tbody>
</table>

We asked a range of questions including the following:

- What is the current environment of conversational commerce in banking?
- How will conversational commerce technologies evolve in the banking industry?
- How would you characterize adoption of conversational technologies by banking incumbents?
- What are the key challenges in technology adoption?
Players in the ecosystem provided a variety of perspectives on conversational commerce...

What is the current environment of conversational commerce in banking?

“Right now is a gold rush – tech giants like Amazon and Google are racing into the game by opening up their artificial intelligence technologies to the public (e.g., Amazon Lex, Amazon Polly, etc.).”

“Innovators are emerging with a host of pre-built, AI-enabled chatbots that enable enterprises to rapidly deploy.”

“We leverage vertical ontology (i.e., defining data in terms of semantics native to an industry like banking and insurance) to enhance solutions.”

How will conversational commerce technologies evolve in the banking industry?

“Artificial intelligence technologies will become smarter and error rate will become miniscule to enable better conversations and higher contextual awareness.”

“As deep learning technologies are democratized and unbundled, conversational commerce will be conducted across a wide range of hardware – mobile, wearable, device, laptop.”

“I can see a trend towards speaker verification (e.g., Microsoft’s Speaker Recognition API) to aid conversational commerce in banking, but there may be security concerns if personal / banking information is involved.”

“Chatbots are the stepping stone to higher technology. Text dominates now, but the industry will transition to audio and will then bring in contextual awareness.”

“Chatbot engagement that is pushed to consumers is the way to go, making predictive modeling a priority – 90% of engagement comes from consumers clicking something versus 10% is from consumers asking a chatbot something.”

Opportunity  Neutral  Concern

Sources: PwC Expert Interviews, Innovation Ecosystem Interviews
... they provided insight to where the industry is going and some key challenges to consider

**How would you characterize adoption of conversational technologies by banking incumbents?**

“Chatbot companies report strong traction and count over half of top 10 banks as customers in pilot or beta testing.”

“Banking chatbots are not only adopted for front-end customer experience but also for within businesses such as providing internal chatbot support.”

**What are the key challenges in technology adoption?**

“One challenge is that this tech ecosystem is fragmented (e.g. certain services only work with Amazon Echo, Google Home, etc). This causes friction in providing a seamless end to end experience - there are multiple standards and no universal integration.”

“There is relatively low cost of entry, but the challenge is likely connecting the technology to the disparate, legacy systems of the banks.”

“Certain technologies, such as Amazon Alexa, require information to be passed into the cloud. This may pose restrictions due to financial institutions’ private networks in order to leverage voice technology.”

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Sources: PwC Expert Interviews, Innovation Ecosystem Interviews
Incumbent Adoption
Conversational commerce is being increasingly adopted by large banks to automate processes and cut human resource costs.

- **Citibank**: Launched voice biometrics authentication from NICE for its Asia Pacific consumer banking customers.
- **USAA**: Embedded a voice biometric service called Nina into its iPhone application for mobile banking.
- **ANZ Bank**: Australian bank has partnered with IBM’s Watson to observe the types of questions received from both customers and financial advisors.
- **BofA**: Launched chatbot "Erica" which scans the financial state of customers and offers opportunities to optimize and consolidate their banking functions.
- **Bank of Tokyo-Mitsubishi UFJ**: Employed non-human staff, with the introduction of a customer service humanoid robot, at its flagship Tokyo outlet.
- **ING**: First bank in Europe to provide hands-free banking by introducing a voice control mode in its mobile banking app.
- **Yes Bank**: Launched a chatbot-based banking app, Yes Tag, that offers a conversational banking experience to customers.
- **Capital One**: Talkwalker, a social media analytics tool and social media monitoring tool, generates social media-based analysis of Capital One’s customers.
- **RBS**: Installed advanced ‘human’ AI, Luvo, to help staff answer customer queries, thus driving employee productivity.
- **AmEx**: Plans to launch AmEx bot through Facebook Messenger that would let customers receive real-time purchase alerts and key information about benefits related to their purchases.
- **DBS**: Acquired minority stake in Kasisto. Kasisto plans to provide its AI based virtual personal assistance to enhance DBS’s retail banking customer servicing solutions.

Sources: Bank Websites, Industry Reports, PwC Analysis
While some conversational commerce solutions serve customers in one or two channels, the majority are not available in all channels nor integrated across channels (1/3)

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<th>Channel</th>
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<td><strong>DBS</strong></td>
<td>Recently launched an AI powered chatbot, in partnership with Kasisto. The chatbot allows customers to make transactions such as money transfers and bill payments through Facebook Messenger that can be accessed via mobile and web channels</td>
<td>Web ✔️</td>
</tr>
<tr>
<td><strong>Citi</strong></td>
<td>Offers a virtual assistant, AskMe, to Indian banking customers. Customers ask queries to and receive answers from AskMe, which can be accessed through the Customer Service Center section of Citi India’s website</td>
<td>Web ❌</td>
</tr>
<tr>
<td><strong>Virtual Assistant</strong></td>
<td>Offers voice recognition-based phone banking which authorizes the bank's customers through voice-based biometrics</td>
<td>Web ✔️</td>
</tr>
<tr>
<td><strong>Voice Recognition</strong></td>
<td>Offers an AmEx chatbot through Facebook Messenger. The chatbot allows customers to receive real-time purchase alerts and key information about benefits related to the purchases through mobile and web channels</td>
<td>Web ✔️</td>
</tr>
<tr>
<td><strong>Chatbot</strong></td>
<td>Launched Mastercard KAI, a chatbot for banks which allows Mastercard’s users to shop and transact through Facebook Messenger, and can be accessed through web and mobile channels</td>
<td>Web ✔️</td>
</tr>
<tr>
<td><strong>HSBC</strong></td>
<td>Offers a virtual assistant, Andrew to banking customer in the UK. Andrew can be accessed through HSBC UK’s website and is designed to provide answers to customer queries</td>
<td>Web ✔️</td>
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Sources: Bank Websites, Industry Reports, PwC Analysis

1. Mobile Banking refers to the use of internet browsers on mobile phones to access banking functions
2. Mobile app refers to the use of native Android or iOS mobile applications to access banking functions
While some conversational commerce solutions serve customers in one or two channels, the majority are not available in all channels nor integrated across channels (2/3)

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<td>Chatbot</td>
<td>Offers an online chatbot, 'Luvo' that integrates with traditional platforms such as the bank's websites or apps and answers customer queries</td>
<td>✔</td>
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<tr>
<td>Chatbot</td>
<td>Partnered with Gupshup, a chatbot platform to offer 'YES mPower' - a banking chatbot for loan products that can be accessed through Facebook Messenger. YES mPOWER allows customers to get information about loan products such as personal and auto loans and also determines loan eligibility for customers</td>
<td>✔</td>
</tr>
<tr>
<td>Chatbot</td>
<td>Launched Yes Tag, a ‘Chat Banking’ service that allows customers to carry-out transactions on five messaging platforms, namely, Facebook Messenger, Twitter, Skype, Telegram and WeChat. Yes Tag allows customers to check their balance, mini statement, fixed deposit details and also allows customers to transfer money</td>
<td>✔</td>
</tr>
<tr>
<td>Virtual Assistant</td>
<td>Offers a virtual assistant, 'Erica' that operates via both audio and text and is hosted on Bofa's mobile app. Erica addresses customer queries and also allows customers to access transaction services such as bill payments, balance check and debt settlement</td>
<td>❌</td>
</tr>
<tr>
<td>Virtual Assistant</td>
<td>Offers a virtual assistant, 'Inge' that allows customers to access transaction services such as balance check and payments, within the mobile application</td>
<td>❌</td>
</tr>
<tr>
<td>Voice Recognition</td>
<td>Provides hands-free banking that allows customers to check balances and make payments through a voice control mode in the bank’s mobile banking application</td>
<td>❌</td>
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While some conversational commerce solutions serve customers in one or two channels, the majority are not available in all channels nor integrated across channels (3/3)

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<td>Virtual Assistant</td>
<td>Offers a voice assistant powered by Amazon Alexa that allows customers to track spending, pay bills and check their account balance. The virtual assistant can be accessed via Capital One’s mobile application</td>
<td>Web: ✔, Mobile Banking: ✘, Mobile App: ✔, Phone Banking: ✔, In-branch: ✘</td>
</tr>
<tr>
<td>Virtual Assistant</td>
<td>Offers a virtual banking assistant, ‘Ask Sara’ which answers questions posed by visitors on the bank's website. Ask Sara can be accessed through both web and mobile channels</td>
<td>Web: ✔, ✔, Mobile Banking: ✘, Mobile App: ✘, Phone Banking: ✘, In-branch: ✘</td>
</tr>
<tr>
<td>Robot</td>
<td>Offers customer care through Nao, a multilingual humanoid robot at outlets in Tokyo. The robot provides information about money exchange, ATMs, opening bank accounts and overseas remittances</td>
<td>Web: ✘, ✔, ✔, Phone Banking: ✔, In-branch: ✔</td>
</tr>
<tr>
<td>Robot</td>
<td>Introduced SoftBank’s Pepper Robot at bank branches in Tokyo to offer customer care to users. The robot engages customers with games and multimedia and provides basic information about the bank’s products</td>
<td>Web: ✘, ✔, ✔, Phone Banking: ✔, In-branch: ✔</td>
</tr>
<tr>
<td>Virtual Assistant, Voice Recognition</td>
<td>Embedded Nuance's virtual assistant, 'Nina' into the iPhone app for mobile banking. Nina answers customer queries and also authenticates users through voice biometrics</td>
<td>Web: ✘, ✔, ✔, Phone Banking: ✔, In-branch: ✘</td>
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Banks implementing conversational commerce solutions would need to overcome certain challenges that impact the advancement of these solutions

1. Confidentiality preference by consumers
   • Conversations pertaining to individuals’ finances and banking activities are sensitive and banking clients are reluctant to share such information on automated platforms

2. Uneven customer experience
   • Messaging platforms are meant to simulate human conversations to help clients complete tasks, but many fail to communicate accurately or offer streamlined customer experiences

3. Security
   • Banks collect sensitive data from clients through conversational commerce solutions. The data could be susceptible to leakages through cyber attacks

4. Technology compatibility
   • Banks are not necessarily drivers of the conversational commerce revolution – they adopt solutions that are developed by technology companies. As such, banks need to upgrade their technology systems to integrate conversational commerce solutions

Sources: Forrester Report – Bots aren’t ready for Bankers, PwC Analysis