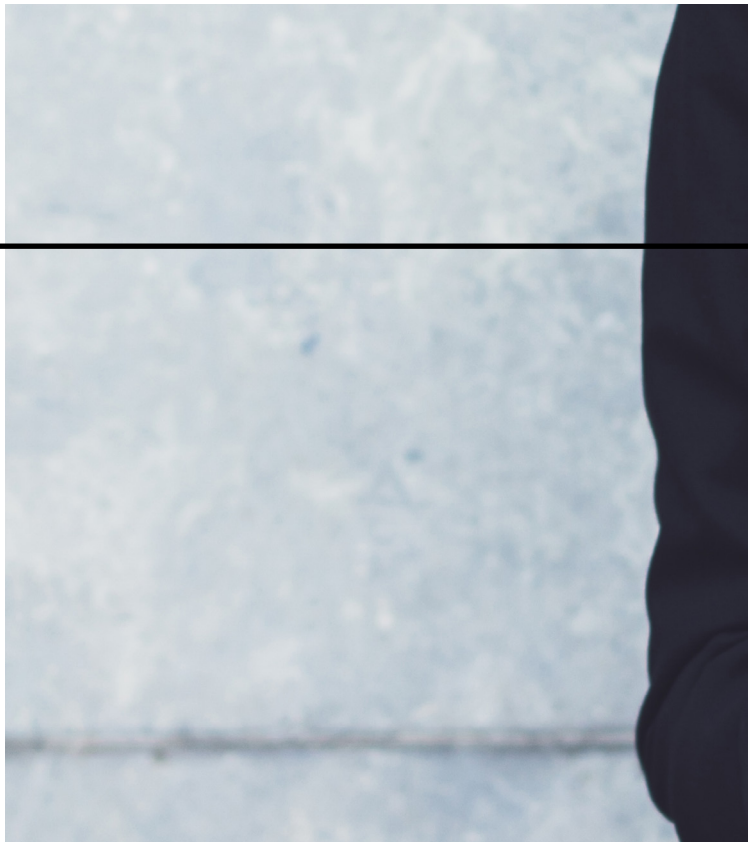
FINANCIAL CHATBOTS

A LANDSCAPE OF WHITE LABEL BANKING PRODUCTS

CAPCO

White Paper



Introduction

Dreams of humans interacting seamlessly with technology have existed for a long time in the realm of science fiction, while artificial intelligence (AI) spent more than 30 years relegated to labs and researchers. However, the past 18 months have witnessed an explosion of AI solutions for many areas of business and finance. One particularly hot area for AI in 2016 was chatbots.

Banks and financial institutions are looking to chatbot technologies to provide new interfaces to their existing service channels and to enable the appearance of 24/7 customer service capabilities.

Seeking to attract millennials and the unbanked, financial institutions are looking for ways to deploy chatbots to handle day-to-day banking tasks. Considering the overwhelming success of Facebook, it would seem that little room remains for other large players in the social network services market. However, expanding interest in messaging apps appeared several years ago and continues to increase around the world as a data-centric replacement to expensive SMS texting options, one with better multimedia and group chatting capabilities.

The proliferation of social media and online messaging brought humanity into the practice of digitizing our personas and our conversions with one another. Today, millions use messaging and chat tools, such as WhatsApp, WeChat, Viber and Telegram. Even Facebook separated its Messenger functionality into a standalone app for mobile platforms, which immediately became a global leader among applications for instant message exchange. Now, online chat services are extending the digital conversation with bots that help users find answers and complete tasks.

Per Statista.com:

- Current internet user figures suggest that there are more than 2.5 billion users worldwide with a global penetration rate of 35 percent with North America accounting for 14 percent of global internet users.
- The emergences of new digital technologies and websites have accelerated forms of human interaction through online forums, instant messaging, and social networking (since the mid-2000's). Email has been a staple of the online experience. However, the rise of social networks, most notably market leader Facebook, and mobile social apps such as Twitter, LINE or WhatsApp have changed the notion of online communications and the divide of the personal and public online space. Facebook has more than 1.2 billion monthly active users, presenting a global reach of almost 50 percent of internet users worldwide.
- As of 2015 75% of internet users worldwide had accessed messaging services on mobile devices. Forecasted mobile message traffic worldwide for 2017 is around 28.2 trillion messages.
- In 2015, 52.7 percent of the global mobile phone population accessed the internet from their mobile phone. This figure is expected to grow to 61.2 percent in 2018.

Why are people flocking to these new communication channels when they already have social media accounts where they can message for free?

There are various reasons depending on the individual:

- **Simplicity** – Messenger applications focus on interpersonal conversations without overloading the users with unnecessary information. They also allow for easy media sharing, group chatting and many offer voice and video chat capabilities.
- **Accessibility** – Anyone with a smartphone and a mobile phone number can register for the service in just a few clicks.
- **Integration** – Messengers make it possible to significantly expand the circle of people to whom users can send messages by linking groups of contacts in different apps.
- **Affordability** – In addition, the popularity of messengers has started to replace the services of mobile providers. People prefer free domestic and international messaging via their data plans or Wi-Fi to expensive SMS messages and direct phone calls.

The opportunities for banking

An ecosystem of chatbots can offer a wide range of opportunities to financial institutions. Chatbots can cover any or all the following functional areas:

- **Customer service** – Offloading simple question-and-answer operations from call centers to reduce the overall call loads on customer service agents. Many simple keyword-based questions can easily be covered by a chatbot, such as resetting a PIN, locating a branch/ATM or reporting a lost or stolen card.
- **Product sales/onboarding** – Chatbots can assist with differentiating groups of products and helping with right-sizing and then onboarding customers for new services.
- **Retail banking** – Day-to-day banking activities, like checking your account balances and transferring funds between accounts and paying bills, are among banks' prime use cases for chatbots today.
- **Personal financial management** – By incorporating analytics, PFM chatbots can help users plan their savings goals and assist with suggested life style changes to make savings grow faster.
- **Wealth management** – Chatbots can navigate users through their investment portfolios and suggesting changes to the mix of investments. Roboadvisory tools could easily include a chatbot interface.

Messaging applications have become the most popular communications channel for users aged 16 to 44 and are supplementing, if not supplanting, the use of SMS text messaging in many regions where SMS carries a fee per message sent. When banking becomes as easy as conversations with your friends, then chatbots can become the preferred way to make payments and transfer money. Institutions can also drive two-way conversations by having bots provide alerts and suggest products and services to the client conversationally.

These chatbots can deliver on some specific benefits to financial institutions including:

- Providing the image of a 24/7 never closed customer service channel. In most cases, especially with smaller institutions, live customer service agents have fixed hours of availability. Chatbots can work every hour of every day to handle general inquiries. More complicated situations can result in the bot booking a time for live agents to call the customer directly during office hours.
- Data analytics against customer conversations can give insights into the current needs and pain points of customers.
- Consistent and balanced interface for customers – Any one customer service call may impact the mood and attitude for that agent with the next caller. Chatbots have no such emotional variance in service delivery quality.
- Chatbots with integrated machine learning capabilities can continually monitor human-to-human chat sessions to improve the bot's ability to answer more questions in the future.

Components of a chatbot

Chatbots are comprised of a simple collection of components:

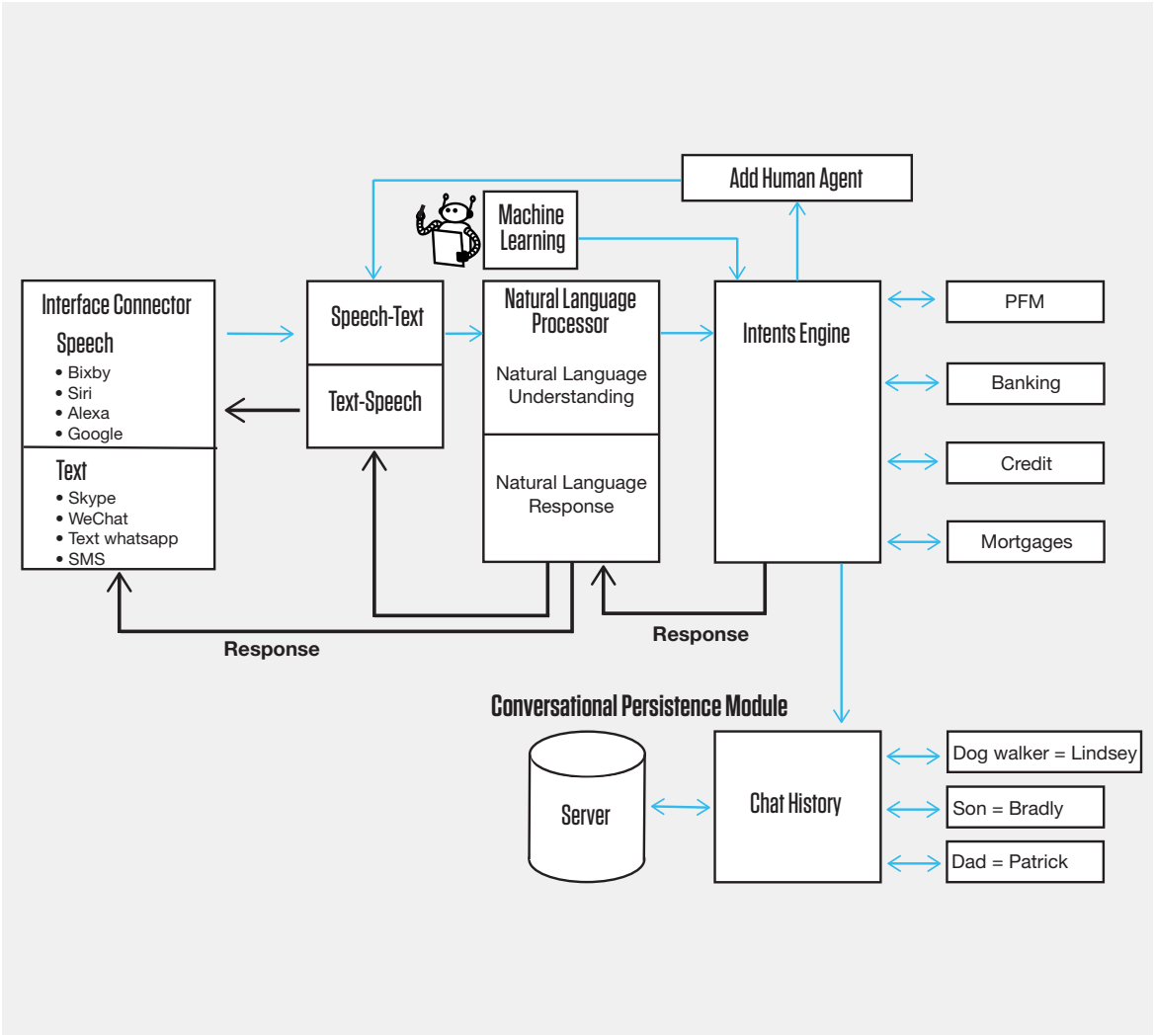


Figure 1 - Components of a chatbot

INTERFACE CONNECTOR

The interface connector determines what chat interfaces are supported for the bot to communicate through. Most bots will allow you to embed a chat interface within your mobile applications and web interfaces, but there will be a wide variance in the supported messaging applications (e.g., Facebook Messenger, Skype, WhatsApp).

TWO-WAY SPEECH CONVERTOR

For chatbots that support voice-based conversational interfaces, such as Amazon's Alexa, a module performs the speech-to-text (S2T) conversion of the user's voice, and another module performs a text-to-speech (T2S) conversion for the bot's spoken response.

NATURAL LANGUAGE PROCESSOR (NLP)

All AI natural language processing tools will have a natural language understanding module, and some also include a natural language response module.

- **Natural Language Understanding (NLU)**
  This module analyzes the text users submit to determine what the intent of the request is and then map the request to a specific intent that the chatbot is designed to respond to.
- **Natural Language Response (NLR)**
  This module varies the conversational style of the chatbot's responses to users, making the chatbot appear more personable by not sounding completely programmed to give the exact same responses to similar queries.

Better bots in the industry include NLR capabilities and allow for changing the mood and candor levels to give the bot a distinctive personality.

INTENTS ENGINE

The intents engine maps the intent determined by the NLP to the content or service that will compose the response to the request. This engine connects to scripts, APIs or other provisioned services to obtain what the bot needs to formulate the response for the user.

MACHINE LEARNING MODULE

Some chatbots exist simply as conversational scripting solutions that require scripting of all possible questions and answers or forwarding to a script that assembles the answer for the chatbot. More advanced chatbots integrate one or more machine learning frameworks, such as neural networks or elastic search mechanisms to help the chatbot learn faster, access existing content or monitor human chats. These frameworks assist in preparing a production-ready bot faster and help the bot adapt and grow over time.

SEAMLESS HUMAN HANDOFF

Using machine learning, a bot can review chat histories to augment conversational abilities for institutions that already have a textual chat interface with their customer service staff. The seamless human handoff capability is an extension to machine learning that allows the chatbot to add a human analyst to the conversation seamlessly when the bot senses that it is starting to struggle with the conversation. The bot will continue to monitor the interactions and enhance its knowledge based on that dialogue. Whether to announce to the customer that a human has entered the conversation remains an open philosophical debate.

CONVERSATIONAL PERSISTENCE MODULE

This module and what it can support determines how well a chatbot can use past elements of the conversation to assist with current requests and responses.

Very simple solutions will only reference and review the past several questions and responses. This means that if the conversation takes larger numbers of interactions to complete, the persistence engine loses the memories of earlier topics and the chatbot can no longer reference them.

Advanced chatbots work with the complete conversation and cross-reference all elements of the conversation for use in future responses to the user. Highly sophisticated chatbots go a step further, offering an engine that can reference all previous conversations with the customer and create a database of personalized content that will generate user shortcuts in future conversations. These services give the appearance that the chatbot is listening and allow it to integrate things that it has learned about the user into future interactions.

White label banking chatbots

Now we examine the landscape of white labeled chatbot offerings targeted to banks and financial institutions. This gives us a specific focus for the vendors included in this report. To qualify for this report, the vendor had to offer a chatbot product that was readily available for a bank or financial institution to purchase, brand and integrate into its own channels.

The following products qualified for this landscape:

FINN.AI	Vancouver-based banking chatbot scripting tool that is implemented at ATB Financial. Many included features are readily customizable to any bank.
PAYJO.IN	An India-based company coming from other banking solutions, Payjo is an AI banking platform, powering six top private banks worldwide.
KASISTO MyKAI	Kasisto is a New York-based company offering a simple chat scripting tool that can handle single or dual account environments out of the box and is noted for their implementations with MasterCard and DBS Bank.
ABE.AI	New York-based Abe.AI offers a public chatbot and provides the white labeled solutions behind chatbots for Bank of America, Wells Fargo, American Express, Ally Bank and Capital One.
OPENWAY – WAY4	Belgium-based OpenWay offers a series of core banking products and recently released the WAY4 Messenger, a standalone banking chatbot that connects to any banking solution. Notably implemented with B1NK, Kazakhstan's digital bank from First Bank
PERSONETICS	Israel-based Personetics is mostly known for their personal financial management analytics capabilities and now offers a chatbot front-end to their tools.
TEXTTELLER	New York-based TextTeller is one of the newest offerings for white labeled chatbots in 2017 and has a pilot implementation with the Brooklyn Cooperative Federal Credit Union.
FINIE by CLINC	This Michigan-based chatbot company started in the open source AI development space.

PRODUCT COVERAGE

Different vendors cover different aspects of the banking experience. While most offer features that span a variety of vertical divisions, most vendors cover day-to-day retail banking activities and personal financial management. Any of these platforms could extend into other areas through further manual scripting efforts. Organizations that have already implemented a customer service chat tool for human-to-human chat sessions could feed those chat logs into machine learning tools to quickly enhance and customize the experience with the chatbot.

We divide product coverage into the following functional areas:

- **Customer service** – General questions and answers like finding ABMs to assisting with lost cards or locked PINs.
- **Product sales/onboarding** – Answering questions related to different products, helping customer select the right product for them and then assisting with adding that product or service to their account
- **Retail banking** – Day-to-day banking activities, such as seeing a list of accounts, checking balances, viewing transaction histories and making bill payments and transfers
- **Personal financial management (PFM)** – Assisting with setting and reaching savings goals

	CUSTOMER SERVICE	PRODUCT SALES	RETAIL BANKING	PFM
FINN.AI	✓		✓	
PAYJO.IN	✓		✓	✓
KASISTO MyKAI			✓	✓
ABE.AI			✓	✓
OPENWAY	✓		✓	
PERSONETICS			✓	✓
TEXTTELLER	✓		✓	✓
FINIE by CLINC			✓	✓

CHATBOT DESIGN

We examined the design philosophy of each chatbot solution. There are several schools of thought on how to implement chatbots across an institution's different divisions. Institutions can build a single bot that tries to do everything or build a network of bots designed for specific functions that transfer topic changes to other specialist bots. Many vendors currently take the single bot approach. Because these vendors tackle only a small set of tasks with their bots, the design is not very complicated, yet. As institutions grow the scope of the bot, the scripting becomes more complicated, and a multibot solution may offer better results and easier management from a continued support perspective – for example, product sales as its own chatbot ecosystem separate from retail banking – rather than attempting to program an aggregated set of scripts to make one bot span both areas.

With these factors in mind, several vendors offer a chatbot with a narrow focus of only one or two functions; thus, they offer a single-bot approach. However, many agree that a networked multibot environment will become the ideal future state. Furthermore, machine learning frameworks are also better suited to narrowly focused domain topics, and this will likely support the drive to a multibot strategy for many institutions.

Vendors that anticipate the future multibot model will better deliver cross-functional chatbots while growing their chatbots into new domains and employ a variety of machine learning capabilities within each bot.

	SINGLE BOT	MULTIBOT
FINN.AI	✓	
PAYJO.IN	✓	
KASISTO MyKAI	✓	
ABE.AI	✓	
OPENWAY	✓	
PERSONETICS		✓
TEXTTELLER	✓	
FINIE by CLINC		✓

NATURAL LANGUAGE PROCESSING AI

The next area of focus on our chatbot vendors is their use of AI for natural language processing. In this case, we did try to differentiate between the use of NLP AI for inbound chat recognition and for varying responses to the user. However, we found that the vendors did not use or make available this feature. All responses were returned as scripted with all the bots that we tested or demoed.

	SINGLE BOT	MULTIBOT	PROPRIETARY
FINN.AI	✓		
PAYJO.IN			✓
KASISTO MyKAI			✓
ABE.AI			✓
OPENWAY			✓
PERSONETICS			✓
TEXTTELLER	✓	✓	
FINIE by CLINC			✓

While most of the vendors offer a proprietary AI solution that they claim offers special enhancements for understanding the financial and banking content, most would allow the API to be swapped for a Watson or other off-the-shelf AI solution if the customer preferred.

MACHINE LEARNING CAPABILITIES

We looked for any broad-scale support for machine learning capabilities within the vendors' chatbots. Machine learning consists of frameworks and tools used to augment a chatbot in different ways. In this case, we focused less on the tools or methods used for machine learning and more on whether vendors made machine learning functions available.

For example:

- **Product details ingestion** – Ability to consume and mark up internal or public-facing product information to be incorporated into the chatbot answers
- **Chat history ingestion** – For companies that have already incorporated a direct customer service human-to-human chat service, machine learning tools can take the script histories of these chats to improve chatbot performance.
- **Seamless human handoff** – Seamlessly including a human interactor with the customer when the chatbot knows that it is struggling. The chatbot then monitors and uses that conversation to augment its future interactions.

Use of machine learning among the vendors was limited, so we focused on whether they supported working with off-the-shelf machine learning tools like Kibana for elastic search, or if they built their own proprietary machine learning algorithms into the chatbot. The other factor we examined was the specific support for the seamless human integration functionality described above.

	OFF THE SHELF	SEAMLESS HUMAN HANDOFF	PROPRIETARY
FINN.AI			
PAYJO.IN		✓	✓
KASISTO MyKAI			
ABE.AI	✓	✓	
OPENWAY			
PERSONETICS		✓	✓
TEXTTELLER			
FINIE by CLINC			✓

While this captures the existing support for machine learning technologies, it is worth noting that both FINN. AI and OpenWay mentioned the inclusion of machine learning capabilities on their 2017 – 2018 road maps.

CHAT INTERFACE SUPPORT

Our last evaluation category for the vendors examines their support for various chat interfaces across different platforms. Adding specific venues to a chatbot is trivial in comparison to the other integration requirements for implementing a chatbot. It is likely very easy for a vendor to add a connection to a Skype or Alexa if a customer requires that specific channel.

Institutions usually take one of two approaches to implementing a chatbot. They either launch a chatbot into a popular chat venue, such as Facebook Messenger, or they embed the chatbot within an existing mobile application or website. Doing both is possible. With that in mind, on next page is the published support for interfaces across vendors.

The venue(s) chosen impact the conversational design and modelling of the chatbot. Conversational design approaches used in a voice interface like Alexa will differ from the approaches used in an SMS interface. Using a rich multimedia interface like Facebook Messenger will have a different approach than a simpler texting interface like WhatsApp. Thus, choosing multiple chat venues may exponentially grow the effort required to script questions and responses.

The multi-interface support column indicates that the chatbot can communicate with the user on multiple interfaces, like embedded app and Facebook Messenger, and understand that it is the same customer and seamlessly continue conversations from one interface to another.

	ALEXA	FACEBOOK MESSENGER	SMS TEXT	EMBEDDED	EMBEDDED WEB	KIK MESSENGER	VIBER	WECHAT	SLACK	SKYPE	LINE	TELEGRAM	ACTIONS ON GOOGLE	MULTI-INTERFACE SUPPORT
FINN.AI	✓	✓	✓	✓	✓	✓		✓			✓			✓
PAYJO.IN				✓	✓									
KASISTO MyKAI		✓	✓	✓	✓				✓					✓
ABE.AI		✓	✓	✓	✓				✓				✓	
OPENWAY		✓		✓	✓		✓	✓			✓	✓		
PERSONETICS	✓	✓		✓	✓									
TEXTTELLER		✓	✓	✓	✓					✓	✓			✓
FINIE by CLINC			✓	✓	✓									

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White label banking chatbots

In addition to the business benefits, the chatbot hype stems from institutions believing that certain customer segments desire them. Customers are interested in chatbots for the following reasons:

- Familiar informal chat environment where customers can communicate with their bank the same way that they communicate with friends and family.
- When the interface is embedded in an app or in an existing messenger tool, it is a single place to find answers and collect information without having to do searches and then paste responses for later reference. Choosing a messenger app means avoids needing to download, install and enroll in yet another specialized app.
- Customers can make bill payments and person-to-person money transfers in a few conversational steps rather than the protracted processes of opening and using an app or website.
- Natural language interfaces are natural for the user and do not require the user to remember special codes or commands. The chatbot guides the user with selection buttons and other functions that assist the user in completing tasks faster.

Banks are interested in chatbots for the following reasons:

- It is easy to replicate the conversational atmosphere into multiple languages for broader customer support.
- Chatbots provides customers the appearance of a 24/7 customer support capability.
- The ability to provide notifications and alerts as lead-ins to further conversations about the client's finances.
- Reduced load on customer service call centers by having chatbots handle many of the frequently asked questions.
- Chatbots can automate fraud prevention processes and collect critical information from potentially impacted users.
- Chatbots bring consistency to the bank's customers in messaging, voice and tone.
- Chatbots can easily scale up or down during high and low volume periods.
- Chatbots can be used to seamlessly extend the banking brand and test user engagement with new product offerings.
- There is great potential cost savings to be garnered from deploying chatbots and reducing customer service staffing levels.

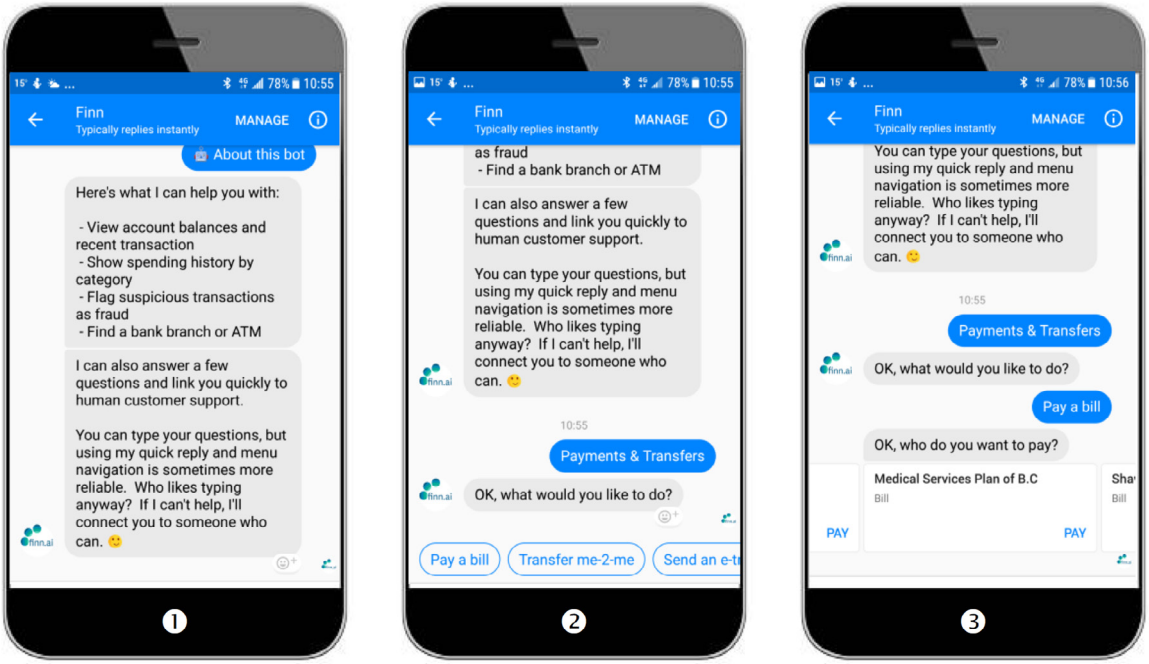
Chatbots in action

To give you a better understanding of the workings of chatbots in the real world, we will take you through a couple of banking scenarios.

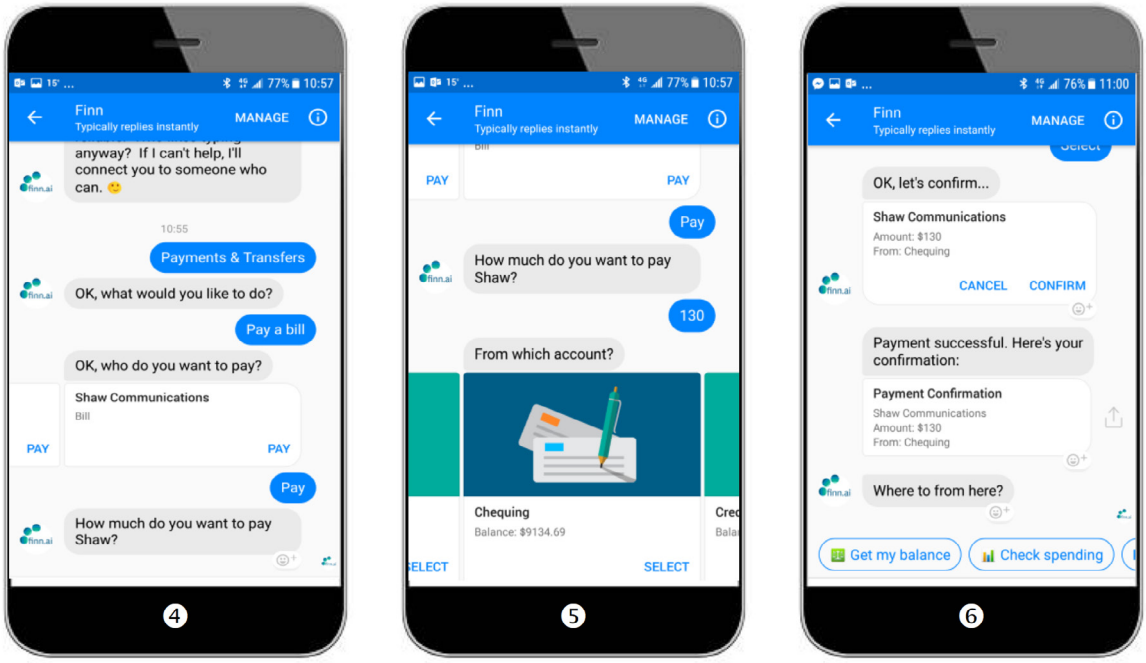
BILL PAYMENT

In this example, we walk through the chat process of paying a bill using a bot through Facebook Messenger:

1. Connecting with the bot initially gives the user specific guidance around what the user can do with the chatbot and how to begin. Creating awareness of the bot's capability can quickly reduce client dissatisfaction with interactions with the chatbot.
2. First, we ask the bot to go to payments and transfers. The bot asks what we action we want to perform, and the rich media interface in Facebook messenger allows us to add several buttons that the customer can quickly tap to accelerate the conversation. We tap on the pay a bill button.
3. Next, the bot would like to know who we want to pay and will look up the available payees that the customer has already set up on their banking profile. Facebook Messenger allows us to scroll left to right across the list and select the company whose bill we want to pay.



4. We scroll left and select Shaw Communications by tapping Pay. The bot will ask the amount we want to pay.
5. We type in 130 to represent a payment of $130 and are presented with another side scrolling list of available accounts we can use to pay. We select the chequing account.
6. The bot now summarizes our transaction and offers us an opportunity to cancel or confirm the transaction. After we tap confirm, the bot provides a notification of success and asks what to do next. Accelerator buttons are also available along the bottom to make it easier to start another task with the bot.

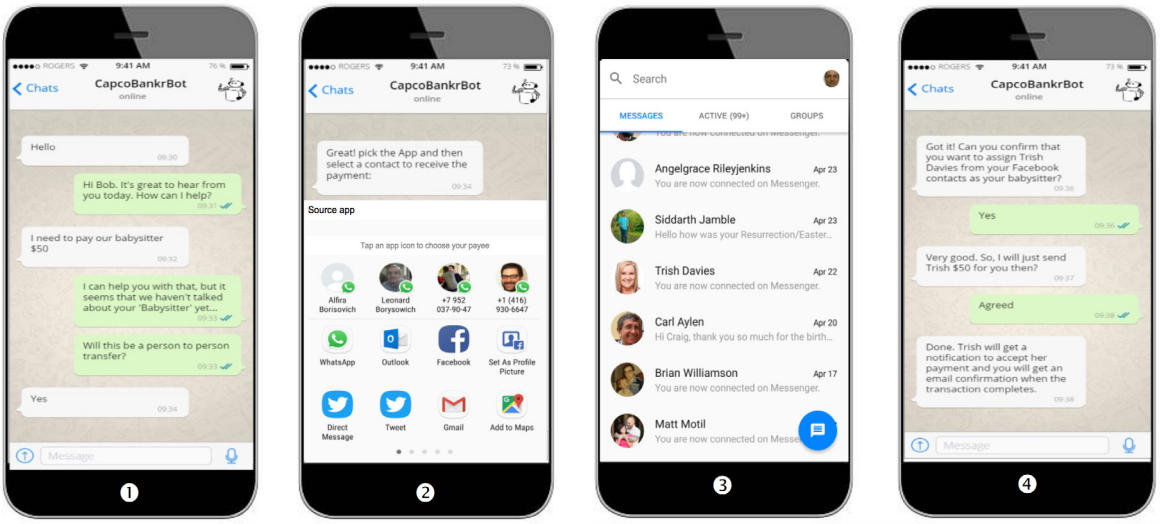


PERSON-TO-PERSON (P2P) PAYMENT

Here, we demonstrate the process of transferring money to another person using a contact found within an app on the phone. The challenge in this scenario is that the bot should be able to take you through the process of setting up and identifying a payee with an alias so that future payments can be simply directed to the alias with fewer steps.

1. In the first visual of our phone conversation, Bob contacts the bot to make a payment to his babysitter. The chatbot can connect to his banking profile and realize that the chatbot hasn't had a previous request to this payee and confirms that it is meant to be a person-to-person payment.
2. The conversation continues in the second visual that allows bob to select the app on his phone where he will select the contact of the person to be paid. In this case Bob taps on Facebook.
3. After selecting the Facebook app, we quickly scroll through our list of contacts and select Trish Davies as the payee.
4. The chatbot confirms the contact and the amount to be paid and then tells Bob how he will be notified when the transaction completes.

Behind the scenes, the chatbot has added a record to Bob's customer profile that links the alias "babysitter" with the contact details for Trish Davies. Future requests to make a payment to the babysitter will go directly to the confirmation steps, completing payments to Trish in fewer steps.



Building a better bot

We can't caution banks enough to take time in thinking through the design, conversation and scope of their chatbots. While chatbots can spark a bubble of interactivity, a poorly designed and implemented bot can quickly burst that bubble. If this occurs, it will become much harder to convince disappointed users to attempt another conversation. Start small, give the user guides, test extensively, and solicit feedback at every step.

Here is a summary of guidelines for helping build a better bot:

- **AI versus AI+ML** – Chatbots with just artificial intelligence will not change or improve over time unless your institution scripts those changes into the conversation. Chatbots that can incorporate different styles of machine learning will improve as your institution adds new sources of content for them to assess in creating their answers.
- **Single bot versus multibot** – Whether your institution decides on a purely scripted model or a machine learning model, developing functionally focused bots that can cooperate will be much easier to maintain, upgrade and test over time instead of trying to create a single bot that tries to do everything.
- **Interaction venues** – Choose the interaction venue for the chatbot carefully. Integrating the chat interface with your app may increase the use of your app, but creating a persona for your bank within a popular messaging platform like Facebook increase user accessibility. The venue also heavily impacts the modelling of your conversations. The approach to modelling conversations in SMS text messaging looks very different from the approach in a rich graphical interface such as Facebook Messenger and different still from the approaches used for voice interfaces like Alexa or Google Home.
- **Seamless human handoff** – Keeping customers engaged with the bot is extremely important. If the user becomes frustrated and abandons the bot, it can be nearly impossible to convince the user to re-engage with the bot. Having the ability to pull in a human service agent to assist the bot when it knows that it is struggling is important. Machine learning should monitor and incorporate those human-to-human chat interactions into future conversations.
- **Proactive versus reactive bots** – A reactive bot only responds when the user makes a query. When you incorporate features for personal financial management or notifications and alerting, your institution will need a proactive bot that can mention things to the user or make suggestions throughout the day.
- **Know the user's context** – Proactive bots need some awareness of the user's context to be effective. Checking the telemetry of the user's phone and seeing that it is travelling at high speed could mean that the user is driving and unprepared to discuss a retirement planning suggestion. Stationary voice devices like Alexa should know that someone, especially the user, is in the room before announcing a payment alert to an empty room. Many opportunities exist to build intelligent bots that know the user's context and can determine the best times and situations to be proactive.
- **Find a partner** – Many players in the industry are micro to midsize business and are typically growing rapidly. Bring a trusted advisor and integrator along who has experience in the design and execution of chatbots and who can assist with integrating the tools and platforms with core financial systems.

Capco continues to partner with industry innovators, using our labs to build examples of working chatbot technologies that target customers in financial services settings. We understand the cognitive conversational craft that goes into voice, text and enhanced visual chatbot designs. Contact Capco to accelerate getting your chatbot talking to your customers.

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Capco is a global management consultancy with a focus in financial services including banking and payments, capital markets, and wealth and asset management, plus a dedicated energy division. We combine innovative thinking with unrivalled industry knowledge to deliver business consulting, digital, technology and transformational services. Our collaborative and efficient approach helps clients reduce costs, manage risk and regulatory change while increasing revenues.

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