

# Emerging Technologies in Contact Centers

## The Key Changes in the Contact Center Space and How They Can Be Leveraged for Customer Satisfaction

### Increasing Customer Satisfaction While Lowering Costs

A central question to any organization focused on long term viability is how to improve customer experience while also lowering costs. One way that many organizations have found to answer this question is through large scale digital transformation in contact centers.<sup>1</sup> Different from traditional call centers which only enable interaction with consumers by telephone, contact centers provide additional services like email, text, chat, fax services, and direct website interface.<sup>2</sup> While the private sector has moved swiftly in adopting emerging technologies like artificial intelligence in their contact centers, the public sector still lags behind leaving improved customer experience and greater efficiencies on the table. Presently, two drivers are moving the contact center of today into the future:

1. A shift from multi-channel contact centers to omnichannel centers in which channels are more integrated, user information is transferred seamlessly from channel to channel, and customer service is more consistent.<sup>3</sup>
2. Accelerating adoption of emerging technologies including Artificial Intelligence (AI), Robotic Process Automation (RPA), and Internet of Things (IoT) that will take on routine aspects of contact center roles (e.g. answering frequently asked questions) leaving the non-routine (e.g. addressing more complex customer inquiries) to humans.<sup>4</sup>

### Part 1 – The Future State of the Contact Center

#### The Drive Toward Omnichannel

Just as “omni” meaning all is superior to “multi” meaning many, omnichannel builds on the capabilities of the multichannel contact center.<sup>5</sup> The key difference between the multichannel contact center of today and the omnichannel center of the future is a consistent brand experience regardless of the technology or method of communication customers choose to use. The United States Department of Agriculture’s (USDA) Farm Service Agency (FSA) which provides agricultural programs to farmers, ranchers and other agricultural partners can demonstrate.<sup>6</sup> In the future, when farmers email the FSA, they would expect as rapid a response as those that call the agency. Despite the majority of business leaders believing that customers prefer to call contact centers for resolution, only 29% of

customers rely on the phone and that percentage is decreasing placing an even greater importance on adequate service in all channels.<sup>7</sup>



**Figure 1.** Channels in the Contact Center

Previously, different communication channels would be housed in single, siloed departments.<sup>8</sup> Consumers would experience different service depending on the channel or even in the same channel. When the company transferred a consumer to a different agent on a call, they would have to not only reintroduce themselves but repeat the issue they were calling about and recall the events of the previous conversation. Consumer expectations have changed. They expect memories and context to be retained from channel to channel and the same seamless experience across channels.<sup>9</sup> If one were to switch from emailing the FSA to calling them, they would expect the agent on the line to have knowledge of their interaction over email.

Achieving frictionless customer service will require shared data across the organization which is challenging to implement. In fact, 64% of Chief

Marketing Officers (CMO) cite a lack of resources and investment, inability to make sense of data with existing technology (61%) and difficulty integrating data (52%) as the three leading obstacles to omnichannel competency.<sup>10</sup> Proper integration is difficult to execute operationally because it requires appropriately structured data in centralized databases.<sup>11</sup> In other words, omnichannel systems need to be able to get data from all potential channels into one system that other agents from different channels can access even though the data inputs from those channels is different. The data generated by an email to the FSA is different from the data generated by a voicemail to the FSA, but an omnichannel system must code those differing inputs consistently, log them into the database, and then ensure that the coded information can be used on other channels to create a seamless customer experience. Data from an email a farmer sent must be usable by an agent that later has a phone call with the farmer, and data from a phone call with the farmer must be usable by an agent who later replies to the farmer's emails.

### *The Adoption of Emerging Technologies*

Cloud-based emerging technologies driven by private sector investment are revolutionizing the contact center space. According to Gartner, by 2022, 70% of customer interactions will involve an emerging technology such as machine learning, chatbots or mobile messaging up from 15% presently.<sup>12</sup> Furthermore, by 2022, 20% of all customer service interactions will be completely handled by AI, an increase of 400% from 2018.<sup>13</sup> This adoption is not being driven by companies, but by customer expectations. The belief that consumers will resist speaking with AI solutions for their customer service needs is unfounded. Smartphone AI like Siri has conditioned consumers to achieve more in short conversations with their most personal devices.<sup>14</sup> Consumers have been taught to ask simple questions in conversational tones, and have the answer returned to them quickly. They expect the same level of efficiency from customer service solutions which can be difficult for human agents to match. It is no coincidence then that usage of Alexa, Amazon's smart home speaker, has skyrocketed, jumping 325% in monthly active users last year alone.<sup>15</sup>

Of course, the key fear surrounding the accelerating adoption of emerging technologies is the elimination of the need for human agents, but the reality is **human agents will be critical for future contact center success, and most interactions will still involve some**

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**human involvement.** It is no coincidence that 46% of contact center leaders are planning a 5-10% increase in agents next year, with an additional 14% of contact center leaders anticipating a more than 10% increase.<sup>16</sup> In addition, emerging technologies will improve the experience of employees in contact centers. Emerging technologies will unburden employees from the mundane, repetitive tasks of answering frequently asked questions or entering data and enable them to spend more time on design, strategy, and implementation. To illustrate, instead of processing loans during the workday by uploading forms to a database, an agent for USDA's Rural Development (RD) agency could spend more time on loan applications where farmers need additional help.

## Part 2 – Emerging Technologies: Description, Benefits, Shortcomings

### *Artificial Intelligence*

At its core AI consists of a group of technologies that when combined can automate tasks that are time intensive and often expensive to do manually.<sup>17</sup> These technologies fall into two groups; technologies that improve perception (the ability to recognize) or improve cognition (the ability to interpret and solve problems).<sup>18</sup> Both are equally important for AI functionality. Perception without cognition is akin to attempting to drive with a clear view of the road without understanding what a road is.

Under the perception group falls technologies like natural language processing and image recognition that identify various forms of communication. Under the cognition group falls machine learning, a buzzword at the core of AI. There are many types of machine learning (See Appendix A) but essentially unlike previously where programmers had to program explicit instructions into computers in order for them to perform tasks, machine learning allows software to learn from examples. In contact centers this could mean that

instead of having scripted responses for every possible question a customer could ask, one could feed software a data set of millions of questions mapped to millions of “good” answers from previous phone calls. Eventually, the software could address 30% or more of customer inquiries and even create responses that a programmer did not explicitly input (for in-depth example of AI see section “Chatbots – An Application of AI”).

AI offers many exciting benefits. In addition to being active 24 hours a day, it is also more accurate at narrowly defined tasks allowing human agents to transition to work that requires a more human touch.<sup>29</sup> To take an example from another field, medicine, IBM Watson’s success rate in diagnosing lung cancer is close to 90%, while human oncologists average 50%.<sup>30</sup> Doctors could spend less time reading x-rays and more time explaining options to those diagnosed.<sup>31</sup> In addition to freeing human time, AI could also augment human performance. Most adopters of AI recognize that there are still many situations where interactions become too complex for AI and that it is necessary for a customer to be transferred to a human, but AI can help even if an agent takes over the interaction. AI can provide recommendations on the next best actions for agents by listening in on the call or even use predictive software to anticipate what a customer needs based on their customer history.<sup>32</sup> Suggested phrases would then appear on an agent’s dashboard. AI could increase an agent’s chances of success by transferring customers to agents that have relevant expertise or similar personalities to the customer through predictive routing.<sup>33</sup> AI could even analyze caller emotions and provide real time feedback and coaching to agents enabling them to improve more quickly. This real time coaching would also save organizations on training, workforce management, and recruiting expenses which plague contact centers of today.<sup>34</sup> On average it costs \$4000 or more to hire a call center service agent, and an additional \$4800 or more to train them, costs that quickly grow with staff attrition.<sup>35</sup> Notably, contact center staff attrition is 30-45% which is more than double the national average of 15%.<sup>36</sup>

The same sentiment analysis that leads to individual improvement can lead to organization wide improvement when aggregated across a high volume of calls.<sup>37</sup> To clarify, if the USDA’s Food Safety and Inspection Service (FSIS) issued a recall for a certain food item, management could analyze the calls the agency would be receiving to gauge the national response of consumers.

Despite the notable benefits, AI also comes with shortcomings. Chief most among these shortcomings is a lack of general purpose knowledge. Although AI can become incredibly proficient at a narrow task such as translating languages from users in different countries, it does not mean it is proficient at related tasks like understanding slang in different languages. This common misconception can lead to customer frustration.<sup>38</sup> Additionally, AI is not a technology that one can simply purchase from a vendor and start using. AI needs to be tailored to each organization which requires substantial backend programming and time.<sup>39</sup> Consequently, incorporating AI means significant investment of resources.<sup>40</sup> For background, the simplest version of a chatbot costs approximately \$30,000 while more advanced versions can cost \$250,000 or more.<sup>41</sup> These figures are just estimates for a prototype. Scaling up the prototype to the entire organization will increase expense.

When AI and humans become work partners, other issues arise. For one, the decisions AI comes to are not always interpretable. Humans rely on logic. Agents can articulate why they attempted to defuse an angry phone call with a customer with a discount offer on

### *Chatbots – an Application of AI*

**What is a chatbot?** A bot is any software that performs an automated task and a chatbot is a bot that lives inside messenger platforms like Facebook Messenger or websites to communicate with consumers.<sup>19</sup> (See Appendix B for types of bots)

**Where will they be used?** Practitioners believe the contact center is the most practical use case for the chatbot as the bot can handle less complex inquiries saving human agents time and effort.<sup>20</sup>

#### **What are their advantages?**

- In a channel customers already use regularly<sup>21</sup>
- Resolves issues without switching channels<sup>22</sup>
- Can incorporate graphical buttons that are simpler than voice input<sup>23</sup>
- Does not need to be downloaded like applications<sup>24</sup>
- Learns from every interaction<sup>25</sup>

#### **Do they have any shortcomings?**

- Humans tend to have unrealistic expectations of their ability and can become quickly frustrated so chatbots need to be able to transfer control to agents quickly<sup>26</sup>
- Bots are often too scripted<sup>27</sup>
- Bots require different development based on the platform which leads to substantial investment<sup>28</sup>

a different product. On the contrary, the decisions that AI comes to can often resist simple explanations which can be difficult to accept.<sup>42</sup> Additionally, when the AI makes a mistake it can be difficult to diagnose why the AI made a mistake.<sup>43</sup> Lastly, because AI's cognitive abilities depend on machine learning which depends on adequate data, faulty data can lead to AI mistakes. Imagine that the Department of Commerce switched the decision power for granting small business loans from humans to AI by feeding the AI data from loan decisions humans made. If those humans had a systematic bias against the elderly, the AI would as well.<sup>44</sup>

Even though AI has its faults, the benefits outweigh the costs. AI has many potential applications at the USDA. Through the One USDA omnichannel program, AI could determine which departments calls need to be routed to and which agent at those departments is best to handle that call. Chatbots built with AI could be present on every agency landing page aiding consumers in search. The applications are endless.

### *Robotic Process Automation*

RPA is a form of software that mimics humans in carrying out computerized tasks.<sup>45</sup> It is different from AI because it is focused on tasks that do not need cognition and dynamism like AI, which needs to be able to respond to a variety of situations. RPA software is rules based and operates best when there are structured data.<sup>46</sup> That structured data make RPA useful for organizations that have a high volume of repetitive processes such as data entry or invoice processing.<sup>47</sup> Because RPA software sits in the presentation layer of software, the graphical interface that humans interact with, RPA is considered "lightweight" IT making it easier to implement than more involved emerging technologies like AI that require intervention by IT departments.<sup>48</sup> In fact, employees involved in business operations with subject matter knowledge can start automating processes within a few weeks of training without any programming experience.<sup>49</sup>

The benefits of RPA are best illustrated through example. Imagine an employee sitting in the halls of FSIS copying inspection numbers from different documents into a spreadsheet. To complete this task, she has to go to her company's database where she clicks on the inspected factory file, scrolls to find the inspection number, copies it, then pastes it into the spreadsheet. She has to repeat the process for over 1000 inspections, a task that will take her at least one workday if not more. Now, imagine that the entire time she was working, a camera was recording her screen, every click and letter typed. The next day it could mimic her movements exactly. She no longer has to perform this repetitive task and is free to do more interesting work like evaluating the inspection forms themselves to see if they can be improved. In fact, it is estimated that businesses can expect a 50% reduction for specific and discrete processing time and associated labor time through RPA adoption.<sup>50</sup> In an age where the volume of work and especially paperwork keeps increasing, RPA provides a safety valve for employees and businesses to get time back and free employees to do more creative work.<sup>51</sup>

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RPA unburdens humans from dull time-consuming tasks, and has the ability to perform those tasks more quickly. As humans progress through repetitive tasks it is easy to make mistakes due to fatigue or disinterest. RPA software never gets tired and is able to perform movements consistently and accurately. One RPA software license can perform structured tasks equivalent to two to five humans.<sup>52</sup> In highly regulated business processes, where mistakes can be costly such as finance or accounting departments, RPA can minimize error.<sup>53</sup> In fact, if coded and tested well enough, RPA can reduce human error risk up to 100% for manual tasks.<sup>54</sup>

RPA is also beneficial when an organization decides to transition business process management systems. If a firm were to switch from Microsoft Office to Apple products for instance, it would take time for employees to adjust. For those employees performing repetitive processes, it would be some time before they achieved intuition and speed. RPA software is faster and can adapt to new processes without the learning curve.<sup>55</sup>

Similar to AI, RPA has shortcomings. One of these shortcomings is that RPA cannot deal with exceptions to the structured rules that are used to create it. Talking clients through their frustrations with faulty products or dealing with mishandled orders will still be human

tasks.<sup>56</sup> For example, if there are errors in the inspection numbers in the FSIS files, RPA will not perform and the error has to be referred to a human.<sup>57</sup> Additionally, although RPA reduces human error for repetitive tasks, there is still potential for human error when setting up RPA. If a human misses a rule when designing the RPA, it can have disastrous effects on an organization.<sup>58</sup> To illustrate, if an RPA is designed to take incoming crop insurance applications and input them into a Client Relationship Management (CRM) software for the Federal Crop Insurance Corporation (FCIC) but a human neglected to create a rule that includes emails that end in “.edu,” the organization would have no record of applications from young farmers who may be using school email addresses. Finally, RPA is also incapable of most of the automations that AI can execute. The more complex a project is the more unlikely that RPA will be useful.<sup>59</sup>

Regardless of its drawbacks, RPA has many potential applications that can benefit the public sector. It has already made inroads at NASA where its financial division, the NASA Shared Services Center (NSSC), has used it liberally for finance, procurement, and human resources.<sup>60</sup> In finance specifically, RPA has worked closely with humans to optimize processes like distributing funds from budgets. The Office of the Chief Financial Officer (CFO) at USDA is implementing an RPA pilot to save its employees time which is scheduled to launch in August via a test case that is similar to the work at NASA in that the RPA will be used to distribute funds from budgets. Anywhere that there is a repetitive, computer-based task, RPA can free human time, reduce errors, and adapt to new systems.

### *Internet of Things*

IoT is the concept of information transfer from sensor-based devices that can connect to broadband. Because broadband internet is widely available and more devices than ever before come with sensor capabilities and can connect to the internet, IoT has experienced nationwide proliferation.<sup>61</sup> From smart thermostats in homes that can be controlled remotely by a mobile device to sensors that can monitor the location of livestock, IoT is impacting a variety of commerce including the contact center.<sup>62</sup>

Although the applications of IoT in the contact center are not as clear as AI or RPA, IoT will still play a large part in shaping future customer service. Notably, IoT will make customer service more proactive instead of reactive.<sup>63</sup> In essence, because devices are sensitive and connected they can alert the manufacturer before a problem arises. A contact center agent would contact the customer or fix the issue remotely without the customer ever realizing there was an issue. To illustrate a potential application, the USDA's Agricultural Marketing Service (AMS) could use IoT in their Packers & Stockyards Division to monitor the movement of livestock and contact members of the livestock, meat, and poultry industries if they need to be made aware of any fraudulent practices.<sup>64</sup> The public sector has already experimented with IoT. At USDA's Forest Service (FS) agency, forests are being equipped with IoT technology creating smart forests. These forests can be monitored in real time giving FS agents and scientists better information through a cheaper method than manual data collection.<sup>65</sup> Being proactive instead of reactive has the potential to reduce call volume by 17% while making the customer interactions much more personal by utilizing data from user devices to better help consumers.<sup>66 67</sup>

*BEING PROACTIVE INSTEAD OF REACTIVE HAS THE POTENTIAL TO REDUCE CALL VOLUME BY 17% WHILE MAKING CUSTOMER INTERACTIONS MUCH MORE PERSONAL...*

As is the case with other emerging technologies, humans will still be necessary. The main challenge will be that the customer inquiries that do need human agents will likely be more complex. That means that agents will need to be trained to be more technical with an ability to answer specific, difficult questions. Expert agents will be standard in a future economy dominated by IoT. By 2020, the amount of Internet-connected things will reach 50 billion, with \$19 trillion in profits and cost savings coming from IoT over the next decade.<sup>68</sup>

## Conclusion

Contact centers and in turn customer service is changing rapidly. The drive toward omnichannel service where customers expect consistent service across communication channels will require more integrated data management. Emerging technologies including AI, RPA, and IoT will lead to more self-service, reduced customer inquiry volume, and better customer experiences. However, through the emergence of these technologies and changes, human employees will still be critical to contact center success. The nature of agent work will change by becoming more technical and more challenging, but also more interesting. After weighing the costs and the benefits of emerging technologies, the public sector should consider adopting these technologies in their future contact centers.

## Appendix

### A – The Types of Machine Learning<sup>69</sup>

- **Supervised Learning Systems:** The software is given many examples of correct answers to a particular problem by mapping from a set of inputs, X, to a set of outputs, Y. For example, one could map photographs to captions to train software to write captions.
- **Unsupervised Learning Systems:** Seek to learn on their own. These are challenging to build and do not exist yet but could understand patterns that humans cannot yet see making them potent.
- **Reinforcement Learning:** A programmer creates a goal for the system, lists allowable actions, and provides constraints. The software determines how to get as close as possible to the goal without violating any constraints. These are helpful when there is a desired outcome but not a clear understanding of a path to get there.

### B – The Types of Chatbots<sup>70</sup>

- **Scripted:** The bot's behavior is determined by rules that can only follow predetermined paths, and the user picks from explicit options.
- **Intelligent:** Bots that are more flexible in the user input that they can accept. The bot improves more as it is used more, but it still, like other AI technologies, has narrow task definition and cannot perform tasks related to its central mission well.
- **Application:** These are bots that can interact with users by using a graphical user interface such as displaying web views like login pages inside messenger apps. The bots can be scripted or intelligent.

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