ATARC

White Paper

Conversational Augmented Intelligence and Artificial Intelligence Framework

Executive Summary

Artificial Intelligence is a powerful technology, and as striking as AI programs may be, the cognitive technologies behind artificial intelligence are already having a real impact on many people's lives and work. AI-based technologies include machine learning, computer vision, speech recognition, natural language processing, and robotics. They are powerful, scalable, and improving at an exponential rate. Developers are working on implementing AI solutions to do everything from self-driving cars to swarms of autonomous drones, and "intelligent" robots.

Artificial intelligence (AI) is defined as the ability of a computer program or a machine to think and learn. It is also a field of study that tries to make computers "intelligent". As these machines become increasingly capable, mental facilities once thought to require people are removed from the definition. Augmented intelligence (AI), also referred to as intelligence augmentation (IA) and cognitive augmentation, is a complement to—not a replacement of — human intelligence. It's about helping humans become faster and smarter at the tasks they're performing. Augmented Intelligence is an alternative conceptualization of artificial intelligence that focuses on AI's assistive role, emphasizing the fact that cognitive technology is designed to enhance human intelligence rather than replace it.

Conversational Augmented Intelligence refers to the use of messaging apps, speech-based assistants and chatbots to automate communication and create personalized customer experiences that augment and enhance human interactions. These technologies have the potential to radically transform the way that people will interact with one another in industry, as well as in government. This document explores several real-world applications of conversational augmented intelligence.

How we employ these technologies in government will have to follow a disciplined approach, instead of a simple drag and drop. There are strategies for success that should be considered, as well as considerations of the federal contracting process. There are certain types of contracts that should be used, and best practices to employ. These types of technologies exist in the various stages of development, from proof of concept, prototype, and dev sec ops environments. There are many use cases in industry, and they are coming into practice in government, as included in this document.

Understanding Conversational Augmented Intelligence

People all across the country, and even the world use Facebook Messenger, Kik, WhatsApp and other messaging platforms to communicate with their friends and family every day. Currently hundreds of millions of people are experimenting with speech-based voice assistants like Amazon Alexa, Google Home, and similar devices. As a result, messaging and speech-based platforms are rapidly displacing traditional web and mobile apps to become the new medium for interactive conversations. In fact, surprisingly many people are enjoying conversations with their Alexa, and speaking to "her". Often people are asking her questions and responding to her replies as if she is an actual person. Surprisingly, she is actually programed for this type of conversation.1

The use of these messaging apps, speech-based assistants and chatbots are meant to automate communication and create personalized customer experiences. This cloud based technology is done at tremendous scale as conversational AI. Conversational AI applications, one of the seven patterns of AI, enable long-running interactions with customers via text or voice using the most intuitive interface available. It is what most refer to as natural language.

Conversational interactions are driven by words, whether in full sentences or in a menu. Unlike social media, conversational applications can support engaging, two-way interactions with private audiences. When combined with automation and artificial intelligence (AI), these interactions connect humans and machines through virtual assistants and chatbots.

The real power of conversational AI lies in its ability to simultaneously carry out highly personalized interactions with large numbers of individual customers. Conversational AI can fundamentally transform an organization, providing additional ways of communicating and engaging with customers, while facilitating stronger interactions and greater engagement.

It is important to note that conversational augmented intelligence is a subset of the broad field of artificial intelligence. Some feel that it is a more powerful evolution and enhancement of AI because of the way that it engages the human interface. However, as we talk about it, it may be applied in many of the domains in which artificial intelligence has made its mark.

There are several major areas where Conversational Augmented Intelligence has been applied as a technology in major applications. It has gone beyond simple chatbots to support many areas such as transcription, translation, conversational sentiment analysis, text summarization and building of knowledge centers. While these are some of the significant areas where it has been applied, it is, by no means limited to these specific areas. This paper will highlight some of the major areas of conversational AI but the uses and applications are endless.

Text Summarization

Text summarization is where natural language processing (NLP) technology can facilitate by creating contextual summarization from vast amounts of data sitting in email, documents and, in some cases, even audio files. NLP can be leveraged for text summarization that facilitates creating short, accurate and fluent summaries of longer text documents or conversations. Automatic text summarization methods are greatly needed to address the growing amount of data available online and historical digitized data to help discover relevant information and deliver faster insights for decision making.[1] Have you ever encountered an application that reads your last few sentences and words, only to suggest a few additional to complete your sentence? This is something that is easy for an automated solution of this type to perform, and it can be nested into many different applications.

Sentiment Analysis

Sentiment analysis or emotion AI refers to the analysis of text and computational linguistics, to identify, extract, quantify and understand and determine the emotional tone behind a series of words, used to gain an understanding of the attitudes, opinions and emotions expressed through those words. It is a technique widely applied to conversational recordings in call centers and materials such as reviews, survey responses, online and social media like Twitter feeds, products, and brand and customer 360-degree views within marketing use cases. Sentiment analysis aims to determine the attitude of the speaker, writer or individual with respect to a specific topic, and to decipher the overall context and associated emotions[2].

Earlier less intelligent forms of sentiment analysis were captured within a binary format of being either positive or negative using rule-based systems to analyze the opinions of users expressed via social media. In reality, emotions provide a richer set of information that addresses consumer choices and preferences, and, in many cases, even determines their decisions. NLP techniques are extremely useful in sentiment analysis focused on capturing emotions with a broader perspective than in a binary format. NLP for speech analysis, combined with social media monitoring, can help organizations understand customer reactions and then act accordingly to improve customer experience in near real time. The analysis of unstructured data allows organizations to manage, analyze and extract insights from billions of social media messages, tweets, blogs, conversations, and reviews. With the help of NLP techniques, they are able to integrate it with structured data (e.g., surveys, tracking studies, focus groups) to get a more comprehensive view of the documents or conversations. Matching metrics to business goals helps ensure delivery of the next best action for business in order to cater to customer needs. There are many instances where this type of sentiment analysis can assist a customer service agent who is working at a multi-channel customer service terminal application. All that the application would have to do is represent red as angry, green as happy, or yellow for neutral. Leave the persuasion to the technician, and assist, or augment with their sales capabilities or power of persuasion.

Translation Services

Machine translation has long been one of the hardest challenges in computer science and AI. It's only with the advent of distributed processing frameworks like Apache Hadoop and Spark, combined with advances in ML algorithms, that have made machine translation start to move from science fiction to reality. Machine translation requires not just the ability to understand the source of human language (as in machine transcription), but also to turn that into a target language to be understood by a speaker of that language. Traditionally, this was attempted by building models based on static sets of instructions combined with dictionaries, but the results of such efforts were often awkward or incomprehensible. A famous example in the early days of using AI for machine translation was government intelligence agencies trying to use machine translation to help translate Russian communication to English but systems not yet being sophisticated enough to handle this. They were trying to translate the phrase "The spirit was willing, but the flesh was weak" to Russian and back to English and the results case back with "The vodka was good, but the meat was rotten".

This changed with the advent of NLP techniques and machine learning (ML), which allowed the ability to train models inferring a knowledge graph approach on massive sets of natural language. For example, phrase-based models relied on translating discrete sequences of words in isolation from the sentence as a whole, often resulting in technically accurate, but confusing or unnatural-sounding, constructs. Companies like Google and Facebook started turning to Deep Neural Nets (DNNs) not only to translate individual words and phrases, but also to take the meaning and intent of a passage into account. In many cases, these results are now almost indistinguishable in accuracy from human translators.[3] It is not uncommon for someone to use such applications for quick excursions abroad, and it would not make a difference what country you happened to visit. Such applications can be used for business as well as for touristic endeavors.

Natural Language Processing (NLP)

NLP has been around for a few decades. As this decades-old form of AI grows more sophisticated, users may forget they are conversing with a machine and not a real person. Speech recognition transcribes human speech automatically and accurately. The technology is improving as machines collect more examples of conversation. This has obvious value for dictation, phone assistance, and much more[4].

Machine translation translates human language text or speech from one language to another. Significant advances have been made in this field in the past year. Machine translation has obvious implications for international relations, defense, and intelligence, as well as, in our multilingual society, numerous domestic applications.

Machine learning allows computers to perform a specific task relying on patterns and training data rather than explicit programming. By trial and error, computers begin to learn, mining information to discover patterns in data that can help predict future events. The larger the dataset, the more examples the computer has to learn from. When your email program flags a message as spam, or your

credit card company warns you of a potentially fraudulent use of your card, machine learning is most likely involved. Deep learning is a branch of machine learning involving artificial neural networks inspired by the brain's structure and function.

Natural language processing refers to the complex and difficult task of organizing and understanding language in a human way. This goes far beyond interpreting search queries, or translating between Mandarin and English text. Combined with machine learning, a system can scan websites for discussions of specific topics and related words even if the user didn't input precise search terms. Computers can identify all the people and places mentioned in a document or extract terms and conditions from contracts. As with all AI-enabled technology, these become smarter as they consume more accurate data—and as developers integrate complementary technologies such as machine translation and natural language processing[4].

Conversational Platforms

Conversational platforms is perhaps one of the most mature applications of NLP. Interest in conversational platforms like chatbots and Virtual Personal Assistant (VPAs) has grown significantly. This is due to a compelling value proposition for users and the potential to improve customer service. In response, businesses and governments alike are moving quickly to implement these technologies. Hence, AI enabled chatbots have become more prevalent in the past few years. These chatbots are not the traditional chatbot frameworks that are more scripted, supporting linear conversations, but can provide the human element within the interaction. Output from the traditional bot frameworks was predetermined based on the expected intents or requests received by the users. NLP techniques have, however, enabled chatbots to provide a more personalized experience for users. Using NLP techniques, you can train the models powering the chatbots and VPAs, streamlining the responses they provide.

These technologies facilitate a compelling value proposition for users, whether they are employees in the organization or customers of the business. Chatbots and VPAs allow users to engage with the technology without having to understand how to access an application or website, or learn how to use the same. This "no learning" use of technology is inherently appealing to users as they merely need to ask for what they want — the responsibility for understanding the request lies with the conversational platform. Additionally, conversational user interfaces can be very efficient, allowing users to accomplish in one request what might require several steps in an application.[4

AI-Augmented Government

The US federal government is undertaking many enterprise IT modernization projects to incorporate AI technologies into its key mission areas. In many instances, this involves issuing requests for information, requesting quotes/proposals and awarding contracts with large project teams to define requirements, document processes and to manage large IT contracts for these types of capabilities.[21]

Legacy applications in government are being replaced with more advanced cloud based systems, and as such advanced technologies can be supplanted into the various agencies. It is often that these advanced technologies are incorporated in new and enhanced features of applications that already exist. They are rolled into newer applications, or in updated versions of existing applications and software so that they incorporate artificial intelligence and emerging technologies into the software application. The contract or acquisition is not specifically for augmented conversational intelligence, or even for artificial intelligence. Many times these technologies are put on top of the applications as an enhancement to something that might already be available but replaced from an older legacy application.

The General Services Administration (GSA) Federal Acquisition Service (FAS) Information Technology Category (ITC) has several acquisition solutions currently in place to procure automated/augmented intelligence products, professional services and solutions. The very widely utilized IT Schedule 70 Contract (SIN 132 20, Automated Contact Center Solutions and 132 51, Information Technology Professional Services) and the Government Wide Acquisition Contracts (Alliant, GSA 8(a) STARS II specifically) are among the acquisition vehicles that have been utilized. The ITC acquisition solutions are uniquely positioned to procure hardware, software and professional services to provide any AI solution for our industry partners.

DARPA created the Deep Exploration and Filtering of Text (DEFT) program to harness the power of NLP. Sophisticated artificial intelligence of this nature has the potential to enable defense analysts to efficiently investigate orders of magnitude more documents so they can discover implicitly expressed, actionable information contained within them.[22] The contracting is done by research and development contracts that resemble the type of acquisitions that exist in major systems acquisition efforts. These are time and material (T&M), as well as Labor Hour type contracts that are commonly seen used in the research organizations and labs.

Development, Security & Operations (DevSecOps)

DevSecOps was developed to increase security features and reduce security defects in the design, implementation, deployment and maintenance of software. DevSecOps builds upon DevOps by increasing the importance of safe practices sooner within the software development lifecycle. Through DevOps, critical customer demands can be met sooner and trust ensured quicker when security constraints are considered earlier in the software development process. Applications are developed in smaller, functional chunks, while keeping in mind the development and incorporation of more secure end applications. The contracting is done in modular increments, and can be smaller dollar amounts and even utilizing firm fixed price type contracts. Each phase is a deliverable of the next, that can be utilized interchangeably by the next acquisition. At the end, the government receives a workable deliverable that can be utilized in the next steps of the process.

The development of an automated solution may involve contributions from linguistics and computer science fields in the areas of artificial intelligence, computational linguistics, machine learning, natural-language understanding, discourse and dialogue analysis, and others. The intent is not to create a whole system in one fell swoop, but to gradually incorporate modules of a system that will bring increasing levels of functionality to the end user. Acceptance is done in small steps that eventually will incorporate the entire solution.[5]

Chatbots & Hybrid AI

Chatbots and Hybrid AI enable companies and government agencies to respond to customer inquiries promptly and to increase the number of customers or citizens they can communicate with at any given time. Technology provides a scalable way to tackle the previously unscalable problem of customer support, especially in the Federal space. As an example, Autodesk implemented the IBM Watson Conversation Platform into its customer service channels and found that a single virtual agent was able to answer and resolve an average of 30,000+ customer support queries per month and also recognize 40+ distinct use cases to quickly resolve simple requests. By contrast, Forrester Research estimates that the average human contact center agent can handle 50 calls per day (or 1,500 calls per month). In addition, Gartner predicts that by 2020, customers will manage 85% of their interactions with companies through automated intelligence.[6] Research firm Cognilytica found that 24% of companies and agencies polled are already adopting or plan to adopt intelligent conversational systems in 2020.[23]

Additional research conducted by Gartner indicates that over 265 billion customer support requests are made every year and it costs businesses over $1.3 trillion to service them. For context, the Federal Government is estimated to have received 750 million inquiries annually. Chatbots can reduce these costs significantly when companies upgrade from antiquated, inefficient Interactive Voice Response (IVR) technology to AI, intelligent chatbots and messaging and other new technologies that are already helping transform call centers across the world for both public and private sectors.[6]

As an example software company Autodesk implemented the IBM Watson Conversation platform into its customer experience channels and achieved a 99% improvement in response times in addition to cutting resolution from 38 hours to 5.4 minutes for most Tier 1 inquiries. They also saw a drop in per-inquiry cost from $15-$200 (human agents) to $1 (virtual agents).[7]

How Conversational AI Reduces Friction

Reducing friction in a user or customer's journey is one of the key objectives for businesses today. Unfortunately, digital channels are fraught with points of irritation. The movement towards voice platforms leaves little or no space for visual navigation menus; at the same time, those navigation menus are growing more complex as businesses increase the content available to customers. Each hiccup in the customer's experience of trying to find information, make a purchase, or solve a problem creates friction. Since people normally choose the path of least resistance, these areas of agitation negatively impact the overall customer experience, potentially driving away business. Conversational AI helps resolves these problems by enabling customers to ask for exactly what they want using their own words and terminology. The capabilities behind conversational AI allow these applications to do so much more such than just fill out forms, make recommendations, upsell, book appointments or any similar task. With conversational AI, customers can now carry out complex online tasks faster and easier than ever before. This not only reduces friction, but also improves the customer experience, which increases engagement.[8]

How The Features of Conversational AI Increase Engagement

For companies and government agencies that want to provide customer service on their terms is no longer sufficient for users and customers. People want an experience that's fast and convenient, and always available no matter the time of day. They want to message you a question at 2AM or use speech-enabled technology to make an online purchase at their convenience. They want to be understood using their own words, not specific keywords. And they want to do so using the multitude of devices and services of their choosing that they already interact with daily. Conversational AI helps eliminate the challenges that customers have experienced with enterprises over digital channels by having these intelligent systems understand, acting in a humanlike manner, and always being available and consistent across whichever channel they choose. At the same time, it provides an opportunity to reignite the customer experience with increased engagement, personalized customer service and improved customer satisfaction.

The features of conversational AI align themselves perfectly with those required to deliver a frictionless experience:

➢ **Easy and Effortless** – Customers can interact with an enterprise over any channel, at any time, simply by asking a question in their own words without any need to know or understand company jargon.

➢ **Personalized and Relevant** – Answers and information given are hyperpersonalized using details provided during the conversation, combined with an understanding of individual's likes and preferences, and previous interactions and information on each user.

➢ **Intelligent** – The conversational AI interface is capable of handling typical humanlike conversations including context, ambiguity and interruption. It can access back-end systems or third-party databases to deliver a comprehensive answer.

➢ **Consistent** – Regardless of how the customer asks their question, the system is able to process and provide correct responses over various channels.

➢ **Data Ownership** – People reveal vast amounts of information in conversations. Their individual preferences, views, opinions, feelings, inclinations and more are all part of the conversation. Sole ownership and control of this intelligence is crucial, as it can then feed back into the conversation and increase engagement, as well as be used to train and maintain a conversational AI application and be further analyzed for actionable business insight. Without control and ownership over that data, enterprises and agencies run the risk of only receiving a portion of the data from third-party chatbot providers with the remainder being sold off to the highest bidder, or even repurposed to serve adverts for your competitors.[8]

Overcoming Resource Constraints

Cognitive automation can perform tasks at previously impractical scales, speeds, and volumes. This allows for not only resource redistribution but workforce optimization: allocating the right resources to the right tasks. Electronic document discovery, for example, locates 95 percent of relevant documents in the discovery phase of legal cases, compared to an average 50 percent for humans, and in a fraction of the time compared to their human counterparts. The technology allows lawyers to sift through vastly larger document dumps relatively quickly and with great accuracy. In medicine, similarly, robotic surgery aims to allow doctors to perform more operations.

It's widely stated that up to 80% of content created in the enterprise is unstructured. Without the help of intelligent solutions it's just not possible to quickly process and sort through this vast amounts of data quickly. The Georgia Government Transparency and Campaign Finance Commission processes about 40,000 pages of campaign finance disclosures per month, many of them handwritten. [9] After evaluating other alternatives, the commission opted for a solution that combines handwriting recognition software with crowdsourced human review to keep pace with the workload while ensuring quality. NASA's Sensorweb, for instance, is a network of low-resolution, high-coverage sensors—space, terrestrial, and airborne—that can trigger closer observations by high-resolution instruments. It provides a way around resource constraints on high-resolution imaging, allowing users to pinpoint and record just-in-time imagery of volcanoes and other cryospheric events (blizzards, lake freezing, etc.). It can also use open-source tools such as Google Earth to create visualizations of

important data. The project's goal is to generate an intelligent and interoperable environment of sensors that can be accessed as easily as a website.[9]

Slashing Paperwork Burdens

In 2017, just as in 1917, government employees spent huge amounts of time on paperwork. A recent Governing survey of state and local officials found that 53 percent had trouble getting their work done in a 35-to-40-hour week due to excessive paperwork burdens. Colorado's recent Child Welfare County Workload Study highlights the problem. For four weeks in 2014, Colorado's Department of Human Services studied 1,300 child welfare workers in 54 counties, recording how much time they spent on different activities. The department found caseworkers spending 37.5 percent of their time on documentation and administration, versus just 9 percent on actual contact with children and their families. [9] At the federal level, research indicates that simply documenting and recording information consumes a half-billion staff hours each year, at a cost of more than $16 billion in wages alone. Procuring and processing information eats up another 280 million person hours, costing the federal government an additional $15 billion annually.[9]

Reducing Backlogs

Backlogs and long wait times are frustrating to both citizens and government employees and can also have severe consequences. Since 2009, the average wait for a Medicare appeal decision has risen from three months to two years. The Social Security Administration expected to have more than a million cases pending at the end of fiscal year 2017 and, exacerbating the problem, expects about a third of its total workforce, nearly 22,000 employees, to retire by 2022. At the US Patent and Trademark Office, the backlog of patent applications reached 558,091 in October 2015. Patent delays can significantly hamper firms, especially start-ups. An agency study concluded that each year of delay in reviewing first patent applications that ultimately receive approval reduces a company's employment and sales growth by 21 and 28 percent, respectively, over five years. Cognitive technologies can sift through large data backlogs and take appropriate action, leaving the more difficult cases to human experts. Additionally cognitive technologies are great at spotting patterns and anomalies in large amounts of data in near real time. A wide range of industries from insurance and banking, to sports, to cybersecurity, and government agencies are all adopting this pattern of AI. In certain cases, depending on their design, some applications can explain to a decision maker why a certain pattern is relevant and important.[9]

Improving Predictions

Machine learning and natural language processing can reveal patterns in data and guide effective responses to problems. It can reveal the most vulnerable populations in public health crises or trace the origins of food-borne illnesses. Using AI to fight food related outbreaks demonstrates how such predictive abilities work and how they can help improve resource allocation.[9

AI enabled chatbots are also proving to be very powerful with IT and IT help desks. North Carolina's Innovation Center (iCenter) is testing chatbots to aid internal IT help desk personnel, freeing their time for more important tasks. The iCenter found that 80 to 90 percent of the tickets that its IT help desk receives are for password resets, which chatbots can perform. Bots could also be used to improve service for a host of other internal applications such as routing tickets, password resets, read inbound emails, chat messages, and voicemails to understand the nature of the requests and automatically handle support inquiries. Additionally, shared services offer a particularly compelling use case. To get the most out of these three categories of cognitive capabilities, it's critical to think about them in a more integrated way. For example, if cognitive automation and engagement are used to relieve the human worker of tasks that are rules-based, routine, repetitive, and relatively simple, humans are then free to focus on more complex, value-adding tasks. [9

The Joint Service Provider (JSP) contract was recently awarded and utilizes conversational augmented intelligence and other AI tools, servicing military in the Washington, DC area. The company that received the award has a focus on AI enabled call centers. The awarded effort includes a contract to provide Information Technology (IT) Support Services - Service Delivery. The specific tasks of this service delivery requirement consists of satisfying Joint Service Provider (JSP) user needs for secure, accessible, and stable IT support. Service delivery services requires an understanding of the current operating environment of the JSP and the ability to leverage mature capabilities and industry best practices to improve efficiency and reduce complexity in order to enhance JSP's IT support services. Through the Service delivery requirement, the JSP delivers responsive IT services and support to its users in the most efficient manner possible using a conversational augmented intelligence platform.

Capabilities in design thinking, business process improvement, and change management pair well with AI to capture the nuances of process being automated, improve upon it where possible, create a foundation for evolution, tailor outputs to the needs of decision-makers, and adapt the organization to enhance adoption. These best practices emphasize stakeholder engagement and communications as core to any organizational improvement. This approach helps organizations implementing AI solutions define their stakeholder base to better understand the users of their automated systems and the impact of those systems on their business processes. Only then can the government incorporate these needs into an end service design. The human-centered approaches to strategy and organizational design enables clients to build their future workforce, harnessing the power of AI to elevate their capabilities. We interpret organizational goals through the lens of human capital, then craft a talent management plan to achieve those goals that aligns with and reinforces positive cultural attributes.[10]

This is where cognitive insights come into play, by helping people perform these more difficult tasks effectively and efficiently. From an organizational perspective, therefore, it often makes sense to consider the logical flow of activities and decision making first. Afterwards you examine how the introduction of cognitive technologies early in this flow affects work performed by the end user. In the

end it becomes evident how new cognitive technologies can augment workforce hours freed up by intelligent automation.[11]

Chatbot Generations

There are 3 different generations of chatbot technology found in contact centers, websites, or in an APP experience[27]. Knowing the difference will help you to understand the customer experience and business impact to a much greater degree.

- 1st Generation: Based on simple written rules. If the customer says something identified in rules, the chatbot replies with pre-configured rules.
- 2nd Generation: Based on supervised machine learning. The machine responds more fluidly based on a range of recognized inputs. This requires the need to label conversation data and to train a model to learn how to interact with the customer. You need a lot of labeled data.
- 3rd Generation: Based on adaptive unsupervised learning. The AI chatbot can learn from unlabeled data. This generation generally combines the benefit of previous generations. It can use rules and labeled data and the ability to learn from many unlabeled data to handle more complex conversations.

Conducting a conversation is an extremely difficult task for humans to manage. This is one of the main reasons chatbots misunderstand or are unable to understand you.

With a 1st Generation chatbot the range of conversation is very limited to a specific use case. The chatbot designer creates a very simple conversation flow. For example, a simple password reset can be handled easily.

Moving on to customer interactions that generate greater business impact and time savings for customers, more linguistically advanced chatbots in the 2nd and 3rd generation conduct natural language processing – often referred to as NLP.

The approaches to NLP vary. This variance often separates the 2nd and 3rd Generation of bots. These later generations are where Conversational Artificial Intelligence becomes available. This is where big business and customer value can be experienced.

How Government Can Buy Conversational AI Systems

In October 2018 GSA announced the award of the Automated Contact Center Solutions (ACCS) Special Item Number (SIN) 132-20 onto the IT Schedule 70 platform. ACCS is defined as any combination of products, equipment, software and/or services that are required to establish and maintain contact center capabilities managed by the contractor for an agency. These include a wide range of automated and attended managed solutions that allow agencies to respond to inquiries from the public.

Permissible offerings under this SIN may include any technologies or services required to deliver and support ACCS to agencies, including but not limited to: Technology: Automated services to include but not limited to Artificial Intelligence (AI), Chat Bots, Robotic Process Automation, Interactive Voice Response (IVR), Voice/Speech Recognition, Text-to-Speech, Voicemail, Callback, Web Callback, Email Delivery, Hosted Online Ordering, Hosted Email Web Form, Hosted FAQ Service, and many more applications.

In addition to the ACCS SIN, IT Schedule 70 Cloud SIN 132-40, which offers streamlined access to a pool of pre vetted contractors that offer cloud computing solutions. GSA customers can clearly distinguish cloud services from non-cloud IT products and services in order to find the right solution quickly. Agencies may be able to restrict their solicitation universe to just the offerings within the Cloud SIN and still satisfy their full and open competition requirements like they may with any other SIN.

It is very easy to order under this vehicle, because it can be utilized by applying Part 8 of the federal acquisition regulation. There are instances where the schedules allow you to order with, or without a statement of work. The range of vendors on this contract are over four and a half thousand, and encompass a very wide range for the socio economic categories of companies. In many instances a quote can go out to industry that incorporates a combination of Special Item Numbers, in addition to the one specific to the contact center, and in most cases will include a statement of work, due to the level of complexity. This allows for very special solutions to be written so that the government can satisfy complex agency requirements. This contract tool is a competitive process, and often will result in a very favorable number of quotations to evaluate for award.

There is a SIN that is designed especially for Cloud, and using this special item number you can incorporate many different technology solutions, based upon the desires of the agency. Here you can provide solutions that are very different in the nature of the service delivery. There is Software as a Service, SaaS, Platform as a Service, or PaaS, and even in some cases there is Infrastructure as a Service, or IaaS. The type of solution would vary, based upon the specific requirement, the existing

technologies, and the anticipated use case. It would also be important to consider the budgeting, obligation, and anticipated consumption model for the hardware or services.

The Alliant 2 and the anticipated Alliant 2 Small Business Government Wide Acquisition Contract (GWAC)s represent the next generation GWAC vehicles for comprehensive information technology (IT) solutions through customizable hardware, software, and services solutions purchased as a total package. The GWAC is a great contract because it allows an agency to purchase hardware and accompanying software. In addition to the purchase of the components, the GWAC also facilitates the integration of the technologies into an agency solution. Cloud solutions are great for these types of contracts and the solutions can incorporate many of the type of technologies that make conversational augmented intelligence so special. Considerations need to be made for legacy applications and business processes for the new technical solution.

The VETS 2 GWAC offers a unique contribution to the federal acquisition community as it's the only GWAC set-aside exclusively for Service-Disabled, Veteran-Owned Small Businesses (SDVOSB). VETS 2 is designed to meet a variety of diverse agency IT requirements, including new and emerging technologies. The contract has a $5 Billion program ceiling with a five-year base period with one five-year option. This contract is very similar to the other type of GWAC, and it also incorporates veteran owned small businesses, so that agencies can incorporate a great socio economic category in the installation of these technologies. Most of these contracts allow for emerging technologies as well.

Impediments to Adoption in Government

Our team has inquired with various government agencies that have mission areas that directly line up with contact center services to the general public, and we wanted to approach them to inquire what things might stand in the way of adopting these advanced technologies into a standard government agency. What we noticed, as we scanned the whole spectrum of government mission areas, that there are agencies across government that span the entire spectrum, from very basic setups, as well as other that have adopted very complex technologies. We wanted to approach only two agencies, to inquire with their leadership, and those in direct mission areas that we thought would be perfect candidates for these advanced technologies. In our research we have had communication with two agencies. One is called the Housing and Urban Development, or commonly referred to as HUD for short, and the Federal Emergency Management Agency, or FEMA. It would seem natural for FEMA to have a need to contact the general public for many reasons aligned with their mission. What the average person does not know is that HUD has many special mortgage and loan programs that they administer to the public, that are also interfaced with many in the banking and financial industries.

FEMA has a constant need to be in contact with the general public during the hurricane season, which lasts from the 1st of June to the end of November. They have utilized call center contracts to make contact with the victims of these horrendous national emergencies. The need for support varies with

the amount of destruction and devastation, and unfortunately there is no easy way to predict exactly how large and how long a call center operation would need to be in place. To the average person it would seem that some of the cloud based solutions would be a perfect option for this type of situation because it could handle any of the surge requirements that might arise. While the technology does have some strengths, what we found out from our investigation with their agency was that their contact with the public occurs at a time when they are at one of the most distressing moments of their lives. For many people they would benefit from having a gentle caring human voice in order to document the damages done by a terrible storm. This does not negate the fact that technology could play a role in call routing, management, and even case management applications. Some of these technologies can help to facilitate, and help manage, as in the case of many augmented conversational intelligence applications.

We had the fortunate situation that we were able to engage many agency representatives in an open forum, where they were able to share some of the difficulties that they felt would stand in their way of full adoption of these advanced technologies. Some of the reasons were obvious, like funding for large technology projects. Like many other federal agencies a large portion of their budget goes to operations and maintenance, and these types of capital improvement projects require a significant amount of financial support. They were also very quick to point out that any technology initiative would have to involve the complete support from the CIO. This is especially true in these times, where FITARA mandates that the CIO plays a central role in these types of endeavors. Many were very interested in the thought of having these emerging technologies support the frantic and hectic pace that accompanies the response to an emergency situation. However they were quick to point out that there would have to be staffing support to maintain such a large acquisition effort, and often that is not easy to do, especially during the hurricane season. During these times it involves every person that can, to provide emergency resources to the relief efforts. This situation would hinder the continuance of activities to develop and establish a complex IT system, even in a situation where it could help emergency activities.

The Department of Housing and Urban Development had similar situations dealing with central control of IT from the CIO's suite, especially when dealing with large and complex technologies. It was also noted that strong executive leadership of such programs was also identified as critical, in order to see that such a system can be established and supported long enough to be a viable system. Funding was identified as one of the critical pieces of the puzzle, because, like FEMA, there are demands placed on the organization from the operations side of the house. What was different in the situation with HUD, is that they are in the middle of a massive IT modernization project, where they are having all of the IT infrastructure replaced with modern systems. The bigger issue was for them to capture all of the steps and the process that is involved with mapping out the business process for a conversational IT system. I think it is important to note that care was taken to document and flowchart the process flow and workflow first, before making the attempt to automate. He mentioned that there are several systems that have been implemented department wide, and any additional system would have to interface with key systems in order to be successful. Their agency is in the final stages of the contracting center of excellence, CoE, and is reaping the benefits of significant attention to

information technology and systems. Overall, HUD seemed very optimistic concerning the prospect of installing a system, if the hurdles identified would allow them to try at putting in a more modern system.

Appendix A: Government Use Cases

Use Case #1: US Citizenship and Immigration Services[17] [24]

In 2015, the US Citizenship and Immigration Services (USCIS) announced the launch of a chatbot named Emma. Emma can reportedly answer questions on immigration and take visitors to the right page of the USCIS website. The USCIS was receiving a high volume of customer queries, with over 14 million calls on immigration issues each year.

Users can click the "Ask a Question" and "Need Help? Ask Emma" links at various locations of the USCIS webpage. In cases where Emma cannot find the right information, the software automatically redirects the customer to a human agent.

In an interview on the AI Today podcast with research firm Cognilytica, Courtney Winship, Chief of the Digital Services Division in the Office of Citizenship and Applicant Information Services at U.S. Citizenship and Immigration Services talks in more detail how Emma chatbot uses natural language processing to work. The chatbot can currently understand both English and Spanish. The chatbot has not actually decreased calls to their call center, but has allowed users to better navigate the page, find more appropriate responses to various questions, and ask as another touch point for people working their way through a complex, and sometimes stressful, immigration process.

Use Case #2: New York City Department of Social Services[18]

The ultimate goal of the project was to improve the online experience for website visitors and reduce the number of people entering their brick and mortar service centers. The AHRA portal purportedly allows users inquiring about disability benefits, income support, food assistance, and health insurance to view their case status, account balances, and e-notices.

IBM and DSS engaged in a private-public partnership to develop the portal. The IBM Watson Health Government team was tasked with finding a scalable solution to maximize outreach to the customer base. IBM was allowed to access data from PC banks at 15 of DSS' physical service centers. This allowed IBM to access user feedback that illuminated trends in what people wished to see from the program.

The partnership established a multidisciplinary team with a mix of public and private sector business and tech experts. The team worked out of the DSS design studio, where elements of the self-service portal were developed jointly.

According to Lauren Aaronson, Assistant Deputy Commissioner for the Office of Business Process Innovation at DSS, after the project with IBM, over 75% of SNAP applications were submitted online, and foot traffic in the physical service centers was reduced by 30%.

Use Case #3: United States Army[19]

The US Army devotes hundreds of millions of dollars to recruitment exercises, from college tours to booths in malls. Obviously, the choice of whether to serve is a life-changing decision. Army career options, however, aren't simple: Recruits must consider future specialties, commitment length, and benefits packages. To help prospective recruits understand their options, visitors to the Army website encounter SGT STAR, an interactive virtual assistant that uses artificial intelligence to answer questions, check users' qualifications, and refer them to human recruiters.

The Army found that SGT STAR does the work of 55 recruiters, with an accuracy rate of more than 94 percent, and has increased engagement time for site visitors from 4.0 to 10.4 minutes. As of 2016, the virtual assistant had answered more than 16 million user questions. SGT STAR uses machine learning to recognize data patterns that help it distinguish helpful answers from unhelpful ones. The more questions it answers, the more it learns and the better it gets. Chatbots such as SGT STAR also can be deployed internally, to automate processes in human resources, IT, and procurement.

Use Case #4: State of California[26]

The Center for Digital Government presented the California Secretary of State with the Best of California Award for its Business Programs Division's Eureka Chatbot. Awarded for Best Application Serving the Public, the Eureka Chatbot, developed in partnership with Microsoft, answers frequently asked business entity and trademark questions, helping to better serve approximately 400,000 customers who contacted the agency last year.

"We are proud that our Eureka Chatbot was recognized by the Center for Digital Government for making it easier to do business in California," said Secretary of State Alex Padilla. "Californians can get answers to their business related questions instantly using Eureka's artificial intelligence. This is another example of what is possible when innovation and public private partnerships meet. I congratulate our Business Program and IT divisions for their work bringing this project to fruition."

Through Eureka, customers can ask questions like "How do I check my business filing status online?" and they will be linked to the California Business Search website where they can look up their business record and access documents for free. Eureka responds best to short questions or keywords. The California Secretary of State is the first state-level Department or Agency to use Microsoft's Artificial Intelligence and bot services to modernize and create efficiencies when providing services to customers.

The Eureka chatbot assistant is part of Secretary of State Padilla's Digital Initiative to modernize and digitize the agency's divisions, including the Business Programs Division. The Digital Initiative includes an online LLC and Corporation Statement of Information filing tool, an online LLC Formation filing option, an online trademark and service mark filing tool, 11 million searchable business records through California Business Search, an updated search engine for the state's successor-in-interest claims, and a Starting a New Business resource page. All of these tools can be easily found at bizfile.sos.ca.gov.

Appendix B: Industry/Commercial Use Cases

Use Case #1 [12]

Amazon's company contact center is the heart of its guest services operation, but it's traditional phone-based solution was not able to meet its growing needs. "We were locked into proprietary hardware and paying for an expensive service that was not particularly robust," says Tim Choate, CEO and founder of RedAwning. "We didn't have the features such as call monitoring and tracking that we needed to drive efficiency, and our agents were tied down to a very limited number of locations."

Those are a few of the reasons that RedAwning moved to Amazon Connect, a self-service, contact center service that runs on Amazon Web Services (AWS). Based on the same contact center technology used by Amazon customer service associates around the world to power millions of customer conversations, Amazon Connect enables RedAwning to deliver better customer service at lower cost

Using Amazon Connect, RedAwning has gained major new capabilities—including easy-to-deploy virtual agents powered by artificial intelligence—while cutting costs by 80 percent compared to its previous contact center solution. RedAwning pays by the minute for usage and has no infrastructure to manage, enabling it to scale without adding staff or incurring capital costs. Given that RedAwning has tripled in size annually since its founding, these benefits are critically important to its business success.

RedAwning found Amazon Connect surprisingly simple to use. The self-service graphical interface makes it easy for nontechnical users to design contact flows, manage agents, and track performance metrics. "I set up our first iteration of Amazon Connect myself, and I'm not a technical expert," says Choate. "We had better capabilities at lower cost from day one—and our customer service team was very happy with all the new features."

RedAwning finds it easy to use other AWS services to augment its Amazon Connect solution. For example, it uses AWS Lambda serverless computing to automatically look up customers in its customer relationship management database, match them to reservations, and use the information to direct calls appropriately. Using the automatic call-back feature, customers can be contacted by customer service agents at a time that's convenient for them rather than having to wait on hold. "Using Amazon Connect greatly reduces wait times and call times for guests and property managers alike while also reducing the burden on our customer service team," says Choate.

The company recognized the potential of using virtual intelligent agents to provide a better customer experience. Amazon Connect is designed to make creating and deploying virtual agents easy. It is seamlessly integrated with Amazon Lex, which provides automatic speech recognition and

natural-language understanding to build engaging user experiences and lifelike interactions, as well as Amazon Polly, which uses advanced deep-learning technologies to synthesize lifelike speech.

RedAwning moved quickly to capitalize on these capabilities once it moved to Amazon Connect, creating its own voice-based intelligent assistant named Scarlett, which can converse naturally with guests and property managers. "Using Amazon Connect with Amazon Lex, it was easy to build an intelligent virtual agent to answer calls, match guests with their reservations, and engage naturally with users," says Choate. "Scarlett can resolve the issues that guests most frequently call about, which allows us to easily scale our operations."

Scarlett immediately solved a major customer service challenge. Previously, guests would call RedAwning to make a cancellation, wait on hold to talk to an agent, and then be told they had to cancel through the platform on which the reservation was originally booked. "It was frustrating for customers, and for our agents who had to deal with this situation dozens of times a day," says Choate. "With Amazon Connect, Scarlett can tell guests exactly where and how to cancel based on their reservation information. Amazon Lex delivers the natural-language understanding to interpret the customer's request. Now, the process takes less than a minute and no agent is required. Guests are happier, and our service professionals can focus on calls where their expertise is truly needed."

Because the solution is cloud-based and does not rely on proprietary hardware, RedAwning is now able to put agents in more locations as the company expands. Agents can share customers' conversation histories, so they have the right context on every call. The company can locate service professionals in areas where there is less competition for the relevant skills, reducing cost and improving quality.

Using Amazon Connect, RedAwning also now has the ability to collect metrics that are relevant to service quality, such as call length and hold times. "We have the metrics we need to continuously improve performance, support effective training, and ensure we are retaining the best people," says Choate. "We can also record calls to more easily resolve disputes over chargebacks and rental terms." As RedAwning continues to grow, Amazon Connect is helping it bring an easy, seamless vacation rental experience to more people around the globe.

Use Case #2[13]

An Educational Q&A web portal that connects visitors to experts in various particular disciplines was looking to improve its functionality and user experience. It has introduced AI-chatbot that routes questions to human experts and makes the 'question-answer' process faster and more efficient.

There is no doubt that human experts are better at answering complex questions than machine learning algorithms. The only problem is that no 'answer engine', including Quora and Yahoo, had been able to crack the code to success. Achievion's client was looking to change that with the use of AI-chatbots.

A company that uses the paid-advice model, the platform connects each user to one of its experts for a consultation fee. Now, a new AI-chatbot or virtual assistant is making the processing faster and more efficient for both the users and experts of the platform. Trained on millions of questions and answers in the platform's database, the virtual assistant or chatbot eliminates the need for experts to spend time deciphering the nature of a user's problem or question before giving their response.

Functioning as an intelligent routing engine, the chatbot developed for Achievion's client can recognize over 100,000 variables and request follow-up questions that are context-specific. For example, if there's a technical problem with a machine, the chatbot will perform a general diagnosis of the problem and then route that information to a qualified technician or mechanical engineer prior to the consultation. Also, during the conversation, users will be asked if they would like assistance from an expert.

The above helps to quickly determine the nature of the question or problem. This, in turn, improves closing rates and increases the number of customers willing to pay for advice. Put simply, customers are twice as likely to interact with a website when you reach out with proactive chat.

By incorporating machine learning and natural language processing, the team at Achievion was able to develop an intelligent chatbot that consistently replicated client's brand personality and voice in user correspondence. Since it is a conversational dialog engine powered by machine learning, the chatbot can carry out conversations with multiple users simultaneously. The major benefit of the AI-chatbot is increased conversions which allows the online expert question and answer website to stay relevant and grow.

Use Case #3 [20] [25]

Amelia is an AI-based platform that combines the capabilities of Machine Learning (ML), conversational technology, process automation, and other aspects of AI to understand, learn and interact with its environment to automate knowledge work across a broad range of functions in the enterprise. Amelia is a cognitive virtual agent, not just a chatbot, but a smart agent that can complete tasks and whole business processes for enterprises. A major telecom hired Amelia to serve as the first line of IT communication for its 20,000 employees. She handles 82% of IT Service Desk requests and has held more than 80,000 conversations. She resolves roughly 70% of queries within her scope independently. It took our client only 24 months to achieve complete ROI.

At a global telecom provider, employing 107,000 employees worldwide, Amelia has become the new face of their IT service desk. She is helping the company ensure that its employees remain productive and she is eliminating downtime in resolving issues. The company's IT service desk is contacted more than a million times a year. Amelia offers the opportunity to keep up with 24x7 user demand. For example, at peak times such as Monday mornings, the team was getting stretched to capacity, making it difficult to ensure that every user was helped within a few minutes of reaching out for support. For more than 20,000 English speaking staff Amelia is now handling an 83% of IT Service Desk requests and has held more than 100,000 conversations. She is assisting with first-line support requests such as password resets, distribution list additions, permission changes, email issues and two-factor authentication. Given Amelia's early successes, she is now on a first-name basis with the English speaking staff. She is featured on laptop stickers, flyers and life-sized cutouts around the offices. Employees know to contact Amelia via the intranet portal for help with any IT problems. Not only has Amelia learned how to execute the requests but her involvement has been the catalyst for improvements in end-to-end processes that have been re-drawn to further leverage automation benefits. Previously, for instance, forms would be emailed to mailbox owners requesting authorization for the addition of a new user. Now Amelia looks up the mailbox owner independently, sends a message that requires a single push button approval, which dramatically shrinks the time it takes to execute the request. To date, she has correctly identified the intent of employee IT requests 93% of the time and when appropriate, successfully escalated queries she could not complete to her human counterparts in real time. Eventually, Amelia will provide the same support for employees in the company's German operations supporting another 14,400 employees in their native tongue. Following this she will engage with the company's very large community of Spanish-speaking employees. Additionally, the telecoms provider is exploring an opportunity for Amelia to take on an external-facing customer support role in an English-speaking market with the goal of further differentiating their service from the competition.

Use Case #4 [14]

A smartphone retailer hired Amelia to handle customer stock inquiries. By deploying Amelia, the retailer was able to quickly improve sales conversion rates via chat from 0.2% to 4%. More than 70% of all customer inquiries begin with an interaction with Amelia. She correctly recognizes customer intent 90% of the time.

One of the largest telecommunications companies in Japan sought to bolster sales through social engagements with customers. Previously, customers could only receive information on SIM cards, data plans and smartphones by visiting a physical location or through inquiries on LINE, Japan's most popular messaging platform. The company tapped AmeliaTM (locally known as COTOHA) to add an interactive, AI-powered social-chat element to its sales and marketing operations.

In September 2017, the company went live with an interactive virtual operator (VO) on its official LINE account. Customers can engage with the VO through a chat-based Natural Language Interface (NLI) directly within the LINE app. After answering three to six questions from the VO, users receive automated recommendations for products accompanied by links to the product page where they can make a purchase.

The Power of AI

Within a few months of deploying the VO, traffic to the company's LINE account grew considerably. Similarly, the conversion rate from LINE to the company's product page underwent a period of accelerated growth. Actual sales of SIM cards and smartphones multiplied during this same period. Part of the success of these numbers is due to the fact that AI has empowered the company to offer 24/7 customer support, which is notable as more than half of engagements with the VO take place outside of business hours.

Beyond additional sales, the telco has combined its customer engagements on LINE with a log analysis engine, which allowed the company to optimize marketing campaigns. Previously, the system would direct marketing campaigns to all registered LINE users, but now the company can easily categorize users into segments. This new highly-targeted paradigm has increased cost-effectiveness of marketing campaigns within LINE by a factor of 80.

Through the power of AI, the company has delivered customer benefits through 24/7 information access, while subsequently boosting sales and supporting more efficient marketing campaigns.

Use Case #5 [16]

<u>**Cognizant Conversational AI**</u>
Cognizant Conversational AI enables intelligent conversational capabilities and experiences for your enterprise. There is a dual mandate driving Conversational AI's adoption right now, which is for brands to better serve both the commerce and care needs of their customers. Innovative brands are looking to accelerate their efforts and results. For most, this means thinking beyond chatbots, voice skills and smart speakers to an omnichannel, multi-device and multi-modal future of highly contextualized and intelligent engagement.

<u>**Voice-Human Centered**</u>
Your customers are living in a transformative and exciting time. Today's Conversational AI innovations—delivered by IoT devices, voice assistants and ambient computing home hubs—continue to shape their connectivity, engagement and communication experiences. With a simple touch of a button, swipe of a finger or utterance of their voice, Conversational AI connects, empowers and informs customers across multiple devices in an evolving omnichannel world.

With the VOICE methodology, we craft customer-centric end-to-end Conversational AI experiences that enable personalized care and support for customers and effortlessly connect their careers, well-being, homes, health, family, entertainment, education, travel, finances and more. Magic mirrors give consumers confidence in their purchases and keep them engaged in new ways Conversational AI enhances everyday objects by making them smart and useful Magic mirrors retrieve essential customer information, lifting the burden of transaction fatigue.

A major credit card company client was experimenting with new ways to interact with its clients and looked to Cognizant for assistance to build a "Magic Mirror" – a smart mirror leveraged Alexa for to understand voice commands and make changes on the mirror's visual interface. COGNIZANT Conversational AI Solution:

- ➢ Created front and backend functionality and deploying Magic Mirror Modules on a Raspberry Pi device
- ➢ Provided an improved holistic customer hotel experience through the addition of a smart mirror, used to order room service, check local weather, order an Uber, and view upcoming events
- ➢ Discover was able to brand the hotel experience end to end as well as run a news feed detailing Discover services and promotions on the mirror.

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