Opus Research Intelliview: Evaluating Enterprise Virtual Assistants
Intelligent Virtual Assistants are the go-to resource for customer care, tech support and marketing – becoming the basis for $700 million in investment by 2016. In this report, Opus Research evaluates the offerings of eight firms who have taken leadership in defining Intelligent Virtual Assistant for enterprise, customer care and self-service.
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THANKS TO DEVELOPMENT AND PROMOTIONAL EFFORTS FROM APPLE AND GOOGLE, the general public has grown to expect their mobile devices to serve as “intelligent assistants” as they carry out daily tasks. Smartphones, which comprise 65% of the mobile phones in service in North America and other developed economies, are tools that help them carry out complex search, scheduling, e-commerce and communications, often in response to spoken commands.

Apple’s Siri started the trend by enabling people to use their own words to provide instructions or dictation. Google (with GoogleNow and Voice Actions) upped the ante by introducing anticipatory speech recognition (the spoken version of auto-complete) into the mobile PVA mix. And Nuance, with DragonGo and the acquisition of Vlingo, has expanded the footprint of speech-enabled mobile assistants. Their success has expanded the domain of virtual assistants into the enterprise. Innovative financial service providers, travel and transportation specialists, retail and utilities have installed Enterprise Virtual Assistants (EVAs) to greet and serve their customers by enabling them to interact with human-like automated resources.

Dozens of companies had already entered the EVA world by supporting “virtual chat,” an automated resource that provides human-like interactions through the chat window on an e-commerce website. A handful of companies have gone directly to mobile by taking a “Siri for the Enterprise” approach, introducing a speech-enabled mobile assistant to carry on natural language conversations with customers through apps on their smartphones.

Whether they are embedded in mobile devices (like Siri or Nuance’s Nina Mobile), integrated into e-commerce websites as automated chat, or instantiated on an interactive voice response (IVR) platform to greet inbound callers, these human-like resources complement or augment efforts of live agents while providing highly personalized service to individual browsers, shoppers or customers. They are playing an important role in defining the future of self-service and “assisted self-service.”

Basis for Evaluating Your EVA Options

Not all EVAs are created equal. In this “Intelliview” document, Opus Research focuses on eight firms that have established leadership position in the EVA marketplace – spanning smartphones and the Web. We take a structured approach that defines criteria that should be taken into account when planning to integrate automated representatives and intelligent assistants into customer care, marketing and self-service infrastructure. These are products or services that create a pleasant customer experience, that is consistent across multiple channels and assist end-users in rapid execution of the tasks they are undertaking.

Each of the companies under study has great merit and deserves evaluation. Our evaluation is structured to assist in understanding the breadth and depth of each vendor’s research and product development efforts coupled with their product development, delivery and fulfillment capabilities. As enterprise decision-makers evaluate their options, they are destined to find that a large population of their customers and prospects already have smartphones and are ready, willing, able and even eager to use their own words to interact with mobile devices, search engines, corporate websites and automated phone systems.

Getting Clear on the Concept

The EVA arena and market lacks a common lexicon. Solution providers and prospective implementers are hard pressed to reconcile product claims and nomenclature with their own concepts and understanding. “Intelligent enterprise agents” can describe a live customer service representative (CSR) that has good phone skills. It has also been used to refer to speech-enabled IVR applications that are tuned to understand natural language and respond quickly to requests. A simple search on Google speaks volumes. Typing or saying “Personal Virtual Assistant” to populate the Google search box yields URLs and phone numbers for (live, human) individuals who stand ready to perform the tasks of concierges, accountants or travel agents.
Lack of a common language hinders rapid deployment and adoption of EVA technologies and solutions. A lot of speech science is involved, spanning accurate automated speech recognition and human-like text-to-speech synthesis to support lifelike conversations. Nonetheless, long-time industry participants know that speech is only one of many input/output modalities. Accurate understanding of a person’s “intent” or the meaning of words relies on resources for natural language processing (NLP), machine learning (ML), and what some people call artificial intelligence (AI). Others, who may come out of the speech analytics world, will say that there is a benefit to subjecting both spoken or typed input to speech or text analytics and sentiment analysis. Others may go so far as to suggest that a camera be involved to detect gestures, facial expression and other visual cues that color a human’s ability to derive meaning beyond spoken words.

**Props to the Originators: SRI’s Siri and IBM’s Watson**

Two giants in computer software development deserve credit for developing and refining “intelligent virtual agents.” SRI International was one. In 2003, with funding from the U.S. Defense Advance Research Project Agency (DARPA), SRI led a five-year, 500-person effort to build a virtual assistant, essentially to help military commanders with both information overload and office chores. The software or application was a “helper” called the Cognitive Assistant that Learns and Organizes, or “CALO.” It became the foundation for Siri as well as a number of other spinoffs.

IBM’s Watson can trace some of its roots to the Deep Blue, a computer that famously defeated reigning chess master Gary Kasporov in a match in 1997. In the more recent past, “Watson” refers to a “deep question answering” computer system which was built to apply advanced natural language processing, information retrieval, knowledge representation, automated reasoning and machine learning technologies to the field of open domain question answering.

It was made most famous by its appearance on the TV quiz show “Jeopardy” in 2011. Development of the system that ultimately won on Jeopardy began in earnest around 2004. It employed IBM computers with access to 200 million pages of structured and unstructured content consuming four terabytes of disk storage. Once it demonstrated its ability to answer general questions, Watson has turned its sights to healthcare. In February 2013, IBM announced Watson’s first commercial application to support management decisions in lung cancer treatment at Memorial Sloan–Kettering Cancer Center, in conjunction with health insurance company WellPoint.

**Companies in this Study**

There are over 100 providers of “chatbots” and intelligent automated agents to support mobile search or enterprise customer care. For this report, Opus Research has narrowed the field to eight solution providers who have distinguished themselves from a much broader field when subjected to three evaluation criteria that are crucial qualifiers for providers of mobile PVA platforms and solutions:

- **Mobile Focus** – Each candidate has made significant investment to bring a mobile channel focus to its offering.

- **Conversational Interface** – Beyond natural language processing, conversation management detects context and exhibits human-like behavior to take turns in the course of interacting with individuals.

- **Multiple Deployments** – Having multiple, successful implementations reflects that the platform is a mature, generally available product that is in operation and supported commercially by the parent company.
Brief descriptions (in alphabetical order) appear below.

**Anboto**
HQ: Spain (U.S office in Redwood City, CA)
Founded: 2011
Corporate status: privately held
Number of employees: 25
Anboto Group leverages its semantic technology expertise to provide solutions that enable natural language interactions between people and computers, primarily in customer care settings. Its virtual agent software has focused on task completion for such applications as booking travel or transferring funds. Customers include Vueling Airlines, BBVA bank, PwC, and Eroski group (retailers).

**Artificial Solutions**
HQ: Barcelona, Spain
Corporate Status: privately held (raised $5.3 million in 2006 through equity investor, Scope, which participates in management and helps build international partnerships)
Number of employees: 100+
Artificial Solutions claims more than 200 successful projects in the public and private sector in 30 countries. Company’s core technology platform, the Teneo Interaction Engine, powers implementations that support virtual contact center agents that communicate via web chat, email, and over social networks. The platform promotes constant improvement in customer understanding with its own analytics and discovery tools. In October 2011, the company launched speech-enabled applications for both smartphones and tablets, claiming to support “deep integration” with smartphone apps, initially in 21 languages.

**Creative Virtual**
HQ: London, U.K.
London, E14 4AS
Founded: 2004
Corporate status: privately held
Number of employees: ~130 to 200
Creative Virtual has built technologies in knowledge management, natural language processing and virtual assistants to support intelligent, personalized customer experiences. Enterprise implementations include: HSBC, Verizon, CA Technologies, E*TRADE, Lloyds Banking Group, O2 and Virgin Media. Solutions include a mobile app.

**Expertmaker**
HQ: Sweden (recently opened office in San Francisco, CA)
Founded: 2006
Corporate status: privately held
Number of employees: ~15
Expertmaker's AI and Big Data analysis platform takes a unique approach to search, discovery and recommendation, and enables broad deployment of intelligent solutions, including advanced recommendations, virtual shopping assistants, coupon targeting and email optimization. It has integrated speech recognition and text-to-speech synthesis into its platform.
IntelliResponse
HQ: Toronto, Canada
Founded: 2000
Corporate status: privately held
Estimated number of employees: 60
IntelliResponse provides patented virtual agent technology solutions for enterprise customers, including CIBC Bank, Harris Bank, ING Direct, Charter Communications, Progress Energy, Copa Airlines, Kobo Books, Penn State University, Yale University, Harvard University Extension School and Optus. It powers corporate websites, mobile applications, social media channels and agent desktops.

Next IT
HQ: Spokane, WA, 99201
Founded: 2002
Corporate status: privately held
Number of employees: approx. 80
Next IT’s primary offering is a web-based virtual assistant, but has a mobile prototype. It has an IP portfolio of three granted patents and up to 20 filed/pending, covering virtual assistants on the desktop. Clients include Merrill Lynch, United Airlines, Alaska Airlines, Aetna and the U.S. Army. The company is placing great emphasis on healthcare and medical applications with its Alme platform.

Nuance
HQ: Burlington, MA
Founded: 1992
Corporate status: public company (revenues: $1.86+ billion (2013); market cap: approx $5 billion (YE 2013))
Number of employees: 12,000
Nuance is the dominant company in speech processing and has developed or acquired core technologies to support both its Nina Mobile and Nina Enterprise offerings. Its acquisition of VirtuOZ in 2013 greatly accelerated its web-based chat deployments so that it stands alone in offering a mobile EVA consistent with a web-based chat presence. Showcase customers include USAA, Garanti Bank (Turkey), Kaspersky Labs, The Coca Cola Company, Windstream, Nespresso, Pitney Bowes and Pfizer.

SRI International
HQ: Menlo Park, CA
Founded: 1946 (as Stanford Research Institute)
Corporate status: nonprofit, R&D specialist
Number of employees: 2,500
SRI is a nonprofit research institute headquartered in Menlo Park, California. In mid-2012, it introduced an EVA named Lola for as the foundation for Spanish commercial bank BBVA’s efforts to build “the bank of the future.” The vision takes advantage of over a decade of natural language understanding (NLU) resources from SRI – whose scientists developed the software that became Siri. Over the past two years, SRI continuously refined the hooks into BBVA’s back office systems so that responses to natural language queries could be fast and accurate. This is the only commercial offering of an SRI-developed EVA, although SRI has spun off a number of companies (including Siri) which leverage the IP developed under CALO, they include Trapit (content curation), Kuato Studios (AI-enhanced gaming), Desti (travel assistant) and others.
Key Evaluation Criteria for Enterprise Mobile PVAs

For the purpose of this document, Opus Research looks specifically at companies with product offerings that can be called “Siri for the Enterprise.” Like Apple’s Siri, they are an application that provides natural language understanding on a smartphone through a persona. Unlike Siri, which can be called a “general purpose” resource that spans command-and-control of device functions, dictation/transcription of messages and supports general voice search, enterprise-oriented mobile PVAs address specific customer care, marketing and self-service functions for companies.

Figure 1: Intelliview Scoring, Mobile PVAs

Dozens of companies provide some flavor of “virtual assistant” that can be deployed in a corporate setting. If you count chatbots with a modicum of personality, there may be hundreds.

For this report, Opus Research has culled through the long list of candidates to expose a list of companies that have the following attributes: Mobile and Multi-Channel Focus, Conversational Interface, Multiple Deployments.

Editor’s Note: SRI is included in our evaluation based on the implementation of LOLA as an EVA at BBVA. IBM deserves special mention for its commercial deployment of Watson; however it is not put in use for customer care. Rather the Interactive Care Guide and Interactive Care Reviewer implementation enables nurses who work for insurers to reduce the time spent on aggregating patient-relevant clinical and administrative data needed for the utilization management process.

Mobile and Multi-Channel Focus
Many EVAs started their lives as “avatars,” meaning that a human-like image or voice was explicitly associated to the automated chat resources for customer care and self-service. These representations were often strategically placed in a corner of an e-commerce website, usually with the headline, “Ask me a question in your own words.” The windows resembled the “pop-ups” that signal the availability of an agent for live chat or interaction and the avatars
were given names that support a company’s brand image. For example, Amtrak has Ask Julie (courtesy of Next IT) which is the same name as the automated agent that can make travel arrangements and answer questions over a speech-enabled IVR (courtesy of Nuance).

Early avatars were not speech-enabled. Customers or prospects simply keyed in content, much like chat. Enterprises got the incentive to add spoken input when they sought to add an avatar to a mobile app running on a smartphone. Once the move to multi-channel and mobile customer care took shape, marketers and customer care professionals, alike, realized that it was in the brand’s best interest to ensure that each mobile customer receive the same answers and suggestions whether conversing with the mobile app or “chatting” over the web. As part of a personalized or 1:1 experience, the ideal best practice is for companies to recognize a customer and transfer a record or transcript of activity and history as they move from a mobile app to a web-based chat resource or live contact center agent.

**Support of Conversational User Interface**

Allowing end-users or customers to use their own words to describe the purpose or intent of their interaction is crucial because it shows that a solution provider has invested the time, money and brainpower to develop an “engine” capable of recognizing or matching phrases that are synonymous with one another. While this capability is at the core of an intelligent agent platform, it is just table stakes when it comes to supporting a conversational user interface.

A “conversational interface” requires resources that go beyond speech recognition, natural language processing and machine learning. It adds domain knowledge, recognition of context and a “conversation manager” or rules engine that governs the sort of turn-taking that characterize human-to-human and human-to-machine conversations.

The candidates that score high in this category offer a platform that supports person-to-machine interactions that have the look and feel of a human-to-human conversation. That includes a resource that keeps track of context so that it understands the antecedent of a pronoun and responds appropriately. If speech processing is involved, the recognizers are closely matched with natural language processing resources so that individuals can speak in their own words. Text-to-speech synthesis should sound lifelike and be able to show emotions such as sympathy, enthusiasm or humor as appropriate.

**Multiple Deployments in Enterprise**

In contrast to Apple’s Siri, which ships as a feature of an iPhone, the EVAs described in this Intelliview have persona that are associated with specific companies or brands. We use this criterion as an indicator of the completeness and maturity of the EVA software provider’s product or service offering. The provider has packaged its core technology in a way that supports a company’s branding, marketing, messaging and customer care best practices.

The ability to render the core technology as a branded assistant indicates that the software provider has a mature product or service offering. That’s why “multiple deployments” is a major criteria in evaluating solutions providers. Ideally, a branded mobile VPA builds its corpus of responses from a number of corporate knowledge bases and stored interactions. Solution providers with multiple deployments have an advantage because, without violating confidences or compromising competitive information, they can foster “best practices” in customer care for specific verticals and help their customers avoid making mistakes that other firms have experienced. Multiple deployments can also indicate that multiple languages are supported, which is another plus.
Findings: Nuance, IntelliResponse and Next IT Lead Group

Figure 2 above provides an illustrated depiction of our research findings. Occupying the upper right corner, Nuance shows product breadth and multiple implementations in enterprise settings. Both Nina Mobile and Nina Web operate at high levels of efficiency providing conversational services through smartphones and web-based chat, both automated and live. There is deep integration into enterprise backend systems that support a consistent set of answers whether an individual talks to an avatar on a smartphone or taps through a chat on the corporate website.

IntelliResponse scores very highly, thanks to a long history of problem solving for banks, educational institutions and telcos around the world. It has built robust conversational interfaces that support an enterprise’s ability to provide the “one right answer” to questions that are posed in a customer’s own terminology. In many instances it has installed conversational systems that track the intent and meaning of a customer’s utterance and is trialing a system that can also insert promotional messages – a new service enhancement called Offers.

Next IT is a leader based on its broad implementations with high-profile clients like Aetna, Alaska Airlines, Amtrak, United Airlines and the U.S. Army. Instead of building its own spoken interface, it has worked with others – like Nuance and Google. Its focus on healthcare will be its source of differentiation, rather than the development of a natural language-based, conversational user interface.

SRI deserves special mention as many of the speech and natural language scientists who gave life to Apple’s Siri have built a robust PVA for BBVA. It has demonstrated a deep understanding of what it takes to promote a conversational interface that overcomes the challenges of multi-channel deployments and is designed to be the foundation for BBVA’s “bank of the future.”
Mobile Subs: 1.5 Billion Reasons to Evaluate VA Options in the Enterprise

Opus Research estimates that over 1.5 billion wireless subscribers will be actively using smartphones by the end of 2013. They make up roughly two-thirds of mobile subscribers in developed economies with emerging economies rapidly moving to that level of deployment. In mid-2013, Nuance Communications surveyed over 1,000 smartphone owners and found that 90% of those with a personal virtual assistant (like Siri) installed on their phones had used it, with 60% saying they used it “every day.”

Taking a look inside the numbers reveals real differences among age cohorts in terms of PVA usage. More than two-thirds (68%) of respondents in the 18-24 age group reported using PVAs regularly, while less than 30% of those between 55 and 65 reported regular usage. We expect popularity of PVAs to grow as young people, who are already comfortable with using PVAs on a regular basis, continue to discover and define new ways to make them part of their everyday lives.

For planning purposes, Opus Research believes that roughly 40% of the smartphone users, roughly 600 million people, use their smartphones as their primary (and most frequent) way to access the Internet. As smartphones assume primacy for Internet access, search engines have become “action engines,” providing answers to queries about goods and services when people are making plans, contemplating a purchase or seeking support.

Forecasting the Enterprise Market for Virtual Assistants

Intelligent Virtual Assistants are the go-to resource for customer care, tech support and even marketing. All told, Opus Research estimates the number of “natural language” queries launched with Google Now, Siri and the dozen or so mobile assistants, exceeded 3 billion in 2013. Natural language interactions with web or chat-based services offered by the dozens of companies served described in this Intelliview added another 1.5 billion queries to that total.

Figure 3: Forecast of Enterprise VA Queries

<table>
<thead>
<tr>
<th>Year</th>
<th>Mobile Search/App</th>
<th>Enterprise /Web</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>1.43</td>
<td>1.00</td>
</tr>
<tr>
<td>2013</td>
<td>3.02</td>
<td>1.58</td>
</tr>
<tr>
<td>2014</td>
<td>6.28</td>
<td>2.76</td>
</tr>
<tr>
<td>2015</td>
<td>9.63</td>
<td>3.47</td>
</tr>
<tr>
<td>2016</td>
<td>15.08</td>
<td>4.86</td>
</tr>
</tbody>
</table>

Source: Opus Research (2014)
Financial Impact of Enterprise Virtual Assistants

Enterprises see real economic benefit from “diverting” customer contact to these automated systems. Given that a call with a support representative carries direct costs of over $5.00, the direct cost savings associated with an enterprise intelligent virtual assistant are formidable. For this reason, Opus Research’s optimistic expectations for enterprise spending on EVA acquisition and implementation and revenue assumptions illustrated in Figure 4 may prove to be conservative.

Figure 4: Forecast of Enterprise VA Revenue

Over time, as virtual assistants become virtual advisors capable of making recommendations surrounding purchases, we expect a growing number of enterprises across a variety of vertical markets exploit the potential of these resources to enhance revenues.

In 2013, spending is relatively low (a little more than $100 million). The firms under study for this report are just beginning to entice large banks, retailers and telecom companies to put natural language understanding and virtual assistants into the critical path with their customers. But Enterprise Virtual Assistants are getting much better at learning new tasks and functions, and responding to customers in highly personalized ways, so we see healthy growth in the near term with spending approaching $700 million forecast by 2016.

Opus Research hopes that a document, like this Intelliview, brings clarity to the marketplace by defining the meaning of the term “virtual assistant” and outlining the features, functions and product attributes that make vendor offerings attractive.
About Opus Research

Opus Research is a research-based advisory firm providing critical insight and analysis of enterprise implementations of software and services that support multimodal customer care and employee mobility strategies. Opus Research calls this market “Conversational Commerce” with tailored coverage and sector analysis that includes: Self-Service & Assisted Self-Service, Voice & Call Processing, Web Services, Personal Virtual Assistance, Mobile Search and Commerce and Voice Biometrics. www.opusresearch.net

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