White Paper: The Hassle-Free way to Developing a (truly) intelligent chatbot!

Introduction

Chatbots are a big deal. Companies in all industry segments (up to 80% of all companies) are planning or have already created chatbots for customer engagement and support, as well as internal staff support. The global market will surpass $1 billion within the next 5 years.

Further, UX experts are already noticing that voice as an interaction medium is more natural and offers many advantages: the human mind works 2 to 3 times faster using oral commands as opposed to typing or clicking. Verbal communication also helps those segments of the population who have difficulties in typing or clicking, including folks for whom English might not be their native language. In addition, just as moving from command lines to GUIs produced a *wow!* experience for many of us, moving from textual entry to vocal entry also elicits such a reaction: those users who have had the privilege of experiencing the chatbot described below have sworn that they never wish to return to more "primitive" forms of interaction!

However, today's reality in the marketplace is very different, as witnessed by the long list of articles where negative experiences reign: disappointment, rigidness, loss of control over a company's data or even its clientele. A Google search on "Chatbot Failures" returns over 2 million hits!

But there is an alternative to this pessimism:

Let's stop viewing chatbots as conversational robots, but rather as a vocal interface integrated into your information system, designed as the digital assistant for a specific function in your organization, and developed within the framework of an actual project using an agile yet architected approach.

Let's examine these 4 aspects

For illustration, we will use an actual chatbot we developed: the APUD (Automated Patient flow UpDate)[1] chatbot

1. Stop viewing chatbots as "conversational" robots

The concept of conversation refers to human cognition, where capturing another's attention and the underlying intents make the dialog interesting.

- If a chatbot appears to maintain a "conversation", it is only because it imitates (by rote) human speech patterns!

In addition, using current script-based technologies (fixed scripts) with keyword identification, we see quickly how it becomes devoid of conversational interest for the human party.

This is why we say that using the label "conversational robot" for a chatbot is at best misleading!

Further, there is often a hidden agenda to "hook" the users at the emotional level.

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[1] The acronym actually comes from the French name for the chatbot, *Attente des Patients & Urgences d'un cabinet méDical*

In fact, existing chatbots are not very different from search engines: we enter words, orally or textually, and a search is performed based on the string of characters within a huge volume of non-structured data.

Moreover, NLP (Natural Language Processing), a technology resulting from Artificial Intelligence and self-configuring algorithms based on examples (not grammatical rules), is available today for general usage:

- How can we best benefit from these advanced algorithms for automated voice processing? By using on-line libraries via APIs (Application Programming Interfaces) readily accessible from our Internet browser!

These APIs transform text into voice that a human can understand, and speech uttered by a human into codes that a machine can test:

> *There is no need to hire AI experts, nor to even know how these algorithms work, to develop a vocal application.*

We can go directly to spoken language, because the automated processing of the voice always passes through these conversions of the text.

Using chatbot technologies do not require you to store your data in the cloud or anywhere else in particular:

Only snippets of conversation – a word, a phrase – anonymous and stripped of context, are exchanged with the APIs. You maintain the direct relationship with your clients and thus your visibility and independence: you are not required to deal with or rely upon any large external supplier. All your data stays under your control!

> *For the APUD chatbot, the speech recognition technology is compatible with W3C, [Web Speech API specification](); it is implemented in all modern browsers (Edge, Chrome, Firefox) although it is currently far from perfect for Speech Recognition; also, Speech Synthesis Markup Language (SSML, like XML), is only active on Edge for the moment.*

2. But rather as a vocal interface integrated into your Information System (IS)

We intentionally take a position outside existing applications that we wish to enhance with a vocal interface, by accessing via the standard Internet browser installed on the user's device (phone, tablet, desktop, etc.):

- Enormous intelligence can be embedded in the questions by using up-to-date data and business rules from your IS:
  - o This enables the design of complex series of questions that can be answered with simple "yes or no", which simplify the interaction between the human and the machine within a specific business domain;
- The Human is in command and responds to closed questions issued by the Machine:
  - o This represents a huge difference with respect to general-purpose vocal interfaces such as home speakers which provide primarily a vocal alternative to graphical or textual navigation.

Such a vocal interface becomes the voice of your IS, invisibly integrated into human-machine interactions!

Mobile applications and APIs change the direction of data access: the user gives consent when installing an App and they choose how to access the data:

- This impacts the architecture of the overall human-machine system and requires us to become "interface-driven":
  - o In many other approaches, we start by identifying functionalities or components, then only later do we think about interfaces between these components, even if this means having to rethink the initial decomposition;
  - o On the other hand, the proposed approach for vocal assistants begins from those vocal interactions that are specific to the service expected by the users, within the context of the services provided by the existing Application.

Multimodal human-machine interfaces are taken as a given: the vocal interface is an enhancement of, not a substitution for, tactile and graphic interfaces.

In the APUD chatbot, the user can plainly see the application's graphic menu on their device, it is natural (otherwise, the on-line help will remind them) to use the keywords for the services provided by the application: appointment, times, etc.

3. Designed as the digital assistant for a specific function in your organization

The Vocal Assistant has access to your company's IS via existing applications, as a vocal interface:

The APUD chatbot is built atop an existing application for managing patient appointments in a medical practice. This application integrates appointment-making, emergency cases, and patients arriving without appointments, such as might be the case for a neighborhood clinic or urgent care center.

Such an interface integrated into your IS would provide true value added for your customers and your employees:

• It enhances the service performed by the human worker, it does not replace human workers:
   o There is already enough anxiety about "robots taking our jobs" without adding to the confusion by implying that chatbots, which enhance human performance through increased productivity, accuracy, and/or capacity, are replacing human support agents.
• A Vocal Assistant should always be identified by the function it performs: THE Assistant for that function in your organization!

For example, the APUD chatbot is the Vocal Assistant for the medical practice's receptionist.

We recommend calling chatbots by a name such as "Vocal Assistant for Function X" and not give it a human name such as Anna or Sam.

Involve the relevant staff of the affected groups in the organization to focus on the business domain and your work teams that the chatbot is intended to serve, by emphasizing the service provided by voice:

• Do not try to create a "universal vocal assistant"!

The APUD chatbot is limited to its domain, which is managing appointments and patient flow in a simulated medical office; urgent cases are not handled by the vocal interface, even though that's one of the key functionalities of the existing application. It also does not access Wikipedia, or provide weather forecasts, or order pizza ….

The audience of the Vocal Assistant can then be well defined and business targeted.

A careful choice of tasks to be handled via a vocal interface allows us to benefit fully from both service channels – automated and human – without diminishing the quality of service as seen by the customer; then a second careful choice is required to identify data and processing that would benefit from a vocal interface.

In the APUD chatbot, patient profile creation and update are not appropriate for being performed via a vocal interface.

4. And developed within the framework of an actual project using an agile yet architected approach.

An agile approach includes system architecture in order to best design interfaces within a human-machine system:

• This works even better when incorporated into an **ADM** (Architecture Development Method) cycle as defined by TOGAF.

Once the overall architecture is set, development following an iterative, incremental method allows us to:

• Elicit and validate business users' user stories: no algorithm will ever be able to do that!

For the APUD chatbot we used the @L-is to model essential underlying knowledge of a medical receptionist. We came away with an increased appreciation for the human aspect of such a position.

- Develop and enforce VUI *(vocal user interface)* standards (just as we do for GUI *[graphical user interface]*):

  In the APUD chatbot, the human is always the "master" of the Human-Machine dialog!

- Specify the **essential business rules** for the vocal dialog, i.e. processing and decisions depending on the vocal messages: that's where the **real intelligence** is at!

  In the APUD chatbot, we distinguish between machine-issued information and requests for information on one hand and human-spoken commands or vocal responses on the other.

The Vocal Assistant, as an interface integrated into the IS, must be maintained along with the IS. Thus, it is essential to manage these projects with the involvement of all affected teams: IT, development, operations, and business, from the inception of the project.

- Be prepared to identify, document, and continually adjust processing functions of the existing IS that the voice-driven service will enhance.

We have produced a webinar to provide a brief introduction to our approach: a recording is available at *www.aebis.com/webinar*.

Would you like to know more?

Come see us at *The AI Summit on 5-6 December 2018 - JAVITS CENTER New York* *Stand S22.*

Contact us at contact@aebis.com for more information.

Who are we?

Aebis US is the US subsidiary of BFD SAS, providing expert service to its clients, especially in banking and finance, for over 30 years.

We developed @lis*, a set of methods and tools created to precisely define and model a* **Knowledge Domain***, and achieve* **mutual understanding** *through usage of well-defined words, to facilitate knowledge transfer and/or accelerate development of advanced algorithms.*

@lis **Online Services** *provide the framework for AI projects using an Agile and Architected Approach.*

Some of our satisfied customers in France