



3Nexus Interactive Voice Response Case Study

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Our Commitment.



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❖ The Client

BeVocal is head quartered in California, and provides managed voice application solutions to service providers and customer service call centers. It caters to all its customer needs right from the platform and telephony to the applications and integration. The company also develops custom voice applications for use on its proprietary managed VoiceXML platform.

3Nexus team provides the client telephone-based tool development and maintenance with offshore Development and QA engineers. We are associated with BeVocal for nearly two years and have moved ahead purely on the basis of our ability to deliver par excellence.

❖ The Challenge

In an effort to increase the quality of BeVocal suites, more and more functionalities were being added to the existing system. As BeVocal system grew rapidly, all other applications were supposed to stand outright to derive lot of attention from their customers. BeVocal had to seamlessly augment and retain these applications in proper form.

The cost of custom application development and its platform was also significant. It was decided to outsource the custom application development and maintenance to 3Nexus, since 3Nexus had the right kind of technical resources to manage these applications.

BeVocal was growing rapidly and being a young company, finances were always hard to come by. BeVocal existed in a very competitive market, and had to constantly come up with enhanced features in the shortest possible time.

The challenge for 3Nexus was to develop an application that would help BeVocal maintain and enhance their existing systems, within a short timeframe and resources.

To complete the development process quickly and effectively, it was important that the 3Nexus team understand the architecture and functionality of the existing system in a short span of time.

❖ The Response

We have successfully completed 10 projects that include design, development, testing and deployment to production. There are 6 small projects and 4 medium sized projects for BeVocal clients like Accenture, Asurion, Cingular, Synchronoss and MetroPCS. We have also taken up the responsibility to customize the existing BeVocal's Client Command Center as per their customer needs and have added many reports to the existing applications. We performed QA to Voice based applications to BeVocal's clients, which include Liberty Wireless, AT&T, and Synchronoss.

At present, we are working on three more projects for BeVocal's clients. We are also working on a platform based product development API, which forms a very crucial part of the endeavor.

❖ The Methodology

3Nexus is involved from the Designing phase to the Testing phase.

DESIGN PHASE

The design phase is done in two phases

- ◆ Prototype
- ◆ Detailed design

✓ Prototype

The first phase involves in creating prototype. Prototype describes user scenarios, the initial high-level call flow, prompts, and grammars. It is important to start the usability analysis during this phase. A technique called "Wizard of Oz testing" involves using a human to play the role of the computer. This person reads the application prompts and processes the caller's inputs to test the dialogs and the call flow before coding starts.

✓ Detailed Design

The Detailed design decisions are made based on the requirements specification and the prototype. The output of the detailed design includes:

- The application architecture, required components, types of implementation, and the back-end systems that will be integrated. The application is composed of the voice front-end (VoiceXML page) and back-end server components. The architect needs to consider performance when determining front-end functionality. This helps the application avoid unnecessary remote HTTP requests to the back-end server, which create conversation delays.
- The call flows and detailed elements associated with each dialog state: actions, error handling, prompt and grammar definitions, input mode [voice, DTMF (touch tone) or both], universal commands, help, synthesized speech, recorded audio, and the interfaces for accessing the back-end logic and databases.

The following Voice User Interface (VUI) design guide lines are strictly followed at 3Nexus:

- Prompt: Prompt should be simple and clear to intuitively lead the caller to an expected (anticipated) outcome.
- Memory load: Studies show that, under normal circumstances, callers have a short-term memory of approximately six words. Ideally, the number of choices for callers to select should be four or less. Otherwise, callers become confused and forget the choices presented to them.
- Service reachability: It is not pleasant for a caller to go through a large number of steps before he reaches a service. Callers start to get impatient with more than five steps. The number of steps a caller must take are minimized to reduce frustration.
- Navigation: Provide a way to navigate back and forth between various dialog steps. The caller should be able to go to different parts of the dialog easily.
- Phonetic similarity: Provide a clear set of choices for caller to select. Avoid choices with similar pronunciations.
- Grammar collision: Same choices at different locations in the conversation should not be given to the customer. If the same grammar element appears in more than one context but has a different function, callers become confused.
- Help: Callers need help messages to explain things that they do not understand.
- Error handling: Humans commit mistakes. Graceful error handling decreases dependency on operators.
- Confirmation: Confirm the caller's response to ensure that the machine got exactly what the caller requested and not a different selection. This gives the caller a feeling of confidence.

- User update: Let the user know what is going on and keep him engaged. Back-end service actions may be slow.
- Timeouts: Specify reasonable timeout values to manage the flow of the dialog and keep the user engaged.
- Educate ahead: Train callers on how to use the application and what they can expect. For example, provide a tutorial option for the first-time caller. This tutorial might play sample dialogs describing how to interact with the application. Another option is to send a caller a web page link with dialog samples when they sign up for a voice service

DEVELOPMENT PHASE

At the development phase, we are involved in grammar development, software development, and back-end integration.

GRAMMAR DEVELOPMENT

The grammar definition is a key part of the VUI and is tightly knotted with the dialog style and prompts. During grammar development, the dialog designers must collaborate very closely with the software developers and audio production team to iteratively test and refine the prompt wording and grammar. Well-tuned grammar can reduce many types of recognition errors.

AUDIO PRODUCTION

The audio production team records the prompts and creates the audio files. The VUI designers often work with the voice talent to create the application persona, such as age (young or mature), personality (calm, peppy, romantic, trustworthy or authoritative), socioeconomic status, education level and etc.

Note: This process was executed onsite.

SOFTWARE DEVELOPMENT

Based on the detailed call flow design, the software development team implements the VoiceXML application.

- Create the VoiceXML project and structure
- Develop code for complete call flow, such as output prompts (TTS and audio)
- Handle errors, help, and universal navigation commands
- Integrate with the back-end using JSP and servlets

In addition, the team is also responsible for developing the server-side logic and integrating with other existing applications or databases. In general, the software development team consists of several sub-teams responsible for the front-end components, the back-end logic, and system integration.

Usability analysis and VUI refinement is very important during this phase to ensure that the implementation closely follows the call flow and detailed design.

Tools Used

3Nexus has used the VoiceGenie IDE for the software development. In addition to assisting the developer in creating, editing, and validating static and dynamic JSP VoiceXML and grammar documents, the tools provide Dialog Analysis capability to help detect usability issues. The Dialog Analysis displays potential usability problems related to memory load, service reachability, grammar collision and phonetic similarity. The tool also displays statistics, broken links, warnings, and a metric summary of the VoiceXML document.

TESTING PHASE

All components should undergo independent unit testing. After the individual components have passed unit testing, the application logic, expected functionality, and dialog flow are tested. Testing can be performed in a simulated environment with Text to Speech (TTS) and Automatic Speech Recognition (ASR) support so developers can actually "dial up" the application.

Usability testing is required for all dialogs, actions, navigation, and help prompts associated with each dialog. The caller's response patterns can indicate the trouble spots, for example, using words like "uh," and "umm," and pausing for a long time after a prompt. The usability engineers evaluate the human interaction experience, identify ambiguous and inconsistent direction, make sure services can be reached in a reasonable number of steps, and look for missing universal commands. The usability engineer's primary objective is to make sure the application provides the required service.

Tools Used

3Nexus deployed the application on the BeVocal platform and executed unit testing and usability test by making use of the SIP enabled Soft Phone called "X-Lite".

❖ Environment

The technologies employed in the project include:

- Microsoft® Office Vision
- Java1.4
- JSP
- JDBC
- VXML
- Oracle 8.0
- XML
- Servelets
- Struts
- Fusion Charts (3rd party tool)

❖ The Result

3Nexus has been associated with BeVocal since Aug' 2004. In a very short span, we have successfully completed the projects for BeVocal's clients like Accenture and Cingular. We design and develop new tools as and when required to add to the existing products. Our QA resources prepare the test cases and carry out a thorough testing of the entire application to the satisfaction of the client. We started our interaction with BeVocal with one team member and today we are a 43 member team, and emphasized to grow further.



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