



## Maximizing Benefit while Minimizing Risk in Speech-Enabling Customer Care

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*How can I cut costs and improve customer satisfaction in my call center? How well are my current IVRs really performing? Is speech recognition technology worth the investment? How can I minimize risk?*

These are some of the tough questions that many call center managers ponder, facing strong financial and competitive pressures. This seems a tall order – finding a way to increase automation while serving customers better. With speech technology maturing, a speech-enabled call center is increasingly marketed as a guaranteed success. Although an Interactive Voice Response (IVR) system with speech recognition capabilities does offer the opportunity to simultaneously cut costs and improve customer satisfaction, it may not provide a sufficient return on investment to justify its use in every call center. As with any investment, a solid business case is essential. Making informed decisions between touch-tone and speech-enabled designs requires a solid understanding of the current IVR benefit, what can be achieved by re-engineering the current touch-tone application, and the potential impact of speech.

At BBN Technologies, a leader in speech and language technology for over 30 years, we have developed a unique, data-driven methodology for evaluating the performance of telephone voice user interfaces. This IVR assessment methodology allows us to quantify the benefit of the existing IVR and the potential for improvement, in terms of both automation and customer satisfaction. Once we have quantified the improvement opportunity, we can project how much improvement could be realized through touch-tone re-engineering and/or speech-enabling the IVR. At the same time, an assessment usually reveals a few obvious IVR usability problems, which can be fixed easily with minor changes to the touch-tone IVR. Such “quick-hit” recommendations deliver immediate cost savings, which are typically much greater than the assessment cost. Capital investments in hardware and software don't have to be made until the benefits are proven. Thus, an assessment shows how to maximize the benefit of an IVR, both in terms of cost savings and customer satisfaction, while minimizing risk in the process (both financially and operationally). An assessment:

- Shows how well the existing IVR is *really* performing, in terms of both saving costs and delivering customer service.
- Leads to touch-tone re-engineering, by identifying IVR usability problems.
- May justify the cost of developing a speech-enabled interface, and guides you to a design that will maximize benefit.
- Pays for itself, with the immediate benefit of quick-hit recommendations.

### **IVR Assessment**

Understanding the effectiveness of the current IVR provides a baseline for determining the impact of touch-tone re-engineering or implementing an effective speech-enabled interface. Automatic Call Distribution (ACD) and IVR reports are inadequate because they lack detail and their statistics may be misleading. For example, one of our customers believed that their existing IVR was providing 30-40% of fully automated self-service. Our assessment revealed that only 1.5% were fully served in the IVR and that 14% actually abandoned the call in the IVR without obtaining any useful information. We find that it is common for ACD and IVR reports to count

abandons in the IVR as fully automated calls, even though they are actually frustrated callers who hang up without any information whatsoever.

An assessment begins with the recording of end-to-end calls, from the initial greeting through menu options and prompts, as well as any agent-caller interactions. Using technology that has minimum impact on call center operation, we record thousands of calls to make the analysis statistically significant. Advanced signal processing and analysis tools allow us to follow the path each caller takes from point to point within the IVR, determining the complete sequence of events for each call. We analyze these data to understand how customers react to given prompts, where they retry options or get caught in loops, and where they bail out of the IVR to agents. We summarize this data visually in User Path and Timing Diagrams.

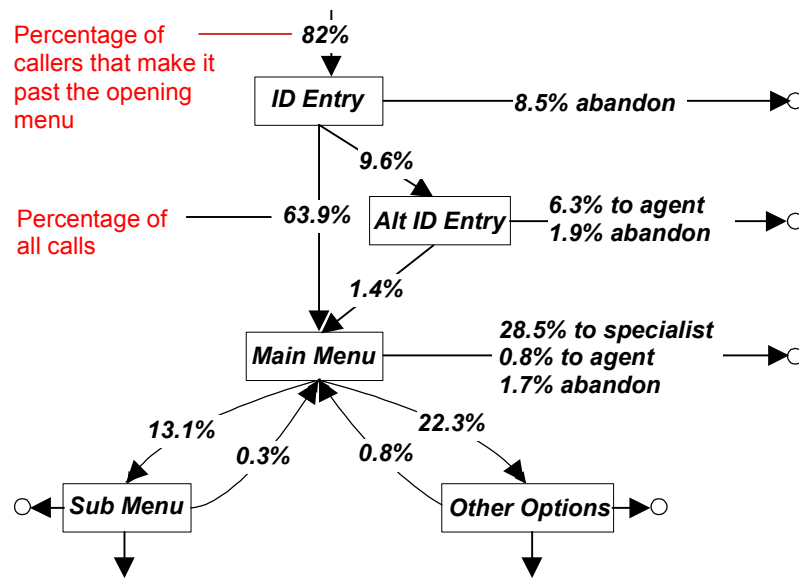


Figure 1: IVR user-path diagram.

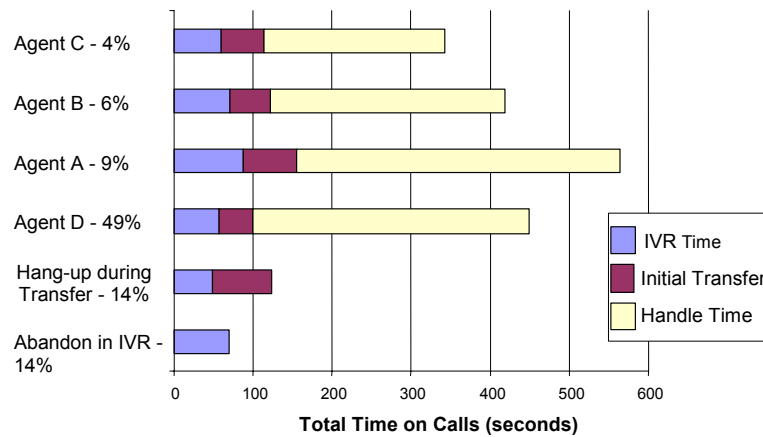
A typical *User Path Diagram*, as shown in Figure 1, shows the path of callers from point to point in the IVR. Usability problems are found by looking at those areas of the call flow receiving little or no caller traffic, or that have high rates of abandoned calls or transfers to an agent. Key IVR usability problems that we have encountered in many IVRs include:

- Complex IVRs many different functions are often underused because customers get confused early in the call.
- IVR sections that attempt to identify the caller are too complex, preventing many callers from reaching the parts of the IVR that deliver automated customer service. Even with effective use of Automatic Number Identification (ANI), the success rate may be low because customers call from phones other than the one registered with their account.
- Touch-tone menus confuse callers because they do not reflect how the customers thinks about their reason for the call. Instead, menu options are motivated by call center operations and the wording is loaded with call center terminology.

Beyond providing useful diagnostic information for IVR redesign, we also use the user path diagram to quantify the potential benefit of specific changes in the IVR, after the overall potential has been estimated using the transcription analysis technique described below.

Further insights about the caller experience and call center operation are gained by tabulating the timing of broad sections of calls of different service categories. For example, Figure 2 shows a Timing Diagram for six different

call types including four agent categories, A-D, in addition to hang-ups during transfer to an agent, and abandons in the IVR. The diagram shows that the call center can service calls of type C much faster than type A. And the category “Hang-up during transfer from IVR” shows that callers’ patience on hold is typically exhausted after around 90 seconds of waiting.



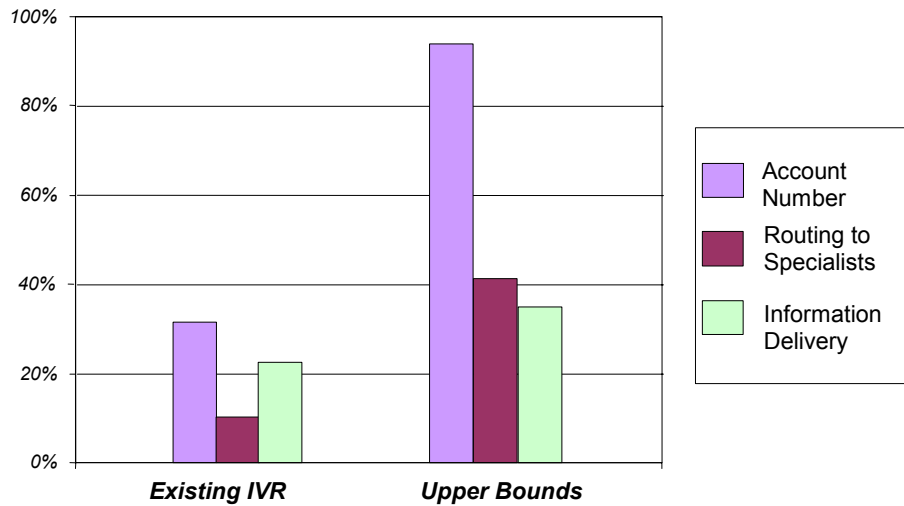
**Figure 2: Timing Diagram.**

### Quantifying the Potential

The main cost driver in the operation of call centers is the cost of agents. Therefore, we have developed a method to quantify IVR benefit as saved agent time. The IVR saves agent time whenever a caller completes a task successfully in the IVR that otherwise would have to be performed by an agent. Tasks that can be automated include caller identification, call routing, information requests, and other transactions.

The potential savings in agent time for each task that can be fully or partially automated is measured using a transcription analysis of agent-caller dialogs in selected calls. Based on time-stamped annotations that characterize the reason for a call and identify the completion of information exchanges and transactions, we measure the frequency and the amount of time that agent spend on tasks that could be automated in an improved IVR. Thus we determine upper bounds for each automation category, both in terms of potential automation, as shown in Figure 3. Given estimates for how much time agents spend on automated tasks, such upper bounds on automation translate to potential savings in agent time.

**Automation  
(% of all calls)**



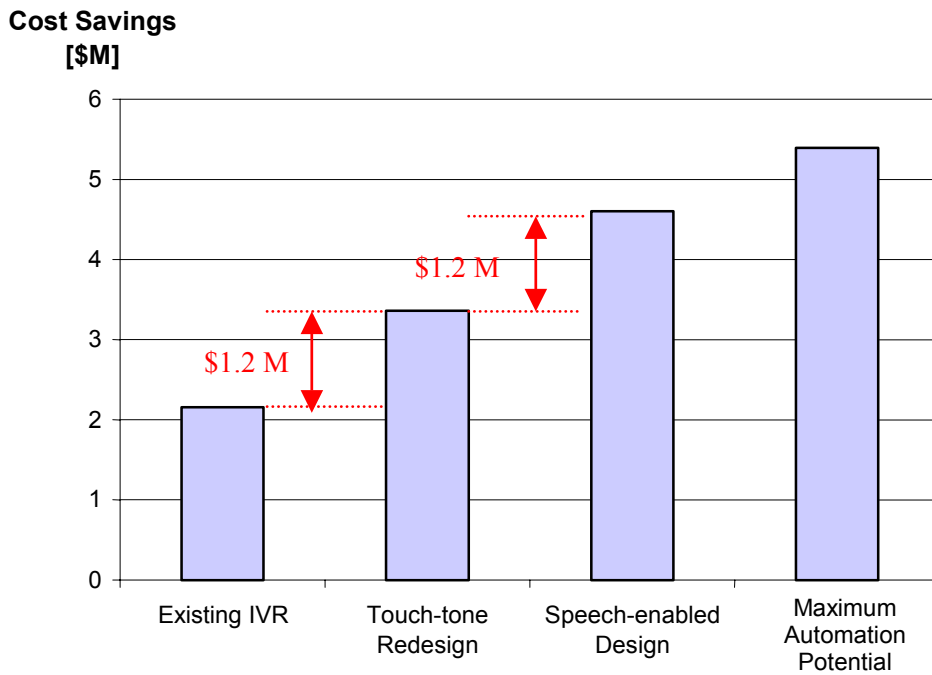
**Figure 3: Assessment of Automation Potential.**

In addition agent cost, IVR changes may impact other cost, such as infrastructure and toll lines. Where applicable, we estimate potential savings in IVR time by timing specific IVR sections based on the complete IVR event traces obtained during an assessment.

**Reaping the Benefit**

Given an assessment of automation potential, we estimate how much of the opportunity we expect to realize by redesigning the IVR. Based on expected savings in agent time per call, hourly rates for the agents, and the anticipated costs for implementing the changes, we build a comparative business case for touch-tone IVR re-engineering versus speech-enabling the call center. Figure 4 illustrates, in a case study of a customer care center of a large telecommunication service provider handling 10 million calls per year, the projected benefits for a touch-tone redesign versus a speech-enabled design. Savings for the fully automated system are labeled as maximum automation potential, which can never be fully realized. The results show that while \$1.2 M can be saved through touch-tone re-engineering, a speech-enabled interface can provide an additional \$1.2 M in savings, for a total of \$2.4 M in savings. Typically, a call center will implement the touch-tone redesign while proceeding with the development of the speech-enabled interface, offsetting the cost of the speech implementation with the money saved from the touch-tone redesign.

If a decision is made to proceed with speech technology, we simulate a speech-enabled interface and present it to live callers to collect speech data needed for configuring the speech recognizer and natural language processing technology. The results are used to optimize the speech-enabled IVR prior to evaluating the prototype on a larger audience of thousands of calls. We measure the actual performance of the speech-enabled IVR by applying the same methodology used during the assessment of the initial IVR. Thus, we can accurately measure the actual benefit delivered by the speech-enabled interface, before the speech-enabled IVR is rolled out in production mode. This phased-approach minimizes the investment required for hardware and software until the benefit of speech is proven.



**Figure 4: Business Case projecting the Benefit of Touch-tone Redesign versus Speech-Enabling the Call Center**

### Summary

It is possible to significantly cut costs and improve customer satisfaction in a call center. Partly, this is due to the poor performance of many existing IVR applications that are in need of re-engineering. However, speech technology can provide gains simply not available through a touch-tone interface. A detailed IVR assessment is a strategic step towards determining and realizing the potential for automation using speech technology, while minimizing the investment risks.