# Optimizing Self-Service Telephone Calls for Mobile Phone Users

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Inventing Real Customer Service™

# Introduction

For many call centers today, over fifty percent of inquiries to voice applications originate from mobile devices.

- At the end of 2012, there were **6.8 billion** mobile subscriptions, according to The International Telecommunication Union.
- Mobile subscriptions outnumber fixed lines **5:1** (more so in developing nations).
- **Eighty-seven percent** of United States adults own a cell phone according to Pew Internet.
- **Forty-five percent** of U.S. adults own a smartphone.
- African-Americans and Latinos (**49 percent** of each) are leading U.S. smartphone ownership, while only **45 percent** of Caucasians own one.
- **Fifty-one percent** of consumers said they made a mobile phone payment within the past three months, and **82 percent** said they would likely make one within the next year (Source: Mobio Identity Systems, Inc. Report, 2011).

# Mobile Phone Use in IVR Applications

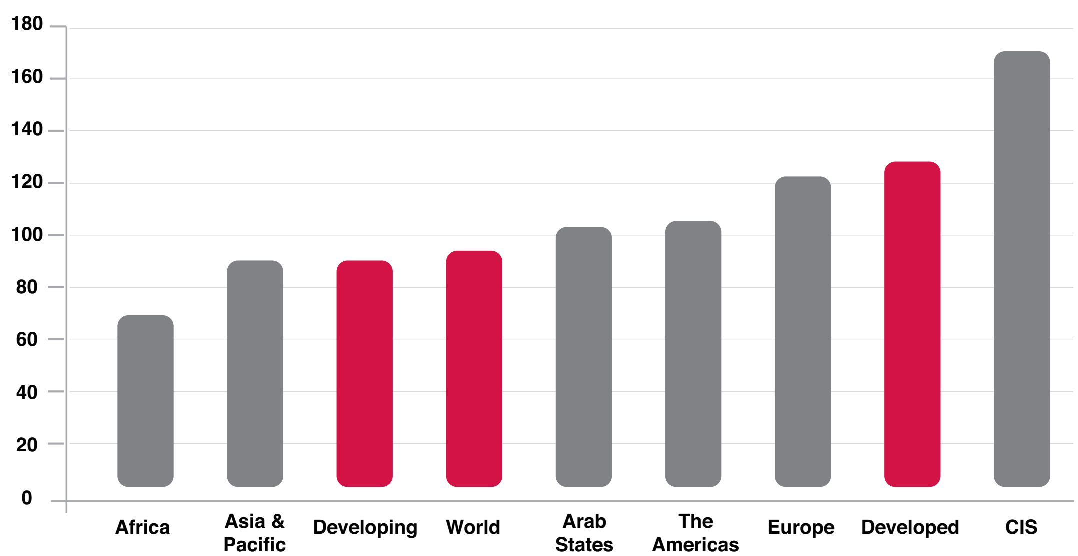
Previous white papers have discussed the human, environmental and cultural factors affecting the effectiveness of interactive voice response (IVR) applications. This paper discusses the impact callers using mobile phones have in the equation.

According to the International Data Corporation, vendors shipped a total of 418.6 million mobile phones in 1Q13 compared to 402.4 million units in the first quarter of 2012 and 483.2 million units in the fourth quarter of 2012.

In the worldwide smart phone market, vendors shipped 216.2 million units in 1Q13, which marked the first time more than half (51.6%) the total phone shipments in a quarter were smart phones. The market grew 41.6% compared to the 152.7 million units shipped in 1Q12, but 5.1% lower than the 227.8 million units shipped in 4Q12.

Phone users want computers in their pockets. The days where phones are used primarily to make phone calls and send text messages are quickly fading away.

TABLE 1: LIST OF COUNTRIES BY NUMBER OF MOBILE PHONES IN USE (2008 – 2010)

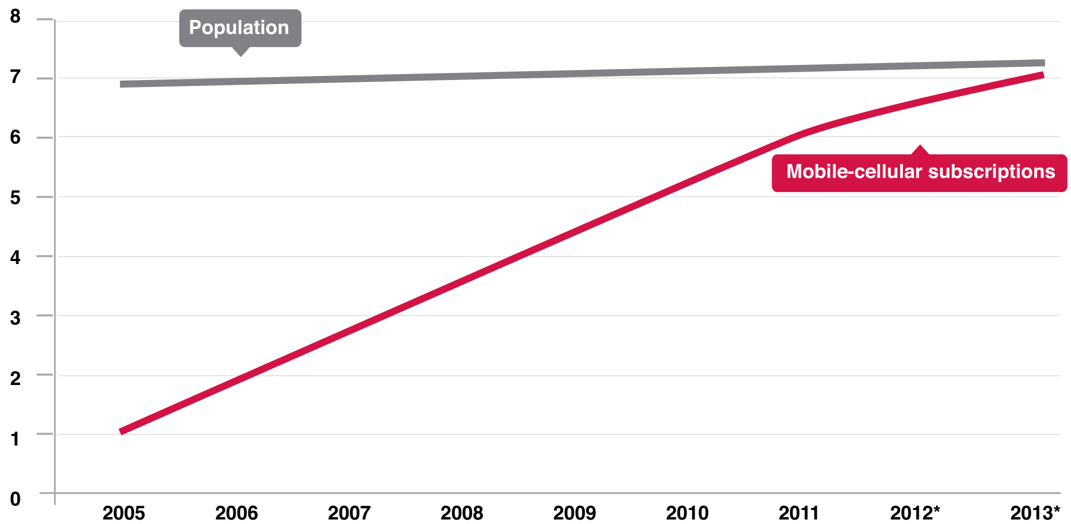


The International Telecommunication Union estimates that at the end of 2012, there were 6.8 billion mobile subscriptions, which is equivalent to more than 87 percent of the world population. This is a significant increase from 5.4 billion mobile subscriptions in 2010 and 4.7 billion in 2009. Table 2 shows mobile phone subscriptions globally in 2013. For many call centers, over fifty percent of inquiries to voice applications originate from mobile devices.

The mobile phone customer channel is subject to network congestion, weather, geographic and other variables that make automated customer service calls particularly difficult on the caller.

This presents an interesting set of challenges for voice user interface designers, application developers and even original equipment manufacturers (OEMs).

TABLE 2: 6.8 BILLION MOBILE CELLULAR SUBSCRIPTIONS




SOURCE: ITU WORLD TELECOMMUNICATION/ICT INDICATORS DATABASE
*ESTIMATE

In 2013, there are almost as many mobile-cellular subscriptions as people in the world, with more than half in the Asia-Pacific region (3.5 billion out of 6.8 billion total subscriptions).

Table 3 below itemizes some of these challenges and how they impact speech and dual tone multi-frequency (DTMF) input modalities when it comes to caller interaction. A weighting of zero to three is assigned to represent the relative significance of each factor when using speech and DTMF as a means of input.

TABLE 3: FACTORS

| FACTOR | DESCRIPTION | IMPACT ON SPEECH | IMPACT ON DTMF |
|---|---|---|---|
| **Network** | Coverage<br>Tower proximity, outages | 2 | 2 |
| | Traffic<br>Peak/off-peak, latency | 2 | 2 |
| | Speed/bandwith<br>GSM, 3G, 4G | 1 | 1 |
| **Device** | Antenna design<br>Headset, earpiece/ bluetooth | 1 | 1 |
| | Access to keypad<br>Touch/mechanical | 0 | 1 |
| **Environment** | Weather<br>Cloud cover, inclement | 1 | 1 |
| | Geography<br>Altitude, line of sight | 2 | 2 |
| **Caller** | Location<br>indoor/outdoor | 1 | 1 |
| | Movement<br>Driving, walking | 2 | 3 |

0 = NO SIGNIFICANT IMPACT
1 = MINOR IMPACT
2 = MODERATE IMPACT
3 = SIGNIFICANT IMPACT

Table 4 itemizes some of the challenges to caller interaction with the IVR from any phone. This table identifies mostly human factors and environmental considerations. Again, a weighting is assigned as a measure of the relative importance of each factor.

Good customer service representatives (CSRs) listen to callers to understand what they want to accomplish. For instance, CSRs will instinctively treat an 80-year-old person who is hard of hearing different than a busy mom, who may have noisy kids in the background during the call. A great CSR will also pick up on the fact that another caller may want to dispense with the pleasantries and cut to the chase, or that a caller is on a mobile phone with one or more of the factors in Table 3 impeding their ability to communicate effectively.

TABLE 4: FACTORS AFFECTING ALL PHONE TO IVR COMMUNICATIONS

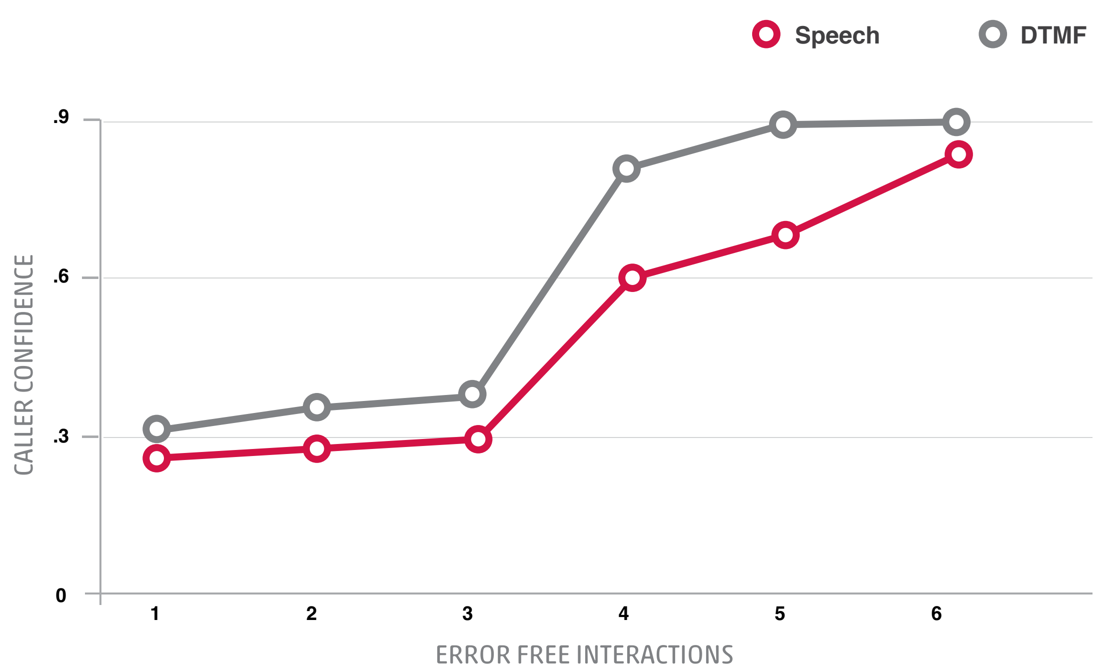
| FACTOR | DESCRIPTION | IMPACT ON SPEECH | IMPACT ON DTMF |
|---|---|---|---|
| **Skills** | Cognition and comprehension | 2 | 2 |
| | Conversational pace | 2 | 2 |
| | Hearing loss | 2 | 2 |
| | Eye-hand coordination | 0 | 3 |
| | Cultural language | 2 | 1 |
| **Attitutude** | Level of like or dislike for Automated Voice Systems in general | 1 | 1 |
| **Environment** | Callers may be using a home, mobile, car, public or office phone) | 2 | 2 |
| **Attention** | Callers (expert and novice alike) can be distracted during a call | 1 | 1 |
| **Familiarity** | All callers are not equally familiar with the voice application | 1 | 1 |

Great self-service voice applications operate like great CSRs, so to speak. In fact, from the caller's perspective, engaging with an IVR application is similar to engaging with another human. Callers are, generally speaking, fair and reasonable individuals who are willing to work with a CSR or technology as long as that engagement works for them.

Figure 1 shows how an "engagement threshold" exists for callers, when they use an IVR application the first few times. Although it may be slightly different for speech and DTMF, there is a significant threshold for callers after two to three successful interactions. During this critical period, callers question whether the automated process will work for them, or whether they should talk to a CSR to get the service they need.

Reaching this "buy in" point is critical to the success of any voice application. As can be seen in Figure 2, the likelihood that a returning caller will use the automated system depends heavily on their past experience with that same voice application. If their prior experience(s) were positive, callers will view the IVR favorably. If not, they

FIGURE 1: CALLER CONFIDENCE IN THE IVR

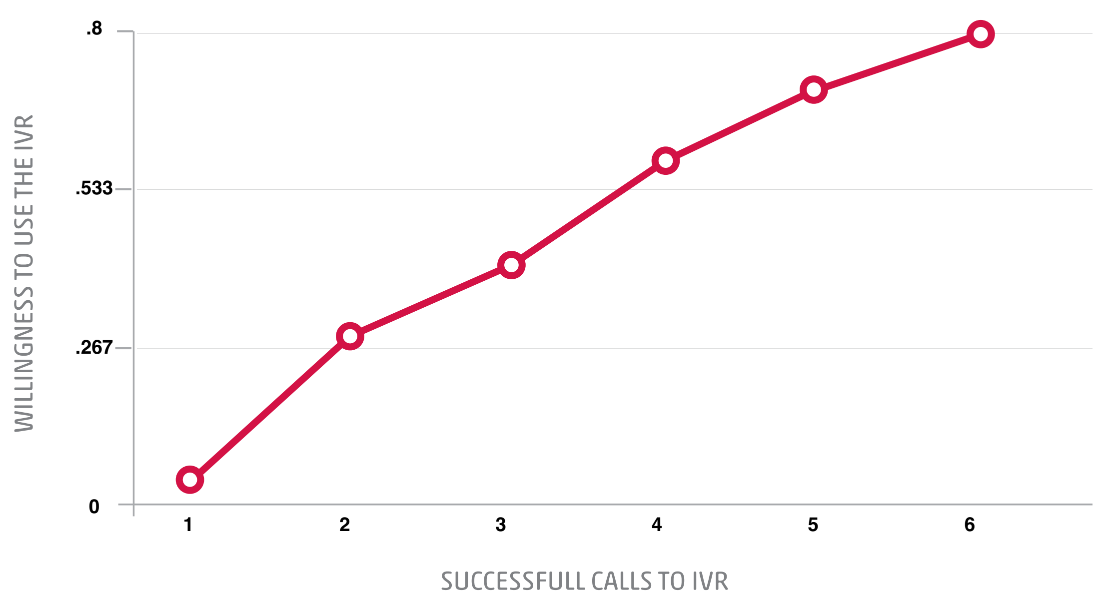


will avoid it altogether. It is similar to how customers treat store personnel they view as unhelpful, rude or ineffective - customers simply go around them.

Every caller brings to your speech application their own individual set of aural, speech, hand-eye coordination (as used in DTMF keypad entry) and comprehension skills. Additionally, these callers contend with environmental variables, such as background noise, poor mobile phone signals and caller distraction. As a result, each call to the IVR system is truly a unique interaction. This is one of the main reasons human operators are so good at handling any type of call – they can instantly handle the dynamics of human conversation intuitively and with ease. Your callers know this all too well, and will opt for an agent the first time your IVR system fails to meet their needs.

To the extent that the voice application can monitor and adjust to the behavior of a particular caller during the call, it will make a proportionate number of your automated calls that much more efficient and productive. While a well-designed call script with optimal structure and content, intentional pauses, grammar tuning and context forming are excellent design principles, these tactics fall short if they fail to consider the real-time behavior and calling environment of the individual callers involved.

FIGURE 2: CALLER PREFERENCE FOR THE IVR



# Addressing Caller Behavior in the IVR

By definition, an IVR engages a caller in a guided conversation. Not only do designers have to consider syntax and grammatical structure, they also have to account for the speed with which a language is commonly spoken, and the voice accent as well.

This is why localization, wherein a speech system is adapted to account for both the linguistic and cultural nuances of a specific region, is so important for enterprises reaching out to non-English-speaking customers.

When callers engage with self-service applications for the first time, something subtle yet very powerful happens. The majority of callers will decide in the first one to three dialogue turns if they feel that interacting with the system will be productive, or if their interests would be better served by speaking to a live agent.

This “Engagement Threshold” is a critical aspect to the success or failure of voice self-service applications. Applications that treat all callers as if they were a single “averaged” user will never make the same critical “first impression” as an application that treats each caller as a unique individual. This has profound implications for repeat callers and new customers alike.

Over the years, traditional voice self-service applications have been “static,” and generally make no dynamic adjustments for the real-time behavior of individual callers. As a result, all callers are handled the same regardless of their knowledge, experience, navigation skills and willingness to use the self-service system. This one-size-fits-all approach results in a significant increase in the costs associated with handling automated telephone calls.

With an adaptive approach, voice self-service systems continuously monitor individual caller behavior during each call and adjusts the output responses accordingly. This approach emulates what humans do during conversation as they continually monitor their audience for clues that the message is being received. Applications that are “caller adaptive” and adjust WPM speaking rate, audio content, time allowed for responses, nuance, audio volume and other variables in real time during the call, stand a much better chance of making a good first impression, and getting the caller past the all-important Engagement Threshold.

Expert callers hear that the system can "keep up with them." Novice callers hear that the system will be more "forgiving and understanding." Those in between will get a similar custom-tailored and synchronized feeling from the system. And, in all cases, the success of the application at handling customer inquiries is significantly improved.

A Harvard Business Review study examined how encounters between customers and service providers make customers feel about the experience. John DeVine and Keith Gilson built on this research with another article titled "Using behavioral science to improve the customer experience." Quoting from this research, the authors conclude, among other things, that "People judge interactions by whether they progress or deteriorate. People also have an innate preference for improvement in both long and short interactions, so it is better to end on a high note. Moreover, the final impression is truly lasting; people forget how a conversation began, but easily recall how it concluded."


> People judge interactions by whether they progress or deteriorate...

Listed below are some of the ways in which Adaptive Technology can address the diversity factors described in the previous section and ensure your IVR leaves your callers with a favorable impression.

**Audio Playback Speed Up** – This feature adaptively and dynamically adjusts the audio playback speed (WPM) to levels above the original recorded pace, based on individual caller skills. This helps expert and fast callers through voice applications designed to cater to the skills of average or below average callers. It also reduces average handle time (AHT), and improves the interactive voice response (IVR) experience for these callers.

**Audio Playback Slow Down** - This feature adaptively and dynamically adjusts the audio playback speed to levels below the original recorded pace, based on individual caller skills. This helps callers with below average skills navigate voice applications designed for callers with average or above average interaction skills. It increases average handle rate (AHR), reduces complaints about the IVR and improves the experience for these callers.

Beyond adaptive adjustment of audio playback rates, additional caller adaptive features can be used to further enhance the caller experience and gain optimization efficiencies. These include:

**Adaptive Timeout Control (ATC)** – This feature allows the voice application to dynamically extend timeout periods for individual callers who have significant difficulty navigating areas of the call script. This increases automation rates and reduces error rates and transfers to human agent.

**Alternate Message Content (AMC)** - This feature prompts the caller with alternately worded voice messages, based on their script navigation skills. Slow and novice callers can hear additional instructions, more assuring inflection and nuance, louder audio volumes and additional characteristics that help retain callers in the automated system. More skilled and experienced callers can be presented with shorter prompts to speed them through the call. This increases AHR, reduces callbacks and abandoned calls and increases customer satisfaction.

**Preemptive Transfer Alerts (PTA)** - This feature keeps a cumulative index of how well each individual caller is navigating the call script, and identifies callers who have excessive difficulty navigating the voice application. When such callers are identified, PTA recommends preemptively transferring them to a customer service representative (CSR). Thresholds are user-programmable, and PTA signals factor in the likelihood that a CSR is available based on incoming call volume. This reduces callbacks and abandoned calls and increases customer satisfaction with the voice system.

**Best Modality Signaling (BMS)** - This feature allows the voice application to offer only speech or DTMF as a means of input at particular points in the call script, based on what has historically been more efficient and/or more successful by a significant margin. The qualifying thresholds are user programmable, so BMS increases call automation rates and reduces user error rates in the voice system.

**Caller Behavior Analytics (CBA)** - This feature provides, real-time, comprehensive analysis and reporting on caller behavior, expertise and willingness to use the voice application. It also pinpoints application trouble spots, and indicates where the application design can be improved. Difficulty ratings for each call script node (CSN) and adaptive versus non-adaptive performance comparisons are provided. CBA provides a unified report for a better understanding of how and where improvements can be made in the voice application script.

**Dynamic Application Smoothing (DAS)** - This feature dynamically adjusts the WPM speaking rate up or down for any points in the call script that callers find particularly easy or difficult to navigate. Adjustment decisions are based on the level of difficulty of each CSN, as represented by the historical behavioral data collected at each such node. This shortens average call duration, reduces error rates in the voice system, and provides an improved user experience.

For a more detailed description of how this adaptive process works, see the Contact Solutions white papers titled "*Using an Adaptive Voice User Interface to Gain Efficiencies in Automated Calls*" and "*Using an Adaptive Voice User Interface to Increase Caller Utilization in Automated Voice Systems.*"

# Measurable Efficiency Gains Reduce Operating Costs

When callers interact with a system tailored to their specific knowledge and aural, vocal and hand-eye coordination skill, efficiencies are gained in the handling of automated calls.

THESE INCLUDE:

**GREATER TOLERANCE** for callers having difficulty using the system.

**MORE FLEXIBILITY** and response time for callers unfamiliar with the system.

**EASIER, FASTER NAVIGATION** for public phone users in noisy environments .

**MORE FLEXIBILITY** for distracted callers.

**EASIER NAVIGATION** for non-native callers.

**FASTER CALL-FLOW** navigation for power users.

As a result, adaptive technology provides increased call automation and IVR utilization, reduced caller errors and shorter call handle times. Additionally, adaptive technology provides a more user-friendly automated call experience.

# Conclusion

While user-personalization has had demonstrated success for web-based interactions, it has yet to be fully leveraged in the handling of automated telephone calls.

Advances in speech technology such as ASR, Natural Language Understanding, Caller-Directed Dialogues and Web Profiles are excellent enabling technologies. Though these technologies are only part of the solution, used in conjunction with a well-designed Voice User Interface, they represent a significant improvement over earlier technologies.

However, one important design factor that has until recently been overlooked is the individuality and in-call behavior of the telephone callers, and the technology they use to access ever-changing and more sophisticated voice applications.

An adaptive approach allows any voice application to do this. The technology automatically learns caller behavior in real time and delivers a personalized and more productive and efficient call experience, thereby improving call automation rates, handle times and overall customer satisfaction. This is especially true for customers calling from mobile phones.

## About the Author

Daniel O'Sullivan is the Chief Technologist at Contact Solutions. He has created software that allows computers and communications devices to learn and adapt to how humans work. Previously, O'Sullivan was a member of the Technical Staff at Lucent/AT&T Bells Labs. He holds an EE degree from the Dublin Institute of Technology and a Masters in Computer Science from the Polytechnic Institute of New York University.

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[1] The Contact Solutions CX Rating quantitatively measures customer intent, interaction and perception.

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