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Simulation: The Best Way To Design Your Call Center

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Call center managers and planners have a much more difficult job today than in times past. With far more products and services being specially created, marketed, sold and supported than ever before, call centers struggle to deliver different service levels to different types of callers with different needs and issues. Today's phone switches provide great flexibility in determining how calls are routed and queued, but at the same time make planning and analysis even more difficult by making it possible to link multiple centers easily, prioritize certain calls, access agents with different skill sets and customize call routing logic. In addition, call center requirements such as call messaging, call transfer and agent conferencing all have an impact on service levels and budgets.

Today, call centers constitute a more important part of more businesses than ever. In particular, sales and service call centers are often the key point of contact between a company and its customers, which makes them both expensive and mission-critical. Companies that do not take the appropriate steps to design new call centers effectively — or to manage, configure and leverage existing call center systems properly — quickly find that their planning mistakes translate into

lower service levels, lost revenue, increased costs and extremely frustrated and dissatisfied customers.

Call center managers must be able to understand what is going on in their call centers, to know how calls, routes, agents and other factors are driving service levels, abandonment rates and agent utilization. To rely on guesswork, trial-and-error, intuition or "black box" software is simply too dangerous for companies that want to succeed — and too risky for call center managers who want to survive.

Leading call centers effectively use simulation to design their call centers, manage their operations and plan for the future.

What Is Simulation?

Simulation is the most effective methodology for organizations designing new call centers or implementing changes to existing centers. With computer simulation, call center managers and analysts can quickly construct a model of an existing or proposed call center for the purpose of understanding its performance over time. This "virtual call center" incorporates all the system dynamics and intricacies of your call center's business, providing you with a "What If" laboratory for strategic planning.

By running the simulation model on a PC with specific inputs, such as call forecasts, routing scripts and agent schedules, analysts can immediately identify critical information such as expected customer wait times, abandonment rates and staff utilization levels. This information, displayed in easy-to-understand reports, tables and graphs, can facilitate design and planning decisions that ultimately affect customer satisfaction and the center's bottom line. In addition, most simulation software products include an animated graphical display of the model as it is running, enabling analysts to spot patterns and problems that might otherwise go undetected.

Simulation has been established as a mainstay in other parts of the corporate enterprise, including manufacturing, distribution and logistics. For example, manufacturing organizations

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in the automotive, defense and electronics industries have relied upon simulation to facilitate strategic decisions for many years. Companies like Ford, Motorola, Federal Express, Hewlett-Packard and Intel have trained dozens of employees in the science of building simulation models of applications such as production lines, distribution channels and supply chains.

Only in the last few years, however, has simulation emerged as an invaluable technology for call center management because call centers have become far too complicated for traditional analysis methods to provide accurate or useful answers to key business questions. "The introduction of call center simulators gives management a tool that allows for trial of all new ideas in a laboratory setting. This capability takes the risk out of evolving call center technologies and allows managers to make informed decisions," said Martin Prunty, a leading call center consultant.

What Questions Can Call Center Simulation Help You Answer?

Without disrupting your call center's business or impacting your operating budget, simulation quickly and accurately enables you to understand how your call center operations will perform under certain scenarios, before any changes are actually made. Once you have built a simulation model of your call center (or of your entire call center network), you can conduct "experiments" that enable you to see the impact of different management decisions. In particular, once a base model has been constructed, many different questions about your call center can be answered:

- How can skills-based routing best help our center and what is the payoff?
- What if we added an IVR (interactive voice response) unit to handle some simple customer questions?
- What if we considered adding an extra shift, increasing staffing levels or cross-training our agents?
- What impact would outsourcing overflow calls have on our service levels and budget?
- What if we started to give our "best" customers special services and/or queue treatment?
- How should we handle different types of call escalation?
- Can we improve service levels by employing "dispatchers" to gather basic customer information?
- What are the implications of turning 25 percent to 50 percent of our agents into inbound-outbound "blend" representatives?

Creating A Simulation Model Of Your Call Center System

Simulation allows you to explicitly spell out your call center design in terms of different types of calls following different routes into different queues with different priorities and getting service from different types of agents with different skills. In particular, simulation enables you to model call center features such as those listed here:

- Skill-based routing,
- Multiple call types,
- Simultaneous queuing,
- Customer abandonment patterns,
- Call routing and overflow,
- Messaging and call return,
- Priority queuing,
- Call transfer and agent conferencing,
- Agent preferences and proficiency,
- Agent schedules (including breaks, meetings and lunches), and
- Blend agents (handling both inbound and outbound calls).

These key call center design components will have a significant impact on

the most important performance measures, such as customer waiting time, call abandonment rates and agent utilization. For example, giving certain types of calls priority over others will increase the service levels for those calls and decrease service levels for the rest. Similarly, allowing calls to queue simultaneously for different agent groups will affect agent utilization for each of these groups while also having a major effect on service levels and abandonment rates. Simulation allows you to understand and evaluate these types of issues and tradeoffs.

Why Simulation Is The New Standard For Call Center Design And Analysis

Call centers have long utilized equations, formulas and calculations to make sense of their operations and plan for the future. In particular, analysts have traditionally relied on two methods:

- Back-of-the-envelope calculations,
- Erlang models.

Each of these methods has some value, as discussed below. However, both fall far short of delivering the useful and accurate results that simulation provides to call center managers and analysts.

Back-Of-The-Envelope Calculations

The typical back-of-the-envelope calculation is as follows:

CALL CAPACITY = [(# of agents) multiplied by (# of phone minutes/agent)] divided by (average # of minutes/call).

This calculation is sometimes referred to as the "Hamburger model" for it considers each call as a "hamburger" of a certain uniform size and each agent as an "eater" who is capable of "consuming" a certain number per shift. The calculation is sometimes modified by reducing the phone minutes per agent to account for some idle time.

The advantage of the Hamburger model is its simplicity. It does provide a theoretical maximum number of calls that can be handled by a center, assuming that the call center is taking only one type of phone call. However, this approach is extremely limited because it does not take into account the variability in call arrival patterns or call lengths. Because of this variability, the *actual* number of calls that can be handled is far lower than what this "back-of-the-envelope" calculation would suggest. Therefore, this type of calculation is of limited use when designing or redesigning a call center. Making decisions — or budgets — based on these results is almost always dangerously misleading.

Erlang Models

Many of today's leading workforce management tools rely upon Erlang models (also known as "queuing equations") in order to represent system variability. Although these tools are primarily used for producing daily forecasts and work schedules, they do attempt to capture the variability that exists within a call center. Queuing equations explicitly take into account the variability of call arrival patterns and call lengths. The most commonly used queuing equations take call volumes, call-handling times and number of agents as inputs and from there determine the average waiting time for each customer.

Erlang models (or slight variants) are often used to determine how many agents are needed to deliver a specific service level. Erlang models provide far more insight and realism than the Hamburger model calculations. However, these queuing equations are based upon a number of key simplifying assumptions:

- Every call is of the same type;
- Every agent can handle calls equally fast;
- Call abandonment rates are known and independent of the time a customer spends waiting;
- Calls are queued on a first-in, first-out (FIFO) basis.

Unfortunately, many of these assumptions are not valid in today's call centers. For example, most centers usually feature many different types of calls, some of which can be handled only by agents with specific types of skills. Specific types of calls (for example, premium customers) may receive service ahead of all other calls. Different call types feature significantly different levels of complexity to agents with different skill levels, which has a major effect on the distribution of call-handling times. Finally, the actual abandonment rate in your call center cannot be assumed, for it will be heavily influenced by the amount of time customers spend waiting, which is in turn driven by the number of agents in your center and the varying skill levels of those agents.

As a result of these simplifying assumptions (which are often incorrect and invalid), queuing models are also of fairly limited application in conducting the analysis for designing or redesigning a call center today. "When Erlang C was developed in 1917, it was designed to solve the question of how many attendants were required to handle the same number of calls with a single group," said Prunty. In today's world, a typical call center is far more complicated. In short, Erlang formulas have simply outlived their usefulness."

The Advantages Of Simulation

Simulation is the process of creating a computerized model or "copy" of your call center system and then observing how this model performs under different conditions. Today's call center simulation tools and fast PCs enable you to quickly and easily include the relevant features and details of your call center in your simulation models. In addition, simulation models produce the type of results you need to understand your call center's performance, including:

- Service level for different call types and different times,
- Abandonment rates for different call types and different times,
- Agent utilization for different agent groups and different times.

Because of the flexibility of inputs and outputs, simulation is by far the most powerful tool for helping you to design or redesign your call center. In contrast to "back-of-the-envelope" calculations, simulation explicitly models the interaction between calls, routes and agents, as well as the randomness of individual call arrivals and call handle times. In

contrast to queuing equations, simulation models do not require unrealistic assumptions about calls, agents, queuing rules or abandonment rates.

The bottom line is that *simulation delivers an extremely high degree of accuracy in projecting the performance of a call center.* This accuracy enables analysts to make the *right* decisions on resource planning to optimize a center's overall performance.

For example, when designing a new call center, there are major decisions to be made with regard to capacity planning and service levels. Capacity planning includes determining the agent staffing and skill levels, equipment needs and other "resource" requirements to meet service objectives. Minimally, you want to know how many agents of each type are needed to handle a particular call volume and mix, and how many trunk lines and IVRs are needed to respond to the forecasted call traffic. In turn, for a different configuration of resources, it is important to be able to understand the different service levels that will be produced so you can assess the tradeoffs associated with building additional capacity and/or deploying resources differently.

Thus, when you are planning a new center, simulation is the *only* technology that allows you to combine diverse information related to staffing, equipment, call data and service levels with financial planning and budgeting calculations to make more informed decisions about your needs.

Similarly, when considering different ways to organize an existing center, the goal of your analysis is to understand how your newly built or newly configured call center system will perform. According to Keith Dawson, a leading authority on the design and management of call centers, "Simulation is the only known way of making any sort of projection in a center that uses skills-based routing (or any other nonrandom call-routing scheme). If you are contemplating large-scale changes in your center's make up, it is much better to simulate than not to know or to test on a live center."

Conclusion

When you design and build a new call center, you are making a major capital investment. When you make any significant change to the way your call centers are configured, you are making a serious decision about the way you do business. In either case, you are putting a lot on the line. From a business perspective, you want to understand the impact of these types of decisions *before* you make your key decisions, *before* you take your business risks.

Traditional methods such as back-of-the-envelope calculations and Erlang models are somewhat useful. However, these tools are of very limited value, in large part because they are unable to account for skills-based routing, simultaneous queuing, call transfer and other routine features of today's call center.

Regardless of the complexity of your call center, simulation gives you answers to the types of questions you want to ask about your business *before* you make a significant design or redesign decision. As a responsible manager of a top-notch call center, you owe it to your organization and your clients to sincerely consider the use of simulation in managing your call center.

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