Quicker contact centres

Contact centres pervade modern life, whether it is calling up your bank or utility providers. These companies are increasingly employing mathematical techniques to make sure you stay on the phone for as little time as possible.

"Your call is currently in a queue" - seven words to strike fear into the heart of any caller. Most people will have experienced being told that their call is important, followed by inordinate renditions of music like Greensleeves. Estimates place the amount of money UK consumers spend on contact centres, including the cost of phone bills and lost time, at around £15 billion a year.

Yet it is often in the companies' best interest to minimise the amount of time you spend on the phone, particularly if they are an energy supplier – OFGEM, the energy regulator, doles out hefty fines to those companies offering inadequate customer service. Content Guru, based in Bracknell, Berkshire, is one company that is using mathematics to design systems that increase contact centre efficiency.

Their communications integration platform, called storm, is the largest of its kind in Europe: it is capable of handling 30,000 simultaneous connections. It is a cloud based platform – it doesn't require hardware to be installed at the client's location. Instead it is a service that piggy-backs on existing infrastructure and the functionality is delivered over the internet from remote computer servers in "the cloud".

Such a system can save money: after a Scottish power company adopted storm for their contact centre, it saved them £200,000 a year in OFGEM fines. A further £200,000 was saved in annual operation costs because the contact centre was hosted on a single remote platform. The switch also saw an increase in customer satisfaction from a score of 3.8 to 4.5.

> "Estimates place the amount of money UK consumers spend on contact centres at around £15 billion a year."

In both May and December 2011, parts of Scotland were battered by over 100 mph winds, causing widespread disruption and power outages as the high winds and falling trees brought down power lines. In the latter case, 150,000 homes were left without power at one of the coldest, and darkest, times of the year. In such a situation the number of calls to electricity companies can escalate rapidly – a typical power cut can generate over 5,000 calls to each supplier within the first 30 minutes.

The first step is to send text messages out to anyone likely to be affected, using any contact information they have on record, in a bid to get the relevant information out to customers as quickly as possible, thereby reducing the number of calls. For the calls that do come in, the mathematics at the heart of storm's functionality works to manage the sudden increase in demand. An area of mathematics, called Queueing Theory, is instrumental in making this possible. Devised in the early 20th century, it was specifically formulated to deal with situations in which there is a need to manage a queue.

A major use of Queueing Theory in this context is to manage the flow of call traffic from switchboard to agent. Imagine those paths as motorways carrying vehicular traffic. If the flow gets too heavy for the 'road' in question, a traffic jam is inevitable. This drives up new callers' waiting time as they have to wait for the backlog to be cleared.

The Queuing Theory algorithms deployed by the storm platform allow it to constantly analyse the situation and effectively widen the 'roads' if necessary, or even divert traffic

Institute of mathematics & its applications

National HE STEM Programme

via alternative routes through its multiple network interconnection points, should the situation demand it. The efficiency of the traffic flow is constantly monitored and, should it drop below a set acceptable threshold, the infrastructure is quickly changed to cope.

As well as "on the fly" re-routing, storm also offers real-time analysis of incoming calls providing statistical reports to be viewed on a dashboard by the contact centre manager. One benefit of this analysis is that the most popular choice in the menu of options can be boosted to the top. This saves callers wading through a long list of options just to get the choice that the majority of people are calling for. In a power cut scenario this is likely to be information about when the power is coming back on, rather than billing information etc.

One of the biggest causes of customer dissatisfaction is not knowing for how long they will be waiting in line. If the wait time is likely to be five minutes then many customers will be happy to wait. However, if the wait time is twenty minutes, for example, storm can ask the customer if they would like to save their position in the queue and request to be called back when they reach the front. Queueing Theory can again be used to give the customer an idea of how long they will have to wait.

No-one likes waiting on the end of a phone line, particularly in inconvenient, uncomfortable or dangerous situations like a power cut or loss of other important services. With contact centres serving as the front line of communication for the companies which provide these services, Content Guru and their storm platform are using mathematics to save you time and save UK industry valuable income.

TECHNICAL SUPPLEMENT

Queueing Theory

The main ideas behind Queueing Theory were first put forward in 1903 by Agner Krarup Erlang, a Danish telephone exchange engineer. However, the standard notation used in modern Queueing Theory is known as Kendall's notation after English mathematician David Kendall who devised it in the 1950s.

Under Kendall's notation, a queuing problem can be written in shorthand as A/B/C/K/N/D. Sometimes this is truncated to just A/B/C. Each letter represents a mathematical model describing the different variables involved in the call process. The letter A models the expected arrival distribution of calls over time, often using a Poisson distribution over a fixed time interval. B represents the distribution of times that a caller is with an agent for and C represents the number of service channels available.

The other values relate to the number of places available in the queue, the total population that could call (i.e. the number of customers than have power supplied by that energy company), and the rules for the order in which the queue is serviced. The simplest rule is first come first served. However, the storm platform does offer configurable queuing rules, so that if the customer has called previously they jump ahead in the queue.

The contact centre's network can be setup based on this modelling with best guesses for the initial conditions. However, if these initial conditions become unrepresentative, due an increase flow of calls, for example, immediate changes can be implemented.

By modelling the process in this way an approximate waiting time to get through to an agent is easily calculable.

References

Kendall, D.G., 1953. Stochastic Processes Occurring in the Theory of Queues and their Analysis by the Method of the Imbedded Markov Chain. ***The Annals of Mathematical Statistics,*** 24(3), 338-354.

The IMA would like to thank the teams at Content Guru and Redwood Technologies, for their help in the preparation of this document.