

## **Case: Call Centre**

Consider a call centre providing a variety of services for organizations such as financial institutions, insurance companies, and medical practices. One of the clients of this call centre is a home improvement store. The call centre has been operating their after-sales warranty services for the last 3 years.

A routine call to the after-sales warranty unfolds in the following way:

- A virtual receptionist picks up each inbound call (toll-free number), collects basic identification information via keypad, and presents a menu of options so that the caller can self-identify the reason for their call. For this particular department store, there are two types of calls, say type 1 and type 2.
- The call is then directed to the appropriate department (say department 1 and department 2) and the customer is put on hold if a customer service representative (CSR) is not available. The next available CSR in the department takes the call. The customers are served on a first-come first-served basis. CSRs are specifically trained for their own department in order to provide a superior service and customer experience. They are not allowed to provide service to customers of a different department.

Recently, the management received complaints of long waiting times from customers. Looking at the work schedule and phone line utilizations, the management confirms that excessive customer waiting occurs occasionally, although, on average, there is plenty of capacity in the call centre. Adding to this discrepancy, it is clear that the call centre is not able to provide a consistent service quality; some customers wait a lot while others do not. The management wants to identify how to manage resources in order to improve the key performance indicators.

To investigate the situation, a call centre analyst collected data (available in the portal: `call_centre_data.csv`).

- The data set shows the call time (real clock time) and the duration that the CSR took to resolve the issue. The data is collected during operating hours (6 am and 7:30 pm) on a daily basis (only weekdays) for approximately 2.5 weeks.
- Occasionally, callers self-identify their type wrong. In this case, the CSR (of the wrong department) redirects them to the correct department. For these cases, two service times are recorded, one with the self-reported (wrong) department and one with the correct department.
- It is easily verified during data collection, and also based on anecdotal evidence, that customers almost never hang up. In other words, they are extremely patient, perhaps due to the nature of their call – which is mostly accessing the warranty program for product exchange or return.

The management wants to build some performance metrics capturing the service quality provided to each customer, for instance what is the predicted waiting time for a customer? How about the total time they spend on the line?