4CallCenters Software
Download and Install

- **setup.exe** and help document available from http://ie.technion.ac.il/serveng/4CallCenters/Downloads.htm

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**4CallCenters™**

Personal Optimization Tools for Call Centers

**Downloads:**

1. **4CallCenters v2.23** (setup.exe file - 3 MB)
   - For installation: Open setup.exe and follow the instructions.
   - To uninstall the installed software: Go to Start/Programs/4CallCenters v2.23/Uninstall 4CallCenters v2.23

2. 4CallCenters - Help Document [PDF-824KB], [Doc-123KB]
   Document containing the 4CallCenters application's help pages.
Tools

• **Performance Profiler**
  o Anticipating your call center's performance for long and short term decision making
  o can profile the performance using a wide variety of performance indicators
• **Staffing Query**
  o determine the staffing level required during a given interval in order to meet your call center's performance goal
  o If more than one performance goal, should use the "Advanced Queries" tool
• **Advanced Profiler**
  o an enhanced profiling tool, allows multiple-value input parameters.
  o especially useful for creating large performance tables or for preparing graphs.
• **Advanced Queries**
  o Can use if you have multiple performance goals or if you want to determine the value of one of your input parameters, for which your goal (or goals) is achieved,
  o Allows multi-value input (for both input parameters and goals)
• **What-if Analysis**
  o test various what-if scenarios which arise from the possible variations in your call center's parameters
  o see the impact of such variations on your performance.
Performance Profiler

- **Example:** \( T = 60 \text{ min} / N = 10 / AHT = 01:00 / \text{Arrival rate} = 550 \)
  - Case 1: Set **Target Time to Answer** = 00:10
  - Case 2: Set **Target Time to Answer** = 00:00 to compute \( P(\text{delay}) \)
  - Case 3: Increase the **arrival rate** up to 600: the system **explodes**
Performance Profiler (2)

- Add either **Trunks** or **Overflows** feature to keep your system stable
  - **Trunks**: maximum number of calls which can be in the system simultaneously
  - **Overflows**: a technical limit on the time a call can spend waiting in queue
Performance Profiler (3)

- Add the **abandonment** feature - the system **does not** explode.
Operational Performance Measures

The most prevalent performance measure is
\[ P\{W_q \leq T; Sr\} \] (or “worse” \[ P\{W_q \leq T | Sr\} \]).

We recommend:

- \[ P\{W_q \leq T; Sr\} \] - fraction of well-served;
- \[ P\{Ab\} \] - fraction of poorly-served.

with \( T \) determined via “Waiting less than \( T \) is Well-Served”.

Or even a four-dimensional refinement:

- \[ P\{W_q \leq T; Sr\} \] - fraction of well-served;
- \[ P\{W_q > T; Sr\} \] - fraction of served, with potential for improvement (say, a higher priority on next visit);
- \[ P\{W_q > \epsilon; Ab\} \] - fraction of poorly-served;
- \[ P\{W_q \leq \epsilon; Ab\} \] - fraction of those whose service-level is undetermined.

with \( \epsilon \): “Abandoning before \( \epsilon \) is Harmless”.
Operational Performance Measures (2)

- With abandonment – changing Target Times
Erlang-A parameters:

\[ \lambda = 300 \text{ calls/hour}, \ 1/\mu = 2 \text{ min}, \ n = 10, \ 1/\theta = 2 \text{ min}. \]

Target times \( T = 30 \text{ sec}, \ \epsilon = 10 \text{ sec}. \)

- \( P\{W_q \leq T; \text{Sr}\} = 71.1\% \);
- \( P\{W_q > T; \text{Sr}\} = 87.5\% - 71.1\% = 16.4\% \);
- \( P\{W_q > \epsilon; \text{Ab}\} = 12.5\% - 3.9\% = 8.6\% \);
- \( P\{W_q \leq \epsilon; \text{Ab}\} = 3.9\% \).
- Delay probability \( P\{W_q > 0\} = 100\% - 45.8\% = 54.2\% \).
Staffing Query

- Choose a performance goal to receive recommendation for staffing
  - \( P(\text{abandonment}) = 5\% \)
  - Avg time in Queue = 1min
  - 80\% of customers wait less than 20 seconds
Advanced Profiling

- Can enter multiple values for input parameters
  - Especially useful for creating graphs or performance tables
  - EX) Change staffing from 3 to 20
Advanced Profiling (2)

- Try using Table > Export to File features. Export the table to Excel.
- Create a graph of probability to abandon against staffing.
Advanced Profiling (3)

- Try **multiple parameters** options.
- Create multi-parameter graph of probability to abandon against arrivals, depending on different staffing levels.
  - Change number of agents from 10 to 20 by step 1.
  - Change arrival rate from 500 to 800 by step 50.

![Graph: %Abandon vs. Calls per Interval for various Number of Agents]
Advanced Queries

• You choose performance goal(s) and a certain system parameter. 4CallCenters determines which value of this parameter will lead to the desired performance goal.
• In Settings choose if you need "Lower", "Upper" or "Best" value of the parameter.
Advanced Queries (2)

EXAMPLE 1)

• Set the number of agents as a parameter to query and set two target goals: 5% of abandon and 80% served within 20 seconds.

• You can also choose multiple arrival rate: from 500 to 1,000 by step 100.

• NOTE: When there are multiple goals, it is usually impossible to meet all goal values simultaneously, therefore achieving the goals is in the sense that the values of the performance indicators set as goals is at least (or no more then, depending on the indicator) the value set as their goal.
Advanced Queries (3)

**EXAMPLE 2)**

- Set the arrival rate as a parameter to query and set two target goals: 5% of abandon and 80% served within 20 seconds.
- With arrival rate of 145 customers per hour, we achieve both % Abandon < 5% and % Answer within 20sec. > 80%.
- With arrival rate of 146 customers per hour, the constraint of at least 80% served within 20 seconds does not hold.
What if Analysis

• Tests the sensitivity of the Call Center performance to variations in parameter’s value.

• Assume number of agents=200, average handling time 5 minutes and 2,500 calls per hour.

• Take the basis of average patience to be 8:00 and perform the analysis.

• Setting → What-if → number of test values and value increments → compute
What if Analysis (2)

To test the sensitivity of your call center's performance to variations in a parameter's value enter your basic scenario in the Input row, and check the parameter you wish to Vary. To control the values tested advise your Settings.
What if Analysis (3)

![What-if Analysis](image)

To test the sensitivity of your call center's performance to variations in a parameter's value, enter your basic scenario in the Input row, and check the parameter you wish to Vary. To control the values tested, advise your Settings.

<table>
<thead>
<tr>
<th>Vary Input</th>
<th>60</th>
<th>00.20</th>
<th>200</th>
<th>05.00</th>
<th>2500</th>
<th>08.00</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic Interval (minutes)</td>
<td>60</td>
<td>00.20</td>
<td>200</td>
<td>05.00</td>
<td>2500</td>
<td>08.00</td>
</tr>
<tr>
<td>Target Time to Answer</td>
<td>60</td>
<td>00.20</td>
<td>200</td>
<td>05.00</td>
<td>2500</td>
<td>08.00</td>
</tr>
<tr>
<td>Number of Agents</td>
<td>60</td>
<td>00.20</td>
<td>200</td>
<td>05.00</td>
<td>2500</td>
<td>08.00</td>
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<tr>
<td>Average Handling Time</td>
<td>60</td>
<td>00.20</td>
<td>200</td>
<td>05.00</td>
<td>2500</td>
<td>08.00</td>
</tr>
<tr>
<td>Calls per Interval</td>
<td>60</td>
<td>00.20</td>
<td>200</td>
<td>05.00</td>
<td>2500</td>
<td>08.00</td>
</tr>
<tr>
<td>Average Patience</td>
<td>60</td>
<td>00.20</td>
<td>200</td>
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<td>2500</td>
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<td>Agent's Occupancy</td>
<td>60</td>
<td>00.20</td>
<td>200</td>
<td>05.00</td>
<td>2500</td>
<td>08.00</td>
</tr>
<tr>
<td>%Answer</td>
<td>60</td>
<td>00.20</td>
<td>200</td>
<td>05.00</td>
<td>2500</td>
<td>08.00</td>
</tr>
<tr>
<td>%Abandon</td>
<td>60</td>
<td>00.20</td>
<td>200</td>
<td>05.00</td>
<td>2500</td>
<td>08.00</td>
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<tr>
<td>Average Speed of Answer</td>
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<td>2500</td>
<td>08.00</td>
</tr>
<tr>
<td>%Answer within Target</td>
<td>60</td>
<td>00.20</td>
<td>200</td>
<td>05.00</td>
<td>2500</td>
<td>08.00</td>
</tr>
<tr>
<td>Average Queue Length</td>
<td>60</td>
<td>00.20</td>
<td>200</td>
<td>05.00</td>
<td>2500</td>
<td>08.00</td>
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