The ABC of Erlang

Jonty Pearce
Editor

The ABC of Erlang

- In Historical Order
  - Erlang B
  - Erlang C
  - Erlang A

Erlang B

- Invented by AK Erlang (Danish Mathematician)
- Works out the Percentage of Blocking in a Phone System

- Used mainly to work out how many lines you require in a contact centre

- Today, of limited use, but forms the foundation for Erlang C
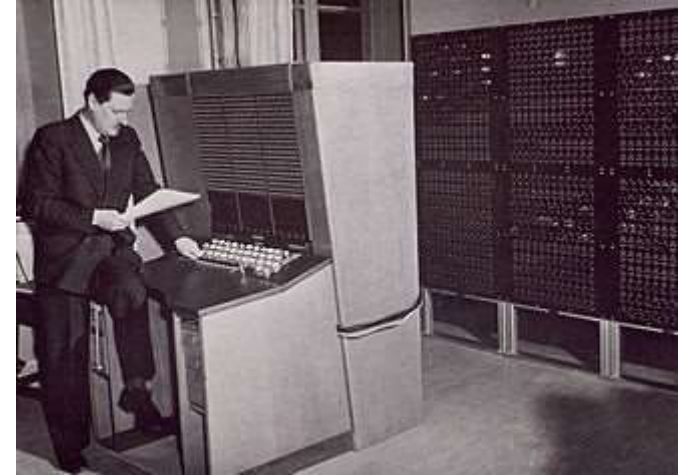
Erlang C

The Erlang C Formula

$$P_w = \dfrac{\dfrac{A^N}{N!}\dfrac{N}{N-A}}{\left(\displaystyle\sum_{i=0}^{N-1}\dfrac{A^i}{i!}\right) + \dfrac{A^N}{N!}\dfrac{N}{N-A}}$$

- Named after the Danish Mathematician A.K. Erlang, who developed the Erlang C in 1917.

- Works out the probability that a call has to wait in a contact centre

- Can convert a number of calls, AHT and service level into a number of staff required

- Robust and in widespread use

- https://www.callcentrehelper.com/erlang-c-formula-example-121281.htm

Erlang A

- Erlang A (the A stands for abandons) formula is an extension of Erlang C
- Was developed by Swedish Mathematician Conny Palm in 1946
- Works out the percentage of calls that will abandon based on an average patience time
- Erlang A tends to under estimate the number of agents required

Good paper here

http://ie.technion.ac.il/serveng/References/Erlang_A.pdf

Average Patience
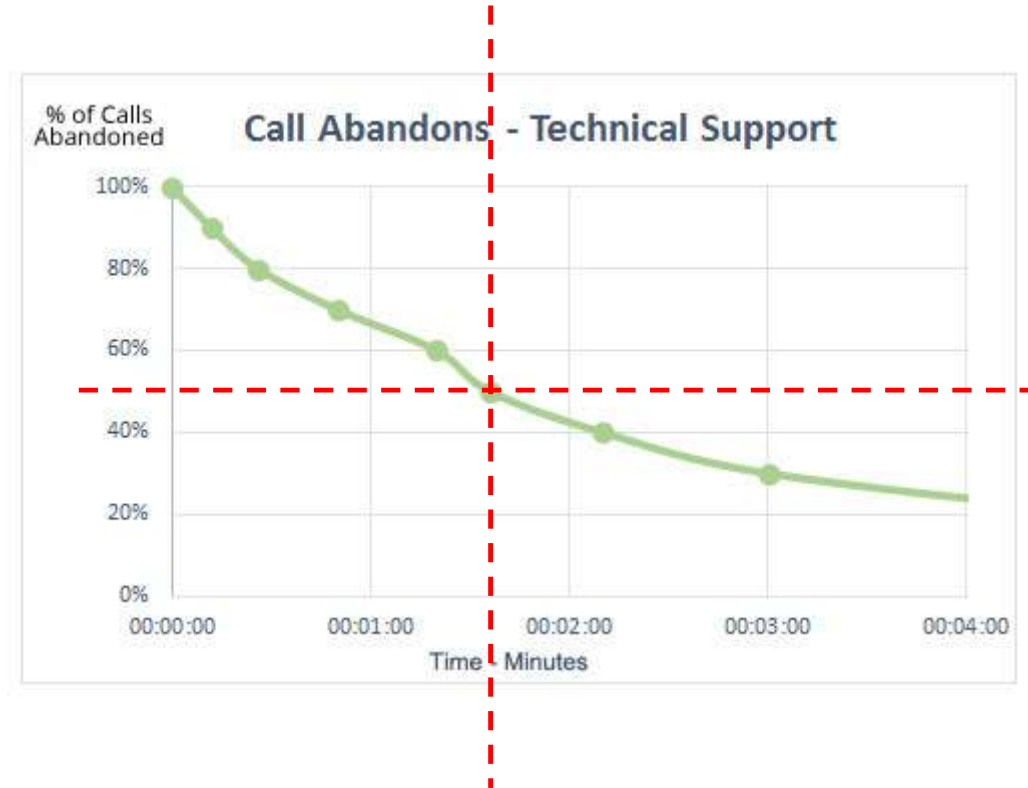
Be Careful with Maximum Occupancy

- Don't confuse Occupancy with Efficiency!

- If your occupancy is higher than 85% you will

- Increase Burnout

- Leading to Increased Attrition and Absence

- Agents picking-up undesirable behaviours on calls

- Increase your AHT (this is often hidden)

85%
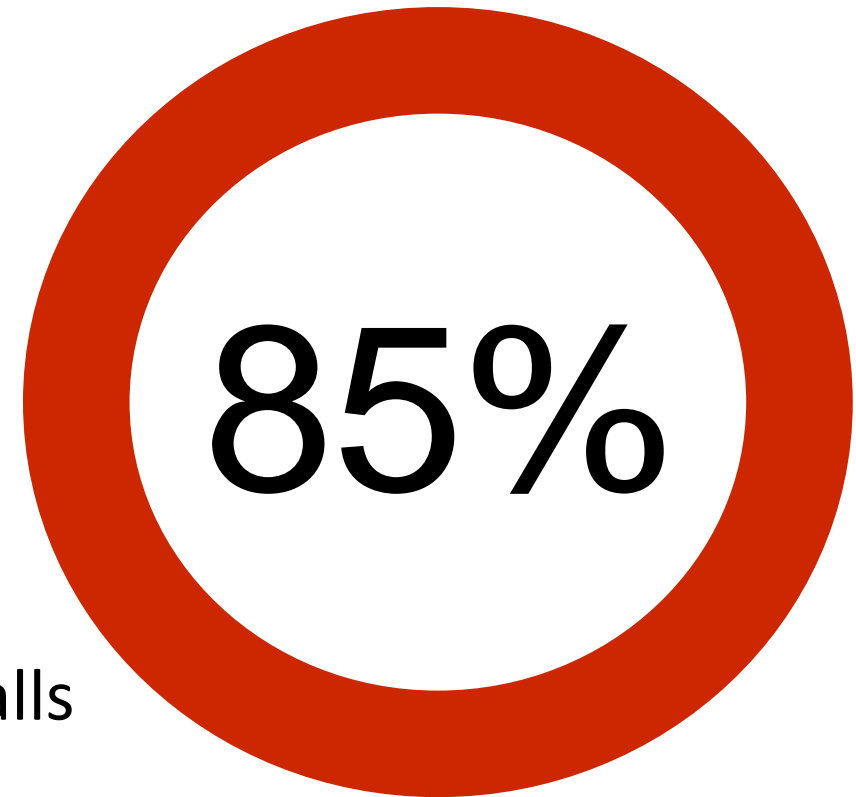
Erlang Calculations

- Erlang A
- Erlang C
- Maximum Occupancy
- Average Patience
- Abandon Rates

- All built into the Erlang Calculator
- https://www.callcentrehelper.com/tools/erlang-calculator/

Erlang Calculator

43 Agents

84.8% 20 Seconds

84.3% Occupancy

290 Calls

Agents	Agents Before Shrinkage	Service Level	Occupancy	ASA (s)	% Answered Immediately	Abandon Rate
37	26	22.9%	97.3%	187.5	15.7%	8.38%
38.5	27	47.4%	93.7%	60.2	34.6%	6.65%
40	28	64.7%	90.3%	28.9	50.1%	5.18%
41.5	29	76.6%	87.2%	15.9	62.5%	3.95%
43	30	84.8%	84.3%	9.2	72.3%	2.95%
44.5	31	90.3%	81.6%	5.5	79.9%	2.15%
45.5	32	93.9%	79%	3.3	85.7%	1.53%
47	33	96.3%	76.6%	2	90%	1.07%

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