

## Support/Services Conference & Expo

# Determining Staffing Levels to meet Service Level Commitments

## Presented by

# Service Management International

## Dave Brown, Founder/CEO




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## NOTES:

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## Did you know that...

- Being short 1 person can double hold times?\*
  - You can determine the exact number of agents to have on the phone and predict hold times...
    - ✓ within a few seconds?
    - ✓ without expensive tools?
- 

\* In a “typical” call center



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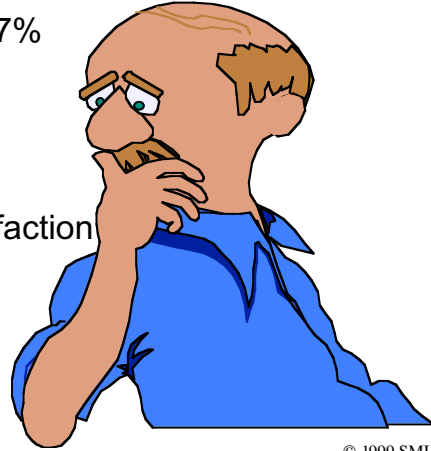
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## Did you know that...

- Kodak....
    - ✓ Reduced hold times from 15 minutes to 1 minute
    - ✓ Reduced Staff Costs by 27%
  - Stac Electronics...
    - ✓ Cut Staffing in Half!
    - ✓ Took 2x calls
    - ✓ Improved Customer Satisfaction
    - ✓ Improved Service Levels
- 



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## Service Management International Mission Statement

We are dedicated exclusively to optimizing customer support operations. We provide expertise in 'Process, People, and Technology'. We blend and balance those three factors to create effective solutions. We are able to solve any service/support related challenge for our clients.

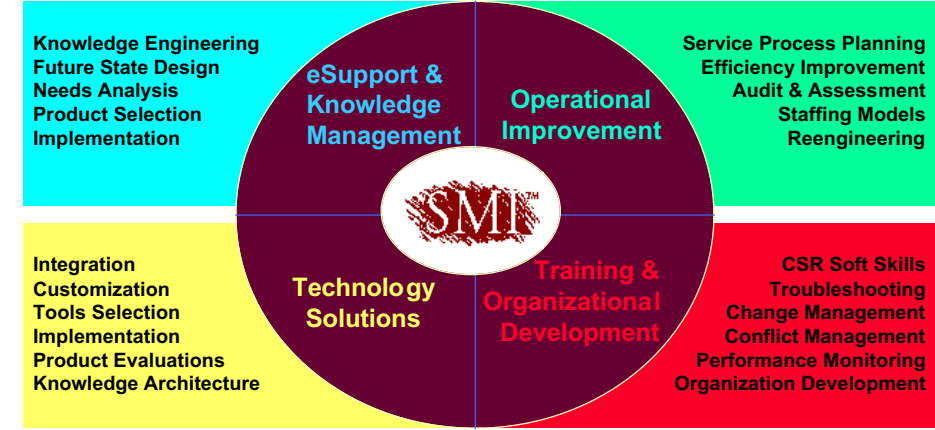


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NOTES:

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## Service Management International Practice Areas



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## Session Agenda

- Understand basic call center queuing theory and staff modeling
- Learn how to estimate the staffing-level impact of changes to call flows (processes)
- Learn to translate a Service Level Target into a staffing model
  - ✓ An 8 step “manual” method for determining staffing levels & accurately predicting hold-times.
  - ✓ Software tools for staff planning

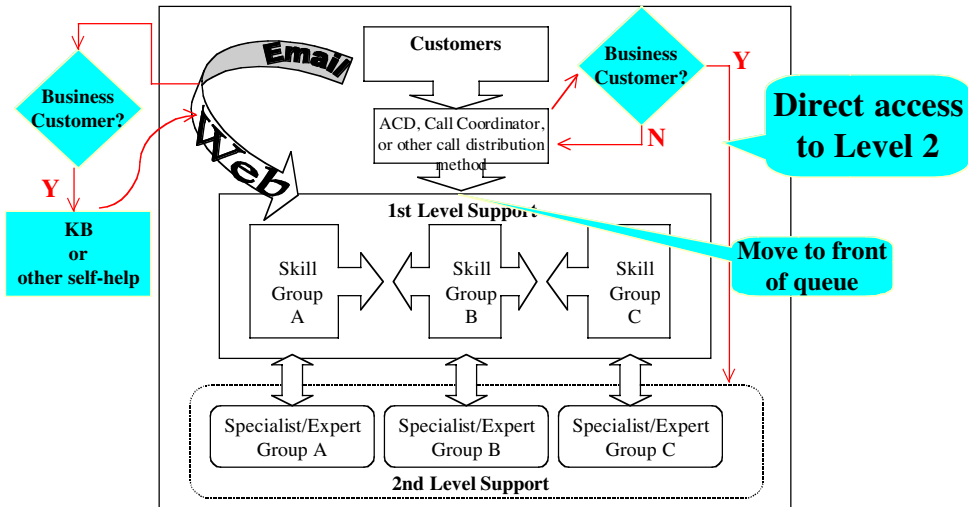


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## You've designed a process...



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## So, now what?

- We need to set a Service Level Target
  - ✓ Likely to result in (or be based upon) a Service Level Agreement
- We need to determine the right level of staffing to meet that target

The methods are not “intuitive...  
Traditional math and/or simple calculations  
DO NOT WORK!



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## Q. Why Are Call Center Mathematics Important to Me?

- Changes that you observe in statistics may seem inconsistent, but are actually entirely explainable
  - ✓ Effect of “splitting” call queues (Pooling Principle)
  - ✓ Non-linear effect of staffing
  - ✓ Service level versus utilization
- Predict the impact of process design changes
- Understanding the basics of call center mathematics will help you understand how management tools work and can help you interpret their results



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NOTES:

Q. What is Erlang?

- Since 1917
- Infinite demand, Queued, FIFO
- Erlang = Load (telephone traffic)



NOTES:

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## Why Erlang-C Tables?

- There are very few inputs to the equations.
  - ✓ Load in Erlangs.
  - ✓ Service Level, expressed as Percent Calls Answered (PCA) in some number of seconds, or
  - ✓ Service Level, expressed as Average Speed of Answer (ASA).
- No software or other tools are required.
- Good for small call centers.



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## Hold-Time Translates to Customer (dis)Satisfaction

- Long wait = abandon & dissatisfaction
- Affects perception of other factors
- 10% to 17% impact!
- Caller's perceived wait is longer
- Informed choice improves tolerance



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## Determine a viable Service Level Target

- Traditional is ASA
  - ◆ Flaw is “averaging”
  - ◆ Used with Erlang C Tables
- Service Level becoming more popular
  - ◆ Provides better picture
  - ◆ Most ACDs can report
  - ◆ Erlang utilities calculate
- Best when combined



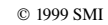
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## Sorting Model

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## Effect of Splitting Queues



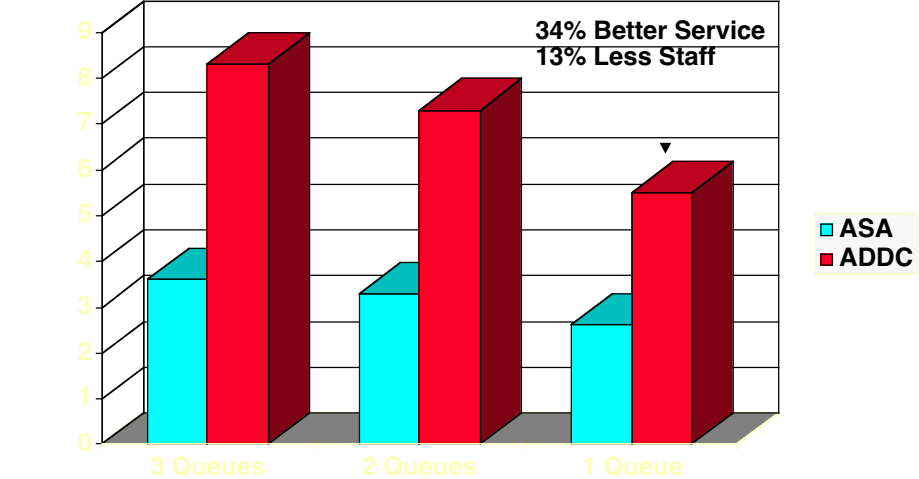
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## Effect of Splitting Queues



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## Non-linear Effect of Staffing

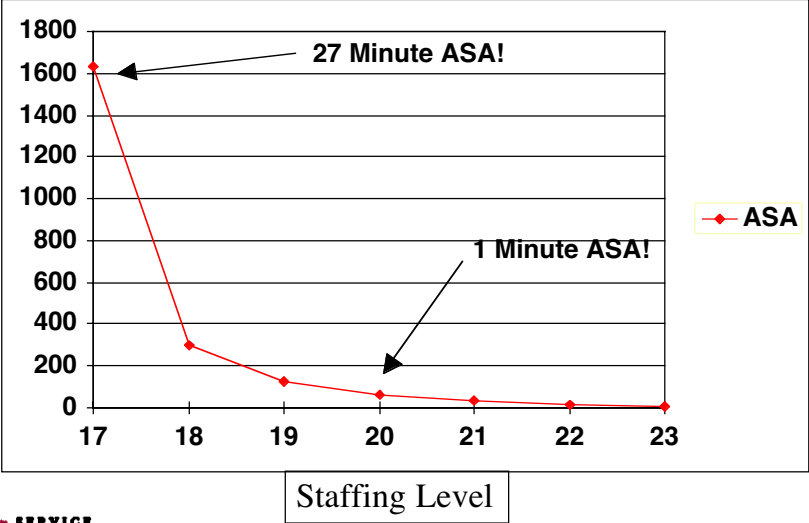


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## Non-linear Effect of Staffing



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## The 6 Key Metrics

- Call Volume
- Agent/Average Handle Time (AHT)
- Service Level
- Call Resolution Rates (1st contact, etc.)
- Customer Satisfaction
- Cost



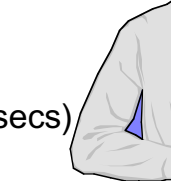
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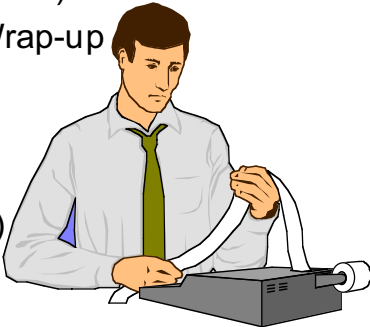
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## Calculating Erlang

An “Erlang” is a unit of measure,  
comparable to Ohms or Gallons

- Determine Average Handle Time (AHT)  
= Average Talk Time + Average Wrap-up Time (in minutes or seconds)
  - $AHT \times Volume = Load$   
✓ Use Peak Hour
  - $Load \div 60$  (minutes...3600 for secs)  
= Erlangs
- 



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## 8 Steps to Accurate Staffing

- Step 1: Calculate workload (in Erlangs)
- Step 2: Determine ADDC factor
- Step 3: Locate load in Erlang C Tables
- Step 4: Locate 1st row  $\leq$  ADDC factor
- Step 5: Note coinciding staffing level
- Step 6: Identify Delayed Portion %
- Step 7: Calculate ADDC
- Step 8: Calculate ASA



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Erlang C Tables			
Workload (in Erlangs)	Staffing Level	Delayed Portion	Average Delay of Delayed Calls
0.2	1	0.2000	1.2500
0.2	2	0.0182	0.5556
0.2	3	0.0012	0.3571
0.4	1	0.4000	1.6667
0.4	2	0.0667	0.6250
0.4	3	0.0082	0.3846
0.6	1	0.6000	2.5000
0.6	2	0.1385	0.7143
0.6	3	0.0247	0.4167
0.6	4	0.0035	0.2941
0.8	1	0.8000	5.0000
0.8	2	0.2286	0.8333
0.8	3	0.0520	0.4545
0.8	4	0.0096	0.3125
0.8	5	0.0015	0.2381
1.0	2	0.3333	1.0000
1.0	3	0.0909	0.5000
1.0	4	0.0204	0.3333
1.0	5	0.0038	0.2500
1.2	2	0.4500	1.2500
1.2	3	0.1412	0.5556
1.2	4	0.0370	0.3571
1.2	5	0.0082	0.2632
1.2	6	0.0016	0.2083
1.4	2	0.5765	1.6667
1.4	3	0.2024	0.6250
1.4	4	0.0603	0.3846
1.4	5	0.0153	0.2778
1.4	6	0.0034	0.2174
1.6	2	0.7111	2.5000
1.6	3	0.2738	0.7143
1.6	4	0.0907	0.4167
1.6	5	0.0259	0.2941
1.6	6	0.0064	0.2273
1.6	7	0.0014	0.1852
1.8	2	0.8526	5.0000
1.8	3	0.3547	0.8333
1.8	4	0.1285	0.4545
1.8	5	0.0405	0.3125
1.8	6	0.0111	0.2381
1.8	7	0.0027	0.1923
2.0	3	0.4444	1.0000
2.0	4	0.1739	0.5000
2.0	5	0.0597	0.3330
2.0	6	0.0180	0.2500
2.0	7	0.0048	0.2000
2.0	8	0.0011	0.1667
2.2	3	0.5422	1.2500
2.2	4	0.2268	0.5556
2.2	5	0.0839	0.3571
2.2	6	0.0275	0.2632
2.2	7	0.0080	0.2083
2.2	8	0.0021	0.1724
2.4	3	0.6472	1.6667
2.4	4	0.2870	0.6250
2.4	5	0.1135	0.3846
2.4	6	0.0400	0.2778
2.4	7	0.0126	0.2174
2.4	8	0.0035	0.1786
2.4	9	0.0009	0.1515
2.6	3	0.7589	2.5000
2.6	4	0.3544	0.7143
2.6	5	0.1487	0.4167
2.6	6	0.0558	0.2941
2.6	7	0.0188	0.2273
2.6	8	0.0057	0.1852
2.6	9	0.0016	0.1563
2.8	3	0.8767	5.0000
2.8	4	0.4287	0.8333
2.8	5	0.1895	0.4545
2.8	6	0.0755	0.3125
2.8	7	0.0271	0.2381
2.8	8	0.0088	0.1923
2.8	9	0.0026	0.1613
3.0	4	0.5094	1.0000
3.0	5	0.2362	0.5000
3.0	6	0.0991	0.3330
3.0	7	0.0376	0.2500
3.0	8	0.0129	0.2000
3.0	9	0.0040	0.1667
3.0	10	0.0012	0.1429

Erlang C Tables			
Workload (in Erlangs)	Staffing Level	Delayed Portion	Average Delay of Delayed Calls
3.2	4	0.5964	1.2500
3.2	5	0.2886	0.5556
3.2	6	0.1271	0.3571
3.2	7	0.0509	0.2632
3.2	8	0.0185	0.2083
3.2	9	0.0061	0.1724
3.2	10	0.0019	0.1471
3.4	4	0.6893	1.6667
3.4	5	0.3467	0.6250
3.4	6	0.1595	0.3846
3.4	7	0.0670	0.2778
3.4	8	0.0256	0.2174
3.4	9	0.0090	0.1786
3.4	10	0.0029	0.1515
3.6	4	0.7878	2.5000
3.6	5	0.4104	0.7143
3.6	6	0.1966	0.4167
3.6	7	0.0862	0.2941
3.6	8	0.0346	0.2273
3.6	9	0.0127	0.1852
3.6	10	0.0043	0.1563
3.6	11	0.0013	0.1351
3.8	4	0.8914	5.0000
3.8	5	0.4796	0.8333
3.8	6	0.2383	0.4545
3.8	7	0.1089	0.3125
3.8	8	0.0457	0.2381
3.8	9	0.0176	0.1923
3.8	10	0.0062	0.1613
3.8	11	0.0020	0.1389
4.0	5	0.5541	1.0000
4.0	6	0.2848	0.5000
4.0	7	0.1351	0.3330
4.0	8	0.0590	0.2500
4.0	9	0.0238	0.2000
4.0	10	0.0088	0.1667
4.0	11	0.0030	0.1429
4.0	12	0.0010	0.1250
4.2	5	0.6338	1.2500
4.2	6	0.3360	0.5556
4.2	7	0.1651	0.3571
4.2	8	0.0749	0.2632
4.2	9	0.0314	0.2083
4.2	10	0.0122	0.1724
4.2	11	0.0044	0.1471
4.2	12	0.0015	0.1282
4.4	5	0.7184	1.6667
4.4	6	0.3919	0.6250
4.4	7	0.1988	0.3846
4.4	8	0.0935	0.2778
4.4	9	0.0407	0.2174
4.4	10	0.0164	0.1786
4.4	11	0.0061	0.1515
4.4	12	0.0021	0.1316
4.6	5	0.8078	2.5000
4.6	6	0.4525	0.7143
4.6	7	0.2366	0.4167
4.6	8	0.1150	0.2941
4.6	9	0.0519	0.2273
4.6	10	0.0217	0.1852
4.6	11	0.0084	0.1563
4.6	12	0.0031	0.1351
4.6	13	0.0010	0.1190
4.8	5	0.9017	5.0000
4.8	6	0.5178	0.8333
4.8	7	0.2783	0.4545
4.8	8	0.1395	0.3125
4.8	9	0.0651	0.2381
4.8	10	0.0282	0.1923
4.8	11	0.0114	0.1613
4.8	12	0.0043	0.1389
4.8	13	0.0015	0.1220
5.0	6	0.5875	1.0000
5.0	7	0.3241	0.5000
5.0	8	0.1673	0.3330
5.0	9	0.0805	0.2500
5.0	10	0.0361	0.2000
5.0	11	0.0151	0.1667
5.0	12	0.0059	0.1429
5.0	13	0.0021	0.1250

Erlang C Tables			
Workload (in Erlangs)	Staffing Level	Delayed Portion	Average Delay of Delayed Calls
6.0	7	0.6138	1.0000
6.0	8	0.3570	0.5000
6.0	9	0.1960	0.3330
6.0	10	0.1013	0.2500
6.0	11	0.0492	0.2000
6.0	12	0.0225	0.1667
6.0	13	0.0096	0.1429
6.0	14	0.0039	0.1250
6.0	15	0.0015	0.1111
7.0	8	0.6353	1.0000
7.0	9	0.3859	0.5000
7.0	10	0.2217	0.3330
7.0	11	0.1211	0.2500
7.0	12	0.0626	0.2000
7.0	13	0.0306	0.1667
7.0	14	0.0142	0.1429
7.0	15	0.0062	0.1250
7.0	16	0.0026	0.1111
7.0	17	0.0010	0.1000
8.0	9	0.6533	1.0000
8.0	10	0.4092	0.5000
8.0	11	0.2450	0.3330
8.0	12	0.1398	0.2500
8.0	13	0.0760	0.2000
8.0	14	0.0393	0.1667
8.0	15	0.0193	0.1429
8.0	16	0.0090	0.1250
8.0	17	0.0040	0.1111
8.0	18	0.0017	0.1000
9.0	10	0.6687	1.0000
9.0	11	0.4305	0.5000
9.0	12	0.2660	0.3330
9.0	13	0.1575	0.2500
9.0	14	0.0892	0.2000
9.0	15	0.0482	0.1667
9.0	16	0.0249	0.1429
9.0	17	0.0123	0.1250
9.0	18	0.0058	0.1111
9.0	19	0.0026	0.1000
9.0	20	0.0011	0.0909
10.0	11	0.6821	1.0000
10.0	12	0.4494	0.5000
10.0	13	0.2853	0.3330
10.0	14	0.1741	0.2500
10.0	15	0.1020	0.2000
10.0	16	0.0573	0.1667
10.0	17	0.0309	0.1429
10.0	18	0.0159	0.1250
10.0	19	0.0079	0.1111
10.0	20	0.0037	0.1000
10.0	21	0.0017	0.0909
11.0	12	0.6939	1.0000
11.0	13	0.4604	0.5000
11.0	14	0.3029	0.3330
11.0	15	0.1898	0.2500
11.0	16	0.1145	0.2000
11.0	17	0.0665	0.1667
11.0	18	0.0371	0.1429
11.0	19	0.0199	0.1250
11.0	20	0.0103	0.1111
11.0	21	0.0051	0.1000
11.0	22	0.0024	0.0909
11.0	23	0.0011	0.0833
12.0	13	0.7044	1.0000
12.0	14	0.4817	0.5000
12.0	15	0.3192	0.3330
12.0	16	0.2046	0.2500
12.0	17	0.1266	0.2000
12.0	18	0.0756	0.1667
12.0	19	0.0435	0.1429
12.0	20	0.0241	0.1250
12.0	21	0.0129	0.1111
12.0	22	0.0066	0.1000
12.0	23	0.0033	0.0909
12.0	24	0.0016	0.0833
13.0	14	0.7138	1.0000
13.0	15	0.4957	0.5000
13.0	16	0.3343	0.3330
13.0	17	0.2185	0.2500
13.0	18	0.1383	0.2000
13.0	19	0.0847	0.1667
13.0	20	0.0501	0.1429
13.0	21	0.0286	0.1250
13.0	22	0.0158	0.1111
13.0	23	0.0084	0.1000
13.0	24	0.0043	0.0909
13.0	25	0.0021	0.0833
13.0	26	0.0010	0.0769

Erlang C Tables			
Workload (in Erlangs)	Staffing Level	Delayed Portion	Average Delay of Delayed Calls
14.0	15	0.7223	1.0000
14.0	16	0.5085	0.5000
14.0	17	0.3483	0.3330
14.0	18	0.2317	0.2500
14.0	19	0.1496	0.2000
14.0	20	0.0936	0.1667
14.0	21	0.0567	0.1429
14.0	22	0.0332	0.1250
14.0	23	0.0188	0.1111
14.0	24	0.0103	0.1000
14.0	25	0.0550	0.0909
14.0	26	0.0028	0.0833
14.0	27	0.0014	0.0769
15.0	16	0.7301	1.0000
15.0	17	0.5203	0.5000
15.0	18	0.3613	0.3330
15.0	19	0.2442	0.2500
15.0	20	0.1604	0.2000
15.0	21	0.1023	0.1667
15.0	22	0.0633	0.1429
15.0	23	0.0380	0.1250
15.0	24	0.0221	0.1111
15.0	25	0.0124	0.1000
15.0	26	0.0068	0.0909
15.0	27	0.0036	0.0833
15.0	28	0.0018	0.0769
15.0	29	0.0009	0.0714
16.0	17	0.7372	1.0000
16.0	18	0.5312	0.5000
16.0	19	0.3736	0.3330
16.0	20	0.2561	0.2500
16.0	21	0.1709	0.2000
16.0	22	0.1109	0.1667
16.0	23	0.0699	0.1429
16.0	24	0.0428	0.1250
16.0	25	0.0255	0.1111
16.0	26	0.0147	0.1000
16.0	27	0.0082	0.0909
16.0	28	0.0045	0.0833
16.0	29	0.0024	0.0769
16.0	30	0.0012	0.

## What does that tell us?



- Staffing level
- % of calls delayed
  - ✓ % of calls not delayed
- ADDC
- ASA

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## Total Staff Requirements

- Factor in “lost time”
  - ✓ Vacation
  - ✓ Sick
- Non-phone time
- Develop phone availability per employee (%)



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## Sample Staffing Model

- 8% Sick/Vacation
- 4% Training
- 15% Management/Staff
- 5.7 hour shifts
- 36 People during peak hour
- 71 Total Staff
- Doesn't include "other" work...



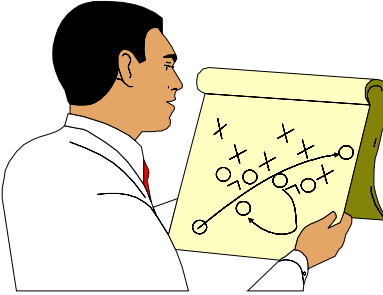
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## Staffing Game Plan

- Build an effective process from the beginning
- Determine the right target service level
- Use queuing theory (Erlang) and call center staffing models



NOTES:

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## Questions?



Service Management International  
111 W. Evelyn Ave., Suite 112  
Sunnyvale, CA 94086

**www.smiweb.com**  
**email: info@smiweb.com**

tel: 408-830-0600  
fax: 408-830-0606



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