Service Engineering: Data-Based Research and Teaching in support of Service Management

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http://ie.technion.ac.il/serveng

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Background Material (Downloadable)

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- Gans (U.S.A.), Koole (Europe), and M. (Israel): "Telephone Call Centers: Tutorial, Review and Research Prospects." MSOM, 2003.
- Brown, Gans, M., Sakov, Shen, Zeltyn, Zhao: "**Statistical** Analysis of a Telephone Call Center: A Queueing-Science Perspective." JASA, 2005.

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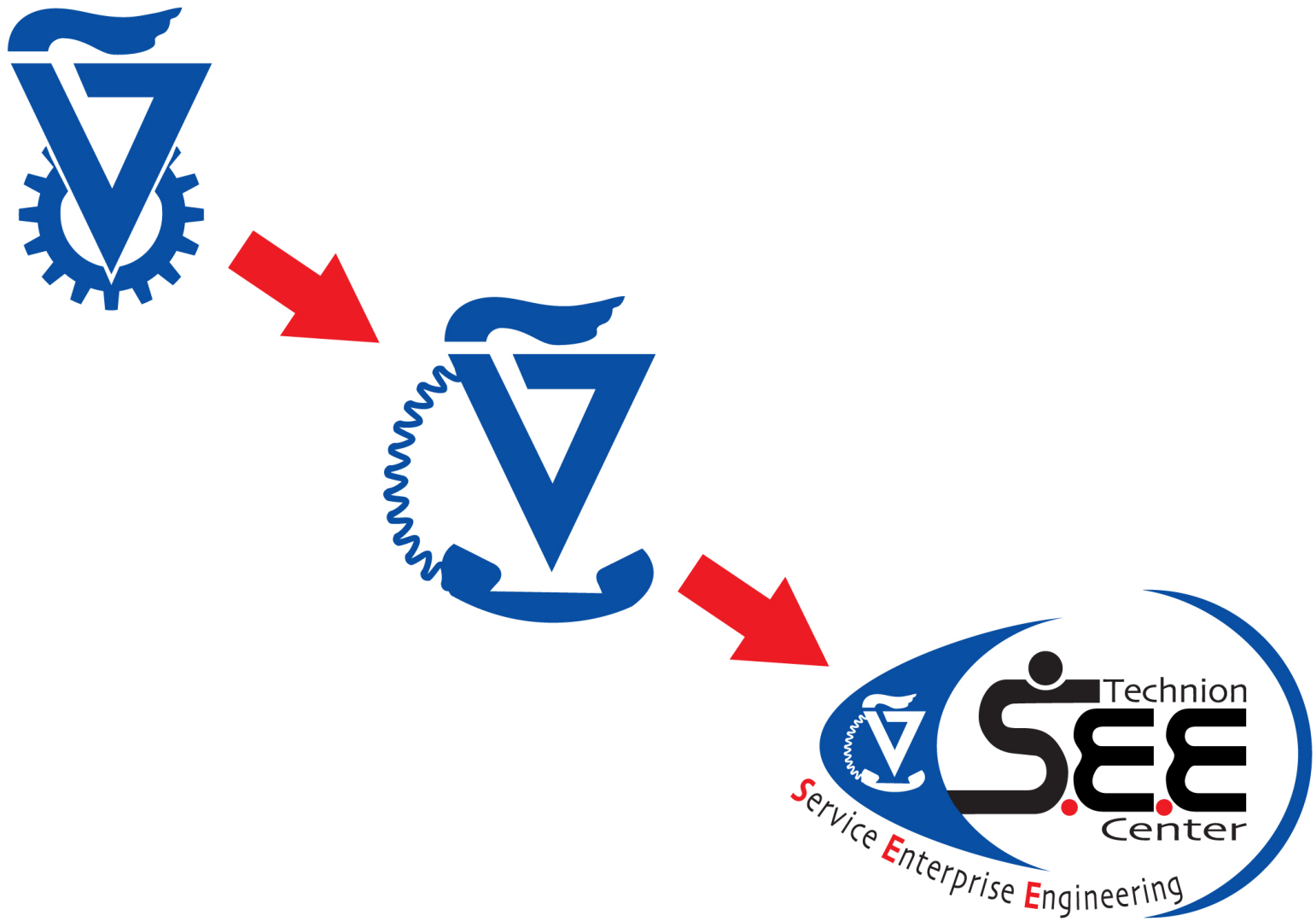
- Technion's **SEE** Center/Lab (Service Enterprise Engineering)
- Further Applications: **Healthcare**, Internet,. . .

Technion (Economy) Evolution



Main Messages

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3. Back to the **Basic-Research Paradigm** (Physics, Biology, . . .): **Measure, Model, Experiment, Validate, Refine, etc.**

4. Yields **scientifically-based design principles and tools (software)**, that support the balance of service **quality**, process **efficiency** and business **profitability**, from the often-conflicting views of **customers, service-providers, managers and society**: **Service Engineering** .

Staffing: How Many? When? What? Who?

Fundamental challenge in Services: Healthcare, . . . , **Call Centers**

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- Reality Complex and becoming more so
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$\Longrightarrow$ Solutions urgently needed.

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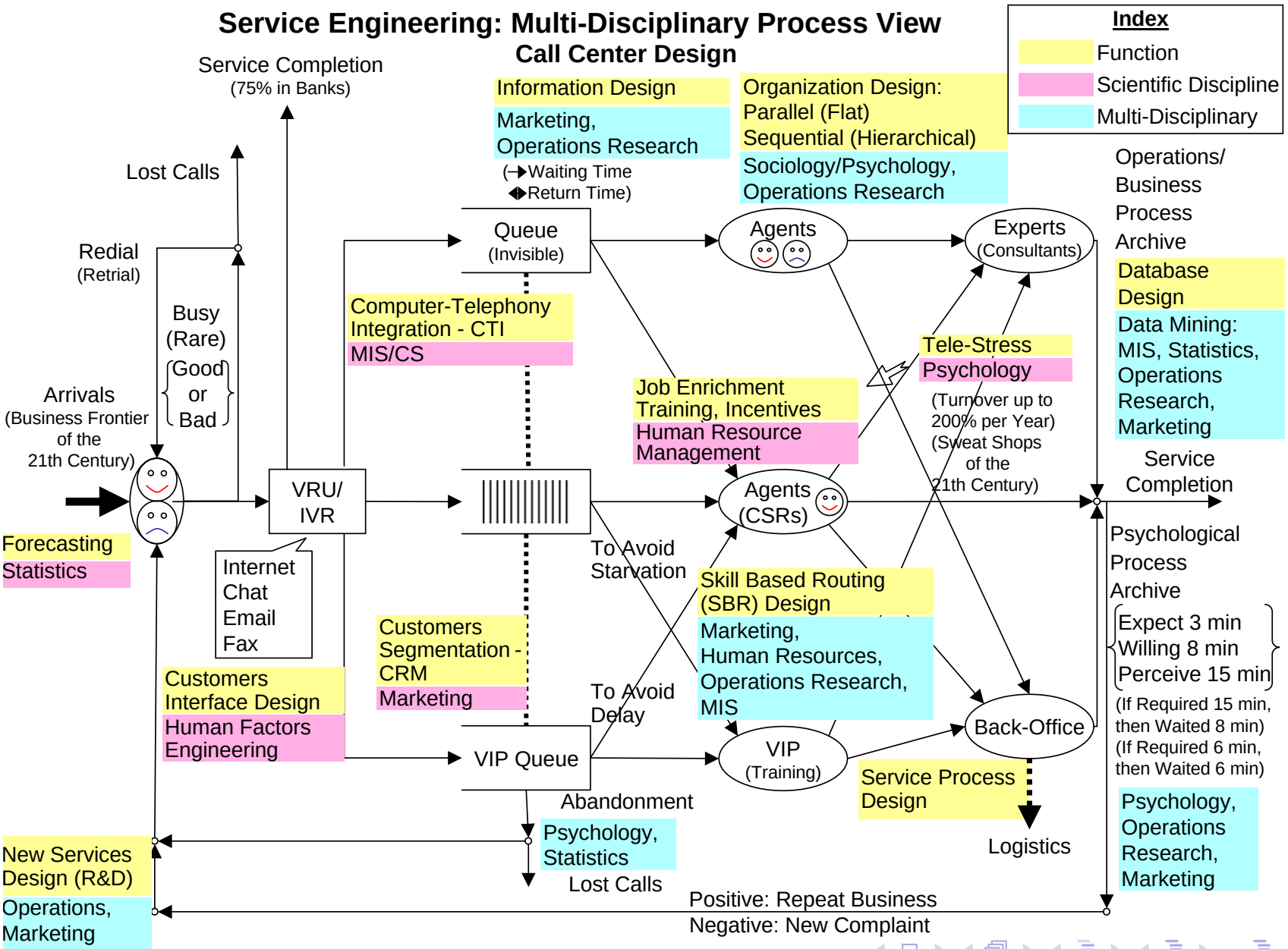
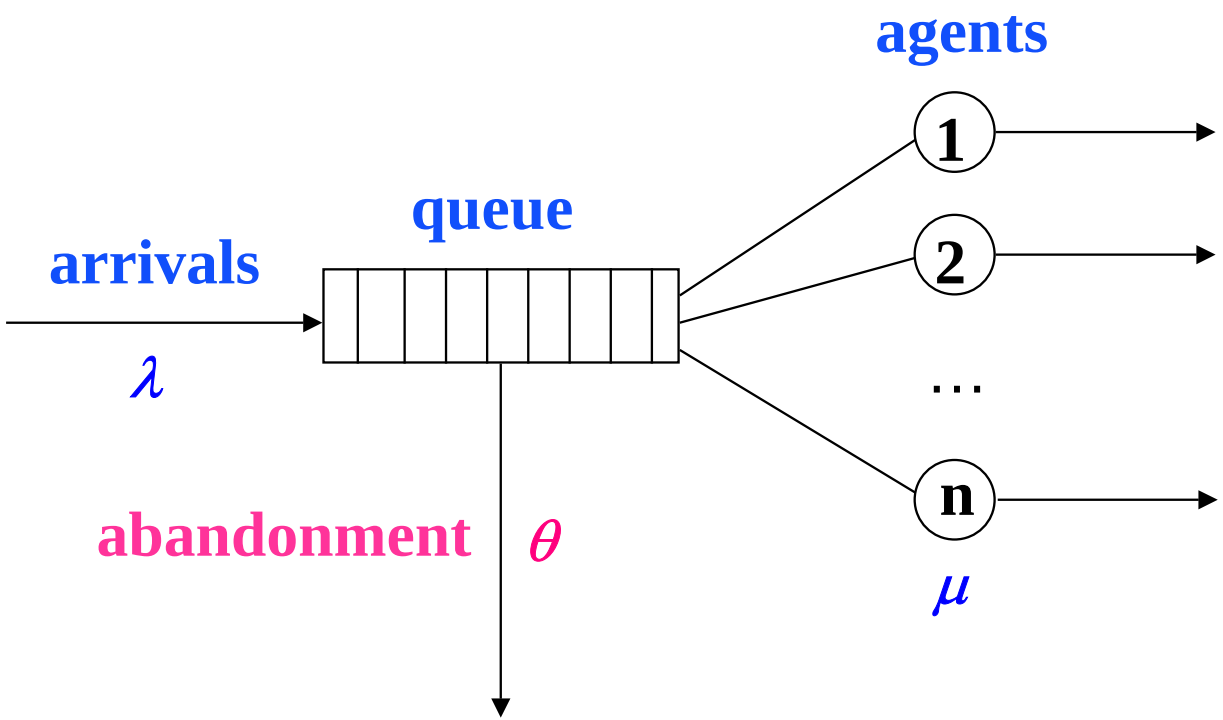
Consider, for example, **Palm/Erlang-A**: a simple (but not too simple) **Mathematical Model** of the complex reality of call centers.

Complex Reality: Call-Center Network



Simple Model: Palm/Erlang-A

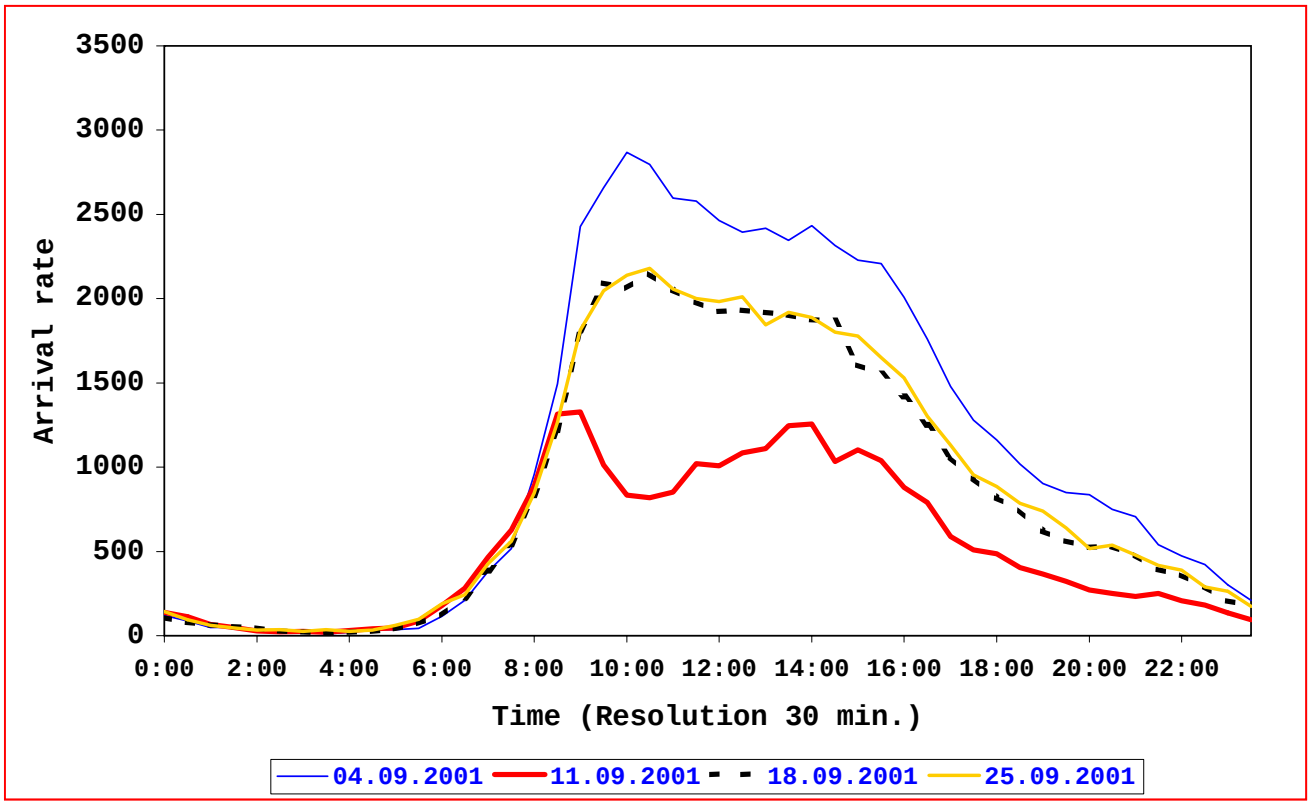


Erlang-A Parameters (Math. Assumptions):

- λ – **Arrival** rate (Poisson)
- μ – **Service** rate (Exponential)
- θ – **Impatience** rate (Exponential)
- n – Number of **Service-Agents**.

Arrivals to Service: Poisson-Relatives

Arrival Rates on Tuesdays in a September – U.S. Bank



- **Tuesday**, September 4th: **Heavy**, following Labor Day
- **Tuesdays**, September 18 & 25: **Normal**

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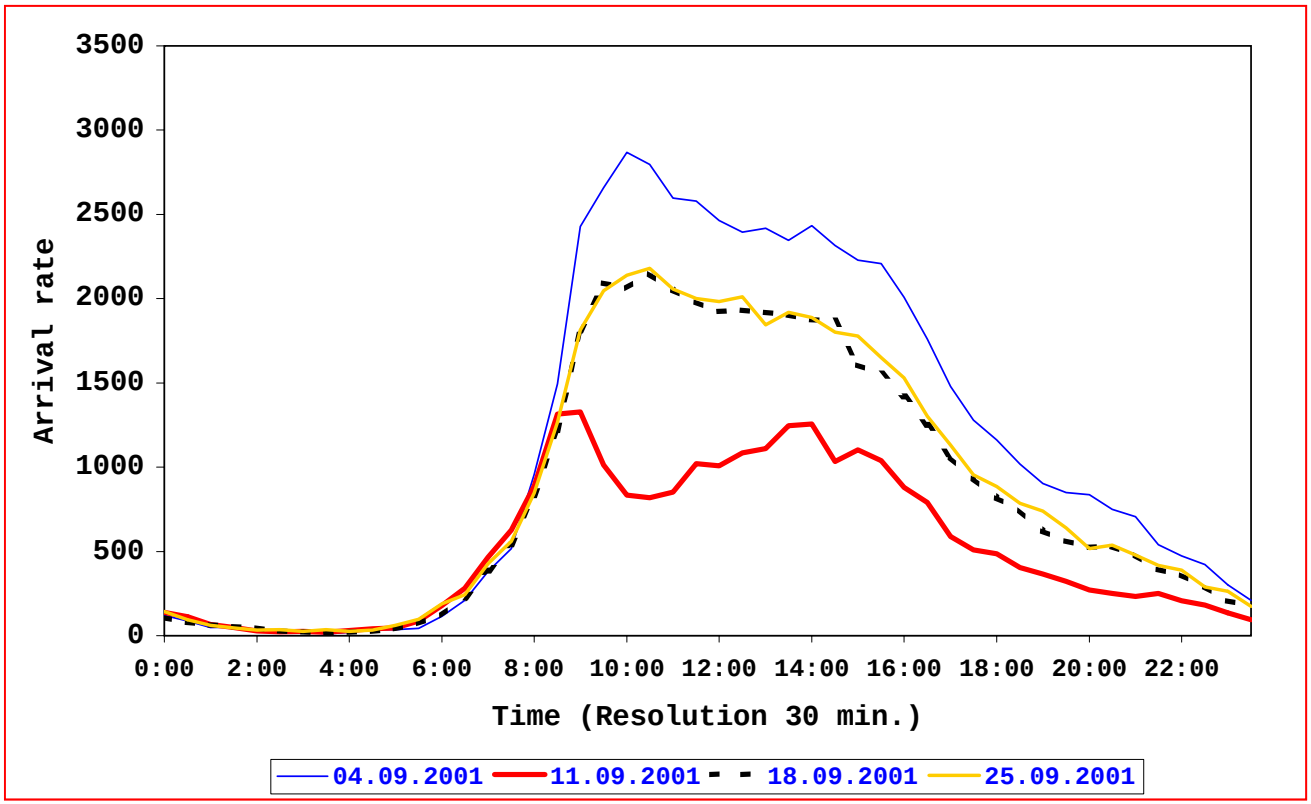

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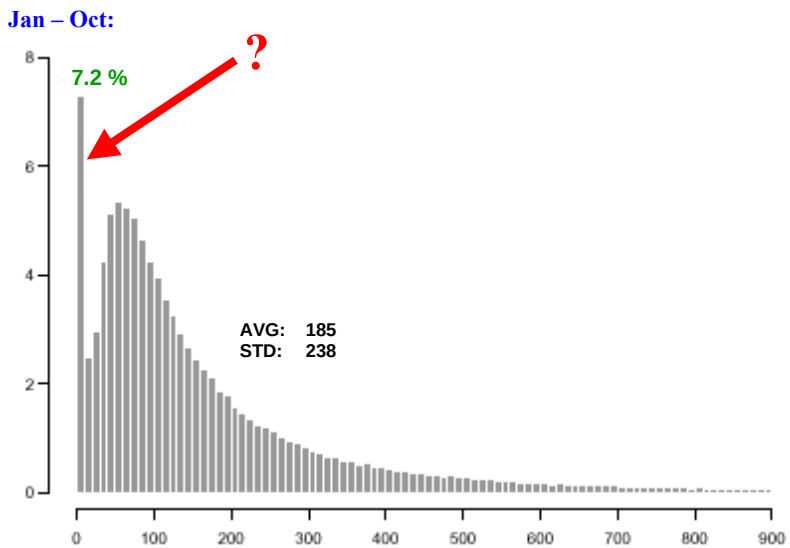
- **Tuesday, September 11th, 2001.**

Service Durations: The LogNormal Law

Service Durations in a Typical (?) Call Center

January-October



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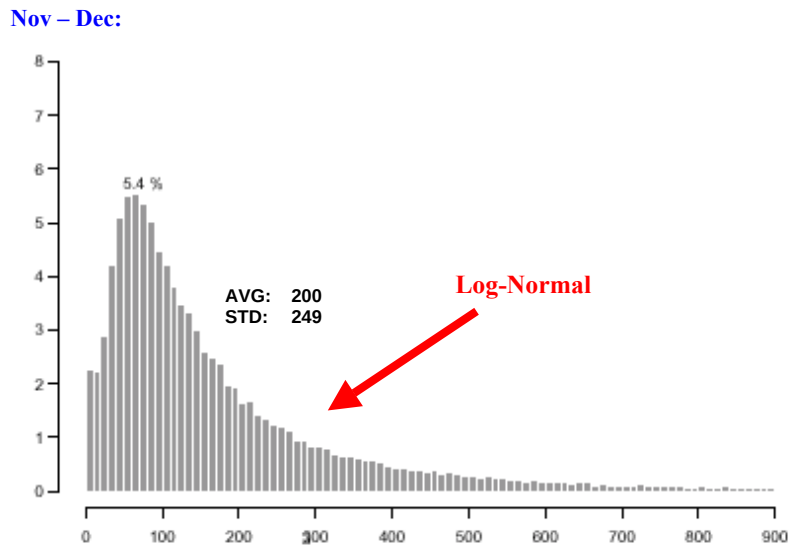

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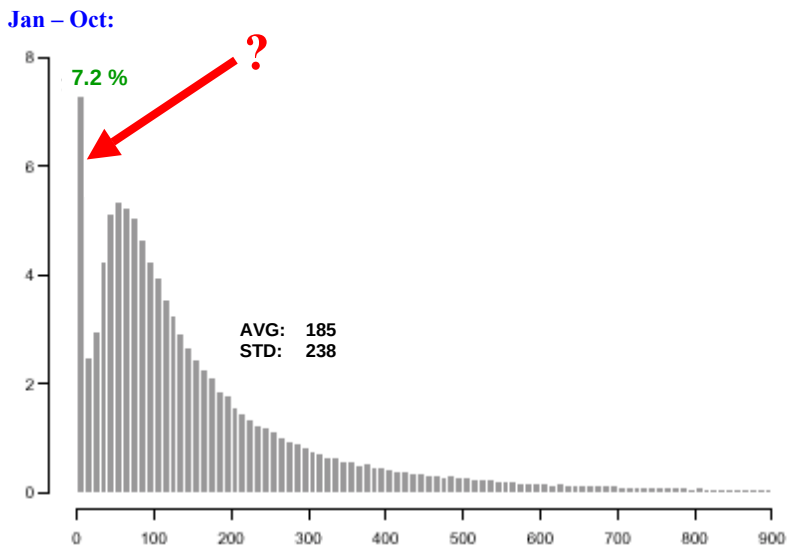

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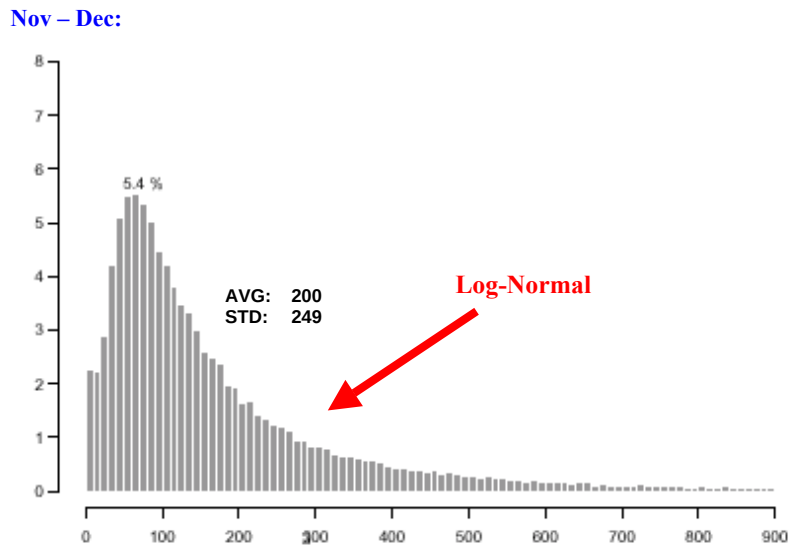
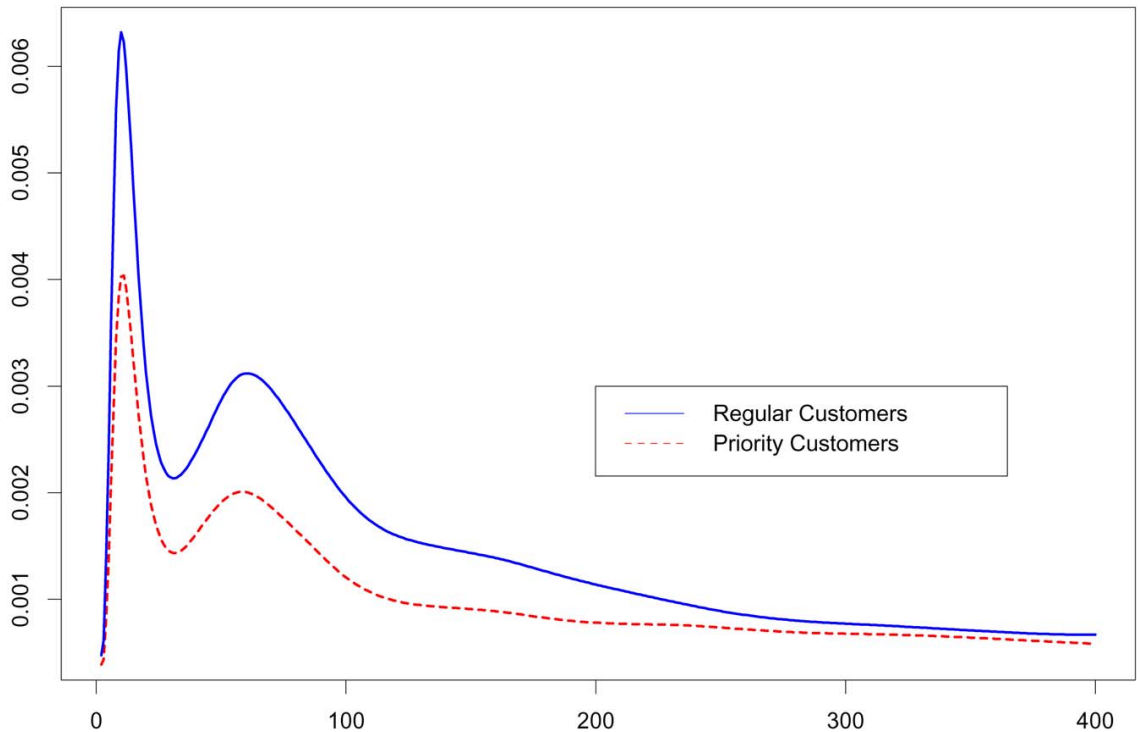


- **Lognormal** service times prevalent in call centers
- **7.2% Short-Services:** Agents' "Abandon" (improve bonus, rest)
- **Distributions**, not only **Averages**, must be measured.

(Im)Patience While Waiting: Palm's Law of Irritation

Hazard Rates of (Im)Patience – Israeli Bank:
Regular over **VIP** Customers



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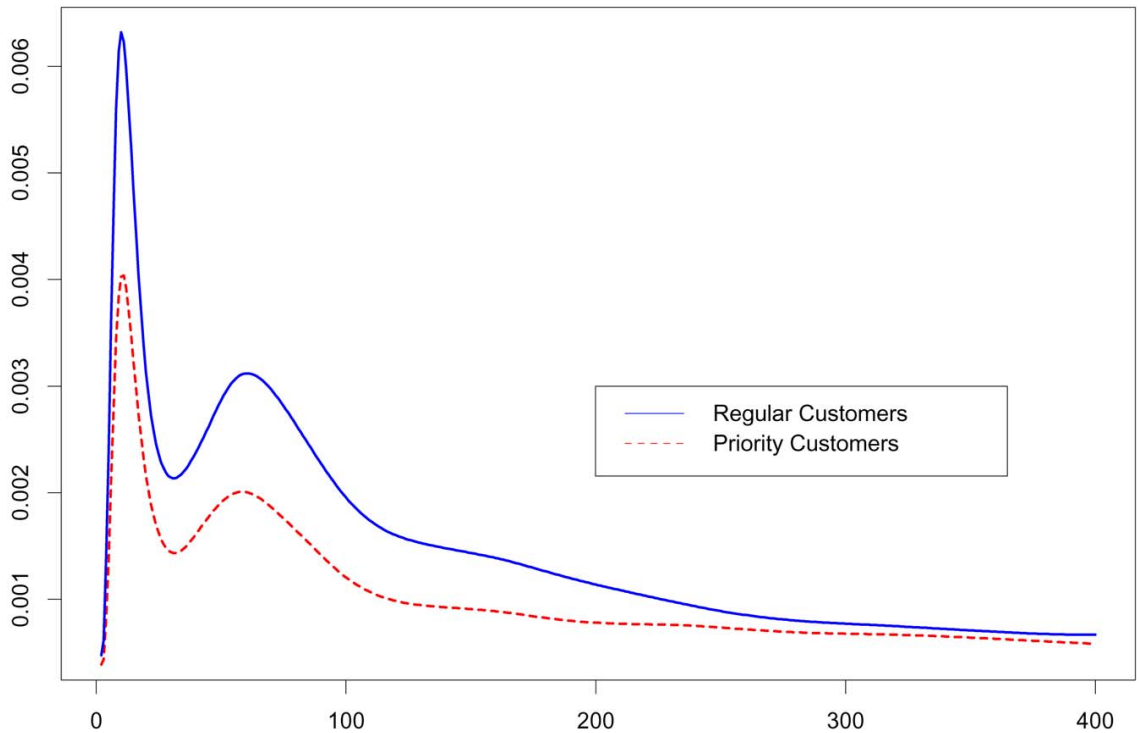

- **Peaks** of abandonment at times of **Announcements**
- **VIP** are more **Patient** (Needy) than the Others
- **Call-by-Call Data (DataMOCCA)** required (Un-Censoring).

Erlang-A: Simple, Useful, Robust, Insightful, Optimal

- **Simple:** 4CallCenters calculator (download in our Website)

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Still has its **Limitations**, theoretical & practical, all of which simulates

$\Longrightarrow$ **Current Research**

Back to Main Messages: Summary of Erlang-A

1. **Simple useful** model, requiring and stimulating **deep** analysis.

2. Supported by **Data-Based** research & teaching.
(**DataMOCCA**, available for (academic) adoption.)

3. Takes one back to the **basic-research** paradigm:
Measure, Model, Experiment, Validate, Refine, etc.

4. Generates scientifically-based **design principles, tools (software) and teaching material**, downloadable at the

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