

Revolutionizing Contact Center Workforce Management: Beyond Erlang C



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Executive Summary

The contact center industry stands at a crucial inflection point. While customer service delivery has evolved dramatically since the 1970s, the fundamental mathematics behind workforce management (WFM) has remained largely unchanged. This paper examines why traditional WFM solutions are no longer sufficient for modern contact centers and introduces ProHanceCX's innovative approach to workforce optimization.

The Evolution of Contact Center Technology

The foundation of modern contact centers was laid in the 1970s with the introduction of the first automated telephone switches. As globalization accelerated and contact centers became increasingly crucial to business operations, workforce management emerged as a critical component of operational efficiency. However, while contact center technology has advanced significantly in areas such as omnichannel communication, cloud infrastructure, and customer experience analytics, the core WFM calculations have remained surprisingly static.

Understanding Erlang C

The Erlang C formula, developed by A.K. Erlang in 1917, is a mathematical equation used to calculate the probability of queuing in a contact center environment. The formula assumes a set of specific conditions: calls arrive randomly following a Poisson distribution, calls that can't be answered immediately are queued, no caller abandons the queue, and all agents handle calls for an exponentially distributed time period. **The formula determines the number of agents needed to achieve a specific service level (typically percentage of calls answered within a target time) based on:**

- ◆ Expected call volume during a specific time period
- ◆ Average handling time (AHT)
- ◆ Target service level
- ◆ Target queue time

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

While this formula has served as the industry standard for decades, its rigid assumptions and inability to account for modern contact center complexities make it increasingly obsolete in today's dynamic environment. Following are the scenarios where we can clearly establish limitations of Erlang-based computations and the need of advance mathematical models to arrest such limitations for more optimized & leaner computations.

Limitations of Traditional WFM Solutions

Traditional WFM solutions continue to rely heavily on the Erlang C formula, developed in 1970 for telephone traffic engineering. While this mathematical model was revolutionary for its time, it makes several assumptions that no longer align with modern contact center operations:

Mathematical Limitations

- Erlang C assumes random call arrival patterns, which oversimplifies modern multichannel customer interaction patterns
- The model treats all time periods as discrete data points, failing to account for the continuous nature of customer interactions
- It doesn't adequately consider the complexity of modern scheduling requirements and agent skill distributions

Operational Challenges

Current WFM solutions from traditional vendors present several significant operational challenges:

01

Secondary Priority in Integrated Suites

- WFM capabilities are often treated as an afterthought in larger contact center suites
- Limited investment in WFM innovation as vendors focus on other suite components
- Lack of specialized attention to workforce optimization requirements

02

Implementation and Usage Barriers

- Complex deployment processes requiring significant IT resources
- High total cost of ownership including licensing, implementation, and maintenance
- Steep learning curves for administrators and supervisors

03

Integration and Flexibility Constraints

- Limited ability to integrate with modern technology stacks
- Rigid frameworks that resist customization
- Difficulty in adapting to changing business requirements

Limitation in Traditional Computational Techniques and Erlang-Based Methods

1. Handling Traffic Volume Figures with Floating-Point Numbers

Limitation:

Many traditional computations rely on floating-point numbers for traffic volumes, which are then converted to integers for capacity calculations. This conversion can introduce inaccuracies due to rounding rules.

- **Example:** A traffic volume of 1.5 per interval may be rounded to 1 or 2, leading to a 100% variation, which becomes particularly significant for low traffic volumes.

Impact:

This dependency on rounding rules creates variability, making outputs less consistent and comparisons unreliable.

2. Addressing AHT Longer Than the Time Interval

Limitation:

Erlang-based methods are not designed to handle scenarios where the Average Handling Time (AHT) exceeds the chosen time interval, a common occurrence in non-voice channels.

- **Example:** For a 15-minute interval, SL=80%, service time=20 seconds, traffic volume=5 calls, and AHT=2500 seconds, Erlang caps AHT at 899 seconds. This adjustment introduces inaccuracies that limit operational applicability.
- **Additional Complexity:** Cumulative effects across time intervals are not considered, which can lead to underestimating capacity requirements.

3. Uniform AHT Assumption Within Time Intervals

Limitation:

Erlang assumes a single Average Handling Time (AHT) for all calls within a time interval, simplifying computations but not accounting for variability in real-world scenarios.

Impact:

This uniformity can lead to results that do not accurately represent operational dynamics, especially in cases where call durations vary significantly.

4. Impact of Low Traffic Volumes on Redundancy

Limitation:

At lower traffic volumes, Erlang's calculations can result in disproportionately higher staffing requirements, leading to potential inefficiencies.

- **Example:** For a 15-minute interval, Service Level=80%, service time=20 seconds, AHT=600 seconds, and traffic volume=5 calls, Erlang computes 9 FTE. Reducing the volume to 4 calls results in 7 FTE—a 2 FTE difference for a single call, highlighting sensitivity at lower volumes.

5. Time Interval and Task Length Alignment

Limitation:

Comparisons with Erlang can be less effective if time intervals and task lengths are not aligned. Erlang does not account for dynamic constraints such as varying task lengths or optimized shift planning.

Impact:

Outputs may not fully reflect operational realities, limiting the applicability of the results for workforce planning.

The ProHanceCX Advantage

ProHanceCX redefines workforce management through advanced mathematical modelling and a cutting-edge technology framework. By addressing the inherent limitations of traditional computational techniques, ProHanceCX delivers a transformative solution tailored to the complexities of modern customer service operations.

1. Advanced Mathematical Modelling

ProHanceCX leverages sophisticated algorithms to go beyond simplistic computations, offering:



Comprehensive Distribution Analysis

Accounts for the full spectrum of interaction patterns rather than relying on discrete data points.



Real-World Variability

Adapts to variable handling times, skill levels, and diverse interaction types across multiple channels.



Dynamic Responsiveness

Adjusts forecasts and staffing requirements in real-time based on changing customer demand and interaction patterns.

This approach ensures unmatched accuracy and adaptability, enabling contact centers to operate with higher precision and efficiency.

2. Operational Benefits

ProHanceCX's innovative methodology delivers significant operational advantages:

01

Accurate Forecasting

Ensures optimal staffing levels by aligning workforce capacity with customer demand.

02

Minimized Staffing Gaps

Reduces both overstaffing and understaffing, improving resource utilization.

03

Enhanced Service Quality

Reduces customer wait times, boosting satisfaction levels.

04

Improved Agent Experience

Balances workloads, increasing agent productivity and satisfaction.

Additionally, ProHanceCX addresses pain points such as:

- Manual scheduling efforts with automation that reduces processing time from hours to minutes.
- Cost implications of traditional solutions, avoiding SLA breaches and associated penalties.

These benefits translate into tangible performance improvements for both customers and agents, creating a seamless service experience.

3. Modern Technology Architecture

Built with a future-ready design, ProHanceCX provides a scalable, efficient, and user-friendly solution:



Cloud-Native Infrastructure

Enables rapid deployment and seamless scalability.



Flexible Integrations

Easily integrates with existing systems and tools, ensuring smooth adoption.



Intuitive Interface

Simplifies usability, reducing the learning curve for workforce management teams.



Continuous Improvement

Incorporates regular updates and customer feedback to stay ahead of evolving needs.

This robust architecture ensures reliability and flexibility, empowering organizations to adapt to the dynamic demands of customer service.

4. How ProHanceCX Overcomes Key Computational Challenges

ProHanceCX effectively addresses the limitations of traditional techniques, including:



Precise Traffic Volume Handling

Advanced methods eliminate inaccuracies caused by rounding floating-point numbers.



Dynamic Interval Management

Implements "capacity hand-over" to manage cumulative effects across time intervals, ensuring smooth operations.



Granular Call Analysis

Considers variability in call durations within intervals for realistic output.



Optimized FTE Calculations

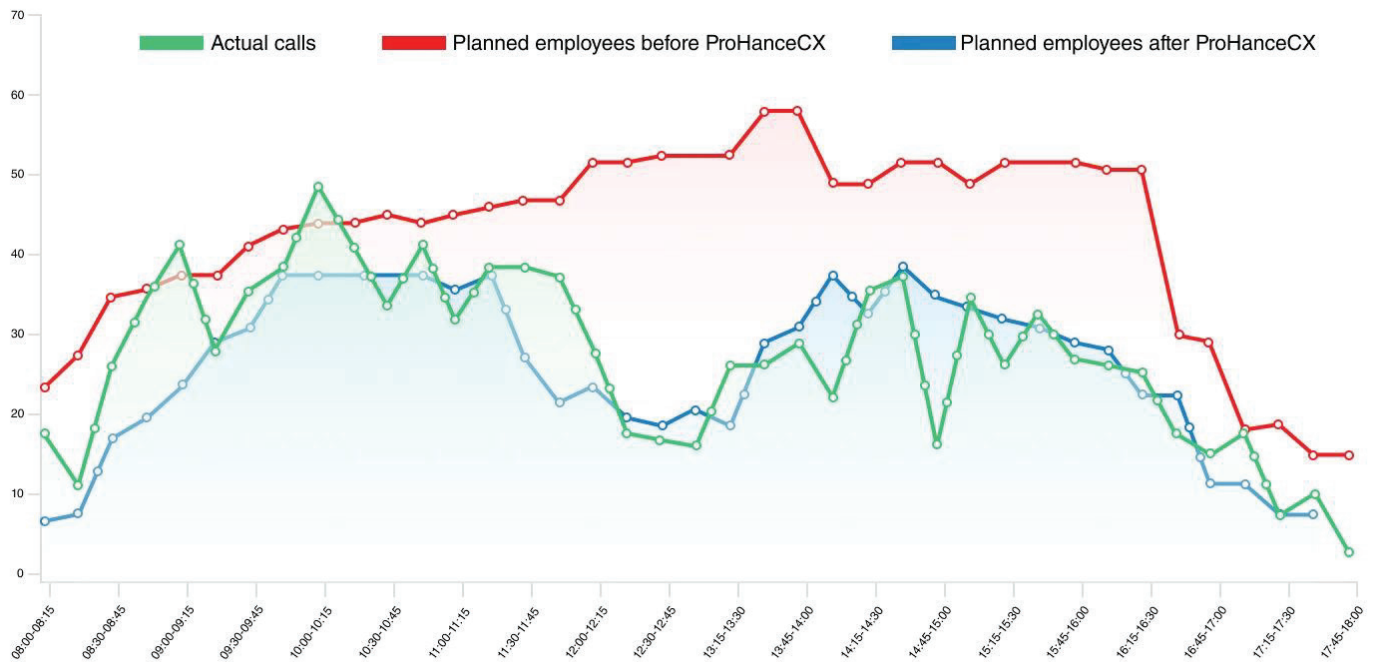
Reduces redundancy and overestimations, particularly for low-traffic scenarios.



Holistic Workforce Optimization

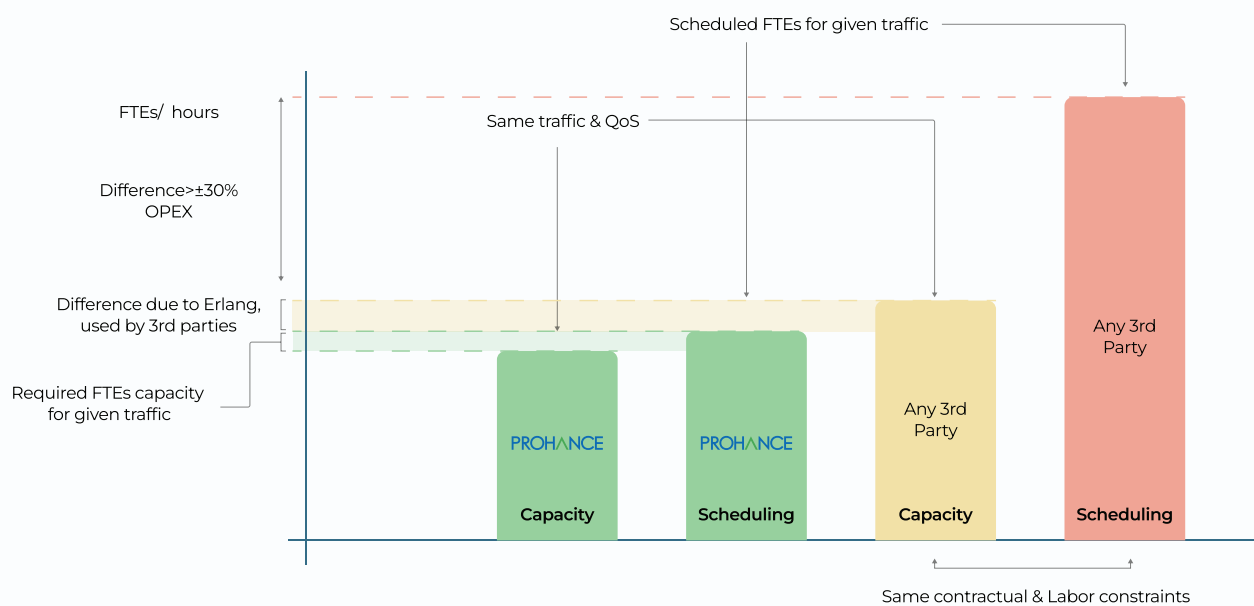
Incorporates task lengths, shift planning, and traffic variability, delivering actionable and realistic workforce insights.

Contact Centre Industry



5. Comparison with Traditional and Market-Leading Tools

ProHanceCX stands out by addressing gaps in traditional WFM approaches.



Converting the Capacity to Scheduling Blended Channel

Against Erlang-Based Models

- Eliminates limitations such as fixed AHT assumptions and inaccuracies in low-traffic scenarios.
- Incorporates real-world factors like skill-based routing and blended queues.

Versus Market Competitors

- Offers a 30-40% cost reduction through precise automation and headcount optimization



99 FTE less = 32% lower operational cost

A proven real life case study

- For a single voice channel with $\pm 7,000$ calls per day
- ProHanceCX achieved a headcount reduction between 72 and 99 FTE per day.
- The difference between 72 and 99 is given by the (in)flexibility of the contractual constraints with the employees.
 - Achieves WAPE < 3-5%, surpassing industry benchmarks in forecasting accuracy.
 - Provides faster ROI, typically within 3-6 months, compared to higher TCO and slower returns from competitors.

Business Impact

Organizations adopting ProHanceCX experience measurable improvements:



Cost Efficiency

Optimized staffing reduces operational costs, avoiding annual penalties of \$500,000+ for a base of 1,000 FTEs.



Customer Satisfaction

Faster response times and better service delivery enhance satisfaction metrics.



Agent Engagement

Balanced workloads and optimized shifts improve employee morale and reduce turnover.



Operational Agility

Quickly adapts to changing customer demands, ensuring alignment with service-level goals.

Conclusion

While traditional WFM methods like Erlang have served the industry well, modern contact center operations require more advanced approaches to address their complexity. ProHanceCX represents a significant leap forward, combining innovation with precision to deliver superior workforce management results.

By selecting ProHanceCX, organizations benefit from a dedicated, focused solution that goes beyond bundled offerings, ensuring easier implementation and a sharper focus on workforce optimization. With ProHanceCX, businesses can embrace the future of workforce management, equipped with tools designed to meet the demands of today's dynamic customer service landscape.

Book a Demo:

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