Quality Improvement Trends in the Telecommunications Industry

A Study Using the TL 9000 On-Time Delivery Measurement

QuEST Forum

QuEST Forum is the telecommunications industry's leading force in the pursuit of global product and service quality and performance excellence. A unique partnership between service providers and suppliers, QuEST Forum has influenced industry-wide quality since 1998 by:

- Maintaining a searchable repository of industry trends, performance and comparative data

- Harmonizing global quality requirements and supporting their consistent application

- Promoting a collaborative global forum of industry leaders

- Identifying and sharing best practices across the telecommunications supply chain

TL 9000

TL9000

QuEST Forum pursues the goal of global telecommunications quality and industry-wide performance excellence through its TL 9000 standard. Building on ISO 9001, TL 9000 provides the telecommunications industry with a consistent set of quality expectations that parallel rapid technology changes and customer expectations resulting in a unique and robust quality management system that drives continual improvement and business excellence.

The performance data requirement of TL 9000 sets it apart from other quality management systems. TL 9000 certified organizations must submit TL 9000 measurement data based on predefined counting rules to QuEST Forum's partner, the University of Texas at Dallas. Security and anonymity are cornerstones in the submittal, storage and reporting of all TL 9000 data.

Through the compilation of industry statistics, such as industry average, best-in-class, and worst-in-class, the measurement data enables QuEST Forum members to identify opportunities for improvement as well as compare themselves to their competitors and set meaningful improvement goals. Furthermore, an organization's quality management system based on TL 9000 functions as a platform to support the continual improvement of these measurements.

The State of Telecom Quality

Today the need for and importance of quality improvement in the telecommunication industry not only continues, but is also a loudly voiced customer demand. QuEST Forum is committed to vigorously pursuing innovative and effective solutions for the current and future quality environment and as the keeper of the TL 9000 data, QuEST Forum is in the unique position to quantify the state of telecom industry quality.

The QuEST Forum Executive Board commissioned the publication of a study to ascertain the state of telecom quality as evidenced by the TL 9000 measurement data. Since the amount of TL 9000 data is vast, covering 47 TL 9000 measurements, 126 product categories, and 869 registrations, as a starting point, this study focuses on a single TL 9000 measurement, On Time Delivery, across a sample of representative product categories over a two-year period, 2007-2008. The study focuses on several selected product categories, as shown below, to provide an overall picture of the key elements that comprise the end-to-end telecom experience.

Product Category	Product Category Name
1.2.2	Access Multi-Service
1.2.9.2	Edge Routers
3.3.2.2	Base Transceiver System (BTS)
4.2.1	On-line Critical Operations Support Systems
5.3	Power Systems
7.1.1	Installation
7.2.2	Software Development Service
8.5.2.3	Optical Subassemblies

Quality Improvement Trends in the Telecom Industry as Indicated by the TL 9000 On-Time Delivery Measurement

In order to ascertain the state of quality in the Telecom Industry as shown by the TL 9000 On-Time Delivery Measurement, this study utilized scatter plots and other simple forms of analyses of the available industry data for the eight selected product categories over a two year period. On-Time delivery is investigated first, followed by a review of the Industry Average trends, Worst in Class (WIC) trends and Best in Class (BIC) trends.

The On-Time Delivery Measurement

On-Time Delivery measures the timeliness of the delivery of products and services to customers. This measurement is used to evaluate organizations on their on-time delivery performance as they strive to meet expectations on orders of any kind from the customer. However, it is not the intent of this measurement to assess an organization's ability to meet its commitments for the release of new designs.

The Industry Average for On-Time Delivery

The Industry Average is the average of all of the eligible data submitted over the smoothing period. For On-Time Service Delivery (OTS), which applies to 7.1.1 and 7.2.2., the smoothing period is twelve months, while for On-Time Item Delivery (OTI) the period is six months.

Findings on On-Time Delivery

- **Delivery variability across the eight product categories was reduced significantly over the two year time period.** As shown in Figure 1, the range of results from the beginning of 2007 to the end of 2008 decreased from 31%-98% to 72% - 99%. At the same time, the standard deviation was also reduced by more than half from 22% to 10%.
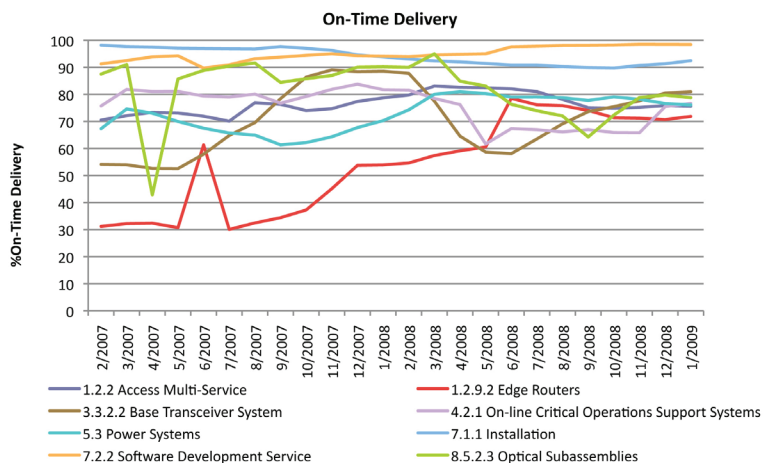

Figure 1 – On-Time Delivery Chart
Note: Per TL 9000 counting rules, 100% represents perfect delivery performance.

- **There was an overall improvement trend across the eight product categories.** Six of eight product categories ended the period with higher on-time delivery (see Figure 2). Five of eight product categories showed positive upward trends based on a simple linear trend analysis (see Figure 3). In aggregate, both the monthly medians and averages across the categories also showed an overall upward trend (see Figure 4). The linear trend for the average increased from ~ 75% to 81% during the time period.

Category Product	Initial OTI	Final OTI	Percent Change
1.2.2	70.5	75.5	7.15%
1.2.9.2	31.2	71.8	130.5%
3.3.2.2	54.1	80.9	49.7%
4.2.1	75.7	76.7	1.3%
5.3	67.3	76.1	13.1%
7.1.1	98.1	92.4	-5.8%
7.2.2	91.2	98.4	7.9%
8.5.2.3	87.5	78.7	-10.0%

Figure 2 – Product Category Percent Change Chart

- **Many of the eight product categories experienced major increases in delivery performance.** As shown in Figure 2, categories including edge routers, BTS, and power showed dramatic relative percent increases, 130%, 50%, and 13% respectively. This is welcome news as these are key elements in providing high speed mobile data access, a major growth area in the industry. The initial poor performance in these categories ranging from 31% to 70% provided ripe opportunity for improvement. Even the categories that decreased, such as Optical Subassemblies and Installation Service, demonstrated reasonable to strong performance at the end of the period.
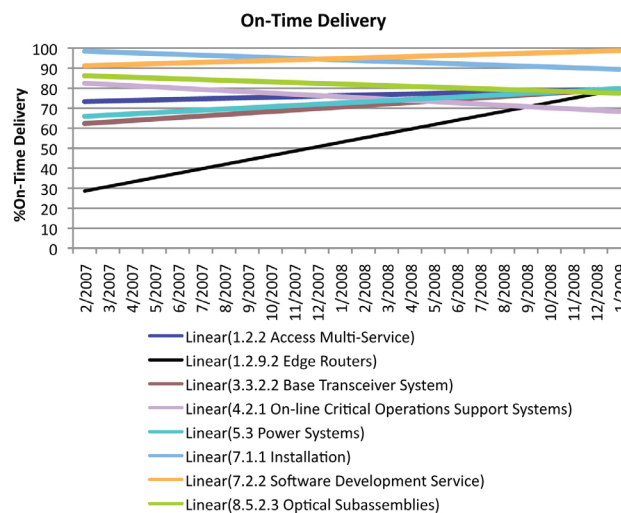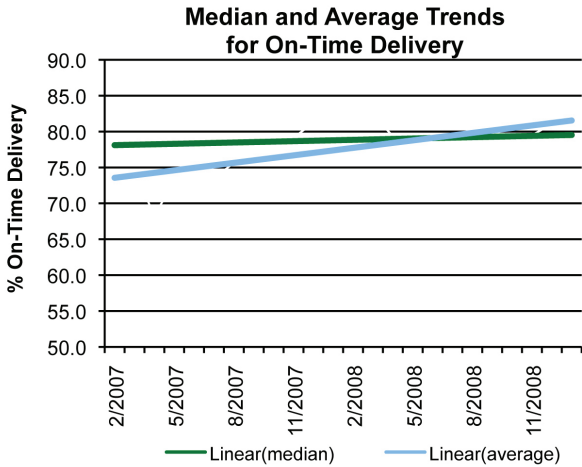

Figure 3 – On-Time Delivery Trends Chart Figure

Median and Average Trends for On-Time Delivery

Figure 4 – Median and Average Trends for On-Time Delivery Chart

Worst-In-Class

Worst in Class equals the worst performance from a single eligible registration over the smoothing period (12 months for OTS and 6 months for OTI).

Findings on Worst-In-Class

- **WIC trends can be categorized into two groups, installation and the "rest".** As the Figure 5 scatter chart shows, installation performance stands apart from the other product categories. While installation shows an overall decline, it started at a very high WIC of approximately 95%, and ended with a respectable 80%. The "rest" includes the other product categories, with initial WIC statistics of very poor to poor and ranging from only 10% to about 45% (~35% range). At the end of the period, the range actually widens (~ 40% range), and despite shifting upward (23% - 63%), is still not close to installation performance.

WIC for On-Time Delivery

Figure 5 – WIC for On-Time Delivery Chart

- **The overall WIC trend is improving.** While the Installation category showed a decline, and the variability, as measured by standard deviation across the product categories, is relatively unchanged, there is an overall improvement trend in on-time delivery performance. This improvement can be seen in the WIC average and median trend lines in the Figure 6 below, with the median trend rising from 22% to 42%, and the average trend improving from 30% to 54%.
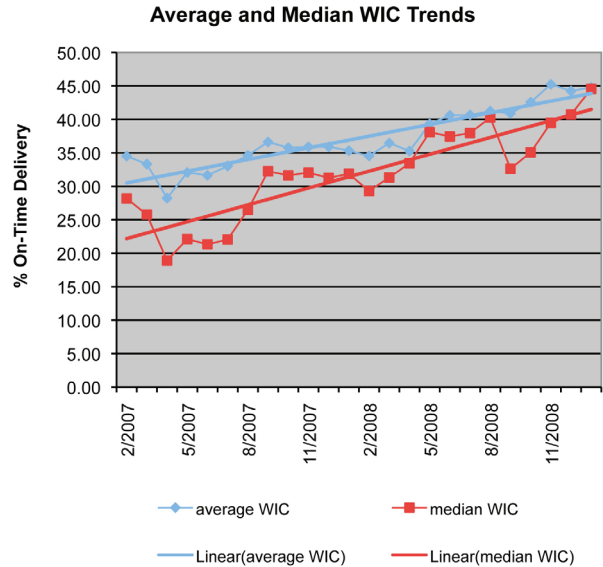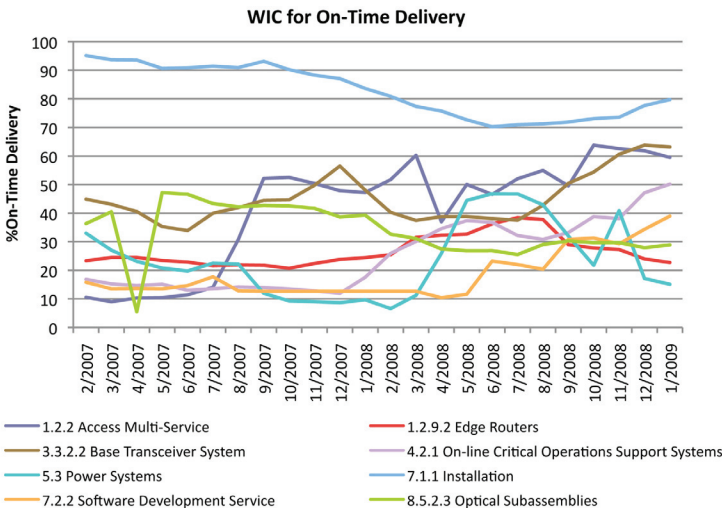
Average and Median WIC Trends

Figure 6 - Average and Median WIC Trends Chart

- **The decrease in Installation WIC has likely reduced its industry average.** The decrease in the Installation industry average noted in the previous section was most likely influenced by its reduction in WIC.

- **Edge Router Industry Average improvement is driven more by many participants improving versus an improvement in WIC.** For the Edge Router category, WIC stayed in the 20-40% range, suggesting that the large increase in the industry average is likely due to the improvement across many participants.

Best-In-Class Industry Statistic

Best in Class equals the best performance from a single eligible registration over the smoothing period (twelve months for OTS and six months for OTI).

Findings on Best-In-Class

- **The BIC range across the product categories is very strong.** As Figure 7 shows, the overall BIC range is narrow, ~12%, and approximately 88% to 100% for this time period. In addition, four of the eight product

categories demonstrated "perfect" BIC performance or 100% for every month. Note that this is difficult to observe on the chart since all four categories are compressed into one line at 100%. Three of the four remaining categories also had a number of months where BIC was at 100%.

- **The Edge Router category is the only category that did not achieve a 100% percent BIC status.** It was also one of only two categories that showed a downward trend; the other being multi-access. However, despite the downward trends in these two categories, both ended 2008 with strong BIC delivery performance of 90-95%. Furthermore, the downward trend in BIC performance for the edge router category did not have a negative impact on the overall industry average which continued to rise fairly steadily during the same time period.
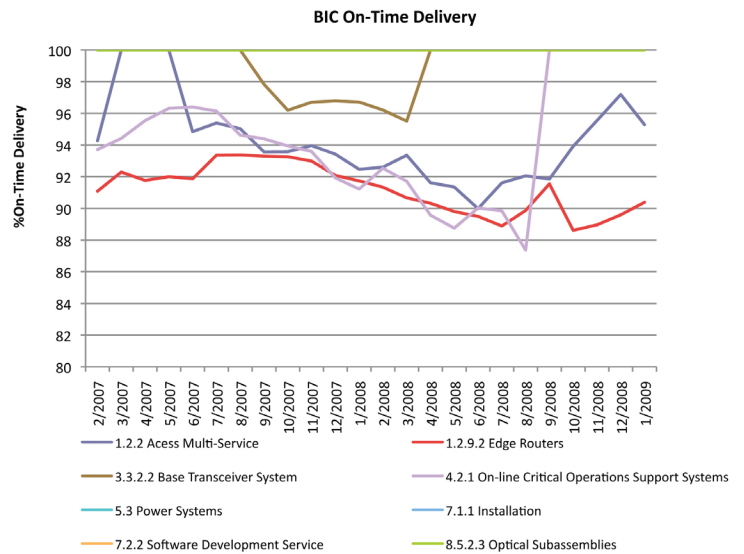

Figure 7 – BIC On-Time Delivery Chart

Summary

This analysis of the TL 9000 on-time delivery measurement shows:

- **There was overall improvement in the industry average for on-time delivery.**

- While the linear trend of the average of the averages showed an **absolute increase from ~ 75% to 81%**, some product categories demonstrated even greater increases.

- **Categories including edge routers, BTS, and power showed dramatic relative percent increases, 130%, 50%, and 13% respectively.** This is welcome news since these are key elements in providing high speed mobile data access which is a major growth area in the industry.

- **The overall Worst-In-Class Industry trend improved.** The median linear trend rose from 22% to 42%, and the average trend improved from 30% to 54%.

- Comparing WIC and Industry average trends indicates that **not only did the industry average improve, but that those performing below the industry average improved at a much greater rate.**

- **The Best-In-Class performance range was very strong and stable. The overall BIC range was narrow (~12%) and approximately 88% to 100%** during this time period. In addition, for every month studied, 4 of 8 product categories demonstrated "perfect" BIC (100%) performance.

Conclusion

A major premise behind QuEST Forum's inception was that as organizations used TL 9000 data to drive improvement, the net effect over time would be an overall improvement in the quality of the telecom industry. While there are many factors that could be responsible for any shift in measurements, it is apparent that the founding intent of QuEST Forum and TL 9000 to improve telecom quality is being realized.

Furthermore, this study vividly illustrates the importance of the TL 9000 measurements and the valuable insight they can provide. Without a common measurement system the study would not have been possible. The TL 9000 measurements provided for the secure collection of anonymous data both derived using accepted definitions and reported in a common format.   While many certified organizations that faithfully use TL 9000 attest to the improvements in quality derived from utilizing TL 9000, this study confirms these statements. The benchmark data derived from the TL 9000 measurement data can be confidently used to drive meaningful improvement targets for certified organizations and the industry as a whole.

QuEST Forum would like to thank the PDR Evaluation Subteam of the IGQ Work Group for graciously giving their time to create this report. The IGQ Workgroup consists of volunteers from QuEST Forum member companies.

For additional information on QuEST Forum or TL 9000 please visit www.questforum.org or call +1-972-423-7360.