

**G**rowing at unimagined rates, the information and communication technologies (ICT) industry is facing ever-increasing challenges from the complexity of interconnected services and the expectations of users. The TL 9000 Quality Management System (QMS) drives efficiency and performance across the ICT global supply chain, tracks performance, improves results, reduces the cost of doing business, and ultimately delivers better products and services to customers. As new technologies are introduced, QuEST Forum continues to collaborate globally to actively evolve the TL 9000 requirements and measurements to keep pace with industry and network changes.

### The TL 9000 Quality Management System

The TL 9000 Quality Management System (QMS) is now in its second decade and the overriding question still remains: Are TL 9000 certified companies demonstrating improved quality and performance?

Since 2009 the QuEST Forum Performance Data Reports (PDR) Team has produced a series of industry papers analyzing the TL 9000 third party audited data with the goal of objectively assessing the performance of companies certified to the TL 9000 QMS. The first paper, released in October 2009, detailed the dramatic improvements shown in the On-Time Delivery (OTD) of products and services by companies certified to TL 9000 during a two year period from 2007 to 2008. The second paper focused on the Number of Problem Reports (NPR) and Fix Response Time (FRT). The third paper studied Return Rates while the fourth in the series focused on Edge Router, Product Category 1.2.9.2, trends over a five year period. This paper, the fifth in the series, studies simple and complex wireless devices which includes the ubiquitous smartphone.

Smartphones are one of the new technologies addressed by TL 9000. Within the TL 9000 QMS, simple wireless devices are in Product Category 6.2.1.2.1 and complex devices are Product Category 6.2.1.2.2. Simple wireless devices, commonly referred to as handsets, are defined as a wireless subscriber user terminal that provides basic voice and text messaging functions. Examples include the basic cell phone, basic wireless single mode user terminal, wireless multi-mode user terminal and wireless global user terminal.

Complex wireless devices are defined as a wireless subscriber user terminal that provides web access, multimedia capability and/or other functionality in addition to basic voice and text messaging functions. Examples include wireless multi-purpose user terminal, wireless video phone and wireless user terminal with built-in camera. The smartphone, which has been widely adopted and whose growth is forecasted to continue, is in this category.

This paper examines the following measurements:

- Number of Problem Reports – Major (NPR2) and Minor (NPR3)
- Problem Report Fix Response Time – Major (FRT2) and Minor (FRT3)
- Overdue Fix Response Time – Major (OFR2) and Minor (OFR3)
- Return Rates – Early Return Index (ERI) and One Year Return Rate (YRR)

### Major Problem Reports (NPR2)

Figure 1 displays the rates of Major Problem Reports, NPR2, for both the simple and complex product categories.

The Major Problem Report rate is defined as the number of Major Problem Reports per units shipped per year. Simply stated, NPR2 is the number of times an average handset would expect to encounter a major problem over the course of a year. A major problem is

defined as when the product is usable, but a condition exists that seriously degrades the product operation, maintenance or administration, etc.

Figure 1 shows that during the two-year study period, the combined NPR2 for simple and complex wireless devices improved by 12%. Figure 1 also shows that during the period studied, simple handsets had a higher problem report rate than complex products. One explanation for this finding is that when a higher population of units exists, it tends to reduce the problem report rate as the problem reports are spread among more units. In the reported population depicted in Figure 1, simple devices had 11 registrations whereas there were 30 registrations for complex devices. Therefore, the complex product category had four times more units present than simple units thus creating the potential for a reduced problem report rate for complex wireless devices.

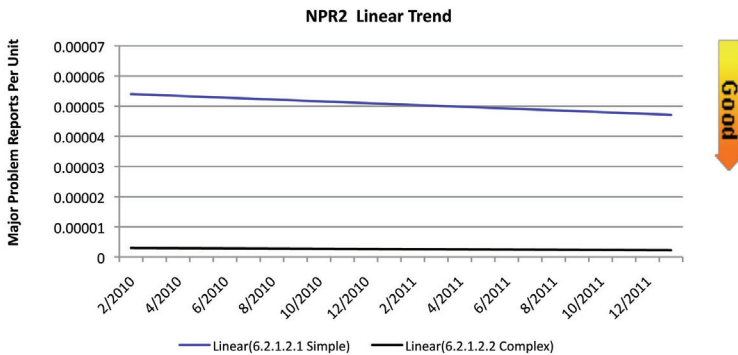


Figure 1 – Major Problem Reports Linear Trend

### Minor Problem Reports (NPR3)

NPR3 is the number of Minor Problem Reports per units shipped per year. As with NPR2, NPR3 is the number of times an average handset would expect to encounter a minor problem over the course of a year. Minor problems are defined as other problems of a lesser severity than “critical” or “major” such as conditions that have little or no impairment on the function of the product.

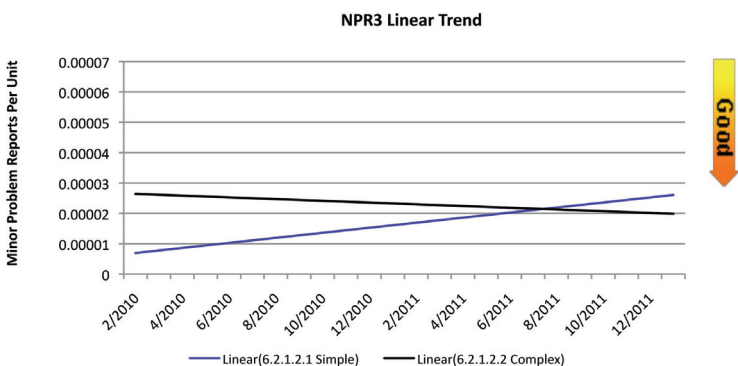


Figure 2 – Minor Problem Report Linear Trend

Figure 2 shows the linear trend for Minor Problem Reports, NPR3, for both simple and complex devices. The graph shows that for complex devices there was a 23% improvement over the time period plotted while simple devices more than doubled the reports per unit. It is important to note that there were multiple additions and deletions with the registered companies during this time period. This can impact the subsequent averages.

### Fix Response Time (FRT)

Major Fix Response Time, FRT2, is the percentage of major problem reports satisfactorily resolved on time, with on time meaning on or before a predetermined due date. FRT2 is a complimentary measurement to NPR2, which measures the number of problems experienced.

There is no TL 9000 measurement for Critical Problem Report Fix Response Time since an immediate response to critical problems is a basic requirement for the industry. Organizations that do not adequately provide resolution to critical problems will not survive in today’s competitive environment. Improvements in FRT2 and FRT3 performance would clearly improve the customer experience.

Figure 3 shows FRT2 for wireless units. Simple devices had an amazing 100% industry average over the two-year span. This means that all the companies in that product category fixed all of their major problems on time resulting in a perfect major fix response time. The Major Fix Response Time for the complex product category also had a very good industry average and remained above 96% over the two-year period.

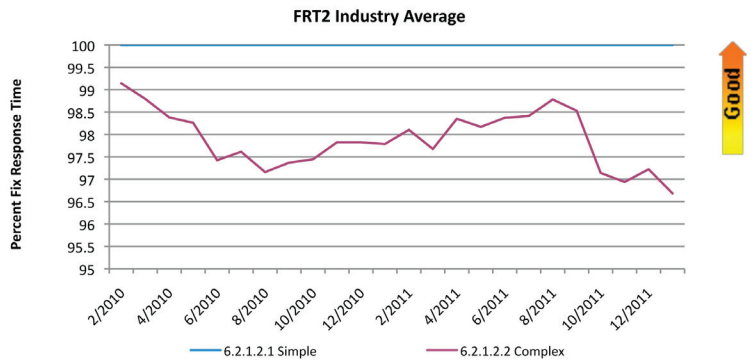


Figure 3 – Major Fix Response Time Industry Average

Minor Fix Response Time, FRT3, is the percentage of minor problem reports satisfactorily resolved on time, with on time meaning on or before a predetermined due date. FRT3 is a complimentary measurement to NPR3, which measures the number of problems experienced.

Figure 4 shows the industry averages for both the simple and complex category data. The simple category had a perfect Minor Fix Response Time rate for the last 14 months of the study period.

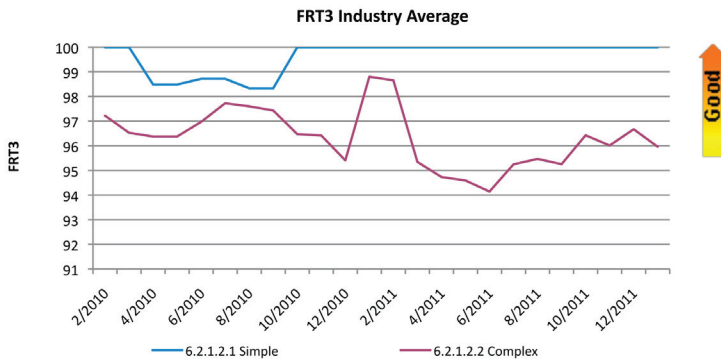


Figure 4 – Minor Fix Response Time Industry Average

### Overdue Problem Report Fix Responsiveness (OFR)

Overdue Problem Report Fix Responsiveness, OFR, measures the responsiveness to customer-originated problem reports that are not fixed on time as defined by the counting rules for failure to meet the Fix Response Time measurement. This measurement is used to quantify the responsiveness to overdue customer-originated problem reports.

The OFR measures included here are OFR2 and OFR3. Major Overdue Problem Report Fix Responsiveness, OFR2, is the percentage of overdue major problem reports closed during the study period.

Figure 5 shows the Major Overdue Fix Response Time industry average for both the simple and complex categories. Since the FRT2 measure for the simple category has a 100% industry average over the two-year span (Figure 3), OFR2 shows the same 100% average. The average for the complex category showed some degradation in the last half of 2011.

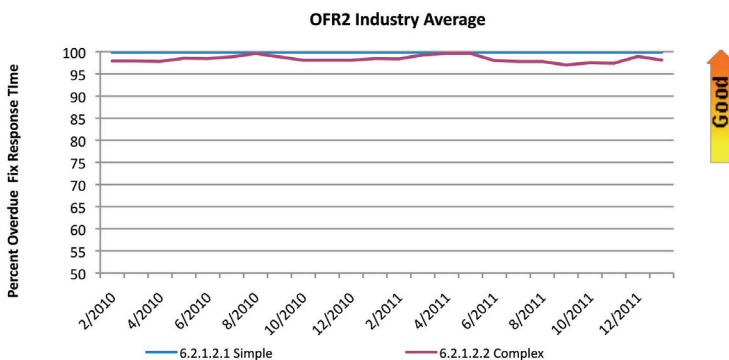


Figure 5 – Major Overdue Fix Response Time Industry Average

Minor Overdue Problem Report Fix Responsiveness, OFR3, is the percentage of overdue minor problem reports that were closed during the period.

Figure 6 shows the industry average for both the simple and complex categories.

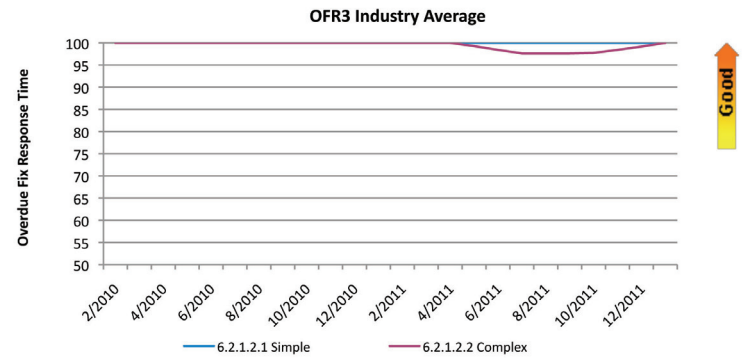


Figure 6 – Minor Overdue Fix Response Time Industry Average

### Early Return Rate (ERI)

Early Return Index, ERI, is a measure of the returns of units during the first six months after initial shipment.

Figure 7 shows the industry average for both the simple and complex categories with the complex category being fairly flat between 4% - 5%.

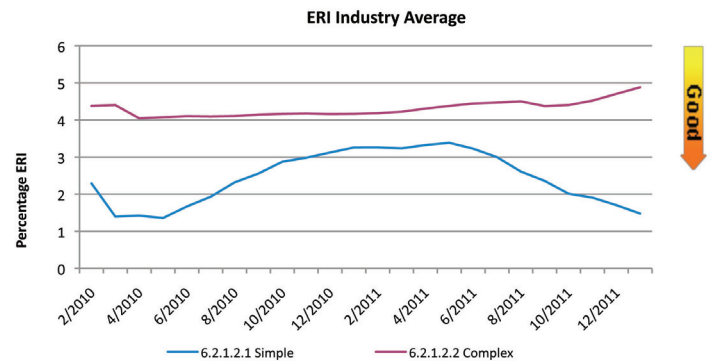


Figure 7 – Early Return Index Industry Average

### One Year Return Rate (YRR)

One Year Return Rate, YRR, is a measure of the return rate of units during the first year following the Early Return Index period. YRR is the number of returns from the population of units shipped during the seven to eighteen months prior to the monthly calculation period. In the YRR population, the early returns would have already come out of the population. That means that YRR is the most accurate measurement of how the hardware is performing

because it does not take into consideration the early returns which would include initially defective devices.

Figure 8 shows the industry average for both complex and simple wireless devices. Similar to ERI, the complex units had a higher YRR. Logically, a complex device would have more components and more software, and thus, more failures. However, unlike ERI, YRR shows a steady downward improvement trend for the complex units from 5.3% to 3.4% with approximately a 35% decrease over the two-year period. From both a user experience and business standpoint (i.e. significantly reduced Cost of Poor Quality due to returns) these improvement trends in return rates are very encouraging. Simple handsets also have had major YRR improvements from approximately 2.5% down to 0.5%, though the improvement was not as steady as the complex handsets.

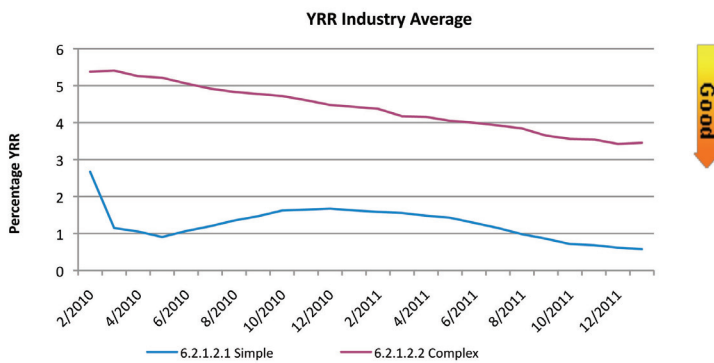


Figure 8 – Yearly Return Rate Industry Average

## Conclusion

A major premise behind QuEST Forum’s inception was that as organizations use TL 9000 data to drive improvement, the net effect over time would be an overall improvement in the quality of the ICT industry. While there are many factors that could be responsible for shifts in measurements, it is apparent from this study covering two years of data, that the founding intent of QuEST Forum and TL 9000 to improve ICT quality is being realized.

Furthermore, this study illustrates the importance of the TL 9000 measurements and the valuable insight they can provide. Without a common measurement system designed for benchmark data, this study would not have been possible. The TL 9000 measurements provide 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, 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.

## Basic Return Rate in TL 9000 Measurements Handbook Release 5.0

The TL 9000 QMS is continually improved through the collaboration of QuEST Forum members. With the new TL 9000 Measurements Handbook 5.0, it was recognized that the current age-based return rate measures such as ERI, YRR and LTR (which was not discussed in this paper) were not a good fit for some product categories. For many products such as components and sub-assemblies, the only returns are those that occur under warranty. Therefore, BRR, Basic Return Rate, was developed with categories like these in mind and will also apply to handsets. The ERI and YRR charts will be exchanged for one BRR chart that contains the first 18 months of return rate data. The selection of 18 months means that organizations will not have to modify the set up of their existing data systems to handle the BRR measure. As the ICT industry continues to evolve and introduce new technologies, QuEST Forum is dedicated to driving industry-wide collaboration to address the challenges of the future.

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 Work Group consists of volunteers from QuEST Forum member companies.

For additional information on QuEST Forum or TL 9000 please visit [www.questforum.org](http://www.questforum.org) or call +1 972-423-7360.

