Quality Improvement Trends in Companies Using the TL 9000 Quality Management System

A Study of the Wireless Product Family

This paper, the ninth in the series, focuses on the return rates, software quality and delivery for the Wireless product family. When there is demand for a new class of products, the first product introduced into that space will usually do well even if it has quality and delivery issues. Customers simply do not have an option before competitors emerge. As competitors emerge and the market matures, the companies competing in that space will likely have to improve quality and delivery or watch their market share decline.

Analysis of Base Transceiver System TL 9000 data submitted to QuEST Forum provides an opportunity to witness this phenomenon as it unfolds. TL 9000 registered companies submit monthly data to QuEST Forum. QuEST Forum then aggregates that data and publishes industry average results for a variety of quality and service measurements in each product category. Three of the product categories are 3.3.2.1-Basic (2G) Base Transceiver Systems, 3.3.2.2-Advanced (3G) Base Transceiver Systems, and 3.3.2.3-(4G) LTE Base Transceiver Systems.

This report utilizes the sustained performance data from TL 9000 with Industry Average trends and drills down into the three product categories that represent the Wireless technologies of 2G, 3G, and 4G.

One-Year Return Rate for the Wireless Product Family

The One-Year Return Rate (YRR) is a measure of the return rate of units during the first year following the Early Return Index (ERI) period. The YRR is the number of returns from the population of units shipped during the seven to eighteen months prior to the monthly calculation period.

Return rates are one good measure of product reliability. Product returns are expensive to both the supplier and the installing customer. Reducing the return rate has a major affect on lowering operational costs and expenses for all of the impacted parties. Such data is useful in helping understand and focus on not only product reliability, but also other improvement areas.

Industry Average for the One-Year Return Rate

Figure 1 shows all three product categories industry averages are currently below 2%. The 4G volume is expected to increase and 3G is expected to level out to the 2G performance level.

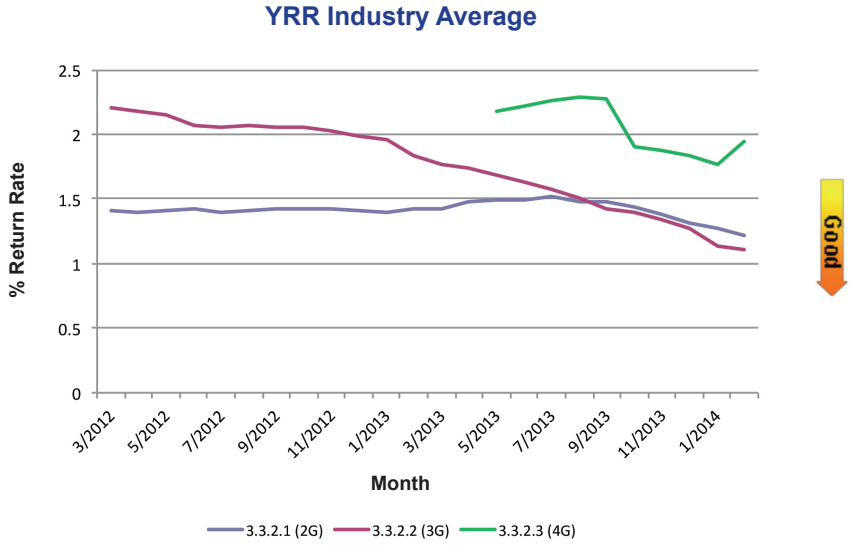

Figure 1 - YRR Industry Average

The roll-out of 4G offers the expectation that 4G will eventually match and level out to the levels of the 3G and 2G YRR return rate.

In order to better show trending, Figure 2 shows the YRR Industry Average linear trend. The 3G trend demonstrates significant improvements over the two year period. The most significant improvement was in the 3G product category 3.3.2.2 with a 50% decrease in returns from 2.2 to 1.1. The 4G product category only has one year of data and thus has no linear trend yet and hovers above the 3G and 2G trend lines. Consistent with a mature technology, the 2G product category 3.3.2.2 may still be improving from its current level of 1.4, although its rate of improvement is slower than the improvement rate for 3G and 4G.

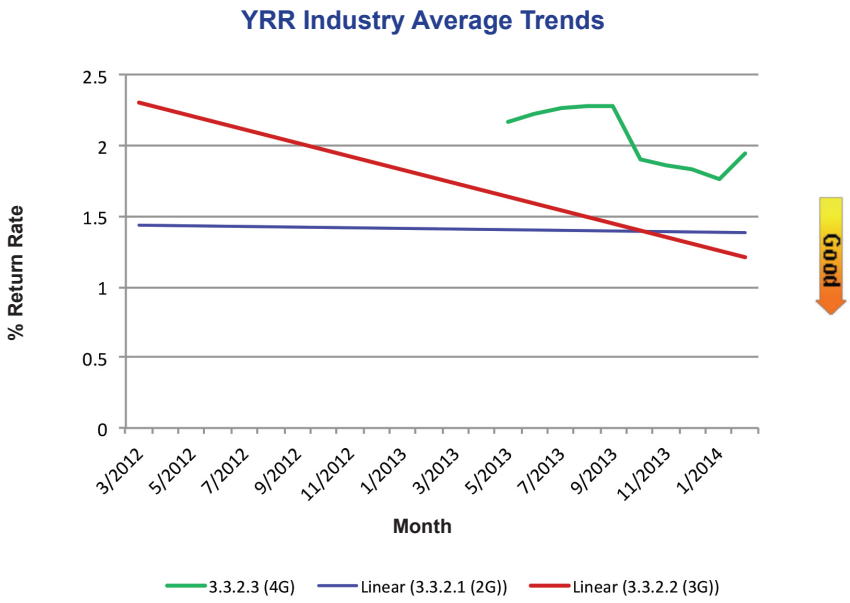

Figure 2 - YRR Linear Average Trend for the 2G and 3G

Major Software Problem Reports Industry Average

Figure 3 provides the Industry Average for the major Software Problem Reports (SPR2). The SPR2 for 2G and 3G shows that maturing technologies are seeking the level obtained by the mature 2G technology. The 4G technology shows that the new technology is reducing the problem rate and may eventually achieve the mature level of 2G as displayed on the chart.

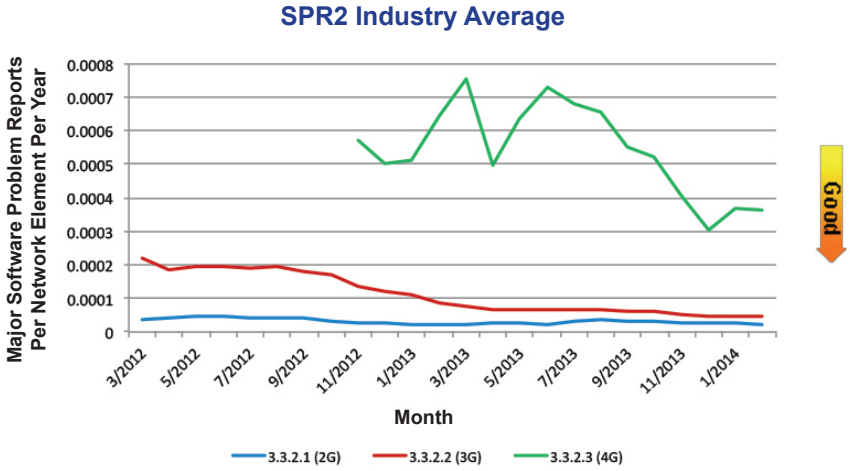

Figure 3 - Major Software Problem Reports Industry Average

Figure 4 shows the linear trend of Major Problem Reports where the 4G has improved from 0.0008 to 0.00051 for a 48% improvement. The 3G has improved from .0002 to less than .0001 for an improvement rate greater than 50%. The 2G is relatively flat and the 3G has now obtained a similar level to the 2G level.

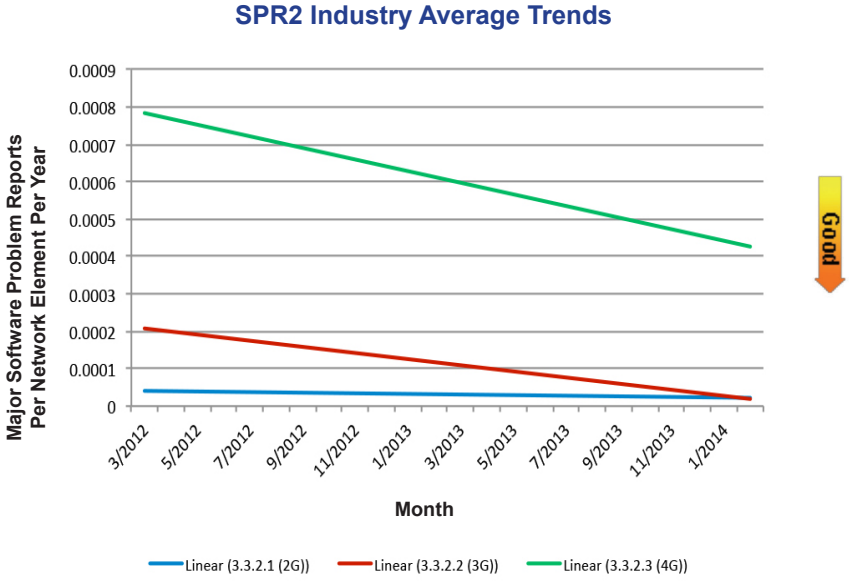

Figure 4 - Major Software Problem Reports Industry Average Trends

Major Problem Report Fix Response Time Industry Average

The allowable Fix Response Time for any Problem Report is determined by an agreement between the customer and supplier. The Major Software Problem Report Fix Response Time (FRT2) is defined as the percentage of Major Software Problem Reports resolved within the allowable window. The 2G and 3G product categories have reached and maintained 95% FRT2. The 4G Fix Response Time has improved from 50% in 2013 to 90% in just one year. The 4G FRT is currently approaching the levels of the 2G and 3G Fix Response Time. This is more than a 75% improvement in the number of 4G problem reports that were not closed on time. See Figure 5.

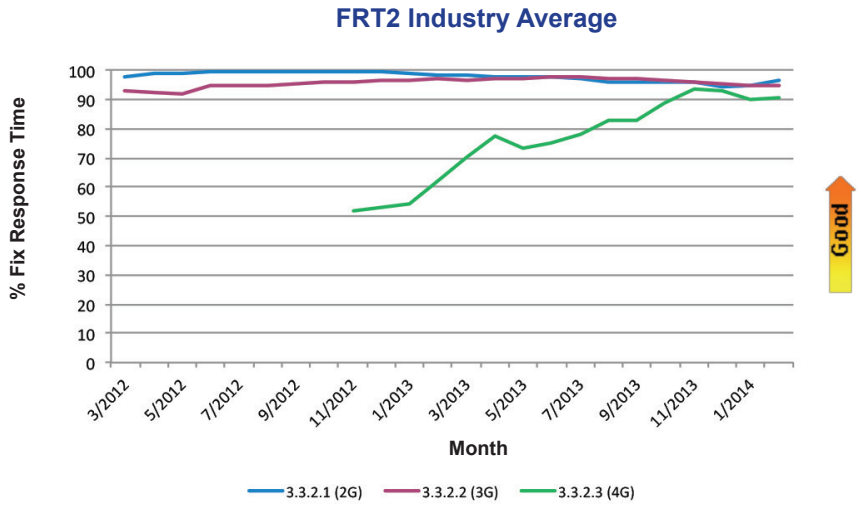

Figure 5 - Major Fix Response Time Industry Average

OTI Industry Average

The On-Time Item (OTI) measures the timeliness of the delivery of products to the Customer Request Date (CRD). In addition to the supplying company performance, this measurement is heavily influenced by outside factors such as the macro-economy and by short lead times of customer request dates. The trends lines are displayed in Figure 6 and are all at approximately 70%.

Despite non-zero slopes of these trend lines, the overall performance across all three product categories may be essentially flat over time and similar to one another. The equivalent performance between less mature and more mature product categories suggests that something other than product maturity is driving this measurement.

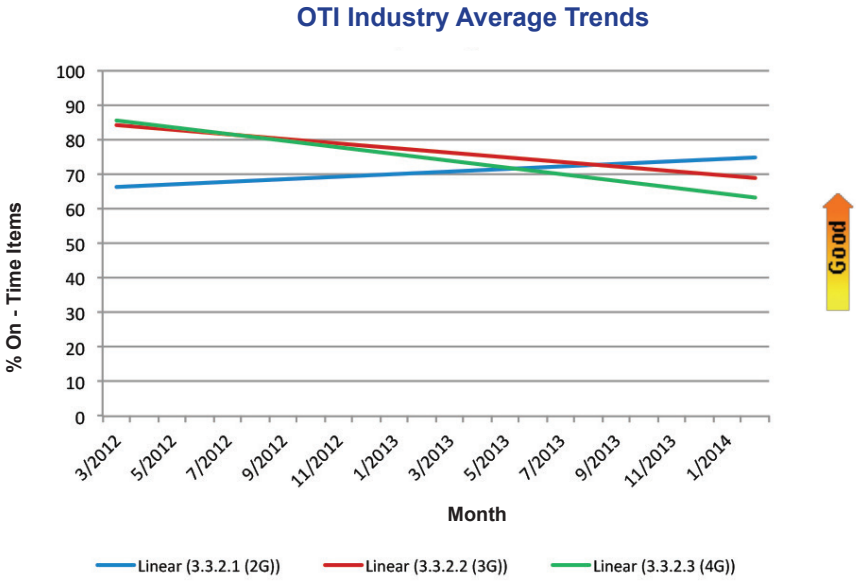

Figure 6 - OTI Industry Average Trends

Summary

As technologies mature, their measurements will likely improve. In these product categories, the 2G is the most mature technology and has already generated considerable improvement. Currently, The 3G is improving rapidly. The 4G is the least mature technology and will likely generate hardware and software improvement in the future.

The One Year Return Rate (YRR) and the Major Software Problem Report (SPR2) data presented in this paper demonstrate these relationships and fit the theory that continual improvement is necessary to maintain market share as markets mature. The OTI (delivery to request date) data does not demonstrate continual improvement. One theory is that 4G aggressive deployments are driving short lead times from customers that are difficult to achieve. As OTI is customer expectation driven, QuEST Forum added the OTIP (delivery to promise date) measurement (release 5.5 of the TL 9000 Measurements Handbook) in 2013. OTIP is supplier capability driven. There is currently insufficient OTIP data to detect long-term trends but there will be sufficient data in 2015.

TL 9000 registered companies supplying 2G and 3G products are progressing on their continual improvement journey. TL 9000 registered companies that are supplying the newest products, such as 4G Base Transceiver Systems, will likely improve quality or risk losing market share. The key is to improve quickly enough to maintain that market share. TL 9000 registered companies in the 4G product category can use the TL 9000 benchmarking data for the 2G and 3G categories to determine how much improvement may eventually be necessary in 4G. This may help TL 9000 registered companies maintain and perhaps improve their market shares.

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