Speeding Time-to-Market at Motorola

A Joint IntraStage and Motorola Solutions Whitepaper

"Before the Ford Model T in 1908, most people didn't travel more than 25 miles from home in their entire lifetime. Since then, the automobile has allowed us the freedom to choose where we live and work and play."

-Bill Ford, Former CEO of Ford

The first production Model T automobile in 1908 ushered in a new era of transportation by shrinking dramatically the time for people to move from place to place. Like the Model T of the past, communication technologies such as email, mobile phone and internet are dramatically shrinking the time for information to move across the globe. Witness the phenomenon of tools like YouTube, Facebook and LinkedIn which are allowing consumers to provide instantaneous feedback on their product experience to companies.

This effect can now be seen in the electronics design and manufacturing world also, where those same tools can be used by customers to propose new features, feedback on current performance and generally pressure their vendors to deliver product quicker to the specifications they want. This whitepaper will explore how the 2-Way Radio Division at Motorola Solutions is tackling some of these pressures around time-to-market by increasing productivity of their employees and employing solutions to better make use of their business data.

Faster, Cheaper, Better

In 1997, the Mars Pathfinder mission from NASA landed on Mars and heralded in a success for the "faster, better, cheaper" mantra of NASA at the time. This mission was performed at lower cost and quicker than previous large scale missions like the Viking missions to Mars. Since then, "faster, better and cheaper" is something that every electronics design and manufacturing business is striving for today to remain competitive in this world of "light speed" information. No longer can you have a design-to-market strategy of 1 year for products - which was the norm in 2000. Now that cycle can be less than 6 months, often shrinking to 2 months.

One way companies can decrease their time-to-market is through improving employee productivity both in the engineering and manufacturing areas. The general metric to measure employee Productivity is thru revenue/employee with typical wireless device manufacturers achieving $400,000/employee. As can be seen from Figure 1, productivity of American manufacturing workers started to increase exponentially in the early 1980s. This was about the time that Information Technology began to work its way into the business environment, with the rapid adoption of desktop computers and software automation. With this new technology, tasks normally done manually by employees were automated and allowed workers to focus on more value-added activities such as design, collaboration and problem fixing.

Figure 1: Productivity Graph

As a principal inventor of Six Sigma processes, Motorola has an embedded culture of Continuous Improvement which includes a focus on improving employee productivity through automation of manual tasks and better understanding of their business data. We will take a closer look at ways that the Motorola 2-Way Radio Testing Group is improving their productivity and getting business insights through its prototype and manufacturing test data.

‘We have got to do more with less”

Motorola Solutions is a world leader in providing 2-way radio products to enterprise and government organizations around the world. Such 2-way radios are used by Firefighters, Police and Public Safety personnel to communicate mission critical voice and data. These are complex products with analog, RF, digital components requiring extensive testing both at the R&D prototyping and manufacturing stage to ensure quality for these demanding end markets.

“Each prototype run can run into the thousands of tests and can take days to complete. Gathering such test data into a readable format has always been a challenge” according to the Test Manager at Motorola Solutions in Chicago, USA who has been with the organization for over 15 years. “We created an internal solution that did the basics and got us what we needed, but the maintenance around the solution was costly for my team. Having engineers come to us to run reports and design feature upgrades was taking up too much of our time”.

“Not only was maintenance an issue but having my team and engineers manually compile, format and analyze the data easily accounted for 20% of their time”. While the ROI was clear in improving productivity of his Test and Engineering team, moving to a solution that would give instant access to that test data and a way to mine the data was an important priority. With a clear vision on how to proceed, an initiative was drawn up to evaluate potential solutions and IntraStage was brought in to fill the gap.

Rapid Prototyping Techniques

The two central themes that the Motorola Test Team in Chicago focused on to improve their productivity and achieve the goal of rapid prototyping was through:

1) Increased automation of manual tasks done by employees
2) Increased ability to mine and analyze the critical test data

The IntraStage software solution provided a path for both. Collecting, aggregating and storing the test data was the first of the manual tasks that were automated by IntraStage. By using software technology that could automatically retrieve the test data as it was generated and store it into a centralized database, engineers no longer had to do this.

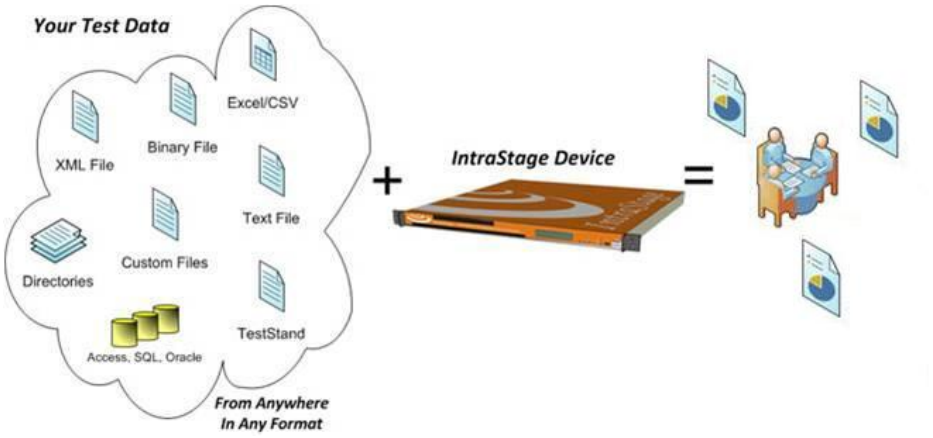


Figure 2: Picture of Retreiving Data into a Database

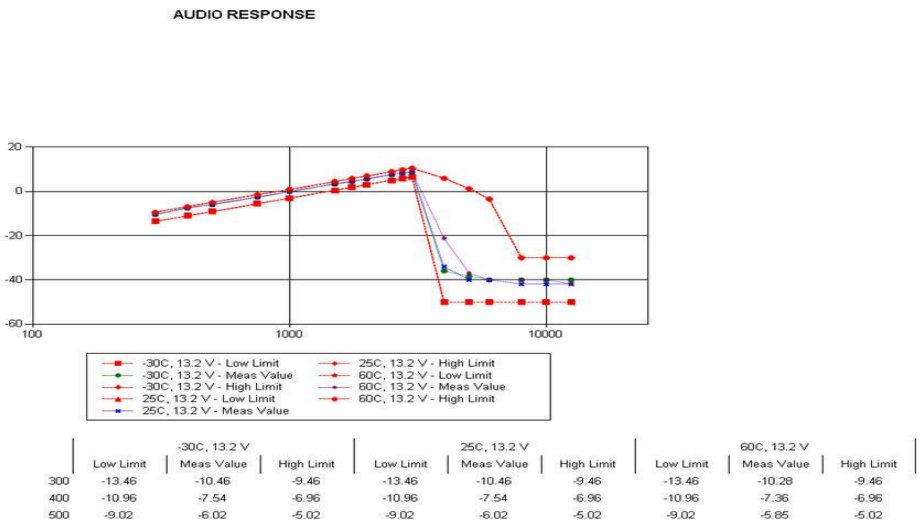
By providing the IntraStage web based platform for reporting and mining, engineers had the capability now to see the data from anywhere and be able to dive deep into the data through pivot-table based tools and the data mining interface of IntraStage.

INTRASTAGE

Recent Files

Process	Event	Run ID		Event Date	Test Count	Result	Station	Operator
⊞ Mobile	PQE Certification	_7	(CSV)	Aug 5, 9:50PM	1020	Failed	1	i86
⊞ Mobile	Correlation	_13	(CSV)	Jun 29, 1:52PM	15	Passed	2	021
⊞ Mobile	Correlation	_12	(CSV)	Jun 29, 10:57AM	15	Passed	2	021
⊞ Mobile	Correlation	_11	(CSV)	Jun 29, 10:27AM	15	Passed	2	021
⊞ Mobile	Correlation	_3	(CSV)	Jun 22, 5:11PM	423	Failed	2	021
⊞ Mobile	Correlation	_9	(CSV)	Jun 29, 10:05AM	15	Passed	4	021
⊞ Base Station -	Eng Evaluation	_3	(CSV)	Jul 6, 3:20PM	24	Passed	5	i63
⊞ Mobile -	Correlation	_8	(CSV)	Jun 29, 9:46AM	15	Passed	4	021
⊞ Base Station -	Eng Evaluation	_2	(CSV)	Jul 6, 11:24AM	60	Passed	5	i63
⊞ Mobile -	Correlation	_7	(CSV)	Jun 29, 9:23AM	15	Passed	4	021
⊞ Base Station -	Eng Evaluation	_2	(CSV)	Jul 7, 5:15PM	24	Passed	1	i63
⊞ Mobile -	Correlation	_6	(CSV)	Jul 1, 11:35AM	6	Passed	4	021
⊞ Base Station -	Eng Evaluation	_1	(CSV)	Jul 7, 2:17PM	30	Passed	1	i63
⊞ Mobile -	Correlation	_5	(CSV)	Jun 30, 11:16AM	6	Passed	4	021
⊞ Mobile -	Correlation	_4	(CSV)	Jun 27, 5:11PM	3	Passed	4	021
⊞ Mobile -	Correlation	_1	(CSV)	Jun 13, 11:11AM	9	Failed	4	021

Figure 3: Picture of Web-based view of Radio Testing Status



	-30C, 13.2 V			25C, 13.2 V			60C, 13.2 V		
	Low Limit	Meas Value	High Limit	Low Limit	Meas Value	High Limit	Low Limit	Meas Value	High Limit
300	-13.46	-10.46	-9.46	-13.46	-10.46	-9.46	-13.46	-10.28	-9.46
400	-10.96	-7.54	-6.96	-10.96	-7.54	-6.96	-10.96	-7.36	-6.96
500	-9.02	-6.02	-5.02	-9.02	-6.02	-5.02	-9.02	-5.85	-5.02

Figure 4: Example of the content of a radio report, here showing an auto-generated chart of frequency response directly from the database

The Future

"With the rollout of the IntraStage software at Motorola Solutions, there has been a substantial increase in the number of reports being run by both the Test and Engineering teams. This has been an exciting indication that once you have lowered the barriers to look at the data, you get a lot of new and interesting ways to solve problems". As Motorola Solutions continues to look at new ways to improve employee productivity and get a better handle on their Test Data in the Prototype phase of development, other functional areas like Manufacturing may also benefit from these pioneering efforts. "Fundamentally, the same core problem exists in manufacturing, as in R&D prototyping – how to reduce the manual effort to get the data and then how to mine it and visualize SPC, Yield and trends to improve product quality".

By better managing, data mining and visualizing their test data on a real-time basis, Motorola Solutions will continue to innovate and improve their Rapid Prototyping techniques.

About Motorola Solutions

Motorola Solutions is a leading provider of mission-critical communication products and services for enterprise and government customers. Through leading-edge innovation and communications technology, it is a global leader that enables its customers to be their best in the moments that matter. Motorola Solutions trades on the New York Stock Exchange under the ticker "MSI." To learn more, visit www.motorolasolutions.com.

About IntraStage

IntraStage is a Quality Management Software provider for companies who design and manufacture electronic products. We provide SPC, Yield, CP, CPK, and test data analytical tools by automating the retrieval, storage, mining and reporting of R&D, Manufacturing, Supplier and Field test data. Our clients choose us because we seamlessly integrate test data from different sources, lower their product design, manufacture and return costs by finding quality trends more quickly and accurately. Fortune 1000 companies rely on our business intelligence to keep them competitive when product quality and customer satisfaction are key differentiators.

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