CQSDI Conference
Data Analytics Driving Quality Improvements

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“IN GOD WE TRUST, ALL OTHERS MUST BRING DATA.”

+W. EDWARD DEMING
Why Data?

WORLDWIDE REVENUES FOR big data and business analytics will grow to more than $203 billion in 2020

Source: IDC

DECODING THE HUMAN GENOME originally took 10 years to process; now it can be achieved in less than one week

Source: The Economist

2.5 Exabytes are produced every day

Which is equivalent to:

- 530,000,000 millions songs
- 150,000,000 iPhones
- 5 million laptops
- 250,000 Libraries of Congress
- 90 years of HD Video

IBM Watson
Regardless of where you are on the spectrum of maturity...

...information management makes effective analytics possible
Why is an Analytics strategy Important?

A sound strategy demonstrates analytic needs. This includes what types are needed, who are the producers and consumers, and how investments are justified and aligned to strategy.

### Aligning to strategic goals
The strategy defines how analytics integrate with existing processes, organizational structure, infrastructure and culture to drive successful business outcomes linked to strategic objectives.

### Measuring outcomes
The strategy establishes how analytics will generate value and create a return on investment. Linking the strategy directly to business outcomes will help build a foundation towards establishing stakeholder support.

### Driving data into the decision making process
The strategy drives a comprehensive approach for using analytics to accelerate innovation and create a sustainable advantage. The strategy should compel others to utilize analytics to enable their line of business strategies.
Drive for Excellence Plan

Effectively using Data Analytics to Improve Program Quality
DFX Framework – Effective use of Data Analytics

6 focus areas targeting Quality performance:

- Product Improvements
- Supplier Performance
- People
- Environment
- Process Improvements
- Quality System Discipline

Culture of Quality with a Data Driven Approach
**Process-Centered Approach**

**Buy**
- **Incoming Quality**
  - Data analysis of defects delivered by suppliers
  - Actions to drive defects delivered by suppliers to zero
  - Supplier surveillance audits
  - Weekly/monthly reviews of critical data points in supplier manufacturing process
  - Source/FAI initially until process improves
  - Block/approve as needed
- **Internal Quality**
  - Data analysis of defects you make internal
  - Actions taken to get them to zero
  - Proof of reach across - similar process other products
  - High defect driver identification / reduction (proactive)
  - Process optimization / variation reduction (proactive)
  - Yield improvements
  - Metrics, & data analytics
  - Process FMEA

**Make**
- **Internal Quality**
  - Data analysis of defects you make internal
  - Actions taken to get them to zero
  - Proof of reach across - similar process other products
  - High defect driver identification / reduction (proactive)
  - Process optimization / variation reduction (proactive)
  - Yield improvements
  - Metrics, & data analytics
  - Process FMEA

**Ship**
- **Outgoing Quality**
  - Technical review of all defects delivered to customers
  - Actions to drive the defects you deliver to zero
  - RCCA-engineering investigations
  - RTOK analysis
  - Inspection process improvements
  - Clarification or design RN's

**Targeting All Sources of Defects**
DFX Approach

Customer Focused and Data-driven Improvement

Customer Quality Rating

Customer Quality Rating applied to all line item deliverables

DFX Plan(s) initiated for all non Zero Defect product

Cross-functional IPT identify product and process corrective actions

Program Quality Rating

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<th>Nov-16</th>
<th>Dec-16</th>
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Customer Focused and Data-driven Improvement
Peaking under the Hood Utilizing Data Analytics

Product level performance

Process level performance

Process-step level capability (CpK)

True Picture of Quality to Drive Lasting Improvements
Supplier DFX Process

**Phase 1: DEFINE**  Supplier Selection and current state performance based on:
- Quality Yields and/or Defect Trends
- Elevated Supplier Risk
- Level of QMS Rigor (process escapes)

**Phase 2: MEASURE/ANALYZE**  Supplier DFX Planning:
- Supplier notification and management review (expectations, Q&A, etc.)
- Initial Supplier DFX submitted & evaluated
  - Alignment with defects and/or identified risk areas
  - Preventive approach which addresses delivered material, manufacturing processes, and purchased material

**Phase 3: IMPROVE**  Supplier DFX Plan Execution/Management:
- Monthly Performance Reviews to monitor supplier performance and progress to DFX & defined Exit Criteria

**Phase 4: CONTROL**  Exit Criteria Evaluation
- Based on specific exit criteria defined for each supplier
- Controlled, sustained performance

Eliminating Defects We Buy – Driving Supplier Quality
• Multi-functional teams with representation from all responsible disciplines, i.e. Test Engineering, Design Engineering, Manufacturing, Mission Assurance, Supply Chain
• Comprehensive review of data from field, factory, suppliers, etc: failure rates, test yields, CpK, escapes
• Aggregate data, focus on high drivers, deep dive on most impactful areas, repeat process
Results

• Delivered Quality improving steadily

• Significantly reduced Scrap and Rework for major assemblies reduced

• Significantly reduced cycle time for targeted products

• Rolling out DFX more broadly across programs

• Supply base embracing DFX methodology

• Increased enhancements to models – driving to predictive and prevention

• Increased Customer Satisfaction – credibility and confidence