Test Data Management

Increase Yield, decrease Failures, increase Profits by understanding your product quality

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White Paper

Internet of Everything (IoE) Value Index

How Much Value Are Private-Sector Firms Capturing from IoE in 2013?

Joseph Bradley
Jeff Loucks
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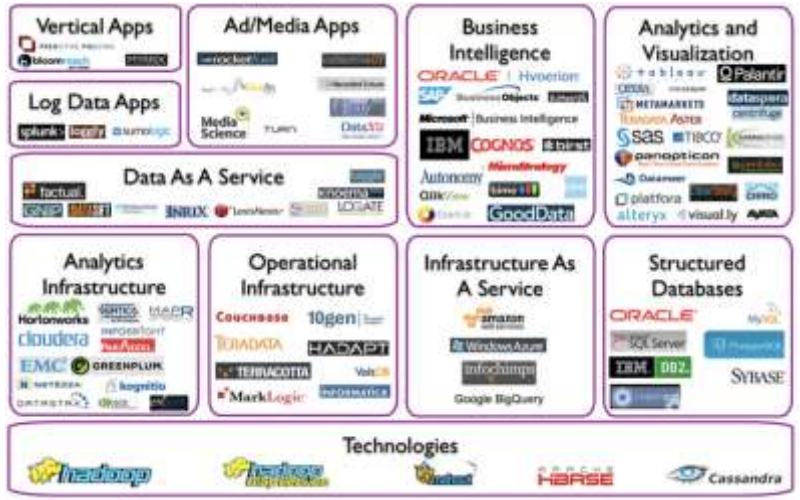
Andy Noronha



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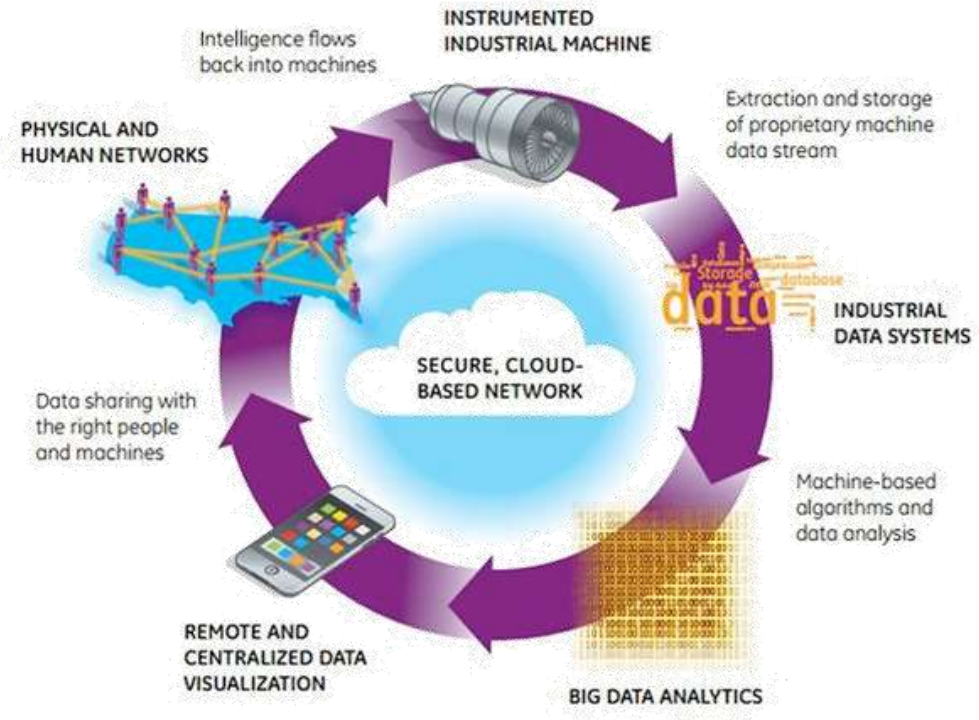
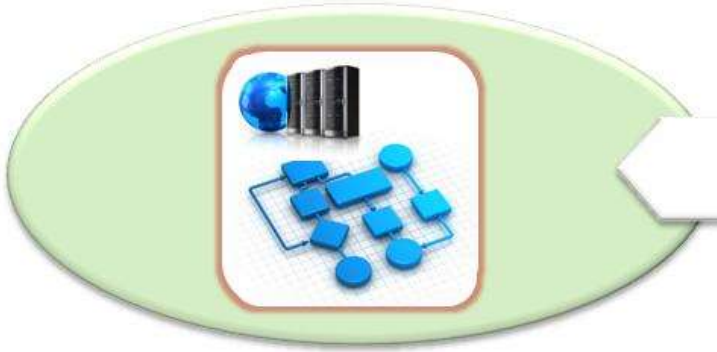
Industrial Internet Opp = $15Trillion



Images courtesy:

Sources of Big Data



Industry / IT data sources

- *Enterprise apps: ERM, CRM, HR*
- *IT data: events, logs, inventories*
- *Process and control*

New / emerging data sources

- *Social data, behaviors, sentiments*
- *Tweets, posts, comments*

Engineering / scientific data sources

- *Physical world: analog phenomenon*
- *DAQ, A/D*

Images courtesy: NATIONAL INSTRUMENTS

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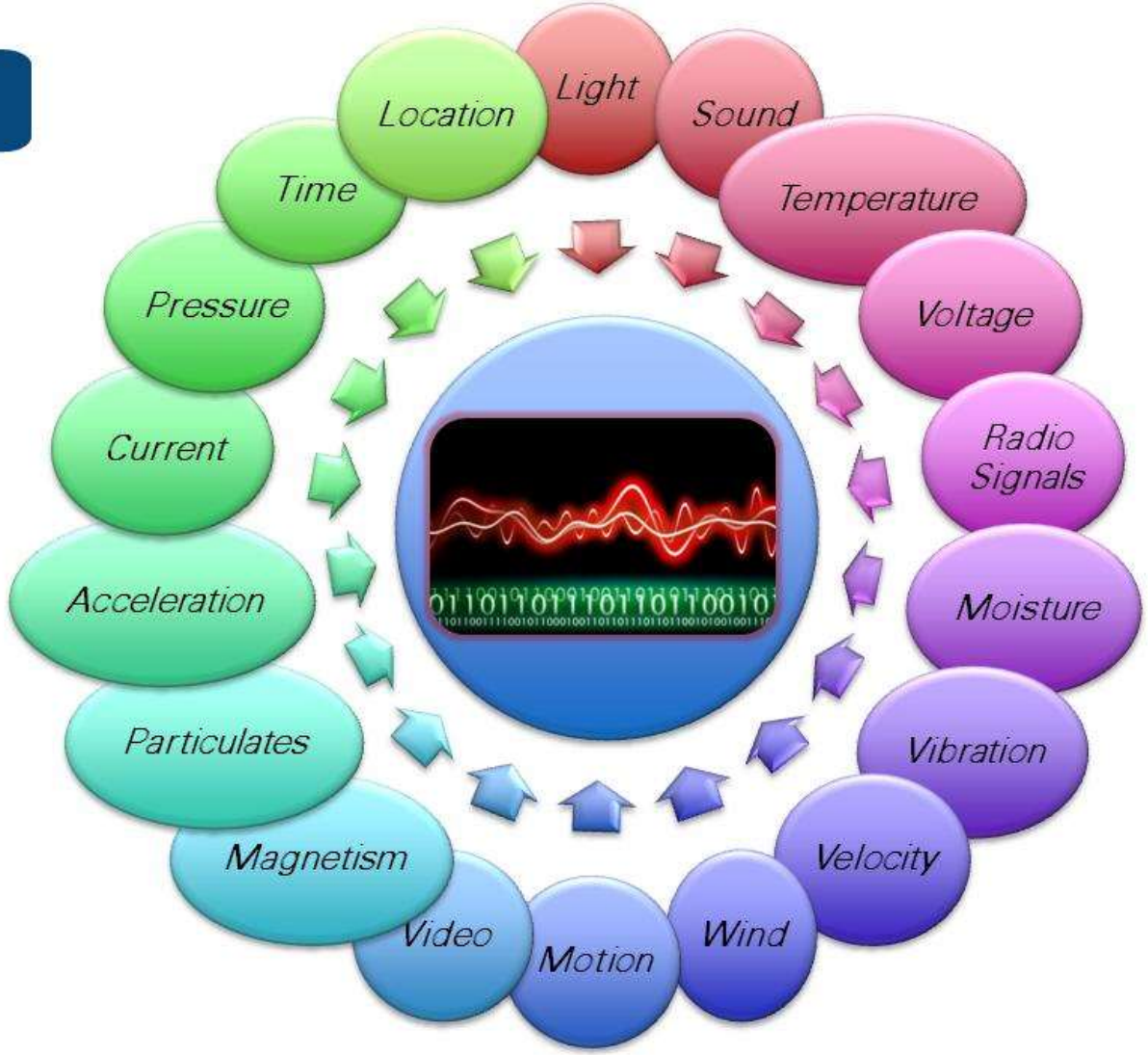
Big Analog Data™

Big Analog Data™

- is Big Data derived from the physical analog world
- is sourced from nature, people, and electrical and mechanical devices and machines
- is digitized via A/D conversion



Images courtesy: NATIONAL INSTRUMENTS

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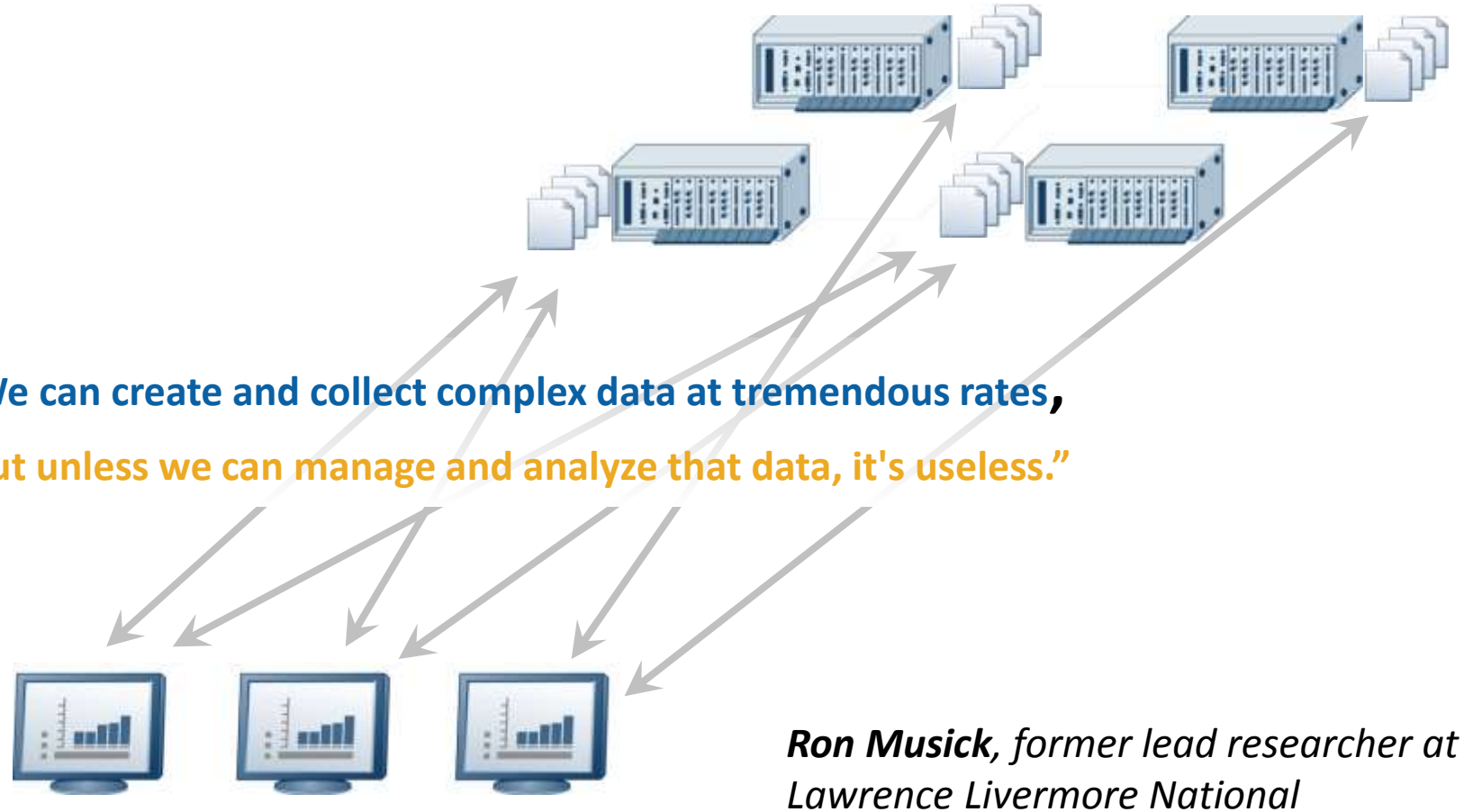
Big data – it's big – it's growing!

- Every 2 days we create as much information as we did from the beginning of time until 2003 Eric Schmidt, Google
- Over 90% of all the data in the world was created in the past 2 years Sintef
- The total amount of data being captured and stored by industry doubles every 1.2 years The Huffington Post
- If you burned all of the data created in just one day onto DVDs, you could stack them on top of each other and they reach the moon – twice ComputerWorld
- Manufacturing stores more data than any other sector – close to 2 exabytes of new data stored in 2010 McKinsey & Company
- Eltek: 50 million test reports in our WATS DB

Can Too Much Data Be a Bad Thing?



“We can create and collect complex data at tremendous rates,

but unless we can manage and analyze that data, it's useless.”

***Ron Musick**, former lead researcher at Lawrence Livermore National Laboratory*

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Why use data from test?

- Manufacturing of electronics is prone to errors or inefficiency:
  Components, process, assembly, machinery, temperature etc

- Mass production or production of critical components, increase risk associated with:
  Failures, warranties, efficiency, sale, profit, branding etc

- Most manufacturers have completely or partly outsourced manufacturing to low-cost countries – the longer it takes to identify a problem the more costly it is

- All companies have significant potential for improvement

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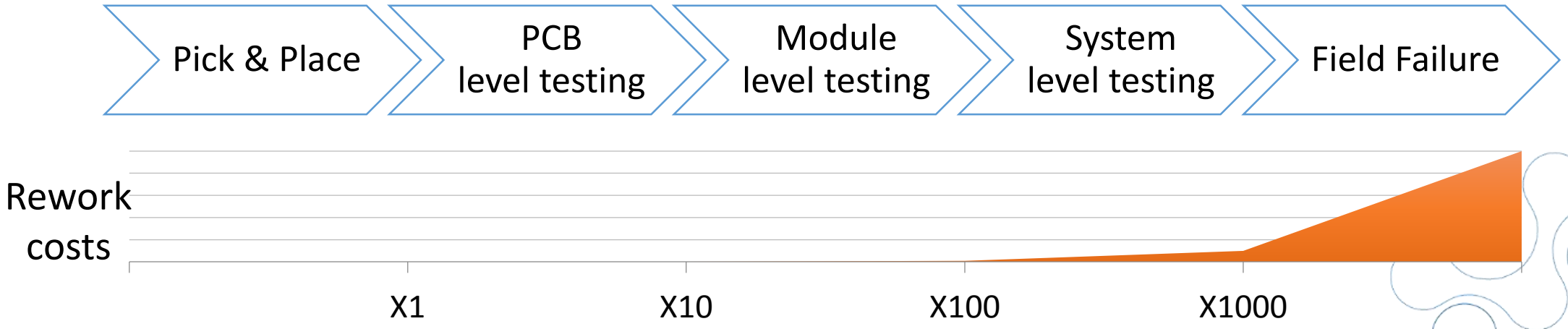
NATIONAL INSTRUMENTS Silver Alliance Partner

Microsoft CERTIFIED Partner

“The 10X Cost Rule”



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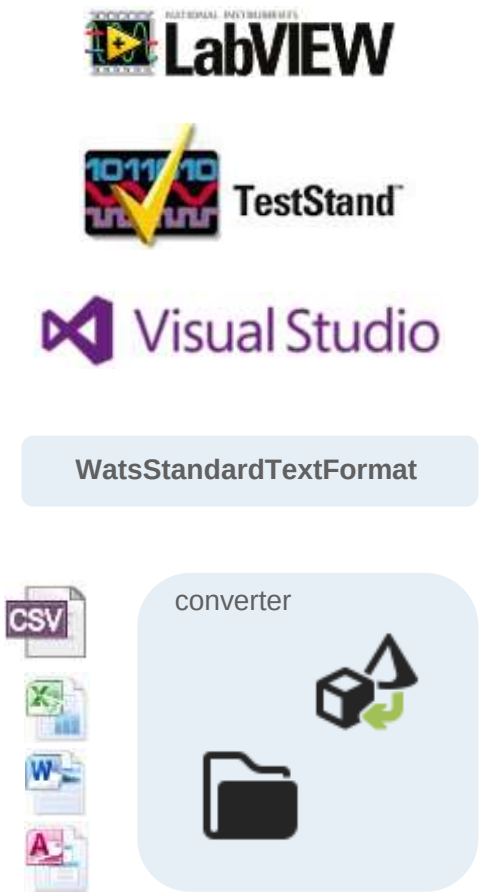
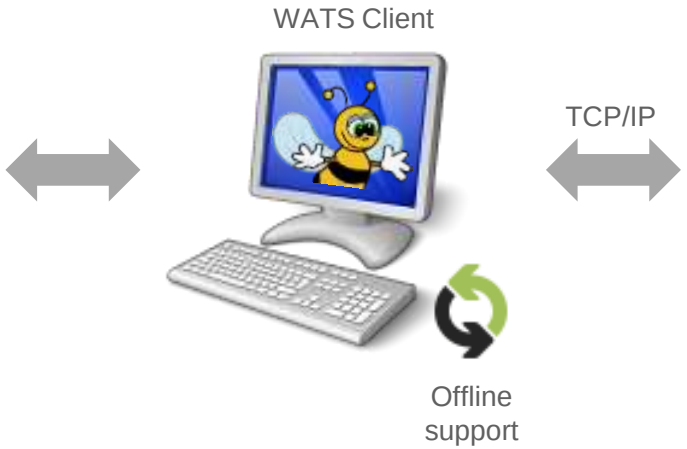
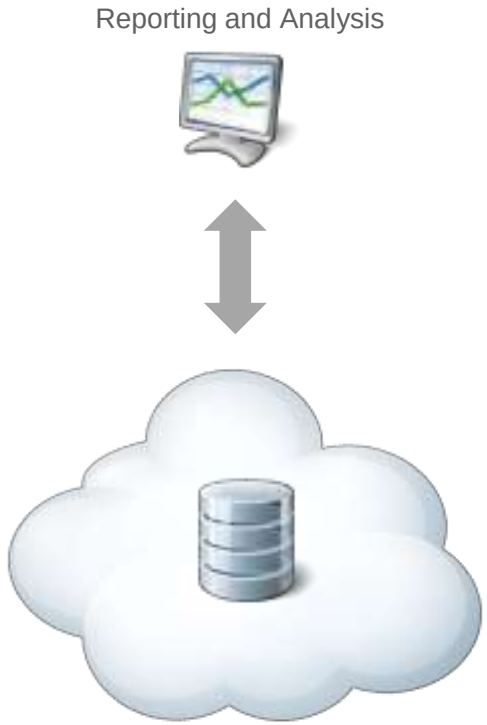
Typical problems

- Data is stored in multiple formats: databases, files, paper
- Data is stored in multiple locations: many computers, globally
- Information is used retroactive, for instance after a field return
- Reporting and queries are manual
- New products or revisions require custom development to fit the reporting
- Follow the current OSs, browsers
- Networking topologies, router configurations, firewalls
- Let your talent focus on your own business
- And more....

Architecture







What can you get out of the data?

- Statistical information
  - FPY, Cpk, stdev, mean, variance ++
- Comparisons
  - Sites, test stations, process, new revisions ++
- Set the right limits for your numerical tests
- Test step failures
- Test step timing
- Repair information
- Historical information on products
- Alarms
- Manage the way you build and test
- Connection to enterprise
- Gauge R&R

Statistical Information: FPY

- #products passed / #products tested

Yield

Product yield

1

Period	Total Count	Pass Count	Yield	Warning	Alarm	PPM
2012, December	338	263	77.8 %	90.0 %	85.0 %	221 893
2012, November	245	195	79.6 %	90.0 %	85.0 %	204 082
2012, October	501	364	72.7 %	90.0 %	85.0 %	273 453
2012, July	109	63	57.8 %	90.0 %	85.0 %	422 018
2012, June	765	596	77.9 %	90.0 %	85.0 %	220 915
2012, April	1	1	100.0 %	90.0 %	85.0 %	0
2012, January	702	623	88.7 %	90.0 %	85.0 %	112 536

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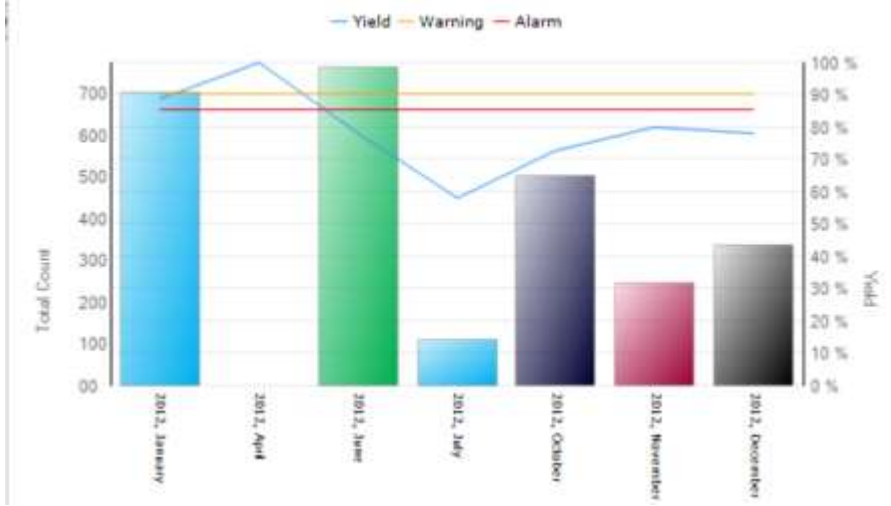

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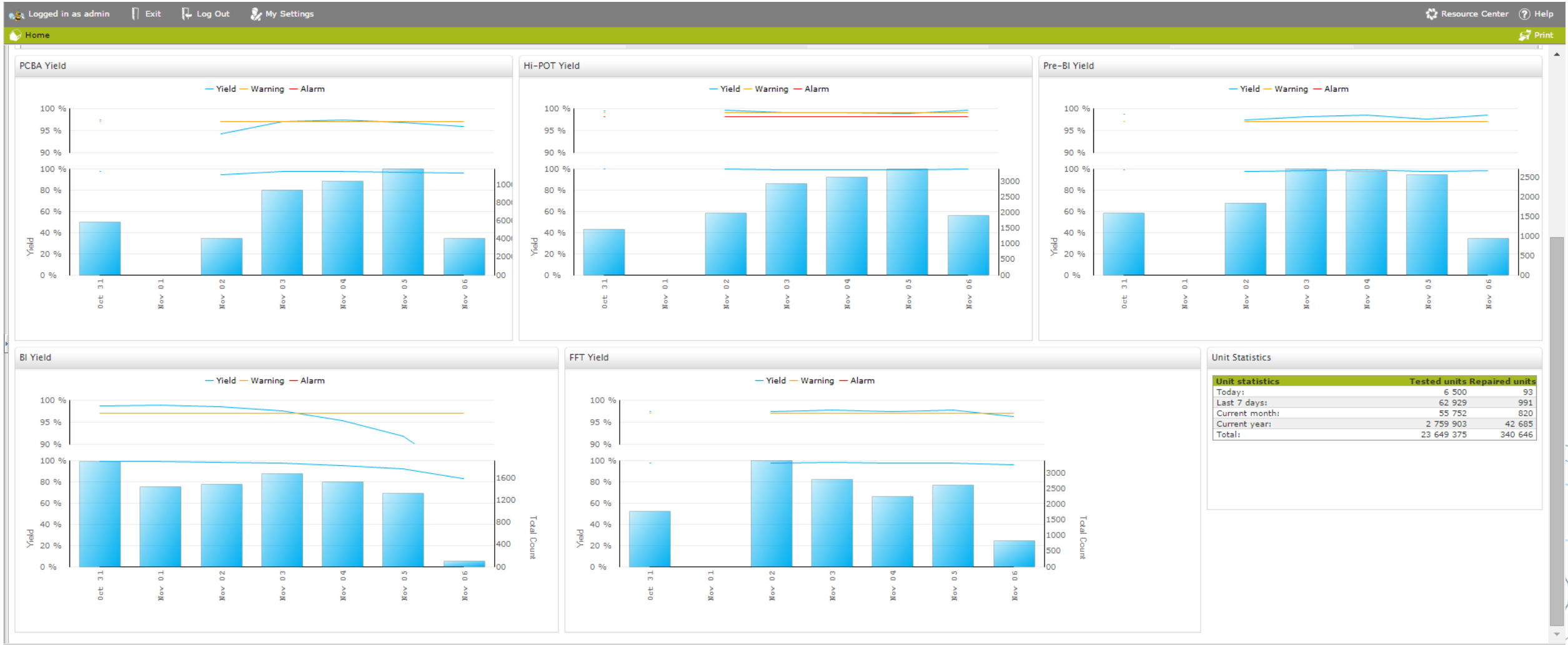
Comparisons: by Site, by Process



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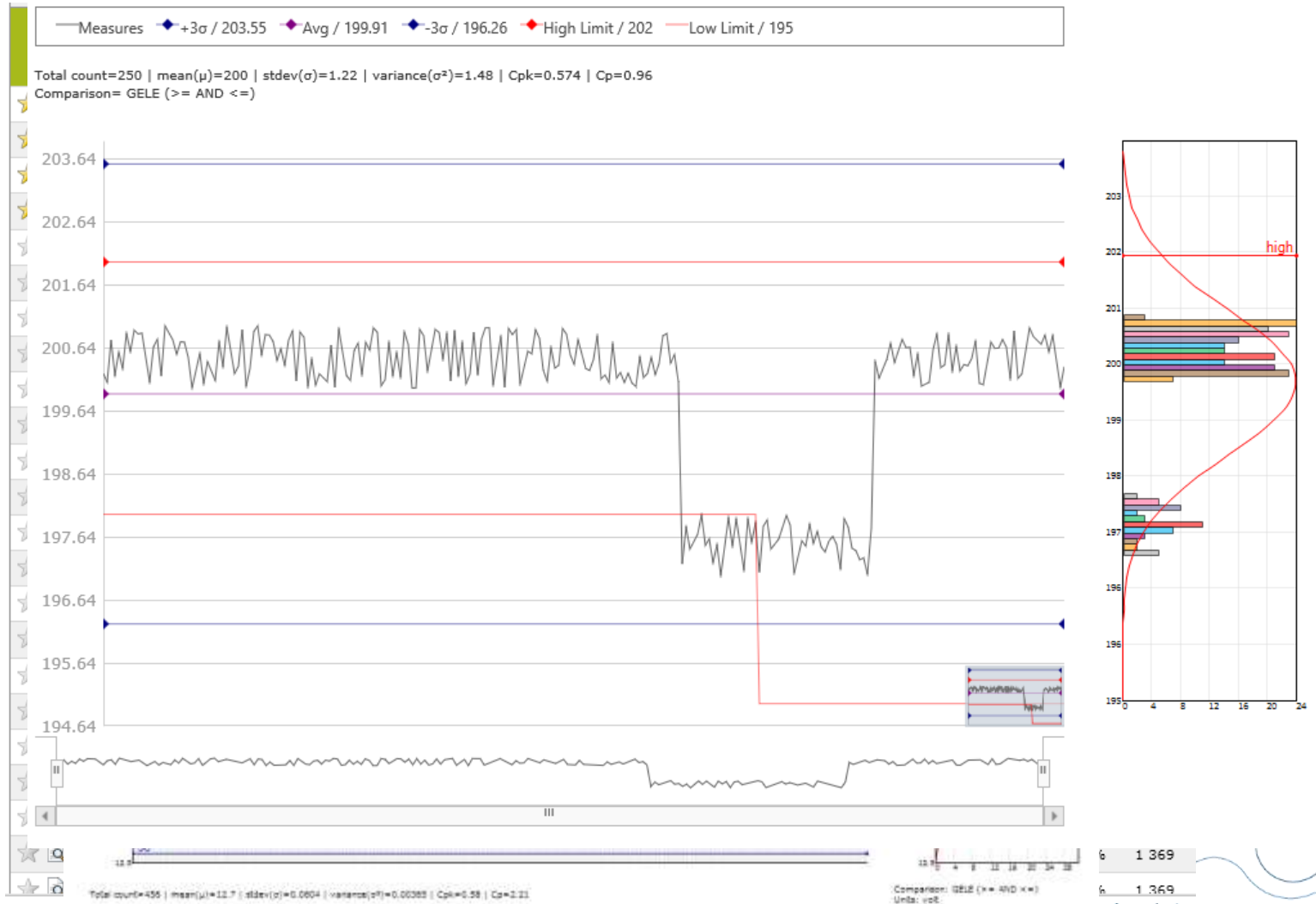
Set Correct Limits

- Cpk measures how close a process is running to its specification limits



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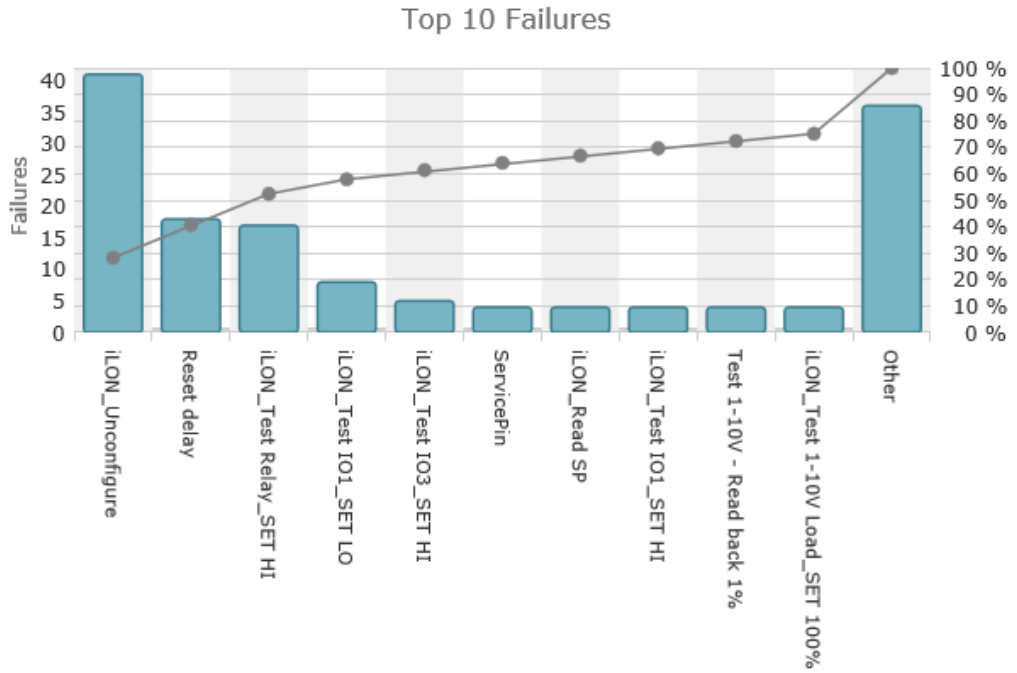
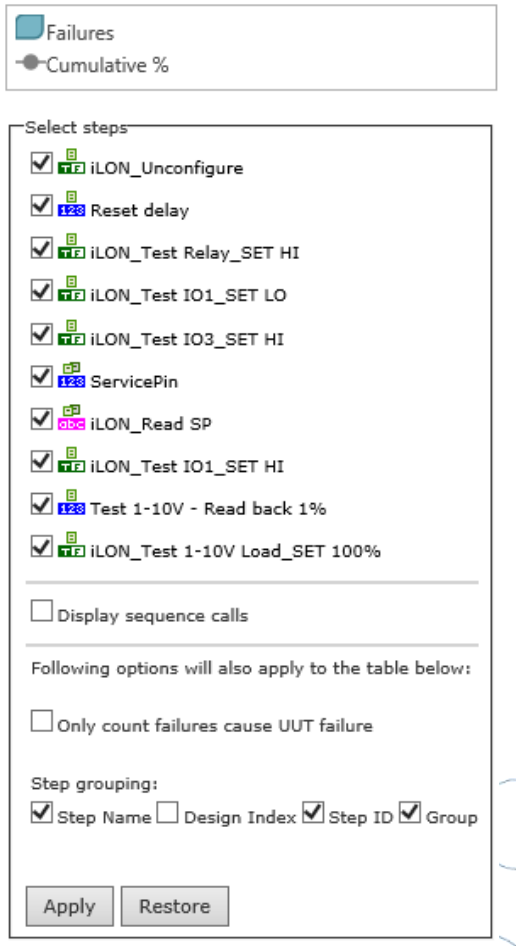
Test Step Failures

- Which test is failing the most:





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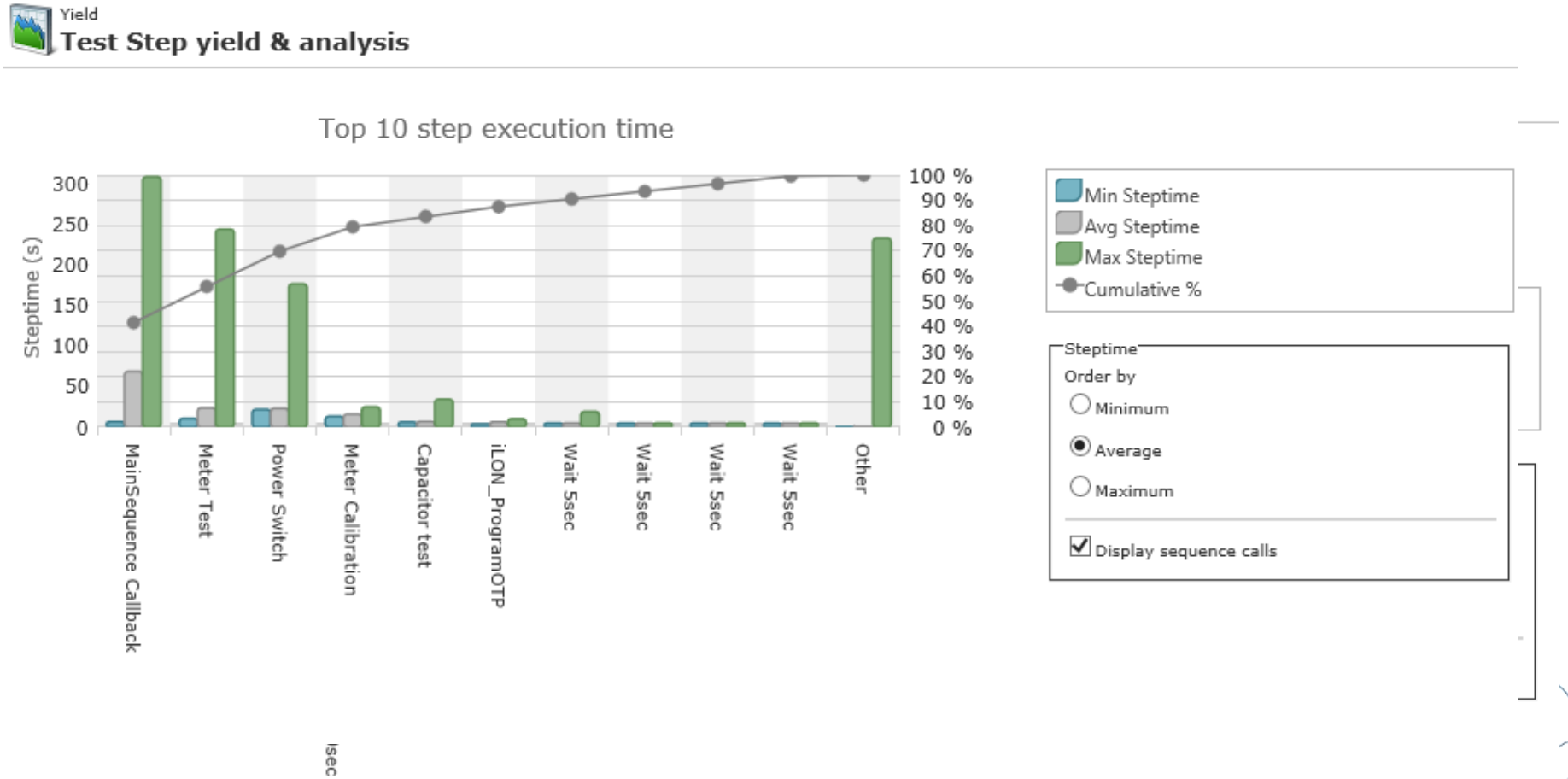
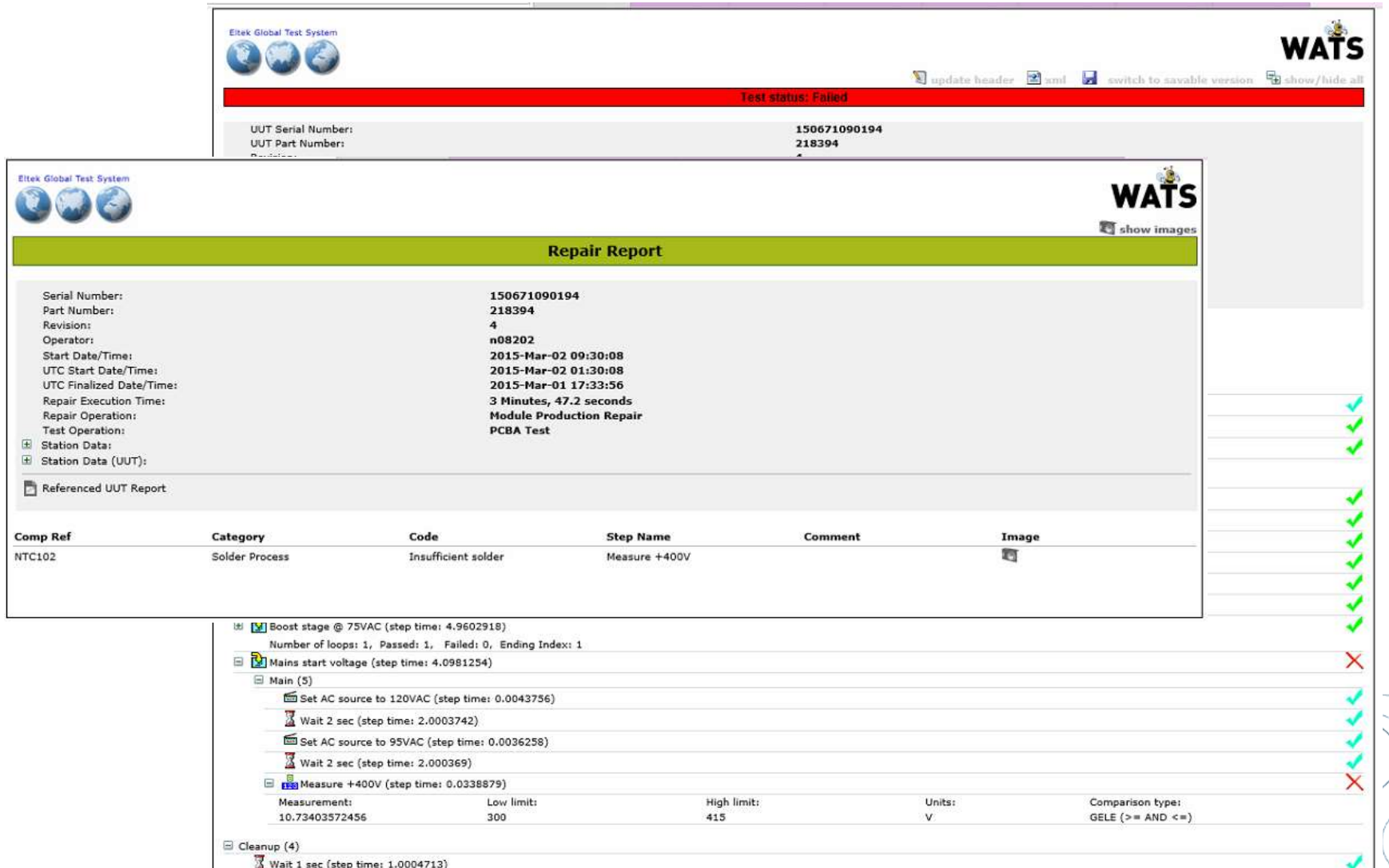
Test Step Timing

- In which step are you spending most time:



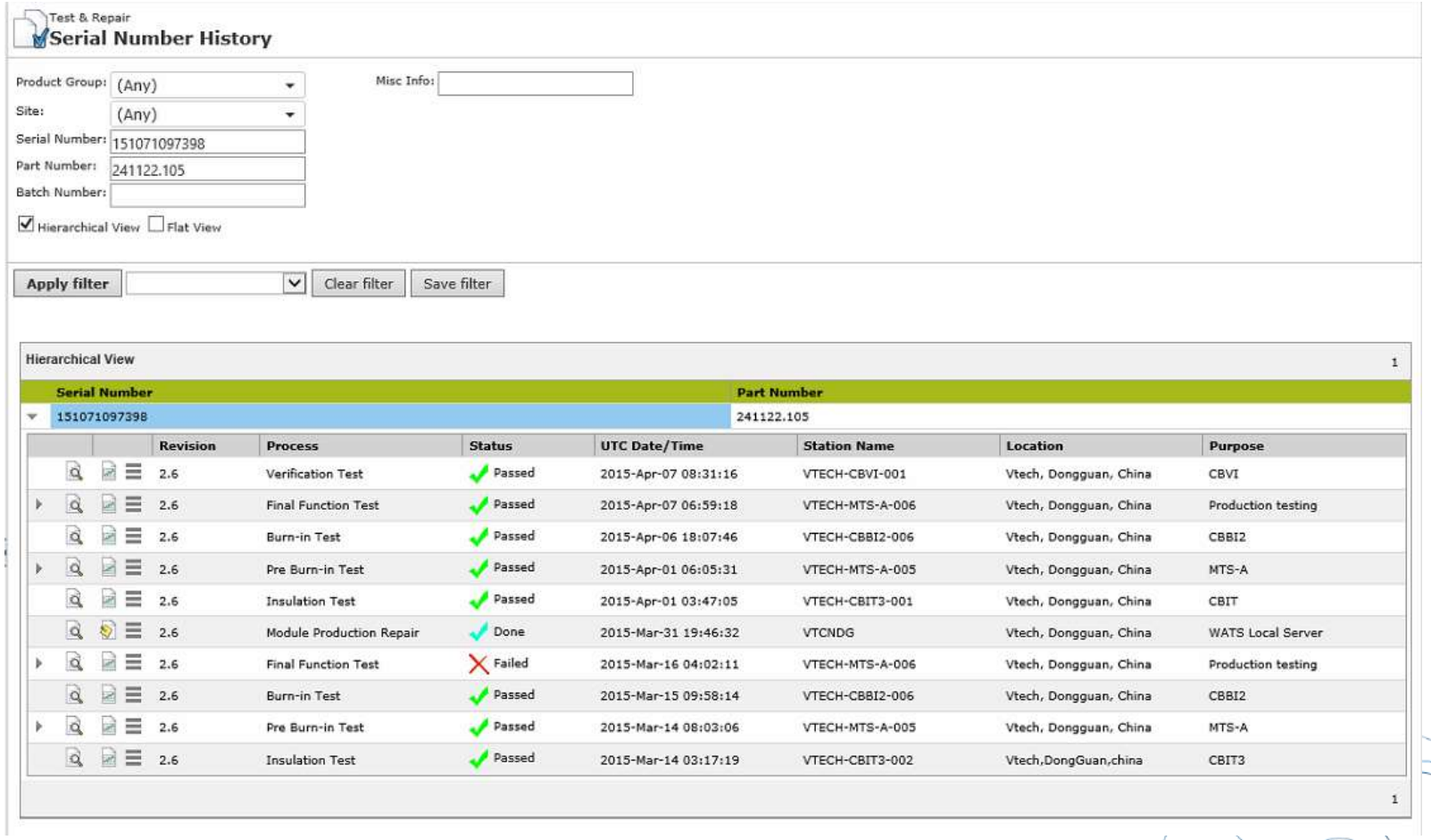
Repair Information

- A failed test is just a symptom, repair may tell you why



Historical Information: by Serial Number

- See all tests and/or repairs you have performed on a device



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Alarms: Visualize Data Simultaneously

- Stay on top of trends in your manufacturing plants and processes

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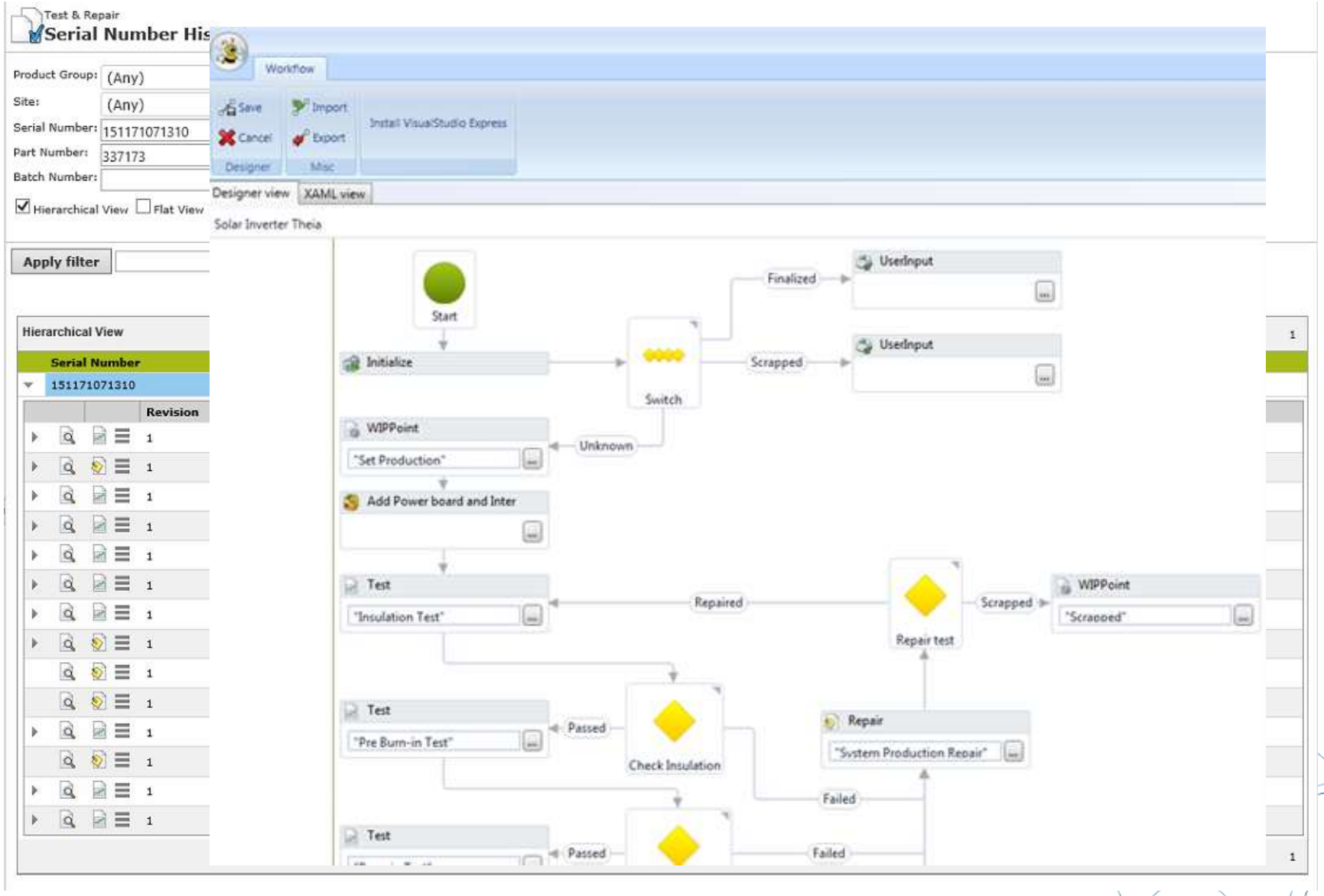
Manage the way you build and test

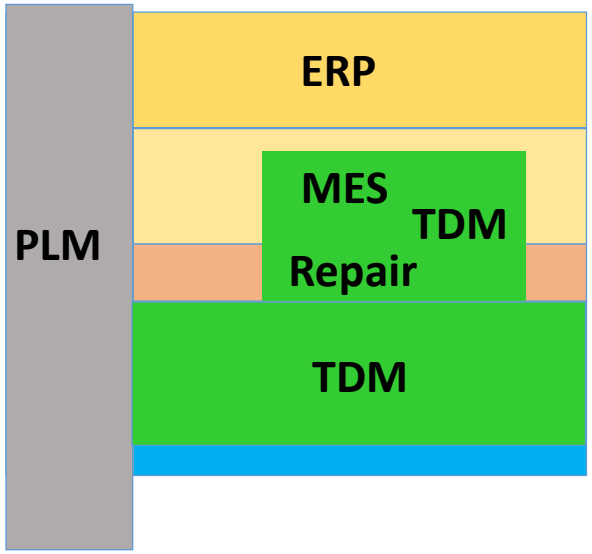


Connection to Enterprise

Real time monitoring and control
Calculation of FPY, Cpk
Reporting

Workflow control
Software distribution
Repair storage and analysis

Management, dissemination and use of product definition information, spanning from concept to end of life



Track business resources: cash, materials, production capacity. Orders, payroll

Order execution, production analysis, OEE, materials track and trace

Record information about repairs

Results stored to file/database

Test Sequenzer, instrumentation, result evaluation, manuel checklists

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Connection to Enterprise

- Extend to cloud tools built by Microsoft, IBM, Google and others

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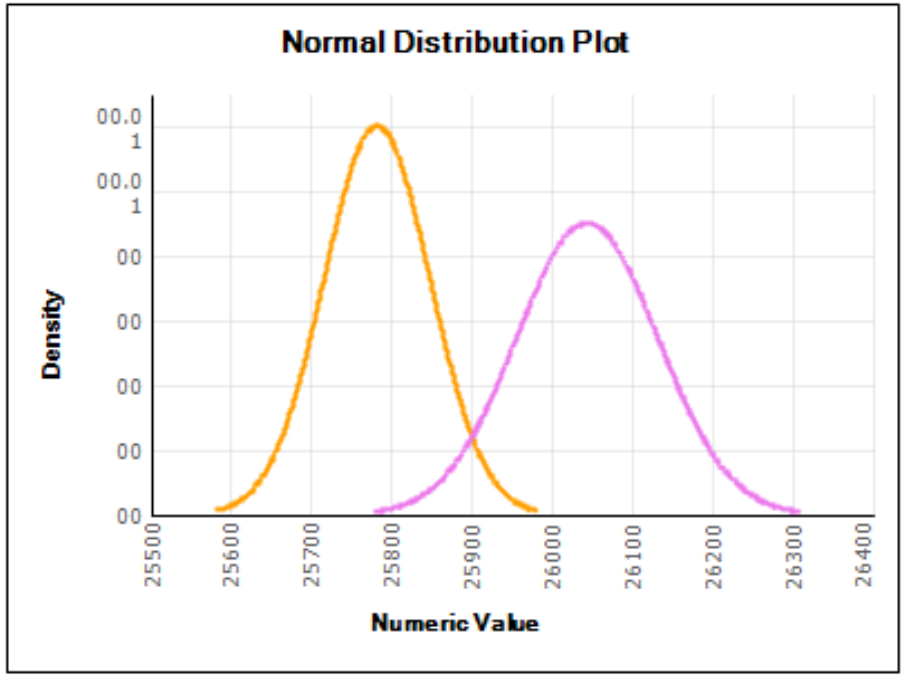
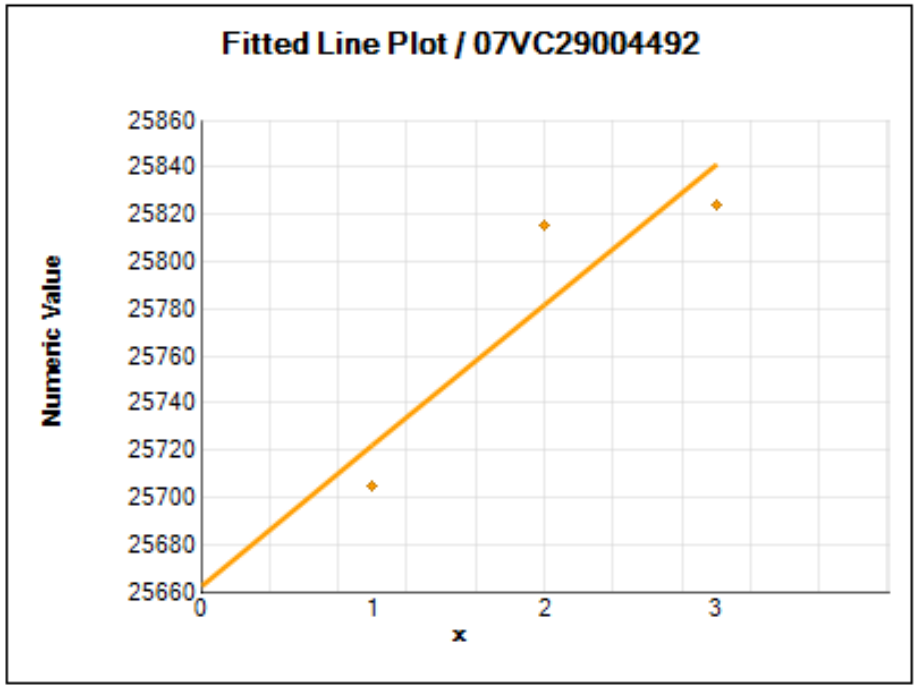
Gauge R&R

- Checks the measurement system



Measurement:



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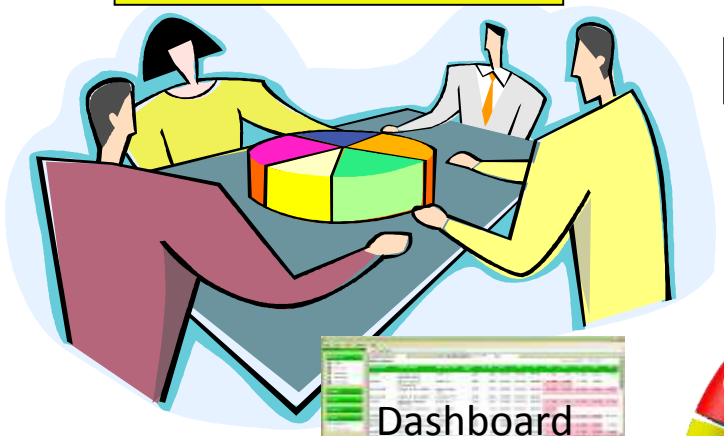
Continuous Improvement

Regular meetings



Define problem

Worst yield report
Actions in production
Actions in RnD
Actions in Test Dep

Test department

Test Engineering task list (6S)
FPY report on spesific product

Control

Improve

Analyse problem

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Conclusion

- Test Data Management is an extension of your test system
- Take advantage of all data stored from test to:
  - Increase Yield
  - Decrease Failures
  - Increase Quality + Profits + Reputation